

## 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(T1 T2)-ABSOLUTE MAXIMUM RATINGS( $T_C=25^{\circ}C$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Values	Unit
$V_{CES}$	Collector Emitter Voltage	$T_J=25^{\circ}C$	V
$V_{GES}$	Gate Emitter Voltage		
$I_C$	DC Collector Current	$T_C=25^{\circ}C, T_{Jmax}=175^{\circ}C$	422
		$T_C=90^{\circ}C, T_{Jmax}=175^{\circ}C$	300
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1ms$	600
$P_{tot}$	Power Dissipation Per IGBT	$T_C=25^{\circ}C, T_{Jmax}=175^{\circ}C$	1428

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

Symbol	Parameter/Test Conditions	Values	Unit
Diode-Serial(D3 D4)			
$V_{RRM}$	Repetitive Reverse Voltage	$T_J=25^{\circ}C$	1200
$I_{F(AV)}$	Average Forward Current		300
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1ms$	600
$I^2t$		$T_J=125^{\circ}C, t=10ms, V_R=0V$	18000
Reverse-Diode(D1 D2)			
$V_{RRM}$	Repetitive Reverse Voltage	$T_J=25^{\circ}C$	1200
$I_{F(AV)}$	Average Forward Current		35
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1ms$	70
$I^2t$		$T_J=125^{\circ}C, t=10ms, V_R=0V$	250

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# MMG300B120DKA6TC

## IGBT(T1 T2)

### 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	$V_{CE}=V_{GE}, I_C=12\text{mA}$	5.0	5.8	6.5	V	
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^{\circ}\text{C}$		1.85	2.25		
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=150^{\circ}\text{C}$		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	
$I_{GES}$	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			1.8		$\Omega$	
$Q_g$	Gate Charge	$V_{CE}=600\text{V}, I_C=300\text{A}, V_{GE}=15\text{V}$		1.5		$\mu\text{C}$	
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		21		nF	
$C_{res}$	Reverse Transfer Capacitance				1		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		90		ns
			$T_J=150^{\circ}\text{C}$		110		ns
$t_r$	Rise Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		72		ns
			$T_J=150^{\circ}\text{C}$		76		ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		450		ns
			$T_J=150^{\circ}\text{C}$		500		ns
$t_f$	Fall Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		80		ns
			$T_J=150^{\circ}\text{C}$		220		ns
$E_{on}$	Turn on Energy	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.7\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		17.5		mJ
			$T_J=150^{\circ}\text{C}$		29.2		mJ
$E_{off}$	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^{\circ}\text{C}$		18.5		mJ
			$T_J=150^{\circ}\text{C}$		29		mJ
$I_{sc}$	Short Circuit Current	$t_{psc}\leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^{\circ}\text{C}, V_{CC}=800\text{V}$		1200		A	
$R_{thJC}$	Junction to Case Thermal Resistance (Per IGBT)				0.105	K/W	

## Diode

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
Diode-Serial(D3 D4)						
$V_F$	Forward Voltage	$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.8	2.3	V
		$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$		1.5		
$I_{RRM}$	Max. Reverse Recovery Current	$I_F=300\text{A}, V_R=600\text{V}$		290		A
$Q_{RR}$	Reverse Recovery Charge	$dI_F/dt=-5600\text{A}/\mu\text{s}$		56.3		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy	$T_J=150^{\circ}\text{C}$		21.5		mJ
$R_{thJCD}$	Junction to Case Thermal Resistance ( Per Diode)				0.18	K/W
Reverse-Diode(D1 D2)						
$V_F$	Forward Voltage	$I_F=35\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.85	2.4	V
		$I_F=35\text{A}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$		1.55		
$I_{RRM}$	Max. Reverse Recovery Current	$I_F=35\text{A}, V_R=600\text{V}$		38		A
$Q_{RR}$	Reverse Recovery Charge	$dI_F/dt=-1000\text{A}/\mu\text{s}$		9.2		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy	$T_J=150^{\circ}\text{C}$		3.3		mJ
$R_{thJCD}$	Junction to Case Thermal Resistance ( Per Diode)				1.1	K/W

