MMG50S170B6TC

1700V 50A IGBT Module

October 2018 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℃	78	A
		T_C=100℃,T_{Jmax}=175℃	50	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	100	
P_{tot}	Power Dissipation Per IGBT	T_C=25℃,T_{Jmax}=175℃	416	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		50	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	100	
I^2t		T_J =125℃, t=10ms, V_R=0V	420	A^2S

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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=2mA		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=50A, V_{GE}=15V, T_J=25℃			2.05	2.5	
		I_C=50A, V_{GE}=15V, T_J=125℃			2.2		
		I_C=50A, V_{GE}=15V, T_J=150℃			2.3		
I_{CES}	Collector Leakage Current	V_{CE}=1700V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=1700V, V_{GE}=0V, T_J=150℃				5	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-500		500	nA
R_{gint}	Integrated Gate Resistor				7.2		Ω
Q_g	Gate Charge	V_{CE}=900V, I_C=50A , V_{GE}=15V			0.38		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			5.3		nF
C_{res}	Reverse Transfer Capacitance				160		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=900V,I_C=50A R_G =10Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		60		ns
			T_J=150℃		80		ns
t_r	Rise Time		T_J=25℃		45		ns
			T_J=150℃		50		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=900V,I_C=50A R_G =10Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		390		ns
			T_J=150℃		450		ns
t_f	Fall Time		T_J=25℃		200		ns
			T_J=150℃		360		ns
E_{on}	Turn on Energy	V_{CC}=900V,I_C=50A R_G =10Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		14		mJ
			T_J=125℃		17.5		mJ
			T_J=150℃		20		mJ
E_{off}	Turn off Energy		T_J=25℃		7.5		mJ
			T_J=125℃		12		mJ
			T_J=150℃		13		mJ
I_{SC}	Short Circuit Current	tpsc≤10μS , V_{GE}=15V T_J=150℃,V_{CC}=1000V			240		A
R_{thJC}	Junction to Case Thermal Resistance （Per IGBT）					0.36	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=50A , V_{GE}=0V, T_J=25℃		1.8	2.2	V
		I_F=50A , V_{GE}=0V, T_J=125℃		1.9		
		I_F=50A , V_{GE}=0V, T_J=150℃		1.9		
t_{rr}	Reverse Recovery Time	I_F=50A , V_R=900V dI_F/dt=-1200A/μs T_J =150℃		400		ns
I_{RRM}	Max. Reverse Recovery Current			84		A
Q_{RR}	Reverse Recovery Charge			25		μC
E_{rec}	Reverse Recovery Energy			13.5		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.63	K /W

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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		＞200	
Torque	to heatsink	Recommended（M6）	3~5	Nm
	to terminal	Recommended（M5）	2.5~5	Nm
Weight			160	g

