MMG100S120B6TC

MACMIC

1200V 100A IGBT Module

November 2020 | Version 02 | RoHS Compliant

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-inverter

ABSOLUTE MAXIMUM RATINGS(*T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	1200	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃, T_{Jmax}=175℃	147	A
		T_C=95℃, T_{Jmax}=175℃	100	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	200	
P_{tot}	Power Dissipation Per IGBT	T_C=25℃, T_{Jmax}=175℃	515	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS (*T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	1200	V
$I_{F(AV)}$	Average Forward Current		100	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	200	
I^2t		T_J=125℃, t=10ms, V_R=0V	2450	A^2S

IGBT-inverter

ELECTRICAL CHARACTERISTICS *(T_C =25°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=4mA		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=100A, V_{GE}=15V, T_J=25℃			1.8	2.25	V
		I_C=100A, V_{GE}=15V, T_J=125℃			2.1		
		I_C=100A, V_{GE}=15V, T_J=150℃			2.15		
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=1200V, V_{GE}=0V, T_J=150℃				10	
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±20V, T_J=25℃		-400		400	nA
R_{gint}	Integrated Gate Resistor				7		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=100A , V_{GE}=15V			0.53		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			7.1		nF
C_{res}	Reverse Transfer Capacitance				300		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=600V,I_C=100A R_G =5.1Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		160		ns
			T_J=125℃		180		ns
			T_J=150℃		190		ns
t_r	Rise Time		T_J=25℃		50		ns
			T_J=125℃		52		ns
			T_J=150℃		54		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=600V,I_C=100A R_G =5.1Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		350		ns
			T_J=125℃		390		ns
			T_J=150℃		410		ns
t_f	Fall Time		T_J=25℃		100		ns
			T_J=125℃		160		ns
			T_J=150℃		180		ns
E_{on}	Turn on Energy	V_{CC}=600V,I_C=100A R_G =5.1Ω, V_{GE}=±15V, Inductive Load	T_J=125℃		14.5		mJ
			T_J=150℃		16.5		mJ
E_{off}	Turn off Energy		T_J=125℃		8.1		mJ
			T_J=150℃		8.6		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=125℃,V_{CC}=800V			420		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)					0.29	K /W

Diode-inverter

ELECTRICAL CHARACTERISTICS *(T_C =25°C unless otherwise specified)*

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=100A , V_{GE}=0V, T_J =25℃		1.75	2.3	V
		I_F=100A , V_{GE}=0V, T_J =125℃		1.5		
		I_F=100A , V_{GE}=0V, T_J =150℃		1.45		
t_{rr}	Reverse Recovery Time	I_F=100A , V_R=600V dI_F/dt=-1950A/μs T_J =150℃		280		ns
I_{RRM}	Max. Reverse Recovery Current			156		A
Q_{RR}	Reverse Recovery Charge			20.5		μC
E_{rec}	Reverse Recovery Energy			6.4		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.5	K /W

MODULE CHARACTERISTICS *(T_C =25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		175	℃
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

