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Datasheet for the decision of 31 July 2023

Case Number: T 0494/21 - 3.4.02

Application Number: 16180266.5

Publication Number: 3139370

IPC: G09G3/00, G06F3/01, G09G5/00

Language of the proceedings: EN

Title of invention:
DISPLAY DEVICE AND METHOD FOR CONTROLLING THE SAME

Applicant:
LG ELECTRONICS INC.

Relevant legal provisions:
EPC Art. 83, 84, 111(1), 123(2)
RPBA 2020 Art. 11, 12(8)

Keyword:
Decision in written proceedings
Added subject-matter (main request: no)
Clarity and sufficiency of disclosure (main request: yes)
Remittal for further prosecution (yes)

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Case Number: T 0494/21 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 31 July 2023

Appellant: (Applicant)	LG ELECTRONICS INC. 128, Yeoui-daero Yeongdeungpo-gu Seoul 07336 (KR)
Representative:	Frenkel, Matthias Alexander Wuesthoff & Wuesthoff Patentanwälte PartG mbB Schweigerstraße 2 81541 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 11 January 2021 refusing European patent application No. 16180266.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairwoman	T. Karamanli
Members:	F. J. Narganes-Quijano
	C. Kallinger

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 16180266.5.

In its decision, the examining division held in respect of the main and the first auxiliary requests then on file that the claims did not comply with Article 123(2) EPC and did not meet the requirement of clarity of Article 84 EPC, and that the claimed invention was not sufficiently disclosed within the meaning of Article 83 EPC. Analogous objections under Articles 83 and 84 EPC were also raised in respect of the claims of the second auxiliary request.

II. With the statement setting out the grounds of appeal, the appellant submitted claims according to a main request and a first and second auxiliary request, identical to the claims of the main request and the first and second auxiliary requests underlying the decision under appeal, and claims according to a third to fifth auxiliary request. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request or of one of the first to fifth auxiliary requests, all requests filed with the statement of grounds of appeal.

The appellant also requested oral proceedings in the event that the board did not intend to grant a patent on the basis of the main request.

III. By letter dated 24 May 2023, filed in reply to the board's preliminary opinion expressed in a communication under Rule 100(2) EPC, the appellant stated to have no reservations against the board's intention to issue a decision in written proceedings setting aside the decision under appeal and remitting the case to the examining division for further prosecution. The appellant maintained its request for oral proceedings only in case the board minded to deviate from the preliminary opinion expressed in the mentioned communication and to confirm the decision under appeal.

IV. Independent claims 1 and 13 of the main request read as follows:

1. "A display device comprising:

a display unit (151) formed to be flexible and configured such that at least one portion of the display unit (151) is modifiable by being protruded or recessed; and

a controller (180) configured to display an output target image on the display unit (151) and control to modify the display unit (151) based on a visual attribute of a portion of the output target image,

wherein the controller (180) is configured to determine a modification target area in the output target image based on the visual attribute of components included in the output target image, and modify a display area of the display unit (151) corresponding to the determined modification target area, wherein the components include at least one of points, lines, or surfaces forming the output target image, wherein the visual attribute is at least one of an aggregation degree of the points forming the output target image, curved degrees of the lines forming the

output target image, or brightness degrees of the surfaces forming the output target image, wherein the controller (180) is configured to divide the output target image into a plurality of reference images having a predetermined size, and determine, as the modification target area, an area corresponding to at least one reference image selected based on a visual attribute of components in each of the plurality of reference images, wherein the controller (180) is configured to select the at least one reference image from the plurality of reference images which has a value corresponding to at least one visual attribute of the components in the at least one reference image that is equal to or greater than a predetermined reference value of the at least one visual attribute, wherein the controller (180) controls the display unit (151) such that a degree of protrusion or recession of the display area is changed according to a difference between a value of the at least one visual attribute and the predetermined reference value of the at least one visual attribute."

