

an envelope amplifier operative to receive an envelope signal and the boosted supply voltage and generate a second supply voltage based on the envelope signal and the boosted supply voltage.

9. (Original) The apparatus of claim 8, wherein the envelope amplifier is operative to further receive the first supply voltage and generate the second supply voltage based on the first supply voltage or the boosted supply voltage.

10. (Currently Amended) An apparatus for wireless communication, comprising:

a power amplifier operative to receive and amplify an input radio frequency (RF) signal and provide an output RF signal; and

a supply generator operative to receive an envelope signal and a first supply voltage, to generate a boosted supply voltage having a higher voltage than the first supply voltage, and to generate a second supply voltage for the power amplifier based on the envelope signal and the boosted supply voltage, wherein the supply generator incorporates an operational amplifier (op-amp) operative to receive the envelope signal and provide an amplified signal, a driver operative to receive the amplified signal and provide a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving a first control signal, a source receiving the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage, and an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the second supply voltage, and a source coupled to circuit ground.

11. (Original) The apparatus of claim 10, wherein the supply generator is operative to generate the second supply voltage based on the envelope signal and either the boosted supply voltage or the first supply voltage.

12. (Currently Amended) A method of generating supply voltages, comprising:

generating a boosted supply voltage based on a first supply voltage, the boosted supply voltage having a higher voltage than the first supply voltage; and

generating a second supply voltage based on an envelope signal and the boosted supply voltage, wherein the second supply voltage is generated by an envelope amplifier that produces the second supply voltage using an operational amplifier (op-amp) that receives the envelope signal and provides an amplified signal, a driver that receives the amplified signal and provides a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor that receives the first control signal, a source that receives the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage and an N-channel metal oxide semiconductor (NMOS) transistor that receives the second control signal at a gate and provides a second supply voltage through a drain, and a source for circuit grounding.

13. (Original) The method of claim 12, wherein the generating the second supply voltage comprises generating the second supply voltage based on the envelope signal and either the boosted supply voltage or the first supply voltage.

14. (Currently Amended) An apparatus for generating supply voltages, comprising:  
means for generating a boosted supply voltage based on a first supply voltage, the boosted supply voltage having a higher voltage than the first supply voltage; and  
means for generating a second supply voltage based on the envelope signal and the boosted supply voltage, wherein the means for generating the second supply voltage incorporates an envelope amplifier that produces the second supply voltage using an operational amplifier (op-amp) that receives the envelope signal and provides an amplified signal, a driver that receives the amplified signal and provides a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor that receives the first control signal, a source that receives the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage and an N-channel metal oxide semiconductor (NMOS) transistor that receives the second control signal at a gate and provides a second supply voltage through a drain, and a source for circuit grounding..

15. (Original) The apparatus of claim 14, wherein the means for generating the second supply voltage comprises means for generating the second supply voltage based on an envelope signal and either the boosted supply voltage or the first supply voltage.



16. (Canceled)

17. (Currently Amended) The apparatus of claim ~~18~~ 16, further comprising:

a boost converter operative to receive the first supply voltage and provide a boosted supply voltage having a higher voltage than the first supply voltage, wherein the envelope amplifier operates based on the first supply voltage or the boosted supply voltage.

18. (Currently Amended) ~~The apparatus of claim 16~~ An apparatus comprising:

a switcher operative to receive a first supply voltage and provide a first supply current;

an envelope amplifier operative to receive an envelope signal and provide a second supply current based on the envelope signal; and

a power amplifier operative to receive an envelope signal and provide a second supply current based on the envelope signal; and

a power amplifier operative to receive a total supply current comprising the first supply current and the second supply current, wherein the switcher comprises

a current sense amplifier operative to sense the first supply current, or the second supply current, or the total supply current and provide a sensed signal,

a driver operative to receive the sensed signal and provide a first control signal and a second control signal,

a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving the first supply voltage, and a drain providing a switching signal for an inductor providing the first supply current, and

an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the switching signal, and a source coupled to circuit ground.

19. (Currently Amended) The apparatus of claim ~~[[16]]~~ 18, wherein the first supply current comprises direct current (DC) and low frequency components, and wherein the second supply current comprises higher frequency components.

20. (Canceled)

21. (Currently Amended) The apparatus of claim ~~22~~ ~~20~~, wherein the switcher operates based on a first supply voltage, and wherein the offset is determined based on the first supply voltage.

22. (Currently Amended) ~~The apparatus of claim 20~~ An apparatus comprising:  
an inductor operative to receive a switching signal and provide a supply current; and  
a switcher operative to sense an input current and generate the switching signal to charge  
and discharge the inductor to provide the supply current, the switcher adding an offset to the  
input current to generate a larger supply current via the inductor than without the offset, wherein the switcher comprises

a summer operative to sum the input current and an offset current and provide a summed current,

a current sense amplifier operative to receive the summed current and provide a sensed signal, and

a driver operative to receive the sensed signal and provide at least one control signal used to generate the switching signal for the inductor.

23. (Original) The apparatus of claim 22, wherein the at least one control signal comprises a first control signal and a second control signal, and wherein the switcher further comprises

a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving a first supply voltage, and a drain providing the switching signal, and

an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the switching signal, and a source coupled to circuit ground.



24. (Currently Amended) The apparatus of claim ~~22~~ ~~20~~, further comprising:  
an envelope amplifier operative to receive an envelope signal and provide a second supply current based on the envelope signal, wherein a total supply current comprises the supply current from the switcher and the second supply current from the envelope amplifier.
25. (Original) The apparatus of claim 24, further comprising:  
a boost converter operative to receive the first supply voltage and provide a boosted supply voltage having a higher voltage than the first supply voltage, wherein the envelope amplifier operates based on the first supply voltage or the boosted supply voltage.
26. (Currently Amended) The apparatus of claim ~~22~~ ~~20~~, further comprising:  
a power amplifier operative to receive the supply current from the inductor and to receive and amplify an input radio frequency (RF) signal and provide an output RF signal.

**REMARKS/ARGUMENTS**

The above identified patent application has been amended and reconsideration and reexamination are hereby requested.

Claims 3-15, 17-19, and 21-26 are now pending in the application. Claims 1, 2, 16, and 20 have been canceled. Claims 3, 4, 6-8, 10, 12, 14, 17-19, 21, 22, 24, and 26 have been amended. No new matter has been added, as the claim amendments and new claims have support in the application as originally filed.

***Claim Rejections - 35 U.S.C. § 112(b)***

Claim 3 was objected under 35 U.S.C. § 112(b), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. According to the Office Action, the conditions where the envelope amplifier operated according to “first threshold” and/or “second threshold” is not seen disclosed in the specification.

The Applicant respectfully directs the Examiner’s attention to paragraphs [0034] and [0051] which disclose the envelope amplifier being operated according to a “first threshold” and/or a “second threshold” and requests that the rejection be withdrawn.

***Claims Rejections - 35 U.S.C. § 102***

The Examiner has rejected claims 1, 2, 6-17, 19-21, and 24-26 under 35 U.S.C. § 102(a) as being anticipated by Kim et al. (RMO3D-1 “High Efficiency and Wideband Envelope Tracking Power Amplifier with Sweet Spot Tracking,” hereinafter “Kim”). Rejections to claims 1, 2, 16, and 20 are moot, as these claims have been canceled.

Kim discloses a high efficiency and wideband envelope tracking power amplifier with sweet spot tracking. (Title) By modulating the supply voltage of a power amplifier efficiency may be increased. Linearity is also improved by envelope shaping and sweet spot tracking. The supply modulator has a combined structure of a switching amplifier and a linear amplifier to achieve high efficient and wide bandwidth. (Abstract)

Amended independent claim 1 recites “... an operational amplifier (op-amp) operative to receive the envelope signal and provide an amplified signal, a driver operative to receive the



amplified signal and provide a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage, and an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the second supply voltage, and a source coupled to circuit ground.” Amended independent claims 8, 10, 12, 14, 16, and 20 recite similar limitations. The Applicant submits that Kim does not teach the recitations of claims 1, 8, 10, 12, 14, 16, and 20.

Kim does not disclose the above recitation. Kim Kim discloses a power amplifier with high efficiency, wideband envelope tracking, and incorporating sweet spot tracking. Kim is silent regarding an operational amplifier that receives the envelope signal and provide as output an amplified signal. Kim is also silent regarding a driver that receives the amplified signal and provides a first control signal and a second control signal. In particular, Kim is silent regarding a PMOS transistor and and NMOS transistor. Therefore, Kim does not teach “an operational amplifier (op-amp) operative to receive the envelope signal and provide an amplified signal, a driver operative to receive the amplified signal and provide a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage, and an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the second supply voltage, and a source coupled to circuit ground.”

Accordingly, the Applicant submits that claims 1, 8, 10, 12, 14, 16, and 20 are not anticipated by Kim under 35 U.S.C. § 102(b).

The dependent claims are dependent on their respective base claims and therefore include all of the features of their respective base claims and additional features therein. As such, these claims are also allowable based upon their respective base claims and the additional features therein.

Application No.: 13/167,659  
Amendment dated February 19, 2013  
Reply to Office Action of November 23, 2012 11

Docket No.: 101005  
Customer No.: 23696

***Claim Objections/Allowable Subject Matter***

The Examiner has objected to claim 4, 5, 18, 22, and 23 as being dependent upon a rejected base claim. The Applicant has amended the claim into independent form including all of the limitations of the base claim and any intervening claims. Accordingly, claim <math>\diamond</math> is now allowable.

**CONCLUSION**

In light of the amendments contained herein, the Applicant submits that the application is in condition for allowance, for which early action is requested.

Please charge any fees or overpayments that may be due with this response to Deposit Account No. 17-0026.

