

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 DIM1200ESM33-F000 is a single switch 3300V, 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:

DIM1200ESM33-F000

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}	3300V
$V_{CE(sat)}$ * (typ)	2.8V
I_C (max)	1200A
$I_{C(PK)}$ (max)	2400A

* Measured at the auxiliary terminals

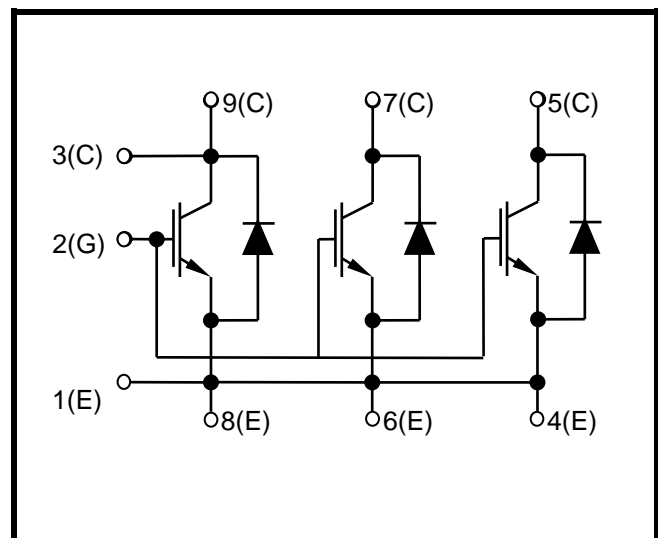
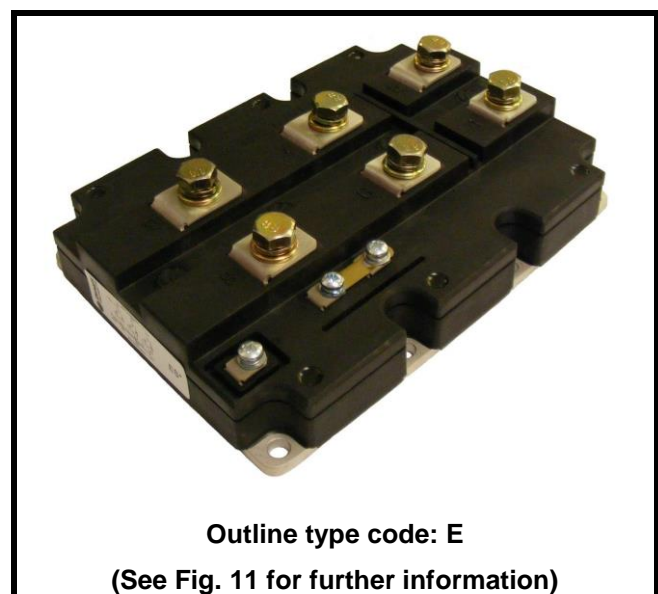


Fig. 1 Circuit configuration



Outline type code: E

(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	3300	V
V _{GES}	Gate-emitter voltage		±20	V
I _C	Continuous collector current	T _{case} = 90°C	1200	A
I _{C(PK)}	Peak collector current	1ms, T _{case} = 115°C	2400	A
P _{max}	Max. transistor power dissipation	T _{case} = 25°C, T _j = 150°C	15.6	kW
I ² t	Diode I ² t value	V _R = 0, t _p = 10ms, T _j = 125°C	720	kA ² s
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	6000	V
Q _{PD}	Partial discharge – per module	IEC1287, V ₁ = 3500V, V ₂ = 2600V, 50Hz RMS	10	pC

