

FEATURES

- 10 μ s Short Circuit Withstand
- High Thermal Cycling Capability
- Soft Punch Through Silicon
- Isolated AISiC Base with AlN Substrates
- Lead Free construction
- Low $V_{CE(sat)}$ Device
- High Current Density

APPLICATIONS

- High Reliability Inverters
- Motor Controllers
- Traction Drives

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 DIM1600FSM17-PS500 is a single switch 1700V, 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:

DIM1600FSM17-PS500

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}	1700V
$V_{CE(sat)}$ * (typ)	2.3 V
I_C (max)	1600A
$I_{C(PK)}$ (max)	3200A

* Measured at the power busbars, not the auxiliary terminals

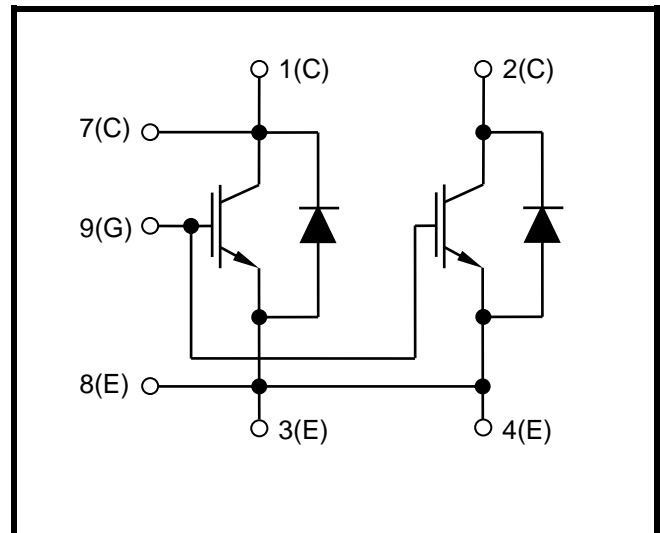
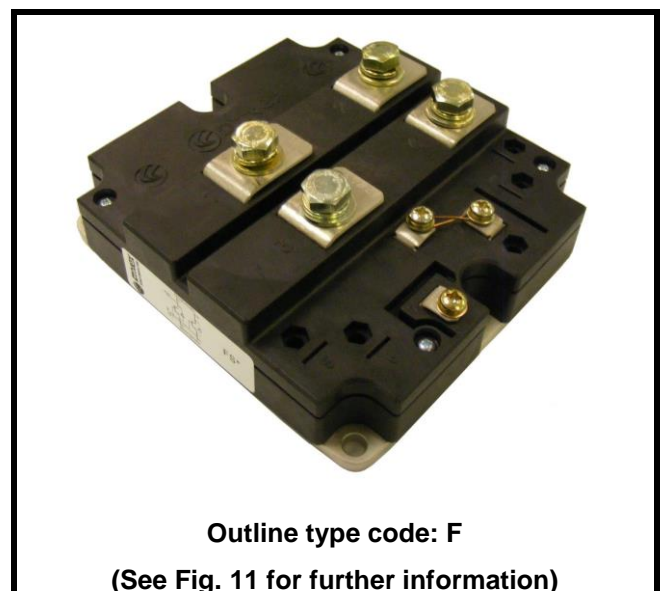


Fig. 1 Circuit configuration



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	1700	V
V _{GES}	Gate-emitter voltage		±20	V
I _C	Continuous collector current	T _{case} = 80°C	1600	A
I _{C(PK)}	Peak collector current	1ms, T _{case} = 110°C	3200	A
P _{max}	Max. transistor power dissipation	T _{case} = 25°C, T _j = 150°C	13.8	kW
I ² t	Diode I ² t value	V _R = 0, t _p = 10ms, T _j = 125°C	480	kA ² s
V _{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	4000	V
Q _{PD}	Partial discharge – per module	IEC1287, V ₁ = 1800V, V ₂ = 1300V, 50Hz RMS	10	pC

THERMAL AND MECHANICAL RATINGS

Internal insulation material:	AlN
Baseplate material:	AlSiC
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		-	9	°C/kW
R _{th(j-c)}	Thermal resistance – diode (per switch)	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}			2	mA
		V _{GE} = 0V, V _{CE} = V _{CES} , T _{case} = 125°C			50	mA
I _{GES}	Gate leakage current	V _{GE} = ± 20V, V _{CE} = 0V			8	μA
V _{GE(TH)}	Gate threshold voltage	I _C = 80mA, V _{GE} = V _{CE}	5.6	5.9	6.2	V
V _{CE(sat)}	Collector-emitter saturation voltage	V _{GE} = 15V, I _C = 1600A		2.3	2.6	V
		V _{GE} = 15V, I _C = 1600A, T _j = 125°C		2.8	3.1	V
I _F	Diode forward current	DC			1600	A
I _{FM}	Diode maximum forward current	t _p = 1ms			3200	A
V _F	Diode forward voltage	I _F = 1600A		1.7	2.0	V
		I _F = 1600A, T _j = 125°C		1.8	2.1	V
C _{ies}	Input capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		120		nF
Q _g	Gate charge	±15V		18		μC
C _{res}	Reverse transfer capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		-		nF
L _M	Module inductance – per switch	-		15		nH
R _{INT}	Internal transistor resistance – per switch	-		140		μΩ
SC _{Data}	Short circuit current, I _{SC}	T _j = 125°C, V _{CC} = 1000V t _p ≤ 10μs, V _{GE} ≤ 15V V _{CE(max)} = V _{CES} – L* x dI/dt IEC 60747-9		6400		A

Note:* L is the circuit inductance + L_M

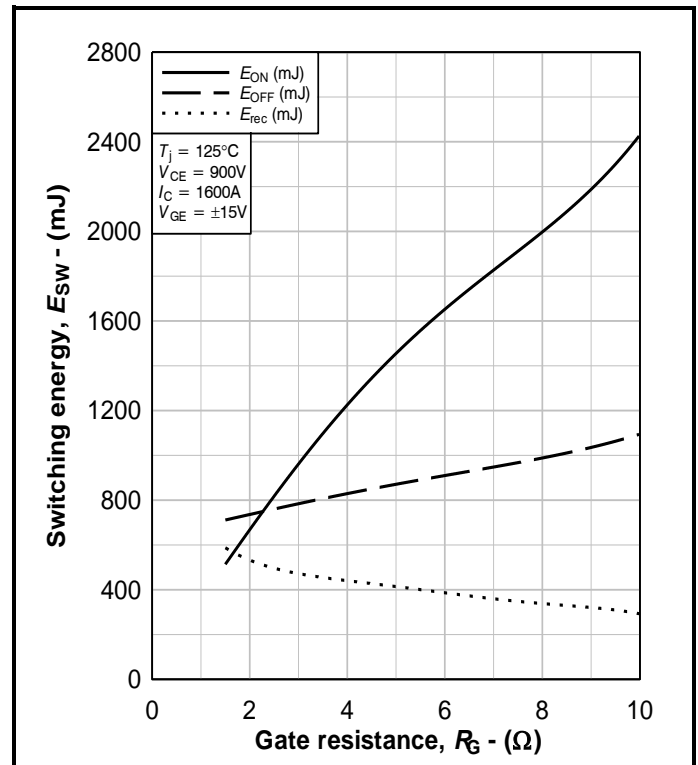
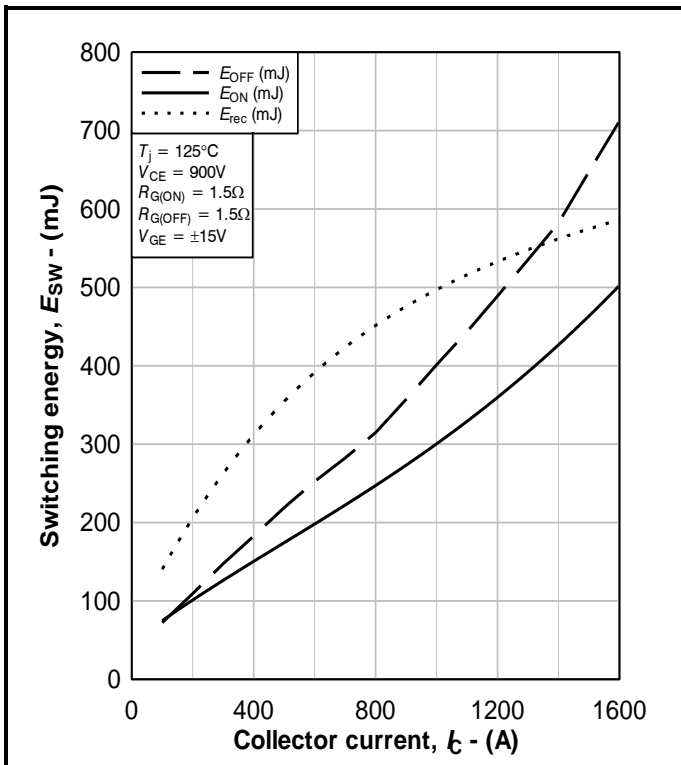
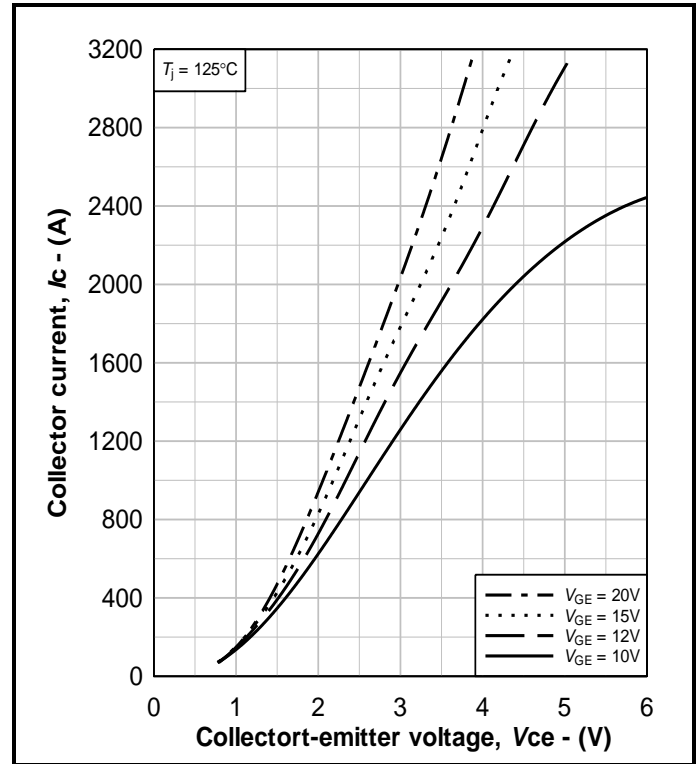
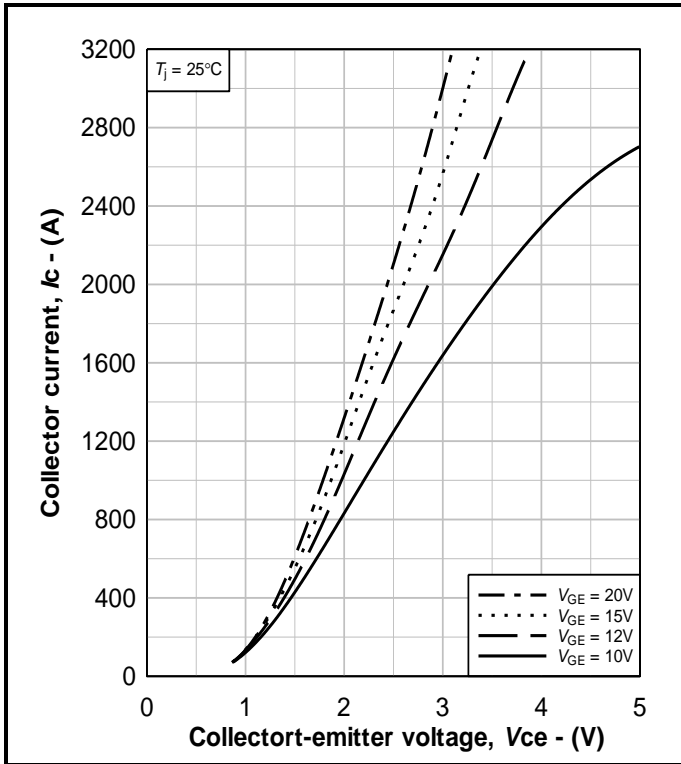
ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$t_{d(\text{off})}$	Turn-off delay time	$I_C = 1600\text{A}$ $V_{GE} = \pm 15\text{V}$ $V_{CE} = 900\text{V}$ $R_{G(\text{ON})} = 1.5\Omega$ $R_{G(\text{OFF})} = 1.5\Omega$ $L_S \sim 100\text{nH}$		1360		ns
t_f	Fall time			275		ns
E_{OFF}	Turn-off energy loss			600		mJ
$t_{d(\text{on})}$	Turn-on delay time			440		ns
t_r	Rise time			390		ns
E_{ON}	Turn-on energy loss			330		mJ
Q_{rr}	Diode reverse recovery charge	$I_F = 1600\text{A}$ $V_{CE} = 900\text{V}$ $di_F/dt = 7000\text{A}/\mu\text{s}$		550		μC
I_{rr}	Diode reverse recovery current			980		A
E_{rec}	Diode reverse recovery energy			380		mJ

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$t_{d(\text{off})}$	Turn-off delay time	$I_C = 1600\text{A}$ $V_{GE} = \pm 15\text{V}$ $V_{CE} = 900\text{V}$ $R_{G(\text{ON})} = 1.5\Omega$ $R_{G(\text{OFF})} = 1.5\Omega$ $L_S \sim 100\text{nH}$		1450		ns
t_f	Fall time			330		ns
E_{OFF}	Turn-off energy loss			710		mJ
$t_{d(\text{on})}$	Turn-on delay time			440		ns
t_r	Rise time			390		ns
E_{ON}	Turn-on energy loss			500		mJ
Q_{rr}	Diode reverse recovery charge	$I_F = 1600\text{A}$ $V_{CE} = 900\text{V}$ $di_F/dt = 7000\text{A}/\mu\text{s}$		870		μC
I_{rr}	Diode reverse recovery current			1150		A
E_{rec}	Diode reverse recovery energy			590		mJ



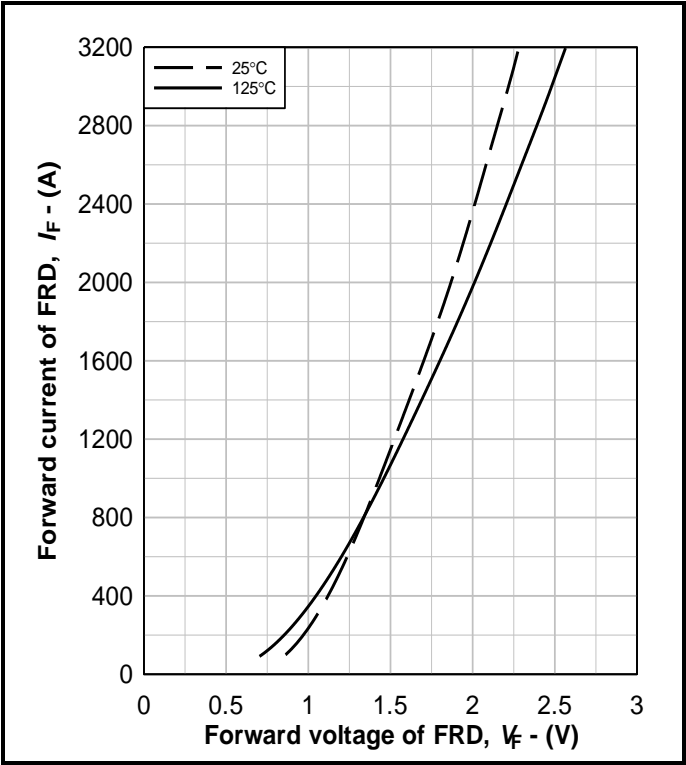


Fig. 7 Diode typical forward characteristics

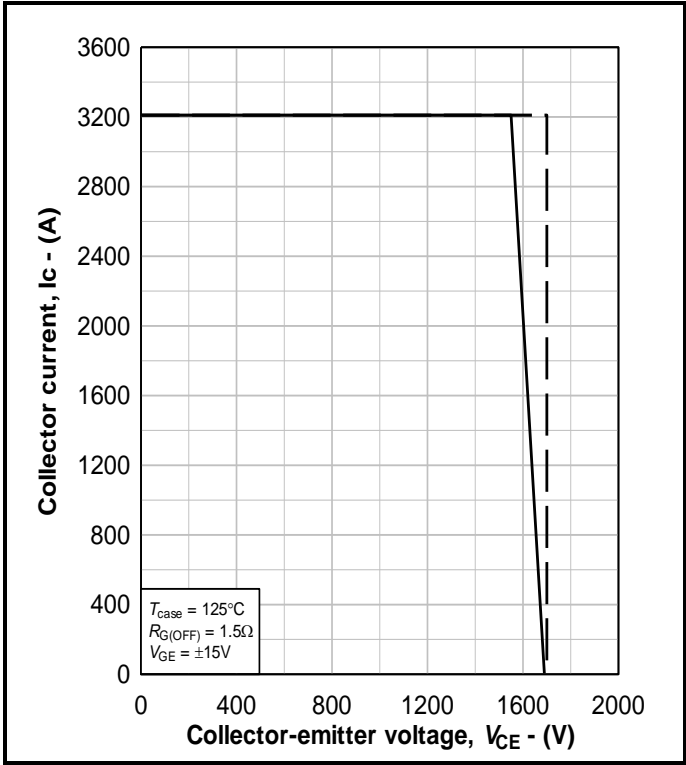


Fig. 8 Reverse bias safe operating area

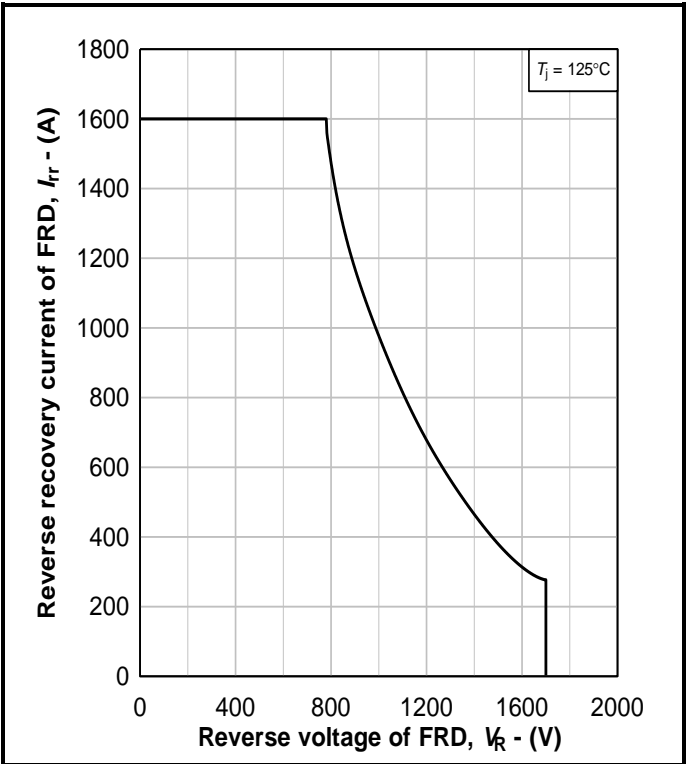


Fig. 9 Diode reverse bias safe operating area

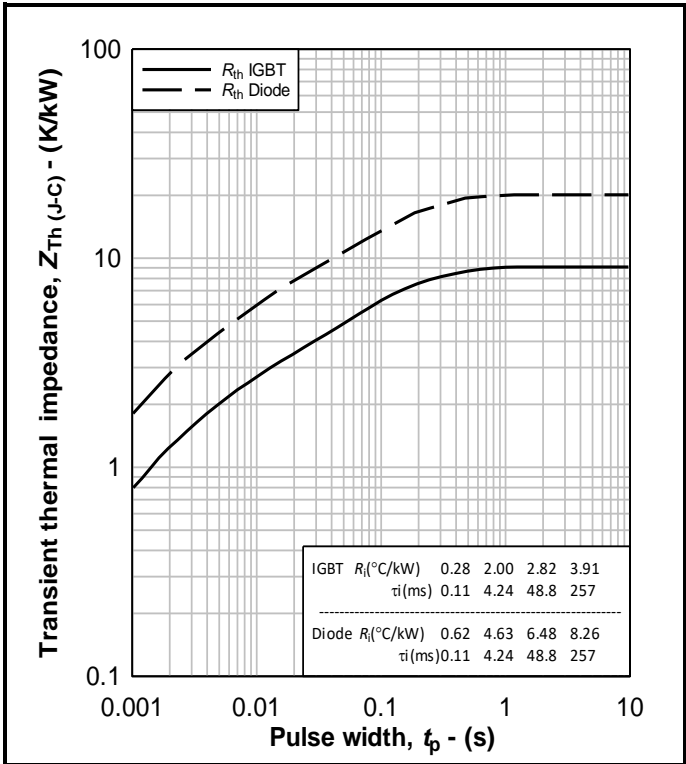
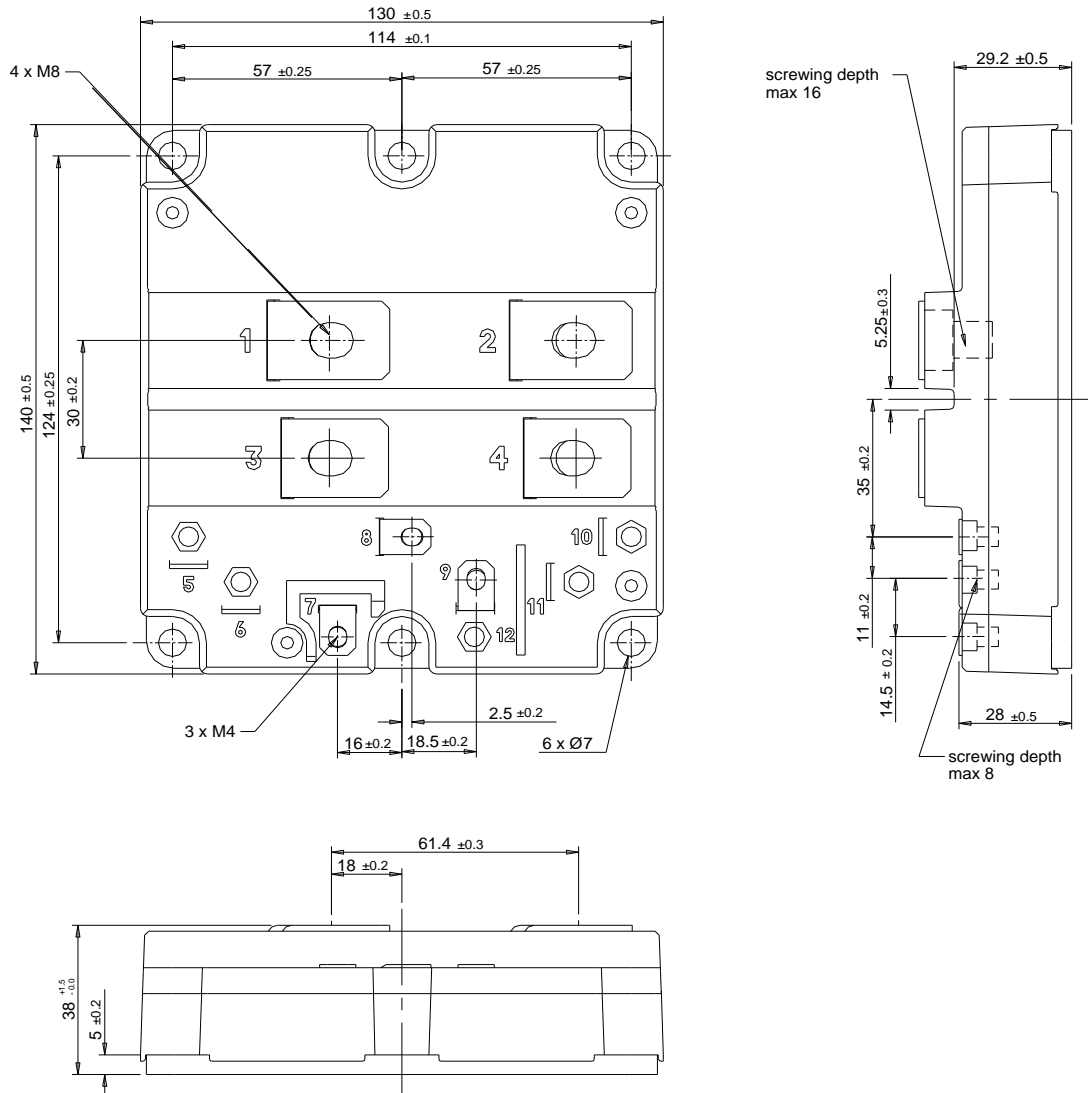


Fig. 10 Transient thermal impedance

PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services.
All dimensions in mm, unless stated otherwise.

DO NOT SCALE.



Nominal Weight: 900g

Module Outline Type Code: F

Fig. 11 Module outline drawing

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