# MMG300B120DKA6TC

## 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
Torque	to heatsink	Recommended (M6)	3~5	Nm
	to terminal	Recommended (M6)	3~5	Nm
Weight			300	g

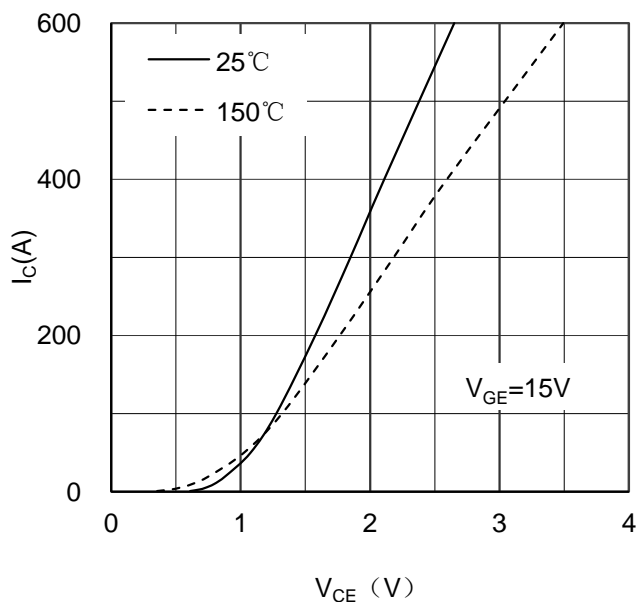


Figure 1. Typical Output Characteristics IGBT

