

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 November 2000 (30.11.2000)

PCT

(10) International Publication Number
WO 00/71173 A3

- (51) International Patent Classification⁷: **A61L 2/26**
- (21) International Application Number: PCT/US00/12593
- (22) International Filing Date: 9 May 2000 (09.05.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/135,279 21 May 1999 (21.05.1999) US
09/556,227 24 April 2000 (24.04.2000) US
- (71) Applicant: **MINIMED INC.** [US/US]; 12744 San Fernando Road, Sylmar, CA 91342 (US).
- (72) Inventors: **VAN ANTWERP, William, P.**; 26833 Pinehurst Drive, Valencia, CA 91355 (US). **KARRE, Sheana**; 5006 Goldenrod Lane, Lincoln, NE 68512 (US). **PROKOP, Adrian**; 12840 197th Place NE, Woodinville, WA 98072 (US). **STINSON, Sara, Akiko**; 9 Dresden Bay, Alameda, CA 94502 (US). **FONG, Jason**; 984 Ruth Drive, Pleasant Hill, CA 94523 (US). **ROSENBERG, James, J.**; 179 N. Melrose Avenue, Monrovia, CA 91016 (US).
- (74) Agent: **KOVELMAN, Paul, H.**; MiniMed, Inc., 12744 San Fernando Road, Sylmar, CA 91342 (US).
- (81) Designated States (*national*): AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— *With international search report.*
- (88) Date of publication of the international search report:
19 April 2001
- 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.*



WO 00/71173 A3

(54) Title: **DEVICE AND METHOD FOR CIRCUIT PROTECTION DURING RADIATION STERILIZATION**

(57) Abstract: A circuit protection device for protection of sensitive components during high energy radiation sterilization that includes a support substrate and a protective housing. The substrate supports the sensitive components. The protective housing is hermetically coupled to the support substrate to seal the sensitive components within the protective housing. Preferably, the protective housing stops high energy used in the high energy sterilization from damaging the sensitive components from a predetermined exposure level of high energy sterilization. The circuit protection device may further include a protective conductor that is coupled to the support substrate on a side which is opposite the protective housing to prevent high energy from entering the opposite side of the support substrate. The circuit protection device can also include an energy absorbing material contained within an area sealed by the protective housing to absorb high energy byproducts produced by the protective housing stopping the high energy used in the high energy sterilization. Preferably, the support substrate is a circuit board, and the sensitive elements are semiconductors. Also, the high energy sterilization is E-beam sterilization and the high energy are electrons, and the high energy byproducts are x-rays.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/12593

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61L2/26

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 7 A61L H01L

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 496 302 A (MINSHALL BILLY W ET AL) 5 March 1996 (1996-03-05) column 3, line 7 - line 27 column 4, line 46 - line 51 ---	1,13,14
X	WO 98 34451 A (SPACE ELECTRONICS INC) 6 August 1998 (1998-08-06) page 4, line 22 -page 8, line 18 example 2 ---	1-14
X	US 5 397 735 A (MERCANDALLI LOUIS ET AL) 14 March 1995 (1995-03-14) column 3, line 57 - line 61 column 4, line 55 -column 5, line 6 --- -/--	1-29

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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

10 November 2000

Date of mailing of the international search report

- 5. 12. 00

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Diederens, J

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/12593

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 529 968 A (SECR DEFENCE) 25 October 1978 (1978-10-25) page 1, line 22 -page 2, line 19 page 4, line 1 - line 5 -----	16-29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/12593

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
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.

☒ 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: 1-14

Claims 1-14 deal with a circuit protection device for protection of sensitive components during high energy radiation. Sensitive components comprise semiconductors. The device comprises a support (circuit board), a protective conductor which is coupled to the opposite site of the protective housing and includes a material which absorbs high energy byproducts (Xray) produced by the metallic protective housing.

2. Claims: 15-29

Claims 15-29 deal with a circuit element (transistor or circuit array) for use in an electronic device comprising a semiconductor structure (PNP high voltage structure) wherein the latter has been sterilised by radiation and wherein the gain characteristics after radiation are reduced by less than a predetermined fraction of before radiation sterilisation and characteristics of a collector current and a base current for a given base voltage change in a proportional relationship relative to each other.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/12593

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5496302 A	05-03-1996	US 5009654 A CA 2027595 A,C DE 69022163 D DE 69022163 T EP 0425602 A IE 69127 B JP 2932316 B JP 4500472 T WO 9011095 A	23-04-1991 11-09-1990 12-10-1995 09-05-1996 08-05-1991 07-08-1996 09-08-1999 30-01-1992 04-10-1990
WO 9834451 A	06-08-1998	AU 5777598 A EP 0956749 A	25-08-1998 17-11-1999
US 5397735 A	14-03-1995	FR 2640428 A DE 68909021 D DE 68909021 T EP 0374001 A	15-06-1990 14-10-1993 03-03-1994 20-06-1990
GB 1529968 A	25-10-1978	DK 275476 A SE 7605127 A	20-12-1976 20-12-1976