

## PRODUCT FEATURES

- IGBT CHIP(Trench+Field Stop technology)
- $V_{CE(sat)}$  with positive temperature coefficient
- High short circuit capability
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses

## APPLICATIONS

- High frequency switching application
- Medical applications
- Motion/servo control
- UPS systems



## IGBT

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

Symbol	Parameter/Test Conditions		Values	Unit
$V_{CES}$	Collector Emitter Voltage	$T_J=25^{\circ}C$	1200	V
$V_{GES}$	Gate Emitter Voltage		$\pm 20$	
$I_C$	DC Collector Current	$T_C=25^{\circ}C, T_{Jmax}=175^{\circ}C$	218	A
		$T_C=95^{\circ}C, T_{Jmax}=175^{\circ}C$	150	
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1ms$	300	
$P_{tot}$	Power Dissipation Per IGBT	$T_C=25^{\circ}C, T_{Jmax}=175^{\circ}C$	750	W

## Diode

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

Symbol	Parameter/Test Conditions		Values	Unit
$V_{RRM}$	Repetitive Reverse Voltage	$T_J=25^{\circ}C$	1200	V
$I_{F(AV)}$	Average Forward Current		150	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1ms$	300	
$I^2t$		$T_J=125^{\circ}C, t=10ms, V_R=0V$	6050	$A^2S$

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# MMG150S120UA6TC

## 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	$V_{CE}=V_{GE}, I_C=6\text{mA}$	5.0	5.8	6.5	V	
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.85	2.25		
		$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.15			
		$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=150^\circ\text{C}$		2.2			
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			1	mA	
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$			10		
$I_{GES}$	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			4		$\Omega$	
$Q_g$	Gate Charge	$V_{CE}=600\text{V}, I_C=150\text{A}, V_{GE}=15\text{V}$		0.75		$\mu\text{C}$	
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		10.5		nF	
$C_{res}$	Reverse Transfer Capacitance				500		pF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=150\text{A}$ $R_G=3.6\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		100	ns	
			$T_J=125^\circ\text{C}$		120	ns	
			$T_J=150^\circ\text{C}$		130	ns	
$t_r$	Rise Time		$T_J=25^\circ\text{C}$		48	ns	
			$T_J=125^\circ\text{C}$		52	ns	
			$T_J=150^\circ\text{C}$		54	ns	
$t_{d(off)}$	Turn off Delay Time	$T_J=25^\circ\text{C}$		350	ns		
		$T_J=125^\circ\text{C}$		410	ns		
		$T_J=150^\circ\text{C}$		430	ns		
$t_f$	Fall Time	$T_J=25^\circ\text{C}$		100	ns		
		$T_J=125^\circ\text{C}$		160	ns		
		$T_J=150^\circ\text{C}$		180	ns		
$E_{on}$	Turn on Energy	$V_{CC}=600\text{V}, I_C=150\text{A}$ $R_G=3.6\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=125^\circ\text{C}$		18.4	mJ	
			$T_J=150^\circ\text{C}$		20.2	mJ	
$E_{off}$	Turn off Energy		$T_J=125^\circ\text{C}$		13	mJ	
			$T_J=150^\circ\text{C}$		14.2	mJ	
$I_{SC}$	Short Circuit Current		$t_{psc}\leq 10\mu\text{S}, V_{GE}=15\text{V}$ $T_J=150^\circ\text{C}, V_{CC}=800\text{V}$		560		A
$R_{thJC}$	Junction to Case Thermal Resistance (Per IGBT)				0.2	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	$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.8	2.3	V
		$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.55		
		$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.5		
$t_{rr}$	Reverse Recovery Time	$I_F=150\text{A}, V_R=600\text{V}$ $dI_F/dt=-3500\text{A}/\mu\text{s}$ $T_J=150^\circ\text{C}$		320		ns
$I_{RRM}$	Max. Reverse Recovery Current			265		A
$Q_{RR}$	Reverse Recovery Charge			38		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			15.6		mJ
$R_{thJCD}$	Junction to Case Thermal Resistance (Per Diode)				0.36	K/W

