GP800DHB18S

Powerline N-Channel IGBT Module

Advance Information

Supesedes August 1998, version DS4933-2.0

DS4933 - 2.8 February 1999

The GP800DHB18S is a dual switch 1800V, robust n channel enhancement mode insulated gate bipolar transistor (IGBT) module. Designed for low power loss, the module is suitable for a variety of high voltage applications in motor drives and power conversion. The high impedance gate simplifies gate drive considerations enabling operation directly from low power control circuitry.

Fast switching times allow high frequency operation making the device suitable for the latest drive designs employing pwm and high frequency switching. The IGBT has a wide reverse bias safe operating area (RBSOA) for ultimate reliability in demanding applications.

These modules incorporate electrically isolated base plates and low inductance construction enabling circuit designers to optimise circuit layouts and utilise earthed heat sinks for safety.

The powerline range of high power modules includes dual and single switch configurations with a range of current and voltage capabilities to match customer system demands.

Typical applications include dc motor drives, ac pwm drives, main traction drives and auxiliaries, large ups systems and resonant inverters.

Features

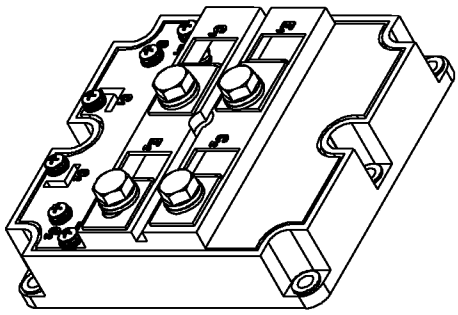
- n - Channel.
- Enhancement Mode.
- High Input Impedance.
- Optimised For High Power High Frequency Operation.
- Isolated Base.
- Full 1800V Capability.
- 800A Per Arm.

Applications

- High Power Switching.
- Motor Control.
- Inverters
- Traction Systems.

Key Parameters

V_{CES}		1800V
$V_{CE(sat)}$	(typ)	3.5V
I_{C25}	(max)	800A
I_{C75}	(max)	600A
$I_{C(PK)}$	(max)	1600A



Outline type code: D

(See package details for further information)

Fig. 1 Package outline

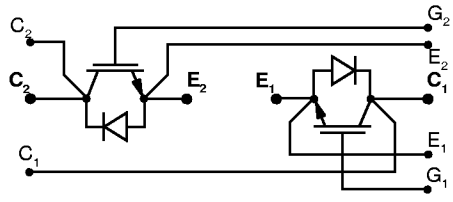


Fig.2 Half bridge circuit diagram

Ordering Information

Order As: **GP800DHB18S**

Note: When ordering, please use the complete part number.

Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

Absolute Maximum Ratings - Per Arm

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to Absolute Maximum Ratings for extended periods may affect device reliability.

T_{case} = 25˚C unless stated otherwise.

Symbol	Parameter	Test Conditions	Max.	Units
V_{CES}	Collector-emitter voltage	V_{GE} = 0V	1800	V
V_{GES}	Gate-emitter voltage	-	±20	V
I_C	Collector current	DC, T_{case} = 25˚C	800	A
		DC, T_{case} = 75˚C	600	A
$I_{C(PK)}$	Peak collector current	1ms, T_{case} = 25˚C	1600	A
		1ms, T_{case} = 75˚C	1200	A
P_{max}	Maximum power dissipation	T_{case} = 25˚C (Transistor)	6000	W
V_{isol}	Isolation voltage	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	4000	V

Thermal And Mechanical Ratings

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - transistor (per arm)	DC junction to case	-	21	°C/kW
$R_{th(j-c)}$	Thermal resistance - diode (per arm)	DC junction to case -	-	40	°C/kW
$R_{th(c-h)}$	Thermal resistance - Case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	8	°C/kW
T_j	Junction temperature	Transistor	-	150	°C
		Diode	-	125	°C
T_{stg}	Storage temperature range	-	–40	125	°C
-	Screw torque	Mounting - M6	-	5	Nm
		Electrical connections - M4	-	2	Nm
		Electrical connections - M8	-	10	Nm

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Electrical Characteristics

T_{case} = 25˚C unless stated otherwise.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_{CES}	Collector cut-off current	V_{GE} = 0V, V_{CE} = V_{CES}	-	-	1	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125˚C	-	-	25	mA
I_{GES}	Gate leakage current	V_{GE} = ±20V, V_{CE} = 0V	-	-	4	µA
$V_{GE(TH)}$	Gate threshold voltage	I_C = 40mA, V_{GE} = V_{CE}	4	-	7.5	V
$V_{CE(SAT)}$	Collector-emitter saturation voltage	V_{GE} = 15V, I_C = 800A	-	3.5	4.0	V
		V_{GE} = 15V, I_C = 800A, T_{case} = 125˚C	-	4.3	5.0	V
I_F	Diode forward current	DC	-	-	800	A
I_{FM}	Diode maximum forward current	t_p = 1ms	-	-	1600	A
V_F	Diode forward voltage	I_F = 800A	-	2.2	2.5	V
		I_F = 800A, T_{case} = 125˚C	-	2.3	2.6	V
C_{ies}	Input capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	90	-	nF
L_M	Module inductance	-	-	20	-	nH

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Inductive Switching Characteristics

For definition of switching waveforms, refer to figure 3 and 4.

