DIM800XSM45-TS000

Single Switch IGBT Module

FEATURES

- 10µs Short Circuit Withstand
- High Thermal Cycling Capability
- High Current Density Enhanced DMOS SPT
- Isolated AlSiC Base With AlN Substrates
- Lead Free Construction

APPLICATIONS

- High Reliability Inverters
- Motor Controllers
- Traction Drives
- Choppers

The Powerline range of high power modules includes half bridge, chopper, dual, single and bi-directional switch configurations covering voltages from 1200V to 6500V and currents up to 2400A.

The DIM800XSM45-TS000 is a single switch 4500V, n-channel enhancement mode, insulated gate bipolar transistor (IGBT) module. The IGBT has a wide reverse bias safe operating area (RBSOA) plus 10µs short circuit withstand. This device is optimised for traction drives and other applications requiring high thermal cycling capability.

The module incorporates an electrically isolated base plate and low inductance construction enabling circuit designers to optimise circuit layouts and utilise grounded heat sinks for safety.

ORDERING INFORMATION

Order As:

DIM800XSM45-TS000

Note: When ordering, please use the complete part number

KEY PARAMETERS

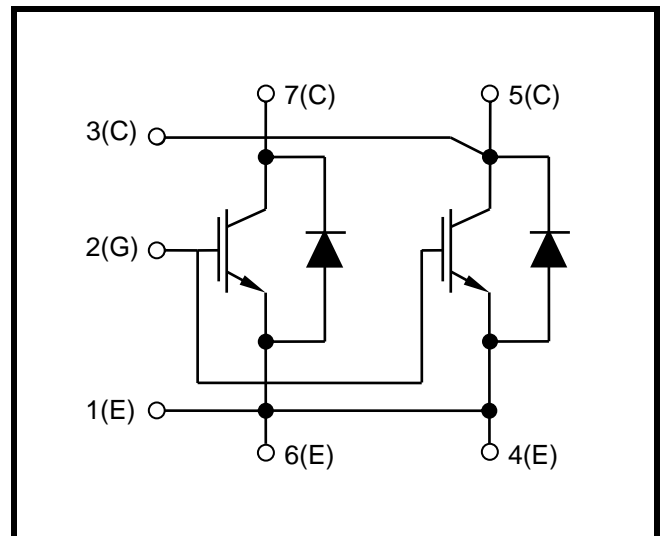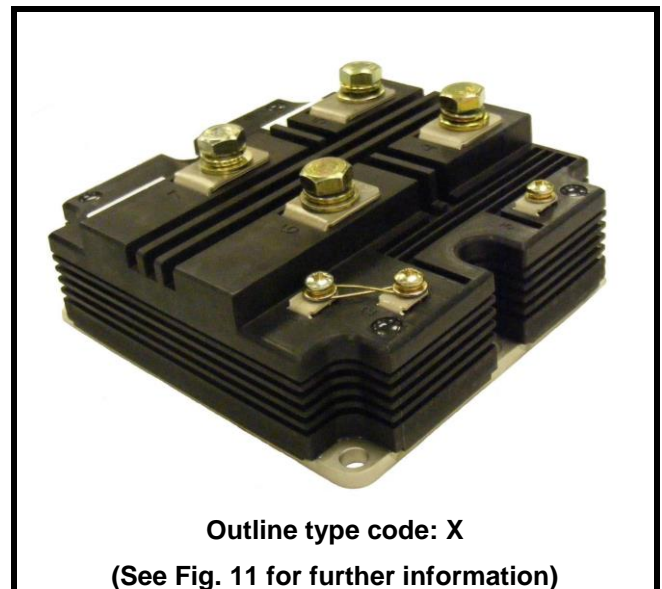|		
V_{CES}		4500V
$V_{CE(sat)}$ * (typ)		2.5V
I_C (max)		800A
$I_{C(PK)}$ (max)		1600A

* Measured at the auxiliary terminals

Fig. 1 Circuit configuration

Outline type code: X

(See Fig. 11 for further information)

