GP500LSS06S

Single Switch IGBT Module

Replaces April 2002 version, DS4324-7.0

DS4324-7.1 July 2002

FEATURES

- n - Channel
- High Switching Speed
- Low Forward Voltage Drop
- Isolated Base

APPLICATIONS

- PWM Motor Control
- UPS

The Powerline range of modules includes half bridge, chopper, dual and single switch configurations covering voltages from 600V to 3300V and currents up to 2400A.

The GP500LSS06S is a single switch 600V n channel enhancement mode insulated gate bipolar transistor (IGBT) module. The module is suitable for a variety of medium voltage applications in motor drives and power conversion.

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.

Typical applications include dc motor drives, ac pwm drivesand ups systems.

ORDERING INFORMATION

Order as:

GP500LSS06S

Note: When ordering, use complete part number.

KEY PARAMETERS

V_{CES}		**600V**
$V_{CE(sat)}$*	**(typ)**	**2.2V**
I_{C25}	**(max)**	**700A**
I_{C75}	**(max)**	**500A**
$I_{C(PK)}$	**(max)**	**1400A**

*(measured at the power busbars and not the auxiliary terminals)

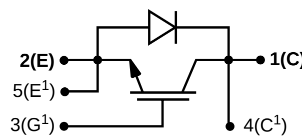
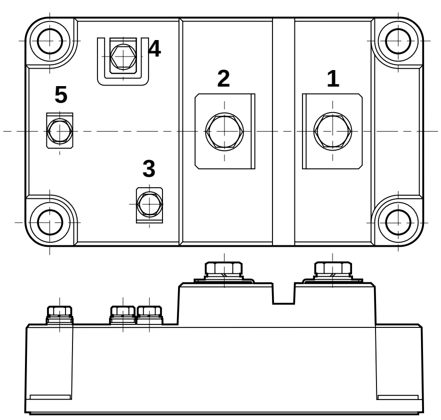


Fig. 1 Single switch circuit diagram



Outline type code: L

(See package details for further information)

Fig. 2 Electrical connections - (not to scale)

ABSOLUTE MAXIMUM RATINGS

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings 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	600	V
V_{GES}	Gate-emitter voltage	-	±20	V
I_C	Collector current	DC, T_{case} = 25˚C	700	A
		DC, T_{case} = 75˚C	500	A
$I_{C(PK)}$		1ms, T_{case} = 25˚C	1400	A
		1ms, T_{case} = 75˚C	1000	A
P_{max}	Maximum power dissipation	(Transistor)	2500	W
V_{isol}	Isolation voltage	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - transistor	DC junction to case	-	50	°C/kW
$R_{th(j-c)}$	Thermal resistance - diode	DC junction to case -	-	125	°C/kW
$R_{th(c-h)}$	Thermal resistance - Case to heatsink	Mounting torque 5Nm (with mounting grease)	-	15	°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 - M6	-	5	Nm

ELECTRICAL CHARACTERISTICS

T_j = 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}	-	-	25	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_j = 125˚C	-	-	100	mA
I_{GES}	Gate leakage current	V_{GE} = ±20V, V_{CE} = 0V	-	-	2	µA
$V_{GE(TH)}$	Gate threshold voltage	I_C = mA, V_{GE} = V_{CE}	4	-	7.5	V
$V_{CE(SAT)}$ †	Collector-emitter saturation voltage	V_{GE} = 15V, I_C = 500A	-	2.2	2.8	V
		V_{GE} = 15V, I_C = 500A, T_j = 125˚C	-	2.3	2.9	V
I_F	Diode forward current	DC	-	-	500	A
I_{FM}	Diode maximum forward current	t_p = 1ms	-	-	1000	A
V_F †	Diode forward voltage	I_F = 500A,	-	1.1	1.9	V
		I_F = 500A, T_j = 125˚C	-	1.05	1.8	V
C_{ies}	Input capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	54000	-	pF
L_M	Module inductance	-	-	15	-	nH