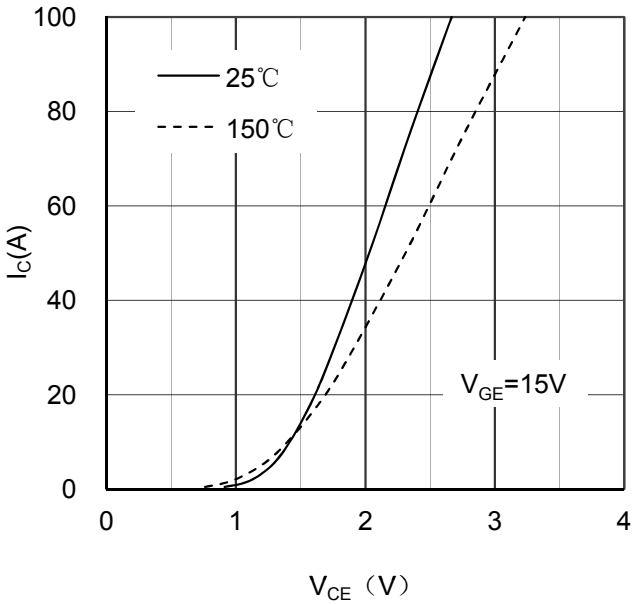


Figure 1. Typical Output Characteristics IGBT-inverter

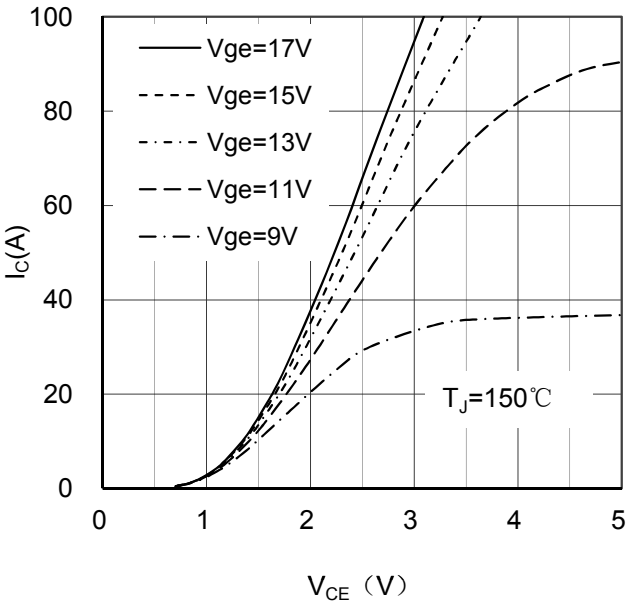


Figure 2. Typical Output Characteristics IGBT-inverter

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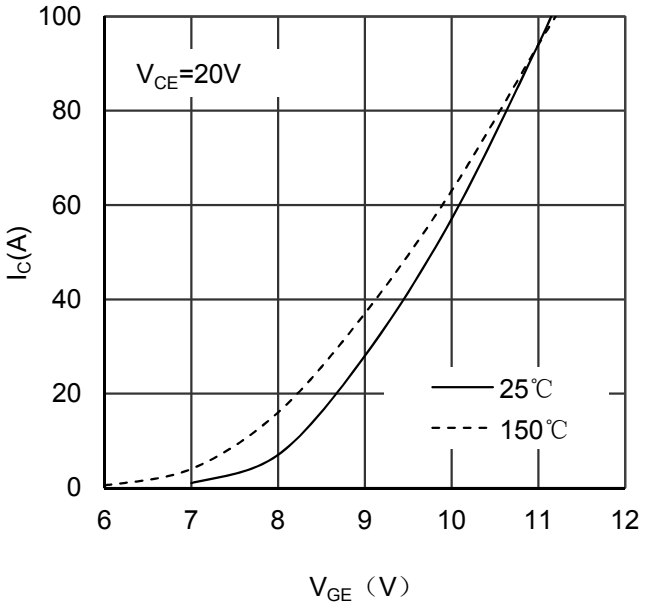


