

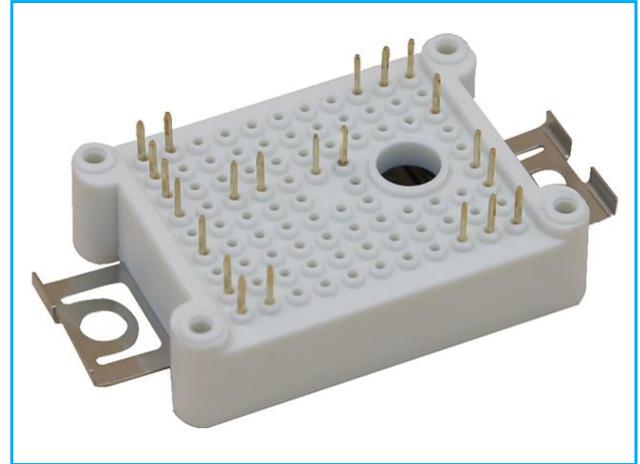
## PRODUCT FEATURES

- IGBT CHIP(Trench+FS)
- Substrate for Low Thermal Resistance
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Solder Contact Technology, Rugged mounting due to integrated Mounting clamps
- Temperature sense included

## APPLICATIONS

生效日期: 2020.12.1

- Motion/servo control
- Inverter and power supplies



### IGBT-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		$\pm 20$	
$I_C$	DC Collector Current	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	54	A
		$T_C=100^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	35	
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1\text{ms}$	70	
$P_{tot}$	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	214	W

### Diode-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		35	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ms}$	70	
$I^2t$		$T_J=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	250	$\text{A}^2\text{s}$

MacMic Science & Technology Co., Ltd.

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

Tel.: +86-519-85163708 Fax: +86-519-85162291 Post Code: 213022 Website: www.macmicst.com

## MMG35CB120X6TC

### IGBT-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	$V_{CE}=V_{GE}, I_C=1.2\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=35\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.85	2.25	
		$I_C=35\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.15		
		$I_C=35\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		2.2		
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			100	$\mu\text{A}$
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$			10	$\text{mA}$
$I_{GES}$	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_J=25^\circ\text{C}$	-400		400	$\text{nA}$
$R_{Gint}$	Integrated Gate Resistor			0		$\Omega$
$Q_g$	Gate Charge	$V_{CE}=600\text{V}, I_C=35\text{A}, V_{GE}=15\text{V}$		0.21		$\mu\text{C}$
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		2.8		$\text{nF}$
$C_{res}$	Reverse Transfer Capacitance				110	
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=35\text{A}$ $R_G=15\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		14	$\text{ns}$
			$T_J=125^\circ\text{C}$		18	$\text{ns}$
			$T_J=150^\circ\text{C}$		20	$\text{ns}$
$t_r$	Rise Time	$V_{CC}=600\text{V}, I_C=35\text{A}$ $R_G=15\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		26	$\text{ns}$
			$T_J=125^\circ\text{C}$		28	$\text{ns}$
			$T_J=150^\circ\text{C}$		30	$\text{ns}$
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=600\text{V}, I_C=35\text{A}$ $R_G=15\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		195	$\text{ns}$
			$T_J=125^\circ\text{C}$		240	$\text{ns}$
			$T_J=150^\circ\text{C}$		250	$\text{ns}$
$t_f$	Fall Time	$V_{CC}=600\text{V}, I_C=35\text{A}$ $R_G=15\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		150	$\text{ns}$
			$T_J=125^\circ\text{C}$		270	$\text{ns}$
			$T_J=150^\circ\text{C}$		290	$\text{ns}$
$E_{on}$	Turn on Energy	$V_{CC}=600\text{V}, I_C=35\text{A}$ $R_G=15\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=125^\circ\text{C}$		4.13	$\text{mJ}$
			$T_J=150^\circ\text{C}$		4.5	$\text{mJ}$
$E_{off}$	Turn off Energy	$V_{CC}=600\text{V}, I_C=35\text{A}$ $R_G=15\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=125^\circ\text{C}$		3.03	$\text{mJ}$
			$T_J=150^\circ\text{C}$		3.2	$\text{mJ}$
$I_{SC}$	Short Circuit Current	$t_{psc}\leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=150^\circ\text{C}, V_{CC}=800\text{V}$		145		A
$R_{thJC}$	Junction to Case Thermal Resistance ( Per IGBT )			0.6	0.7	$\text{K/W}$

