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Datasheet for the decision of 7 May 2010

Case Number: T 0729/08 - 3.4.02

Application Number: 00309575.9

Publication Number: 1099971

IPC: G02B 26/02

Language of the proceedings: EN

Title of invention:
Microelectromechanical optical isolators

Applicant:
LUCENT TECHNOLOGIES INC.

Opponent:
-

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step (yes - amended claims)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0729/08 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 7 May 2010

Appellant: LUCENT TECHNOLOGIES, INC.
600 Mountain Avenue
Murray Hill NJ 07974-0636 (US)

Representative: Williams, David John
Page White & Farrer
Bedford House
John Street
London WC1N 2BF (GB)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 20 November 2007 refusing European application No. 00309575.9 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
D. S. Rogers

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 00309575.9 published with the No. 1099971.

In the decision taken by the examining division according to the state of the file it was held that claim 1 amended according to the main request then on file did not comply with the requirements of Article 123(2) EPC 1973 and that the subject-matter of the claims of the main and the auxiliary requests then on file did not involve an inventive step (Article 56 EPC 1973) in view of the disclosure of the two following documents:

D1: "A silicon MEMs optical switch attenuator and its use in lightwave subsystems" C. R. Giles *et al.*, IEEE Journal of Selected Topics in Quantum Electronics (US), Vol. 5 (1999); pages 18 to 25

D4: EP-A-0628796.

II. With the statement setting out the grounds of appeal the appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the main or the auxiliary request underlying the decision under appeal.

III. The Board issued a summons to oral proceedings. In a communication annexed to the summons the Board introduced the following document into the proceedings:

D5: FR-A-2618914

and gave its preliminary opinion on the appellant's case.

IV. In response to the summons to oral proceedings, the appellant filed with a letter dated 23 April 2010 a set of claims 1 and 2 amended according to a main (and sole) request and amended pages 1 to 8 of the description replacing the corresponding application documents on file.

After consideration of the amendments made to the application documents according to the main and sole request of the appellant, the Board cancelled the oral proceedings.

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

"A device for converting an electrical signal to an optical signal and controlling the transfer of said optical signal from a source to a detector, comprising:

an optical source (12), comprising an LED, for converting an electrical signal to an optical signal;

an optical signal detector (14) for receiving the optical signal from the optical source (12), said optical detector (14) being spaced apart from and in selective optical communication with said optical source (12) for defining an optical path between said optical source (12) and said optical detector (14); and

a MEMS device (16) for controlling optical communication of the optical signal between said optical source (12) and said optical detector (14), said MEMS device comprising an actuator (22) and a

moveable shutter element (18) positionable in said optical path and moveable by said actuator for adjusting the position of the moveable element relative to the optical path when a voltage is applied to said actuator to thereby control transfer of the produced optical signal from said source to said detector along the optical path as a function of the position of the moveable element relative to the optical path, wherein said actuator is operable for moving said shutter to a multiplicity of predetermined positions relative to said optical path as a function of a voltage level applied to said actuator so as to enable control of the receipt of the produced optical signal by said detector;

wherein the movable shutter element (18) is a masking element provided with an aperture (32) formed therein for shaping the optical signal prior to receipt by the detector, and the device further comprising:

a source aperture element (30) disposed in the optical path between said optical source and said moveable element for shaping the produced optical signal travelling along the optical path;

a detector aperture element (34) disposed between said moveable element and said detector for shaping the produced optical signal travelling along the optical path."

The main request further includes dependent claim 2 referring back to claim 1.

VI. The arguments submitted by the appellant in support of its request can be summarized as follows:

The invention addresses the control of the transfer of the optical signal to the detector. The shutter is not merely a blocking element, but includes an aperture that manipulates the shape of the optical signal. Thus, the signal can be configured to have a logarithmic, square root, or other configuration. The ability to control the functionality of the detected signal is advantageous in optical communications applications and is not disclosed in the prior art. In addition, providing the source and the detector aperture elements in addition to the aperture in the shutter element for providing additional shaping of the optical signal is not derivable from the prior art. The prior art does not envisage the possibility of providing such extensive shaping control of the optical signal at three distinct locations. Furthermore, claim 1 requires that the MEMS device has an actuator operable for moving the shutter to a multiplicity of predetermined positions relative to the optical path as a function of the voltage level applied to the actuator so as to enable control of the receipt of the produced optical signal by the detector. Thus, the actuator is not operable merely to place the shutter in the path of the optical beam to block it and alternatively remove the shutter from the path.

Document D4 relates to a spectrophotometer employed to analyze the wavelengths present in incident light and the shutter merely allows light to be analyzed for its wavelength components, i.e. it is not used to shape incident light. Document D5 has a magnetically controlled shutter, not a MEMS device using voltage applied to the actuator to control the position of the moveable element as it is the case in claim 1. It is

therefore not appropriate to combine document D1 with document D4 or document D5.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

The application documents amended according to the present main request of the appellant satisfy the formal requirements of the EPC.