T_{case} = 25˚C unless stated otherwise

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{d(off)}$	Turn-off delay time	I_C = 800A V_{GE} = ±15V V_{CE} = 800V $R_{G(ON)}$ = $R_{G(OFF)}$ = 2.2Ω L ~ 100nH	-	700	850	ns
t_f	Fall time		-	180	225	ns
E_{OFF}	Turn-off energy loss		-	160	190	mJ
$t_{d(on)}$	Turn-on delay time		-	650	800	ns
t_r	Rise time		-	300	400	ns
E_{ON}	Turn-on energy loss		-	270	315	mJ
Q_{rr}	Diode reverse recovery charge	I_F = 800A V_R = 800V, dI_F/dt = 3000A/µs^{-1}	-	130	170	µC

T_{case} = 125˚C unless stated otherwise.

$t_{d(off)}$	Turn-off delay time	I_C = 800A V_{GE} = ±15V V_{CE} = 800V $R_{G(ON)}$ = $R_{G(OFF)}$ = 2.2Ω L ~ 100nH	-	800	950	ns
t_f	Fall time		-	200	250	ns
E_{OFF}	Turn-off energy loss		-	180	210	mJ
$t_{d(on)}$	Turn-on delay time		-	750	900	ns
t_r	Rise time		-	350	450	ns
E_{ON}	Turn-on energy loss		-	290	330	mJ
Q_{rr}	Diode reverse recovery charge	I_F = 800A V_R = 800V, dI_F/dt = 3000A/µs^{-1}	-	175	225	µC

