TOSHIBA

ST1200FXF21

NEW PRODUCT GUIDE

Outline

As the successor to the 2500-V, 1000-A insulated-gate bipolar transistor (IGBT), Toshiba are marketing their newly developed 3300-V, 1200-A IGBT, which comes in a flat package with compression-bonded encapsulation.
The new IGBT uses Toshiba's original multi-pellet alloy-free assembly structure. The bonding wires and soldering used in conventional plastic-module IGBTs have been dispensed with. As a result, the new product offers improved longevity and high reliability during thermal cycling.
Applications include high-voltage DC transmission equipment, static VAR compensators, and inverters for driving the motors of electric trains.

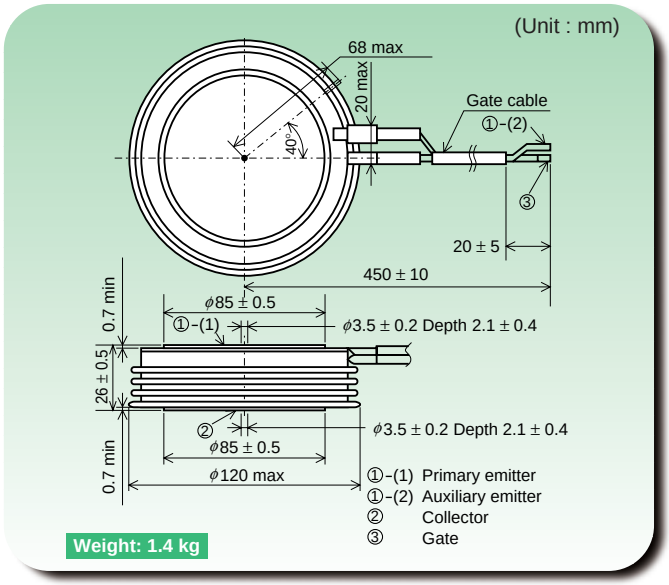
Features

- All electrical terminals and connections use compression-contact encapsulation. As a result, the IGBT is much less prone to damage caused by the junctions between the external terminals' leads and the internal semiconductor device getting hot and breaking. In this regard the IGBT is now as reliable as a GTO thyristor with the same structure.

- If the new IGBT is electrically damaged and breaks down, current flows directly between the collector and the emitter. In particular, when components are connected in series, there is no residual high voltage remaining from the snubber circuit or any other circuits connected to the product, and thus electrical stability is maintained.
  In addition, since the breakdown short circuit ensures that the device remains on, this IGBT is particularly effective in designs consisting of multiple components connected in series where built-in redundancy is required.
  Furthermore, even if, for example, the IGBT is damaged by surge current, its internal structural materials will not rupture the package and scatter.

- Because the IGBT uses a hermetically sealed structure with ceramic and copper terminals to seal in the inert gases, the IGBT is highly resistant to humidity and other climatic factors. In addition, the new IGBT's characteristics remain unaffected by pulse power because the thermal resistance over a brief period (the transient thermal resistance) of the IGBT is smaller than that of plastic module IGBTs with the same ratings. This is achieved by the thermal capacity of the metal terminals that come into direct contact with the semiconductor chip.

Package Dimensions



Technical specification

Maximum Ratings

Characteristic		Symbol	Rating	Unit
Collector-emitter voltage		V_{CES}	3300	V
Gate-emitter voltage		V_{GES}	± 20	V
Collector current	DC	I_C	1200	A
	1 ms	I_{CP}	2400	A
Forward current	DC	I_F	1200	A
	1 ms	I_{FM}	2400	A
Collector power dissipation (Tc = 25°C)		P_c	7100	W
Junction temperature		T_j	−20~125	°C
Storage temperature		T_{stg}	−40~125	°C
Mounting force		–	31.5 ± 3.2	kN

Electrical characteristics

(T_C=125°C (except R_{th}))

