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Datasheet for the decision of 12 January 2022

Case Number: T 0134/19 - 3.4.03

Application Number: 14154972.5

Publication Number: 2767972

IPC: G09G3/36, G06F3/041, H02J17/00

Language of the proceedings: EN

Title of invention:
Display devices, wireless charging system including display devices, and methods of operating the display devices

Applicant:
Samsung Electronics Co., Ltd.

Headword:

Relevant legal provisions:
EPC Art. 52(1), 56
RPBA 2020 Art. 12(3)
RPBA Art. 12(4)

Keyword:

Inventive step - obvious combination of known features - main request (no)
Late-filed request - request clearly allowable (no) - request could have been filed in first instance proceedings (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

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Case Number: T 0134/19 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 12 January 2022

Appellant: (Applicant)	Samsung Electronics Co., Ltd. 129, Samsung-ro Yeongtong-gu Suwon-si Gyeonggi-do 443-742 (KR)
Representative:	Elkington and Fife LLP Prospect House 8 Pembroke Road Sevenoaks, Kent TN13 1XR (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 26 July 2018 refusing European patent application No. 14154972.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	T. Häusser
Members:	J. Thomas
	C. Heath

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division to refuse European patent application No. 14 154 972 on the grounds that

- the then main request did not fulfil the requirements of Articles 123(2), 84 EPC and 52(1) EPC in combination with Article 56 EPC,
- the then first and second auxiliary requests did not fulfil the requirements of Article 52(1) EPC in combination with Article 56 EPC.

II. At the end of the oral proceedings held before the Board the appellant requested that

- the decision under appeal be set aside and
- a patent be granted in the version of the main request, or one of the first to eleventh auxiliary requests, all filed with the statement setting out the grounds of appeal.

III. The following documents are referred to:

D1: WO 2012/132929 A1;
D1a: US 2014/0015337 A1;
D5: WO 2012/037444 A2;
D6: "Inductive & Capacitive Proximity Sensor Control Technology", 1 February 2001, from www.traskinstrumentation.com;
D7: "Capacitive Proximity Sensors", 6 July 2009, from www.thomasnet.com.

IV. Claims 1, 8 and 13 of the **main request** are worded as follows:

Claim 1:

A display device (300) for being charged by a charging device adapted to generate an electric field, the display device comprising:

a display panel (310) including at least two electrodes, comprising a first electrode and a second electrode spaced apart from the first electrode;

a panel driving unit (320) configured to drive the display panel;

a power storage unit (330) configured to store received power by an electric field coupling method; and

a switching unit (340) configured to electrically connect the at least two electrodes to one of the panel driving unit and the power storage unit, and

characterized by further comprising:

a sensor (360) configured to sense an intensity of the electric field, generated by the charging device, around the at least two electrodes, wherein the switching unit is configured to electrically connect the at least two electrodes to one of the panel driving unit and the power storage unit based on the output of the sensor,

and in that the switching unit is configured to

(i) electrically connect the at least two electrodes to the power storage unit if the sensor output indicates that the electric field intensity of the electric field generated by the charging device is greater than or equal to a first electric field reference value, and

(ii) electrically disconnect the at least two electrodes from the power storage unit if the sensor output indicates that the electric field intensity of the electric field generated by the charging device is less than a second electric field reference value, wherein the first electric

field reference value is greater than the second electric field reference value.

Claim 8:

A charging system, comprising:
the display device of any preceding claim; and
a charging device configured to generate electric field.

Claim 13:

A method of operating a display device for being charged by a charging device adapted to generate an electric field, characterized by comprising:
detecting an intensity of the electric field generated by the charging device, around at least two electrodes, comprising a first electrode and a second electrode spaced apart from the first electrode, of a display panel, the display panel being configured to display an image based on a voltage applied to the at least two electrodes, wherein the display panel is driven by a panel driving unit configured to drive the display panel;
switching an electrical connection of the at least two electrodes to a power storage unit based on the detected electric field; and
storing power in the storage unit if the at least two electrodes is [sic] electrically connected to the power storage unit,
wherein switching comprises: electrically connecting the at least two electrodes to the power storage unit if the detected electric field intensity of the electric field generated by the charging device is greater than or equal to a first

electric field reference value; and electrically disconnecting the at least two electrodes from the power storage unit if the detected electric field intensity of the electric field generated by the charging device is less than a second electric field reference value, wherein the first electric field reference value is greater than the second electric field reference value.

