MMG450WQ120PD6T7

1200V 450A Three Level Inverter Module

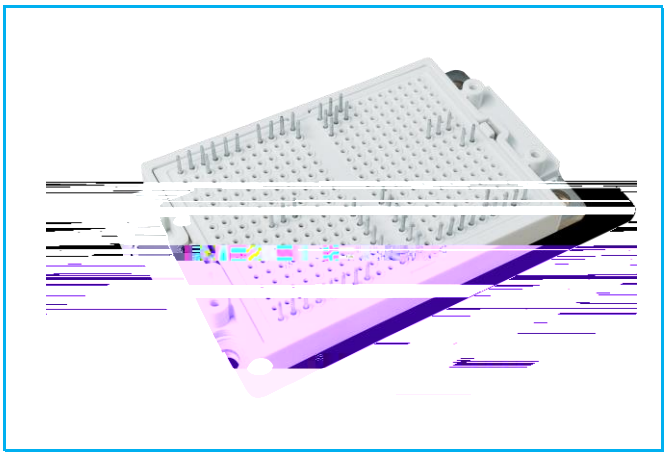
November 2024 | Preliminary | RoHS Compliant

PRODUCT FEATURES

☐ 1200V IGBT CHIP

☐ Low VCE(sat) and Low switching losses

☐ Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

☐ 3-Level-Applications

☐ Solar Applications

☐ PCS

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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			Unit
			℃
			W

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

			Unit
			nA
			µC
			nF
			nF
			nF
			ns
			ns
			ns
			ns
			ns
			ns
			mJ
			mJ
			mJ
			ns
		1290	ns
	T_J=150℃		ns
		60	ns
			ns
		115	ns
		9.7	mJ
			mJ
		14.9	mJ
			K /W

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

						Unit
						nA
Q_G						µC
C_{ies}	Input Capacitance				63.6	nF
		V_{CE}=25V, V_{GE}=0V, f =100kHz				nF
C_{res}	Reverse Transfer Capacitance				0.281	nF
			T_J=25℃		129	ns
$t_{d(on)}$	Turn on Delay Time		T_J=125℃		113	ns
			T_J=150℃			ns
						ns
						ns
					44	ns
						mJ
						mJ
						mJ
			T_J=25℃			ns
$t_{d(off)}$	Turn off Delay Time		T_J=125℃			ns
		V_{CC}=650V,I_C=200A	T_J=150℃			ns
		R_{Goff}				ns
		V_{GE}=±15V,			92	ns
		Inductive Load			115	ns
		（T_J=150℃）			10.3	mJ
E_{off}	Turn off Energy		T_J=125℃			mJ
					15.7	mJ
R_{thJC}	Junction to Case Thermal Resistance				0.107	K /W

thJC

Diode(D2、D3)

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_{FN}	Implemented Forward Current		280	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	560	
I^2t		T_{vj}=25℃, t=10ms, 50Hz	9100	A^2S
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=280A , V_{GE}=0V, T_J=25℃		2.80		V
		I_F=280A , V_{GE}=0V, T_J=125℃		2.30		
		I_F=280A , V_{GE}=0V, T_J=150℃		2.15		
R_{thJC}	Junction to Case Thermal Resistance				0.250	K /W

Diode(D1、D4、D5、D6)

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_{FN}	Implemented Forward Current		250	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	500	
I^2t		T_{vj}=25℃, t=10ms, 50Hz	16200	A^2S
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=250A , V_{GE}=0V, T_J=25℃		1.34	1.65	V
		I_F=250A , V_{GE}=0V, T_J=125℃		1.6		
		I_F=250A , V_{GE}=0V, T_J=150℃		1.66		
R_{thJC}	Junction to Case Thermal Resistance				0.163	K /W

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
R_{25}	Resistance	T_{NTC} =25℃		5		
△R/R	T_{NTC}=100℃， R_{100}		-5		5	%
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\ K))]$			3375		K