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F=35\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.95	2.45	V
		$I_F=35\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.55		
		$I_F=35\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.5		
$t_{rr}$	Reverse Recovery Time	$I_F=35\text{A}, V_R=600\text{V}$ $di_F/dt=-1500\text{A}/\mu\text{s}$ $T_J=150^\circ\text{C}$		320		$\text{ns}$
$I_{RRM}$	Max. Reverse Recovery Current			47		A
$Q_{RR}$	Reverse Recovery Charge			6.8		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			2.37		$\text{mJ}$
$R_{thJCD}$	Junction to Case Thermal Resistance ( Per Diode )			0.8	0.9	$\text{K/W}$

# MMG35CB120X6TC

## 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	
F	Mounting Force Per Clamp	20~50	N
Weight		25	g

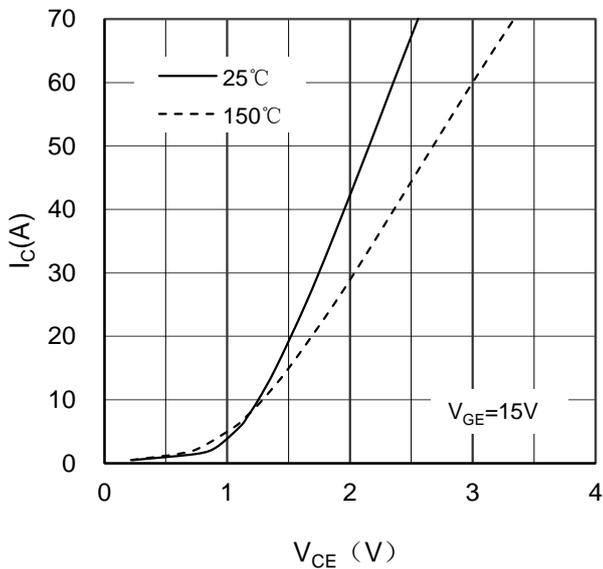


Figure 1. Typical Output Characteristics IGBT

