

FEATURES

- 10 μ s Short Circuit Withstand
- Non Punch Through Silicon
- Isolated Cu Base with Al₂O₃ 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 600V to 3300V and currents up to 2400A.

The DIM400DDS12-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 10 μ 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:

DIM400DDS12-A000

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}	1200V
$V_{CE(sat)}$ * (typ)	2.2 V
I_C (max)	400A
$I_{C(PK)}$ (max)	800A

* Measured at the power busbars, not the auxiliary terminals

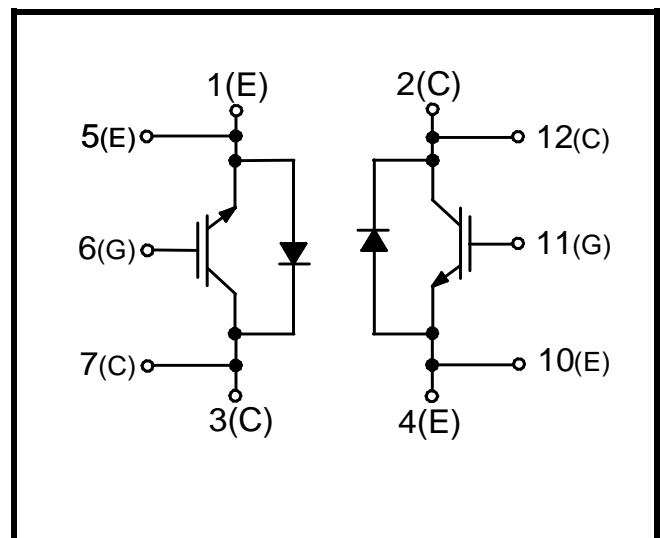
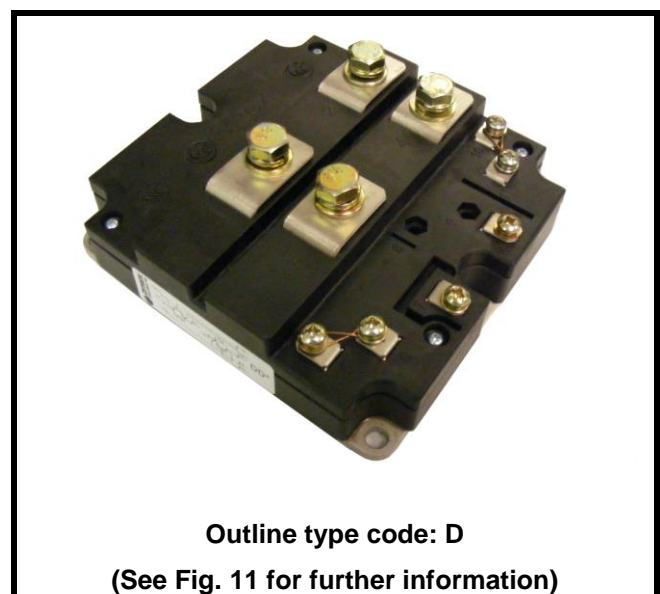


Fig. 1 Circuit configuration



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_{case} = 25°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
V _{CES}	Collector-emitter voltage	V _{GE} = 0V	1200	V
V _{GES}	Gate-emitter voltage		±20	V
I _C	Continuous collector current	T _{case} = 85°C	400	A
I _{C(PK)}	Peak collector current	1ms, T _{case} = 115°C	800	A
P _{max}	Max. transistor power dissipation	T _{case} = 25°C, T _j = 150°C	3470	W
I ² t	Diode I ² t value	V _R = 0, t _p = 10ms, T _j = 125°C	25	kA ² s
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V

