



(43) International Publication Date
28 May 2009 (28.05.2009)

(10) International Publication Number
WO 2009/067556 A3

(51) International Patent Classification:
F21V 29/00 (2006.01) *H05K 7/20* (2006.01)

(21) International Application Number:
PCT/US2008/084089

(22) International Filing Date:
19 November 2008 (19.11.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/988,954 19 November 2007 (19.11.2007) US

(71) Applicant (for all designated States except US):
NEXXUS LIGHTING, INC. [US/US]; 124 Floyd Smith Drive, Suite 300, Charlotte, NC 28262 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **GRAJCAR, Zdenko** [SK/US]; 3220 Utah Avenue North, Crystal, MN 55427 (US).

(74) Agent: **GROSS, Charles, J.**; McGuireWoods LLP, 1750 Tysons Boulevard, Suite 1800, McLean, VA 22102 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,

CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

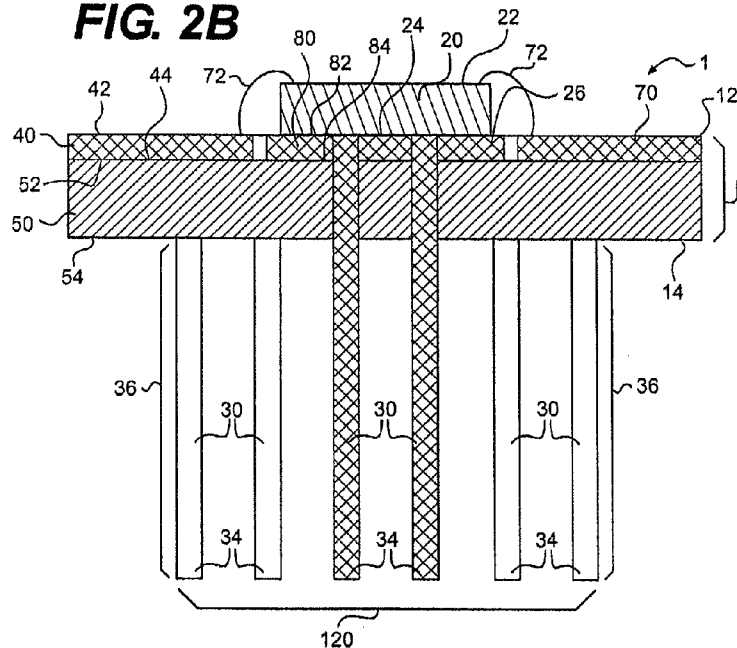
Published:

- 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:
13 August 2009

(54) Title: APPARATUS AND METHODS FOR THERMAL MANAGEMENT OF LIGHT EMITTING DIODES

FIG. 2B



(57) Abstract: An apparatus is disclosed that may include one or more printed circuit boards (PCBs) and an electronics package may be disposed about the first surface of one or more of the PCBs. The PCBs may include a metal layer and a core, and, in some aspects, may include multiple cores interposed between multiple metal layers, and in some embodiments a backplane may be disposed along the core(s). A plurality of PCB's may be set apart and connected by pins to dissipate heat from one PCB to another, and/or to convey electrical connectivity. Pins may be configured to pass through or into one or both the PCBs including the cores to conduct heat generated by the electronics package away for dispersion. In some embodiments, the pins may pass into the backplane. The apparatus may include LEDs, lights, computer devices, memories, telecommunications devices, or combinations of these.

A. CLASSIFICATION OF SUBJECT MATTER***F21V 29/00(2006.01)i, H05K 7/20(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)

IPC: F21V, H05K

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

Korean utility models and applications for utility models since 1975

Japanese utility models and applications for utility models since 1975

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

eKIPASS "THERMAL", "HEAT", "PCB", "ELECTRONIC", "DEVICE", "PIN", "INTERVAL", "CORE", "TRACE"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005-0083698 A1 (CARLOS J. GONZALEZ ; KEVIN M. CONLEY) 12 APR. 2007 see the abstract, fig 2B, 4 to 6, 8, p.2 [31] to p.3 [41]	1 - 3, 7, 9 - 24
X	US 6,799,864 B2 (GELCORE LLC) 05 OCT. 2004 see the abstract, fig 1 to 4, col. 2 line 65 to col.5 line 50	12 - 14
A	KR 10-0767738 B1 (LEE, NAM JU) 18 OCT 2007 see the abstract, fig. 2,5	1 - 24
A	JP 2003-178602 A (KOITO MFG CO LTD) 27 JUN 2003 see the abstract, fig. 1, 2, 8	1 - 24



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 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 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

30 JUNE 2009 (30.06.2009)

Date of mailing of the international search report

30 JUNE 2009 (30.06.2009)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

CHO, Ji Eun

Telephone No. 82-42-481-5753



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2008/084089Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

US 2007-083698 A1

12.04.2007

None

US 6,799,864 B2

05.10.2004

CN 1518768 A

04.08.2004

EP 1393374 A1

03.03.2004

JP 2004-528698

16.09.2004

US 2002-0176250 A1

28.11.2002

US 2002-176250 A1

28.11.2002

US 6799864 B2

05.10.2004

WO 0209-7884A1

05.12.2002

KR 10 - 0767738 B1

18.10.2007

None

JP 2003-178602 A

27.06.2003

None