THERMAL AND MECHANICAL RATINGS

Internal insulation material: AIN
 Baseplate material: AISiC
 Creepage distance: 33mm
 Clearance: 20mm
 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	-	-	8	°C/kW
R _{th(j-c)}	Thermal resistance – diode	Continuous dissipation - junction to case	-	-	16	°C/kW
R _{th(c-h)}	Thermal resistance – case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	-	6	°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	$V_{GE} = 0V, V_{CE} = V_{CES}$			5	mA
		$V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125^{\circ}C$			90	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	7.0	V
$V_{CE(sat)}^{\dagger}$	Collector-emitter saturation voltage	$V_{GE} = 15V, I_C = 1200A$		2.8		V
		$V_{GE} = 15V, I_C = 1200A, T_j = 125^{\circ}C$		3.6		V
I_F	Diode forward current	DC		1200		A
I_{FM}	Diode maximum forward current	$t_p = 1ms$		2400		A
V_F^{\dagger}	Diode forward voltage	$I_F = 1200A$		2.9		V
		$I_F = 1200A, T_j = 125^{\circ}C$		3.0		V
C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		216		nF
Q_g	Gate charge	$\pm 15V$		30		μC
C_{res}	Reverse transfer capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		3.3		nF
L_M	Module inductance			10		nH
R_{INT}	Internal transistor resistance			90		$\mu\Omega$
SC_{Data}	Short circuit current, I_{SC}	$T_j = 125^{\circ}C, V_{CC} = 2500V$ $t_p \leq 10\mu s, V_{GE} \leq 15V$ $V_{CE(max)} = V_{CES} - L^* \times dl/dt$ IEC 60747-9		5500		A

Note:

[†] Measured at the power busbars, not the auxiliary terminals

* L is the circuit inductance + L_M

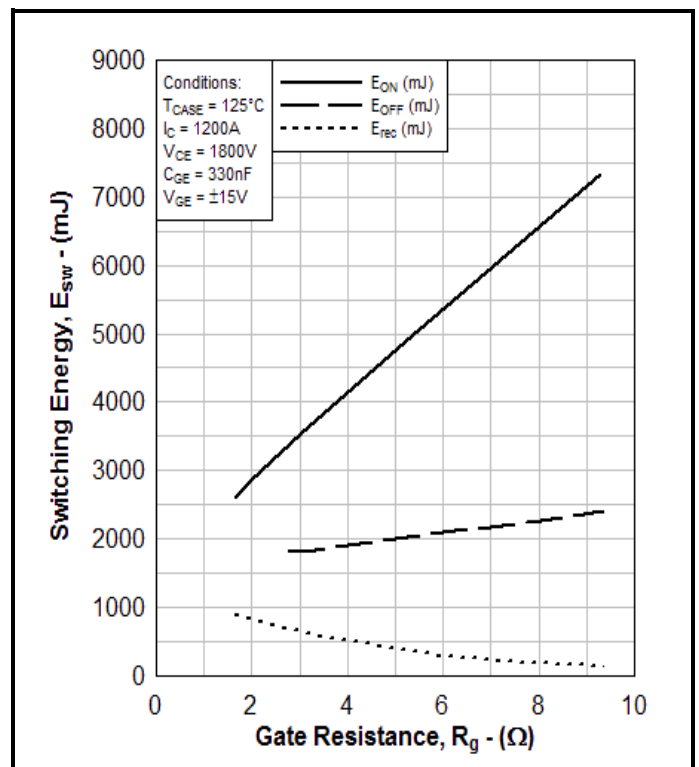
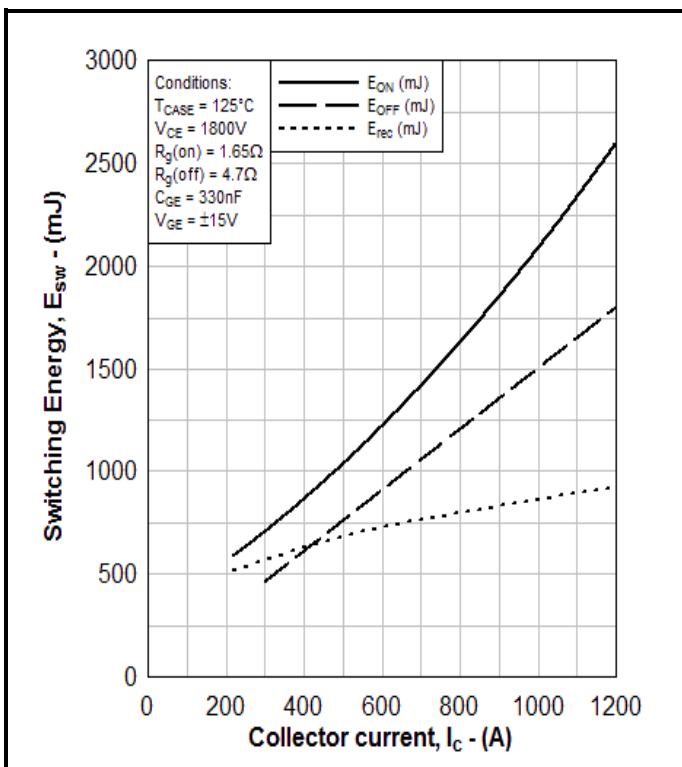
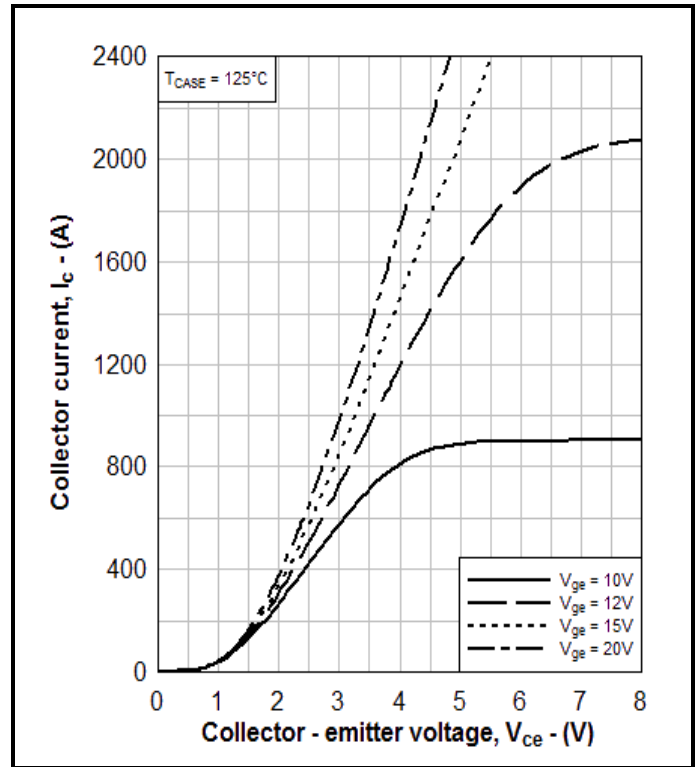
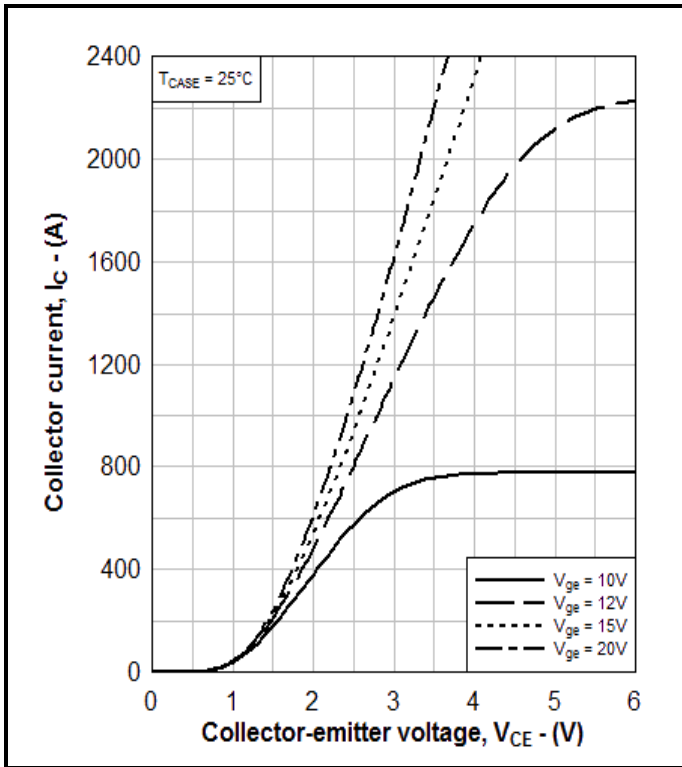
ELECTRICAL CHARACTERISTICS