THERMAL AND MECHANICAL RATINGS

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
R _{th(j-c)}	Thermal resistance – transistor (per switch)	Continuous dissipation - junction to case	-	-	36	°C/kW
R _{th(j-c)}	Thermal resistance – diode (per switch)	Continuous dissipation - junction to case	-	-	80	°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	-	-	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 – 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	$V_{GE} = 0V, V_{CE} = V_{CES}$			0.5	mA
		$V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125^{\circ}C$			12	mA
I_{GES}	Gate leakage current	$V_{GE} = \pm 20V, V_{CE} = 0V$			2	μA
$V_{GE(TH)}$	Gate threshold voltage	$I_C = 20mA, V_{GE} = V_{CE}$	4.5	5.5	6.5	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE} = 15V, I_C = 400A$		2.2	2.8	V
		$V_{GE} = 15V, I_C = 400A, T_j = 125^{\circ}C$		2.6	3.2	V
I_F	Diode forward current	DC			400	A
I_{FM}	Diode maximum forward current	$t_p = 1ms$			800	A
V_F	Diode forward voltage	$I_F = 400A$		2.1	2.4	V
		$I_F = 400A, T_j = 125^{\circ}C$		2.1	2.4	V
C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		45		nF
Q_g	Gate charge	$\pm 15V$		4		μC
C_{res}	Reverse transfer capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$				nF
L_M	Module inductance – per switch			20		nH
R_{INT}	Internal transistor resistance – per switch			270		$\mu\Omega$
SC_{Data}	Short circuit current, I_{SC}	$T_j = 125^{\circ}C, V_{CC} = 900V$ $t_p \leq 10\mu s, V_{GE} \leq 15V$ $V_{CE(max)} = V_{CES} - L^* \times di/dt$ IEC 60747-9		2250		A

Note:

* 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 = 400A V _{GE} = ±15V V _{CE} = 600V R _{G(ON)} = 3.3Ω R _{G(OFF)} = 3.3Ω L _S ~ 100nH		710		ns
t _f	Fall time			70		ns
E _{OFF}	Turn-off energy loss			60		mJ
t _{d(on)}	Turn-on delay time			190		ns
t _r	Rise time			100		ns
E _{ON}	Turn-on energy loss			40		mJ
Q _{rr}	Diode reverse recovery charge		I _F = 400A V _{CE} = 600V di _F /dt = 4700A/μs		55	
I _{rr}	Diode reverse recovery current			300		A
E _{rec}	Diode reverse recovery energy			17		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 = 400A V _{GE} = ±15V V _{CE} = 600V R _{G(ON)} = 3.3Ω R _{G(OFF)} = 3.3Ω L _S ~ 100nH		890		ns
t _f	Fall time			100		ns
E _{OFF}	Turn-off energy loss			60		mJ
t _{d(on)}	Turn-on delay time			440		ns
t _r	Rise time			125		ns
E _{ON}	Turn-on energy loss			60		mJ
Q _{rr}	Diode reverse recovery charge		I _F = 400A V _{CE} = 600V di _F /dt = 4000A/μs		85	
I _{rr}	Diode reverse recovery current			320		A
E _{rec}	Diode reverse recovery energy			32		mJ