Figure 3. Typical Transfer characteristics IGBT-inverter

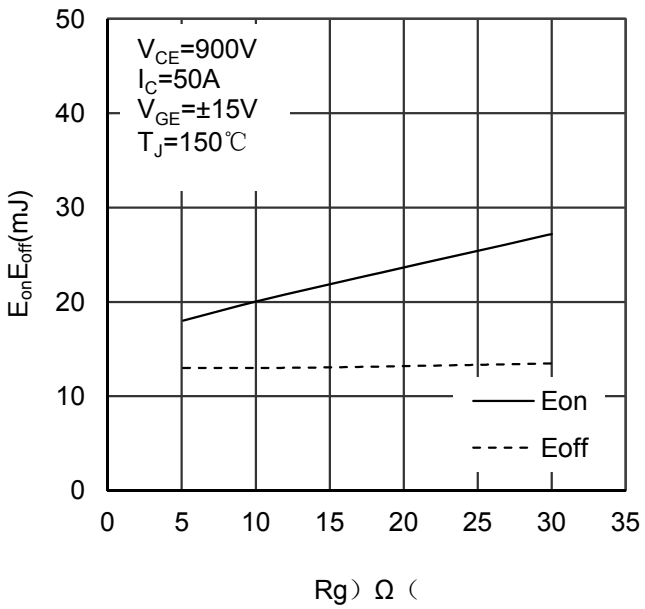


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

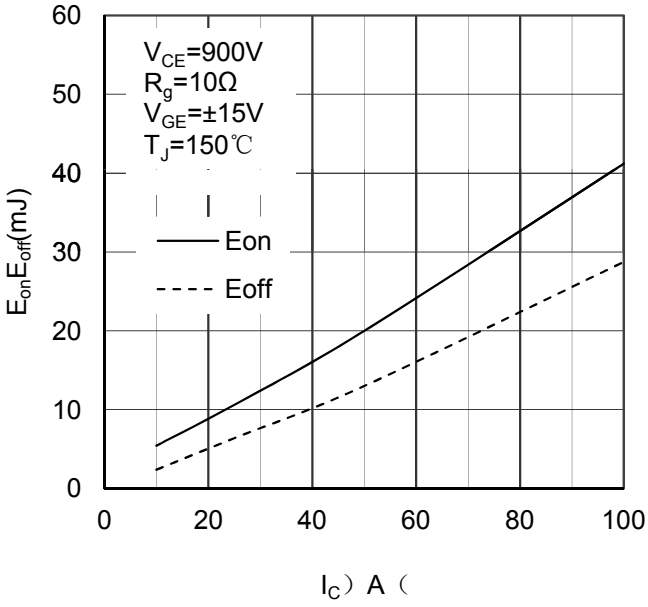


Figure 5. Switching Energy vs Collector Current IGBT-inverter

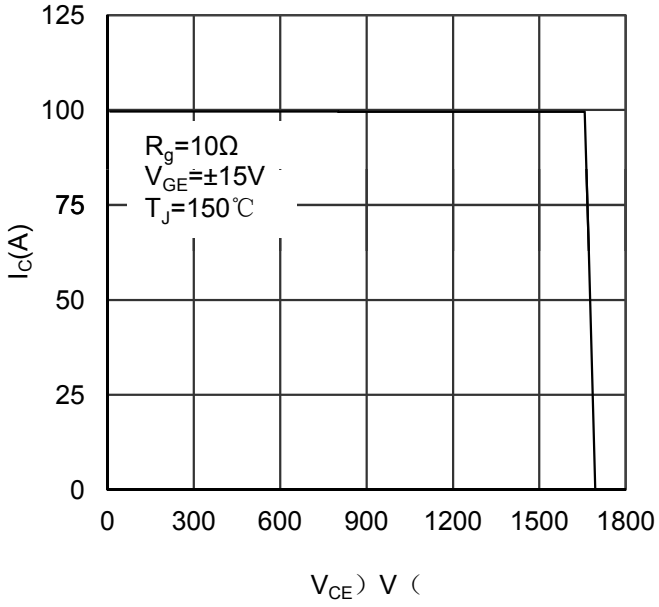


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

