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Datasheet for the decision of 30 November 2006

Case Number: T 1348/05 - 3.4.01

Application Number: 02290008.8

Publication Number: 1249888

IPC: H01Q 1/22

Language of the proceedings: EN

Title of invention:
Internal display-mounted antenna for mobile electronic equipment and mobile electronic equipment incorporating same

Applicant:
LG ELECTRONICS INC.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1348/05 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 30 November 2006

Appellant: LG ELECTRONICS INC.
20, Yoido-Dong
Yongdungpo-Ku
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 20 May 2005 refusing European application No. 02290008.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: B. Schachenmann
Members: R. Bekkering
H. Wolfrum

Summary of Facts and Submissions

I. European patent application 02 290 008.8 (publication no. EP-A-1 249 888) was refused pursuant to Article 97(1) EPC by a decision of the examining division dispatched on 20 May 2005, on the ground of lack of inventive step (Articles 52(1) and 56 EPC).

II. The applicant (appellant) lodged an appeal against the decision on 20 June 2005 and paid the appeal fee on the same day. The statement setting out the grounds of appeal was received on 29 July 2005.

III. Reference is made to the following documents:

D1: EP-A-0 543 645

D2: EP-B-0 484 454

D4: US-A-2002 0 021 250

IV. Oral proceedings, requested as an auxiliary measure by the appellant, were held on 30 November 2006.

V. The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

Main request:

Claims: no. 1 to 44 filed with letter dated 3 October 2006;
Description: pages 1, 2 and 5 to 22 as originally filed;

page 23 filed with letter of 10 November 2004;
pages 3 and 4 filed with the statement setting out the grounds of appeal received on 29 July 2005;
Drawings: sheets 1/9 to 9/9 as originally filed.

Auxiliary request:

Claims: no. 1 to 39 filed with letter dated 3 October 2006;
Description and drawings as for the main request.

VI. Claim 1 according to the main request reads as follows:

"*1. A mobile electronic equipment (20, 30, 61) with an internal antenna comprising:*
a case (50, 55, 71, 72) having an opened portion;
a display panel (38, 67) exposed through the opened portion of the case for displaying text or images;
an electrically conductive panel frame (37, 68) for supporting edges of the display panel, and being positioned within the case;
an antenna (40, 92) fastened to the panel frame for enabling a radio communication, the antenna being grounded to the panel frame in a state of being inserted in the case;
characterized in that the equipment further comprises:
at least one first screw (47, 80) for fastening the antenna to the panel frame (37, 68); and
at least one second screw (54, 99) for securing to the case (50, 55, 71, 72) the panel frame (37, 68) with the antenna (40, 92) fastened thereto."

VII. Claim 1 according to the auxiliary request consists of the pre-characterising portion of claim 1 according to the main request with the following further features:

"*and comprising a transmitting and receiving portion (49, 92) extended long in a longitudinal direction of the antenna and extending in parallel with and spaced at a distance from a side wall of the panel frame (39, 68a);*
a radio communication control device; and
a coaxial cable (43, 95) with one end portion connected to the radio communication control device and with another end portion connected to the transmitting and receiving portion of the antenna;
characterized in that the coaxial cable is disposed to pass between the transmitting and receiving portion of the antenna (49, 92) and the side wall of the panel frame (39, 68a)."

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. *Main request*

2.1 Novelty, inventive step

2.1.1 The closest prior art is provided by document D1 disclosing a portable communication device with a display having an internal antenna for radio frequency

communication (see figures 2 and 3 with corresponding description).

In particular, document D1 discloses, using the terminology of claim 1 under consideration, a mobile electronic equipment with an internal antenna comprising:
a case having an opened portion,
a display panel (200) exposed through the opened portion of the case for displaying text or images,
an electrically conductive panel frame (206) for supporting edges of the display panel, and being positioned within the case (see column 2, lines 42 to 55).

In this known device the frame is used as antenna and radio frequency signals received by the frame are coupled to the receiver circuitry for decoding (see column 2, lines 55 to 58).