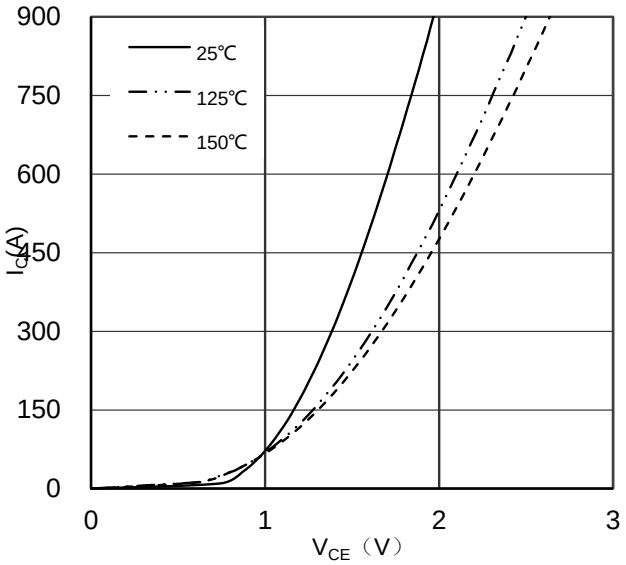


Figure 1. Typical Output Characteristics IGBT

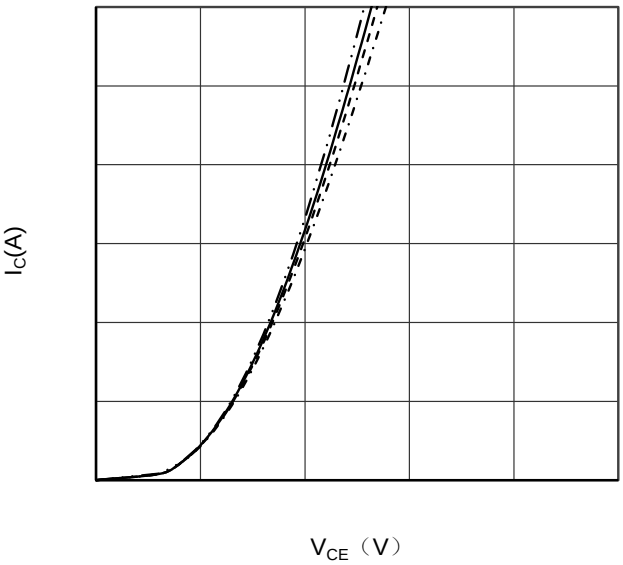


Figure 2. Typical Output Characteristics IGBT

I_C(A)

V_{GE}（V）

Figure 3. Typical Transfer characteristics IGBT

$E_{on}E_{off}$(mJ)

R_G（ ）

Figure 4. Switching Energy vs Gate Resistor IGBT
（T1、T4）

$E_{on}E_{off}$(mJ)

I_C（A）

Figure 5. Switching Energy vs Collector Current IGBT
（T1、T4）

$E_{on}E_{off}$(mJ)