# MMG150S120UA6TC

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	
Torque	to heatsink	Recommended (M6)	3~5	Nm
	to terminal	Recommended (M5)	2.5~5	Nm
Weight			160	g

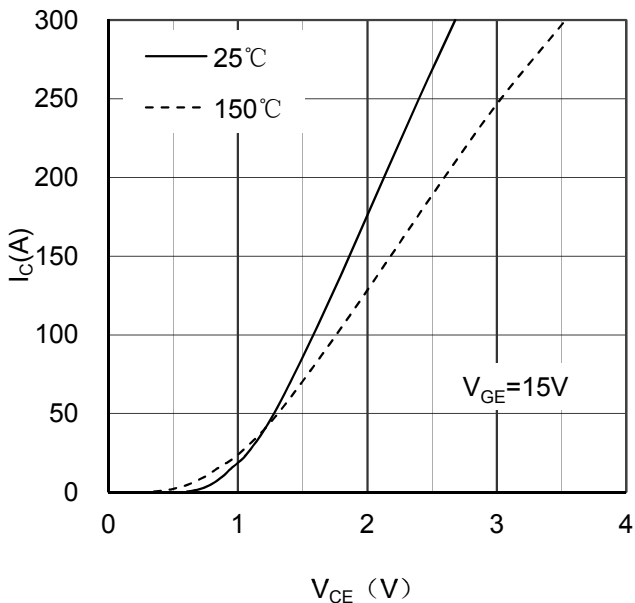


Figure 1. Typical Output Characteristics IGBT

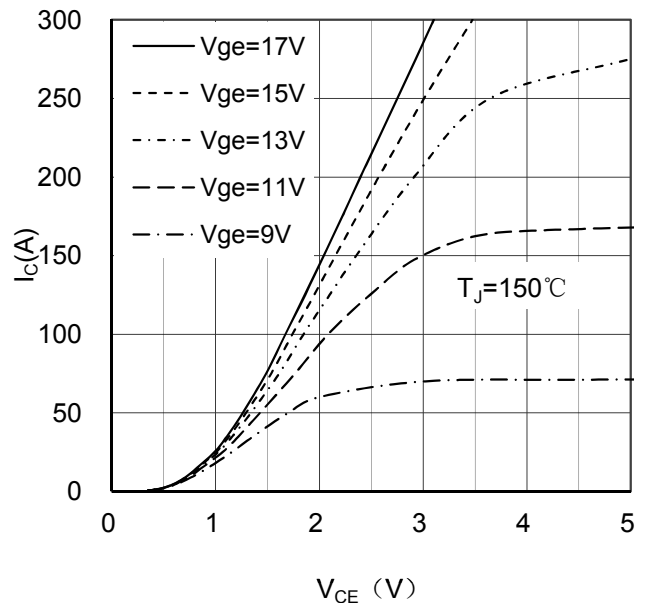


