MMG600WQ100PD6T7

1000V 600A Three Level Inverter Module

July 2024 | Preliminary | RoHS Compliant

PRODUCT FEATURES

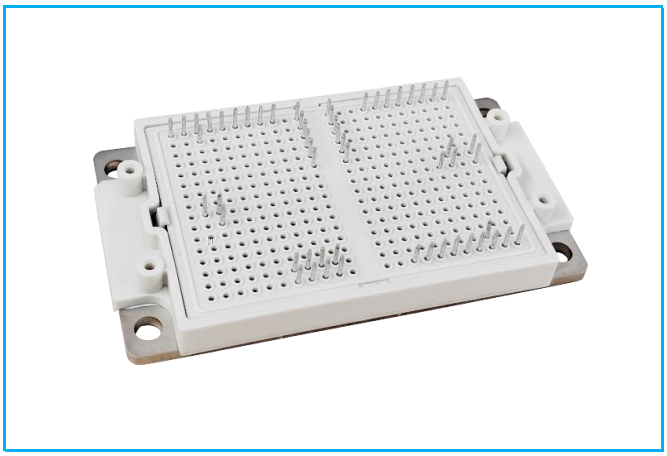
1000V IGBT CHIP

Low VCE(sat) and Low switching losses

Free wheeling diodes with fast and soft reverse recovery

Maximum junction temperature 175°C

PressFIT contact technology



APPLICATIONS

3-Level-Applications

☐ Solar Applications

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

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jop}	Operating Temperature		-40~150	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3200	V
RTI	RTI Elec.	housing	140	
CTI	Comparative Tracking Index		>400	
Md	Mounting Torque	Recommended M5	2.5~5	Nm

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MMG600WQ100PD6T7

IGBT(T1 T4)

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

Symbol	Parameter/Test Conditions	Values	Unit
	T_J=25	1000	
I_{CN}			
I_{CDC}	T_C=25 ,T_{Jmax}=175	620	A
	T_C=120 ,T_{Jmax}=175	300	
I_{CM}			
			℃
			W

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

Symbol	Parameter/Test Conditions			Min.	Typ.		Unit
$V_{GE(th)}$	Gate Emitter Threshold Voltage	V_{CE}=V_{GE}, I_C=3mA		4.20	5.00	5.80	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=600A, V_{GE}=15V, T_J=25			1.8		V
		I_C=600A, V_{GE}=15V, T_J=125			1.9		
		I_C=600A, V_{GE}=15V, T_J=150			2.0		
I_{CES}	Collector Leakage Current	V_{CE}=1000V, V_{GE}=0V, T_J=25				100	
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±20V, T_J=25		-400		400	nA
R_{Gint}	Integrated Gate Resistor				0.6		
Q_G	Gate Charge	V_{CE}=500V, I_C=300A , V_{GE}=15V			1.9		µC
C_{ies}	Input Capacitance				36.8		nF
C_{oes}		V_{CE}=25V, V_{GE}=0V, f =100kHz					nF
C_{res}	Reverse Transfer Capacitance						pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=500V,I_C=300A R_{Gon} V_{GE}=±15V, Inductive Load	T_J=25		150		ns
			T_J=125		100		ns
			T_J=150		90		ns
t_r	Rise Time		T_J=25				ns
			T_J=125		64		ns
			T_J=150		66		ns
E_{on}		T_J=150	T_J=25				mJ
					21.6		mJ
							mJ
$t_{d(off)}$	Turn off Delay Time	V_{CC}=500V,I_C=300A R_{Goff} V_{GE}=±15V, Inductive Load			570		ns
			T_J=125		640		ns
			T_J=150				ns
t_f	Fall Time				35		ns
							ns
			T_J=150		66		ns
E_{off}		T_J=150	T_J=25		11.8		mJ
			T_J=125		16.6		mJ
			T_J=150		17.9		mJ
R_{thJC}							K /W

T

					Unit
I_{CDC}	Continuous DC Collector Current	T_C=25 ,T_{Jmax}=175 T_C=100 ,T_{Jmax}=175		300	
					℃
					W

