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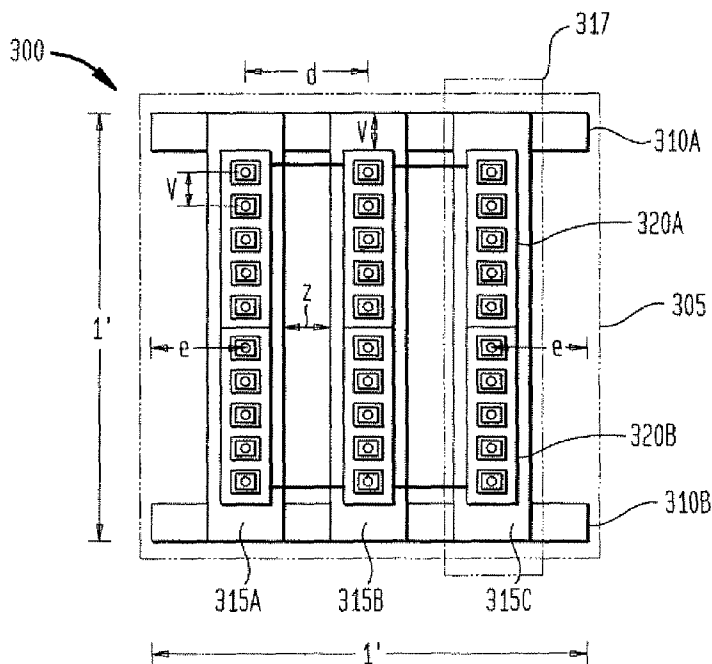
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5 March 2009

(54) Title: LIGHT EMITTING DIODE PACKAGES



(57) Abstract: Lighting packages are described for light emitting diode (LED) lighting solutions having a wide variety of applications which seek to balance criteria such as heat dissipation, brightness, and color uniformity. The present approach includes a backing of thermally conductive material and two or more arrays of LEDs attached to a printed circuit board (PCB). The PCB is attached to the top surface of the backing and the two or more arrays of LEDs are separated by a selected distance to balance heat dissipation and color uniformity of the LEDs.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2007/066417

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F21V 21/00 (2008.04)

USPC - 362/249

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(8) - B60Q 1/26, F21V 21/00, 23/00 (2008.04)

USPC - 362/227, 249, 295

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 practicable, search terms used)

MicroPatent, IP.com, Patbase, Google Patent, IEEEEXPLORE, Google Scholar

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0061539 A1 (SONG et al) 23 March 2006 (23.03.2006) entire document	1, 4, 5
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Y		2, 3, 6-13
Y	US 6,441,943 B1 (ROBERTS et al) 27 August 2002 (27.08.2002) entire document	2, 3
Y	US 2005/0077525 A1 (LYNCH et al) 14 April 2005 (14.04.2005) entire document	6, 7
Y	US 6,278,607 B1 (MOORE et al) 21 August 2001 (21.08.2001) entire document	8
Y	US 6,800,932 B2 (LAM et al) 05 October 2004 (05.10.2004) entire document	9-13
Y	US 6,805,474 B2 (WALSER et al) 19 October 2004 (19.10.2004) entire document	11
Y	US 6,864,573 B2 (ROBERTSON et al) 08 August 2005 (08.03.2005) entire document	12, 13
X	US 2005/0128751 A1 (ROBERGE et al) 16 June 2005 (16.06.2005) entire document	14-17

☐ Further documents are listed in the continuation of Box C.

\* 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 application or patent 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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2007/066417

Continuation of Box III.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-13, drawn to systems with light emitting diodes (LEDs) attached to a printed circuit board (PCB) to dissipate heat generated from the LEDs.

Group II, claims 14-17, drawn to a control system with a potentiometer, wherein adjustment of the potentiometer results in simultaneous brightness adjustment of lighting packages.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: a printed circuit board (PCB) to dissipate heat generated from the LEDs as claimed therein is not present in the invention of Group II. The special technical feature of the Group II invention: adjustment of the potentiometer resulting in simultaneous brightness adjustment of lighting packages as claimed therein is not present in the invention of Groups I.

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2007/066417

## 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 extra sheet

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 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.:

### 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.