2.1.2 The subject-matter of claim 1 under consideration differs from the equipment known from document D1 in that it comprises:

- an antenna fastened to the panel frame for enabling a radio communication, the antenna being grounded to the panel frame in a state of being inserted in the case, and
- at least one first screw for fastening the antenna to the panel frame and at least one second screw for securing to the case the panel frame with the antenna fastened thereto.

Accordingly, the subject-matter of claim 1 is novel with respect to document D1 (Articles 52(1) and 54(1), (2) EPC). Novelty is also given having regard to the remaining cited, more remote prior art.

2.1.3 In view of the above differences of the subject-matter of claim 1 over the teaching of document D1, the objective problem to be solved may be seen as residing in the improvement of the internal antenna performance allowing at the same time for a reliable and efficient assembly of the antenna.

The problem as such is trivial in the technical field of mobile communication devices at issue, where antenna performance improvements, as well as compactness and assembly efficiency are constant objectives. In particular, it would be clear to the skilled person working in this field that the antenna formed by the display panel frame of document D1 is scarcely adapted to the specific characteristics (wavelength etc...) of the radio communication signals involved.

2.1.4 The skilled person, faced with the above problem, would consider document D2 which is specifically concerned with the improvement of the transmitting and receiving performance of the internal antenna of mobile radio communication equipment, providing at the same time a simple and reliable construction of the antenna (see column 1, lines 49 to 53 and column 4, lines 34 to 40).

Document D2 discloses in particular a more sophisticated antenna arrangement of mobile radio communication equipment comprising two or more quarter lambda resonator elements formed by angled metal sheets

connected to a metal shielding housing enclosing the radio frequency section of the equipment. The resonator elements comprise a free end extending along and spaced apart from the metal housing and an angled-off end conductively connected to the metal shielding housing (see column 1, line 54 to column 4, line 19 and the figures). The metal housing, besides acting as a shield for the enclosed radio frequency section, also serves as ground for the antenna. One or more of the resonators are fed at a feed point lying between the free end and the bent edge, thereby forming an inverted-F type antenna, with the metal housing forming the ground portion of the antenna. The angled metal sheet resonators may be soldered to the metal housing providing a reliable, mechanically stable arrangement (see eg column 3, lines 48 to 49 and claim 9).

Adopting the teaching of document D2 to the equipment known from document D1, the skilled person would modify the antenna formed by the display frame by adding an angled metal sheet resonator to the frame forming an inverted-F type antenna, with the frame providing the ground portion of the antenna.

Furthermore, as far as the fastening of the resonator to the display frame is concerned, the skilled person would consider, as a straightforward alternative to for example soldering suggested in document D2, fastening by such conventional means as screws, the display frame of document D1 as such being suitable for receiving screws. Likewise, the use of screws for securing the display frame to the case of the equipment would be obvious to the skilled person, as screws are commonly used in the assembly of such equipment.

2.1.5 The appellant has argued that since document D2 suggested the use of a shielding housing, adoption of the teaching of document D2 in the equipment known from document D1 would result in the provision of a closed metal case rather than a frame. Furthermore, neither document D1 nor document D2 were concerned with assembling details. Document D2 merely disclosed assembling by means of soldering. Soldering, however, was both difficult and time consuming, whereas the invention sought to provide a rapid and cheap assembling. Furthermore, numerous other fastening means such as clipping, gluing, plugging etc... were available.

Moreover, the appellant referred to document D4, which, though published after the priority date of the application under consideration and thus not included in the state of the art, provided insight into the skilled person's general knowledge. In particular, the document confirmed that internal antennas would not perform as well as external antennas and that antennas were to be kept away from metal components.

The appellant's argumentation, however, overlooks the fact that in document D2 the closed metal shielding housing is provided for shielding the radio frequency communication section of the equipment which is provided in the immediate vicinity of the antenna. In document D1, however, no such radio frequency communication section is provided near the antenna (see figures 3 and 5).