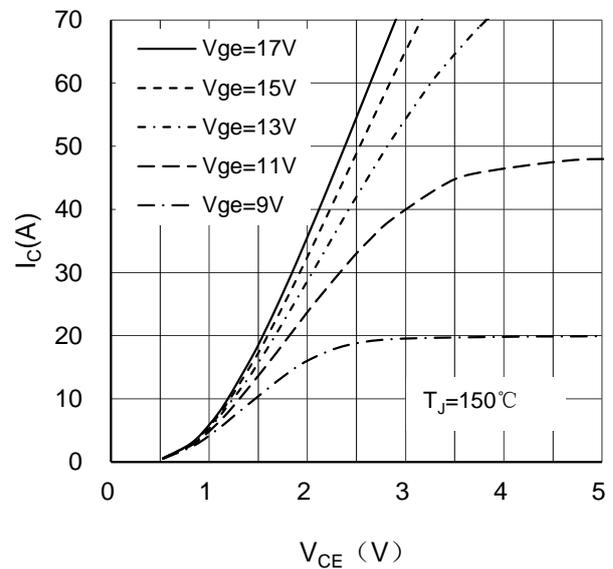


Figure 2. Typical Output Characteristics IGBT

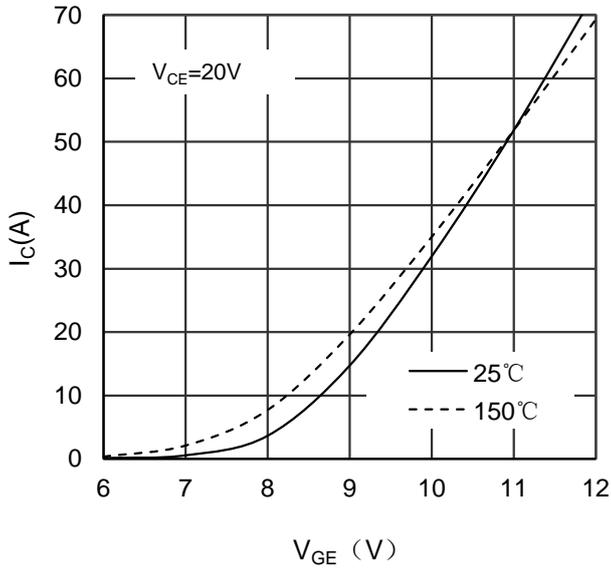


Figure 3. Typical Transfer characteristics IGBT

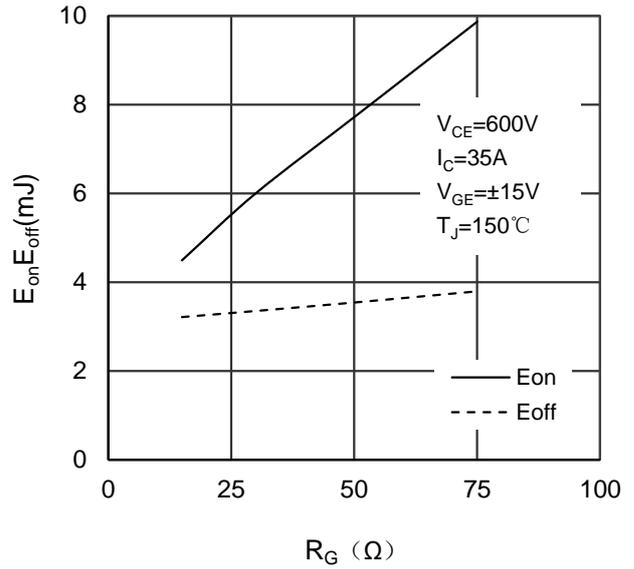


Figure 4. Switching Energy vs Gate Resistor IGBT

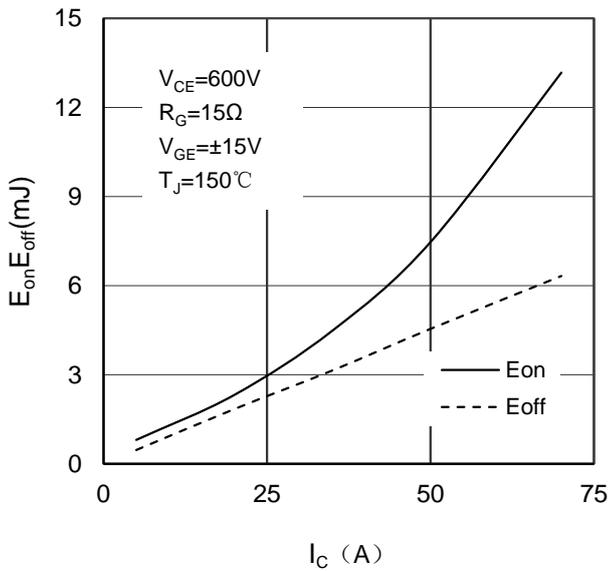


Figure 5. Switching Energy vs Collector Current IGBT

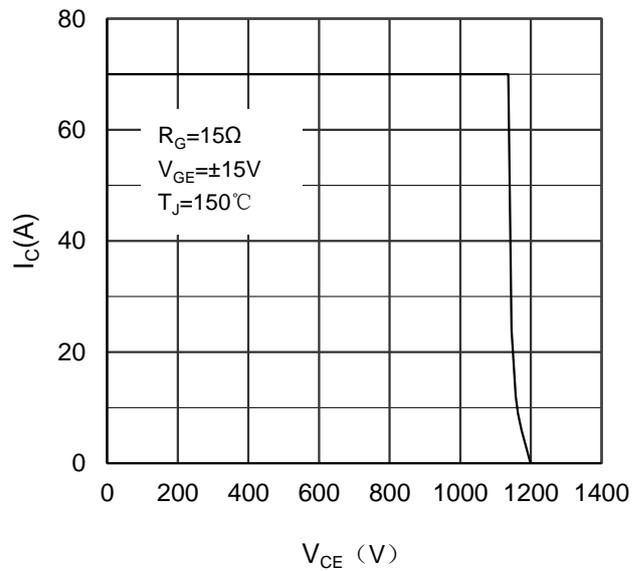


Figure 6. Reverse Biased Safe Operating Area IGBT

