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(71) Applicant *(for all designated States except US)*: **FÉINICS AMATECH TEORANTA LIMITED** [—/IE]; Lower Churchfield, County Mayo, Tourmakeady (IE).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **FINN, David** [IE/IE]; Lower Churchfield, County Mayo, Tourmakeady (IE).

(74) Agent: **CREMER, Ulrike**; St.-Barbara-Str. 16, 89077 Ulm (DE).

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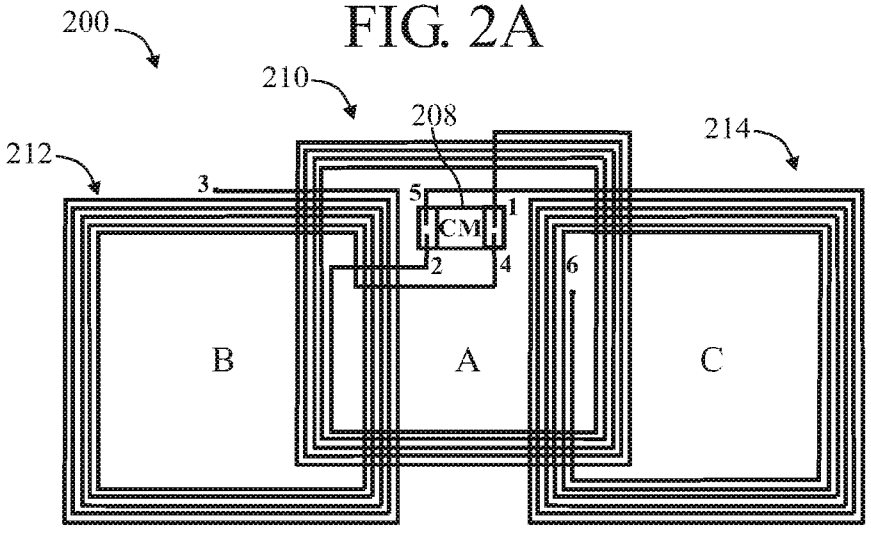
(88) Date of publication of the international search report:
24 May 2012

(54) Title: RFID ANTENNA MODULES AND INCREASING COUPLING

FIG. 2A



(57) Abstract: A transponder (240) with an antenna module (200, 200A, 200B, 200E, 200E, AM) having a chip module (108, 208) and an antenna (110, 210, A); a booster antenna (250) having a first antenna structure (252, D) in the form of a flat coil having a number of turns, an outer end (7) and an inner end (8), and a second antenna structure (254, E) in the form of a flat coil having a number of turns, an outer end (9) and an inner end (10); the inner end (10) of the second antenna structure (254) connected with the outer end (7) of the first antenna structure (252). The antenna module may be positioned so that its antenna (A) overlaps one of the first antenna structure (252, D) or the second antenna structure (254, E). An antenna module (200, 200A, 200B, 200D, 200E) having two additional antenna structures (B, C) is disclosed. Methods of enhancing coupling are disclosed.

WO 2012/020073 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/063806

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06K19/077
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)
G06K

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.
A	WO 2010/029218 A1 (UPM RAFLATAC OY [FI]; LIPONKOSKI SAMI [FI]) 18 March 2010 (2010-03-18) page 7; figure 3	1-8,16, 17
A	US 2008/308641 A1 (FINN DAVID [IE]) 18 December 2008 (2008-12-18) paragraphs [0220] - [0226], [0248]; figures 3C,5	1-8,16, 17
X	WO 2009/142235 A1 (MURATA MANUFACTURING CO [JP]; KATO NOBORU [JP]; SASAKI JUN [JP]; ISHIN) 26 November 2009 (2009-11-26) figures 1,7	9-15
X	US 2008/246614 A1 (PAANANEN HEIKKI SAKARI [JP]) 9 October 2008 (2008-10-09) figure 17	9

☐ 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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 February 2012	07/03/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Fichter, Uli

3

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2011/063806

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: 1-8, 16, 17

   Transponder comprising chip module and one antenna and further comprising
   a booster antenna consisting of two flat coils each having a number of turns and an inner end and an outer end where one of the inner end is connected with an outer end of the other coil, the remaining ends are unconnected

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2. claims: 9-15

   Antenna module comprising a chip module and three antennas, each having two ends. The first antenna is connected with the chip module, the other antennas are connected with the first antenna respectively.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2011/063806

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010029218 A1	18-03-2010	NONE	
US 2008308641 A1	18-12-2008	NONE	
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		WO 2008119422 A1	09-10-2008