(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 October 2012 (18.10.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/142184 A3

(51) International Patent Classification:
G01R 33/02 (2006.01) *H02J 17/00* (2006.01)

(21) International Application Number:
PCT/US2012/033157

(22) International Filing Date:
11 April 2012 (11.04.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
13/084,510 11 April 2011 (11.04.2011) US

(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:
US 13/084,510 (CON)
Filed on 11 April 2011 (11.04.2011)

(71) Applicant *(for all designated States except US)*: **TEXAS INSTRUMENTS INCORPORATED** [US/US]; P.O. Box 655474, Mail Station 3999, Dallas, TX 75265-5474 (US).

(71) Applicant *(for JP only)*: **TEXAS INSTRUMENTS JAPAN LIMITED** [JP/JP]; 24-1, Nishi-Shinjuku 6-chome, Shinijuku-ku Tokyo, 160-8366 (JP).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **OETTINGER, Eric, G.** [US/US]; 532 5th Street SW, Rochester, MN 55902 (US).

(74) Agents: **FRANZ, Warren, L.** et al.; Texas Instruments Incorporated, Deputy General Patent Counsel, P.O. Box 655474, Mail Station 3999, Dallas, TX 75265-5474 (US).

(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, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, 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.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

[Continued on next page]

(54) Title: SYSTEMS AND METHODS OF DETECTING A CHANGE IN OBJECT PRESENCE IN A MAGNETIC FIELD

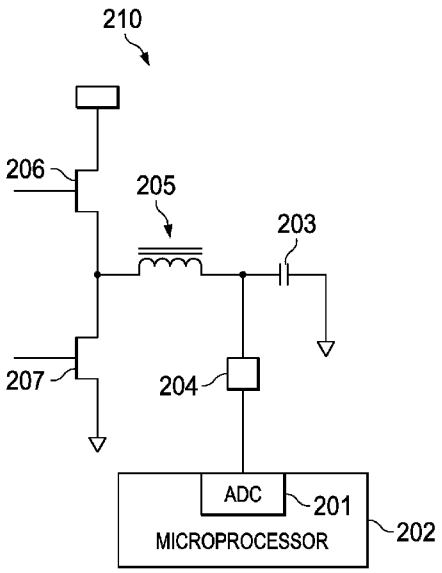

FIG. 2A

(57) Abstract: A system detects a change in object presence in a magnetic field generated from a coil (205). A low amplitude signal near the resonant frequency is injected into the coil (205) until the system comes to equilibrium. At this point the feedback is measured. The feedback signal can be measured as at least one of several signals, for example, but not limited to the voltage on the resonant capacitor (203), the current in the coil (205), or the voltage between the resonant capacitor (203) and the coil (205). A change in the steady state response indicates a change in device presence.

WO 2012/142184 A3

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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))*

Published:

— *with international search report (Art. 21(3))*

(88) Date of publication of the international search report:
31 January 2013

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/033157

A. CLASSIFICATION OF SUBJECT MATTER

G01R 33/02(2006.01)i, H02J 17/00(2006.01)i

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 33/02; H02J 17/00; H02J 7/00; H02J 7/02

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

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

eKOMPASS(KIPO internal) & Keywords: wireless charging, magnetic field, primary coil, response

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	KR 10-2010-0133557 A (CHUN KIL JUNG) 22 December 2010 See abstract, claims 1-3,5,9, paragraph 57 and figures 1-3	1,8,12 2-7,9-11
Y A	KR 10-2005-0048315 A (HANRIM POSTECH CO., LTD.) 24 May 2005 See abstract, claims 1,6, page 2 and figure 1	1,8,12 2-7,9-11
A	US 2006-0022636 A1 (BO-XUN XIAN et al.) 02 February 2006 See abstract, claim 1, paragraphs 10-11 and figures 1-3	1-12
A	KR 10-2006-0107148 A (LS CABLE LTD.) 13 October 2006 See abstract, claims 3,6 and figures 1-2	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 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 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	Date of mailing of the international search report
22 OCTOBER 2012 (22.10.2012)	**23 OCTOBER 2012 (23.10.2012)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Oh Keyung Hwan

Telephone No. 82-42-481-5938

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/033157

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2010-0133557 A	22.12.2010	None	
KR 10-2005-0048315 A	24.05.2005	KR 20-0342764 Y1	18.02.2004
US 2006-0022636 A1	02.02.2006	US 7151357 B2	19.12.2006
KR 10-2006-0107148 A	13.10.2006	None	