V. The amendments in the independent claims of the **first auxiliary request** compared to the main request are as follows.

In claim 1, the underlined features (underlining by the Board) are added in the following features recited from claim 1 of the main request:

"and in that the switching unit is configured to (i) electrically disconnect the at least two electrodes from the panel driving unit and electrically connect the at least two electrodes to the power storage unit if the sensor output indicates that the electric field intensity of the electric field generated by the charging device is greater than or equal to a first electric field reference value, and (ii) electrically disconnect the at least two electrodes from the power storage unit and electrically connect the at least two electrodes to the panel driving unit if the sensor output indicates that the electric field intensity of the electric field generated by the charging device is less than a second electric field reference value, wherein the first electric field reference value is greater than the second electric field reference value."

Claim 8 remains unchanged compared to claim 8 of the main request.

In claim 13, the underlined features (underlining by the Board) are added in the following features recited from claim 13 of the main claim:

"wherein switching comprises: electrically disconnecting the at least two electrodes from the panel driving unit and electrically connecting the at least two electrodes to the power storage unit if the detected electric field intensity of the electric field generated by the charging device is greater than or equal to a first electric field reference value; and electrically disconnecting the at least two electrodes from the power storage unit and electrically connecting the at least two electrodes to the panel driving unit if the detected electric field intensity of the electric field generated by the charging device is less than a second electric field reference value, wherein the first electric field reference value is greater than the second electric field reference value."

VI. The **second and third auxiliary requests** are based on the main and first auxiliary requests, respectively, but deleting dependent claim 2 and renumbering the remaining claims.

VII. The **fourth auxiliary request** is based on the main request wherein

- "sensor" is replaced by "Hall effect sensor" in claim 1,
- claim 8 remains unchanged compared to claim 8 of the main request and
- claim 13 is, compared to claim 13 of the main request, amended as follows (underlining by the

Board indicating the amendments): "detecting, using a Hall effect sensor, an intensity of the electric field".

VIII. The amendments of the **fifth to seventh auxiliary requests** concern the same amendments as the first to third auxiliary requests, respectively, but the claims are based on the fourth auxiliary request instead of the main request.

IX. The amendments of the **eighth auxiliary request** are compared to the fourth auxiliary request the following (underlining and strike-through by the Board indicating the amendments):
Claim 1: "and ~~in that the switching unit is~~ a control unit (350) configured to control the switching unit to".
Furthermore, dependent claims 6 and 7 are deleted and the remaining claims are renumbered.

X. The amendments of the **ninth to eleventh auxiliary requests** concern the same amendments as the fifth to seventh auxiliary requests, respectively, but the claims are based on the eighth auxiliary request instead of the fourth request.

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

Main request - inventive step:
Document D1 disclosed a power charging device in which the switching on and off of the power receiving device was based on the detection of a physical contact between the power transmitting device and the power receiving device. The use of a standard proximity

sensor was therefore the most obvious choice for the sensor which was unspecified in document D1.

Document D5 dealt with improving the alignment accuracy of the two devices, but did not link this alignment accuracy to the on/off switch event that was triggered in document D1 by the physical contact of the two devices. Documents D1 and D5 could not be combined due to this lack of linkage between the alignment accuracy and the switching event. Furthermore, the "spacing" mentioned in document D5 on page 9, line 25, was not specified in more detail and was not necessarily associated with the separation distance between the power receiving and power transmitting devices. Rather, the horizontal offset between the two devices could have been meant here. Furthermore, in document D5, page 9, lines 22 to 26, the first and second sentences were unrelated, so monitoring the wireless signal using the electric field strength as indicated in the first sentence was not associated with the undefined spacing used in the second sentence of this paragraph. Consequently, there was no direct hint to the use of a sensor that measures the electric field strength for deciding whether the power receiving device should be switched on or off.

