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Datasheet for the decision of 10 February 2022

Case Number: T 2647/18 - 3.4.03

Application Number: 14172481.5

Publication Number: 2819117

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Language of the proceedings: EN

Title of invention:
Organic light emitting display device and method of driving the same

Applicant:
LG Display Co., Ltd.

Headword:

Relevant legal provisions:
EPC Art. 84, 123(2)
RPBA 2020 Art. 13(1), 13(2)

Keyword:
Claims - clarity - main and first auxiliary requests (no)
Second auxiliary request - admitted (no)

Decisions cited:
T 2429/17

Catchword:

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Case Number: T 2647/18 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 10 February 2022

Appellant: (Applicant)	LG Display Co., Ltd. 128 Yeoui-daero Youngdungpo-gu Seoul 150-721 (KR)
Representative:	Viering, Jentschura & Partner mbB Patent- und Rechtsanwälte Am Brauhaus 8 01099 Dresden (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 6 July 2018 refusing European patent application No. 14172481.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	M. Papastefanou
Members:	S. Ward
	C. Heath

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division to refuse European patent application No. 14 172 481 on the grounds that the claimed subject-matter did not involve an inventive step within the meaning of Article 56 EPC. In section 3 of the decision ("Further remarks not part of the decision"), the claimed subject-matter was found not to be new within the meaning of Article 54 EPC.

II. At the end of the oral proceedings held before the Board the appellant confirmed that it requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed with letter dated 11 May 2018, or the first auxiliary request filed during oral proceedings before the Examining Division (both requests being re-filed with the grounds of appeal), or a second auxiliary request filed with letter dated 10 January 2022.

III. (a) Claim 1 of the main request reads as follows:

"An organic light emitting display device comprising:
a display panel (100) configured to include a plurality of pixels, each of the plurality of pixels including an organic light emitting diode (OLED) and a pixel circuit (PC) for emitting light from the corresponding organic light emitting diode (OLED);
a compensation circuit (210) configured to generate an initial compensation voltage of a driving thin film transistor (DT) and a sequential compensation voltage;
a data driver (200) configured to reflect the compensation voltage in a data voltage (Vdata) based on

an image signal to generate a driving voltage (Vd) that is used to drive the driving thin film transistor (DT) included in the pixel circuit (PC), and supply the driving voltage (Vd) of the driving thin film transistor (DT) to each of the plurality of pixels;
a power unit (600) which is connected to the data driver (200); and
a timing controller (400);
characterized in that
the sequential compensation voltage is based on the characteristic change of the driving thin film transistor (DT) corresponding to an elapse of a driving time of the driving thin film transistor (DT),
the timing controller (400) is configured to set at an initial driving time a driving voltage (SVDD) of the data driver (200), and to set a new driving voltage (SVDD) of the data driver (200), as a value corresponding to a sum of the data voltage (Vdata), the initial compensation voltage and the sequential compensation voltage at a current time, and
the timing controller (400) controls the power unit (600) to set the calculated driving voltage (SVDD) value to supply the set driving voltage (SVDD) to the data driver (200),
wherein the driving voltage (SVDD) of the data driver (200) is set as a sum of the data voltage (Vdata), and a maximum compensation voltage,
wherein the maximum compensation voltage is a maximum value of a plurality of values obtained by summating the sequential compensation voltage and the initial compensation voltage of each of the all pixels, and
wherein the driving voltage (SVDD) is supplied to the data driver (200) from the power unit (600) and the data driver (200) generates the driving voltage (Vd) by using the driving voltage (SVDD) to supply the driving voltage (Vd) to the driving thin film transistor (DT)."

(b) Claim 1 of the first auxiliary request comprises all features of claim 1 of the main request, and further includes the feature that the data driver comprises a grayscale voltage generator, which generates a plurality of grayscale voltages by using a plurality of reference gamma voltages.