Characteristic		Symbol	Test conditions	Min	Typ.	Max	Unit
Collector cut-off current		I_{CES}	V_{CE} = 3300 V,V_{GE} = 0 V	–	–	300	mA
Gate-emitter cut-off voltage		$V_{GE(off)}$	V_{CE} = 5 V,I_C = 1.2 A	–	3.8		V
Collector-emitter saturation voltage		$V_{CE(sat)}$	I_C = 1200 A,V_{GE} = 15 V	–	5.5	–	V
Input capacitance		C_{ies}	V_{CE} = 10 V,V_{GE} = 0 V, f = 1 MHz	–	220	–	nF
Switching time	Rise time	t_r	Inductive load V_{CC} = 1500 V, I_C = 1200 A, V_{GG} = ± 15 V, $R_{G(on)}$ = 10 Ω, $R_{G(off)}$ = 3.3 Ω	–	–	–	μs
	Turn-on time	t_{on}		–	–	–	μs
	Fall time	t_f		–	1.5	–	μs
	Turn-off time	t_{off}		–	2.7	–	μs
Forward voltage		V_F	I_F = 1200 A,V_{GE} = 0 V	–	3.6	–	V
Reverse recovery time		t_{rr}	I_F = 1200 A,V_{GG} = −15 V di/dt = 1500 A/μs	–	–	–	μs
Thermal resistance	Transistor part	$R_{th(j-f)}$	Junction-fin(DC), Cooling on both sides	–	–	14.0	°C/kW
	Diode part	$R_{th(j-f)}$	Junction-fin(DC), Cooling on both sides	–	–	35.0	

OVERSEAS SUBSIDIARIES AND AFFILIATES

980403 (D)

Toshiba America Electronic Components, Inc.

Headquarters-Irvine, CA
9775 Toledo Way, Irvine,
CA 92718, U.S.A.
Tel: (714)455-2000 Fax: (714)859-3963

Altamonte Springs, FL(Orland)
600 S, North Lake Blvd., Suite 250,
Altamonte Springs, FL 32701, U.S.A.
Tel: (407)332-0966 Fax: (407)339-3777

Deerfield, IL(Chicago)
One Pkwy., North, Suite 500, Deerfield,
IL 60015-2547, U.S.A.
Tel: (847)945-1500 Fax: (847)945-1044

Denver, CO
8400 E, Prentice Englewood, CO 80111, U.S.A.
Tel: (303)220-9848 Fax: (303)220-9856

Edison, NJ
2035 Lincoln Hwy. Ste. #3000, Edison
NJ 08817, U.S.A.
Tel: (908)248-8070 Fax: (908)248-8030

Irvine, CA
2 Venture Plaza, Suite 500, Irvine,
CA 92718, U.S.A.
Tel: (714)453-0224 Fax: (714)453-0125

Microelectronics Center-Sunnyvale, CA
1220 Midas Way, Sunnyvale,
CA 94088-3509, U.S.A.
Tel: (408)739-0560 Fax: (408)746-0577

Norcross, GA(Atlanta)
655 Engineering Dr. #160, Norcross,
GA 30092, U.S.A.
Tel: (404)368-0203 Fax: (404)368-0075

Richardson, TX(Dallas)
777 East Campbell Rd., Suite 650, Richardson,
TX 75081, U.S.A.
Tel: (214)480-0470 Fax: (214)235-4114

Wakefield, MA(Boston)
401 Edgewater Place, Suite #360, Wakefield,
Essex, MA 01880-6229, U.S.A.
Tel: (617)224-0074 Fax:(617)224-1095

San Jose Engineering Center, CA
1060 Rincon Circle, San Jose,
CA 95131, U.S.A.
Tel: (408)456-8900 Fax: (408)456-8910

Toshiba Electronics Europe GmbH

Düsseldorf Head Office
Hansaallee 181, D-40549 Düsseldorf
Germany
Tel: (0211)5296-0 Fax: (0211)5296-400

Stuttgart Office
Buro Stuttgart, Eltinger Str.
61, D-71229 Leonberg, Germany
Tel: (07152)6045-0 Fax: (07152)6045-45

München Office
Büro München Hofmannstrasse 52,
D-81378, München, Germany
Tel: (089)748595-0 Fax: (089)748595-42

Berlin Office
Buro Berlin, Alt-Moabit 96B,
D-10559, Berlin, Germany
Tel: (030)-3999000 Fax: (030)-3999017

Toshiba Electronics France SARL
Immeuble Robert Schumann 3 Rue de Rome,
F-93561, Rosny-Sous-Bois, Cedex, France
Tel: (1)48-12-48-12 Fax: (1)48-94-51-15

Toshiba Electronics Italiana S.R.L.
Centro Direzionale Colleoni
Palazzo Perseo Ingr. 2-Piano 6,
Via Paracelso n.12,
1-20041 Agrate Brianza Milan, Italy
Tel: (039)68701 Fax:(039)6870205