R_G（ ）

Figure 6. Switching Energy vs Gate Resistor IGBT
（T2、T3）

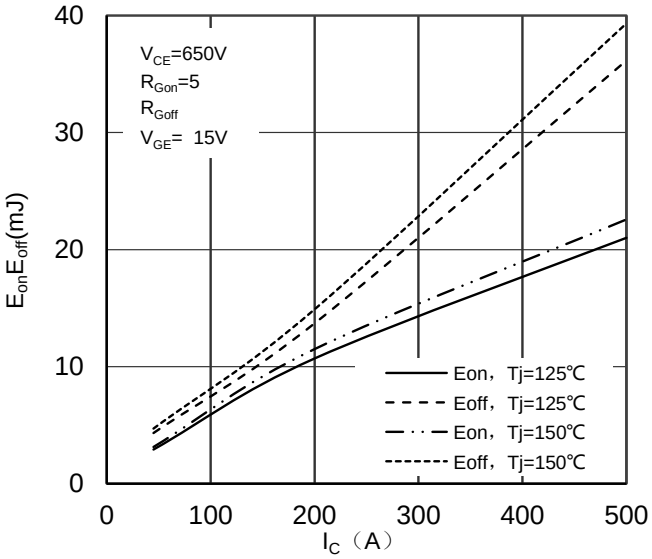


Figure 7. Switching Energy vs Collector Current IGBT （T2、T3）

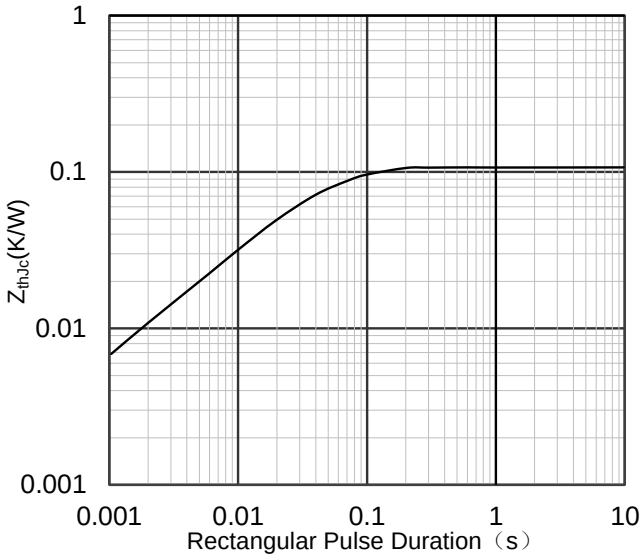


Figure 8. Transient Thermal Impedance of IGBT

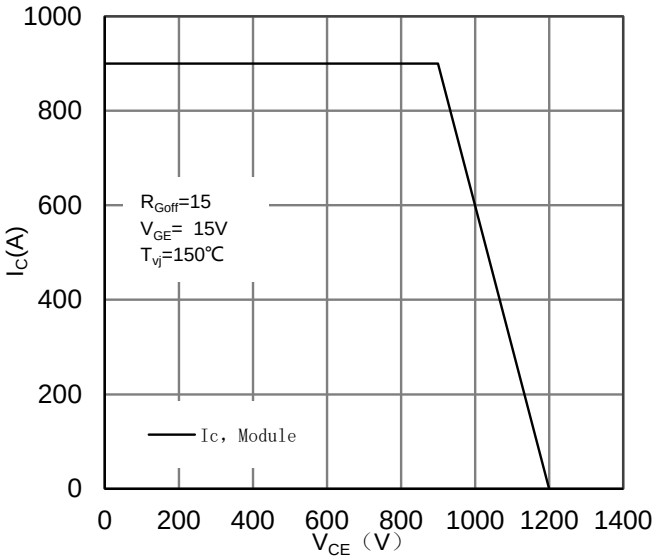


Figure 9. Reverse Bias Safe Operating Area IGBT

