

## DECLARATION OF GERARD P. GRENIER

I, Gerard P. Grenier, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

1. I am Senior Director of Publishing Technologies of The Institute of Electrical and Electronics Engineers, Incorporated (“IEEE”).
2. IEEE is a neutral third party in this dispute.
3. Neither I nor IEEE itself is being compensated for this declaration.
4. Among my responsibilities as Senior Director of Publishing Technologies, I act as a custodian of certain records for IEEE.
5. I make this declaration based on my personal knowledge and information contained in the business records of IEEE.
6. As part of its ordinary course of business IEEE publishes and makes available technical articles and standards. These publications are made available for public download through the IEEE digital library, IEEE Xplore.
7. It is the regular practice of IEEE to publish articles and other writings including article abstracts and make them available to the public through IEEE Xplore. IEEE maintains copies of publications in the ordinary course of its regularly conducted activities.
8. The article below has been attached as Exhibits A to this declaration:

A.	J. Choi, et al. “Envelope Tracking Power Amplifier Robust to Battery Depletion” 2010 IEEE MTT-S International Microwave Symposium Digest, May 23 – 28, 2010.
----	--

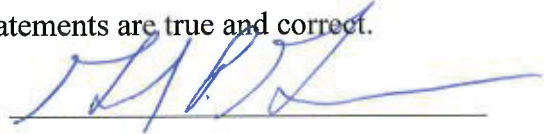
9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE’s business. Exhibit A is a true and correct copy of the Exhibit as it existed on or about March 22, 2018.
10. The article abstract from IEEE Xplore shows the date of publication. IEEE Xplore populates this information using the metadata associated with the publication
11. J. Choi, et al. “Envelope Tracking Power Amplifier Robust to Battery Depletion” was published as part of the 2010 IEEE MTT-S International Microwave Symposium.

The 2010 IEEE MTT-S International Microwave Symposium was held from May 23 – 28, 2010. Copies of the conference proceedings were made available no later than the last day of the conference. The article is currently available for public download from the IEEE digital library, IEEE Xplore.

12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on: 22-March-2018



# EXHIBIT A

Institutional Sign In

Browse

My Settings

Get Help

Subscribe

Advertisement

Browse Conferences > Microwave Symposium Digest (M...

# Envelope tracking power amplifier robust to battery depletion

Sign In or Purchase  
to View Full Text

9  
Paper  
Citations

3  
Patent  
Citations

665  
Full  
Text Views

### Related Articles

Augmentation of grasp robustness using intrinsic tactile sensing

Energy-efficient pipelines

View All

6  
Author(s)

Jinsung Choi ; Dongsu Kim ; Daehyun Kang ; Jungmin Park ; Boshi Jin ; Bumman Kim

View All Authors

Abstract

Authors

Figures

References

Citations

Keywords

Metrics

Media

**Abstract:**

A wideband envelope tracking power amplifier, which is robust to battery depletion, is introduced. An integrated boost converter keeps a stable operation of the PA supply modulator. Even at the battery depletion from 4.2V to 2.8V, there is no significant degradation of output power and linearity in the power amplifier. Moreover, the efficiency degradation by the additional regulator is minimized for the novel supply modulator architecture proposed in this work. The fabricated 2.535GHz envelope tracking power amplifier presents max/min power-added efficiencies of 32.3/26.2% for 10MHz BW 3GPP LTE standard along the battery voltage from 4.2V to 2.8V.

**Published in:** Microwave Symposium Digest (MTT), 2010 IEEE MTT-S International

**Date of Conference:** 23-28 May 2010

**INSPEC Accession Number:** 11452890

**Date Added to IEEE Xplore:** 23 July 2010

**DOI:** 10.1109/MWSYM.2010.5517825

**ISBN Information:**

**Publisher:** IEEE

**ISSN Information:**

**Conference Location:** Anaheim, CA, USA

 **Contents**

Download PDF

Download Citation

View References

Email

Print

Request Permissions

Export to Collabratec

Alerts

**I. Introduction**

As the wireless communication systems evolve, the peak-to-average power ratio (PAPR) of the signal increases. For 2G and 3G systems such as CDMA, EDGE, and WCDMA, the PAPRs of the signals are around 3.5dB as depicted in Fig. 1. For the next generation communication systems such as 3GPP LTE and Mobile-WiMAX, however, an orthogonal frequency-division multiplexing (OFDM) is employed for a wideband communication, which results in higher PAPR around 8-10dB. In the case, an efficiency of a radio frequency (RF) power amplifier (PA) is so low that the efficiency improvement technique is required. The envelope tracking (ET) technique is one of the best way achieving a high efficiency. Because the supply of the RF PA is modulated according to the instantaneously transmitted power level, the power dissipated as a heat is minimized. Ideally, it is the optimum PA architecture with assumption of high efficiency supply modulator. In [1], the low drop-out (LDO) regulator is employed as a supply modulator. It operates over a wide bandwidth, but efficiency of the LDO is not high enough for high PAPR signals. The switching mode power supply such as a buck converter shows a high efficiency, but the switching frequency is limited by the switching loss so that wide bandwidth capability can not be fulfilled [2].

**Read document**

Authors



References



Citations



Keywords



Related Articles



Disclaimer



Full Text

Authors

References

Citations

Keywords

Related Articles

Back to Top

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.