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**Datasheet for the decision
of 22 April 2024**

Case Number: T 0344/21 - 3.5.04

Application Number: 17196131.1

Publication Number: 3328072

IPC: H04N5/378, H03M1/08, H03M1/56,
H01L27/146

Language of the proceedings: EN

Title of invention:
SEMICONDUCTOR APPARATUS, SOLID-STATE IMAGE SENSING APPARATUS,
AND CAMERA SYSTEM

Applicant:
Sony Group Corporation

Headword:

Relevant legal provisions:
EPC Art. 76(1)
RPBA 2020 Art. 13(2)
EPC R. 64(1)

Keyword:

Request filed at oral proceedings admitted (yes)
Divisional application - subject-matter extends beyond content
of earlier application (yes)
Refund of further search fee (no)

Decisions cited:

T 0129/14, T 0755/14

Catchword:



Beschwerdekammern

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Chambres de recours

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Case Number: T 0344/21 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 22 April 2024

Appellant: Sony Group Corporation
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 10 September
2020 refusing European patent application
Number 17196131.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair B. Willems
Members: B. Le Guen
T. Karamanli

Summary of Facts and Submissions

- I. The appeal is against the decision to refuse European patent application No. 17 196 131.1, which is a divisional application of European patent application No. 12 840 933.1 (hereinafter: "earlier application").
- II. The prior-art documents cited in the decision under appeal included the following:
- D1: EP 2 234 387 A1
D2: US 2010/0276572 A1
- III. The decision was based *inter alia* on the grounds that the subject-matter of claim 1 of the main request and of the first and second auxiliary requests then on file did not involve an inventive step within the meaning of Article 56 EPC and that claim 1 of the first auxiliary request was not clear (Article 84 EPC).
- In the decision under appeal, the examining division also refused the appellant's request under Rule 64(2) EPC for a refund of the further search fee paid on 25 May 2018 in reply to the communication under Rule 64(1), second sentence, EPC dated 6 April 2018.
- IV. The applicant (appellant) filed notice of appeal. With the statement of grounds of appeal, the appellant requested that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the main request on which the decision under appeal was based or, alternatively, on the basis

of the claims of one of the first to third auxiliary requests filed with the statement of grounds of appeal.

The appellant also maintained its request that the further search fee paid on 25 May 2018 be refunded.

V. The appellant was summoned to oral proceedings. In a communication under Article 15(1) RPBA (OJ EPO 2024, A15), the board provided the following preliminary opinion.

- The subject-matter of claim 1 of the main request and the third auxiliary request did not involve an inventive step within the meaning of Article 56 EPC.
- The board was minded to exercise its discretion under Article 12(4) and (6) RPBA and not admit the first auxiliary request into the appeal proceedings.
- Claim 1 of the second auxiliary request was not clear (Article 84 EPC).
- The board tended to agree with the search division that claim 2 of the application as filed on the one hand and claims 3 to 7 of the application as filed on the other hand did not relate to a group of inventions so linked as to form a single general inventive concept. Since the communication under Rule 64(1) EPC dated 6 April 2018 seemed to have been justified, the board was minded not to order a refund of the further search fee.
- At first glance, the question arose whether the earlier application as filed disclosed "a row

selection circuit (320) configured to output through the first plurality of TCVs (410, 420) digital control signals for selecting a row of pixels (111) for outputting of the analogue signal", as specified by claim 1 of the main request.

- VI. In its reply dated 22 March 2024, the appellant gave reasons to support its opinion that the subject-matter of claim 1 of the main request and the third auxiliary request involved an inventive step and that claim 1 of the second auxiliary request was clear.
- VII. The oral proceedings before the board took place on 22 April 2024.

During the oral proceedings, the appellant filed *inter alia* a main request having the time-stamp "11.20 am" on its first page. After being informed by the chair of the board's conclusion that claim 1 of that request did not meet the requirements of Article 76(1) EPC, the appellant withdrew all its further requests then on file, except its request that the further search fee paid on 25 May 2018 be refunded.

The appellant's final requests were as follows.

The appellant requested that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the main request "11.20 am" filed during the oral proceedings of 22 April 2024 (hereinafter: "main request"). Furthermore, it requested that the further search fee paid on 25 May 2018 be refunded.

At the end of the oral proceedings, the chair announced the board's decision.

