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**Datasheet for the decision
of 8 May 2008**

Case Number: T 0974/04 - 3.5.04

Application Number: 96112544.0

Publication Number: 0757479

IPC: H04N 5/225

Language of the proceedings: EN

Title of invention:

Image sensor

Applicant:

CANON KABUSHIKI KAISHA

Headword:

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Relevant legal provisions:

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Relevant legal provisions (EPC 1973):

EPC Art. 56

Keyword:

"Inventive step - no"

Decisions cited:

-

Catchword:

-



Case Number: T 0974/04 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 8 May 2008

Appellant: CANON KABUSHIKI KAISHA
30-2, 3-chome, Shimomaruko,
Ohta-ku
Tokyo (JP)

Representative: TBK-Patent
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 10 March 2004
refusing European application No. 96112544.0
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: F. Edlinger
Members: A. Teale
B. Müller

Summary of Facts and Submissions

- I. The appeal is against the decision by the examining division to refuse European patent application No. 96112544.0 (published as EP 0 757 479 A2) because the subject-matter of claim 1 of a main and an auxiliary request was found to lack inventive step, Article 56 EPC 1973, in view of the combination of D1 with either D2 or D3 and, in the case of the auxiliary request, D4 as an example of common general knowledge, these documents being as follows:
- D1: JP 07 121147 A and English abstract (PAJ) and computer translation;
- D2: JP 05 130475 A and English abstract (PAJ);
- D3: JP 04 281678 A and English abstract (PAJ) and
- D4: JP 04 286474 A and English abstract (PAJ).
- II. The applicant appealed, requesting as a main request that the impugned decision be set aside and the application be granted according to a main request having amended claims filed with the grounds of appeal.
- III. With a letter dated 8 April 2008 the appellant filed amended claims 1 to 22 to replace those of the main request.
- IV. Oral proceedings were held before the board on 8 May 2008 at which the appellant requested that the decision under appeal be set aside and that a patent be granted in the following version:

Main request:

Claims:

No. 1 to 22 filed with the letter of 8 April 2008.

Description:

Pages 1, 3 to 6, 9 to 26 and 28 to 41 as originally filed.

Pages 2, 7, 8, 27 and 42 filed with the letter of 30 January 2004.

Drawings:

Sheets 1/12 and 2/12 filed with the letter of 30 January 2004.

Sheets 3/12 to 12/12 as originally filed.

Auxiliary request:

Claims:

No. 1 to 21 filed with the letter of 30 January 2004.

Description and Drawings: as for the main request.

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

"An image sensor comprising: a card (50) which includes a circuit board mounting electronic parts; an image sensing unit (60) supported on a frame forming said card; and a power supply unit (20) for generating a voltage necessary to drive said image sensing unit; characterized in that said card has an exposed portion exposed from an electronic device when the card has been loaded in the electronic device, and an unexposed portion which is inserted into the electronic device when the card has been loaded in the electronic device, said exposed portion is larger than said unexposed portion in thickness direction, said power supply unit being arranged on said exposed portion."

Claim 1 of the auxiliary request, which is the same as that of the auxiliary request on which the appealed decision was based, reads as follows:

"An image sensor comprising: a card (50) which includes a circuit board mounting electronic parts; an image sensing unit (60) supported on a frame forming said card; and a power supply unit (20) for generating a voltage necessary to drive said image sensing unit; wherein said card has an exposed portion exposed from an electronic device when the card has been loaded in the electronic device, and an unexposed portion which is inserted into the electronic device when the card has been loaded in the electronic device, characterized in that said power supply unit is arranged on said exposed portion, wherein the image sensor further comprises a first cover member (53 and 54) for covering said unexposed portion of said card; and a first shielding member (59) for covering at least said power supply unit at said exposed portion; at least said first shielding member being connected to a ground terminal of said circuit board."

- VI. In the appealed decision the examining division found that the subject-matter of claim 1 of the then main request only differed from the disclosure of D1 in that the image sensor further comprised a power supply unit for generating a voltage necessary to drive the image sensing unit, said power supply unit being arranged on the portion of the card that remained exposed when the card was loaded into an electronic device, D1 being silent about any power supply. However, as stated on page 3, lines 10 to 15, of the description, it was well known that a conventional CCD required a plurality of

driving voltages which were generally obtained from a DC/DC converter; this was also supported by documents D2 and D3. The problem that such a DC/DC converter generated heat and noise was already known (see page 3, lines 16 to 19, of the original application, as well as D2 and D3). Consequently, from the various alternatives as to where to arrange a DC/DC converter so that the adverse effects of heat and noise were minimized in the image sensor of D1, the choice of arranging it on the "exposed portion" lacked an inventive step. The examining division did not share the applicant's view that the voltage(s) necessary to drive the camera of D1 were probably generated in the computer itself, since it was unlikely that the skilled person would provide an appropriate power supply unit inside the computer (even less in the case of a laptop, shown in figure 2) just in case such a card were to be connected to it, thereby increasing the weight of the computer and the amount of heat that it had to dissipate.

As to the auxiliary request, the feature in claim 1 of a first cover member for covering said unexposed portion of said card was anticipated by the case 17 shown in figure 4 of D1, whilst the feature of a first shielding member for covering at least said power supply unit at said exposed portion, at least said first shielding member being connected to a ground terminal of said circuit board, was considered to be a usual measure. D4 was cited as evidence of this, since it showed that the problem of shielding a DC/DC converter was already known in the field of electronic cameras before the priority date of the application. Shielding by connecting a covering member (such as a

metallic plate) to a ground terminal was moreover a matter of common general knowledge.

VII. The appellant's arguments regarding the main request may be summarized as follows. D1 formed the closest prior art. Although figures 3 and 4 disclosed a ring portion in the exposed portion of the image pickup device 7, this did not amount to D1 disclosing the card being thicker in the exposed portion compared to the unexposed portion, since figure 4 showed the card thickness remaining constant at point "A" where it extended beyond the electronic device. The invention solved the problem of supplying the various voltages required by a card-based image sensing unit such as a CCD. Although image sensing units operating at the voltages provided by electronic devices, typically 5 V, were probably known at the priority date, others required different voltages. D1 taught not to put the power supply on the card at all and instead to use an image sensing unit able to use the supply voltages provided by the electronic device. Indeed the card could have its own power supply independent from the electronic device. The solution according to the invention lay in providing a power supply on the card itself. Making the exposed portion of the card larger than the unexposed portion in the thickness direction resulted in better heat removal and space efficiency. Since the exposed portion was sufficiently separated from the electronic device, noise from the power supply unit could be prevented from affecting the electronic device. D2 concerned a video camera and taught to locate a DC/DC converter away from an image sensor so that it would not be disturbed by the heat and noise radiated by the DC/DC converter. D3 taught to place a

battery between a DC/DC converter and a solid-state image pickup element, again so that it would not be disturbed by the heat and noise radiated by the DC/DC converter. In both cases the converter should be put as far as possible from the image sensor/solid-state image pickup element. The claimed solution was therefore surprising, since the power supply and the image sensing unit were located close to one another.

VIII. The appellant's arguments regarding the auxiliary request may be summarized as follows. The additional features in claim 1 with respect to the main request concerned the mitigation of the negative effects of locating the power supply on the card. D1 did disclose a first cover member. It would also be usual when providing the card known from D1 with a DC/DC converter to shield the converter and to connect the shielding member to a ground terminal. However it was inventive to realize the power supply on the card at all.

IX. At the end of the oral proceedings the board announced its decision.

Reasons for the Decision

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

The invention relates to an image sensor comprising a card, for instance a PCMCIA card, suitable for insertion into an electronic device, the card having an image sensing device such as a CCD camera.

3. *The amendments*

Claim 1 of the main request results from taking up the feature from the description "said exposed portion is larger than said unexposed portion in thickness direction" (see page 24, lines 3 to 6, corresponding to column 11, lines 13 to 16, of the published application) into claim 1 as originally filed. Claim 1 of the auxiliary request results from the combination of claims 1 and 2 as originally filed. The board is consequently satisfied that the amendments to claim 1 of both requests satisfy the requirements of Article 123(2) EPC.

4. *The closest prior art*

The board concurs with the appellant that D1 forms the closest prior art. Judging by its computer translation, D1 discloses in paragraphs [0013] to [0015] and figures 3 and 4 an image sensor comprising a card which includes a circuit board (35) having electronic parts (10) and an image sensing unit (camera head 8) supported on the card, the card having an exposed portion exposed from an electronic device when the card has been loaded in the electronic device and an unexposed portion which is inserted into the electronic device when the card has been loaded in the electronic device (see the laptop computer in figure 2). In the light of the statement in the published application concerning PCMCIA cards (see column 1, lines 20 to 25), it is moreover implicit that the PCMCIA card described in D1 (see the sentence bridging pages 2 and 3 of the computer translation) also comprises a frame and a

first cover member covering the unexposed portion of the card.

