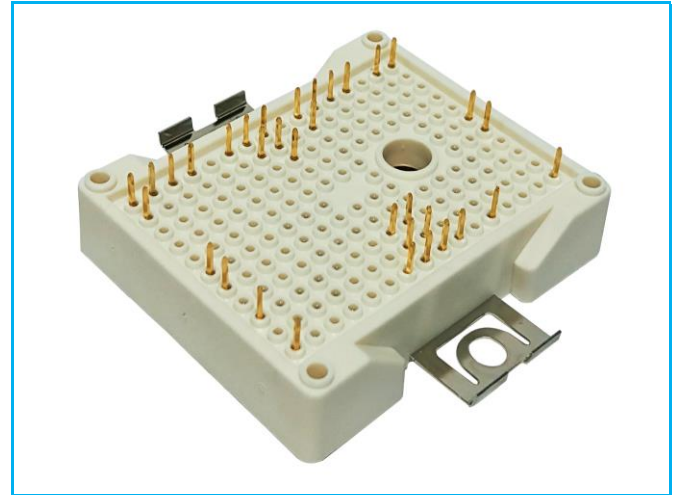


## PRODUCT FEATURES

- 650V IGBT CHIP(Trench+Field Stop technology)
- Low saturation voltage and positive temperature coefficient
- Low switching losses and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Temperature sense included

## APPLICATIONS

- 3-Level-Applications
- Solar Applications
- UPS Systems



### IGBT(T1、 T2、 T3、 T4)

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

Symbol	Parameter/Test Conditions		Values	Unit
$V_{CES}$	Collector Emitter Voltage	$T_J=25^{\circ}\text{C}$	650	V
$V_{GES}$	Gate Emitter Voltage		$\pm 20$	
$I_C$	DC Collector Current	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	150	A
		$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	150	
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1\text{ms}$	300	
$P_{tot}$	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	335	W

### Diode(D1、 D2、 D3、 D4、 D5、 D6)

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

Symbol	Parameter/Test Conditions		Values	Unit
$V_{RRM}$	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	650	V
$I_{F(AV)}$	Average Forward Current		150	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ms}$	300	
$I^2t$		$T_J=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	1700	$\text{A}^2\text{S}$

# MMG150CE065PD6TC

IGBT(T1、T2、T3、T4)

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	$V_{CE}=V_{GE}, I_C=2.4\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.65	2.15	
		$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		1.9		
$I_{CES}$	Collector Leakage Current	$V_{CE}=650\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			1	mA
		$V_{CE}=650\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$			5	
$I_{GES}$	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			2		$\Omega$
$Q_g$	Gate Charge	$V_{CE}=300\text{V}, I_C=150\text{A}, V_{GE}=15\text{V}$		0.7		$\mu\text{C}$
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		9.7		nF
$C_{res}$	Reverse Transfer Capacitance				400	
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=300\text{V}, I_C=150\text{A}$ $R_G=5.1\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		90	ns
			$T_J=150^\circ\text{C}$		100	ns
$t_r$	Rise Time		$T_J=25^\circ\text{C}$		70	ns
			$T_J=150^\circ\text{C}$		80	ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=300\text{V}, I_C=150\text{A}$ $R_G=5.1\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		330	ns
			$T_J=150^\circ\text{C}$		370	ns
$t_f$	Fall Time		$T_J=25^\circ\text{C}$		60	ns
			$T_J=150^\circ\text{C}$		70	ns
$E_{on}$	Turn on Energy	$V_{CC}=300\text{V}, I_C=150\text{A}$ $R_G=5.1\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		3.8	mJ
			$T_J=150^\circ\text{C}$		5.5	mJ
$E_{off}$	Turn off Energy		$T_J=25^\circ\text{C}$		4	mJ
			$T_J=150^\circ\text{C}$		5.1	mJ
$I_{SC}$	Short Circuit Current	$tp_{sc}\leq 6\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=360\text{V}$		700		A
$R_{thJC}$	Junction to Case Thermal Resistance ( Per IGBT )			0.4	0.45	K /W

