

PRODUCT FEATURES

- ☐ IGBT4 CHIP(1700V Trench+Field Stop technology)
- ☐ Low turn-off losses, short tail current
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ DIODE CHIP(1700V EMCON 3 technology)
- ☐ 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	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	960	A
		$T_C=100^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	600	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	1200	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	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		600	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	1200	
I^2t		$T_J=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	32000	A^2S

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MMG600WB170B6E4N

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	$V_{CE}=V_{GE}, I_C=24\text{mA}$	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=25^{\circ}\text{C}$		1.95	2.3	
		$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=125^{\circ}\text{C}$		2.35		
		$I_C=600\text{A}, V_{GE}=15\text{V}, T_J=150^{\circ}\text{C}$		2.45		
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	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_J=25^{\circ}\text{C}$	-400		400	nA
R_{gint}	Integrated Gate Resistor			1.2		Ω
Q_g	Gate Charge	$V_{CE}=900\text{V}, I_C=600\text{A}, V_{GE}=\pm 15\text{V}$		6.15		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		48		nF
C_{res}	Reverse Transfer Capacitance			1.55		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=900\text{V}, I_C=600\text{A}$ $R_G=1.0\Omega,$	$T_J=25^{\circ}\text{C}$	200		ns
			$T_J=150^{\circ}\text{C}$	240		ns
t_r	Rise Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$	70		ns
			$T_J=150^{\circ}\text{C}$	80		ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=900\text{V}, I_C=600\text{A}$ $R_G=1.0\Omega,$	$T_J=25^{\circ}\text{C}$	620		ns
			$T_J=150^{\circ}\text{C}$	800		ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$	110		ns
			$T_J=150^{\circ}\text{C}$	180		ns
E_{on}	Turn on Energy	$V_{CC}=900\text{V}, I_C=600\text{A}$ $R_G=1.0\Omega,$	$T_J=25^{\circ}\text{C}$	140		mJ
			$T_J=125^{\circ}\text{C}$	210		mJ
			$T_J=150^{\circ}\text{C}$	225		mJ
E_{off}	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$	118		mJ
			$T_J=125^{\circ}\text{C}$	180		mJ
			$T_J=150^{\circ}\text{C}$	205		mJ
I_{SC}	Short Circuit Current	$tp_{sc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=150^{\circ}\text{C}, V_{CC}=1000\text{V}$		2300		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	$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.8	2.2	V
		$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=125^{\circ}\text{C}$		1.9		
		$I_F=600\text{A}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$		1.95		
I_{RRM}	Max. Reverse Recovery Current	$I_F=600\text{A}, V_R=900\text{V}$		670		A
Q_{RR}	Reverse Recovery Charge	$di_F/dt=-6500\text{A}/\mu\text{s}$		285		μC
E_{rec}	Reverse Recovery Energy	$T_J=150^{\circ}\text{C}$		165		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.075	K/W

MMG600WB170B6E4N

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	$^{\circ}\text{C}$
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		> 200	
Torque	to heatsink	Recommended (M5)	2.5~5	Nm
	to terminal	Recommended (M6)	3~5	Nm
Weight			350	g