					Unit
					nA
					µC
					nF
					nF
					pF
					ns
					ns
					ns
					ns
					ns
					ns
					mJ
					mJ
					mJ
					ns
					ns
					ns
					ns
					ns
					ns
					mJ
					mJ
					mJ
				0.097	K /W

Diode

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25	1000	V
I_{FN}	Implemented Forward Current		300	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	600	
T_{Jmax}	Max. Junction Temperature		175	℃

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			2.35		V
		I_F=300A , V_{GE}=0V, T_J=125			2.2		
		I_F=300A , V_{GE}=0V, T_J=150			2.1		
t_{rr}	Reverse Recovery Time	I_F=300A , V_R=500V dI_F T_J =150	T_J=25		86		ns
			T_J=150		155		ns
I_{RRM}	Max. Reverse Recovery Current		T_J=25		220		A
			T_J=150		310		A
Q_{RR}	Reverse Recovery Charge		T_J=25		9.1		µC
			T_J=150		24.8		µC
E_{rec}	Reverse Recovery Energy		T_J=25		3.9		mJ
			T_J=150		8.6		mJ
R_{thJC}	Junction to Case Thermal Resistance					0.08	K /W

NTC CHARACTERISTICS (T_C =25°C unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
R_{25}	Resistance	T_C =25		22		
R/R	T_{NTC}=100 R_{100}		-5		5	%
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\ K))]$			3950		K