Note:
† Measured at the power busbars and not the auxiliary terminals.
* L is the circuit inductance + L_M

INDUCTIVE SWITCHING CHARACTERISTICS

T_j = 25°C unless stated otherwise

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{d(off)}$	Turn-off delay time	I_C = 500A V_{GE} = ±15V V_{CE} = 50% V_{CES} $R_{G(ON)} = R_{G(OFF)} = 5\Omega$ L ~ 100nH	-	1150	-	µs
t_f	Fall time		-	220	-	ns
E_{OFF}	Turn-off energy loss		-	45	-	mJ
$t_{d(on)}$	Turn-on delay time		-	490	-	ns
t_r	Rise time		-	225	-	ns
E_{ON}	Turn-on energy loss		-	30	-	mJ
t_{rr}	Diode reverse recovery time	I_F = 500A V_R = 50%V_{CES}, dI_F/dt = 1500A/µs	-	225	-	ns
Q_{rr}	Diode reverse recovery charge		-	20	-	µC

T_j = 125°C unless stated otherwise.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{d(off)}$	Turn-off delay time	I_C = 500A V_{GE} = ±15V V_{CE} = 50% V_{CES} $R_{G(ON)} = R_{G(OFF)} = 5\Omega$ L ~ 100nH	-	1400	-	µs
t_f	Fall time		-	400	-	ns
E_{OFF}	Turn-off energy loss		-	65	-	mJ
$t_{d(on)}$	Turn-on delay time		-	550	-	ns
t_r	Rise time		-	320	-	ns
E_{ON}	Turn-on energy loss		-	50	-	mJ
t_{rr}	Diode reverse recovery time	I_F = 500A V_R = 50%V_{CES}, dI_F/dt = 1500A/µs	-	310	-	ns
Q_{rr}	Diode reverse recovery charge		-	28	-	µC