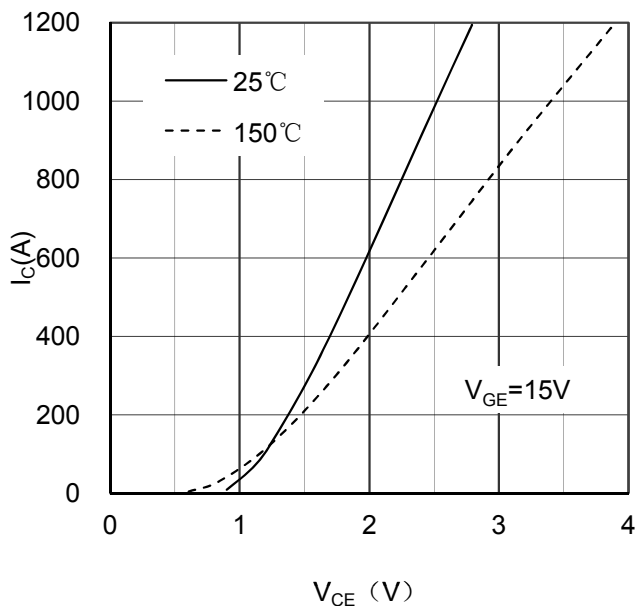


Figure 1. Typical Output Characteristics IGBT-inverter

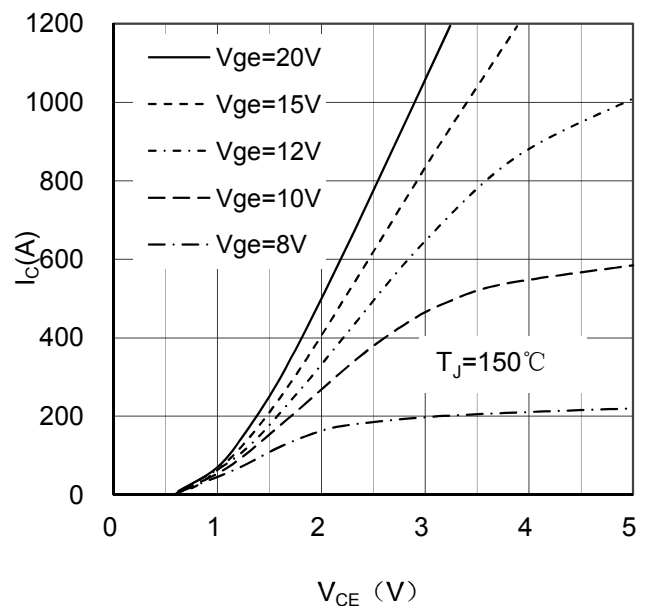


Figure 2. Typical Output Characteristics IGBT-inverter

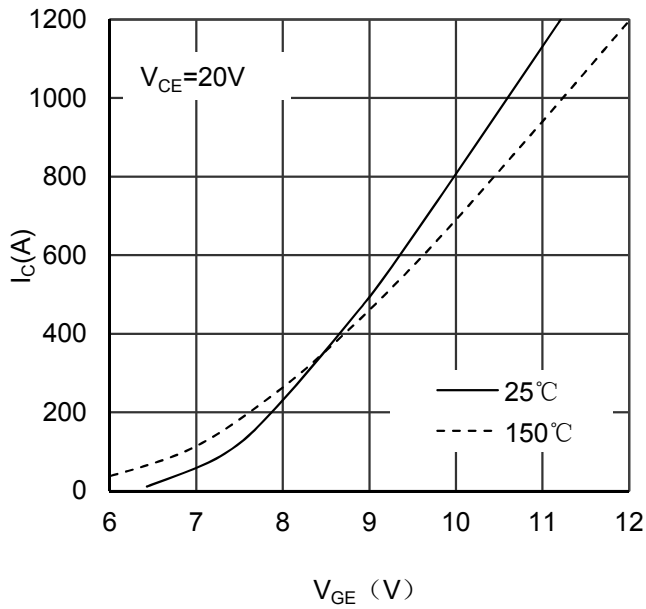


Figure 3. Typical Transfer characteristics IGBT-inverter