Respectfully submitted,

Dated: 2013-02-19

By: /William Marcus Hooks/  
William M. Hooks  
Reg. No. 48,857

QUALCOMM Incorporated  
Attn: Patent Department  
5775 Morehouse Drive  
San Diego, California 92121-1714  
Telephone: (858) 658-4351  
Facsimile: (858) 658-3984



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

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.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13167659
	Filing Date	2011-06-23
	First Named Inventor	MATHE; Lennart K.
	Art Unit	2817
	Examiner Name	NGUYEN, Khanh V
	Attorney Docket Number	101005

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

Add

U.S.PATENT APPLICATION PUBLICATIONS						Remove
Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050046474		2005-03-03	MATSUMOTO; Hidetoshi et al.	
	2	20050215209		2005-09-29	TANABE; Mitsuru et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

Add

FOREIGN PATENT DOCUMENTS								Remove
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1							<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button

Add

NON-PATENT LITERATURE DOCUMENTS								Remove
---------------------------------	--	--	--	--	--	--	--	--------

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13167659
	Filing Date	2011-06-23
	First Named Inventor	MATHE; Lennart K.
	Art Unit	2817
	Examiner Name	NGUYEN, Khanh V
	Attorney Docket Number	101005

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 <sup>5</sup>
	1	CHOI, J et al., "A Polar Transmitter With CMOS Programmable Hysteretic-Controlled Hybrid Switching Supply Modulator for Multi standard Applications", IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 57, no. 7, 1 July 2009 (2009-07-01), pages 1675-1686, XP011258456.	<input type="checkbox"/>
	2	ERTL, H et al., "Basic Considerations and Topologies of Switched-Mode Assisted Linear Power Amplifiers", IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, IEEE SERVICE CENTER, PISCATAWAY, NJ, USA, vol. 44, no. 1, 1 February 1997 (1997-02-01), XP011023224.	<input type="checkbox"/>
	3	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION - PCT/US2012/043915 - ISA/EPO - 2012-11-26 (101005WO).	<input type="checkbox"/>
	4	KANG D., et al., "A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", IEEE RANSCTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 58, no. 10, 1 October 2010 (2010-10-01), pages 2598-2608, XP011317521, ISSN: 0018-9480.	<input type="checkbox"/>
	5	KANG, D et al., "LTE Power Amplifier for envelope tracking polar transmitters", MICROWAVE CONFERENCE (EUMC), 2010, EUROPEAN, IEEE, PISCATAWAY, NJ, USA, 28 September 2010 (2010-09-28), pages 628-631, XP031786114.	<input type="checkbox"/>
	6	KIM D., et al., "High efficiency and wideband envelope tracking power amplifier with sweet spot tracking", RADIO FREQUENCY INTEGRATED CIRCUITS SYMPOSIUM (RFIC) , 2010 IEEE, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23), pages 255-258, XP031684103, ISBN: 978-1-4244-6240-7.	<input type="checkbox"/>
	7	LI, Y et al., "High Efficiency Wide Bandwidth Power Supplies for GSM and EDGE RF Power Amplifiers", CONFERENCE PROCEEDINGS / IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (ISCAS) : MAY 23 - 26, 2005, INTERNATIONAL CONFERENCE CENTER, KOBE, JAPAN, IEEE SERVICE CENTER, PISCATAWAY, NJ, 23 May 2005 (2005-05-23), pages 1314-1317, XP010815779.	<input type="checkbox"/>
	8	PARTIAL INTERNATIONAL SEARCH REPORT - PCT/US2012/043915 - INTERNATIONAL SEARCH AUTHORITY EUROPEAN PATENT OFFICE 2012-10-04 (101005WO).	<input type="checkbox"/>
	9	STAUTH, J.T., et al., "Optimum Bias Calculation for Parallel Hybrid Switching-Linear Regulators", APPLIED POWER ELECTRONICS CONFERENCE, APEC 2007 - TWENTY SECOND ANNUAL IEEE, IEEE, PI, 1 February 2007 (2007-02-01), pages 569-574, XP031085267.	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button **Add**



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13167659
	Filing Date	2011-06-23
	First Named Inventor	MATHE; Lennart K.
	Art Unit	2817
	Examiner Name	NGUYEN, Khanh V
	Attorney Docket Number	101005

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
<p>*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.</p>			
<p><sup>1</sup> See Kind Codes of USPTO Patent Documents at <a href="http://www.USPTO.GOV">www.USPTO.GOV</a> or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.</p>			

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

Application Number	13167659		
Filing Date	2011-06-23		
First Named Inventor	MATHE; Lennart K.		
Art Unit	2817		
Examiner Name	NGUYEN, Khanh V		
Attorney Docket Number	101005		

**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	/William Marcus Hooks/	Date (YYYY-MM-DD)	2013-02-22
Name/Print	William M. Hooks	Registration Number	48857

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.**



## 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.

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:

Hooks, William M.  
 QUALCOMM INCORPORATED  
 5775 Morehouse Drive  
 San Diego, CA 92121-1714  
 ETATS-UNIS D'AMERIQUE



INVITATION TO PAY ADDITIONAL FEES  
 AND, WHERE APPLICABLE, PROTEST FEE  
 (PCT Article 17(3)(a) and Rule 40.1 and 40.2(e))

Date of mailing (day/month/year)	4 October 2012 (04-10-2012)
Applicant's or agent's file reference 101005WO	<b>PAYMENT DUE</b> within <b>ONE MONTH</b> from the above date of mailing
International application No. PCT/US2012/043915	International filing date (day/month/year) 24 June 2012 (24-06-2012)
Applicant QUALCOMM INCORPORATED	

## 1. This International Searching Authority

- (i) considers that there are 5 (number of) inventions claimed in the international application covered by the claims indicated on an extra sheet:
- (ii) therefore considers that **the international application does not comply with the requirements of unity of invention** (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet:
- (iii)  has carried out a partial international search (see Annex)  will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:  
**see extra sheet**
- (iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby **invited to pay**, within the time limit indicated above, the amount indicated below:

$$\frac{\text{EUR } 1.875,00}{\text{Fee per additional invention}} \times \frac{4}{\text{number of additional inventions}} = \frac{\text{EUR } 7.500,00}{\text{currency/total amount of additional fees}}$$

3. The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest**, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.

Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 830,00 (currency/amount)

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so declare.

4.  Claim(s) Nos. \_\_\_\_\_ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2  
 NL-2280 HV Rijswijk  
 Tel. (+31-70) 340-2040  
 Fax: (+31-70) 340-3016

Authorized officer

GHILINI, Marie  
 Tel: +49 (0)89 2399-6121



This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-15

Independent claim 1 in connection with dependent claims 2-5 and independent claim 8 in connection with dependent claim 9 define a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal, the first supply voltage, and the boosted supply voltage, and generates a second supply voltage based thereon.

1.1. claim: 6

Independent claim 1 in connection with dependent claim 6 defines a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based thereon, wherein the envelope amplifier feeds an RF power amplifier.

1.2. claim: 7

Independent claim 1 in connection with dependent claim 7 defines a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based thereon, wherein the first supply voltage is a battery voltage.

1.3. claims: 10-15

Independent claim 10 in connection with dependent claim 11 and independent claim 12 in connection with dependent claim 13 and independent claim 14 in connection with dependent claim 15 define a device or method comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based on the first supply voltage or the boosted supply voltage.

---

2. claims: 16, 17

Independent claim 16 in connection with dependent claim 17 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and



second supply currents; and further including a boost converter for supplies (or not) the envelope amplifier.

---

3. claim: 18

Independent claim 16 in connection with dependent claim 18 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; the 'switcher' further including a current sensing amplifier, a driver, and a CMOS switching stage.

---

4. claim: 19

Independent claim 16 in connection with dependent claim 19 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; wherein the first supply current comprises DC and low frequency components, and the second supply current comprises higher frequency components.

---

5. claims: 20-26

Independent claim 20 and dependent claims 21-26 define an apparatus involving an inductor that receives a switching signal and generates a supply current; and a 'switcher' that senses an input current, adds an offset, and accordingly generates the switching signal.

---

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

The subject-matter common to the five identified groups of inventions amounts to no more than a voltage- or current supply, which is trivially not new.

Note that the first sub-invention, dependent claim 6, is included in the first group of inventions, not because it is unitary with the rest of the claims in the group, but because it is only trivially different from claim 1; the same is the case for the second and third sub-inventions (claims 7, 10-15).

Also note that a search carried out for claims 20-26 may reveal, a posteriori, further lack of unity.

**Annex to Form PCT/ISA/206  
COMMUNICATION RELATING TO THE RESULTS  
OF THE PARTIAL INTERNATIONAL SEARCH**

International Application No

PCT/US2012/043915

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
- see 'Invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/215209 A1 (TANABE MITSURU [JP] ET AL) 29 September 2005 (2005-09-29) figure 3	1-3,6-15
X	----- DONGSU KIM ET AL: "High efficiency and wideband envelope tracking power amplifier with sweet spot tracking", RADIO FREQUENCY INTEGRATED CIRCUITS SYMPOSIUM (RFIC), 2010 IEEE, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23), pages 255-258, XP031684103, ISBN: 978-1-4244-6240-7 figures 3-5	1-15
X	----- DAEHYUN KANG ET AL: "A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 58, no. 10, 1 October 2010 (2010-10-01), pages 2598-2608, XP011317521, ISSN: 0018-9480 figure 4	1-15
X	----- US 2005/046474 A1 (MATSUMOTO HIDETOSHI [JP] ET AL) 3 March 2005 (2005-03-03) figures 5, 15 -----	1-3,6-15

 Further documents are listed in the continuation of box C.

 Patent family members are listed in annex.

## ° Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

**Patent Family Annex**  
Information on patent family membersInternational Application No  
PCT/US2012/043915

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2005215209	A1	29-09-2005	CN 1674449 A	28-09-2005
			JP 4012165 B2	21-11-2007
			JP 2005277559 A	06-10-2005
			US 2005215209 A1	29-09-2005
-----				
US 2005046474	A1	03-03-2005	CN 1592089 A	09-03-2005
			JP 4589665 B2	01-12-2010
			JP 2005102146 A	14-04-2005
			US 2005046474 A1	03-03-2005
-----				



## Important Information

### General:

- The **claims cannot be changed** at this point in the procedure, the transmitted report is **not** the international search report (see Art. 19 PCT).
- Any payment has to be made **directly** to this ISA, payments to other entities will not be accepted.
- In case of a **total of more than 2 inventions** found: when paying please **specify exactly** which claims should be searched (unless you pay for all inventions found).
- An **extension of the set time limit** can only be granted for cases that fall under the provisions of Rule 80.6 PCT.
- The **amount of the additional search fee** depends on the amount **due on the international filing date**.
- The **amount of the protest fee** depends on the amount **due on the date on which the payment is made**.

### Payment or transfer to a bank account:

- The **date to be considered as the date on which the payment is made** is the date on which the amount of the payment or the transfer is **actually entered** in a bank account or Giro account held by the EPO.
- The fees shall be paid in **euros**, no equivalents in other currencies, all charges to be carried by the applicant
- For a list of accounts held by the EPO please see [http://www.european-patent-office.org/epo/new/bank\\_euro.pdf](http://www.european-patent-office.org/epo/new/bank_euro.pdf)

### Payment by deposit account with the EPO:

- The **date to be considered as the date on which the payment is made** is the date that the **authorisation** to deduct fees from the deposit account is **received at the EPO**.