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Switching Definitions

$$E_{on} = \int_{t_1}^{t_4 + 5\mu s} V_{ce}.I_c dt$$

$t_{d(on)} = t_2 - t_1$

$t_r = t_3 - t_2$

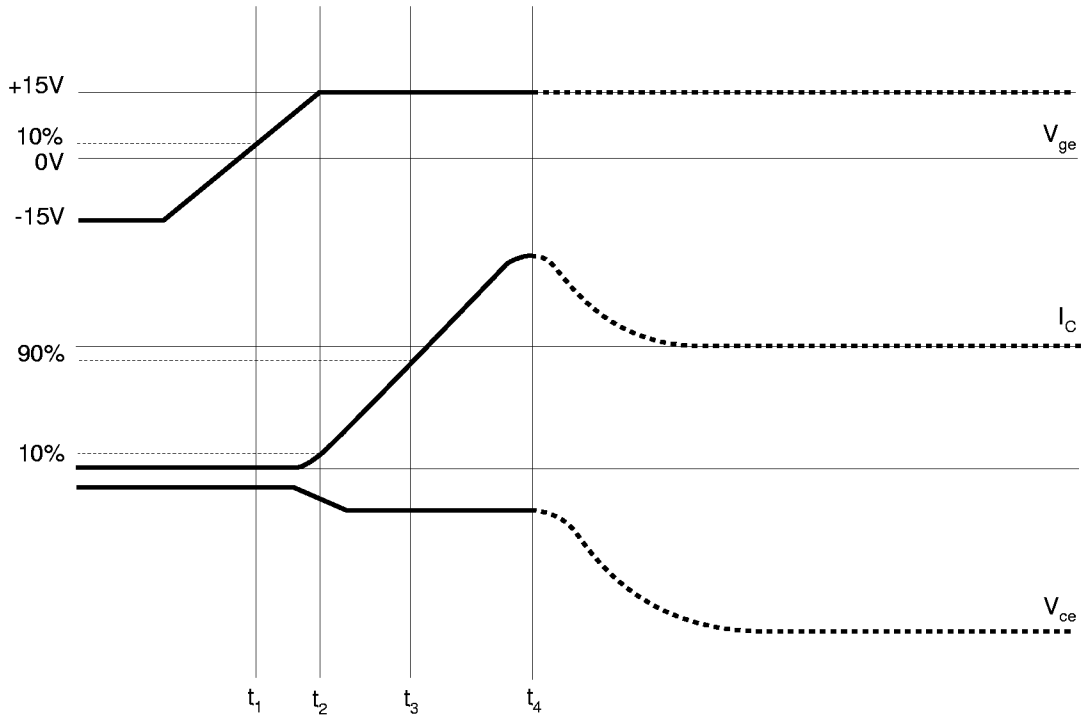

Fig.3 Definition of turn-on switching times

$$E_{off} = \int_{t_5}^{t_7 + 5\mu s} V_{ce}.I_c dt$$

$t_{d(off)} = t_6 - t_5$

$t_f = t_7 - t_6$

