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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	10/17/2017	9793299	0520-46908CC4CON	9583

133303 7590 09/27/2017

TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 235 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Koichi FUKUDA, Mobara, JAPAN;
Japan Display Inc., Tokyo, JAPAN;
Panasonic Liquid Crystal Display Co., Ltd., Hyogo-ken, JAPAN;

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2015-02-17
First Named Inventor	Koichi FUKUDA
Art Unit	
Examiner Name	
Attorney Docket Number	0520-46908CC4CON

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8558965		2013-10-15	FUKUDA	
	2	5793461		1998-08-11	INOU	
	3	6084652		2000-07-04	YAMAHARA	
	4	7166352		2007-01-23	WATANABE	
	5	7285323		2007-10-23	SONE	
Change(s) applied to document, /J.E./ 7/14/2017	6	7532274		05/2009 ~~2007-07-10~~	FUKUDA	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /P.V/

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/624,339	02/17/2015	2871	1600	0520-46908CC4CON	19	3

CONFIRMATION NO. 9583

CORRECTED FILING RECEIPT

133303
TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

OC000000094087296

Date Mailed: 09/14/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Koichi FUKUDA, Mobara, JAPAN;

Applicant(s)

Japan Display Inc., Tokyo, JAPAN;
Panasonic Liquid Crystal Display Co., Ltd., Hyogo-ken, JAPAN;

Power of Attorney: The patent practitioners associated with Customer Number 133303

Domestic Priority data as claimed by applicant

This application is a CON of 14/020,331 09/06/2013 PAT 9013653
which is a CON of 13/446,331 04/13/2012 PAT 8558965
which is a CON of 13/279,587 10/24/2011 PAT 8164717
which is a CON of 12/437,218 05/07/2009 PAT 8045101
which is a CON of 11/644,872 12/26/2006 PAT 7532274

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
JAPAN 2005-372185 12/26/2005

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 02/27/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/624,339**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Preliminary Class

349

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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NOT GRANTED

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

TYPHA IP LLC
1819 L St. NW Suite 200
Washington DC 20036

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	2015-02-17	Koichi FUKUDA	0520-46908CC4CON	9583

TITLE OF INVENTION:

DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

APPLN. TYPE	ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	Undiscounted	$960	$0	$960	2017-09-29

EXAMINER	ART UNIT	CLASS-SUBCLASS
VU, PHU	2871	349-122000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 TYPHA IP LLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE	(B) RESIDENCE: (CITY and STATE OR COUNTRY)
Japan Display Inc.	Tokyo, Japan
Panasonic Liquid Crystal Display Co., Ltd.	Hyogo-ken, Japan

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):
☐ A check in the amount of the fee(s) is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 506785 .

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Arimi Yamada/ Date 2017-09-12

Typed or printed name Arimi Yamada Registration No. 70156

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	14624339
Filing Date:	17-Feb-2015
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Filer:	Arimi Yamada/Emily Rice
Attorney Docket Number:	0520-46908CC4CON

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt	
EFS ID:	30335566
Application Number:	14624339
International Application Number:	
Confirmation Number:	9583
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Customer Number:	133303
Filer:	Arimi Yamada
Filer Authorized By:	
Attorney Docket Number:	0520-46908CC4CON
Receipt Date:	12-SEP-2017
Filing Date:	17-FEB-2015
Time Stamp:	13:10:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	091217INTEFSW13122700
Deposit Account	506785
Authorized User	Arimi Yamada
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	0520-56908CC4CON_Updated ADS_cu.pdf	289191 6c8bcf32c0baa0beb08b9a16031af6049d04c9a9	no	8
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2	Issue Fee Payment (PTO-85B)	0520-46908CC4CON_Issue_Fee_Ptol85b_cu.pdf	192475 1cc5eb7f4f6aa1331a7210bec7c24c5908407acc	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30394 fdd518ef82a5237ea7bc7329a36edb46b38fad6d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	512060		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Koichi		FUKUDA	

Residence Information (Select One) ◯ US Residency ◉ Non US Residency ◯ Active US Military Service

City	~~Mobara~~ Tokyo	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	~~3300, Hayano, Mobara-shi~~ c/o Japan Display Inc.,		
Address 2	3-7-1, Nishi-shinbashi, Minato-ku		
City	~~Chiba-ken~~ Tokyo	State/Province	
Postal Code	~~297-8622~~ 1050003	Country i	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	~~127271~~ 133303		
Email Address	~~japan.display@ipfirm.com~~ typha_japan@typhaip.com	Add Email	Remove Email

Application Information:

Title of the Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE		
Attorney Docket Number	0520-46908CC4CON	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	15	Suggested Figure for Publication (if any)	

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	~~127271~~ 133303		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	14020331	2013-09-06
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14020331	Continuation of	13/446331	2012-04-13	8558965	2013-10-15

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13446331	Continuation of	13279587	2011-10-24	8164717	2012-04-24
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13279587	Continuation of	12437218	2009-05-07	8045101	2011-10-25
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12437218	Continuation of	11644872	2006-12-26	7532274	2009-05-12

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
2005-372185	JP	2005-12-26	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(•) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. [X]

Organization Name	Japan Display Inc.

Mailing Address Information:

Address 1	~~-3300 Hayano, Mobara-shi-~~ 3-7-1, Nishi-shinbashi, Minato-ku		
Address 2			
City	~~- Chiba -~~ Tokyo	**State/Province**	
Country [i] JP		Postal Code	1050003
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Applicant 2 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(•) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

If the Applicant is an Organization check here. ☒			
Organization Name	Panasonic Liquid Crystal Display Co., Ltd.		
Mailing Address Information:			
Address 1	1-6 Megahida-cho, Shikama-ku, Himeji-shi		
Address 2			
City	Hyogo-ken	**State/Province**	
Country i JP		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	14/624,339
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Arimi Yamada/			Date (YYYY-MM-DD)	~~2015-02-17~~ 2017-09-12
First Name	Arimi	Last Name	Yamada	Registration Number	70156

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

133303 7590 06/29/2017

TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

EXAMINER	
VU, PHU	
ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 06/29/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON	9583

TITLE OF INVENTION: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/29/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

133303 7590 06/29/2017
TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON	9583

TITLE OF INVENTION: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/29/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
VU, PHU	2871	349-122000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
❑ Issue Fee
❑ Publication Fee (No small entity discount permitted)
❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
❑ A check is enclosed.
❑ Payment by credit card. Form PTO-2038 is attached.
❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
❑ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON	9583

133303 7590 06/29/2017

TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

EXAMINER	
VU, PHU	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 06/29/2017

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/624,339	Applicant(s) FUKUDA, KOICHI	
	Examiner PHU VU	Art Unit 2871	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *6/5/17*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1,2,4-8,10-16,20 and 21*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Allowable Subject Matter

Claims 1-2, 4-8, 10-16 and 20-21 are allowed.

The following is an examiner's statement of reasons for allowance: Claims 1-2, 4-8 and 10-13 have been amended to incorporate allowable subject matter. A thickness of a protective member at least .2mm and no greater than 1.0 mm was not found in the prior art because rejection relied on a protective member as a hard coat. Thicknesses in this range were much thicker than those of the prior art. Regarding claims 14-16 and 20-21, a protection member that extended outside an edge of the resin film and an edge of the polarizing plate excluded any type of rejection of this nature.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHU VU whose telephone number is (571)272-1562. The examiner can normally be reached on 8AM-5PM M-R.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an

interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PHU VU/
Primary Examiner, Art Unit 2871

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	**Art Unit**
	PHU VU	2871

CPC						
Symbol					**Type**	**Version**
H01L		27	/	124	F	2013-01-01
G02F		1	/	133536	I	2013-01-01
G02F		1	/	133528	I	2013-01-01
G02F		1	/	133308	I	2013-01-01
G02F		1	/	133608	I	2013-01-01
G02F		1	/	1333	I	2013-01-01
G02F		2201	/	50	A	2013-01-01
G02F		1	/	133305	I	2013-01-01
G02F		1	/	1339	I	2013-01-01
G02F		1	/	1368	I	2013-01-01
			/			
			/			
			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	16	
/PHU VU/ Primary Examiner.Art Unit 2871	06/26/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No. 20170626

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		G	0	2	F	1 / 1333 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/PHU VU/ Primary Examiner.Art Unit 2871	06/26/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No. 20170626

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	**Art Unit**
	PHU VU	2871

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 16	
/PHU VU/ Primary Examiner.Art Unit 2871	06/26/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office Part of Paper No. 20170626

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/09/2017								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see srnt	3/3/17	PV
updated	6/26/17	PV

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/P.V./ Primary Examiner.Art Unit 2871

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Koichi FUKUDA	Confirmation No.:	9583
Application No.:	14/624,339	Examiner:	VU, PHU
Filed:	February 17, 2015	Group Art Unit:	2871

For: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Commissioner for Patents
Alexandria, VA 22313-1450

RESPONSE UNDER 37 C.F.R. § 1.111

Dear Sir:

In response to the Office Action dated March 6, 2017, please amend this application as follows.

AMENDMENT AND PRESENTATION OF CLAIMS

Please replace all prior claims in the present application with the following claims.

1. (Currently Amended) A display device comprising display area and used in a hand-held electronic device comprising;

a TFT substrate,

a counter substrate,

a multi-thin film layer,

a liquid crystal layer,

a seal member,

a polarizing plate,

an adhesive member, and

a protective member;

wherein the multi-thin film layer disposed on the TFT substrate,

wherein the liquid crystal layer ~~dispose~~ disposed on the multi-thin film layer,

wherein the seal member surrounds the liquid crystal layer,

wherein the counter substrate is disposed between the TFT substrate and the polarizing plate,

wherein the polarizing plate is a separate member ~~formed by a different member~~ from the protective member and disposed between the counter substrate and the protective member,

wherein the adhesive member overlaps with the display area ~~where is~~ in a plan view, and is between the protective member and the polarizing plate, and

wherein the protective member is a protective cover of the hand-held electronic device, [[and]]

wherein the protective member overlaps with the sealing member in a plan [[view]]view, and

wherein a thickness of the protective member is at least 0.2 mm and no greater than 1.0 mm.

2. (Currently Amended) [[A]]The display device according to claim 1, wherein a surface pencil hardness of the protective member is at least 3H.

3. (Canceled)

4. (Currently Amended) [[A]]The display device according to claim 1, wherein the counter substrate having a multi-thin film layer.

5. (Currently Amended) [[A]]The display device according to claim 1, wherein the liquid crystal layer is sandwiched by the counter substrate and the TFT substrate.

6. (Currently Amended) [[A]]The display device according to claim 1, wherein the multi-thin film layer includes plural insulating layers, conductive layer and organic layer.

7. (Currently Amended) A display device used in a hand- held electronic device comprising;

a first substrate,

a multi-thin film layer,

a seal member,

a polarizing plate,

an adhesive member, and

[[and]] a protective member;

wherein the multi-thin film layer disposed on the first substrate,

wherein the seal member is disposed inside an outer periphery end face of the first substrate,

wherein the polarizing plate is a separate member ~~formed by a different member~~ from the protective member and disposed between the first substrate and the protective member,

wherein the adhesive member overlaps with the display area in a plan view, and is ~~disposed~~ between the protective member and the polarizing plate ~~and without an air layer between the protective member and the polarizing member~~, and

wherein the protective member is a protective cover of the hand-held electronic device, [[and]]

wherein the protective member overlaps with the sealing member in a plan [[view]]view, and

wherein a thickness of the protective member is at least 0.2mm and no greater than 1.0mm.

8. (Currently Amended) [[A]]The display device according to claim [[6]]7,

wherein a surface pencil hardness of the protective member is at least 3H.

9. (Canceled)

10. (Currently Amended) [[A]]The display device according to claim [[6]]7,

wherein a second substrate is disposed between the first substrate and polarizing plate.

11. (Currently Amended) [[A]]The display device according to claim [[6]]7, wherein the second substrate having a multi-thin film layer.

12. (Currently Amended) [[A]]The display device according to claim [[6]]7, wherein a liquid crystal layer is sandwiched between the first substrate and the second substrate.

13. (Currently Amended) [[A]]The display device according to claim [[6]]7, wherein the multi-thin film layer includes plural insulating layers, conductive layer and organic layer.

14. (Currently Amended) A display device used in a hand-held electronic device comprising;

a TFT substrate having a multi-thin film layer,

~~a multi-thin film layer,~~

~~a seal member,~~

a resin film disposed over the TFT substrate,

a polarizing plate disposed on the resin film,

a protective member disposed on the polarizing plate, and

an adhesive member member disposed between the polarizing plate and the protective member, [[and]]

~~and a protective member;~~

~~wherein the multi-thin film layer is disposed on the TFT substrate,~~

~~wherein the seal member is disposed inside an outer periphery end face of the TFT substrate,~~

wherein the polarizing plate is ~~formed by a different~~ a separate member from the protective member and the resin film, ~~disposed between the TFT substrate and the protective member,~~

wherein the adhesive member is disposed ~~between the protective member and the polarizing plate and without an air layer~~ between the protective member and the polarizing member, and

wherein the protective member is a protective cover of the hand-held electronic device, and

wherein an edge of the protective member is disposed outside an edge of the resin film and an edge of the polarizing plate ~~overlaps with the sealing member~~ in a plan view.

15. (Currently Amended) [[A]]The display device according to claim [[13]]14,

wherein a surface pencil hardness of the protective member is at least 3H.

16. (Currently Amended) [[A]]The display device according to claim [[13]]14,

wherein a thickness of the protective member is at least 0.2mm and no greater than 1.0mm.

17-19. (Canceled)

20. (New) The display device according to claim 1, wherein an edge of the protective member is disposed outside an edge of the polarizing plate in a plan view.

21. (New) The display device according to claim 7, wherein an edge of the protective member is disposed outside an edge of the polarizing plate in a plan view.

REMARKS

By this amendment, claims 1, 2, 4-8, 10-16, 20, and 21 are pending. Claims 3, 9, 17-19 are canceled without prejudice or disclaimer, claims 1, 2, 4-8, and 10-16 are currently amended, and claims 20 and 21 are newly presented.

Support for the amendments can be found throughout the original disclosure. For example, support for the amendment to claim 1 includes canceled claims 3 and 9, and the corresponding disclosure of the specification and drawings. Support for the amendment to claim 14 includes FIGS. 5 and 13A-15C of the drawings and the corresponding disclosure of the specification. Support for the newly presented claims 20 and 21 includes FIG. 5 of the drawings and the corresponding disclosure of the specification. No new matter is introduced.

The Office Action mailed March 6, 2017, **A)** rejected claims 1-19 on the ground of nonstatutory double patenting over claims 1-19 of U.S. Patent No. 9,013,653 in view of *Hashimoto* (US Pub. 2004/0247918); **B)** rejected claims 1, 2, 4-8, 10-15, and 17-19 under pre-AIA 35 U.S.C. §103(a) as being unpatentable over *Maekawa et al.* (US Pub. 2005/0158665 hereinafter "*Maekawa*") in view of *Hashimoto*[1]; **C)** objected to claims 13 and 19 because of minor informalities; and **D)** objected to claims 3, 9, and 16 as being dependent upon a rejected base claim, but otherwise allowable. The Office acknowledges that claims 3, 9, and 16 contain allowable subject matter. The objections and rejections are respectfully traversed.

Amendments to the Claims

[1] The Office Action merely states that claim 1 is rejected under §103(a). However, the reasons for rejection includes claims 2, 4-8, 10-15, and 17-19. Thus, Applicant assumes that the Office rejected claims 1, 2, 4-8, 10-15, and 17-19 under §103(a). Further, page 4 of the Office Action does not state "Hashimoto" after "in view of." However, Applicant assumes that Hashimoto (US Pub. 2004/0247918) is applied based on the reasons for rejection stated in pages 5-8 of the Office Action and double patenting rejection stated in page 3 of the Office Action.

As mentioned above, Applicant has amended one or more claims in this application. Applicant is not conceding in this application that these claims are not patentable over the art cited by the Office, as the present claim amendments are only for facilitating expeditious prosecution of allowable subject matter. Applicant respectfully reserves the right to pursue the original claims and other claims in one or more continuations and/or divisional patent applications.

A. Double Patenting Rejection

As an initial matter, Applicant has canceled claims 3, 9, 17-19 without prejudice or disclaimer, thus, the rejection of these claims is rendered moot.

The Office rejected claims 1-19 on the ground of nonstatutory double patenting over claims 1-19 of U.S. Patent No. 9,013,653 in view of *Hashimoto*. Applicant respectfully disagrees.

Nonetheless, in order to expedite the prosecution, Applicant submits a terminal disclaim herewith.

Thus, Applicant respectfully requests that the rejection of claims 1, 2, 4-9, 10-16, 20, and 21 on the ground of nonstatutory type double patenting be withdrawn.

B. Rejection of Claims 1, 2, 4-8, 10-15, and 17-19 under pre-AIA 35 U.S.C. § 103(a)

As an initial matter, Applicant has canceled claims 17-19 without prejudice or disclaimer, thus, the rejection of these claims is rendered moot.

The Office asserts that claims 1, 2, 4-8, 10-15, and 17-19 are obvious over *Maekawa* in view of *Hashimoto*. Applicant respectfully disagrees.

Nonetheless, in order to expedite the prosecution, Applicant has amended claim 1 by incorporating features previously recited in claim 3, which, as acknowledged by the Office,

includes allowable subject matter. The Office states that claim 3 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (see, page 9 of the Office Action).

Thus, Applicant respectfully submits that claim 1 is patentable. Further, dependent claims 2 and 4-6, each depending from claim 1, are patentable at least for the reasons claim 1 is patentable as well as for additional features these claims recite.

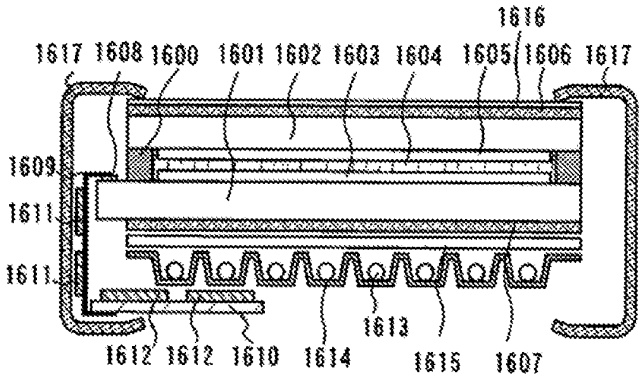
In addition, Applicant has amended independent claim 7 by adding features originally recited in claim 3, which, as acknowledged by the Office, includes allowable subject matter (see, page 9 of the Office Action), thus, claim 7, as amended, contains allowable subject matter. The applied references, *Maekawa* and *Hashimoto*, when taken singularly or in combination, fail to disclose or suggest the recited features, "a thickness of the protective member is at least 0.2mm and no greater than 1.0mm."

Accordingly, Applicant respectfully submits that claim 7 is allowable. Claims 8 and 10-13 have been amended so as to directly depend from allowable claim 7, thus, these claims are allowable at least for the reasons claim 7 is allowable as well as for additional features these claims recite.

Moreover, in order to expedite the prosecution, Applicant has amended claim 14 without conceding the Office's assertion regarding the patentability of the previously recited claim 14.

The Office asserts that items 1606 and 1616 illustrated in Fig. 16 of *Maekawa* respectively correspond to the recited polarizing plate and protective member (see, page 8 of the Office Action).

As illustrated in Fig. 16 of *Maekawa* (shown below), items 1606 and 1616 are completely overlap with each other in a plan view and the edges of item 1616 are not disposed outside the edge of item 1606.



By contrast, claim 14, as amended, recites, *inter alia*, "wherein an **edge of the protective member is disposed outside** an edge of the resin film and **an edge of the polarizing plate in a plan view**" (emphasis added).

As explained above, Fig. 16 clearly does not disclose or even suggest the above recited features. Further, the secondary reference, *Hashimoto*, does not cure the above deficiencies of *Maekawa*.

Thus, the combination of *Maekawa* and *Hashimoto* fails to disclose or even suggest at least the above recited features of claim 14.

Accordingly, Applicant respectfully requests that the rejection of claim 14 be withdrawn. Further, as amended claim 15 depends from claim 14, thus, claim 15 is not obvious over the applied references at least for the reasons claim 14 is not obvious as well as for additional features claim 15 recites.

Therefore, withdrawal and reconsideration of the rejection of claims 1, 2, 4-8, 10-15, and 17-19 are respectfully requested.

C. Objection to Claims 13 and 19

Claim 19 has been canceled without prejudice or disclaimer, thus, the rejection of claim 19 is rendered moot.

Claim 13 has been amended so as to depend from claim 7. Thus, Applicant respectfully requests that the objection to claim 13 be withdrawn.

D. Objection to Claims 3, 9, and 16

Claims 3 and 9 have been canceled without prejudice or disclaimer, thus, the rejection of claims 3 and 9 is rendered moot.

Claim 16, as amended, depends from claim 14, which, as discussed above, is patentable.

Thus, claim 16 is patentable over the references at least for the reasons claim 14 is patentable as well as for additional features claim 16 recites.

Newly Presented Claims 20 and 21

Newly Presented claims 20 and 21 are fully supported by the original disclosure.

Since claims 20 and 21 depend from claims 1 and 7 respectively. As discussed above, claims 1 and 7 contain are patentable, thus, claims 20 and 21 are patentable at least for the reasons advanced for claims 1 and 7 as well as for additional features these claims recite.

Conclusion

Therefore, the present application overcomes the objections and rejections of record and is in condition for allowance. Favorable consideration is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper,

including extension of time fees, to Deposit Account 506785 and please credit any excess fees to such deposit account.

Respectfully submitted,

TYPHA IP LLC

/ Arimi Yamada /

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TEL: (202)-800-8679
FAX: (202)-654-5728
Dated: June 5, 2017

PTO/AIA/26 (04-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 0520-46908CC4CON

In re Application of: Koichi FUKUDA

Application No.: 14/624,339

Filed: 2015-02-17

For: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

JAPAN DISPLAY INC. and

The applicant, PANASONIC LIQUID CRYSTAL DISPLAY CO., LTD., owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 9,013,653 as the term of said **prior patent** is presently shortened by any terminal disclaimer.

The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns. In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 70156

/Arimi Yamada/ — Signature
2017-06-05 — Date

Arimi Yamada — Typed or printed name

Registered Attorney — Title
202-800-8683 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal	
Application Number:	14624339
Filing Date:	17-Feb-2015
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Filer:	Arimi Yamada/Emily Rice
Attorney Docket Number:	0520-46908CC4CON
Filed as Large Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
		Total in USD ($)		**160**

Electronic Acknowledgement Receipt	
EFS ID:	29396713
Application Number:	14624339
International Application Number:	
Confirmation Number:	9583
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Customer Number:	133303
Filer:	Arimi Yamada/Sunny HAN
Filer Authorized By:	Arimi Yamada
Attorney Docket Number:	0520-46908CC4CON
Receipt Date:	05-JUN-2017
Filing Date:	17-FEB-2015
Time Stamp:	15:14:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$160
RAM confirmation Number	060617INTEFSW15143700
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0520-46908CC4CON_ResponseNonFOAmailed_2017-03-06_cu.pdf	250522 a4eb00f75d1204f68d99fece8f4a1dfd3b59ca43	yes	12

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	6
Applicant Arguments/Remarks Made in an Amendment	7	12

Warnings:					
Information:					
2	Terminal Disclaimer Filed	0520-46908CC4CON_Terminal Disclaimer_for_PAT_cu.pdf	150958 ae1538de996b1605f7919ec0c2525cfb3d690a0b	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30392 b7a4ad0e302a443cffdddf0a451a7196e2dae061	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	431872		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	14/624,339	FUKUDA, KOICHI	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 05 June, 2017	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

/CRYSTAL QUEEN/

Technology Center: PLRC

Telephone: _____

U.S. Patent and Trademark Office

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/624,339	Filing Date 02/17/2015	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)		(Column 2)		
FOR	NUMBER FILED		NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A		N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A		N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A		N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =		*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =		*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
AMENDMENT	06/05/2017	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

		(Column 1)		(Column 2)	(Column 3)		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
SHERRY DAVIS

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON	9583

133303 7590 03/06/2017

TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

EXAMINER
VU, PHU

ART UNIT	PAPER NUMBER
2871	

MAIL DATE	DELIVERY MODE
03/06/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/624,339	Applicant(s) FUKUDA, KOICHI	
	Examiner PHU VU	Art Unit 2871	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-19* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-19* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *2/17/15*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

This action replaces the office action from 1/13/17. The period for response has been reset with the mailing of this office action.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a

result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-19 rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-19 of U.S. Patent No. 9013653 in view of Hashimoto US 2004/0247918. Claims 1-19 are identical to claims 1-19 of the patent except for an adhesive member, wherein the adhesive member overlaps with the display area where is between the protective member and the polarizing plate. Hashimoto teaches an adhesive member for bonding a polarizer protective film with the polarizer [0262-0263]. Therefore, it would have been obvious to one of ordinary skill in the art to provide an

adhesive member overlapping the display area between the protective member and the polarizing plate to provide secure bonding between the two films.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1 is is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Maekawa US 2005/0158665 in view of

Regarding claim 1, Maekawa a display device comprising display area and used in a hand-held electronic device comprising; a TFT substrate (fig. 16 1601), a counter substrate (1602), a multi-thin film layer (see figs. 8-10 elements 872 alignment layer 871 pixel electrode layer which shows a more detailed view of the LC cell), a liquid crystal layer (fig. 16 element 1604), a seal member (1600), a polarizing plate (1606), and a protective member (1616); wherein the multi-thin film layer disposed on the TFT substrate, wherein the liquid crystal layer (884 in fig 10 and 1604 in fig. 16) dispose on the multi-thin film layer, wherein the seal member (fig. 10 1600) surrounds the liquid crystal layer, wherein the counter substrate (1602) is disposed between the TFT substrate and the polarizing plate, wherein the polarizing plate (1606) is formed by a different member from the protective member (1616) and disposed between the counter

substrate (1602) and the protective member (1616) and wherein the protective member is a protective cover of the hand-held electronic device (see fig. 16), and wherein the protective member overlaps with the sealing member in a plan view (see fig. 16).

Maekawa omits an adhesive member, wherein the adhesive member overlaps with the display area where is between the protective member and the polarizing plate. Hashimoto teaches an adhesive member for bonding a polarizer protective film with the polarizer [0262-0263]. Therefore, it would have been obvious to one of ordinary skill in the art to provide an adhesive member overlapping the display area between the protective member and the polarizing plate to provide secure bonding between the two films.

Regarding claim 2, Maekawa teaches all the limitations of the claim except a surface pencil hardness of the protective member is at least 3H. However Hashimoto teaches a surface pencil hardness of the protective member is at least 3H [0376] which would provide ample protection of the polarizing film. Therefore it would have been obvious to one of ordinary skill in the art to modify the Maekawa in view of Hashimoto to provide ample protection of the polarizing film.

Regarding claim 4, Maekawa teaches the counter substrate having a multi-thin film layer (see fig.8-10 elements 882 counter electrode, 883 alignment layer).

Regarding claim 5, Maekawa teaches the liquid crystal layer (884) is sandwiched by the counter substrate and the TFT substrate.

Regarding claim 6, Maekawa teaches the multi-thin film layer includes plural insulating layers (fig. 8-10 843, 853), conductive layer (861) and organic layer [0091].

Regarding claim 7, Maekawa teaches a display device used in a hand-held electronic device comprising; a first substrate (fig 16 element 1601), a multi-thin film layer (see figs. 8-10 elements 872 alignment layer 871 pixel electrode layer which shows a more detailed view of the LC cell), a seal member (1600), a polarizing plate (1606), and a protective member (1616); wherein the multi-thin film layer (see figs. 8-10 elements 872 alignment layer 871 pixel electrode layer which shows a more detailed view of the LC cell) is disposed on the first substrate, wherein the seal member (1600) is disposed inside an outer periphery end face of the first substrate, wherein the polarizing plate (1606) is formed by a different member from the protective member and disposed between the first substrate (1602) and the protective member (1616), and the polarizing member (1606), and wherein the protective member (1616) is a protective cover of the hand-held electronic device (see fig. 16), and wherein the protective member overlaps with the sealing member in a plan view (see fig. 16).

Maekawa omits an adhesive member wherein the adhesive member is disposed between the protective member and the polarizing plate and without an air layer between the protective member. Hashimoto teaches an adhesive member wherein the adhesive member is disposed between the protective member and the polarizing plate and without an air layer between the protective member [0261-263] for bonding a polarizer protective film with the polarizer. Therefore, it would have been obvious to one of ordinary skill in the art to provide an adhesive member overlapping the display area between the protective member and the polarizing plate to provide secure bonding between the two films.

Regarding claim 8, Maekawa teaches all the limitations of the claim except a surface pencil hardness of the protective member is at least 3H. However Hashimoto teaches a surface pencil hardness of the protective member is at least 3H [0376] which would provide ample protection of the polarizing film. Therefore it would have been obvious to one of ordinary skill in the art to modify the Maekawa in view of Hashimoto to provide ample protection of the polarizing film.

Regarding claim 10 Maekawa teaches a second substrate (fig. 16 element 1602) is disposed between the first substrate (1601) and polarizing plate (1606).

Regarding claim 11, Maekawa teaches a display device according to claim 6, wherein the second substrate having a multi-thin film layer (see fig.8-10 elements 882 counter electrode, 883 alignment layer).

Regarding claim 12, Maekawa teaches a liquid crystal layer (1604) is sandwiched between the first substrate (1601) and the second substrate (1602).

Regarding claim 13, Maekawa teaches display device according to claim 6, wherein the multi-thin film layer includes plural insulating layers (fig. 8-10 843, 853), conductive layer (861) and organic layer [0091].

Regarding claim 14 Maekawa teaches display device used in a hand-held electronic device comprising; a TFT substrate (fig. 16 element 1601) , a multi-thin film layer (see figs. 8-10 elements 872 alignment layer 871 pixel electrode layer which shows a more detailed view of the LC cell), a seal member (1600), a polarizing plate (1606), and a protective member (1616); wherein the multi-thin film layer is disposed on the TFT substrate (see fig. 8-1), wherein the seal member (1600) is disposed inside an

outer periphery end face of the TFT substrate, wherein the polarizing plate (1606) is formed by a different member from the protective member (1616) and disposed between the TFT substrate (1601) and the protective member (1616), and wherein the protective member is a protective cover of the hand-held electronic device, and wherein the protective member overlaps with the sealing member in a plan view (see fig. 16).

Maekawa fails to teach an adhesive member wherein the adhesive member is disposed between the protective member and the polarizing plate and without an air layer between the protective member and the polarizing member.

Hashimoto teaches an adhesive member wherein the adhesive member is disposed between the protective member and the polarizing plate and without an air layer between the protective member [0261-263] for bonding a polarizer protective film with the polarizer. Therefore, it would have been obvious to one of ordinary skill in the art to provide an adhesive member overlapping the display area between the protective member and the polarizing plate to provide secure bonding between the two films.

Regarding claim 15, Maekawa teaches all the limitations of the claim except a surface pencil hardness of the protective member is at least 3H. However Hashimoto teaches a surface pencil hardness of the protective member is at least 3H [0376] which would provide ample protection of the polarizing film. Therefore it would have been obvious to one of ordinary skill in the art to modify the Maekawa in view of Hashimoto to provide ample protection of the polarizing film.

Regarding claim 17, Maekawa teaches a second substrate (1602) is disposed between the TFT substrate and the polarizing plate.

Regarding claim 18, Maekawa teaches a display device wherein the second substrate having a multi-thin film layer (see fig.8-10 elements 882 counter electrode, 883 alignment layer).

Regarding claim 19, Maekawa teaches display device, wherein the multi-thin film layer includes plural insulating layers (fig. 8-10 843, 853), conductive layer (861) and organic layer [0091].

Claim Objections

Claim 13 and 19 is objected to because of the following informalities: Claim 13 is a duplicate of claim 6. Claim 19 depends from itself.

Appropriate correction is required.