13. "A method for controlling a display device having a display unit (151) formed to be flexible and configured such that at least one portion of the display unit (151) is modifiable by being protruded or recessed, the method comprising:

displaying an output target image on the display unit;

determining, by a controller (180), a modification target area in the output target image based on a visual attribute of components included in the output target image; and

modifying, by the controller (180), a display area of the display unit (151) corresponding to the determined modification target area,

wherein the components include at least one of points, lines, or surfaces forming the output target image,

wherein the visual attribute is at least one of an aggregation degree of the points forming the output target image, curved degrees of the lines forming the output target image, or brightness degrees of the surfaces forming the output target image, wherein the method further comprises:

dividing the output target image into a plurality of reference images having a predetermined size,

determining, as the modification target area, an area corresponding to at least one reference image selected based on a visual attribute of components in each of the plurality of reference images,

wherein the at least one reference image, which has a value corresponding to at least one visual attribute of the components in the at least one reference image that is equal to or greater than a predetermined reference value of the at least one visual attribute, is selected from the plurality of reference images,

wherein a degree of protrusion or recession of the display area is changed according to a difference between a value of the at least one visual attribute with the predetermined reference value of the at least one visual attribute."

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters*

With the letter dated 24 May 2023, the appellant maintained its request for oral proceedings previously made in the statement of grounds of appeal only in case the board minded to deviate from the preliminary opinion expressed in the communication under Rule 100(2) EPC and to confirm the decision under appeal (*cf.* point III above).

The present decision is in conformity with the preliminary opinion expressed by the board in its communication under Rule 100(2) EPC and it does not confirm the decision under appeal. Consequently, the board considers that oral proceedings are neither necessary nor expedient in the case at hand (see Article 116(1) EPC). Therefore, the present decision is taken in written proceedings in accordance with Article 12(8) RPBA 2020, with due regard for the appellant's procedural rights under Articles 113 and 116 EPC. In particular, the principle of the right to be heard under Article 113(1) EPC is fully respected, since the appellant has presented arguments on the merits and the board has based its decision on those arguments. The case is ready for decision on the basis of the contested decision to be reviewed and the appellant's written submissions.

3. *Main request - Claim 1 - Article 123(2) EPC*

3.1 In its decision the examining division held that there was no basis in the application as filed for the combination of the following features of claim 1 of the main request [*emphasis added by the examining division*] (Article 123(2) EPC):

- "the visual attribute is [...] brightness degrees of the surfaces forming the output target image", and

- "the controller (180) is configured to divide the output target image into a plurality of reference images having a predetermined size, and determine, as the modification target area, an area corresponding to at least one reference image selected based on a visual attribute of components in each of the plurality of reference images, wherein the controller (180) is configured to select the at least one reference image from the plurality of reference images which has a value corresponding to at least one visual attribute of the components in the at least one reference image that is equal to or greater than a predetermined reference value of the at least one visual attribute".

In particular, the examining division found that, contrary to the appellant's view, paragraphs [0191] to [0194] of the application as filed did not refer to a brightness degree being equal to or greater than a reference value, but to a darkness value being equal to or greater than a predetermined reference value (paragraph [0194] together with Figure 3B). In addition, a division of the output target image into pre-set regions (i.e. the claimed plurality of reference images) was disclosed in the application as filed in the context of embodiments involving as a visual attribute an aggregation degree of points or a curved degree of lines (see the square regions represented in Figures 2B, 2C, 3A, 4A, 4B, 5A and 5B), but not in the context of embodiments involving as visual attribute a brightness degree of surfaces forming the output target image (see Figures 3B and 3C).

3.2 The board first notes that paragraphs [0191] to [0194] of the application as filed relate to an embodiment in which different surfaces are extracted from the output

target image according to their brightness or darkness (Figure 3B together with paragraph [0191]), but that in this embodiment - unlike, for example, in the embodiment disclosed by reference to Figure 3A - the output target image is not divided "into a plurality of reference images having a predetermined size" as required by claim 1. Therefore, paragraphs [0191] to [0194] do not define an embodiment according to claim 1 of the main request. In any case, the board notes that the embodiment disclosed in paragraphs [0191] to [0194] of the description relates to the attribute "darkness", but - as submitted by the appellant - only as one of the visual attributes (see "When the control 180 selects darkness [...]" in paragraph [0191]) to be selected from among the visual attributes previously specified in the preceding paragraph [0190] which reads "For example, the visual attribute may mean [...] brightness, darkness, roughness [...]". In the board's view the skilled person, when reading paragraphs [0191] to [0194] in their context, and in particular in the technical context of the preceding paragraph [0190], would understand that the disclosure relating to the visual attribute "darkness" also applies correspondingly when the controller, instead of selecting "darkness" as visual attribute, selects one of the other attributes, and in particular "brightness".

