DIM900H2HS12-PA500

Half Bridge IGBT Module

Replaces DS6314-1

DS6314-2 February 2020 (LN39580)

FEATURES

- Trench Gate IGBT
- Cu Base with Al_2O_3 Substrates
- High Thermal Cycling Capability
- 10µs Short Circuit Withstand
- Low $V_{ce(sat)}$ Variant

KEY PARAMETERS

V_{CES}		**1200V**
$V_{CE(sat)}$ *	(typ)	**1.75V**
I_C	(max)	**900A**
$I_{C(PK)}$	(max)	**1800A**

* Measured at the auxiliary terminals

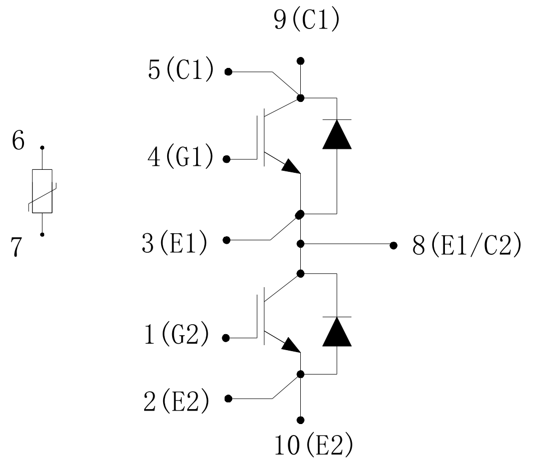


Fig. 1 Circuit configuration

APPLICATIONS

- Motor Drives
- High Power Converters
- Renewable Energy Power Conversion
- High Reliability Inverters

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 DIM900H2HS12-PA500 is a half bridge 1200V, trench gate IGBT with enhanced field stop and implantation technology. 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.

Outline type code: H2

(See Fig. 15 for further information)

Fig. 2 Package

ORDERING INFORMATION

Order As:

DIM900H2HS12-PA500

Note: When ordering, please use the complete part number

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, T_C = 25°C	1200	V
V_{GES}	Gate-emitter voltage	T_C = 25°C	±20	V
I_C	Continuous collector current	T_C = 90°C	900	A
$I_{C(PK)}$	Peak collector current	t_P = 1ms	1800	A
P_{max}	Max. transistor power dissipation	T_C = 25°C, T_{vj} = 150°C	4.23	kW
I^2t	Diode I^2t value	V_R = 0, t_p = 10ms, T_{vj} = 150°C	76	kA^2s
V_{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	4000	V

THERMAL AND MECHANICAL RATINGS

Internal insulation material:	Al_2O_3
Baseplate material:	Cu
Creepage distance – Terminal to heatsink:	33mm
Creepage distance – Terminal to terminal:	33mm
Clearance – Terminal to heatsink:	19mm
Clearance – Terminal to terminal:	19mm
CTI (Comparative Tracking Index):	>400

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$R_{th(j-c)}$	Thermal resistance – IGBT	Continuous dissipation - junction to case	-	-	29.5	°C/kW
$R_{th(j-c)}$	Thermal resistance – diode		-	-	55	°C/kW
$R_{th(c-h)}$	Thermal resistance – case to heatsink (IGBT)	Mounting torque 3.5Nm (with mounting grease 1W/m °C)	-	-	14	°C/kW
$R_{th(c-h)}$	Thermal resistance – case to heatsink (Diode)		-	-	25.5	°C/kW
T_j	Junction temperature	IGBT	-40	-	150	°C
		Diode	-40	-	150	°C
T_{stg}	Storage temperature range	-	-40	-	150	°C
	Screw torque	Mounting – M5	3	-	6	Nm
		Electrical connections – M8	8	-	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	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_C = 125°C			10	mA
		V_{GE} = 0V, V_{CE} = V_{CES}, T_C = 150°C			20	mA
I_{GES}	Gate leakage current	V_{GE} = ± 20V, V_{CE} = 0V			0.5	μA
$V_{GE(TH)}$	Gate threshold voltage	I_C = 40mA, V_{GE} = V_{CE}	5.0	6.0	7.0	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{GE} = 15V, I_C = 900A		1.75	2.15	V
		V_{GE} = 15V, I_C = 900A, T_j = 125°C		2.10	2.50	V
		V_{GE} = 15V, I_C = 900A, T_j = 150°C		2.20	2.60	V
I_F	Diode forward current	DC		900		A
I_{FM}	Diode maximum forward current	t_p = 1ms		1800		A
V_F	Diode forward voltage	I_F = 900A		1.85	2.25	V
		I_F = 900A, T_j = 125°C		2.05	2.45	V
		I_F = 900A, T_j = 150°C		2.05	2.45	V
C_{ies}	Input capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 100kHz		79		nF
Q_g	Gate charge	±15V		8.8		μC
C_{res}	Reverse transfer capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2.5		nF
L_M	Module inductance			18		nH
R_{INT}	Internal transistor resistance			0.3		mΩ
SC_{Data}	Short circuit current, I_{SC}	T_j = 150°C, V_{CC} = 800V t_p ≤ 10μs, V_{GE} ≤ 15V $V_{CE\ (max)}$ = V_{CES} – L^* x dI/dt IEC 60747-9		3800		A