Figure 2. Typical Output Characteristics IGBT

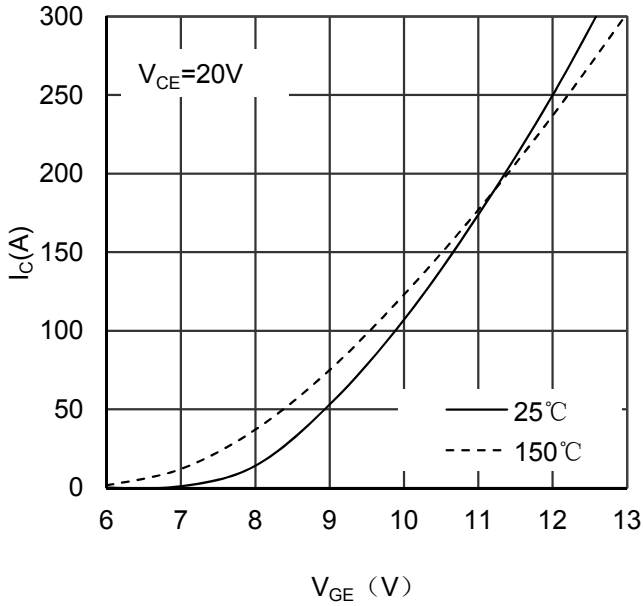


Figure 3. Typical Transfer characteristics IGBT

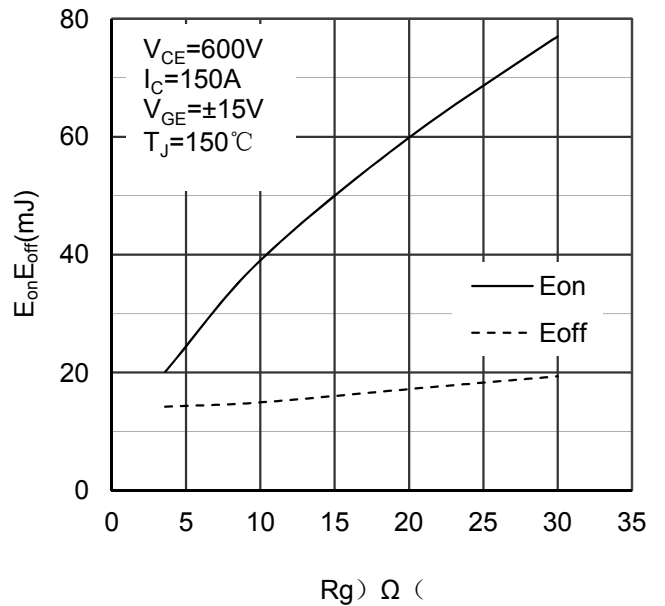


Figure 4. Switching Energy vs Gate Resistor IGBT

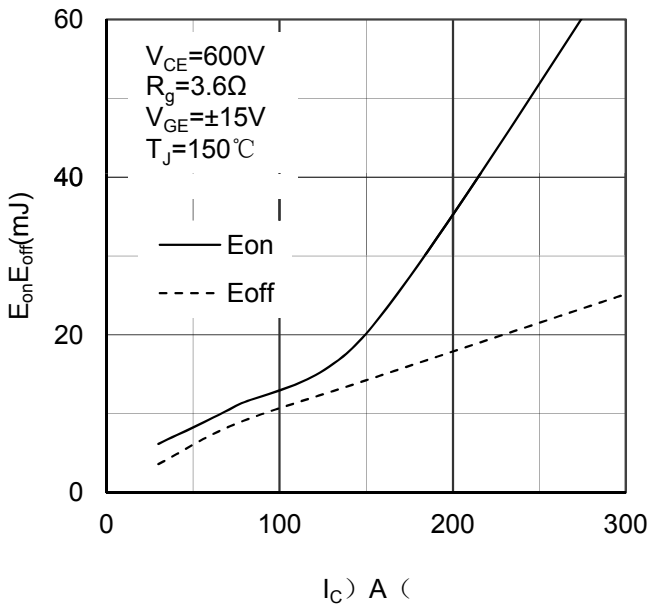


