

### FEATURES

- 10 $\mu$ s Short Circuit Withstand
- High Thermal Cycling Capability
- Soft Punch Through Silicon
- 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 600V to 6500V and currents up to 2400A.

The DIM750ASM65-TS000 is a single switch 6500V, soft punch through n-channel enhancement mode, insulated gate bipolar transistor (IGBT) module. The IGBT has a wide reverse bias safe operating area (RBSOA) plus 10 $\mu$ s 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:

### DIM750ASM65-TS000

Note: When ordering, please use the complete part number

### KEY PARAMETERS

$V_{CES}$	<b>6500V</b>
$V_{CE(sat)}$ * (typ)	<b>3.0V</b>
$I_C$ (max)	<b>750A</b>
$I_{C(PK)}$ (max)	<b>1500A</b>

\* Measured at the auxiliary terminals

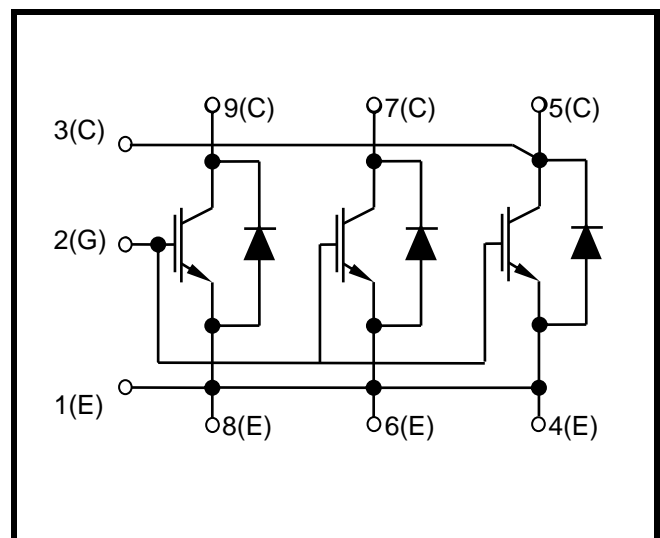


Fig. 1 Circuit configuration



Outline type code: A  
(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.

$T_{\text{case}} = 25^{\circ}\text{C}$  unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
$V_{\text{CES}}$	Collector-emitter voltage	$V_{\text{GE}} = 0\text{V}, T_j = 125^{\circ}\text{C}$	6500	V
		$V_{\text{GE}} = 0\text{V}, T_j = 25^{\circ}\text{C}$	6500	V
		$V_{\text{GE}} = 0\text{V}, T_j = -40^{\circ}\text{C}$	6000	V
$V_{\text{GES}}$	Gate-emitter voltage		$\pm 20$	V
$I_{\text{C}}$	Continuous collector current	$T_{\text{case}} = 95^{\circ}\text{C}$	750	A
$I_{\text{C(PK)}}$	Peak collector current	1ms, $T_{\text{case}} = 115^{\circ}\text{C}$	1500	A
$P_{\text{max}}$	Max. transistor power dissipation	$T_{\text{case}} = 25^{\circ}\text{C}, T_j = 125^{\circ}\text{C}$	10	kW
$I^2t$	Diode $I^2t$ value	$V_{\text{R}} = 0, t_{\text{p}} = 10\text{ms}, T_j = 125^{\circ}\text{C}$	200	$\text{kA}^2\text{s}$
$V_{\text{isol}}$	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	10.2	kV
$Q_{\text{PD}}$	Partial discharge – per module	IEC1287, $V_1 = 6900\text{V}, V_2 = 5100\text{V}, 50\text{Hz RMS}$	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
$R_{\text{th(j-c)}}$	Thermal resistance – transistor	Continuous dissipation – junction to case			10	$^{\circ}\text{C}/\text{kW}$
$R_{\text{th(j-c)}}$	Thermal resistance – diode	Continuous dissipation – junction to case			20	$^{\circ}\text{C}/\text{kW}$
$R_{\text{th(c-h)}}$	Thermal resistance – case to heatsink	Mounting torque 5Nm (with mounting grease)			6	$^{\circ}\text{C}/\text{kW}$
$T_j$	Junction temperature	Transistor			125	$^{\circ}\text{C}$
		Diode			125	$^{\circ}\text{C}$
$T_{\text{stg}}$	Storage temperature range		-40		125	$^{\circ}\text{C}$
	Screw torque	Mounting – M6			5	Nm
		Electrical connections – M4			2	Nm
		Electrical connections – M8			10	Nm