(c) Claim 1 of the second auxiliary request reads as follows:

"An organic light emitting display device comprising:
a display panel (100) configured to include a plurality of pixels, each of the plurality of pixels including an organic light emitting diode (OLED) and a pixel circuit (PC) for emitting light from the corresponding organic light emitting diode (OLED);
a compensation circuit (210) configured to generate a compensation voltage value being composed of an initial compensation voltage value and a sequential compensation voltage value of a driving thin film transistor (DT) included in a respective pixel circuit (PC);
a data driver (200) comprising a greyscale voltage generator, which generates a plurality of greyscale voltages by using a plurality of reference gamma voltages, and being configured to reflect the compensation voltage value in a data voltage (Vdata) value based on an image signal to generate a driving voltage (Vd) that is used to drive the respective driving thin film transistor (DT) included in the pixel circuit (PC), and supply the driving voltage (Vd) of the driving thin film transistor (DT) to each of the plurality of pixels;
a power unit (600) which is connected to the data driver (200); and

a timing controller (400);
characterized in that
the sequential compensation voltage value is based on the characteristic change of the driving thin film transistor (DT) corresponding to an elapse of a driving time of the driving thin film transistor (DT),
the timing controller (400) is configured to set at an initial driving time a supply voltage (SVDD) value of the data driver (200), and to set a new supply voltage (SVDD) value of the data driver (200), as a value corresponding to a sum of a maximum data voltage (Vdata) and a maximum compensation voltage at a current time,
wherein the maximum compensation voltage is a maximum value of a plurality of values each obtained by summating the sequential compensation voltage and the initial compensation voltage of a respective one of the driving thin film transistors (DT) of the plurality of pixels, and
the timing controller (400) controls the power unit (600) to set the calculated supply voltage (SVDD) value to supply the set supply voltage (SVDD) to the data driver (200), and
wherein the supply voltage (SVDD) is supplied to the data driver (200) from the power unit (600) and the data driver (200) generates the driving voltage (Vd) by using the supply voltage (SVDD) to supply the driving voltage (Vd) to the driving thin film transistor (DT)."

IV. Following the summons to oral proceedings, the Board sent the appellant a communication under Article 15(1) RPBA. The preliminary view of the Board was that claim 1 of the main request appeared to lack clarity within the meaning of Article 84 EPC. Whether the requests involved an inventive step and met the requirements of Article 123(2) EPC was also discussed.

V. The appellant's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

(i) Although the wording of claim 1 of the main request might lack precision in relation to the definition of the value at which the driving voltage (SVDD) of the data driver was to be set, it would be clear to the skilled person that the driving voltage of the data driver should be set to a value equal to the maximum possible data voltage plus the maximum compensation voltage. Claim 1 of the main request was therefore clear for the skilled reader. The argument for claim 1 of the first auxiliary request in relation to clarity was the same as that for claim 1 of the main request.

(ii) The second auxiliary request should be admitted into the procedure as it included amendments to address the objections raised in the preliminary opinion of the Board of Appeal for the first time.

Furthermore, claim 1 of the second auxiliary request did not give rise to any new objections, in particular in relation to the requirements of Article 123(2) EPC. The skilled person would understand from the application as originally filed that the driving voltage (SVDD) of the data driver should be set to a value equal to the maximum possible data voltage plus the maximum compensation voltage, wherein the maximum possible data voltage was the value corresponding to the highest brightness value being possible. This was supported by the statement of the objective of the invention in paragraph [0051], and also by paragraphs [0121] and [0128], in which the word "minimum" was an obvious mistake. Further support could be found in paragraph [0108].

(iii) The invention as defined by any of the requests was new and involved an inventive step over the cited prior art.

Reasons for the Decision

1. The appeal is admissible.

2. *Background of the Invention*

2.1 The present invention relates to a device and method which optimises a driving voltage of a data driver in an organic light emitting display (OLED) to reduce power consumption, as set out in paragraph [0002] (paragraph numbers refer to the description of the present application as originally filed).

2.2 Non-uniformity in the OLED manufacturing process may lead to driving thin film transistors (TFTs) having different characteristics for different pixels which results in a non-uniform image (paragraph [0011]). A known solution is to provide a compensation circuit in each pixel, so that the applied pixel driving voltage is the sum of the data voltage (Vdata) based on an image signal and a compensation voltage (paragraph [0012]).