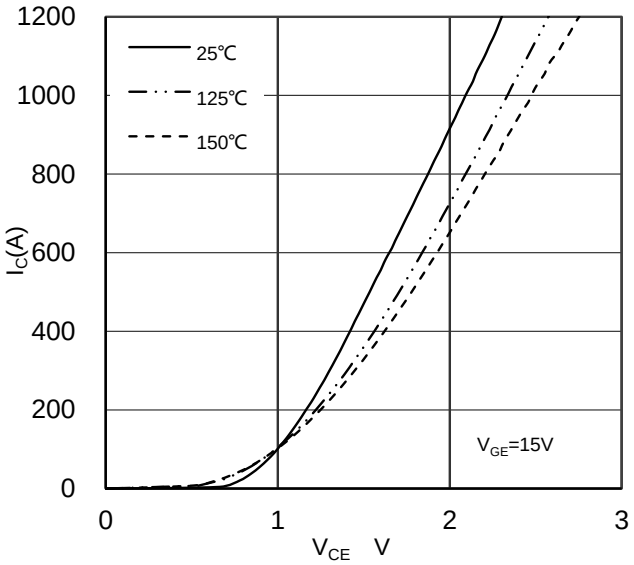


Figure 1. Typical Output Characteristics IGBT

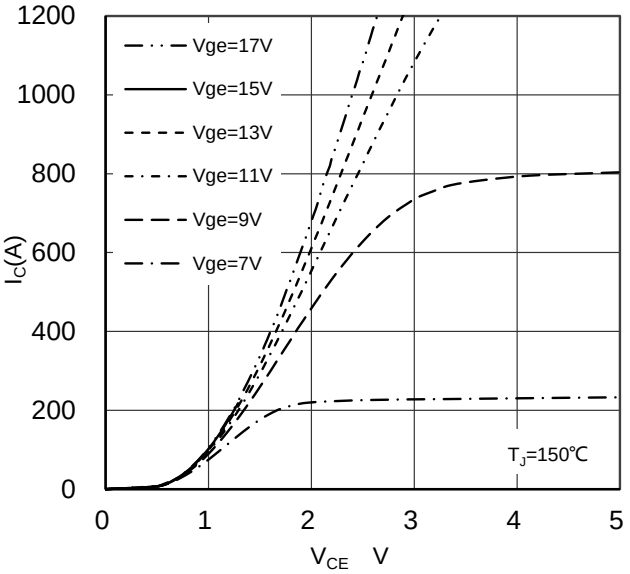


Figure 2. Typical Output Characteristics IGBT

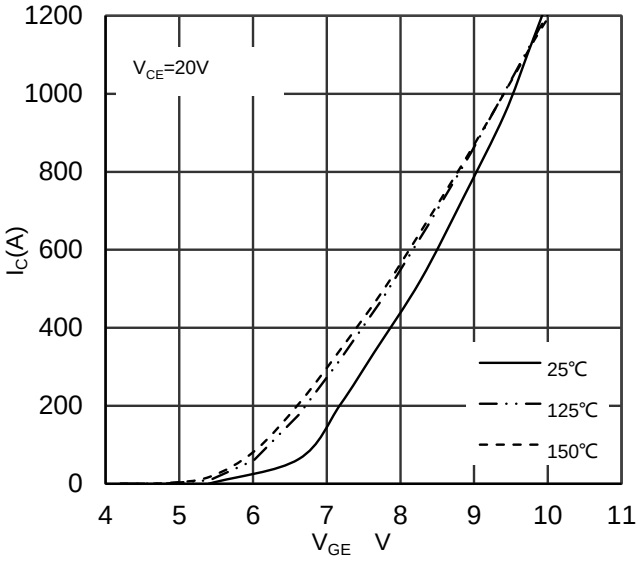


Figure 3. Typical Transfer characteristics IGBT

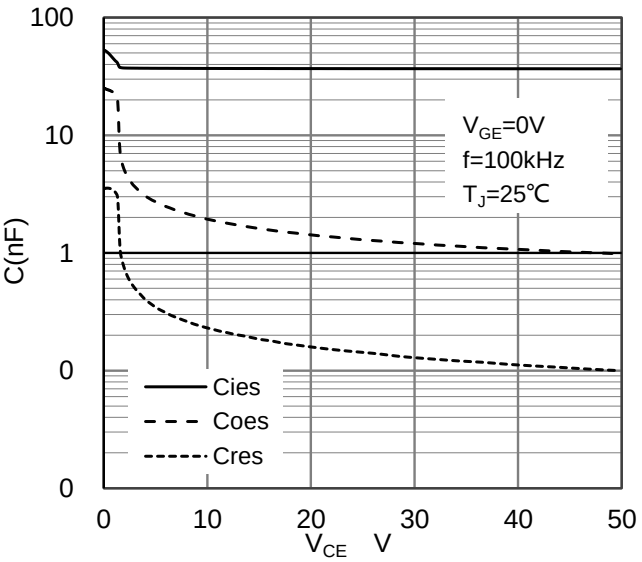


