DIM1200FSS12-A000

Single Switch IGBT Module

Replaces DS5834-2

DS5834-3 July 2014 (LN31766)

FEATURES

- 10µs Short Circuit Withstand
- Non Punch Through Silicon
- Isolated Cu Base with Al_2O_3 Substrates
- Lead Free construction

APPLICATIONS

- High Power 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 DIM1200FSS12-A000 is a single 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. 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:

DIM1200FSS12-A000

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}		**1200V**
$V_{CE(sat)}$ *	**(typ)**	**2.2V**
I_C	**(max)**	**1200A**
$I_{C(PK)}$	**(max)**	**2400A**

* Measured at the power busbars, not the auxiliary terminals

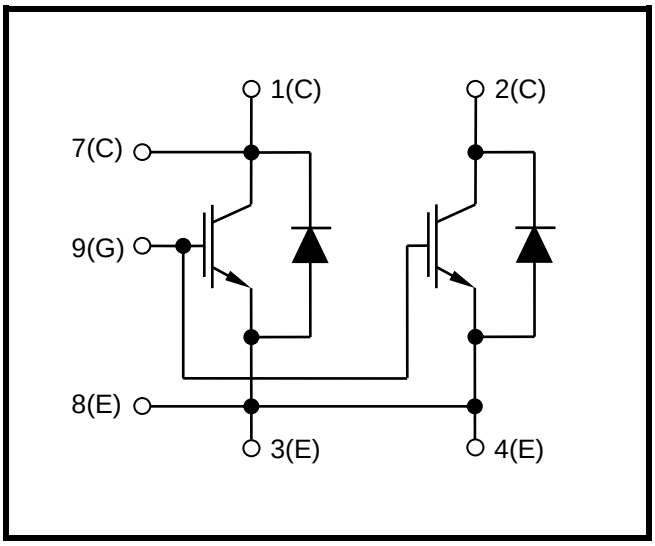


Fig. 1 Circuit configuration

Outline type code: F

(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	1200	A
$I_{C(PK)}$	Peak collector current	1ms, T_{case} = 110°C	2400	A
P_{max}	Max. transistor power dissipation	T_{case} = 25°C, T_j = 150°C	10400	W
I^2t	Diode I^2t value	V_R = 0, t_p = 10ms, T_j = 125ºC	400	kA^2s
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_2O_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	Continuous dissipation - junction to case	-	-	12	°C/kW
$R_{th(j-c)}$	Thermal resistance – diode	Continuous dissipation - junction to case	-	-	20	°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°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}			1.5	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125°C			40	mA
I_{GES}	Gate leakage current	V_{GE} = ± 20V, V_{CE} = 0V			6	µA
$V_{GE(TH)}$	Gate threshold voltage	I_C = 60mA, V_{GE} = V_{CE}	4.5	5.5	6.5	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{GE} = 15V, I_C = 1200A		2.2	2.8	V
		V_{GE} = 15V, I_C = 1200A, T_j = 125°C		2.6	3.3	V
I_F	Diode forward current	DC			1200	A
I_{FM}	Diode maximum forward current	t_p = 1ms			2400	A
V_F	Diode forward voltage	I_F = 1200A		1.9	2.2	V
		I_F = 1200A, T_j = 125°C		1.8	2.1	V
C_{ies}	Input capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		135		nF
Q_g	Gate charge	±15V		12		µC
C_{res}	Reverse transfer capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz				nF
L_M	Module inductance			15		nH
R_{INT}	Internal transistor resistance			140		µΩ
SC_{Data}	Short circuit current, I_{SC}	T_j = 125°C, V_{CC} = 900V t_p ≤ 10µs, V_{GE} ≤ 15V $V_{CE\ (max)}$ = V_{CES} – L^* x dI/dt IEC 60747-9		7000		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 = 1200A V_{GE} = ±15V V_{CE} = 600V $R_{G(ON)}$ = 2.2Ω $R_{G(OFF)}$ = 2.2Ω L_S ~ 100nH		1250		ns
t_f	Fall time			180		ns
E_{OFF}	Turn-off energy loss			160		mJ
$t_{d(on)}$	Turn-on delay time			250		ns
t_r	Rise time			200		ns
E_{ON}	Turn-on energy loss			80		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 1200A V_{CE} = 600V dI_F/dt = 6200A/µs		120		µC
I_{rr}	Diode reverse recovery current			570		A
E_{rec}	Diode reverse recovery energy			60		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} = 600V $R_{G(ON)}$ = 2.2Ω $R_{G(OFF)}$ = 2.2Ω L_S ~ 100nH		1380		ns
t_f	Fall time			200		ns
E_{OFF}	Turn-off energy loss			260		mJ
$t_{d(on)}$	Turn-on delay time			350		ns
t_r	Rise time			220		ns
E_{ON}	Turn-on energy loss			140		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 1200A V_{CE} = 600V dI_F/dt = 5700A/µs		240		µC
I_{rr}	Diode reverse recovery current			680		A
E_{rec}	Diode reverse recovery energy			110		mJ

