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AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
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KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
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TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
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[Continued on next page]

- (54) **Title:** APPARATUS AND METHODS FOR ENVELOPE TRACKING

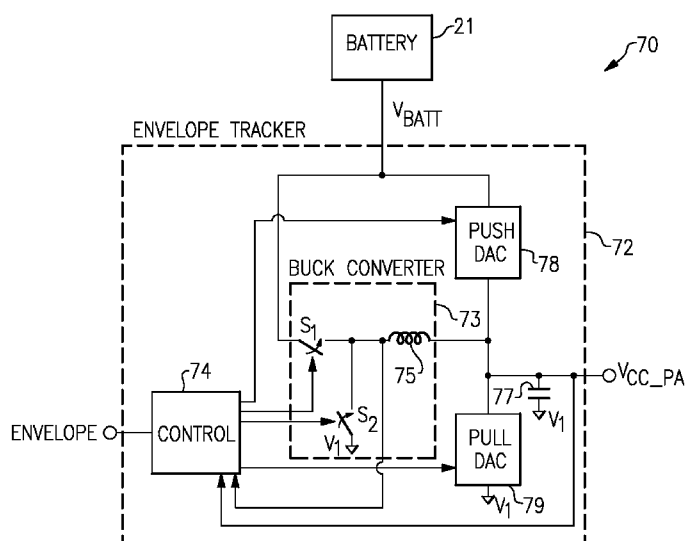


FIG.6

- (57) **Abstract:** Apparatus and methods for envel-
ope tracking are disclosed. In one embodiment, a
power amplifier system including a power amplifi-
er (32) and an envelope tracker (30) is provided.
The power amplifier is configured to amplify a ra-
dio frequency (RF) signal, and the envelope track-
er is configured to control a supply voltage of the
power amplifier using an envelope of the RF sig-
nal. The envelope tracker includes a buck convert-
er (73) for generating a buck voltage from a bat-
tery voltage and a digital-to-analog conversion
(DAC) module (78, 79) for adjusting the buck
voltage based on the envelope of the RF signal to
generate the supply voltage for the power ampli-
fier.



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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INTERNATIONAL SEARCH REPORT

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PCT/US2012/034820**A. CLASSIFICATION OF SUBJECT MATTER****H03F 1/30(2006.01)i, H03F 1/32(2006.01)i, H03F 3/20(2006.01)i**

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 1/30; G05F 5/00; H04B 1/04; H03F 3/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords:power amplifier, envelope tracker, DAC, buck converter

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6914487 B1 (JAMES T. DOYLE et al.) 05 July 2005	1, 13
A	See abstract, column 8, lines 8 - column 9, lines 30; claims 1, 24 and figures 2, 5.	2-12, 14-20
A	F.W. A Monolithic High-Efficiency 2.4-GHz 20-dBm SiGe BiCMOS Envelope-Tracking OFDM Power Amplifier, IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 42, NO. 6, JUNE 2007. pp, 1271-1281 See abstract, figures 1, 2 and corresponding detailed description.	1-20
A	US 2008-0278136 A1 (MURTOJARVI SIMO) 13 November 2008 See abstract, paragraphs [0027], [0041], [0050]; claims 1-2, 8, 41-42, 47-48 and figure 1.	1-20
A	US 2009-0088096 A1 (SUN KAE-OH et al.) 02 April 2009 See abstract, claims 1, 6, 9 and figure 3.	1-20
A	US 7782141 B2 (WITMER STEVEN B. et al.) 24 August 2010 See abstract, column 5, lines 16-40; claims 1, 4 and figure 1.	1-20

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6914487 B1	05.07.2005	None	
US 2008-0278136 A1	13.11.2008	CA 2684917 A1 CN 101689806 A EP 2145382 A1 FI 20075322 D0 US 8089253 B2 WO 2008-135637 A1	13.11.2008 31.03.2010 20.01.2010 07.05.2007 03.01.2012 13.11.2008
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US 7782141 B2	24.08.2010	US 2010-0164630 A1	01.07.2010