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**Datasheet for the decision  
of 30 October 2013**

**Case Number:** T 0442/10 - 3.4.02  
**Application Number:** 07014462.1  
**Publication Number:** 1882976  
**IPC:** G02F1/1343, G02F1/1333  
**Language of the proceedings:** EN  
**Title of invention:**  
Liquid crystal display  
**Applicant:**  
Samsung Display Co., Ltd.  
**Relevant legal provisions:**  
EPC 1973 Art. 56  
**Keyword:**  
Inventive step (yes - amended claims)



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Case Number: T 0442/10 - 3.4.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.02**  
**of 30 October 2013**

**Appellant:** Samsung Display Co., Ltd.  
(Applicant) 95, Samsung 2 Ro  
Giheung-Gu  
Yongin-City, Gyeonggi-Do (KR)

**Representative:** Weitzel, Wolfgang  
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Patent- und Rechtsanwälte  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 5 October 2009  
refusing European patent application No.  
07014462.1 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman:** A. G. Klein  
**Members:** F. J. Narganes-Quijano  
L. Bühler

## Summary of Facts and Submissions

- I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 07014462.1 (publication No. 1882976).

In its decision the examining division held with regard to claim 1 of the set of claims then on file that the claimed subject-matter did not involve an inventive step in view of the disclosure of documents

D1: US 2006/0059837 A1

D2: US 2004/0135147 A1.

- II. With the statement setting out the grounds of appeal the appellant filed sets of claims amended according to a main and an auxiliary request, and requested that the decision under appeal be set aside and a patent be granted.
- III. In a communication annexed to summons to oral proceedings the Board gave a preliminary assessment of the case.
- IV. In reply to the Board's communication, the appellant filed with the letter dated 11 October 2013 an amended set of claims 1 to 20, and with the letter dated 16 October 2013 an amended description (pages 1 to 3, 3a, and 4 to 31) replacing the corresponding application documents on file.

The wording of claim 1 amended according to the appellant's request reads as follows:

"A liquid crystal display comprising:

a substrate (110);  
a plurality of gate lines (121) formed on the substrate (110);  
a plurality of data lines (171) formed on the substrate (110) so as to intersect the gate lines (121); and  
a plurality of pixel electrodes (191) formed on the substrate (110), wherein the pixel electrode (191) comprises  
a first main side (90b) substantially parallel with the gate line (121),  
a second main side (90a) substantially parallel with the data line (171),  
a first oblique side (90c) making a first oblique angle with respect to the first main side (90b), and  
a second oblique side (90d) making a second oblique angle with respect to the first main side (90b),  
the first oblique angle and the second oblique angle being different from each other,  
the liquid crystal display further comprising a plurality of storage electrode lines (131), at least a part of the second oblique side (90d) being intersected by one electrode line (131) among the plurality of storage electrode lines (131); and  
wherein the first main side (90b), the second oblique side (90d), the first oblique side (90c), and the second main side (90a) are sequentially adjacent to one another."

The claim request also includes dependent claims 2 to 20 all referring back to claim 1.

V. In view of the amendments to the application documents and the arguments submitted by the appellant, the oral proceedings were cancelled.

## **Reasons for the Decision**

1. The appeal is admissible.
2. *Amendments*

The Board is satisfied that the application documents amended according to the appellant's request satisfy the formal requirements of the EPC. In particular, claim 1 is based on claim 1 as originally filed together with the features of dependent claims 3 and 9 as originally filed, and dependent claims 2 to 20 are respectively based on dependent claims 2, 4 to 8 and 10 to 22 as originally filed (Article 123(2) EPC).

As regards the description, its content has been revised and brought into conformity with the invention as presently claimed (Article 84, second sentence, and Rule 27(1) (c) EPC 1973), and the pertinent prior art has been appropriately acknowledged in the introductory part of the description (Rule 27(1) (b) EPC 1973).

3. *Novelty and inventive step*
  - 3.1 Document D1, considered by the examining division in its decision to represent the closest state of the art, discloses a liquid crystal display (see abstract and Figures 1, 3, 9 and 11 together with the corresponding description) of the type comprising a substrate (110 in Figure 4), a plurality of pixel electrodes (191), a plurality of gate lines (121), a plurality of data lines (171) intersecting the gate lines, and a plurality of storage electrode lines (131), the pixel electrodes having a substantially rectangular shape

with a main side parallel to a respective one of the gate lines and a main side substantially parallel to a respective one of the data lines (Figures 1, 3, 9 and 11).