Allowable Subject Matter

Claims 3, 9 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHU VU whose telephone number is (571)272-1562. The examiner can normally be reached on 8AM-5PM M-R.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PHU VU/
Primary Examiner, Art Unit 2871

Notice of References Cited	Application/Control No. 14/624,339	Applicant(s)/Patent Under Reexamination FUKUDA, KOICHI	
	Examiner PHU VU	Art Unit 2871	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-9,013,653 B2	04-2015	Fukuda; Koichi	G02F1/1333	349/58
*	B	US-2006/0109395 A1	05-2006	Yamamoto; Junya	G02B6/005	349/58
*	C	US-2005/0158665 A1	07-2005	Maekawa, Shinji	G02B5/201	430/313
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2015-02-17
First Named Inventor	Koichi FUKUDA
Art Unit	
Examiner Name	
Attorney Docket Number	0520-46908CC4CON

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8558965		2013-10-15	FUKUDA	
	2	5793461		1998-08-11	INOU	
	3	6084652		2000-07-04	YAMAHARA	
	4	7166352		2007-01-23	WATANABE	
	5	7285323		2007-10-23	SONE	
	6	7532274		2007-07-19	FUKUDA	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

	1	20050243245	A1	2005-11-03	TAGUCHI	
	2	20060152664	A1	2006-07-13	NISHIO	
	3	20050046783	A1	2005-03-03	KAWATA	
	4	20080055522	A1	2008-03-06	SAKAGUCHI	
	5	20050271835	A1	2005-12-08	KIM	
	6	20050146650	A1	2005-07-07	CHUNG	
	7	20040051827	A1	2004-03-18	HINATA	
	8	20010043297	A1	2001-11-22	ARAI	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2003-195043	JP		2003-07-09	FUJI PHOTO FILM CO., LTD.		☐

EFS Web 2.1.17

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

	2	2003-337322	JP		2003-11-28	IHARA		☐
	3	H08-110821	JP		1996-04-30	HANAOKA		☐
	4	H08-006039	JP		1996-01-12	INO		☐
	5	2005-189571	JP		2005-07-14	OGASAWARA		☐
	6	2005-037927	JP		2005-02-10	SONE		☐
	7	1211746	CN		1999-03-24	YAMAHARA		☐
	8	1441453	CN		2003-09-10	WATANABE		☐
	9	1512216	CN		2004-07-14	OTA		☐
	10	H08-338912	JP		1996-12-24	OGAWA		☐
	11	H01-015516	JP		1993-08-27	YOSHIDA		☐
	12	2003-337549	JP		2003-11-28	KEYAKIDA		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

	13	2005-134841	JP		2005-05-26	SUZUKI		☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/PHU VU/	Date Considered	03/03/2017

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Arimi Yamada/	Date (YYYY-MM-DD)	2015-02-17
Name/Print	Arimi Yamada	Registration Number	70156

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /P.V/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	5	13/446331	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L2	137	"7057681"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L3	1	"7057681".pn.	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L4	2	10/603057	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L5	5143	349/58-60.ccls.	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L6	1046	349/58-60.ccls. and (portable hand-held hand adj held)	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L7	2555	"349"/$.ccls. and substrate with thickness with mm	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L8	1249	"349"/$.ccls. and substrate with thickness with mm with (".1" ".2" ".3" ".4" ".5")	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L9	1045	"349"/$.ccls. and substrate with thickness with mm with ("0.1" "0.2" "0.3" "0.4" "0.5")	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L10	1	"349"/$.ccls. and substrate with thickness with mm with ("0.1" "0.2" "0.3" "0.4" "0.5") with standard	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L11	0	"349"/$.ccls. and substrate with thickness with mm with ("0.1" "0.2" "0.3" "0.4" "0.5") with industry	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L12	1	"20100110328"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L13	25	"349"/$.ccls. and substrate with thickness with mm with ("0.1" "0.2" "0.3" "0.4" "0.5") with standardized	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L14	11	11/644872	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L15	540	"349"/$.ccls. and substrate with thickness with mm with ("0.5")	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L16	1	"349"/$.ccls. and substrate with thickness with mm with ("0.5") with market	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L17	0	"349"/$.ccls. and substrate with thickness with mm with ("0.5") with standard	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L18	401	349/58-60.ccls. and (portable hand-held hand adj held) and @ad<"20051226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L19	496	349/58-60.ccls. and (portable hand-held hand adj held mobile) and @ad<"20051226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L20	7	("20020154254" | "20050083465" | "5455313" | "5691794" | "5969023" | "6317189" | "7057681").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/03/03 06:43

L21	716	hard adj coat and (polarizer) and pencil adj hardness	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L22	201	(hard adj coat with adhesive)and (polarizer) and pencil adj hardness	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L23	37	349/96.ccls. and (hard adj coat with adhesive)and (polarizer) and pencil adj hardness	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L24	71	349/96.ccls. and (hard adj coat with adhesive)and (polarizer)	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L25	1	14/624339	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L26	164	(hard adj coat with adhesive)and (polarizer) and @ad<"20061226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L27	926	349/58-60.ccls. and bezel	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L28	164	L26 and @ad<"20061226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L29	193	L27 and @ad<"20061226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L30	22	L29 and polarizer	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L31	1	"6525786".pn.	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L32	1	14/834242	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L33	112	(hard adj coat with adhesive)and (polarizer) and @ad<"20051226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L34	1	14/624339	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L35	726	hard adj coat with thickness and ("mm") and polarizer	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L36	2	"20080303977"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L37	2	"20090257215"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L38	1	14/859235	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L39	35	349/58-60.ccls. and bezel and @ad<"20051226" and (portable hand adj held)	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L40	96	polarizer and bezel and @ad<"20051226" and (portable hand adj held) and liquid adj crystal	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L41	26	polarizer and bezel and @ad<"20051226" and (portable hand adj held) and liquid adj crystal and seal	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L42	866	"349"/$.ccls. and substrate and polarizer and (thickness with mm with ("0.1" "0.2" "0.3" "0.4" "0.5"))	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L43	469	L42 and @ad<"20061226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L44	372	L42 and @ad<"20051226"	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L45	1339	substrate and polarizer and (thickness with	US-PGPUB;	OR	OFF	2017/03/03

		mm with ("0.1" "0.2" "0.3" "0.4" "0.5")) and @ad<"20061226"	USPAT			06:43
L46	1003	L45 and liquid adj crystal	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43
L47	537	L46 and (not L43)	US-PGPUB; USPAT	OR	OFF	2017/03/03 06:43

3/3/2017 6:47:47 AM
C:\Users\pvu2\Documents\EAST\Workspaces\14624339.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see srnt	3/3/17	PV

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/P.V./ Primary Examiner.Art Unit 2871

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/09/2017								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON	9583

133303 7590 01/13/2017

TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

EXAMINER
VU, PHU

ART UNIT	PAPER NUMBER
2871	

MAIL DATE	DELIVERY MODE
01/13/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 14/624,339	Applicant(s) FUKUDA, KOICHI	
	Examiner PHU VU	Art Unit 2871	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-19* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-19* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *2/17/15*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-19 rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification fails to show the adhesive member overlaps with the display area where between the protective member and the polarizing plate.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application

in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-19 rejected on the ground of nonstatutory double patenting as being unpatentable over claims of U.S. Patent No. 9013653. Although the claims at issue are not identical, they are not patentably distinct from each other because they are obvious over claims 1-19 of the patent barring the subject matter contained in the 112 rejection above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHU VU whose telephone number is (571)272-1562. The examiner can normally be reached on 8AM-5PM M-R.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PHU VU/
Primary Examiner, Art Unit 2871

Notice of References Cited	Application/Control No. 14/624,339	Applicant(s)/Patent Under Reexamination FUKUDA, KOICHI	
	Examiner PHU VU	Art Unit 2871	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-9,013,653 B2	04-2015	Fukuda; Koichi	G02F1/1333	349/58
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see srnt	1/9/17	PV

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/P.V./ Primary Examiner.Art Unit 2871

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14624339	FUKUDA, KOICHI
	Examiner	Art Unit
	PHU VU	2871

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/09/2017								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON

CONFIRMATION NO. 9583

POWER OF ATTORNEY NOTICE

127271
Hauptman Ham, LLP
2318 Mill Road
Suite 1400
Alexandria, VA 22314

OC000000082224897

Date Mailed: 04/18/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/05/2016.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tpetros/

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/624,339	02/17/2015	Koichi FUKUDA	0520-46908CC4CON

CONFIRMATION NO. 9583

133303
TYPHA IP LLC
1819 L Street NW Suite 200
Washington, DC 20036

POA ACCEPTANCE LETTER

OC000000082224976

Date Mailed: 04/18/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/05/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tpetros/

Post-AIA GPA

POWER OF ATTORNEY TO PROSECUTE APPLICTIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 C.F.R. §3.73(c).

I hereby appoint practitioners associated with Customer Number: **133303**

TYPHA IP LLC

1875 I Street NW Suite 523

Washington DC 20006

Email: typha_japan@typhaip.com

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 C.F.R. §3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 C.F.R. §3.73(c) to the address associated with Customer Number: **133303**

Legal Name and Address of Assignee:
Name: **Japan Display Inc.**
Address: 3-7-1, Nishi-shinbashi, Minato-ku, Tokyo 1050003, Japan

Note-A copy of this form, together with a statement under 37 C.F.R. §3.73(c) is required to be filed in each application in which this form is used. The statement under 37 C.F.R. §3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

Signature of Assignee of Record: The individual whose signature and title are supplied below is authorized to act on behalf of the assignee:	
Signature: Hiroyuki Goshida	Date: January 6, 2016
Name: Hiroyuki YOSHIDA	Telephone: +81-3-6782-8368
Title: Senior General Manager, Intellectual Property Dept., Japan Display Inc.	

Post-AIA GPA

POWER OF ATTORNEY TO PROSECUTE APPLICTIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 C.F.R. §3.73(c).

I hereby appoint practitioners associated with Customer Number: **133303**

TYPHA IP LLC

Email: TYPHA_IP@typhaip.com

Fax: 202-654-5728

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 C.F.R. §3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 C.F.R. §3.73(c) to the address associated with Customer Number: **133303**

Legal Name and Address of Assignee:
Name: Panasonic Liquid Crystal Display Co., Ltd.
Address: 1-6, Megahida-cho, Shikama-ku, Himeji-shi, Hyogo 672-8033, Japan

Note-A copy of this form, together with a statement under 37 C.F.R. §3.73(c) is required to be filed in each application in which this form is used. The statement under 37 C.F.R. §3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

Signature of Assignee of Record: The individual whose signature and title are supplied below is authorized to act on behalf of the assignee:	
Signature:	Date: February 16, 2016
Name: Seiji Harada	Telephone: +81-(0)50-3487-3187
Title: Manager, Intellectual Property Dept., Product Development Center	

Electronic Acknowledgement Receipt	
EFS ID:	25398693
Application Number:	14624339
International Application Number:	
Confirmation Number:	9583
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Customer Number:	127271
Filer:	Arimi Yamada/Kayo Matsumoto
Filer Authorized By:	Arimi Yamada
Attorney Docket Number:	0520-46908CC4CON
Receipt Date:	05-APR-2016
Filing Date:	17-FEB-2015
Time Stamp:	11:47:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	0520-46908CC4CON_373c_JDI.pdf	121569 1d9d6f50a635ee2484b898aa58b431c4d4d2ed26	no	3
Warnings:					
Information:					

2	Assignee showing of ownership per 37 CFR 3.73	0520-46908CC4CON_373c_PLD.pdf	121856 6efb5e6d268c4c7370d8b51ba066621c67b41140	no	3
Warnings:					
Information:					
3	Power of Attorney	20160106_POA_JDI.pdf	32742 5795d14efaf6e0ec7a5de35ceff3e86c3324d314	no	1
Warnings:					
Information:					
4	Power of Attorney	20160216_POA_PLD.pdf	28968 ab9448cce3454a7db085110b9504915568fd323c	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	305135	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Japan Display Inc.

Application No./Patent No.: 14/624,339 Filed/Issue Date: 2015-02-17

Titled: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Japan Display Inc., a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☐ The assignee of the entire right, title, and interest.

2. ☑ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☑ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Panasonic Liquid Crystal Display Co. LTD

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Koichi FUKUDA To: HITACHI DISPLAYS, LTD.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 019075, Frame 0860, or for which a copy thereof is attached.

2. From: HITACHI DISPLAYS, LTD. To: JAPAN DISPLAY EAST, INC.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 031751, Frame 0179, or for which a copy thereof is attached.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: JAPAN DISPLAY EAST, INC. To: JAPAN DISPLAY INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 031763, Frame 0833, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Arimi Yamada/	2016-04-05
Signature	Date
Arimi Yamada/	70156
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Panasonic Liquid Crystal Display Co. LTD

Application No./Patent No.: 14/624,339 Filed/Issue Date: 2015-02-17

Titled: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Panasonic Liquid Crystal Display Co. LTD, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☐ The assignee of the entire right, title, and interest.

2. ☑ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☑ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Japan Display Inc.

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Koichi FUKUDA To: HITACHI DISPLAYS, LTD.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 019075, Frame 0860, or for which a copy thereof is attached.

2. From: HITACHI DISPLAYS, LTD. To: IPS ALPHA SUPPORT CO., LTD.

   The document was recorded in the United States Patent and Trademark Office at

   Reel 027063, Frame 0019, or for which a copy thereof is attached.

PTO/AIA/96 (08-12)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

STATEMENT UNDER 37 CFR 3.73(c)

3. From: IPS ALPHA SUPPORT CO., LTD. To: PANASONIC LIQUID CRYSTAL DISPLAY CO., LTD.

The document was recorded in the United States Patent and Trademark Office at
Reel 027063, Frame 0139, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Arimi Yamada/	2016-04-05
Signature	Date
Arimi Yamada	70156
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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This is to certify that the annexed is a true copy of the following application as filed with this Office.

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【書類名】特許請求の範囲
【請求項１】
第１の基板と、
前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
前記第１の基板と前記第２の基板との間に挟持された液晶と、
前記第２の基板よりも観察者側に配置された上偏光板と、
前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた、前記上偏光板よりも表面硬度が高い樹脂フィルムとを有する液晶表示パネルを備えることを特徴とする液晶表示装置。
【請求項２】
前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上であることを特徴とする請求項１に記載の液晶表示装置。
【請求項３】
前記樹脂フィルムは、厚さが０．２ｍｍ以上であることを特徴とする請求項１または請求項２に記載の液晶表示装置。
【請求項４】
前記樹脂フィルムは、厚さが０．２ｍｍ以上、１ｍｍ以下であることを特徴とする請求項１または請求項２に記載の液晶表示装置。
【請求項５】
前記樹脂フィルムの材質は、アクリル樹脂またはエポキシ樹脂であることを特徴とする請求項１から請求項４のいずれか１項に記載の液晶表示装置。
【請求項６】
前記第１の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項５のいずれか１項に記載の液晶表示装置。
【請求項７】
前記第２の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項６のいずれか１項に記載の液晶表示装置。
【請求項８】
前記第１の基板と前記第２の基板の厚さがほぼ等しいことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項９】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄いことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項１０】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚いことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項１１】
前記液晶表示パネルの総厚が、２ｍｍ以下であることを特徴とする請求項１から請求項１０のいずれか１項に記載の液晶表示装置。
【請求項１２】
前記上偏光板と前記第２の基板との間に上位相差板を有することを特徴とする請求項１から請求項１１のいずれか１項に記載の液晶表示装置。
【請求項１３】
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記上偏光板の外形よりも小さいことを特徴とする請求項１から請求項１２のいずれか１項に記載の液晶表示装置。
【請求項１４】
前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形と前記上偏光板の外

形は、前記下偏光板の外形よりも小さいことを特徴とする請求項１から請求項１２のいずれか１項に記載の液晶表示装置。
【請求項１５】
前記下偏光板と前記第１の基板との間に下位相差板を有することを特徴とする請求項１４に記載の液晶表示装置。
【請求項１６】
前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項１から請求項１５のいずれか１項に記載の液晶表示装置。
【請求項１７】
第１の基板と、
前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
前記第１の基板と前記第２の基板との間に挟持された液晶と、
前記第２の基板よりも観察者側に配置された上偏光板と、
前記上偏光板と前記第２の基板との間に配置された樹脂フィルムとを有する液晶表示パネルを備え、
前記樹脂フィルムは、厚さが０．２ｍｍ以上であり、
前記上偏光板の表面硬度は、表面鉛筆硬度が３Ｈ以上であることを特徴とする液晶表示装置。
【請求項１８】
前記樹脂フィルムは、厚さが１ｍｍ以下であることを特徴とする請求項１７に記載の液晶表示装置。
【請求項１９】
前記第１の基板と前記第２の基板の厚さがほぼ等しいことを特徴とする請求項１７または請求項１８に記載の液晶表示装置。
【請求項２０】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄いことを特徴とする請求項１７または請求項１８に記載の液晶表示装置。
【請求項２１】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚いことを特徴とする請求項１７または請求項１８に記載の液晶表示装置。
【請求項２２】
前記上偏光板と前記第２の基板との間に上位相差板を有することを特徴とする請求項１７から請求項２１のいずれか１項に記載の液晶表示装置。
【請求項２３】
前記液晶表示パネルを正面から見た場合、前記上偏光板の外形は、前記樹脂フィルムの外形よりも小さいことを特徴とする請求項１７から請求項２２のいずれか１項に記載の液晶表示装置。
【請求項２４】
前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、
前記液晶表示パネルを正面から見た場合、前記上偏光板の外形は、前記下偏光板の外形よりも小さいことを特徴とする請求項１７から請求項２３のいずれか１項に記載の液晶表示装置。
【請求項２５】
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記下偏光板の外形よりも小さいことを特徴とする請求項２４に記載の液晶表示装置。
【請求項２６】
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記下偏光板の外形よりも大きいことを特徴とする請求項２４に記載の液晶表示装置。
【請求項２７】

前記下偏光板と前記第１の基板との間に下位相差板を有することを特徴とする請求項２４から請求項２６のいずれか１項に記載の液晶表示装置。
【請求項２８】
前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項１７から請求項２７のいずれか１項に記載の液晶表示装置。
【請求項２９】
第１の基板と、
前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
前記第１の基板と前記第２の基板との間に挟持された液晶と、
前記第２の基板よりも観察者側に配置された上偏光板と、
前記第１の基板よりも背面側に配置された下偏光板と、
前記下偏光板よりも背面側に配置され、前記下偏光板に密着して貼り付けられた樹脂フィルムとを有する液晶表示パネルを備え、
前記第１の基板と前記第２の基板の厚さの合計が、０．５ｍｍ以下であることを特徴とする液晶表示装置。
【請求項３０】
前記樹脂フィルムは、厚さが０．１ｍｍ以上、０．３ｍｍ以下であることを特徴とする請求項２９に記載の液晶表示装置。
【請求項３１】
前記第１の基板と前記第２の基板の厚さがほぼ等しいことを特徴とする請求項２９または請求項３０に記載の液晶表示装置。
【請求項３２】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄いことを特徴とする請求項２９または請求項３０に記載の液晶表示装置。
【請求項３３】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚いことを特徴とする請求項２９または請求項３０に記載の液晶表示装置。
【請求項３４】
前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項２９から請求項３３のいずれか１項に記載の液晶表示装置。
【請求項３５】
第１の基板と、
前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
前記第１の基板と前記第２の基板との間に挟持された液晶と、
前記第２の基板よりも観察者側に配置された上偏光板と、
前記第１の基板よりも背面側に配置された下偏光板と、
前記下偏光板と前記第１の基板との間に配置された樹脂フィルムとを有する液晶表示パネルを備え、
前記第１の基板と前記第２の基板の厚さの合計が、０．５ｍｍ以下であることを特徴とする液晶表示装置。
【請求項３６】
前記樹脂フィルムは、厚さが０．１ｍｍ以上、０．３ｍｍ以下であることを特徴とする請求項３５に記載の液晶表示装置。
【請求項３７】
前記第１の基板と前記第２の基板の厚さがほぼ等しいことを特徴とする請求項３５または請求項３６に記載の液晶表示装置。
【請求項３８】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄いことを特徴とする請求項

３５または請求項３６に記載の液晶表示装置。
【請求項３９】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚いことを特徴とする請求項３５または請求項３６に記載の液晶表示装置。
【請求項４０】
前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項３５から請求項３９のいずれか１項に記載の液晶表示装置。
【請求項４１】
第１の基板と、
前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
前記第２の基板よりも観察者側に配置された上偏光板とを有する表示パネルを備えた表示装置であって、
前記第１の基板および前記第２の基板はガラス基板であり、
前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた樹脂フィルムを有し、
前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上であることを特徴とする表示装置。

【書類名】明細書
【発明の名称】液晶表示装置および表示装置
【技術分野】
【０００１】
本発明は、液晶表示装置および表示装置に関し、特に、携帯電話端末などの携帯型電子装置に用いられる液晶表示装置（モジュール）に適用して有効な技術に関するものである。
【背景技術】
【０００２】
従来、携帯電話端末やＰＤＡ（Ｐｅｒｓｏｎａｌ　Ｄｉｇｉｔａｌ　Ａｓｓｉｓｔａｎｔ）などの携帯型電子装置のディスプレイには、たとえば、液晶表示装置などの薄型の表示装置が用いられている。
【０００３】
前記液晶表示装置は、１対の基板の間に液晶材料を挟持した液晶表示パネルを有する表示装置である。このとき、前記１対の基板の一方は、一般にＴＦＴ基板と呼ばれ、たとえば、ガラス基板上にＴＦＴ（Ｔｈｉｎ　Ｆｉｌｍ　Ｔｒａｎｓｉｓｔｏｒ）素子や画素電極などが形成されている。また、前記１対の基板の他方は、一般に対向基板と呼ばれ、たとえば、ガラス基板上にカラーフィルタなどが形成されている。なお、前記液晶表示パネルは、前記液晶材料の駆動方式が縦電界方式の場合、前記対向基板側に前記画素電極と対向する共通電極（対向電極とも呼ばれる）が形成されている。また、前記液晶材料の駆動方式が横電界方式の場合、前記ＴＦＴ基板側に前記共通電極が形成されている。
【０００４】
前記携帯型電子装置は、近年、本体の薄型化が進んでおり、それにともない、用いられる液晶表示装置の薄型化も進んでいる。液晶表示装置を薄型化する方法には、たとえば、液晶表示パネルを薄型化する方法がある。
【０００５】
前記液晶表示パネルを薄型化する方法には、たとえば、前記ＴＦＴ基板や対向基板に用いられるガラス基板を研磨して薄型化する方法がある。
【０００６】
また、前記液晶表示パネルを薄型化する方法には、たとえば、前記ＴＦＴ基板または対向基板のいずれか一方の基板で、ガラス基板の代わりにプラスチック基板を用いる方法もある（たとえば、特許文献１を参照。）。
【特許文献１】特開平８－００６０３９号公報
【発明の開示】
【発明が解決しようとする課題】
【０００７】
前記液晶表示装置では、前記液晶表示パネルを薄型化するために、前記ＴＦＴ基板や対向基板に用いられるガラス基板を研磨して薄くしていくと、それにともない、ガラス基板の強度が低下し、液晶表示パネルの強度が低下する。そのため、ガラス基板を研磨して薄型化する方法では、薄型化と十分な強度の確保を両立させることが難しいという問題があった。
【０００８】
また、ガラス基板の代わりにプラスチック基板を用いる方法では、プラスチック基板の耐熱性や耐溶剤性（耐薬品性）が、ガラス基板に比べて弱いので、たとえば、ガラス基板上にＴＦＴ素子などを形成する工程における取り扱いが困難であるという問題がある。また、たとえば、ガラス基板を用いたＴＦＴ基板とプラスチック基板を用いた対向基板を用いた液晶表示パネルの場合、温度や湿度などの環境変化による各基板の変形量が異なるので、表示むらが発生しやすいという問題があった。
【０００９】
本発明の目的は、たとえば、液晶表示パネルの薄型化と十分な強度の確保を両立させる

ことが可能な技術を提供することにある。
【００１０】
本発明の他の目的は、たとえば、液晶表示装置（モジュール）を有する携帯型電子装置の薄型化が可能な技術を提供することにある。
【００１１】
本発明の前記ならびにその他の目的と新規な特徴は、本明細書の記述および添付図面によって明らかになるであろう。
【課題を解決するための手段】
【００１２】
本願において開示される発明のうち、代表的なものの概略を説明すれば、以下の通りである。
【００１３】
（１）第１の基板と、前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、前記第１の基板と前記第２の基板との間に挟持された液晶と、前記第２の基板よりも観察者側に配置された上偏光板と、前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた、前記上偏光板よりも表面硬度が高い樹脂フィルムとを有する液晶表示パネルを備える液晶表示装置である。
【００１４】
（２）前記（１）において、前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上である液晶表示装置である。
【００１５】
（３）前記（１）または（２）において、前記樹脂フィルムは、厚さが０．２ｍｍ以上である液晶表示装置である。
【００１６】
（４）前記（１）または（２）において、前記樹脂フィルムは、厚さが０．２ｍｍ以上、１ｍｍ以下である液晶表示装置である。
【００１７】
（５）前記（１）から（４）のいずれかにおいて、前記樹脂フィルムの材質は、アクリル樹脂またはエポキシ樹脂である液晶表示装置である。
【００１８】
（６）前記（１）から（５）のいずれかにおいて、前記第１の基板の厚さは、０．５ｍｍ以下である液晶表示装置である。
【００１９】
（７）前記（１）から（６）のいずれかにおいて、前記第２の基板の厚さは、０．５ｍｍ以下である液晶表示装置である。
【００２０】
（８）前記（１）から（７）のいずれかにおいて、前記第１の基板と前記第２の基板の厚さがほぼ等しい液晶表示装置である。
【００２１】
（９）前記（１）から（７）のいずれかにおいて、前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄い液晶表示装置である。
【００２２】
（１０）前記（１）から（７）のいずれかにおいて、前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚い液晶表示装置である。
【００２３】
（１１）前記（１）から（１０）のいずれかにおいて、前記液晶表示パネルの総厚が、２ｍｍ以下である液晶表示装置である。
【００２４】
（１２）前記（１）から（１１）のいずれかにおいて、前記上偏光板と前記第２の基板との間に上位相差板を有する液晶表示装置である。

【００２５】
（１３）前記（１）から（１２）のいずれかにおいて、前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記上偏光板の外形よりも小さい液晶表示装置である。
【００２６】
（１４）前記（１）から（１２）のいずれかにおいて、前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形と前記上偏光板の外形は、前記下偏光板の外形よりも小さい液晶表示装置である。
【００２７】
（１５）前記（１４）において、前記下偏光板と前記第１の基板との間に下位相差板を有する液晶表示装置である。
【００２８】
（１６）前記（１）から（１５）のいずれかにおいて、前記第１の基板および前記第２の基板はガラス基板である液晶表示装置である。
【００２９】
（１７）第１の基板と、前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、前記第１の基板と前記第２の基板との間に挟持された液晶と、前記第２の基板よりも観察者側に配置された上偏光板と、前記上偏光板と前記第２の基板との間に配置された樹脂フィルムとを有する液晶表示パネルを備え、前記樹脂フィルムは、厚さが０．２ｍｍ以上であり、前記上偏光板の表面硬度は、表面鉛筆硬度が３Ｈ以上である液晶表示装置である。
【００３０】
（１８）前記（１７）において、前記樹脂フィルムは、厚さが１ｍｍ以下である液晶表示装置である。
【００３１】
（１９）前記（１７）または（１８）において、前記第１の基板と前記第２の基板の厚さがほぼ等しい液晶表示装置である。
【００３２】
（２０）前記（１７）または（１８）において、前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄い液晶表示装置である。
【００３３】
（２１）前記（１７）または（１８）において、前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚い液晶表示装置である。
【００３４】
（２２）前記（１７）から（２１）のいずれかにおいて、前記上偏光板と前記第２の基板との間に上位相差板を有する液晶表示装置である。
【００３５】
（２３）前記（１７）から（２２）のいずれかにおいて、前記液晶表示パネルを正面から見た場合、前記上偏光板の外形は、前記樹脂フィルムの外形よりも小さい液晶表示装置である。
【００３６】
（２４）前記（１７）から（２３）のいずれかにおいて、前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、前記液晶表示パネルを正面から見た場合、前記上偏光板の外形は、前記下偏光板の外形よりも小さい液晶表示装置である。
【００３７】
（２５）前記（２４）において、前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記下偏光板の外形よりも小さい液晶表示装置である。
【００３８】
（２６）前記（２４）において、前記液晶表示パネルを正面から見た場合、前記樹脂フ

ィルムの外形は、前記下偏光板の外形よりも大きい液晶表示装置である。
【００３９】
（２７）前記（２４）から（２６）のいずれかにおいて、前記下偏光板と前記第１の基板との間に下位相差板を有する液晶表示装置である。
【００４０】
（２８）前記（１７）から（２７）のいずれかにおいて、前記第１の基板および前記第２の基板はガラス基板である液晶表示装置である。
【００４１】
（２９）第１の基板と、前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、前記第１の基板と前記第２の基板との間に挟持された液晶と、前記第２の基板よりも観察者側に配置された上偏光板と、前記第１の基板よりも背面側に配置された下偏光板と、前記下偏光板よりも背面側に配置され、前記下偏光板に密着して貼り付けられた樹脂フィルムとを有する液晶表示パネルを備え、前記第１の基板と前記第２の基板の厚さの合計が、０．５ｍｍ以下である液晶表示装置である。
【００４２】
（３０）前記（２９）において、前記樹脂フィルムは、厚さが０．１ｍｍ以上、０．３ｍｍ以下である液晶表示装置である。
【００４３】
（３１）前記（２９）または（３０）において、前記第１の基板と前記第２の基板の厚さがほぼ等しい液晶表示装置である。
【００４４】
（３２）前記（２９）または（３０）において、前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄い液晶表示装置である。
【００４５】
（３３）前記（２９）または（３０）において、前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚い液晶表示装置である。
【００４６】
（３４）前記（２９）から（３３）のいずれかにおいて、前記第１の基板および前記第２の基板はガラス基板である液晶表示装置である。
【００４７】
（３５）第１の基板と、前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、前記第１の基板と前記第２の基板との間に挟持された液晶と、前記第２の基板よりも観察者側に配置された上偏光板と、前記第１の基板よりも背面側に配置された下偏光板と、前記下偏光板と前記第１の基板との間に配置された樹脂フィルムとを有する液晶表示パネルを備え、前記第１の基板と前記第２の基板の厚さの合計が、０．５ｍｍ以下である液晶表示装置である。
【００４８】
（３６）前記（３５）において、前記樹脂フィルムは、厚さが０．１ｍｍ以上、０．３ｍｍ以下である液晶表示装置である。
【００４９】
（３７）前記（３５）または（３６）において、前記第１の基板と前記第２の基板の厚さがほぼ等しい液晶表示装置である。
【００５０】
（３８）前記（３５）または（３６）において、前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄い液晶表示装置である。
【００５１】
（３９）前記（３５）または（３６）において、前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚い液晶表示装置である。
【００５２】
（４０）前記（３５）から（３９）のいずれかにおいて、前記第１の基板および前記第

２の基板はガラス基板である液晶表示装置である。
【００５３】
（４１）第１の基板と、前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、前記第２の基板よりも観察者側に配置された上偏光板とを有する表示パネルを備えた表示装置であって、前記第１の基板および前記第２の基板はガラス基板であり、前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた樹脂フィルムを有し、前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上である表示装置である。
【発明の効果】
【００５４】
本発明の液晶表示装置のうち、第１の発明の液晶表示装置は、液晶表示パネルの上偏光板に樹脂フィルムが密着して貼り付けられており、かつ、この樹脂フィルムは、表面硬度が上偏光板の表面硬度よりも高い。このような樹脂フィルムを有する液晶表示パネルでは、前記樹脂フィルムが補強部材としての機能を持ち、液晶表示パネルの強度が高くなる。そのため、第１の基板または第２の基板、あるいは両方の基板を薄型化しても、液晶表示パネルに十分な強度を確保することができる。また、樹脂フィルムの表面鉛筆硬度を３Ｈ以上にすることで、液晶表示パネルに傷が付きにくくなる。そのため、たとえば、この液晶表示パネルを有する液晶表示装置（モジュール）を携帯電話端末に組み込んだときに、携帯電話端末の外表面に液晶表示パネルを保護する保護カバーを取り付けなくてもよくなる。その結果、携帯電話端末の表示部を薄型化することができる。
【００５５】
このとき、前記樹脂フィルムは、たとえば、厚さが０．２ｍｍ以上、１ｍｍ以下であることが好ましい。また、前記樹脂フィルムは、光の透過率が高い材質、特に無色透明の材質であることが好ましい。そのような材質としては、たとえば、アクリル樹脂またはエポキシ樹脂が挙げられる。なお、前記樹脂フィルムにアクリル樹脂またはエポキシ樹脂を用いる場合、たとえば、表面にハードコート処理を施して、表面鉛筆硬度が３Ｈ以上になるようにする。この表面鉛筆硬度とは、材料の表面に鉛筆で線を引いたときに材料表面に傷が付く硬さで表される硬度である。つまり、表面鉛筆硬度が３Ｈであるということは、３Ｈおよび３Ｈより軟らかい芯の鉛筆で樹脂フィルムに線を引いたときには表面に傷が付かないことを意味する。
【００５６】
また、前記第１の基板および第２の基板の厚さは、それぞれ０．５ｍｍ以下であることが好ましい。このとき、第１の基板の厚さと第２の基板の厚さは、ほぼ等しくてもよいし、異なっていてもよい。特に、前記樹脂フィルムを貼り付けている第２の基板は、樹脂フィルムにより補強されているので、第１の基板より薄くても十分な強度を確保できる。ただし、液晶表示パネルが、たとえば、ＩＰＳ（Ｉｎ　Ｐｌａｎｅ　Ｓｗｉｔｃｈｉｎｇ）と呼ばれる横電界駆動方式の場合、第２の基板の上偏光板５が貼り付けられる面には、帯電防止用の導体膜が設けられていることがある。そのような場合、たとえば、第２の基板を研磨して薄型化することができない。そのため、第２の基板に前記導体膜が設けられている場合は、第１の基板を第２の基板より薄くすることで、液晶表示パネルを薄型化する。このとき、樹脂フィルムの厚さ、第１の基板の厚さ、および第２の基板の厚さは、たとえば、液晶表示パネルの厚さが２ｍｍ以下になるようにすることが好ましい。
【００５７】
また、このような液晶表示パネルでは、たとえば、液晶表示パネルを正面から見たときに、前記樹脂フィルムの外形が、前記上偏光板の外形よりも小さくなっていることが好ましい。前記液晶表示パネルを有する液晶表示装置を、たとえば、携帯電話端末に組み込んだ場合、通常、携帯電話端末の外装と液晶表示パネルの間に若干の隙間ができる。そして、その隙間を通って、端末外部から外装内部に水分が進入する。そのため、樹脂フィルムの外形を上偏光板の外形よりも小さくすることで、たとえば、樹脂フィルムの外周と上偏光板の外周の間で、上偏光板と携帯電話端末の外装を粘着剤などで貼り合わせて隙間を埋

めることができ、外装内部への水分の進入を防ぐことができる。
【００５８】
また、このような液晶表示パネルでは、たとえば、第１の基板の背面側に下偏光板が配置されていてもよい。この場合、たとえば、液晶表示パネルを正面から見たときに、前記樹脂フィルムの外形および前記上偏光板の外形が、前記下偏光板の外形よりも小さくなっていることが好ましい。
【００５９】
また、このような液晶表示パネルでは、たとえば、前記上偏光板と第２の基板の間に、上位相差板が配置されていてもよい。同様に、前記下偏光板と第１の基板の間に、下位相差板が配置されていてもよい。
【００６０】
なお、このような液晶表示パネルにおいて、第１の基板および第２の基板は、ともにガラス基板であることが好ましい。前記第１の基板および第２の基板にガラス基板を用いた場合でも、前記樹脂フィルムによって十分な強度を確保できるので、各ガラス基板を薄型化することができる。そのため、液晶表示パネルの薄型化と十分な強度の確保を両立することができる。
【００６１】
また、本発明の液晶表示装置のうち、第２の発明の液晶表示装置は、液晶表示パネルの前記第２の基板と上偏光板の間に前記樹脂フィルムが配置されている。この場合も、樹脂フィルムの厚さは、たとえば、０．２ｍｍ以上、１ｍｍ以下であることが好ましい。なお、このような液晶表示パネルでは、観察者から見て最も手前に配置されるのは上偏光板であるため、前記樹脂フィルムは、表面鉛筆硬度が３Ｈ以上でなくてもよい。その代わり、第２の発明の液晶表示装置では、たとえば、上偏光板の表面にハードコート処理を施して、表面鉛筆硬度が３Ｈ以上になるようにすることが好ましい。このようにすれば、第１の発明の液晶表示装置（液晶表示パネル）と同じ効果が得られる。
【００６２】
また、第２の発明の液晶表示装置においても、第１の基板と第２の基板の厚さは、ほぼ等しくてもよいし、どちらか一方を薄くしてもよい。
【００６３】
また、第２の発明の液晶表示装置においても、たとえば、液晶表示パネルを正面から見たときに、前記樹脂フィルムの外形が、前記上偏光板の外形よりも小さくなっていることが好ましい。
【００６４】
また、第２の発明の液晶表示装置においても、たとえば、第１の基板の背面側に下偏光板が配置されていてもよい。この場合、たとえば、液晶表示パネルを正面から見たときに、前記樹脂フィルムの外形および前記上偏光板の外形が、前記下偏光板の外形よりも小さくなっていることが好ましい。
【００６５】
また、第２の発明の液晶表示装置においても、たとえば、前記上偏光板と第２の基板の間に、上位相差板が配置されていてもよい。同様に、前記下偏光板と第１の基板の間に、下位相差板が配置されていてもよい。なお、前記上位相差板は、第２の基板と樹脂フィルムの間に配置されていてもよいし、樹脂フィルムと上偏光板の間に配置されていてもよい。
【００６６】
なお、第２の発明の液晶表示装置においても、第１の基板および第２の基板は、ともにガラス基板であることが好ましい。前記第１の基板および第２の基板にガラス基板を用いた場合でも、前記樹脂フィルムによって十分な強度を確保できるので、各ガラス基板を薄型化することができる。そのため、液晶表示パネルの薄型化と十分な強度の確保を両立することができる。
【００６７】

また、本発明の液晶表示装置のうち、第３の発明の液晶表示装置は、液晶表示パネルの下偏光板の背面側に樹脂フィルムが密着して貼り付けられており、かつ、第１の基板と第２の基板の厚さの合計が０．５ｍｍ以下である。このような液晶表示パネルでは、前記樹脂フィルムの厚さは、たとえば、０．１ｍｍ以上、０．３ｍｍ以下にすることが好ましい。このようにすれば、たとえば、液晶表示パネルに、上偏光板側から押圧が加わったときに、その力を表示パネルの背面側に貼り付けられた樹脂フィルムで支えることができる。そのため、第１の基板および第２の基板を薄型化しても、液晶表示パネルの強度を十分に確保できる。

【００６８】

また、第３の発明の液晶表示装置においても、第１の基板と第２の基板の厚さは、ほぼ等しくてもよいし、どちらか一方を薄くしてもよい。

【００６９】

なお、第３の発明の液晶表示装置においても、第１の基板および第２の基板は、ともにガラス基板であることが好ましい。前記第１の基板および第２の基板にガラス基板を用いた場合でも、前記樹脂フィルムによって十分な強度を確保できるので、各ガラス基板を薄型化することができる。そのため、液晶表示パネルの薄型化と十分な強度の確保を両立することができる。

【００７０】

また、本発明の液晶表示装置のうち、第４の発明の液晶表示装置は、液晶表示パネルの前記第１の基板と下偏光板の間に前記樹脂フィルムが配置されており、、かつ、第１の基板と第２の基板の厚さの合計が０．５ｍｍ以下である。この場合も、樹脂フィルムの厚さは、たとえば、０．１ｍｍ以上、０．３ｍｍ以下であることが好ましい。このようにすることで、第３の発明の液晶表示装置と同様の効果が得られる。