Figure 4. Typical capacitance

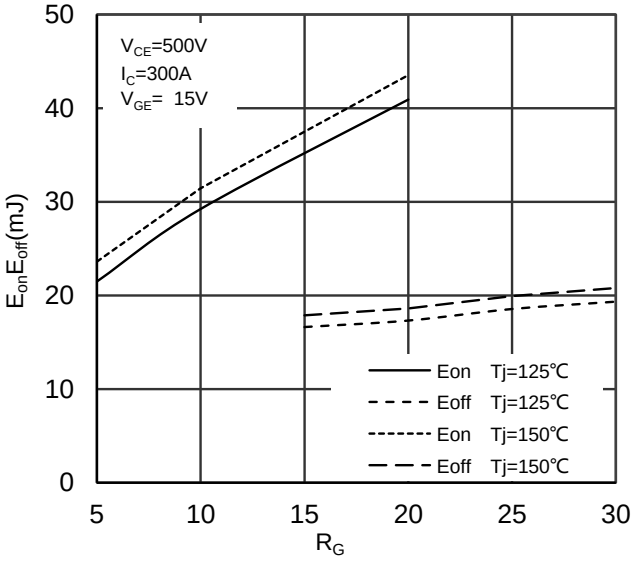


Figure 5. Switching Energy vs Gate Resistor IGBT
T1 T4

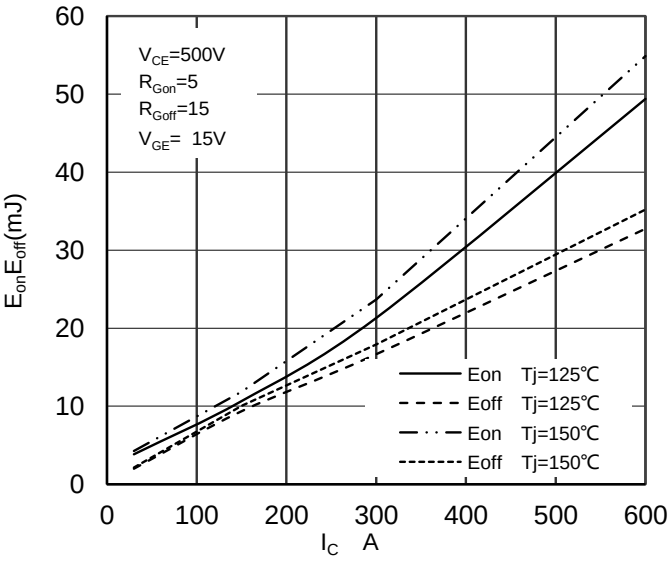


Figure 6. Switching Energy vs Collector Current IGBT
T1 T4

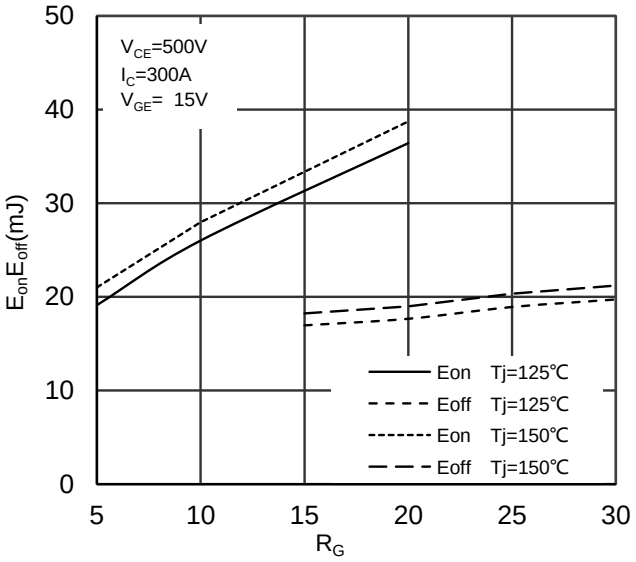


Figure 7. Switching Energy vs Gate Resistor IGBT