VIII. Claim 1 of the main request reads as follows:

"A solid state imaging device comprising:

a first chip (110) comprising:

a pixel array (310) including a plurality of pixels (111) arranged in rows and columns, each pixel (111) of the plurality of pixels (111) being configured to receive incident light and output an analog signal,

a plurality of signal lines (LSGN) each being connected to one column of pixels (111) and being configured to transmit the analog signals of the pixels (111) connected to it,

a first plurality of through contact vias, TCVs, disposed at opposite first and third sides of the pixel array (310) in a first region (410) and a third region (420) of the first chip (110), and

a second plurality of TCVs disposed at a second side of the pixel array (310) in a second region (430) of the first chip (110), wherein the first plurality of TCVs (410, 420) is arranged between the pixel array (310) and a chip end at the first side and at the third side, and the second plurality of TCVs is arranged between the pixel array (310) and a chip end at the second side,

the first side and the third side of the pixel array (310) each extend perpendicular to the second side of the pixel array (310); and

a second chip (120) bonded to the first chip (110), the second chip comprising:

a plurality of AD converters (350) configured to convert the analog signals to digital signals, each AD converter (350) of the plurality of AD converters (350) comprising a comparator (351) and a counter (352) that are connected in series, and

a row selection circuit (320) configured to output through the first plurality of TCVs a selection signal (SEL), a transfer signal (TRG) and a reset signal (RST) for driving a row of pixels (111) via corresponding control lines (LSEL, LRST, LTRG) in the first chip (110), wherein

each signal line (LSGN) is configured to transmit the analog signal through at least one of the second plurality of TCVs to the comparator (351) of one AD converter (350)."

IX. The appellant's arguments relevant to the present decision may be summarised as follows.

Main request - admittance

The main request was filed as a reaction to a new objection under Article 76(1) EPC, first raised by the board in its communication under Article 15(1) RPBA and further specified at the oral proceedings.

Main request - Article 76(1) EPC

The skilled person reading claim 1 would have understood that the TCVs disposed on the first side of the pixel array transmitted digital control signals driving half of the pixels of a row whilst the TCVs disposed on the opposite side of the pixel array transmitted digital control signals driving the other half of the pixels of the row.

The subject-matter of claim 1 was disclosed in the following passages of the earlier application as filed: paragraphs [0064] to [0072], [0074] to [0085], and Figures 2, 9, 13 and 15 to 19.

Figure 18 of the earlier application as filed showed an arrangement in which each TCV was used to transmit a digital control signal driving a whole pixel row. Figure 19 showed an arrangement in which digital signal TCVs were disposed on opposite sides of the pixel array. The purpose of the latter arrangement was to reduce interferences. The skilled person would have understood that interferences could only be reduced if the TCVs on either side of the pixel array transmitted digital control signals driving half of the pixels of a row. They would have excluded the case in which the TCVs on either side of the pixel array transmitted digital control signals driving a whole pixel row because, in that case, it would have been apparent that no reduction in the length of the wire connecting the TCV to the pixels - and thus no reduction in the parasitic capacitance of that wire - could be achieved.

*Request for refund of the further search fee paid on
25 May 2018*

Although the objection of lack of unity raised by the search division was not contested, the invitation to pay a further search fee had not been justified. Dependent claims 3 to 7 of the application as filed merely characterised the pixels already specified in claim 1, not additional features of the imaging device. It was not fair to ask for a further search fee in such a situation. Moreover, the search division would not have asked for a further search fee for claims 3 to 7 had it taken document D1 into account. In any case, the effort required for searching the features of these claims did not justify the payment of a further search fee. Part F, Chapter V, 4 of the Guidelines for Examination in the EPO (version of March 2024) stated that the consideration of the requirement of unity of invention was always made with a view to giving the applicant fair treatment and that the invitation to pay additional fees was made only in clear cases. Reference was also made to decisions T 129/14 and T 755/14.

Reasons for the Decision

1. The appeal is admissible.

The application

2. The application relates to an imaging device comprising two stacked chips. The first chip includes a plurality of pixels arranged in rows and columns, each pixel having means for converting incident light into an electronic analogue signal. The second chip includes both a row selection circuit generating the digital control signals driving the pixels of a row and a plurality of analogue-to-digital (AD) converters, each

receiving the analogue signal output by a pixel of a row via a signal line.

