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(71) Applicant *(for all designated States except US)*: **ALTERA CORPORATION** [US/US]; 101 Innovation Drive, San Jose, California 95134 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **SHUMARAYEV, Sergey** [US/US]; 12501 Corbetta Lane, Los Altos Hills, California 94022 (US). **WONG, Wilson** [US/US]; 21 Talbert Court, San Francisco, California 94134 (US).

(74) Agents: **JACKSON, Robert R.** et al.; ROPES & GRAY LLP, 1211 Avenue of the Americas, New York, NY 10036 (US).

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(54) Title: AUTOMATIC CALIBRATION IN HIGH-SPEED SERIAL INTERFACE RECEIVER CIRCUITRY

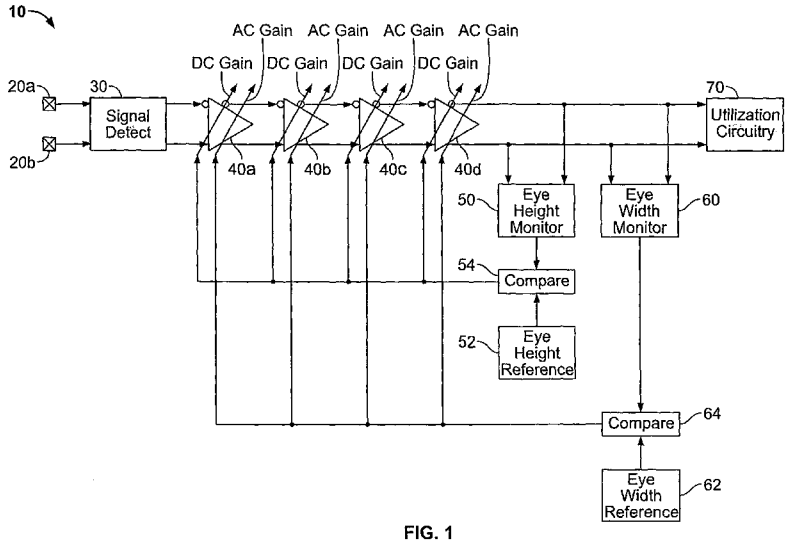

FIG. 1

(57) Abstract: Circuitry for receiving a serial data signal (e.g., a high-speed serial data signal) includes adjustable equalizer circuitry for producing an equalized version of the serial data signal. The equalizer circuitry may include controllably variable DC gain and controllably variable AC gain. The circuitry may further include eye height and eye width monitor circuitry for respectively producing first and second output signals indicative of the height and width of the eye of the equalized version. The first output signal may be used in control of the DC gain of the equalizer circuitry, and the second output signal may be used in control of the AC gain of the equalizer circuitry.

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INTERNATIONAL SEARCH REPORT

International application No.
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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)

IPC: H04L

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 since 1975

Japanese Utility Models and applications for Utility Models since 1975

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

eKOMPASS(KIPO internal) & keywords: equalizer, adjust, modify, change, control, gain, monitor, resistor, capacitance

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007-0026829 A1 (JE-KOOK KIM et al.) 01 February 2007 See abstract; pages 3-4; fig. 2	1-33
A	US 2006-0045176 A1 (RAED MOUGHABGHAB et al.) 02 October 2008 See abstract; page 1; fig. 2	1-33
A	US 2008-0240218 A1 (SUMESAGLAM TANER) 25 May 1993 See abstract; page 2; fig. 4	1-33

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

☒ See patent family annex.

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Authorized officer

Choi, Jin Ho

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-0026829 A1	01.02.2007	JP 2007-037152 A	08.02.2007
		KR 20070013880 A	31.01.2007
		KR 20070013880 A	31.01.2007
		KR 10-0790967 B1	02.01.2008
		TW 200705800 A	01.02.2007
US 2006-045176 A1	02.03.2006	US 07400675 B2	15.07.2008
US 2008-240218 A1	02.10.2008	US 2008-240218 A1	02.10.2008