T2 T3

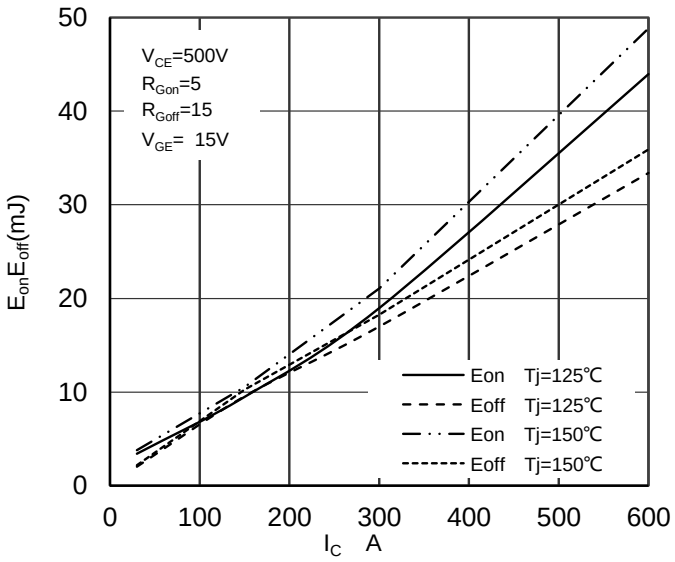


Figure 8. Switching Energy vs Collector Current IGBT
T2 T3

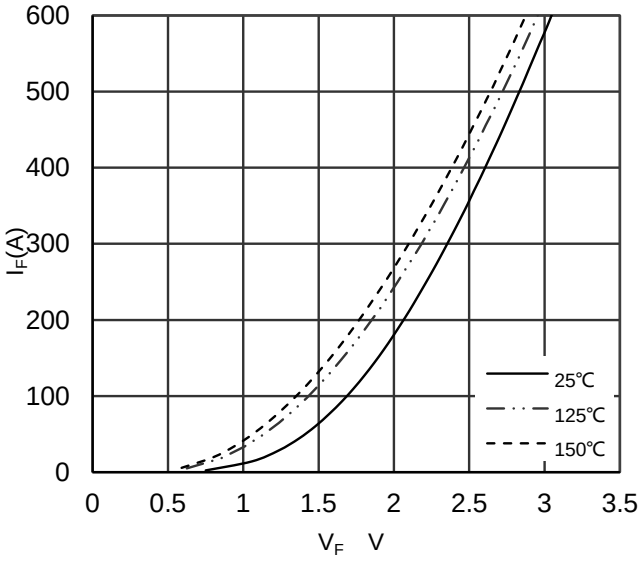


Figure 9. Diode Forward Characteristics Diode

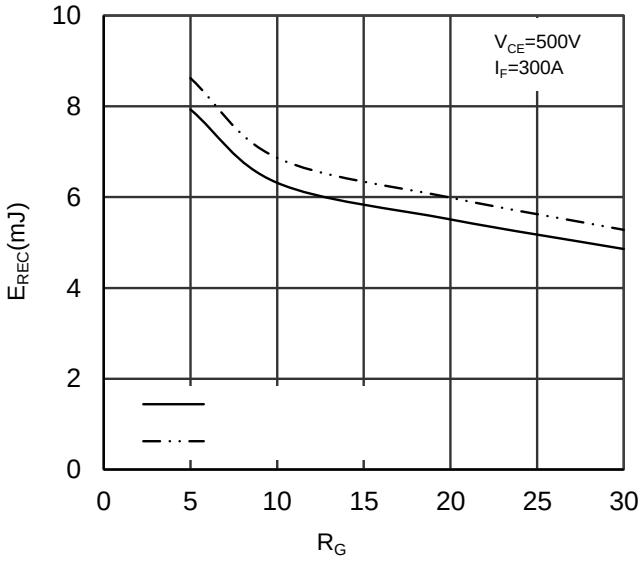


Figure 10. Switching Energy vs Gate Resistor Diode

