

PRODUCT FEATURES

- ☐ IGBT chip in trench FS-technology
- ☐ Low switching losses
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery

APPLICATIONS

- ☐ Welding Machine
- ☐ Power Supplies
- ☐ Others



IGBT-inverter

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	60	A
		$T_C=95^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	40	
I_{CM}	Repetitive Peak Collector Current	$tp=1\text{ms}$	80	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	230	W

Diode-inverter

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current		40	A
I_{FRM}	Repetitive Peak Forward Current	$tp=1\text{ms}$	80	
I^2t		$T_J=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	250	A^2S

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MMG40S120B6UC

IGBT-inverter

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 =1.6mA	5.2	5.8	6.5	V	
V _{CE(sat)}	Collector Emitter Saturation Voltage	I _C =40A, V _{GE} =15V, T _J =25℃		2.15	2.6		
		I _C =40A, V _{GE} =15V, T _J =125℃		2.4			
		I _C =40A, V _{GE} =15V, T _J =150℃		2.5			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃			100	μA	
		V _{CE} =1200V, V _{GE} =0V, T _J =150℃			1	mA	
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±20V, T _J =25℃	-400		400	nA	
R _{gint}	Integrated Gate Resistor			0		Ω	
Q _g	Gate Charge	V _{CE} =600V, I _C =40A , V _{GE} =15V		0.19		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		2.5		nF	
C _{res}	Reverse Transfer Capacitance			110		pF	
t _{d(on)}	Turn on Delay Time	V _{CC} =600V, I _C =40A R _G =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		30	ns	
			T _J =125℃		35	ns	
			T _J =150℃		40	ns	
t _r	Rise Time		T _J =25℃		25	ns	
			T _J =125℃		30	ns	
			T _J =150℃		30	ns	
t _{d(off)}	Turn off Delay Time		T _J =25℃		190	ns	
			T _J =125℃		230	ns	
			T _J =150℃		250	ns	
t _f	Fall Time	T _J =25℃		80	ns		
		T _J =125℃		100	ns		
		T _J =150℃		110	ns		
E _{on}	Turn on Energy	V _{CC} =600V, I _C =40A R _G =15Ω, V _{GE} =±15V, Inductive Load	T _J =125℃		2.6	mJ	
			T _J =150℃		2.95	mJ	
E _{off}	Turn off Energy		T _J =125℃		2	mJ	
			T _J =150℃		2.2	mJ	
I _{SC}	Short Circuit Current		tpsc≤10μS , V _{GE} =15V T _J =150℃, V _{CC} =600V		260		A
R _{thJC}	Junction to Case Thermal Resistance （ Per IGBT ）				0.65	K /W	

Diode-inverter

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 =40A , V _{GE} =0V, T _J =25℃		2.1	2.6	V
		I _F =40A , V _{GE} =0V, T _J =125℃		1.85		
		I _F =40A , V _{GE} =0V, T _J =150℃		1.80		
t _{rr}	Reverse Recovery Time	I _F =40A , V _R =600V dI _F /dt=-1800A/μs T _J =150℃		100		ns
I _{RRM}	Max. Reverse Recovery Current			75		A
Q _{RR}	Reverse Recovery Charge			6.3		μC
E _{rec}	Reverse Recovery Energy			2.4		mJ
R _{thJCD}	Junction to Case Thermal Resistance （ Per Diode ）				1.05	K /W

MMG40S120B6UC

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), $t=1$ minute	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