**ELECTRICAL CHARACTERISTICS**
 $T_{case} = 25^{\circ}\text{C}$  unless stated otherwise.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$I_{CES}$	Collector cut-off current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}$			4	mA
		$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_{case} = 125^{\circ}\text{C}$			90	mA
$I_{GES}$	Gate leakage current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$			1	$\mu\text{A}$
$V_{GE(TH)}$	Gate threshold voltage	$I_C = 120\text{mA}, V_{GE} = V_{CE}$	5.5	6.5	7.5	V
$V_{CE(sat)}^{\dagger}$	Collector-emitter saturation voltage	$V_{GE} = 15\text{V}, I_C = 750\text{A}$		3.0		V
		$V_{GE} = 15\text{V}, I_C = 750\text{A}, T_j = 125^{\circ}\text{C}$		4.0		V
$I_F$	Diode forward current	DC			750	A
$I_{FM}$	Diode maximum forward current	$t_p = 1\text{ms}$			1500	A
$V_F^{\dagger}$	Diode forward voltage	$I_F = 750\text{A}$		3.6		V
		$I_F = 750\text{A}, T_j = 125^{\circ}\text{C}$		4.3		V
$C_{ies}$	Input capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		120		nF
$Q_g$	Gate charge	$\pm 15\text{V}$		10		$\mu\text{C}$
$C_{res}$	Reverse transfer capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		2.3		nF
$L_M$	Module inductance			10		nH
$R_{INT}$	Internal resistance			90		$\mu\Omega$
$SC_{Data}$	Short circuit current, $I_{SC}$	$T_j = 125^{\circ}\text{C}, V_{CC} = 4400\text{V}$ $t_p \leq 10\mu\text{s}, V_{GE} \leq 15\text{V}$ $V_{CE(max)} = V_{CES} - L^* \times di/dt$ IEC 60747-9		3700		A