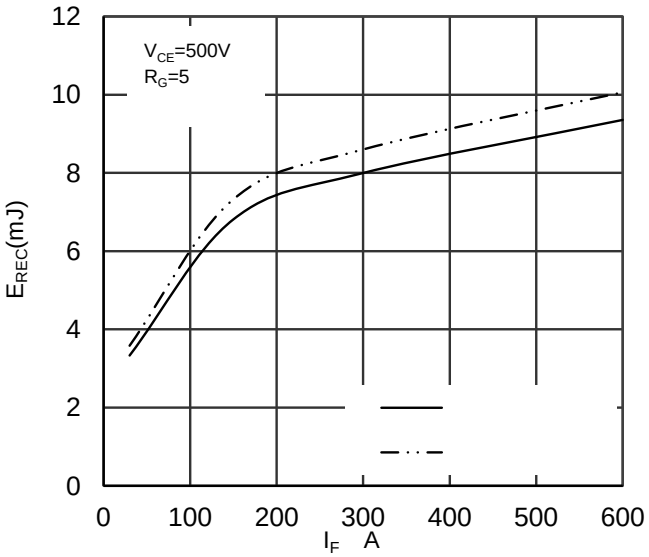


Figure 11. Switching Energy vs Forward Current Diode

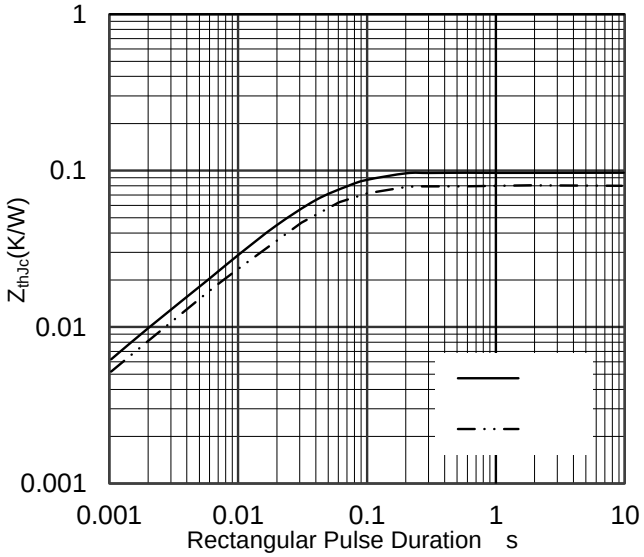


Figure 12. Transient Thermal Impedance

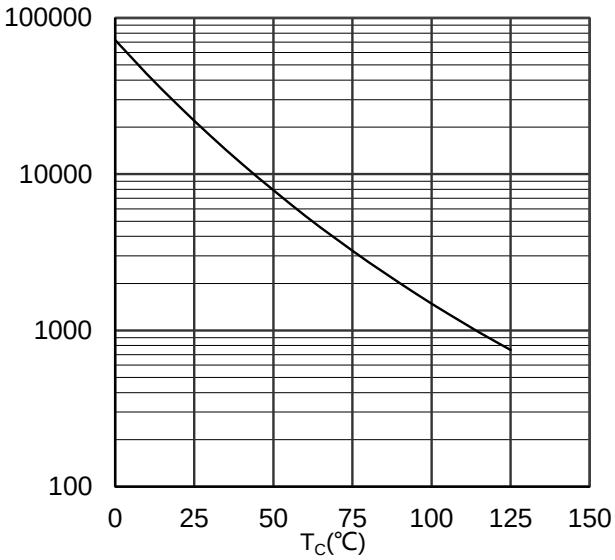


Figure 13. NTC Characteristics

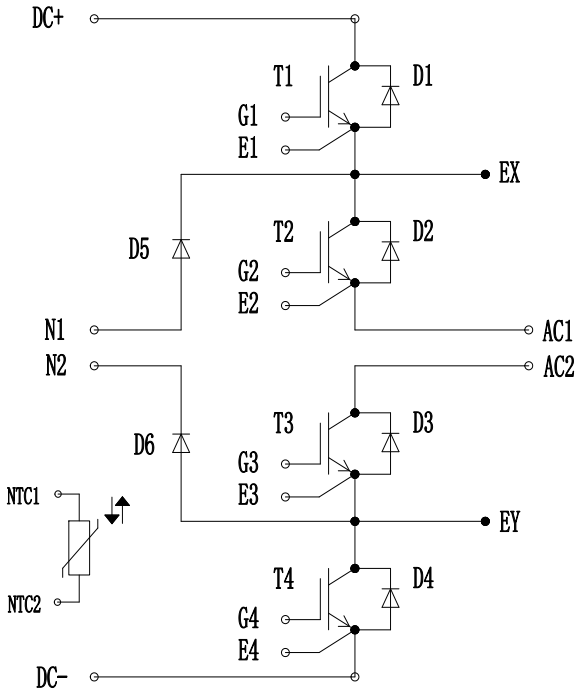
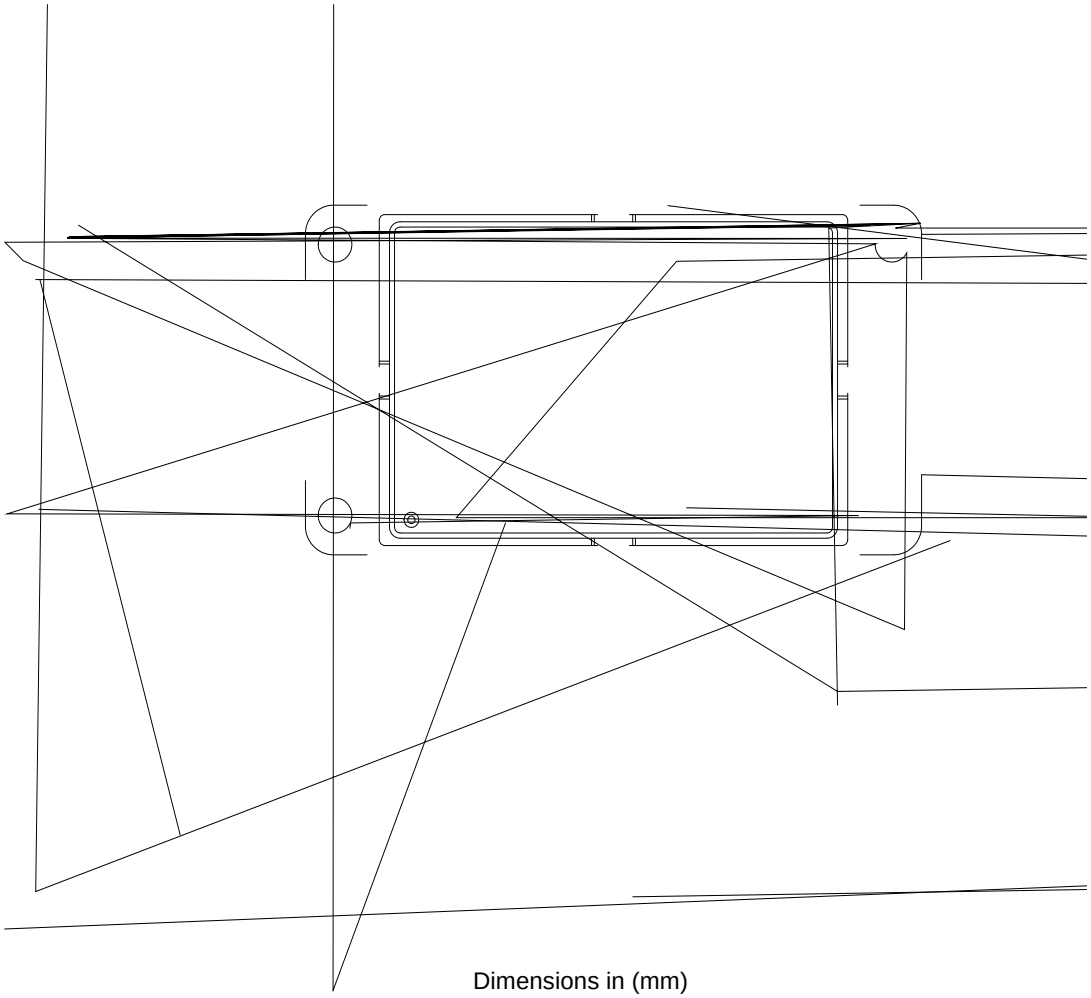


