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(71) Applicant: MICROCHIP TECHNOLOGY INCORPORATED [US/US]; 2355 West Chandler Blvd., Chandler, AZ 85224-6199 (US).

(72) Inventor: PETER, Dieter; Adolf-vorwerk-strasse 158a, 42287 Wuppertal (DE).

(74) Agent: SLAYDEN, Bruce, W.; KING & SPALDING LLP, 401 Congress Ave., Suite 3200, Austin, TX 78701 (US).

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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))

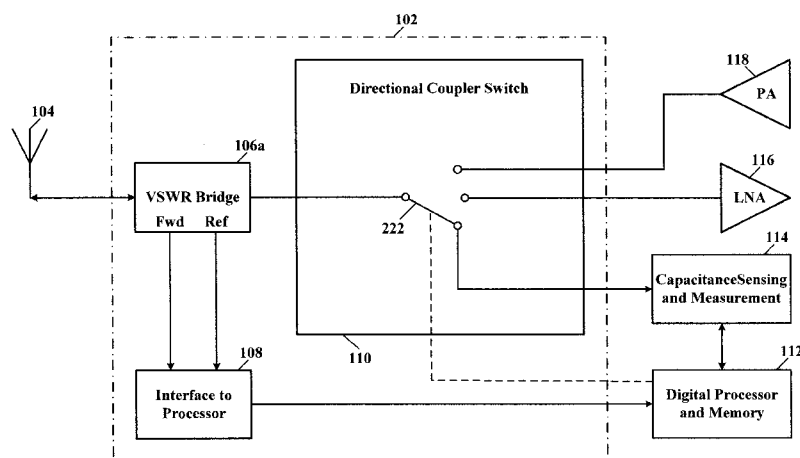
Published:

- with international search report (Art. 21(3))
- 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))

(88) Date of publication of the international search report:

28 November 2013

(54) Title: PROXIMITY DETECTION USING AN ANTENNA AND DIRECTIONAL COUPLER SWITCH



(57) Abstract: Detection of an increase in a mismatch of an antenna of a radio frequency (RF) device and/or a change in a capacitance value of the antenna indicates proximity of a body to the antenna. Upon detection of proximity of a body to the antenna, reduction of transmit power of the RF device may be done to meet Specific Absorption Rate (SAR) level regulations.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/026090

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04B1/38
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)
H04B

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, INSPEC, 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 5 564 086 A (CYGAN LAWRENCE F [US] ET AL) 8 October 1996 (1996-10-08) column 3, line 8 - column 5, line 44; figure 1 -----	1-16
X	WO 02/05443 A2 (ERICSSON INC [US]; IRVIN DAVID R [US]; RYDBECK NILS [US]; HAYES GERARD) 17 January 2002 (2002-01-17) page 9, line 3 - line 11; figure 6 -----	1-16
X	US 2003/062907 A1 (NEVERMANN PETER [US]) 3 April 2003 (2003-04-03) paragraph [0018] - paragraph [0023]; figures 1,2 -----	1-16

☐

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

18 June 2013

Date of mailing of the international search report

15/10/2013

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

Lindberg, Per

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/026090

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

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

Relate to a directional coupler and an RF device comprising the directional coupler.

2. claims: 17-22

Relate to detecting proximity of an object to an antenna of an RF device by measuring a capacitance value or a reflected voltage standing wave of the antenna.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/026090

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5564086	A	08-10-1996	NONE	

WO 0205443	A2	17-01-2002	AU 7202101 A	21-01-2002
			WO 0205443 A2	17-01-2002

US 2003062907	A1	03-04-2003	US 2003062907 A1	03-04-2003
			US 2006139034 A1	29-06-2006