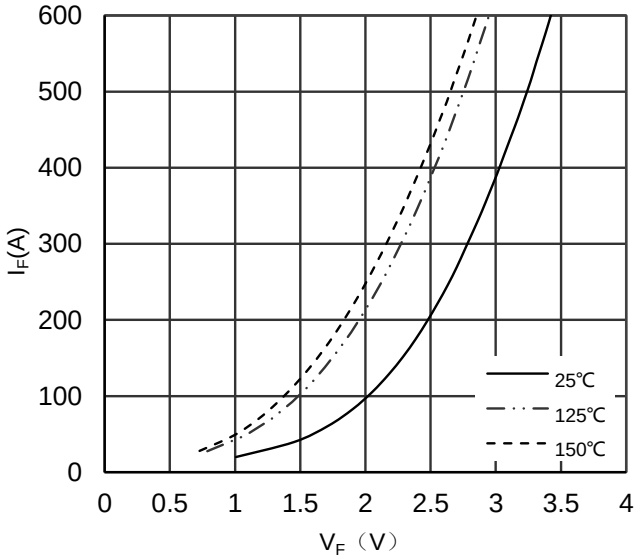


Figure 10. Diode Forward Characteristics Diode （D2、D3）

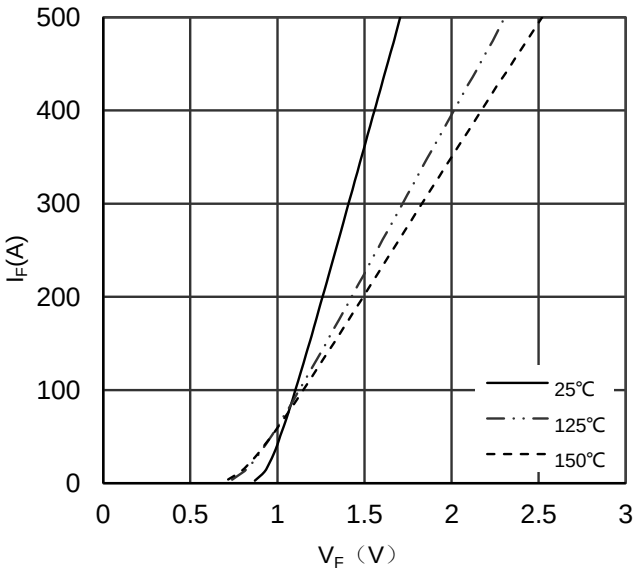


Figure 11. Diode Forward Characteristics Diode （D1、D4、D5、D6）

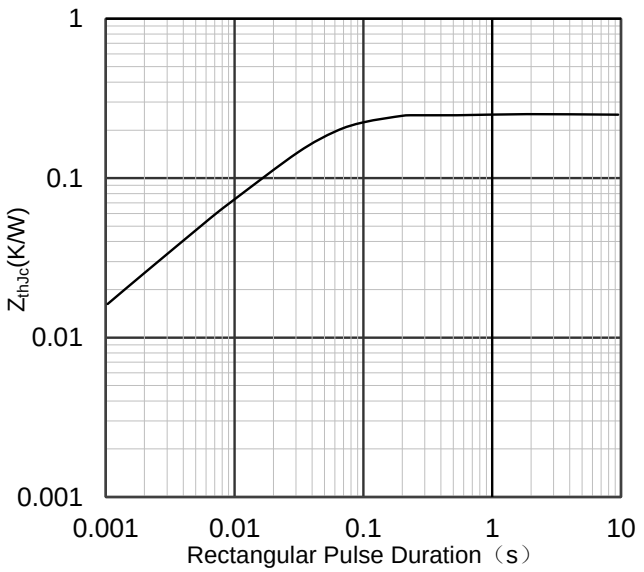


Figure 12. Transient Thermal Impedance of Diode （D2、D3）

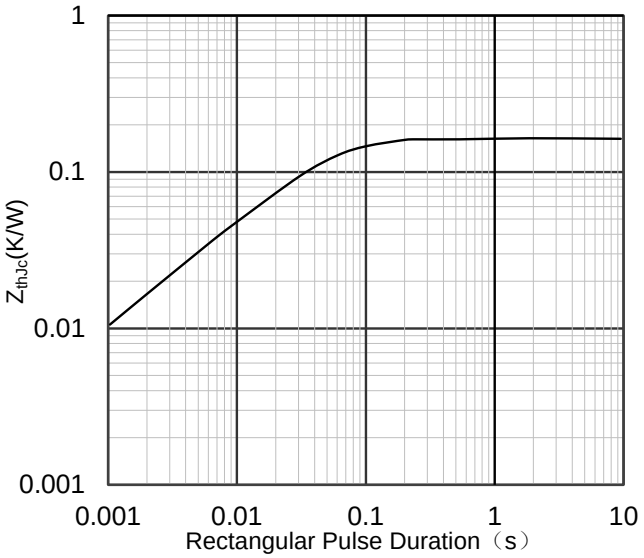