T_{case} = 25°C unless stated otherwise

Symbol	Parameter	Test Conditions		Min	Typ.	Max	Units
t _{d(off)}	Turn-off delay time	I _C = 1200A V _{GE} = ±15V V _{CE} = 1800V C _{ge} = 330nF L _S ~ 100nH	R _{G(ON)} = 2.7Ω R _{G(OFF)} = 4.7Ω		2150		ns
t _f	Fall time				230		ns
E _{OFF}	Turn-off energy loss				1550		mJ
t _{d(on)}	Turn-on delay time				1300		ns
t _r	Rise time				275		ns
E _{ON}	Turn-on energy loss		R _{G(ON)} = 1.65Ω R _{G(OFF)} = 4.7Ω	1850		mJ	
Q _{rr}	Diode reverse recovery charge	I _F = 2400A V _{CE} = 1800V dI _F /dt = 6000A/μs			480		μC
I _{rr}	Diode reverse recovery current				1000		A
E _{rec}	Diode reverse recovery energy				450		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 = 1200A V _{GE} = ±15V V _{CE} = 1800V C _{ge} = 330nF L _S ~ 100nH	R _{G(ON)} = 2.7Ω R _{G(OFF)} = 4.7Ω		2200		ns
t _f	Fall time				240		ns
E _{OFF}	Turn-off energy loss				1800		mJ
t _{d(on)}	Turn-on delay time				1200		ns
t _r	Rise time				315		ns
E _{ON}	Turn-on energy loss		R _{G(ON)} = 1.65Ω R _{G(OFF)} = 4.7Ω	2600		mJ	
Q _{rr}	Diode reverse recovery charge	I _F = 1200A V _{CE} = 1800V dI _F /dt = 6000A/μs			900		μC
I _{rr}	Diode reverse recovery current				1200		A
E _{rec}	Diode reverse recovery energy				900		mJ



