

### FEATURES

- 10µs Short Circuit Withstand
- Non Punch Through Silicon
- Isolated Cu Base With Al<sub>2</sub>O<sub>3</sub> Substrates
- Lead Free Construction

### APPLICATIONS

- High Reliability Inverters
- Motor Controllers

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 DIM800DCS12-A000 is a dual switch 1200V, 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.

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:

#### DIM800DCS12-A000

Note: When ordering, please use the complete part number

### KEY PARAMETERS

$V_{CES}$	<b>1200V</b>
$V_{CE(sat)}$ * (typ)	<b>2.2V</b>
$I_C$ (max)	<b>800A</b>
$I_{C(PK)}$ (max)	<b>1600A</b>

\* Measured at the power busbars, not the auxiliary terminals

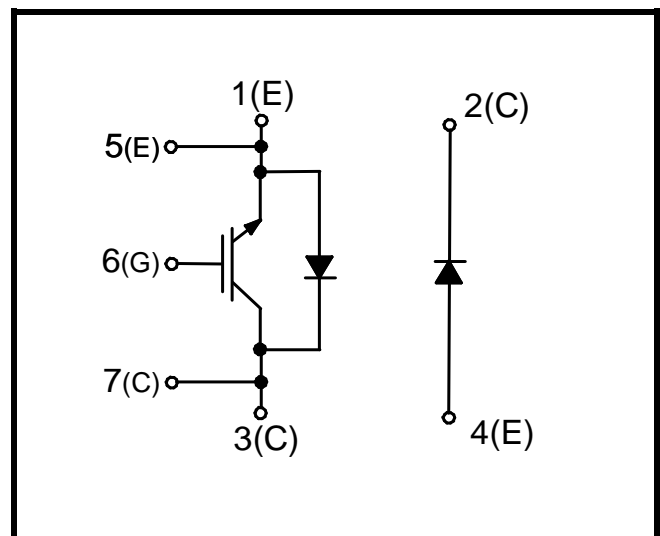
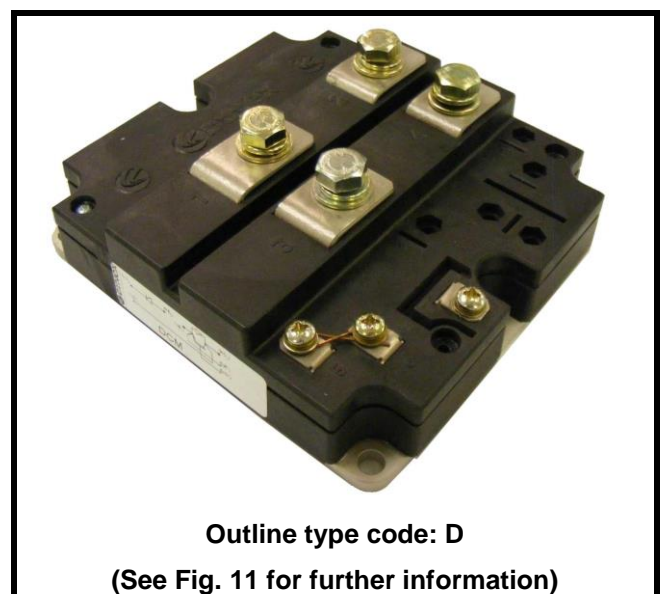


Fig. 1 Circuit configuration



Outline type code: D

(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<sub>case</sub> = 25°C unless stated otherwise**

Symbol	Parameter	Test Conditions	Max.	Units
V <sub>CES</sub>	Collector-emitter voltage	V <sub>GE</sub> = 0V	1200	V
V <sub>GES</sub>	Gate-emitter voltage		±20	V
I <sub>C</sub>	Continuous collector current	T <sub>case</sub> = 85°C	800	A
I <sub>C(PK)</sub>	Peak collector current	1ms, T <sub>case</sub> = 115°C	1600	A
P <sub>max</sub>	Max. transistor power dissipation	T <sub>case</sub> = 25°C, T <sub>j</sub> = 150°C	6940	W
I <sup>2</sup> t	Diode I <sup>2</sup> t value (IGBT arm)	V <sub>R</sub> = 0, t <sub>p</sub> = 10ms, T <sub>j</sub> = 125°C	100	kA <sup>2</sup> s
	Diode I <sup>2</sup> t value (Diode arm)		225	kA <sup>2</sup> s
V <sub>isol</sub>	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V