Diode(D1、D2、D3、D4、D5、D6)

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.55	1.95	V
		$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.45		
$t_{rr}$	Reverse Recovery Time	$I_F=150\text{A}, V_R=300\text{V}$ $di_F/dt=-1600\text{A}/\mu\text{s}$ $T_J=150^\circ\text{C}$		220		ns
$I_{RRM}$	Max. Reverse Recovery Current			93		A
$Q_{RR}$	Reverse Recovery Charge			10.8		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			3.2		mJ
$R_{thJCD}$	Junction to Case Thermal Resistance ( Per Diode )				0.55	K /W

# MMG150CE065PD6TC

## 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 $\Omega$
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$		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	°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		40~80	N
Weight			50	g

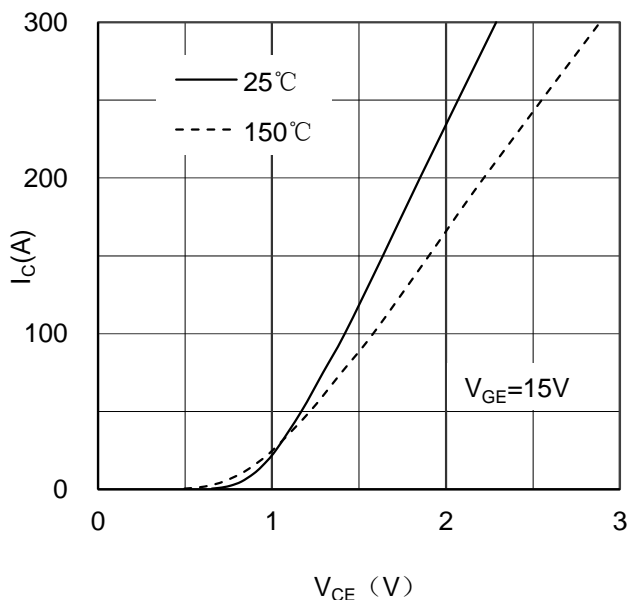


Figure 1. Typical Output Characteristics IGBT

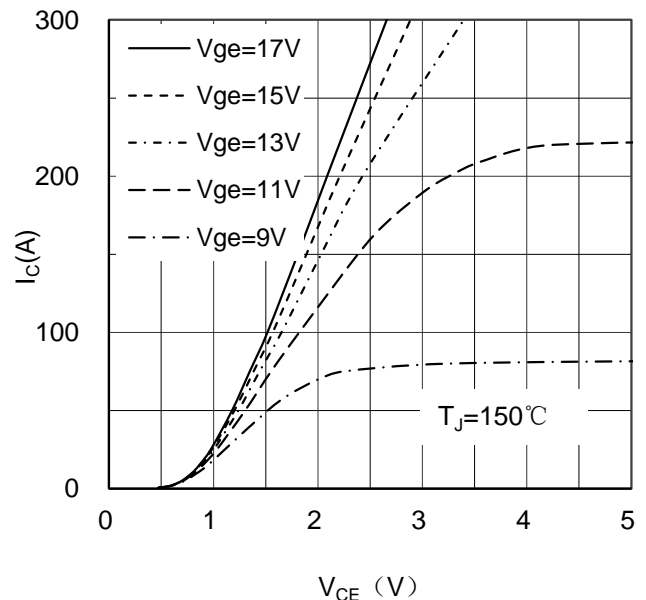


Figure 2. Typical Output Characteristics IGBT

# MMG150CE065PD6TC

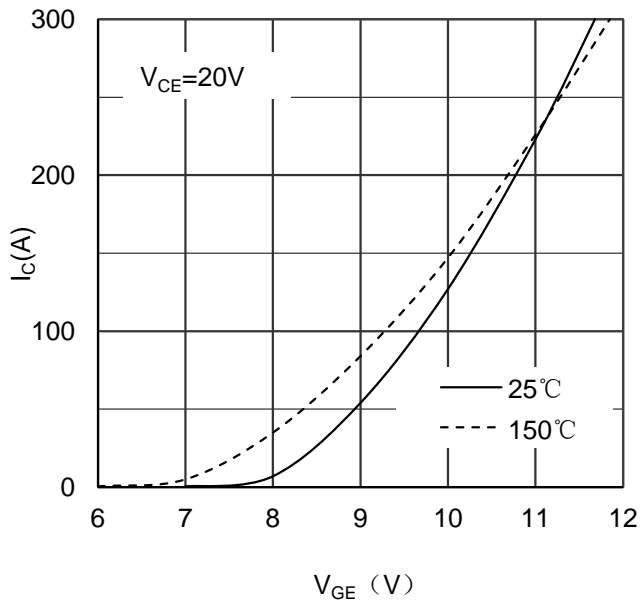


Figure 3. Typical Transfer characteristics IGBT