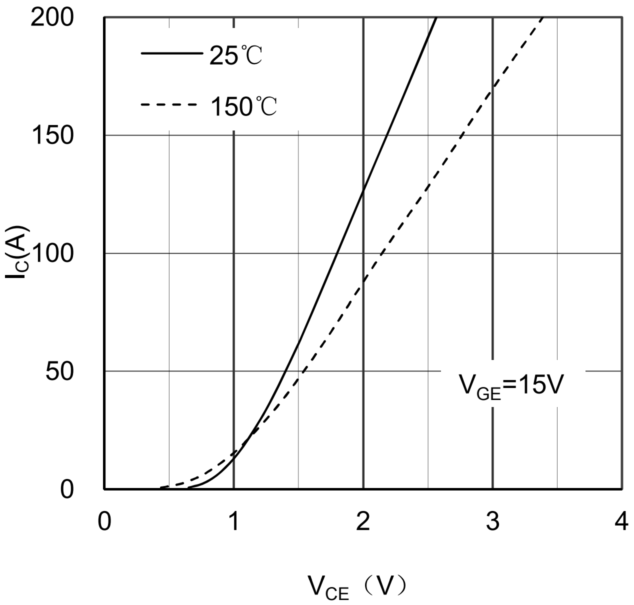


Figure 1. Typical Output Characteristics IGBT-inverter

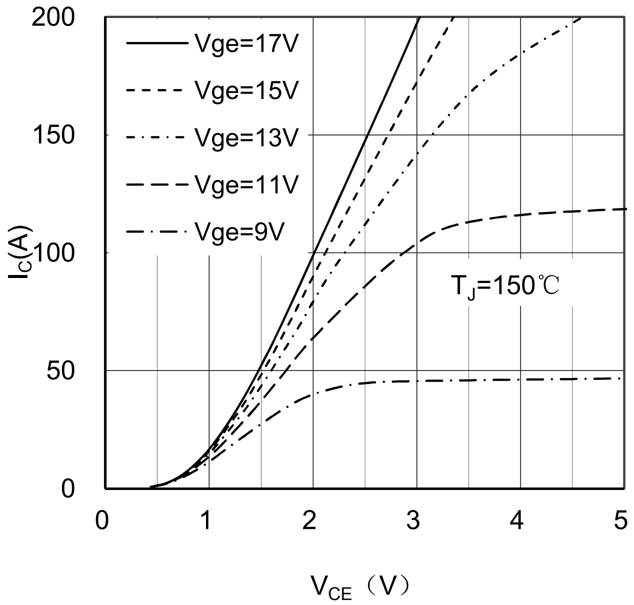


Figure 2. Typical Output Characteristics IGBT-inverter

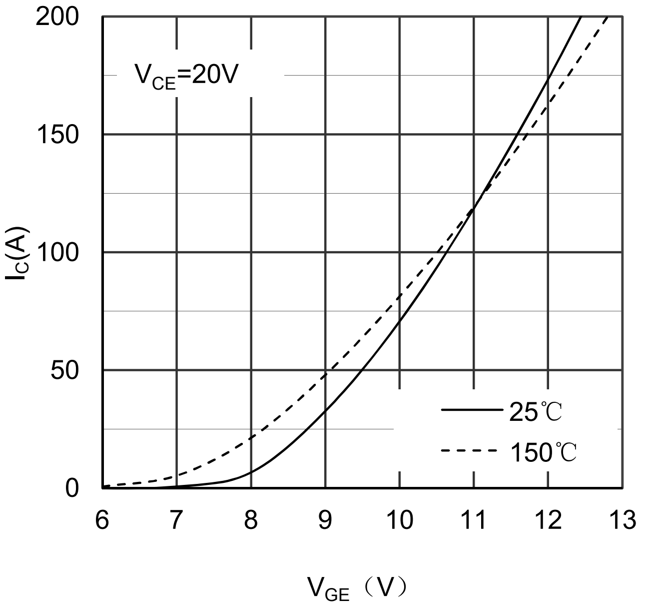


Figure 3. Typical Transfer characteristics IGBT-inverter

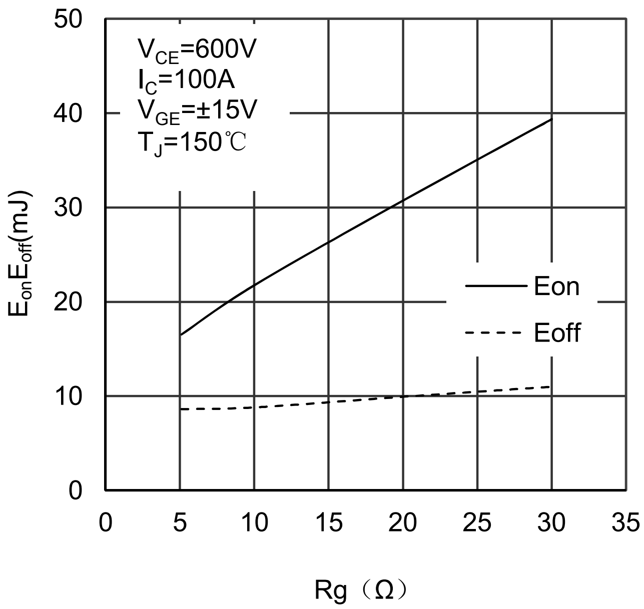