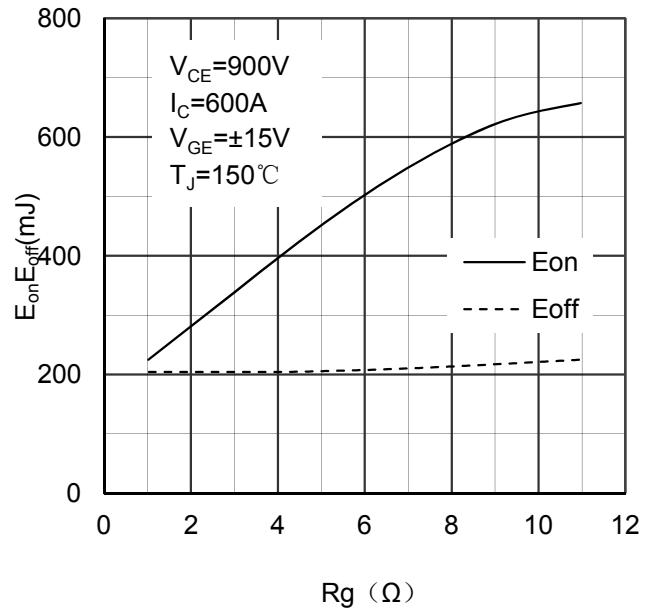


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

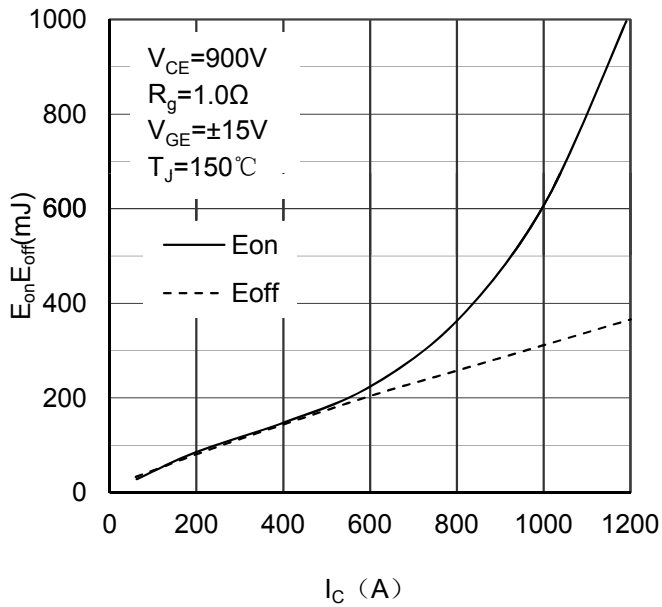


Figure 5. Switching Energy vs Collector Current IGBT-inverter

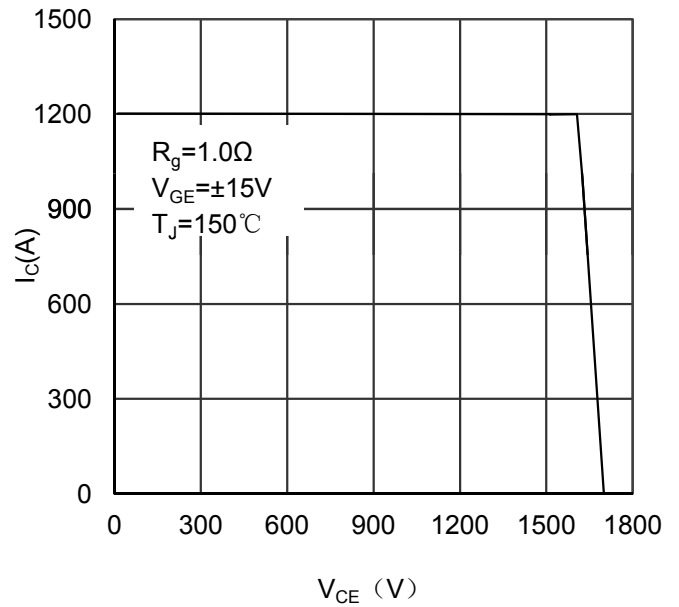
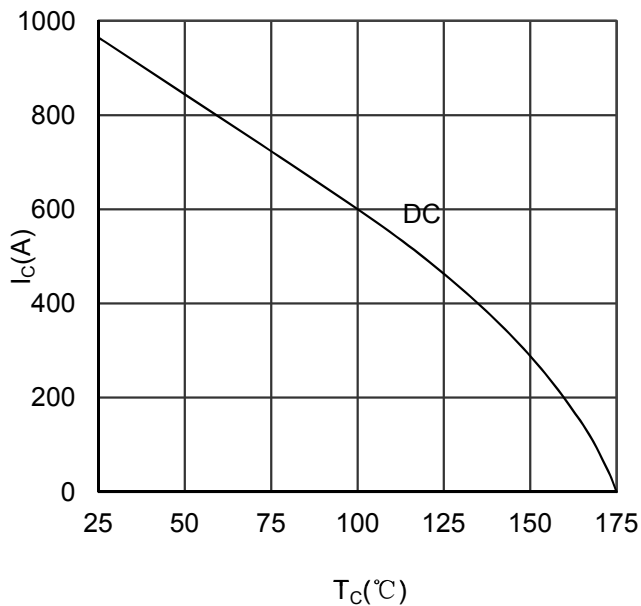
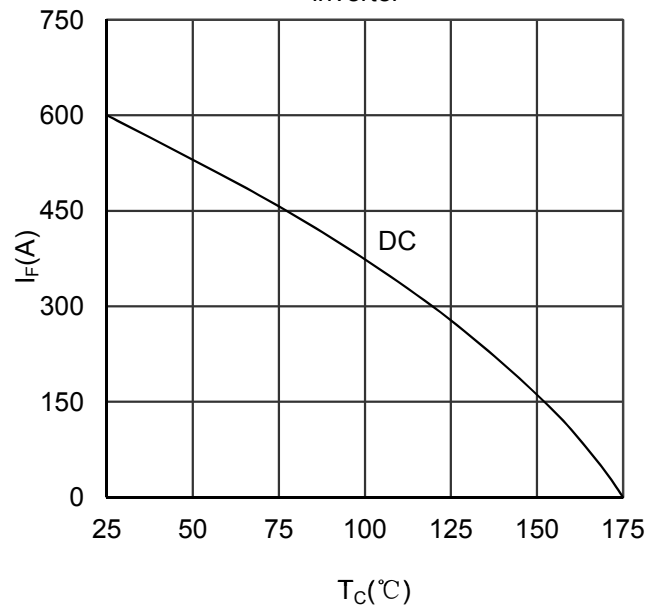