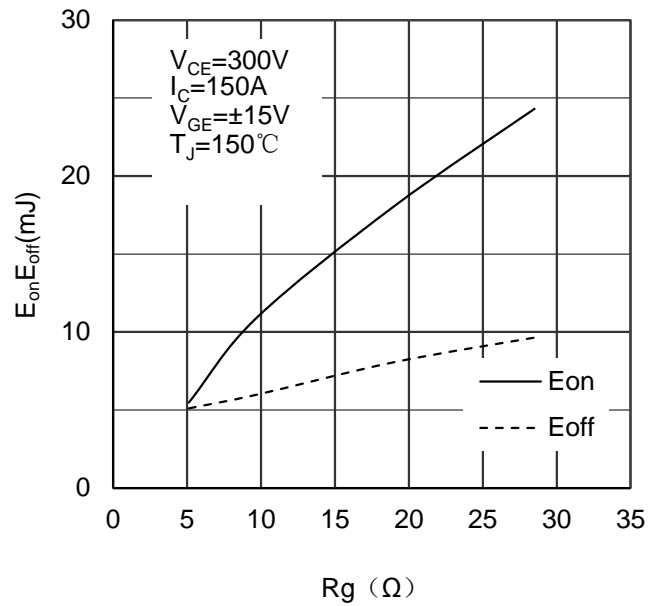


Figure 4. Switching Energy vs Gate Resistor IGBT

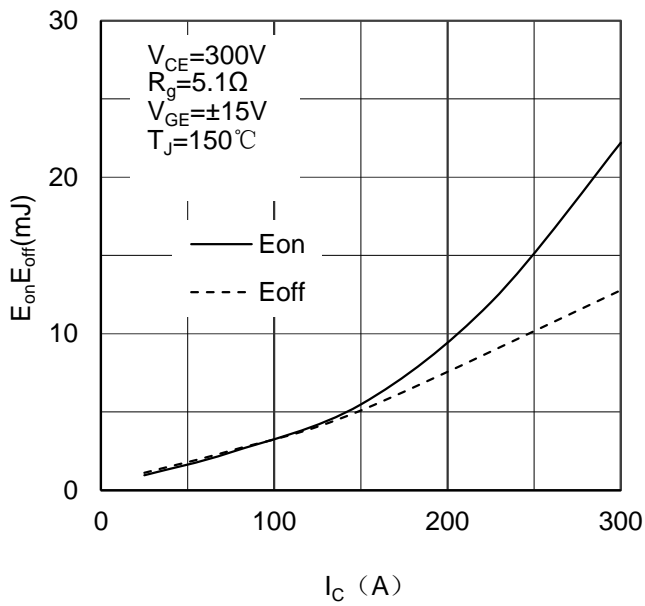


Figure 5. Switching Energy vs Collector Current IGBT

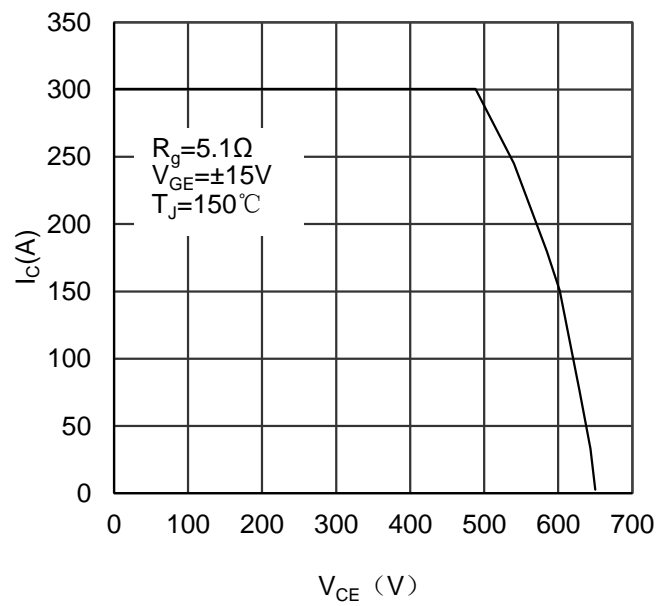


Figure 6. Reverse Biased Safe Operating Area IGBT

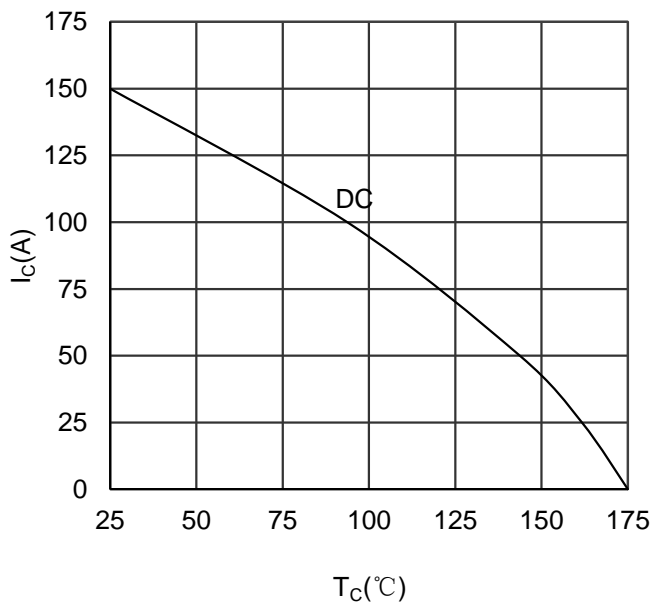


Figure 7. Collector Current vs Case temperature IGBT