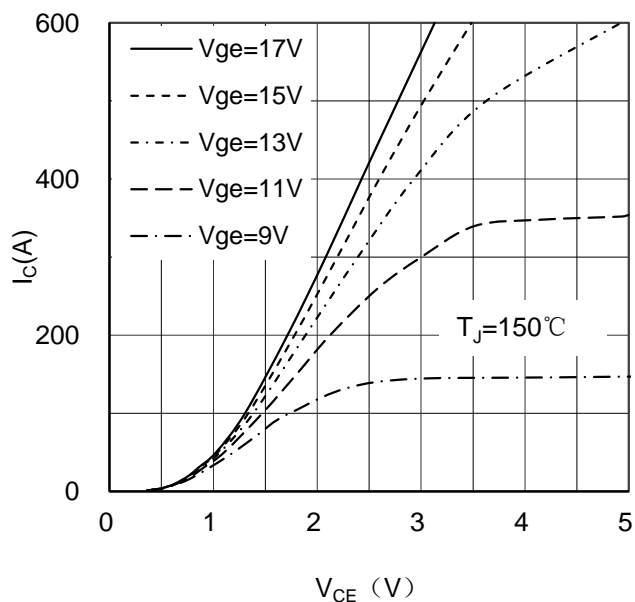


Figure 2. Typical Output Characteristics IGBT

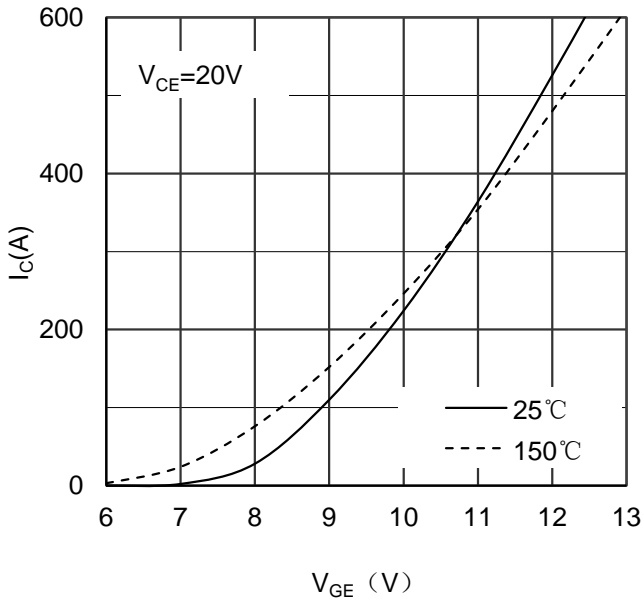


Figure 3. Typical Transfer characteristics IGBT

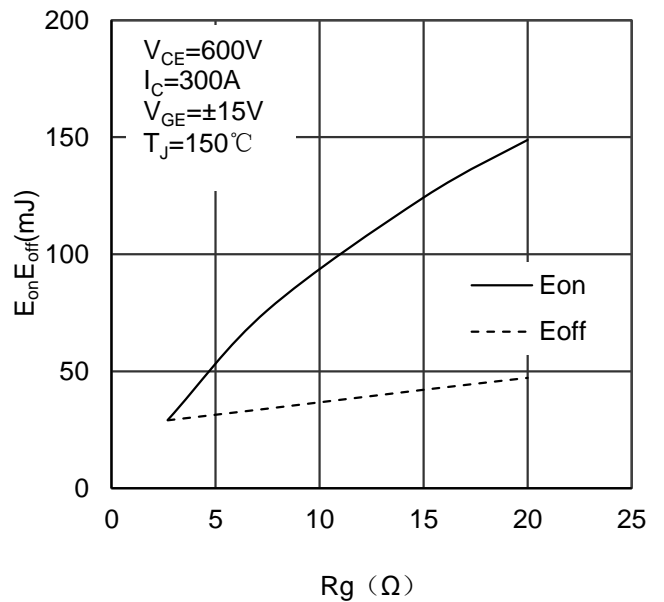