【００７１】

また、第４の発明の液晶表示装置においても、第１の基板と第２の基板の厚さは、ほぼ等しくてもよいし、どちらか一方を薄くしてもよい。

【００７２】

なお、第４の発明の液晶表示装置においても、第１の基板および第２の基板は、ともにガラス基板であることが好ましい。前記第１の基板および第２の基板にガラス基板を用いた場合でも、前記樹脂フィルムによって十分な強度を確保できるので、各ガラス基板を薄型化することができる。そのため、液晶表示パネルの薄型化と十分な強度の確保を両立することができる。

【００７３】

また、第３の発明および第４の発明の液晶表示装置を、たとえば、携帯電話端末に組み込む場合は、従来の液晶表示装置のように、携帯電話端末の外装に、液晶表示パネルを保護する保護カバーを貼り付けることが好ましい。ただし、第３の発明および第４の発明の液晶表示装置の場合、第１の基板と第２の基板の厚さの合計が０．５ｍｍ以下であり、かつ、樹脂フィルムの厚さが０．１ｍｍ以上、０．３ｍｍ以下である。つまり、第３の発明および第４の発明の液晶表示装置では、液晶表示パネルの厚さが、従来の液晶表示パネルの厚さに比べて薄くなっている分、液晶表示装置を薄型化できる。その結果、液晶表示パネルを保護する保護カバーを貼り付けても、携帯電話端末の表示部を、従来のものに比べて薄型化できる。

【００７４】

また、第１の発明は液晶表示装置に関する発明であるが、液晶表示装置で用いられる液晶表示パネルと類似した構成の表示パネルを有する表示装置であれば、第１の発明と同じ構成を適用することができる。つまり、第１の基板と第２の基板の間に液晶材料が挟持されていない表示パネルでも、たとえば、第２の基板よりも観察者側に上偏光板を有する場合に、上偏光板に前記樹脂フィルムを貼り付けて密着させることで、表示パネルの薄型化と十分な強度の確保を両立することができる。またこのとき、樹脂フィルムの表面鉛筆硬度が３Ｈ以上であれば、第１の発明の液晶表示装置と同様に、たとえば、携帯電話端末に

組み込んだときに、液晶表示パネルを保護する保護カバーを貼り付けなくてもよくなり、携帯電話端末の表示部を薄型化できる。なお、液晶表示パネルと類似した構成であり、かつ、液晶材料を用いていない表示パネルには、たとえば、有機ＥＬを用いた自発光型の表示パネルがある。

【発明を実施するための最良の形態】

【００７５】

以下、本発明について、図面を参照して実施の形態（実施例）とともに詳細に説明する。

なお、実施例を説明するための全図において、同一機能を有するものは、同一符号を付け、その繰り返しの説明は省略する。

【実施例１】

【００７６】

図１は、本発明による実施例１の液晶表示パネルの概略構成を示す模式平面図である。図２は、図１のＡ－Ａ’線断面図である。図３は、実施例１の液晶表示パネルの作用効果を説明するための模式断面図である。なお、図３には、作用効果を説明するために（ａ），（ｂ）の２つの断面図を例示している。また、図３に示した（ａ），（ｂ）の２つの断面図は、ともに図１のＡ－Ａ’線での断面構成に相当する図である。

【００７７】

実施例１では、本発明が適用される表示装置の一例として透過型の液晶表示装置を挙げ、前記透過型の液晶表示装置で用いられる液晶表示パネルの構成および作用効果について説明する。

【００７８】

実施例１の液晶表示パネルは、図１に示すように、ＴＦＴ基板１と、対向基板２と、ＴＦＴ基板１と対向基板２の間に挟持された液晶材料３と、液晶材料３を挟持しているＴＦＴ基板１および対向基板２を挟むように配置された一対の偏光板４，５と、対向基板２側に配置された偏光板５と密着して貼り付けられた樹脂フィルム６とを有する。

【００７９】

また、ＴＦＴ基板１と対向基板２は、環状のシール材７によって接着されており、液晶材料３は、ＴＦＴ基板１、対向基板２、およびシール材７で囲まれた空間内に封入されて挟持されている。

【００８０】

なお、このような液晶表示パネルを有する表示装置では、ＴＦＴ基板１を基準にすると、観察者から見たときに、ＴＦＴ基板１よりも観察者側に対向基板２が配置されているのが一般的である。つまり、実施例１の液晶表示パネルを観察者が見たときには、手前から樹脂フィルム６、偏光板５、対向基板２、液晶材料３、ＴＦＴ基板１、偏光板４の順に配置されている。そこで、以下の説明では、観察者から見て対向基板２よりも手前（前方）に配置されている偏光板５を上偏光板と呼び、ＴＦＴ基板１の背面（後方）に配置されている偏光板４を下偏光板と呼ぶ。

【００８１】

ＴＦＴ基板１は、ガラス基板１０１と多層薄膜層１０２とを有する。詳細な説明は省略するが、多層薄膜層１０２は、複数の絶縁層、導電層、および半導体層などが積層しており、たとえば、走査信号線（ゲート信号線とも呼ばれる）、映像信号線（ドレイン信号線とも呼ばれる）、ＴＦＴ素子、および画素電極などが形成されている。

【００８２】

対向基板２は、ガラス基板２０１と多層薄膜層２０２とを有する。詳細な説明は省略するが、多層薄膜層２０２は、複数の絶縁層、導電層などが積層しており、たとえば、カラーフィルタが形成されている。

【００８３】

なお、液晶表示パネルの駆動方式が縦電界方式の場合、対向基板２の多層薄膜層２０２には、ＴＦＴ基板１の画素電極と対向する共通電極も形成されている。また、液晶表示パ

ネルの駆動方式が横電界方式の場合、前記共通電極はＴＦＴ基板１の多層薄膜層１０２に形成されている。

【００８４】

また、ＴＦＴ基板１の多層薄膜層１０２の構成と対向基板２の多層薄膜層２０２の構成の組み合わせは、従来の液晶表示パネルで適用されている種々の組み合わせのいずれかを適用すればよい。そのため、各多層薄膜層１０２，２０２の具体的な構成例についての詳細な説明は省略する。

【００８５】

下偏光板４は、たとえば、粘着剤などでＴＦＴ基板１のガラス基板１０１に貼り付けられて密着している。同様に、上偏光板５も、たとえば、粘着剤などで対向基板２のガラス基板２０１に貼り付けられて密着している。このとき、上偏光板４と下偏光板５は、透過軸（偏光軸とも呼ばれる）が直交するか、あるいは平行になるように貼り付けられる。この下偏光板４および上偏光板５は、たとえば、従来の液晶表示パネルに用いられているフィルム状の偏光板を用いればよいので、材料などの具体的な構成例についての詳細な説明は省略する。

【００８６】

なお、図示は省略するが、実施例１の液晶表示パネルでは、ＴＦＴ基板１のガラス基板１０１と下偏光板４の間、および対向基板２のガラス基板２０１と上偏光板５の間に、位相差板が配置されていてもよい。

【００８７】

樹脂フィルム６は、観察者から見て最も手前に配置されるフィルム部材である。そのため、樹脂フィルム６には、光の透過率が高いフィルム、特に無色透明のフィルムを用いることが好ましい。この樹脂フィルム６には、たとえば、アクリル樹脂またはエポキシ樹脂を用いることができる。またこのとき、樹脂フィルム６は、たとえば、粘着剤などで上偏光板５に貼り付けられて密着している。

【００８８】

また、実施例１の液晶表示パネルにおいて、樹脂フィルム６の厚さＴ６は、たとえば、０．２ｍｍ以上１．０ｍｍ以下にすることが好ましい。樹脂フィルム６の厚さＴ６が０．２ｍｍ以上あれば、ＴＦＴ基板１のガラス基板１０１および対向基板２のガラス基板２０１を、たとえば、それぞれ０．５ｍｍ以下に薄くしても液晶表示パネルの強度を十分に確保できる。そのため、実施例１の液晶表示パネルでは、パネルの総厚ＴＰを、たとえば、２ｍｍ以下にしても十分な強度を確保できる。またこのとき、実施例1の液晶表示パネルでは、パネルの総厚ＴＰが２ｍｍ以下であり、かつ、樹脂フィルムを除いたパネルの厚さＴＰ－Ｔ６が１．３ｍｍ以下であることが望ましい。

【００８９】

またこのとき、樹脂フィルム６には、液晶表示パネルの補強部材としての機能があるので、たとえば、図３の（ａ）に示すように、樹脂フィルム６が貼り付けられている対向基板２のガラス基板２０１の厚さＴ２を、ＴＦＴ基板１のガラス基板１０１の厚さＴ１よりも薄くすることが可能である。そのため、パネルの総厚ＴＰをさらに薄型化できる。

【００９０】

また、液晶表示パネルが、ＩＰＳ（Ｉｎ　Ｐｌａｎｅ　Ｓｗｉｔｃｈｉｎｇ）と呼ばれる横電界駆動型の場合、たとえば、図３の（ｂ）に示すように、対向基板２のガラス基板２０１の裏面、言い換えると上偏光板５が貼り付けられている面に、耐電防止用の導体膜２０３が設けられていることがある。この場合、対向基板２のガラス基板２０２は、裏面を研磨して薄型化することはできない。そのため、対向基板２に導体膜２０３が設けられている場合は、図３の（ｂ）に示すように、ＴＦＴ基板１のガラス基板１０１の裏面、言い換えると下偏光板４が貼り付けられている面を研磨し、ＴＦＴ基板１のガラス基板１０１の厚さＴ１を、対向基板２のガラス基板２０１の厚さＴ２よりも薄くすることで、パネルの総厚ＴＰを薄型化できる。

【００９１】

またさらに、樹脂フィルム６は、表面硬度が上偏光板５の表面硬度よりも高いことが好ましく、より具体的には表面鉛筆硬度が３Ｈ以上であることが好ましい。なお、表面鉛筆硬度とは、材料の表面に鉛筆で線を引いたときに材料表面に傷が付く硬さで表される硬度である。つまり、表面鉛筆硬度が３Ｈであるということは、３Ｈおよび３Ｈより軟らかい芯の鉛筆で樹脂フィルム６に線を引いたときには表面に傷が付かないことを意味する。

【００９２】

なお、樹脂フィルム６の表面鉛筆硬度を３Ｈ以上にする場合、鉛筆硬度が３Ｈ以上の硬度を有する材料をフィルム状に成形したものを用いてもよいし、任意の鉛筆硬度の材料をフィルム状に成形した後、表面にハードコート処理を施して表面の鉛筆硬度が３Ｈ以上になるようにしてもよい。樹脂フィルム６の材料としてアクリル樹脂やエポキシ樹脂を用いる場合は、後者のように、表面にハードコート処理を施すことで表面鉛筆硬度を３Ｈ以上にする。

【００９３】

図４乃至図７は、実施例１の液晶表示パネルを用いることが好ましい携帯型電子機器の一例と作用効果を説明するための模式図である。

図４は、従来の携帯電話端末の表示部の概略構成を示す模式正面図である。図５は、図４のＢ－Ｂ’線断面図である。図６は、実施例１の液晶表示パネルを用いた携帯電話端末の表示部の概略構成を示す模式正面図である。図７は、図６のＣ－Ｃ’線断面図である。

【００９４】

実施例１の液晶表示パネルは、たとえば、携帯電話端末などの携帯型電子機器の表示装置（モジュール）に適用することが好ましい表示パネルである。

【００９５】

携帯電話端末の表示部に用いられる液晶表示装置は、液晶表示パネルの他に、液晶表示パネルの映像信号線（ドレイン線）に映像信号を出力するデータドライバ、液晶表示パネルの走査信号線（ゲート線）に走査信号を出力するゲートドライバ、前記映像信号および走査信号を出力するタイミングを制御するタイミングコントローラーなどを有する。また、液晶表示装置が透過型または半透過型である場合は、バックライト（光源）を有する。そして、これらの部品は、たとえば、表示素子モールドと呼ばれるフレーム部材によって一体的に保持されている。

【００９６】

従来の携帯電話端末に用いられる液晶表示パネルは、たとえば、図４および図５に示すように、ＴＦＴ基板１、対向基板２、液晶材料３、下偏光板４、上偏光板５、シール材７で構成されている。このとき、液晶表示パネルを観察者が見たときには、手前から上偏光板５、対向基板２、液晶材料３、ＴＦＴ基板１、下偏光板４の順に配置されている。またこのとき、透過型の液晶表示装置であれば、観察者から見て下偏光板４のさらに後方にバックライト８が配置されている。そして、液晶表示パネルおよびバックライト８は、バックライト８の背面側が底面になるような凹形状の表示素子モールド９によって保持されている。

【００９７】

また、このような液晶表示装置は、液晶表示パネルの表示領域ＤＡが見えるように開口された携帯電話端末の外装（筐体）１０に収容されている。また、従来の携帯電話端末では、観察者から見て液晶表示パネルよりも手前に、たとえば、アクリル板などで構成された透明な保護カバー１１を配置しているのが一般的である。またこのとき、保護カバー１１は、外装１０の表面に設けたくぼみにはめ込み、粘着剤１２で外装１０に貼り付けていることが多い。この保護カバー１１は、たとえば、液晶表示パネルの表面（上偏光板５）に傷が付くのを防いだり、液晶表示パネルに圧力がかかって割れるのを防いだりするためのものである。

【００９８】

このように、従来の液晶表示装置を用いた携帯電話端末では、液晶表示パネルを保護する保護カバー１１が必要であり、その分、表示部が厚くなっていた。

【００９９】
一方、実施例１の液晶表示パネルは、上偏光板５に樹脂フィルム６を貼り付けることで、液晶表示パネルの強度を高くしている。また、樹脂フィルム６の表面鉛筆硬度を３Ｈ以上にすることで、表面に傷が付きにくくしている。つまり、実施例１の液晶表示パネルは、樹脂フィルム６に、従来の保護カバー１１としての機能を持たせている。そのため、たとえば、図６および図７に示すように、観察者から見て樹脂フィルム６が最も手前になるように液晶表示パネルを配置した液晶表示装置を携帯電話端末の外装１０に収容すれば、保護カバー１１が無くても液晶表示パネルを傷や圧力による割れから保護できる。この結果、携帯電話端末の表示部を、従来のものに比べて薄くすることができる。
【０１００】
また、従来の携帯電話端末の表示部は、液晶表示パネルと保護カバー１１の間に空気の層があるが、実施例１の液晶表示パネルを用いることで、その空気の層をなくすことができる。そのため、従来のものに比べて、表示効率も改善することができる。
【０１０１】
また、実施例１の液晶表示パネルは、ＴＦＴ基板１および対向基板２を、ガラス基板１０１，２０１を用いて製造することができる。そのため、特許文献１に記載されたプラスチック基板を用いた液晶表示パネルよりも、多層配線層１０２，２０２を容易に形成することができる。また、ＴＦＴ基板１および対向基板２を、ガラス基板１０１，２０１を用いて製造することで、環境変化による表示むらの発生も防げる。
【０１０２】
図８は、実施例１の液晶表示パネルを用いた携帯電話端末の表示部の構成の変形例を示す模式断面図である。なお、図８には、構成の変形例として（ａ），（ｂ）の２つの断面図を例示している。また、図８に示した（ａ），（ｂ）の２つの断面図は、ともに図６のＣ－Ｃ’線での断面構成に相当する図である。
【０１０３】
実施例１の液晶表示パネルを有する液晶表示装置を携帯電話端末に用いた場合、たとえば、図７に示したように、外装１０の表面に保護カバー１１を貼り付けなくてもよくなる。しかしながら、図７に示したような状態で収容されている場合、外装１０の開口領域の外周１０Ａと液晶表示パネル（樹脂フィルム６）の間に生じる隙間から外装内部に水分などが進入しやすく、液晶表示パネルのＴＦＴ基板１に形成された配線や他の回路基板に形成された配線などが腐食しやすくなる。
【０１０４】
そこで、実施例１の液晶表示パネルを用いる場合、たとえば、図８の（ａ）に示すように、対向基板２に貼り付けられた上偏光板５および樹脂フィルム６の外形を、下偏光板４の外形よりも小さくし、対向基板２と外装１０を粘着剤１３で接着固定することが好ましい。このとき、粘着剤１３の形状を、たとえば、上偏光板５および樹脂フィルム６を囲む環状にすれば、粘着剤１３が壁になり、外装内部への水分などの進入を防ぐことができる。なお、粘着剤１３に代えて、接着剤を用いてもよいことはもちろんである。
【０１０５】
またこのとき、たとえば、図８の（ｂ）に示すように、外装１０の開口領域の外周１０Ａに対向基板２側に突出する突起部を設ければ、外装内部への水分などの進入を防ぐ効果がより一層高くなる。
【０１０６】
図９は、実施例１の液晶表示パネルの応用例を説明するための模式正面図である。図１０は、図９のＤ－Ｄ’線断面図である。
【０１０７】
実施例１の液晶表示パネルは、対向基板２に貼り付けられた上偏光板５に、樹脂フィルム６を貼り付けることで、液晶表示パネルの薄型化と十分な強度の確保を両立している。また、このような液晶表示パネルを用いることで、携帯電話端末などの携帯型電子機器の表示部の薄型化を可能にしている。

【０１０８】
しかしながら、たとえば、図１および図２に示した液晶表示パネルのように、正面から見たときに上偏光板５の外周と樹脂フィルム６の外周が一致している場合、たとえば、図７および図８の（ａ），（ｂ）に示したように、上偏光板５の外周端面が外気に触れてしまう。そのため、外気に含まれる水分で上偏光板５が腐食、劣化してしまい、上偏光板５が対向基板２から剥がれたり、表示むらの原因になったりする可能性がある。
【０１０９】
そのような問題の発生を防ぐには、たとえば、図９および図１０に示すように、液晶表示パネルを正面から見たときに、樹脂フィルム６の外周が、上偏光板５の外周よりも内側になるように樹脂フィルム６の外形を小さくすればよい。なお、樹脂フィルム６の外形を小さくする場合、その外周が表示領域ＤＡよりも外側になるようにすることはもちろんである。
【０１１０】
図１１は、図９および図１０に示した液晶表示パネルを用いた携帯電話端末の表示部の構成例を示す模式断面図である。なお、図１１には、構成例として（ａ），（ｂ），（ｃ）の３つの断面図を例示している。また、図１１に示した（ａ），（ｂ），（ｃ）の３つの断面図は、ともに図６のＣ－Ｃ’線での断面構成に相当する図である。
【０１１１】
図９および図１０に示した液晶表示パネルを有する液晶表示装置を携帯電話端末に用いた場合も、たとえば、図１１の（ａ）に示したように、外装１０の表面に保護カバー１１を貼り付けなくてもよくなる。そのため、携帯電話端末の表示部を、従来のものより薄型化できる。
【０１１２】
また、液晶表示パネルの樹脂フィルム６の外周が、上偏光板５の外周よりも内側にあるので、外装１０の開口領域の外周１０Ａを上偏光板５の外周よりも内側にすることができる。そのため、たとえば、図７に示した場合に比べて、外装１０の外側から上偏光板５の外周側面に達するまでの経路が長く、かつ複雑になり、水分などが進入しにくくなる。その結果、上偏光板５の外周側面が腐食、劣化しにくくなり、上偏光板５が対向基板２から剥がれたり、表示むらの原因になったりする可能性を低くできる。
【０１１３】
またこのとき、たとえば、図１１の（ｂ）に示すように、上偏光板５と外装１０を粘着剤１３で接着固定することが好ましい。このとき、粘着剤１３の形状を、たとえば、樹脂フィルム６を囲む環状にすれば、粘着剤１３が壁になり、外装内部への水分などの進入を防ぐことができる。その結果、上偏光板５の外周側面がさらに劣化しにくくなり、上偏光板５が対向基板２から剥がれたり、表示むらの原因になったりする可能性をさらに低くできる。
【０１１４】
またさらに、たとえば、図１１の（ｃ）に示すように、外装１０の開口領域の外周１０Ａに上偏光板５側に突出する突起部を設ければ、外装内部への水分などの進入を防ぐ効果がより一層高くなる。
【０１１５】
以上説明したように、実施例１の液晶表示パネルによれば、上偏光板５に樹脂フィルム６を貼り付けて密着させることで、液晶表示パネルの強度を確保できる。また、樹脂フィルム６により強度を確保できるので、ＴＦＴ基板１のガラス基板１０１および対向基板２のガラス基板２０１を研磨して薄型化できる。そのため、液晶表示パネルを薄型化できる。つまり、実施例１の液晶表示パネルは、薄型化と十分な強度の確保を両立することができる。
【０１１６】
また、ＴＦＴ基板１および対向基板２を、ガラス基板を用いて形成することができるので、環境変化による変形量に差がほとんど無い。そのため、環境変化による表示むらの発

生を防ぐこともできる。
【０１１７】
また、携帯電話端末などの携帯型電子機器に、実施例１の液晶表示パネルを有する液晶表示装置（モジュール）を用いることで、携帯型電子機器の表示部を薄型化できる。
【０１１８】
なお、実施例１では、樹脂フィルム６の表面鉛筆硬度を３Ｈ以上にすることで、たとえば、携帯電話端末に組み込む際の従来の保護カバー１１を不要にし、表示部を薄型化する例を挙げている。しかしながら、実施例１の液晶表示パネルは、これに限らず、たとえば、保護カバー１１を用いる携帯電話端末に組み込んでもよいことはもちろんである。保護カバー１１を用いる場合、樹脂フィルム６の表面鉛筆硬度は３Ｈ以下でも構わない。ただし、この場合は、樹脂フィルム６を含む液晶表示パネルの総厚ＴＰを１．３ｍｍ以下にすることが望ましい。
【実施例２】
【０１１９】
図１２は、本発明による実施例２の液晶表示パネルの概略構成を示す模式断面図である。なお、図１２に示した断面図は、図１のＡ－Ａ’線での断面構成に相当する図である。
【０１２０】
実施例２の液晶表示パネルは、基本的には実施例１の液晶表示パネルの同様の構成である。そのため、実施例２では、実施例１と異なる点のみを説明する。
【０１２１】
実施例２の液晶表示パネルは、たとえば、図１２に示すように、ＴＦＴ基板１と、対向基板２と、ＴＦＴ基板１と対向基板２の間に挟持された液晶材料３と、液晶材料３を挟持しているＴＦＴ基板１および対向基板２を挟むように配置された一対の偏光板（下偏光板４および上偏光板５）と、対向基板２側に配置された樹脂フィルム６とを有する。
【０１２２】
なお、図示は省略するが、実施例２の液晶表示パネルでも、ＴＦＴ基板１のガラス基板１０１と下偏光板４の間、および対向基板２のガラス基板２０１と上偏光板５の間に、位相差板が配置されていてもよい。
【０１２３】
このとき、樹脂フィルム６は、実施例１と異なり、対向基板２と上偏光板５の間に配置される。またこのとき、樹脂フィルム６は、たとえば、粘着剤などで対向基板２のガラス基板２０１に貼り付けられて密着している。そして、上偏光板５も、たとえば、粘着剤などで樹脂フィルム６に貼り付けられて密着している。
【０１２４】
実施例２の液晶表示パネルにおいても、樹脂フィルム６は、光の透過率が高いフィルム、特に無色透明なフィルムを用いることが好ましい。また、実施例２の液晶表示パネルでは、上偏光板５と対向基板２（下偏光板４）の間に樹脂フィルム６を配置している。そのため、樹脂フィルム６は光学異方性が小さいことが望ましく、ほぼ０であることがより望ましい。したがって、樹脂フィルム６には、たとえば、エポキシ樹脂を用いることが望ましい。ただし、光学異方性が許容できる大きさである場合、あるいは補償できる場合には、たとえば、樹脂フィルム６にアクリル樹脂を用いても構わない。
【０１２５】
なお、実施例２の液晶表示パネルは、観察者から見ると、樹脂フィルム６よりも手前（前方）に上偏光板５が配置されている。そのため、実施例２の場合、実施例１の液晶表示パネルのように樹脂フィルム６の表面鉛筆硬度を３Ｈ以上にする必要は無い。その代わりに、実施例２の液晶表示パネルでは、観察者から見て最も手前に配置される上偏光板５の表面鉛筆硬度を３Ｈ以上にする。上偏光板５の表面鉛筆硬度を３Ｈ以上にするには、たとえば、従来の一般的な偏光板の表面にハードコート処理を施せばよい。
【０１２６】
また、実施例２の液晶表示パネルにおいても、樹脂フィルム６の厚さＴ６は、たとえば

、０．２ｍｍ以上１．０ｍｍ以下にすることが好ましい。樹脂フィルム６の厚さＴ６が０．２ｍｍ以上あれば、ＴＦＴ基板１のガラス基板１０１および対向基板２のガラス基板２０１を、たとえば、それぞれ０．５ｍｍ以下に薄くしても液晶表示パネルの強度を十分に確保できる。そのため、実施例２の液晶表示パネルでは、パネルの総厚ＴＰを、たとえば、２ｍｍ以下にしても十分な強度を確保できる。またこのとき、実施例２の液晶表示パネルでは、パネルの総厚ＴＰが２ｍｍ以下であり、かつ、樹脂フィルムを除いたパネルの厚さＴＰ－Ｔ６が１．３ｍｍ以下であることが望ましい。

【０１２７】

またこのとき、樹脂フィルム６には、液晶表示パネルの補強部材としての機能があるので、たとえば、図３の（ａ）に示した構成と同様に、樹脂フィルム６が貼り付けられている対向基板２のガラス基板２０１の厚さＴ２を、ＴＦＴ基板１のガラス基板１０１の厚さＴ１よりも薄くすることが可能である。そのため、パネルの総厚ＴＰをさらに薄型化できる。

【０１２８】

また、液晶表示パネルが、ＩＰＳと呼ばれる横電界駆動型の場合、たとえば、図３の（ｂ）に示した構成と同様に、対向基板２のガラス基板２０１の裏面、言い換えると上偏光板５が貼り付けられている面に、耐電防止用の導体膜２０３が設けられていることがある。この場合、対向基板２のガラス基板２０２は、裏面を研磨して薄型化することはできない。そのため、対向基板２に導体膜２０３が設けられている場合は、たとえば、図３の（ｂ）に示した構成と同様に、ＴＦＴ基板１のガラス基板１０１の裏面、言い換えると下偏光板４が貼り付けられている面を研磨し、ＴＦＴ基板１のガラス基板１０１の厚さＴ１を、対向基板２のガラス基板２０１の厚さＴ２よりも薄くすることで、パネルの総厚ＴＰを薄型化できる。

【０１２９】

図１３は、実施例２の液晶表示パネルを用いた携帯電話端末の表示部の構成例を示す模式断面図である。なお、図１３には、構成例として（ａ），（ｂ），（ｃ）の３つの断面図を例示している。また、図１３に示した（ａ），（ｂ），（ｃ）の３つの断面図は、ともに図６のＣ－Ｃ’線での断面構成に相当する図である。

【０１３０】

実施例２の液晶表示パネルを有する液晶表示装置を携帯電話端末に用いた場合も、たとえば、図１３の（ａ）に示したように、外装１０の表面に保護カバー１１を貼り付けなくてもよくなる。そのため、携帯電話端末の表示部を、従来のものより薄型化できる。

【０１３１】

しかしながら、図１３の（ａ）に示したような状態で収容されている場合、外装１０の開口領域の外周１０Ａと液晶表示パネル（上偏光板５）の間に生じる隙間から外装内部に水分などが進入しやすく、液晶表示パネルのＴＦＴ基板１に形成された配線や他の回路基板に形成された配線などが腐食しやすくなる。

【０１３２】

そこで、実施例２の液晶表示パネルを用いる場合も、たとえば、図１３の（ｂ）に示すように、対向基板２に貼り付けられた上偏光板５および樹脂フィルム６の外形を、下偏光板４の外形よりも小さくし、対向基板２と外装を粘着剤１３で接着固定することが好ましい。このとき、粘着剤１３の形状を、たとえば、上偏光板５および樹脂フィルム６を囲む環状にすれば、粘着剤１３が壁になり、外装内部への水分などの進入を防ぐことができる。

【０１３３】

またこのとき、たとえば、図１３の（ｃ）に示すように、外装１０の開口領域の外周１０Ａに、対向基板２側に突出する突起部を設ければ、外装内部への水分などの進入を防ぐ効果がより一層高くなる。

【０１３４】

図１４は、実施例２の液晶表示パネルの応用例を説明するための模式断面図である。な

お、図１４に示した断面図は、図９のＤ－Ｄ’線での断面構成に相当する図である。
【０１３５】
実施例２の液晶表示パネルにおいても、対向基板２のガラス基板２０１に貼り付けた樹脂フィルム６および上偏光板５は、たとえば、図１４に示すように、上偏光板５の外周が、樹脂フィルム６の外周よりも内側になるように上偏光板５の外形を小さくしてもよい。なお、上偏光板５の外形を小さくする場合、その外周が表示領域ＤＡよりも外側になるようにすることはもちろんである。
【０１３６】
図１５は、図１４に示した液晶表示パネルを用いた携帯電話端末の表示部の構成例を示す模式断面図である。なお、図１５には、構成例として（ａ），（ｂ），（ｃ）の３つの断面図を例示している。また、図１５に示した（ａ），（ｂ），（ｃ）の３つの断面図は、ともに図６のＣ－Ｃ’線での断面構成に相当する図である。
【０１３７】
図１４に示した液晶表示パネルを有する液晶表示装置を携帯電話端末に用いた場合も、たとえば、図１５の（ａ）に示したように、外装１０の表面に保護カバー１１を貼り付けなくてもよくなる。そのため、携帯電話端末の表示部を、従来のものより薄型化できる。
【０１３８】
また、液晶表示パネルの上偏光板５の外周が、樹脂フィルム６の外周よりも内側にあるので、外装１０の開口領域の外周１０Ａを樹脂フィルム６の外周よりも内側にすることができる。そのため、たとえば、図１３の（ａ）に示した場合に比べて、外装１０の外側から内部に達する経路が長く、かつ複雑になり、水分などが進入しにくくなる。
【０１３９】
またこのとき、たとえば、図１５の（ｂ）に示すように、樹脂フィルムと外装１０を粘着剤１３で接着固定することが好ましい。このとき、粘着剤１３の形状を、たとえば、上偏光板を囲む環状にすれば、粘着剤１３が壁になり、外装内部への水分などの進入を防ぐことができる。
【０１４０】
またさらに、たとえば、図１５の（ｃ）に示すように、外装１０の開口領域の外周１０Ａに、樹脂フィルム６側に突出する突起部を設ければ、外装内部への水分などの進入を防ぐ効果がより一層高くなる。
【０１４１】
以上説明したように、実施例２の液晶表示パネルによれば、対向基板２のガラス基板２０１と上偏光板５の間に樹脂フィルム６を密着させて配置することで、液晶表示パネルの強度を確保できる。また、樹脂フィルム６により強度を確保できるので、ＴＦＴ基板１のガラス基板１０１および対向基板２のガラス基板２０１を研磨して薄型化できる。そのため、液晶表示パネルを薄型化できる。つまり、実施例２の液晶表示パネルも、薄型化と十分な強度の確保を両立することができる。
【０１４２】
また、ＴＦＴ基板１および対向基板２を、ガラス基板を用いて形成することができるので、環境変化による変形量に差がほとんど無い。そのため、環境変化による表示むらの発生を防ぐこともできる。
【０１４３】
また、携帯電話端末などの携帯型電子機器に、実施例２の液晶表示パネルを有する液晶表示装置（モジュール）を用いることで、携帯型電子機器の表示部を薄型化できる。
【０１４４】
なお、実施例２では、上偏光板５の表面鉛筆硬度を３Ｈ以上にすることで、たとえば、携帯電話端末に組み込む際の従来の保護カバー１１を不要にし、表示部を薄型化する例を挙げている。しかしながら、実施例２の液晶表示パネルの場合も、これに限らず、たとえば、保護カバー１１を用いる携帯電話端末に組み込んでもよいことはもちろんである。保護カバー１１を用いる場合、上偏光板５の表面鉛筆硬度は３Ｈ以下でも構わない。ただし

、この場合は、樹脂フィルム６を含む液晶表示パネルの総厚ＴＰを１．３ｍｍ以下にすることが望ましい。
【実施例３】
【０１４５】
図１６は、本発明による実施例３の液晶表示パネルの概略構成を示す模式断面図である。
【０１４６】
実施例３の液晶表示パネルは、基本的には実施例１の液晶表示パネルの同様の構成である。そのため、実施例３では、実施例１と異なる点のみを説明する。
【０１４７】
実施例３の液晶表示パネルは、たとえば、図１６に示すように、ＴＦＴ基板１と、対向基板２と、ＴＦＴ基板１と対向基板２の間に挟持された液晶材料３と、液晶材料３を挟持しているＴＦＴ基板１および対向基板２を挟むように配置された一対の偏光板（下偏光板４および上偏光板５）と、ＴＦＴ基板１側の下偏光板４と密着して貼り付けられた樹脂フィルム６とを有する。
【０１４８】
つまり、実施例３の液晶表示パネルでは、樹脂フィルム６は、実施例１と異なり、ＴＦＴ基板１の背面側にあり、観察者から見て最も奥に配置される。このとき、樹脂フィルム６は、たとえば、粘着剤などで下偏光板４に貼り付けられて密着している。
【０１４９】
なお、図示は省略するが、実施例３の液晶表示パネルにおいても、ＴＦＴ基板１のガラス基板１０１と下偏光板４の間、および対向基板２のガラス基板２０１と上偏光板５の間に、位相差板が配置されていてもよい。
【０１５０】
実施例３の液晶表示パネルにおいても、樹脂フィルム６は、光の透過率が高いフィルム、特に無色透明なフィルムを用いることが好ましい。この樹脂フィルム６には、たとえば、アクリル樹脂やエポキシ樹脂を用いることができる。
【０１５１】
なお、実施例３の液晶表示パネルは、観察者から見ると、樹脂フィルム６よりも手前（前方）に下偏光板４やＴＦＴ基板１などが配置されている。そのため、実施例３の場合も、実施例１の液晶表示パネルのように樹脂フィルム６の表面鉛筆硬度を３Ｈ以上にする必要は無い。
【０１５２】
また、実施例３の液晶表示パネルでは、たとえば、ＴＦＴ基板１のガラス基板１０１の厚さＴ１と対向基板２のガラス基板２０１の厚さＴ２の合計が０．５ｍｍ以下になるようにすることが好ましい。なお、このときの各ガラス基板１０１，２０１の厚さＴ１，Ｔ２は、ほぼ等しくてもよいし、一方が薄く他方が厚くなっていてもよい。
【０１５３】
このようにすると、たとえば、液晶表示パネルに、上偏光板５側から押圧が加わったときに、その力を液晶表示パネルの背面側に貼り付けられた樹脂フィルム６で支えることができる。そのため、各ガラス基板１０１，２０１を薄型化しても、液晶表示パネルの強度を十分に確保できる。
【０１５４】
図１７は、実施例３の液晶表示パネルの変形例を説明するための模式断面図である。
【０１５５】
実施例３のように、ＴＦＴ基板１側に樹脂フィルム６を配置する場合、その配置位置は、たとえば、図１７に示すように、ＴＦＴ基板１のガラス基板１０１と下偏光板４の間であってもよい。なお、ＴＦＴ基板１と下偏光板４の間に樹脂フィルム６を配置する場合は、樹脂フィルム６は光学異方性が小さいことが望ましく、ほぼ０であることがより望ましい。したがって、樹脂フィルム６には、たとえば、エポキシ樹脂を用いることが望ましい

。ただし、光学異方性が許容できる大きさである場合、あるいは補償できる場合には、たとえば、樹脂フィルム６にアクリル樹脂を用いても構わない。

【０１５６】

また、実施例３の液晶表示パネルにおいても、樹脂フィルム６の厚さＴ６は、たとえば、０．２ｍｍ以上１．０ｍｍ以下にすることが好ましい。樹脂フィルム６の厚さＴ６が０．２ｍｍ以上あれば、ＴＦＴ基板１のガラス基板１０１および対向基板２のガラス基板２０１を、たとえば、それぞれ０．５ｍｍ以下に薄くしても液晶表示パネルの強度を十分に確保できる。そのため、実施例３の液晶表示パネルでは、パネルの総厚ＴＰを、たとえば、１．３ｍｍ以下にしても十分な強度を確保できる。