**THERMAL AND MECHANICAL RATINGS**

Internal insulation material: Al<sub>2</sub>O<sub>3</sub>  
 Baseplate material: Cu  
 Creepage distance: 20mm  
 Clearance: 10mm  
 CTI (Comparative Tracking Index): >600

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
R <sub>th(j-c)</sub>	Thermal resistance – transistor (per arm)	Continuous dissipation – junction to case	-	-	18	°C/kW
R <sub>th(j-c)</sub>	Thermal resistance – diode (IGBT arm)	Continuous dissipation – junction to case	-	-	40	°C/kW
	Thermal resistance – diode (Diode arm)		-	-	27	°C/kW
R <sub>th(c-h)</sub>	Thermal resistance – case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	-	8	°C/kW
T <sub>j</sub>	Junction temperature	Transistor	-	-	150	°C
		Diode	-	-	125	°C
T <sub>stg</sub>	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<sub>case</sub> = 25°C unless stated otherwise.**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I <sub>CES</sub>	Collector cut-off current	V <sub>GE</sub> = 0V, V <sub>CE</sub> = V <sub>CES</sub>			1	mA
		V <sub>GE</sub> = 0V, V <sub>CE</sub> = V <sub>CES</sub> , T <sub>case</sub> = 125°C			25	mA
I <sub>GES</sub>	Gate leakage current	V <sub>GE</sub> = ± 20V, V <sub>CE</sub> = 0V			4	µA
V <sub>GE(TH)</sub>	Gate threshold voltage	I <sub>C</sub> = 40mA, V <sub>GE</sub> = V <sub>CE</sub>	4.5	5.5	6.5	V
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage	V <sub>GE</sub> = 15V, I <sub>C</sub> = 800A		2.2	2.8	V
		V <sub>GE</sub> = 15V, I <sub>C</sub> = 800A, T <sub>VJ</sub> = 125°C		2.6	3.2	V
I <sub>F</sub>	Diode forward current	DC			800	A
I <sub>FM</sub>	Diode maximum forward current	t <sub>p</sub> = 1ms			1600	A
V <sub>F</sub>	Diode forward voltage (IGBT arm)	I <sub>F</sub> = 800A		2.1	2.4	V
	Diode forward voltage (Diode arm)			1.8	2.1	V
	Diode forward voltage (IGBT arm)	I <sub>F</sub> = 800A, T <sub>VJ</sub> = 125°C		2.1	2.4	V
	Diode forward voltage (Diode arm)			1.7	2.0	V
C <sub>ies</sub>	Input capacitance	V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz		90		nF
Q <sub>g</sub>	Gate charge	±15V		9		µC
C <sub>res</sub>	Reverse transfer capacitance	V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz				nF
L <sub>M</sub>	Module inductance – per arm			20		nH
R <sub>INT</sub>	Internal transistor resistance – per arm			270		µΩ
SC <sub>Data</sub>	Short circuit current, I <sub>SC</sub>	T <sub>j</sub> = 125°C, V <sub>CC</sub> = 900V t <sub>p</sub> ≤ 10µs, V <sub>GE</sub> ≤ 15V V <sub>CE(max)</sub> = V <sub>CES</sub> - L* x di/dt IEC 60747-9		4500		A

