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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:
3 September 2009

(54) Title: LIGHT EMITTING DIODE FOR MOUNTING TO A HEAT SINK

(57) Abstract: A light emitting diode (LED) apparatus for mounting to a heat sink having a front surface with an opening therein is disclosed. The apparatus includes a sub-mount, at least one LED die mounted on the sub-mount, and a thermally conductive slug having first and second areas. The first area is thermally coupled to the sub-mount and the second area has a post protruding outwardly therefrom. The post is operably configured to be received in the opening in the heat sink and to secure the LED apparatus to the heat sink such that the second area is thermally coupled to the front surface of the heat sink. Other embodiments for mounting an LED apparatus utilizing adhesive thermally conductive material 196, spring clips, insertion snaps, or welding are also disclosed.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2008/055230

A. CLASSIFICATION OF SUBJECT MATTER

INV. F21K7/00
ADD. F21Y101/02

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)
F21V F21K

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/214810 A1 (ZHANG LONG BAO [US]) 20 November 2003 (2003-11-20) paragraphs [0028], [0038] - [0043] figures 1,2,6,7	1-3,7-10
X	US 5 890 794 A (ABTAHI HOMAYOON [US] ET AL) 6 April 1999 (1999-04-06) column 8, line 29 - line 58 figures 5,9	1-4,7-10
X	EP 1 503 139 A (OSRAM SYLVANIA INC [US]) 2 February 2005 (2005-02-02) paragraphs [0022], [0023], [0028], [0031], [0032] figures 1,3,9	1,4,7-10
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 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
- *E* earlier document but 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

- *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
- *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.
- *&* document member of the same patent family

Date of the actual completion of the international search

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17/07/2009

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INTERNATIONAL SEARCH REPORT

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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.
X	US 2006/050514 A1 (OPOLKA HARALD [DE]) 9 March 2006 (2006-03-09) the whole document -----	1-3,7-10
P,X	US 7 396 139 B2 (SAVAGE NIGEL C [GB]) 8 July 2008 (2008-07-08) column 5, line 57 - column 7, line 67 figures 1,2,13 -----	1-5
A	EP 0 202 335 A (JAPAN TRAFFIC MANAGE TECH ASS [JP]; STANLEY ELECTRIC CO LTD [JP]; KOIT) 26 November 1986 (1986-11-26) figure 4 page 3, line 13 - line 24 -----	1
A	JP 2002 299700 A (NICHIA KAGAKU KOGYO KK) 11 October 2002 (2002-10-11) abstract -----	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2008/055230

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

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

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.:

see additional sheet(s)

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-10

A light emitting diode (LED) apparatus comprising a sub-mount, at least one LED die mounted on sub-mount, a thermally conductive slug having first and second areas, said first area being thermally coupled to said sub-mount and said second area having a post, the post being configured to be received in an opening in a heat sink with its second area that can be coupled to the front surface of the heat sink.

2. claims: 11-15

A light emitting diode (LED) apparatus comprising a sub-mount, at least one LED die mounted on sub-mount, a thermally conductive slug having first and second areas, said first area being thermally coupled to said sub-mount, the apparatus further comprising, on the slug, a thermally conductive material having an outer surface with adhesive properties for securing the LED apparatus to a heat sink..

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2008/055230

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