Figure 4. Switching Energy vs Gate Resistor IGBT

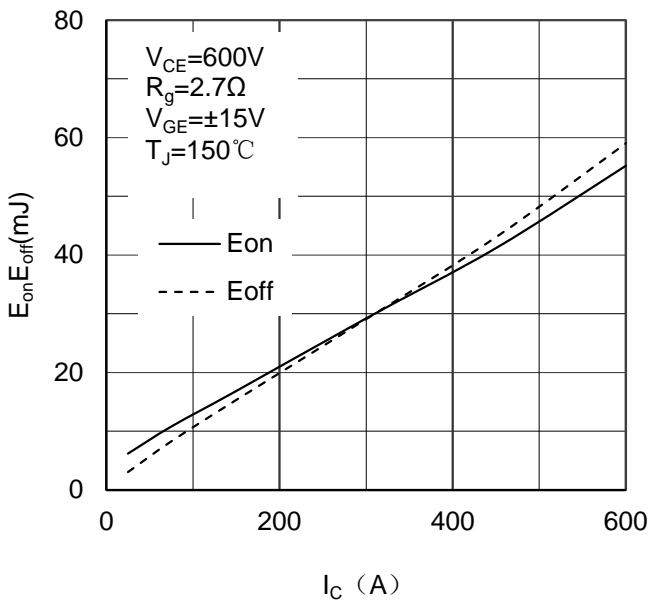


Figure 5. Switching Energy vs Collector Current IGBT

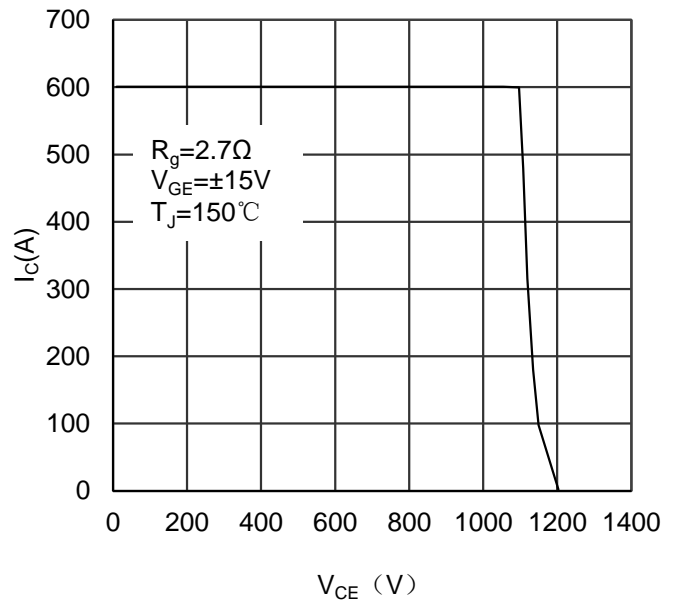


Figure 6. Reverse Biased Safe Operating Area IGBT

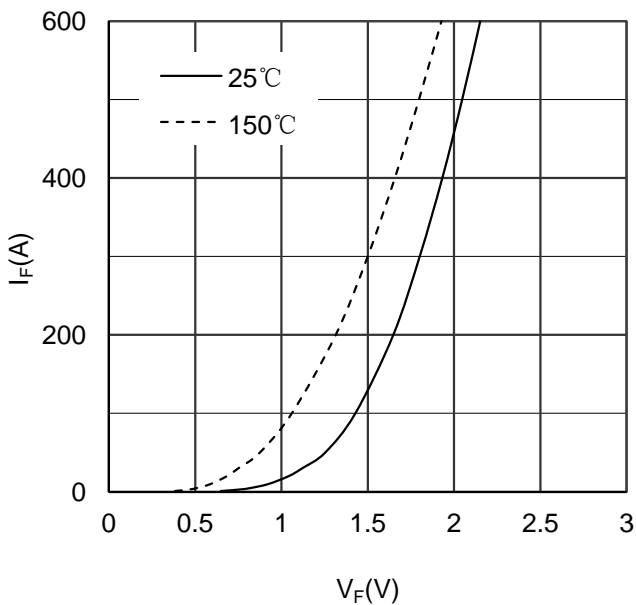