【０１５７】

以上説明したように、実施例３の液晶表示パネルによれば、下偏光板４の背面側またはＴＦＴ基板１のガラス基板１０１と下偏光板４の間に樹脂フィルム６を密着させて配置することで、液晶表示パネルの強度を確保できる。また、樹脂フィルム６により強度を確保できるので、ＴＦＴ基板１のガラス基板１０１および対向基板２のガラス基板２０１を研磨して薄型化できる。そのため、液晶表示パネルを薄型化できる。つまり、実施例３の液晶表示パネルも、薄型化と十分な強度の確保を両立することができる。

【０１５８】

また、ＴＦＴ基板１および対向基板２を、ガラス基板を用いて形成することができるので、環境変化による変形量に差がほとんど無い。そのため、環境変化による表示むらの発生を防ぐこともできる。

【０１５９】

なお、実施例３の液晶表示パネルを有する液晶表示装置を、たとえば、携帯電話端末に組み込む場合は、従来の液晶表示装置のように、携帯電話端末の外装１０に、液晶表示パネルを保護する保護カバー１１を貼り付けることが好ましい。ただし、実施例３の液晶表示パネルを有する液晶表示装置の場合、ＴＦＴ基板１のガラス基板１０１と対向基板２のガラス基板２０１の厚さの合計Ｔ１＋Ｔ２が０．５ｍｍ以下であり、かつ、樹脂フィルム６の厚さが０．１ｍｍ以上、０．３ｍｍ以下である。つまり、実施例３の液晶表示パネルを用いた液晶表示装置では、液晶表示パネルの厚さが、従来の液晶表示パネルの厚さに比べて薄くなっている分、液晶表示装置を薄型化できる。その結果、液晶表示パネルを保護する保護カバーを貼り付けても、携帯電話端末の表示部を、従来のものに比べて薄型化できる。

【０１６０】

以上、本発明を、前記実施例に基づき具体的に説明したが、本発明は、前記実施例に限定されるものではなく、その要旨を逸脱しない範囲において、種々変更可能であることはもちろんである。

【０１６１】

たとえば、前記各実施例では、透過型または半透過型の液晶表示パネルを例に挙げており、下偏光板４と上偏光板５の２枚の偏光板を有する。しかしながら、本発明は、透過型または半透過型に限らず、反射型の液晶表示パネルに適用することもできる。

【０１６２】

図１８は、本発明を反射型の液晶表示パネルに適用したときの概略構成を示す模式断面図である。

【０１６３】

反射型の液晶表示パネルは、たとえば、図１８に示すように、ＴＦＴ基板１と、対向基板２と、ＴＦＴ基板１と対向基板２の間に挟持された液晶材料３と、対向基板２のガラス基板２０１に貼り付けられた偏光板５とを有する。そして、実施例１の構成を適用した場合、対向基板２側に配置された偏光板５と密着して貼り付けられた樹脂フィルム６とを有する。

【０１６４】

なお、このような液晶表示パネルを有する表示装置では、ＴＦＴ基板１を基準にすると

、観察者から見たときに、ＴＦＴ基板１よりも観察者側に対向基板２が配置されているのが一般的である。つまり、図１８に示した液晶表示パネルを観察者が見たときには、手前から樹脂フィルム６、偏光板５、対向基板２、液晶材料３、ＴＦＴ基板１の順に配置されている。

【０１６５】

またこのとき、たとえば、ＴＦＴ基板１の多層薄膜層１０２に反射層が形成されており、樹脂フィルム６側から液晶表示パネルに入射した光１４を、多層薄膜層１０２の反射層で反射させた後、観察者側に出射させる。

【０１６６】

このような反射型の液晶表示パネルでも、たとえば、アクリル樹脂やエポキシ樹脂などを用いた樹脂フィルム６を偏光板５に貼り付けて密着させることで、ＴＦＴ基板１のガラス基板１０１や対向基板２のガラス基板２０１を研磨して薄型化しても、十分な強度を確保することができる。そのため、液晶表示パネルの薄型化と、十分な強度の確保を両立させることができる。

【０１６７】

なお、図１８には、観察者から見て偏光板５の手前に樹脂フィルム６を配置する例を挙げているが、これに限らず、対向基板２のガラス基板２０１と偏光板５の間、あるいはＴＦＴ基板１のガラス基板１０１の背面側に樹脂フィルム６を貼り付けて密着させてもよい。

【０１６８】

また、前記各実施例では、本発明を液晶表示パネルに適用した場合を例に挙げたが、本発明は、他の表示パネル、たとえば、有機ＥＬ（Ｅｌｅｃｔｒｏ　Ｌｕｍｉｎｅｓｃｅｎｃｅ）を用いた自発光型の表示装置の表示パネルにも適用することができる。

【０１６９】

図１９は、本発明を有機ＥＬパネルに適用したときの概略構成を示す模式断面図である。

【０１７０】

有機ＥＬパネルは、たとえば、図１９に示すように、ＴＦＴ基板１と、対向基板２（ガラス基板２０１）と、対向基板２に貼り付けられた位相差板１５および上偏光板５とを有する。そして、実施例１の構成を適用した場合、対向基板２側に配置された上偏光板５と密着して貼り付けられた樹脂フィルム６とを有する。

【０１７１】

有機ＥＬパネルにおいては、上偏光板５と位相差板１５とを組み合わせて円偏光板を構成することで、外光の反射（映り込み）を防止している。このとき、位相差板１５は、たとえば、λ／４位相差板のみを用いてもよいし、λ／４位相差板とλ／２位相差板を重ねて用いてもよい。特に、λ／４位相差板とλ／２位相差板を重ねた位相差板１５と上偏光板５を組み合わせることで、広帯域円偏光板を構成することができる。

【０１７２】

また、有機ＥＬパネルの場合、たとえば、ＴＦＴ基板１の多層薄膜層１０２に、有機ＥＬ材料を用いた発光層を有し、発光層の点灯および消灯、そして点灯時の光１４の輝度によって各画素の階調を制御する。そのため、ＴＦＴ基板１、対向基板２、およびシール材７で囲まれた空間内は、真空状態になっている。また、液晶表示パネルと異なり、対向基板２には多層薄膜層２０２が無くてもよい。

【０１７３】

なお、本発明は、液晶表示パネル、有機ＥＬを用いた表示パネルに限らず、これらと類似した構成の表示パネルに適用可能であることはもちろんである。

【図面の簡単な説明】

【０１７４】

【図１】本発明による実施例１の液晶表示パネルの概略構成を示す模式平面図である。

【図２】図１のＡ－Ａ’線断面図である。
【図３】実施例１の液晶表示パネルの作用効果を説明するための模式断面図である。
【図４】従来の携帯電話端末の表示部の概略構成を示す模式正面図である。
【図５】図４のＢ－Ｂ’線断面図である。
【図６】実施例１の液晶表示パネルを用いた携帯電話端末の表示部の概略構成を示す模式正面図である。
【図７】図６のＣ－Ｃ’線断面図である。
【図８】実施例１の液晶表示パネルを用いた携帯電話端末の表示部の構成の変形例を示す模式断面図である。
【図９】実施例１の液晶表示パネルの応用例を説明するための模式正面図である。
【図１０】図９のＤ－Ｄ’線断面図である。
【図１１】図９および図１０に示した液晶表示パネルを用いた携帯電話端末の表示部の構成例を示す模式断面図である。
【図１２】本発明による実施例２の液晶表示パネルの概略構成を示す模式断面図である。
【図１３】実施例２の液晶表示パネルを用いた携帯電話端末の表示部の構成例を示す模式断面図である。
【図１４】実施例２の液晶表示パネルの応用例を説明するための模式断面図である。
【図１５】図１４に示した液晶表示パネルを用いた携帯電話端末の表示部の構成例を示す模式断面図である。
【図１６】本発明による実施例３の液晶表示パネルの概略構成を示す模式断面図である。
【図１７】実施例３の液晶表示パネルの変形例を説明するための模式断面図である。
【図１８】本発明を反射型の液晶表示パネルに適用したときの概略構成を示す模式断面図である。
【図１９】本発明を有機ＥＬパネルに適用したときの概略構成を示す模式断面図である。

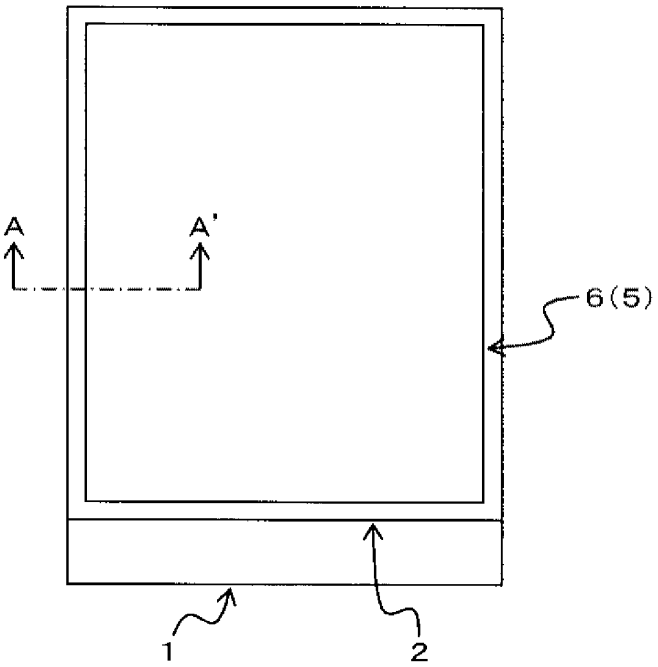
【符号の説明】

【０１７５】

１…ＴＦＴ基板
２…対向基板
１０１，２０１…ガラス基板
１０２，２０２…多層配線層
２０３…導体膜
３…液晶材料
４…偏光板（下偏光板）
５…偏光板（上偏光板）
６…樹脂フィルム
７…シール材
８…バックライト
９…表示素子モールド
１０…外装
１０Ａ…外装の開口領域の外周
１１…保護カバー
１２，１３…粘着剤
１４…光
１５…位相差板

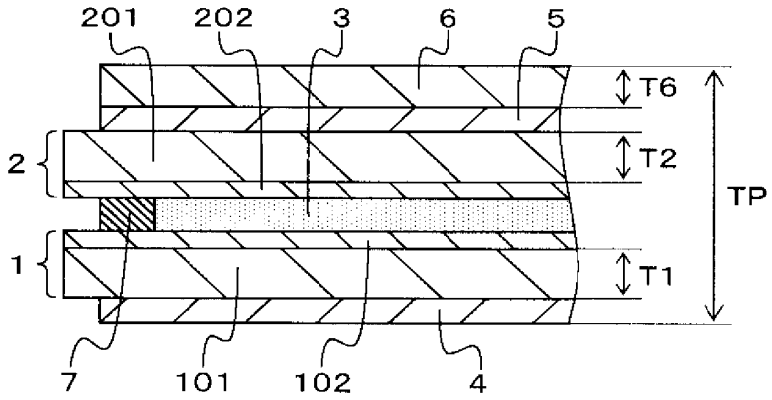
【書類名】図面
【図１】

図1



【図２】

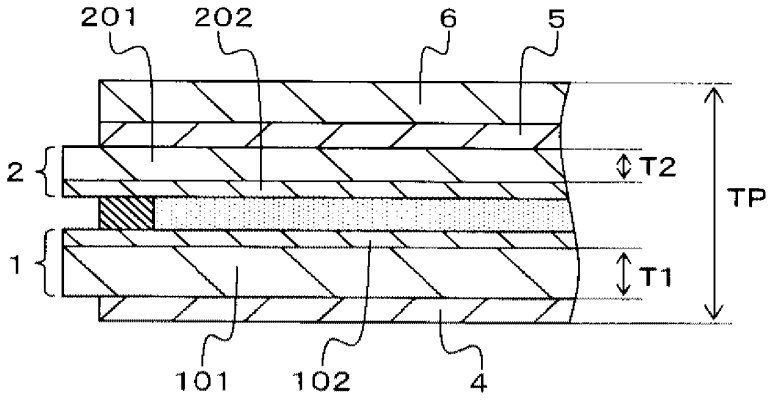
図2



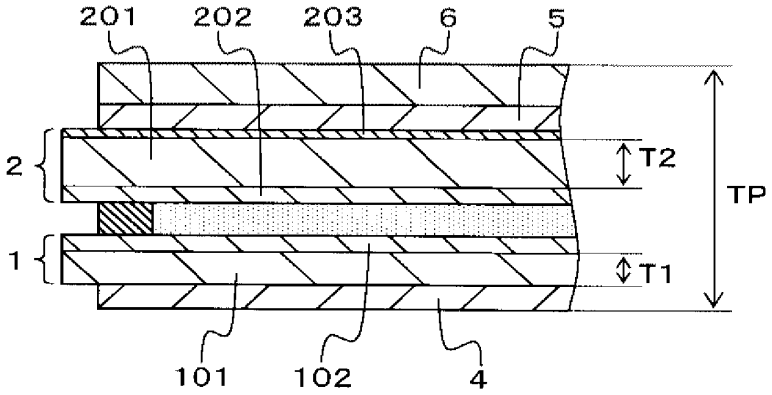
【図３】

図3

(a)

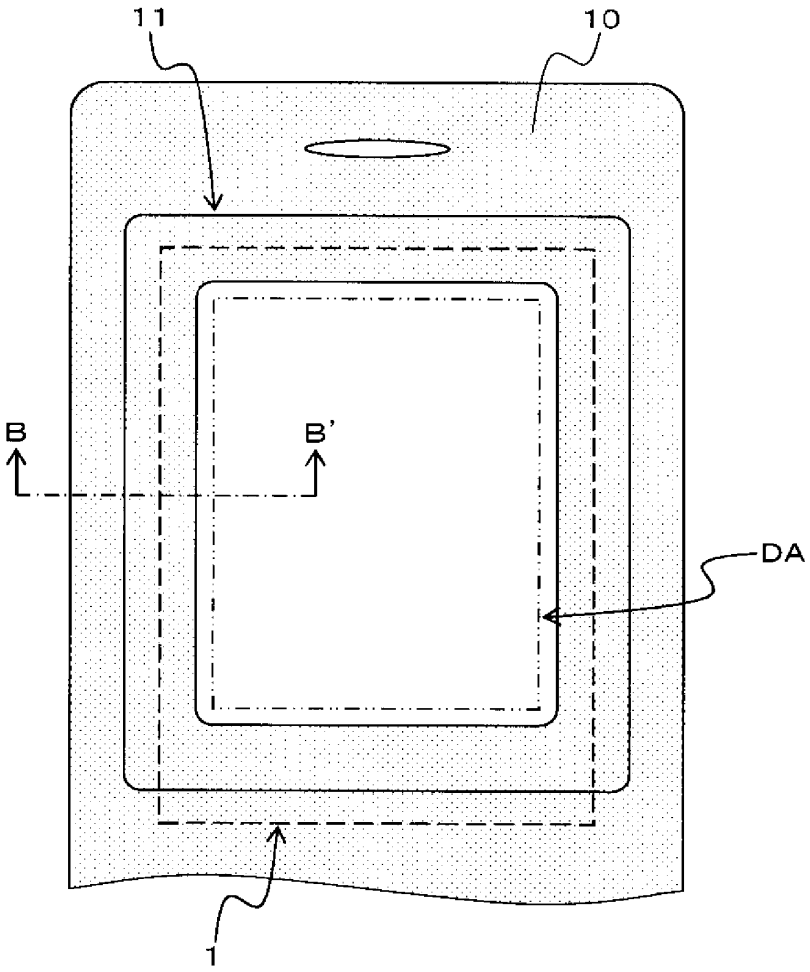


(b)