**Note:**

\* L is the circuit inductance + L<sub>M</sub>

**ELECTRICAL CHARACTERISTICS**

**T<sub>case</sub> = 25°C unless stated otherwise**

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units	
t <sub>d(off)</sub>	Turn-off delay time	I <sub>C</sub> = 800A V <sub>GE</sub> = ±15V V <sub>CE</sub> = 600V R <sub>G(ON)</sub> = 2.7Ω R <sub>G(OFF)</sub> = 2.7Ω L <sub>S</sub> ~ 100nH		1250		ns	
t <sub>f</sub>	Fall time			170		ns	
E <sub>OFF</sub>	Turn-off energy loss				130		mJ
t <sub>d(on)</sub>	Turn-on delay time				250		ns
t <sub>r</sub>	Rise time				250		ns
E <sub>ON</sub>	Turn-on energy loss				80		mJ
Q <sub>rr</sub>	Diode reverse recovery charge	<b>Diode arm</b>		12		μC	
I <sub>rr</sub>	Diode reverse recovery current	I <sub>F</sub> = 800A		570		A	
E <sub>rec</sub>	Diode reverse recovery energy	V <sub>CE</sub> = 600V dI <sub>F</sub> /dt = 4200A/μs		60		mJ	

**T<sub>case</sub> = 125°C unless stated otherwise**

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units	
t <sub>d(off)</sub>	Turn-off delay time	I <sub>C</sub> = 800A V <sub>GE</sub> = ±15V V <sub>CE</sub> = 600V R <sub>G(ON)</sub> = 2.7Ω R <sub>G(OFF)</sub> = 2.7Ω L <sub>S</sub> ~ 100nH		1500		ns	
t <sub>f</sub>	Fall time				200		ns
E <sub>OFF</sub>	Turn-off energy loss				160		mJ
t <sub>d(on)</sub>	Turn-on delay time				400		ns
t <sub>r</sub>	Rise time				220		ns
E <sub>ON</sub>	Turn-on energy loss				120		mJ
Q <sub>rr</sub>	Diode reverse recovery charge	<b>Diode arm</b>		240		μC	
I <sub>rr</sub>	Diode reverse recovery current	I <sub>F</sub> = 800A		680		A	
E <sub>rec</sub>	Diode reverse recovery energy	V <sub>CE</sub> = 600V dI <sub>F</sub> /dt = 4000A/μs		110		mJ	