Figure 7. Diode Forward Characteristics Diode-Serial

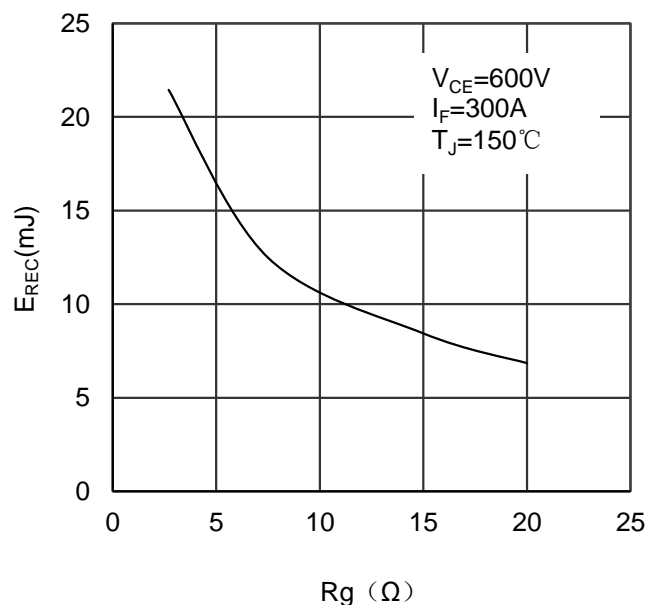


Figure 8. Switching Energy vs Gate Resistor Diode-Serial

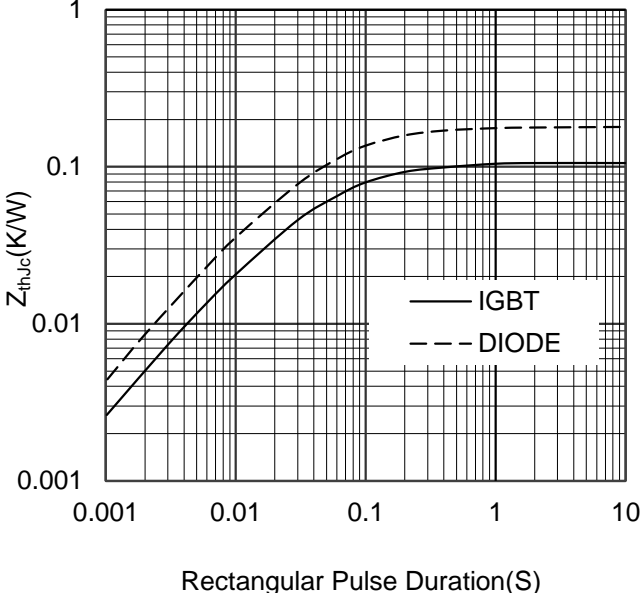
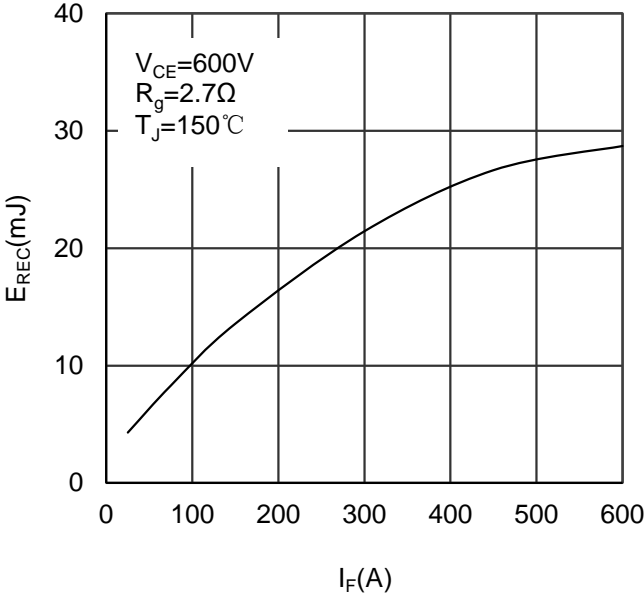