**Note:**
 $\dagger$  Measured at the auxiliary terminals

 $*$  L is the circuit inductance +  $L_M$

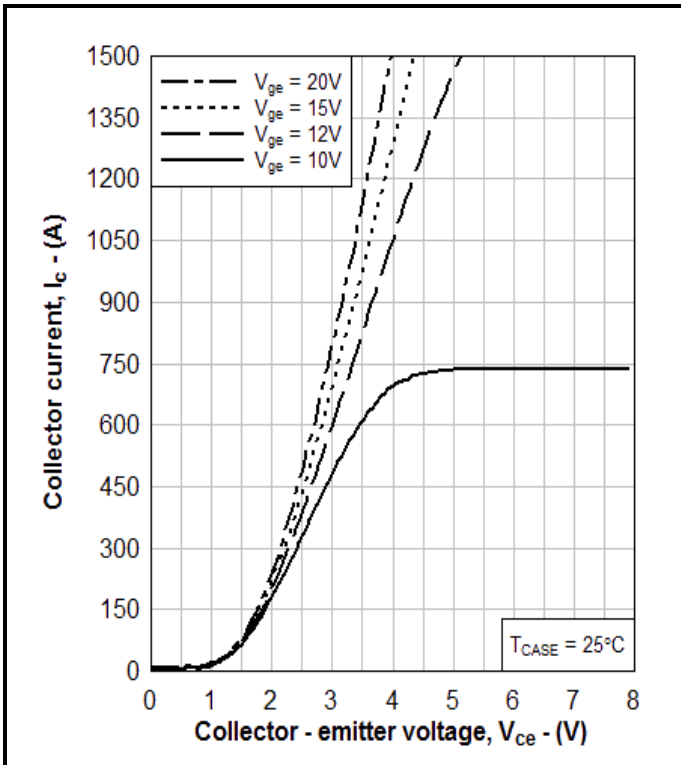
## ELECTRICAL CHARACTERISTICS

$T_{case} = 25^{\circ}\text{C}$  unless stated otherwise

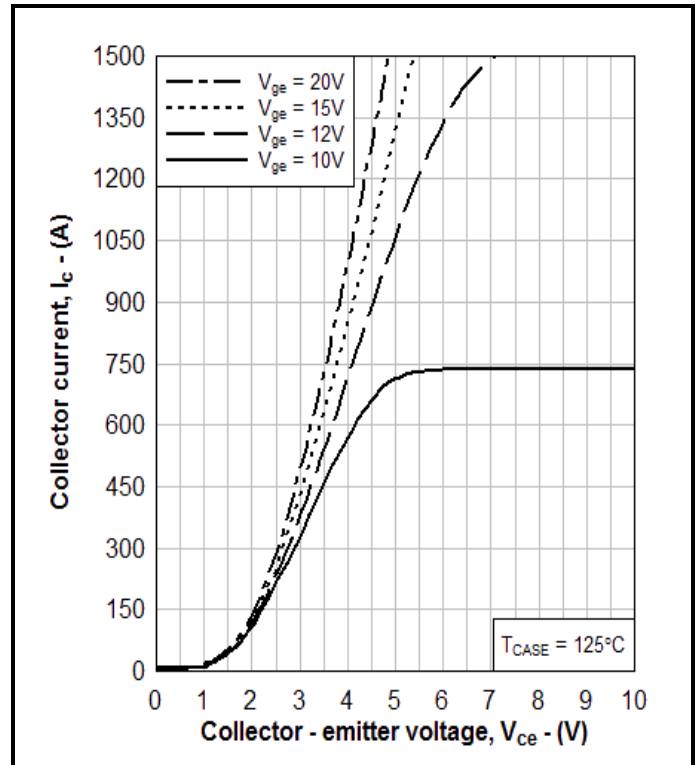
Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$t_{d(off)}$	Turn-off delay time	$I_C = 750\text{A}$ $V_{GE} = \pm 15\text{V}$ $V_{CE} = 3600\text{V}$ $R_{G(ON)} = 2.2\Omega$ $R_{G(OFF)} = 6.8\Omega$ $C_{ge} = 330\text{nF}$ $L_S \sim 280\text{nH}$		3.6		$\mu\text{s}$
$t_f$	Fall time			450		ns
$E_{OFF}$	Turn-off energy loss			3900		mJ
$t_{d(on)}$	Turn-on delay time			900		ns
$t_r$	Rise time			400		ns
$E_{ON}$	Turn-on energy loss			4800		mJ
$Q_{rr}$	Diode reverse recovery charge	<b>Diode arm</b>		1200		$\mu\text{C}$
$I_{rr}$	Diode reverse recovery current	$I_F = 750\text{A}$		900		A
$E_{rec}$	Diode reverse recovery energy	$V_{CE} = 3600\text{V}$ $di_F/dt = 2000\text{A}/\mu\text{s}$		2600		mJ

