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(54) **Title:** TECHNIQUES FOR GENERATING FRACTIONAL CLOCK SIGNALS

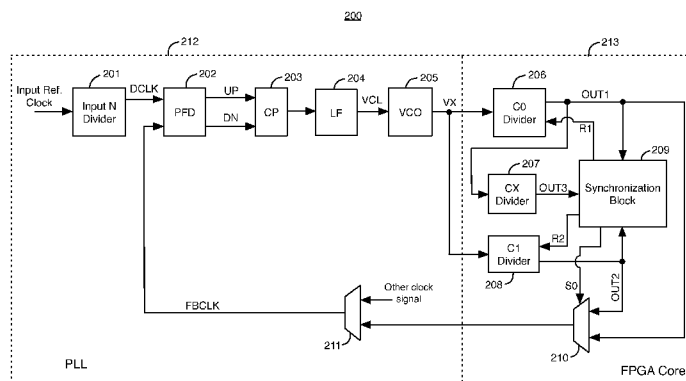


FIG. 2

(57) **Abstract:** A circuit includes phase detection circuitry, a clock signal generation circuit, a first frequency divider, and a second frequency divider. The phase detection circuitry compares an input clock signal to a feedback signal to generate a control signal. The clock signal generation circuit generates a periodic output signal in response to the control signal. The first frequency divider divides a frequency of the periodic output signal by a first value to generate a first frequency divided signal. The second frequency divider divides the frequency of the periodic output signal by a second value to generate a second frequency divided signal. The first and the second frequency divided signals are routed to the phase detection circuitry as the feedback signal during different time intervals.

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INTERNATIONAL SEARCH REPORT

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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 7/193; H03D 3/24; H03L 7/00; H03L 7/16; H03M 3/02

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

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

eKOMPASS(KIPO internal) & Keywords: pll, divider, feedback, time, interval and the similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7405629 B2 (LI SHULIANG) 29 July 2008 See abstract; Figs 1-2; column 4, line 58-column 6, line 49	1-22
A	US 2008-0008284 A1 (Huang et al.) 10 January 2008 See abstract; Fig 3; [0019]-[0020]	1-22
A	US 7205848 B2 (Cordos et al.) 17 April 2007 See abstract; Fig 2; column 2, line 36-column 3, line 27	1-22
A	US 6914490 B2 (EYAL FAYNEH et al.) 05 July 2005 See abstract; Fig 1; column 2, line 16-column 3, line 39	1-22

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

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INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7405629 B2	29.07.2008	US 2007-0001776 A1 WO 2007-005360 A1	04.01.2007 11.01.2007
US 2008-0008284 A1	10.01.2008	CN 101106375 A CN 101106375 C0 TW 200805894 A	16.01.2008 16.01.2008 16.01.2008
US 7205848 B2	17.04.2007	US 2005-0156674 A1	21.07.2005
US 6914490 B2	05.07.2005	US 2004-0251970 A1	16.12.2004