DIM200PHM33-F000

Half Bridge IGBT Module

Replaces DS5606-4

DS5606-5 October 2011 (LN28814)

FEATURES

- 10µs Short Circuit Withstand
- High Thermal Cycling Capability
- Soft Punch Through Silicon
- Isolated AlSiC Base with AlN Substrates
- Lead Free Construction

APPLICATIONS

- High Reliability Inverters
- Motor Controllers
- Traction Auxiliaries

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 DIM200PHM33-F000 is a half bridge 3300V, soft punch through n-channel enhancement mode, insulated gate bipolar transistor (IGBT) chopper module configured with the lower arm of the bridge controlled.. The IGBT has a wide reverse bias safe operating area (RBSOA). 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:

DIM200PHM33-F000

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{CES}		**3300V**
$V_{CE(sat)}$ *	**(typ)**	**2.8V**
I_C	**(max)**	**200A**
$I_{C(PK)}$	**(max)**	**400A**

* Measured at the auxiliary terminals

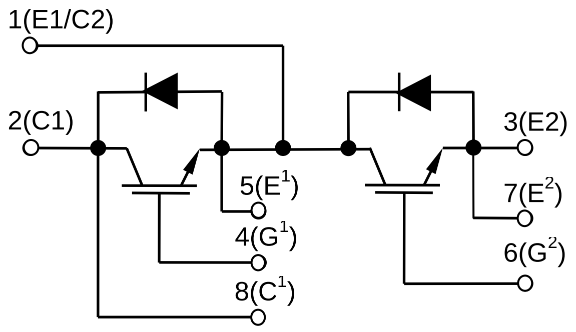
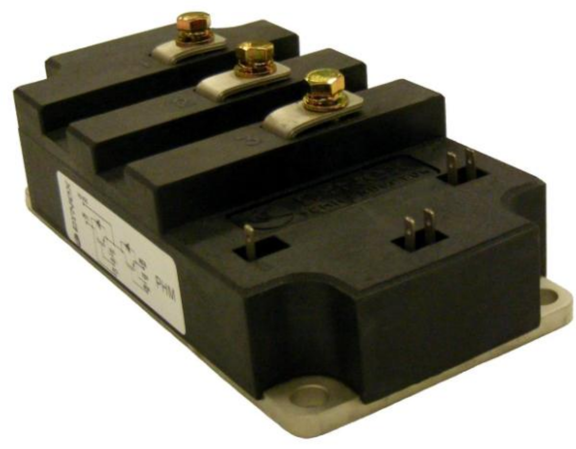


Fig. 1 Circuit configuration



Outline type code: P

(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	200	A
$I_{C(PK)}$	Peak collector current	1ms, T_{case} = 115°C	400	A
P_{max}	Max. transistor power dissipation	T_{case} = 25°C, T_j = 150°C	2.6	kW
I^2t	Diode I^2t value	V_R = 0, t_p = 10ms, T_j = 125ºC	20	kA^2s
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:	AlN
Baseplate material:	AlSiC
Creepage distance:	33mm
Clearance:	20mm
CTI (Comparative Tracking Index):	≥350

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$R_{th(j-c)}$	Thermal resistance – transistor	Continuous dissipation - junction to case	-	-	48	°C/kW
$R_{th(j-c)}$	Thermal resistance – Diode	Continuous dissipation - junction to case	-	-	96	°C/kW
$R_{th(c-h)}$	Thermal resistance – case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	-	16	°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 – M5	-	-	4	Nm

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

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	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_{case} = 125°C			15	mA
I_{GES}	Gate leakage current	V_{GE} = ± 20V, V_{CE} = 0V		400		nA
$V_{GE(TH)}$	Gate threshold voltage	I_C = 20mA, V_{GE} = V_{CE}	5.5	6.5	7.0	V
$V_{CE(sat)}$ †	Collector-emitter saturation voltage	V_{GE} = 15V, I_C = 200A		2.8		V
		V_{GE} = 15V, I_C = 200A, T_j = 125°C		3.6		V
I_F	Diode forward current	DC		200		A
I_{FM}	Diode maximum forward current	t_p = 1ms		400		A
V_F †	Diode forward voltage	I_F = 200A		2.9		V
		I_F = 200A, T_j = 125°C		3.0		V
C_{ies}	Input capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		36		nF
Q_g	Gate charge	±15V		5		μC
C_{res}	Reverse transfer capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		0.55		nF
L_M	Module inductance			40		nH
R_{INT}	Internal transistor resistance			500		μΩ
SC_{Data}	Short circuit current, I_{SC}	T_j = 125°C, V_{CC} = 2500V t_p ≤ 10μs, V_{GE} ≤ 15V $V_{CE\ (max)} = V_{CES} - L^* \times dI/dt$ IEC 60747-9		930		A

