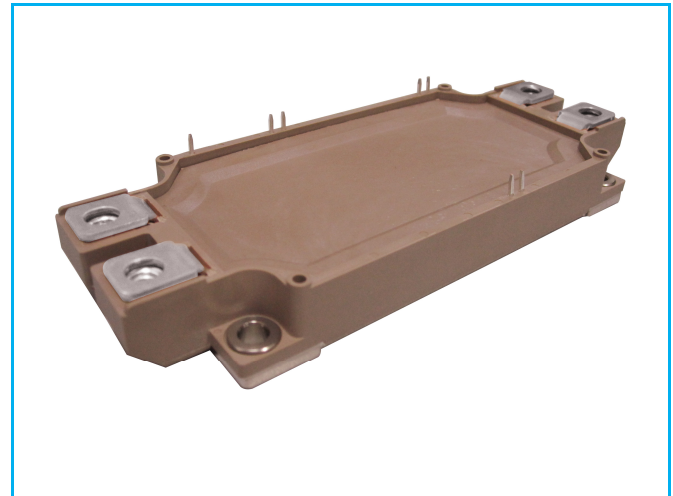


PRODUCT FEATURES

- High short circuit capability, self limiting short circuit current
- IGBT CHIP(Highly rugged SPT+ design)
- $V_{CE(sat)}$ with positive temperature coefficient
- Ultra Low Loss, High Ruggedness
- Free wheeling diodes with fast and soft reverse recovery
- Temperature sense included



APPLICATIONS

- AC motor control
- Motion/servo control
- Inverter and power supplies
- Photovoltaic/Fuel cell

IGBT-inverter

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J = 25^\circ\text{C}$	1700	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C = 25^\circ\text{C}$	900	A
		$T_C = 100^\circ\text{C}$	600	
I_{CM}	Repetitive Peak Collector Current	$t_p = 1\text{ms}$	1200	
P_{tot}	Power Dissipation Per IGBT		3750	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J = 25^\circ\text{C}$	1700	V
$I_{F(AV)}$	Average Forward Current	$T_C = 25^\circ\text{C}$	600	A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ms}$	1200	
I^2t		$T_J = 150^\circ\text{C}$, $t = 10\text{ms}$, $V_R = 0\text{V}$	40000	A^2S

MacMic Science & Technology Co., Ltd.

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MMG600WB170B

IGBT-inverter

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit	
$V_{GE(th)}$	Gate Emitter Threshold Voltage		$V_{CE}=V_{GE}, I_C=24\text{mA}$	5.4	6.2	7.4	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	chip	$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		2.25	2.6	
			$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		2.6		
		terminal	$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		2.7	3.1	
			$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		3.1		
I_{CES}	Collector Leakage Current		$V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		3	mA	
			$V_{CE}=1700\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		20	mA	
I_{GES}	Gate Leakage Current		$V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$	-500		500	nA
Q_g	Gate Charge		$V_{CE}=900\text{V}, I_C=600\text{A}, V_{GE}=\pm 15\text{V}$		4		μC
C_{ies}	Input Capacitance		$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		36.6		nF
C_{res}	Reverse Transfer Capacitance				2.15		nF
$t_{d(on)}$	Turn on Delay Time		$V_{CC}=900\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		210	ns
				$T_J=150^\circ\text{C}$		250	ns
t_r	Rise Time		Inductive Load	$T_J=25^\circ\text{C}$		190	ns
				$T_J=150^\circ\text{C}$		200	ns
$t_{d(off)}$	Turn off Delay Time		$V_{CC}=900\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		630	ns
				$T_J=150^\circ\text{C}$		730	ns
t_f	Fall Time		Inductive Load	$T_J=25^\circ\text{C}$		180	ns
				$T_J=150^\circ\text{C}$		320	ns
E_{on}	Turn on Energy		$V_{CC}=900\text{V}, I_C=600\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		270	mJ
				$T_J=125^\circ\text{C}$		340	mJ
				$T_J=150^\circ\text{C}$		350	mJ
E_{off}	Turn off Energy		Inductive Load	$T_J=25^\circ\text{C}$		152	mJ
				$T_J=125^\circ\text{C}$		200	mJ
				$T_J=150^\circ\text{C}$		215	mJ
I_{SC}	Short Circuit Current		$tpsc \leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=150^\circ\text{C}, V_{CC}=1000\text{V}$		1920		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.04		K/W