Admission of the first to third and fifth to eleventh auxiliary requests:
The requests were in response to the examining division's decision in order to overcome the objections raised therein.

Admission of the fourth auxiliary request:
The use of a Hall effect sensor was not specified in any of the available cited prior art documents. Since a proximity sensor was the most obvious choice for the

unspecified sensor disclosed in document D1, the choice of a Hall effect sensor provided an inventive contribution over the available prior art.

Reasons for the Decision

1. The appeal is admissible.

2. Main request - inventive step

2.1 The main request comprises independent claim 1 directed to a display device and independent claim 8 directed to a charging system as well as an independent method claim (claim 13). The Board's assessment of inventive step will focus on the display device as defined in claim 1.

2.2 Closest prior art

2.2.1 The closest prior art is document D1 which is written in Japanese. The examining division assumed that document D1a, which is a US patent application and a family document of the international application D1, has an identical content with document Dl (see European Search Opinion). The Board agrees with this assessment, since in addition to identical figures and apparently identical content of both documents D1 and D1a, they also claim the priority from the same Japanese patent application (JP 2011-0763231). Therefore, in the following, the Board refers to document D1a instead of document D1. This was never objected to by the appellant during the entire proceedings.

2.2.2 Document D1a shows a display device (title, [0064], [0065]) for being charged by a charging device (2;

[0065]) adapted to generate an electric field ([0066]), the display device comprising:
a display panel (figure 4B) including at least two electrodes (7, 17A and 18A), comprising a first electrode and a second electrode spaced apart from the first electrode (figure 4B);
a panel driving unit ([0074]) configured to drive the display panel;
a power storage unit ([0065], [0066]) configured to store received power by an electric field coupling method; and
a switching unit (21) configured to electrically connect the at least two electrodes to one of the panel driving unit and the power storage unit (Figure 5), and further comprising:
~~a sensor configured to sense an intensity of the electric field, generated by the charging device, around the at least two electrodes, wherein the switching unit is configured to electrically connect the at least two electrodes to one of the panel driving unit and the power storage unit based on the output of the sensor, and in that the switching unit is configured to~~
~~(i) electrically connect the at least two electrodes to the power storage unit if the sensor output indicates that the electric field intensity of the electric field generated by the charging device is greater than or equal to a first electric field reference value, and~~
~~(ii) electrically disconnect the at least two electrodes from the power storage unit if the sensor output indicates that the electric field intensity of the electric field generated by the charging device is less than a second electric field reference value, wherein the first electric field reference value is greater than the second electric field reference value.~~

Rather, in the device of D1a a sensor/control unit (20) is configured to detect/determine the proximity of the display device with respect to the charging device ([0084], [0085], [0113], [0114]).

2.3 Differentiating features

The subject-matter defined in claim 1 differs from the teaching of documents D1/D1a by

- the detailed specification of the control unit defining according to which criteria the control unit determines that the electrodes are ready for power transmission and proceeds to the switching operation to perform the power feeding operation and
- the first and second reference values used for deciding the on and off switching of the charging device by the control unit as defined by features (i) and (ii) in claim 1.

2.4 Technical effect and objective technical problem to be solved

The first differentiating feature relates to the choice of how to take the decision to switch the power transmission device on and off. The second differentiating feature is a consequence of the first selected feature in order to render the selection well-functioning.

Hence, the objective technical problem solved by the differentiating features concerns the selection and correct implementation of the - in document D1 unspecified - sensor which determines the presence or proximity of the power receiving unit (power storage unit) in relation to the power transmitting unit (power

charging device) in order to properly implement the on/off switching of the power receiving unit.

2.5 Obviousness

2.5.1 Document D1/D1a is silent on how the power receiving unit determines that it is placed on the power transmitting device or that the electrodes responsible for charging are in "close proximity". Document D1a only indicates throughout the document that the power receiving device should be placed on the power transmitting device or that the charging electrodes must be in close proximity to the power receiving device, but no indication is given in document D1a how this "placement of the power receiving unit on the power transmitting unit" or the "close proximity" is detected.

