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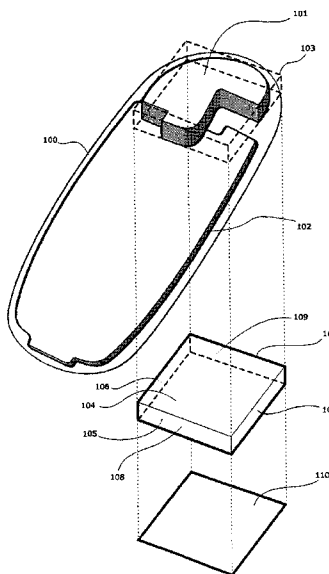
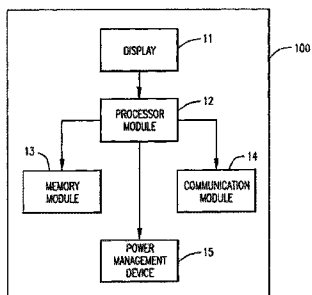
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[Continued on next page]

(54) **Title:** MULTIFUNCTION WIRELESS DEVICE AND METHODS RELATED TO THE DESIGN THEREOF



(57) **Abstract:** A multifunction wireless device, a method and system of identifying complexity factors and a method any system of optimizing the geometry of an antenna system using such complexity factors.

WO 2008/009391 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/006242

A. CLASSIFICATION OF SUBJECT MATTER INV. H01Q1/24 H01Q5/00 H01Q9/04				
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) H01Q				
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				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	US 6 275 198 B1 (KENOUN ROBERT [US] ET AL) 14 August 2001 (2001-08-14) column 1, lines 2-35 figure 4 -----	1,12,55		
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> *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 </td> <td style="width: 50%; border: none; vertical-align: top;"> *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 </td> </tr> </table>			*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
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 <p style="text-align: center; font-size: 1.2em;">26 November 2007</p>		Date of mailing of the international search report <p style="text-align: center; font-size: 1.2em;">29/02/2008</p>		
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <p style="text-align: center; font-size: 1.2em;">Kruck, Peter</p>		

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 2-11,13-15,17,18,20-27,45,46,48-50,52,100-105

Lack of Clarity and Non-Sufficiency of Disclosure

1. The application does not meet the requirements of Article 6 PCT, because claims 2-11, 13-15, 17, 18, 20-27, 45, 46, 48-50, 52, 100-105 are not clear.

2. The term "complexity factor" used in these claims has no well established meaning in the field of antennas, thereby rendering the definition of the subject-matter of said claims unclear (Article 6 PCT).

There is no definition of the term "complexity factor" in these claims. Having regard to the description page 32 and page 33, it is noted, that the definition of said complexity factor is based on a graphical analysis of a plurality of three grids G1 to G3 plotted over a particular antenna element. It is evident from this graphical analysis, that said complexity factor is not a unique parameter which defines the exact shape or contour of said antenna element. Instead, the value of the complexity factor strongly depends on the definitions of said grids, which are introduced for graphical reasons only without having any particular technical meaning.

However, this definition implies that one and the same antenna element could exhibit a plurality of different complexity factors depending on the definition of the grids. As a matter of fact the mere choice of a certain complexity factor does not unambiguously lead to distinct technical features of said antenna element, contrary to Rule 6.3 (a) PCT, which requires the definition of the subject-matter in terms of the technical features of the invention.

3. Furthermore, it is noted, that according to the description (page 7, paragraph 32) the object of the invention is to provide new antenna design parameters, namely said complexity factors, that allegedly optimize the efficiency of an antenna for a multifunctional wireless device thereby avoiding the problem of dealing with a large number of design parameters that are usually involved in optimizing the performance of multiband antennas (page 6, paragraph 26). In other words, the application claims a simplification of the antenna design by the replacement of the usually large number of design parameters by a concept incorporating two complexity factors only. However, it is pointed out that antenna elements with completely differing antenna characteristics could result in one and the same complexity factors. The application does not, therefore, put the skilled person in a position to adapt the various embodiments of the antenna to his own needs, i.e. the skilled man is unable to design an antenna according to the invention coming within his own specifications concerning antenna characteristics. The application does therefore not comply with the requirements of Article 5 PCT. For these reasons these claims are technically unclear (Article 6 PCT)

4. Claim 3 sets out: "F21 is larger than a lower bound ...or smaller than an upper bound, said lower and upper bounds...being selected from a

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

list of values comprising: 1.05...1.80. With e.g. 1.8 as an upper bound and 1.05 as a lower bound, all values of F21 smaller than 1.8 and larger than 1.05 are included. Therefore, the wording of claim 3 does not provide any limitation to the scope of the claim and has no technical relevance whatsoever. The wording of claim 3 is therefore completely unclear (Article 6 PCT). This objection applies equally to claim 4.

5. Furthermore, the above mentioned claims contain various inconsistencies with regard to range definitions of said complexity factor. As an example reference is made to claim 8, wherein F21 is defined to be higher than 1.45, whereas according to claim 21, being dependent on claim 8, F21 is defined to be lower than 1.4.

6. For the reason set out above, the International Searching Authority considers that the claims 2-11, 13-15, 17, 18, 20-27, 45, 46, 48-50, 52, 100-105 and their corresponding parts of the description and drawings are unclear to such an extent, that no meaningful search can be carried out in respect of these claims (Article 17(2)(a)(ii), Article 17(2)(b) PCT).

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2007/006242

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.: 2-11, 13-15, 17, 18, 20-27, 45, 46, 48-50, 52, 100-105
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:
see FURTHER INFORMATION sheet PCT/ISA/210

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, 12, 55

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: 1,12,55

A multifunction wireless device

2. claims: 16,19,43,44

Overlap between an antenna and a ground plane

3. claims: 28,29,30

Smart phone, handheld multimedia terminal of the type clamshell twist or slider

4. claims: 31, 32, 33, 34, 35, 36, 37, 38, 39, 56, 57, 58, 59, 60, 61, 62:

A multiband multimode multifunction wireless device including 2G, 2.5G, 3G, 3.5G or 4G services

5. claims: 40, 41,70, 71, 72, 73

Antenna system comprising a plurality of contacts, antenna elements and transceivers

6. claim: 42

Parasitic elements

7. claims: 47,51

Antenna position within body of multifunction wireless device

8. claims: 53,54

Positioning of feeding point on antenna system

9. claim: 63

Multifunction wireless device with diversity antenna system

10. claim: 64

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Block layout of multifunction wireless device

11. claims: 65,66,67

Multifunction wireless device with multilayer printed
circuit board

12. claims: 68,69

Multifunction wireless device with additional electronic
modules, antennas or subsystems

13. claims: 74,75,76,77

Antenna system with three portions operating in respective
frequency bands

14. claim: 78

Antenna system with slots, apertures or openings

15. claim: 79

Antenna system with bended or folded structure;

16. claim: 80

Antenna system with an antenna box having additional
conducting parts therein

17. claims: 81,82,83,84,98

Antenna comprising plurality of antenna elements

18. claim: 85

Position of Antenna box within multifunction wireless device

19. claims: 86,87,88,89,90,91,92,93,94,95,96,97

Antenna system with antenna contour comprising straight
and/or curved segments;

20. claim: 99

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Dielectric material for antenna arrangement

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/006242

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6275198	B1	14-08-2001	NONE
