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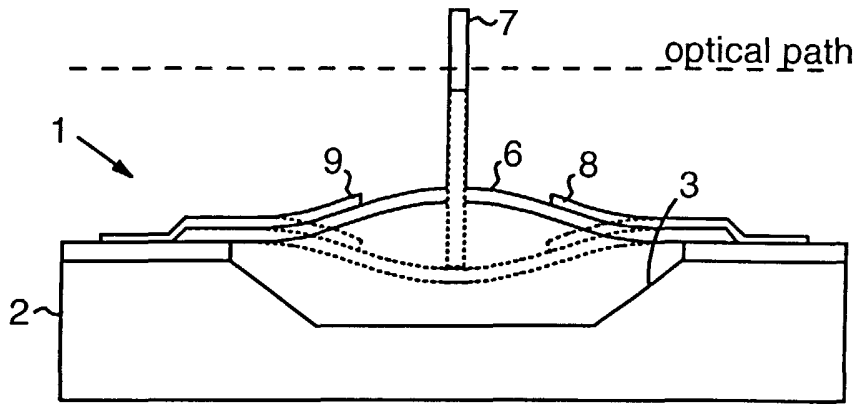
[Continued on next page]

(54) Title: MICROSYSTEM SWITCHES



(57) Abstract: A microsystem switch (1, 20, 25, 30, 33) has a support (2) defining a recess (3), and a flexible bridge (6) is mounted on the support (2) bridging the recess (3). The bridge (6) is shaped so as to hold selectively a concave support stable state, in which the bridge bulges out of the recess (3). The switch includes an actuator (8, 9; 26, 27) for effecting flexing of the bridge (6) between the stable states, and a switching element (7, 31, 34) is mounted on the bridge (6) such that movement of the bridge between the stable states moves the switching element between an on position and an off position. According to another design, a microsystem switch (40, 55) has a support (41) defining a recess (42), and an elongate torsion member (44) is mounted on the support (41) bridging the recess (42). A flexible bridge (43, 56) is mounted on the support (41) bridging the recess (42) in a direction substantially perpendicular to the torsion member (44). The bridge (43, 56) is connected to the torsion member (44) at the cross-point thereof so that a first section of the bridge extends between the cross-point and one side; of the recess, (42) and a second section of the bridge extends between the cross-point and the opposite side of the recess (42). *The bridge* (43, 56) is shaped so as to hold selectively a first stable state, in which the first section of the bridge bulges into the recess and the second section of the bridge bulges out of the recess, and a second stable state in which this configuration is reversed.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

PCT/IB 02/02117

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G02B6/35 H01H1/00 B81B3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01H G02B B81B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 867 302 A (FLEMING JAMES G) 2 February 1999 (1999-02-02) figures 1,3,4,7,8 column 3, line 17 -column 4, line 8 column 6, line 54 -column 10, line 55 column 12, line 6 -column 13, line 17 ---	1,2,8,9, 12-15, 20-23
A	FR 2 753 565 A (THOMSON CSF) 20 March 1998 (1998-03-20) page 5, line 19 - line 35 page 6, line 1 - line 8 page 7, line 24 - line 35 page 8, line 1 - line 35 figures 1-3,5,6 --- -/--	1-3,7,8, 11,23

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 December 2003	20. 01. 2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Mathyssek, K

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 229 640 B1 (ZHANG NAN) 8 May 2001 (2001-05-08) figures 1,2,4 column 3, line 28 -column 6, line 21 column 9, line 32 - line 55	1,2,10, 21-27
A	FR 2 772 512 A (COMMISSARIAT ENERGIE ATOMIQUE) 18 June 1999 (1999-06-18) page 2, line 4 -page 4, line 19 page 4, line 32 -page 7, line 11 page 7, line 30 -page 8, line 34 page 17, line 14 -page 19, line 15 figures 1-5,9-12	1-4,6
A	EP 0 880 040 A (LUCENT TECHNOLOGIES INC) 25 November 1998 (1998-11-25) figures 2,4,7 column 4, line 51 -column 11, line 5	1,2,10, 21,22
A	L.DELLMANN ET.AL.: "4X4 MATRIX SWITCH BASED ON MEMS SWITCHES AND INTEGRATED WAVEGUIDES" TRANSDUCERS'01 EUROSENSORS XV, 11TH INTERNATIONAL CONFERENCE ON SOLID-STATE SENSORS AND ACTUATORS ,MUNICH,GERMANY,JUNE 10-14,2001, October 1906 (1906-10) - 14 June 2001 (2001-06-14), pages 1332-1335, XP002244596 MUNICH,GERMANY cited in the application the whole document	1,2,7,8, 10,21-27
A	US 5 148 506 A (MCDONALD T GUS) 15 September 1992 (1992-09-15) figures 1,2,4,7 column 1, line 41 - line 55 column 2, line 4 -column 5, line 8	1,2,8, 12,21-26
A	EP 0 510 629 A (TEXAS INSTRUMENTS INC) 28 October 1992 (1992-10-28) column 1, line 12 - line 58 column 2, line 55 -column 6, line 31	1,12,21, 24

INTERNATIONAL SEARCH REPORT

PCT/IB 02/02117

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. [X] As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

[X] No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/IB 02 /02117

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-11,21 till 27 only when dependent on claims 1-10

are directed to a microsystem switch comprising a support with a recess,flexible bridge on the support and bridging the recess and being shaped to hold two stable states(concave and convex) by bulging into and out of the recess,an actuator for flexing the bridge into the stable states and a switching element mounted on that bridge such that moving the bridge moves the switching element between on- and off-position.

2. Claims: 12-20,
21 till 27 only when dependent on claims 12-20

are related to microsystem switch comprising a support with a recess,flexible bridge on the support and bridging the recess,an elongate tension member mounted on the support and bridging it in a direction perpendicular to the flexible bridge,bridge being connected to the torsion member and having two sections and holding two stable states by bulging the sections in each state into concave and convex shape,an actuator for flexing the bridge,switching element mounted at the cross-point of the bridge and torsion member such that moving the bridge effects twisting of the torsion member and rotation of the switching element between on- and off-position.

INTERNATIONAL SEARCH REPORT

PCT/IB 02/02117

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