Therefore, the skilled person, when starting from the teaching of document D1a, looks for a suitable sensor which allows the detection/determination of the presence or absence of the power receiving device on, close to or at a predetermined distance from the power transmitting device.

A suitable solution thereto is indicated in document D5, which deals with a non-contact power transfer in electronic devices. Document D5 indicates near-field coupling so that wireless power modules transfer a wireless power signal across a separation distance and hence between a first and second electronic device (D5: page 5, lines 20 to 32). In particular, document D5 indicates that one or more characteristics of wireless signals, such as signal strength and/or signal transmission efficiency, may be monitored to increase alignment accuracy (D5: page 9, lines 22 to 26). This

is done using a differential capacitance sensor which senses the spacing and/or alignment between the first electronic device and the second electronic device (D5: page 9, lines 3 to 26). The skilled person can understand this information only in one way, namely that an electric field is sensed and according to the electric field strength the on/off switching of the power charging unit is activated or not. This corresponds exactly to what is defined in present claim 1. Therefore, the skilled person receives an immediate hint from document D5 to implement the in D1/D1a unspecified sensor by a sensor measuring the electric field strength.

Hence, the first differentiating feature is obvious to the skilled person based on the teaching of document D1 in combination with document D5.

2.5.2 Concerning the second differentiating feature, the skilled person realises when implementing a sensor detecting the electric field strength that the use of a single threshold value of the electric field strength used for the on/off switching would result in the so-called jitter effect (an undesired on/off switching by the sensor due to small uncontrollable variations in the electric field strength). This is part of the common general knowledge of the skilled person. It is further part of the common general knowledge how the jitter effect can be suppressed. The well-known solution thereto is the use of two different thresholds for the on-switching decision and the off-switching decision as defined in present claim 1. This is also exemplified in documents D6 or D7. Hence, the second feature emerges automatically in order to implement the first feature in a technically correct and operational way.

In addition, it is noted that the use of two different thresholds is even already hinted at in document D1a. D1a teaches to start the power charging process when the display device is "positioned on" the charging device. Furthermore, the charging process is interrupted when the display device is "at a predetermined distance" away and not already when the display device is no longer on the charging device. This means that the threshold value for the switching-on decision is apparently smaller ("positioned on") than for the switching-off decision ("at a predetermined distance away"). Therefore, the suppression of the jitter effect is already suggested in document D1a - at least incidentally. Therefore, the suppression of the jitter effect using two different threshold values must be considered all the more obvious for the skilled person when starting from document D1/D1a and attempting to solve the posed technical problem.

2.5.3 Moreover, the use of a standard proximity sensor, held by the appellant to be the obvious choice for implementing the unspecified sensor of D1/D1a, does not appear to present a technically reasonable choice, because it would determine simply the proximity of other objects. This would cause a high number of faulty switching operations, since every object that came close to the display device would cause the power storing unit to be switched on independently of the fact whether it is in fact a power charging unit that is provided in close proximity or not. Therefore, the detection of the parameter which is used for the charging process is the most obvious choice in order to decide upon the switching event as indicated in document D5 (page 9, lines 22 to 26). Hence, the

skilled person would get the necessary hint from document D5 (page 9, lines 22 to 26), wherein the two sentences in the cited passage are separate but would be considered to be intimately linked by the skilled person. Indeed, the skilled person would take from both sentences the necessary information and conclude that the relevant parameter is the electric field strength. The skilled person would also understand that the spacing and the alignment are interrelated insofar as both values are significant and that the strength of the wireless signal presenting the electric field strength is the relevant parameter to detect.

2.5.4 In view of the above the board reaches the conclusion that the subject-matter defined in present claim 1 does not involve an inventive step based on the teaching of document D1 in combination with document D5 and common general knowledge.

3. Admission of the first to eleventh auxiliary requests into the procedure

3.1 None of the first to eleventh auxiliary requests are admitted into the procedure for the following reasons.

3.2 All of the auxiliary requests could have been filed during the examining procedure, in particular if the appellant had attended the oral proceedings before the examining division. Not attending oral proceedings is equivalent to waiving an essential opportunity to overcome the outstanding objections (Article 12(4) RPBA 2007 which applies according to Article 25(2) RPBA 2020).