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

TYPICAL CHARACTERISTICS

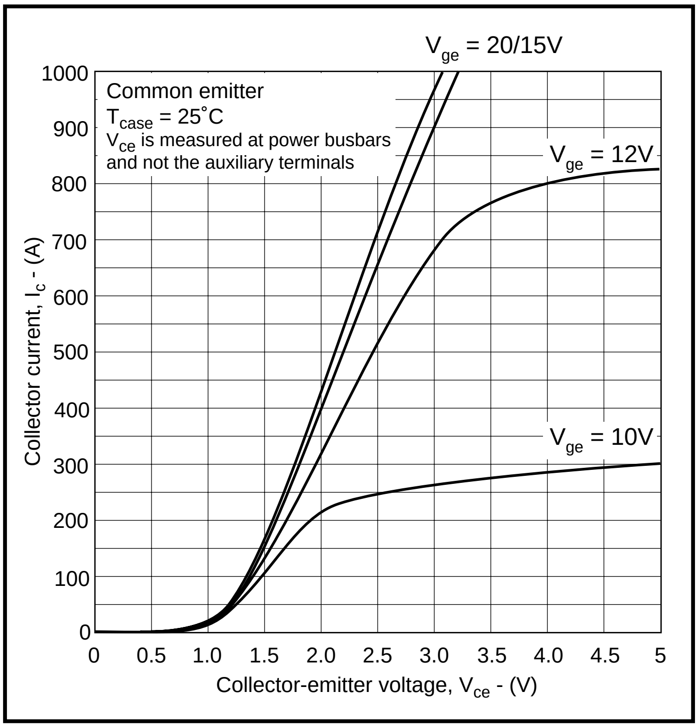


Fig.3 Typical output characteristics

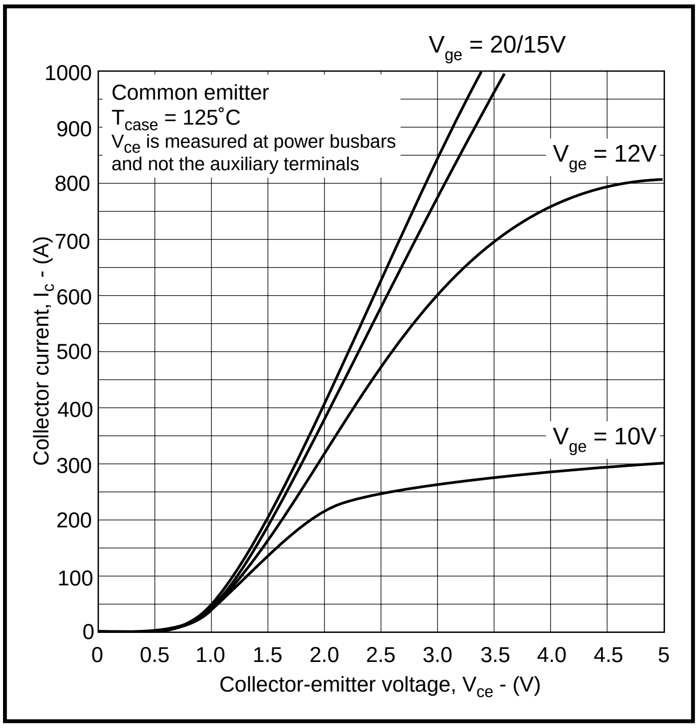


Fig.4 Typical output characteristics