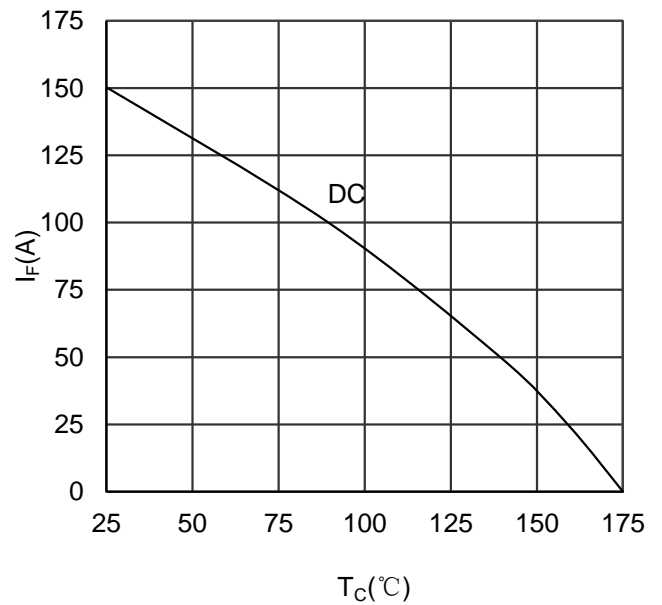


Figure 8. Forward current vs Case temperature Diode

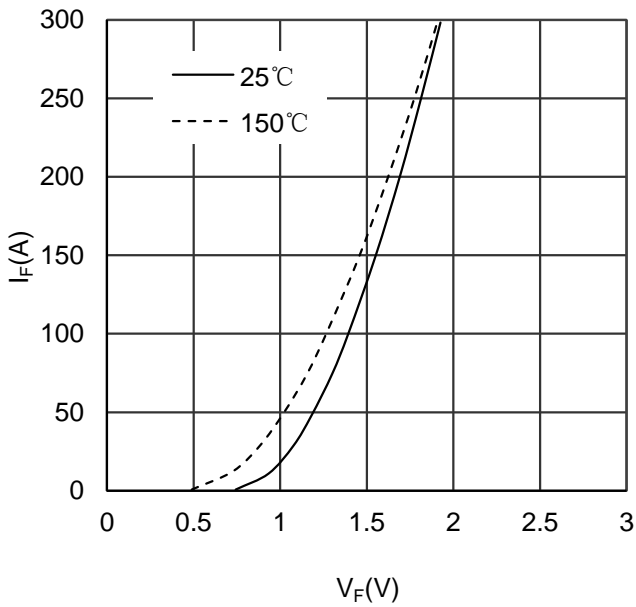


Figure 9. Diode Forward Characteristics Diode

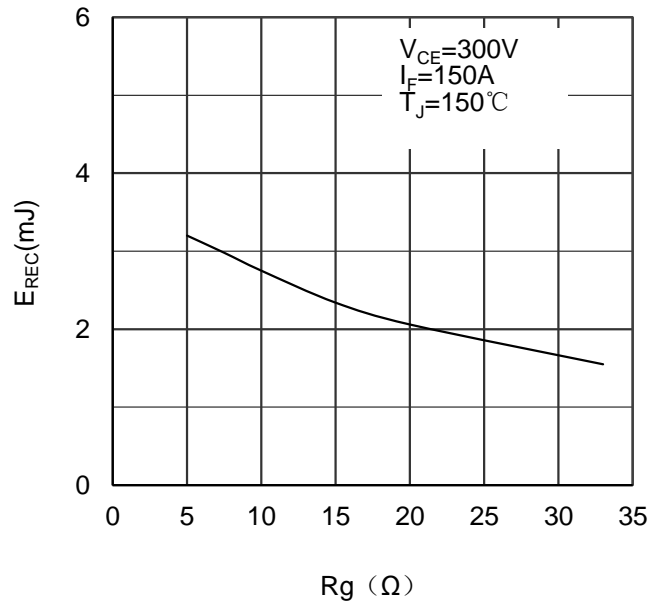


Figure 10. Switching Energy vs Gate Resistor Diode

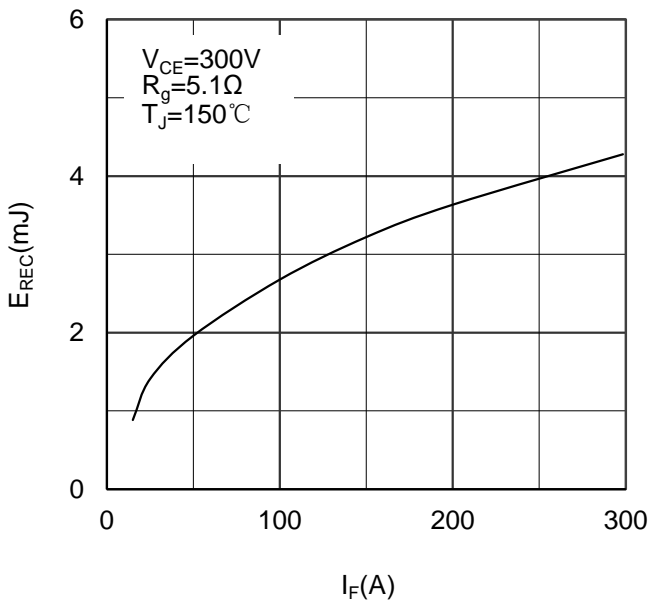


Figure 11. Switching Energy vs Forward Current Diode