*Note: If you don't have a deposit account with the EPO yourself you might want to consider using the account of an associate as a safe and quick way of paying.*

**Payments by credit card or cheque are not possible.**

### Payments under protest (Rule 40.2 (c) PCT):

- For general information on the protest procedure at ISA/EP, please refer to the Special Edition No. 3 of the OJ of the EPO 2007, pages 140-145, [http://www.european-patent-office.org/epo/pubs/oj007/08\\_07/special\\_edition\\_3\\_epc\\_2000\\_decisions.pdf](http://www.european-patent-office.org/epo/pubs/oj007/08_07/special_edition_3_epc_2000_decisions.pdf)
- Any protest will **only be accepted if**, within the time limit set in the invitation, the additional fees for each invention to be searched **and** the protest fee are paid.
- The protest has to be **accompanied by a technical reasoning**, taking into account the findings of the ISA.

## European Patent Organisation

### Account details

N° 3 338 800 00 (BLZ 700 800 00)  
Commerzbank  
Promenadeplatz 7  
D-80273 München  
SWIFT Code: DRESDEFF700  
IBAN: DE20 7008 0000 0333 880000  
BIC: DRESDEFF

Bitte beachten Sie, dass angeführte Nichtpatentliteratur (wie z. B. wissenschaftliche oder technische Dokumente) je nach geltendem Recht dem Urheberrechtsschutz und/oder anderen Schutzarten für schriftliche Werke unterliegen könnte. Die Vervielfältigung urheberrechtlich geschützter Texte, ihre Verwendung in anderen elektronischen oder gedruckten Publikationen und ihre Weitergabe an Dritte ist ohne ausdrückliche Zustimmung des Rechtsinhabers nicht gestattet.

Veillez noter que les ouvrages de la littérature non-brevets qui sont cités, par exemple les documents scientifiques ou techniques, etc., peuvent être protégés par des droits d'auteur et/ou toute autre protection des écrits prévue par les législations applicables. Les textes ainsi protégés ne peuvent être reproduits ni utilisés dans d'autres publications électroniques ou imprimées, ni rediffusés sans l'autorisation expresse du titulaire du droit d'auteur.

Please be aware that cited works of non-patent literature such as scientific or technical documents or the like may be subject to copyright protection and/or any other protection of written works as appropriate based on applicable laws. Copyrighted texts may not be copied or used in other electronic or printed publications or re-distributed without the express permission of the copyright holder.



## PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

**PCT**

To:

Hooks, William M.  
 QUALCOMM INCORPORATED  
 5775 Morehouse Drive  
 San Diego, CA 92121-1714  
 ETATS-UNIS D'AMERIQUE



NOTIFICATION OF TRANSMITTAL OF  
 THE INTERNATIONAL SEARCH REPORT AND  
 THE WRITTEN OPINION OF THE INTERNATIONAL  
 SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year)		26 November 2012 (26-11-2012)
Applicant's or agent's file reference 101005WO	<b>FOR FURTHER ACTION</b>	See paragraphs 1 and 4 below
International application No. PCT/US2012/043915	International filing date (day/month/year)	24 June 2012 (24-06-2012)
Applicant QUALCOMM INCORPORATED		

1.  The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the international Application (see Rule 46):

**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

**Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338 82.70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2.  The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3.  **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
- no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

**4. Reminders**


The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90**bis**.1 and 90**bis**.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see [www.wipo.int/pct/en/texts/time\\_limits.html](http://www.wipo.int/pct/en/texts/time_limits.html) and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority	Authorized officer
 European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax. (+31-70) 340-3016	GHILINI, Marie Tel: +49 (0)89 2399-6121

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 101005WO	<b>FOR FURTHER ACTION</b>		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2012/043915	International filing date (day/month/year) 24/06/2012	(Earliest) Priority Date (day/month/year) 23/06/2011	
Applicant  QUALCOMM INCORPORATED			
<p>This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.</p> <p>This international search report consists of a total of <u>3</u> sheets.</p> <p><input checked="" type="checkbox"/> It is also accompanied by a copy of each prior art document cited in this report.</p>			
<p><b>1 Basis of the report</b></p> <p>a. With regard to the <b>language</b>, the international search was carried out on the basis of:</p> <p><input checked="" type="checkbox"/> the international application in the language in which it was filed</p> <p><input type="checkbox"/> a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))</p> <p>b. <input type="checkbox"/> This international search report has been established taking into account the <b>rectification of an obvious mistake</b> authorized by or notified to this Authority under Rule 91 (Rule 43.6 bis(a)).</p> <p>c. <input type="checkbox"/> With regard to any <b>nucleotide and/or amino acid sequence</b> disclosed in the international application, see Box No. I.</p> <p>2. <input type="checkbox"/> <b>Certain claims were found unsearchable</b> (See Box No. II)</p> <p>3. <input checked="" type="checkbox"/> <b>Unity of invention is lacking</b> (see Box No III)</p> <p>4. With regard to the <b>title</b>,</p> <p><input checked="" type="checkbox"/> the text is approved as submitted by the applicant</p> <p><input type="checkbox"/> the text has been established by this Authority to read as follows:</p> <p>5. With regard to the <b>abstract</b>,</p> <p><input checked="" type="checkbox"/> the text is approved as submitted by the applicant</p> <p><input type="checkbox"/> the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority</p> <p>6. With regard to the <b>drawings</b>,</p> <p>a. the figure of the <b>drawings</b> to be published with the abstract is Figure No. <u>3</u></p> <p><input checked="" type="checkbox"/> as suggested by the applicant</p> <p><input type="checkbox"/> as selected by this Authority, because the applicant failed to suggest a figure</p> <p><input type="checkbox"/> as selected by this Authority, because this figure better characterizes the invention</p> <p>b. <input type="checkbox"/> none of the figures is to be published with the abstract</p>			



## INTERNATIONAL SEARCH REPORT

**Box No. II** Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III** Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.



A. CLASSIFICATION OF SUBJECT MATTER INV. H03F1/02 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) H03F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/215209 A1 (TANABE MITSURU [JP] ET AL) 29 September 2005 (2005-09-29) figure 3	1-3,6-15
X	----- DONGSU KIM ET AL: "High efficiency and wideband envelope tracking power amplifier with sweet spot tracking", RADIO FREQUENCY INTEGRATED CIRCUITS SYMPOSIUM (RFIC), 2010 IEEE, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23), pages 255-258, XP031684103, ISBN: 978-1-4244-6240-7 figures 3-5 ----- -/--	1-17,19
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier application or patent but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed		*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art *8* document member of the same patent family
Date of the actual completion of the international search  19 November 2012		Date of mailing of the international search report  26/11/2012
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer  Agerbaek, Thomas

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DAEHYUN KANG ET AL: "A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 58, no. 10, 1 October 2010 (2010-10-01), pages 2598-2608, XP011317521, ISSN: 0018-9480 figure 4</p>	1-19
X	<p>-----            US 2005/046474 A1 (MATSUMOTO HIDETOSHI [JP] ET AL) 3 March 2005 (2005-03-03) figures 5, 15</p>	1-3, 6-17,19
X	<p>-----            JINSUNG CHOI ET AL: "Envelope tracking power amplifier robust to battery depletion", MICROWAVE SYMPOSIUM DIGEST (MTT), 2010 IEEE MTT-S INTERNATIONAL, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23), pages 1074-1077, XP031714159, ISBN: 978-1-4244-6056-4 abstract; figure 5</p>	1-3,6,8, 10-17,19
X	<p>-----            DAEHYUN KANG ET AL: "LTE Power Amplifier for envelope tracking polar transmitters", MICROWAVE CONFERENCE (EUMC), 2010 EUROPEAN, IEEE, PISCATAWAY, NJ, USA, 28 September 2010 (2010-09-28), pages 628-631, XP031786114, ISBN: 978-1-4244-7232-1 figure 9</p>	1-3,6-8, 10-17,19
X	<p>-----            JINSUNG CHOI ET AL: "A Polar Transmitter With CMOS Programmable Hysteretic-Controlled Hybrid Switching Supply Modulator for Multistandard Applications", IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 57, no. 7, 1 July 2009 (2009-07-01), pages 1675-1686, XP011258456, ISSN: 0018-9480 figure 1</p> <p>-----            -/--</p>	16,18,19



C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>YUSHAN LI ET AL: "High Efficiency Wide Bandwidth Power Supplies for GSM and EDGE RF Power Amplifiers",            CONFERENCE PROCEEDINGS / IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (ISCAS) : MAY 23 - 26, 2005, INTERNATIONAL CONFERENCE CENTER, KOBE, JAPAN, IEEE SERVICE CENTER, PISCATAWAY, NJ,            23 May 2005 (2005-05-23), pages 1314-1317, XP010815779,            DOI: 10.1109/ISCAS.2005.1464837            ISBN: 978-0-7803-8834-5            figure 4</p>	16,18,19
X	<p>JASON T STAUTH ET AL: "Optimum Bias Calculation for Parallel Hybrid Switching-Linear Regulators",            APPLIED POWER ELECTRONICS CONFERENCE, APEC 2007 - TWENTY SECOND ANNUAL IEEE, IEEE, PI,            1 February 2007 (2007-02-01), pages 569-574, XP031085267,            ISBN: 978-1-4244-0713-2            figure 1</p>	16, 18-24,26
X	<p>HANS ERTL ET AL: "Basic Considerations and Topologies of Switched-Mode Assisted Linear Power Amplifiers",            IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, IEEE SERVICE CENTER, PISCATAWAY, NJ, USA,            vol. 44, no. 1,            1 February 1997 (1997-02-01), XP011023224,            ISSN: 0278-0046            figures 2, 9c, 9d</p>	20,24



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No  
PCT/US2012/043915

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005215209 A1	29-09-2005	CN 1674449 A	28-09-2005
		JP 4012165 B2	21-11-2007
		JP 2005277559 A	06-10-2005
		US 2005215209 A1	29-09-2005
-----			
US 2005046474 A1	03-03-2005	CN 1592089 A	09-03-2005
		JP 4589665 B2	01-12-2010
		JP 2005102146 A	14-04-2005
		US 2005046474 A1	03-03-2005
-----			

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-15

Independent claim 1 in connection with dependent claims 2-5 and independent claim 8 in connection with dependent claim 9 define a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal, the first supply voltage, and the boosted supply voltage, and generates a second supply voltage based thereon.

1.1. claim: 6

Independent claim 1 in connection with dependent claim 6 defines a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based thereon, wherein the envelope amplifier feeds an RF power amplifier.

1.2. claim: 7

Independent claim 1 in connection with dependent claim 7 defines a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based thereon, wherein the first supply voltage is a battery voltage.

1.3. claims: 10-15

Independent claim 10 in connection with dependent claim 11 and independent claim 12 in connection with dependent claim 13 and independent claim 14 in connection with dependent claim 15 define a device or method comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based on the first supply voltage or the boosted supply voltage.

---

2. claims: 16, 17

Independent claim 16 in connection with dependent claim 17 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; and further including a boost

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

converter for supplies (or not) the envelope amplifier.

---

## 3. claim: 18

Independent claim 16 in connection with dependent claim 18 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; the 'switcher' further including a current sensing amplifier, a driver, and a CMOS switching stage.

