The present invention provides an electro-optical isolation system (10) for coupling an electronic measuring device to a device under test (12) for making accurate measurements of signals within a wide frequency range while the device under test (12) is being subject to high power electrical disturbances (14, 16). The invention provides an increased rejection of high common mode signals and reduction of undesired self-capacitance by implementing a shielded handheld transmitter unit (18) having an integrated measurement probe (24). The transmitter unit (18) converts the sensed signal to an optical signal which is transmitted through an optical medium to a receiver unit (22). Under control of a microprocessor (116), the level of the output signal from the transmitter unit (18) is modulated by the signal received from the sensing probe (24). The microprocessor (116) within the transmitter unit (18) automatically controls the level of optical signal (126) emitted by the optical converter (124), and further calibrates a driver circuit (134) to maintain measurement accuracy. The modulated optical signal (126) emitted by the electro-optical converter (124) is communicated to the receiver unit (22) by an optical fiber medium (20a or 20b).
FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL Albania
AM Armenia
AT Austria
AU Australia
AZ Azerbaijan
BA Bosnia and Herzegovina
BB Barbados
BE Belgium
BF Burkina Faso
BG Bulgaria
BJ Benin
BR Brazil
BY Belarus
CA Canada
CF Central African Republic
CG Congo
CH Switzerland
CI Côte d'Ivoire
CM Cameroon
CN China
CU Cuba
CZ Czech Republic
dE Germany
DK Denmark
EE Estonia
ES Spain
FI Finland
FR France
GA Gabon
GB United Kingdom
GE Georgia
GH Ghana
GN Guinea
GR Greece
HU Hungary
IE Ireland
IL Israel
IS Iceland
IT Italy
JP Japan
KE Kenya
KG Kyrgyzstan
KP Democratic People's Republic of Korea
KR Republic of Korea
KZ Kazakhstan
LC Saint Lucia
LI Liechtenstein
LK Sri Lanka
LR Liberia
LS Lesotho
LT Lithuania
LU Luxembourg
LV Latvia
MC Monaco
MD Republic of Moldova
MG Madagascar
MK The former Yugoslavia
ML Mali
MN Mongolia
MR Mauritania
MW Malawi
MX Mexico
NE Niger
NL Netherlands
NO Norway
NZ New Zealand
PL Poland
PT Portugal
RO Romania
RU Russian Federation
SD Sudan
SE Sweden
SG Singapore
SI Slovenia
SK Slovakia
SN Senegal
SZ Swaziland
TD Chad
TG Togo
TJ Tajikistan
TM Turkmenistan
TT Turkey
TT Trinidad and Tobago
UA Ukraine
UG Uganda
US United States of America
UZ Uzbekistan
VN Viet Nam
YU Yugoslavia
ZW Zimbabwe
### A. CLASSIFICATION OF SUBJECT MATTER

**IPC 6** G01R15/22

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 6** G01R

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):

- **Y**
  - US 5 311 116 A (ROGERS WESLEY A)
    - 10 May 1994 (1994-05-10)
    - abstract; claims 1-4, 21, 22; figures 1, 3, 3A
    - column 1, line 8 - line 27
    - column 3, line 43 - column 4, line 43
    - column 18, line 22 - line 32
  - Relevant to claim No. 1, 2, 5, 15

- **X**
  - DE 295 14 423 U (LANGER GUNTER DIPL ING)
    - page 1, paragraph 1 - page 2, paragraph 4; figures 1-3
    - page 3, last paragraph - page 4, paragraph 3
  - Relevant to claim No. 8, 9, 13

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Y</strong></td>
<td>US 5 311 116 A (ROGERS WESLEY A) 10 May 1994 (1994-05-10)</td>
<td>1, 2, 5, 15</td>
</tr>
<tr>
<td></td>
<td>abstract; claims 1-4, 21, 22; figures 1, 3, 3A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>column 1, line 8 - line 27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>column 3, line 43 - column 4, line 43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>column 18, line 22 - line 32</td>
<td></td>
</tr>
<tr>
<td><strong>X</strong></td>
<td>DE 295 14 423 U (LANGER GUNTER DIPL ING) 2 November 1995 (1995-11-02)</td>
<td>8, 9, 13</td>
</tr>
<tr>
<td></td>
<td>page 1, paragraph 1 - page 2, paragraph 4; figures 1-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>page 3, last paragraph - page 4, paragraph 3</td>
<td></td>
</tr>
</tbody>
</table>

### Further documents are listed in the continuation of box C.

### 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
- **E** earlier document published on or after the international filing date
- **L** document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- **O** document referring to an oral disclosure, use, exhibition or other means
- **P** document published prior to the international filing date but later than the priority date claimed

