UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD
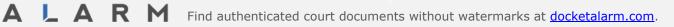
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TIANMA MICROELECTRONICS CO. LTD.,
Petitioner,

v.

JAPAN DISPLAY INC.,
Patent Owner.

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Case No. IPR2021-01058
U.S. Patent No. 7,636,142

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DECLARATION OF E. FRED SCHUBERT, PH.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 7,636,142

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I.   INTRODUCTION

1.   I, E. Fred Schubert, Ph.D., submit this declaration to state my opinions on the matter described below.

2.   I have been retained by Petitioner Tianma Microelectronics Co. Ltd., ("Tianma" or "Petitioner"), as an independent expert in this proceeding before the United States Patent and Trademark Office. Although I am being compensated at my usual and customary rate of $500.00 per hour, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding.

3.   I understand that this proceeding involves U.S. Patent No. 7,636,142 (the "'142 patent"), and I have been asked to provide my opinions as to the patentability of the claims of the '142 patent. I understand that the application for the '142 patent was filed on January 30, 2008, and claims priority to a foreign application having a filing date of February 26, 2007.

4.   I have been asked to consider the validity of certain claims of the '142 patent based on certain prior art references. I have also been asked to consider the state of the art and prior art available as of February 26, 2007. Based on the prior art discussed in this declaration, it is my opinion that claims 1-3, 5, 6, and 8 of the '142 patent are unpatentable for the reasons provided below.

II.   QUALIFICATIONS AND BACKGROUND

5.   I believe that I am well qualified to serve as a technical expert in this matter based upon my educational and work experience, and specifically, flat panel display devices, including liquid crystal displays ("LCDs").

6.   I am currently an active tenured full professor in the Department for Electrical, Computer, and Systems Engineering at the Rensselaer Polytechnic Institute (RPI) located in Troy, New York.

7.   I also held other positions at RPI. For example, from 2002 to 2012, I was a professor in the Department of Physics, Applied Physics, and Astronomy. In 2008-2009, I served as the founding director for RPI's Engineering Research Center for Smart Lighting, which was funded by the National Science Foundation (NSF).

8.   Before I moved to RPI, I was a professor in the Department of Electrical and Computer Engineering at Boston University, from 1995 to 2002. I also served as the director of Boston University's Semiconductor Devices Research Laboratory.

9.   Prior to my university career, I was a post-doctoral member of the technical staff, member of the technical staff, principal investigator, and member of management at AT&T Bell Laboratories Murray Hill, New Jersey, from 1985 to 1995.

10.   I earned my Ph.D. in 1986, Master of Science in 1981, and Bachelor's degree in 1978, all in Electrical Engineering, at the University of Stuttgart, Germany.

11.   My curriculum vitae ("CV") is submitted as Exhibit 1003. As shown by my CV, I have extensive experience in the design and implementation of flat panel display devices, including the design, fabrication, processing, and packaging of the electrodes and semiconductor devices that are commonly used in liquid crystal displays (LCDs) and light emitting diode (LED) displays.

12.   I have published over 300 technical articles, most at highly competitive refereed conferences and rigorously reviewed journals. These papers relate to Liquid Crystal Displays (LCDs), LEDs, semiconductor electronics (e.g., field-effect transistors and bipolar junction transistors), semiconductor lasers, photo-detectors, etc., the technologies of which are the foundations of the flat panel display devices.

13.   As an example of my research activities in the field of LCDs, I refer to a US patent issued in 2012: Jaehee Cho, E. Fred Schubert, and Xing Yan "Liquid crystal display with refractive index matched electrodes" US Patent No. 8,164,727; filed on April 28, 2010; issued on April 24, 2012. During my tenure in industry (AT&T Bell Laboratories), I was part of a working group on LCDs. I have also performed technical consulting services in the field of LCDs and associated TFTs (thin film transistors). One project concerned the enhancement of the carrier mobility

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