---

## 4. claim: 19

Independent claim 16 in connection with dependent claim 19 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; wherein the first supply current comprises DC and low frequency components, and the second supply current comprises higher frequency components.

---

## 5. claims: 20-26

Independent claim 20 and dependent claims 21-26 define an apparatus involving an inductor that receives a switching signal and generates a supply current; and a 'switcher' that senses an input current, adds an offset, and accordingly generates the switching signal.

---



From the  
INTERNATIONAL SEARCHING AUTHORITY

To:
see form PCT/ISA/220

# PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference see form PCT/ISA/220		<b>FOR FURTHER ACTION</b> See paragraph 2 below
International application No. PCT/US2012/043915	International filing date (day/month/year) 24.06.2012	Priority date (day/month/year) 23.06.2011
International Patent Classification (IPC) or both national classification and IPC INV. H03F1/02		
Applicant QUALCOMM INCORPORATED		

1. This opinion contains indications relating to the following items:



- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Date of completion of this opinion see form PCT/ISA/210	Authorized Officer Agerbaek, Thomas Telephone No. +49 89 2399-8692	
--	--	--	---

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2012/043915

---

**Box No. I Basis of the opinion**

---

1. With regard to the **language**, this opinion has been established on the basis of:
  - the international application in the language in which it was filed
  - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
  - a. (means)
    - on paper
    - in electronic form
  - b. (time)
    - in the international application as filed
    - together with the international application in electronic form
    - subsequently to this Authority for the purposes of search
4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2012/043915

**Box No. IV Lack of unity of invention**

1.  In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- paid additional fees
  - paid additional fees under protest and, where applicable, the protest fee
  - paid additional fees under protest but the applicable protest fee was not paid
  - not paid additional fees
2.  This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- complied with
  - not complied with for the following reasons:  
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- all parts.
  - the parts relating to claims Nos. 1-26

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	<u>22, 23, 25</u>
	No: Claims	<u>1-21, 24, 26</u>
Inventive step (IS)	Yes: Claims	<u>25</u>
	No: Claims	<u>1-24, 26</u>
Industrial applicability (IA)	Yes: Claims	<u>1-26</u>
	No: Claims	

2. Citations and explanations

see separate sheet



Re Item IV**Lack of unity of invention**

- 1 This Authority considers that the application does not meet the requirements of unity of invention and that there are five inventions covered by the claims indicated as follows:

## 1. Claims: 1-15

Independent claim 1 in connection with dependent claims 2-5 and independent claim 8 in connection with dependent claim 9 define a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal, the first supply voltage, and the boosted supply voltage, and generates a second supply voltage based thereon.

## 1.1 Claim: 6

Independent claim 1 in connection with dependent claim 6 defines a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based thereon, wherein the envelope amplifier feeds an RF power amplifier.

## 1.2 Claim: 7

Independent claim 1 in connection with dependent claim 7 defines a device comprising a boost converter that generates from a first supply voltage a boosted supply voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based thereon, wherein the first supply voltage is a battery voltage.

## 1.3 Claims: 10-15

Independent claim 10 in connection with dependent claim 11 and independent claim 12 in connection with dependent claim 13 and independent claim 14 in connection with dependent claim 15 define a device or method comprising a boost converter that generates from a first supply voltage a boosted supply

voltage, and an envelope amplifier that receives an envelope signal and the boosted supply voltage, and generates a second supply voltage based on the first supply voltage or the boosted supply voltage.

2. Claims: 16, 17

Independent claim 16 in connection with dependent claim 17 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; and further including a boost converter for supplies (or not) the envelope amplifier.

3. Claim: 18

Independent claim 16 in connection with dependent claim 18 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; the 'switcher' further including a current sensing amplifier, a driver, and a CMOS switching stage.

4. Claim: 19

Independent claim 16 in connection with dependent claim 19 defines an apparatus involving a 'switcher' that generates from a first supply voltage a first supply current; an envelope amplifier that generates a second supply current based on an envelope signal; and a power amplifier that receives a total supply current comprising the first and second supply currents; wherein the first supply current comprises DC and low frequency components, and the second supply current comprises higher frequency components.

5. Claims: 20-26

Independent claim 20 and dependent claims 21-26 define an apparatus involving an inductor that receives a switching signal and generates a supply current; and a 'switcher' that senses an input current, adds an offset, and accordingly generates the switching signal.



The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The subject-matter common to the five identified groups of inventions amounts to no more than a voltage- or current supply, which is trivially not new.

Note that a first sub-invention, dependent claim 6, is included in the first group of inventions, not because it is unitary with the rest of the claims in the group, but because it is only trivially different from claim 1; the same is the case for the second and third sub-inventions (claims 7, 10-15).

### Re Item V

#### **Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

2 Reference is made to the following documents:

- D1 US 2005/215209 A1 (TANABE) 29 September 2005
- D2 DONGSU KIM ET AL: "High efficiency and wideband envelope tracking power amplifier with sweet spot tracking",  
RADIO FREQUENCY INTEGRATED CIRCUITS SYMPOSIUM (RFIC),  
2010 IEEE, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23),  
pages 255-258, XP031684103,  
ISBN: 978-1-4244-6240-7
- D3 DAEHYUN KANG ET AL: "A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator",  
IEEE TRANSACTIONS ON MICROWAVE THEORY AND  
TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US,  
vol. 58, no. 10, 1 October 2010 (2010-10-01), pages 2598-2608,  
XP011317521,  
ISSN: 0018-9480
- D4 US 2005/046474 A1 (MATSUMOTO) 3 March 2005



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2012/043915

- D5 JINSUNG CHOI ET AL: "Envelope tracking power amplifier robust to battery depletion",  
MICROWAVE SYMPOSIUM DIGEST (MTT), 2010 IEEE MTT-S INTERNATIONAL, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23), pages 1074-1077, XP031714159,  
ISBN: 978-1-4244-6056-4
- D6 DAEHYUN KANG ET AL: "LTE Power Amplifier for envelope tracking polar transmitters",  
MICROWAVE CONFERENCE (EUMC), 2010 EUROPEAN, IEEE, PISCATAWAY, NJ, USA, 28 September 2010 (2010-09-28), pages 628-631, XP031786114,  
ISBN: 978-1-4244-7232-1
- D7 JINSUNG CHOI ET AL: "A Polar Transmitter With CMOS Programmable Hysteretic-Controlled Hybrid Switching Supply Modulator for Multistandard Applications",  
IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US,  
vol. 57, no. 7, 1 July 2009 (2009-07-01), pages 1675-1686, XP011258456,  
ISSN: 0018-9480
- D8 YUSHAN LI ET AL: "High Efficiency Wide Bandwidth Power Supplies for GSM and EDGE RF Power Amplifiers",  
CONFERENCE PROCEEDINGS / IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (ISCAS) : MAY 23 - 26, 2005, INTERNATIONAL CONFERENCE CENTER, KOBE, JAPAN, IEEE SERVICE CENTER, PISCATAWAY, NJ, 23 May 2005 (2005-05-23), pages 1314-1317, XP010815779,  
DOI: 10.1109/ISCAS.2005.1464837  
ISBN: 978-0-7803-8834-5
- D9 JASON T STAUTH ET AL: "Optimum Bias Calculation for Parallel Hybrid Switching-Linear Regulators",  
APPLIED POWER ELECTRONICS CONFERENCE, APEC 2007 - TWENTY SECOND ANNUAL IEEE, IEEE, PI, 1 February 2007 (2007-02-01), pages 569-574, XP031085267,  
ISBN: 978-1-4244-0713-2

D10 HANS ERTL ET AL: "Basic Considerations and Topologies of Switched-Mode Assisted Linear Power Amplifiers", IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, IEEE SERVICE CENTER, PISCATAWAY, NJ, USA, vol. 44, no. 1, 1 February 1997 (1997-02-01), XP011023224, ISSN: 0278-0046.

First invention (claims 1-15)

- 3 The application fails to meet the requirements of Art. 33(1) PCT because claims 1-3, 6, 8-15 lack novelty, Art. 33(2) PCT, while claim 7 lacks an inventive step, Art. 33(3) PCT:
- D1 (US 2005/215209) discloses (Fig. 3) an envelope tracking power supply comprising a step-up (boost) switching converter 104 operating off a 3.3 V supply to generate a 4.7V supply voltage, a linear envelope tracking amplifier 118/119 providing an envelope tracking supply voltage to RF power amplifier 124, wherein the 3.3V supply and the boosted 4.7V supply are selectably provided to the linear amplifier as a function of the input envelope compared to a number of predetermined thresholds, corresponding to claims 1-3, 6, 8-15. The skilled person uses a battery to power the D1 amplifier system when needed, e.g., for a mobile application: claim 7 not inventive.
- 4 The application fails to meet the requirements of Art. 33(1) PCT because claims 1-15 lack novelty, Art. 33(2) PCT:
- D2 ("High efficiency and wideband envelope tracking power amplifier with sweet spot tracking", by Kim et al, IEEE 2010) discloses (Fig. 3) an envelope tracking power supply comprising a 5V boost converter operating off a 3.4V battery (Section 'Measurement results, 5th line) and feeding a linear amplifier that drives the supply voltage for the RF PA. The boost converter generates the boosted voltage if the envelope is above some value, and also if the battery voltage is below some value - in fact, it always generates the boosted voltage. A switching class D converter runs directly off the 3.4V battery and assists the linear amplifier, corresponding to claims 1-3, 6-15. The linear amplifier is shown in Fig. 4 and described on page 256, left hand column to



comprise an operational transconductance amplifier (OTA) consisting of complementary, differential long-tail pairs and a folded cascode gain stage, the OTA connected to two source followers (the FETs shown to be biased by symbolic current sources) which read as the claimed driver and which generate two drive signals for the output stage transistors which include a P-ch FET with its source connected to the positive (boosted) supply and a N-ch FET with its source connected to ground, both drains connected to the output, corresponding to claim 4. The switching amplifier of Fig. 3 is shown in detail in Fig. 5 to comprise other two P-ch FETs P1, P2 connected as per claim 5.

- Additionally, D3 ("A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", by Kang et al, IEEE 2010) discloses (Fig. 4) a similar arrangement according to claims 1-15.

5 The application fails to meet the requirements of Art. 33(1) PCT because claims 1-3, 6-15 lack novelty, Art. 33(2) PCT:

- D4 (US 2005/046474) discloses (Fig. 5) an envelope tracking power supply for an RF power amplifier in a battery powered cell phone (para. [0003-4], the supply comprising a boost converter 41 generating, from supply 7, a boosted voltage  $V_{s2}$ , which is passed via buck converter 25 to the linear part 3, 4 of an envelope tracking amplifier. A switching part 1, 24, 26 of the envelope tracking amplifier receives the supply voltage 7 directly. The boost converter generates the boosted voltage  $V_{s2}$  if the envelope is above some value, and also if the battery voltage 7 is below some value - in fact, it always generates the boosted voltage, corresponding to claims 1, 2, 6, 7-15.