Figure 14. Circuit Diagram



Dimensions in (mm)

Figure 15. Package Outline

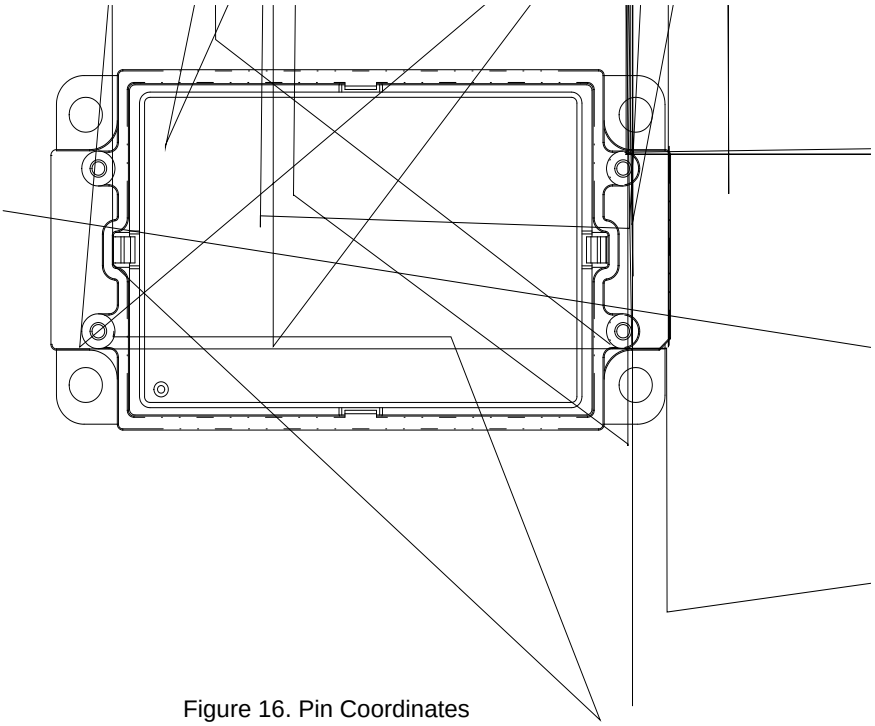


Figure 16. Pin Coordinates