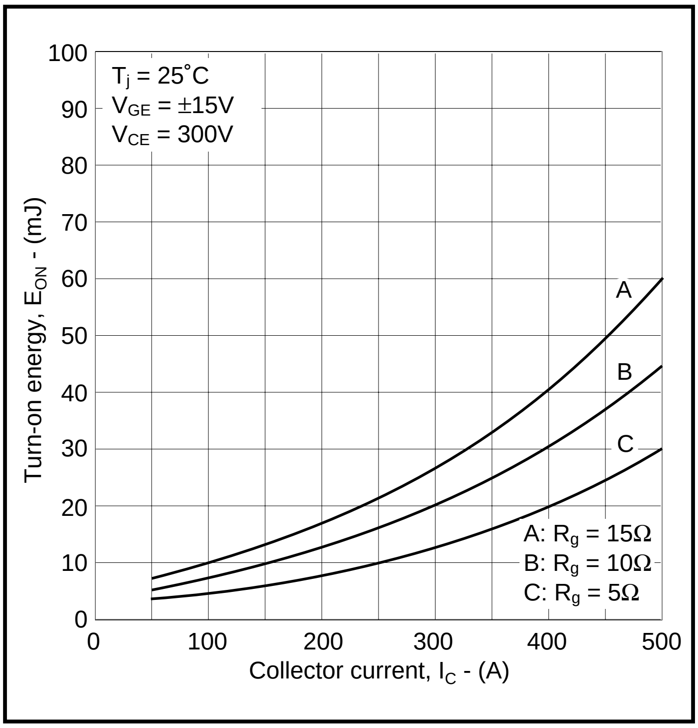


Fig.5 Typical turn-on energy vs collector current

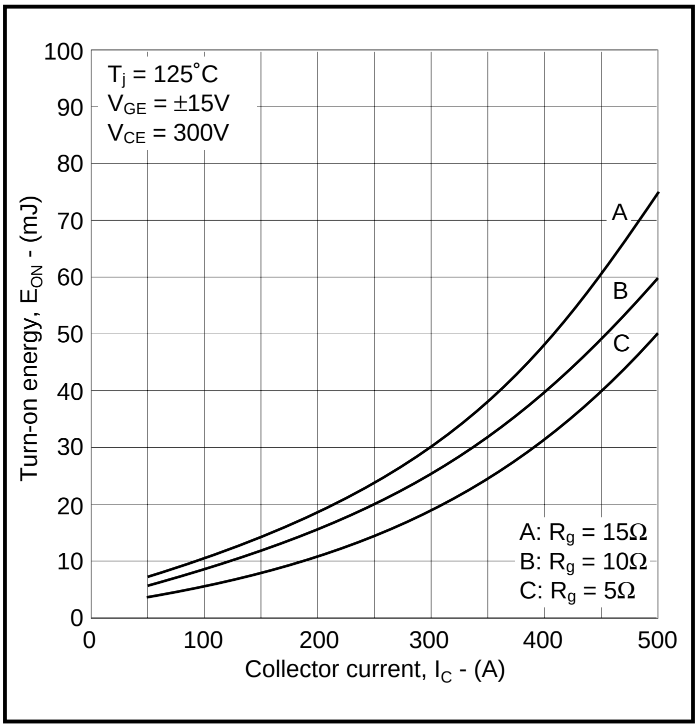


Fig.6 Typical turn-on energy vs collector current

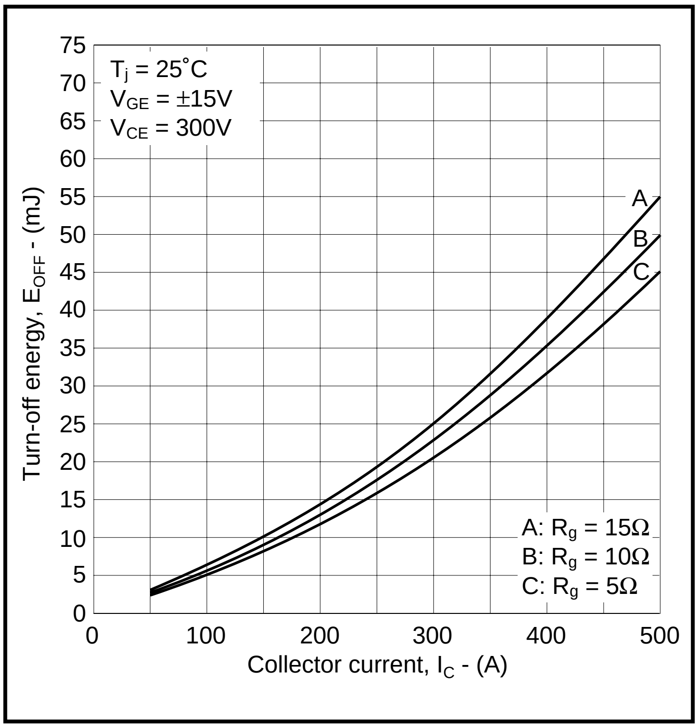