- Additionally, D5 (CHOI: "Envelope tracking power amplifier robust to battery depletion", XP031714159, Fig. 5) and D6 (KANG: "LTE Power Amplifier for envelope tracking polar transmitters", XP031786114, Fig. 9) each discloses envelope tracking amplifiers according to claims 1-3, 6, 8, 10-15.



Second invention (claim 16 in combination with claim 17)

- 6 The application fails to meet the requirements of Art. 33(1) PCT because claims 16, 17 lack novelty, Art. 33(2) PCT:
- D2 ("High efficiency and wideband envelope tracking power amplifier with sweet spot tracking", by Kim et al, IEEE 2010) discloses (Fig. 3) an envelope tracking power supply comprising a 5V boost converter operating off a 3.4V battery (Section 'Measurement results, 5th line) and feeding a linear amplifier; and a switching amplifier, the two amplifiers' output currents combining to feed the RF PA load.
  - D3 ("A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", by Kang et al, IEEE 2010) discloses (Fig. 4) a composite linear/switching envelope tracking supply for an RF PA, the linear amplifier fed from a boost converter.
  - D4 (US 2005/046474) discloses (Fig. 5) a composite linear/switching envelope tracking power supply for an RF PA, the linear amplifier 3 boost converter 41 via buck converter 25.
  - D5 (CHOI: "Envelope tracking power amplifier robust to battery depletion", XP031714159, Fig. 5) and D6 (KANG: "LTE Power Amplifier for envelope tracking polar transmitters", XP031786114, Fig. 9) each discloses envelope tracking composite linear/amplifiers with boosted supplies for the linear part.

Third invention (claim 16 in combination with claim 18)

- 7 The application fails to meet the requirements of Art. 33(1) PCT because claims 16, 18 lack novelty, Art. 33(2) PCT:
- D3 ("A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", by Kang et al, IEEE 2010) discloses (Fig. 4) a composite linear/switching envelope tracking supply for an RF PA, the output current of the linear amplifier sensed by current sense amplifier I-to-V to control the CMOS (N/P MOS) output stage  $V_{sw}$  via a hysteretic comparator and a gate driver.
  - D7 ("A Polar Transmitter With CMOS Programmable Hysteretic-Controlled Hybrid Switching Supply Modulator for Multistandard Applications", by Choi, XP011258456) discloses (Fig. 1) a tracking supply essentially identical to that of D3.

- 8 The application fails to meet the requirements of Art. 33(1) PCT because claim 16 lacks novelty, Art. 33(2) PCT, and because claim 18 lacks an inventive step, Art. 33(3) PCT:
- D8 ("High Efficiency Wide Bandwidth Power Supplies for GSM and EDGE RF Power Amplifiers", by Li, XP010815779) discloses (Fig. 4) a composite linear/switching envelope tracking supply for an RF PA, according to claim 16, and further having a comparator receiving the sensed linear amplifier output current and a gate driver for the switching CMOS output stage. D8 does not disclose a current sense amplifier as required in claim 18. The skilled person, however, when faced with task of realizing the symbolically depicted current sense function, uses, as a matter of course, a current sense amplifier for its intended purpose, e.g., to provide to the comparator a more suitable signal.
  - D9 ("Optimum Bias Calculation for Parallel Hybrid Switching-Linear Regulators", by Stauth, XP031085267) discloses (Fig. 1) a composite linear/switching envelope tracking supply for an RF PA, according to claim 16, and further having a comparator receiving the sensed linear amplifier output current and a gate driver for the switching CMOS output stage. D9 does not disclose a current sense amplifier as required in claim 18. The skilled person uses one for the same reasons given for D8.

Fourth invention (claim 16 in combination with claim 19)

- 9 The application fails to meet the requirements of Art. 33(1) PCT because claims 16, 19 lack novelty, Art. 33(2) PCT:
- Each one of documents D2-D9 discloses a composite linear/switching envelope tracking supply for an RF PA. In such an arrangement the linear amplifier generally delivers the faster signal components and the switching amplifier DC and low frequency components, as explicitly taught in D2, page 256, left column, top; in D3, 2nd page, left column, penultimate paragraph; in D4, Fig. 5 (low pass- and high pass filters 26, 4); in D7, Fig. 8; in D8, page 1315, left column, bottom; and in D9, page 569, right column, top.

Fifth invention (claims 20-26)

- 10 The application fails to meet the requirements of Art. 33(1) PCT because claims 20, 21, 24, 26 lack novelty, Art. 33(2) PCT, while claims 22, 23 lack an inventive step, Art. 33(3) PCT:
- D9 discloses (Fig. 1) a composite linear/switching tracking supply for an RF PA, wherein the linear amplifier's output current is sensed and used to control the output current of the switching supply. An offset as given in eq. (8) is added to the sensed current to increase the switching current to maximize the overall efficiency. The offset is partially based on the supply voltage  $V_{dd}$  which feeds the switching amplifier, according to claims 20, 21, 24, 26, Art. 33(2) PCT. Of the additional features of claims 22 and 23, only the current sense amplifier is not disclosed in D9; the skilled person non-inventively adds it, please refer to above point 8 (claims 22, 23 not inventive, Art. 33(3) PCT).
  - D10 ("Basic Considerations and Topologies of Switched-Mode Assisted Linear Power Amplifiers", by Ertl, XP011023224) discloses (Fig. 2) a composite linear/switching power amplifier, where a switching stage senses the current of the linear push-pull output stage. In the Fig. 9d variant of the switching stage the current source- and sink parts have been separated; the current in the sourcing part is greater (always above zero) than the normal case seen in Fig. 3, which effectively amounts to an offset having been added to the sensed current, according to claims 20, 24.
  - Claim 25 appears to meet the requirements of Art. 33(1) PCT. The cited prior art does not teach or fairly suggest feeding a boosted supply voltage to the linear amplifier in D9 or D10, nor adding an offset current in the other cited art, Art. 33(2), (3) PCT.



Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

---

General information

For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.

---

Amending claims under Art. 19 PCT

Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.

---

Filing a demand for international preliminary examination

In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT).

If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).

---

Filing informal comments

After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.

---

End of the international phase

At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).

---

Relevant PCT Rules and more information

Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

Bitte beachten Sie, dass angeführte Nichtpatentliteratur (wie z. B. wissenschaftliche oder technische Dokumente) je nach geltendem Recht dem Urheberrechtsschutz und/oder anderen Schutzarten für schriftliche Werke unterliegen könnte. Die Vervielfältigung urheberrechtlich geschützter Texte, ihre Verwendung in anderen elektronischen oder gedruckten Publikationen und ihre Weitergabe an Dritte ist ohne ausdrückliche Zustimmung des Rechtsinhabers nicht gestattet.

Veillez noter que les ouvrages de la littérature non-brevets qui sont cités, par exemple les documents scientifiques ou techniques, etc., peuvent être protégés par des droits d'auteur et/ou toute autre protection des écrits prévue par les législations applicables. Les textes ainsi protégés ne peuvent être reproduits ni utilisés dans d'autres publications électroniques ou imprimées, ni rediffusés sans l'autorisation expresse du titulaire du droit d'auteur.

Please be aware that cited works of non-patent literature such as scientific or technical documents or the like may be subject to copyright protection and/or any other protection of written works as appropriate based on applicable laws. Copyrighted texts may not be copied or used in other electronic or printed publications or re-distributed without the express permission of the copyright holder.



## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13167659			
<b>Filing Date:</b>	23-Jun-2011			
<b>Title of Invention:</b>	LOW-VOLTAGE POWER-EFFICIENT ENVELOPE TRACKER			
<b>First Named Inventor/Applicant Name:</b>	Lennart K. Mathe			
<b>Filer:</b>	William M. Hooks/Sheryl Schoen			
<b>Attorney Docket Number:</b>	101005			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
Submission- Information Disclosure Stmt	1806	1	180	180
<b>Total in USD (\$)</b>				<b>180</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	15032621
<b>Application Number:</b>	13167659
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	8529
<b>Title of Invention:</b>	LOW-VOLTAGE POWER-EFFICIENT ENVELOPE TRACKER
<b>First Named Inventor/Applicant Name:</b>	Lennart K. Mathe
<b>Customer Number:</b>	23696
<b>Filer:</b>	William M. Hooks/Sheryl Schoen
<b>Filer Authorized By:</b>	William M. Hooks
<b>Attorney Docket Number:</b>	101005
<b>Receipt Date:</b>	22-FEB-2013
<b>Filing Date:</b>	23-JUN-2011
<b>Time Stamp:</b>	20:35:25
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$180
RAM confirmation Number	8153
Deposit Account	170026
Authorized User	

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 1.19 (Document supply 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	Amendment/Req. Reconsideration-After Non-Final Reject	101005_2013-02-22_AMENDMENT.pdf	115399 375b7d79f37430e9d08bec5b570c96c32a3e3af2	no	11
<b>Warnings:</b>					
<b>Information:</b>					
2	Information Disclosure Statement (IDS) Form (SB08)	101005_2013-02-22_IDS.pdf	708080 335530789608a822b4332453c274c98732f86942	no	5
<b>Warnings:</b>					
<b>Information:</b>					
3	Non Patent Literature	101005WO_2012_10_04_PISR.PDF	841374 844f74fa4f311a0dd6601fb593c9492c5aeadd6	no	8
<b>Warnings:</b>					
<b>Information:</b>					
4	Non Patent Literature	101005WO_2012_11_26_WO_ISR.PDF	18955910 49d1ffc55b49a2c5cd2606f571fdabd70aa2847	no	23
<b>Warnings:</b>					
<b>Information:</b>					
5	Non Patent Literature	CHOI_A_POLAR_VOL_57_PP_1675_1686.PDF	8308952 ba11028e93c6a285f4d85e45e123011a9a8ff48f	no	13
<b>Warnings:</b>					
<b>Information:</b>					
6	Non Patent Literature	ERTL_BASIC_VOL_44_FEB_1997.PDF	6647354 f31f9718ea0c5344af61b86e1dcf419e6fcd2a3	no	8
<b>Warnings:</b>					
<b>Information:</b>					
7	Non Patent Literature	KANG_A_MULTIMODE_VOL_58_NO_10_PGS_2598_2608_YEAR_2010.PDF	2003928 4c7831b078216ea2262836323a2e7057c93185a8	no	11
<b>Warnings:</b>					
<b>Information:</b>					
8	Non Patent Literature	KANG_LTE_SEP_2010_PP_628_631.PDF	1851350 11383e0a7d596d743a4bf0a7046a43b6f087eacf	no	4



<b>Warnings:</b>					
<b>Information:</b>					
9	Non Patent Literature	KIM_HIGH_EFFICIENCY_AND_WIDEBAND_ENVELOPE_IEEE_2010.PDF	447037 25199eb5478ab7b125fd085ca7ec5bae307b24a0	no	4
<b>Warnings:</b>					
<b>Information:</b>					
10	Non Patent Literature	LI_HIGH_MAY_2005_PP_1314_1317.PDF	712564 56a0a6ecf89142a5cf05a15e90932f3c89c5f376	no	4
<b>Warnings:</b>					
<b>Information:</b>					
11	Non Patent Literature	STAUTH_OPTIMUM_FEB_2007_PP_569_574.PDF	3892881 8a2e779dbf04c833c56a43e498acdca5beefa94b	no	6
<b>Warnings:</b>					
<b>Information:</b>					
12	Fee Worksheet (SB06)	fee-info.pdf	30457 00e9b5b06f19fd42d4fc5c2a459389595cc57f65	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>				44515286	

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.

