MMG300D170B6TC

1700V 300A IGBT Module

November 2019 Version 01 RoHS Compliant

PRODUCT FEATURES

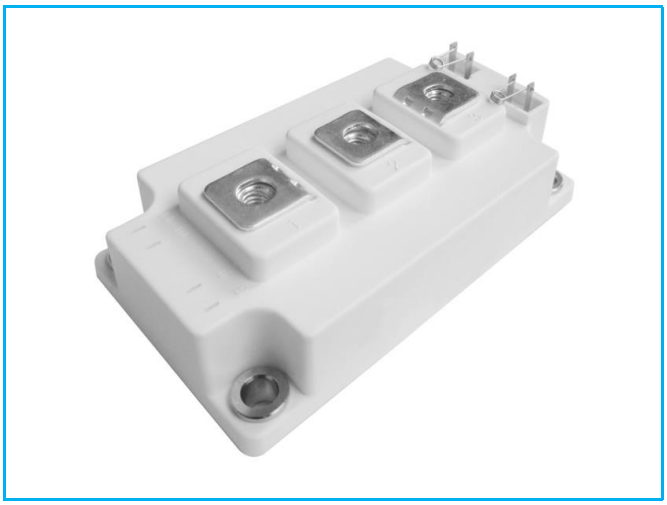
☐ IGBT CHIP(1700V Trench+Field Stop technology)

☐ Low turn-off losses, short tail current

☐ $V_{CE(sat)}$ with positive temperature coefficient

☐ Ultra Low Loss,High Ruggedness

☐ Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

☐ AC motor control

☐ Motion/servo control

☐ Inverter and power supplies

☐ Photovoltaic/Fuel cell

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℃	1700	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃,T_{Jmax}=175℃	446	A
		T_C=95℃,T_{Jmax}=175℃	300	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	600	
P_{tot}	Power Dissipation Per IGBT	T_C=25℃,T_{Jmax}=175℃	1760	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℃	1700	V
$I_{F(AV)}$	Average Forward Current		300	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	600	
I^2t		T_J=125℃, t=10ms, V_R=0V	14500	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=12mA		5.0	6.0	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=300A, V_{GE}=15V, T_J=25℃			2.15	2.6	
		I_C=300A, V_{GE}=15V, T_J=125℃			2.35		
		I_C=300A, V_{GE}=15V, T_J=150℃			2.45		
I_{CES}	Collector Leakage Current	V_{CE}=1700V, V_{GE}=0V, T_J=25℃				2	mA
		V_{CE}=1700V, V_{GE}=0V, T_J=150℃				20	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±20V, T_J=25℃		-500		500	nA
R_{gint}	Integrated Gate Resistor				1.8		Ω
Q_g	Gate Charge	V_{CE}=900V, I_C=300A , V_{GE}=15V			2.1		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			29.4		nF
C_{res}	Reverse Transfer Capacitance				900		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=900V,I_C=300A R_G =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		170		ns
			T_J=150℃		190		ns
t_r	Rise Time		T_J=25℃		150		ns
			T_J=150℃		165		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=900V,I_C=300A R_G =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		690		ns
			T_J=150℃		770		ns
t_f	Fall Time		T_J=25℃		240		ns
			T_J=150℃		360		ns
E_{on}	Turn on Energy	V_{CC}=900V,I_C=300A R_G =4.7Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		173		mJ
			T_J=125℃		223		mJ
			T_J=150℃		232		mJ
E_{off}	Turn off Energy		T_J=25℃		58		mJ
			T_J=125℃		90		mJ
			T_J=150℃		96		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=150℃,V_{CC}=1000V			1000		A
R_{thJC}	Junction to Case Thermal Resistance （ Per IGBT）					0.085	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=300A , V_{GE}=0V, T_J=25℃		1.8	2.2	V
		I_F=300A , V_{GE}=0V, T_J=125℃		1.9		
		I_F=300A , V_{GE}=0V, T_J=150℃		1.9		
t_{rr}	Reverse Recovery Time	I_F=300A , V_R=900V dI_F/dt=-1500A/μs T_J =150℃		1380		ns
I_{RRM}	Max. Reverse Recovery Current			212		A
Q_{RR}	Reverse Recovery Charge			143		μC
E_{rec}	Reverse Recovery Energy			63		mJ
R_{thJCD}	Junction to Case Thermal Resistance （ Per Diode）				0.13	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	4000	V
CTI	Comparative Tracking Index		> 225	
Torque	to heatsink	Recommended（M6）	3~5	Nm
	to terminal	Recommended（M6）	2.5~5	Nm
Weight			300	g