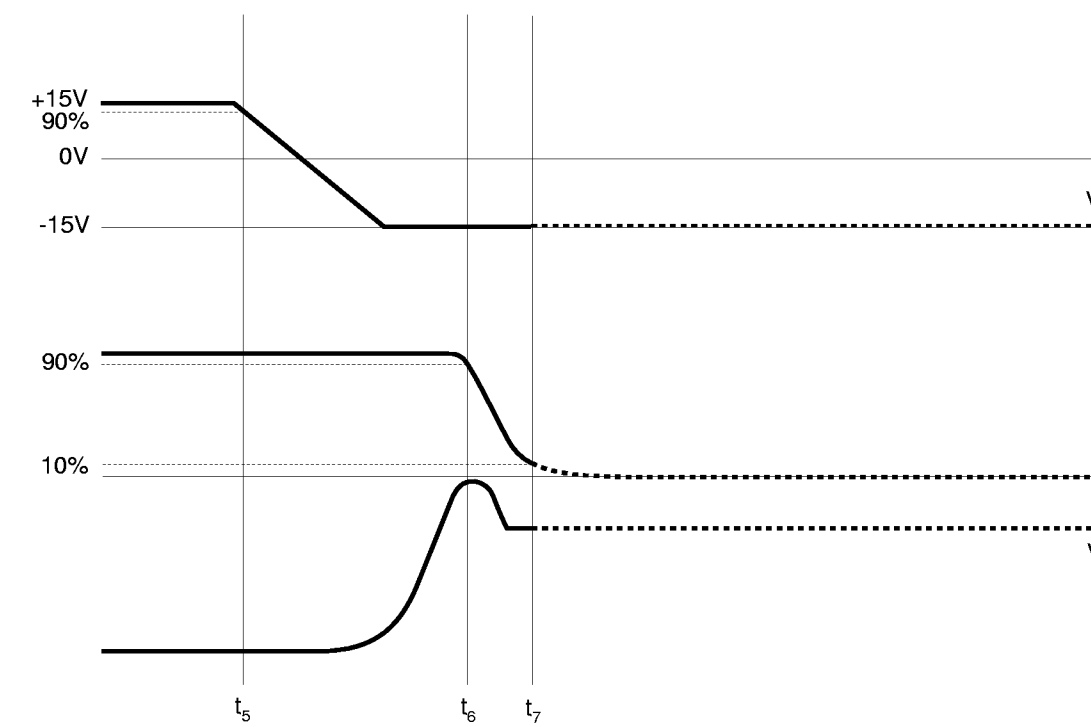

Fig.4 Definition of turn-off switching times

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Curves

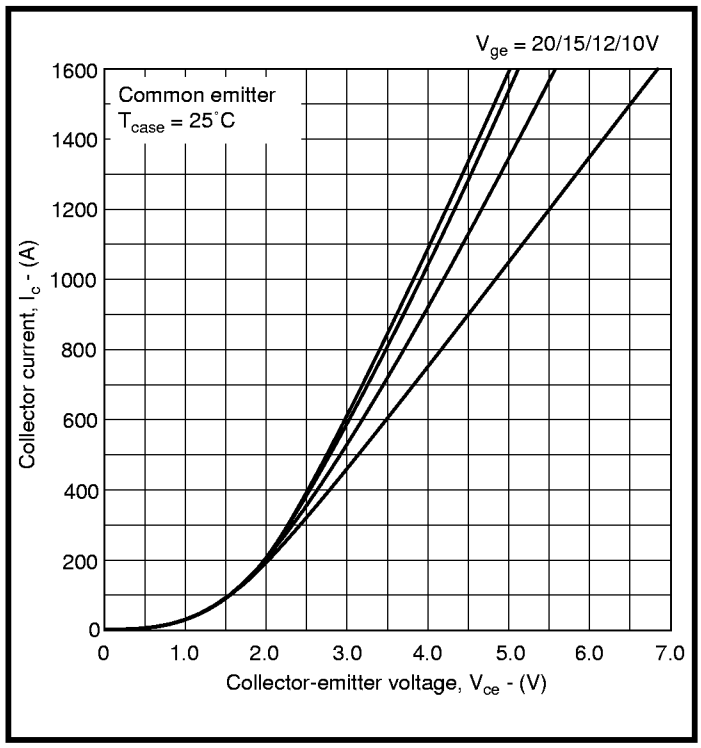

Fig.5 Typical output characteristics

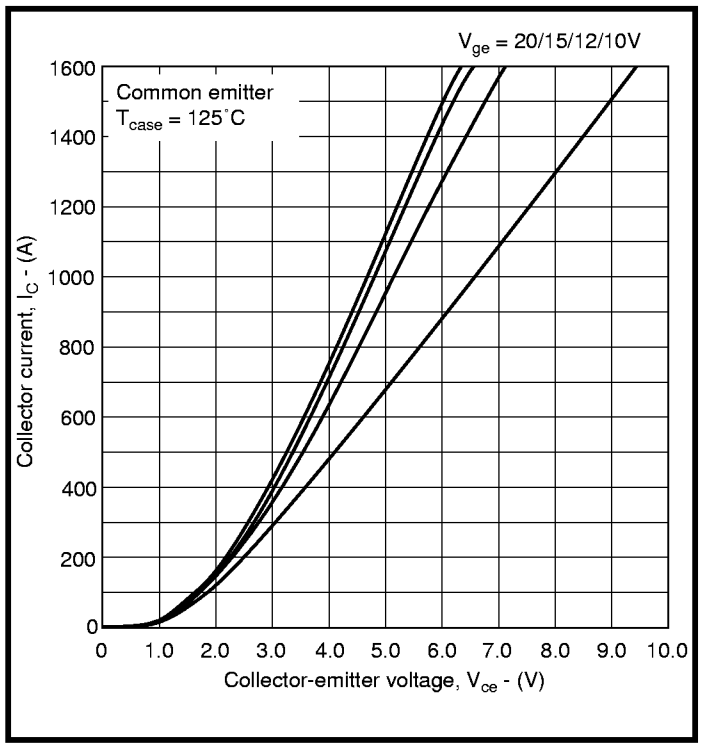

Fig.6 Typical output characteristics

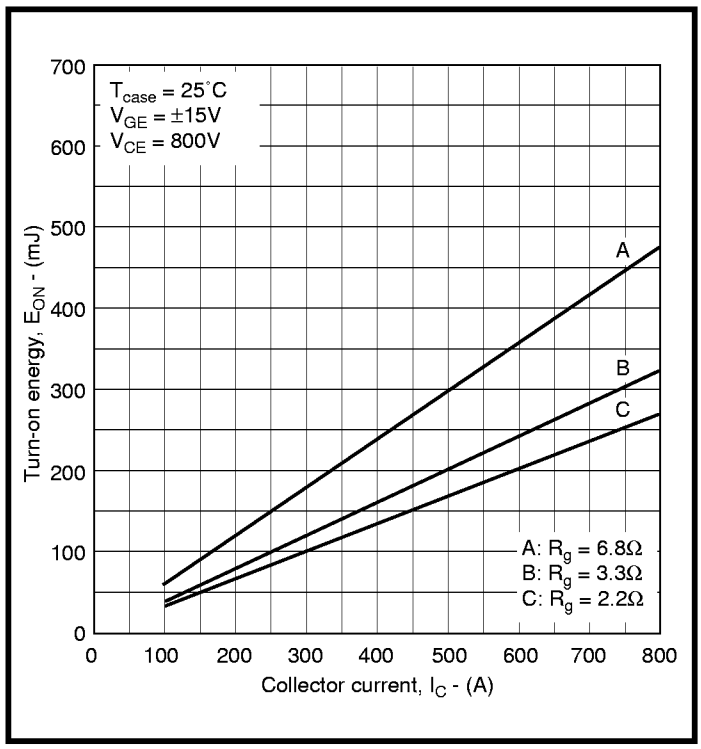