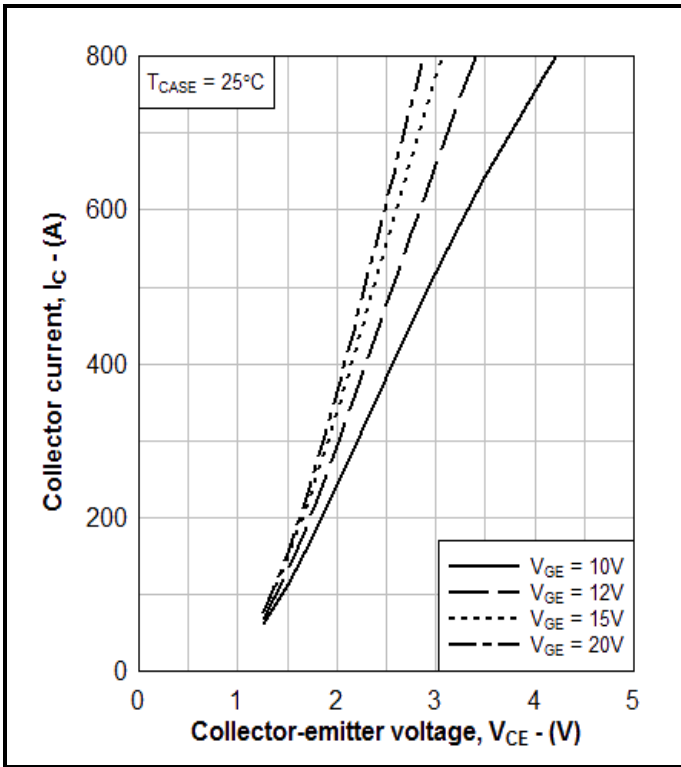


Fig. 3 Typical output characteristics

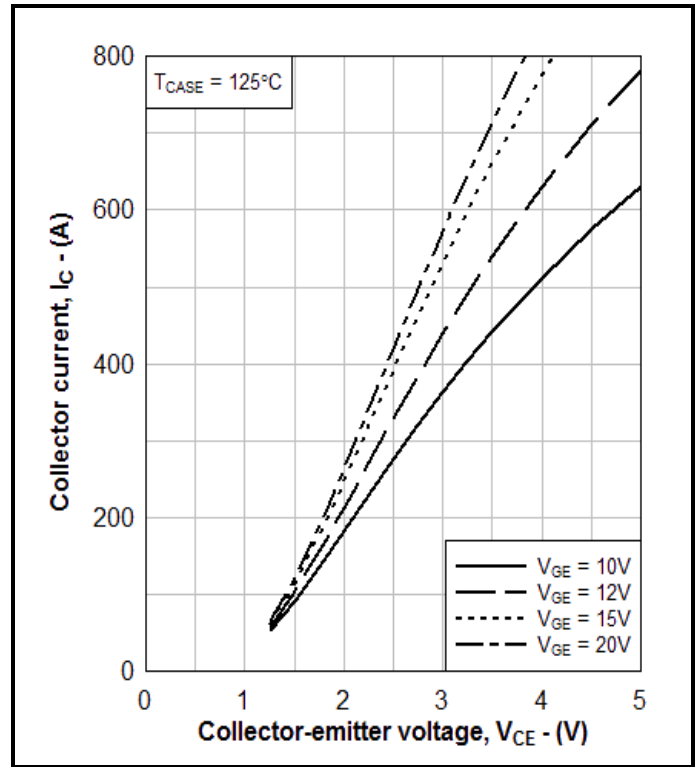


Fig. 4 Typical output characteristics

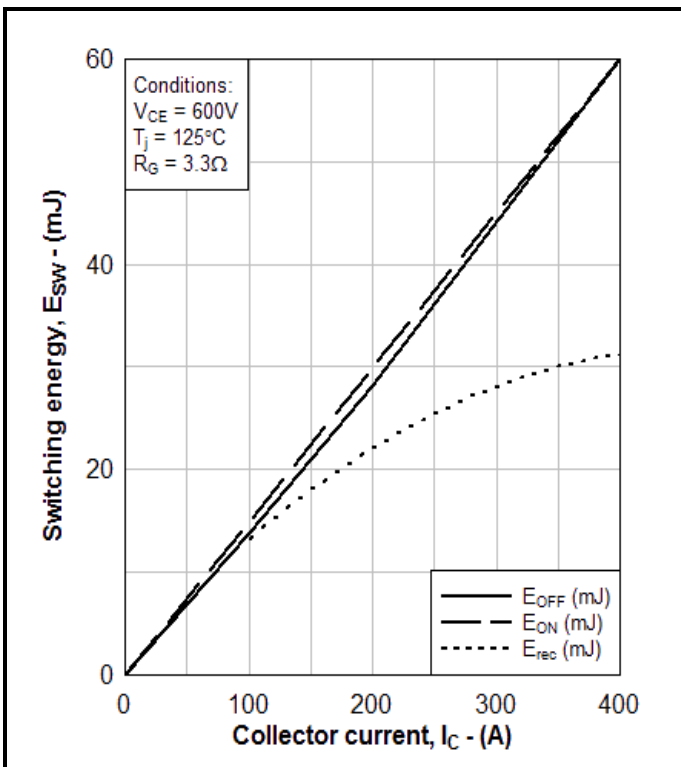