Figure 5. Switching Energy vs Collector Current IGBT

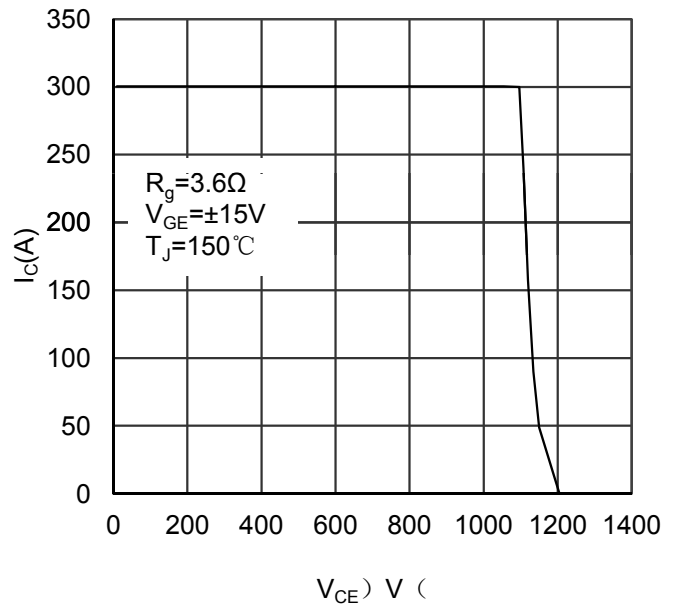


Figure 6. Reverse Biased Safe Operating Area IGBT

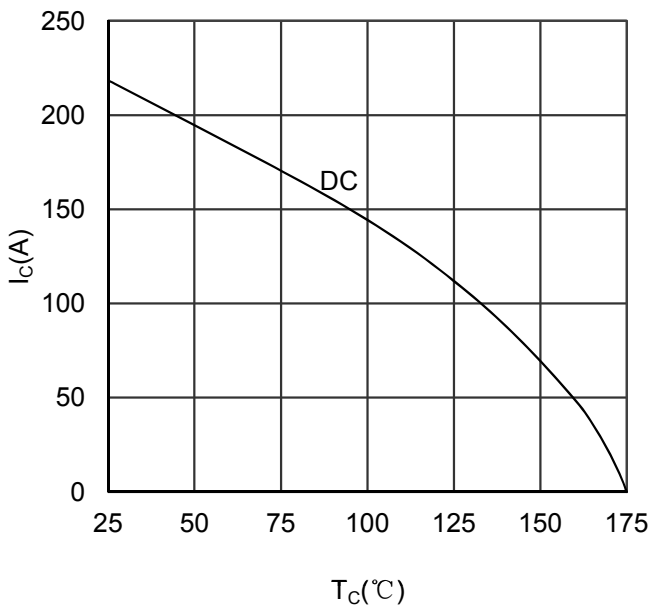


Figure 7. Collector Current vs Case temperature IGBT

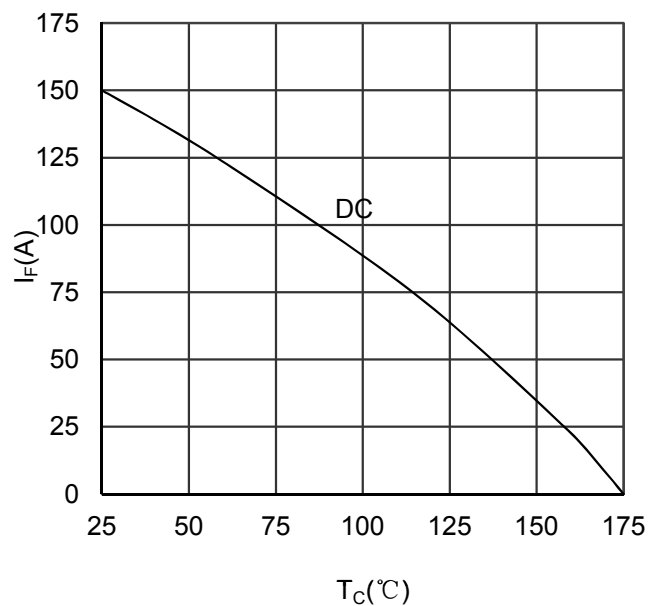