Fig.7 Typical turn-on energy vs collector current

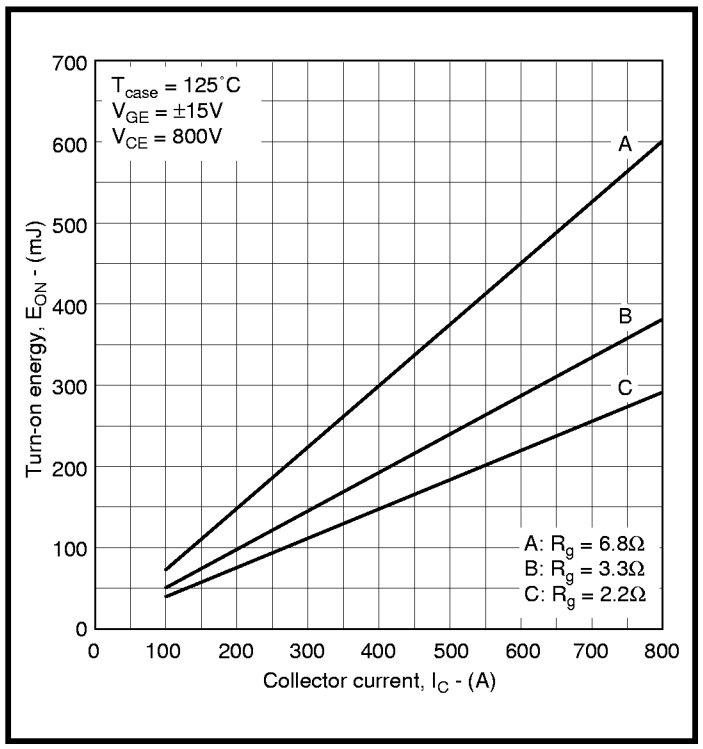

Fig.8 Typical turn-on energy vs collector current

Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

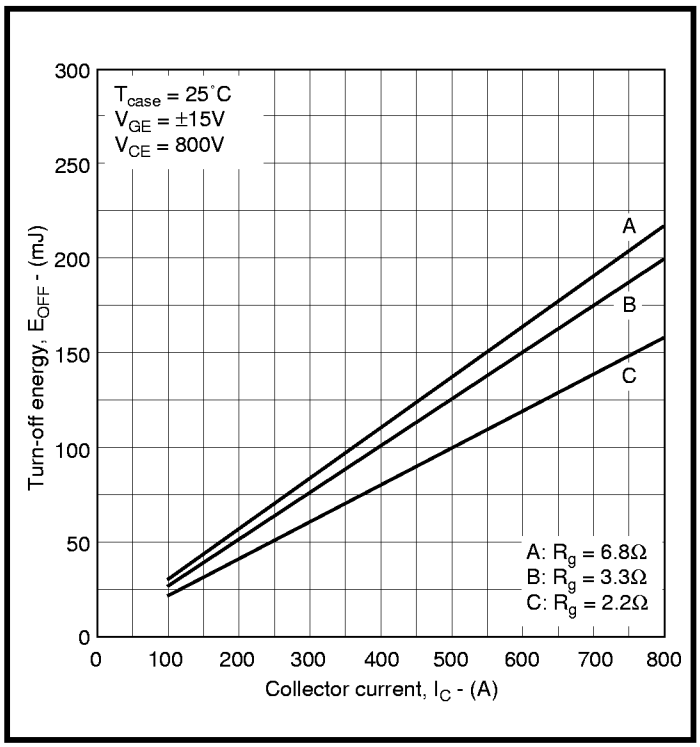

Fig.9 Typical turn-off energy vs collector current

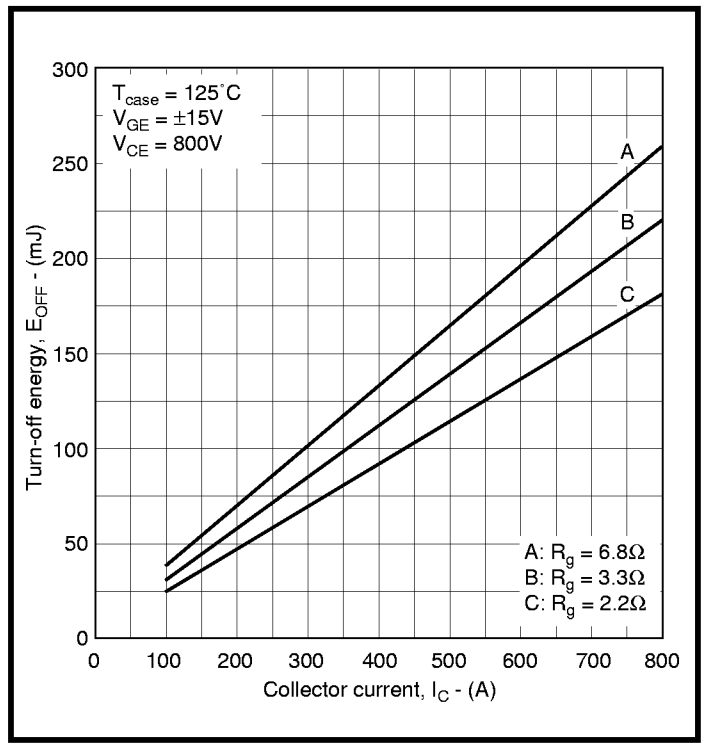

Fig.10 Typical turn-off energy vs collector current

