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(54) Title: TECHNIQUES FOR PHASE DETECTION

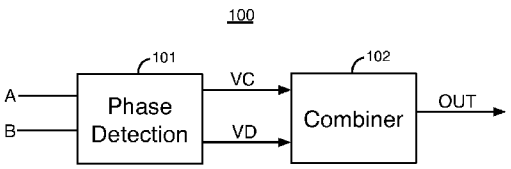

FIG. 1

(57) Abstract: A phase detection circuit can include two phase detectors that each generate a non-zero output in response to input signals being aligned in phase. The input signals are based on two periodic signals. The phase detection circuit subtracts the output signal of one phase detector from the output signal of the other phase detector to generate a signal having a zero value when the periodic signals are in phase. Alternatively, a phase detector generates a phase comparison signal indicative of a phase difference between periodic signals. The phase comparison signal has a non-zero value in response to input signals to the phase detector being aligned in phase. The input signals are based on the periodic signals. An output circuit receives the phase comparison signal and generates an output having a zero value in response to the periodic signals being aligned in phase.

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INTERNATIONAL SEARCH REPORT

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PCT/US2010/054900

A. CLASSIFICATION OF SUBJECT MATTER

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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)

H03L 7/087; H03D 3/24; H03L 7/06

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: phase, align, zero, output

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2008-0265957 A1 (LUONG TRONG V. et al.) 30 October 2008 See abstract; Fig 2; [0022]-[0030]	1-46
A	US 6993109 B2 (Lee et al.) 31 January 2006 See abstract; Fig 4; column 1, line 53-column 2, line 30	1-46
A	US 7298191 B2 (Wu et al.) 20 November 2007 See abstract; Fig 2; column 3, line 17-line 57	1-46

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008-0265957 A1	30.10.2008	None	
US 6993109 B2	31.01.2006	CN 1415137 A0	30.04.2003
		EP 1238461 A1	11.09.2002
		JP 2003-514479 A	15.04.2003
		JP 2003-514479 T	15.04.2003
		KR 10-0380968 B1	21.04.2003
		US 2003-0169086 A1	11.09.2003
		US 6731667 B1	04.05.2004
		WO 01-37428 A1	25.05.2001
US 7298191 B2	20.11.2007	DE 10394282 T5	03.08.2006
		US 2006-0132205 A1	22.06.2006
		WO 2005-027349 A1	24.03.2005