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

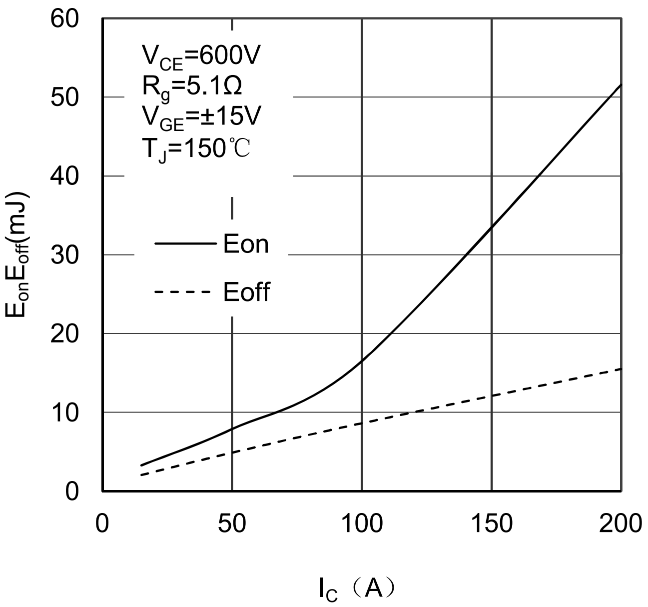


Figure 5. Switching Energy vs Collector Current IGBT-inverter

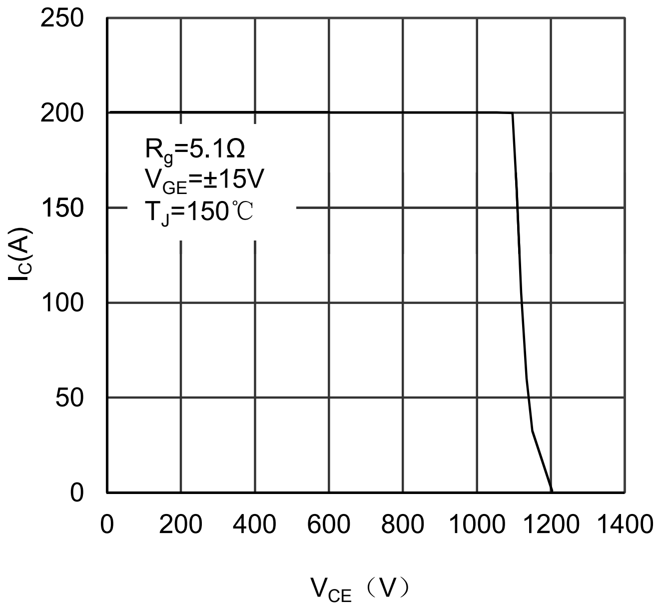


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

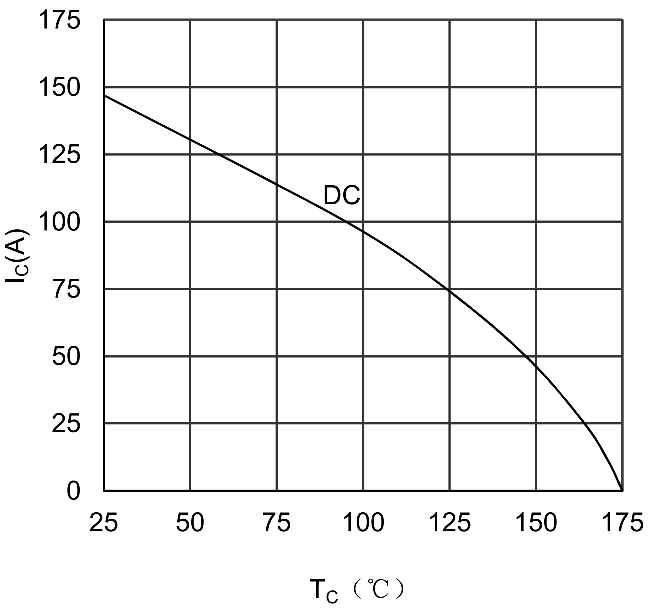


Figure 7. Collector Current vs Case temperature IGBT -inverter