Fig.7 Typical turn-off energy vs collector current

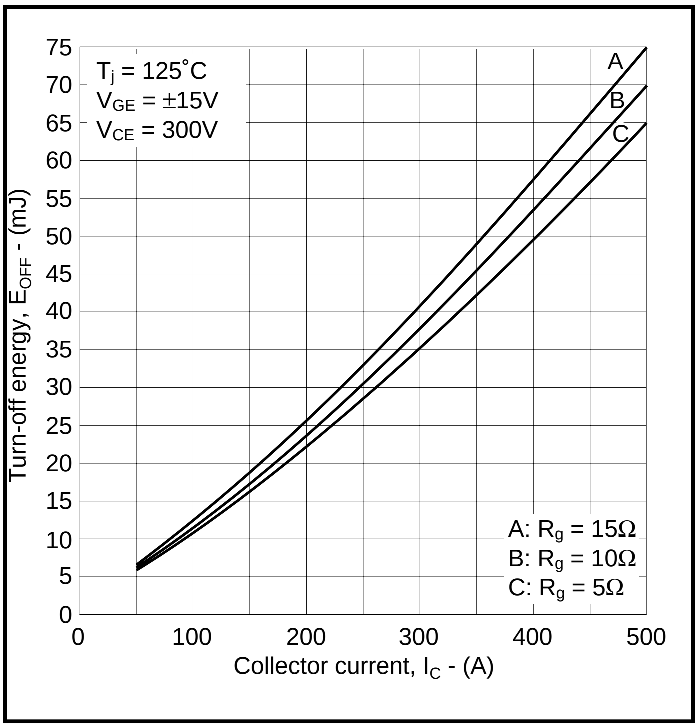


Fig.8 Typical turn-off energy vs collector current

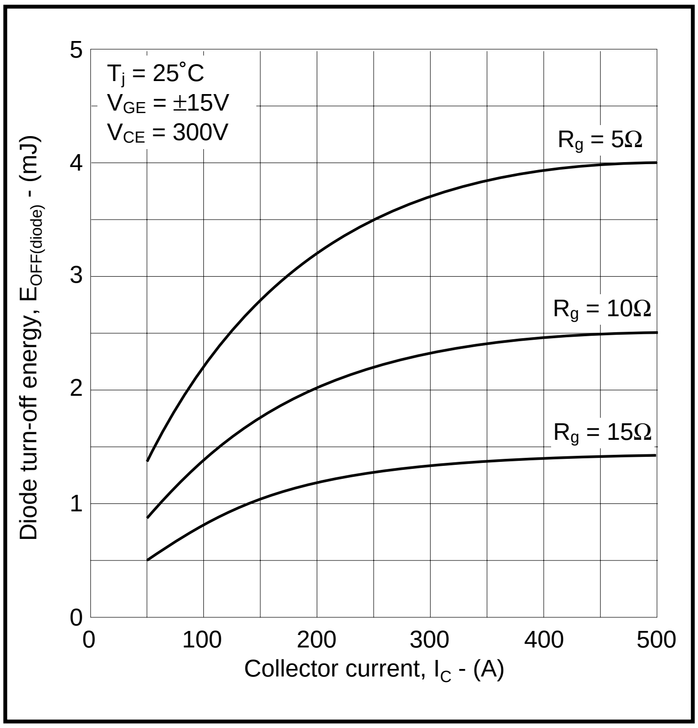


Fig.9 Typical diode turn-off energy vs collector current

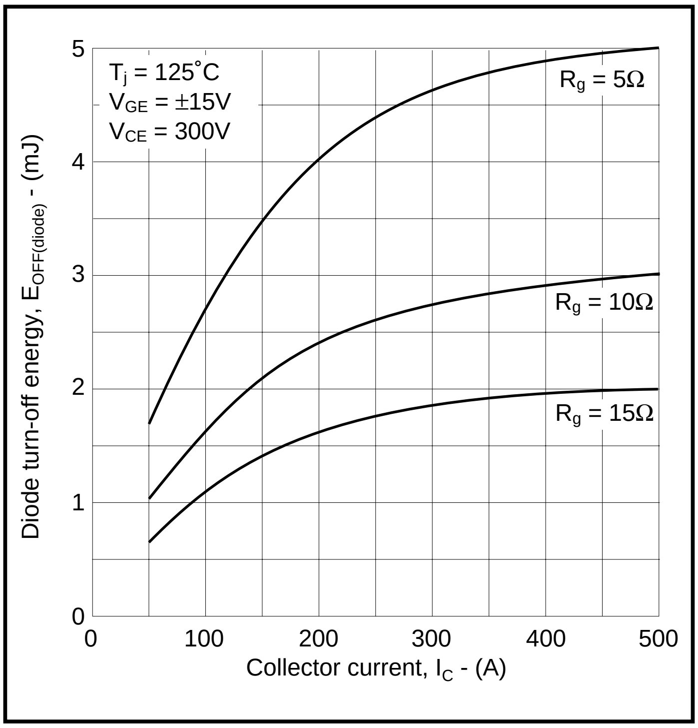


Fig.10 Typical diode turn-off energy vs collector current

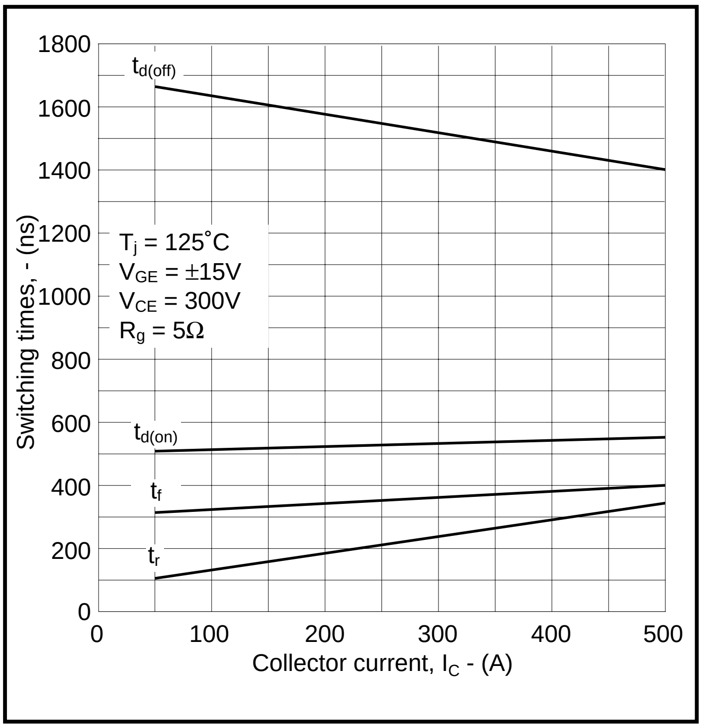


Fig.11 Typical switching characteristics

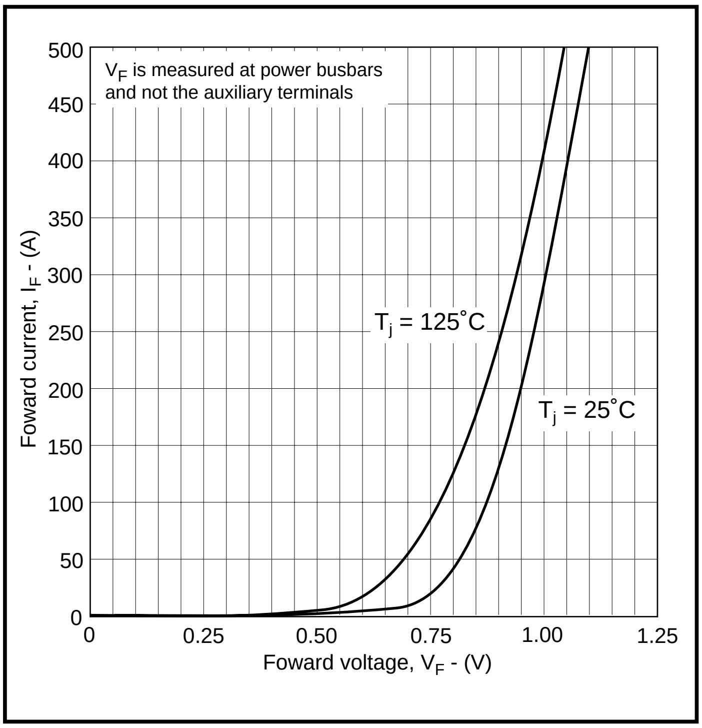


