

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference Z16121454PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/CN2016/112125	International filing date (<i>day/month/year</i>) 26 December 2016	(Earliest) Priority Date (<i>day/month/year</i>)
Applicant Texas Instruments Incorporated et al.		

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.

This international search report consists of a total of 4 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out 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)).

b. This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. **Certain claims were found unsearchable** (see Box No. II).

3. **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

METHODS AND APPARATUS FOR NEGATIVE OUTPUT VOLTAGE ACTIVE CLAMPING USING FLOATING BANDGAP REFERENCE AND TEMPERATURE COMPENSATION

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

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.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 12

as suggested by the applicant.

as selected by this Authority, because the applicant failed to suggest a figure.

as selected by this Authority, because this figure better characterizes the invention.

b. none of the figures is to be published with the abstract.

Box No. IV **Text of the abstract (Continuation of item 5 of the first sheet)**

Methods, apparatus, systems and articles of manufacture for negative output voltage active clamping using a floating bandgap reference and temperature compensation are disclosed. An example load switch (1200) includes a floating bandgap reference circuit (1230) to generate a bandgap reference voltage (1231). A resistor divider (1250) is to generate a resistor divider voltage. A temperature compensator (1240) to apply a temperature compensation current (1241) to the resistor divider to create a temperature compensated resistor divider voltage. A power transistor (1265) is to be enabled when the temperature compensated resistor divider voltage is less than the bandgap reference voltage (1231). The example load switch (1200) can work under negative output voltage clamping and get better accuracy drain to source clamped voltage of power transistor (1265) for inductive load condition.

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International application No.

PCT/CN2016/112125

A. CLASSIFICATION OF SUBJECT MATTER G05F 1/567(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) G05F; H02M 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) WPI, EPODOC, CNKI, CNPAT, IEEE, GOOGLE: switch, transistor, bandgap, reference, resistor, divider, temperature, compensate, breakdown		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 101330252 A (VASTVIEW TECHNOLOGY INC.) 24 December 2008 (2008-12-24) description, pages 8-9 and figure 3	1-14
A	CN 104010424 A (UNIV. ELECTRONIC SCI. & TECHNOLOGY) 27 August 2014 (2014-08-27) the whole document	1-14
A	CN 104375554 A (WUXI WST. MICROELECTRONICS CO., LTD.) 25 February 2015 (2015-02-25) the whole document	1-14
A	CN 102290995 A (UNIV. XIDIAN) 21 December 2011 (2011-12-21) the whole document	1-14
A	CN 101453270 A (WUXI JIANGNAN COMPUTING TECHNOLOGY INST.) 10 June 2009 (2009-06-10) the whole document	1-14
A	US 2006007616 A1 (MICRON TECHNOLOGY, INC.) 12 January 2006 (2006-01-12) the whole document	1-14
<input 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 "&" document member of the same patent family		
Date of the actual completion of the international search 21 September 2017		Date of mailing of the international search report 28 September 2017
Name and mailing address of the ISA/CN STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088 China Facsimile No. (86-10)62019451		Authorized officer WANG,Xiaoxi Telephone No. (86-10)61648441

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2016/112125

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	101330252	A	24 December 2008	CN 101330252 B	09 June 2010
CN	104010424	A	27 August 2014	CN 104010424 B	27 April 2016
CN	104375554	A	25 February 2015	CN 104375554 B	25 November 2015
CN	102290995	A	21 December 2011	CN 102290995 B	25 September 2013
CN	101453270	A	10 June 2009	CN 101453270 B	24 April 2013
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				US 7148742 B2	12 December 2006
				JP 4784841 B2	05 October 2011
				EP 1766629 B1	15 April 2015
				KR 101157691 B1	21 June 2012
				JP 2008506196 A	28 February 2008
				WO 2006036255 A1	06 April 2006
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				US 2007057716 A1	15 March 2007
				US 7332946 B2	19 February 2008
				EP 1766629 A2	28 March 2007
				SG 128877 A1	26 February 2007
				SG 128877 B	31 December 2007