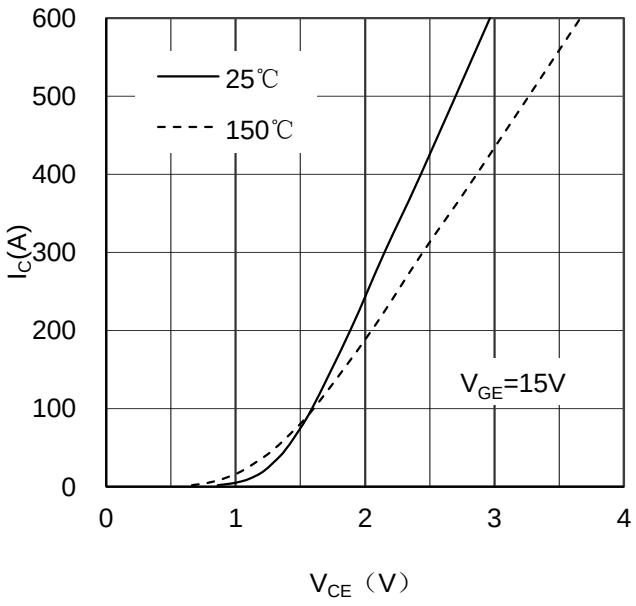


Figure 1. Typical Output Characteristics IGBT-inverter

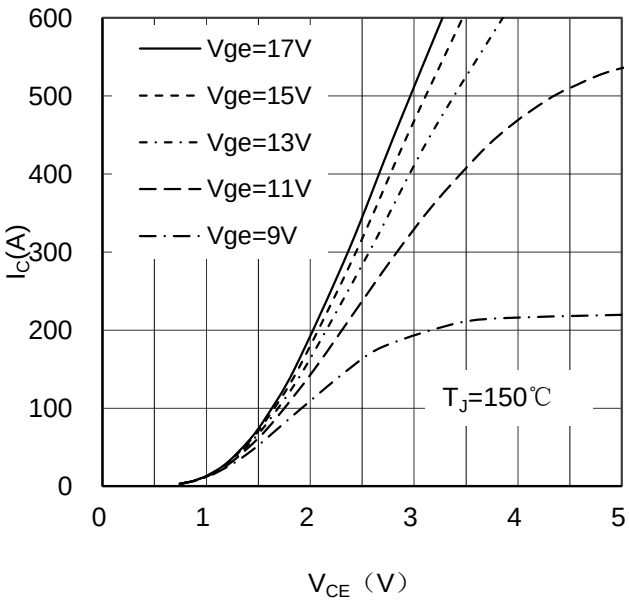


Figure 2. Typical Output Characteristics IGBT-inverter

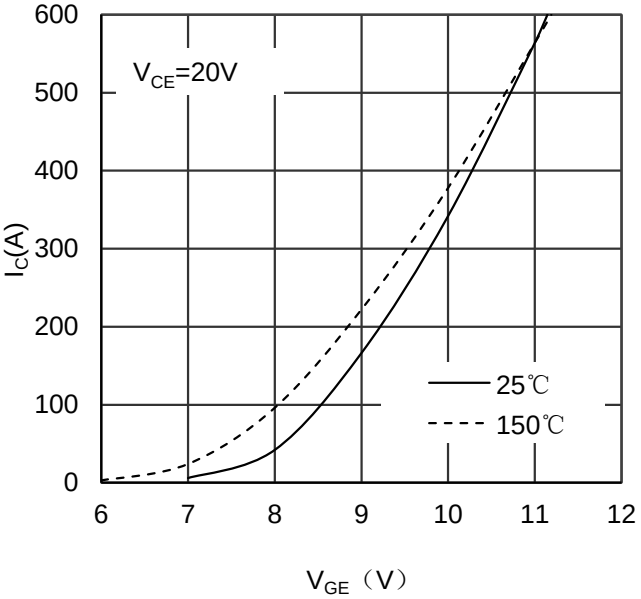


Figure 3. Typical Transfer characteristics IGBT-inverter