Figure 8. Forward current vs Case temperature Diode

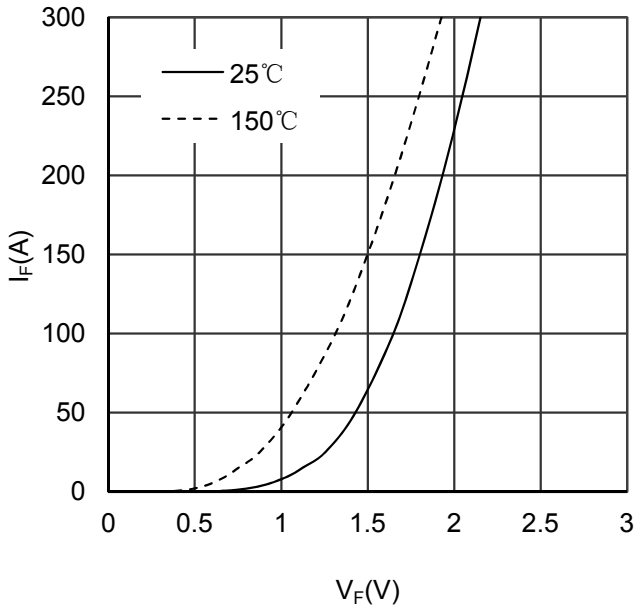


Figure 9. Diode Forward Characteristics Diode

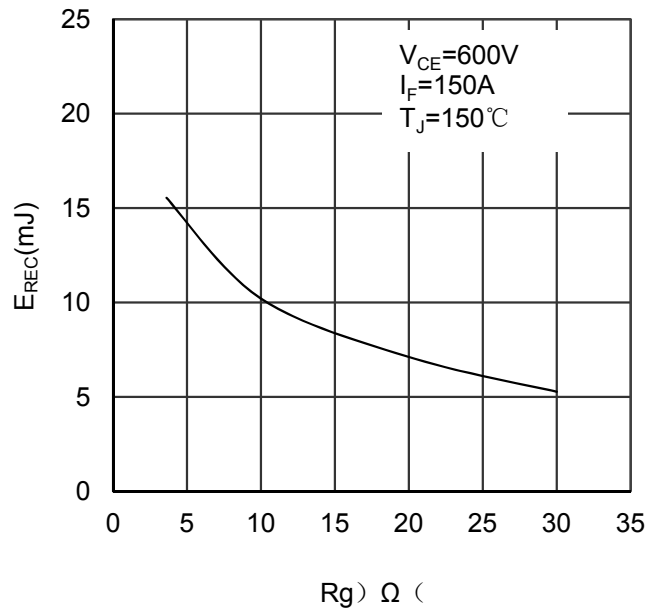


Figure 10. Switching Energy vs Gate Resistor Diode

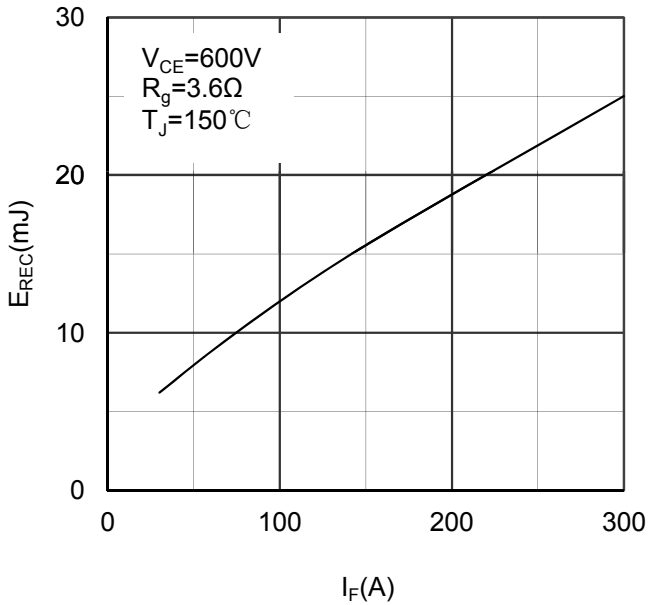