Document D4 (see eg figures 4, 5, 7A and 7B) discloses an internal antenna for a laptop located between the outer side face of a display panel with a metal frame and the inner surface of a housing. In particular, the antenna is of the inverted-F type having a radiator portion provided at a predetermined distance from the metal frame and a ground portion connected to the metal frame. The document mentions in general the lower performance of internal antennas and the practice of keeping a minimum distance between the antenna and metal components (see page 1, paragraphs [0006] and [0007]). This, however, cannot support the appellant's contention that the skilled person would have definitely kept away from the claimed arrangement. Rather, the document confirms that inverted-F antennas consisting of a radiator portion and a ground portion, such as disclosed in document D2, were already generally known to the skilled person.

Moreover, as regards the fastening by screws, in the board's opinion the respective advantages and disadvantages of per se well known and commonly used fastening means such as screws, as well as soldering, or clipping, gluing etc... for that matter, belong to the general knowledge of the skilled person working in the technical field at issue. Based hereon, the skilled person would select screws as claimed without the exercise of inventive skills.

2.1.6 For the reasons above, the subject-matter of claim 1 according to the main request lacks an inventive step (Articles 52(1) and 56 EPC).

For the reasons above, the main request is not allowable.

3. *Auxiliary request*

3.1 Inventive step

3.1.1 Claim 1 according to the auxiliary request contains in substance the following further features:

- the antenna comprising a transmitting and receiving portion extended long in a longitudinal direction of the antenna and extending in parallel with and spaced at a distance from a side wall of the panel frame, and
- a radio communication control device, and a coaxial cable with one end portion connected to the radio communication control device and with another end portion connected to the transmitting and receiving portion of the antenna, wherein the coaxial cable is disposed to pass between the transmitting and receiving portion of the antenna and the side wall of the panel frame.

As far as the above first feature is concerned, adoption of the teaching of document D2 in the equipment known from document D1 would lead to a resonator forming the transmitting and receiving portion extended in a longitudinal direction of the overall antenna arrangement and spaced at a distance from a side wall of the display panel frame. Furthermore, in order to obtain a compact device, it would be obvious to the skilled person to arrange the

antenna parallel to the side wall of the display panel frame.

Concerning the remaining above features, a radio communication control device is necessarily provided in the radio communication device known from document D1. Moreover, it would be obvious for the skilled person to use a coaxial cable for connecting the radio communication control device with the transmitting and receiving portion of the antenna, as coaxial cables are generally used for this purpose. Finally, in the mobile communication equipment at issue generally all available free space is used up in order to render the equipment as compact as possible. Accordingly, the skilled person would consider disposing the coaxial cable to pass in the free space between the transmitting and receiving portion of the antenna and the side wall of the panel frame as a matter of normal design practice.

3.1.2 The appellant argued that since neither documents D1 and D2 disclosed a coaxial cable, the claimed cable arrangement, fixing the cable and preventing it from moving, would not be obvious. Furthermore, the skilled person would not feed the cable between the frame and the antenna as this would influence the antenna operation. Document D4, in this respect explicitly disclosed feeding the cable outside the antenna to this end.

The appellant's arguments cannot convince since, as discussed above, general assembly consideration of the skilled person would already lead him to the claimed coaxial cable arrangement. The argued fixing of the

cable would be achieved as well, as a result of its arrangement between the antenna and the frame, whereby it should be noted that according to the application as filed minimizing the movement of the cable is actually achieved by means of additional cable rack portions of a supporting bracket (see paragraph bridging pages 16 and 17 as originally filed). As far as document D4 is concerned, it is noted that in the shown arrangements there is actually no free space between the antenna and the frame (see figures 4, 7A, 7B), so that the document does not support the appellant's contention in this respect. Furthermore, it should be noted that if arranging the coaxial cable between the antenna and the panel frame were to influence the antenna, the application apparently merely accepts this per se known drawback.

3.1.3 For the reasons above, the subject-matter of claim 1 according to the auxiliary request lacks an inventive step (Articles 52(1) and 56 EPC).

Therefore, the auxiliary request is not allowable either.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

R. Schumacher B. Schachenmann