In particular, the amendments overcome the objections raised by the examining division under Article 123(2) EPC 1973 with regard to the sets of claims underlying the decision under appeal, and the amended application documents satisfy the requirements of Article 123(2) EPC. More particularly, claim 1 is based on claims 1, 2, 4, 5, 9 and 10 as originally filed together with page 1, lines 20 and 21, the paragraph bridging pages 3 and 4, page 4, lines 21 to 23, and page 6, lines 14 to 16 of the description as originally filed, and dependent claim 2 is based on claim 3 as originally filed.

The description has been thoroughly revised and brought into line with the invention as now claimed.

3. *Inventive step*

3.1 Novelty was not questioned by the examining division and the Board is satisfied that the subject-matter of

claim 1 is novel over the prior art on file, and in particular over the disclosure of document D1 which - as held by the examining division - represents the closest state of the art. This document discloses a MEMS (microelectromechanical system) device for controlling optical communication between an ASE light source and a detector, the MEMS device comprising a shutter element selectively moveable by an actuator between a first position in which the light from the light source is intercepted by the shutter element and a second position outside the propagation path of the light as a function of the voltage applied to the actuator (Figure 4(a) together with the first two paragraphs of section II).

Document D1 also addresses the attenuating effect of the edge of the shutter element on the light when the shutter element is in an intermediate position (page 20, second column, last paragraph, and page 21, second column) and analyses the attenuation of the transmitted light as a function of the different intermediate positions of the shutter element (Figures 4(b), 6 and 7 and the corresponding description). However, while in document D1 the optical signal from the light source is either entirely transmitted, or completely intercepted, or partially intercepted and therefore attenuated by having its spatial light distribution partially intercepted by the edge of the shutter element (Figure 6), claim 1 requires that the shutter element is formed with an aperture and that the optical signal reaching the detector is shaped by the aperture in cooperation with two aperture elements provided between the light source and the shutter element and between the shutter element and the detector, respectively.

3.2 According to the application (page 4, lines 21 to 23, and page 6, lines 1 to 16) and the submissions of the appellant (point VI above, first paragraph), the technical effect achieved by the distinguishing features identified above over the device disclosed in document D1 is that, while in document D1 a variable lateral sector of the light signal from the light source is masked by the shutter element for the purpose of controllably attenuating the light reaching the detector, according to the claimed invention the optical signal from the light source is controllably shaped by means of the aperture formed in the shutter element together with the two aperture elements arranged respectively on the source and the detector side, thus allowing a better control of the transfer of the optical signal to the detector as a function of the position of the shutter element determined by the voltage applied to the actuator.

3.3 None of the documents presently on file discloses or suggests improving the control of the transfer of an optical signal by shaping the optical signal by means of a light-shaping aperture formed in a shutter element controllably moveable to a plurality of positions in the path of the optical signal propagating between two light-shaping aperture elements as claimed. In particular:

- Document D4 relates to an optical slit with an adjustable width for adjusting the width of the entrance and/or exit slit of a spectrometer (column 1, line 1 *et seq*. together with Figures 4 and 5 and the corresponding description) and more particularly for controlling the amount of light to be analysed

(column 1, lines 9 to 19, and column 5, lines 25 to 36) and, as submitted by the appellant (point VI above, last paragraph), neither the technical field to which the document pertains nor the structural and functional features of the optical slit (and in particular the dimensions and the light intensity control function of the slit) concern features of a device as that disclosed in document D1. More particularly, there is no disclosure in document D4 relating to an optical signal used in optics communications, let alone to shaping the corresponding light signal.

- Document D5 discloses moving a shutter element formed with an aperture in the optical path between two optical fibres for controlling the transmission of a light beam between the two fibres (Figures 1 to 3 together with page 3, lines 1 to 19, and page 6, line 21 to page 7, line 2). However, the document only teaches selectively moving the shutter element between a first position in which the light beam is entirely transmitted by the aperture and a second position in which the light beam is completely intercepted by the shutter element, i.e. the document addresses the operation of the shutter element only as an optical switcher and there is no disclosure in the document towards arranging the aperture of the shutter element as a light-shaping aperture, let alone towards bringing the apertured shutter element to an intermediate position in which the transmitted light beam would be partially masked and thus shaped by the aperture of the shutter element.

The remaining documents on file are less relevant that documents D1, D4 and D5.

In view of the above, the claimed subject-matter is not rendered obvious by the prior art available on the file.

3.4 In view of the above conclusions and considerations, the Board concludes that the subject-matter of claim 1 of the main request, as well as that of dependent claim 2, is novel and involves an inventive step over the available prior art (Article 52(1) EPC).

4. The Board is also satisfied that the application documents amended according to the present main request and the invention to which they relate 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 main and sole 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 in the following version:

   - claims: claims No. 1 and 2 of the main request filed with the letter dated 23 April 2010,
   - description: pages 1 to 8 filed with the letter dated 23 April 2010, and
   - drawings: sheets 1/3 to 3/3 as originally filed.

The Registrar: The Chairman:

M. Kiehl A. G. Klein