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.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>13/167,659</b>	Filing Date <b>06/23/2011</b>	<input type="checkbox"/> To be Mailed		
<b>APPLICATION AS FILED – PART I</b>					<b>OTHER THAN</b>				
(Column 1)		(Column 2)			SMALL ENTITY <input type="checkbox"/> OR		SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA			RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)	
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A			N/A		N/A		
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A			N/A		N/A		
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A			N/A		N/A		
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	minus 20 =	*			X \$ =		X \$ =		
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*			X \$ =		X \$ =		
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 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).								
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>									
* If the difference in column 1 is less than zero, enter "0" in column 2.									
<b>APPLICATION AS AMENDED – PART II</b>					<b>OTHER THAN</b>				
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY OR		SMALL ENTITY	
<b>AMENDMENT</b>	<b>02/22/2013</b>	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	<small>Total (37 CFR 1.16(i))</small>	* 23	Minus	** 26	= 0	X \$ =		OR X \$62=	0
	<small>Independent (37 CFR 1.16(h))</small>	* 7	Minus	***7	= 0	X \$ =		OR X \$250=	0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
TOTAL ADD'L FEE						OR	TOTAL ADD'L FEE		
							<b>0</b>		
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY OR		SMALL ENTITY	
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	<small>Total (37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =		OR X \$ =	
	<small>Independent (37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =		OR X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
TOTAL ADD'L FEE						OR	TOTAL ADD'L FEE		
<p>* 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.</p>									

Legal Instrument Examiner:  
/ANTJUAN RIVERA/

This collection of information is required by 37 CFR 1.16. 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, 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.**  
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



## 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.
13/167,659	06/23/2011	Lennart K. Mathe	101005	8529
23696	7590	05/10/2013	EXAMINER	
QUALCOMM INCORPORATED			NGUYEN, KHANH V	
5775 MOREHOUSE DR.			ART UNIT	PAPER NUMBER
SAN DIEGO, CA 92121			2817	
			NOTIFICATION DATE	DELIVERY MODE
			05/10/2013	ELECTRONIC

**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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

us-docketing@qualcomm.com



<b>Office Action Summary</b>	<b>Application No.</b> 13/167,659	<b>Applicant(s)</b> MATHE ET AL.	
	<b>Examiner</b> KHANH V. NGUYEN	<b>Art Unit</b> 2817	<b>AIA (First Inventor to File) Status</b> 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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) 3-7, 10-15, 17-19 and 21-26 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) 8 and 9 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](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto: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.

#### Interim copies:

- a)  All    b)  Some    c)  None of the: Interim copies of the priority documents have been received.

### Attachment(s)

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 2/22/13.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

Claim 8 is objected to because of the following informalities:

Claim 8, “wherein the envelope amplifier is operative to further receive the first supply voltage and generate the second supply voltage based on the first supply voltage and generate the second supply voltage based on the first supply voltage or the boosted supply voltage, and further” should correctly be -- **wherein the envelope amplifier is operative to further receive the first supply voltage and generate the second supply voltage based on the first supply voltage or the boosted supply voltage.** – Note, the original limitations of claim 8 should be deleted since similar claimed subject matters are disclosed.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of 35 U.S.C. 112(b):

(B) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8 and 9 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly



claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Regarding claim 8, newly amended claim 8 disclosed similar claimed subject matters, see the last two limitations of the claim.

Regarding claim 9, it should be canceled since the claimed subject matters already disclosed in amended claim 8.

### ***Allowable Subject Matter***

Claims 3-8, 10-15, 17-19, 21-26 are allowed.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh V. Nguyen whose telephone number is 571-272-1767. The examiner can normally be reached on 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on 571-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Application/Control Number: 13/167,659

Page 4

Art Unit: 2817

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.

**/Khanh Van Nguyen/**  
Primary Examiner, Art Unit 2817

Receipt date: 02/22/2013

13167659 - GAI: 2817

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

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.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13167659
	Filing Date	2011-06-23
	First Named Inventor	MATHE; Lennart K.
	Art Unit	2817
	Examiner Name	NGUYEN, Khanh V
	Attorney Docket Number	101005

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

Add

U.S.PATENT APPLICATION PUBLICATIONS						Remove
Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050046474		2005-03-03	MATSUMOTO; Hidetoshi et al.	
	2	20050215209		2005-09-29	TANABE; Mitsuru et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

Add

FOREIGN PATENT DOCUMENTS							Remove	
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1							<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button

Add

NON-PATENT LITERATURE DOCUMENTS						Remove
---------------------------------	--	--	--	--	--	--------



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Receipt date: 02/22/2013	Application Number	13167659	13167659 - GAU: 2817
		Filing Date	2011-06-23	
		First Named Inventor	MATHE; Lennart K.	
		Art Unit	2817	
		Examiner Name	NGUYEN, Khanh V	
		Attorney Docket Number	101005	


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 <sup>5</sup>
	1	CHOI, J et al., "A Polar Transmitter With CMOS Programmable Hysteretic-Controlled Hybrid Switching Supply Modulator for Multi standard Applications", IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 57, no. 7, 1 July 2009 (2009-07-01), pages 1675-1686, XP011258456.	<input type="checkbox"/>
	2	ERTL, H et al., "Basic Considerations and Topologies of Switched-Mode Assisted Linear Power Amplifiers", IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, IEEE SERVICE CENTER, PISCATAWAY, NJ, USA, vol. 44, no. 1, 1 February 1997 (1997-02-01), XP011023224.	<input type="checkbox"/>
	3	INTERNATIONAL SEARCH REPORT AND WRITTEN OPINION - PCT/US2012/043915 - ISA/EPO - 2012-11-26 (101005WO).	<input type="checkbox"/>
	4	KANG D., et al., "A Multimode/Multiband Power Amplifier With a Boosted Supply Modulator", IEEE RANSCTIONS ON MICROWAVE THEORY AND TECHNIQUES, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 58, no. 10, 1 October 2010 (2010-10-01), pages 2598-2608, XP011317521, ISSN: 0018-9480.	<input type="checkbox"/>
	5	KANG, D et al., "LTE Power Amplifier for envelope tracking polar transmitters", MICROWAVE CONFERENCE (EUMC), 2010, EUROPEAN, IEEE, PISCATAWAY, NJ, USA, 28 September 2010 (2010-09-28), pages 628-631, XP031786114.	<input type="checkbox"/>
	6	KIM D., et al., "High efficiency and wideband envelope tracking power amplifier with sweet spot tracking", RADIO FREQUENCY INTEGRATED CIRCUITS SYMPOSIUM (RFIC) , 2010 IEEE, IEEE, PISCATAWAY, NJ, USA, 23 May 2010 (2010-05-23), pages 255-258, XP031684103, ISBN: 978-1-4244-6240-7.	<input type="checkbox"/>
	7	LI, Y et al., "High Efficiency Wide Bandwidth Power Supplies for GSM and EDGE RF Power Amplifiers", CONFERENCE PROCEEDINGS / IEEE INTERNATIONAL SYMPOSIUM ON CIRCUITS AND SYSTEMS (ISCAS) : MAY 23 - 26, 2005, INTERNATIONAL CONFERENCE CENTER, KOBE, JAPAN, IEEE SERVICE CENTER, PISCATAWAY, NJ, 23 May 2005 (2005-05-23), pages 1314-1317, XP010815779.	<input type="checkbox"/>
	8	PARTIAL INTERNATIONAL SEARCH REPORT - PCT/US2012/043915 - INTERNATIONAL SEARCH AUTHORITY EUROPEAN PATENT OFFICE 2012-10-04 (101005WO).	<input type="checkbox"/>
	9	STAUTH, J.T., et al., "Optimum Bias Calculation for Parallel Hybrid Switching-Linear Regulators", APPLIED POWER ELECTRONICS CONFERENCE, APEC 2007 - TWENTY SECOND ANNUAL IEEE, IEEE, PI, 1 February 2007 (2007-02-01), pages 569-574, XP031085267.	<input type="checkbox"/>

If you wish to add additional non-patent literature document citation information please click the Add button **Add**



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13167659	13167659 - GAU: 2817
	Filing Date		2011-06-23	
	First Named Inventor	MATHE; Lennart K.		
	Art Unit	2817		
	Examiner Name	NGUYEN, Khanh V		
	Attorney Docket Number	101005		

EXAMINER SIGNATURE			
Examiner Signature	/Khanh Nguyen/	Date Considered	05/03/2013
<p>*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.</p>			
<p><sup>1</sup> See Kind Codes of USPTO Patent Documents at <a href="http://www.USPTO.GOV">www.USPTO.GOV</a> or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.</p>			

<b>Search Notes</b>  	<b>Application/Control No.</b>  13167659	<b>Applicant(s)/Patent Under Reexamination</b>  MATHE ET AL.
	<b>Examiner</b>  KHANH V NGUYEN	<b>Art Unit</b>  2817

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
330	10,136,207A,251,297	11/5/2012	NKV
UPDATE	ABOVE	4/25/2013	NKV