$T_{case} = 125^{\circ}\text{C}$  unless stated otherwise

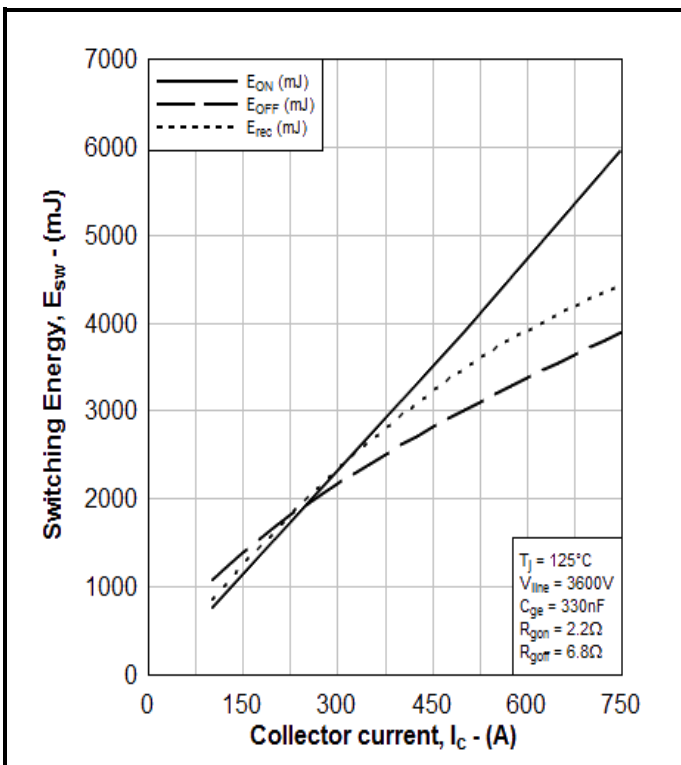
Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$t_{d(off)}$	Turn-off delay time	$I_C = 750\text{A}$ $V_{GE} = \pm 15\text{V}$ $V_{CE} = 3600\text{V}$ $R_{G(ON)} = 2.2\Omega$ $R_{G(OFF)} = 6.8\Omega$ $C_{ge} = 330\text{nF}$ $L_S \sim 280\text{nH}$		3.6		$\mu\text{s}$
$t_f$	Fall time			450		ns
$E_{OFF}$	Turn-off energy loss			4000		mJ
$t_{d(on)}$	Turn-on delay time			800		ns
$t_r$	Rise time			450		ns
$E_{ON}$	Turn-on energy loss			6100		mJ
$Q_{rr}$	Diode reverse recovery charge	<b>Diode arm</b>		2100		$\mu\text{C}$
$I_{rr}$	Diode reverse recovery current	$I_F = 750\text{A}$		1000		A
$E_{rec}$	Diode reverse recovery energy	$V_{CE} = 3600\text{V}$ $di_F/dt = 2000\text{A}/\mu\text{s}$		4500		mJ



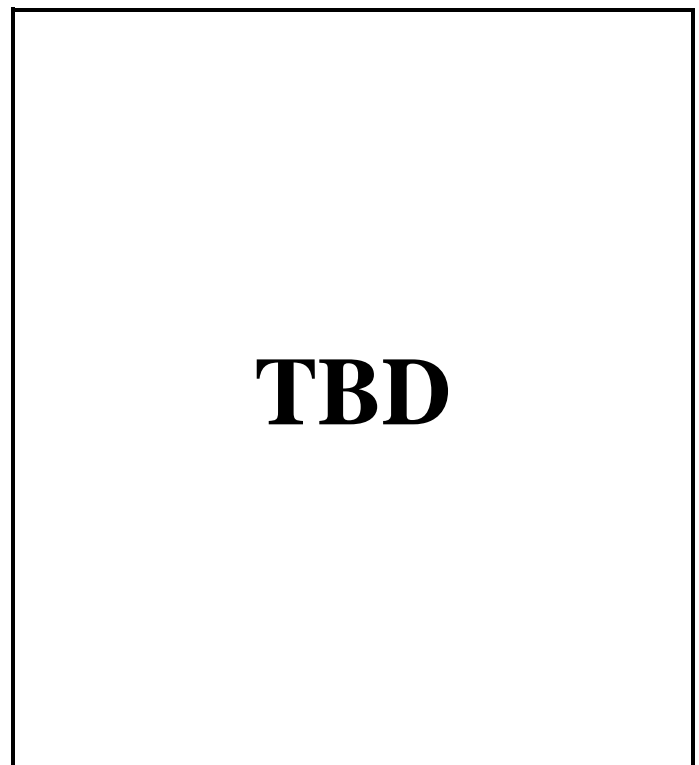
**Fig. 3 Typical output characteristics**



