

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/033853

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. H01L23/28 (2006.01) i, H01L23/12 (2006.01) i, H01L33/62 (2010.01) i, H01S5/022 (2006.01) i

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)

Int. Cl. H01L23/28-23/31, H01L23/12-23/15, H01L25/00-25/18, H01L33/62, H01S5/022

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

Published examined utility model applications of Japan 1922-1996
 Published unexamined utility model applications of Japan 1971-2017
 Registered utility model specifications of Japan 1996-2017
 Published registered utility model applications of Japan 1994-2017

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2013-62506 A (INFINEON TECHNOLOGIES AG) 04 April 2013, paragraphs [0012]-[0018], fig. 1 & US 2013/0062750 A1, paragraphs [0028]-[0035], fig. 1 & DE 102012200325 A & KR 10-2013-0028866 A	1-4
Y	JP 2011-228589 A (PANASONIC CORP.) 10 November 2011, paragraphs [0003], [0019]-[0034], [0070]-[0071], fig. 1, 6 (Family: none)	1-3, 5

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance	“T” 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
“E” earlier application or patent but published on or after the international filing date	“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
“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)	“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
“O” document referring to an oral disclosure, use, exhibition or other means	“&” document member of the same patent family
“P” document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search	Date of mailing of the international search report
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2013-236005 A (DAINIPPON PRINTING CO., LTD.) 21 November 2013, paragraphs [0023]-[0024], [0062]-[0069], [0130], fig. 1, 4, 16 (Family: none)	1-3, 5
A	JP 2003-158142 A (MITSUI HIGH TEC) 30 May 2003, paragraph [0011], fig. 1 (Family: none)	1-5