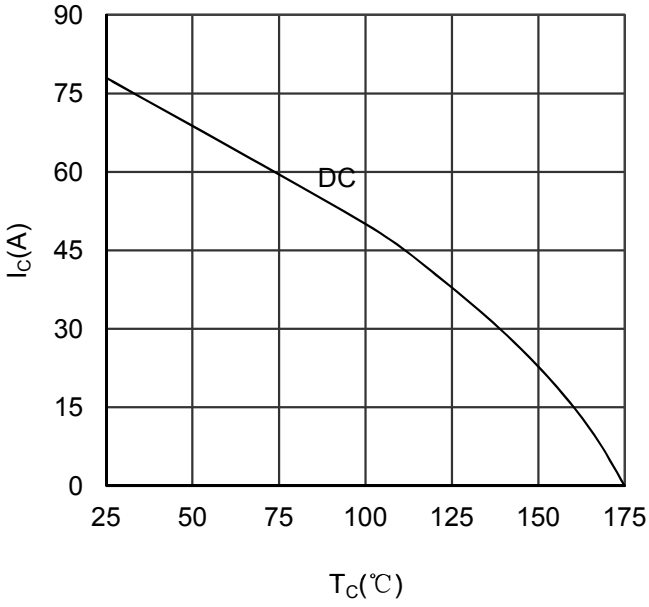


Figure 7. Collector Current vs Case temperature IGBT -inverter

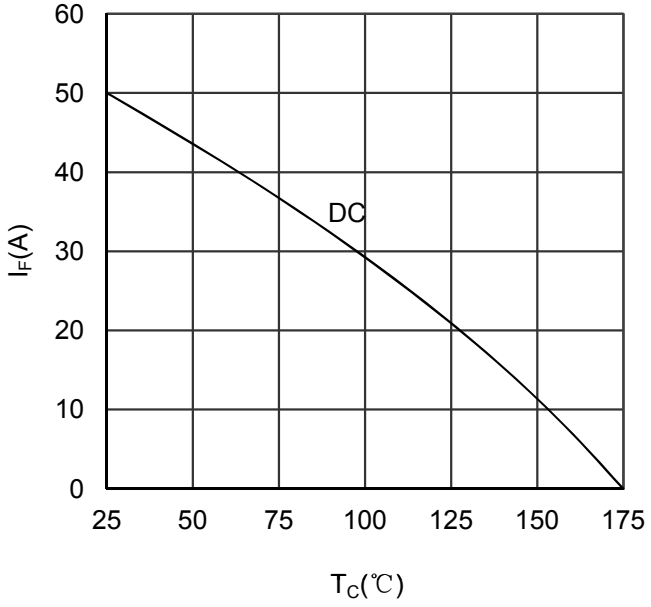


Figure 8. Forward current vs Case temperature Diode -inverter

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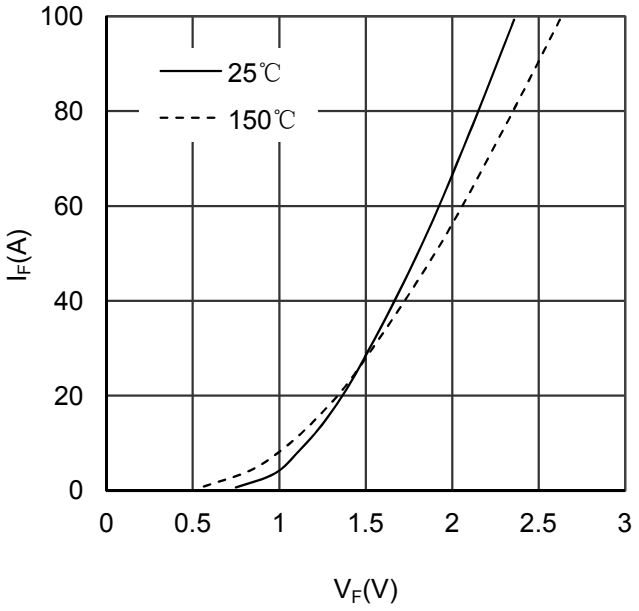