Note:
* L is the circuit inductance + L_M

NTC-Thermistor Data

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
R_{25}	Rated resistance	T_C = 25°C		5		kΩ
$\Delta R/R$	Deviation of R100	T_C = 100°C, R_{100} = 493Ω	-5		5	%
P_{25}	Power dissipation	T_C = 25°C			20	mW
$B_{25/50}$	B-value	$R_2 = R_{25}\exp[B_{25/50}(1/T_2 - 1/(298.15K))]$		3375		K
$B_{25/80}$		$R_2 = R_{25}\exp[B_{25/80}(1/T_2 - 1/(298.15K))]$		3411		K
$B_{25/100}$		$R_2 = R_{25}\exp[B_{25/100}(1/T_2 - 1/(298.15K))]$		3433		K

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 = 900A V_{CE} = 600V V_{GE} = ±15V $R_{G(OFF)}$ = 1.3Ω $R_{G(ON)}$ = 0.5Ω L_S ~ 25nH	*dv/dt* = 2100V/µs		1200		ns
t_f	Fall time				210		ns
E_{OFF}	Turn-off energy loss				165		mJ
$t_{d(on)}$	Turn-on delay time		*di/dt* = 6800A/µs		300		ns
t_r	Rise time				110		ns
E_{ON}	Turn-on energy loss				81		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 900A V_{CE} = 600V *di/dt* = 6800A/µs			64		µC
I_{rr}	Diode reverse recovery current				390		A
E_{rec}	Diode reverse recovery energy				28		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 = 900A V_{CE} = 600V V_{GE} = ±15V $R_{G(OFF)}$ = 1.3Ω $R_{G(ON)}$ = 0.5Ω L_S ~ 25nH	*dv/dt* = 2100V/µs		1280		ns
t_f	Fall time				300		ns
E_{OFF}	Turn-off energy loss				185		mJ
$t_{d(on)}$	Turn-on delay time		*di/dt* = 6800A/µs		290		ns
t_r	Rise time				120		ns
E_{ON}	Turn-on energy loss				103		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 900A V_{CE} = 600V *di/dt* = 6800A/µs			135		µC
I_{rr}	Diode reverse recovery current				465		A
E_{rec}	Diode reverse recovery energy				61		mJ

T_{case} = 150°C unless stated otherwise

Symbol	Parameter	Test Conditions		Min	Typ.	Max	Units
$t_{d(off)}$	Turn-off delay time	I_C = 900A V_{CE} = 600V V_{GE} = ±15V $R_{G(OFF)}$ = 1.3Ω $R_{G(ON)}$ = 0.5Ω L_S ~ 25nH	*dv/dt* = 2100V/µs		1300		ns
t_f	Fall time				330		ns
E_{OFF}	Turn-off energy loss				190		mJ
$t_{d(on)}$	Turn-on delay time		*di/dt* = 6800A/µs		280		ns
t_r	Rise time				130		ns
E_{ON}	Turn-on energy loss				110		mJ
Q_{rr}	Diode reverse recovery charge	I_F = 900A V_{CE} = 600V *di/dt* = 6800A/µs			157		µC
I_{rr}	Diode reverse recovery current				510		A
E_{rec}	Diode reverse recovery energy				69		mJ