Claim 1 as presently amended is also directed to a liquid crystal display of the type disclosed in document D1, and the claim incorporates features that were not present in claim 1 considered by the examining division in the decision under appeal. The resulting combination of features results in a display that differs from the display disclosed in document D1 in several respects. In particular, while in document D1 the main side of the pixel electrodes adjacent and parallel to the respective gate line is connected to the adjacent main side adjacent and parallel to the respective data line by three relatively small, oblique sides connected to each other so as to form a chamfered side segment at the corner of the pixel electrodes (Figures 1, 3, 9 and 11 together with the corresponding description, in particular paragraph [0072]), claim 1 requires that this chamfered side segment is constituted by two oblique sides connected to each other, the angle between the main side parallel to the gate line and the oblique side connected to the main side parallel to the data line being different than the angle between the main side parallel to the data line and the oblique side connected to the main side parallel to the gate line.

In addition, while in document D1 the storage electrode line associated to a respective one of the pixel electrodes only intersects the intermediate one of the three oblique sides of the pixel electrode (storage electrode line 131 in Figures 1, 3, 9 and 11), present claim 1 requires that the storage electrode line

intersects at least a part of the oblique side connected to the main side parallel to the gate line of the pixel electrode.

Document D2 also discloses a liquid crystal display of the type disclosed in document D1. However, contrary to the claimed subject-matter - and also contrary to document D1 -, in document D2 the main sides of the pixel electrodes are directly connected to each other at the corner of the electrode without the intermediate of a chamfered side segment. Therefore, claim 1 also defines new subject-matter over the disclosure of document D2.

The remaining documents on file are less pertinent than documents D1 and D2.

It follows that the subject-matter of claim 1 is new over the disclosure of each of documents D1 and D2.

- 3.2 As concluded in point 3.1 above, the claimed liquid crystal display differs from the display disclosed in document D1 in the shape of the chamfered side segment of the pixel electrodes and in the relative position of the storage electrode lines with respect to the chamfered side segments of the pixel electrodes. According to the appellant's submissions and to the disclosure of the claimed display in the description of the application (Figure 3 together with Figures 6 to 9 and the corresponding disclosure on page 17, line 23 to page 19, line 12), the distinguishing features identified above determine a spatial configuration of the pixel electrodes and the data, the gate and the storage electrode lines that results in a transverse component of the electric field oriented towards the inner region of the pixel electrodes at the respective

oblique side connected to the main side parallel to the gate line (page 18, lines 7 to 12). As a consequence of this technical result and since the orientation of the liquid crystal molecules is determined by the orientation of the electric field, the coupling of liquid crystal molecules to the gate line and the coupling between neighbouring pixel electrodes are reduced (page 18, line 18 to page 19, line 2), resulting in a reduction of unwanted textures and consequently in an improvement of the response speed and of the picture quality of the liquid crystal display (page 19, lines 1 to 12, and page 31, lines 4 to 6).

None of the documents on file teach or suggest the claimed arrangement of pixel electrodes and gate, data and storage electrode lines, nor the improvements achieved thereof and mentioned above. In particular, the influence of the shape of the pixel electrodes on the electric field and therefore on the orientation of the liquid crystal molecules is already addressed in document D1 (paragraphs [0100] to [0108]) and in document D2; however, the underlying mechanism is only discussed in document D1 with reference to the specific configuration disclosed in the document and mentioned in point 3.1 above (paragraphs [0104] and [0105]), and in document D2 with reference to pixel electrodes having a rectangular shape partitioned into subareas by a series of cut-outs but otherwise having right corners at the region of the intersection of the gate and the data lines (Figure 1 and the corresponding description together with paragraphs [0051], [0052] and [0108]).

In view of the above considerations, the claimed subject-matter involves an inventive step over the available prior art (Article 56 EPC 1973).



- 3.3 The Board concludes that the subject-matter of claim 1 as well as that of dependent claims 2 to 20 define patentable subject-matter and that the amended set of claims overcomes the reasons given by the examining division for the refusal of the application.
4. The Board is also satisfied that the application documents amended according to the appellant's request and the invention to which it relates meet the remaining requirements of the EPC within the meaning of Article 97(1) EPC. The Board therefore concludes that the decision under appeal is to be set aside and a patent be granted on the basis of the application documents amended according to the present request of the appellant.

## 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 with the order to grant a patent on the basis of the following application documents:
  - claims: claims 1 to 20 filed with the letter dated 11 October 2013;
  - description: pages 1 to 3, 3a and 4 to 31 filed with the letter dated 16 October 2013; and
  - drawings: sheets 1/21 to 21/21 as originally filed.

The Registrar:

The Chairman:



M. Kiehl

A. G. Klein

Decision electronically authenticated