Figure 9. Switching Energy vs Forward Current Diode-Serial

Figure 10. Transient Thermal Impedance of Diode-Serial and IGBT

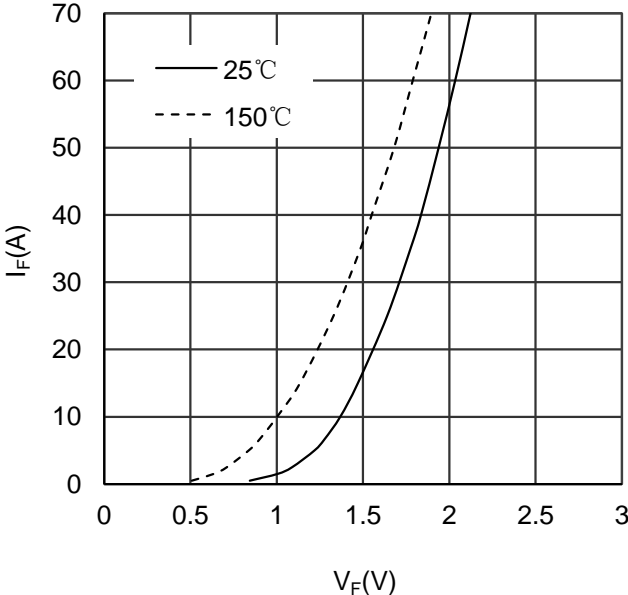


Figure 11. Diode Forward Characteristics Reverse-Diode

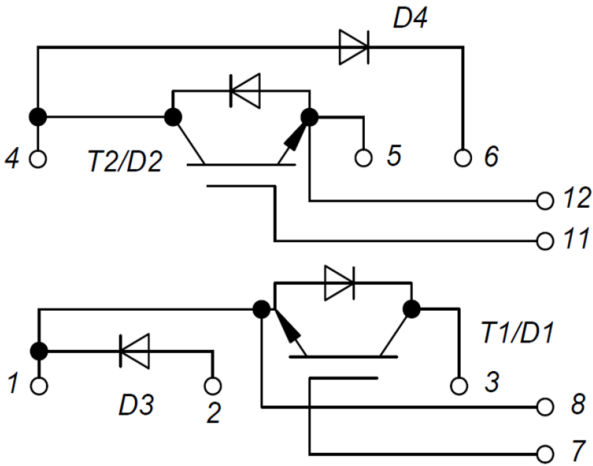
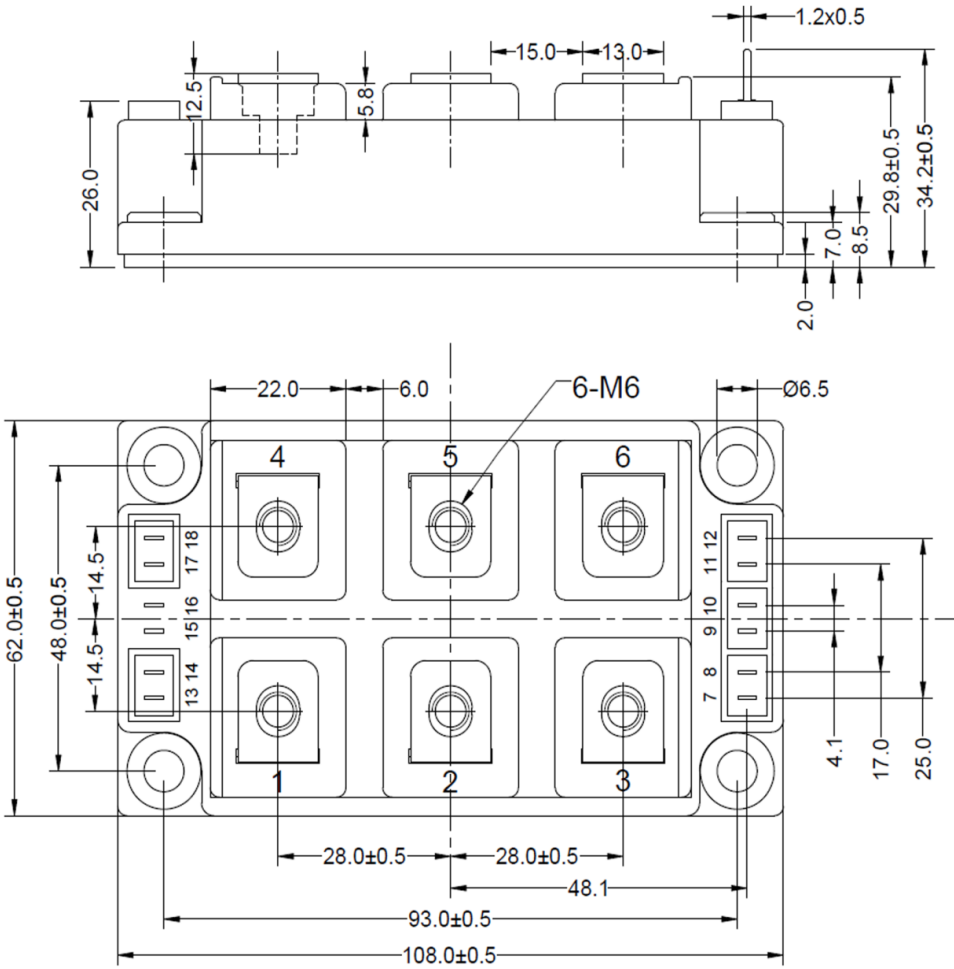


Figure 12. Circuit Diagram



Dimensions in (mm)

Figure 13. Package Outline