Fig. 2 Package

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	4500	V
V_{GES}	Gate-emitter voltage		±20	V
I_C	Continuous collector current	T_{case} = 90°C	800	A
$I_{C(PK)}$	Peak collector current	1ms, T_{case} = 115°C	1600	A
P_{max}	Max. transistor power dissipation	T_{case} = 25°C, T_j = 125°C	8.3	kW
I^2t	Diode I^2t value	V_R = 0, t_p = 10ms, T_j = 125°C	205	kA^{2}s
V_{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	7.4	kV
Q_{PD}	Partial discharge – per module	IEC1287, V_1 = 4800V, V_2 = 3500V, 50Hz RMS	10	pC

THERMAL AND MECHANICAL RATINGS

Internal insulation material:	AlN
Baseplate material:	AlSiC
Creepage distance:	56mm
Clearance:	26mm
CTI (Comparative Tracking Index):	>600

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$R_{th(j-c)}$	Thermal resistance – transistor	Continuous dissipation - junction to case	-	-	12	°C/kW
$R_{th(j-c)}$	Thermal resistance – diode	Continuous dissipation - junction to case	-	-	24	°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	-	-	125	°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

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

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ELECTRICAL CHARACTERISTICS

T$_{case}$ = 25°C unless stated otherwise.

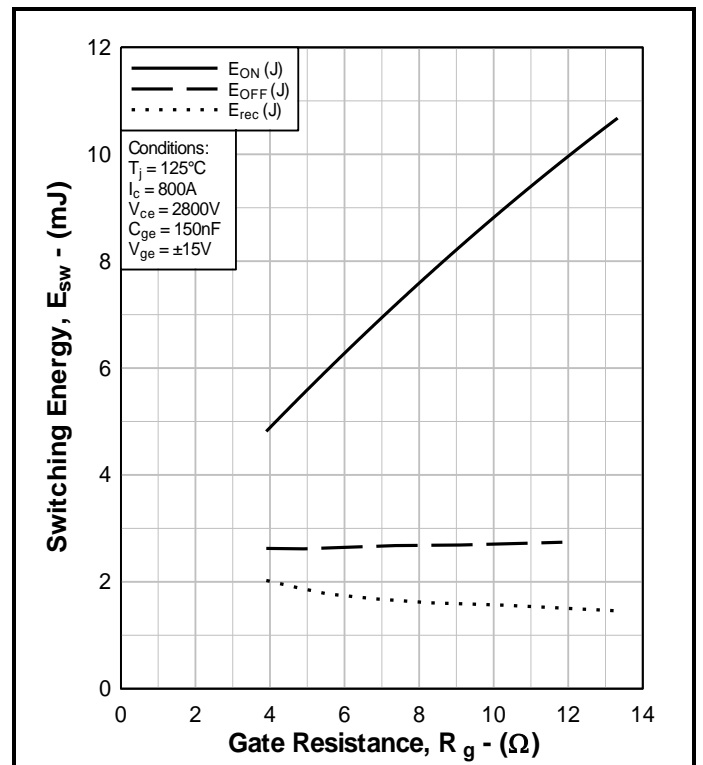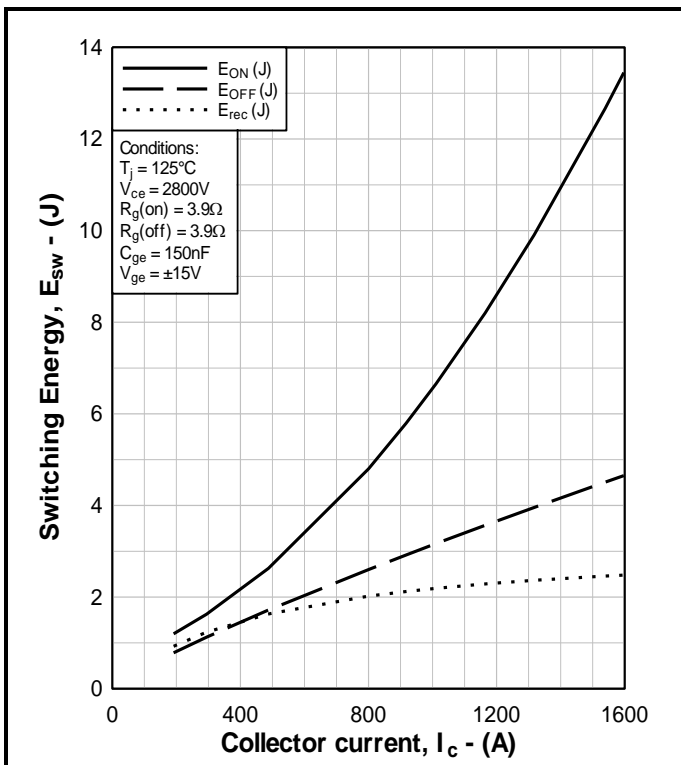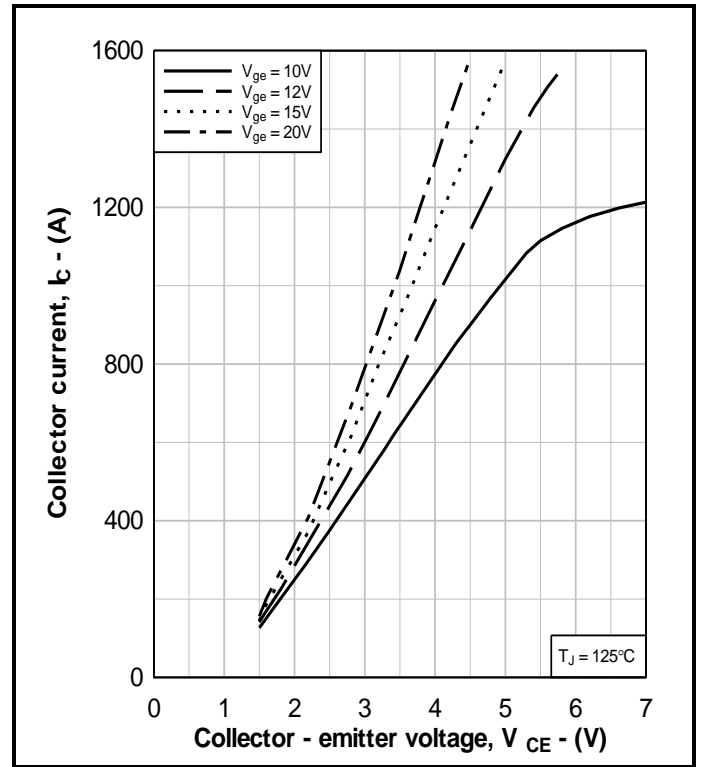| Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I$_{CES}$	Collector cut-off current	V$_{GE}$ = 0V, V$_{CE}$ = V$_{CES}$			1	mA
		V$_{GE}$ = 0V, V$_{CE}$ = V$_{CES}$, T$_{case}$ = 125°C			40	mA
I$_{GES}$	Gate leakage current	V$_{GE}$ = ± 20V, V$_{CE}$ = 0V			1	μA
V$_{GE(TH)}$	Gate threshold voltage	I$_C$ = 80mA, V$_{GE}$ = V$_{CE}$		5.8		V
V$_{CE(sat)}$	Collector-emitter saturation voltage	V$_{GE}$ = 15V, I$_C$ = 800A		2.5		V
		V$_{GE}$ = 15V, I$_C$ = 800A, T$_j$ = 125°C		3.2		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		2.9		V
		I$_F$ = 800A, T$_j$ = 125°C		3.1		V
C$_{ies}$	Input capacitance	V$_{CE}$ = 25V, V$_{GE}$ = 0V, f = 1MHz		100		nF
Q$_g$	Gate charge	±15V		15		μC
C$_{res}$	Reverse transfer capacitance	V$_{CE}$ = 25V, V$_{GE}$ = 0V, f = 1MHz		8		nF
L$_M$	Module inductance			15		nH
R$_{INT}$	Internal transistor resistance			135		μΩ
SC$_{Data}$	Short circuit current, I$_{SC}$	T$_j$ = 125°C, V$_{CC}$ = 3400V t$_p$ ≤ 10μs, V$_{GE}$ ≤ 15V V$_{CE (max)}$ = V$_{CES}$ – L* x dI/dt IEC 60747-9		3200		A

Note:

* L is the circuit inductance + L$_M$

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3/8

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ELECTRICAL CHARACTERISTICS

T$_{case}$ = 25°C unless stated otherwise

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
t$_{d(off)}$	Turn-off delay time	I$_C$ = 800A V$_{GE}$ = ±15V V$_{CE}$ = 2800V R$_{G(ON)}$ = 3.9Ω R$_{G(OFF)}$ = 3.9Ω C$_{ge}$ = 150nF L$_S$ ~ 165nH		2800		ns
t$_f$	Fall time			530		ns
E$_{OFF}$	Turn-off energy loss			2500		mJ
t$_{d(on)}$	Turn-on delay time			1000		ns
t$_r$	Rise time			160		ns
E$_{ON}$	Turn-on energy loss			3500		mJ
Q$_{rr}$	Diode reverse recovery charge	I$_F$ = 800A V$_{CE}$ = 2800V dI$_F$/dt = 1900A/µs		880		µC
I$_{rr}$	Diode reverse recovery current			680		A
E$_{rec}$	Diode reverse recovery energy			1100		mJ

T$_{case}$ = 125°C unless stated otherwise

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
t$_{d(off)}$	Turn-off delay time	I$_C$ = 800A V$_{GE}$ = ±15V V$_{CE}$ = 2800V R$_{G(ON)}$ = 3.9Ω R$_{G(OFF)}$ = 3.9Ω C$_{ge}$ = 150nF L$_S$ ~ 165nH		2900		ns
t$_f$	Fall time			490		ns
E$_{OFF}$	Turn-off energy loss			2600		mJ
t$_{d(on)}$	Turn-on delay time			1000		ns
t$_r$	Rise time			170		ns
E$_{ON}$	Turn-on energy loss			4800		mJ
Q$_{rr}$	Diode reverse recovery charge	I$_F$ = 800A V$_{CE}$ = 2800V dI$_F$/dt = 2000A/µs		1450		µC
I$_{rr}$	Diode reverse recovery current			750		A
E$_{rec}$	Diode reverse recovery energy			2000		mJ

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Fig. 3 Typical output characteristics

Fig. 4 Typical output characteristics

Fig. 5 Typical switching energy vs collector current

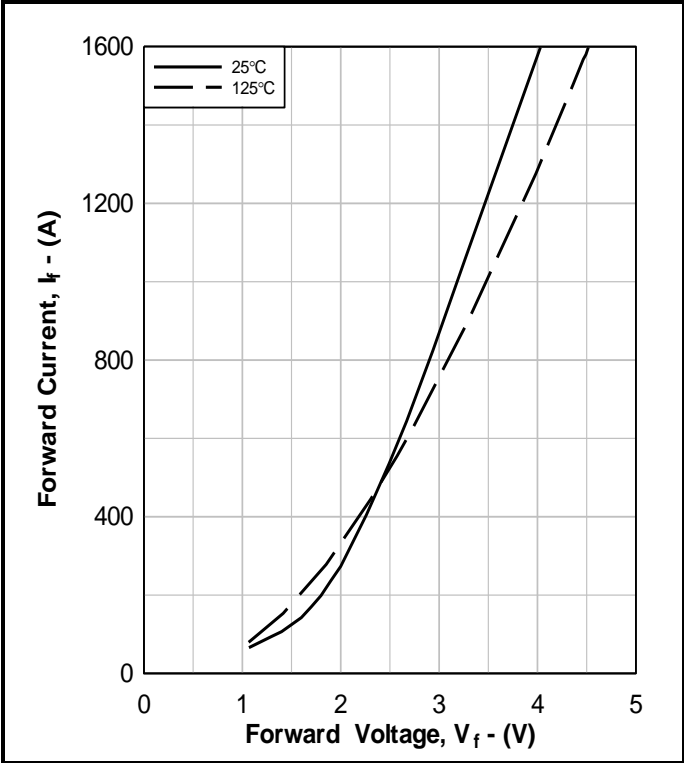**Fig. 6 Typical switching energy vs gate resistance**
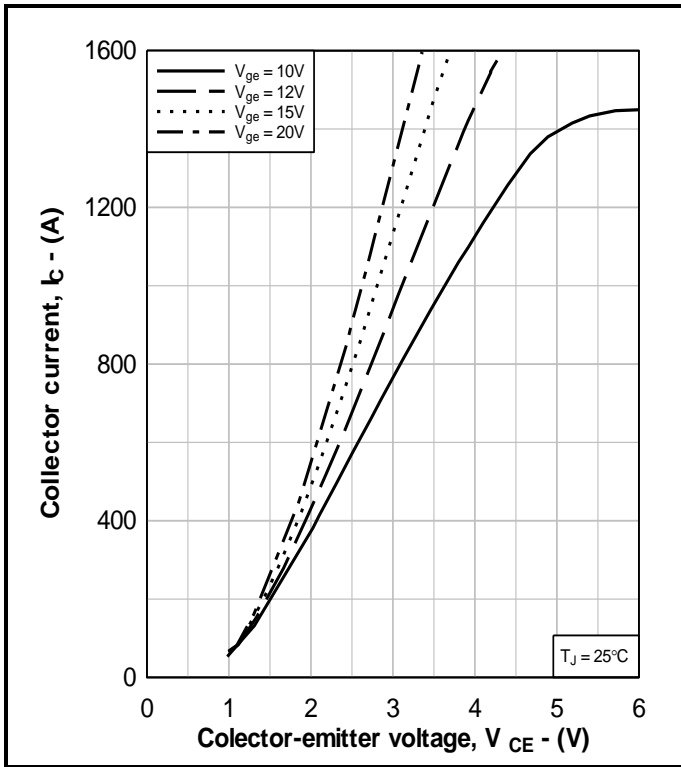
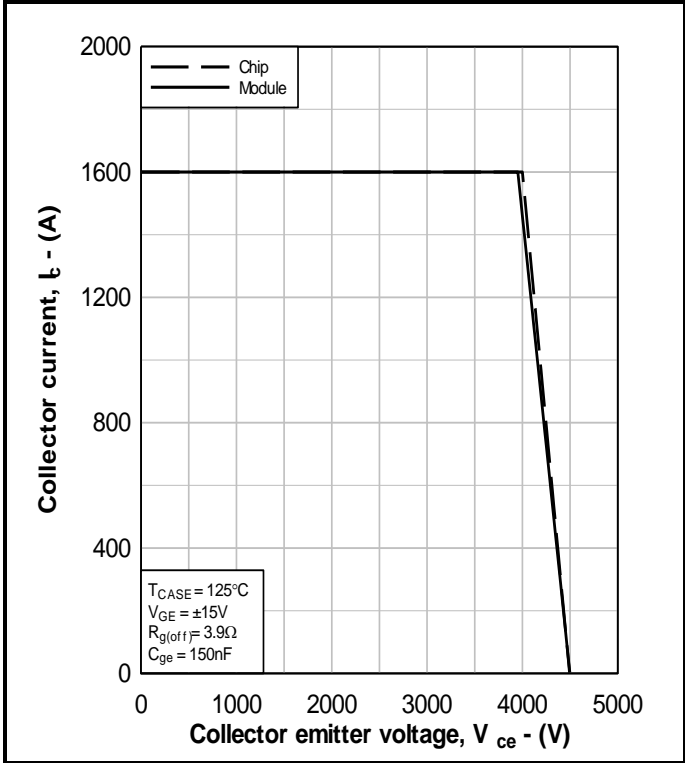**Fig. 7 Diode typical forward characteristics**

Fig. 8 Reverse bias safe operating area
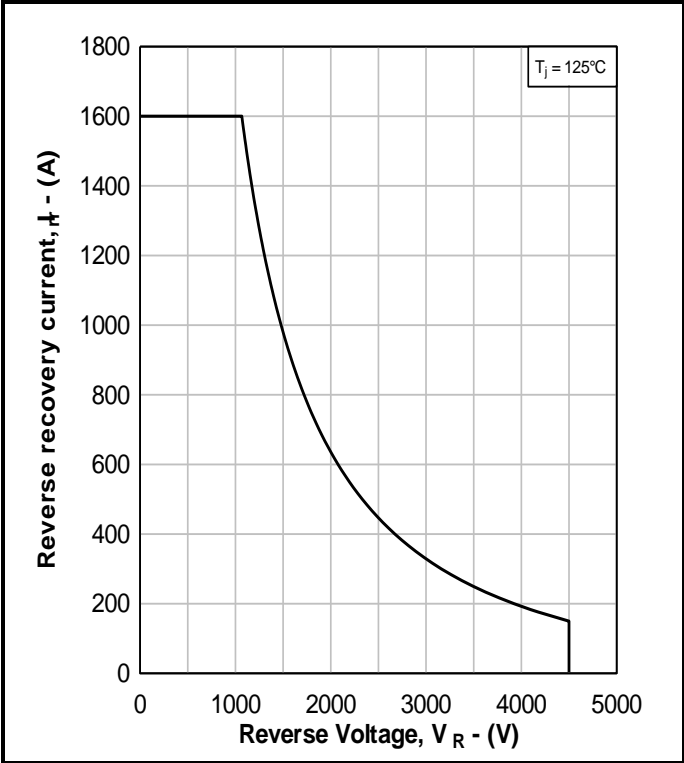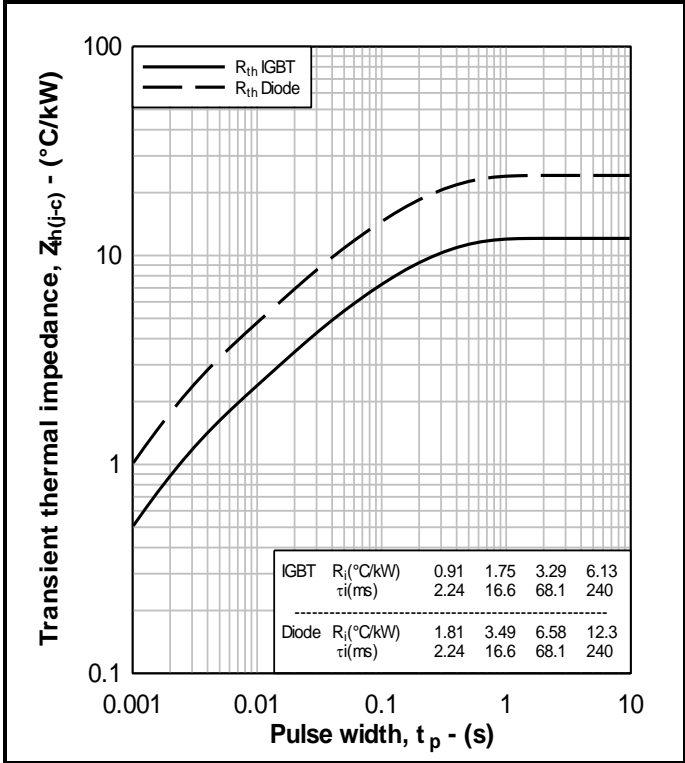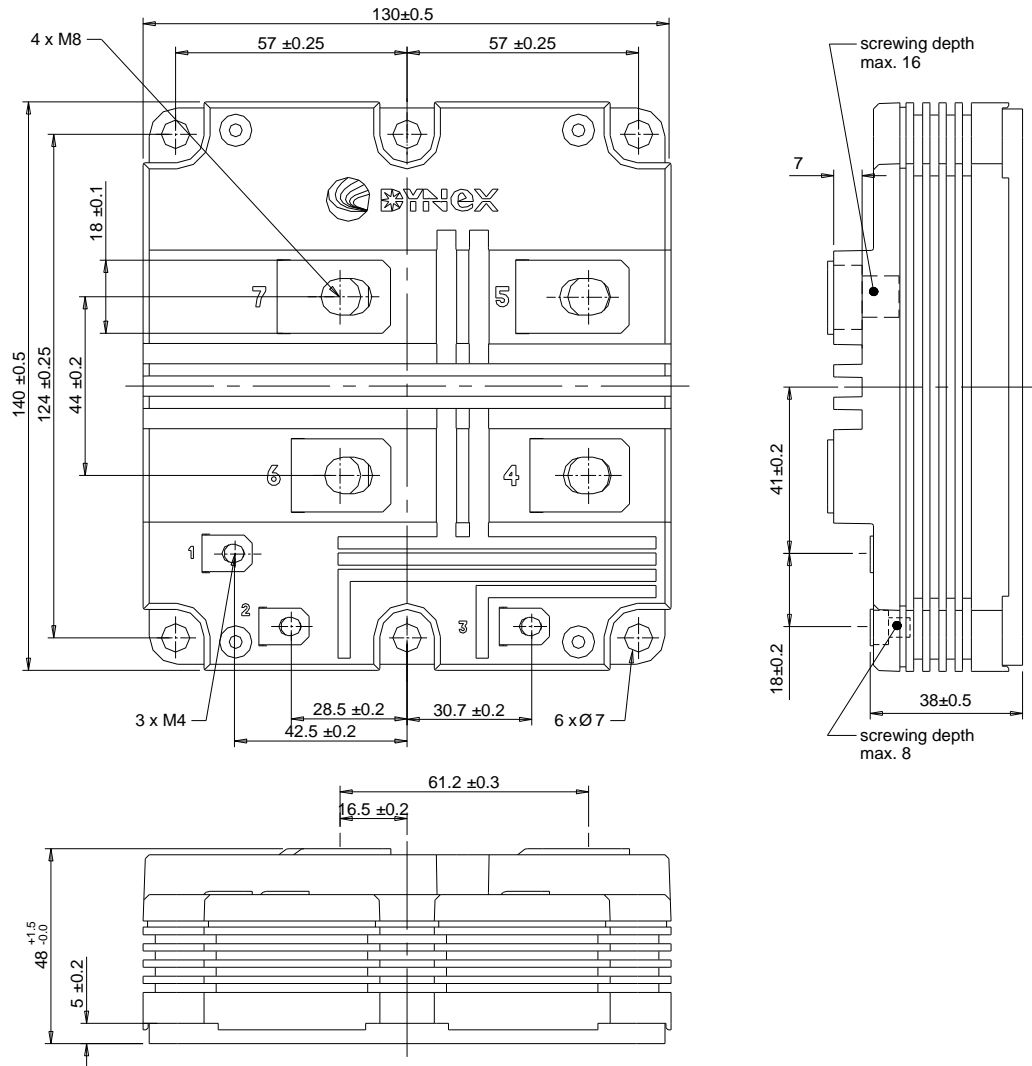
Fig. 9 Diode reverse bias safe operating area

Fig. 10 Transient thermal impedance

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PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services.
All dimensions in mm, unless stated otherwise.
DO NOT SCALE.

Nominal Weight: 1100g

Module Outline Type Code: X

Fig. 11 Module outline drawing

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Extended exposure to conditions outside the product ratings may affect reliability leading to premature product failure. Use outside the product ratings is likely to cause permanent damage to the product. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture, a large current to flow or high voltage arcing, resulting in fire or explosion. Appropriate application design and safety precautions should always be followed to protect persons and property.

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HEADQUARTERS OPERATIONS

DYNEX SEMICONDUCTOR LTD
Doddington Road, Lincoln, Lincolnshire, LN6 3LF,
United Kingdom
Fax: +44(0)1522 500550
Tel: +44(0)1522 500500
Web: http://www.dynexsemi.com

CUSTOMER SERVICE

DYNEX SEMICONDUCTOR LTD
Doddington Road, Lincoln, Lincolnshire, LN6 3LF,
United Kingdom

Tel: +44(0)1522 502753 / 502901
Email: powersolutions@dynexsemi.com

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