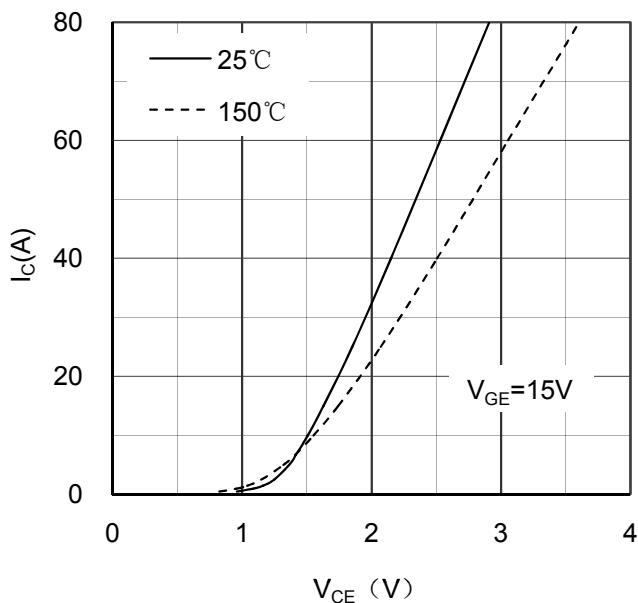


Figure 1. Typical Output Characteristics IGBT-inverter

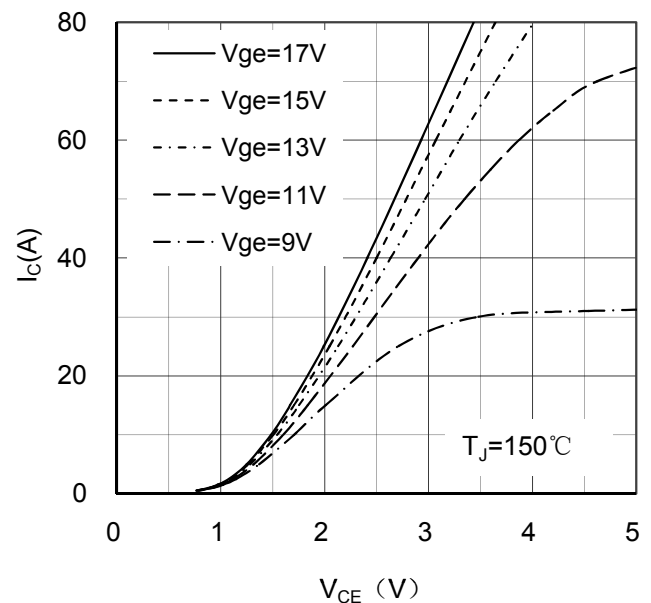


Figure 2. Typical Output Characteristics IGBT-inverter

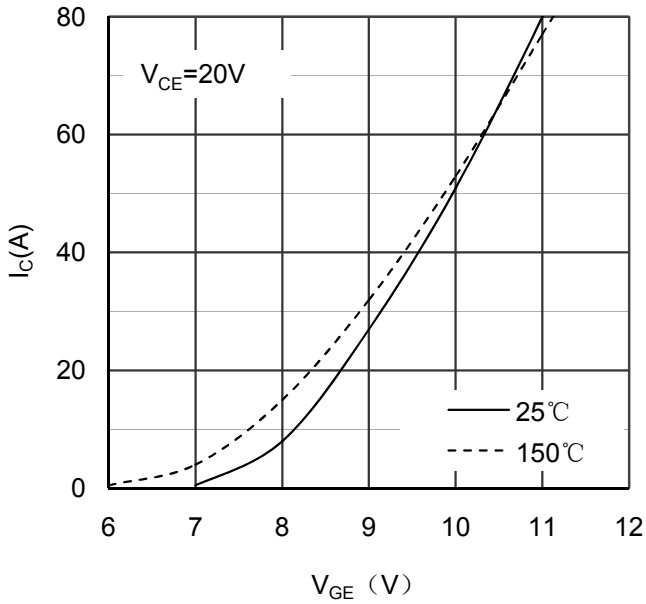


Figure 3. Typical Transfer characteristics IGBT-inverter

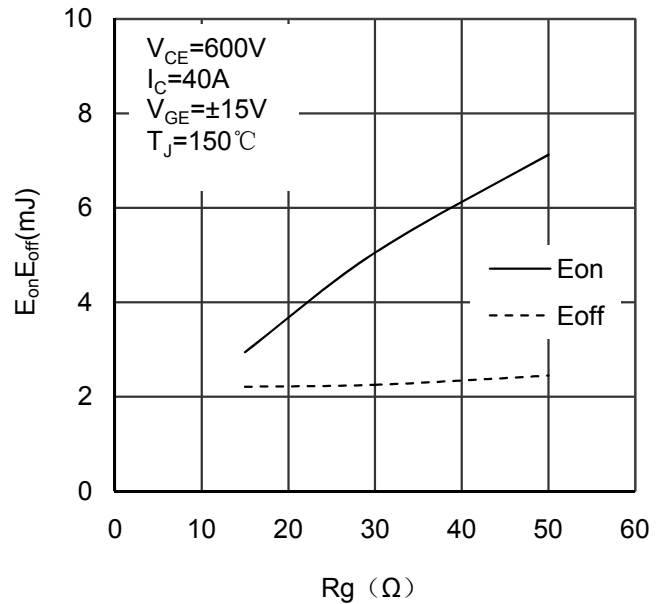