Furthermore, the claimed combination of features referred to in the first paragraph of point 3.1 above, is, as submitted by the appellant, based on dependent claim 15 of the application as filed. According to this claim, the determination of the modification of the target area includes "dividing the output target image into a plurality of reference images having a predetermined size" and determining, as the

modification area, "an area corresponding to at least one reference image among the plurality of reference images, based on a visual attribute of components in each of the plurality of reference images", together with the reference in dependent claim 15 to the previous dependent claim 14 specifying that the visual attribute is related to, among other possibilities, "brightness degrees of the surfaces forming the output target image". This combination of features is further disclosed in the general statement in paragraphs [0011] and [0012] of the introductory part of the description of the application as filed relating to the selection by the controller of the reference image in terms of the comparison of a value of at least one visual attribute of the components of the output target image with a predetermined reference value related to the visual attribute, together with the previous paragraph [0010] stating that the visual attribute may relate to, among other possibilities, the brightness degree of the surfaces forming the output target image. Said passages of the application as filed do not specify the concrete criteria to be used in said comparison. However, the application as filed consistently discloses numerous embodiments in which the mentioned comparison of values involves the value of the corresponding visual attribute being "equal to or greater than a predetermined reference value" (see, for example, paragraphs [0014], [0168], [0185], [0188], [0193] together with [0190], [0201], etc.).

Therefore, the combination of features of claim 1 objected to by the examining division is directly and unambiguously derivable from the application as filed.

3.3 In its decision, the examining division further objected that there was no single embodiment in the

description of the application as filed disclosing the combination of features of claim 1 mentioned in the first paragraph of point 3.1 above.

However, as the combination of features in question is, as concluded in point 3.2 above, directly and unambiguously derivable from the application as filed, this objection would then not fall under Article 123(2) EPC, but under Article 84, second sentence, EPC which requires that the claims must be supported by the description. In any case, also this objection under Article 84 EPC is not convincing either because, although the description does not contain a complete description of a particular embodiment for each of the variants covered by claim 1, and in particular for each of the variants involving the brightness degree of surfaces as visual attribute, the claimed subject-matter is in the board's view sufficiently supported by the description within the meaning of Article 84, second sentence, EPC by the particular embodiments disclosed in detail in the description, together with statements relating to modifications and other variants of these embodiments, see in particular the embodiments referred to in point 3.2 above, together with the general statements in paragraphs [0010] and [0011], [0025] and [0026], [0336] and [0337], and [0351] and [0352] of the description cited by the appellant in this respect.

3.4 Therefore, in the board's opinion, the features of claim 1 referred to in point 3.1 above are directly and unambiguously derivable from the application as filed and, consequently, the objections raised by the examining division under Article 123(2) EPC in respect of claim 1 of the main request are not persuasive.

4. *Main request - Claim 1 - Articles 83 and 84 EPC*

In its decision the examining division raised a number of objections of lack of clarity (Article 84 EPC) and of lack of sufficiency of disclosure (Article 83 EPC) in respect of claim 1 of the main request. However, the board does not find the examining division's arguments in support of these objections convincing for the following reasons:

4.1 According to the examining division it was not clear (Article 84 EPC) what was supposed to be understood by the claimed "points forming the output target image" and by the claimed "aggregation degree of points". In particular, it was not clear what was meant by the points forming an image, and whether the points corresponded to the pixels of the display unit. In addition, the number of points per unit area in an image was fixed and given by its pixel resolution. However, this did not seem to be the meaning attributed to the aggregation degree of points in the description of the application (see Figure 3A of the application).