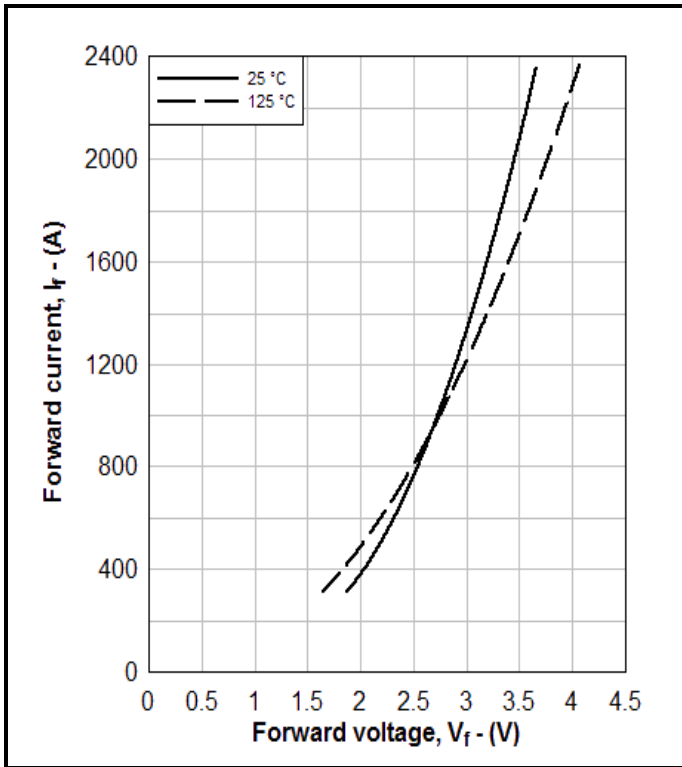


Fig. 7 Diode typical forward characteristics

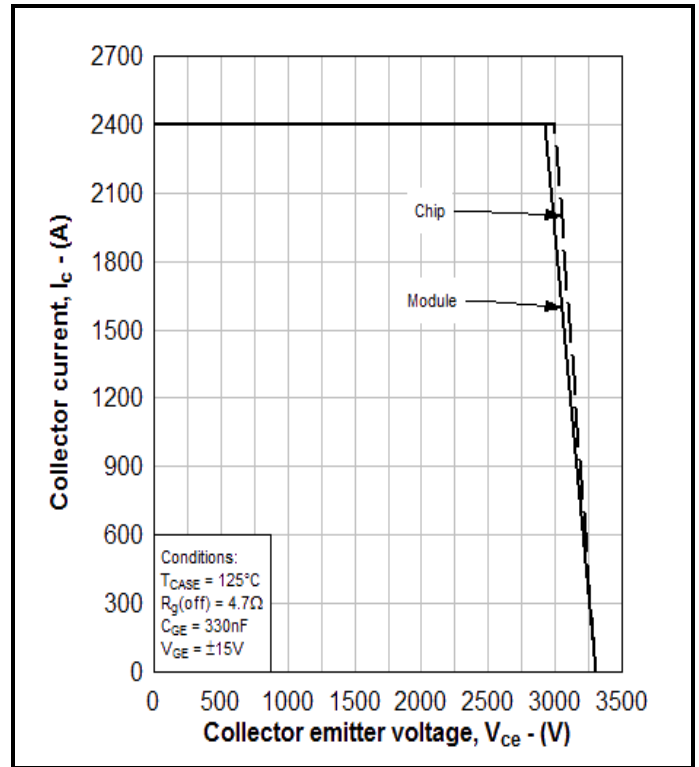


Fig. 8 Reverse bias safe operating area

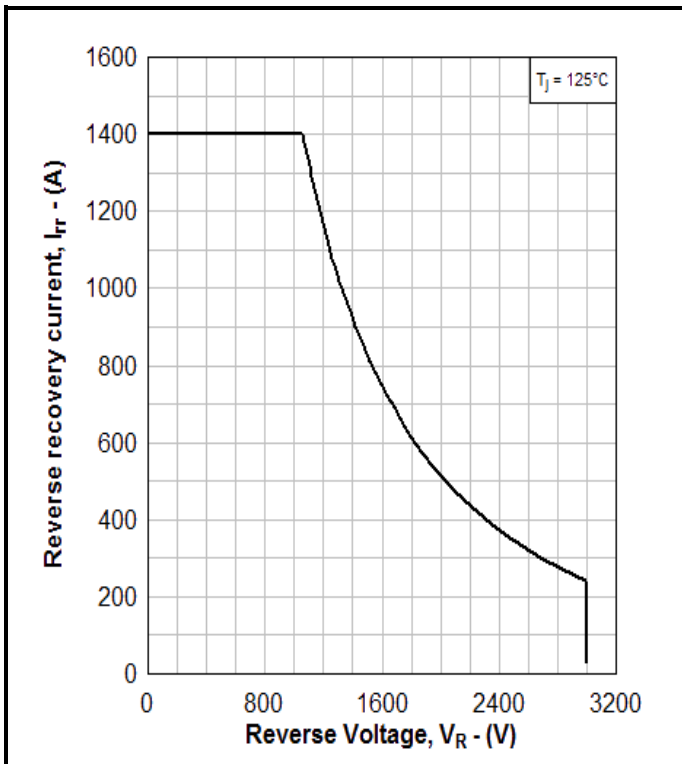


Fig. 9 Diode reverse bias safe operating area