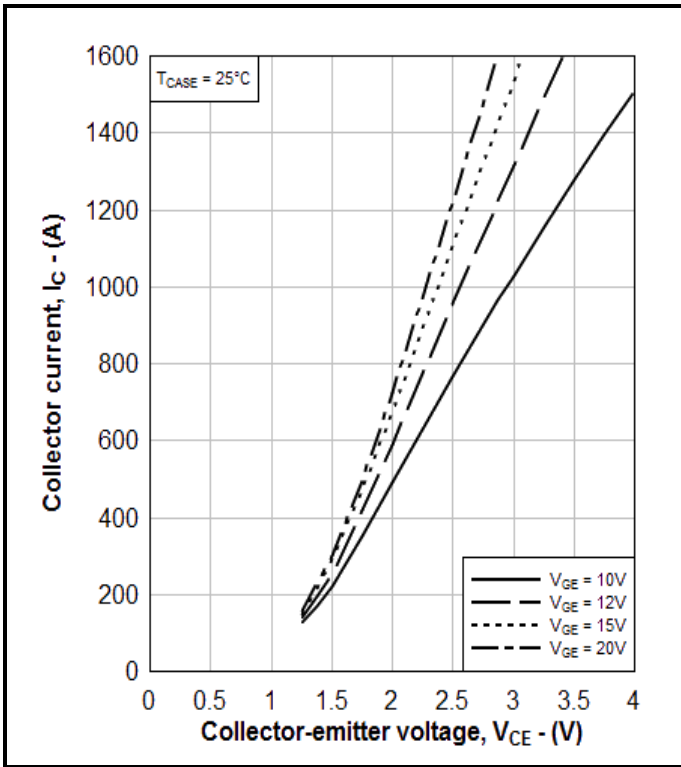


Fig. 3 Typical output characteristics

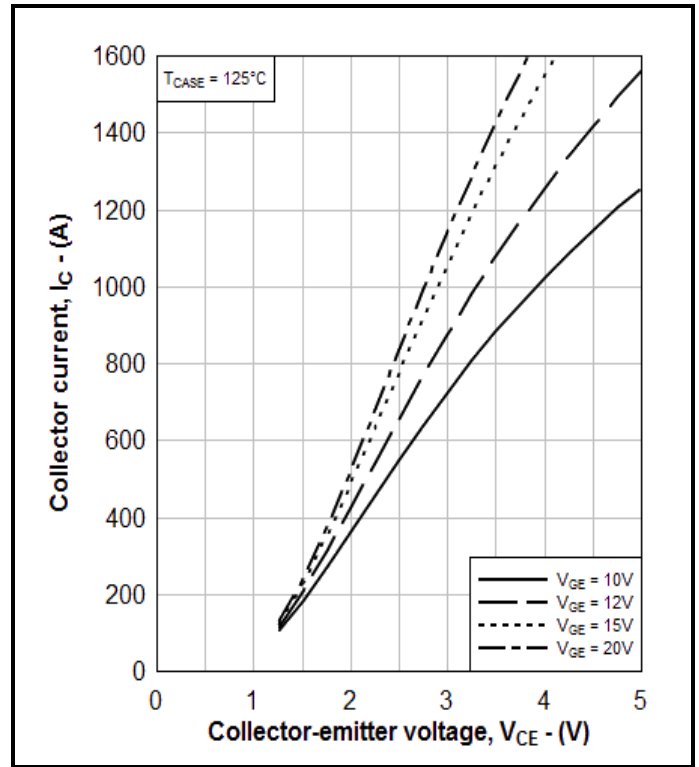


Fig. 4 Typical output characteristics

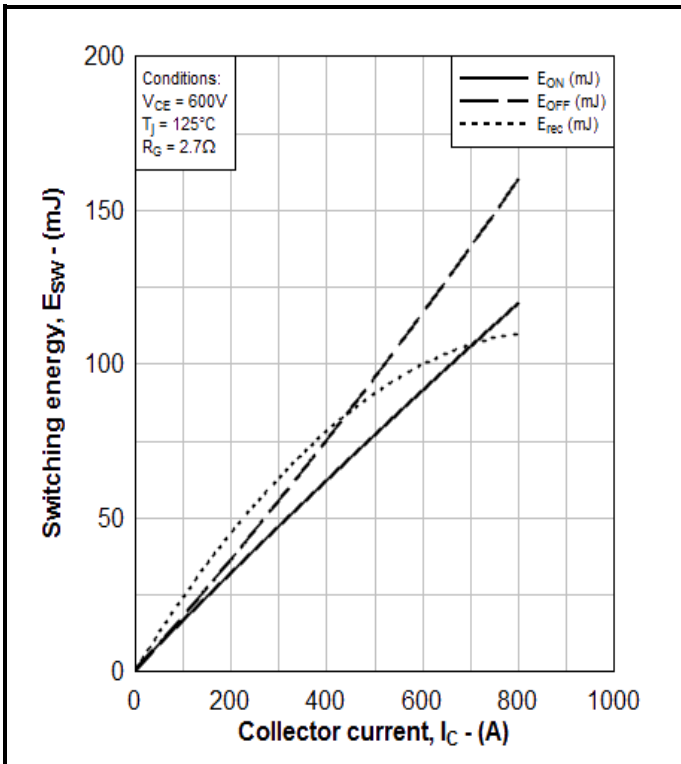