However, the board first notes that claim 1 is silent as to whether the display unit is formed by pixels. In any case, claim 1 refers to a display unit in which an "output target image" is displayed, and to the "components" of the output target image including "at least one of points, lines or surfaces forming the output target image". Thus, in the case of a display unit formed by pixels, the skilled person would understand that the claimed "output target image" is not constituted by the entire array of pixels as such, but by the image formed by, and represented in the array of pixels and viewable and identifiable as such

by an observer, the image being formed by the claimed "components" including at least one of points, lines or surfaces "forming the output target image". Consequently, the skilled person would not identify the claimed points of the output target image with arbitrary ones of the pixels of the display unit, but with discrete points displayed in the display unit and identifiable as components of the displayed image, i.e. discrete points each constituted by a dot-shaped set of pixels having similar visual characteristics different from those of the pixels adjacent to the dot-like set of pixels - in the same way as the claimed lines and surfaces of the output target image would be identified by the skilled person not with arbitrary one- and two-dimensional arrays of pixels of the display unit, respectively, but with lines and surfaces constituting image components forming the image represented in the display, each of the lines and of the surfaces being constituted respectively by an elongated and a planar set of pixels having similar visual characteristics different from those of the pixels adjacent to the set of pixels.

In addition, in the case of an output target image formed, among other possible components, by a plurality of points in the sense mentioned above, the aggregation degree of points mentioned in claim 1 is determined by the spatial distribution of points of the output target image (see in this respect paragraph [0155] of the description, and Figure 3A together with paragraphs [0183] to [0188] of the description) and not by the pixel density or resolution of the display unit.

4.2 The examining division further objected under Article 84 EPC that it was not clear what was meant in claim 1 by a "curved degree" of a line, and whether the

"curved degree" referred to a curvature degree of only a part of a line within a divided region of the image as disclosed by reference to Figure 5A, or of a line as a whole in the context of the entire image, as it appeared to be disclosed by reference to Figure 4B. In addition, it was not clear from the wording of claim 1 whether the device was intended to extract the respective attributes in each reference region obtained by dividing the imaged output target into the plurality of reference images having a predetermined size.

The board notes that claim 1 explicitly requires that the modification area is determined as the area corresponding to at least one reference image selected "based on a visual attribute of components in each of the plurality of reference images". Therefore, the skilled person would understand that the visual attributes are to be determined for each of the possible reference regions mentioned by the examining division, i.e. for each of the claimed plurality of reference images in which the attributes are present. In particular, when the visual attribute corresponds to the curved degree of lines, then the curved degree of lines is to be determined within each of the claimed plurality of reference images containing lines of the output target image.

4.3 The examining division also objected under Article 84 EPC that the division of the output target image into reference images of predetermined sizes did not correlate with the image content and that, for this reason, a reference image could comprise points with different aggregation degrees in different areas of the reference image, as well as multiple lines with different degrees of curvature and surfaces having different brightness values. In this case, it remained

undefined in claim 1 how the visual attributes were supposed to be taken into account for comparison with the respective claimed reference values to ultimately determine whether the display area corresponding to the reference image was to be recessed or protruded. In addition, attributes such as the curved degree of lines in a predetermined region of the output target image could be determined in different ways, each having a corresponding direct impact on the outcome of which regions are to be recessed or protruded, thus resulting in contradictory outcomes.

The board notes first of all that this objection was raised by the examining division under Article 84 EPC, but that by its nature it also contains arguments falling under Article 83 EPC. As regards the question of clarity, the board notes that claim 1 is broad in the sense that it requires the degree of protrusion or recession of a portion of the display unit to be determined as a function of the aggregation degree of points, the degree of curvature of lines and the brightness of surfaces of the output target image, and that each of these quantities can be evaluated following different methods. For example, the degree of curvature of lines in a particular portion may be evaluated - as noted by the examining division in its decision - as the average, or as the maximum, etc., of the curvature degree of the lines in the image portion. However, the mere fact that claim 1 is broad in the sense mentioned above and that it allows the skilled person to choose between different methods of evaluating said quantities does not, in the board's view, lead to the claim being unclear within the meaning of Article 84 EPC. In particular, the different methods of evaluation would lead to different alternative embodiments of the invention defined in

claim 1, and the board does not see in what respect the mere fact that claim 1 would cover different alternative embodiments. which might lead to different outcomes for the same output target image (e.g. different portions of the display unit being protruded or recessed, or the same portion thereof being modified with a different degree of protrusion or recess), would in the present case be detrimental to clarity of claim 1.