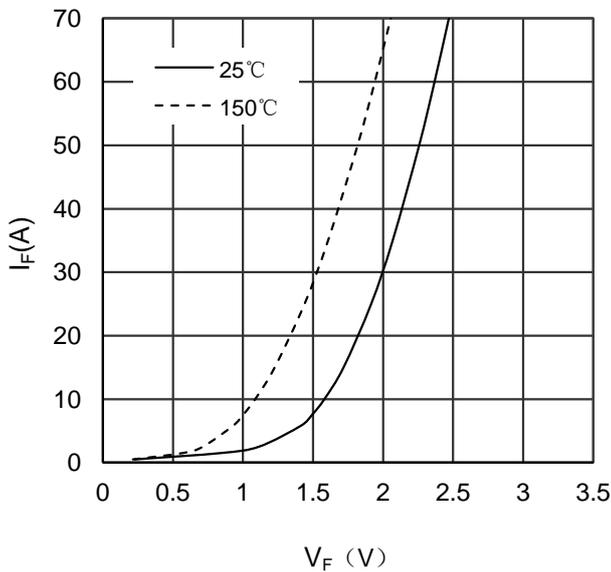


Figure 7. Diode Forward Characteristics Diode

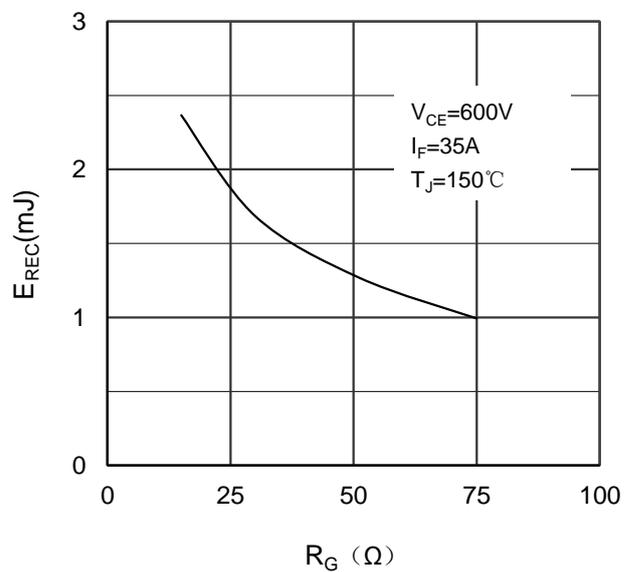


Figure 8. Switching Energy vs Gate Resistor Diode

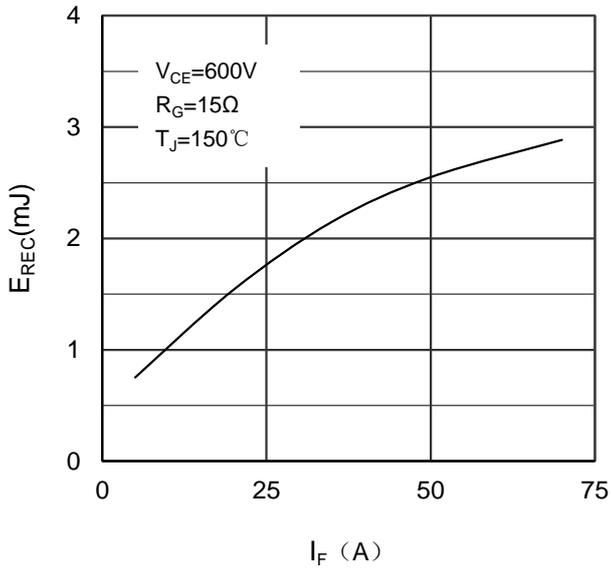


Figure 9. Switching Energy vs Forward Current Diode

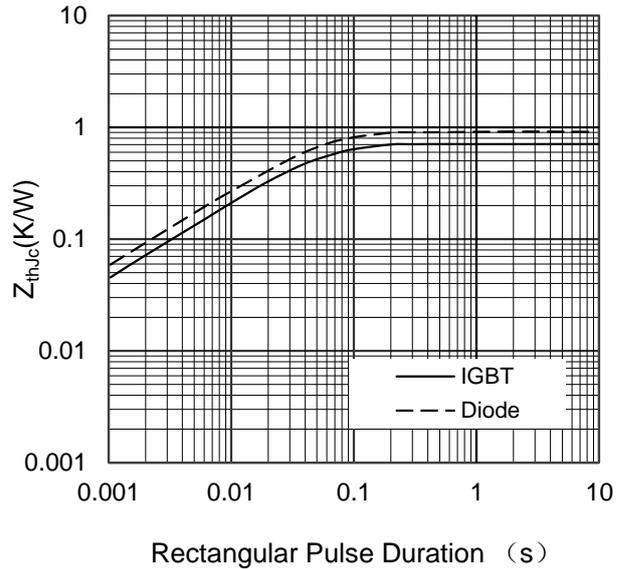


Figure 10. Transient Thermal Impedance of Diode and IGBT

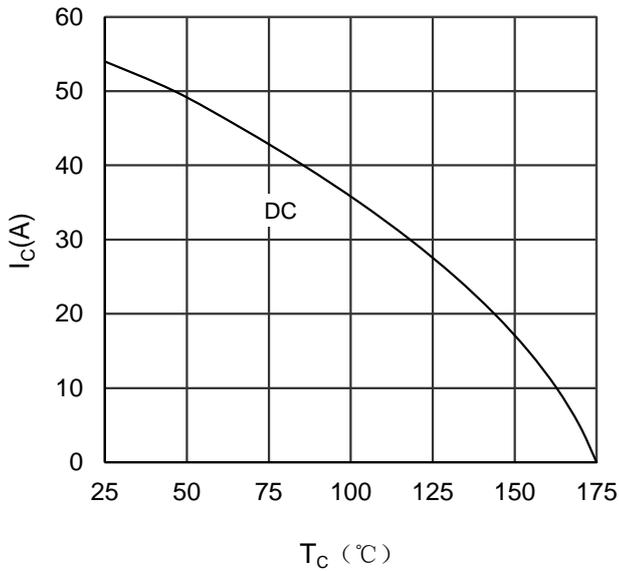