**I** later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

**X** document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

**Y** document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

**A** document member of the same patent family

### Date of the actual completion of the international search

9 July 1999

### Date of mailing of the international search report

20.07.99

### Name and mailing address of the ISA

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

Authorized officer

Fritz, S
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>DE 195 07 809 A (LANGER GUNTER DIPLOM ING) 12 September 1996 (1996-09-12) column 1, line 17 - line 46</td>
<td>1, 2, 5</td>
</tr>
<tr>
<td>A</td>
<td>LIN D L: &quot;FCBM-A FIELD-INDUCED CHARGED-BARD MODEL FOR ELECTROSTATIC DISCHARGES&quot; IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS, vol. 29, no. 6, 1 November 1993 (1993-11-01), pages 1047-1052, XP000439259 abstract; figures 1, 2</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>ANDERSON K ET AL: &quot;A CONDUCTIVE PROBING METHOD FOR DETERMINING INTEGRATED CIRCUIT CONTRIBUTIONS TO RADIATED EMISSIONS&quot; CONFERENCE PROCEEDINGS RF EXPO WEST 1995, EMC/ESD INTERNATIONAL, SAN DIEGO, JAN 29 - FEB. 1, 1995, 29 January 1995 (1995-01-29), pages 355-362, XP000492830 EMC TEST AND DESIGN; RF DESIGN figures 2-4 page 357, left-hand column, paragraph 1 - right-hand column, paragraph 3</td>
<td>1</td>
</tr>
<tr>
<td>X</td>
<td>US 5 107 202 A (RENDU GEORGE F) 21 April 1992 (1992-04-21) abstract; figure 1</td>
<td>8</td>
</tr>
<tr>
<td>A</td>
<td>US 5 181 026 A (GRANVILLE J MICHAEL) 19 January 1993 (1993-01-19) cited in the application abstract; figures 1A1B</td>
<td>1</td>
</tr>
<tr>
<td>X</td>
<td>US 4 939 446 A (ROGERS WESLEY A) 3 July 1990 (1990-07-03) abstract; figures 1-3 column 5, line 23 - line 28</td>
<td>8, 9, 13</td>
</tr>
</tbody>
</table>

Form PCT/ISA/210 (continuation of second sheet) (July 1982)
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>DAHER J K ET AL: &quot;A RADIATED SUSCEPTIBILITY TEST TECHNIQUE FOR PC BOARDS IMPLEMENTING BUILT-IN-TEST OR BOUNDARY SCAN DESIGNS&quot; PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY, WASHINGTON, AUG. 21 - 23, 1990, 21 August 1990 (1990-08-21), pages 109-112, XP000224640 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS abstract: figures 1,2 page 109, right-hand column, last paragraph - page 110, right-hand column, paragraph 2</td>
<td>8,9</td>
</tr>
<tr>
<td>X</td>
<td>US 5 414 345 A (ROGERS WESLEY A) 9 May 1995 (1995-05-09) abstract: figures 1,3,8-12B column 12, line 49 - column 13, line 14</td>
<td>8,13</td>
</tr>
<tr>
<td>A</td>
<td>SPERBER W ET AL: &quot;TEST PROCEDURE AND SPECIFICATIONS FOR COMPONENT SUSCEPTIBILITY TO ELECTROSTATIC DISCHARGES&quot; INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY, SEATTLE, AUG. 2 - 4, 1988, 2 August 1988 (1988-08-02), pages 190-195, XP000012761 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS figure 2</td>
<td>15</td>
</tr>
<tr>
<td>A</td>
<td>BOUCHER E: &quot;FIBRES OPTIQUES EH H.T. UN POTENTIEL QUI FAIT LA DIFFERENCE&quot; MESURES REGULATION AUTOMATISME, no. 612, 23 October 1989 (1989-10-23), pages 41-45, XP000072650 abstract page 44; figure</td>
<td>1,15</td>
</tr>
</tbody>
</table>
INTERNATIONAL SEARCH REPORT

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

As a result of the prior review under R. 40.2(e) PCT, no additional fees are to be refunded.

1. ☑ 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.

☐ No protest accompanied the payment of additional search fees.
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>US 5534772 A</td>
<td>09-07-1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5723975 A</td>
<td>03-03-1998</td>
</tr>
<tr>
<td>DE 29514423 U</td>
<td>02-11-1995</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>DE 19507809 A</td>
<td>12-09-1996</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>US 5107202 A</td>
<td>21-04-1992</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5689192 A</td>
<td>18-11-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5701082 A</td>
<td>23-12-1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5414366 A</td>
<td>09-05-1995</td>
</tr>
</tbody>
</table>
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-7
   
   Isolation test probe with automatically controlled electro-optical converter

2. Claims: 8-14
   
   Isolation test system including a transmitter with a plurality of shields

3. Claims: 15-20
   
   Electronic instrumentation isolation system with an equalized earth ground system