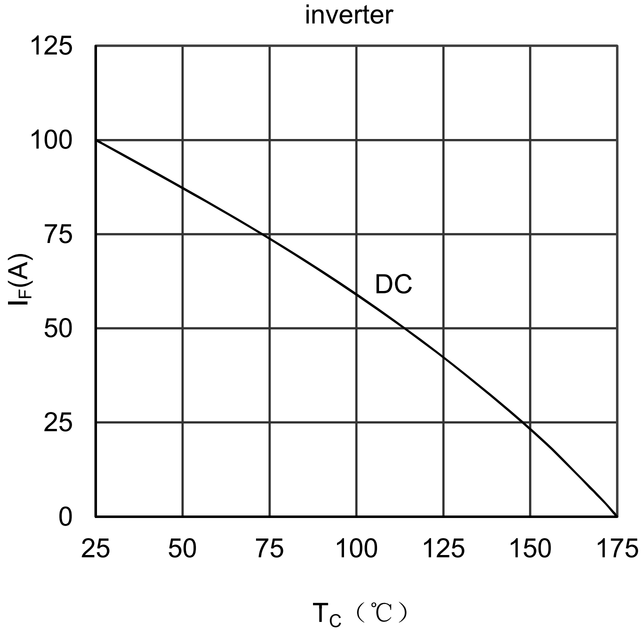


Figure 8. Forward current vs Case temperature Diode -inverter

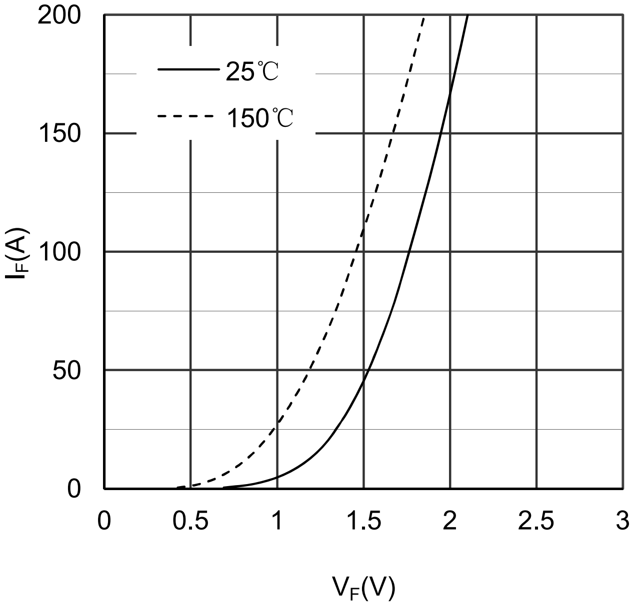


Figure 9. Diode Forward Characteristics Diode -inverter

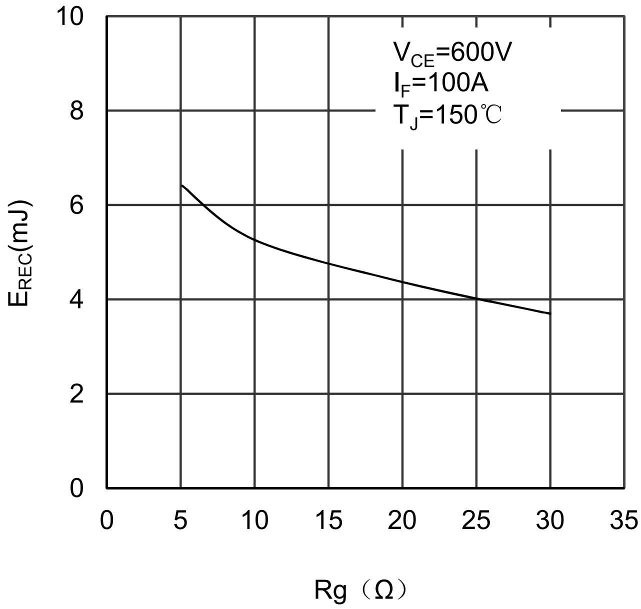


Figure 10. Switching Energy vs Gate Resistor Diode - inverter