SEARCH NOTES		
Search Notes	Date	Examiner

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

--	--

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4	((("20050046474") or ("20050215209")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2013/05/03 21:34
S1	2	("6893101").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/11/05 13:41
S2	11	((("20080278136") or ("20100001793") or ("20110095827") or ("6300826") or ("6661217") or ("6792252") or ("7061313") or ("7068984") or ("7368985") or ("7679433") or ("7932780")).PN.	US-PGPUB; USPAT	OR	OFF	2012/11/05 13:45
S3	231	330/136,251,297.ccls. and boost\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/05 14:30
S4	45	("20020135338"   "20030198300"   "20050110562"   "20060119425"   "20070019446"   "20070024360"   "20080224769"   "20090091305"   "3600667"   "3970953"   "4378530"   "4502152"   "4516080"   "5682303"   "5905407"   "6005377"   "6009000"   "6043707"   "6121761"   "6215290"   "6281666"   "6292378"   "6300826"   "6346798"   "6362607"   "6362608"   "6404175"   "6424129"   "6449174"   "6534962"   "6583664"   "6642631"   "6650096"   "6661210"   "6674274"   "6833760"   "6850045"   "6894559"   "6985039"   "7058373"   "7071662"   "7109689"   "7126315"   "7135918"   "7190150").PN. OR ("7990214").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/06 11:02
S5	11	("20020153940"   "20040251968"   "20050057308"   "6437641"   "6492867"   "6566944"   "6831519"   "6985039"   "7193470"   "7405618"   "7420415").PN. OR ("7932780").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/06 12:08
S6	58	("20050110562"   "20060119425"   "20070019446"   "20070024360"	US-PGPUB; USPAT;	OR	ON	2012/11/06 12:11



		"20070126408"   "20080030174"   "20080224769"   "20080237705"   "20090091305"   "3600667"   "3970953"   "4378530"   "4502152"   "4516080"   "5682303"   "5905407"   "5939867"   "6009000"   "6043707"   "6121761"   "6215290"   "6281666"   "6292378"   "6300826"   "6346798"   "6362607"   "6362608"   "6404175"   "6424129"   "6449174"   "6509722"   "6534962"   "6583664"   "6642631"   "6650096"   "6661210"   "6674274"   "6781452"   "6825726"   "6833760"   "6850045"   "6992353"   "7058373"   "7071662"   "7091777"   "7109689"   "7116946"   "7126315"   "7126317"   "7183755"   "7183856"   "7190150"   "7229886"   "7499502"   "7551688"   "7583149"   "7602155").PN. OR ("7808313").URPN.	USOCR			
S7	50	"330"/\$.ccls. and switcher	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/09 14:47
S9	590	"330"/\$.ccls. and boost\$4 same switch\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/09 15:28
S10	57	"330"/\$.ccls. and boost\$4 same (envelop\$3 with (amplif\$4 or amplification))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/12 11:16
S11	3	((("5414614") or ("6055168") or ("6198645")).PN.	USPAT	OR	OFF	2012/11/12 11:39
S12	197	"330"/\$.ccls. and (envelop\$3 adj1 (amplif\$4 or amplification))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/12 11:49
S13	6	((("20040208262") or ("20040266366") or ("20080252380") or ("20090167427") or ("5905407") or ("0671646")).PN.	US-PGPUB; USPAT	OR	OFF	2012/11/12 16:12
S14	2	("5905407").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/11/12 18:01
S15	36	("4152670"   "4446440"   "4523152"   "4600891"   "5329245"   "5352986"	US-PGPUB; USPAT;	OR	ON	2012/11/12 18:04



		"5543753").PN. OR ("5905407").URPN.	USOCR			
S16	4	("5905407"   "6838931"   "7116947").PN. OR ("7755431").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/12 18:27
S17	6	((("20090289720") or ("6300826") or ("6583664")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/11/12 19:09
S18	6	("7808323").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/11/12 19:11
S19	7	("20080074207"   "7449954"   "7679433"   "7755422").PN. OR ("7808323").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/12 19:11
S20	5	("20030146791"   "6437641"   "6621350"   "6975166"   "7091777").PN. OR ("8274328").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/12 19:43
S21	51	("2210028"   "5142240"   "5420536"   "5442317"   "5745526"   "5883927"   "5886575"   "5898342"   "5929702"   "6028486"   "6175372").PN. OR ("6437641").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/12 19:44
S22	229	"330"/\$.ccls. and (((step\$4 adj1 up) or boost\$3) with converter)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/13 09:33
S23	76	"330"/\$.ccls. and ((DC adj1 DC) adj1 convert\$4) same (envelop\$3 with (amplif\$4 or amplification))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/13 12:29
S24	2	("20090160555"   "20090215413").PN. OR ("8237499").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/13 13:33
S25	11	("20020153940"   "20040251968"   "20050057308"   "6437641"   "6492867"   "6566944"   "6831519"   "6985039"   "7193470"   "7405618"   "7420415").PN. OR ("7932780").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/13 13:46
S26	86	330/10,136,207A,251,297.ccls. and (envelop\$4 adj1 (amplif\$4 or amplification))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/13 20:22
S27	5	("20030146791"   "6437641"   "6621350"   "6975166"   "7091777").PN.	US-PGPUB; USPAT;	OR	ON	2012/11/13 20:32



		OR ("8274328").URPN.	USOCR			
S28	51	("2210028"   "5142240"   "5420536"   "5442317"   "5745526"   "5883927"   "5886575"   "5898342"   "5929702"   "6028486"   "6175372").PN. OR ("6437641").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/13 20:33
S29	60	("20020171477"   "20020186079"   "20030214355"   "20040174212"   "20050242875"   "3900823"   "4320350"   "4346349"   "5142240"   "5287069"   "5757229"   "5777519"   "5786727"   "5789984"   "5793253"   "5929702"   "6043707"   "6081161"   "6112062"   "6157253"   "6239656"   "6268768"   "6297696"   "6300826"   "6362685"   "6437641"   "6515541"   "6566944"   "6583664"   "6590451"   "6617920"   "6617929"   "6661284"   "6677819"   "6735419").PN. OR ("7440733").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/13 20:36
S30	4	("20090191826"   "20090289720"   "6583664"   "7808323").PN. OR ("8030995").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2012/11/13 20:51
S31	11	((("8030995") or ("5929776") or ("7932780") or ("2009027860") or ("5905407") or ("6838931") or ("20040208262") or ("7755431") or ("7808323") or ("20090191826") or ("7932780") or ("20110273235") or ("8237499") or ("8030995")).PN.	US-PGPUB; USPAT	OR	OFF	2012/11/17 17:41
S32	3	((("5414614") or ("6055168") or ("6198645")).PN.	US-PGPUB; USPAT	OR	OFF	2012/11/17 18:11
S33	163605	((Dongsu near1 Kim) or (Jinsung or Choi) or (Daehyun near1 Kang) or (Bumman near1 Kim)).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/17 18:14
S34	7	((Dongsu near1 Kim) or (Jinsung or Choi) or (Daehyun near1 Kang) or (Bumman near1 Kim)).in. and (envelope adj1 tracking)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/17 18:15
S35	11	Wideband with Envelope with Tracking with (Power adj1 Amplifier)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/17 18:16
S36	121	boost\$4 with (linear\$4 adj1 (amplif\$4 or amplification))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/11/17 18:20
S37	2	("6300826").PN.	US-PGPUB;	OR	OFF	2012/11/17



			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			18:55
S38	218	330/10,136,207A,251,297.ccls. and (boost\$4 with (voltage or power))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/25 18:48

**EAST Search History (Interference)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S39	99	330/10,136,207A,251,297.ccls. and (boost\$4 with (voltage or power)) same switch\$4	US-PGPUB; USPAT; UPAD	OR	ON	2013/04/26 09:34

5/ 3/ 2013 9:35:30 PM

C:\Users\knguyen7\Documents\EAST\Workspaces\13167659.wsp

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  13167659	<b>Applicant(s)/Patent Under Reexamination</b>  MATHE ET AL.
	<b>Examiner</b>  KHANH V NGUYEN	<b>Art Unit</b>  2817

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

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

CLAIM		DATE							
Final	Original	11/17/2012	05/03/2013						
	1	✓	✓						
	2	✓	✓						
	3	✓	=						
	4	○	=						
	5	○	=						
	6	✓	=						
	7	✓	=						
	8	✓	✓						
	9	✓	✓						
	10	✓	=						
	11	✓	=						
	12	✓	=						
	13	✓	=						
	14	✓	=						
	15	✓	=						
	16	✓	-						
	17	✓	=						
	18	○	=						
	19	✓	=						
	20	✓	-						
	21	✓	=						
	22	○	=						
	23	○	=						
	24	✓	=						
	25	✓	=						
	26	✓	=						

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appln. No.: 13/167,659

Applicant: Lennart K. Mathe et al.

Filed: June 23, 2011

Examiner: Khanh V. Nguyen

Art Unit: 2817

Customer No.: 23696

Confirm. No.: 8529

Docket No.: 101005

**Certificate of Transmission/Mailing**

I hereby certify that this correspondence is being transmitted to the USPTO, transmitted via the Office electronic filing system addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

July 20, 2013      /Sheryl Schoen/  
Date                      Sheryl Schoen

Mail Stop **AF**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**AMENDMENT AFTER FINAL**

Sir:

In response to the Office Action dated May 10, 2013, please amend the above-identified application as follows:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks/Arguments** begin on page 9 of this paper.



**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Canceled)
2. (Canceled)
3. (Previously Presented) The apparatus of claim 4, wherein the envelope amplifier is operative to generate the second supply voltage based on the boosted supply voltage if the envelope signal exceeds a first threshold, or if the first supply voltage is below a second threshold, or both.
4. (Previously Presented) An apparatus comprising:
  - a boost converter operative to receive a first supply voltage and generate a boosted supply voltage having a higher voltage than the first supply voltage; and
  - an envelope amplifier operative to receive an envelope signal and the boosted supply voltage and generate a second supply voltage based on the envelope signal and the boosted supply voltage, wherein the envelope amplifier is operative to further receive the first supply voltage and generate the second supply voltage based on the first supply voltage and generate the second supply voltage based on the first supply voltage or the boosted supply voltage, and further wherein the envelope amplifier comprises
    - an operational amplifier (op-amp) operative to receive the envelope signal and provide an amplified signal,
    - a driver operative to receive the amplified signal and provide a first control signal and a second control signal,
    - a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage, and

an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the second supply voltage, and a source coupled to circuit ground.

5. (Original) The apparatus of claim 4, wherein the envelope amplifier further comprises

a second PMOS transistor having a gate receiving a third control signal, a source receiving the boosted supply voltage, and a drain coupled to the source of the PMOS transistor, and

a third PMOS transistor having a gate receiving a fourth control signal, a source receiving the first supply voltage, and a drain coupled to the source of the PMOS transistor.

6. (Previously Presented) The apparatus of claim 4, further comprising:

a power amplifier operative to receive the second supply voltage from the envelope amplifier and to receive and amplify an input radio frequency (RF) signal and provide an output RF signal.

7. (Previously Presented) The apparatus of claim 4, wherein the first supply voltage is a battery voltage for the apparatus.