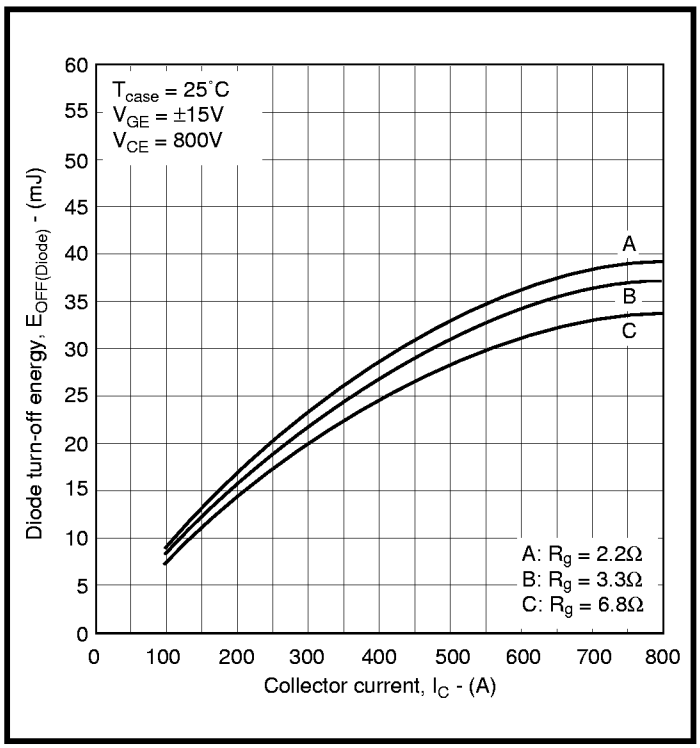

Fig.11 Typical diode turn-off energy vs collector current

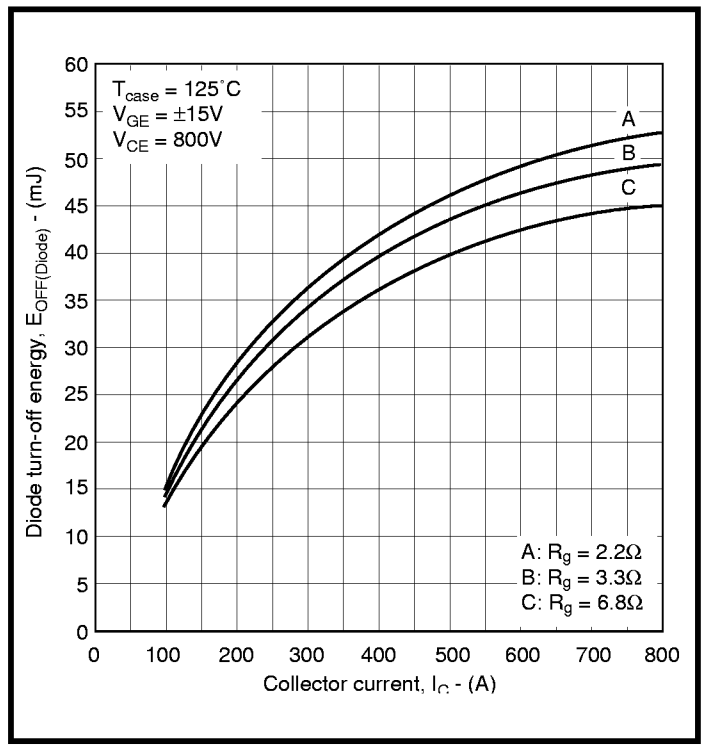

Fig.12 Typical diode turn-off energy vs collector current

Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

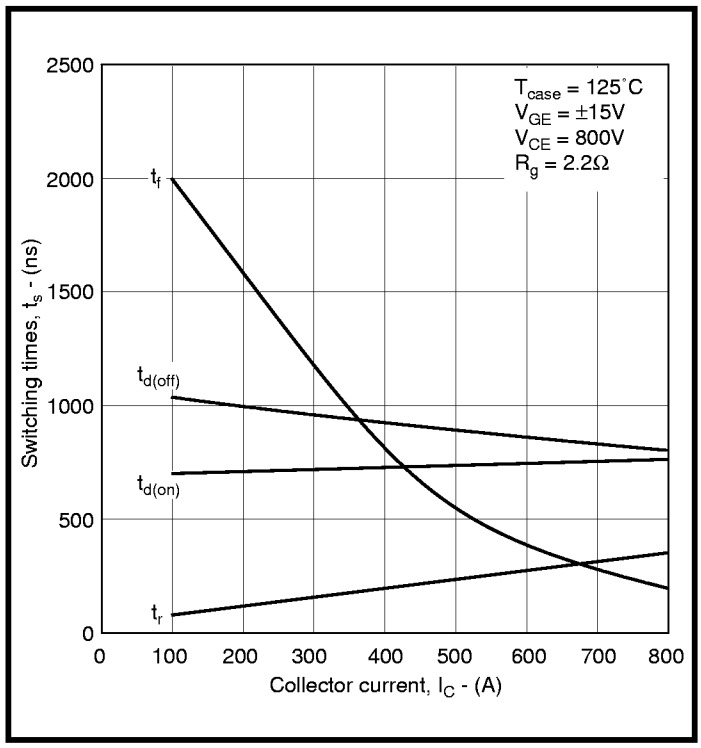

Fig.13 Typical switching characteristics