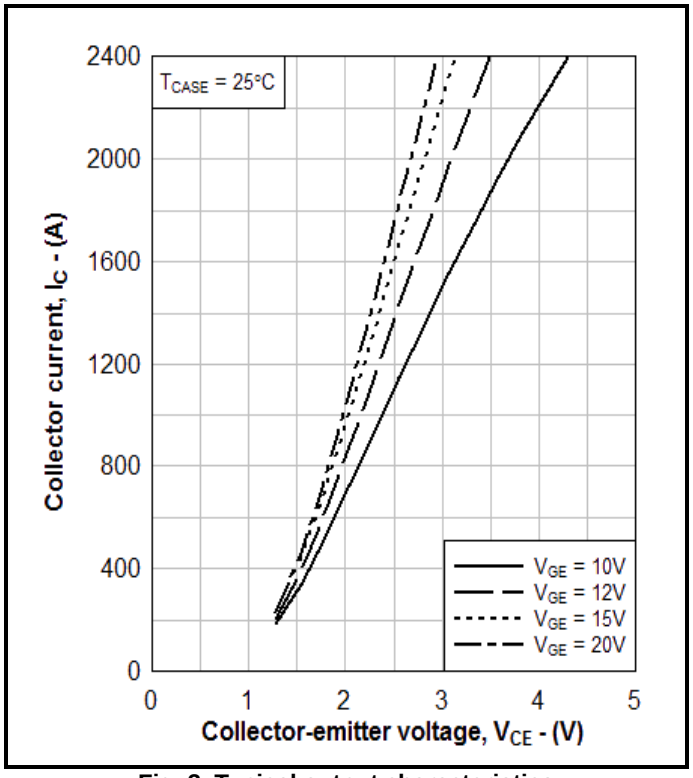


Fig. 3 Typical output characteristics

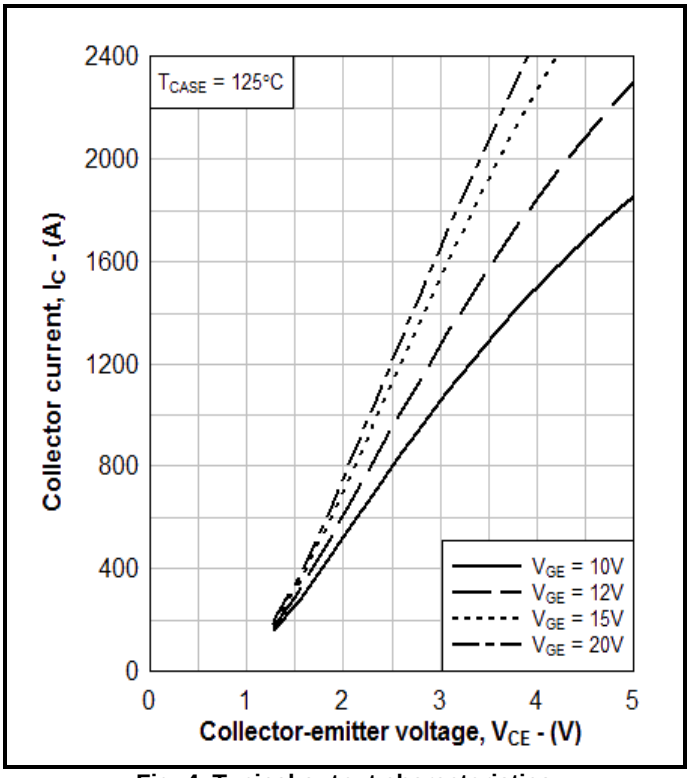


Fig. 4 Typical output characteristics

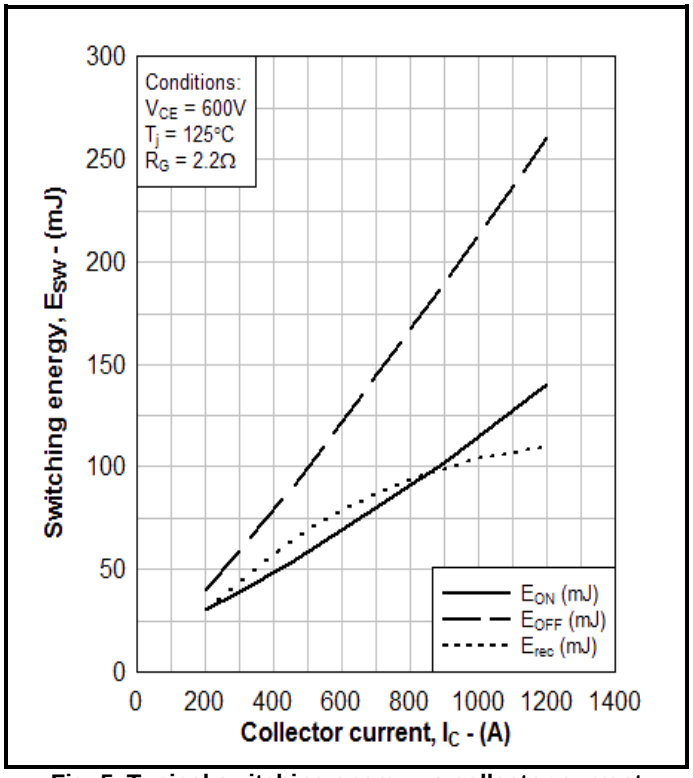


