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(54) Title: POWER-UP BASED INTEGRATED CIRCUIT CONFIGURATION

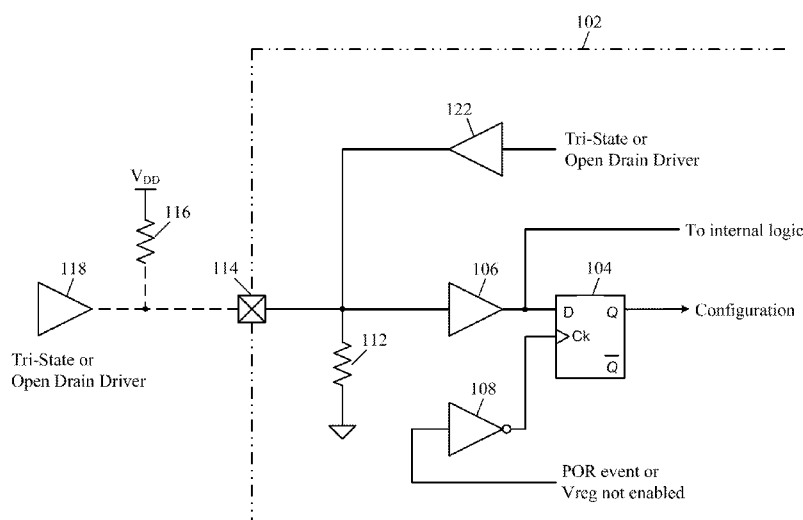


Figure 1

(57) Abstract: An integrated circuit (102) having a plurality of selectable modes, functions and/or characteristics may be configured at the time of product manufacture by providing an appropriate resistance value pull-up resistor (116) at an external pin connection (114) of the integrated circuit package. At least one external connection (114) may be used for such configuration of the integrated circuit. This is done without having to program the integrated circuit before placing on the product printed circuit board. The same integrated circuit may thus be used for a plurality of different products without requiring any pre-programming thereof. The integrated circuit's personality or desired characteristics will be programmed automatically as soon as power is first applied to the finished product printed circuit board. Once the integrated circuit has been configured at power up, the external at least one connection (114), initially used for configuration, can be used for either analog or digital input, output or input/output.

SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/027263

A. CLASSIFICATION OF SUBJECT MATTER
INV. H03K19/0185 H03K19/173
ADD.

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)
H03K

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 477 166 A (MATTHEWS WALLACE E [US]) 19 December 1995 (1995-12-19) column 1, lines 58-67 column 3, lines 21-24,60-67; figure 2 column 4, lines 5-12 figure 3 column 5, lines 1,2,15-20,41-64; figures 4,5 column 6, lines 6-9,31-35,55-66 column 6, lines 20-24; figure 6 -----	1-16,32
X	US 5 608 341 A (ANDERSSON RALPH E [US]) 4 March 1997 (1997-03-04) column 4, lines 6-19,33-54; figures 2-4 column 6, line 42 - column 7, line 25; figures 8,9 ----- -/--	1-16,32



Further documents are listed in the continuation of Box C.



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

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/027263

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-16(completely); 32(partially)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-16(completely); 32(partially)

The first subject (Claims 1-16 and 32, as far as claim 32 depends on one of claims 1-14) relates to an integrated circuit configured during power-up to be in a first or a second operating mode depending upon whether an external pull-up resistor is or is not coupled between a power supply voltage and one of the external connections.

2. claims: 17-31(completely); 32(partially)

The second subject (Claims 17-32, as far as claim 32 depends on one of claims 17-29) relates to an integrated circuit having a plurality of voltage comparators having first inputs coupled to one external connection and configured during power-up to be in one of a plurality of operating modes depending upon a resistance value of an external pull-up resistor coupled between a power supply voltage and the external connection.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2017/027263

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7 733 119 B1 (KAMATH GAUTHAM DEVENDRA [US]) 8 June 2010 (2010-06-08)	1-10, 12-16
A	column 1, lines 19-25 column 2, lines 46-58; figures 2,3 column 3, lines 10-15 column 3, lines 49-55; figure 4A -----	11
A	EP 0 651 513 A1 (SGS THOMSON MICROELECTRONICS [IT]) 3 May 1995 (1995-05-03) column 2, line 52 - column 3, line 31; figures 3,4 column 4, lines 16-25 -----	1-16,32

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/027263

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5477166	A	19-12-1995	US 5477166 A 19-12-1995
		US 5617040 A	01-04-1997

US 5608341	A	04-03-1997	NONE

US 7733119	B1	08-06-2010	US 7733119 B1 08-06-2010
		US 8058895 B1	15-11-2011

EP 0651513	A1	03-05-1995	DE 69312939 D1 11-09-1997
			DE 69312939 T2 02-01-1998
			EP 0651513 A1 03-05-1995
			JP H07183791 A 21-07-1995
			US 5557236 A 17-09-1996