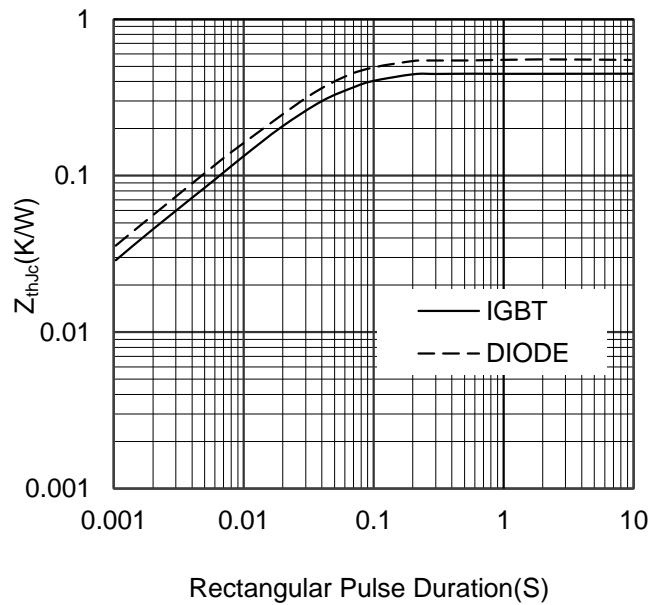


Figure 12. Transient Thermal Impedance of Diode and IGBT

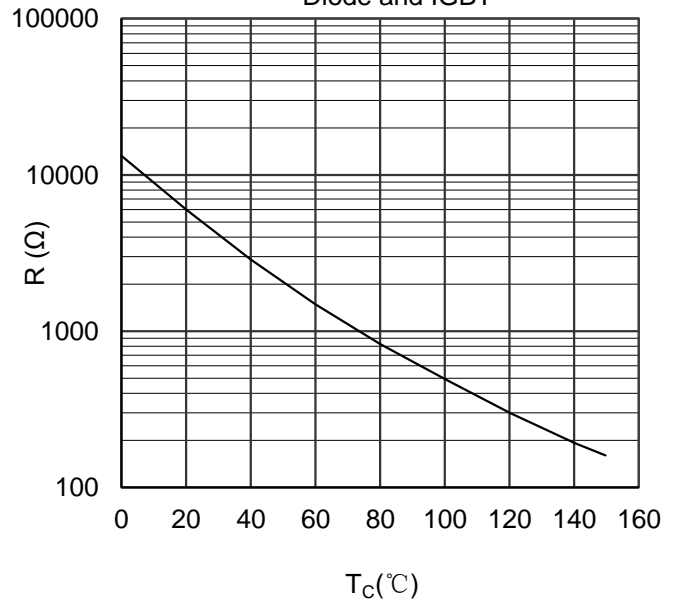


Figure 13. NTC Characteristics

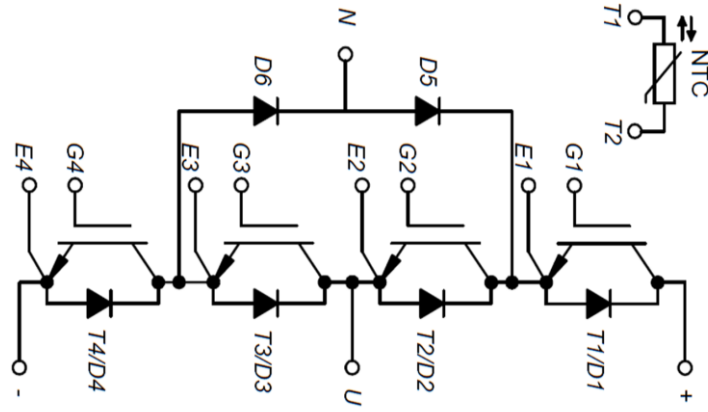
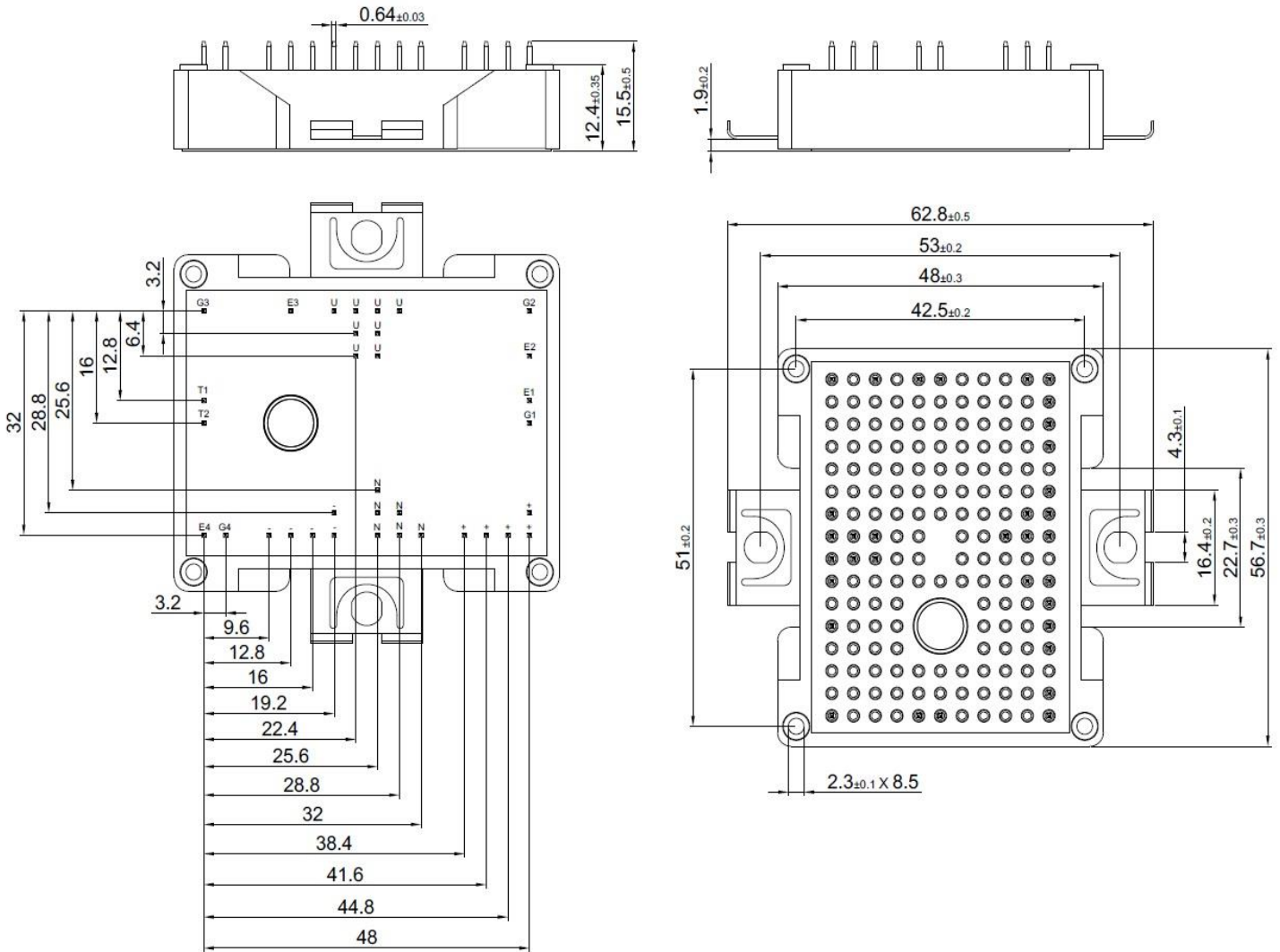


Figure 14. Circuit Diagram



Dimensions in (mm)  
Figure 15. Package Outline