Fig. 5 Typical switching energy vs collector current

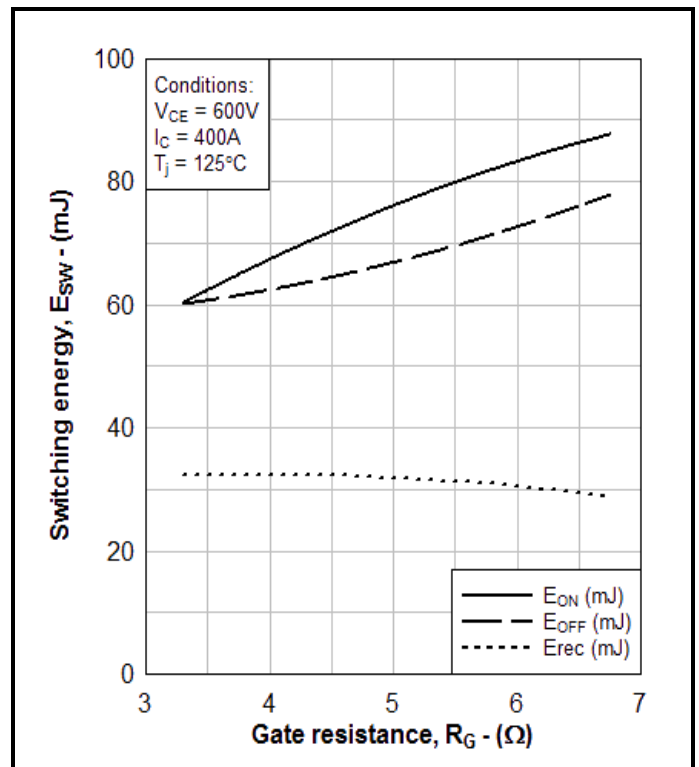


Fig. 6 Typical switching energy vs gate resistance

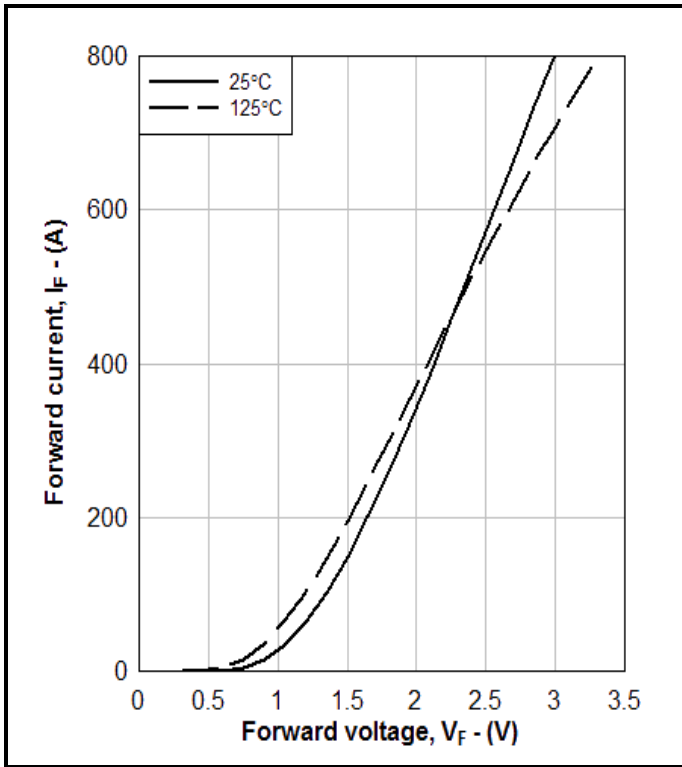


Fig. 7 Diode typical forward characteristics

