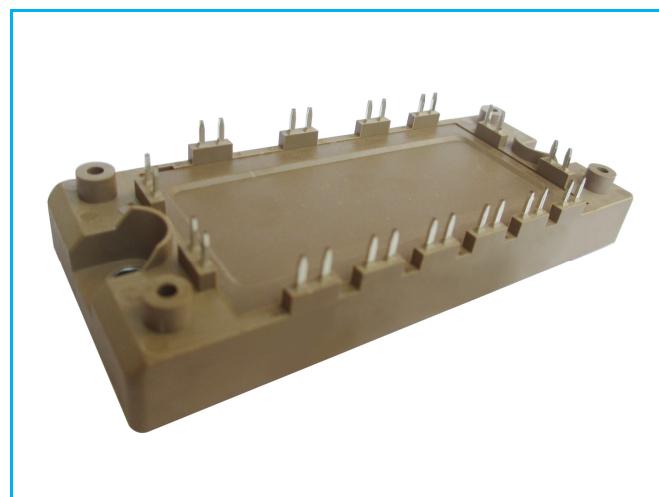


PRODUCT FEATURES

- IGBT CHIP(T4 Fast Trench+Field Stop technology)
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Industry standard package with insulated copper base plate and soldering pins for PCB mounting
- Temperature sense included



APPLICATIONS

- AC motor control
- Motion/servo control
- Inverter and power supplies

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	$T_J=25^\circ\text{C}$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	75	A
		$T_C=95^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	50	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	100	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	300	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	$T_J=25^\circ\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current		50	
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	100	A
I^2t		$T_J=125^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$	680	

MacMic Science & Technology Co., Ltd.

Add: #18, Hua Shan Zhong Lu, New District, Changzhou City, Jiangsu Province, P. R. of China

MMG50H120X6HN

IGBT-inverter

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$V_{GE(\text{th})}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}$, $I_C=2\text{mA}$	5.4	6.0	6.5	V
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$I_C=50\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^\circ\text{C}$		2.1	2.5	
		$I_C=50\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^\circ\text{C}$		2.5		
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$			100	μA
		$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}$, $V_{GE}=\pm 15\text{V}$, $T_J=25^\circ\text{C}$	-400		400	nA
R_{gint}	Integrated Gate Resistor			4		Ω
Q_g	Gate Charge	$V_{CE}=600\text{V}$, $I_C=50\text{A}$, $V_{GE}=15\text{V}$		0.23		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		2.8		nF
C_{res}	Reverse Transfer Capacitance			0.16		nF
$t_{d(\text{on})}$	Turn on Delay Time	$V_{CC}=600\text{V}$, $I_C=50\text{A}$, $R_G=15\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	60		ns
			$T_J=125^\circ\text{C}$	70		ns
			$T_J=150^\circ\text{C}$	80		ns
t_r	Rise Time	$V_{CC}=600\text{V}$, $I_C=50\text{A}$, $R_G=15\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	40		ns
			$T_J=125^\circ\text{C}$	50		ns
			$T_J=150^\circ\text{C}$	55		ns
$t_{d(\text{off})}$	Turn off Delay Time	$V_{CC}=600\text{V}$, $I_C=50\text{A}$, $R_G=15\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	280		ns
			$T_J=125^\circ\text{C}$	320		ns
			$T_J=150^\circ\text{C}$	360		ns
t_f	Fall Time	$V_{CC}=600\text{V}$, $I_C=50\text{A}$, $R_G=15\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	40		ns
			$T_J=125^\circ\text{C}$	60		ns
			$T_J=150^\circ\text{C}$	70		ns
E_{on}	Turn on Energy	$V_{CC}=600\text{V}$, $I_C=50\text{A}$, $R_G=15\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=125^\circ\text{C}$	5		mJ
			$T_J=150^\circ\text{C}$	5.5		mJ
E_{off}	Turn off Energy	$V_{CC}=600\text{V}$, $I_C=50\text{A}$, $R_G=15\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=125^\circ\text{C}$	3		mJ
			$T_J=150^\circ\text{C}$	3.3		mJ
I_{sc}	Short Circuit Current	$tpsc \leqslant 10\mu\text{s}$, $V_{GE}=15\text{V}$, $T_J=125^\circ\text{C}$, $V_{CC}=600\text{V}$		200		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.5	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	$I_F=50\text{A}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$		1.65	2.15	V
		$I_F=50\text{A}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$		1.65		
t_{rr}	Reverse Recovery Time			330		ns
I_{RRM}	Max. Reverse Recovery Current	$I_F=50\text{A}$, $V_R=600\text{V}$, $dl_F/dt=-1300\text{A}/\mu\text{s}$		55		A
Q_{RR}	Reverse Recovery Charge	$T_J=125^\circ\text{C}$		8.5		μC
E_{rec}	Reverse Recovery Energy			3.2		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)			0.78		K/W