Fig. 5 Typical switching energy vs collector current

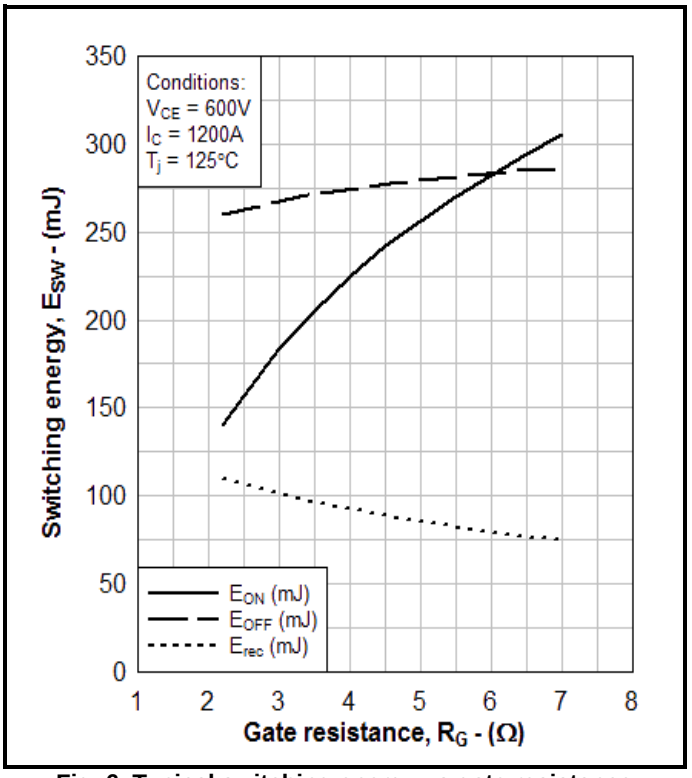


Fig. 6 Typical switching energy vs gate resistance

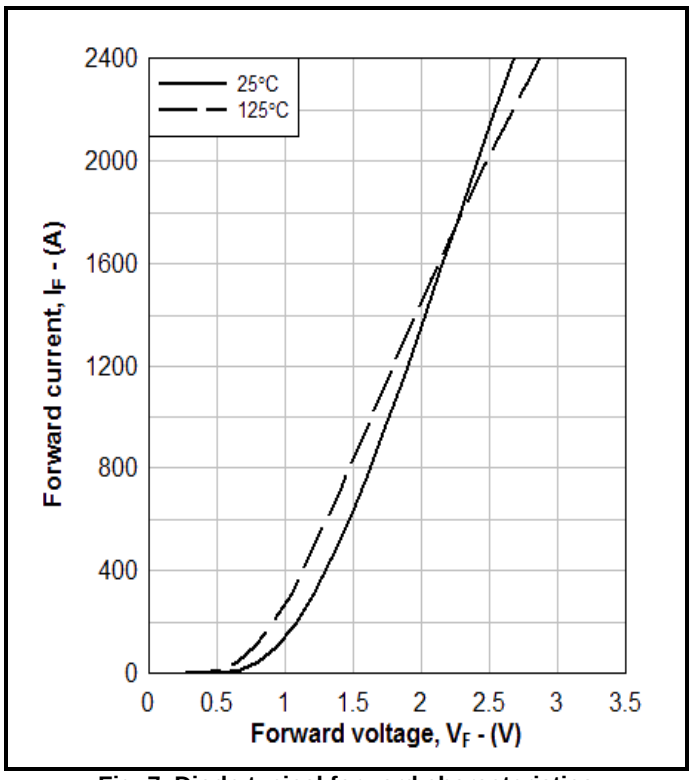


Fig. 7 Diode typical forward characteristics