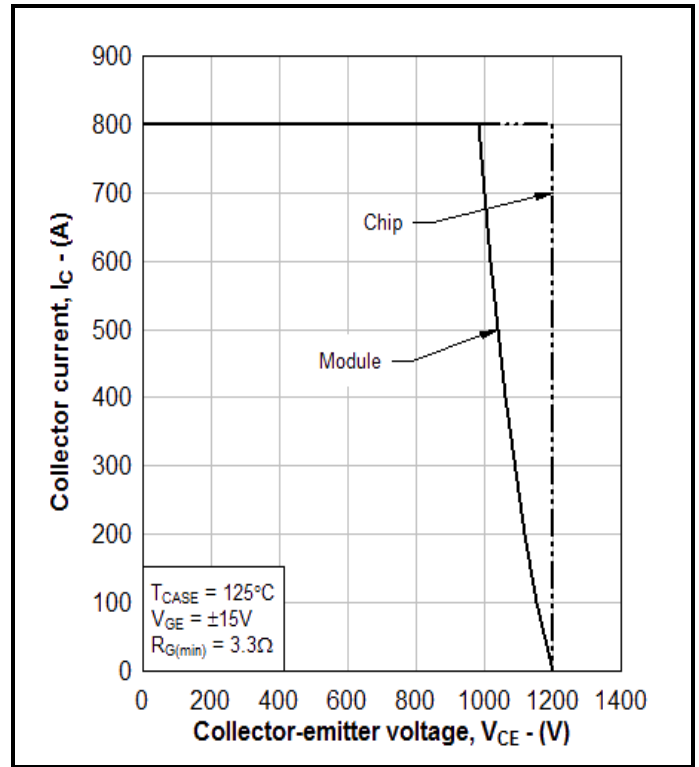


Fig. 8 Reverse bias safe operating area

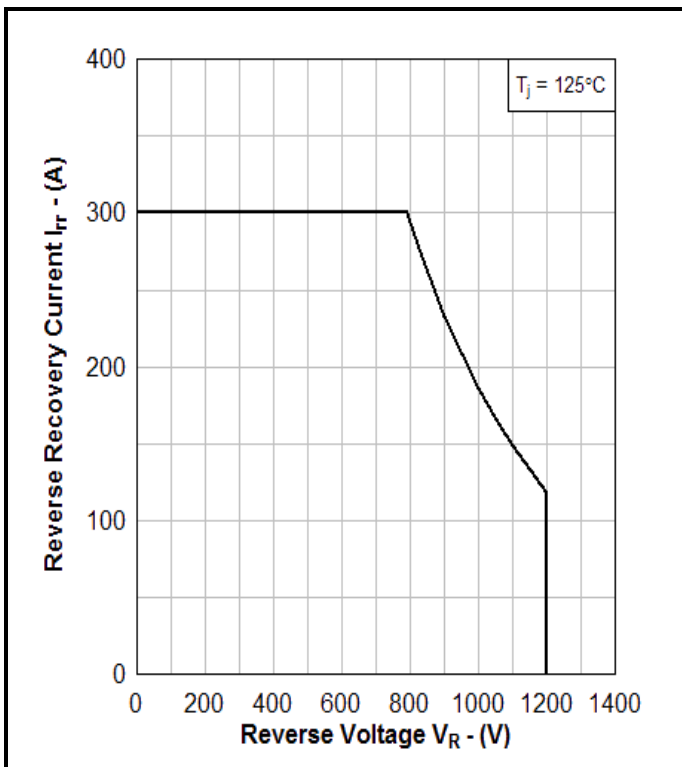


Fig. 9 Diode reverse bias safe operating area

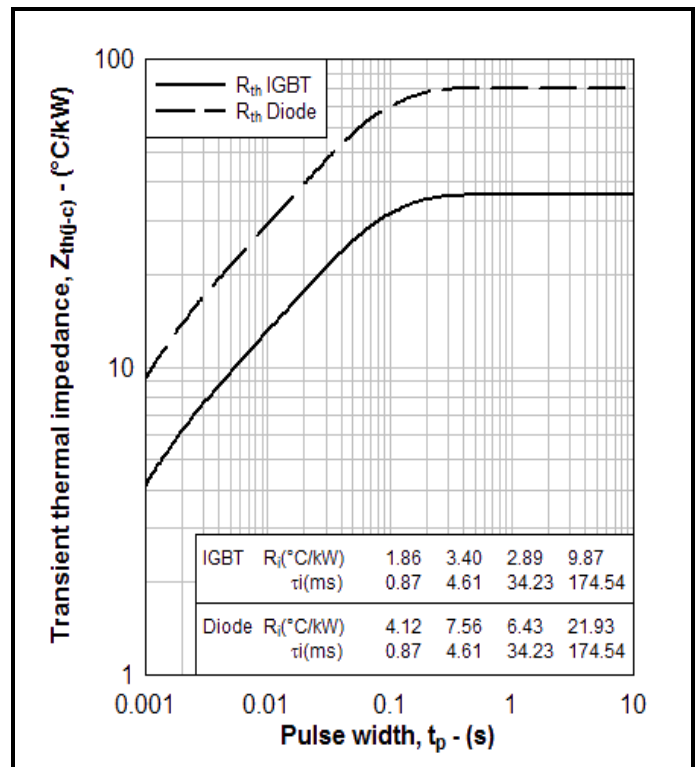