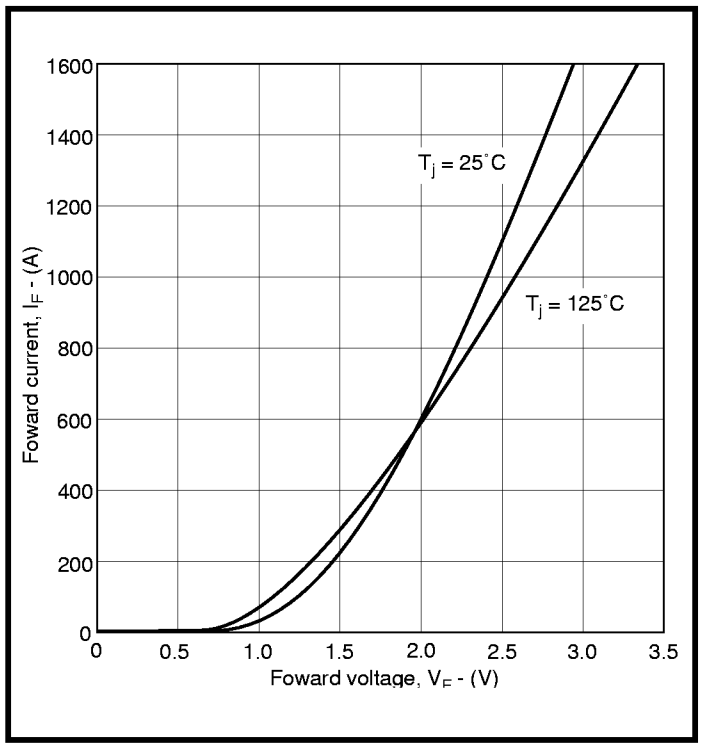

Fig.14 Diode typical forward characteristics

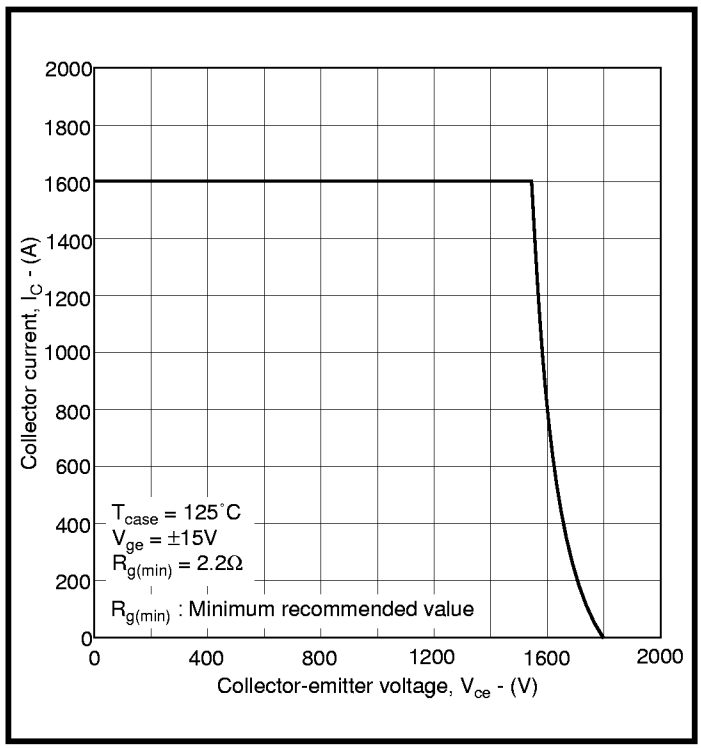

Fig.15 Reverse bias safe operating area

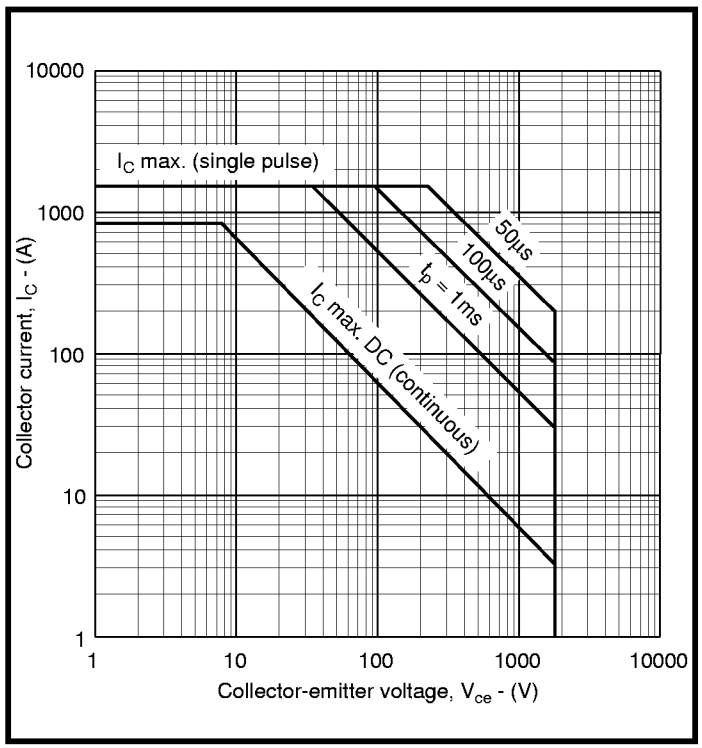

Fig.16 Forward bias safe operating area

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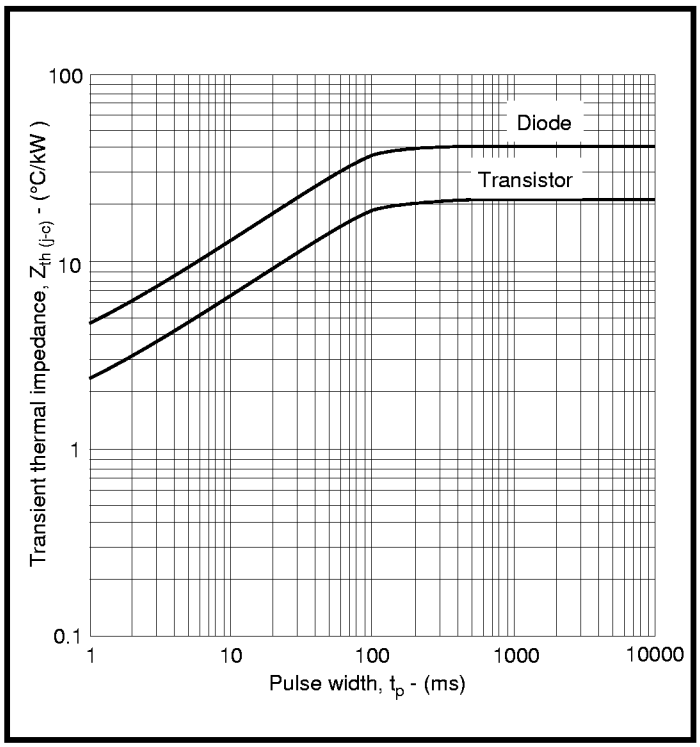