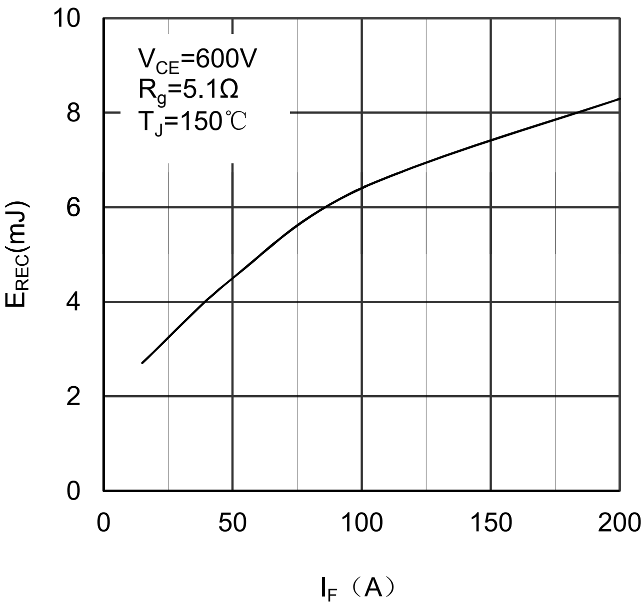


Figure 11. Switching Energy vs Forward Current Diode-inverter

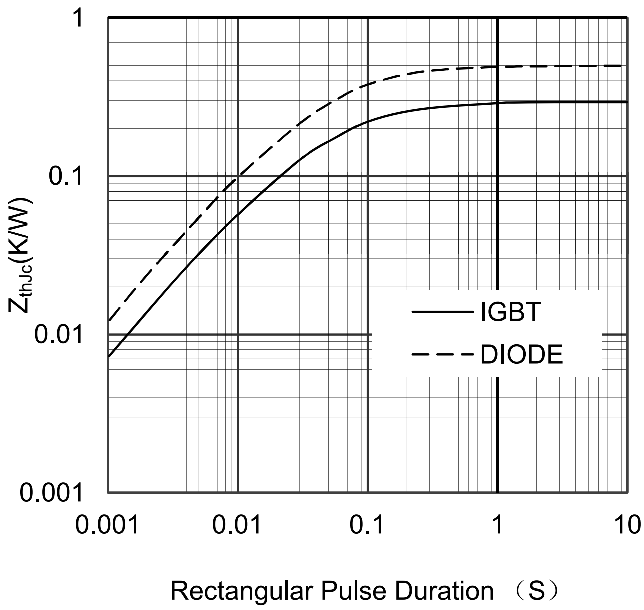


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

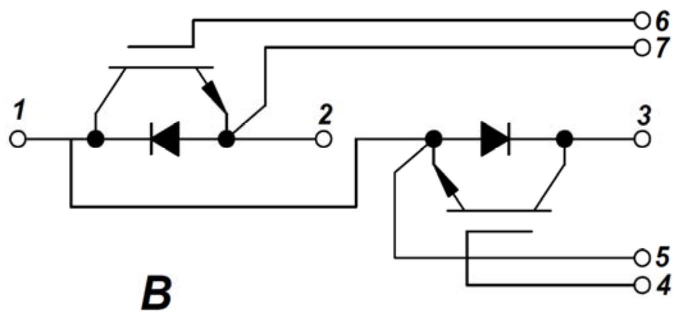
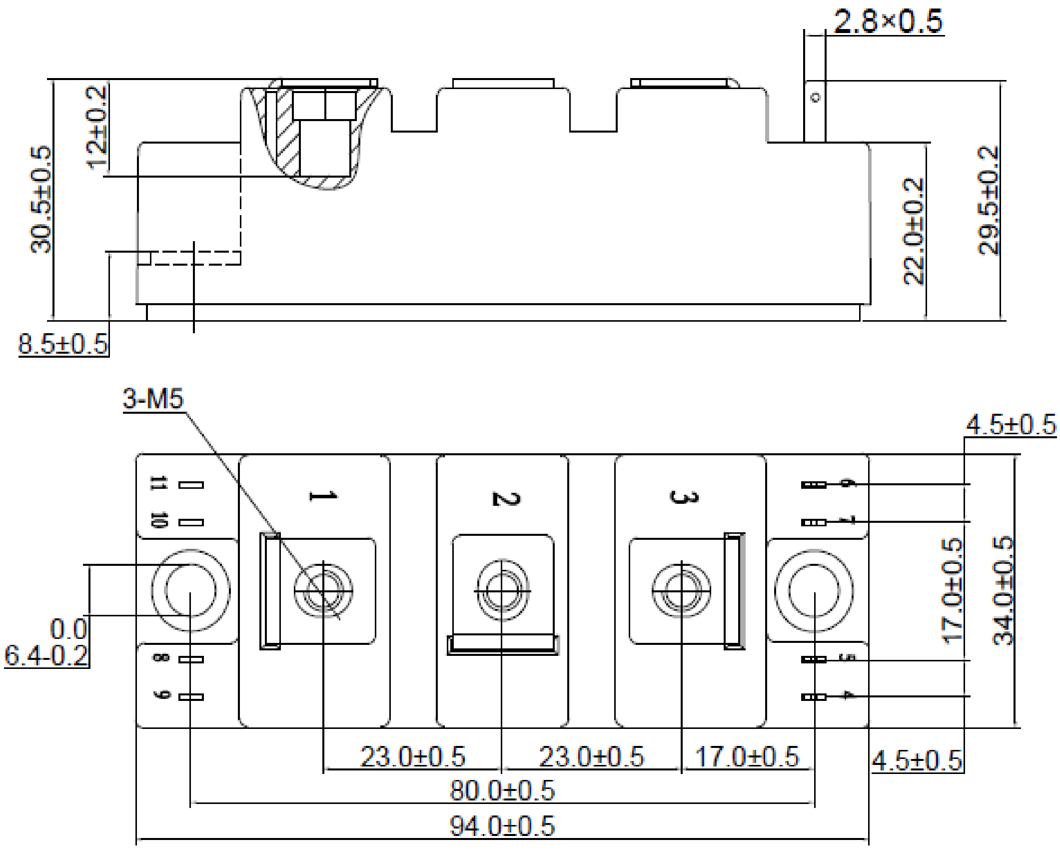


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline