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D E C I S I O N
of 10 September 2003

Case Number: T 1001/98 - 3.4.2

Application Number: 89301985.1

Publication Number: 0331436

IPC: G02B 6/42, H05K 3/32,
H01L 33/00

Language of the proceedings: EN

Title of invention:
Optical communication apparatus

Applicant:
KABUSHIKI KAISHA TOSHIBA

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"
"In-house knowledge not published before priority date"

Decisions cited:
T 0654/92

Catchword:
-



Case Number: T 1001/98 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 10 September 2003

Appellant:

KABUSHIKI KAISHA TOSHIBA
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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 5 June 1998
refusing European application No. 89301985.1
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: E. Turrini
Members: M. A. Rayner
V. Di Cerbo

Summary of Facts and Submissions

I. The applicant has appealed against the decision of the examining division refusing European patent application number 89 301 985.1. The patent application relates to an optical communication apparatus.

The decision of the examining division made reference to the following document:

D1 US-A-4 126 882, and

during the appeal proceedings reference has also been made to documents which the board numbers as follows

D2 JP-A-56117211 (together with English translation) and

D3 Conference on Lasers and Electro-Optics, San Francisco, California, 9th to 13th June 1986, pages 332 to 333; K. Kato et al.: "THS5 Three- channel wavelength-division-multiplexing transceiver module assembled without an adjustment process".

II. The examining division decided that the subject matter of claim 1 did not involve an inventive step (Articles 52(1) and 56 EPC), the decision relying on reference to a device mentioned in the application with reference to Figures 7(a) and 7(b) thereof and the teaching of document D1. The division was of the view that the packages disclosed in document D1 do, at least, not include an optical fibre element. The skilled person would have considered a particularly preferred

ball-bonding technique as used therein for establishing connection to semiconductor device packages because of the disclosure that stress problems can be avoided by using wire bonding techniques for all the connections. Moreover, it is undisputed that wire bonding techniques are normally used for making internal connections to, for example semiconductor chips in the housing of LED's or photodiodes. The skilled person would have had no reason to believe that the wire bonding technique cannot be used to attach wires to a component's leads for external connections.

III. Following the notice and statement setting out the grounds for appeal, the board of appeal issued communications to the appellant. The appellant filed amended application papers in reply to these communications and also declared the arrangement of Figures 7(a) and 7(b) of the patent application to be in-house knowledge which was not published before the priority date of the patent.

IV. The case of the appellant can be summarised as follows:

Request

Grant of a patent on the basis of documents according to the main request of 11 June 2003 as amended by the letter of 15 July 2003.

Submissions

Document D1 does not teach a solution to the problem of misalignment between an optical fibre element and an optoelectronic device caused by thermal stresses. If

pins disclosed in document D1 are considered leads of an optoelectronic device, then the whole thing is contained by package 10.

Claim 1 of the main request is worded as follows:

"1. An optical communication apparatus comprising: a first body (7,22) secured to a second body (12,19); and, secured to said first body (7,22), an optical fibre element (3) and at least one optoelectronic device (1,2) arranged for communication therewith, the at least one optoelectronic device being secured by solder to the first body and having a conductive lead (8a,8b,9a,9b) connected to a conductive member (11a,11b,11c,11d; 15a,15b,15c,15d; 18a,18b,18c,18d) provided on said second body (12,19), wherein:

the connection between the conductive lead and the conductive member is provided by an electrical conductor (10) having a curved portion and connected to said conductive lead (8a,8b,9a,9b) and to said conductive member, said electrical conductor (10) having a rigidity less than that of said conductive lead (8a,8b,9a,9b) so that the curved portion absorbs thermal stresses applied to the apparatus."

Reasons for the Decision

1. Admissibility of the appeal

The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Amendments (Article 123(2) EPC)*

The board is satisfied that the application according to the request of the appellant does not contain subject matter which extends beyond the content of the application as filed. Therefore the present form of the application does not contravene Article 123(2) EPC.

3. *State of the Art*

Consistent with a number of previous decisions of the Boards of Appeal (for instance T 654/92, point 4 of the reasons), the board does not consider it appropriate either for itself or for the examining division to base assessment of substantive patentability (novelty and inventive step) upon subject matter not identified as within the state of the art within the meaning of Article 54(2) EPC. Consequent to the declaration of the appellant that the arrangement of Figures 7(a) and 7(b) of the patent application is in-house knowledge not published before the priority date of the patent and given that the European Search Report did not reveal any corresponding document, the board reached the conclusion that the arrangement concerned cannot be treated as state of the art within the meaning of Article 54(2) EPC. The board does not therefore consider this arrangement relevant to substantive patentability. By the same token, the reasoning in the decision of the examining division, so far as relying on this arrangement, cannot be followed.

4. *Prior Art*

Document D1

A light-emitting diode array chip 114 is bonded to a substrate 116, the substrate/chip being mounted to a substrate 64 with adhesive and chip elements 118 being coupled to terminal pads 106 on the substrate 64 by wire beam leads 120. A chain of patterns and wire or beam leads reach terminal pads 84 on the substrate and on to connector pins 72 via leads 98 (see Figure 3). Wire leads are particularly preferred for leads 98 as they provide flexibility between the connector pins 72 and terminal pads 84 to accommodate any vibrational movement of pins 72 produced by such forces as, for example, coupling or withdrawal of the external connector plugs.

Document D2

A coupling structure converts light signals into electrical signals (page 4, lines 24 to 29) and comprises a first connector case 1 to which an optical fibre element 2 is fixed by a bonding agent. A second connector case 10 screwed to holder 3 (see page 3, bottom and 4, lines 6 to 10) is secured to the first connector case. A light receiving element 5 is supported in holder (Figure 1 and page 3, lines 11 to 28). The light receiving element comprises in addition a lead terminal 9 (see page 3, line 32) and the second connector case contains connection pins 11, the conductive lead and the connection pins being connected by means of lead wires 13 which are wound in the form of coils in the connector case 10 so as to

permit a certain amount of extension and contraction (Figure 1 and page 4, lines 1 to 6). The second connector case is detachably coupled to the first connector case (see page 4, lines 35 to 38) by means of a connection ring 14.

Document D3

A wavelength-division-multiplexing (WDM) transceiver consists of a common port fibre terminating with a ball lens for collimating and focussing optical beams, two LED packages with a collimating lens, a photodiode PD package with a focussing lens and a glass block to the sides of which four interference filters are attached. The assembly method uses a mould having precisely formed V-grooves and L-angles to position the components accurately. Module components such as the packages and the common port fibre are set in the V-grooves and the glass block is pushed against the L-angles. The components are then rapidly solder fixed while their position is maintained on a ceramic substrate. In Figure 1, it can be seen that the PD and LEDs are directly connected to conductors on the ceramic substrate. A pin package is present for onwardly connecting the substrate.

5. *Novelty (Article 54 EPC)*

There is no optical communication disclosed in document D1 and thus, as pointed out by the examining division, the optical fibre element arranged for communication with an optoelectronic device is not present. Moreover, the disclosure pertaining to the connector pins 72 does not correspond to the claimed configuration of

conductive lead, electrical conductor and electrical conductor as, for example, the wire leads 98 are not connected to a conductive lead of the array chip.

No soldered connection as claimed can be present in the disclosure of document D2 in view of the detachable coupling of the first and second connector cases with the connection ring.

In considering document D3, the relationship with the presently claimed subject matter depends on whether the mold in the assembly stage is taken to be part of the apparatus or not. If it is, then it can be considered a first body and the ceramic substrate the second. In such a case, the fibre element and LED's are not secured to the mold, but only positioned by its positioning grooves for subsequent soldering to the ceramic substrate and moreover the two bodies are not secured to each other. In addition, no low rigidity electrical connector is present. However, in the view of the board, a more correct assessment of document D3 is to consider the finished WDM transceiver, in which case the ceramic substrate would be the first body as it can be seen from Figure 1 that the mold is not part of the finished device. In this case, there is not even a "second body" disclosed in Figure 1 and connection to any such (undisclosed) member would have to be via the pin package so a low rigidity connector would not be involved.

Therefore the board is satisfied as to the novelty in the sense of Article 54 EPC of the subject matter of claim 1.

6. *Inventive Step (Article 56 EPC)*

Since document D3, like the present application, is concerned with alignment of optical components, the board came to the conclusion that this document constitutes the closest prior art. The problem solved by the novel features of the claim pertaining to the connection is that of compensating optical misalignment between optical components caused by temperature variations and/or mechanical vibrations affecting the solder.

While coils are disclosed in document D2, this teaching cannot give any suggestion to the skilled person towards the solution claimed because even assuming the light receiving element is considered "secured" to the first connector case after assemblage of the first and second connector cases, the board has no doubt that the detachable coupling between the first and second connector cases required by document D2 is completely incompatible with a "securing" by soldering of the optoelectronic element to the first body as claimed in claim 1.

Accommodating vibrational movement of pins produced by such forces as, for example, coupling or withdrawal of the external connector plugs is taught by document D1. However, in the absence of any optical communication with an optical fibre and the arrangement of the pins away from the LED chip, the view of the board is that only hindsight in the knowledge of the invention could suggest picking any particular one of the wires or components from document D1 and choosing its properties for use with the teaching of document D3 in an attempt

to reach the claimed solution to solder-related alignment problems of optical communication components. A negative argument that there is nothing against applying the teaching amounts, if anything, to a "could" not "would" approach, which according to established case law does not give rise to a negative view of inventive step.

No other documents in the file come closer to the subject matter of claim 1 than those specifically mentioned in this decision.

The board therefore reached the conclusion that the subject matter of claim 1 can be considered to involve an inventive step within the meaning of Article 56 EPC.

7. *Further procedure*

Having convinced itself that the application documents meet the requirements of the EPC, the board considers it appropriate to exercise its power within the competence of the examining division to order grant of a patent on the basis of the documents specified in the Order below.

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 based on the following application documents:

Description: Pages 1 to 13 submitted with the letter of 11 June 2003

Claims: 1 to 10 submitted with the letter of 11 June 2003

Drawings: Figures 1 to 6, 8 and 9 submitted with the letter of 11 June 2003

Figure 7 submitted with the letter of 15 July 2003.

The Registrar:

The Chairman:

P. Martorana

E. Turrini