Figure 11. Switching Energy vs Forward Current Diode

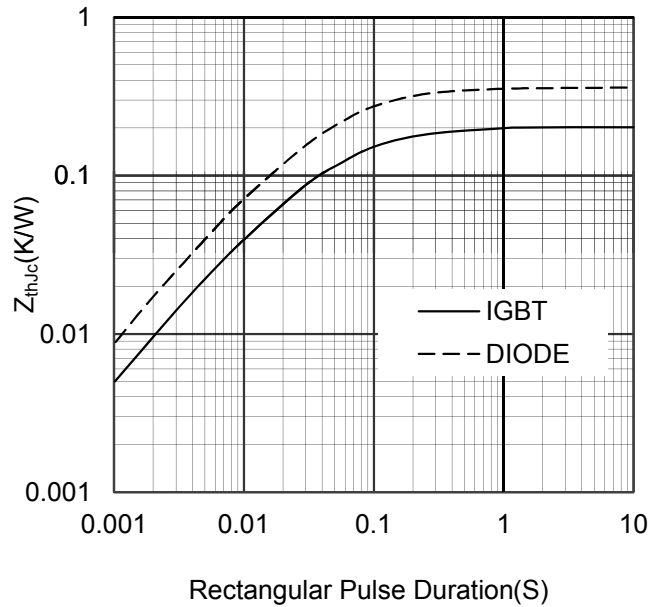


Figure 12. Transient Thermal Impedance of Diode and IGBT

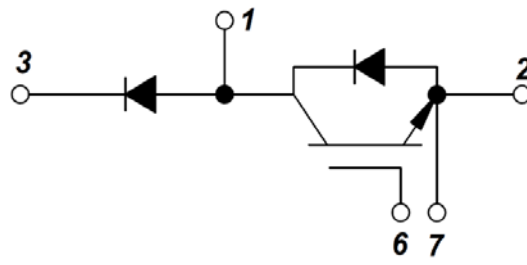
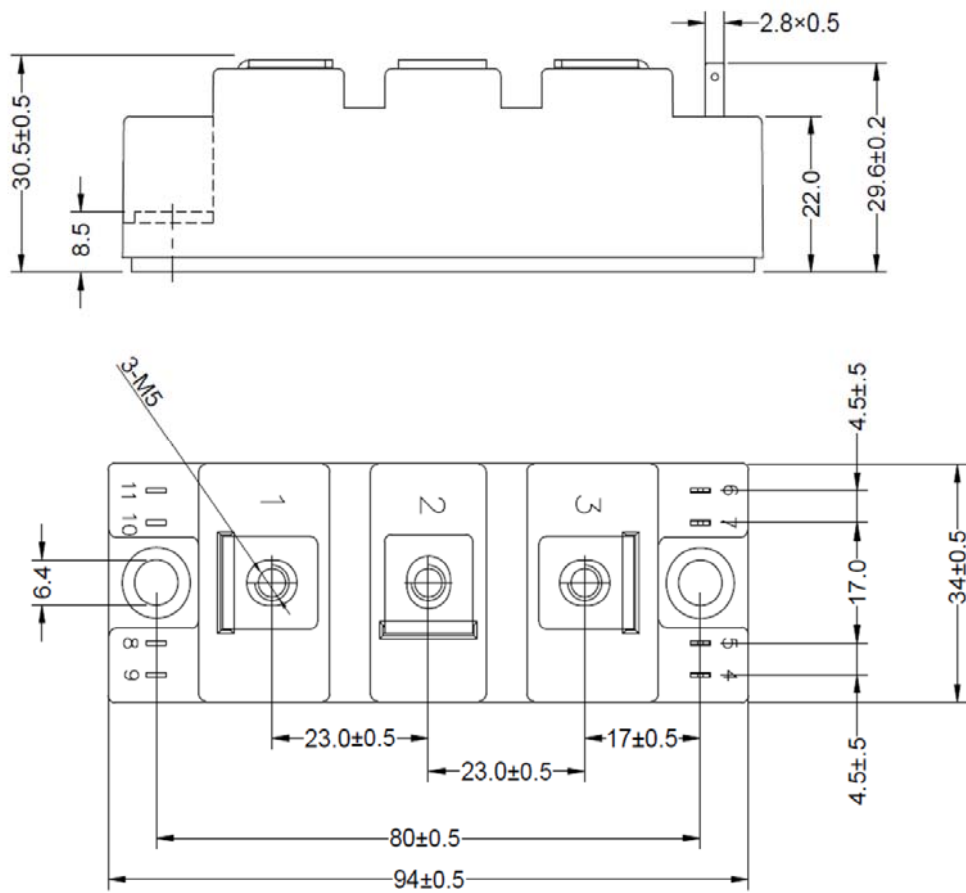


Figure 13. Circuit Diagram



Dimensions in (mm)  
Figure 14. Package Outline