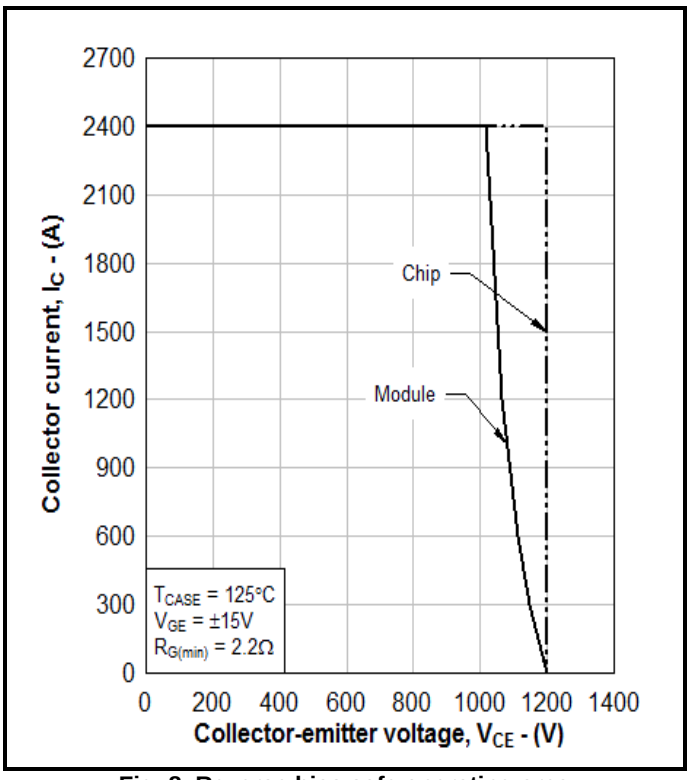


Fig. 8 Reverse bias safe operating area

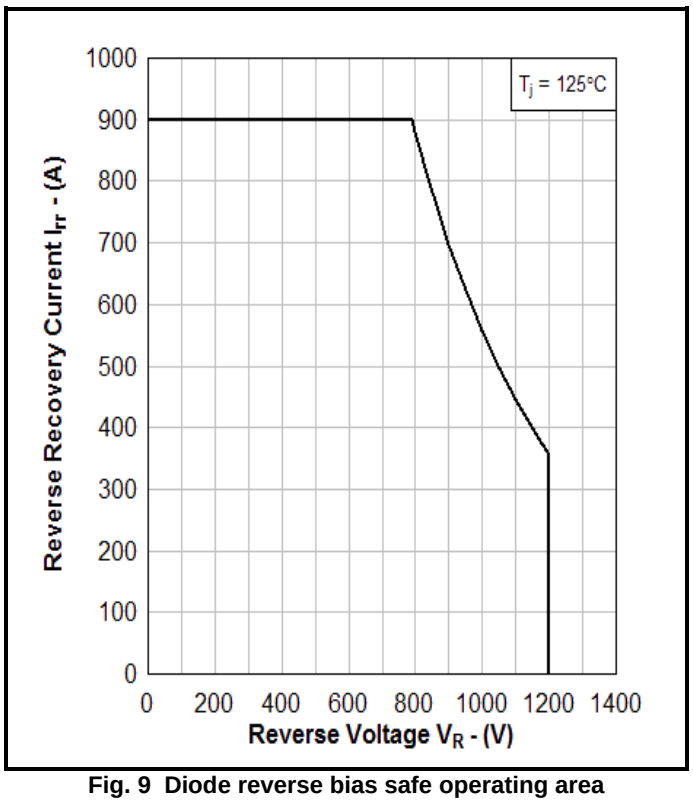


Fig. 9 Diode reverse bias safe operating area