**Fig. 4 Typical output characteristics**



**Fig. 5 Typical switching energy vs collector current**



**Fig. 6 Typical switching energy vs gate resistance**

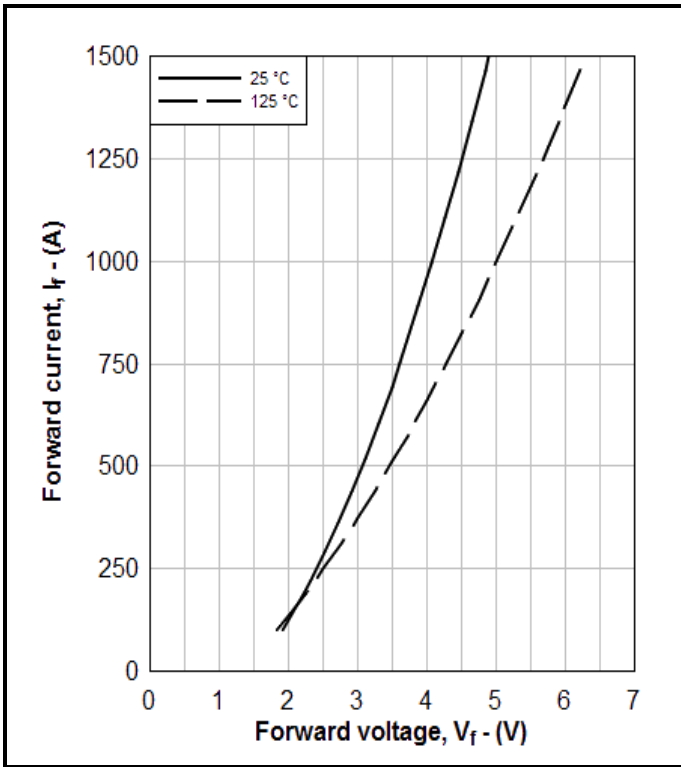


Fig. 7 Diode typical forward characteristics

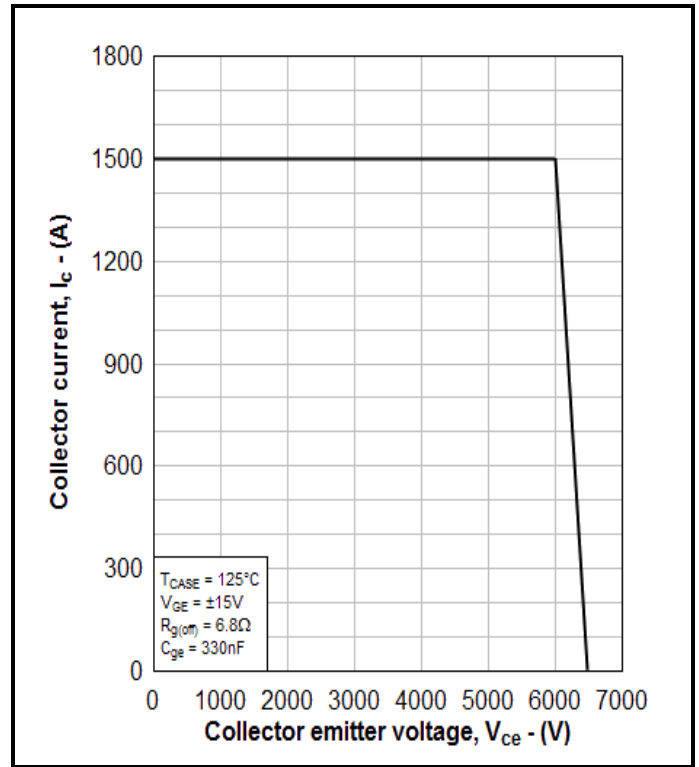


Fig. 8 Reverse bias safe operating area

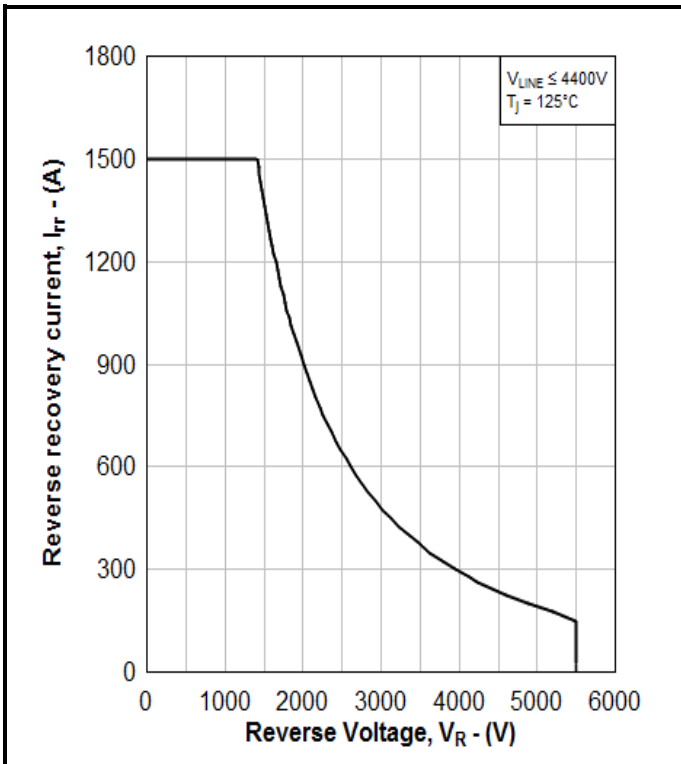


Fig. 9 Diode reverse bias safe operating area

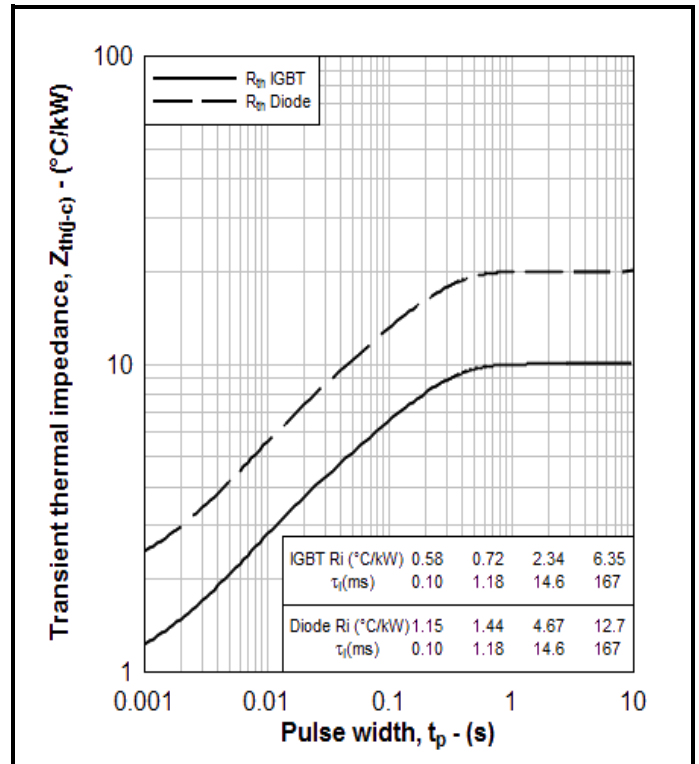
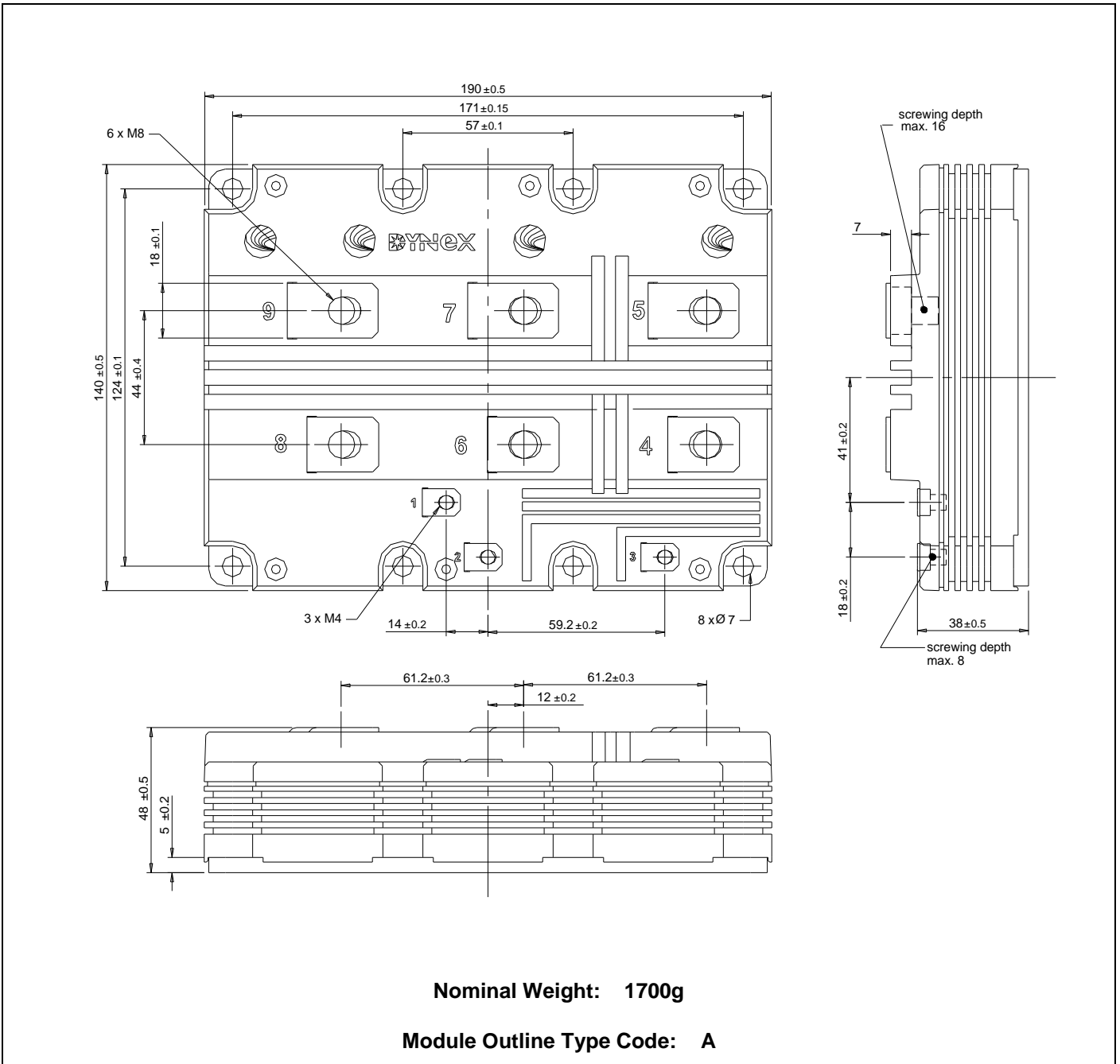


Fig. 10 Transient thermal impedance

**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: 1700g**

**Module Outline Type Code: A**

**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

Fax: +44(0)1522 500020

Tel: +44(0)1522 502753 / 502901

Email: [Power\\_solutions@dynexsemi.com](mailto:Power_solutions@dynexsemi.com)