Note:
† Measured at 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 = 200A V_{GE} = ±15V V_{CE} = 1800V C_{ge} = 56nF L_S ~ 100nH	$R_{G(ON)}$ = 16.5Ω $R_{G(OFF)}$ = 16.5Ω		1.95		μs
t_f	Fall time				170		ns
E_{OFF}	Turn-off energy loss				220		mJ
$t_{d(on)}$	Turn-on delay time				1180		ns
t_r	Rise time				225		ns
E_{ON}	Turn-on energy loss		$R_{G(ON)}$ = 7.5Ω, $R_{G(OFF)}$ = 16.5Ω		290		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 200A V_{CE} = 1800V dI_F/dt = 1600A/μs			80		μC
I_{rr}	Diode reverse recovery current				144		A
E_{rec}	Diode reverse recovery energy				75		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 = 200A V_{GE} = ±15V V_{CE} = 1800V C_{ge} = 56nF L_S ~ 100nH	$R_{G(ON)}$ = 16.5Ω $R_{G(OFF)}$ = 16.5Ω		2.2		μs
t_f	Fall time				190		ns
E_{OFF}	Turn-off energy loss				265		mJ
$t_{d(on)}$	Turn-on delay time				1150		ns
t_r	Rise time				280		ns
E_{ON}	Turn-on energy loss		$R_{G(ON)}$ = 7.5Ω, $R_{G(OFF)}$ = 16.5Ω		390		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 200A V_{CE} = 1800V dI_F/dt = 1600A/μs			125		μC
I_{rr}	Diode reverse recovery current				155		A
E_{rec}	Diode reverse recovery energy				130		mJ

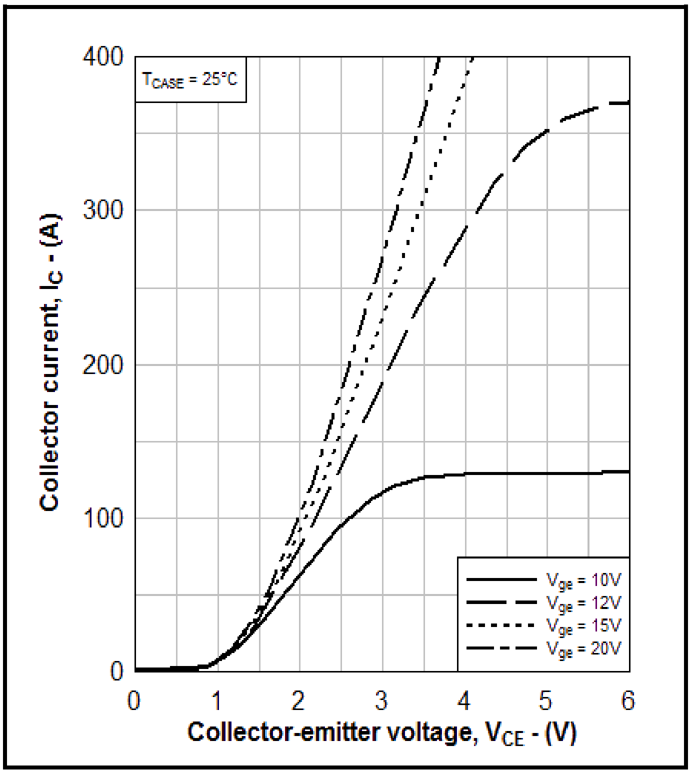


Fig. 3 Typical output characteristics

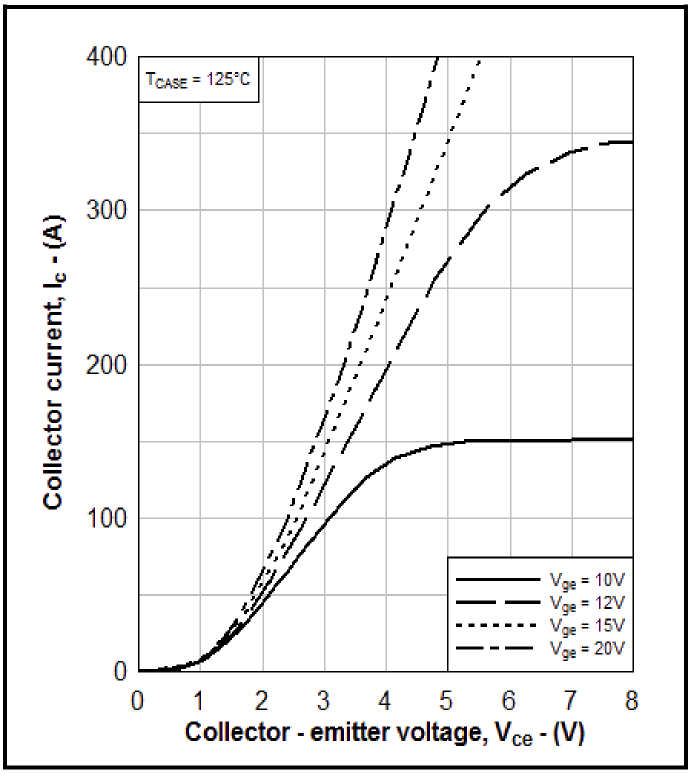


Fig. 4 Typical output characteristics

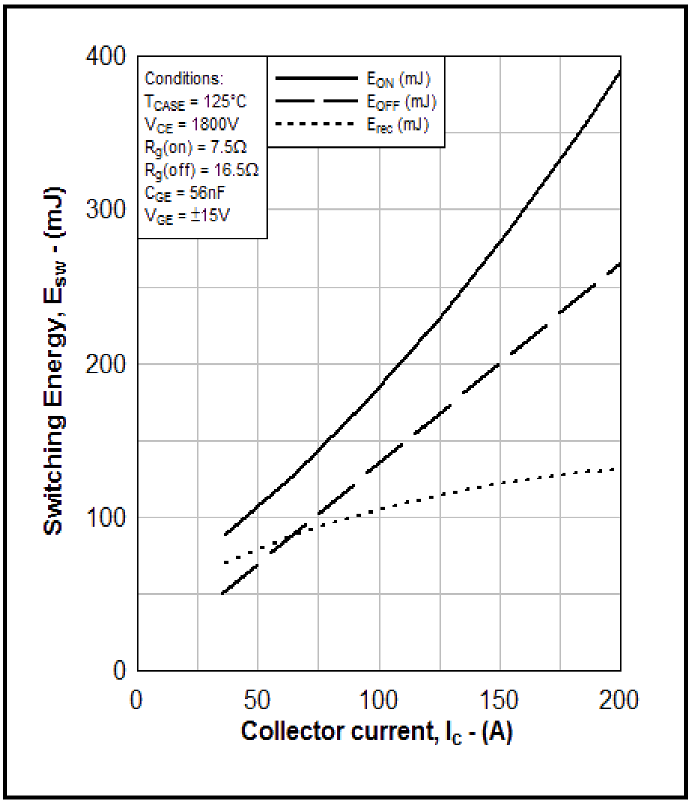


Fig. 5 Typical switching energy vs collector current

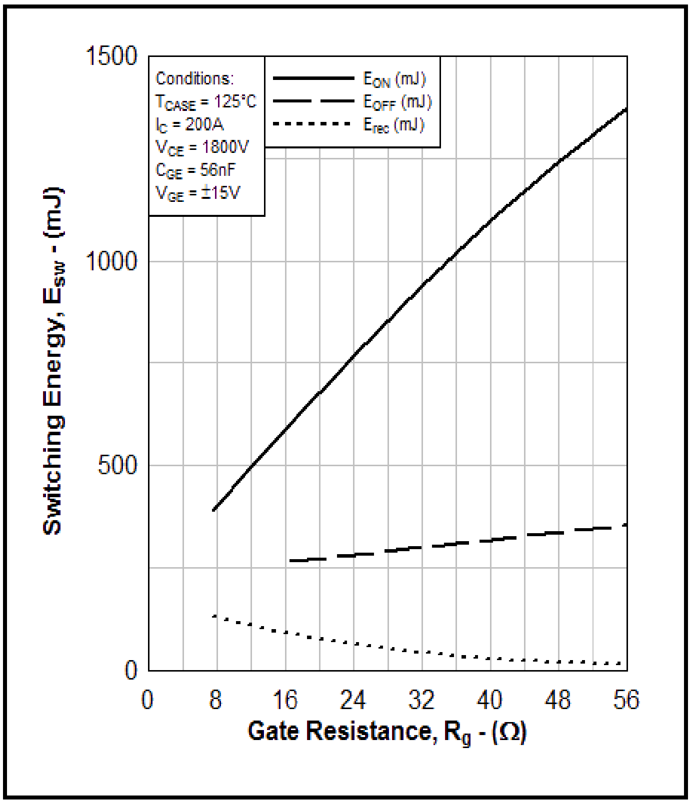


Fig. 6 Typical switching energy vs gate resistance

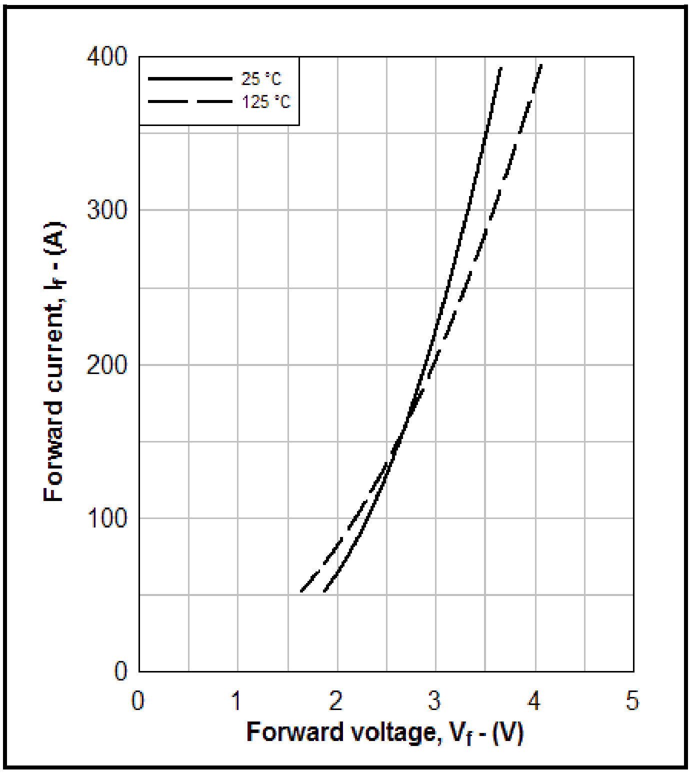


Fig. 7 Diode typical forward characteristics

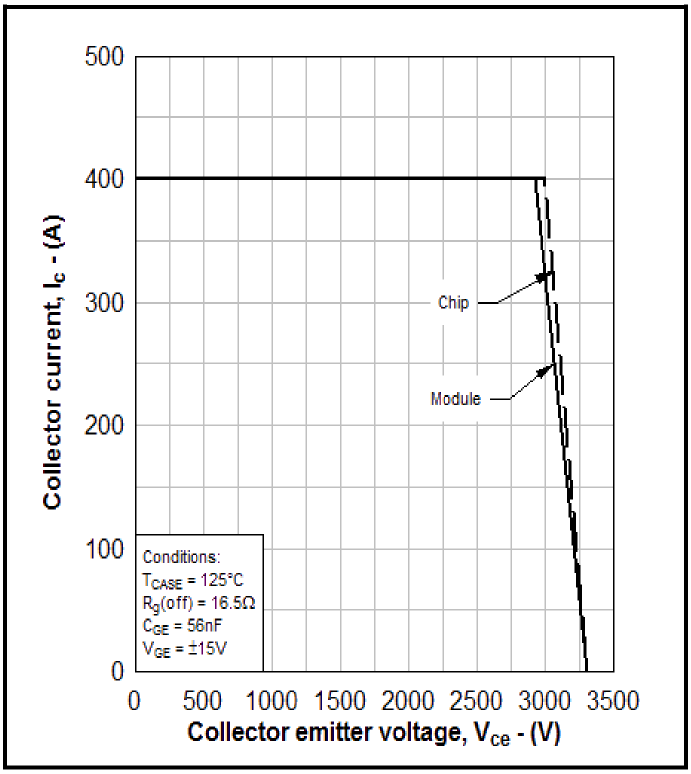


Fig. 8 Reverse bias safe operating area

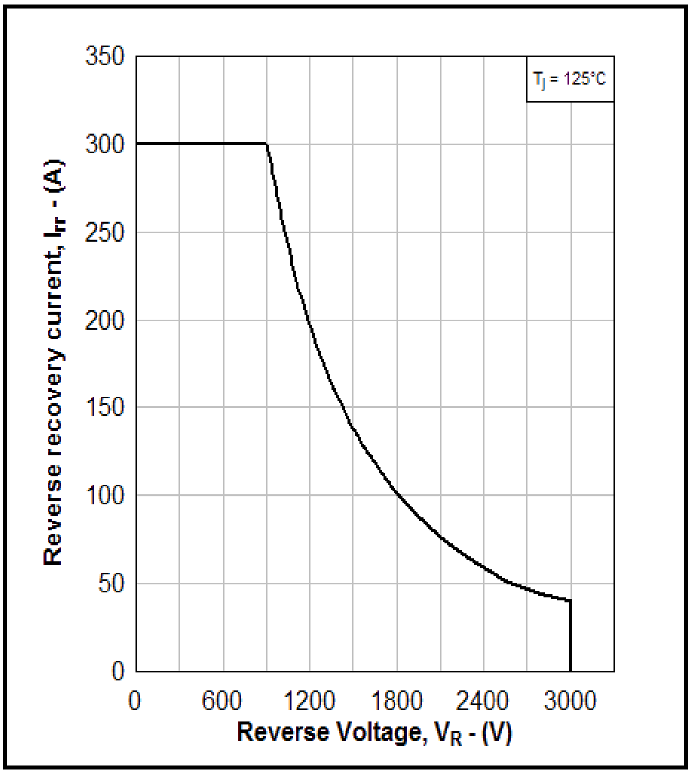


Fig. 9 Diode reverse bias safe operating area

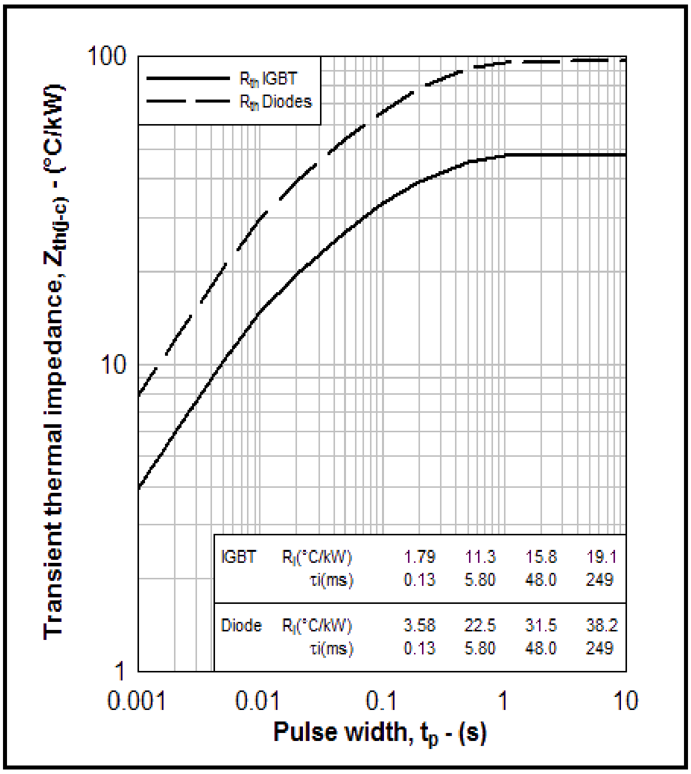
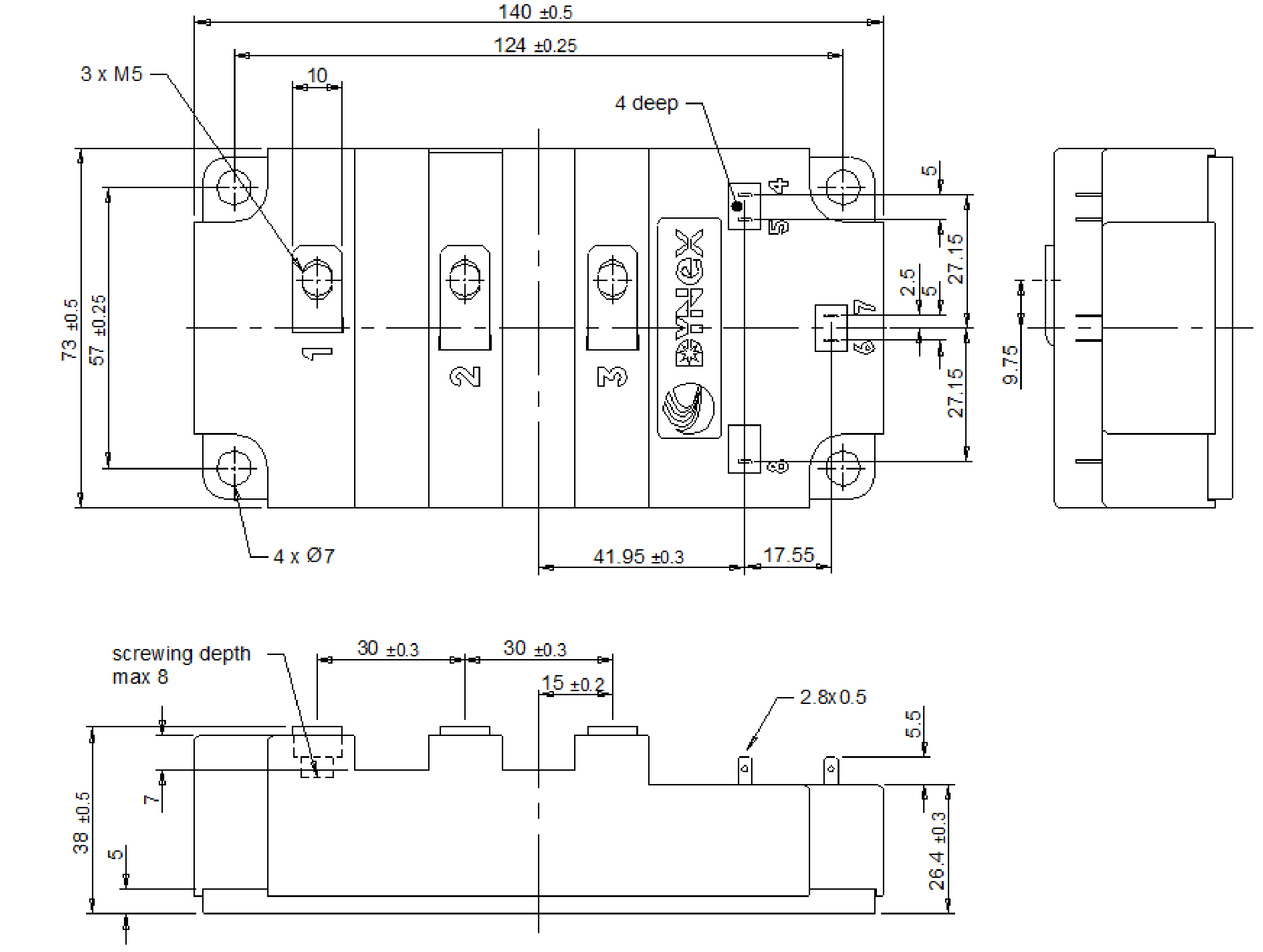


Fig. 10 Transient thermal impedance

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

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: 750g

Module Outline Type Code: P

Fig. 11 Module outline drawing

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