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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		$\text{k}\Omega$
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$			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	3000	V
CTI	Comparative Tracking Index	>200	
Md	Mounting Torque Recommended (M5)	2.5~5	Nm
Weight		180	g

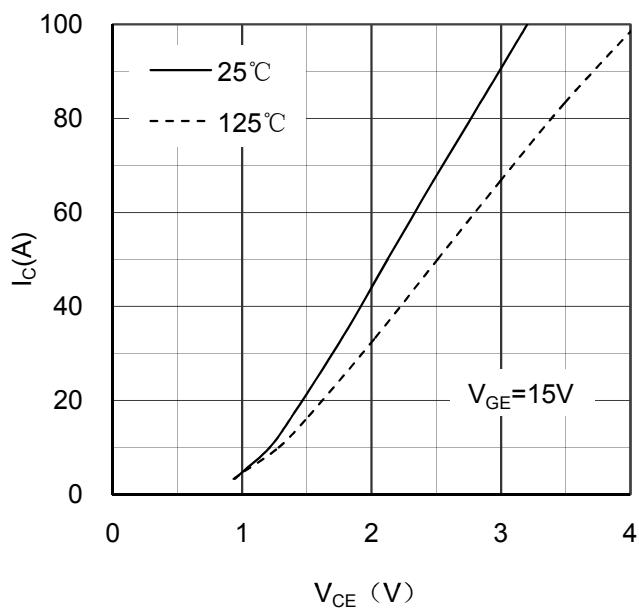


Figure 1. Typical Output Characteristics IGBT-inverter

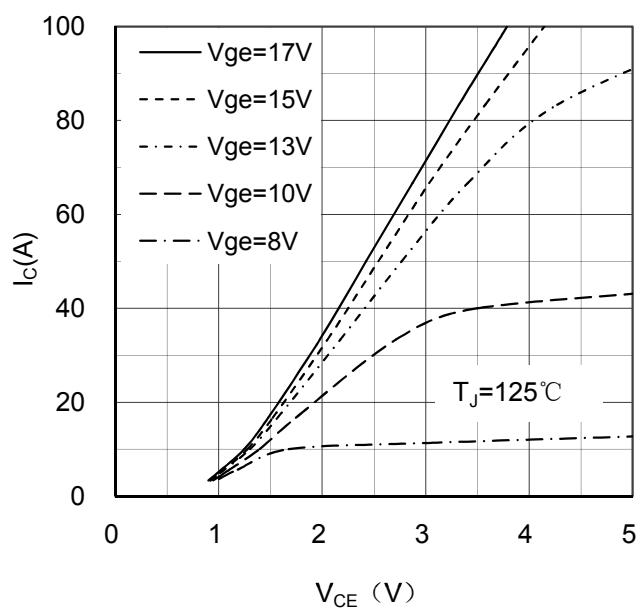


Figure 2. Typical Output Characteristics IGBT-inverter

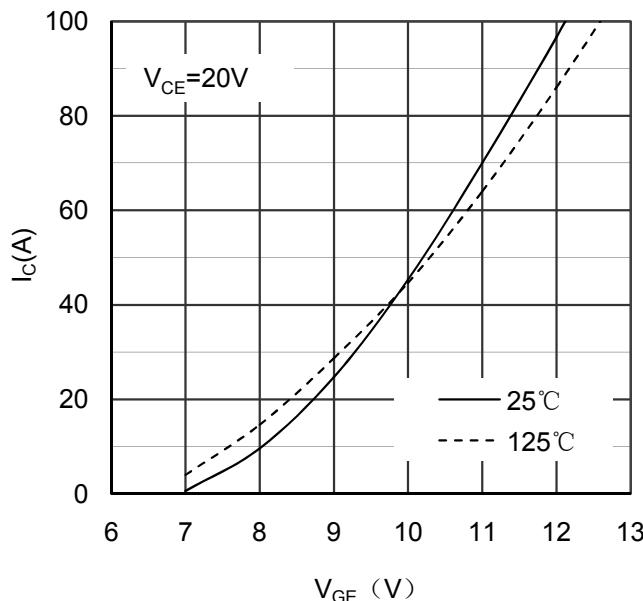


Figure 3. Typical Transfer characteristics IGBT-inverter