Figure 13. Transient Thermal Impedance of Diode （D1、D4、D5、D6）

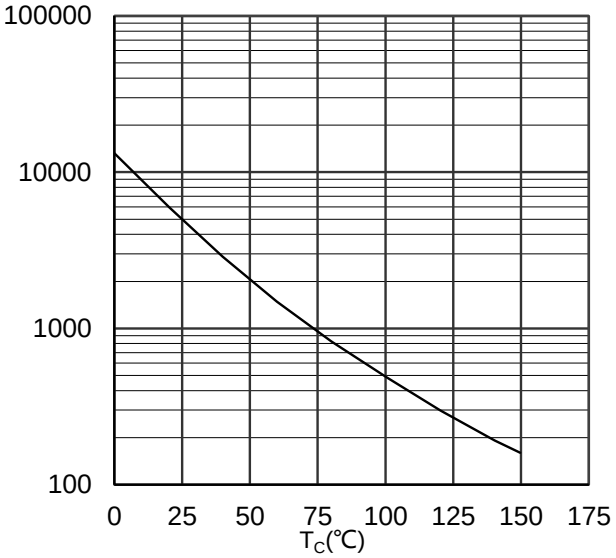


Figure 14. NTC Characteristics

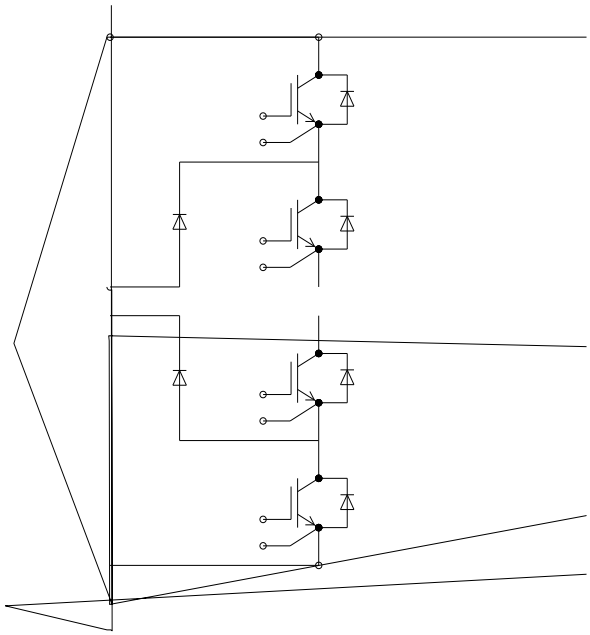
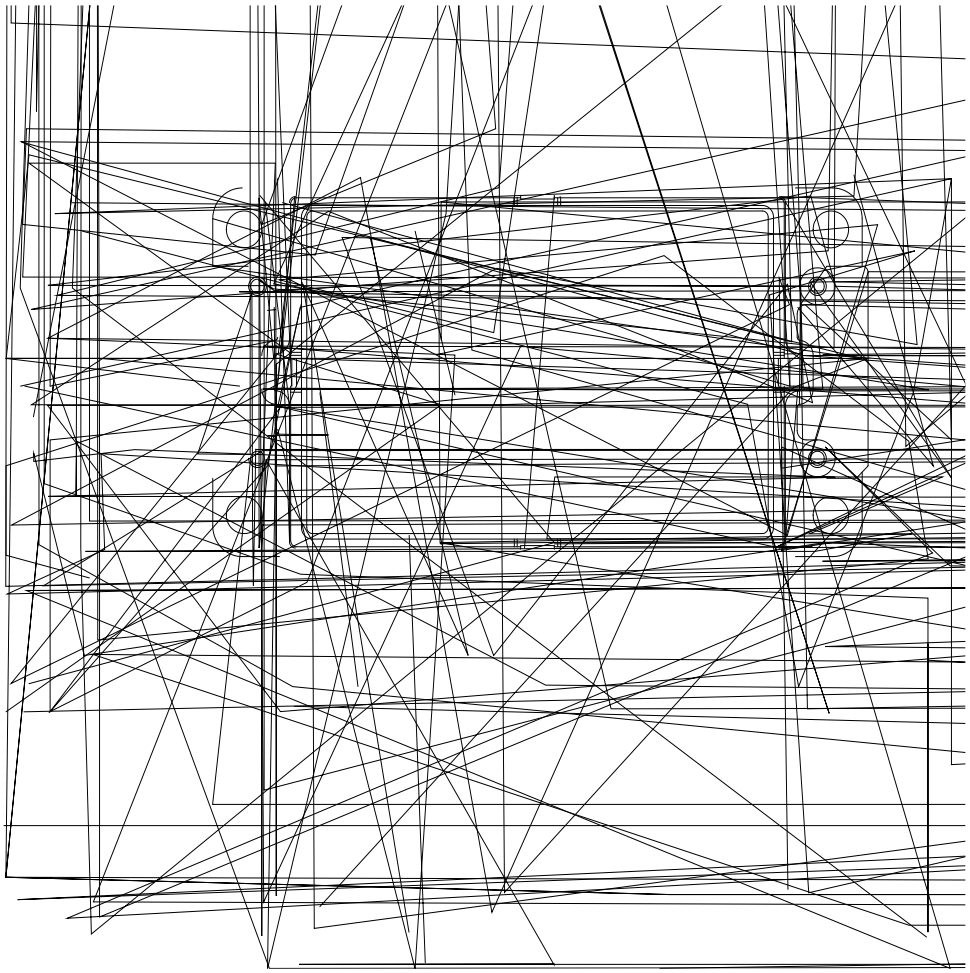


Figure 15. Circuit Diagram



Dimensions in (mm)

Figure 16. Package Outline

Pin table(mm)							

Figure 17. Coordinates