The characteristics of the TFTs may deteriorate over time, and hence a compensation voltage may be applied which is the sum of an initial compensation voltage, used to compensate for an initial deviation, and a sequential compensation voltage which is used to

compensate for a sequential change due to deterioration or change during a use period (paragraph [0015]).

2.3 The driving voltage of the data driver must be high enough to drive the pixels even at a point in time when the maximum sequential compensation voltage is required. However, if the driving voltage is set at a fixed high value, then initially, when little or no sequential compensation voltage is required, power is wasted (paragraph [0017]).

The invention aims to optimise the driving voltage of a data driver (SVDD) in order to eliminate or reduce the waste in energy.

3. *Claim 1 of the main request: Article 84 EPC*

3.1 As explained above, the key idea of the invention is that the driving voltage (SVDD) of the data driver is not fixed, but can be dynamically set to an optimal value for a given elapse of driving time, taking into account the deterioration of the driving TFTs, in order to reduce wasted energy.

Hence, the clarity requirement of Article 84 EPC implies *inter alia* that claim 1 should include an unambiguous definition of the optimal value at which, according to the invention, the driving voltage of the data driver should be set.

3.2 A first definition is given in lines 18 to 20 of claim 1, according to which the timing controller sets the driving voltage (SVDD) of the data driver to be:

"a value corresponding to a sum of the data voltage (Vdata), the initial compensation voltage and the sequential compensation voltage at a current time".

According to claim 1 (lines 7 and 8) the data voltage (Vdata) value is "based on an image signal", and hence would generally vary from pixel to pixel. The initial compensation voltage and the sequential compensation voltage are derived from (lines 5 and 6):

"a compensation circuit (210) configured to generate an initial compensation voltage of a driving thin film transistor (DT) and a sequential compensation voltage".

The initial compensation voltage and the sequential compensation voltage are "of a driving thin film transistor", and are therefore also defined on a pixel by pixel basis.

Hence, this first definition implies that the driving voltage (SVDD) of the data driver would vary from pixel to pixel, both as a result of the data voltage and the compensation voltages.

3.3 Later in claim 1 (line 26 to 30) a second definition of SVDD is given:

"wherein the driving voltage (SVDD) of the data driver (200) is set as a sum of the data voltage (Vdata), and a maximum compensation voltage,

"wherein the maximum compensation voltage is a maximum value of a plurality of values obtained by summating the sequential compensation voltage and the initial compensation voltage of each of the all pixels".

According to this definition the driving voltage (SVDD) of the data driver would appear to vary from pixel to pixel by virtue of the data voltage, but a single maximum value for the compensation voltage is used for all pixels.

3.4 The appellant accepted that claim 1 "lacks precision" in this respect, but argued that what was intended was that the SVDD would be applied as one value, and not on a pixel by pixel basis, and the correct definition of the value to which the SVDD should be set is the sum of the maximum value of the data voltage and the maximum value of the compensation voltage, where the maximum value of the data voltage "is the value corresponding to the highest brightness being possible" (letter dated 10 January 2022, page 5). According to the appellant, this would be understood by a skilled person reading the claim.

3.5 It is established case law that the claims *per se* must be free of contradiction, and must be clear in themselves when read by the person skilled in the art, without any reference to the content of the description (*Case Law of the Boards of Appeal*, 9th Edition, 2019, II.A.3.1, first paragraph).

A claim comprising two different definitions of the same quantity is not free of contradiction, and generally would be regarded as lacking clarity within the meaning of Article 84 EPC.

3.6 It is arguable that there might be cases where, despite a claim comprising apparently contradictory definitions, clarity could nevertheless be acknowledged if it could be persuasively argued that a skilled person, having in mind the common general knowledge in

the art, would understand that one of the claimed definitions was clearly the correct one and the other one manifestly inaccurate.

In the present case, however, the argument of the appellant is that both definitions given in claim 1 are inaccurate. The Board does not see how this could constitute an argument that claim 1 of the main request is clear within the meaning of Article 84 EPC.

3.7 As noted above, the claims should be clear in themselves without any reference to the content of the description. However, even if, *arguendo*, one were to look to the description in the present case, this would not add anything to support the contention that claim 1 is clear.