Fig. 5 Typical switching energy vs collector current

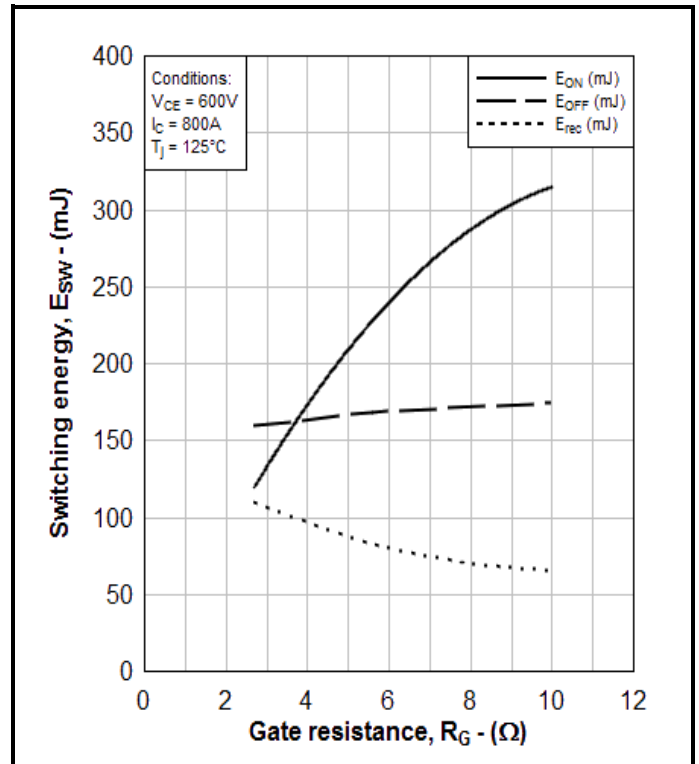


Fig. 6 Typical switching energy vs gate resistance

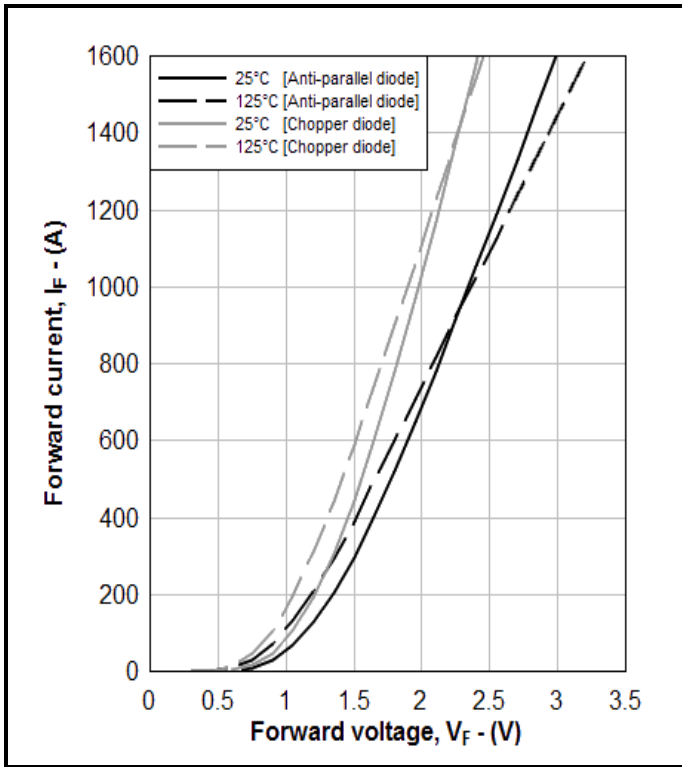


Fig. 7 Diode typical forward characteristics