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

Figure 7. Collector Current vs Case temperature
IGBT -inverterFigure 8. Forward current vs Case temperature
Diode -inverter

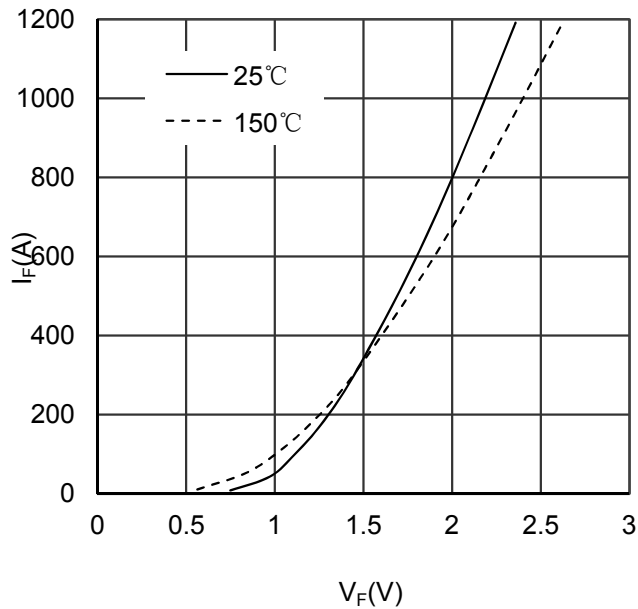


Figure 9. Diode Forward Characteristics Diode -inverter