According to the appellant's arguments, the "clear" meaning of claim 1 is that the driving voltage (SVDD) of the data driver is set equal to the maximum possible data voltage plus the maximum compensation voltage. This is not, however, stated anywhere in the description, and neither the concept of a "maximum possible data voltage" nor even a "maximum data voltage" is disclosed. The description therefore provides no support for the allegedly "clear" meaning of claim 1 proposed by the appellant.

3.8 In the light of the above considerations, the Board judges that claim 1 of the main request lacks clarity and therefore does not meet the requirements of Article 84 EPC.

4. *Claim 1 of the first auxiliary request: Article 84 EPC*

The definitions referred to above under points 3.2 and 3.3 are also found in claim 1 of the first auxiliary request. Hence, the first auxiliary request does not meet the requirements of Article 84 EPC.

5. *Second auxiliary request: Admission into the proceedings*

5.1 In the contested decision the subject-matter of the main and auxiliary requests was rejected for lack of inventive step. The clarity objection set out above was raised for the first time in the Board's communication under Article 15(1) RPBA, and this could be seen as constituting "exceptional circumstances", within the meaning of Article 13(2) RPBA, which might allow the second auxiliary request, which was filed in response to these new objections, to be taken into account.

5.2 However, in applying Article 13(2) RPBA, the Board may also rely on the criteria set out in Article 13(1) RPBA (see Supplementary publication 2 of the Official Journal EPO 2020, explanatory notes to Article 13(2), page 60, fourth paragraph; see also T 2429/17, Reasons for the Decision, point 2.2).

According to Article 13(1) RPBA, any amendment to a party's appeal case after it has filed its grounds of appeal or reply may be admitted only at the discretion of the Board, and in exercising its discretion the Board shall take into account *inter alia*:

"whether the party has demonstrated that any such amendment, prima facie, overcomes the issues raised by ... the Board and does not give rise to new objections."

5.3 According to claim 1 of the second auxiliary request the timing controller sets an initial SVDD value, and subsequently sets a new supply voltage value of the data driver:

"as a value corresponding to a sum of a maximum data voltage (Vdata) and a maximum compensation voltage at a current time".

The term "maximum data voltage" has no explicit basis in the application as originally filed.

5.4 As used in Article 13(1) RPBA the expression *prima facie* means "At first sight; on the face of it; as it appears at first without investigation" (Oxford English Dictionary). Since there is always a *prima facie* doubt that amendments having no explicit basis in the original application comply with the requirements of Article 123(2) EPC, the Board doubts that such amendments, filed after the grounds of appeal or reply, could ever be regarded as meeting the requirements of Article 13(1) RPBA.

5.5 Moreover, in the present case the appellant's arguments fail to dispel the Board's doubts that the amendment meets the requirements of Article 123(2) EPC.

Paragraph [0051], cited by the appellant, defines the invention in general terms ("the present invention optimizes an SVDD voltage supplied to a data driver") and states the technical aim ("the present invention can decrease consumption power that is wasted"), without providing support for the claimed formulation cited above under point 5.3.

The appellant cites paragraphs [0121] and [0128], which disclose a driving voltage of the data driver being "the minimum value corresponding to the sum of the maximum compensation voltage and a data voltage based on an image signal". Whether the word "minimum" is an obvious error, as asserted by the appellant, is questionable, but even if this were admitted, what is disclosed in these paragraphs does not correspond to the amended feature. In the Board's view the adjective "maximum" applies to the "compensation voltage" and not to "a data voltage based on an image signal", a view which is supported by the final phrase in paragraph [0031]. Even if the Board's view were contested, it is, at the very least, not unambiguously clear that the adjective "maximum" applies to "a data voltage based on an image signal".

Paragraph [0108], also cited by the appellant, mentions a "maximum driving voltage", but again, there is no disclosure of a "maximum data voltage".

5.6 For the reasons given above, the Board judges that the amendment cited above under point 5.3 raises *prima facie* a new objection under Article 123(2) EPC, and hence the second auxiliary request is not admitted into the proceedings (Article 13(2) RPBA in combination with Article 13(1) RPBA).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero M. Papastefanou

Decision electronically authenticated