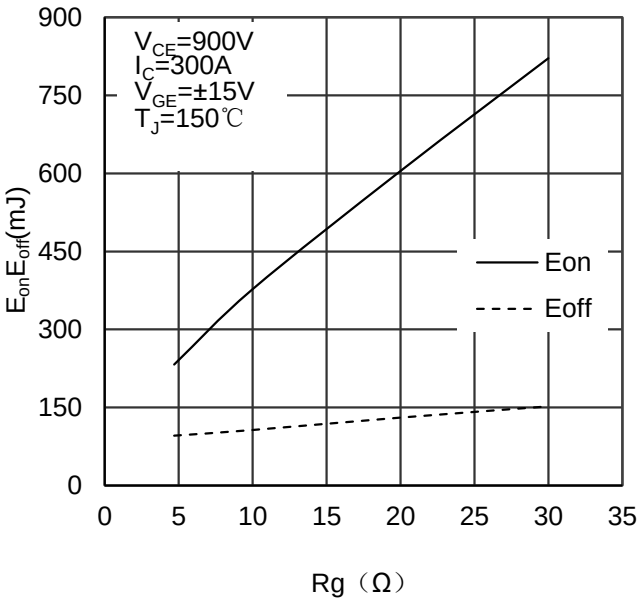


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

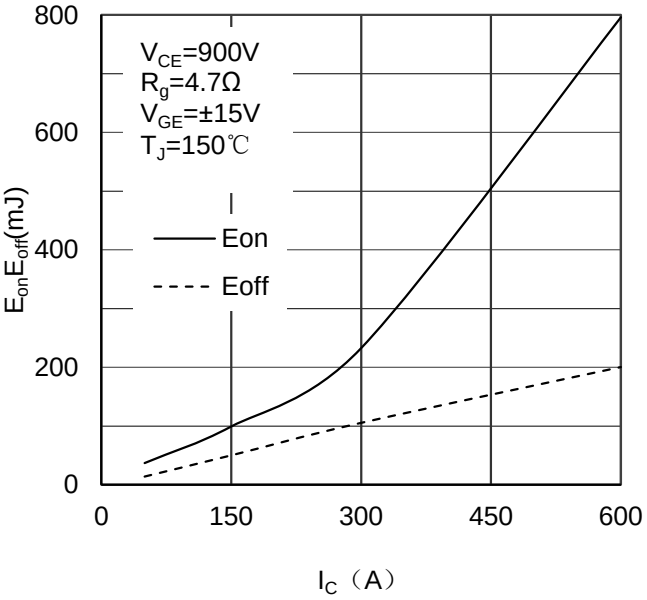


Figure 5. Switching Energy vs Collector Current IGBT-inverter

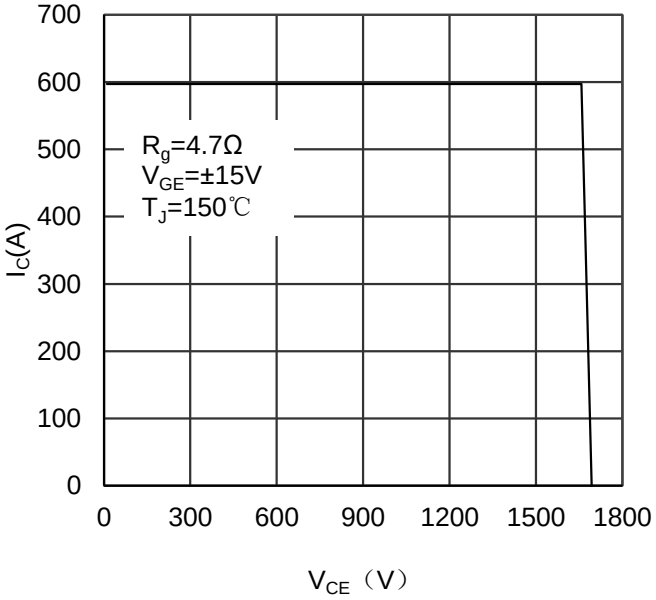