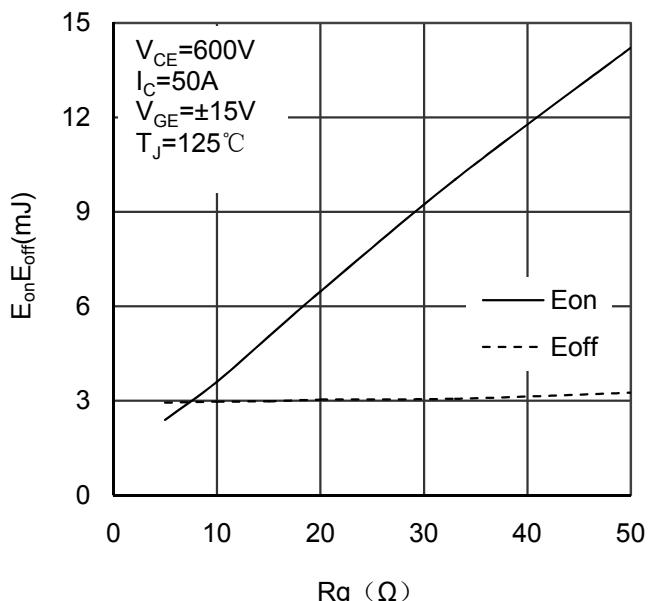


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

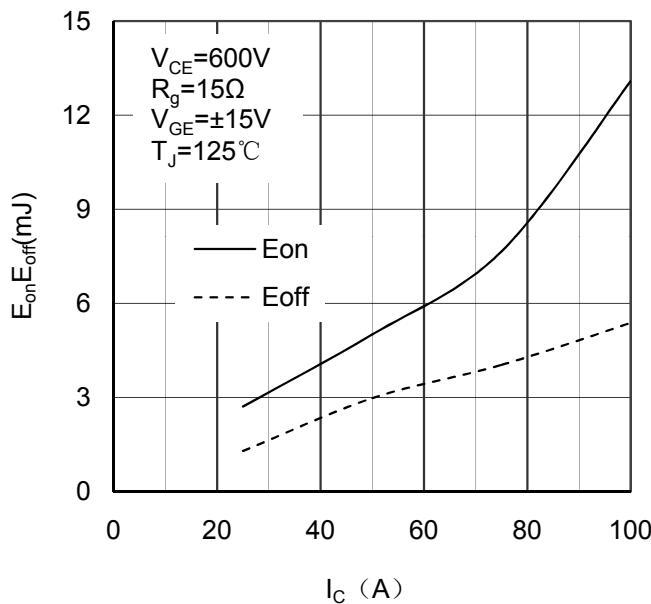


Figure 5. Switching Energy vs Collector Current IGBT-inverter

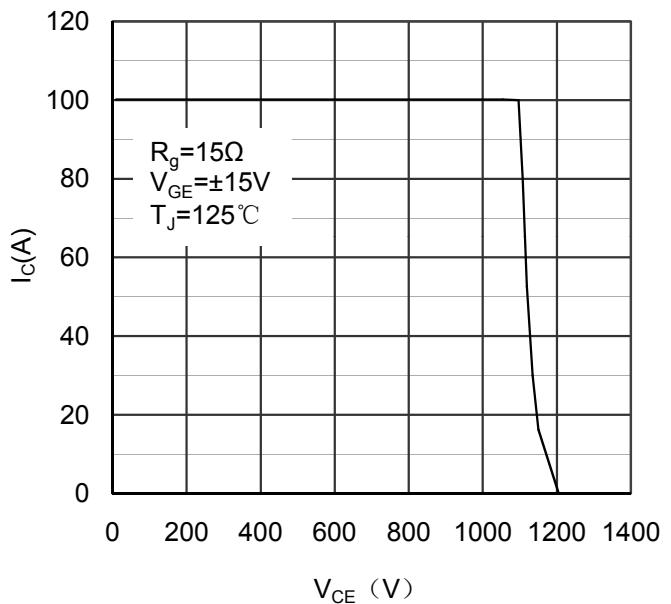


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

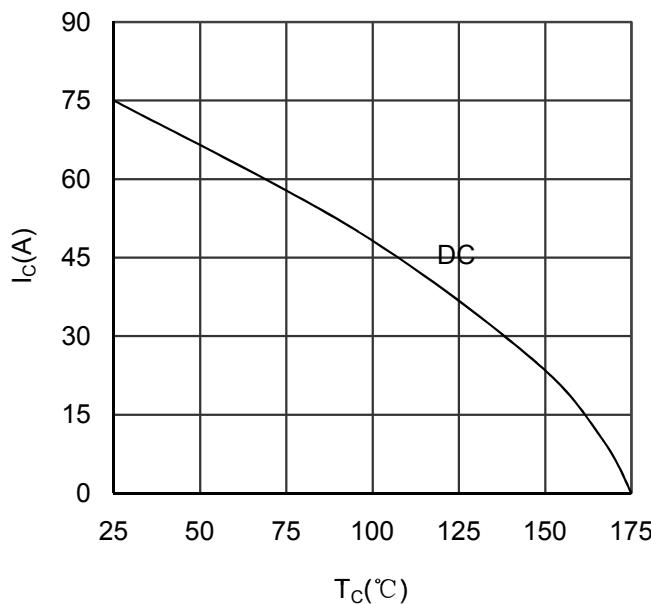


Figure 7. Collector Current vs Case temperature IGBT -inverter

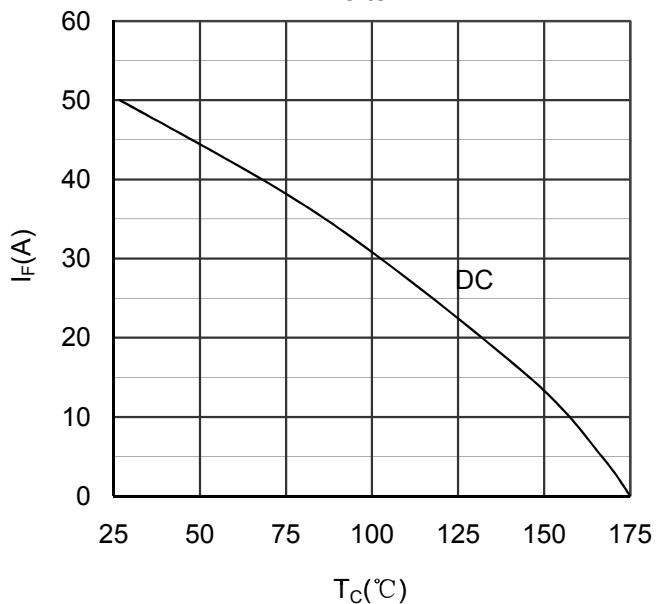


Figure 8. Forward current vs Case temperature Diode -inverter

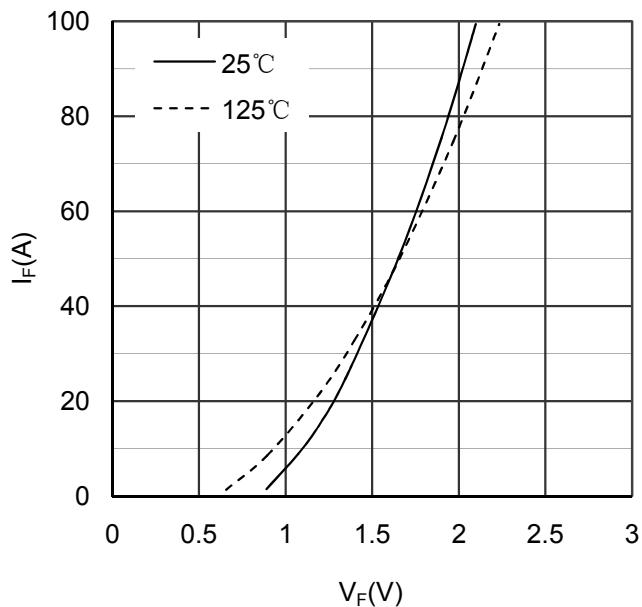


Figure 9. Diode Forward Characteristics Diode -inverter

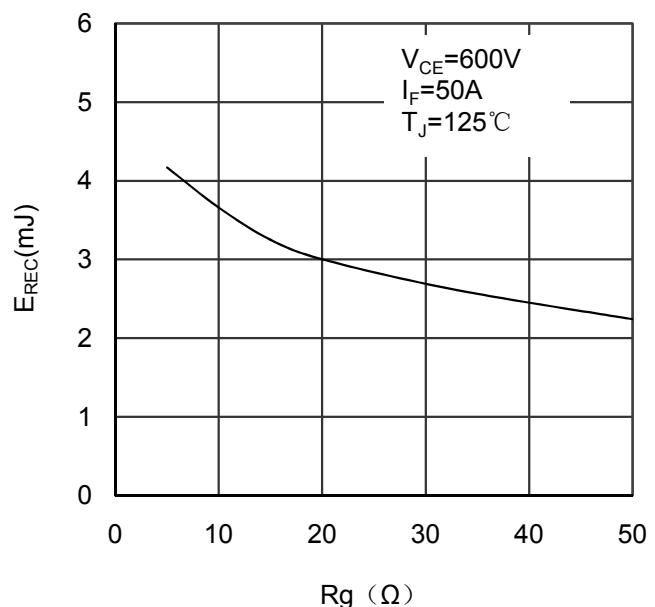


Figure 10. Switching Energy vs Gate Resistor Diode - inverter

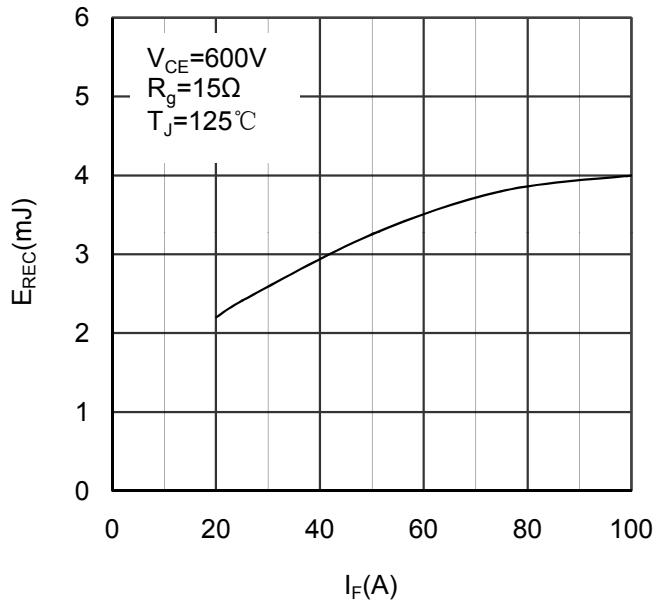


Figure 11. Switching Energy vs Forward Current Diode-inverter

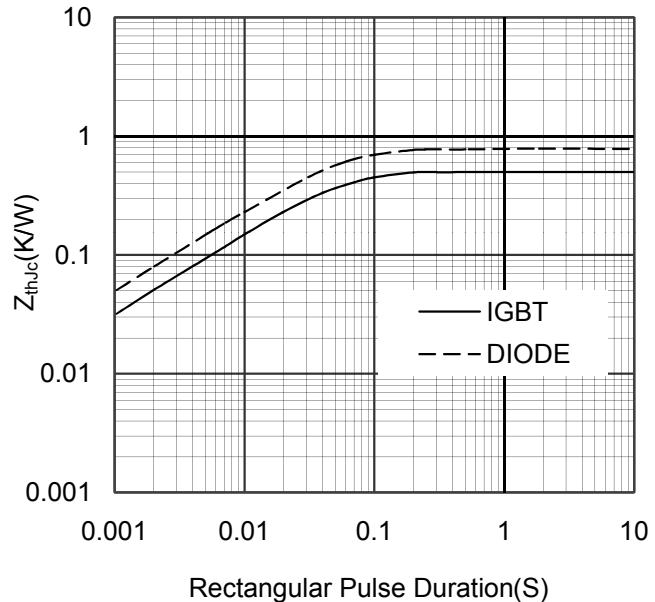


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

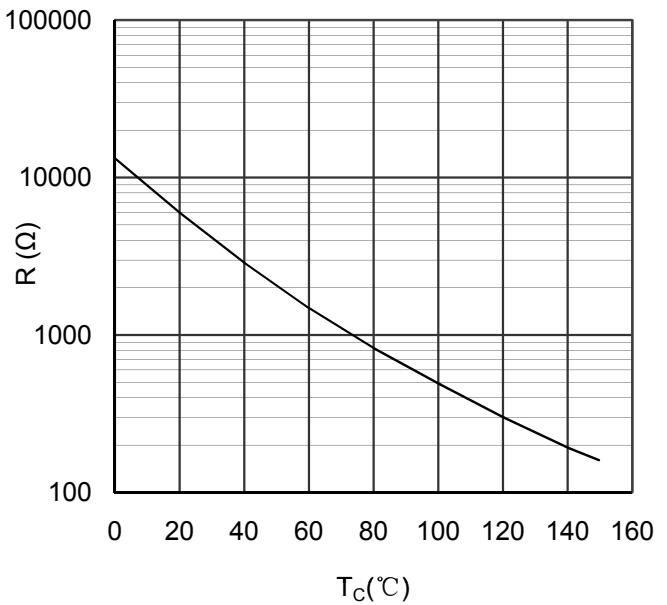


Figure 13. NTC Characteristics

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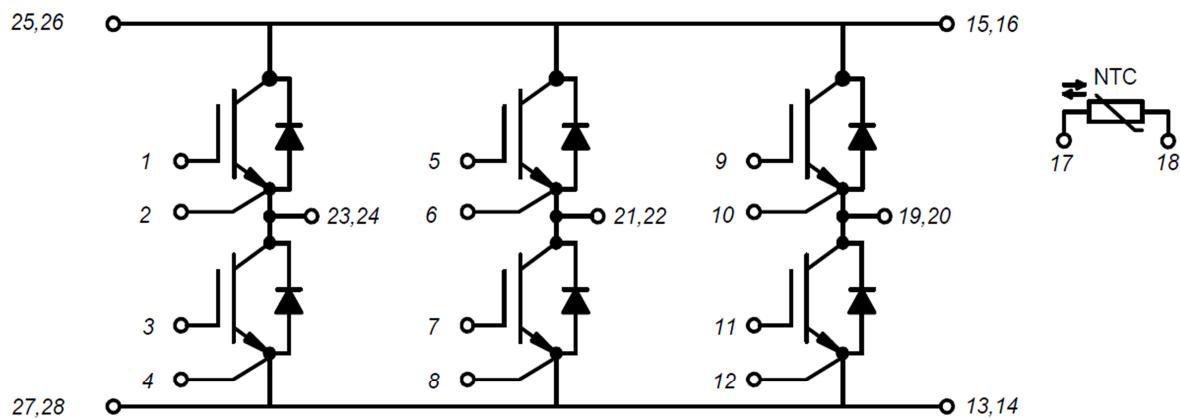
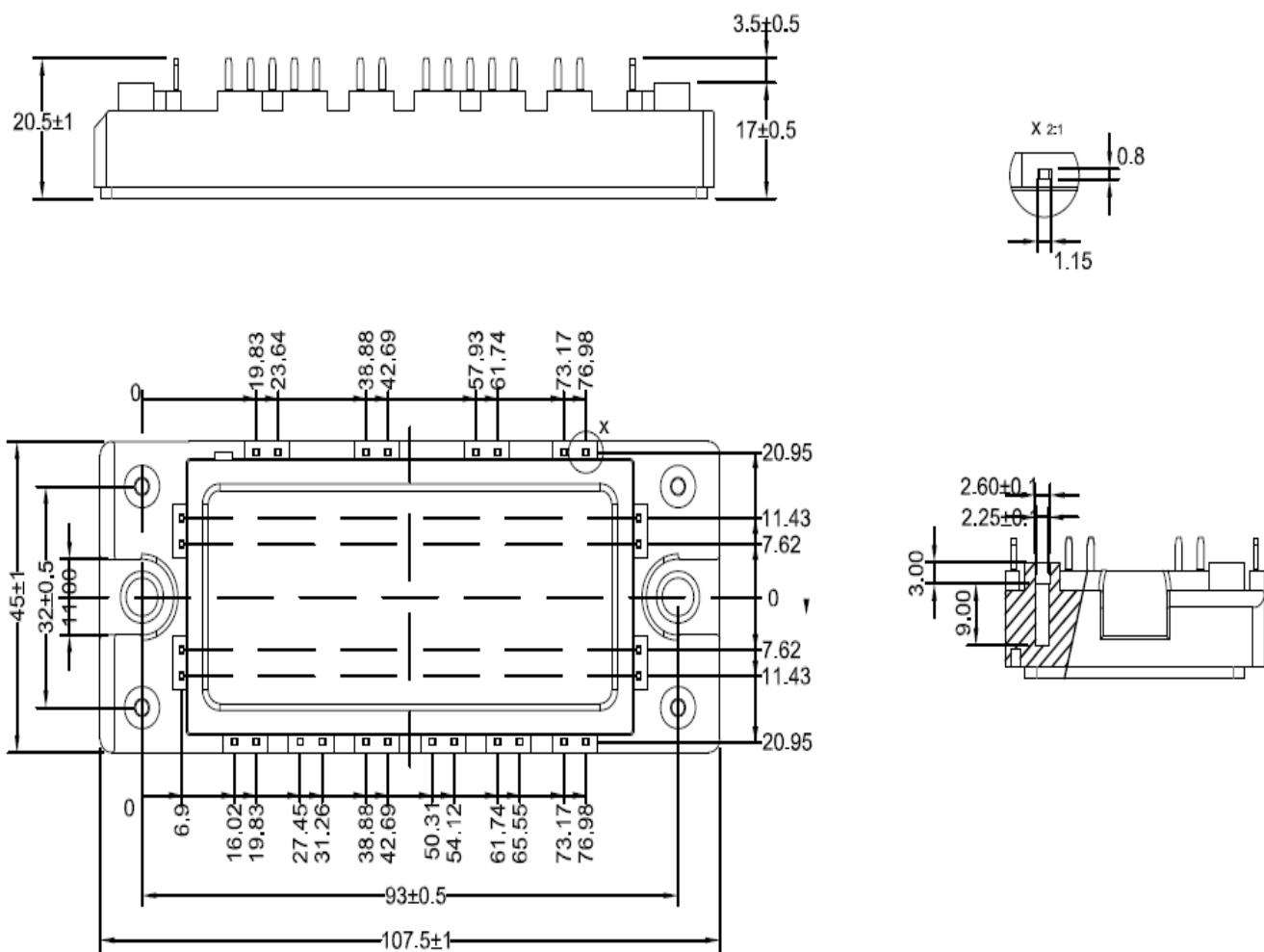


Figure 14. Circuit Diagram



Dimensions in (mm)

Figure 15. Package Outline