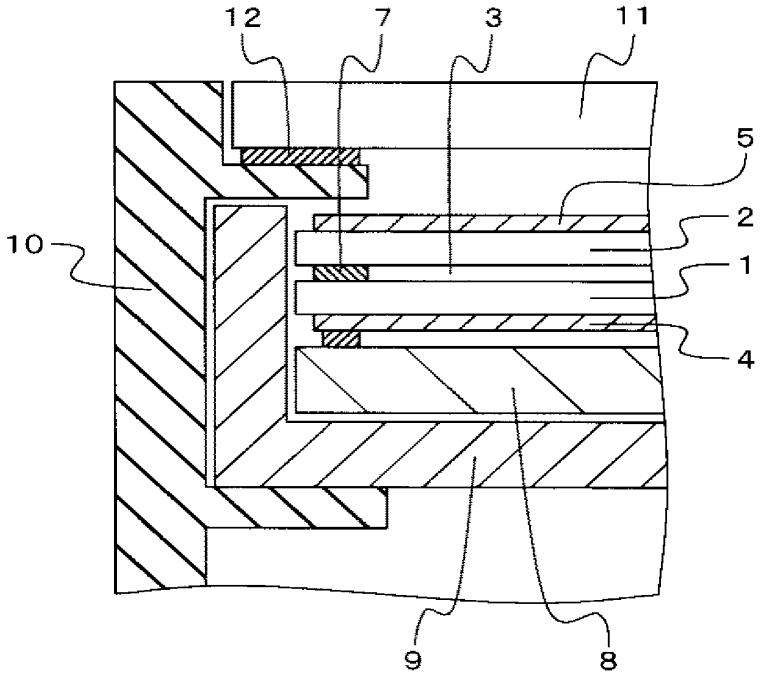
【図４】

図4



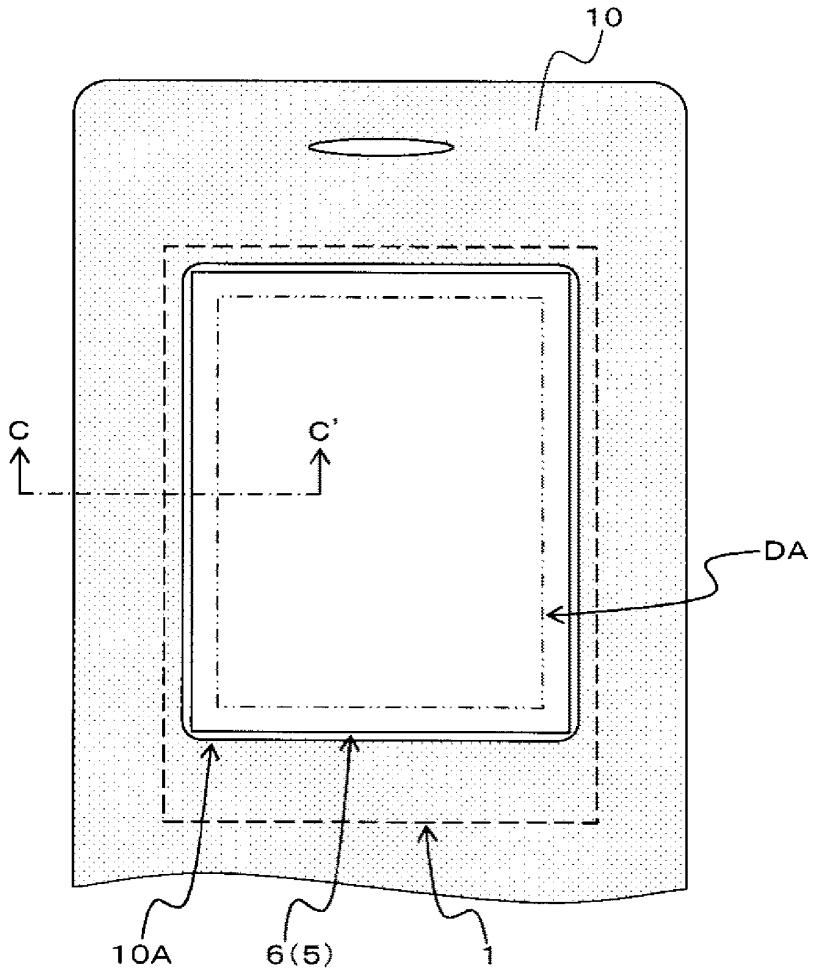
【図５】

図５



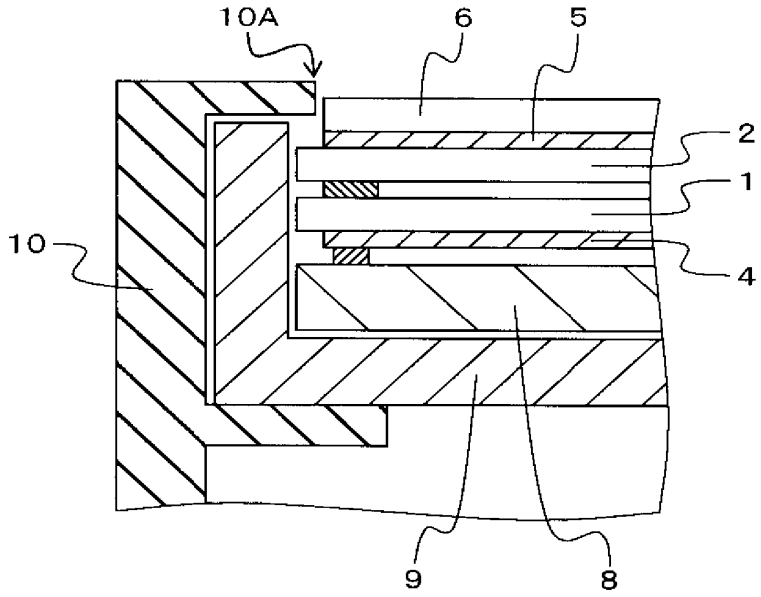
【図６】

図6



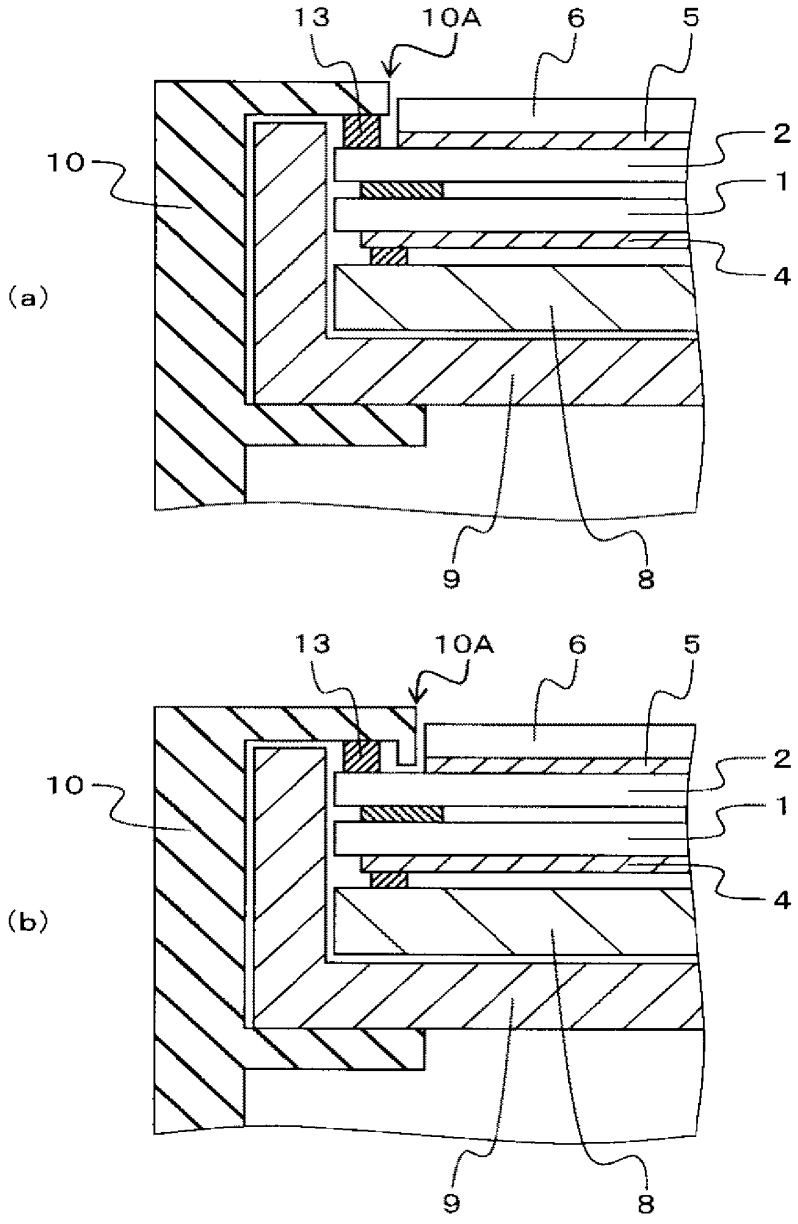
【図７】

図7



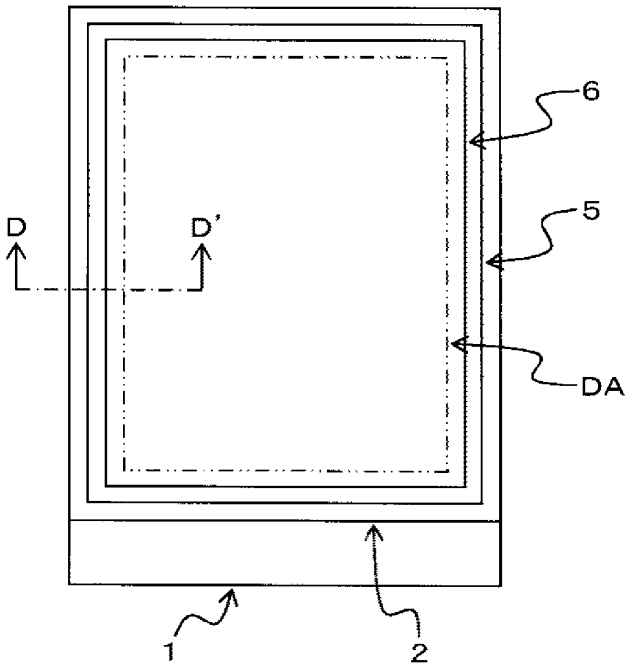
【図８】

図8



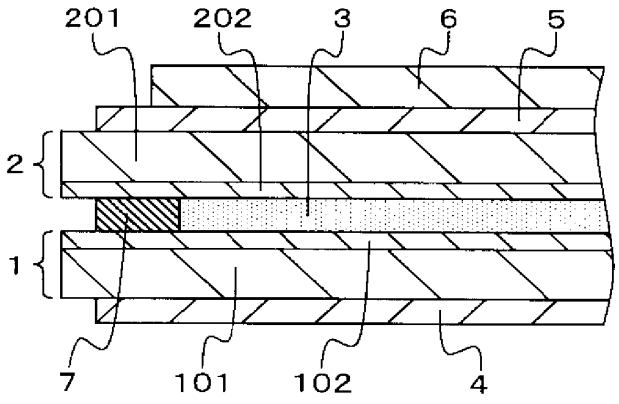
【図９】

図9



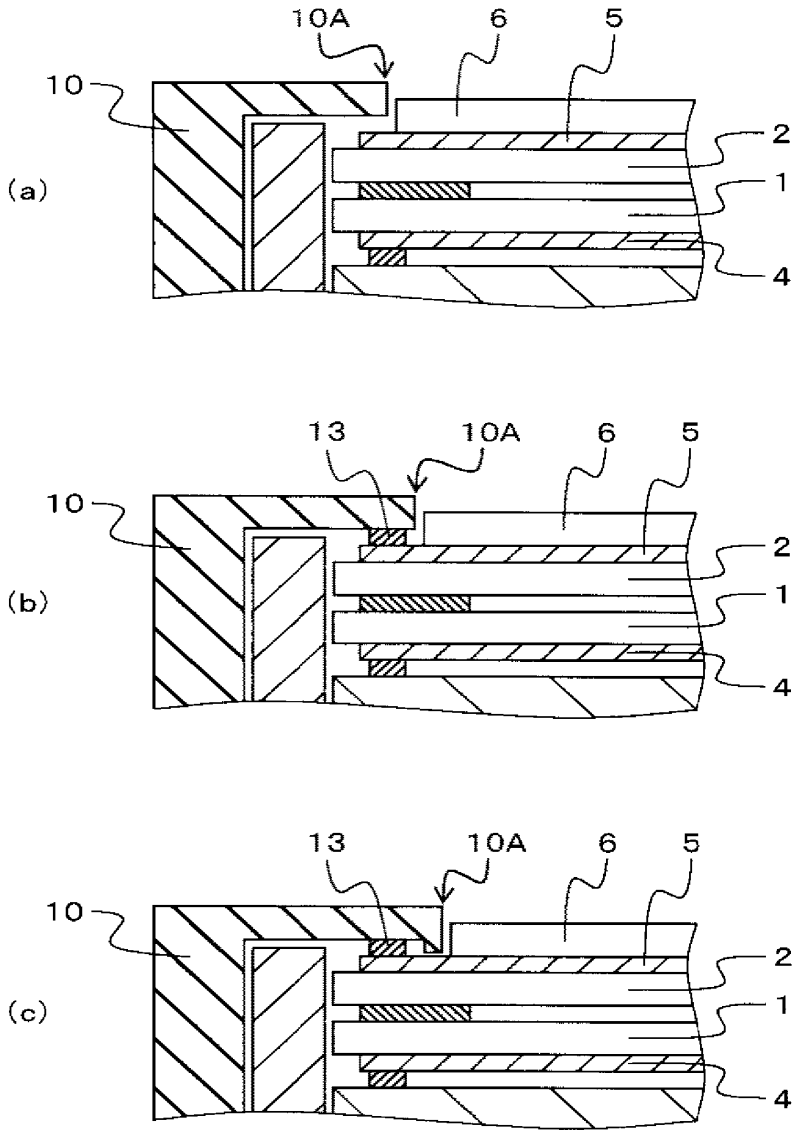
【図１０】

図10



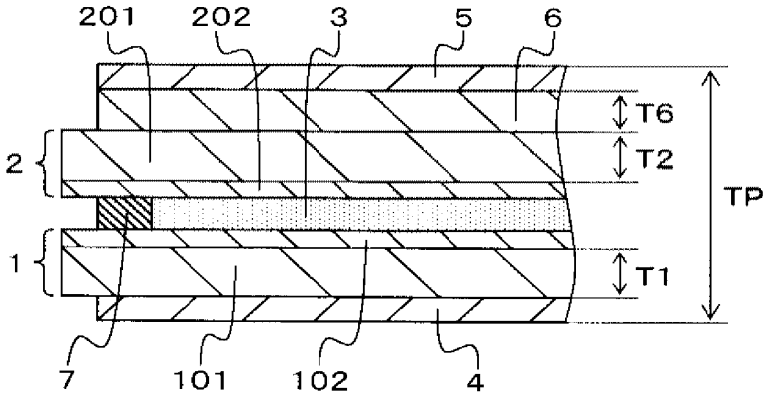
【図１１】

図１１



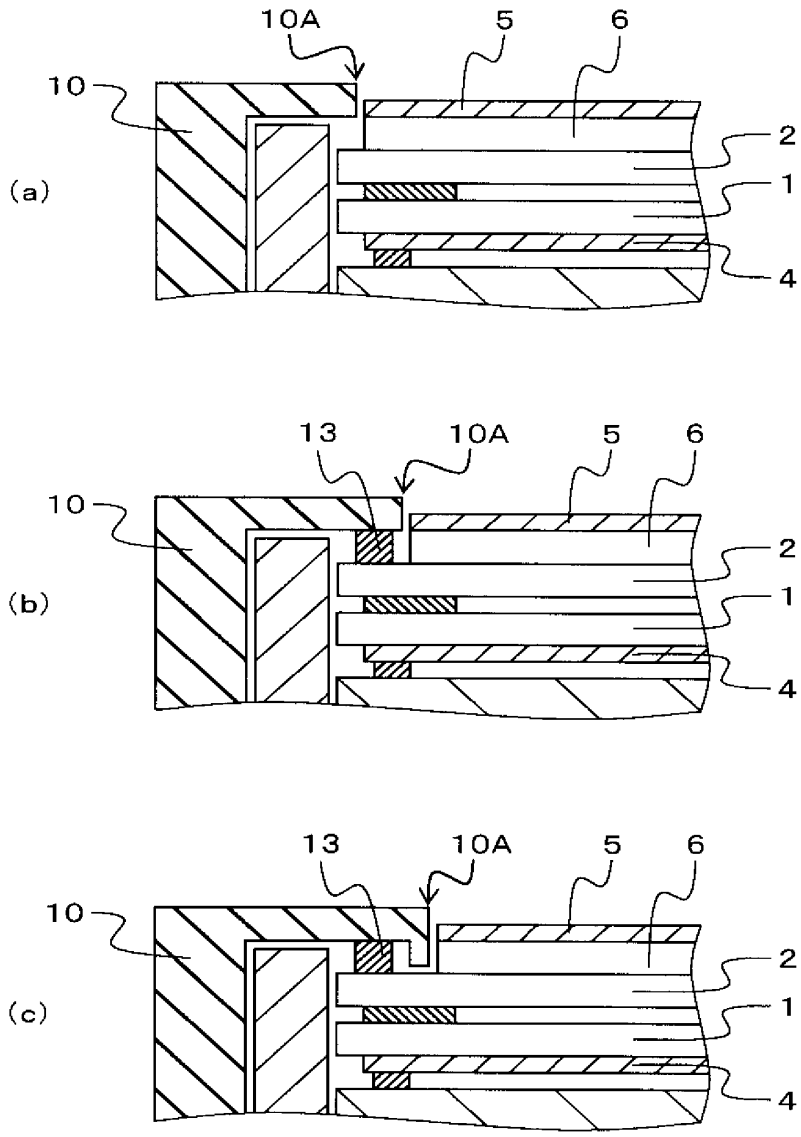
【図１２】

図12



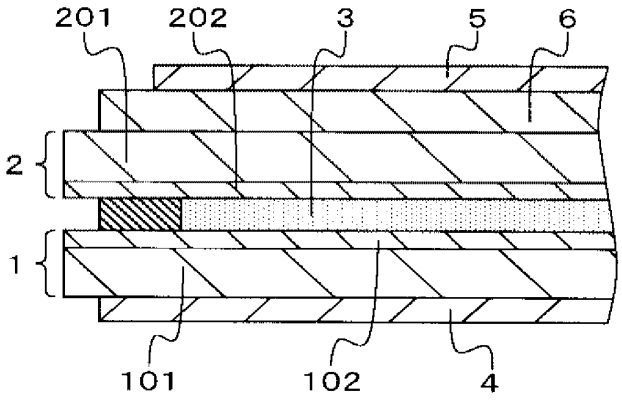
【図１３】

図13



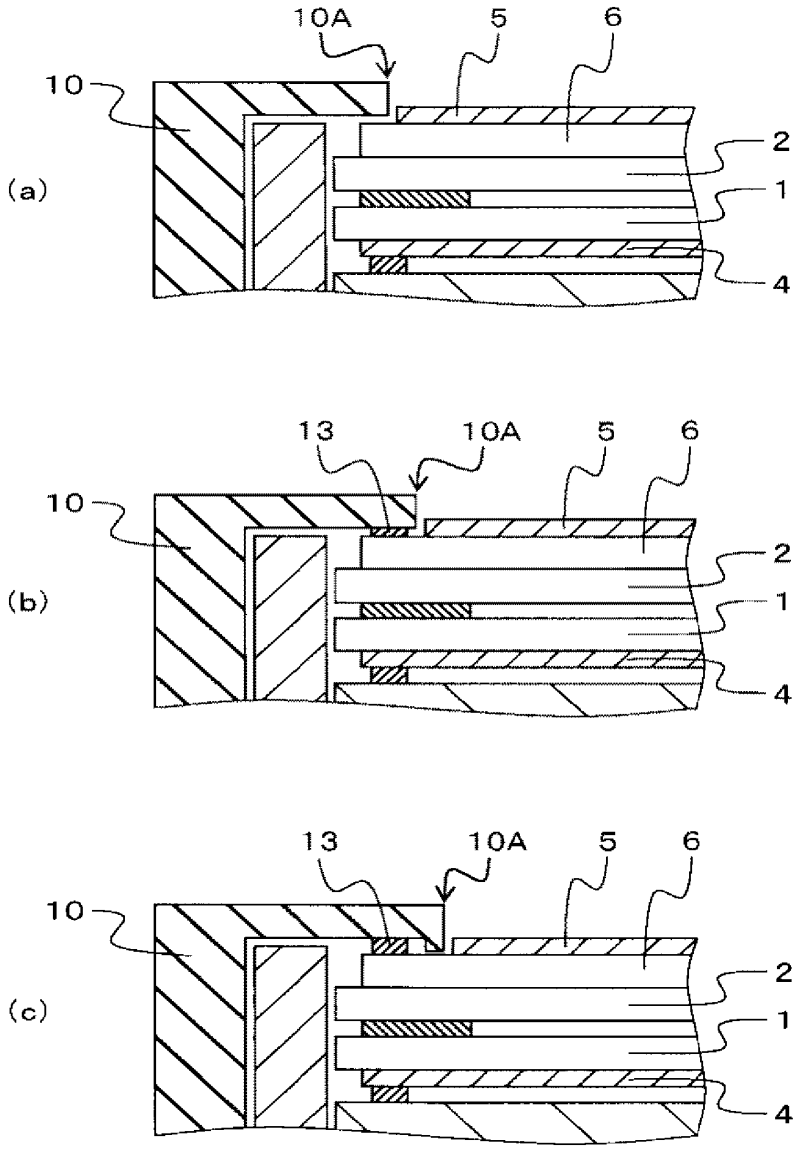
【図１４】

図14



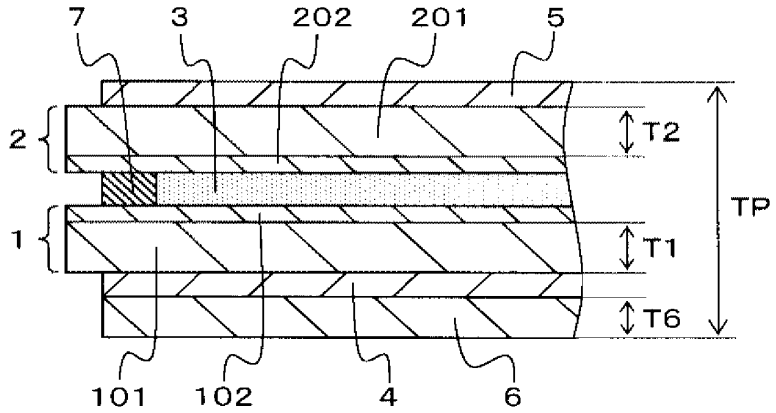
【図１５】

図15



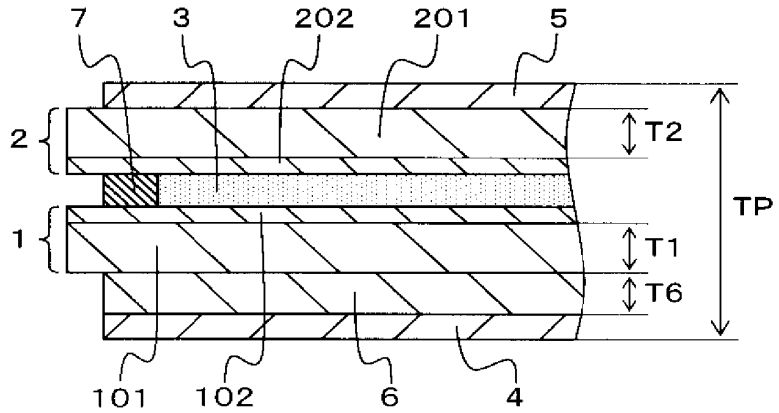
【図１６】

図16



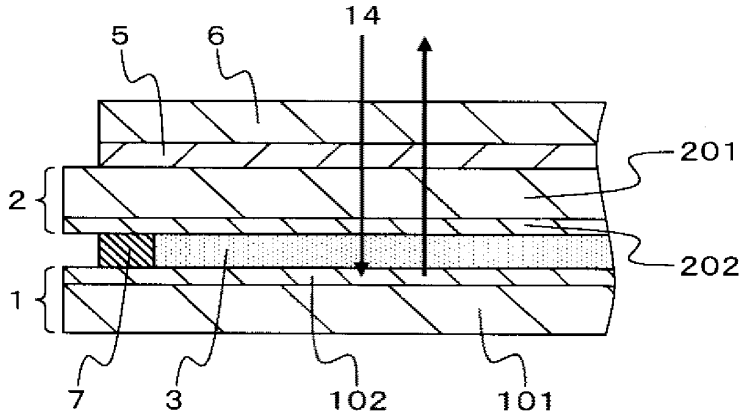
【図１７】

図17



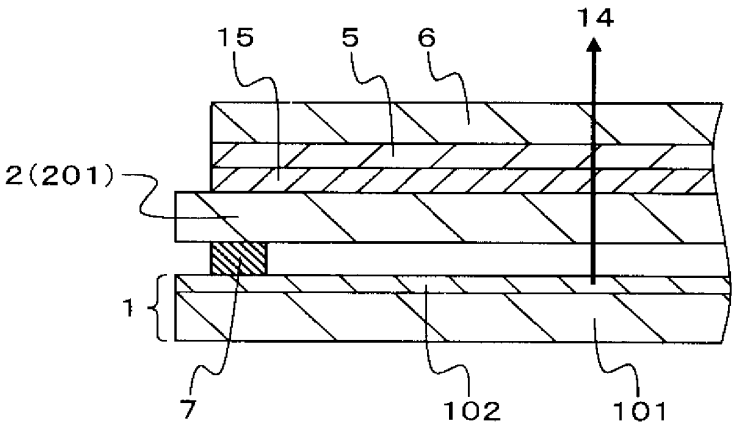
【図１８】

図18



【図１９】

図19



【書類名】要約書
【要約】
【課題】　液晶表示パネルの薄型化と十分な強度の確保を両立させる。
【解決手段】　第１の基板と、前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、前記第１の基板と前記第２の基板との間に挟持された液晶と、前記第２の基板よりも観察者側に配置された上偏光板と、前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた、前記上偏光板よりも表面硬度が高い樹脂フィルムとを有する液晶表示パネルを備える液晶表示装置である。
【選択図】　図２

【書類名】　出願人名義変更届（一般承継）
【整理番号】　330500326
【あて先】　特許庁長官殿
【事件の表示】
　【出願番号】　特願2005-372185
【承継人】
　【識別番号】　506087819
　【氏名又は名称】　パナソニック液晶ディスプレイ株式会社
【承継人代理人】
　【識別番号】　110000154
　【氏名又は名称】　特許業務法人はるか国際特許事務所
　【代表者】　岩本　康隆
　【電話番号】　03-5367-2790
【提出物件の目録】
　【物件名】　株式会社日立ディスプレイズの会社分割を証明する書面　1
　　【援用の表示】　平成２３年１月１２日付提出の特願２００８－１３３９１３の手続補足書（名義変更届）に添付のもの（閉鎖事項一部証明書）を援用する。
　【物件名】　パナソニック液晶ディスプレイ株式会社が承継人であることを証明する書面　1
　　【援用の表示】　平成２３年１月１２日付提出の特願２００８－１３３９１３の手続補足書（名義変更届）に添付のもの（履歴事項一部証明書）を援用する。
　【物件名】　株式会社日立ディスプレイズによる株式会社ＩＰＳアルファ支援会社への権利の承継を証明する書面　1
　　【援用の表示】　平成２２年１１月５日付提出の特許第３０９０４８０号外９８件に係る会社分割による一部移転登録申請書（１）に添付のもの（会社分割承継証明書）を援用する。
　【包括委任状番号】　0807200

【書類名】　手続補正書
【整理番号】　330500326
【あて先】　特許庁長官殿
【事件の表示】
　【出願番号】　特願2005-372185
【補正をする者】
　【識別番号】　502356528
　【氏名又は名称】　株式会社日立ディスプレイズ
【補正をする者】
　【識別番号】　506087819
　【氏名又は名称】　パナソニック液晶ディスプレイ株式会社
【代理人】
　【識別番号】　100083552
　【弁理士】
　【氏名又は名称】　秋田　収喜
　【電話番号】　03-3893-6221
【発送番号】　031236
【手続補正1】
　【補正対象書類名】　特許請求の範囲
　【補正対象項目名】　全文
　【補正方法】　変更
　【補正の内容】
　　【書類名】特許請求の範囲
　　【請求項１】
　第１の基板と、
　前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
　前記第１の基板と前記第２の基板との間に挟持された液晶と、
　前記第２の基板よりも観察者側に配置された上偏光板と、
　前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた、前記上偏光板よりも表面硬度が高い樹脂フィルムとを有する液晶表示パネルを備えることを特徴とする液晶表示装置。
　　【請求項２】
　前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上であることを特徴とする請求項１に記載の液晶表示装置。
　　【請求項３】
　前記樹脂フィルムは、厚さが０．２ｍｍ以上であることを特徴とする請求項１または請求項２に記載の液晶表示装置。
　　【請求項４】
　前記樹脂フィルムは、厚さが０．２ｍｍ以上、１ｍｍ以下であることを特徴とする請求項１または請求項２に記載の液晶表示装置。
　　【請求項５】
　前記樹脂フィルムの材質は、アクリル樹脂またはエポキシ樹脂であることを特徴とする請求項１から請求項４のいずれか１項に記載の液晶表示装置。
　　【請求項６】
　前記第１の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項５のいずれか１項に記載の液晶表示装置。
　　【請求項７】
　前記第２の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項６のいずれか１項に記載の液晶表示装置。

【請求項８】
前記第１の基板と前記第２の基板の厚さがほぼ等しいことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項９】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄いことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項１０】
前記第１の基板の厚さよりも前記第２の基板の厚さの方が厚いことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項１１】
前記液晶表示パネルの総厚が、２ｍｍ以下であることを特徴とする請求項１から請求項１０のいずれか１項に記載の液晶表示装置。
【請求項１２】
前記上偏光板と前記第２の基板との間に上位相差板を有することを特徴とする請求項１から請求項１１のいずれか１項に記載の液晶表示装置。
【請求項１３】
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記上偏光板の外形よりも小さいことを特徴とする請求項１から請求項１２のいずれか１項に記載の液晶表示装置。
【請求項１４】
前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形と前記上偏光板の外形は、前記下偏光板の外形よりも小さいことを特徴とする請求項１から請求項１２のいずれか１項に記載の液晶表示装置。
【請求項１５】
前記下偏光板と前記第１の基板との間に下位相差板を有することを特徴とする請求項１４に記載の液晶表示装置。
【請求項１６】
前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項１から請求項１５のいずれか１項に記載の液晶表示装置。

【手続補正2】
【補正対象書類名】　明細書
【補正対象項目名】　発明の名称
【補正方法】　変更
【補正の内容】
【発明の名称】液晶表示装置

【書類名】　手続補正書
【整理番号】　330500326
【あて先】　特許庁長官殿
【事件の表示】
　【出願番号】　特願2005-372185
【補正をする者】
　【識別番号】　502356528
　【氏名又は名称】　株式会社日立ディスプレイズ
【補正をする者】
　【識別番号】　506087819
　【氏名又は名称】　パナソニック液晶ディスプレイ株式会社
【代理人】
　【識別番号】　100083552
　【弁理士】
　【氏名又は名称】　秋田　収喜
　【電話番号】　03-3893-6221
【発送番号】　008133
【手続補正1】
　【補正対象書類名】　特許請求の範囲
　【補正対象項目名】　全文
　【補正方法】　変更
　【補正の内容】
　　【書類名】特許請求の範囲
　　【請求項１】
　第１の基板と、
　前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
　前記第１の基板と前記第２の基板との間に挟持された液晶と、
　前記第２の基板よりも観察者側に配置された上偏光板と、
　前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して貼り付けられた、前記上偏光板よりも表面硬度が高い樹脂フィルムとを有する液晶表示パネルを備え、
　前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄いことを特徴とする液晶表示装置。
　　【請求項２】
　前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上であることを特徴とする請求項１に記載の液晶表示装置。
　　【請求項３】
　前記樹脂フィルムは、厚さが０．２ｍｍ以上であることを特徴とする請求項１または請求項２に記載の液晶表示装置。
　　【請求項４】
　前記樹脂フィルムは、厚さが０．２ｍｍ以上、１ｍｍ以下であることを特徴とする請求項１または請求項２に記載の液晶表示装置。
　　【請求項５】
　前記樹脂フィルムの材質は、アクリル樹脂またはエポキシ樹脂であることを特徴とする請求項１から請求項４のいずれか１項に記載の液晶表示装置。
　　【請求項６】
　前記第１の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項５のいずれか１項に記載の液晶表示装置。
　　【請求項７】
　前記第２の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項

６のいずれか１項に記載の液晶表示装置。
【請求項８】
前記液晶表示パネルの総厚が、２ｍｍ以下であることを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。
【請求項９】
前記上偏光板と前記第２の基板との間に上位相差板を有することを特徴とする請求項１から請求項８のいずれか１項に記載の液晶表示装置。
【請求項１０】
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記上偏光板の外形よりも小さいことを特徴とする請求項１から請求項９のいずれか１項に記載の液晶表示装置。
【請求項１１】
前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、
前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形と前記上偏光板の外形は、前記下偏光板の外形よりも小さいことを特徴とする請求項１から請求項９のいずれか１項に記載の液晶表示装置。
【請求項１２】
前記下偏光板と前記第１の基板との間に下位相差板を有することを特徴とする請求項１１に記載の液晶表示装置。
【請求項１３】
前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項１から請求項１２のいずれか１項に記載の液晶表示装置。

【書類名】　手続補正書
【整理番号】　330500326
【あて先】　特許庁長官　殿
【事件の表示】
　【出願番号】　特願2005-372185
【補正をする者】
　【識別番号】　502356528
　【氏名又は名称】　株式会社ジャパンディスプレイイースト
【補正をする者】
　【識別番号】　506087819
　【氏名又は名称】　パナソニック液晶ディスプレイ株式会社
【代理人】
　【識別番号】　100083552
　【弁理士】
　【氏名又は名称】　秋田　収喜
　【電話番号】　03-3893-6221
【発送番号】　815399
【手続補正1】
　【補正対象書類名】　特許請求の範囲
　【補正対象項目名】　全文
　【補正方法】　変更
　【補正の内容】
　　【書類名】特許請求の範囲
　　【請求項１】
　第１の基板と、
　前記第１の基板に対向して、前記第１の基板よりも観察者側に配置される第２の基板と、
　前記第１の基板と前記第２の基板との間に挟持された液晶と、
　前記第２の基板よりも観察者側に配置された上偏光板と、
　前記上偏光板よりも観察者側に配置され、前記上偏光板に密着して粘着材などで貼り付けられた、前記上偏光板よりも表面硬度が高い樹脂フィルムとを有する液晶表示パネルを備え、
　前記第１の基板の厚さよりも前記第２の基板の厚さの方が薄く、
　前記樹脂フィルムの表面硬度は、表面鉛筆硬度が３Ｈ以上であり、
　前記樹脂フィルムは、厚さが０．２ｍｍ以上であり、
　前記樹脂フィルムは、当該液晶表示装置が組み込まれる携帯型電子機器の保護カバーに相当するものであることを特徴とする液晶表示装置。
　　【請求項２】
　前記樹脂フィルムは、厚さが１ｍｍ以下であることを特徴とする請求項１に記載の液晶表示装置。
　　【請求項３】
　前記樹脂フィルムの材質は、アクリル樹脂またはエポキシ樹脂であることを特徴とする請求項１または請求項２のいずれか１項に記載の液晶表示装置。
　　【請求項４】
　前記第１の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項３のいずれか１項に記載の液晶表示装置。
　　【請求項５】
　前記第２の基板の厚さは、０．５ｍｍ以下であることを特徴とする請求項１から請求項４のいずれか１項に記載の液晶表示装置。
　　【請求項６】

前記液晶表示パネルの総厚が、２ｍｍ以下であることを特徴とする請求項１から請求項５のいずれか１項に記載の液晶表示装置。

【請求項７】

前記上偏光板と前記第２の基板との間に上位相差板を有することを特徴とする請求項１から請求項６のいずれか１項に記載の液晶表示装置。

【請求項８】

前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形は、前記上偏光板の外形よりも小さいことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。

【請求項９】

前記液晶表示パネルは、前記第１の基板よりも背面側に配置された下偏光板を有し、

前記液晶表示パネルを正面から見た場合、前記樹脂フィルムの外形と前記上偏光板の外形は、前記下偏光板の外形よりも小さいことを特徴とする請求項１から請求項７のいずれか１項に記載の液晶表示装置。

【請求項１０】

前記下偏光板と前記第１の基板との間に下位相差板を有することを特徴とする請求項９に記載の液晶表示装置。

【請求項１１】

前記第１の基板および前記第２の基板はガラス基板であることを特徴とする請求項１から請求項１０のいずれか１項に記載の液晶表示装置。

出願人履歴

５０２３５６５２８

20021001

新規登録

千葉県茂原市早野３３００番地

株式会社　日立ディスプレイズ

５０２３５６５２８

20120410

名称変更

千葉県茂原市早野３３００番地

株式会社ジャパンディスプレイイースト

５０２３５６５２８

20130426

名称変更　住所変更

東京都港区西新橋三丁目７番１号

株式会社ジャパンディスプレイ

５０６０８７８１９

20060315

新規登録

千葉県茂原市早野３７３２番地

株式会社ＩＰＳアルファテクノロジ

５０６０８７８１９

20101004

名称変更　住所変更

兵庫県姫路市飾磨区妻鹿日田町１－６

パナソニック液晶ディスプレイ株式会社

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/624,339

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	19 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/624,339	02/17/2015	2811	1600	0520-46908CC4CON	19	3

CONFIRMATION NO. 9583

127271
Lowe Hauptman & Ham, LLP
2318 Mill Road
Suite 1400
Alexandria, VA 22314

FILING RECEIPT

OC000000073683756

Date Mailed: 03/02/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Koichi FUKUDA, Mobara, JAPAN;

Applicant(s)

Japan Display Inc., Chiba, JAPAN
Panasonic Liquid Crystal Display Co., Ltd., Hyogo-ken, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 127271

Domestic Priority data as claimed by applicant

This application is a CON of 14/020,331 09/06/2013
which is a CON of 13/446,331 04/13/2012 PAT 8558965
which is a CON of 13/279,587 10/24/2011 PAT 8164717
which is a CON of 12/437,218 05/07/2009 PAT 8045101
which is a CON of 11/644,872 12/26/2006 PAT 7532274

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
JAPAN 2005-372185 12/26/2005

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to**

Retrieve Electronic Priority Application(s) (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 02/27/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/624,339**

Projected Publication Date: 06/11/2015

Non-Publication Request: No

Early Publication Request: No

Title

DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Preliminary Class

257

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

Post-AIA GPA

POWER OF ATTORNEY TO PROSECUTE APPLICTIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 C.F.R. §3.73(c).

I hereby appoint practitioners associated with Customer Number: **127271**

Lowe Hauptman & Ham, LLP

Telephone: +1-703-684-1111

Email: docketing@ipfirm.com

www.ipfirm.com

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 C.F.R. §3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 C.F.R. §3.73(c) to the address associated with Customer Number: **127271**

Legal Name and Address of Assignee:
Name: **Japan Display Inc.**
Address: 3-7-1, Nishi-shinbashi, Minato-ku, Tokyo 105-0003, Japan

Note-A copy of this form, together with a statement under 37 C.F.R. §3.73(c) is required to be filed in each application in which this form is used. The statement under 37 C.F.R. §3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

Signature of Assignee of Record: The individual whose signature and title are supplied below is authorized to act on behalf of the assignee:	
Signature: Hiroyuki Yoshida	Date: January 16, 2015
Name: Hiroyuki YOSHIDA	Telephone: +81-3-6732-8368
Title: Senior General Manager, Intellectual Property Dept., Japan Display Inc.	

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8558965		2013-10-15	FUKUDA	
	2	5793461		1998-08-11	INOU	
	3	6084652		2000-07-04	YAMAHARA	
	4	7166352		2007-01-23	WATANABE	
	5	7285323		2007-10-23	SONE	
	6	7532274		2007-07-19	FUKUDA	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

	1	20050243245	A1	2005-11-03	TAGUCHI	
	2	20060152664	A1	2006-07-13	NISHIO	
	3	20050046783	A1	2005-03-03	KAWATA	
	4	20080055522	A1	2008-03-06	SAKAGUCHI	
	5	20050271835	A1	2005-12-08	KIM	
	6	20050146650	A1	2005-07-07	CHUNG	
	7	20040051827	A1	2004-03-18	HINATA	
	8	20010043297	A1	2001-11-22	ARAI	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2003-195043	JP		2003-07-09	FUJI PHOTO FILM CO., LTD.		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

	2	2003-337322	JP		2003-11-28	IHARA		☐
	3	H08-110821	JP		1996-04-30	HANAOKA		☐
	4	H08-006039	JP		1996-01-12	INO		☐
	5	2005-189571	JP		2005-07-14	OGASAWARA		☐
	6	2005-037927	JP		2005-02-10	SONE		☐
	7	1211746	CN		1999-03-24	YAMAHARA		☐
	8	1441453	CN		2003-09-10	WATANABE		☐
	9	1512216	CN		2004-07-14	OTA		☐
	10	H08-338912	JP		1996-12-24	OGAWA		☐
	11	H01-015516	JP		1993-08-27	YOSHIDA		☐
	12	2003-337549	JP		2003-11-28	KEYAKIDA		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

	13	2005-134841	JP		2005-05-26	SUZUKI		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2015-02-17
	First Named Inventor	Koichi FUKUDA
	Art Unit	
	Examiner Name	
	Attorney Docket Number	0520-46908CC4CON

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Arimi Yamada/	Date (YYYY-MM-DD)	2015-02-17
Name/Print	Arimi Yamada	Registration Number	70156

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Koichi FUKUDA	Confirmation No.:	Not yet assigned
Application No.:	Not yet assigned	Examiner:	Not yet assigned
Filed:	Filed with New Application	Group Art Unit:	Not yet assigned

For: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Commissioner for Patents
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

This subject Information Disclosure Statement is submitted in connection with applicant's continuing duty of disclosure under 37 C.F.R. §1.56.

This Information Disclosure Statement (IDS) is submitted before the mailing of a first office action on the merits.

The relevant documents are listed on the attached Form PTO/SB/08a.

References were either cited by the examiner or submitted by the applicants during previous parent applications of the current application. Copies of these references should be available in the parent files. Thus, they are not concurrently submitted herewith.

The filing of this information disclosure statement shall not be construed as a representation that a search has been made, or an admission that the information cited is, or is considered to be, material to patentability, or that the information is analogous to the subject matter of the present invention, or that no other material information exists. Further, the filing of this information disclosure statement shall not be construed as an admission against interest in any manner. Written notification that the enclosed references have been considered in their entirety by return of a copy of the enclosed form, completed by the Examiner, is respectfully requested.

Please charge any shortage in fee due in connection with the filing of this paper to deposit account No. 07-1337.

Respectfully submitted,

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Dated: February 17, 2015

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SIR:

The undersigned representative of Panasonic Liquid Crystal Display Co., Ltd., the assignee of the entire right, title and interest of the patents/applications identified by appendix A by virtue of an assignment from the inventor(s), hereby revokes any and all previous Powers of Attorney, appoints the practitioners associated with the Customer Number 127271 as Assignee's attorneys with full power of substitution and revocation, to prosecute said patent applications, receive any Letters Patent(s) and to transact all business in the United States Patent and Trademark Office with regard to said patent applications and any Letters Patent(s) issuing thereon, and requests that all correspondence be sent to Customer No. 127271 or Lowe Hauptman & Ham, LLP., 2318 Mill Road, Suite 1400, Alexandria, Virginia 22314.

CERTIFICATION UNDER 37 C.F.R. 3.73(b) / 37 C.F.R. 3.73(c)

I, the undersigned, certify that I am an individual empowered to act on behalf of Panasonic Liquid Crystal Display Co., Ltd., the assignee of the entire right, title and interest of the identified patents/applications identified by appendix A by virtue of an assignment from the inventor(s).

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or

imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Panasonic Liquid Crystal Display Co., Ltd.

Date of Signature: Jan. 21, 2015 Signature:

Name: Kazuhiko Ishimaru

Title of Signor: Manager, Intellectual Property Team, Product Development Center

SPECIFICATION

Title of the Invention

DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation of US Application Serial No. 13/446,331, filed April 13, 2013, which is a continuation of US Application Serial No. 13/279,587, filed October 24, 2011, now US Patent No. 8,164,717, which is a continuation of US Application Serial No. 12/437,218, filed May 7, 2009, now US Patent No. 8,045,101, which is a continuation application of US Application Serial No. 11/644,872, filed December 26, 2006, now US Patent No. 7,532,274, the contents of which are incorporated herein by reference.

CLAIM OF PRIORITY

The present application claims priority from Japanese Application JP 2005-372185 filed on December 26, 2005, the content of which is hereby incorporated by reference into this application.

Background of the Invention

Field of the Invention

The present invention relates to a liquid crystal display and a display. In particular, the present invention is concerned with a technique applicable effectively to a liquid crystal display (module) used in a hand-held electronic device such as a mobile telephone terminal.

Description of the Related Art

A thin display such as a liquid crystal display has been conventionally used for a display used in a hand-held electronic device such as a mobile telephone terminal or a PDA (Personal Digital Assistant).

The liquid crystal display is a display having a liquid crystal display panel comprising a pair of substrates and a liquid crystal material held therebetween. One of the paired substrates is generally called a TFT substrate and, for example, comprises a glass substrate, as well as TFTs (Thin Film Transistor) and pixel electrodes formed on the substrate. The other substrate is generally called a counter substrate and, for example, comprises a glass substrate and a color filter, etc. formed thereon. In the case where the liquid crystal material driving method is a longitudinal electric field type, common electrodes (also called counter electrodes) opposed to the pixel electrodes are formed on the counter substrate side. In the case where the liquid crystal material driving method is a lateral electric field type, the common electrodes are formed on the TFT substrate side.

With the recent tendency toward the reduction in thickness of the hand-held electronic device, the liquid crystal display used therein has also been becoming more and more thin. For example, as a method of reducing the thickness of a liquid crystal panel, the method of reducing the thickness of the liquid crystal display is known.

For example, a method of polishing the glass substrate used in the TFT substrate or the counter substrate is known as the method of reducing the thickness of the liquid crystal display panel.

Also, as a method of reducing the thickness of a liquid crystal display

panel, the method of using a plastic substrate for either one of the TFT substrate or the counter substrate instead of the glass substrate (see, for example, Japanese Patent Laid-Open No. 8-006039 (Patent Document 1)) is known.

Summary of the Invention

In the liquid crystal display, when the thickness of the glass substrate used in the TFT substrate or the counter substrate is reduced by polishing in order to reduce the thickness of the liquid crystal display panel, the strength of the glass substrate is deteriorated and the strength of the liquid crystal display panel is also deteriorated. Thus, the method of polishing the glass substrate to reduce the substrate thickness poses the problem that it is difficult to attain both thickness reduction and ensuring of a sufficient strength.

Moreover, the method of using a plastic substrate instead of the glass substrate poses the problem that the heat resistance and solvent resistance (chemicals resistance) of the plastic substrate are low in comparison with the glass substrate and that therefore the handling of the plastic substrate is difficult for example in the step of forming TFT onto the glass substrate. Further, in the case of a liquid crystal display panel using a glass substrate as the TFT substrate and a plastic substrate as the counter substrate, unevenness in display easily occurs because the substrates differ in the amount of deformation caused by changes of environmental conditions such as temperature and humidity.

It is an object of the present invention to provide a technique able to attain both thickness reduction of a liquid crystal display panel and ensuring of a sufficient strength of the panel.

It is another object of the present invention to provide a technique able to reduce the thickness of a hand-held electronic device such as a liquid crystal display (module).

The above and other objects and novel features of the present invention will become apparent from the following description and the accompanying drawings.

The following is an outline of typical modes of the present invention as disclosed herein.

(1) A liquid crystal display comprising a liquid crystal display panel, the liquid crystal display panel having a first substrate, a second substrate disposed on the side of an observer with respect to the first substrate and opposed to the first substrate, a liquid crystal held between the first substrate and the second substrate, an upper polarizing plate disposed on the observer side with respect to the second substrate, and a resin film disposed on the observer side with respect to the upper polarizing plate and affixed in contact with the upper polarizing plate, the resin film being higher in surface hardness than the upper polarizing plate.

(2) The liquid crystal display according to the above (1), wherein the resin film has a surface hardness of 3H or harder in terms of surface pencil hardness.

(3) The liquid crystal display according to the above (1) or (2), wherein the resin film has a thickness of 0.2 mm or more.

(4) The liquid crystal display according to the above (1) or (2), wherein the resin film has a thickness of 0.2 mm or more and 1 mm or less.

(5) The liquid crystal display according to any one of the above (1) to

(4), wherein the material of the resin film is an acrylic resin or an epoxy resin.

(6) The liquid crystal display according to any one of the above (1) to (5), wherein the first substrate has a thickness of 0.5 mm or less.

(7) The liquid crystal display according to any one of the above (1) to (6), wherein the second substrate has a thickness of 0.5 mm or less.

(8) The liquid crystal display according to any one of the above (1) to (7), wherein the thickness of the first substrate and that of the second substrate are almost equal to each other.

(9) The liquid crystal display according to any one of the above (1) to (7), wherein the thickness of the second substrate is smaller than that of the first substrate.

(10) The liquid crystal display according to any one of the above (1) to (7), wherein the thickness of the second substrate is larger than that of the first substrate.

(11) The liquid crystal display according to any one of the above (1) to (10), wherein the total thickness of the liquid crystal display panel is 2 mm or less.

(12) The liquid crystal display according to any one of the above (1) to (11), further comprising an upper phase difference plate disposed between the upper polarizing plate and the second substrate.

(13) The liquid crystal display according to any one of the above (1) to (12), wherein when the liquid crystal display panel is viewed from a front side thereof, an outline of the resin film is smaller than that of the upper polarizing plate.

(14) The liquid crystal display according to any one of the above (1) to

(12), wherein the liquid crystal display panel further comprises a lower polarizing plate disposed on a back surface side of the first substrate, and when the liquid crystal display panel is viewed from the front side thereof, an outline of the resin film and that of the upper polarizing plate are smaller than an outline of the lower polarizing plate.

(15) The liquid crystal display according to the above (14), further comprising a lower phase difference plate disposed between the lower polarizing plate and the first substrate.

(16) The liquid crystal display according to any one of the above (1) to (15), wherein the first substrate and the second substrate are glass substrates.

(17) A liquid crystal display comprising a liquid crystal display panel, the liquid crystal display panel having a first substrate, a second substrate disposed on an observer side with respect to the first substrate and opposed to the first substrate, a liquid crystal held between the first substrate and the second substrate, an upper polarizing plate disposed on the observer side with respect to the second substrate, and a resin film disposed between the upper polarizing plate and the second substrate, the resin film having a thickness of 0.2 mm or more, the upper polarizing plate having a surface hardness of 3H or harder in terms of surface pencil hardness.

(18) The liquid crystal display according to the above (17), wherein the resin film has a thickness of 1 mm or less.

(19) The liquid crystal display according to the above (17) or (18), wherein the thickness of the first substrate and that of the second substrate are almost equal to each other.

(20) The liquid crystal display according to the above (17) or (18),

wherein the thickness of the second substrate is smaller than that of the first substrate.

(21) The liquid crystal display according to the above (17) or (18), wherein the thickness of the second substrate is larger than that of the first substrate.

(22) The liquid crystal display according to any one of the above (17) to (21), further comprising an upper phase difference plate disposed between the upper polarizing plate and the second substrate.

(23) The liquid crystal display according to any one of the above (17) to (22), wherein when the liquid crystal display panel is viewed from a front side thereof, an outline of the upper polarizing plate is smaller than that of the resin film.

(24) The liquid crystal display according to any one of the above (17) to (23), wherein the liquid crystal display panel further comprises a lower polarizing plate disposed on a back surface side of the first substrate, and when the liquid crystal display panel is viewed from the front side thereof, an outline of the upper polarizing plate is smaller than that of the lower polarizing plate.

(25) The liquid crystal display according to the above (24), wherein when the liquid crystal display panel is viewed from the front side thereof, an outline of the resin film is smaller than that of the lower polarizing plate.

(26) The liquid crystal display according to the above (24), wherein when the liquid crystal display panel is viewed from the front side thereof, an outline of the resin film is larger than that of the lower polarizing plate.

(27) The liquid crystal display according to any one of the above (24) to (26), further comprising a lower phase difference plate disposed between the

lower polarizing plate and the first substrate.

(28) The liquid crystal display according to any one of the above (17) to (27), wherein the first substrate and the second substrate are glass substrates.

(29) A liquid crystal display comprising a liquid crystal display panel, the liquid crystal display panel having a first substrate, a second substrate disposed on an observer side with respect to the first substrate and opposed to the first substrate, a liquid crystal held between the first substrate and the second substrate, an upper polarizing plate disposed on the observer side with respect to the second substrate, a lower polarizing plate disposed on a back surface side of the first substrate, and a resin film affixed in contact with a back surface side of the lower polarizing plate, wherein the total thickness of the first substrate and the second substrate is 0.5 mm or less.

(30) The liquid crystal display according to the above (29), wherein the resin film has a thickness of 0.1 mm or more and 0.3 mm or less.

(31) The liquid crystal display according to the above (29) or (30), wherein the thickness of the first substrate and that of the second substrate are almost equal to each other.

(32) The liquid crystal display according to the above (29) or (30), wherein the thickness of the second substrate is smaller than that of the first substrate.

(33) The liquid crystal display according to the above (29) or (30), wherein the thickness of the second substrate is larger than that of the first substrate.

(34) The liquid crystal display according to any one of the above (29) to (33), wherein the first substrate and the second substrate are glass substrates.

(35) A liquid crystal display comprising a liquid crystal display panel, the liquid crystal display panel having a first substrate, a second substrate disposed on an observer side with respect to the first substrate and opposed to the first substrate, a liquid crystal held between the first substrate and the second substrate, an upper polarizing plate disposed on the observer side with respect to the second substrate, a lower polarizing plate disposed on a back surface side of the first substrate, and a resin film disposed between the lower polarizing plate and the first substrate, wherein the total thickness of the first substrate and the second substrate is 0.5 mm or less.

(36) The liquid crystal display according to the above (35), wherein the resin film has a thickness of 0.1 mm or more and 0.3 mm or less.

(37) The liquid crystal display according to the above (35) or (36), wherein the thickness of the first substrate and that of the second substrate are almost equal to each other.

(38) The liquid crystal display according to the above (35) or (36), wherein the thickness of the second substrate is smaller than that of the first substrate.

(39) The liquid crystal display according to the above (35) or (36), wherein the thickness of the second substrate is larger than that of the first substrate.

(40) The liquid crystal display according to any of the above (35) to (39), wherein the first substrate and the second substrate are glass substrates.

(41) A display comprising a display panel, the display panel comprising a first substrate, a second substrate disposed on an observer side with respect to the first substrate and opposed to the first substrate, and an upper polarizing

plate disposed on the observer side with respect to the second substrate, wherein the first substrate and the second substrate are glass substrates and there is provided a resin film disposed on the observer side with respect to the upper polarizing plate and affixed in contact with the upper polarizing plate, the resin film having a surface hardness of 3H or harder in terms of surface pencil hardness.

In connection with the liquid crystal display according to the present invention, in the liquid crystal display of the first invention (1), a resin film is affixed in contact with the upper polarizing plate of the liquid crystal display panel, the resin film having a surface hardness higher than that of the upper polarizing plate. In the liquid crystal display panel having such a resin film, the resin film functions as a reinforcing member, whereby the strength of the liquid crystal display panel is enhanced. Therefore, even if one or both of the first and second substrates are reduced in thickness, it is possible to ensure a sufficient strength of the liquid crystal display panel. With the resin film having the surface pencil hardness of 3H or harder, the liquid crystal display panel becomes difficult to be damaged. Consequently, when the liquid crystal display (module) having this liquid crystal display panel is installed into a mobile telephone terminal, a protective cover for protecting the liquid crystal display panel is not necessary to be attached to the outer surface of the mobile telephone terminal. As a result, a display unit of the mobile telephone terminal can be made thin.