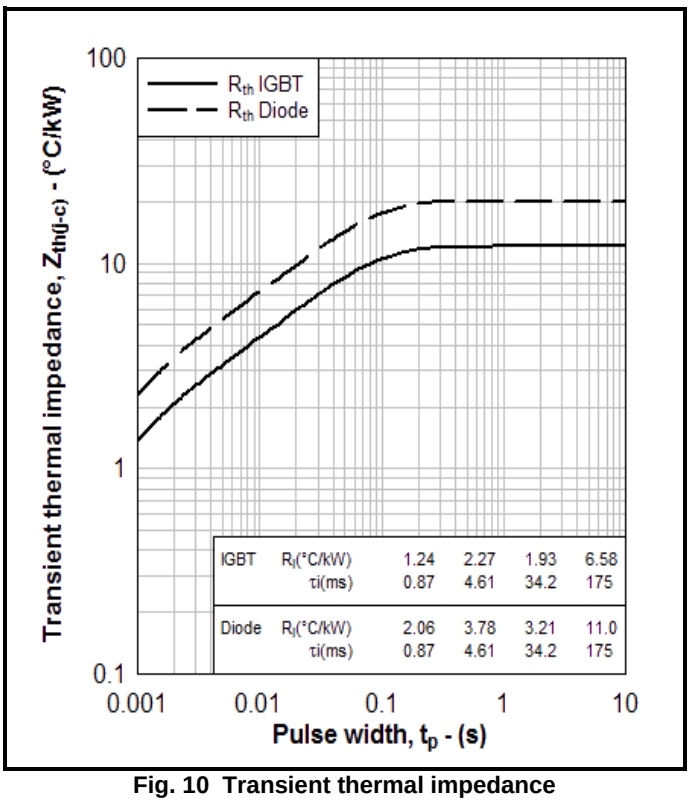
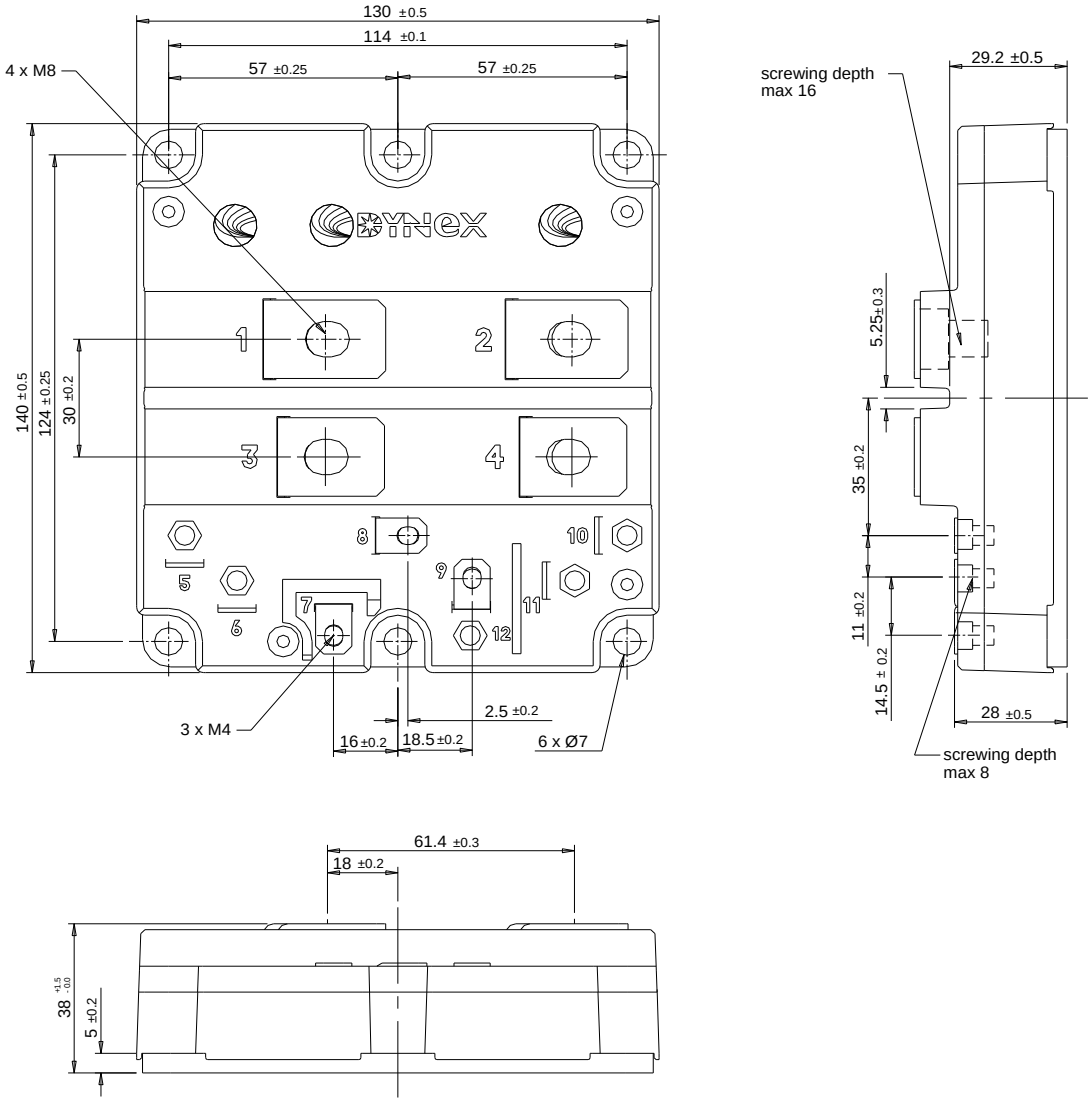


Fig. 10 Transient thermal impedance

PACKAGE DETAILS

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



Nominal Weight: 1450g

Module Outline Type Code: F

Fig. 11 Module outline drawing

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Caution: This device is sensitive to electrostatic discharge. Users should follow ESD handling procedures.