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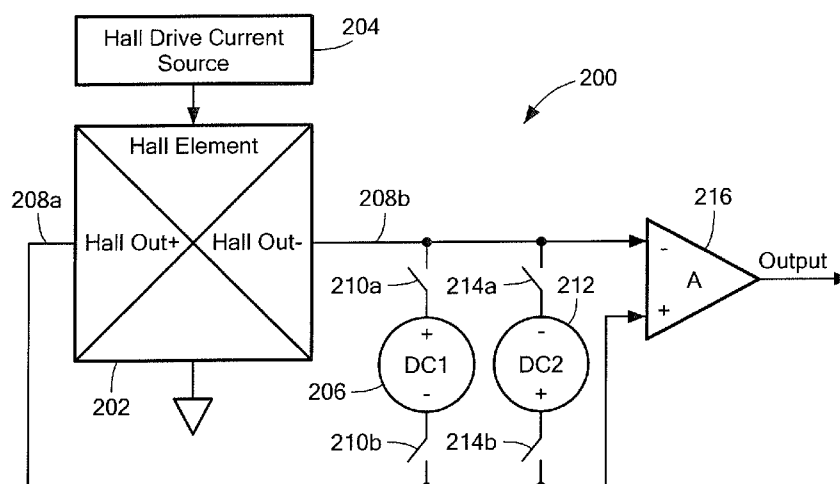
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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
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SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHODS AND APPARATUS FOR SENSOR DIAGNOSTICS

**FIG. 2**

(57) Abstract: Methods and apparatus to provide an integrated circuit having a magnetic sensing element having differential first and second outputs and an input, the input to receive current and first and second switches coupled to a respective one of the differential first and second outputs. A first voltage source is coupled between the first and second switches, the first and second switches having a first state in which the first voltage source is coupled across the differential first and second outputs, and an IC output can output a voltage corresponding to the first voltage source when the first and second switches are in the first state for monitoring operation of a signal path from the magnetic sensing element to the IC output.

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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A. CLASSIFICATION OF SUBJECT MATTER INV. G01R33/09 G01R31/28 G01R31/3187 G01R33/00 G01R33/02 G01R33/07 G01R35/00 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) G01R 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 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category*</th> <th style="width: 70%;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width: 20%;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td>WO 2012/164915 A2 (TOKAI RIKA CO LTD [JP]; MELEXIS NV [BE]; UENO HIROSHI [JP]; KANEMARU K) 6 December 2012 (2012-12-06) paragraph [0012] - paragraph [0050]; figure 1 -----</td> <td style="text-align: center; vertical-align: top;">1-41</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>JP H06 26968 A (KAYABA INDUSTRY CO LTD) 4 February 1994 (1994-02-04) the whole document -----</td> <td style="text-align: center; vertical-align: top;">1-41</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>US 2005/038623 A1 (HAMMERSCHMIDT DIRK [AT]) 17 February 2005 (2005-02-17) the whole document ----- -/-</td> <td style="text-align: center; vertical-align: top;">1-41</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	WO 2012/164915 A2 (TOKAI RIKA CO LTD [JP]; MELEXIS NV [BE]; UENO HIROSHI [JP]; KANEMARU K) 6 December 2012 (2012-12-06) paragraph [0012] - paragraph [0050]; figure 1 -----	1-41	A	JP H06 26968 A (KAYABA INDUSTRY CO LTD) 4 February 1994 (1994-02-04) the whole document -----	1-41	A	US 2005/038623 A1 (HAMMERSCHMIDT DIRK [AT]) 17 February 2005 (2005-02-17) the whole document ----- -/-	1-41
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<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex. </div>														
<div style="display: flex;"> <div style="flex: 1;"> <p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="flex: 1;"> <p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p> </div> </div>														
Date of the actual completion of the international search <div style="text-align: center; font-size: 1.2em;">25 September 2015</div>		Date of mailing of the international search report <div style="text-align: center; font-size: 1.2em;">08/10/2015</div>												
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer <div style="text-align: center; font-size: 1.2em;">Jedlicska, István</div>												

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/071825

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 2010/211347 A1 (FRIEDRICH ANDREAS P [FR] ET AL) 19 August 2010 (2010-08-19) paragraphs [0047] - [0054], [0068], [0071], [0087] - [0090], [0118], [0190]; figure 2B -----	42-58
X	US 2003/164711 A1 (ISHIDA SHOICHI [JP]) 4 September 2003 (2003-09-04) paragraphs [0018] - [0024]; figure 1 -----	59-86
A	EP 1 032 846 A1 (SIEMENS AG [DE]; PUNZMANN HORST [AU]) 6 September 2000 (2000-09-06) paragraphs [0014] - [0021] -----	59-86

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/071825

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.:

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: 1-41

Testing the amplifying part of a magnetic sensor, not including the sensing element itself

2. claims: 42-58

Testing a magnetic sensor circuit, including the sensing element itself

3. claims: 59-86

Fault detection module with self-test for a magnetic sensor

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/071825

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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