5. *Novelty, Article 54(1,2) EPC 1973*

5.1 *Claim 1 of the main request*

The image sensor according to claim 1 differs from the disclosure of D1 in a power supply unit for generating a voltage necessary to drive the image sensing unit, the power supply unit being arranged on the exposed portion, and in said exposed portion being larger than said unexposed portion in thickness direction.

5.2 *Claim 1 of the auxiliary request*

The image sensor according to claim 1 differs from the disclosure of D1 in a power supply unit for generating a voltage necessary to drive said image sensing unit, the power supply unit being arranged on the exposed portion, and in a first shielding member for covering at least said power supply unit at said exposed portion, the first shielding member being connected to a ground terminal of said circuit board.

5.3 *Conclusion on novelty*

The subject-matter of claim 1 according to the main and the auxiliary request is new, Article 54(1,2) EPC 1973.

6. *Inventive step, Article 56 EPC 1973*

6.1 *The objective technical problem*

The board agrees with the appellant that the objective technical problem can be seen as supplying the various voltages required by a card-based image sensing unit. This problem is derivable from the description (see the corresponding passage in column 1, line 57, to column 2, line 5, of the published application).

6.2 *Claim 1 of the main request*

The appellant has argued that D1 teaches using an image sensing unit capable of operating with the voltages provided by the electronic device. Since D1 makes no mention of a power supply, this is a possible interpretation of D1. However the description on page 3 (see column 1, lines 55 to 57, of the published application) acknowledges that it was known at the priority date to use CCDs requiring supply voltages of +15 V and -8 V as image sensing units. These voltages would not usually be provided by the electronic device, the appellant not having disputed this. Moreover it was known in the prior art to use a DC/DC converter as a power supply to convert the voltage supplied by an electronic device into the voltages required by a CCD image sensing unit (see column 2, lines 2 to 8, of the published application). The skilled person implementing the image sensor known from D1 would consequently have chosen to add a DC/DC converter as a usual matter of design if one of the known image sensing units (CCDs) had been chosen as better suiting the particular application, this image sensing unit requiring

different voltages to those supplied by the electronic device.

Such a converter could be realized in the electronic unit (the computer in the case of D1), in an external unit directly feeding the card or in the card itself. The board agrees with the argument in the appealed decision that it is unlikely that the skilled person would provide an appropriate power supply unit inside the computer (even less in the case of a laptop, shown in figure 2) just in case such a card were to be connected to it, thereby increasing the weight of the computer and the amount of heat that it had to dissipate. The board also regards the use of an external unit directly feeding the card as unlikely, given the compact and portable nature of the PCMCIA card known from D1. The board finds that the most likely choice would instead be to realize the DC/DC converter in the card itself.

It was common general knowledge at the priority date that DC/DC converters produced heat and noise which could disturb other circuitry, this being acknowledged on page 3, lines 16 to 19, of the description (see the published application at column 2, lines 8 to 12, and the English abstracts of D2, D3 and D4). In deciding where to locate the DC/DC converter on the card the skilled person would have selected the exposed portion of the card as a usual matter of design, since power supplies typically require bulky components to dissipate heat and the exposed portion is less dimensionally constrained than the unexposed portion. One freedom afforded by the decision to locate the DC/DC converter in the exposed portion of the card is

that the card thickness can be increased to accommodate the bulky components.

The appellant has argued that, in view of the noise produced by a DC/DC converter, the skilled person would have been disinclined to locate the converter in the exposed portion of the card, since this would cause interference with the image sensing unit. The board does not accept this argument, since the claim is not limited as to the proximity of the power supply to the image sensing unit. Moreover it was common general knowledge at the priority date that, with appropriate shielding measures, interference problems could be mitigated. This is also what is disclosed in the present application. Starting from D1, the skilled person would thus have arrived at the subject-matter of claim 1 of the main request without inventive step.

6.3 *Claim 1 of the auxiliary request*

This claim is the same as claim 1 of the auxiliary request on which the appealed decision was based. The board essentially agrees with the reasoning given by the examining division in the appealed decision.

As set out above for the main request, the skilled person would have decided to implement a power supply unit (DC/DC converter) in the exposed part of the card as a usual matter of design. It was known at the priority date that such converters produced electrical noise, shielding being a usual means of preventing the noise from disturbing other circuits; see, for instance, D4. It was also common practice at the priority date to connect electrical shielding elements to ground.

Starting from D1, the skilled person would thus have arrived at the subject-matter of claim 1 of the auxiliary request without inventive step.

7. *Conclusion*

Since the subject-matter of claim 1 of the main and the auxiliary request lacks inventive step, Article 56 EPC 1973, neither of the appellant's requests is allowable, and the appealed decision cannot be set aside.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

D. Sauter

F. Edlinger