8. (Currently Amended) An integrated circuit comprising:

a boost converter operative to receive a first supply voltage and generate a boosted supply voltage having a higher voltage than the first supply voltage; and

an envelope amplifier operative to receive an envelope signal and the boosted supply voltage and generate a second supply voltage based on the envelope signal and the boosted supply voltage, wherein the envelope amplifier is operative to further receive the first supply voltage and generate the second supply voltage based on the first supply voltage ~~and generate the second supply voltage based on the first supply voltage~~ or the boosted supply voltage, and further

~~a boost converter operative to receive a first supply voltage and generate a boosted supply voltage having a higher voltage than the first supply voltage; and~~



~~an envelope amplifier operative to receive an envelope signal and the boosted supply voltage and generate a second supply voltage based on the envelope signal and the boosted supply voltage.~~

9. (Canceled)

10. (Previously Presented) An apparatus for wireless communication, comprising:

a power amplifier operative to receive and amplify an input radio frequency (RF) signal and provide an output RF signal; and

a supply generator operative to receive an envelope signal and a first supply voltage, to generate a boosted supply voltage having a higher voltage than the first supply voltage, and to generate a second supply voltage for the power amplifier based on the envelope signal and the boosted supply voltage, wherein the supply generator incorporates an operational amplifier (op-amp) operative to receive the envelope signal and provide an amplified signal, a driver operative to receive the amplified signal and provide a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving a first control signal, a source receiving the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage, and an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the second supply voltage, and a source coupled to circuit ground.

11. (Original) The apparatus of claim 10, wherein the supply generator is operative to generate the second supply voltage based on the envelope signal and either the boosted supply voltage or the first supply voltage.

12. (Previously Presented) A method of generating supply voltages, comprising:

generating a boosted supply voltage based on a first supply voltage, the boosted supply voltage having a higher voltage than the first supply voltage; and

generating a second supply voltage based on an envelope signal and the boosted supply voltage, wherein the second supply voltage is generated by an envelope amplifier that produces the second supply voltage using an operational amplifier (op-amp) that receives the envelope



signal and provides an amplified signal, a driver that receives the amplified signal and provides a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor that receives the first control signal, a source that receives the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage and an N-channel metal oxide semiconductor (NMOS) transistor that receives the second control signal at a gate and provides a second supply voltage through a drain, and a source for circuit grounding.

13. (Original) The method of claim 12, wherein the generating the second supply voltage comprises generating the second supply voltage based on the envelope signal and either the boosted supply voltage or the first supply voltage.

14. (Currently Amended) An apparatus for generating supply voltages, comprising:  
means for generating a boosted supply voltage based on a first supply voltage, the boosted supply voltage having a higher voltage than the first supply voltage; and

means for generating a second supply voltage based on the envelope signal and the boosted supply voltage[ ], wherein the means for generating the second supply voltage incorporates an envelope amplifier that produces the second supply voltage using an operational amplifier (op-amp) that receives the envelope signal and provides an amplified signal, a driver that receives the amplified signal and provides a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor that receives the first control signal, a source that receives the boosted supply voltage or the first supply voltage, and a drain providing the second supply voltage and an N-channel metal oxide semiconductor (NMOS) transistor that receives the second control signal at a gate and provides a second supply voltage through a drain, and a source for circuit grounding[.].

15. (Original) The apparatus of claim 14, wherein the means for generating the second supply voltage comprises means for generating the second supply voltage based on an envelope signal and either the boosted supply voltage or the first supply voltage.

16. (Canceled)

17. (Previously Presented) The apparatus of claim 18, further comprising:  
a boost converter operative to receive the first supply voltage and provide a boosted supply voltage having a higher voltage than the first supply voltage, wherein the envelope amplifier operates based on the first supply voltage or the boosted supply voltage.
18. (Previously Presented) An apparatus comprising:  
a switcher operative to receive a first supply voltage and provide a first supply current;  
an envelope amplifier operative to receive an envelope signal and provide a second supply current based on the envelope signal; and  
a power amplifier operative to receive an envelope signal and provide a second supply current based on the envelope signal; and  
a power amplifier operative to receive a total supply current comprising the first supply current and the second supply current, wherein the switcher comprises  
a current sense amplifier operative to sense the first supply current, or the second supply current, or the total supply current and provide a sensed signal,  
a driver operative to receive the sensed signal and provide a first control signal and a second control signal,  
a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving the first supply voltage, and a drain providing a switching signal for an inductor providing the first supply current, and  
an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the switching signal, and a source coupled to circuit ground.
19. (Previously Presented) The apparatus of claim 18, wherein the first supply current comprises direct current (DC) and low frequency components, and wherein the second supply current comprises higher frequency components.
20. (Canceled)



21. (Previously Presented) The apparatus of claim 22, wherein the switcher operates based on a first supply voltage, and wherein the offset is determined based on the first supply voltage.
22. (Previously Presented) An apparatus comprising:  
an inductor operative to receive a switching signal and provide a supply current; and  
a switcher operative to sense an input current and generate the switching signal to charge and discharge the inductor to provide the supply current, the switcher adding an offset to the input current to generate a larger supply current via the inductor than without the offset, wherein the switcher comprises  
a summer operative to sum the input current and an offset current and provide a summed current,  
a current sense amplifier operative to receive the summed current and provide a sensed signal, and  
a driver operative to receive the sensed signal and provide at least one control signal used to generate the switching signal for the inductor.
23. (Original) The apparatus of claim 22, wherein the at least one control signal comprises a first control signal and a second control signal, and wherein the switcher further comprises  
a P-channel metal oxide semiconductor (PMOS) transistor having a gate receiving the first control signal, a source receiving a first supply voltage, and a drain providing the switching signal, and  
an N-channel metal oxide semiconductor (NMOS) transistor having a gate receiving the second control signal, a drain providing the switching signal, and a source coupled to circuit ground.
24. (Previously Presented) The apparatus of claim 22, further comprising:  
an envelope amplifier operative to receive an envelope signal and provide a second supply current based on the envelope signal, wherein a total supply current comprises the supply current from the switcher and the second supply current from the envelope amplifier.



25. (Original) The apparatus of claim 24, further comprising:  
a boost converter operative to receive the first supply voltage and provide a boosted supply voltage having a higher voltage than the first supply voltage, wherein the envelope amplifier operates based on the first supply voltage or the boosted supply voltage.
26. (Previously Presented) The apparatus of claim 22, further comprising:  
a power amplifier operative to receive the supply current from the inductor and to receive and amplify an input radio frequency (RF) signal and provide an output RF signal.

## REMARKS/ARGUMENTS

The above identified patent application has been amended and reconsideration and reexamination are hereby requested.

Claims 3-8, 10-15, 17-19, and 21-26 are now pending in the application. Claims 1, 2, 16, and 20 have been previously canceled. Claim 8 and 14 have been amended. Claim 9 has been canceled. No new matter has been added, as the claim amendments and new claims have support in the application as originally filed.

### *Claim Objections*

The Examiner has objected to claim 8 because of an informality. The Applicant has amended claim 8. In view of the above amendments, the Applicant respectfully requests that the above objection be withdrawn.

### *Claim Rejections - 35 U.S.C. § 112(b)*

Claims 8 and 9 were objected under 35 U.S.C. § 112(b), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. According to the Office Action, newly amended 8 disclosed similar claimed subject matters; claim 9 should be canceled since the claimed subject matters are already disclosed in amended claim 8.

The Applicant has amended claim 8 and submits that claim 8 particularly points out and distinctly claims the subject matter which the Applicant regards as the invention. Claim 9 has been cancelled.

### *Claim Objections/Allowable Subject Matter*

The Applicant thanks the Examiner for allowing claims 3-8, 10-15, 17-19, and 21-26.

Application No.: 13/167,659  
Amendment dated July 10, 2013  
Reply to Office Action of May 10, 2013

Docket No.: 101005  
Customer No.: 23696

10

**CONCLUSION**

In light of the amendments contained herein, the Applicant submits that the application is in condition for allowance, for which early action is requested.

Please charge any fees or overpayments that may be due with this response to Deposit Account No. 17-0026.

Respectfully submitted,

Dated: 2013-07-10

By: /William Marcus Hooks/  
William M. Hooks  
Reg. No. 48,857

QUALCOMM Incorporated  
Attn: Patent Department  
5775 Morehouse Drive  
San Diego, California 92121-1714  
Telephone: (858) 658-4351  
Facsimile: (858) 658-3984



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	16282420
<b>Application Number:</b>	13167659
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	8529
<b>Title of Invention:</b>	LOW-VOLTAGE POWER-EFFICIENT ENVELOPE TRACKER
<b>First Named Inventor/Applicant Name:</b>	Lennart K. Mathe
<b>Customer Number:</b>	23696
<b>Filer:</b>	William M. Hooks/Sheryl Schoen
<b>Filer Authorized By:</b>	William M. Hooks
<b>Attorney Docket Number:</b>	101005
<b>Receipt Date:</b>	10-JUL-2013
<b>Filing Date:</b>	23-JUN-2011
<b>Time Stamp:</b>	19:38:55
<b>Application Type:</b>	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	Response After Final Action	101005_2013-07-10_AMENDM ENT_AF.pdf	109191 <small>0c83c82114221ef8640d13098d2f5090f3746cc2</small>	no	10

### Warnings:

### Information:

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.

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.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/167,659</b>	Filing Date <b>06/23/2011</b>	<input type="checkbox"/> To be Mailed
---	---	----------------------------------	---------------------------------------

ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 = *	*	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 = *	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>				
<small>* If the difference in column 1 is less than zero, enter "0" in column 2.</small>			TOTAL	

**APPLICATION AS AMENDED – PART II**

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>	<b>07/10/2013</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	* 21	Minus	** 26	= 0	X \$80 = 0
	Independent <small>(37 CFR 1.16(h))</small>	* 7	Minus	*** 7	= 0	X \$420 = 0
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small> <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					
					TOTAL ADD'L FEE	<b>0</b>

	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	X \$ =
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small> <input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>					
					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  
/CHRISTINE MOLLISH/

This collection of information is required by 37 CFR 1.16. 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, 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.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*





## 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.
13/167,659	06/23/2011	Lennart K. Mathe	101005	8529
23696	7590	07/26/2013	EXAMINER	
QUALCOMM INCORPORATED			NGUYEN, KHANH V	
5775 MOREHOUSE DR.			ART UNIT	PAPER NUMBER
SAN DIEGO, CA 92121			2817	
			NOTIFICATION DATE	DELIVERY MODE
			07/26/2013	ELECTRONIC

**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.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

us-docketing@qualcomm.com

<b>Office Action Summary</b>	<b>Application No.</b> 13/167,659	<b>Applicant(s)</b> MATHE ET AL.	
	<b>Examiner</b> KHANH V. NGUYEN	<b>Art Unit</b> 2817	<b>AIA (First Inventor to File) Status</b> 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 10 July 2013.  
 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) 3-8, 10-15, 17-19 and 21-26 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) 3-7, 10-15, 17-19 and 21-26 is/are allowed.
- 7)  Claim(s) 8 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](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto: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/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.