Toshiba Electronics España, S.A.
Parque Empresarial San Fernando Edificio Europa,
1a Planta, ES-28831 Madrid, Spain
Tel: (91)660-6700 Fax:(91)660-6799

Toshiba Electronics(UK) Limited
Riverside Way, Camberley Surrey,
GU15 3YA, U.K.
Tel: (01276)69-4600 Fax: (01276)69-4800

Toshiba Electronics Scandinavia AB
Gustavslundsvägen 12, 2nd Floor
S-161 15 Bromma, Sweden
Tel: (08)704-0900 Fax: (08)80-8459

Toshiba Electronics Asia (Singapore) Pte. Ltd.

Singapore Head Office
460 Alexandra Rd., #21-00 PSA Bldg.,
Singapore 0511
Tel: (278)5252 Fax: (271)5155, (270)6056

Bangkok Office
135 Moo 5 Bangkadi Industrial Park, Tivanon Rd.,
Bangkadi Amphur Muang Pathumthani 12000, Thailand
Tel: (2)501-1635 Fax: (2)501-1638

Toshiba Electronics Trading (Malaysia)Sdn. Bhd.

Kuala Lumpur Head Office
Suite W1203, Wisma Consplant, No.2,
Jalan SS 16/4, Subang Jaya, 47500 Petaling Jaya,
Selangor Darul Ehsan, Malaysia
Tel: (3)731-6311 Fax: (3)731-6307

Penang Office
Suite 13-1, 13th Floor, Menard Penang Garden,
42-A, Jalan Sultan Ahmad Shah,
100 50 Penang, Malaysia
Tel: 4-226-8523 Fax: 4-226-8515

Toshiba Electronics Asia, Ltd.

Hong Kong Head Office
Level 11, Top Glory Insurance Building,
Grand Century Place,
No.193, Prince Edward Road West,
Mong Kok, Kowloon, Hong Kong
Tel: 2375-6111 Fax: 2375-0969

Seoul Branch
14/F, KEC B/D, 257-7 Yangjae-dong,
Seocho-ku, Seoul, Korea
Tel: (02)589-4334 Fax: (02)589-4302

Seoul Branch, Gumi Office
6/F, Ssangyong Investment Securities B/D,
56 Songjung-Dong, Gumi City
Kyeongbuk, Korea
Tel: (0645)456-7613-6 Fax: (0546)456-7617

Shenzhen Office
Rm 3010-3012, Shun Hing Square,
Di Wang Commercial Centre,
333 Shennan Road East,
Shenzhen, China, 518008
Tel: (0755)246-1582 Fax: (0755)246-1581

Shanghai Office
RM2612 26F, Rui Jin Bldg., 205 Mao Ming
South Rd., Shanghai, China
Tel: (021)64723077 Fax:(021)64727028

Tsurong Xiamen Xiangyu Trading Co., Ltd.
8N, Xiamen Sez Bonded Goods Market Building,
Xiamen, Fujian, China
Tel: (0592)562-3798 Fax:(0592)562-3799

Beijing Office
Rm 714, Beijing Fortune Building,
No.5 Dong San Huan Bei-Lu, Chao Yang District,
Beijing, China, 10004
Tel:(010)6595-8795 Fax: (010)6590-8791

Toshiba Electronics Taiwan Corporation

Taipei Head Office
17F, Union Enterprise Plaza Bldg. 109
Min Sheng East Rd., Section 3, 0446 Taipei,
Taiwan R.O.C.
Tel: (02)514-9988 Fax: (02)514-7892

Kaohsiung Office
16F-A, Chung-Cheng Bldg., Chung-Cheng 3Rd.,
80027, Kaohsiung, Taiwan R.O.C.
Tel: (07)222-0826 Fax: (07)223-0046

Toshiba Display Devices (Thailand) Co., Ltd.

142 Moo 5, Bangkadi Industrial Park,
Tivanon Rd., Pathumthani 12000, Thailand
Tel: (2)501-1200 Fax: (2)501-1209

In Touch with Tomorrow

TOSHIBA

TOSHIBA CORPORATION

Electronic Devices Sales & Marketing Group
1-1, Shibaura 1-chome, Minato-ku, Tokyo, 105-8001, Japan
Tel: (03)3457-3405 Fax: (03)5444-9324