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

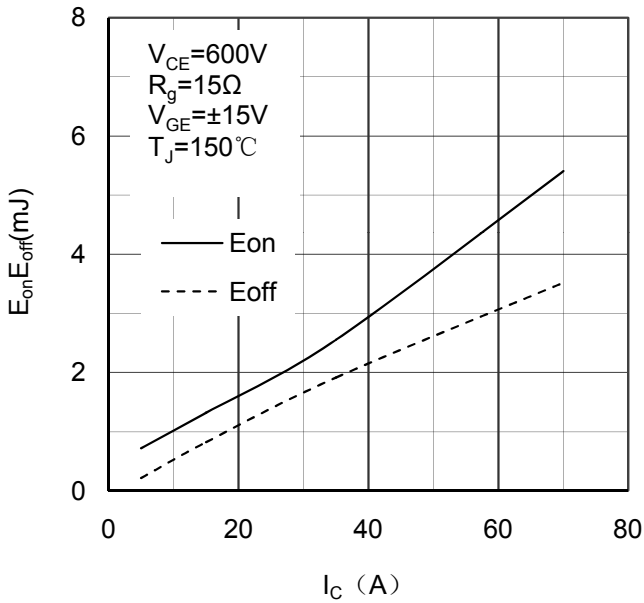


Figure 5. Switching Energy vs Collector Current IGBT-inverter

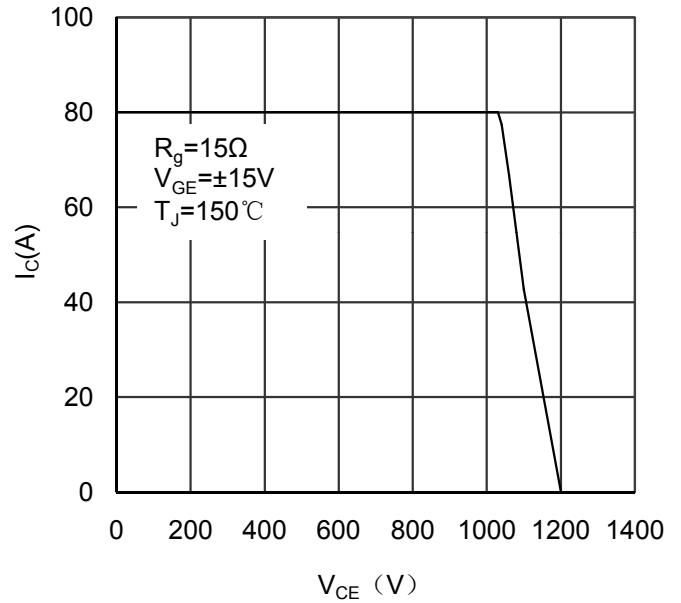


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

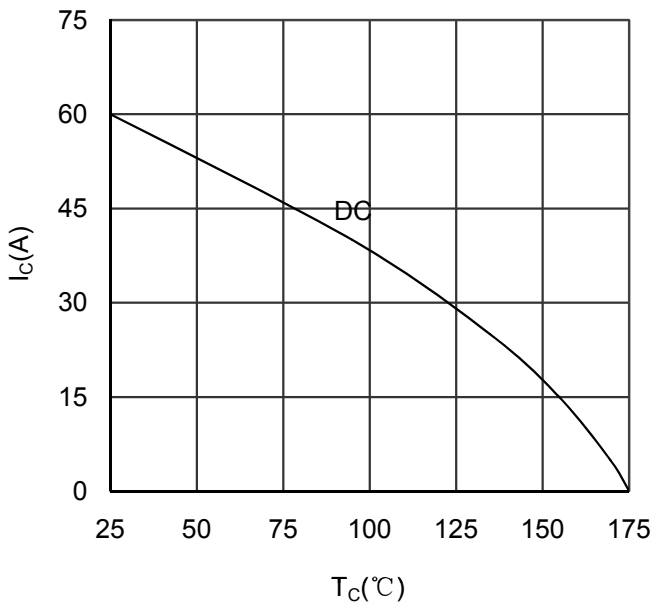


Figure 7. Collector Current vs Case temperature IGBT-inverter

