

FEATURES

- 10µs Short Circuit Withstand
- High Thermal Cycling Capability
- Soft Punch Through Silicon
- Isolated AISiC 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 DIM500XSM65-TF000 is a single switch 6500V, 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:

DIM500XSM65-TF000

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}	6500V
$V_{CE(sat)}$ * (typ)	3.6V
I_C (max)	500A
$I_{C(PK)}$ (max)	1000A

* Measured at the auxiliary terminals

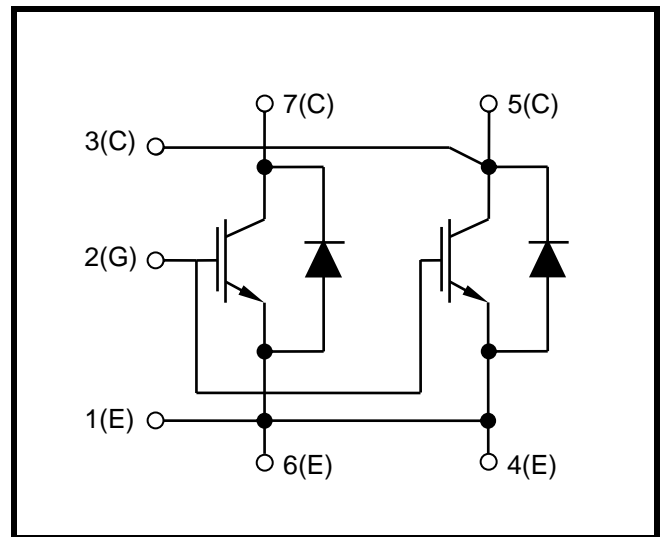
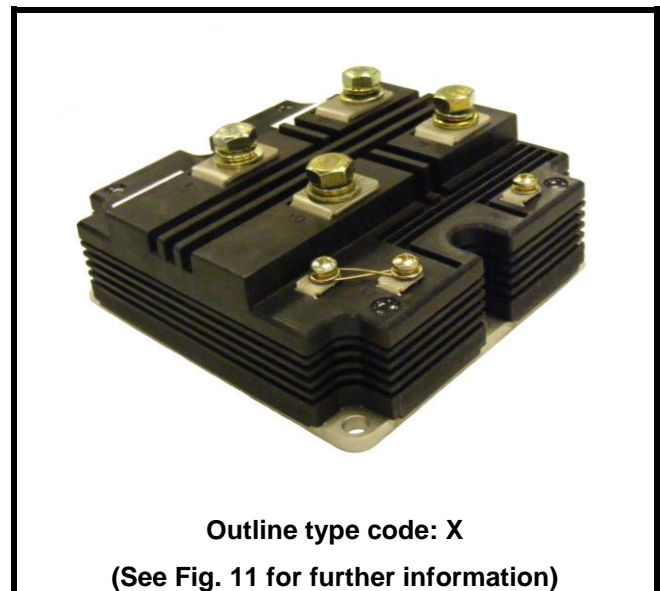


Fig. 1 Circuit configuration



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, T _j = 125°C	6500	V
		V _{GE} = 0V, T _j = 25°C	6500	V
		V _{GE} = 0V, T _j = -40°C	6000	V
V _{GES}	Gate-emitter voltage		±20	V
I _C	Continuous collector current	T _{case} = 95°C	500	A
I _{C(PK)}	Peak collector current	1ms, T _{case} = 113°C	1000	A
P _{max}	Max. transistor power dissipation	T _{case} = 25°C, T _j = 125°C	7.4	kW
I ² t	Diode I ² t value	V _R = 0, t _p = 10ms, T _j = 125°C	180	kA ² s
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	10.2	kV
Q _{PD}	Partial discharge – per module	IEC1287, V ₁ = 6900V, V ₂ = 5100V, 50Hz RMS	10	pC

THERMAL AND MECHANICAL RATINGS

Internal insulation material: AIN
 Baseplate material: AISiC
 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	-	-	13.5	°C/kW
R _{th(j-c)}	Thermal resistance – diode	Continuous dissipation - junction to case	-	-	27	°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

ELECTRICAL CHARACTERISTICS

$T_{case} = 25^{\circ}C$ 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
		$V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125^{\circ}C$			60	mA
I_{GES}	Gate leakage current	$V_{GE} = \pm 20V, V_{CE} = 0V$			1	μA
$V_{GE(TH)}$	Gate threshold voltage	$I_C = 120mA, V_{GE} = V_{CE}$	5.5	6.5	7.5	V
$V_{CE(sat)}^{\dagger}$	Collector-emitter saturation voltage	$V_{GE} = 15V, I_C = 500A$		3.6		V
		$V_{GE} = 15V, I_C = 500A, T_j = 125^{\circ}C$		4.3		V
I_F	Diode forward current	DC			500	A
I_{FM}	Diode maximum forward current	$t_p = 1ms$			1000	A
V_F^{\dagger}	Diode forward voltage	$I_F = 500A$		3.3		V
		$I_F = 500A, T_j = 125^{\circ}C$		3.7		V
C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		8		nF
Q_g	Gate charge	$\pm 15V$		7		μC
C_{res}	Reverse transfer capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		1.6		nF
L_M	Module inductance			20		nH
R_{INT}	Internal transistor resistance			180		$\mu\Omega$
SC_{Data}	Short circuit current, I_{SC}	$T_j = 125^{\circ}C, V_{CC} = 4400V,$ $t_p \leq 10\mu s, V_{GE} \leq 15V$ $V_{CE(max)} = V_{CES} - L^* \times di/dt$ IEC 60747-9		2500		A

Note:

† Measured at the auxiliary terminals

* L is the circuit inductance + L_M

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 = 500A V _{GE} = ±15V V _{CE} = 3600V R _{G(ON)} = 2.2Ω R _{G(OFF)} = 12Ω C _{ge} = 220nF L _S ~ 200nH		3.3		μs
t _f	Fall time			360		ns
E _{OFF}	Turn-off energy loss			2000		mJ
t _{d(on)}	Turn-on delay time			620		ns
t _r	Rise time			340		ns
E _{ON}	Turn-on energy loss			3900		mJ
Q _{rr}	Diode reverse recovery charge	I _F = 500A V _{CE} = 3600V di _F /dt = 2800A/μs		900		μC
I _{rr}	Diode reverse recovery current			900		A
E _{rec}	Diode reverse recovery energy			1800		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 = 500A V _{GE} = ±15V V _{CE} = 3600V R _{G(ON)} = 2.2Ω R _{G(OFF)} = 12Ω C _{ge} = 220nF L _S ~ 200nH		3.5		μs
t _f	Fall time			360		ns
E _{OFF}	Turn-off energy loss			2050		mJ
t _{d(on)}	Turn-on delay time			550		ns
t _r	Rise time			300		ns
E _{ON}	Turn-on energy loss			4700		mJ
Q _{rr}	Diode reverse recovery charge	I _F = 500A V _{CE} = 3600V di _F /dt = 2800A/μs		1500		μC
I _{rr}	Diode reverse recovery current			1350		A
E _{rec}	Diode reverse recovery energy			2900		mJ

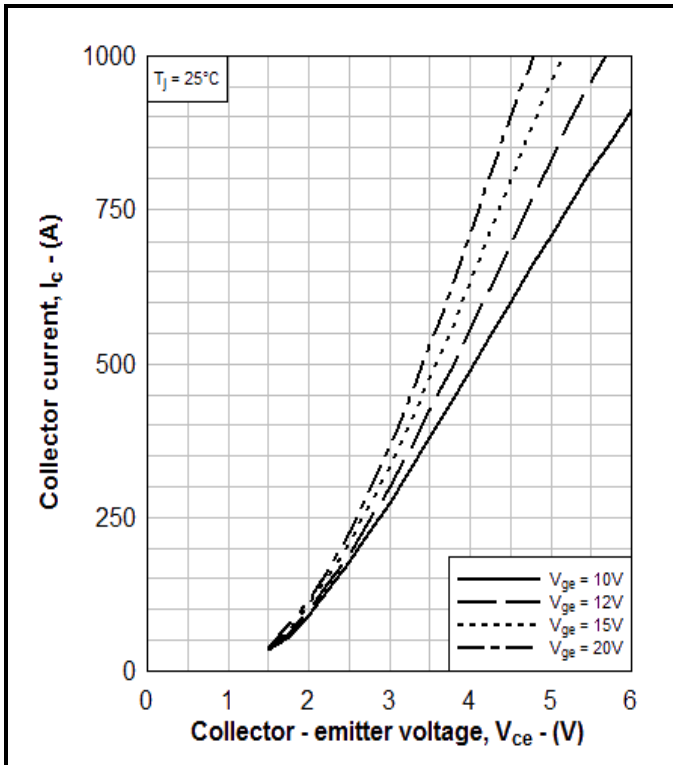


Fig. 3 Typical output characteristics

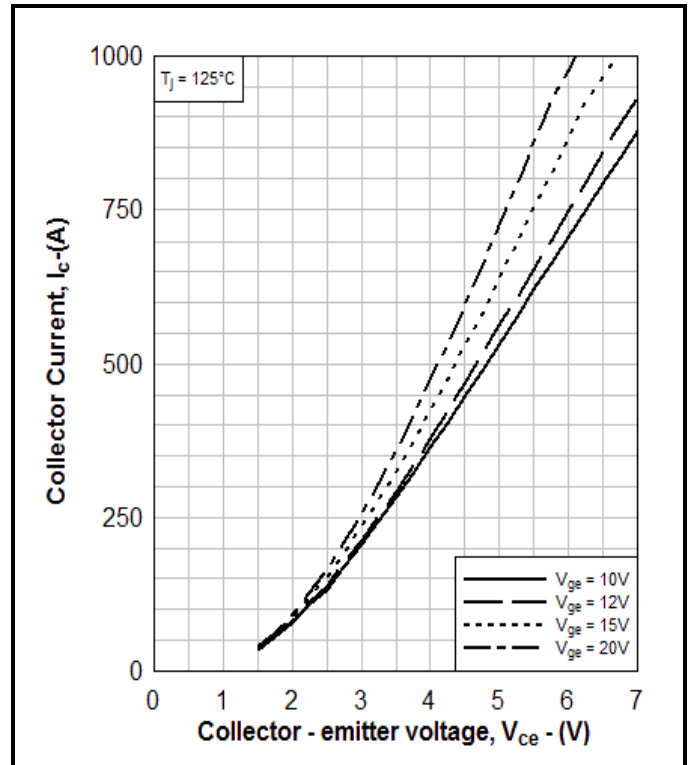


Fig. 4 Typical output characteristics

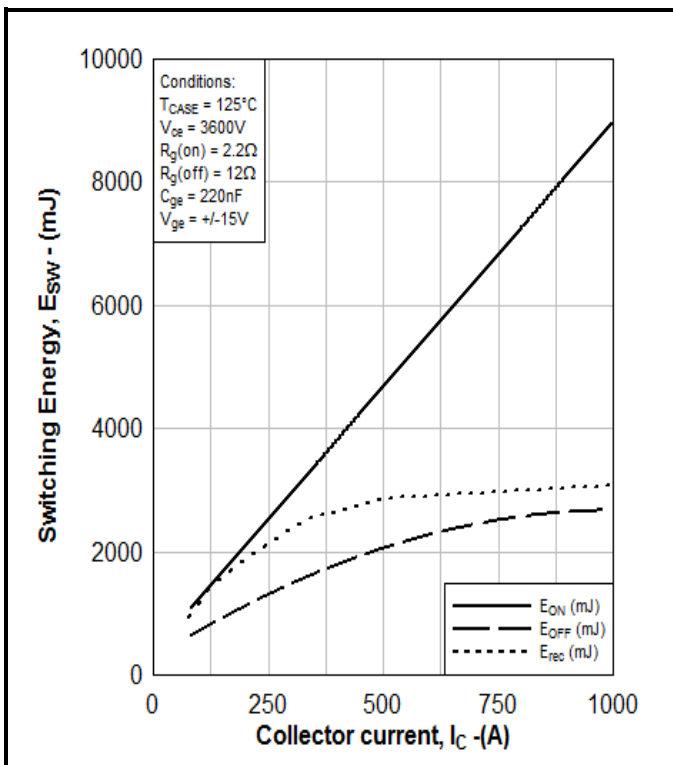


Fig. 5 Typical switching energy vs collector current

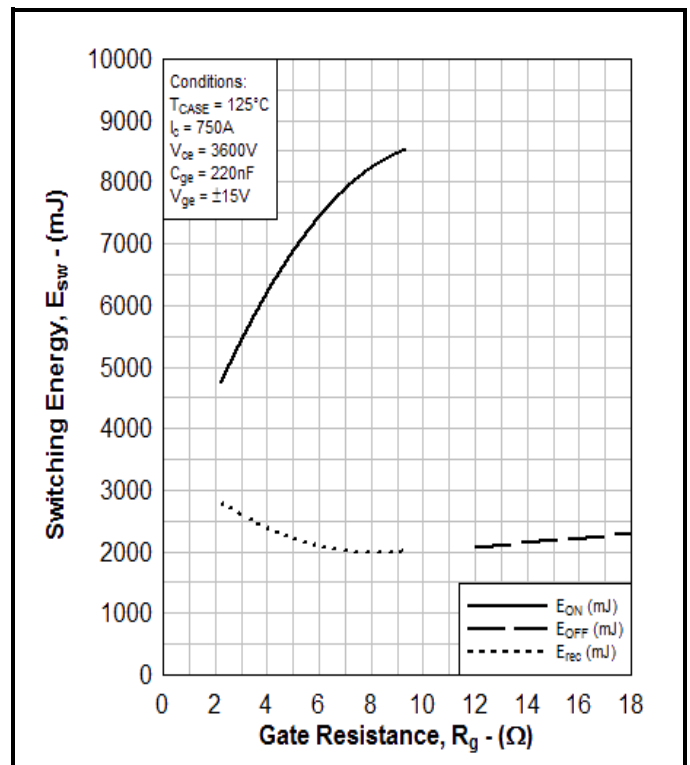


Fig. 6 Typical switching energy vs gate resistance

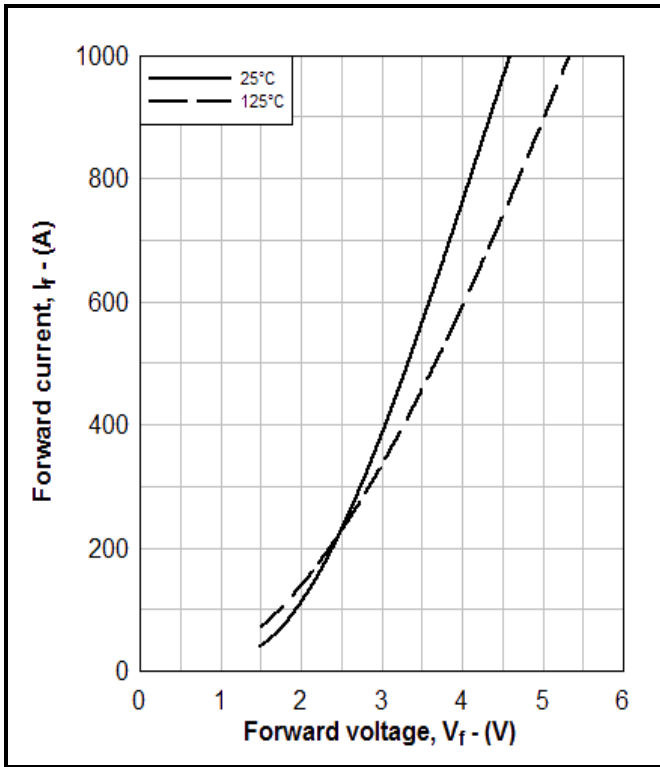


Fig. 7 Diode typical forward characteristics

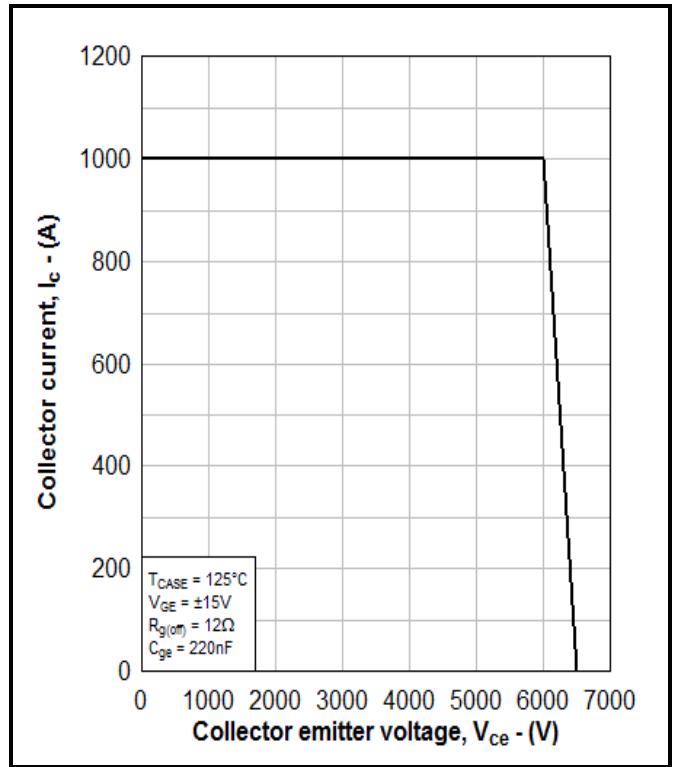


Fig. 8 Reverse bias safe operating area

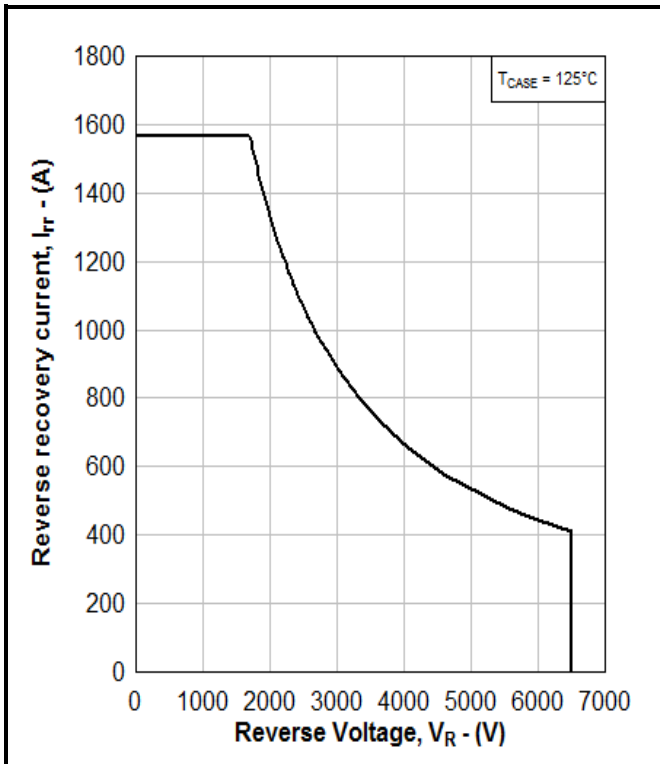


Fig. 9 Diode reverse bias safe operating area

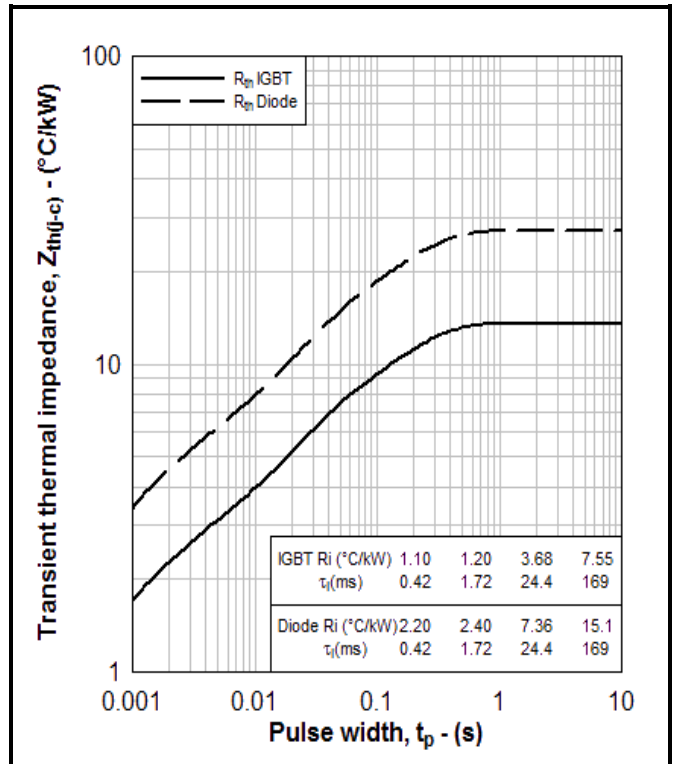
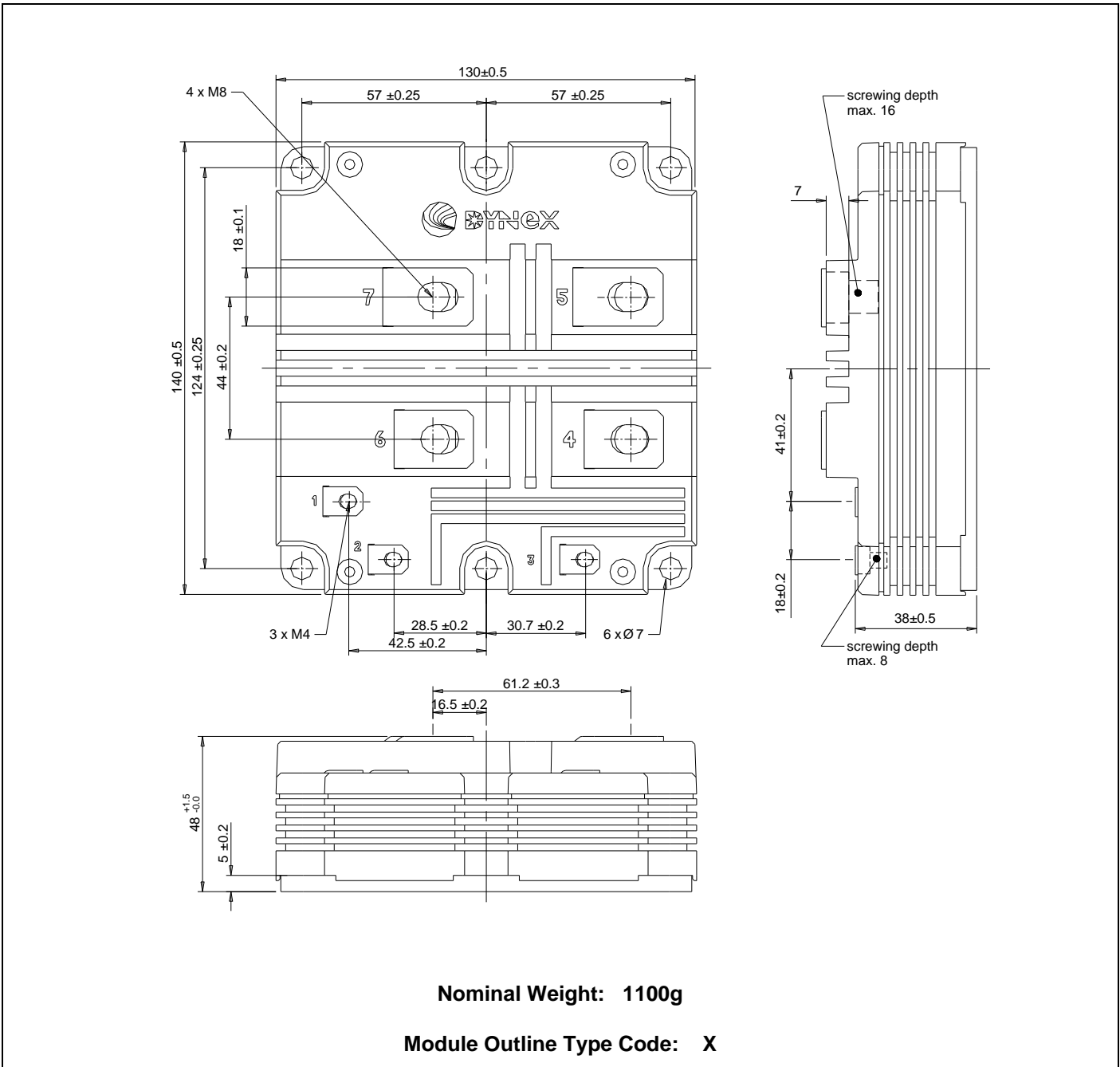


Fig. 10 Transient thermal impedance

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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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