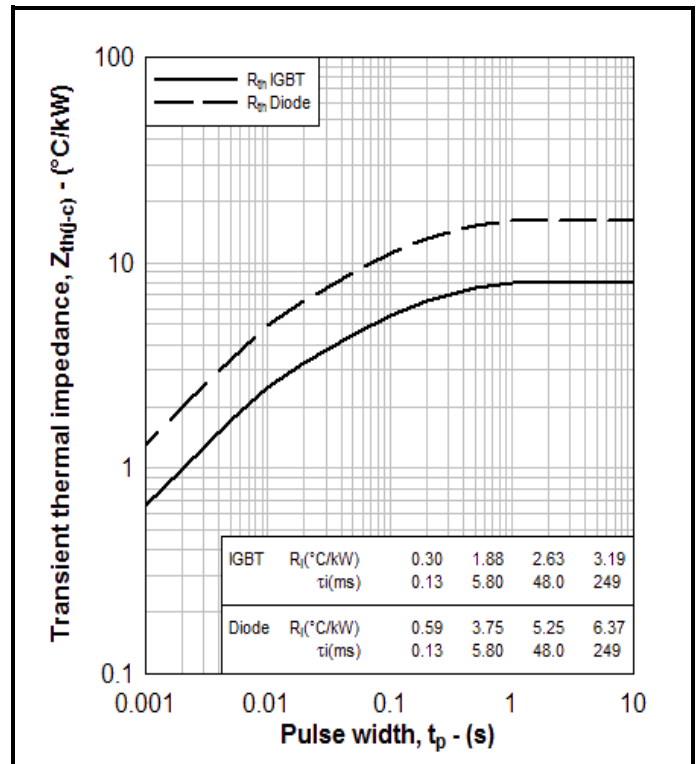


Fig. 10 Transient thermal impedance

PACKAGE DETAILS

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

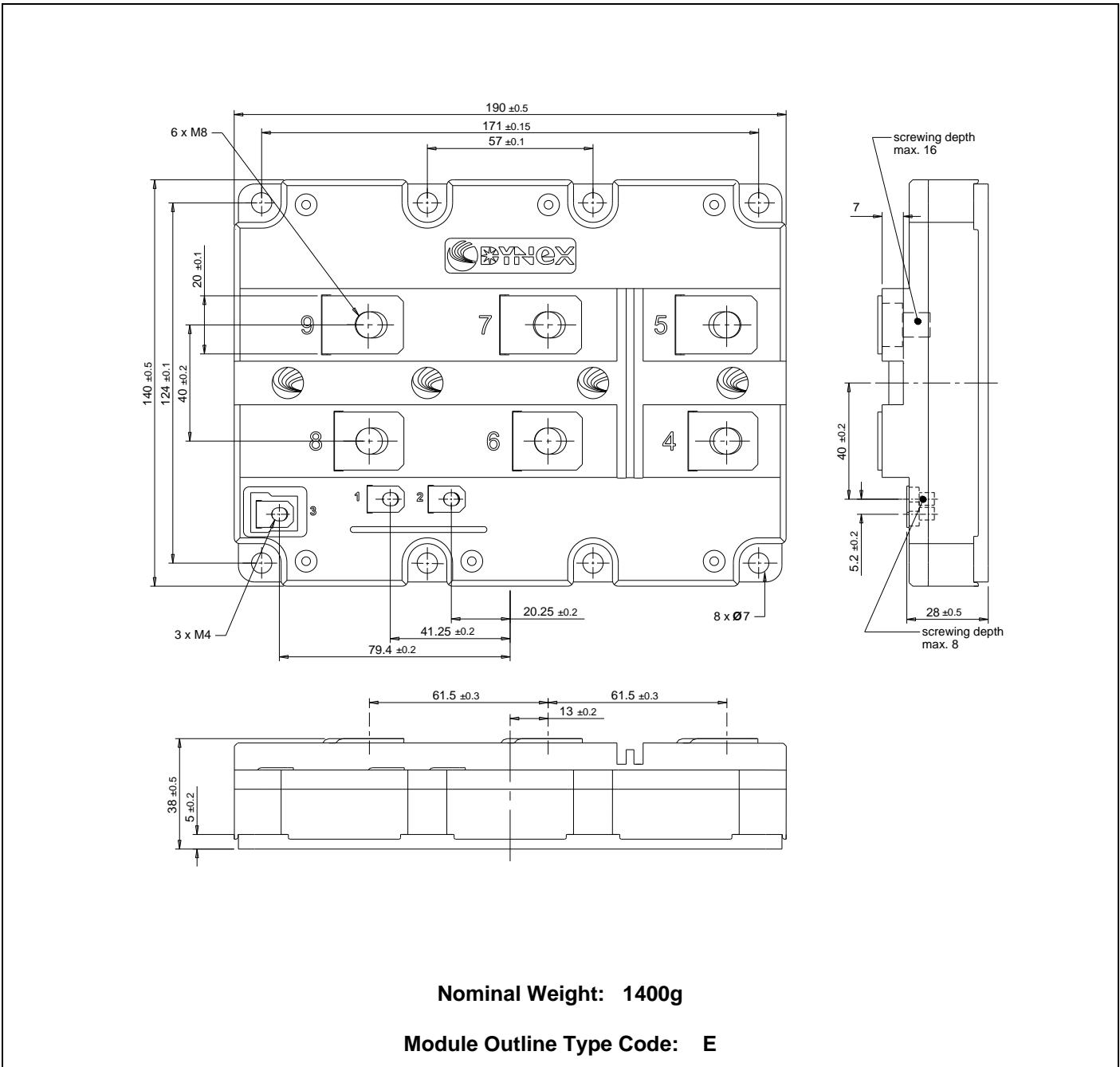


Fig. 11 Module outline drawing

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