Fig.17 Transient thermal impedance

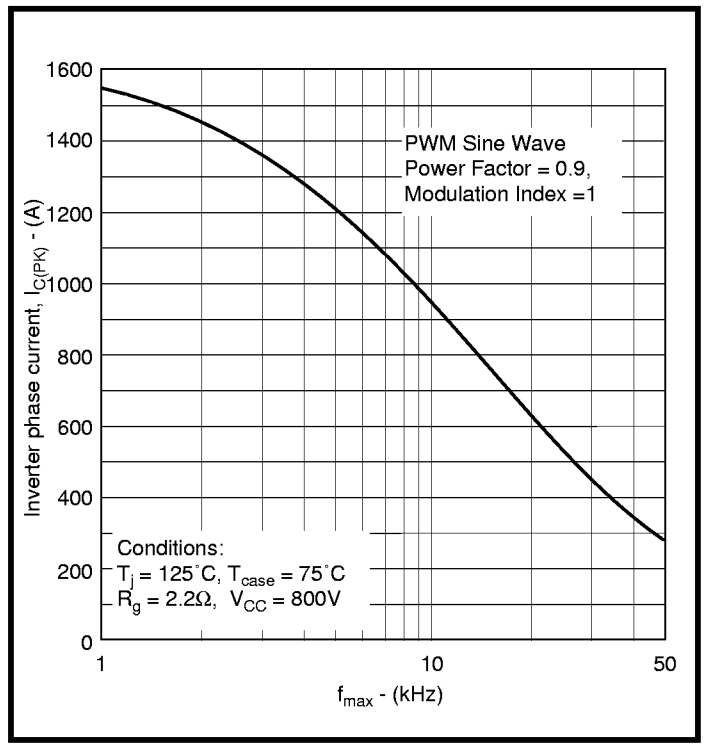


Fig.18 3-Phase inverter operating frequency

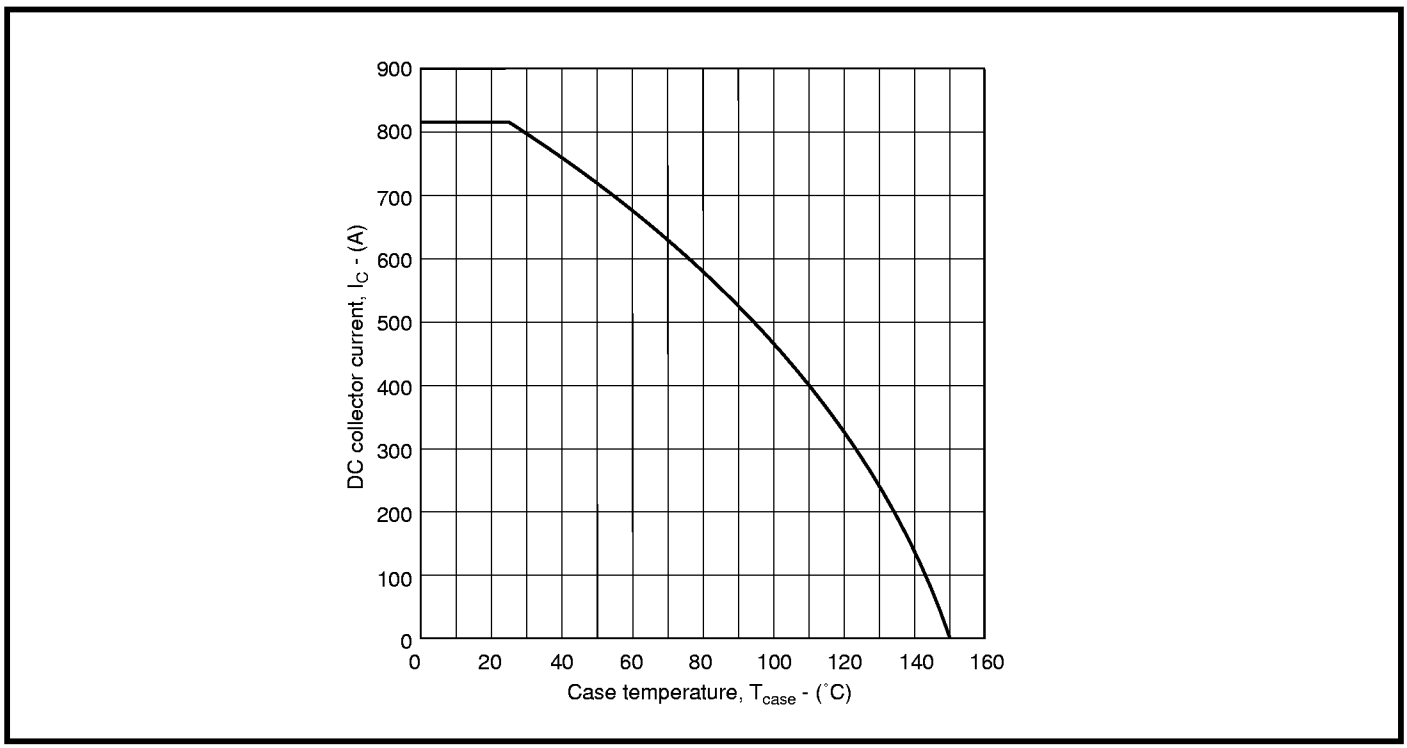
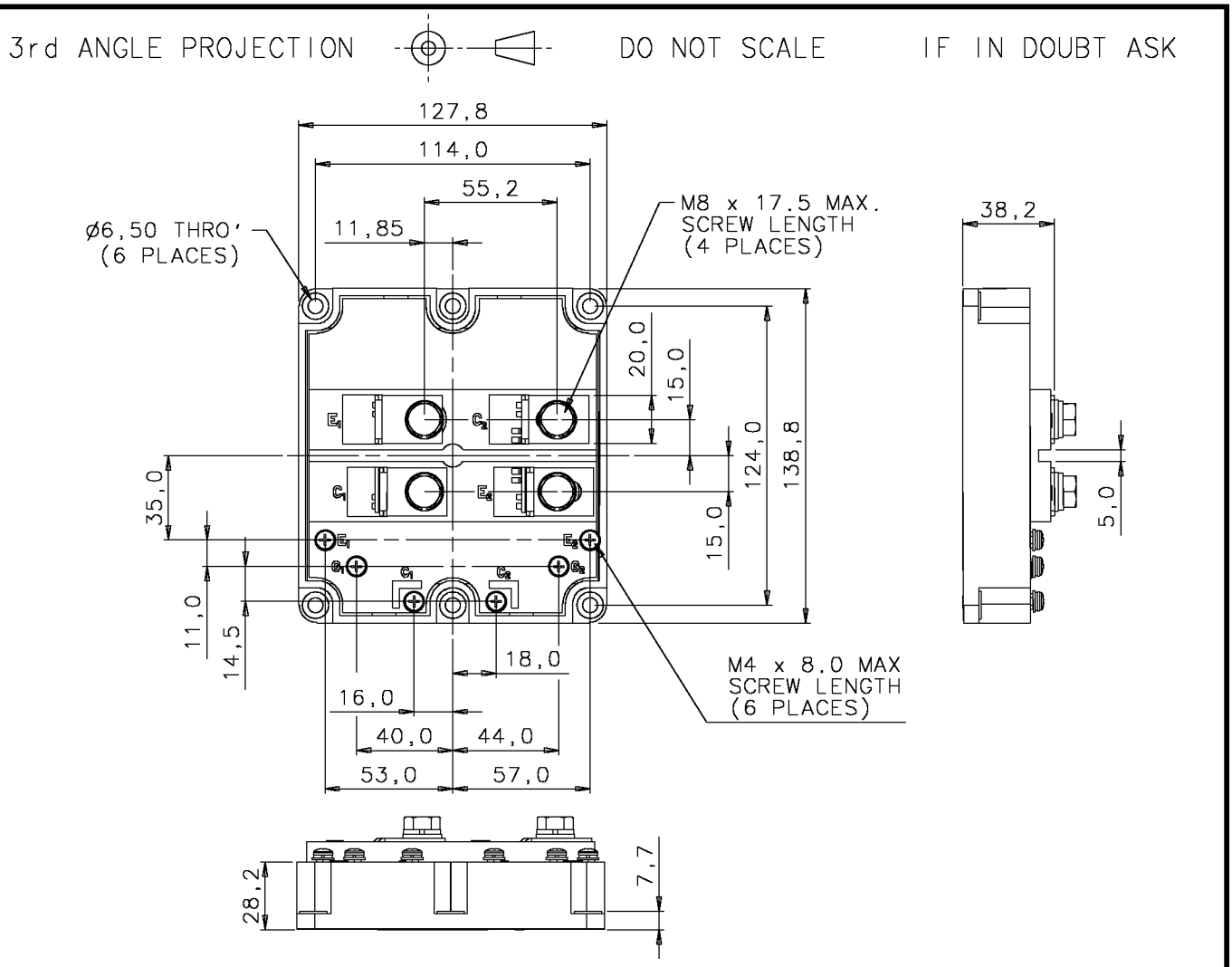


Fig.19 DC current rating vs case temperature

Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.

Package Details

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



Nominal weight: 1600g

Package outline type D

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