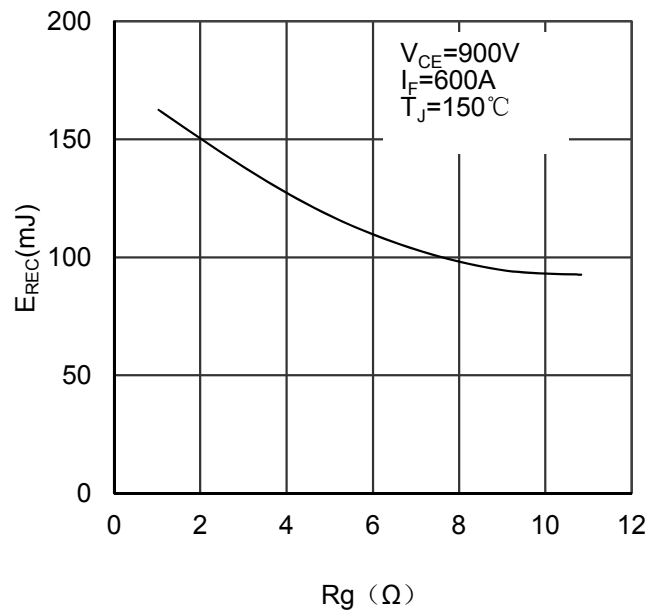


Figure 10. Switching Energy vs Gate Resistor Diode - inverter

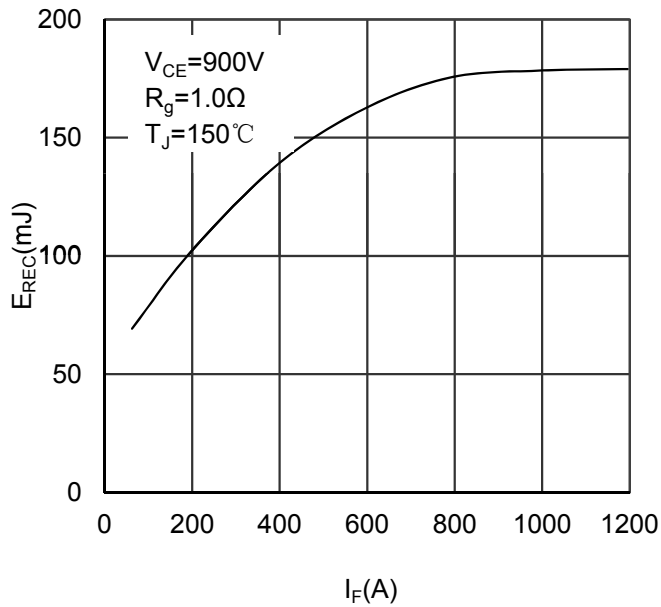


Figure 11. Switching Energy vs Forward Current Diode-inverter

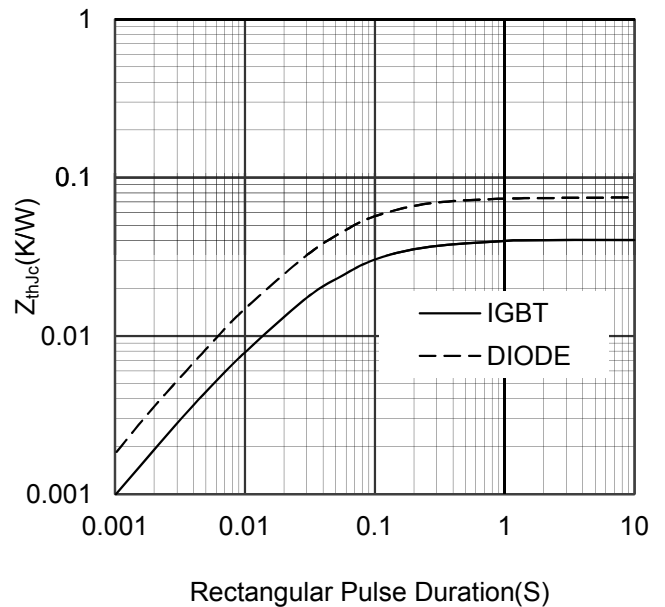


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

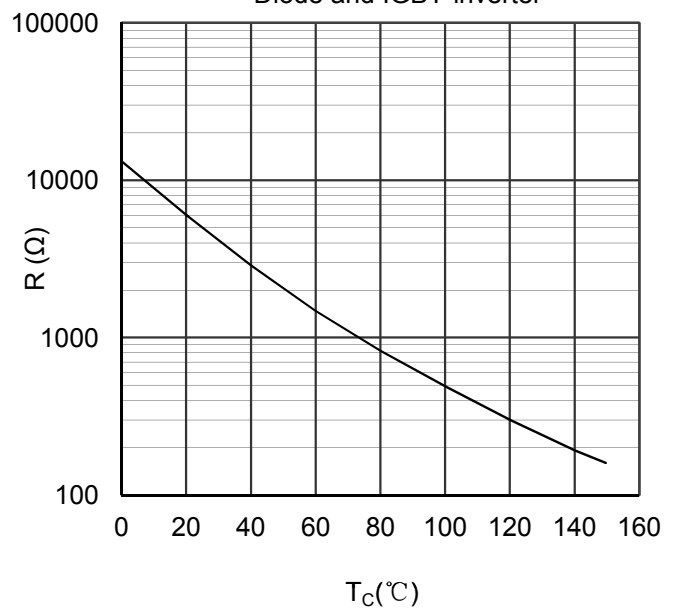


Figure 13. NTC Characteristics

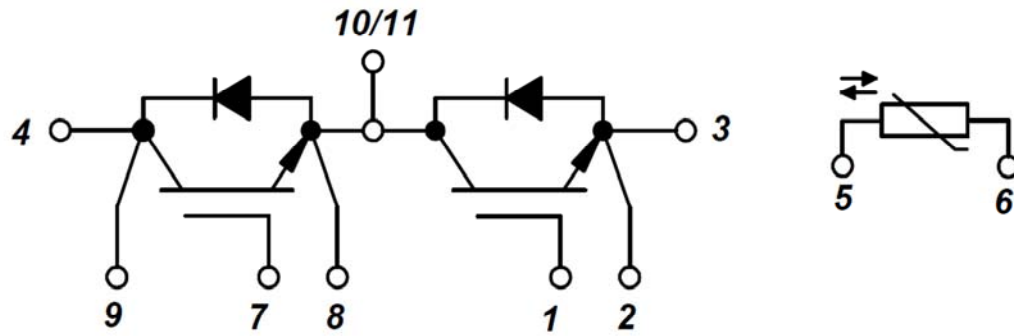
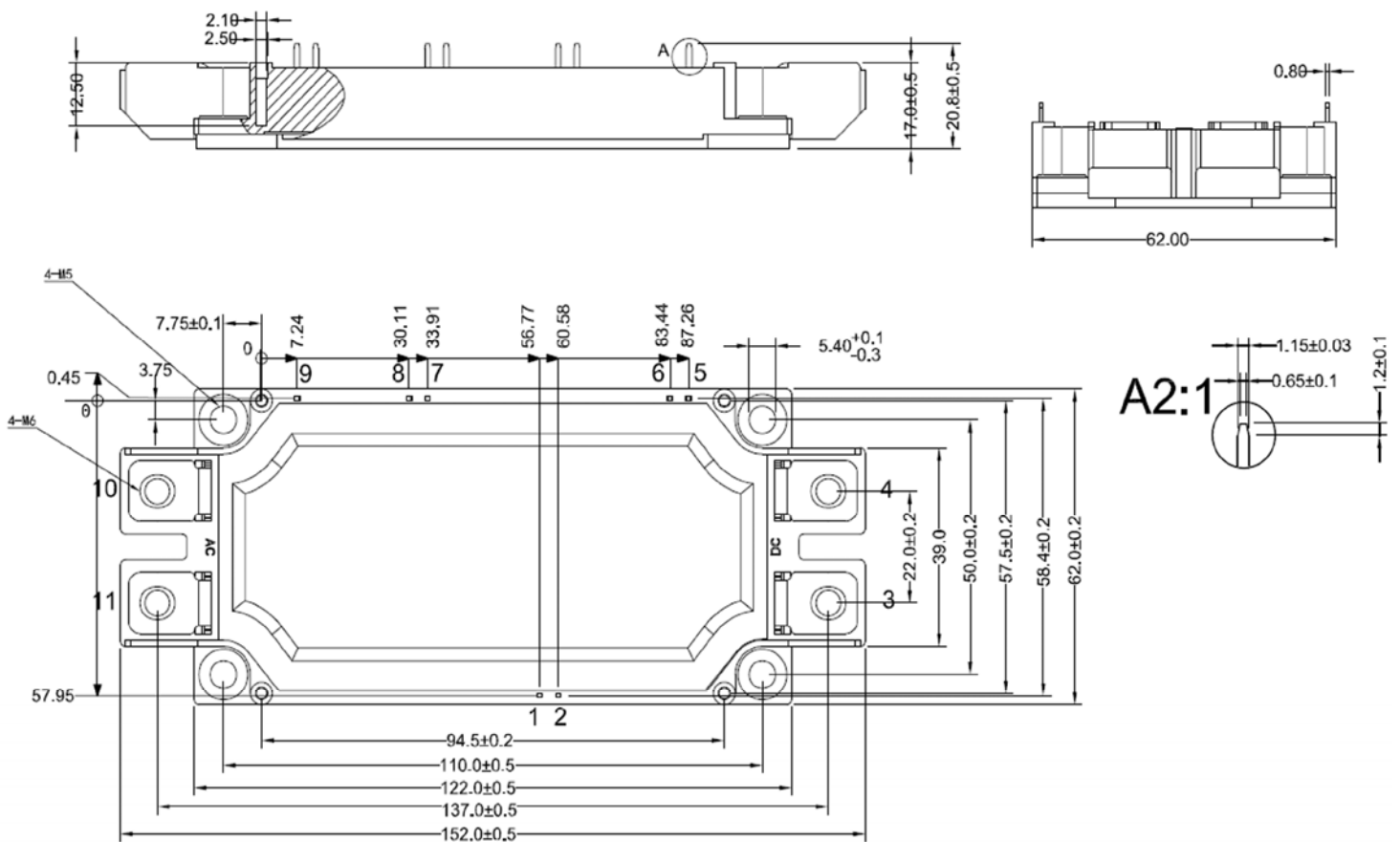


Figure 14. Circuit Diagram



Dimensions in (mm)

Figure 15. Package Outline