Fig. 10 Transient thermal impedance

PACKAGE DETAILS

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

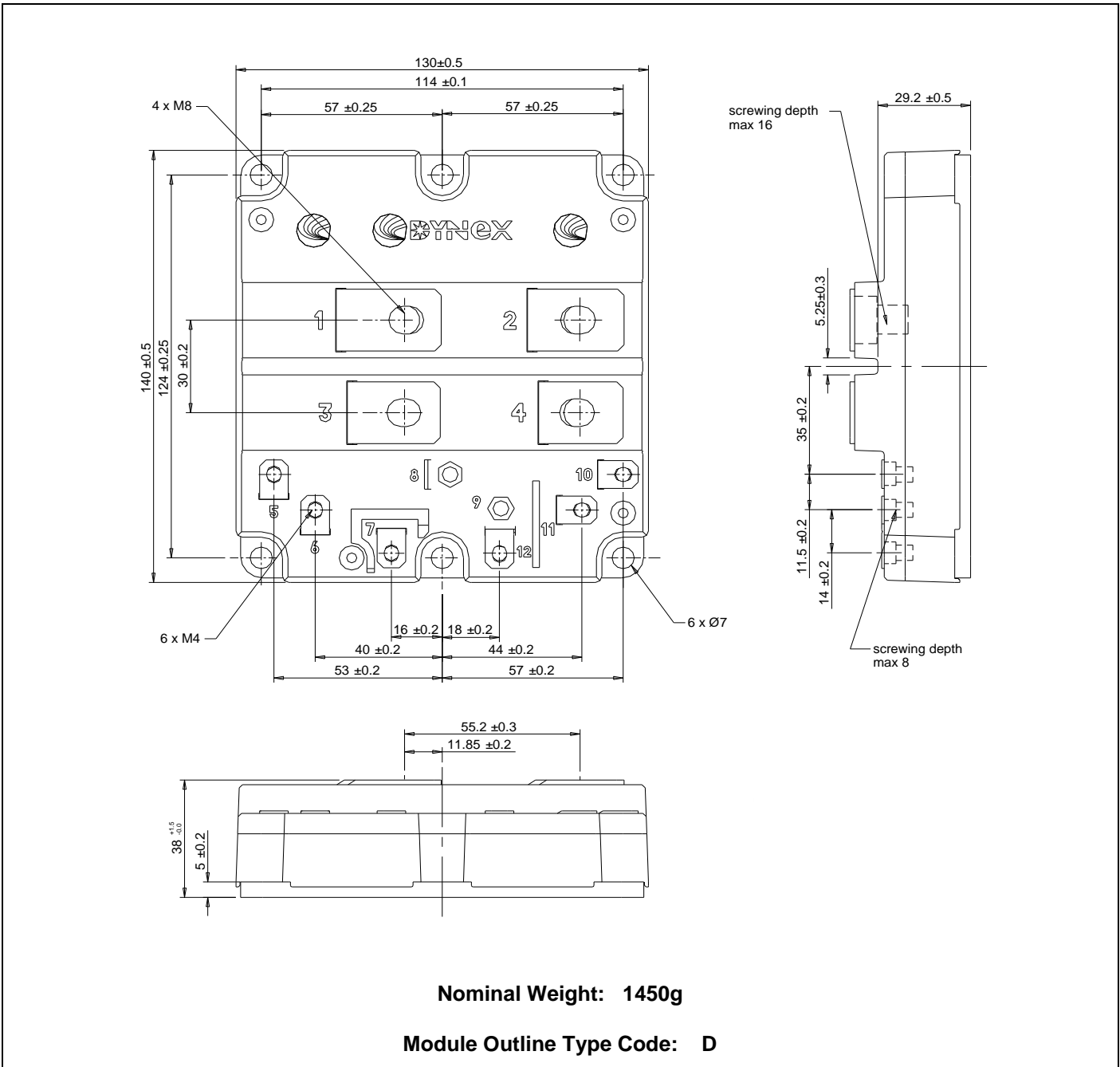


Fig. 11 Module outline drawing

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