3. To achieve miniaturisation, the two chips are bonded and the electrical connections transmitting the signals between chips are implemented using so-called through-chip vias (TCVs), i.e. vertical connections passing completely through the first chip.
4. Figure 19 of both the application and earlier application as filed show an arrangement that "*can reduce the interference from the adjacent TCVs*" (see paragraph [0085] of the application and earlier application as filed). In that arrangement, the TCVs transmitting the digital control signal ("digital signal TCVs") are disposed on both the right-hand and left-hand sides of the pixel array, and the TCVs transmitting the analogue signals ("analogue signal TCVs") are arranged below the pixel array.

Main request - admittance

5. The main request was filed at the oral proceedings before the board and thus constitutes an amendment to the appellant's case within the meaning of Article 13(2) RPBA.
6. In its communication pursuant to Article 15(1) RPBA, the board had raised for the first time a *prima facie* objection under Article 76(1) EPC directed at the row selection circuit specified in claim 1 of the main request then on file. At the oral proceedings, the board provided a detailed explanation in respect of that objection and raised a further issue under Article 76(1) EPC pertaining to the placement of the TCVs around the pixel array. The fact that these new

aspects were raised for the first time at the oral proceedings constitutes exceptional circumstances within the meaning of Article 13(2) RPBA 2020.

7. The main request represents a fair attempt to address the newly raised aspects. Therefore, the board exercised its discretion under Article 13(2) RPBA 2020 and decided to admit the main request into the appeal proceedings.

Main request - Article 76(1) EPC

8. Under Article 76(1) EPC, a European divisional application may be filed only in respect of subject-matter which does not extend beyond the content of the earlier application as filed. This means that the subject-matter of a divisional application must be directly and unambiguously derivable from the content of the earlier application as filed (see Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, II.F.2.1.1).
9. The features specified in claim 1 of the main request include the following:
 - (a) *a first plurality of through contact vias, TCVs, disposed at opposite first and third sides of the pixel array (310) in a first region (410) and a third region (420) of the first chip (110),*
 - (b) *a row selection circuit (320) configured to output through the first plurality of TCVs a selection signal (SEL), a transfer signal (TRG) and a reset signal (RST) for driving a row of pixels (111) via corresponding control lines (LSEL, LRST, LTRG) in the first chip (110).*

10. The board disagrees with the appellant that the person skilled in the art reading claim 1 would have understood that the TCVs disposed on the first side of the pixel array transmitted digital control signals driving half of the pixels of a row whilst the TCVs disposed on the opposite side of the pixel array transmitted digital control signals driving the other half of the pixels of the row. Feature (b) specifies a single selection/transfer/reset signal output through the first plurality of TCVs for driving a row of pixels. Therefore, this feature leaves no room for the appellant's reading, which pre-supposes that two sets of selection, transfer and reset signals are output, each driving one half of the pixels of the row. On the contrary, feature (b) necessarily implies that each TCV of the plurality of TCVs outputs one of the single selection, transfer and reset signals driving the whole row of pixels. Since feature (a) further specifies that the first plurality of TCVs is disposed on opposite sides of the pixel array, the combination of features (a) and (b) thus implies that a TCV disposed on one side of the array outputs one of the selection, transfer and reset signals whilst the TCVs disposed on the opposite side of the pixel array output the two remaining signals.
11. Figure 19 and paragraphs [0084] and [0085] of the earlier application as filed disclose an embodiment in which the digital signal TCVs are arranged on two opposite sides of the pixel array. However, it is undisputed that the application as filed does not disclose an arrangement in which a TCV located on one side of the pixel array outputs one of the selection, transfer and reset signals driving a row of pixels, and TCVs located on the opposite side of the pixel array

output the two remaining signals driving that row of pixels. Therefore, the board concludes that the subject-matter of claim 1 of the main request does not meet the requirements of Article 76(1) EPC.

*Request for refund of the further search fee paid on
25 May 2018*

12. Pursuant to Rule 64(1) EPC, "*[i]f the European Patent Office considers that the European patent application does not comply with the requirement of unity of invention, it shall draw up a partial search report on those parts of the application which relate to the invention, or the group of inventions within the meaning of Article 82, first mentioned in the claims. It shall inform the applicant that, for the European search report to cover the other inventions, a further search fee must be paid, in respect of each invention involved, within a period of two months*".