It is preferable that the thickness of the resin film be, for example, 0.2 mm or more and 1 mm or less. It is preferable that the resin film be formed of a material high in light transmittance, especially a colorless, transparent material. As an example of such a material there is an acrylic resin or an epoxy resin. In

the case of using an acrylic resin or an epoxy resin as the material of the resin film, the surface of the resin is subjected to a hard coating treatment so as to give a surface pencil hardness of 3H or harder. the surface pencil hardness is meant a hardness with which the material surface is damaged when a line is drawn on the material surface with a pencil. That is, the surface pencil hardness of 3H means that the film surface gets not damaged when a line is drawn on the film surface with a pencil with a pencil hardness of 3H or softer.

It is preferable that the first and second substrates each have a thickness of 0.5 mm or less. The thickness of the first substrate and that of the second substrate may be almost equal to or different from each other. In particular, the second substrate with the resin film affixed thereto is reinforced by the resin film and therefore, even if it is thinner than the first substrate, it is possible to ensure a sufficient strength. For example, in the case where the liquid crystal display panel is of a lateral electric field driving type called IPS (In Plane Switching), a conductor film for the prevention of electric charging may be provided on the surface to which the upper polarizing plate is affixed. In this case, for example, it is impossible to reduce the thickness of the second substrate by polishing. Therefore, in the case where the aforesaid conductor film is provided on the second substrate, the first substrate is made thinner than the second substrate to reduce the thickness of the liquid crystal display panel. In this case, it is preferable that the thickness of the resin film, that of the first substrate and that of the second substrate be set so as to give a liquid crystal display panel thickness of 2 mm or less.

In such a liquid crystal display panel, it is preferable that an outline of the resin film be smaller than that of the upper polarizing plate for example when

the panel is viewed from the front side thereof. For example, when the liquid crystal display having the liquid crystal display panel is installed into a mobile telephone terminal, there usually is formed a slight gap between the sheath of the mobile telephone terminal and the liquid crystal display panel, and water gets into the inside of the mobile telephone terminal from the outside through the gap. In this case, the outline of the resin film is made smaller than that of the upper polarizing plate, whereby the upper polarizing plate and the sheath of the mobile telephone terminal can be affixed together between the outer periphery of the resin film and that of the upper polarizing plate using a pressure-sensitive adhesive or the like to fill up the gap. In this way it is possible to prevent the entry of water into the inside of the sheath.

In such a liquid crystal panel, for example, the lower polarizing plate may be disposed on the back surface side of the first substrate. In this case, for example when the liquid crystal display panel is viewed from the front side, it is preferable that the outline of the resin film and that of the upper polarizing plate be smaller than the outline of the lower polarizing plate.

In such a liquid crystal display panel, for example, an upper phase difference plate may be disposed between the upper polarizing plate and the second substrate. Likewise, a lower phase difference plate may be disposed between the lower polarizing plate and the first substrate.

In such a liquid crystal display panel it is preferable that both first and second substrates be glass substrates. Even in the case of using glass substrates as the first and second substrates, it is possible to reduce the thickness of each glass substrate because a sufficient strength can be ensured by the resin film. Thus, it is possible to attain both the reduction in thickness of

the liquid crystal display panel and ensuring of a sufficient strength.

In connection with the liquid crystal display according to the present invention, in the liquid crystal display of the second invention (17), the resin film is disposed between the second substrate and the upper polarizing plate of the liquid crystal display panel. Also in this case it is preferable that the thickness of the resin film be, for example, 0.2 mm or more and 1 mm or less. In such a liquid crystal display panel, since the upper polarizing plate is disposed most closely to the observer, the surface pencil hardness of the resin film is not required to be 3H or harder. Instead, in the liquid crystal display of the second invention it is preferable that the surface of the upper polarizing plate be subjected to a hard coating treatment so as to become 3H or harder in surface pencil hardness. With this configuration, it is possible to obtain the same effect as in the liquid crystal display (liquid crystal display panel) of the first invention.

Also in the liquid crystal display of the second invention, the thickness of the first substrate and that of the second substrate may be almost equal to each other or either one of the first or second substrates may be reduced in thickness.

Also in the liquid crystal display of the second invention it is preferable that the outline of the resin film be smaller than that of the upper polarizing plate for example when the liquid crystal display panel is viewed from the front side thereof.

In the liquid crystal display of the second invention, for example, a lower polarizing plate may be disposed on the back surface side of the first substrate. In this case, it is preferable that the outline of the resin film and that of the upper polarizing plate be smaller than the outline of the lower polarizing

plate for example when the liquid crystal display panel is viewed from the front side thereof.

Moreover, in the liquid crystal display of the second invention, for example, an upper phase difference plate may be disposed between the upper polarizing plate and the second substrate. Likewise, a lower phase difference plate may be disposed between the lower polarizing plate and the first substrate. The upper phase difference plate may be disposed between the second substrate and the resin film or may be disposed between the resin film and the upper polarizing plate.

Further, in the liquid crystal display of the second invention it is preferable that both first and second substrates be glass substrates. Even in the case of using glass substrates as the first and second substrates, the glass substrates can be made thin because a sufficient strength can be ensured by the resin film. Thus, it is possible to attain both the reduction in thickness of the liquid crystal display panel and ensuring of a sufficient strength.

In connection with the liquid crystal display according to the present invention, in the liquid crystal display of the third invention (29), a resin film is affixed in contact with the back surface side of the lower polarizing plate of the liquid crystal display panel and the total thickness of both first and second substrates is 0.5 mm or less. In such a liquid crystal panel it is preferable that the thickness of the resin film be, for example, 0.1 mm or less and 0.3 mm or more. With such a thickness, when a pressing force is applied to the liquid crystal display panel from the upper polarizing plate side, the resin film can bear the force, the resin film being affixed to the back surface side of the display panel. Thus, even if the first and second substrates are made thin, it is

possible to ensure a sufficient strength of the liquid crystal display panel.

Also in the liquid crystal display of the third invention, the thickness of the first substrate and that of the second substrate may be almost equal to each other, or either one of the first or second substrates may be reduced in thickness.

Moreover, in the liquid crystal display of the third invention, it is preferable that both first and second substrates be glass substrates. Even in the case of using glass substrates as the first and second substrates, it is possible to reduce the thickness of each glass substrate because a sufficient strength can be ensured by the resin film. Thus, it is possible to attain both the reduction in thickness of the liquid crystal display panel and ensuring of a sufficient strength.

In connection with the liquid crystal display according to the present invention, in the liquid crystal display of the fourth invention (35), the resin film is disposed between the first substrate and the lower polarizing plate of the liquid crystal display panel and the total thickness of the first and second substrates is 0.5 mm or less. Also in this case it is preferable that the thickness of the resin film be, for example, 0.1 mm or more and 0.3 mm or less. According to this construction, the same effect can be obtained as in the liquid crystal display of the third invention.

Also in the liquid crystal display of the fourth invention, the thickness of the first substrate and that of the second substrate may be almost equal to each other, or either one of the first or second substrates may be reduced in thickness.

Moreover, in the liquid crystal display of the fourth invention it is preferable that both first and second substrates be glass substrates. Even in the case of using glass substrates as the first and second substrates it is

possible to reduce the thickness of each glass substrate because a sufficient strength can be ensured by the resin film. Thus, it is possible to attain both thinning of the liquid crystal display panel and ensuring of a sufficient strength.

In the case of installing the liquid crystal display of the third or the fourth invention into a mobile telephone terminal, it is preferable that a protective cover for protecting the liquid crystal display panel be affixed to a sheath of the mobile telephone terminal as in the conventional liquid crystal display. However, in the liquid crystal displays of third and fourth inventions, the total thickness of the first and second substrates is not larger than 0.5 mm and the thickness of the resin film is 0.1 mm or more and 0.3 mm or less. That is, in each of the liquid crystal displays of the third and fourth inventions, since the liquid crystal display panel is thinner than the conventional liquid crystal display panel, the thickness of the liquid crystal display can be so much reduced. Consequently, even if the protective cover for protecting the liquid crystal display panel is affixed to the sheath of the mobile telephone terminal, it is possible to reduce the thickness of the display unit of the mobile telephone terminal in comparison with the conventional counterpart.

Although the first invention is concerned with a liquid crystal display, the same construction as the first invention is applicable to any display insofar as the display has a liquid crystal panel of a construction similar to the construction of the liquid crystal display panel used in the liquid crystal display. For example, even in the case of a display panel with a liquid crystal material not held between the first and second substrates, if an upper polarizing plate is disposed on the observer side with respect to the second substrate, both thinning of the liquid crystal panel and ensuring of a sufficient strength can be attained by

affixing the resin film in contact with the upper polarizing plate. In this connection, if the surface pencil hardness of the resin film is 3H or harder, then as is the case with the liquid crystal display of the first invention, for example when the liquid crystal display in question is installed into a mobile telephone terminal, it is no longer required to use a liquid crystal display panel protecting cover and hence it is possible to reduce the thickness of the display unit of the mobile telephone terminal. As an example of a display panel having a configuration similar to that of the liquid crystal display panel and not using any liquid crystal material, there is known a self-light emission type display panel using an organic EL.

Brief Description of the Drawings

Fig. 1 is a schematic plan view showing a schematic configuration of a liquid crystal display panel according to a first embodiment of the present invention;

Fig. 2 is a sectional view taken along the line A-A' of Fig. 1;

Figs. 3A and 3B are schematic sectional views for explaining a function and effect of the liquid crystal display panel of the first embodiment;

Fig. 4 is a schematic front view showing a schematic configuration of a display unit of a conventional mobile telephone terminal;

Fig. 5 is a sectional view taken along the line B-B' of Fig. 4;

Fig. 6 is a schematic front view showing a schematic configuration of a display unit of a mobile telephone terminal using the liquid crystal display panel of the first embodiment;

Fig. 7 is a sectional view taken along the line C-C' of Fig. 6;

Figs. 8A and 8B are schematic sectional views showing modified configurations of the display unit of the mobile telephone terminal using the liquid crystal display panel of the first embodiment;

Fig. 9 is a schematic front view for explaining an application example of the liquid crystal display panel of the first embodiment;

Fig. 10 is a sectional view taken along the line D-D' of Fig. 9;

Figs. 11A to 11C are schematic sectional views showing structural examples of a display unit of a mobile telephone terminal using the liquid crystal display panel shown in Figs. 9 and 10;

Fig. 12 is a schematic sectional view showing a schematic configuration of a liquid crystal display panel according to a second embodiment of the present invention;

Figs. 13A to 13C are schematic sectional views showing structural examples of a display unit of a mobile telephone terminal using the liquid crystal display panel of the second embodiment;

Fig. 14 is a schematic sectional view for explaining an application example of the liquid crystal display panel of the second embodiment;

Figs. 15A to 15C are schematic sectional views showing structural examples of a display unit of a mobile telephone terminal using the liquid crystal display panel shown in Fig. 14;

Fig. 16 is a schematic sectional view showing a schematic configuration of a liquid crystal display panel according to a third embodiment of the present invention;

Fig. 17 is a schematic sectional view for explaining a modification of the liquid crystal display panel of the third embodiment;

Fig. 18 is a schematic sectional view showing a schematic configuration of a reflection type liquid crystal display panel to which the present invention is applied; and

Fig. 19 is a schematic sectional view showing a schematic configuration of an organic EL panel to which the present invention is applied.

Detailed Description of Preferred Embodiments

The present invention will be described in detail by way of embodiments thereof and with reference to the accompanying drawings.

In all of the drawings for illustration of the embodiments, portions having the same functions are identified by the same reference numerals, and repeated explanations thereof will be omitted.

[First Embodiment]

Fig. 1 is a schematic plan view showing a schematic configuration of a liquid crystal display panel according to a first embodiment of the present invention, Fig. 2 is a sectional view taken along the line A-A' of Fig. 1, and Fig. 3 is a schematic sectional view for explaining a function and effect of the liquid crystal display panel of the first embodiment. In Fig. 3 there are shown two sectional views as Fig. 3A and Fig. 3B, both of which correspond to the sectional configuration taken along the line A-A' in Fig. 1.

In the first embodiment, a reference will be made to a transmission type liquid crystal display as an example of a display to which the present invention is applied, and a description will be given below about the configuration, as well as function and effect, of a liquid crystal display panel used in the transmission type liquid crystal display.

As shown in Fig. 1, the liquid crystal display panel of the first embodiment includes a TFT substrate 1, a counter substrate 2, a liquid crystal material 3 held between the TFT substrate 1 and the counter substrate 2, a pair of polarizing plates 4, 5 disposed between the TFT substrate and the counter substrate 2 both holding the liquid crystal material 3, and a resin film 6 affixed in contact with the polarizing plate 5 which is located on the counter substrate 2 side.

The TFT substrate 1 and the counter substrate 2 are bonded together through an annular sealing member 7 and the liquid crystal material 3 is sealed and held within the space enclosed by the TFT substrate 1, counter substrate 2 and sealing member 7.

In the display having such a liquid crystal display panel, when seen from an observer side, the counter substrate 2 is usually disposed on the observer side with respect to the TFT substrate. That is, when the liquid crystal display panel of the first embodiment is viewed from the observer side, the resin film 6, polarizing plate 5, counter substrate 2, liquid crystal material 3, TFT substrate 1 and polarizing plate 4 are disposed in this order from the observer side. Therefore, in the following description, the polarizing plate 5 disposed on the observer side (front side) with respect to the counter substrate 2 when seen from the observer side will be designated the upper polarizing plate, while the polarizing plate 4 disposed on the back surface side (back side) of the TFT substrate will be designated the lower polarizing plate.

The TFT substrate 1 includes a glass substrate 101 and a multi-thin film layer 102. Though detailed descriptions are omitted, the multi-thin film layer 102 is a laminate of plural insulating layers, conductive layer,

semiconductor layer and the like. For example, a scanning signal line (also called a gate signal line), a video signal line (also called a drain signal line), TFT and pixel electrodes are formed in the multi-thin film layer 102.

The counter substrate 2 includes a glass substrate 201 and a multi-thin film layer 202. Though detailed descriptions are omitted, the multi-thin film layer 202 is a laminate of plural insulating layers and conductive layer, forming a color filter for example.

In the case where the driving method for the liquid crystal display panel is of a longitudinal electric field type, common electrodes are also formed in the multi-thin film layer 202 of the counter substrate 2 and opposed to the pixel electrodes of the TFT substrate 1. Where the driving method for the liquid crystal display panel is of a lateral electric field type, the common electrodes are formed in the multi-thin film layer 102 of the TFT substrate 1.

Any of various combinations applied to conventional liquid crystal display panels may be adopted for the combination of the configuration of the multi-thin film layer 102 of the TFT substrate and the multi-thin film layer 202 of the counter substrate 2. Therefore, detailed descriptions on concrete structural examples of the multi-thin film layers 102 and 202 will be here omitted.

The lower polarizing plate 4 is affixed in contact with the glass substrate 101 in the TFT substrate
1 through a pressure-sensitive adhesive for example. Likewise, the upper polarizing plate 5 is also affixed in contact with the glass substrate 201 of the counter substrate 2 through a pressure-sensitive adhesive for example. In this case, the upper polarizing plate 4 and the lower polarizing plate 5 are affixed to the glass substrates in such a manner that their transmission axes (also called

polarization axes) intersect each other perpendicularly or are parallel to each other. For the lower polarizing plate 4 and the upper polarizing plate 5, for example, film-like polarizing plates used in conventional liquid crystal display panels may be used. Detailed descriptions on concrete structural examples of the material, etc. will be here omitted.

In the liquid crystal display panel of the first embodiment, though not shown, a phase difference plate may be disposed between the glass substrate of the TFT substrate 1 and the lower polarizing plate 4 and also between the glass substrate 201 of the counter substrate 2 and the upper polarizing plate 5.

The resin film 6 is a film member disposed on the most front side when viewed from the observer side. Therefore, it is preferable that a film with a high light transmittance, especially a colorless, transparent film be used as the resin film 6. For example, an acrylic resin film or an epoxy resin film may be used as the resin film 6. The resin film 6 is affixed in contact with the upper polarizing plate through a pressure-sensitive adhesive for example.

In the liquid crystal display panel of the first embodiment it is preferable that the resin film 6 have a thickness, T6, of 0.2 mm or more and 1.0 mm or less. If the thickness T6 of the resin film 6 is 0.2 mm or more, a sufficient strength of the liquid crystal panel can be ensured even if the glass substrate 101 of the TFT substrate and the glass substrate 201 of the counter electrode 2 are each made as thin as 0.5 mm or less. Therefore, in the liquid crystal display panel of the first embodiment, a sufficient strength can be ensured even if the total panel thickness, TP, is 2 mm or less. In the liquid crystal display panel of this embodiment it is preferable that the total panel thickness TP be not larger than 2 mm and the panel thickness, TP-T6, exclusive of the resin film be not larger than

1.3 mm.

Since the resin film 6 exhibits a function as a reinforcing member for the liquid crystal display panel, for example, as shown in Fig. 3A, the thickness T2 of the glass substrate 201 of the counter substrate 2 with the resin film 6 affixed thereto can be made thinner than the thickness T1 of the glass substrate 101 of the TFT substrate 1. Consequently, the total panel thickness TP can be further reduced.

In the case where the driving method for the liquid crystal display panel is of a lateral electric field type called IPS (In Plane Switching), for example, a conductor film 203 for the prevention of electric charging may be provided on a back surface of the glass substrate 201 of the counter substrate 2, in other words, on the surface to which the upper polarizing plate 5 is affixed, as shown in Fig. 3B. In this case, the back surface of the glass substrate 201 in the counter substrate 2 cannot be subjected to polishing for the reduction of thickness. When the conductor film 203 is thus formed on the counter substrate, as shown in Fig. 3B, a back surface of the glass substrate 101 in the TFT substrate, in other words, the surface to which the lower polarizing plate 4 is affixed, is ground to make the thickness T1 of the glass substrate 101 in the TFT substrate 1 smaller than the thickness T2 of the glass substrate 201 in the counter substrate 2, whereby the total panel thickness TP can be reduced.

Further, it is preferable that the surface hardness of the resin film 6 be harder than that of the upper polarizing plate 5. More specifically, it is preferable for the resin film 6 to have a surface pencil hardness of 3H or harder. The surface pencil hardness is meant a hardness with which the material surface is damaged when a line is drawn on the material surface with a pencil.

That is, the surface pencil hardness of 3H means that the material surface is not damaged when a line is drawn on the resin film 6 with a pencil having a hardness of 3H or softer.

To make the resin film 6 with a surface pencil hardness of 3H or harder, there may be used a film obtained by forming a material having a pencil hardness of 3 H or harder into a film shape, or there may be adopted a method wherein a material having an arbitrary pencil hardness is formed into a film and then the surface of the film is subjected to a hard coating treatment so as to give a surface pencil hardness of 3H or harder. In the case of using an acrylic resin or epoxy resin as the material of the resin film 6, the resin surface is subjected to a hard coating treatment as in the latter method just referred to above to give a surface pencil hardness of 3H or harder.

Figs. 4 to 7 are schematic diagrams for explaining an example and functional effects of a hand-held electronic device for which the use of the liquid crystal display panel of the first embodiment is preferred.

Fig. 4 is a schematic front view showing a schematic configuration of a display unit of a conventional mobile telephone terminal, Fig. 5 is a sectional view taken along the line B-B' of Fig. 4, Fig. 6 is a schematic front view showing a schematic configuration of a display unit of a mobile telephone terminal using the liquid crystal display panel of the first embodiment, and Fig. 7 is a sectional view taken along the line C-C' of Fig. 6.

The liquid crystal display panel of the first embodiment is a display panel which is preferably applied to a display of a hand-held electronic device such as, for example, a mobile telephone terminal.

The liquid crystal display used in the display unit of the mobile

telephone terminal includes, in addition to the liquid crystal display panel, a data driver which outputs a video signal to a video signal line (drain line) in the liquid crystal display panel, a gate driver which outputs a scanning signal to a scanning signal line (gate line) in the liquid crystal display panel, and a timing controller for controlling the timing at which the video signal and the scanning signal are to be outputted. In the case of a transmission type or semi-transmission type liquid crystal display, the liquid crystal display has a back light (light source). These parts are held integrally by a frame member called a display mold for example.

A liquid crystal display panel used in a conventional mobile telephone terminal includes, for example as shown in Figs. 4 and 5, a TFT substrate 1, a counter substrate 2, a lower polarizing plate 4, an upper polarizing plate 5, and a sealing member 7. When the liquid crystal display panel is seen by the observer, the upper polarizing plate 5, counter substrate 2, liquid crystal material 3, TFT substrate 1 and lower polarizing plate 4 are disposed in this order from the observer. If the liquid crystal display concerned is a transmission type display, a back light 8 is disposed further behind the lower polarizing plate 4 when seen from the observer side. The liquid crystal display panel and the back light 8 are held by a concave display mold 9 so that a back surface side of the back light 8 is a bottom surface.

Such a liquid crystal display is accommodated within a sheath (case) 10 having an opening of the mobile telephone terminal so that a display area DA of the liquid crystal display panel can be seen. In the conventional mobile telephone terminal, a transparent protective cover 11 constituted by an acrylic plate or the like is usually disposed at a position closer to the observer

compared with the liquid crystal display panel. In many cases, the protective cover 11 is fitted in a depression formed in the surface of the sheath 10 and is affixed to the sheath 10 through a pressure-sensitive adhesive 12. For example, the protective cover 11 functions to prevent the surface (upper polarizing plate 5) of the liquid crystal display panel from being damaged or prevent the liquid crystal display panel from being cracked upon exertion of pressure on the liquid crystal display panel.

In the conventional mobile telephone terminal using the liquid crystal display, it is necessary to use the protective cover 11 for protecting the liquid crystal display panel. Thus, the thickness of the display unit is increased.

On the other hand, in the liquid crystal display panel of the first embodiment, the resin film 6 is affixed to the upper polarizing plate 5 to enhance the strength of the liquid crystal display panel, and the resin film 6 with a surface pencil hardness of 3H or harder makes it difficult to damage the surface of the resin film 6. That is, in the liquid crystal display panel of the first embodiment, the resin film 6 is endowed with the function of the conventional protective cover 11. Therefore, for example as shown in Figs. 6 and 7, if the liquid crystal display wherein the liquid crystal display panel is disposed so that the resin film 6 is positioned closest to the observer is accommodated inside the sheath 10 of the liquid crystal display, the liquid crystal display panel can be protected from being damaged and cracked due to pressure even in the absence of the protective cover 11. As a result, the display unit of the mobile telephone terminal can be made thinner than the conventional counterpart.

In the display unit of the conventional mobile telephone terminal there is an air layer between the liquid crystal display panel and the protective cover

11, but the air layer can be eliminated by using the liquid crystal display panel of the first embodiment. Consequently, the display efficiency can also be improved over conventional displays.

In the liquid crystal display panel of the first embodiment, the TFT substrate and the counter substrate 2 can be fabricated using glass substrates 101 and 201. Therefore, the multiple wiring layers 102 and 202 can be formed more easily than in the liquid crystal display panel using plastic substrates which is described in Patent Document 1. Besides, by forming the TFT substrate 1 and the counter substrate 2 with use of the glass substrates 101 and 201, it is also possible to prevent the occurrence of unevenness in display caused by a change in environment.

Figs. 8A and 8B is schematic sectional views showing modified configurations of the display unit of the mobile telephone terminal using the liquid crystal display panel of the first embodiment. In Fig. 8, as such modified configurations, there are shown two sectional views which are Fig. 8A and Fig. 8B. These two sectional views correspond to the sectional configuration taken along the line C-C' of Fig. 6.

When the liquid crystal display having the liquid crystal panel of the first embodiment is applied to a mobile telephone terminal, it is not necessary to affix the protective cover 11 to the surface of the sheath 10, as shown in Fig. 7. However, when the liquid crystal display is accommodated in such a state as shown in Fig. 7, water or the like is apt to get into the inside of the sheath through a gap formed between an outer periphery 10A of the opening area of the sheath 10 and the liquid crystal display panel (resin film 6). As a result, wiring formed on the TFT substrate 1 of the liquid crystal display panel and

wiring formed on another circuit board are apt to be corroded.

Therefore, in the case of using the liquid crystal display panel of the first embodiment, for example as shown in Fig. 8A, it is preferable that the outline of both upper polarizing plate 5 and resin film 6 affixed to the counter substrate 2 be made smaller than that of the lower polarizing plate 4 and that the counter substrate 2 and the sheath 10 be fixed together by bonding with use of a pressure-sensitive adhesive 13. In this case, if the pressure-sensitive adhesive 13 is formed in an annular shape which surrounds the upper polarizing plate 5 and the resin film 6, the pressure-sensitive adhesive 13 serves as a wall and it is possible to prevent the entry of water or the like into the inside of the sheath. Of course, an adhesive may be used instead of the pressure-sensitive adhesive 13.

For example as shown in Fig. 8B, if a projecting portion projecting toward the counter substrate 2 is formed on the outer periphery 10A of the opening area of the sheath 10, the effect of preventing the entry of water or the line to the inside of the sheath is further enhanced.

Fig. 9 is a schematic front view for explaining an application of the liquid crystal display panel of the first embodiment and Fig. 10 is a sectional view taken along the line D-D' of Fig. 9.

In the liquid crystal display panel of the first embodiment, both reduction in thickness of the panel and ensuring of a sufficient strength thereof are attained by affixing the resin film 6 to the upper polarizing plate 5 affixed to the counter substrate 2. Further, by using such a liquid crystal display panel it is made possible to reduce the thickness of a hand-held electronic device such as a mobile telephone terminal.

However, in the case where the outer periphery of the upper polarizing plate 5 and that of the resin film 6 are coincident with each other when seen from the front side for example as is the case with the liquid crystal display panel shown in Figs. 1 and 2, the outer periphery end face of the upper polarizing plate 5 comes into contact with the outside air for example as shown in Fig. 7 and Figs. 8A and 8B. Consequently, the upper polarizing plate 5 is corroded and deteriorated due to moisture contained in the outside air and there is a possibility that the upper polarizing plate 5 may be peeled off from the counter substrate 2 or unevenness in display may result.

The occurrence of such a problem can be prevented by diminishing the outline of the resin film 6 so that the outer periphery of the resin film 6 lies inside the outer periphery of the upper polarizing plate 5 when the liquid crystal display panel is viewed from the front side for example as shown in Figs. 9 and 10. Of course, the outline of the resin film 6 should be diminished in such a manner that the outer periphery thereof lies outside the display area DA.

Figs. 11A to 11C are schematic sectional views showing structural examples of a display unit of a mobile telephone terminal using the liquid crystal display panel shown in Figs. 9 and 10. In Fig. 11, there are shown three sectional views 11A, 11B and 11C as structural examples, which sectional views correspond to the sectional configuration taken along the line C-C' of Fig. 6.

Also in the case where the liquid crystal display having the liquid crystal display panel shown in Figs. 9 and 10 is applied to a mobile telephone terminal, it is not necessary to affix the protective cover 11 to the surface of the sheath 10 for example as shown in Fig. 11A. Consequently, the display unit of the mobile telephone terminal can be made thinner than the conventional counterpart.

Besides, since the outer periphery of the resin film 6 in the liquid crystal display panel lies inside the outer periphery of the upper polarizing plate 5, the outer periphery 10A of the opening area of the sheath 10 can be positioned inside the outer periphery of the upper polarizing plate 5. Therefore, for example in comparison with the case of Fig. 7, the path from the outside of the sheath 10 up to a side face of the outer periphery of the upper polarizing plate 5 becomes long and complicated and the entry of moisture, etc. becomes difficult. As a result, the side face of the outer periphery of the upper polarizing plate 5 becomes difficult to be corroded and deteriorated and it is possible to diminish the possibility of the upper polarizing plate 5 being peeled off from the counter substrate 2 or causing unevenness in display.

For example as shown in Fig. 11B, it is preferable that the upper polarizing plate 5 and the sheath 10 be bonded and fixed together using a pressure-sensitive adhesive 13. In this case, if the shape of the pressure-sensitive adhesive 13 is made an annular shape which surrounds the resin film 6, the pressure-sensitive adhesive 13 serves as a wall and it is thereby possible to prevent the entry of moisture, etc. into inside of the sheath. As a result, the side face of the outer periphery of the upper polarizing plate 5 becomes more difficult to be deteriorated and it is possible to further diminish the possibility of the upper polarizing plate 5 being peeled off from the counter substrate 2 or causing unevenness in display.

Moreover, for example as shown in Fig. 11C, if the outer periphery 10A of the opening area of the sheath 10 is formed with a projecting portion projecting toward the upper polarizing plate 5, the effect of preventing the entry of moisture, etc. into the inside of the sheath is more enhanced.

According to the liquid crystal display panel of the first embodiment, as set forth above, a required strength of the liquid crystal display panel can be ensured by affixing the resin film 6 in contact with the upper polarizing plate 5. As a result, the thickness of the glass substrate 10 in the TFT substrate 1 and that of the glass substrate 201 in the counter substrate 2 can be reduced by polishing. Consequently, it is possible to reduce the thickness of the liquid crystal display panel. That is, in the liquid crystal display panel of the first embodiment it is possible to attain both reduction of thickness and ensuring of a sufficient strength.

Further, since the TFT substrate 1 and the counter substrate 2 can each be formed using a glass substrate, there is little difference in the amount of deformation caused by an environmental change. Therefore, it is also possible to prevent the occurrence of unevenness in display caused by an environmental change.

Additionally, by applying the liquid crystal display (module) having the liquid crystal display panel of the first embodiment to a hand-held electronic device such as a mobile telephone terminal it is possible to reduce the thickness of a display unit of the hand-held electronic device.

In the first embodiment, a reference is made to an example in which the surface pencil hardness of the resin film 6 is set to 3H or harder, whereby for example the use of the conventional protective cover 11 is made unnecessary when installing the liquid crystal display into the mobile telephone terminal and the thickness of the display unit is thereby reduced. However, the application of the liquid crystal display panel of the first embodiment is not limited to such an example. For example, it goes without saying that the liquid crystal display

panel of the first embodiment may be installed into a mobile telephone terminal using the protective cover 11. In the case of using the protective cover 11, the surface pencil hardness of the resin film 6 may be 3H or softer. In this case, however, it is preferable the total thickness TP of the liquid crystal display panel including the resin film 6 be set to a value of 1.3 mm or less.

[Second Embodiment]

Fig. 12 is a schematic sectional view showing a schematic configuration of a liquid crystal display panel according to a second embodiment of the present invention. The sectional view of Fig. 12 corresponds to the sectional configuration taken along the line A-A' of Fig. 1.

The liquid crystal display panel of the second embodiment is basically of the same configuration as the liquid crystal display panel of the first embodiment. In the second embodiment, therefore, a description will be given below about only the difference from the first embodiment.

For example as shown in Fig. 12, the liquid crystal display panel of the second embodiment includes a TFT substrate 1, a counter substrate 2, a liquid crystal material 3 held between the TFT substrate 1 and the counter substrate 2, a pair of polarizing plates (a lower polarizing plate 4 and an upper polarizing plate 5) disposed between the TFT substrate 1 and the counter substrate 2 both holding the liquid crystal material 3, and a resin film 6 disposed on the counter substrate 2 side.

Also in the liquid crystal display panel of the second embodiment, though not shown, a phase difference plate may be disposed between a glass substrate 101 in the TFT substrate 1 and the lower polarizing plate 4 and also

between a glass substrate 201 in the counter substrate 2 and the upper polarizing plate 5.

In this case, unlike the first embodiment, the resin film 6 is disposed between the counter substrate 2 and the upper polarizing plate 5. For example, the resin film 6 is affixed in contact with the glass substrate 201 in the counter substrate 2 through a pressure-sensitive adhesive or the like. Further, the upper polarizing plate 5 is affixed in contact with the resin film 6 through a pressure-sensitive adhesive for example.

Also in the liquid crystal display panel of the second embodiment it is preferable that a film of a high light transmittance, especially a colorless, transparent film, be used as the resin film 6. In the liquid crystal panel of the second embodiment the resin film 6 is disposed between the upper polarizing plate 5 and the counter substrate 2 (lower polarizing plate 4). Therefore, it is preferable for the resin film 6 to be low, more preferably nearly zero, in optical anisotropy. Therefore, it is preferable to use an epoxy resin as the material of the resin film 6. However, in the case where the optical anisotropy is of an allowable magnitude or can be compensated, an acrylic resin for example may be used as the material of the resin film 6.

In the liquid crystal display panel of the second embodiment, the upper polarizing plate 5 is disposed on the observer side (front side) with respect to the resin film 6. Therefore, in the second embodiment, unlike the first embodiment, it is not necessary to set the surface pencil hardness of the resin film 6 to 3H or harder. Instead, in the liquid crystal display panel of the second embodiment, the surface pencil hardness of the upper polarizing plate 5 positioned closest to the observer is made 3H or harder. This can be done for example by applying

a hard coating treatment to the surface of a conventional polarizing plate.

Also in the liquid crystal display panel of the second embodiment it is preferable that the thickness T6 of the resin film 6 be set to a value of 0.2 mm or more and 1.0 mm or less. If the thickness T6 of the resin film 6 is not smaller than 0.2 mm, it is possible to ensure a sufficient strength of the liquid crystal display panel even if the glass substrate 101 in the TFT substrate 1 and the glass substrate 201 in the counter substrate 2 are made as thin as 0.5 mm or less. In the liquid crystal display panel of the second embodiment, therefore, it is possible to ensure a sufficient strength even if the total panel thickness TP is made 2 mm or less. In the liquid crystal display panel of the second embodiment it is preferable that the total panel thickness TP be 2 mm or less and that the panel thickness TP-T6 exclusive of the resin film be 1.3 mm or less.

The resin film 6 also functions as a reinforcing member for the liquid crystal display panel and therefore, as in the configuration shown in Fig. 3A, the thickness T2 of the glass substrate 201 in the counter substrate 2 with the resin film 6 affixed thereto can be made smaller than the thickness T1 of the glass substrate 101 in the TFT substrate 1. Consequently, the total panel thickness TP can be further reduced.

When the liquid crystal display panel is of the lateral electric field driving type called IPS, for example as in the configuration shown in Fig. 3B, there sometimes is a case where a conductor film 203 for the prevention of electric charging is provided on the back surface of the glass substrate 201 in the counter substrate 2, in other words, the surface with the upper polarizing plate 5 affixed thereto. In this case, the glass substrate 201 in the counter substrate 2 cannot be subjected to polishing for the reduction of thickness.

Therefore, when the conductor film 203 is provided on the counter substrate 2, for example as in the configuration shown in Fig. 3B, the back surface of the glass substrate 101 in the TFT substrate, in other words, the surface with the lower polarizing plate 4 affixed thereto, is subjected to polishing to make the thickness T1 of the glass substrate 101 in the TFT substrate 1 smaller than the thickness T2 of the glass substrate 201 in the counter substrate 2, whereby the total panel thickness TP can be reduced.

Figs. 13A to 13C are schematic sectional views showing structural examples of a display unit of a mobile telephone terminal using the liquid crystal display panel of the second embodiment. In Fig. 13 there are shown three sectional views 13A, 13B and 13C as structural examples, which correspond to the sectional configuration taken along the line C-C' of Fig. 6.

Also in the case of applying the liquid crystal display having the liquid crystal display panel of the second embodiment to a mobile telephone terminal, it is not necessary to affix the protective cover 11 to the surface of a sheath 10 for example as shown in Fig. 13A. Consequently, the display unit of the mobile telephone terminal can be made thinner than the conventional counterpart.

However, when the liquid crystal display is accommodated inside the sheath 10 in such a state as shown in Fig. 13A, moisture or the like is apt to get into the inside of the sheath 10 through a gap formed between an outer periphery 10A of the opening area of the sheath 10 and the liquid crystal display panel (upper polarizing plate 5), so that wiring formed in the TFT substrate 1 of the liquid crystal display panel and wiring formed in another circuit board are apt to be corroded.