Fig.12 Diode typical forward characteristics

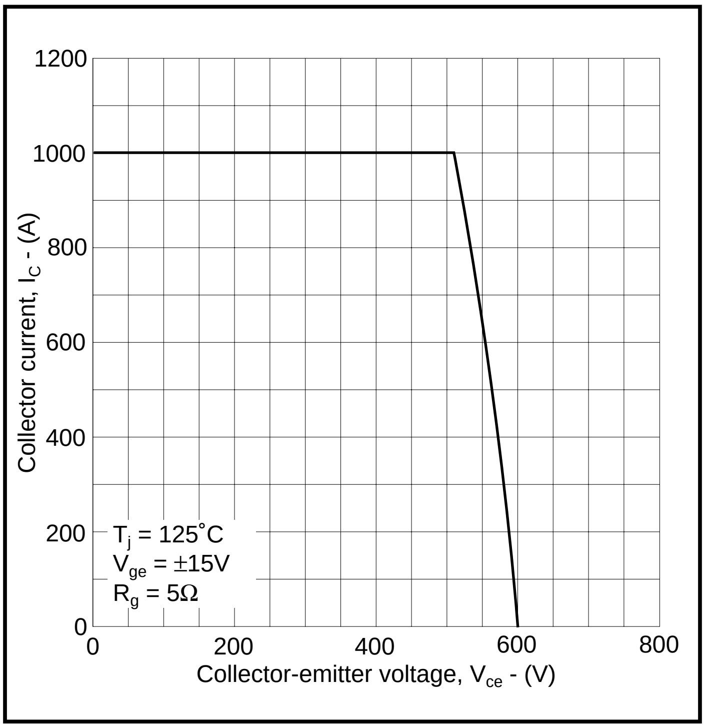


Fig.13 Reverse bias safe operating area

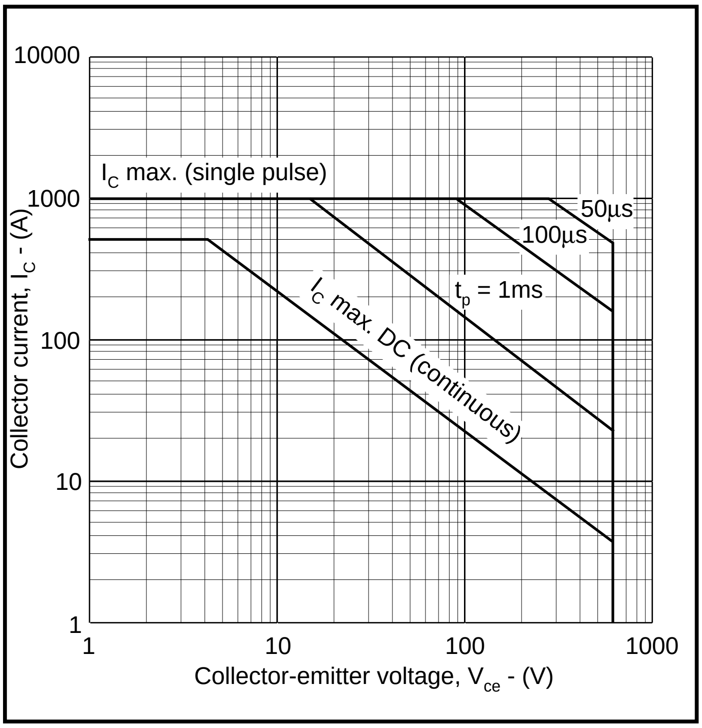


Fig.14 Forward bias safe operating area (DC and single pulse)