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

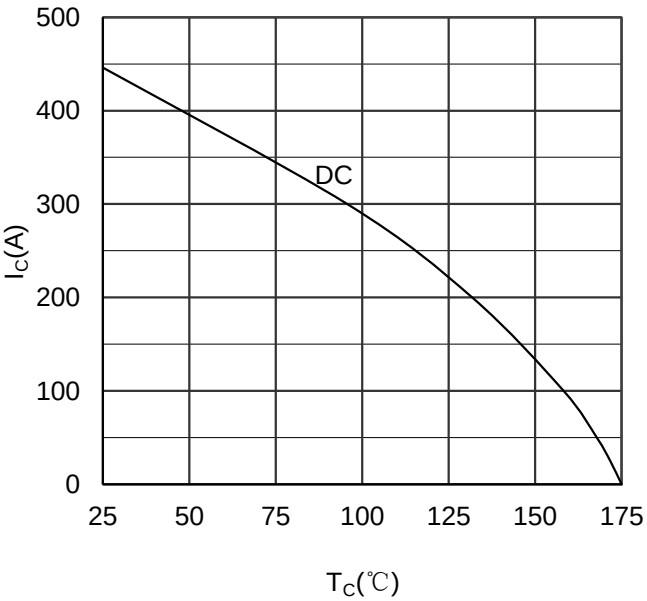


Figure 7. Collector Current vs Case temperature IGBT -inverter

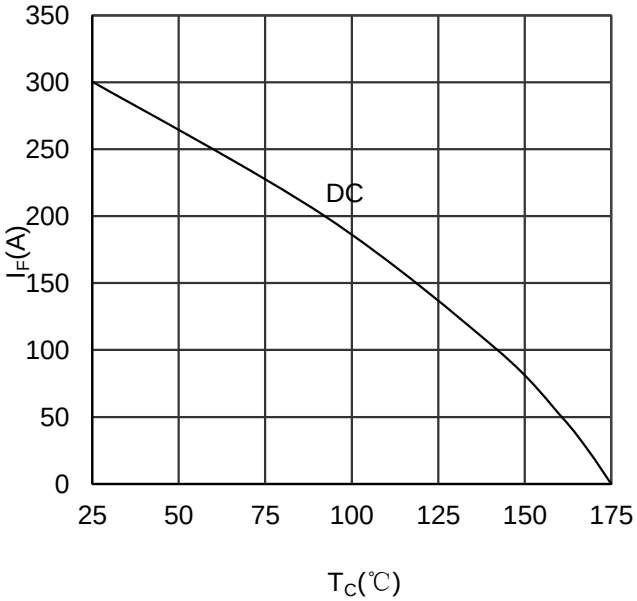


Figure 8. Forward current vs Case temperature Diode -inverter