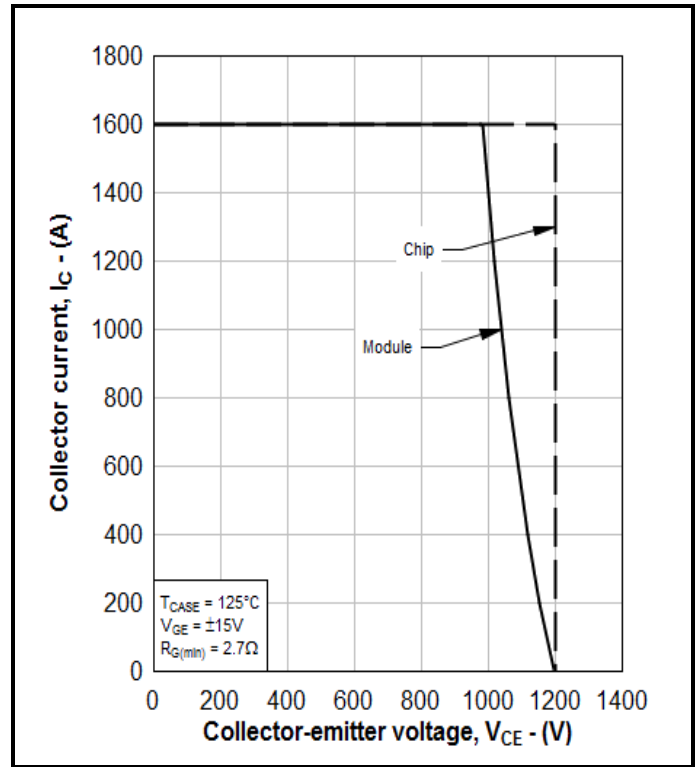


Fig. 8 Reverse bias safe operating area

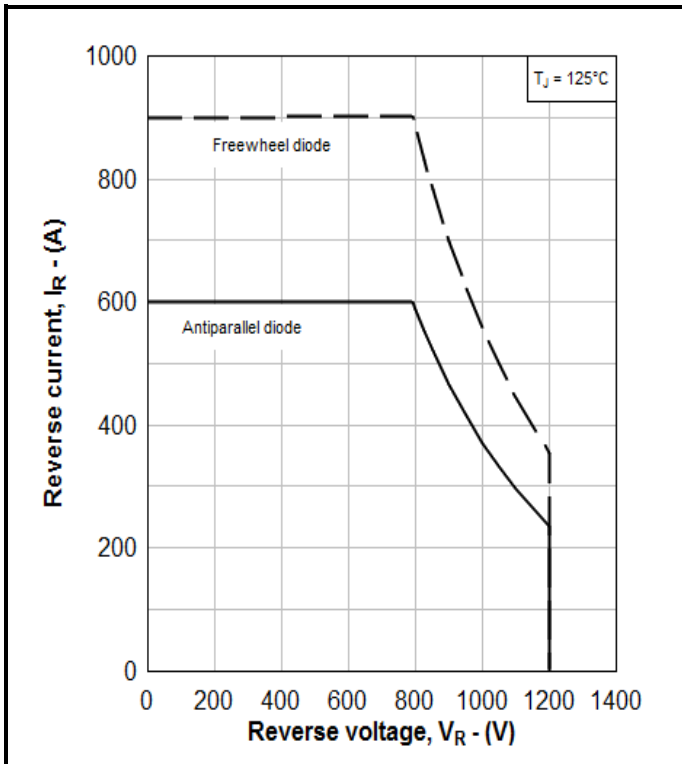


Fig. 9 Diode reverse bias safe operating area

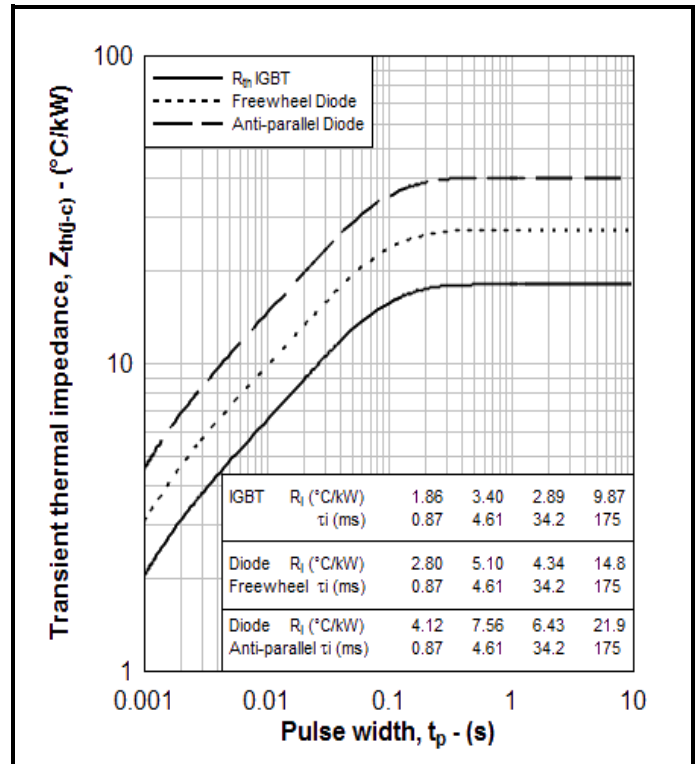
