

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 November 2006 (02.11.2006)

PCT

(10) International Publication Number
WO 2006/116249 A3

- (51) International Patent Classification:
H01L 23/02 (2006.01)
- (21) International Application Number:
PCT/US2006/015376
- (22) International Filing Date: 25 April 2006 (25.04.2006)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/674,616 25 April 2005 (25.04.2005) US
- (71) Applicant (for all designated States except US): **INTERNATIONAL RECTIFIER CORPORATION** [US/US];
233 Kansas Street, El Segundo, California 90245 (US).
- (72) Inventor: **CONNAH, Norman Glyn**; 18 Longmoor Road, Glossop Derbyshire SK 13 6NH (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **PAVIER, Mark**

[GB/GB]; Anns Orchard, 65 Crawley Down Road, Feldbridge West Sussex RH19 2PP (GB).

(74) Agents: **WEINER, Samuel, H.** et al.; Ostrolenk, Faber, Gerb & Soffen LLP, 1180 Avenue Of The Americas, New York, New York 10036 (US).

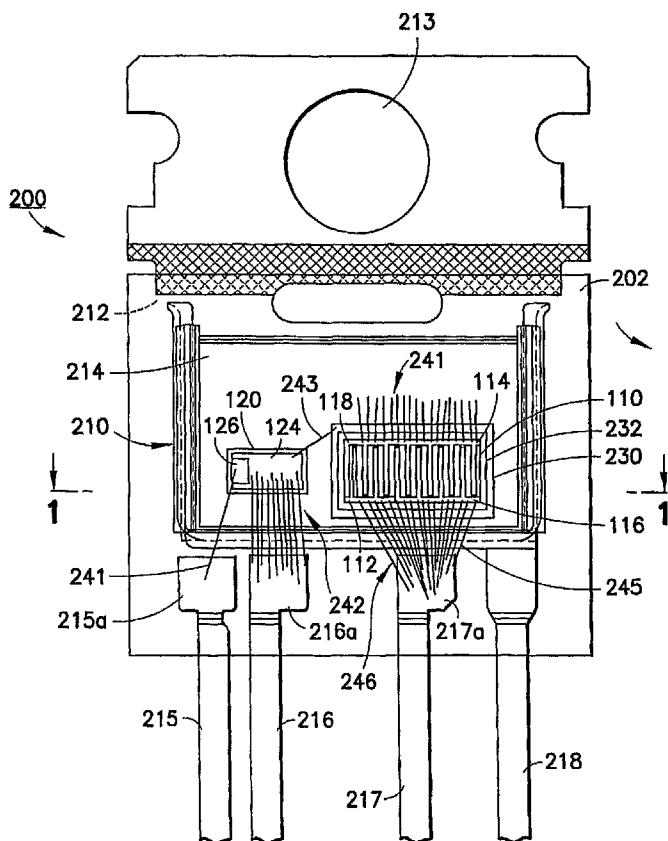
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, 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, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,

[Continued on next page]

(54) Title: DEVICE PACKAGES HAVING A III-NITRIDE BASED POWER SEMICONDUCTOR DEVICE

(57) Abstract: A semiconductor device package includes a die pad, a substrate disposed on the die pad, and a III-nitride based semiconductor device disposed on the substrate. The device package may also include a second semiconductor device disposed on the die pad or the substrate, which device may be electrically connected to the III-nitride based device to form a circuit.



WO 2006/116249 A3



RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:
18 October 2007

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US06/15376

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01L 23/02 (2007.01)

USPC - 257/686

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) - H01L 23/02 (2007.01)

USPC - 257/680-690

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, GooglePatents

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,597,063 B1 (SHIMIZU et al) 22 July 2003 (22.07.2003) entire document	1,4-5,8-18 and 20
---		-----
Y		2-3,6-7 and 19
Y	US 6,380,569 B1 (CHANG et al) 30 April 2002 (30.04.2002) entire document	2-3
Y	US 6,255,722 B1 (EWER et al) 03 July 2001 (03.07.2001) entire document	6
Y	US 6,762,488 B2 (MAEDA et al) 13 Jul 2004 (13.07.2004) entire document	7 and 19
A	US 2005/0012541 A1 (WATANABE) 20 January 2005 (20.01.2005) entire document	1-20

 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

"&" document member of the same patent family

Date of the actual completion of the international search

02 May 2007

Date of mailing of the international search report

30 AUG 2007

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774