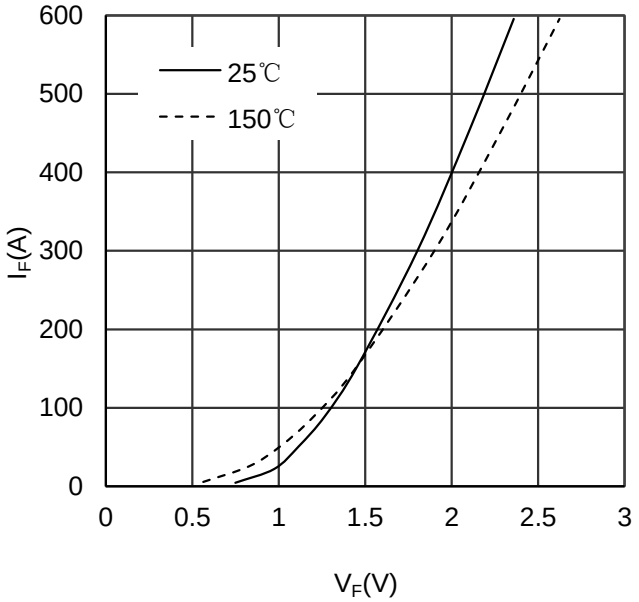


Figure 9. Diode Forward Characteristics Diode -inverter

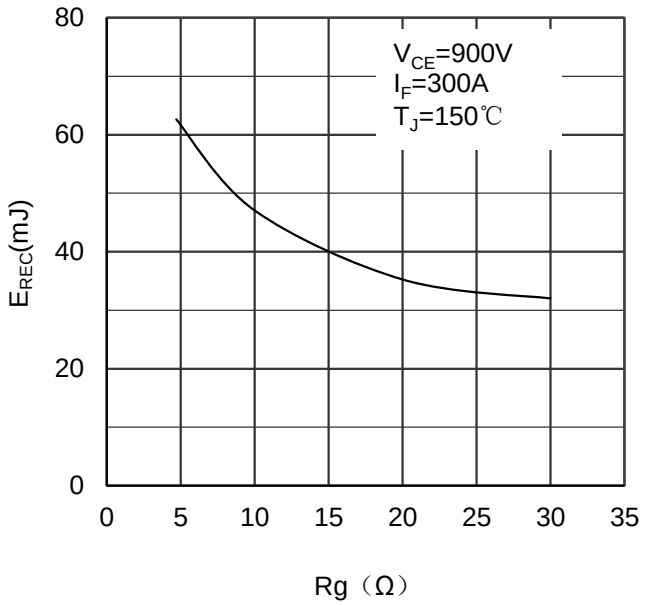


Figure 10. Switching Energy vs Gate Resistor Diode - inverter

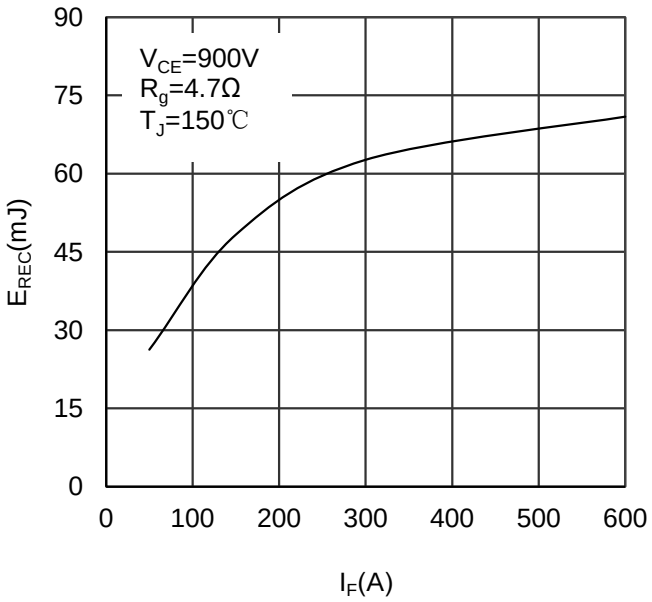