In addition, the output target image may, as maintained by the examining division, contain within a predetermined reference image an inhomogeneous distribution of points and/or one or more lines of varying curvature within the reference image and/or one or more surfaces each having surface portions of different brightness. However, in the board's view the skilled person would be in a position to implement the claimed invention on the basis of the common general knowledge by selecting a suitable method for evaluating the attribute, such as - as submitted by the appellant - computing the average of the respective attribute, or - as mentioned by the examining division in its decision in connection with the curvature degree of lines - by taking a maximum value as the value of the attribute, or even by reducing the predetermined size of the reference images in order to reduce the number of the image components (points, lines and surfaces) and/or the variability of the attributes (aggregation degree of points, curved degree of curves, and brightness degree of surfaces) within the reference images, etc.. In this respect, the requirements of Article 83 EPC are therefore met.

4.4 In its decision the examining division also found that the description did not provide embodiments which would

allow all the clarity objections raised in the decision in respect of claim 1 of the main request to be resolved (*cf.* first paragraph of each of points 4.1 to 4.3 above) and that, for this reason, the invention defined in claim 1 was not sufficiently disclosed within the meaning of Article 83 EPC.

However, for the reasons given in points 4.1 to 4.3 above, the board is of the opinion that said objections of lack of clarity are not convincing and that the corresponding objections raised by the examining division under Article 83 EPC are not convincing either. In particular, the skilled person would be in a position to understand the terms of the claims and to carry out the claimed invention in view of the disclosure of the description (see passages of the description referred to in points 4.1 to 4.3 above). More particularly, the skilled person would understand the points of the output target image mentioned in claim 1 not as consisting of the pixels of the display unit themselves, but, as mentioned in point 4.1, as consisting of discrete dot-like image components of the image displayed in the display unit. In addition, the mentioned points would be spatially distributed with a predetermined density which, as noted by the examining division, may be different in different regions of the output target image - in particular, according to the content of the image as disclosed in the embodiment of Figure 3A, see paragraph [0187] -, and the skilled person would be in a position to evaluate the claimed aggregation degree of points - in particular, within each of the claimed reference images - depending on the density distribution of points (see point 4.1 above, last paragraph). Similar considerations apply to the lines and surfaces defined in claim 1 as components forming the output target images and the corresponding

attributes, i.e. the curved degree of lines and the brightness degree of surfaces (see point 4.3 above, second and third paragraphs).

4.5 The examining division also noted in respect of the issue of sufficiency of disclosure of the claimed variants involving the brightness of surfaces under Article 83 EPC that paragraphs [0191] to [0194] of the description did not disclose a division of the image into regions of pre-set size as claimed.

The board notes, however, that the description currently on file corresponds to the description of the application as filed and that the embodiment disclosed in paragraphs [0191] to [0194] of the description constituted an embodiment according to claim 1 as originally filed, but - as already noted above in point 3.2, first paragraph, first two sentences - not according to claim 1 of the main request. Therefore, the deficiency found by the examining division does not relate to the requirement of sufficiency of disclosure under Article 83 EPC, but at most to the requirement of Article 84, second sentence, EPC that the claims must be supported by the description. This deficiency therefore only reflects a possibly pending adaptation of the description as filed to the invention defined in claim 1 of the main request.

4.6 The board concludes that the examining division's objections under Articles 83 and 84 EPC with respect to claim 1 of the main request are not convincing.

5. *Main request - Independent claim 13 - Articles 123(2), 83 and 84 EPC*

In its decision the examining division also found that the objections raised under Articles 123(2), 83 and 84 EPC in respect of claim 1 of the main request (*see* points 3 and 4 above) applied *mutatis mutandis* to the corresponding features of independent method claim 13 of the main request.

However, in the board's view these objections are not convincing in respect of independent claim 13 of the main request for reasons analogous to those set out in points 3 and 4 above in respect of claim 1 of the main request (Articles 123(2), 83 and 84 EPC).

6. *Further prosecution*

The reasons given by the examining division in its decision to refuse the application as amended according to the main request were based only on objections under Articles 123(2), 83 and 84 EPC. As concluded in points 3 to 5 above, the board is of the opinion that none of these objections are convincing. In addition, as stated in Article 12(2) RPBA 2020, the primary object of the appeal proceedings is to review the decision under appeal in a judicial manner. In these circumstances, the board finds that there are special reasons to set aside the decision under appeal and remit the case to the examining division for further prosecution (Article 111(1), second sentence, EPC together with Article 11 RPBA 2020).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution.

The Registrar: The Chairwoman:

H. Jenney T. Karamanli

Decision electronically authenticated