3.3 In addition, the first to third and fifth to eleventh auxiliary requests are not substantiated and the fourth

auxiliary request is neither substantiated with respect to inventive step nor does it obviously remedy the objections raised. Details therefor are presented in the following.

3.3.1 In the statement setting out the grounds of appeal, the appellant holds that the amendments provided in the first to third auxiliary requests should clarify the claimed subject-matter:

- page 7, section "FIRST AUXILIARY REQUEST": "Claim 1 has also been amended to clarify ...", "This amendment has been performed to explicitly clarify ...";
- page 8, sections "SECOND AUXILIARY REQUEST" and "THIRD AUXILIARY REQUEST": "This amendment has been done for the sake of improved clarity".

No arguments were presented why these amendments should overcome the objection concerning lack of inventive step. The first to third auxiliary requests are consequently not a response to the decision and do not set out any reason why the appellant requested that the decision under appeal be reversed. These requests are consequently not sufficiently substantiated and the statement of grounds of appeal is not considered to comply with the provisions of Article 12(3) RPBA 2020 in relation to these requests.

3.3.2 Claim 1 of the fourth auxiliary request further specifies the sensor which is configured to sense an intensity of the electric field being a "Hall effect sensor".

In the statement setting out the grounds of appeal, the appellant holds that this amendment provides additional clarification and that documents D5, D6 and D7 do not suggest to use a Hall effect sensor. Hence, the

appellant's arguments relate to clarity and novelty but not to inventive step, since the closest prior art document, namely document D1/D1a is not even mentioned at all in this context. Concerning the selection of a Hall effect sensor, it is noted that the mere fact that documents D5 to D7 do not explicitly mention the most obvious solution, does not mean that this solution is inventive thereby overcoming the objection of lack of inventive step raised with respect to the main request. Therefore, the fourth auxiliary request is unsubstantiated with respect to the objection concerning lack of inventive step and the statement of grounds of appeal is not considered to comply with the provisions of Article 12(3) RPBA 2020 in relation to this request, either.

3.3.3 The amendments provided in the fifth to seventh auxiliary request are identical to the amendments provided in the first to third auxiliary request, however this time based on the fourth auxiliary request (instead of the main request for the first to the third auxiliary request). No reasoning going beyond that provided for the first to fourth auxiliary requests is contained in the statement of grounds of appeal, which is therefore not considered to comply with the provisions of Article 12(3) RPBA 2020 in relation to these requests.

3.3.4 The eighth auxiliary request provides an amendment with respect to the control unit in relation to the switching unit.
In the statement setting out the grounds of appeal, the applicant indicated that "[t]his amendments [sic] has been performed for more complete compliance with Article 84 EPC". Therefore, no argument is presented why the amendment overcomes the objection concerning

lack of inventive step. The appellant did not clearly and concisely set out why it is requested that the decision under appeal be reversed when dealing only with clarity issues and not with the objection concerning lack of inventive step. Hence, the statement of grounds of appeal does not comply with the provisions of Article 12(3) RPBA 2020 in relation to the eighth auxiliary request.

3.3.5 The amendments provided in the ninth to eleventh auxiliary requests are the same as in the first to third and fifth to seventh auxiliary requests, but now based on the eighth auxiliary request (instead of the main or fourth auxiliary request, respectively). No reasoning going beyond that provided for the first to eighth auxiliary requests is contained in the statement of grounds of appeal, which is therefore not considered to comply with the provisions of Article 12(3) RPBA 2020 in relation to these requests, either.

3.4 For the above reasons the first to eleventh auxiliary requests are not admitted into the proceedings according to Article 12(4) RPBA 2007 and Article 12(3) RPBA 2020.

4. Conclusion

Since the subject-matter defined in claim 1 of the main request does not involve an inventive step and the first to eleventh auxiliary requests are not admitted into the proceedings, the appeal must fail.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero T. Häusser

Decision electronically authenticated