Therefore, also in the case of using the liquid crystal display panel of

the second embodiment, for example as shown in Fig. 13B, it is preferable that the outline of the upper polarizing plate 5 and the resin film 6 both affixed to the counter substrate 2 be made smaller than that of the lower polarizing plate 4 and that the counter substrate 2 and the sheath be bonded and fixed together through a pressure-sensitive adhesive 13. In this case, if the pressure-sensitive adhesive 13 is formed in an annular shape which surrounds the upper polarizing plate 5 and the resin film 6, the pressure-sensitive adhesive 13 serves as a wall, whereby the entry of moisture, etc. into the inside of the sheath can be prevented.

Moreover, for example as shown in Fig. 13C, if the outer periphery 10A of the opening area of the sheath 10 is formed with a projecting portion projecting toward the counter substrate 2, the effect of preventing the entry of moisture, etc. into the inside of the sheath is further enhanced.

Fig. 14 is a schematic sectional view for explaining an application of the liquid crystal display panel of the second embodiment, which corresponds to the sectional configuration taken along the line D-D' of Fig. 9.

Also in the liquid crystal display panel of the second embodiment, the resin film 6 and the upper polarizing plate 5 are both affixed to the glass substrate 201 of the counter substrate 2, and the outline of the upper polarizing plate 5 may be made small so that the outer periphery thereof lies inside the outer periphery of the resin film 6, as shown in Fig. 14. In this case, it goes without saying that the outer periphery of the upper polarizing plate 5 should lie outside the display area DA.

Figs. 15A to 15C are schematic sectional views showing structural examples of a display unit of a mobile telephone terminal using the liquid crystal

display panel shown in Fig. 14. In Fig. 15, there are shown three sectional views 15A, 15B and 15C as structural examples, which correspond to the sectional configuration taken along the line C-C' of Fig. 6.

Also in the case of applying the liquid crystal display using the liquid crystal display panel shown in Fig. 14 to a mobile telephone terminal, for example as shown in Fig. 15A, it is not necessary to affix the protective cover 11 to the surface of the sheath 10, whereby the display unit of the mobile telephone terminal can be made thinner than the conventional counterpart.

Moreover, since the outer periphery of the upper polarizing plate 5 of the liquid crystal display panel lies inside the outer periphery of the resin film 6, the outer periphery 10A of the opening area of the sheath 10 can be positioned inside the outer periphery of the resin film 6. Consequently, for example in comparison with the case of Fig. 13A, the path from the outside of the sheath 10 to the inside thereof becomes long and complicated, making the entry of moisture, etc. difficult.

In this case, it is preferable that the resin film and the sheath 10 be bonded and fixed together using the pressure-sensitive adhesive 13, for example as shown in Fig. 15B. If the pressure-sensitive adhesive 13 is formed for example in an annular shape which surrounds the upper polarizing plate, the pressure-sensitive adhesive 13 serves as a wall, whereby it is possible to prevent the entry of moisture, etc. into the inside of the sheath.

Further, for example as shown in Fig. 15C, if the outer periphery 10A of the opening area of the outer sheath 10 is formed with a projecting portion projecting toward the resin film 6, the effect of preventing the entry of moisture, etc. into the inside of the sheath is further enhanced.

According to the liquid crystal display panel of the second embodiment, since the resin film 6 is disposed between and in close contact with the glass substrate 101 in the TFT substrate 1 and the glass substrate 201 in the counter substrate 2, it is possible to ensure a required strength of the liquid crystal display panel. As a result, both glass substrates 101 and 201 can be reduced in thickness by polishing and hence it is possible to reduce the thickness of the liquid crystal display panel. That is, also in the liquid crystal display panel of the second embodiment it is possible to attain both reduction of thickness and ensuring of a sufficient strength.

Further, since the TFT substrate 1 and the counter substrate 2 can be formed using glass substrates, there is little difference in the amount of deformation caused by an environmental change. Consequently, it is also possible to prevent the occurrence of unevenness in display caused by an environmental change.

Additionally, the display unit of a hand-held electronic device such as a mobile telephone terminal can be made thin by applying the liquid crystal display (module) having the liquid crystal display panel of the second embodiment to the hand-held electronic device.

In the second embodiment reference is made to an example in which the surface pencil hardness of the upper polarizing plate 5 is made 3H or harder, thereby making the use of the conventional protective cover 11 unnecessary when installing the liquid crystal display into the mobile telephone terminal to attain the reduction in thickness of the display unit. However, it goes without saying that the application of the liquid crystal display panel of the second embodiment is not limited to this example, and the liquid crystal display panel

may be installed into a mobile telephone terminal using the protective cover 11. In the case of using the protective cover 11, the surface pencil hardness of the upper polarizing plate 5 may be 3H or softer. In this case, however, it is preferable that the total thickness TP of the liquid crystal display panel including the resin film 6 be set to a value of 1.3 mm or less.

[Third Embodiment]

Fig. 16 is a schematic sectional view showing a schematic configuration of a liquid crystal display panel according to a third embodiment of the present invention.

The liquid crystal display panel of the third embodiment is basically of the same configuration as the liquid crystal display panel of the first embodiment. In the third embodiment, therefore, a description will be given only about points different from the first embodiment.

For example as shown in Fig. 16, the liquid crystal display panel of the third embodiment includes a TFT substrate 1, a counter substrate 2, a liquid crystal material 3 held between the TFT substrate and the counter substrate 2, a pair of polarizing plates (a lower polarizing plate 4 and an upper polarizing plate 5) disposed between the TFT substrate 1 and the counter substrate 2 both holding the liquid crystal material 3, and a resin film 6 affixed in contact with the lower polarizing plate 4 located on the TFT substrate 1 side.

That is, in the liquid crystal display panel of the third embodiment, unlike the first embodiment, the resin film 6 is disposed lies on the back surface side of the TFT substrate 1 and is most distant from the observer. The resin film 6 is affixed in contact with the lower polarizing plate 4 with use of a

pressure-sensitive adhesive for example.

Also in the liquid crystal display panel of the third embodiment, though not shown, a phase difference plate may be disposed between a glass substrate 101 in the TFT substrate and the lower polarizing plate 4 and also between a glass substrate 201 of the counter substrate 2 and the upper polarizing plate 5.

Also in the liquid crystal display panel of the third embodiment it is preferable that a film of a high light transmittance, especially a colorless, transparent film, be used as the resin film 6. For example, an acrylic resin or an epoxy resin may be used as the resin film 6.

In the liquid crystal display panel of the third embodiment, the lower polarizing plate 4 and the TFT substrate 1 are disposed more closely to (in front of) the observer with respect to the resin film 6. Therefore, also in the third embodiment, unlike the liquid crystal display panel of the first embodiment, it is not necessary to set the surface pencil hardness of the resin film 6 to 3H or harder.

In the liquid crystal display panel of the third embodiment, for example, it is preferable that the total of the thickness T1 of the glass substrate 101 in the TFT substrate 1 and the thickness T2 of the glass substrate 201 in the counter substrate 2 be 0.5 mm or less. The thicknesses T1 and T2 of the glass substrates 101 and 201 may be approximately equal to each other, or either one of them may be thin and the other thick.

As a result, when a pressing force is exerted on the liquid crystal display panel from the upper polarizing plate 5 side, the force can be borne by the resin film 6 affixed to the back surface of the liquid crystal display panel. Therefore, even if the glass substrates 101 and 201 are made thin, it is possible

to ensure a sufficient strength of the liquid crystal display panel.

Fig. 17 is a schematic sectional view for explaining a modified example of the liquid crystal display panel of the third embodiment.

In the case of disposing the resin film 6 on the TFT substrate 1 side as in the third embodiment, the disposed position may be between the glass substrate 101 in the TFT substrate 1 and the lower polarizing plate 4 as in Fig. 17. In the case of disposing the resin film 6 between the TFT substrate 1 and the lower polarizing plate 4, it is preferable that the resin film 6 be low, more preferably nearly zero, in optical anisotropy. Therefore, it is preferable to use, for example, an epoxy resin as the material of the resin film 6. However, if the optical anisotropy is of an allowable magnitude or can be compensated, for example an acrylic resin may be used as the material of the resin film 6.

Also in the liquid crystal display panel of the third embodiment it is preferable that the thickness T6 of the resin film 6 be set to 0.2 mm or more and 1.0 mm or less. If the thickness T6 of the resin film 6 is 0.2 mm or more, a sufficient strength of the liquid crystal display panel can be ensured even if the glass substrate 101 in the TFT substrate 1 and the glass substrate 201 in the counter substrate 2 are each made as thin as 0.5 mm or less. Thus, in the liquid crystal display panel of the third embodiment, a sufficient strength can be ensured even if the total panel thickness TP is set to 1.3 mm or less.

According to the liquid crystal display panel of the third embodiment, as set forth above, a required strength of the liquid crystal display panel can be ensured by disposing the resin film 6 in a contact manner on the back surface side of the lower polarizing plate 4 or between the glass substrate 101 in the TFT substrate 1 and the lower polarizing plate 4. Besides, since the required

strength can be ensured by the resin film 6, the glass substrate 101 in the TFT substrate 1 and the glass substrate 201 in the counter substrate 2 can be reduced in thickness by polishing. Consequently, it is possible to reduce the thickness of the liquid crystal display panel. That is, also in the liquid crystal display panel of the third embodiment it is possible to attain both reduction of thickness and ensuring of a sufficient strength.

Moreover, since the TFT substrate 1 and the counter substrate 2 can be formed using glass substrates, there is little difference in the amount of deformation caused by an environmental change. Therefore, it is possible to prevent the occurrence of unevenness in display caused by an environmental change.

In the case of installing the liquid crystal display having the liquid crystal display panel of the third embodiment to, for example, a mobile telephone terminal, it is preferable, as in the conventional liquid crystal display, that a protective cover for protecting the liquid crystal display panel be affixed to a sheath 10 of the mobile telephone terminal. However, in the liquid crystal display having the liquid crystal display panel of the third embodiment, the total of the thickness T1 of the glass substrate 101 in the TFT substrate 1 and the thickness T2 of the glass substrate 201 in the counter substrate 2 is 0.5 mm or less and the thickness of the resin film is 0.1 mm or more and 0.3 mm or less. That is, in the liquid crystal display using the liquid crystal display panel of the third embodiment, the liquid crystal display panel is thinner than the conventional liquid crystal display panel and can be so much reduced in thickness. As a result, even if the protective cover for protecting the liquid crystal display panel is affixed to the sheath of the mobile telephone terminal, the display unit of the

mobile telephone terminal can be made thinner than the conventional counterpart.

Although the present invention has been described concretely on the basis of the above embodiments, it goes without saying that the invention is not limited to the above embodiments, but that various changes may be made within the scope not departing from the gist of the invention.

For example, in each of the above embodiments, reference is made to a transmission type or semi-transmission type liquid crystal display panel as an example, which has two polarizing plates, i.e., the lower polarizing plate 2 and the upper polarizing plate 5. However, the present invention is applicable not only to such a transmission or semi-transmission type but also to a reflection type liquid crystal display panel.

Fig. 18 is a schematic sectional view showing a schematic configuration wherein the present invention is applied to a reflection type liquid crystal display panel.

For example as shown in Fig. 18, the reflection type liquid crystal display panel includes a TFT substrate 1, a counter substrate 2, a liquid crystal material 3 held between the TFT substrate and the counter substrate 2, and a polarizing plate 5 affixed to a glass substrate 201 in the counter substrate 2. In the case of applying the configuration of the first embodiment to this display panel, there is provided a resin film 6 affixed in contact with the polarizing plate 5 which is disposed on the counter substrate 2 side.

When the display having such a liquid crystal display panel is viewed from the observer side, the counter substrate 2 is usually disposed on the observer side with respect to the TFT substrate 1. That is, when the observer

looks at the liquid crystal display panel shown in Fig. 18, the resin film 6, polarizing plate 5, counter substrate 2, liquid crystal material 3 and TFT substrate 1 are disposed in this order from the observer side.

In this case, for example a reflective layer is formed in a multi-thin film layer 102 of the TFT substrate 1 and light incident on the liquid crystal display panel from the resin film 6 side is reflected by the reflective layer in the multi-thin film layer 102 and is then emitted toward the observer.

Even in such a reflection type liquid crystal display panel, by affixing the resin film 6 formed of, for example, an acrylic resin or an epoxy resin to the polarizing plate 5 in a contact manner, it is possible to ensure a sufficient strength even if the glass substrate 101 in the TFT substrate 1 and the glass substrate 201 in the counter substrate 2 are reduced in thickness by polishing. Thus, it is possible to attain both reduction in thickness of the liquid crystal display panel and ensuring of a sufficient strength.

Fig. 18 shows an example in which the resin film 6 is disposed more closely to the observer compared with the polarizing plate 5 However, this configuration is not limited, and the resin film 6 may be affixed between the glass substrate 201 in the counter substrate 2 and the polarizing plate 5 or to the back surface of the glass substrate 101 in the TFT substrate 1.

Although in each of the above embodiments reference is made to an example in which the present invention is applied to a liquid crystal display panel, the present invention is applicable also to other display panels, e.g., a display panel in a self-light emission type display using organic EL (Electro Luminescence).

Fig. 19 is a schematic sectional view showing a schematic

configuration in which the present invention is applied to an organic EL panel.

For example as shown in Fig. 19, the organic EL panel includes a TFT substrate 1, a counter substrate 2 (glass substrate 201), as well as a phase difference plate 15 and an upper polarizing plate 5 both affixed to the counter substrate 2. In the case of applying the configuration of the first embodiment to this panel, there is provided a resin film 6 affixed in contact with the upper polarizing plate 5 which is disposed on the counter substrate 2 side.

In the organic EL panel, the upper polarizing plate 5 and a phase difference plate 15 are combined together to form a circularly polarizing plate, thereby preventing extraneous light from being reflected (preventing extraneous light from entering an image display area in the display panel). For the phase difference plate 15, for example, only a quarter-wave phase difference plate may be used, or both a quarter-wave phase difference plate and a half-wave phase difference plate may be used in a stacked fashion. In particular, A combination of the upper polarizing plate 5 with a phase difference plate 15 having the quarter-wave phase difference plate and the half-wave phase difference plate stacked makes it possible to form a wide-band circularly polarizing plate.

In the organic EL panel, for example a light emitting layer using an organic EL material is provided in the multi-thin film layer 102 of the TFT substrate 1 and the gradation of each pixel is controlled by turning ON and OFF of the light emitting layer and by the luminance of light 14 during turning ON of the light emitting layer. Therefore, the space enclosed with the TFT substrate 1, counter substrate 2 and sealing member 7 is in a vacuum state. Further, unlike the liquid crystal display panel, a multi-thin film layer 202 may be absent in the counter substrate 2.

It goes without saying that the present invention is applicable not only to the liquid crystal display panel and the display panel using organic EL, but also to display panels similar in configuration to those panels.

What Is Claimed Is:

1. A display device comprising display area and used in a hand-held electronic device comprising;

a TFT substrate,

a counter substrate,

a multi-thin film layer,

a liquid crystal layer,

a seal member,

a polarizing plate,

an adhesive member, and

a protective member;

wherein the multi-thin film layer disposed on the TFT substrate,

wherein the liquid crystal layer dispose on the multi-thin film layer,

wherein the seal member surrounds the liquid crystal layer,

wherein the counter substrate is disposed between the TFT substrate and the polarizing plate,

wherein the polarizing plate is formed by a different member from the protective member and disposed between the counter substrate and the protective member,

wherein the adhesive member overlaps with the display area where is between the protective member and the polarizing plate, and

wherein the protective member is a protective cover of the hand-held electronic device, and

wherein the protective member overlaps with the sealing member in a plan view.

2. A display device according to claim 1, wherein a surface pencil hardness of the protective member is at least 3H.

3. A display device according to claim 1, wherein a thickness of the protective member is at least 0.2mm and no greater than 1.0mm.

4. A display device according to claim 1, wherein the counter substrate having a multi-thin film layer.

5. A display device according to claim 1, wherein the liquid crystal layer is sandwiched by the counter substrate and the TFT substrate.

6. A display device according to claim 1, wherein the multi-thin film layer includes plural insulating layers, conductive layer and organic layer.

7. A display device used in a hand- held electronic device comprising;

a first substrate,

a multi-thin film layer,

a seal member,

a polarizing plate,

an adhesive member, and

and a protective member;

wherein the multi-thin film layer disposed on the first substrate,

wherein the seal member is disposed inside an outer periphery end face of the first substrate,

wherein the polarizing plate is formed by a different member from the protective member and disposed between the first substrate and the protective member,

wherein the adhesive member is disposed between the protective member and the polarizing plate and without an air layer between the protective member and the polarizing member, and

wherein the protective member is a protective cover of the hand-held electronic device, and

wherein the protective member overlaps with the sealing member in a plan view.

8. A display device according to claim 6, wherein a surface pencil hardness of the protective member is at least 3H.

9. A display device according to claim 6, wherein a thickness of the protective member is at least 0.2mm and no greater than 1.0mm.

10. A display device according to claim 6, wherein a second substrate is disposed between the first substrate and polarizing plate.

11. A display device according to claim 6, wherein the second substrate having a multi-thin film layer.

12. A display device according to claim 6, wherein a liquid crystal layer is sandwiched between the first substrate and the second substrate.

13. A display device according to claim 6, wherein the multi-thin film layer includes plural insulating layers, conductive layer and organic layer.

14. A display device used in a hand-held electronic device comprising;

a TFT substrate,

a multi-thin film layer,

a seal member,

a polarizing plate,

an adhesive member, and

and a protective member;

wherein the multi-thin film layer is disposed on the TFT substrate,

wherein the seal member is disposed inside an outer periphery end face of the TFT substrate,

wherein the polarizing plate is formed by a different member from the protective member and disposed between the TFT substrate and the protective member,

wherein the adhesive member is disposed between the protective member and the polarizing plate and without an air layer between the protective member and the polarizing member, and

wherein the protective member is a protective cover of the hand-held electronic device, and

wherein the protective member overlaps with the sealing member in a plan view.

15. A display device according to claim 13, wherein a surface pencil hardness of the protective member is at least 3H.

16. A display device according to claim 13, wherein a thickness of the protective member is at least 0.2mm and no greater than 1.0mm.

17. A display device according to claim 13, wherein a second substrate is disposed between the TFT substrate and the polarizing plate.

18. A display device according to claim 13, wherein the second substrate having a multi-thin film layer.

19. A display device according to claim19, wherein the multi-thin film layer includes plural insulating layers and conductive layer.

Abstract of the Disclosure

An electronic device includes a liquid crystal display device having a first substrate, a second substrate bonded to the first substrate, with liquid crystal material held between the first substrate and the second substrate, and an upper polarizing plate affixed to the second substrate. A protective member is disposed over the upper polarizing plate, and an adhesive member is disposed between the protective member and the upper polarizing plate without an air layer between the protective member and the upper polarizing plate. The protective member is configured as a protective cover of the electronic device.

PTO/AIA/15 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	0520-46908CC4CON
First Named Inventor	Koichi FUKUDA
Title	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☐ **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. ☐ **Applicant asserts small entity status.** See 37 CFR 1.27
3. ☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. ☑ **Specification** [*Total Pages* 52] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. ☑ **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 15]
6. **Inventor's Oath or Declaration** [*Total Pages* 1] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. ☐ Newly executed (original or copy)
   b. ☑ A copy from a prior application (37 CFR 1.63(d))
7. ☑ **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   ☐ Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. ☐ Computer Readable Form (CRF)
   b. ☐ Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

ADDRESS TO:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ACCOMPANYING APPLICATION PAPERS

10. ☐ **Assignment Papers** (cover sheet & document(s))
    Name of Assignee _____
11. ☐ **37 CFR 3.73(c) Statement** (*when there is an assignee*) ☑ **Power of Attorney**
12. ☐ **English Translation Document** (*if applicable*)
13. ☑ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    ☐ Copies of citations attached
14. ☑ **Preliminary Amendment**
15. ☐ **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. ☐ **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. ☐ **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. ☐ **Other:** _____

Note*: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

☑ The address associated with Customer Number: 127271 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Arimi Yamada/	Date	2015-02-17
Name (Print/Type)	Arimi Yamada	Registration No. (Attorney/Agent)	70156

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Koichi FUKUDA	Confirmation No.:	Not yet assigned
Application No.:	Not yet assigned	Examiner:	Not yet assigned
Filed:	Filed with New Application	Group Art Unit:	Not yet assigned

For: DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE

Commissioner for Patents
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Sir:

Prior to examination on the merits, please amend the above-identified application as follows:

AMENDMENT TO THE SPECIFICATION

Please amend the specification by marked up replacement paragraph(s) as follows.

Please amend the CROSS REFERENCE TO RELATED APPLICATION as follows:

This application is a continuation of US Application Serial No. 14/020,331, filed September 6, 2013, which is a continuation of US Application Serial No. 13/446,331, filed April 13, 2013, now US Patent No. 8,558,965, which is a continuation of US Application Serial No. 13/279,587, filed October 24, 2011, now US Patent No. 8,164,717, which is a continuation of US Application Serial No. 12/437,218, filed May 7, 2009, now US Patent No. 8,045,101, which is a continuation application of US Application Serial No. 11/644,872, filed December 26, 2006, now US Patent No. 7,532,274, the contents of which are incorporated herein by reference.

REMARKS

Applicant respectfully requests the above amendments be entered in the instant application prior to examination. No new matter is introduced.

Applicant believes no fee is due with this amendment. However, if a fee is due, please charge our Deposit Account No. 07-1337, under Order No. 0520-46908CC4CON from which the undersigned is authorized to draw.

Respectfully submitted,

Lowe Hauptman & Ham, LLP

/Arimi Yamada/

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Dated: February 17, 2015

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Filer:	Arimi Yamada/Jimin Jeong
Attorney Docket Number:	0520-46908CC4CON

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1600**

Electronic Acknowledgement Receipt	
EFS ID:	21521021
Application Number:	14624339
International Application Number:	
Confirmation Number:	9583
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Customer Number:	127271
Filer:	Arimi Yamada/Jimin Jeong
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Attorney Docket Number:	0520-46908CC4CON
Receipt Date:	17-FEB-2015
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Time Stamp:	18:23:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1600
RAM confirmation Number	3664
Deposit Account	071337
Authorized User	HAM, YOON S
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	0520-46908CC4CON_ADS.pdf	1561749 d0ae1c56c49d6f92686cf3359564aa13d67046aa	no	8
Warnings:					
Information:					
2	Oath or Declaration filed	0520-46908CC4CON_Declaration.pdf	64755 61ebfe82f83d3b744e7e6e17f88e91560f3e19a9	no	1
Warnings:					
Information:					
3	Drawings-only black and white line drawings	0520-46908CC4CON_Drawings.pdf	339908 e5a8072b078923a66e0a08eb79aae8f71662f628	no	15
Warnings:					
Information:					
4	Power of Attorney	0520-46908CC4CON_GeneralPOA_JDI.pdf	29113 eab5954bbf61a27bf8bfde4e0bdfaf90eca2814e	no	1
Warnings:					
Information:					
5	Power of Attorney	0520-46908CC4CON_RevocationPOA_Panasonic.pdf	501710 344155dce67384a8aac2d478dfa78711e724be17	no	2
Warnings:					
Information:					
6		0520-46908CC4CON_SpecificationClaimsAbstract.pdf	2581259 1aa6deba356e7ce3e1e133ab8effe4abe456b0c7	yes	52

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	46
Claims	47	51
Abstract	52	52

Warnings:					
Information:					
7	Information Disclosure Statement (IDS) Form (SB08)	0520-46908CC4CON_updated_IDS_ptosb08a.pdf	612913 c611e87859b3e1ec21c612607afa39e3854b5c64	no	6
Warnings:					
Information:					
8	Transmittal Letter	0520-46908CC4CON_IDSTransmittal.pdf	106891 8c0d7a0c5417a0926be91630d4a6376a214f719d	no	2
Warnings:					
Information:					
9	Transmittal of New Application	0520-46908CC4CON_Utility_Transmittal_aia0015.pdf	277761 d766f9a1ab7b1a4dde43f051c201614621718ffb	no	2
Warnings:					
Information:					
10		0520-46908CC4CON_PreliminaryAmendment.pdf	128874 2d12c575d1092807f21ed3d85ccd884d5d7a40e8	yes	3

Multipart Description/PDF files in .zip description

Document Description	Start	End
Preliminary Amendment	1	1
Specification	2	2
Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:					
Information:					
11	Fee Worksheet (SB06)	fee-info.pdf	35022 938d7e91238cb42cf32b1a43ed1c08adff91171a	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	6239955	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt	
EFS ID:	21521021
Application Number:	14624339
International Application Number:	
Confirmation Number:	9583
Title of Invention:	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Koichi FUKUDA
Customer Number:	127271
Filer:	Arimi Yamada/Jimin Jeong
Filer Authorized By:	Arimi Yamada
Attorney Docket Number:	0520-46908CC4CON
Receipt Date:	17-FEB-2015
Filing Date:	
Time Stamp:	18:23:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1600
RAM confirmation Number	3664
Deposit Account	071337
Authorized User	HAM, YOON S
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	0520-46908CC4CON_ADS.pdf	1561749 d0ae1c56c49d6f92686cf3359564aa13d67046aa	no	8
Warnings:					
Information:					
2	Oath or Declaration filed	0520-46908CC4CON_Declaration.pdf	64755 61ebfe82f83d3b744e7e6e17f88e91560f3e19a9	no	1
Warnings:					
Information:					
3	Drawings-only black and white line drawings	0520-46908CC4CON_Drawings.pdf	339908 e5a8072b078923a66e0a08eb79aae8f71662f628	no	15
Warnings:					
Information:					
4	Power of Attorney	0520-46908CC4CON_GeneralPOA_JDI.pdf	29113 eab5954bbf61a27bf8bfde4e0bdfaf90eca2814e	no	1
Warnings:					
Information:					
5	Power of Attorney	0520-46908CC4CON_RevocationPOA_Panasonic.pdf	501710 344155dce67384a8aac2d478dfa78711e724be17	no	2
Warnings:					
Information:					
6		0520-46908CC4CON_SpecificationClaimsAbstract.pdf	2581259 1aa6deba356e7ce3e1e133ab8effe4abe456b0c7	yes	52

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	46
Claims	47	51
Abstract	52	52

Warnings:					
Information:					
7	Information Disclosure Statement (IDS) Form (SB08)	0520-46908CC4CON_updated_IDS_ptosb08a.pdf	612913 c611e87859b3e1ec21c612607afa39e3854b5c64	no	6
Warnings:					
Information:					
8	Transmittal Letter	0520-46908CC4CON_IDSTransmittal.pdf	106891 8c0d7a0c5417a0926be91630d4a6376a214f719d	no	2
Warnings:					
Information:					
9	Transmittal of New Application	0520-46908CC4CON_Utility_Transmittal_aia0015.pdf	277761 d766f9a1ab7b1a4dde43f051c201614621718ffb	no	2
Warnings:					
Information:					
10		0520-46908CC4CON_PreliminaryAmendment.pdf	128874 2d12c575d1092807f21ed3d85ccd884d5d7a40e8	yes	3

Multipart Description/PDF files in .zip description

Document Description	Start	End
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Specification	2	2
Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:					
Information:					
11	Fee Worksheet (SB06)	fee-info.pdf	35022 938d7e91238cb42cf32b1a43ed1c08adff91171a	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	6239955	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
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PTO/AIA/14 (12-13)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Koichi		FUKUDA	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Mobara	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	3300, Hayano, Mobara-shi		
Address 2			
City	Chiba-ken	**State/Province**	
Postal Code	297-8622	**Country** i	JP

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	127271		
Email Address	japan.display@ipfirm.com	Add Email	Remove Email

Application Information:

Title of the Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE		
Attorney Docket Number	0520-46908CC4CON	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	15	**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	127271		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	14020331	2013-09-06
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14020331	Continuation of	13/446331	2012-04-13	8558965	2013-10-15

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13446331	Continuation of	13279587	2011-10-24	8164717	2012-04-24
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13279587	Continuation of	12437218	2009-05-07	8045101	2011-10-25
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12437218	Continuation of	11644872	2006-12-26	7532274	2009-05-12

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
2005-372185	JP	2005-12-26	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	Japan Display Inc.		
Mailing Address Information:			
Address 1	3300 Hayano, Mobara-shi		
Address 2			
City	Chiba	**State/Province**	
Country [i]	JP	Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Applicant 2 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

If the Applicant is an Organization check here. ☒			
Organization Name	Panasonic Liquid Crystal Display Co., Ltd.		
Mailing Address Information:			
Address 1	1-6 Megahida-cho, Shikama-ku, Himeji-shi		
Address 2			
City	Hyogo-ken	**State/Province**	
Country i JP		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (12-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0520-46908CC4CON
	Application Number	
Title of Invention	DISPLAY DEVICE AND HAND-HELD ELECTRONIC DEVICE	

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature	/Arimi Yamada/			Date (YYYY-MM-DD)	2015-02-17
First Name	Arimi	Last Name	Yamada	Registration Number	70156

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

申請データシート(37 CFR 1.76)を使った実用及び意匠登録出願宣言書(37 CFR 1.63)
DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION
USING AN APPLICATION DATA SHEET (37 CFR 1.76)

発明の名称 Title of Invention	LIQUID CRYSTAL DISPLAY AND DISPLAY

下記発明者である私は、つぎのことがらを宣言します。
As the below named inventor, I hereby declare that:
本宣言は
This declaration is directed to:

☐ 添付されている、あるいは
The attached application, or

☒ _____に、米国出願あるいは PCT 国際出願番号_____として出願されているものに宛てられています。
United States application or PCT international application
number 14/020331 filed on September 6, 2013 .

上記の出願は私自身、あるいは私が権限を譲与したものによって行われたものです。
The above-identified application was made or authorized to be made by me.

私は本出願書中にあらわれるもともとの発明者、あるいはもともとの共同発明者です。
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

私は本宣言書において故意に虚偽の申し立てを行った場合は 18 U.S.C. 1001 により、罰金あるいは最高五(5)年の禁固刑、あるいはその両方による罰則の対象となることを認めます。
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

私は、特許請求の範囲を含む上記の明細書を確認し内容を理解しています。
I have reviewed and understand the contents of the above-identified application, including the claims.

私は、連邦規則法典第 37 編規則 1.56 に定義されている、特許性について重要な情報を開示する義務があることを認めます。
I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

発明者の正式氏名: LEGAL NAME OF INVENTOR:	Koichi FUKUDA
署名: Signature: Koichi FUKUDA	日付(任意): Date (Optional):

備考:出願データシート(PTO/AIA/14 あるいはその同等用紙)は、発明の自主独立体全体の命名を含め、本用紙に添付すること。なお残余の発明者ごとにこの用紙の写しを使用する。
Note: An application data sheet (PTO/AIA/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional copy of the present form for each additional inventor.