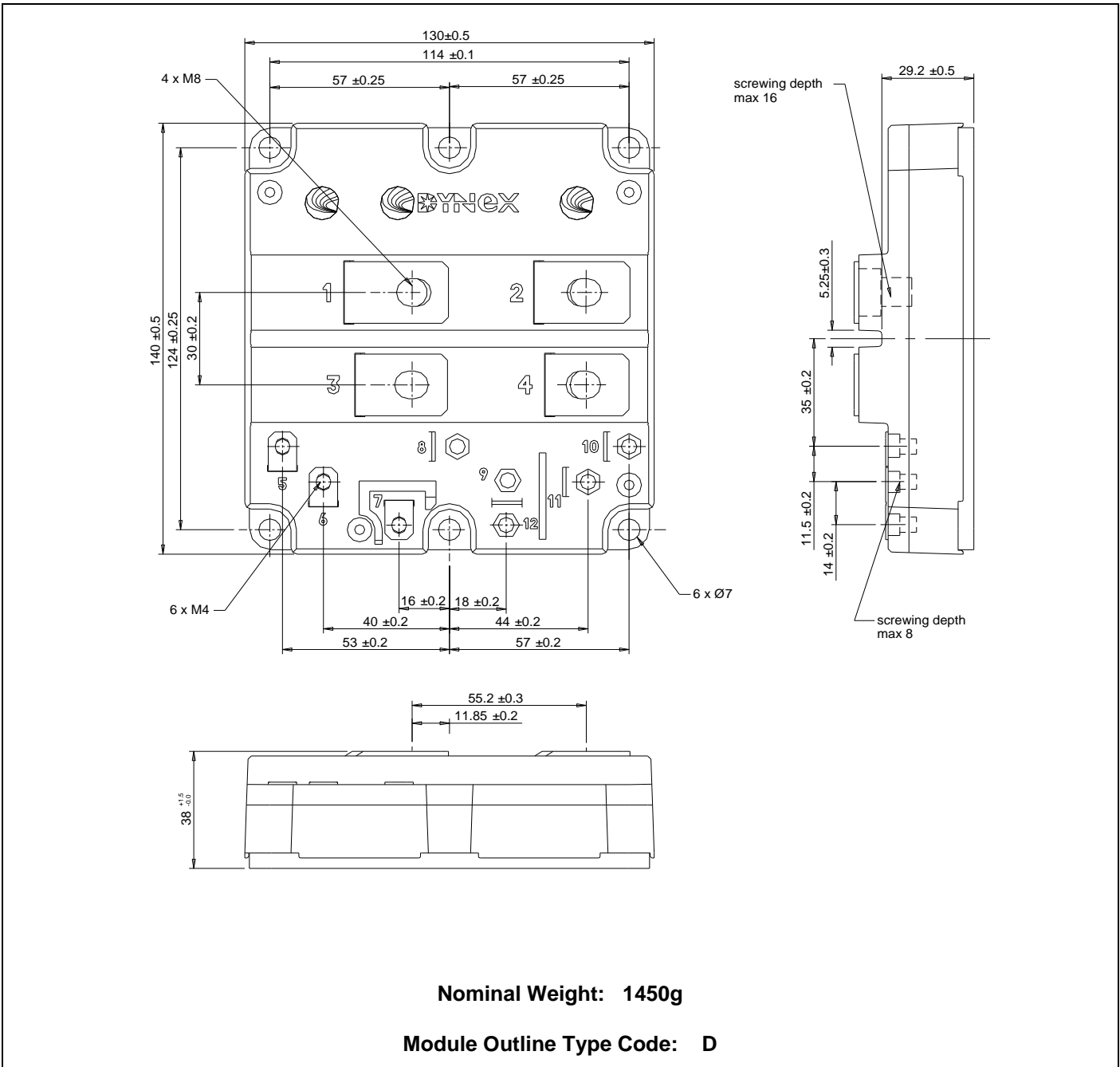


Fig. 10 Transient thermal impedance

**PACKAGE DETAILS**

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



**Fig. 11 Module outline drawing**

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