Figure 11. Switching Energy vs Forward Current Diode-inverter

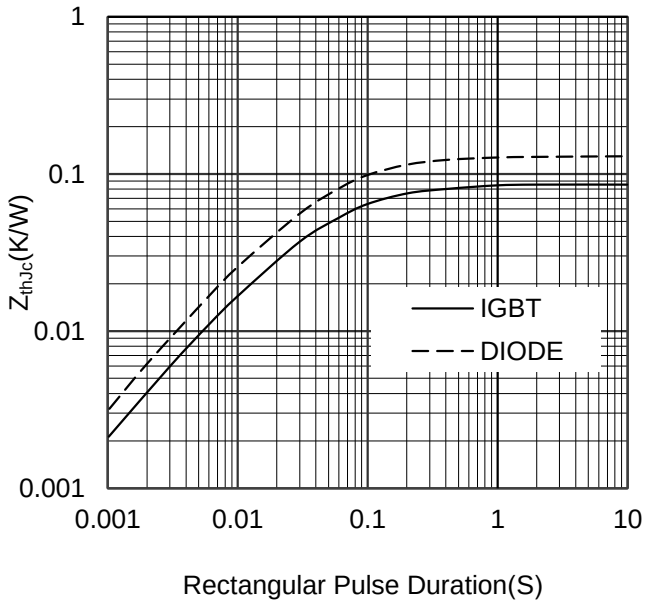


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

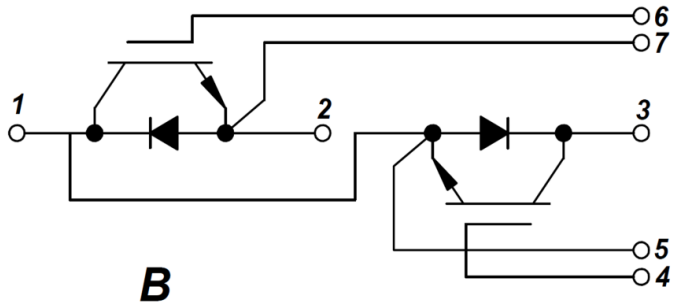
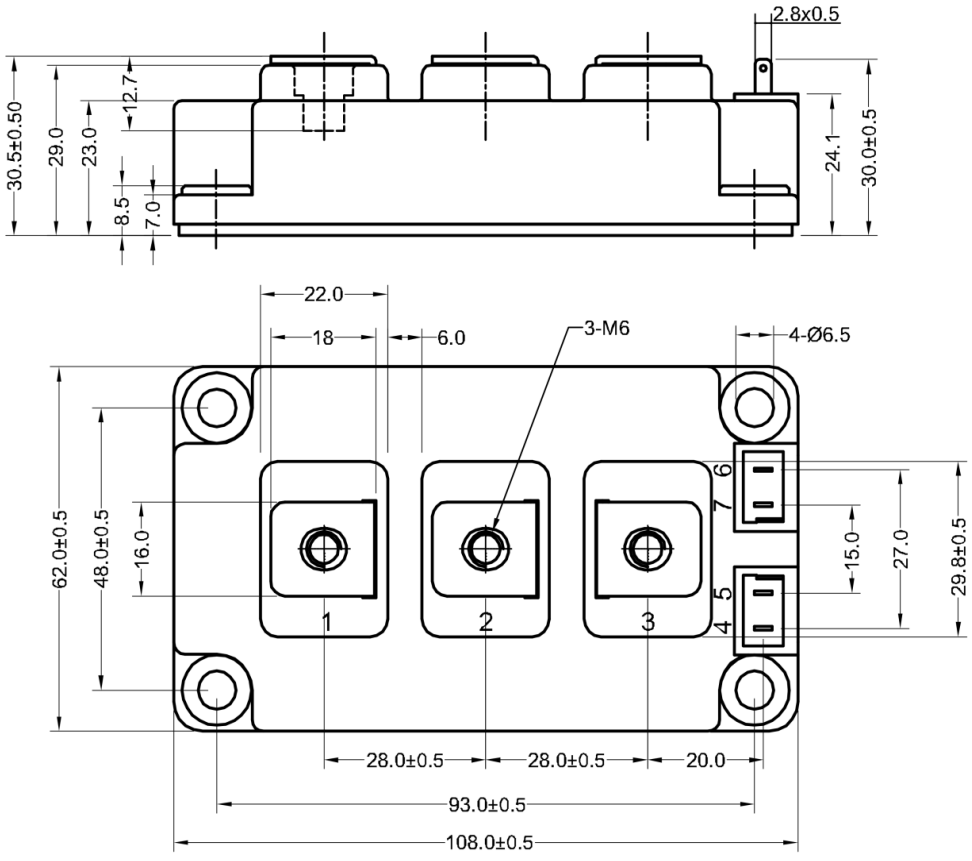


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline