

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
11 October 2007 (11.10.2007)

PCT

(10) International Publication Number
WO 2007/113724 A3

(51) International Patent Classification:

G01N 15/06 (2006.01) *G01R 33/09* (2006.01)
G01N 33/543 (2006.01) *G01R 33/12* (2006.01)
G01N 35/00 (2006.01)

NL-5656 AA Eindhoven (NL). **KAHLMAN, Josephus, A., H., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **IMMINK, Albert, H., J.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(21) International Application Number:

PCT/IB2007/051030

(74) Agents: **SCHOUTEN, Marcus, M.** et al.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(22) International Filing Date: 23 March 2007 (23.03.2007)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

06111997.0 30 March 2006 (30.03.2006) EP

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

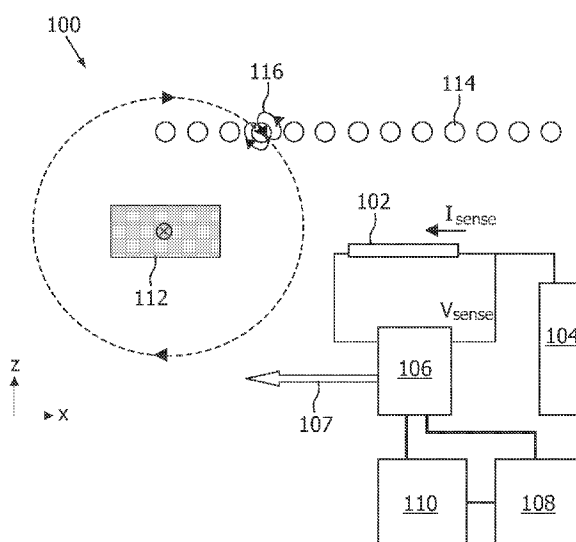
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **NIEUWENHUIS, Jeroen, H.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **JANSEN, Theodorus, P., H., G.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **VEEN, Jeroen** [NL/NL]; c/o Prof. Holstlaan 6,

[Continued on next page]

(54) Title: MAGNETORESISTIVE SENSOR AS TEMPERATURE SENSOR



(57) Abstract: A detection system (100, 150) for qualitative or quantitative detection of a magnetic field property of a modulated magnetic field is described. The modulated magnetic field may e.g. stem from an adjacent electrical current (I_{adj}) or magnetic particles. The detection system (100, 150) comprises at least one magneto resistive sensor element (102), a current controller (104) for providing a sensing current (I_{sense}) flowing through the magnetic sensor element (102) and a controlling means (108). The controlling means (108) is adapted for deriving at a first frequency f_1 a temperature-related parameter of the at least one magneto resistive sensor. The controlling means (108) furthermore is adapted for deriving a qualitative or quantitative characteristic of the adjacent electrical current (I_{adj}) or magnetic particles, taking into account the derived temperature-related parameter. This second frequency (f_2) is different from the first frequency (f_1). The invention also relates to a corresponding method.

WO 2007/113724 A3



Declaration under Rule 4.17:

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

Published:

- *with international search report*
- (88) **Date of publication of the international search report:**
21 February 2008

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/051030

A. CLASSIFICATION OF SUBJECT MATTER

INV. G01N15/06 G01N33/543 G01N35/00 G01R33/09 G01R33/12

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)

G01N 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 practical, 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.
Y	WO 2005/010503 A (KONINKL PHILIPS ELECTRONICS NV [NL]; KAHLMAN JOSEPHUS A H M [NL]) 3 February 2005 (2005-02-03) abstract page 11, line 24 - page 14, line 16; figures 6-11	1-12
Y	US 2005/077890 A1 (RANNOV RANDY K [US] ET AL) 14 April 2005 (2005-04-14) cited in the application abstract page 2, paragraph 16 - page 6, paragraph 56; figures 1-5 ----- -/--	1-12

☒ 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 document 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.
- *Z* document member of the same patent family

Date of the actual completion of the international search

11 December 2007

Date of mailing of the international search report

18/12/2007

Name and mailing address of the ISA/

European Patent Office, P.B. 5618 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

BERGADO COLINA, J

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2007/051030

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005/010542 A (KONINKL PHILIPS ELECTRONICS NV [NL]; KAHLMAN JOSEPHUS A H M [NL]; PRIN) 3 February 2005 (2005-02-03) abstract page 3, line 4 - line 19 page 10, line 30 - page 13, line 31; figures 4-8 page 15, line 24 - page 17, line 13; figure 13	1-12
A	WO 03/102546 A (UNIV CALIFORNIA [US]; AYTUR TURGUT [US]; BEATTY P ROBERT [US]; BOSER B) 11 December 2003 (2003-12-11) abstract page 17, paragraph 60 - page 18, paragraph 65; figures 12a,12b	1-12
A	WO 2005/010543 A (KONINKL PHILIPS ELECTRONICS NV [NL]; KAHLMAN JOSEPHUS A H M [NL]; DE B) 3 February 2005 (2005-02-03) abstract page 3, line 15 - line 18 page 13, line 29 - page 18, line 6; figures 12-17	1-12
A	BASELT D R ET AL: "A biosensor based on magnetoresistance technology" BIOSENSORS & BIOELECTRONICS, ELSEVIER SCIENCE PUBLISHERS, BARKING, GB, vol. 13, no. 7-8, 3 June 1998 (1998-06-03), pages 731-739, XP002285269 ISSN: 0956-5663 abstract page 735, right-hand column, last paragraph - page 737, left-hand column, paragraph 1; figure 8	1-12
A	US 6 262 574 B1 (CHO CHAHEE P [US] ET AL) 17 July 2001 (2001-07-17) abstract column 4, line 7 - column 7, line 38; figures 1-9	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2007/051030

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2005010503	A	03-02-2005	JP 2007501379 T KR 20060059980 A US 2006214658 A1	25-01-2007 02-06-2006 28-09-2006
US 2005077890	A1	14-04-2005	JP 2005114727 A	28-04-2005
WO 2005010542	A	03-02-2005	CN 1829922 A JP 2007500347 T KR 20060054351 A US 2006194327 A1	06-09-2006 11-01-2007 22-05-2006 31-08-2006
WO 03102546	A	11-12-2003	AU 2003239963 A1 EP 1525447 A2	19-12-2003 27-04-2005
WO 2005010543	A	03-02-2005	NONE	
US 6262574	B1	17-07-2001	US 2001007423 A1	12-07-2001