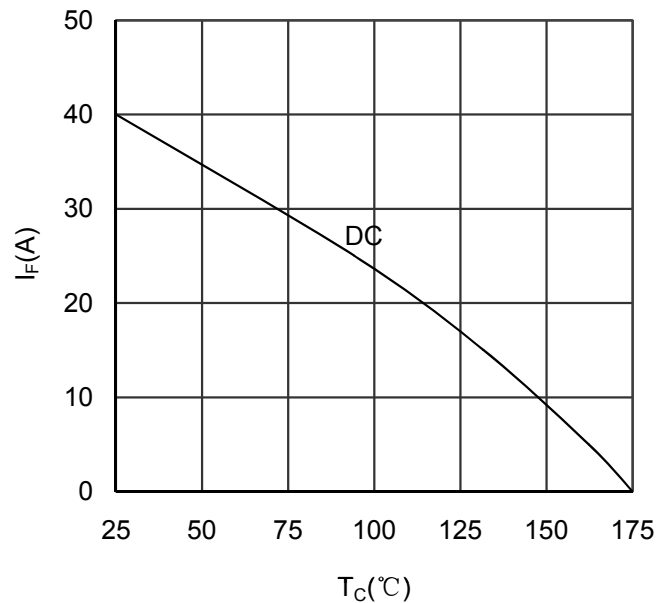


Figure 8. Forward current vs Case temperature Diode-inverter

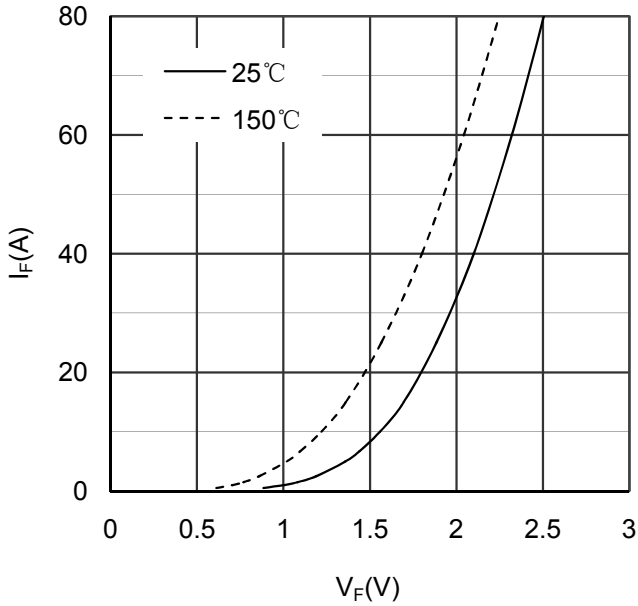


Figure 9. Diode Forward Characteristics Diode -inverter

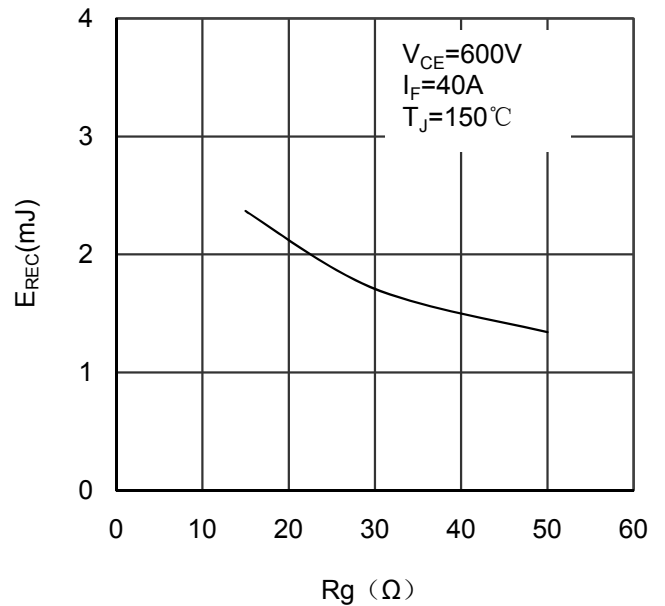


Figure 10. Switching Energy vs Gate Resistor Diode -inverter