Diode-inverter

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit	
V_F	Forward Voltage	chip	$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.8	2.2	V
			$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.95		
		terminal	$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		2.3	2.7	
			$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		2.45		
t_{rr}	Reverse Recovery Time		$I_F=600\text{A}, V_R=900\text{V}$		1200	ns	
I_{RRM}	Max. Reverse Recovery Current		$dI_F/dt=-3000\text{A}/\mu\text{s}$		360	A	
Q_{RR}	Reverse Recovery Charge		$T_J=150^\circ\text{C}$		215	μC	
E_{rec}	Reverse Recovery Energy				140	mJ	
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.09		K/W

MMG600WB170B

NTC CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Resistance $T_C=25^\circ\text{C}$		5		K Ω
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$		3375		K

MODULE CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Values	Unit	
T_{Jmax}	Max. Junction Temperature	175	°C	
T_{Jop}	Operating Temperature	-40~150		
T_{stg}	Storage Temperature	-40~125		
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	4000	V
CTI	Comparative Tracking Index		> 225	
Torque	to heatsink	Recommended (M5)	2.5~5	Nm
	to terminal	Recommended (M6)	3~5	Nm
Weight			350	g

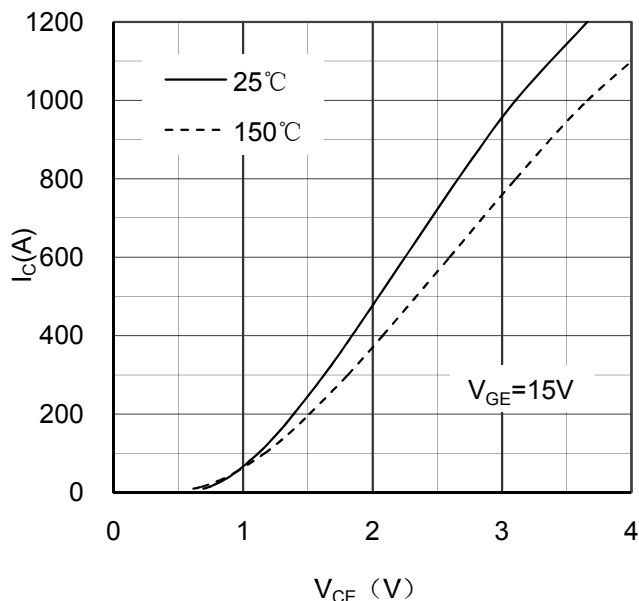


Figure 1. Typical Output Characteristics IGBT-inverter

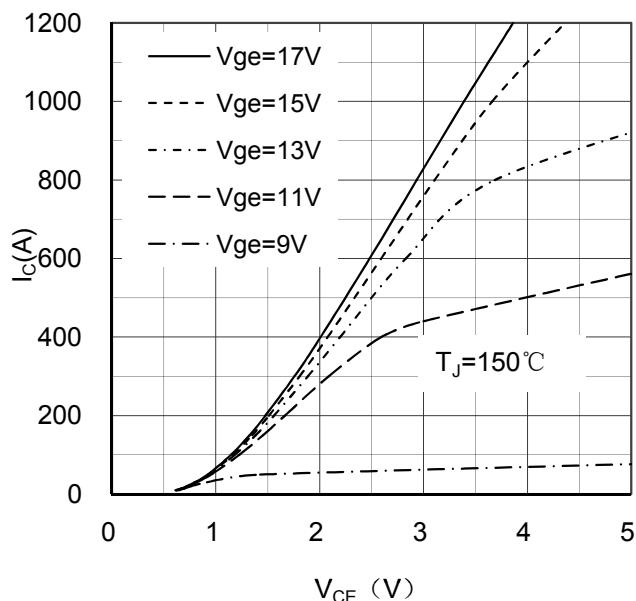


Figure 2. Typical Output Characteristics IGBT-inverter

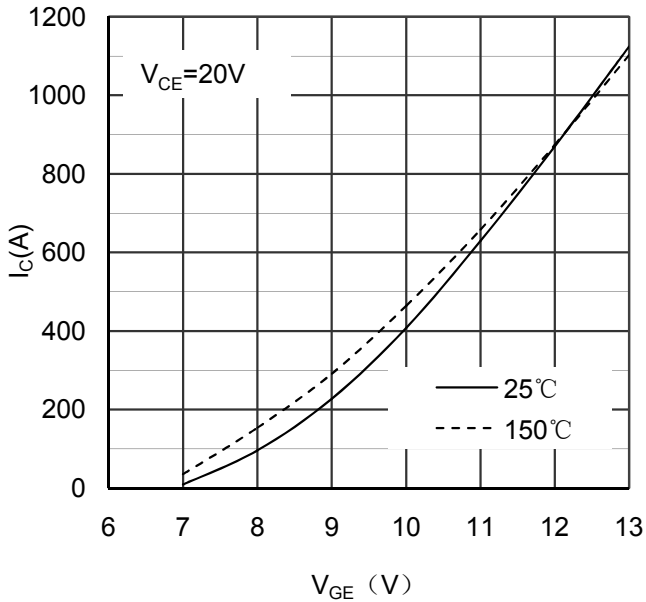


Figure 3. Typical Transfer characteristics IGBT-inverter

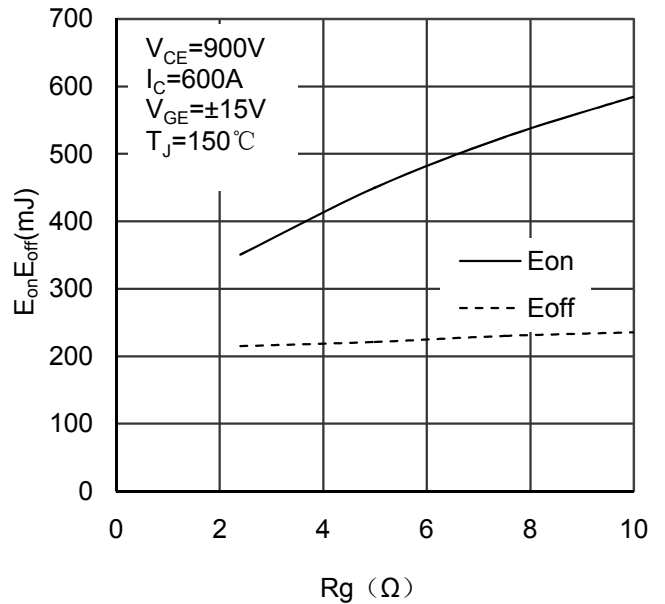


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

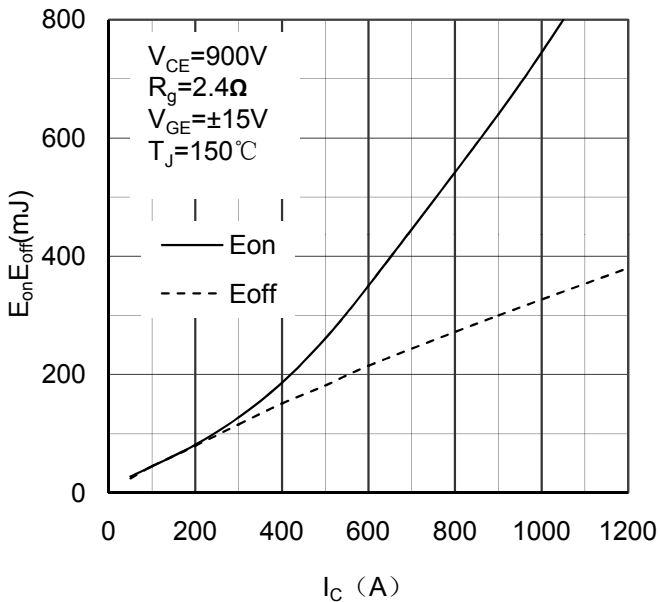


Figure 5. Switching Energy vs Collector Current IGBT-inverter

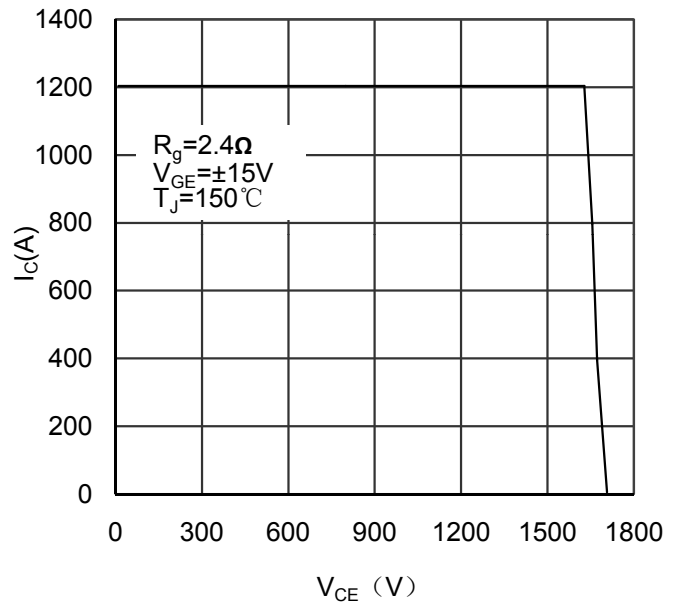


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

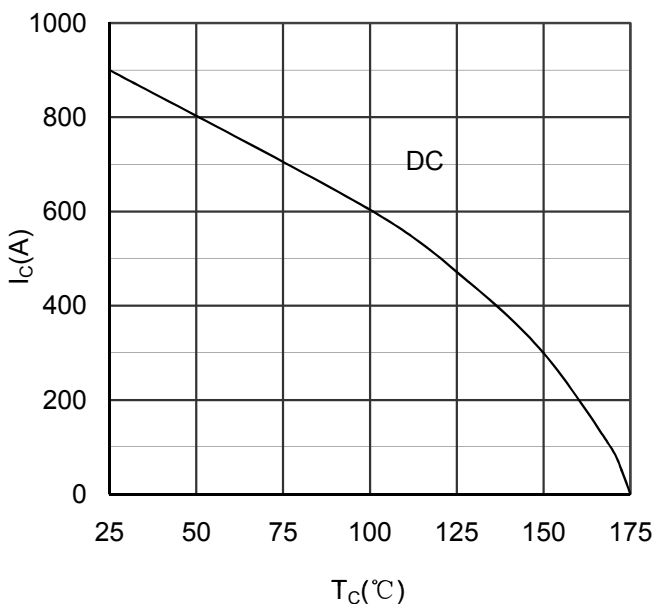


Figure 7. Collector Current vs Case temperature IGBT -inverter

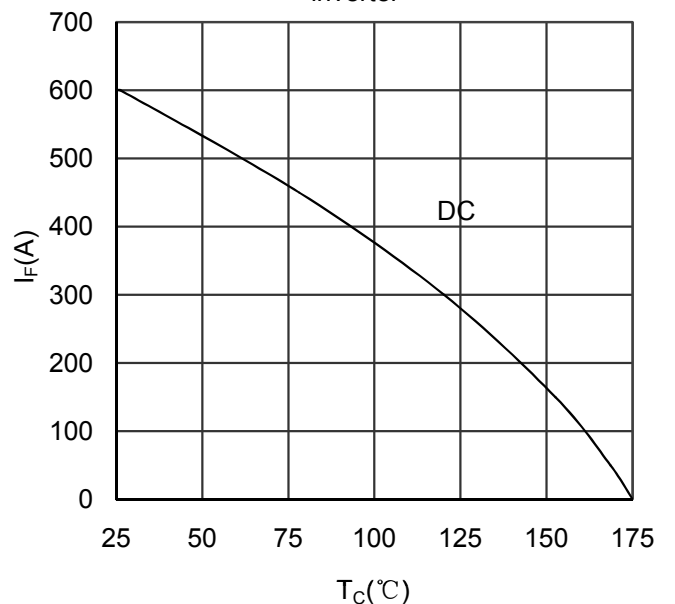


Figure 8. Forward current vs Case temperature Diode -inverter

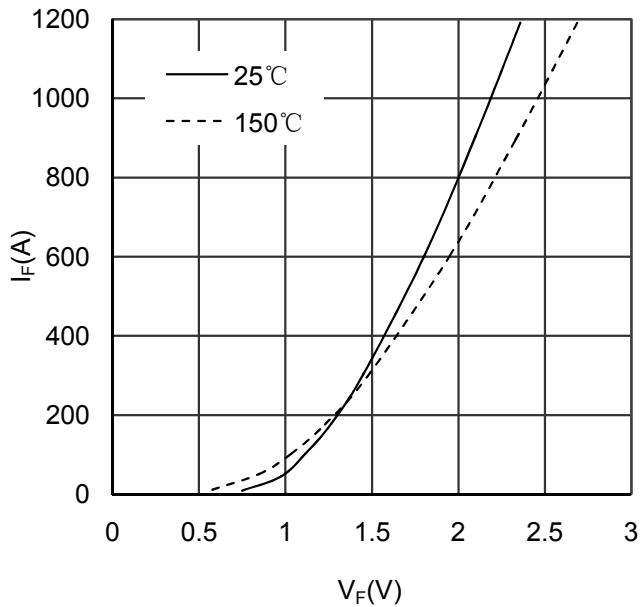


Figure 9. Diode Forward Characteristics Diode -inverter

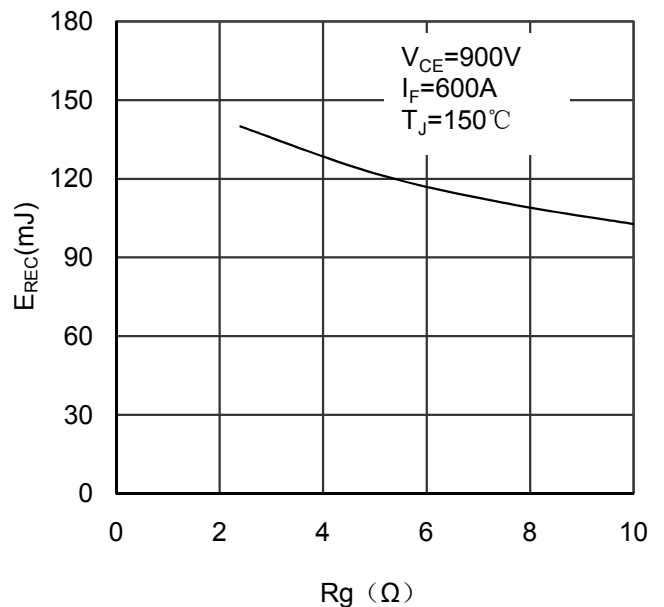


Figure 10. Switching Energy vs Gate Resistor Diode -inverter

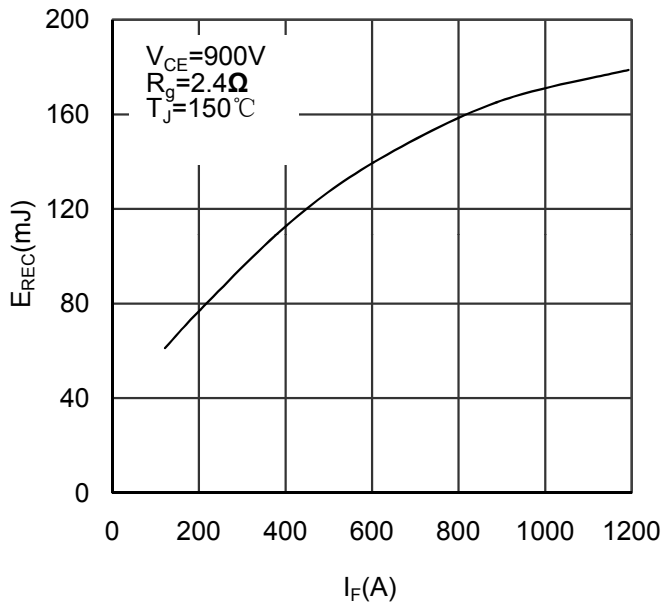


Figure 11. Switching Energy vs Forward Current Diode-inverter

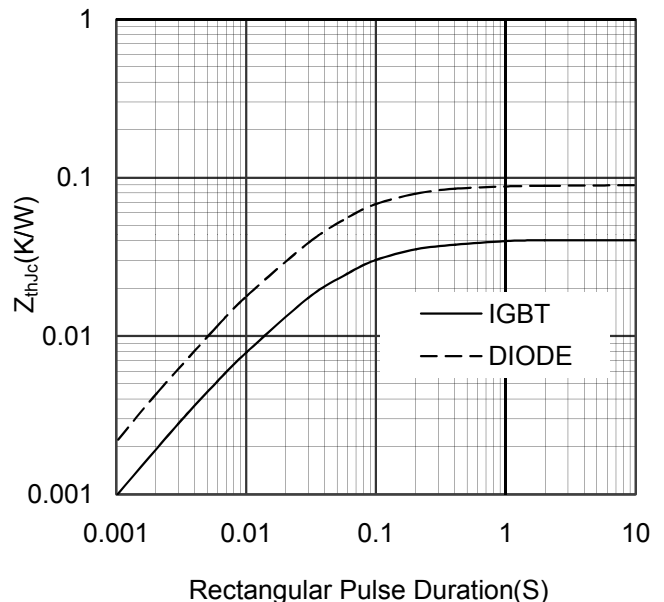


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

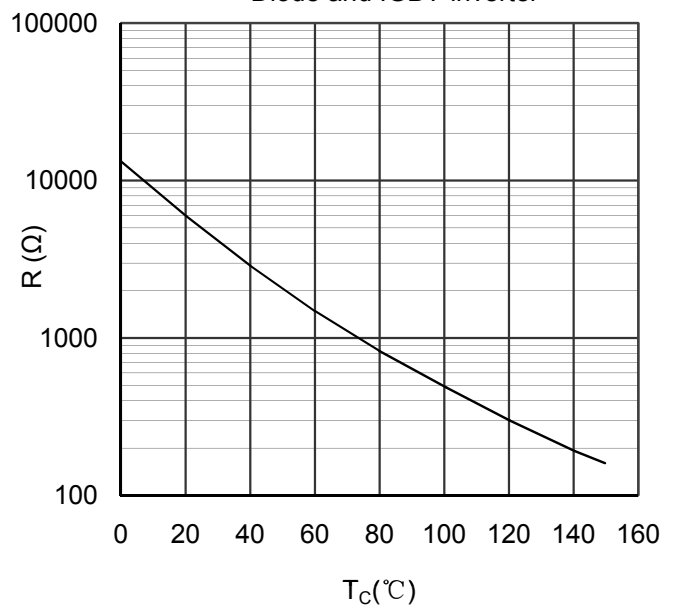


Figure 13. NTC Characteristics

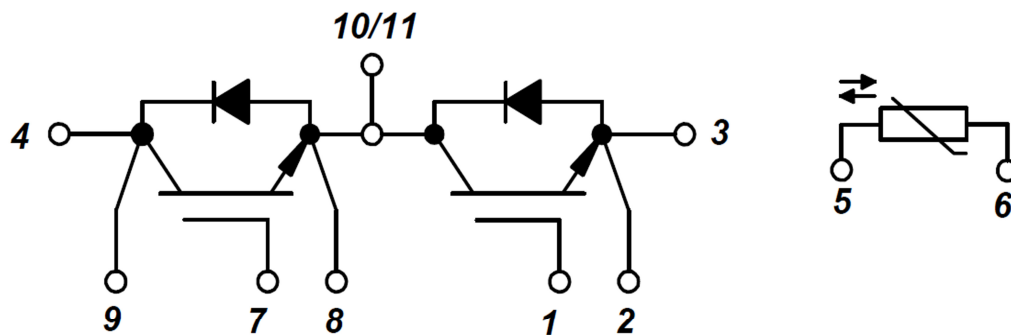
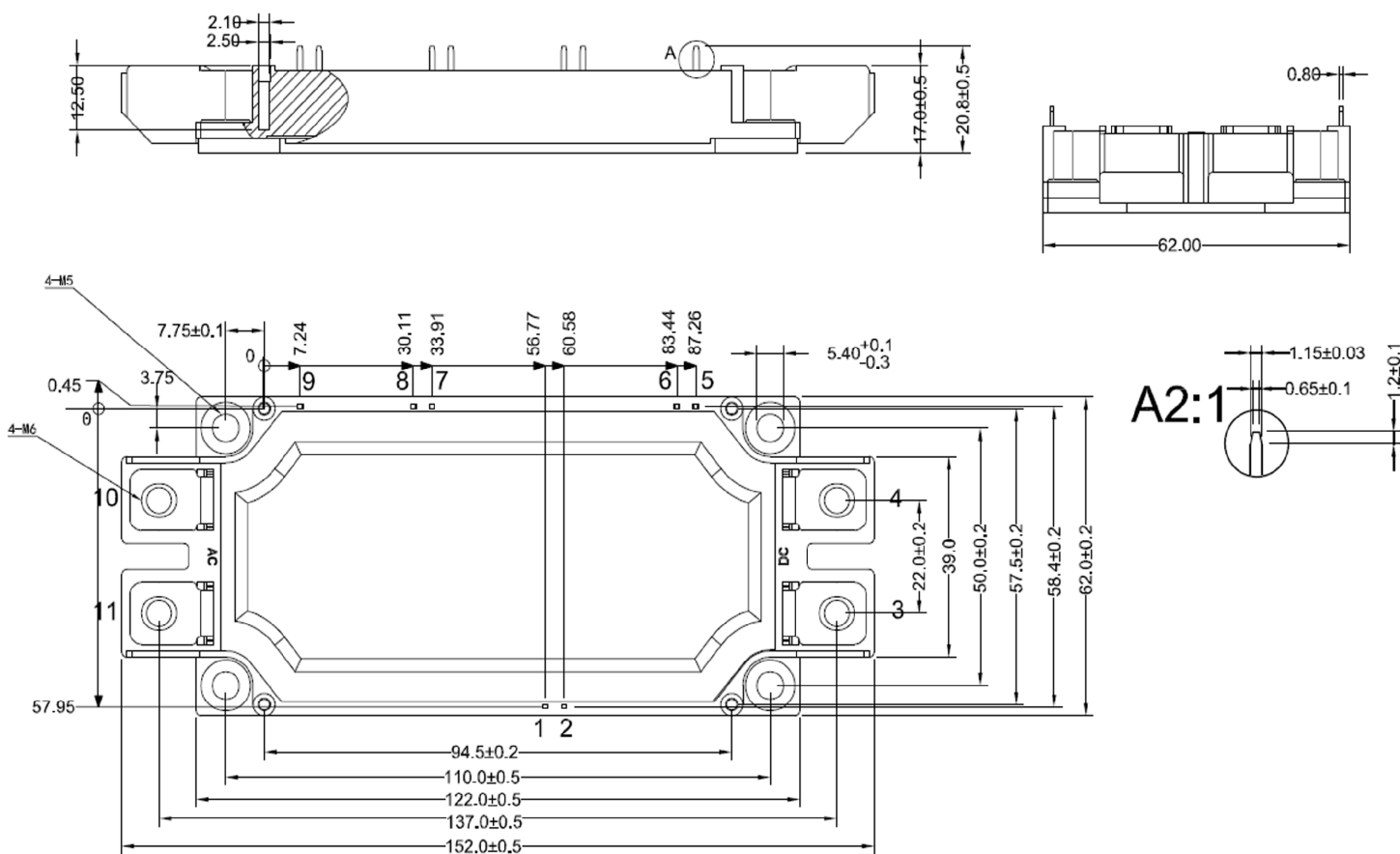


Figure 14. Circuit Diagram



Dimensions in (mm)

Figure 15. Package Outline