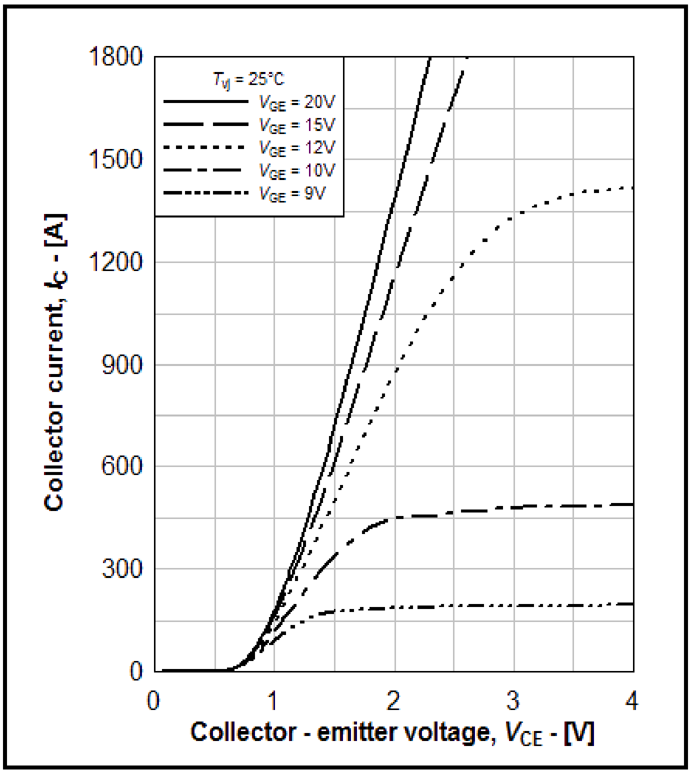


Fig. 3 Typical IGBT output characteristics

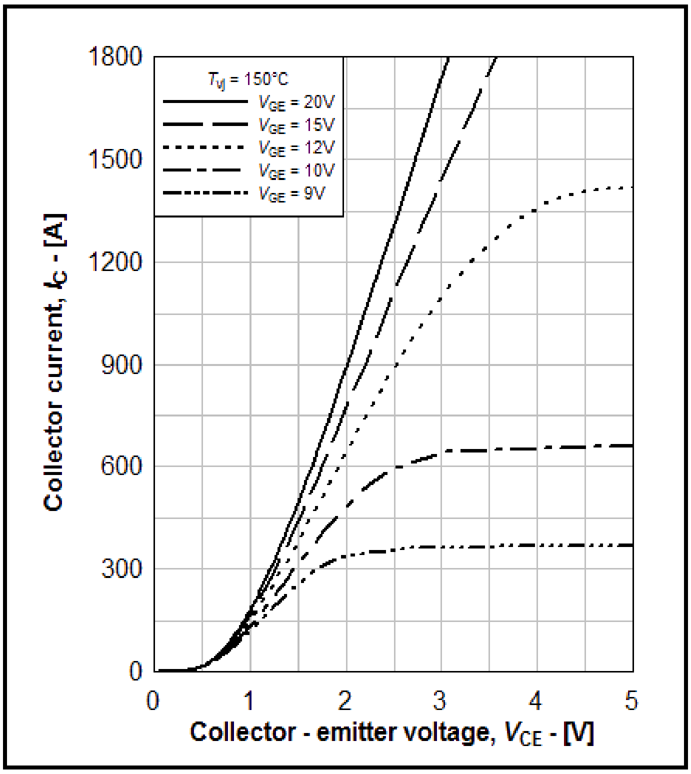


Fig. 4 Typical IGBT output characteristics

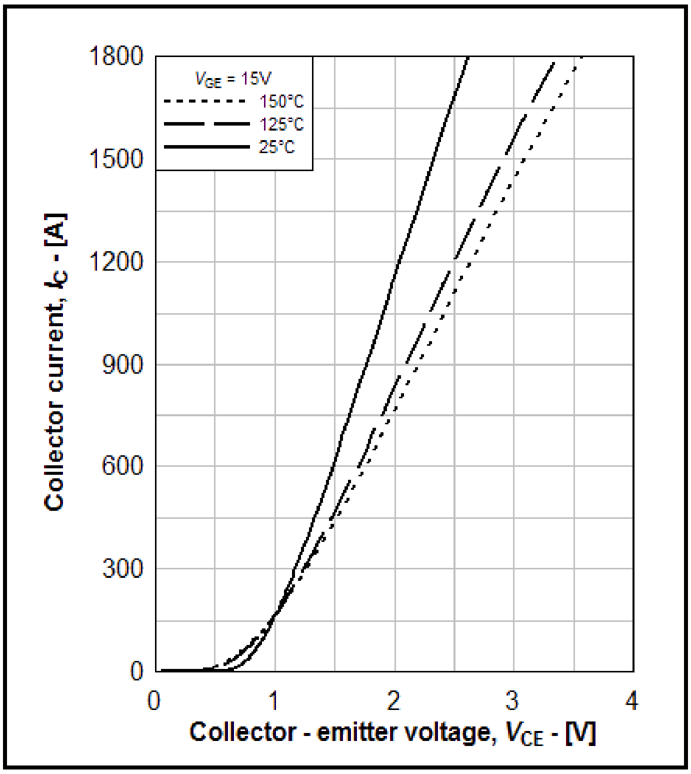


Fig. 5 Typical IGBT output characteristics

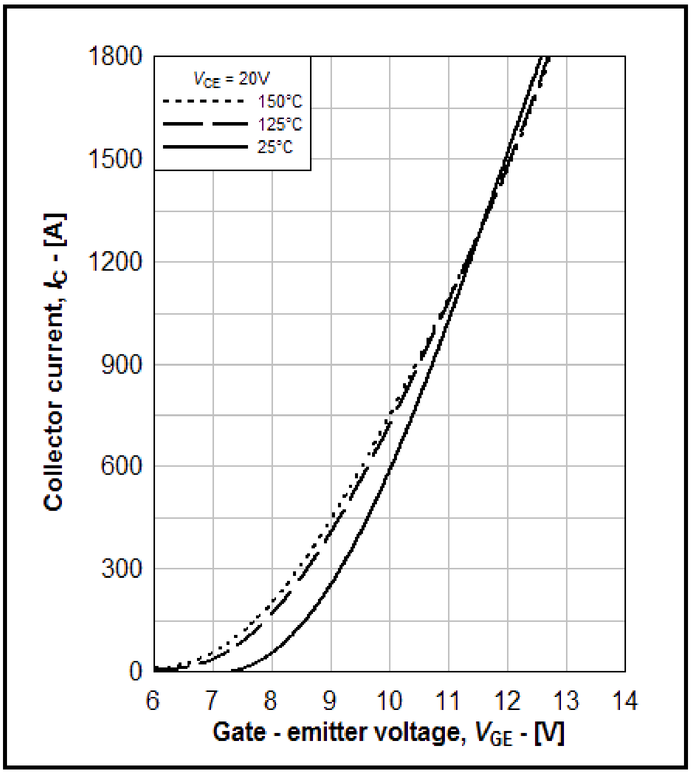


Fig. 6 Typical IGBT transfer characteristics

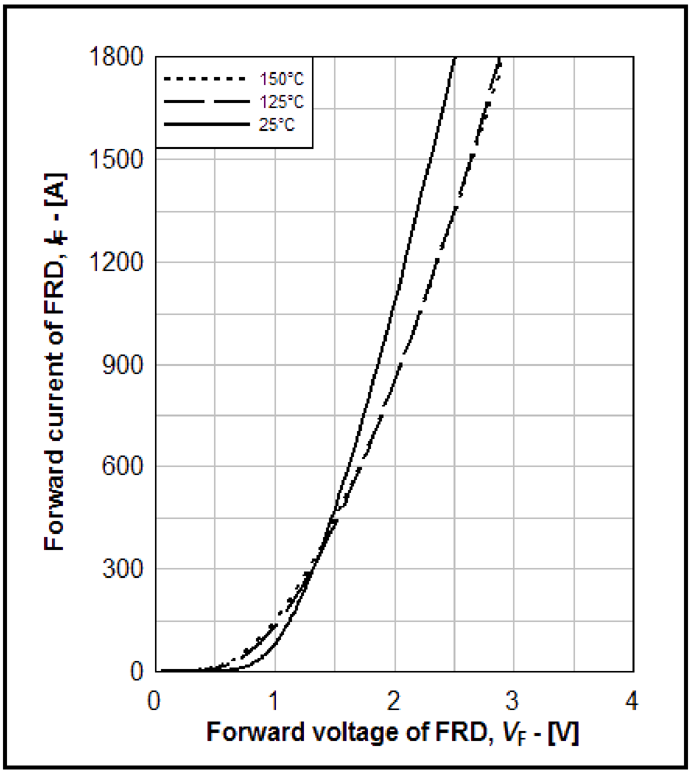


Fig. 7 Diode typical forward characteristics

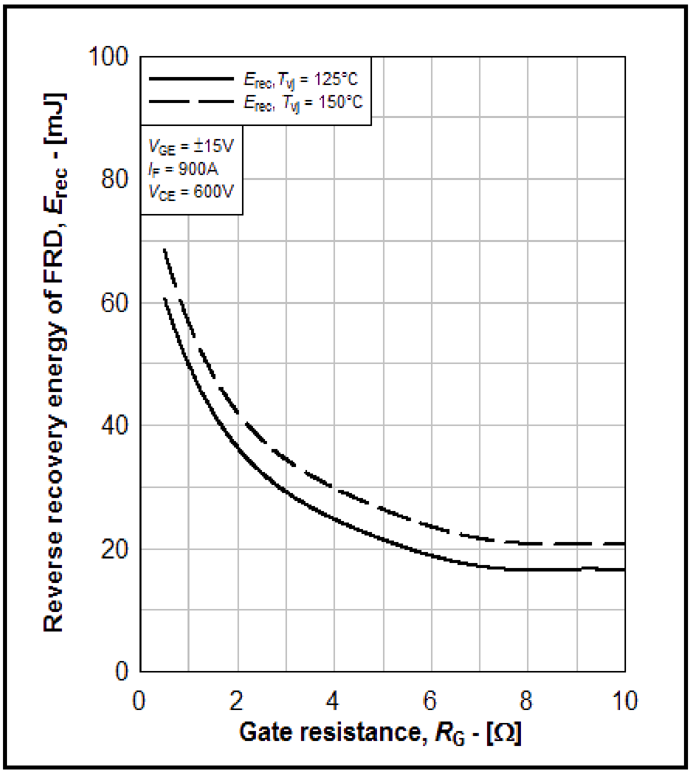


Fig. 8 Typical diode E_{rec}

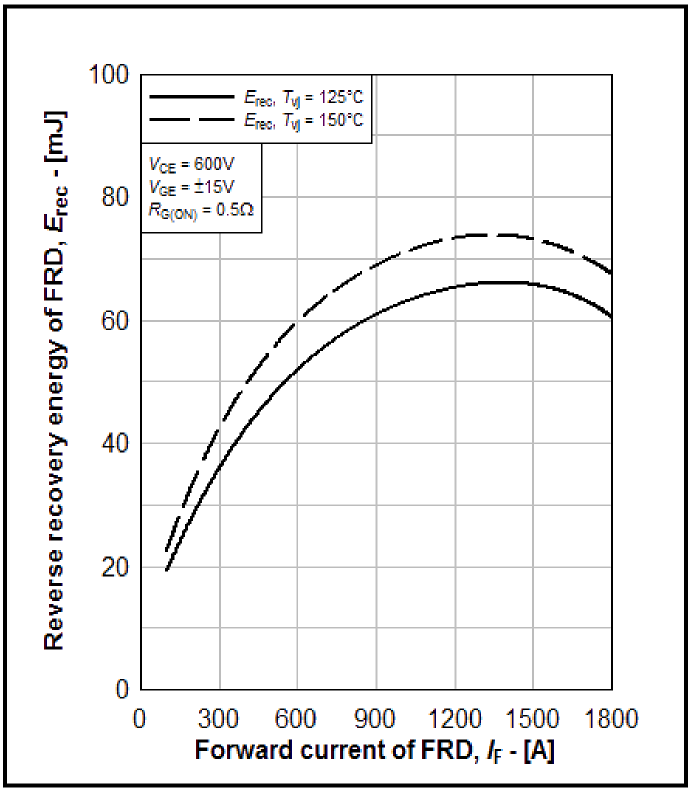


Fig. 9 Typical diode E_{rec}

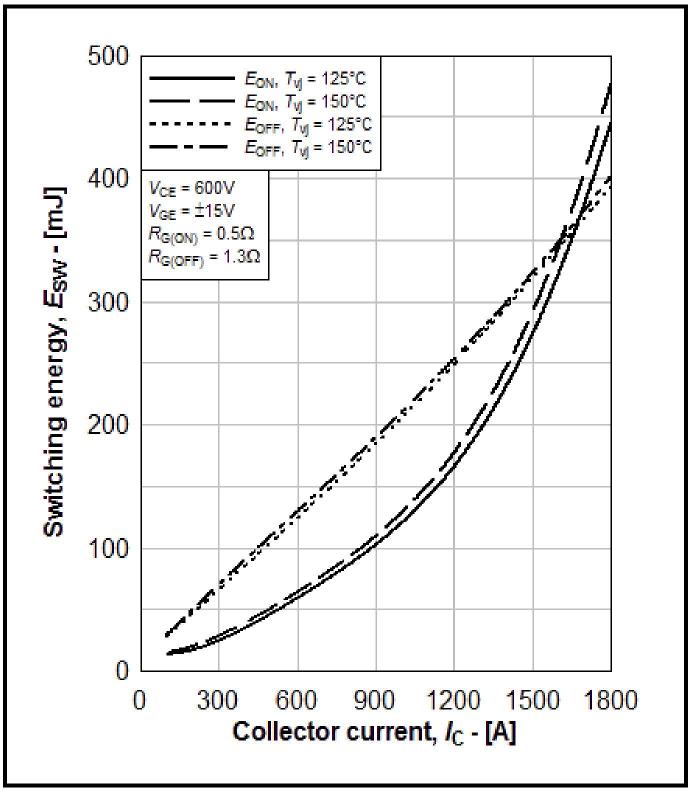


Fig. 10 Typical IGBT switching enery

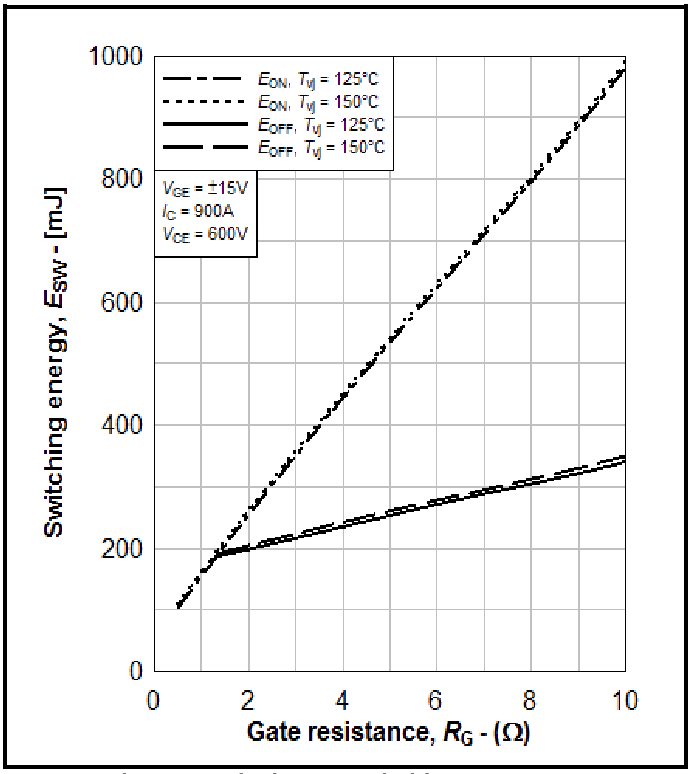


Fig. 11 Typical IGBT switching energy

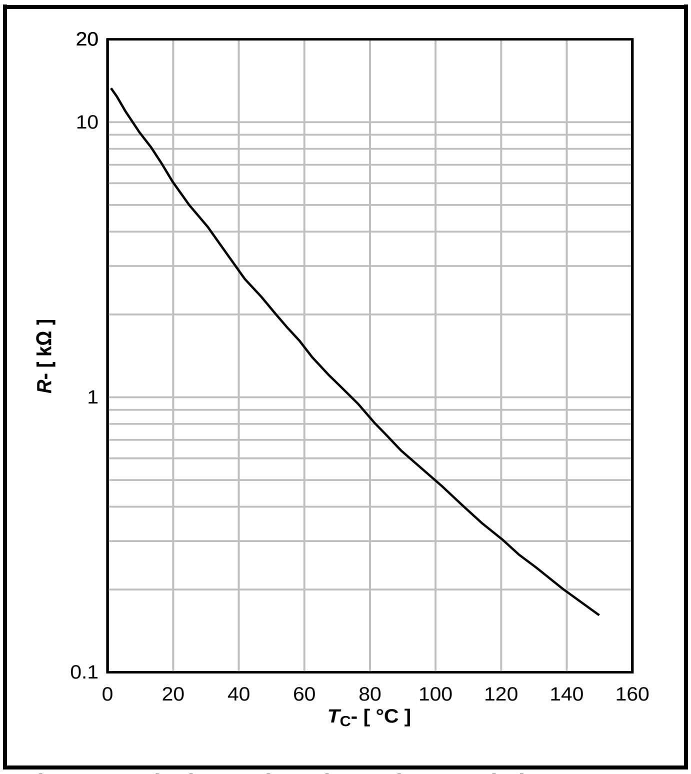


Fig. 12 Typical NTC thermistor characteristics

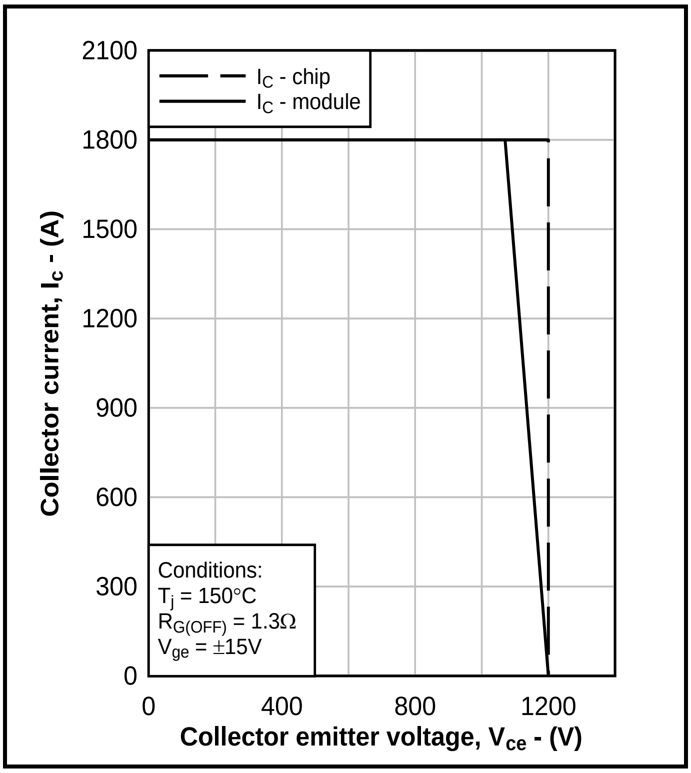


Fig. 13 Reverse bias safe operating area

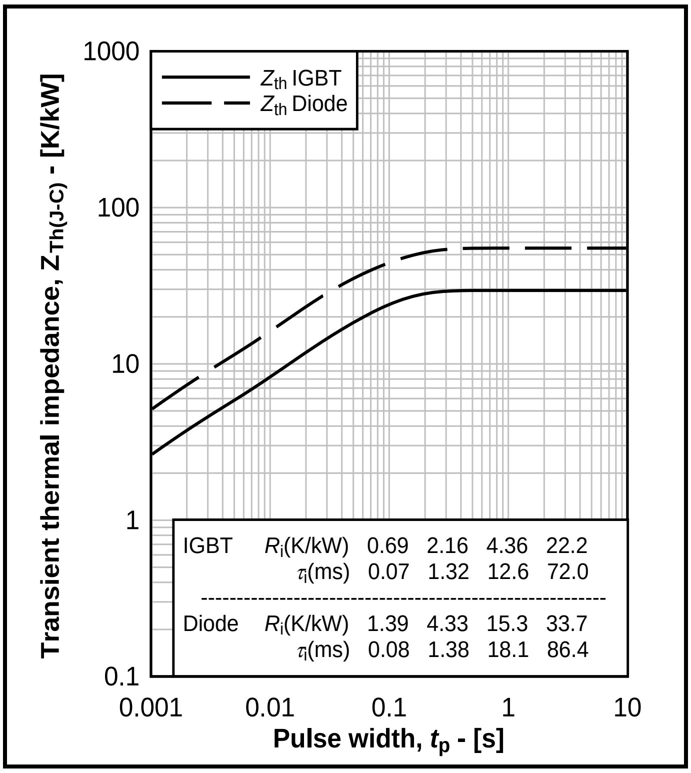
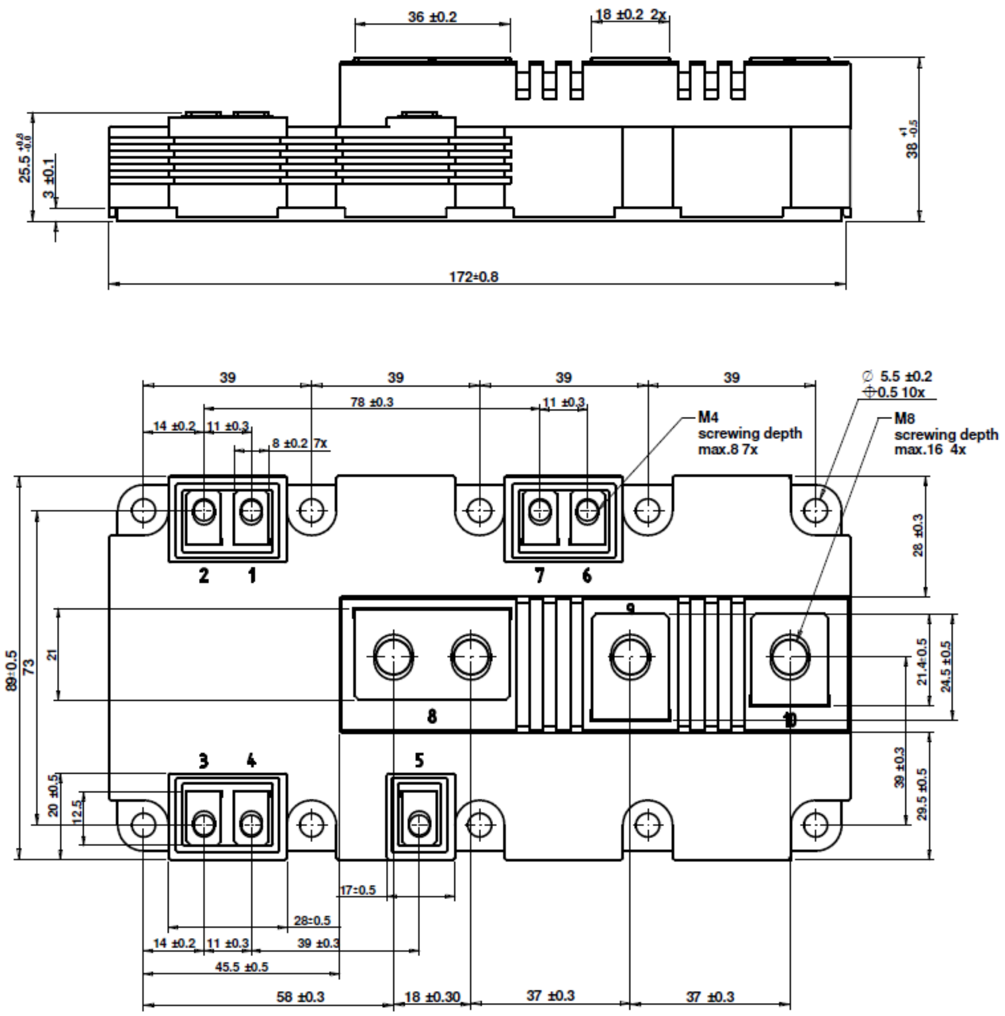


Fig. 14 Transient thermal impedance

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: H2

Fig. 15 Module outline drawing

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

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Extended exposure to conditions outside the product ratings may affect reliability leading to premature product failure. Use outside the product ratings is likely to cause permanent damage to the product. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture, a large current to flow or high voltage arcing, resulting in fire or explosion. Appropriate application design and safety precautions should always be followed to protect persons and property.

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