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(54) Title: ISOLATED SWITCH-MODE DC/DC CONVERTER WITH SINE WAVE TRANSFORMER VOLTAGES

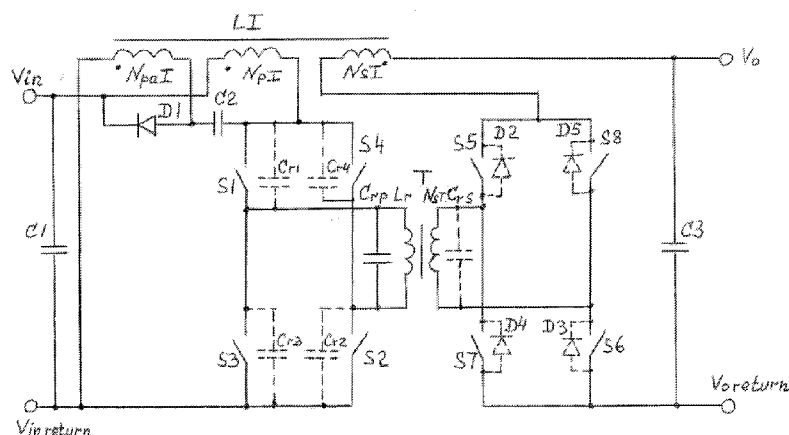


Fig. 1

(57) Abstract: A converter includes a transformer including a primary winding and a secondary winding, a primary-side circuit connected to first and second input terminals and to the primary winding and including a switching circuit connected to the primary winding and a parallel resonant tank circuit including the primary winding and a resonant capacitor connected in parallel with the primary winding, a secondary-side circuit connected to the secondary winding and to first and second output terminals and including a rectifier circuit connected to the secondary winding, and an inductor including a primary inductor winding connected to the first input terminal and the primary winding and a secondary inductor winding connected to the secondary winding and the first output terminal.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/054109**A. CLASSIFICATION OF SUBJECT MATTER*****H02M 3/28(2006.01)i, H02M 1/42(2007.01)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)

H02M 3/28; H02M 3/335; H01F; H02M 7/12

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: converter, resonant, switch, efficiency, inductor winding, capacitor, clamp circuit

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6587356 B2 (LIZHI ZHU et al.) 01 July 2003 See column 5, line 53-column 7, line 60, claims 1-2, and figures 1-8.	1-21
A	JP 2001-157447 A (KIMIGAFUCHI GAKUEN) 08 June 2001 See abstract, paragraphs [0024]-[0037], and figures 1, 4-6.	1-21
A	JP 2005-318707 A (SOC CORP.) 10 November 2005 See abstract, paragraphs [0001]-[0005], and figures 1-3.	1-21
A	WO 02-45101 A2 (PRIMARION, INC.) 06 June 2002 See page 11, line 12-page 16, line 34, and figures 3-9.	1-21
A	US 4262328 A (GORDON E. BLOOM et al.) 14 April 1981 See column 2, line 33-column 3, line 28, claims 1-2, and figures 1-4.	1-21

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

* Special categories of cited documents:

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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 6587356 B2	01.07.2003	US 2002-159280 A1	31.10.2002
JP 2001-157447 A	08.06.2001	JP 3219249 B2	15.10.2001
JP 2005-318707 A	10.11.2005	None	
WO 02-45101 A2	06.06.2002	AU 2002-239239 A8	11.06.2002
		AU 2002-39239 A1	11.06.2002
		TW 535175 B	01.06.2003
		WO 02-45101 A3	01.08.2002
		WO 02-45101 A3	06.06.2002
US 4262328 A	14.04.1981	US 4355352 A	19.10.1982