FIG. 1

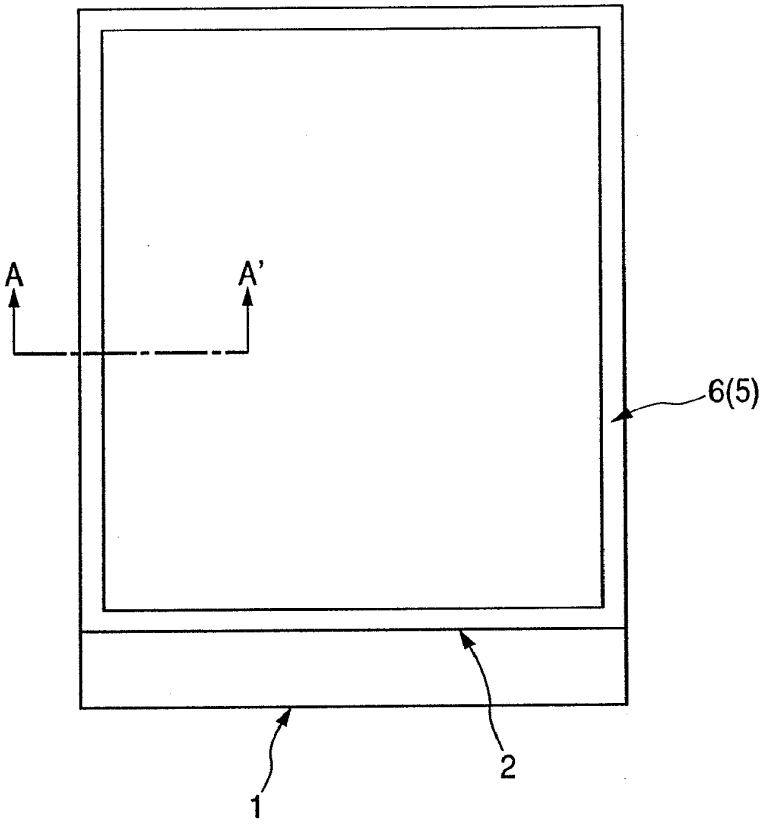


FIG. 2

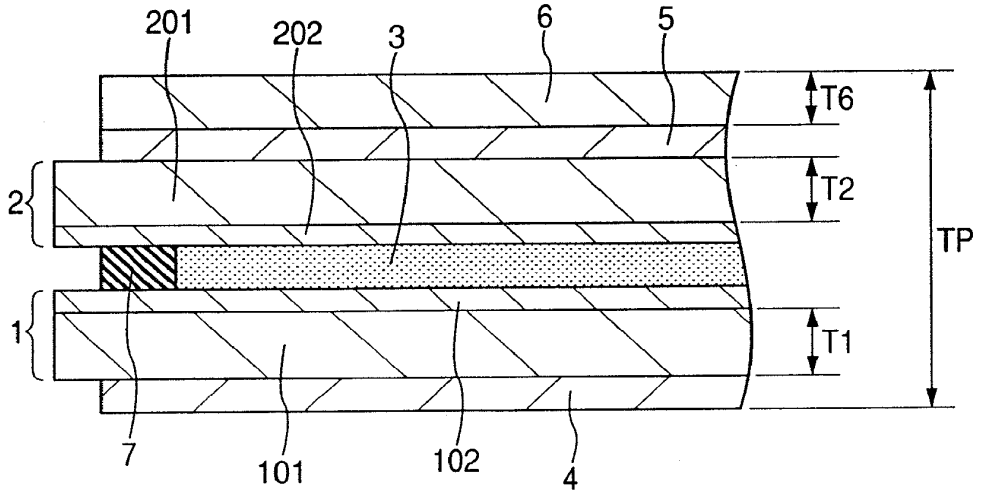


FIG. 3A

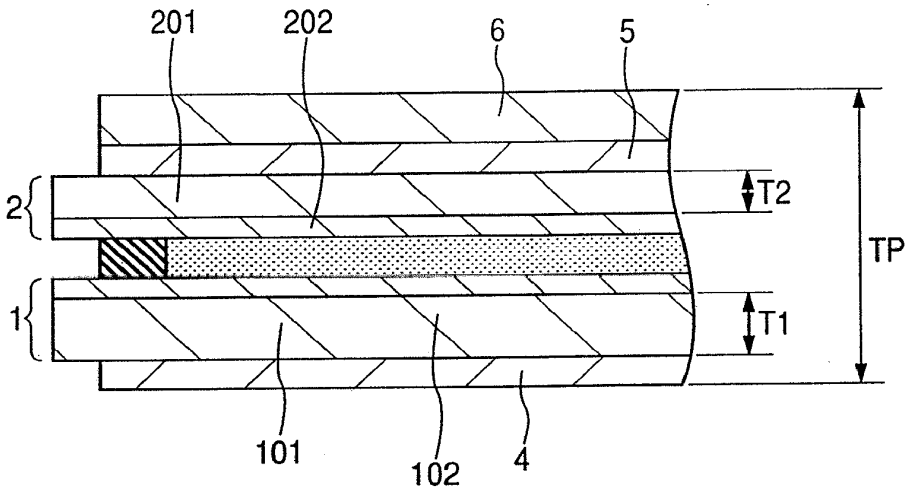


FIG. 3B

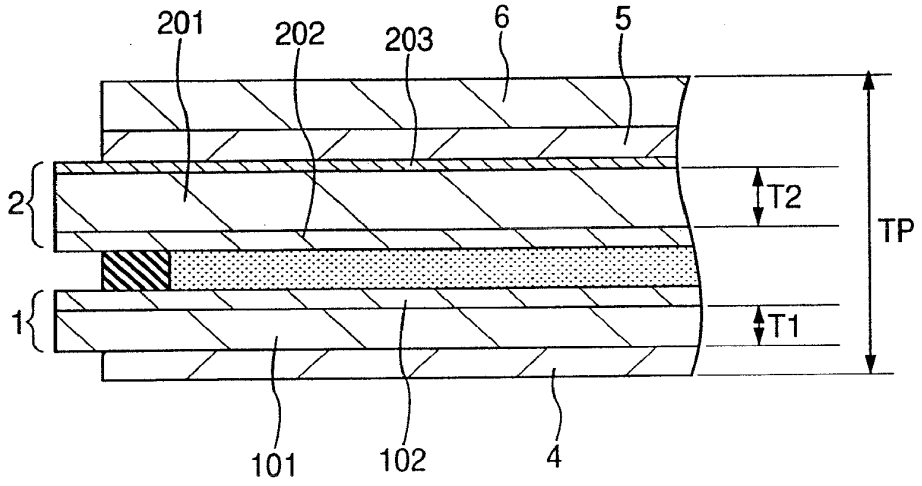


FIG. 4

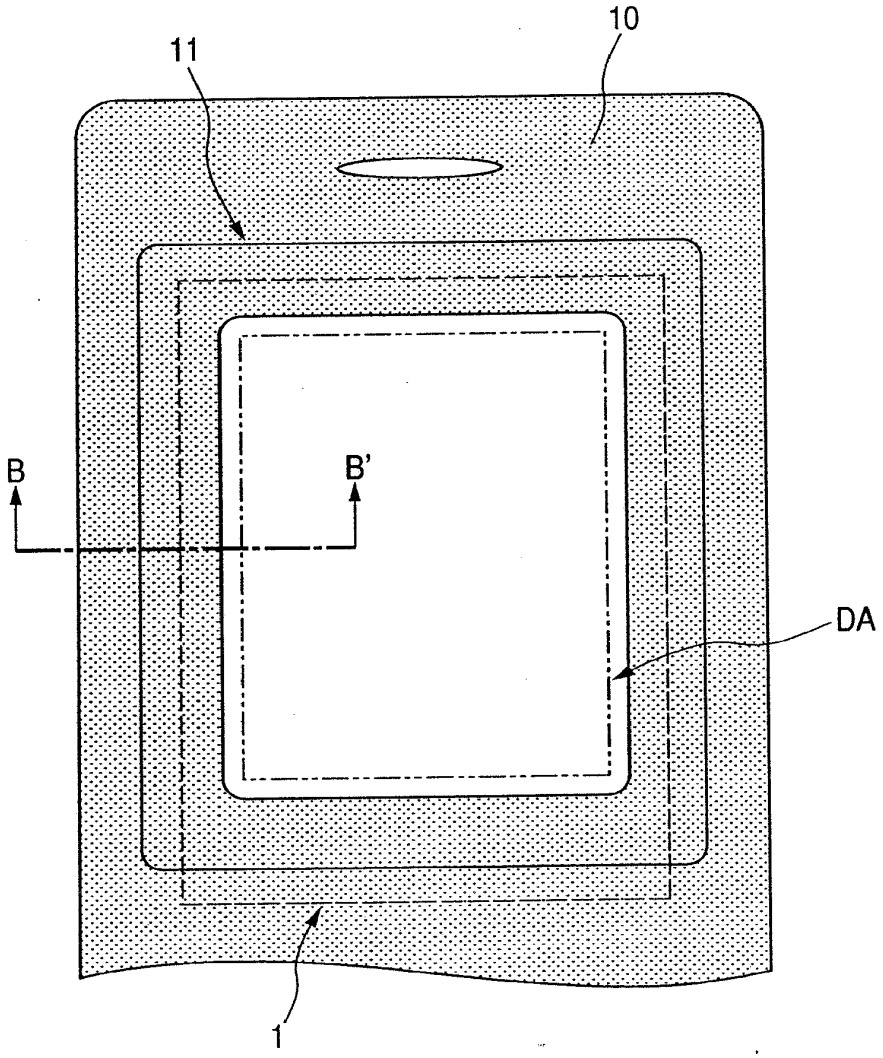


FIG. 5

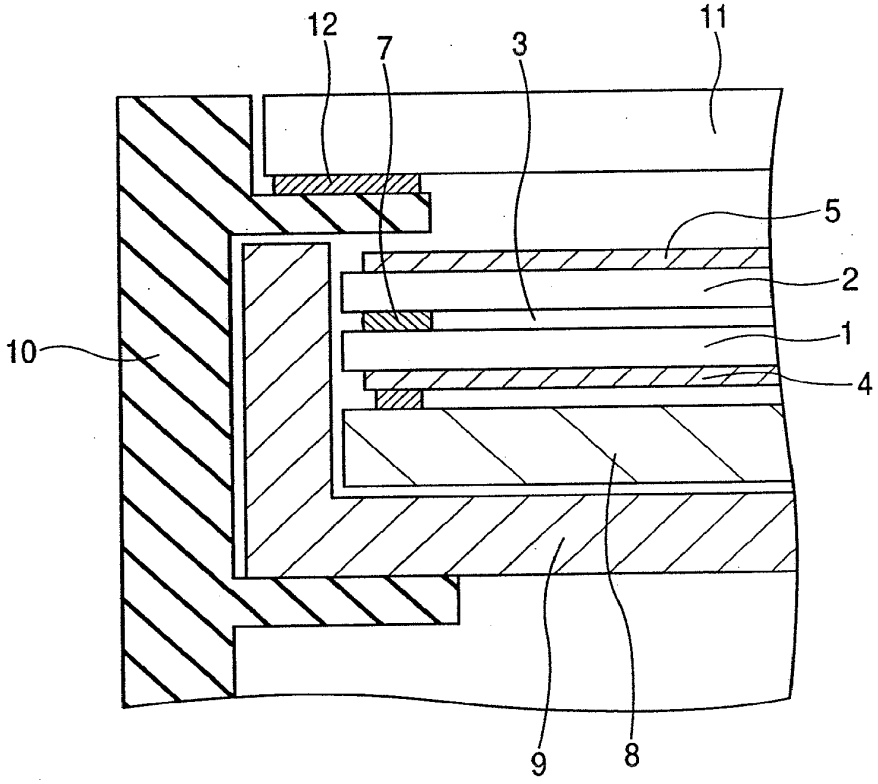


FIG. 6

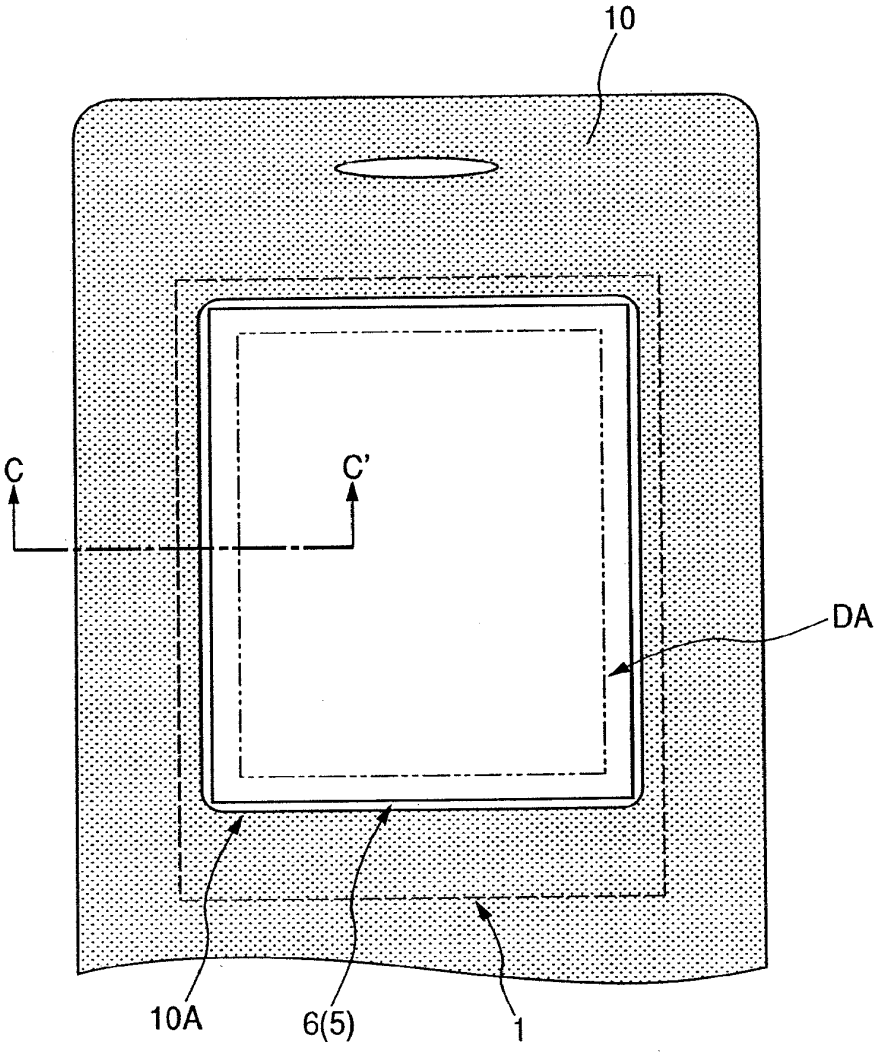


FIG. 7

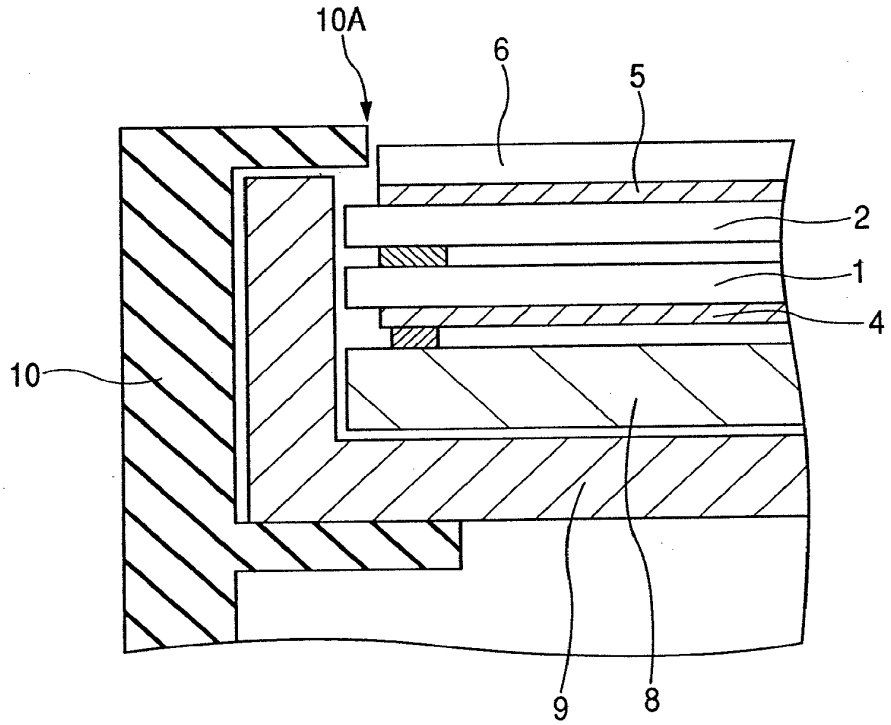


FIG. 8A

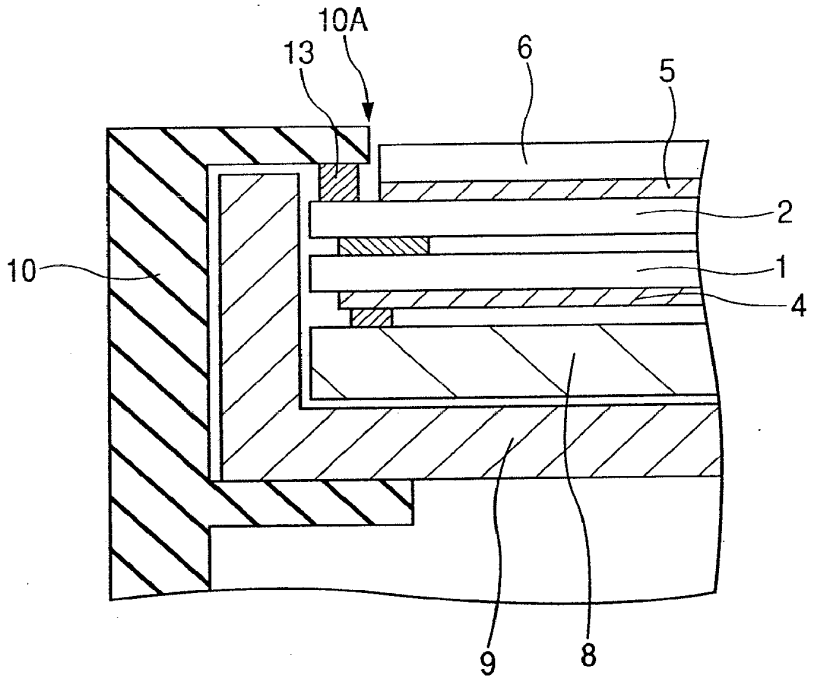


FIG. 8B

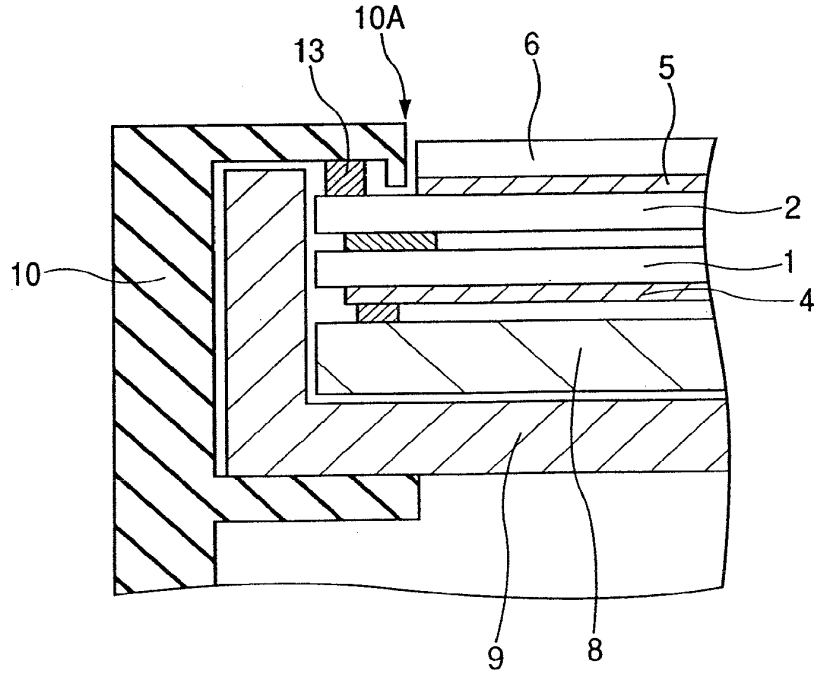


FIG. 9

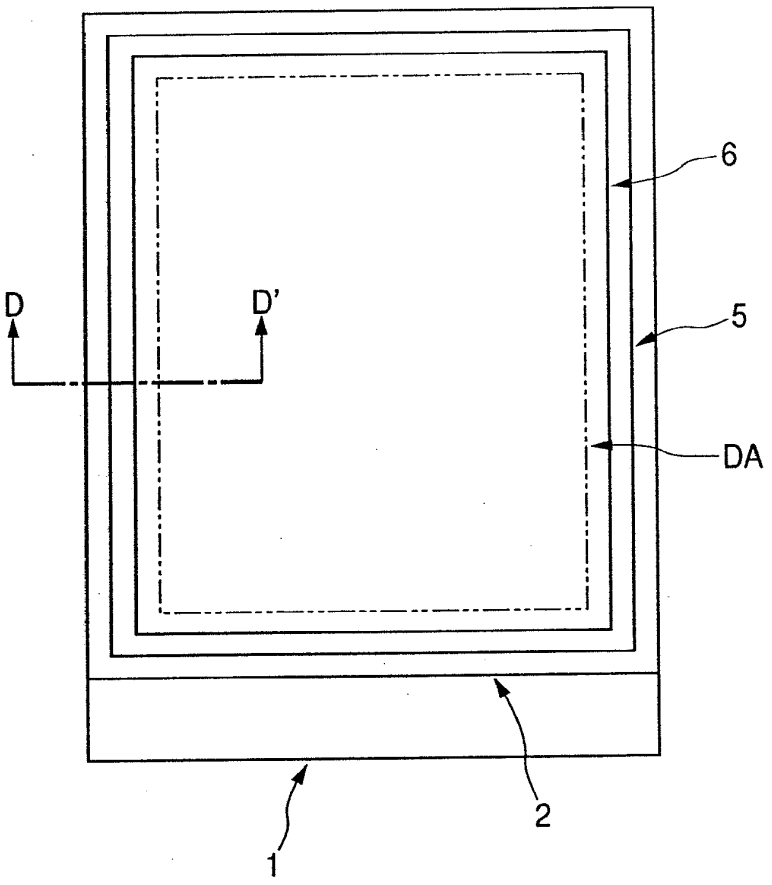


FIG. 10

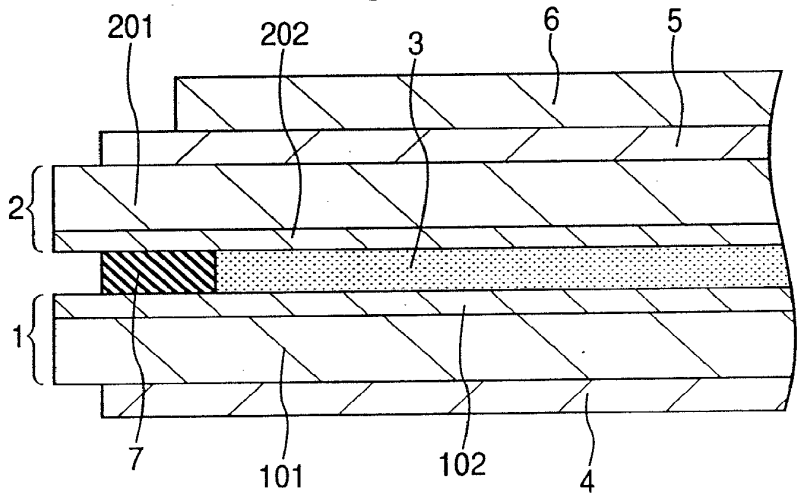


FIG. 11A

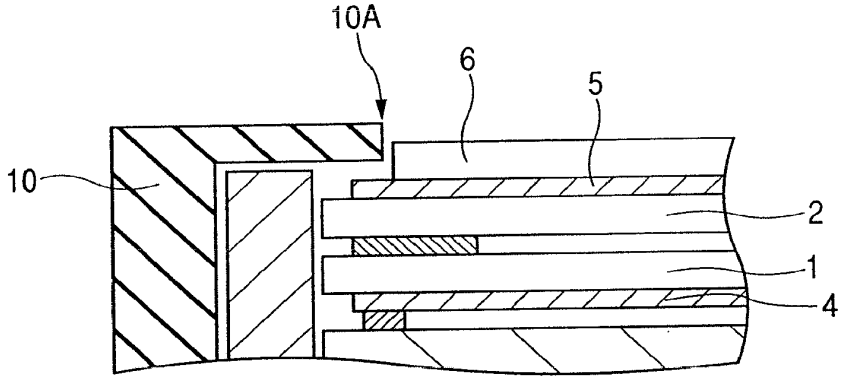


FIG. 11B

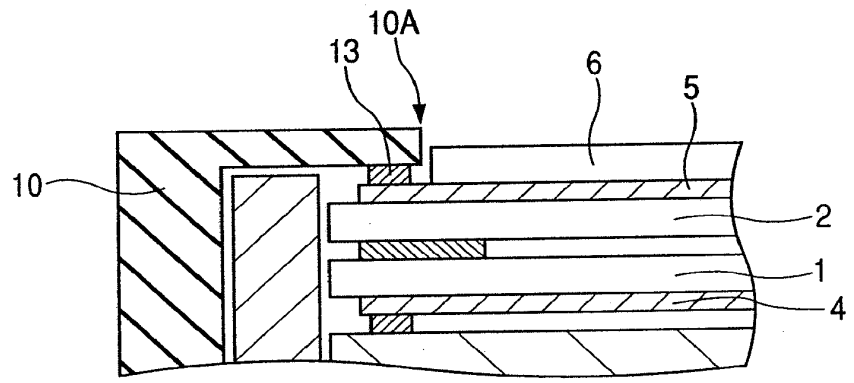


FIG. 11C

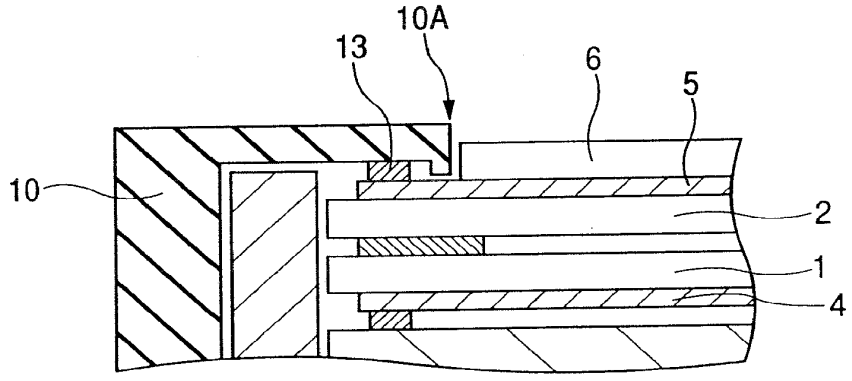


FIG. 12

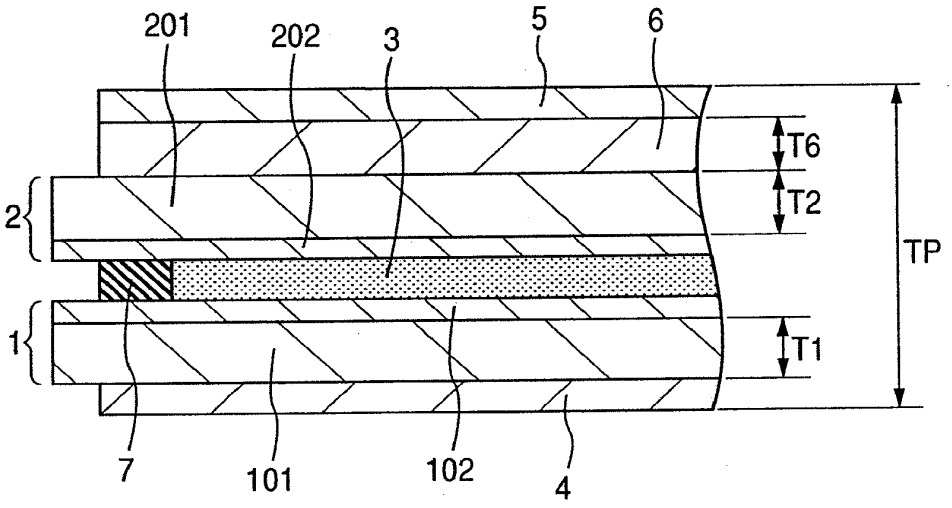


FIG. 13A

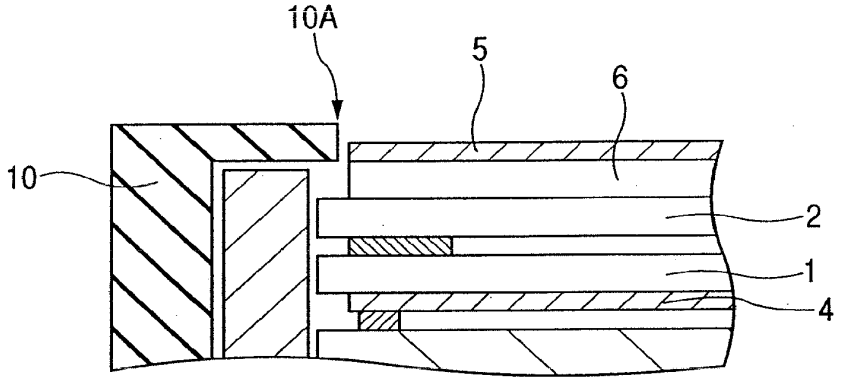


FIG. 13B

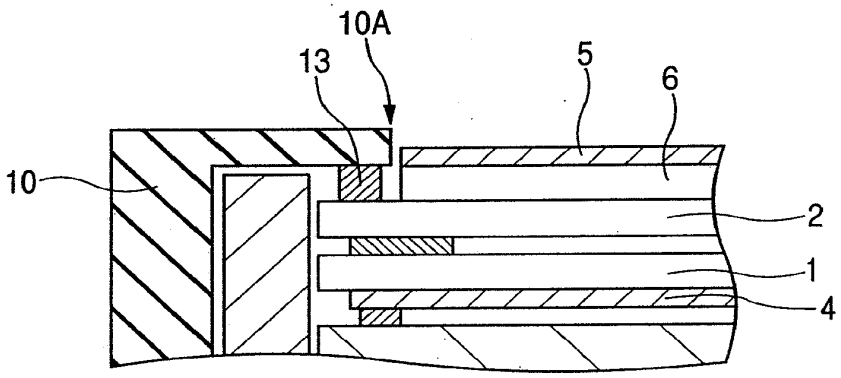


FIG. 13C

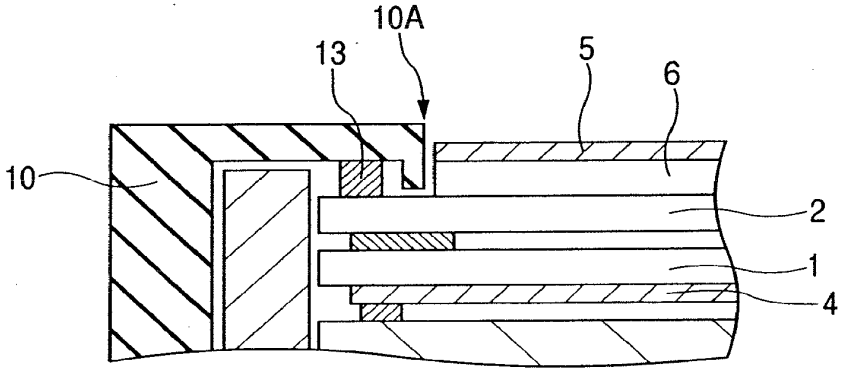


FIG. 14

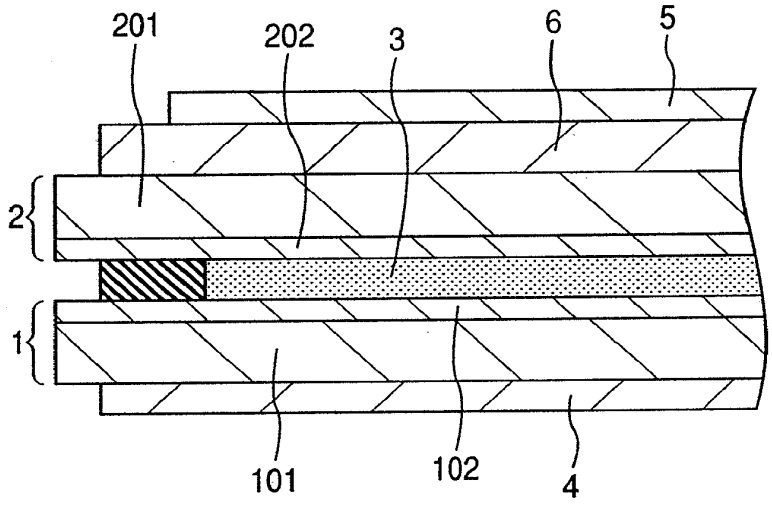


FIG. 15A

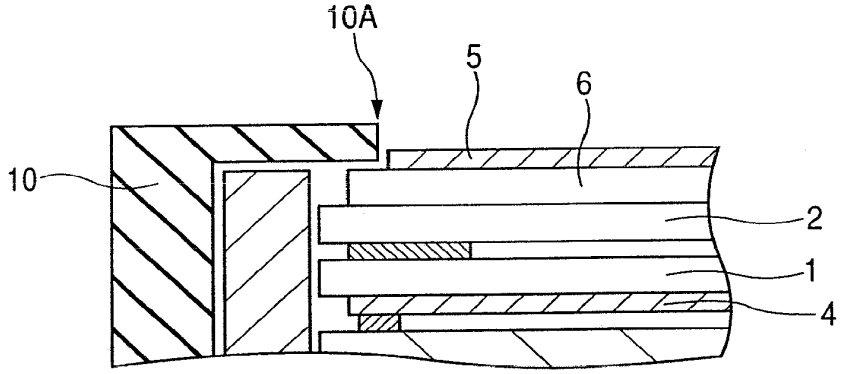


FIG. 15B

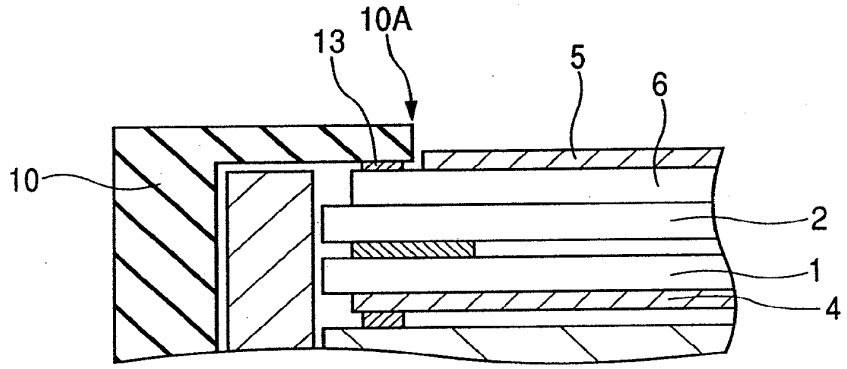


FIG. 15C

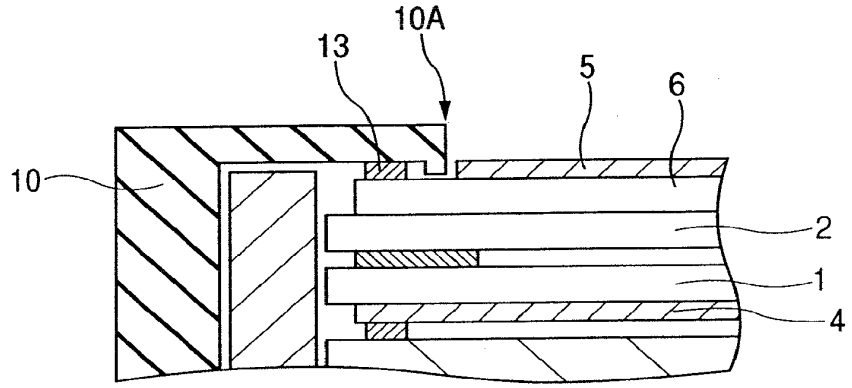


FIG. 16

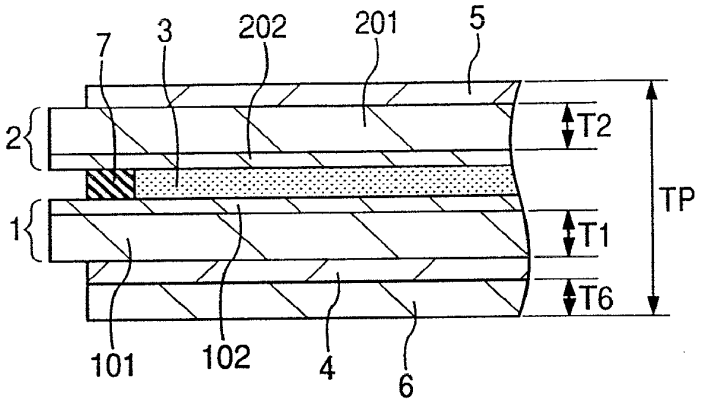


FIG. 17

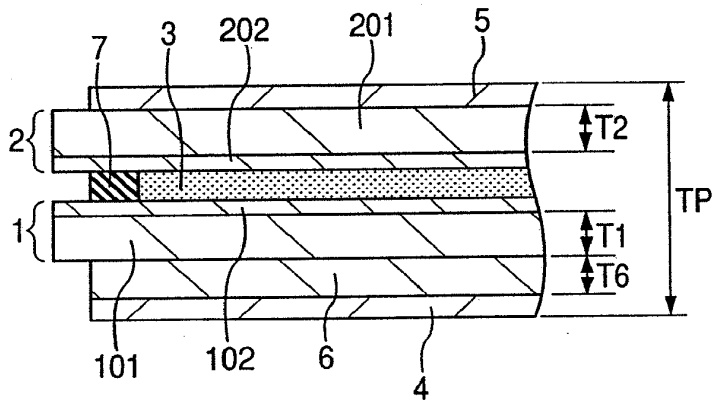


FIG. 18

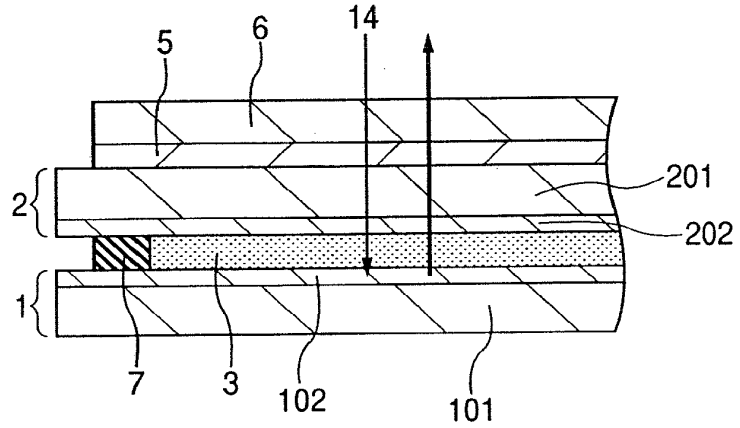
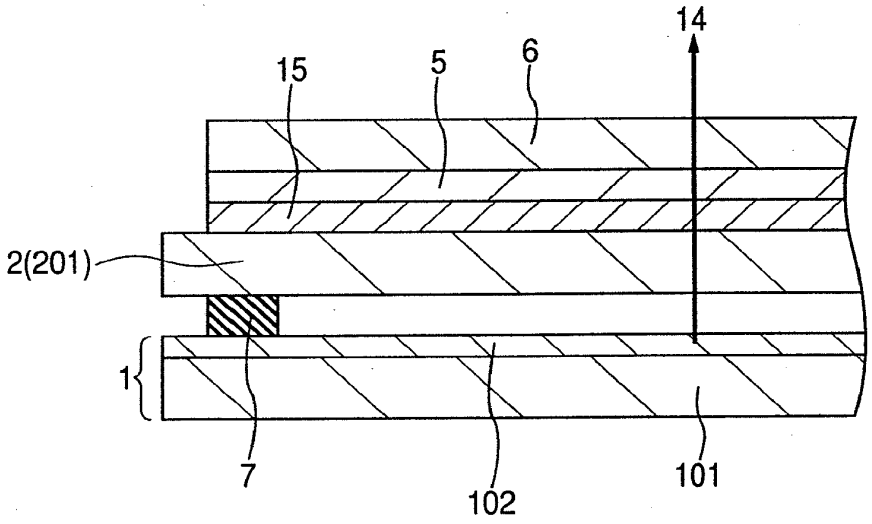


FIG. 19



PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/624,339	Filing Date 02/17/2015	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 02/17/2015

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 19	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/PATRICIA F. LEWIS/