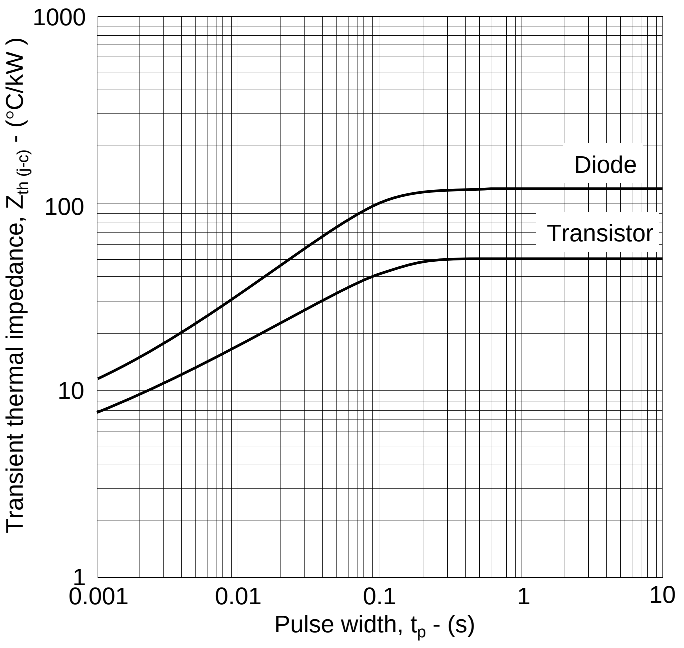
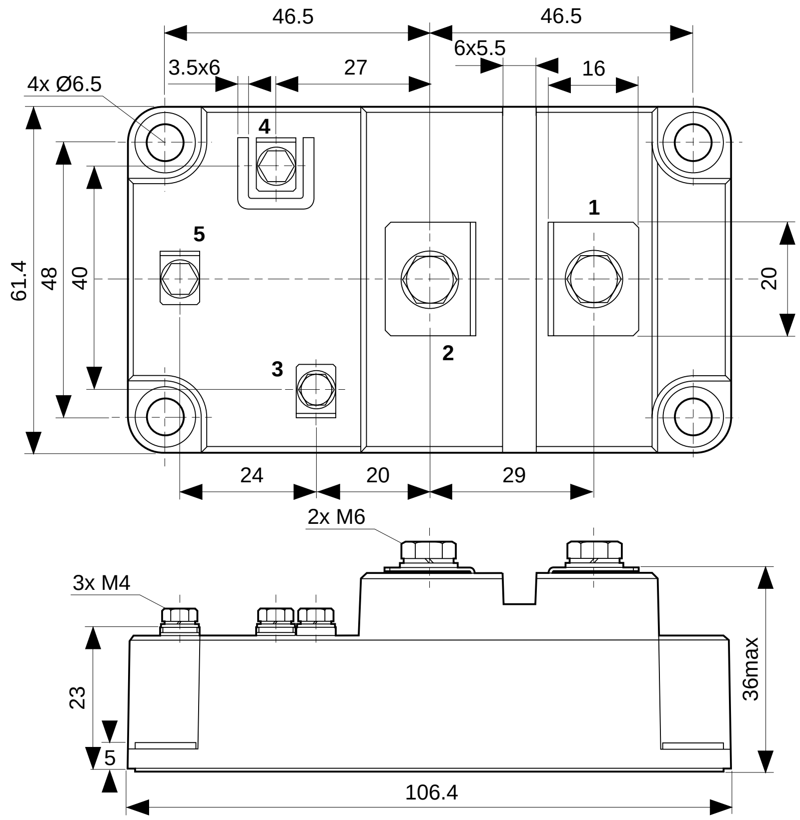


Fig.18 Transient thermal impedance

PACKAGE DETAILS

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



Nominal weight: 270g
Recommeded fixings for mounting: M6
Recommended mounting torque: 5Nm (44lbs.ins)
Recommended torque for electrical connections (M4): 2Nm (17lbs.ins)

Module outline type code: L

POWER ASSEMBLY CAPABILITY

The Power Assembly group was set up to provide a support service for those customers requiring more than the basic semiconductor, and has developed a flexible range of heatsink and clamping systems in line with advances in device voltages and current capability of our semiconductors.

We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group offers high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks which have been designed to optimise the performance of Dynex semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest sales representative or Customer Services.

DYNEX SEMICONDUCTOR

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Target Information: This is the most tentative form of information and represents a very preliminary specification. No actual design work on the product has been started.

Preliminary Information: The product is in design and development. The datasheet represents the product as it is understood but details may change.

Advance Information: The product design is complete and final characterisation for volume production is well in hand.

No Annotation: The product parameters are fixed and the product is available to datasheet specification.