13. In the case in hand, the claims of this divisional application as filed consisted of independent claim 1 and dependent claims 2 to 7. By a communication dated 6 April 2018, the EPO sent the partial European search report under Rule 64(1) EPC and invited the appellant to pay a further search fee. The partial search report covered the subject-matter of claims 1 and 2 of the application as filed. In a provisional opinion accompanying the partial search report, the search division found that the application did not comply with the requirement of unity of invention because (i) the subject-matter of claim 1 of the application as filed was not new in view of the disclosure of document D1 and (ii) dependent claim 2 on the one hand and dependent claims 3 to 7 on the other hand did not involve one or more of the same or corresponding

special technical features within the meaning of Rule 44(1) EPC. The search division also found that the subject-matter of claim 2 was not new in view of the disclosure of document D1.

The applicant paid the further search fee on 25 May 2018.

The European search report, covering all the claims of the application as filed and citing three additional documents including document D2, was issued on 30 November 2018. In the accompanying European search opinion, the search division found that the subject-matter of claims 3 to 7 was rendered obvious by the disclosure of document D2.

14. At the oral proceedings before the board, the appellant stated that it did not contest that the two groups of claims identified by the search division did not relate to a group of inventions so linked as to form a single general inventive concept. Nevertheless, the appellant argued that asking for a further search fee had not been justified in view of Part F, Chapter V, 4 of the Guidelines for Examination in the EPO (version of March 2024) and decisions T 129/14 and T 755/14. In the appellant's opinion, further search fees should not be asked for when dependent claims merely characterise features already specified in the independent claims. Moreover, the search division would not have asked for a further search fee for claims 3 to 7 had it taken document D1 into account. In any case, the effort required for searching the features of these claims did not justify the payment of a further search fee.
15. The board does not find the appellant's arguments persuasive.

- 15.1 In its communication pursuant to Article 15(1) RPBA, the board provisionally confirmed the search division's finding that claim 2 and claims 3 to 7 of the application as filed did not relate to a group of inventions so linked as to form a single general inventive concept. The appellant did not contest this. Therefore, the case in hand must be distinguished from the case on which decision T 129/14 was based, in which the board found that all the claims of the application as filed related to a group of inventions so linked as to form a single general inventive concept (see point 5.5 of the Reasons).
- 15.2 If the search division finds a lack of unity during the search, then according to Part F, Chapter V, 4 of the Guidelines for Examination in the EPO (version of March 2024), cited by the appellant, (i) it must inform the applicant that, if the search report is to be drawn up to cover those inventions present other than the first mentioned, further search fees must be paid within two months, and (ii) this applies even if the search reveals prior art that renders the entirety of the subject-matter of the first invention not novel. In the case in hand (see point 13. above), the search division found that the entirety of the subject-matter of the first invention was not new in view of document D1 and proceeded according to (i) and (ii). Therefore, the invitation to pay a further search fee issued by the EPO would have been in line with these guidelines cited by the appellant if they had been applicable at the time of the search.
- 15.3 The board disagrees with the appellant that further search fees should not be asked for when dependent claims further characterise features already specified

in the independent claims. If such a rule - which has no basis in the EPC - were nonetheless applied as a principle, the payment of further search fees could be easily circumvented by filing an independent claim specifying a combination of broadly formulated features and multiple groups of dependent claims each solving a different problem related to one of these broadly formulated features.

- 15.4 There is no evidence on file that the search division did not take document D1 into account when considering whether to ask for a further search fee for the additional features of claims 3 to 7. In point 3.3 of the European search opinion accompanying the European search report issued on 30 November 2018, the search division expressed its view that these features were obvious in view of the disclosure of document D2. Therefore, it must be assumed that the search division did not find these features in document D1.
- 15.5 Lastly, the board notes that document D2 was not available to the search division when the partial European search report under Rule 64(1) EPC issued on 6 April 2018 was drafted. Therefore, the circumstances of the case in hand differ from those in decision T 755/14, in which the additional prior-art disclosures relied on in the European search report were already derivable from the application as filed (see point 6.3 of the Reasons).
16. In view of the above, the board sees no reason to order a refund of the further search fee paid on 25 May 2018.

Conclusion

17. Since none of the appellant's requests is allowable, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



K. Boelicke

B. Willems

Decision electronically authenticated