Figure 9. Diode Forward Characteristics Diode -inverter

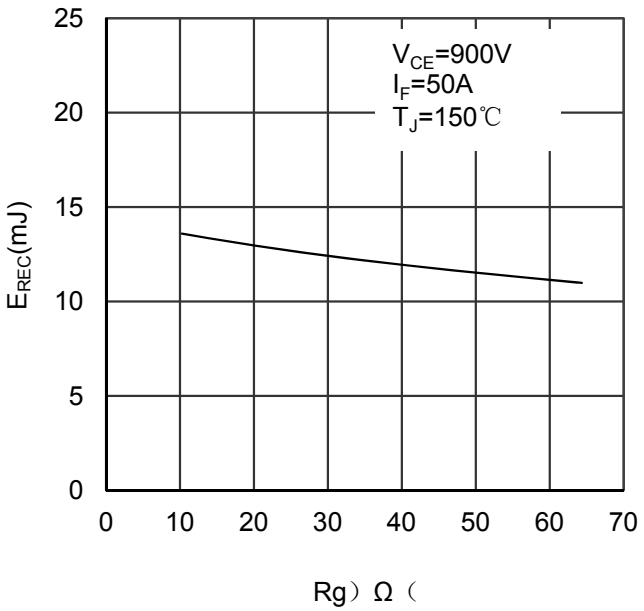


Figure 10. Switching Energy vs Gate Resistor Diode -inverter

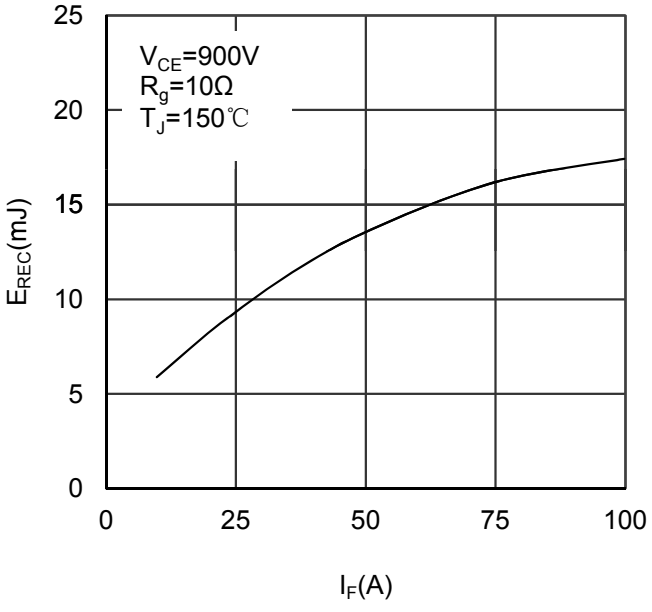


Figure 11. Switching Energy vs Forward Current Diode-inverter

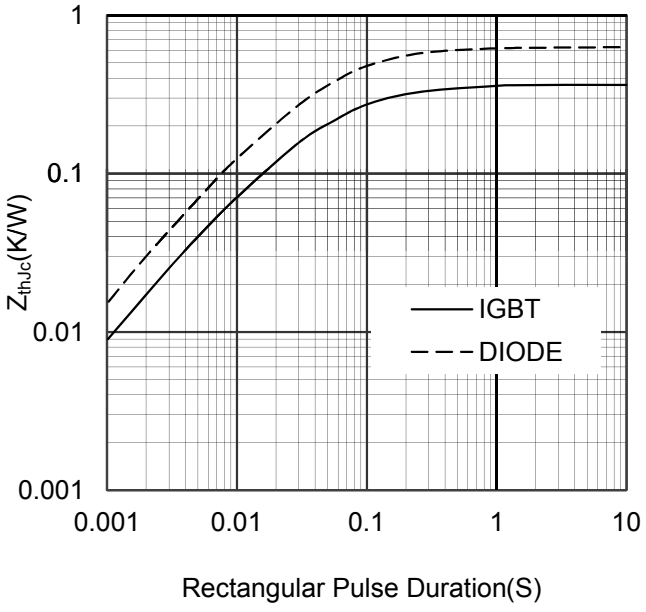


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

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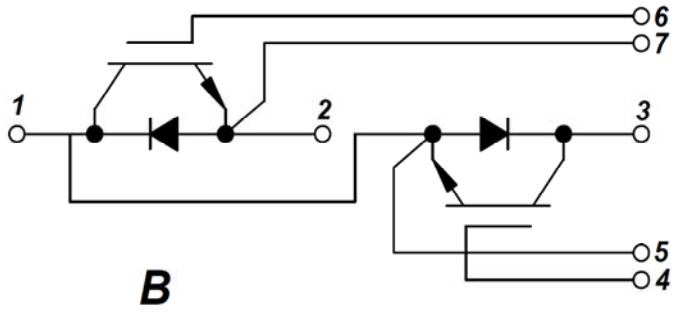
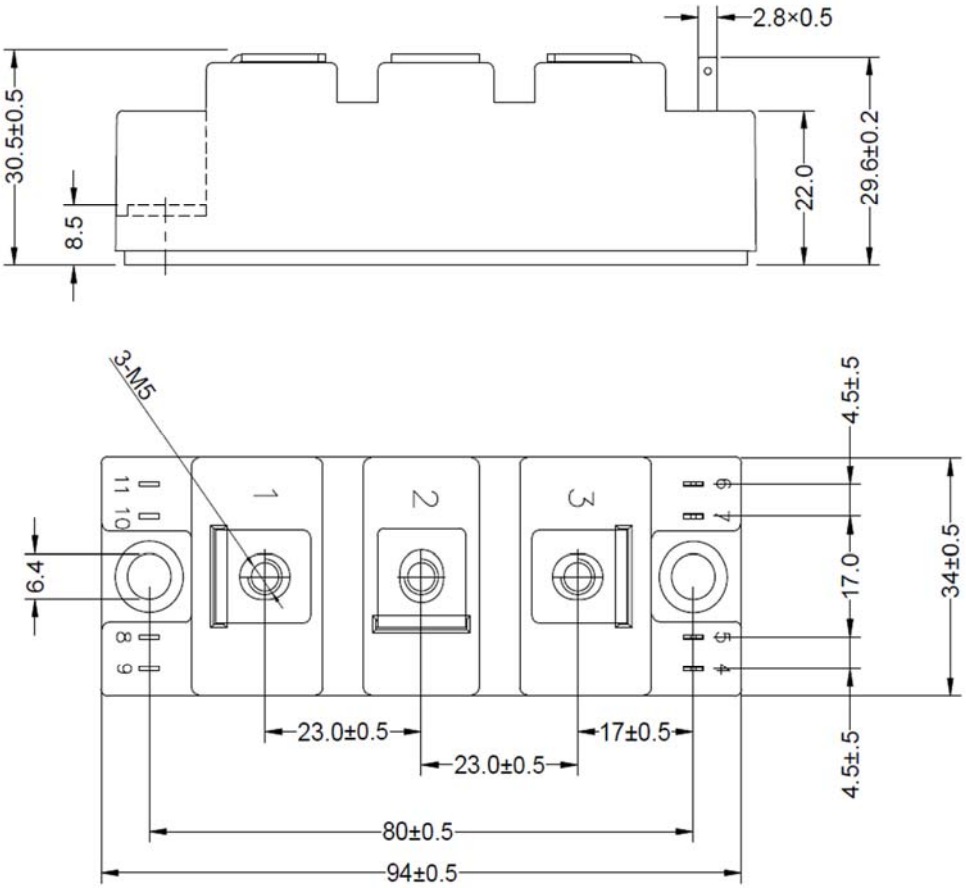


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline

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