Figure 11. Collector Current vs Case temperature IGBT

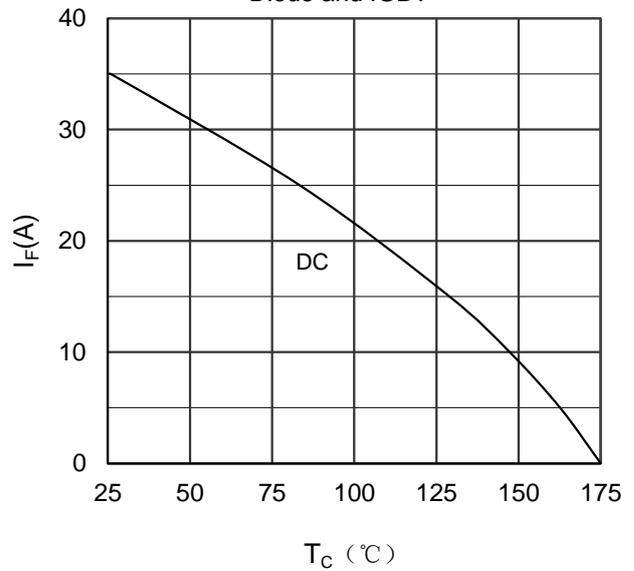


Figure 12. Forward current vs Case temperature Diode

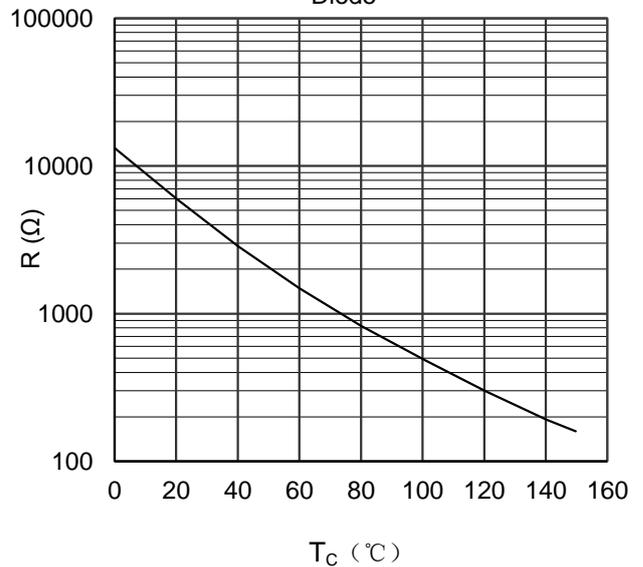


Figure 13. NTC Characteristics

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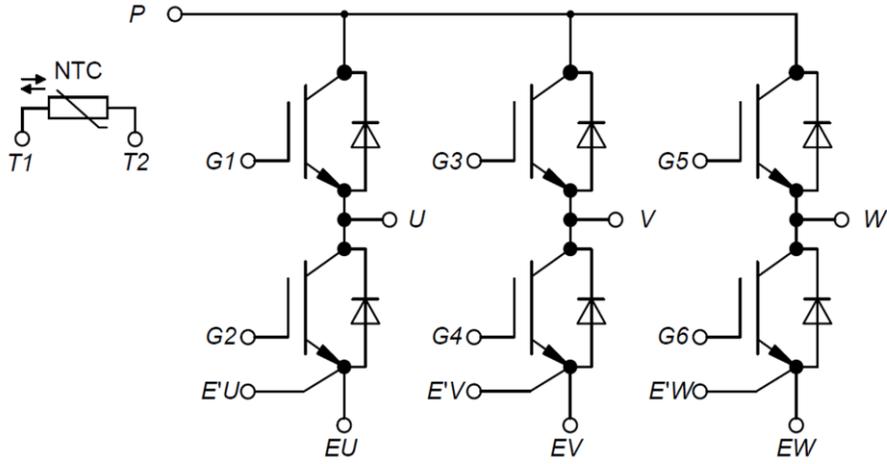
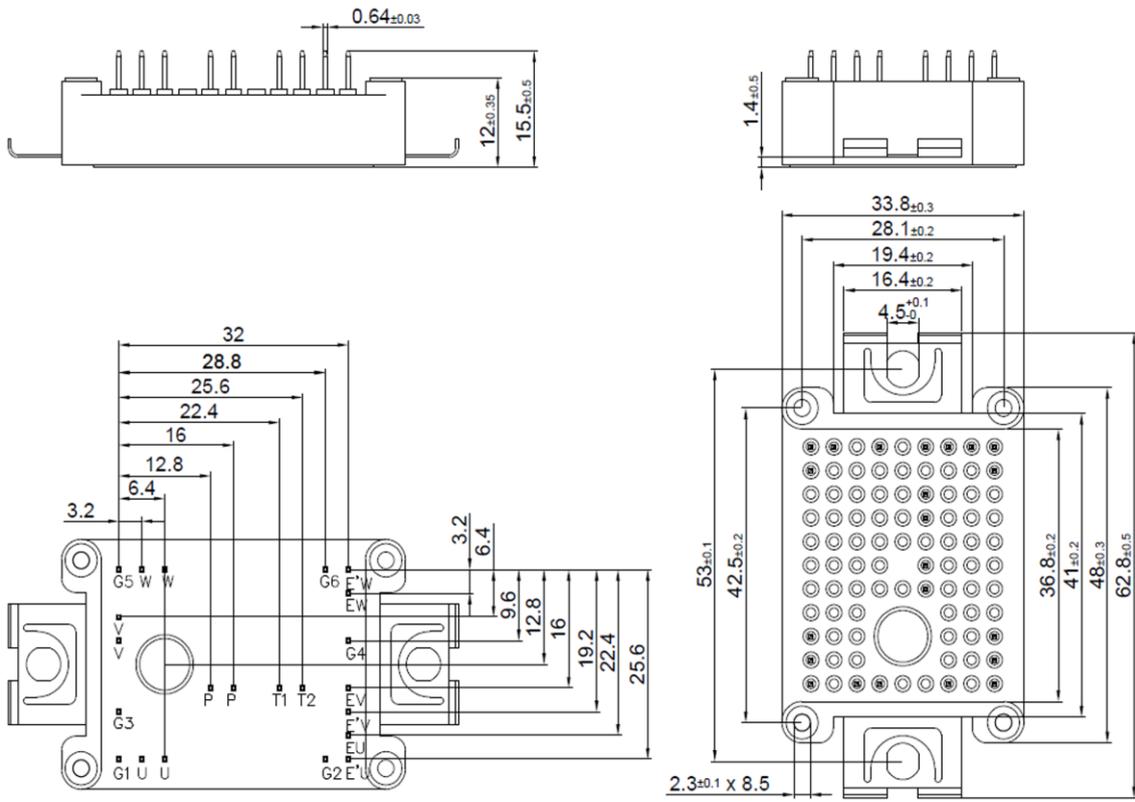


Figure 14. Circuit Diagram



Dimensions in (mm)

Figure 15. Package Outline