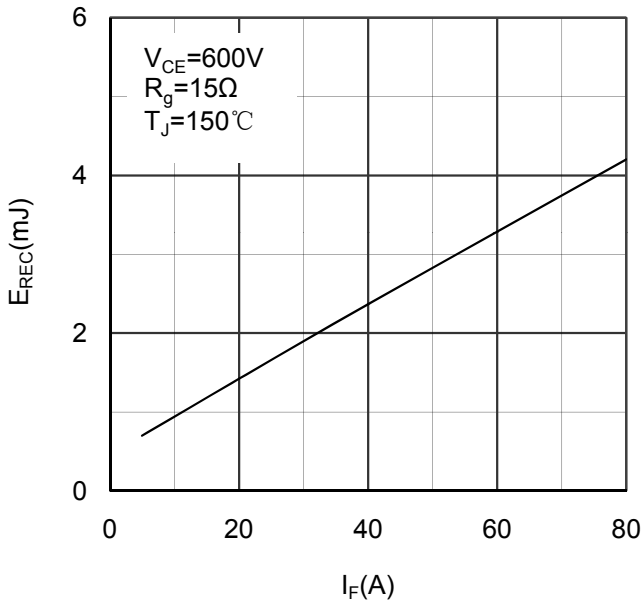


Figure 11. Switching Energy vs Forward Current Diode-inverter

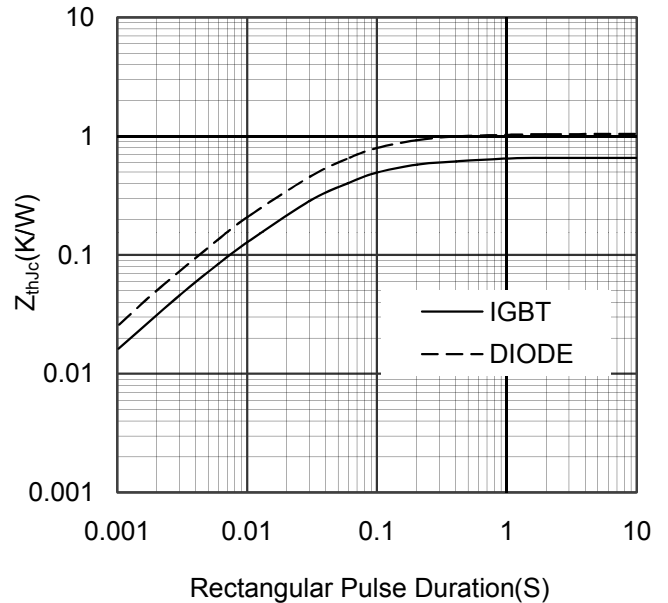


Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter

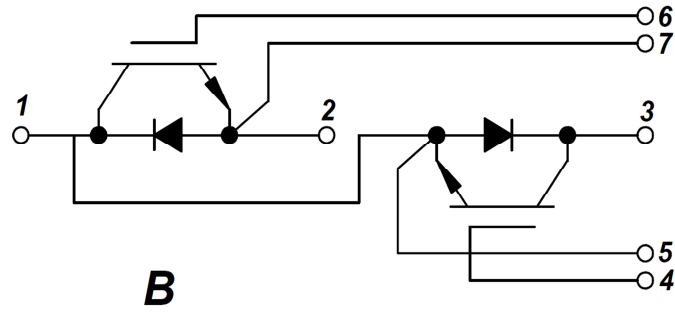
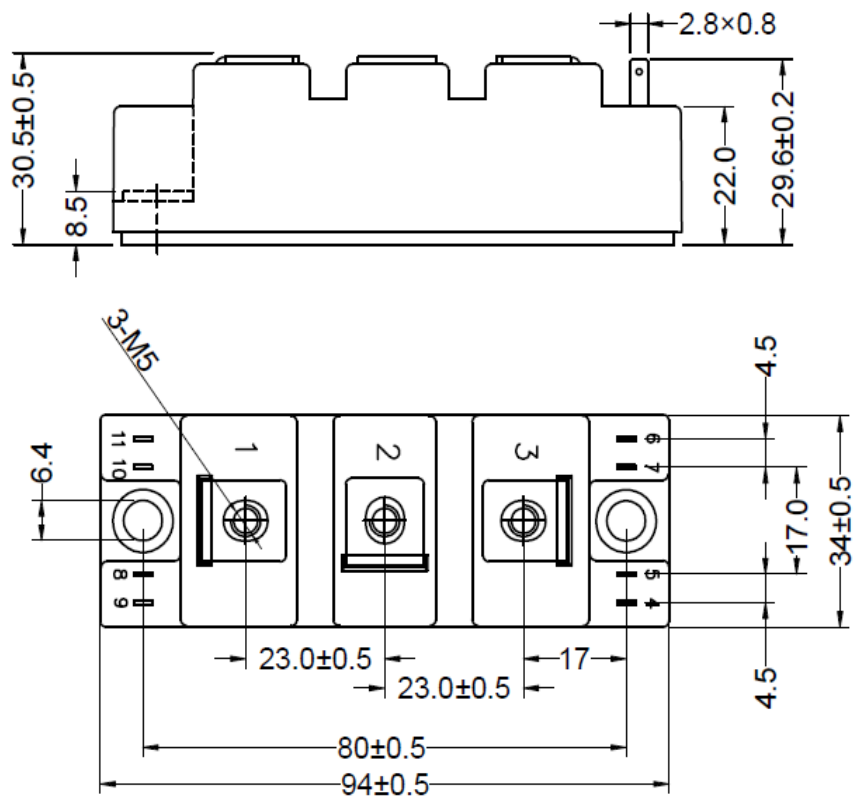


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline