

PRODUCT FEATURES

- IGBT³ CHIP(Trench+Field Stop technology)
- High short circuit capability,self limiting short circuit current
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses



APPLICATIONS

- High frequency switching application
- Medical applications
- Motion/servo control
- UPS systems

IGBT

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

Symbol	Parameter/Test Conditions	Values	Unit	
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}C$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^{\circ}C, T_{Jmax}=150^{\circ}C$	450	A
		$T_C=80^{\circ}C, T_{Jmax}=150^{\circ}C$	300	
I_{CM}	Repetitive Peak Collector Current	$t_p=1ms$	600	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}C, T_{Jmax}=150^{\circ}C$	1450	W

Diode

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

Symbol	Parameter/Test Conditions	Values	Unit	
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}C$	1200	V
$I_{F(AV)}$	Average Forward Current		300	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1ms$	600	
I^2t		$T_J=125^{\circ}C, t=10ms, V_R=0V$	19000	A ² S

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MMG300D120UA6TN

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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	$V_{CE}=V_{GE}, I_C=12\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.7	2.15	
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		1.9		
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			1	mA
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_J=25^\circ\text{C}$	-400		400	nA
R_{gint}	Integrated Gate Resistor			2.5		Ω
Q_g	Gate Charge	$V_{CE}=600\text{V}, I_C=300\text{A}, V_{GE}=\pm 15\text{V}$		2.8		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		21		nF
C_{res}	Reverse Transfer Capacitance			850		pF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		160	ns
			$T_J=125^\circ\text{C}$		170	ns
t_r	Rise Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		40	ns
			$T_J=125^\circ\text{C}$		45	ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		450	ns
			$T_J=125^\circ\text{C}$		520	ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		100	ns
			$T_J=125^\circ\text{C}$		160	ns
E_{on}	Turn on Energy	$V_{CC}=600\text{V}, I_C=300\text{A}$ $R_G=2.4\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		16.5	mJ
			$T_J=125^\circ\text{C}$		25	mJ
E_{off}	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		24.5	mJ
			$T_J=125^\circ\text{C}$		37	mJ
I_{SC}	Short Circuit Current	$t_{psc} \leq 10\mu\text{S}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=900\text{V}$		1200		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.085	K/W

Diode

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.65	2.15	V
		$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.65		
t_{rr}	Reverse Recovery Time	$I_F=300\text{A}, V_R=600\text{V}$ $dI_F/dt=-6000\text{A}/\mu\text{s}$ $T_J=125^\circ\text{C}$		300		ns
I_{RRM}	Max. Reverse Recovery Current			270		A
Q_{RR}	Reverse Recovery Charge			56		μC
E_{rec}	Reverse Recovery Energy			26		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.15	K/W

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MODULE CHARACTERISTICS ($T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		150	$^\circ\text{C}$
T_{Jop}	Operating Temperature		-40~125	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	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

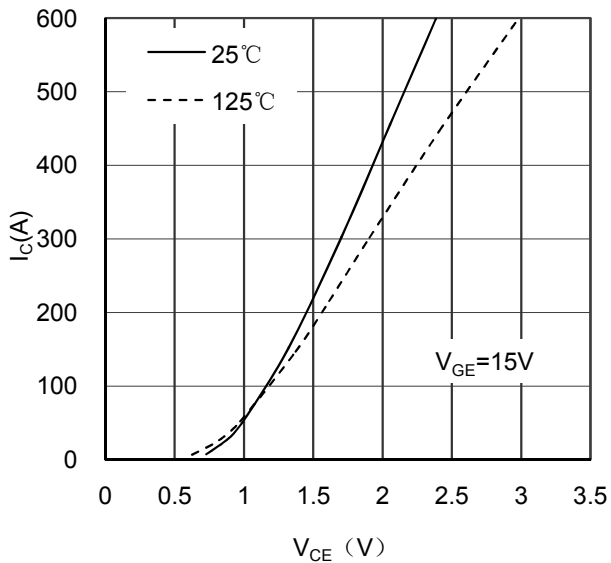


Figure 1. Typical Output Characteristics IGBT

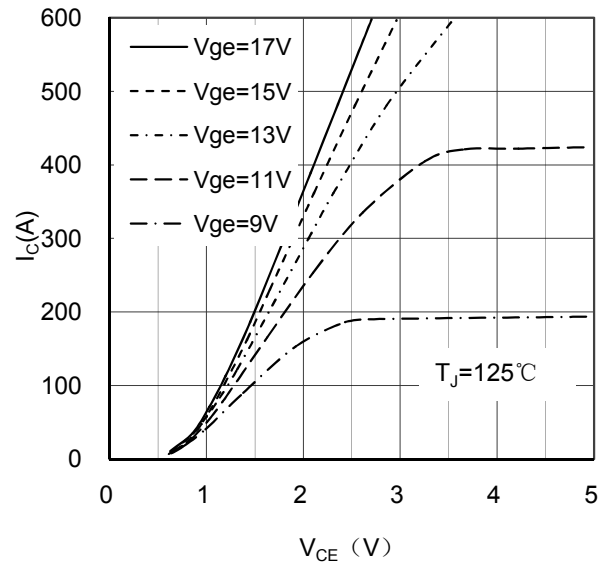


Figure 2. Typical Output Characteristics IGBT

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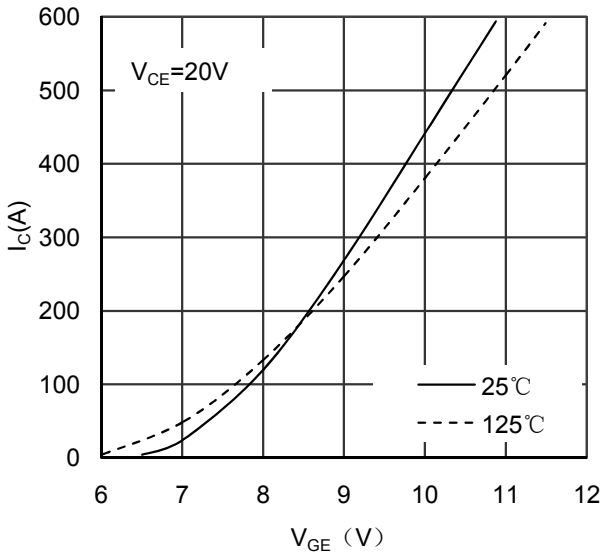


Figure 3. Typical Transfer characteristics IGBT

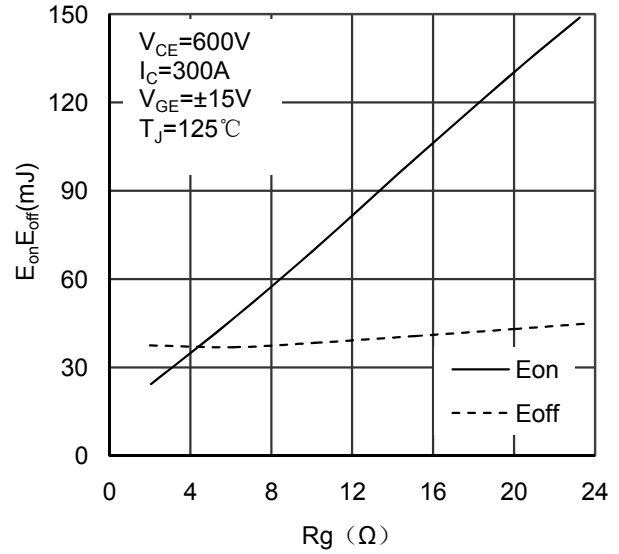


Figure 4. Switching Energy vs Gate Resistor IGBT

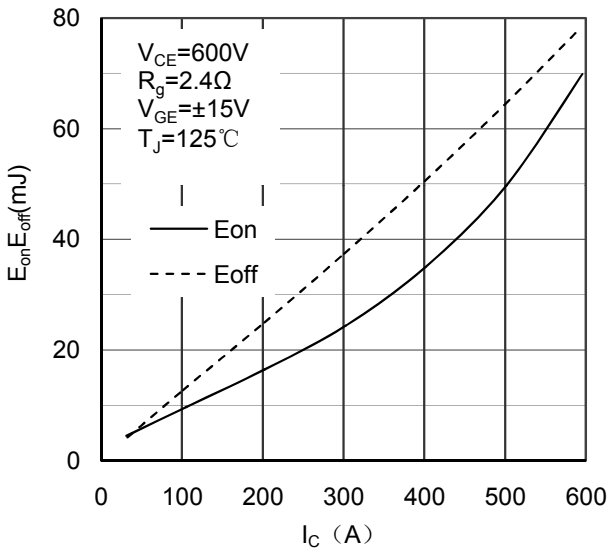


Figure 5. Switching Energy vs Collector Current IGBT

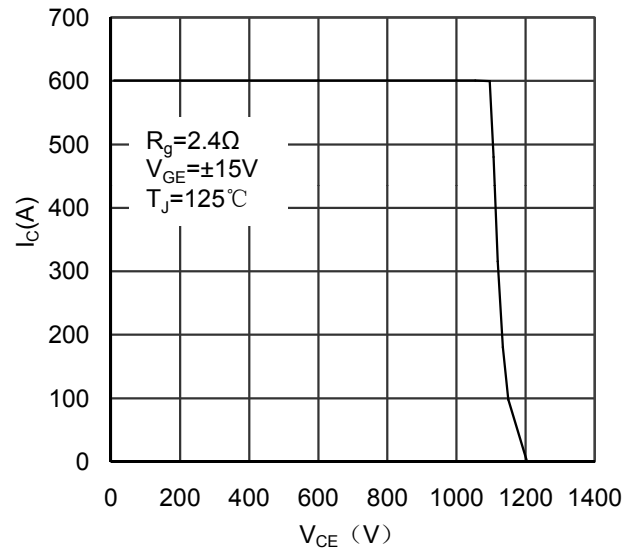


Figure 6. Reverse Biased Safe Operating Area IGBT

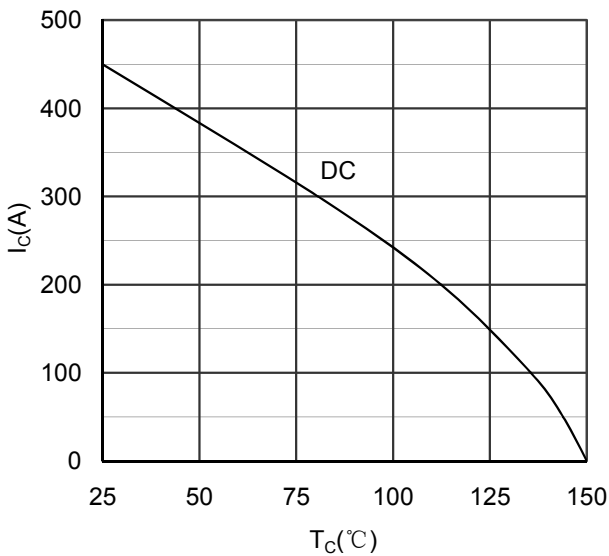


Figure 7. Collector Current vs Case temperature IGBT

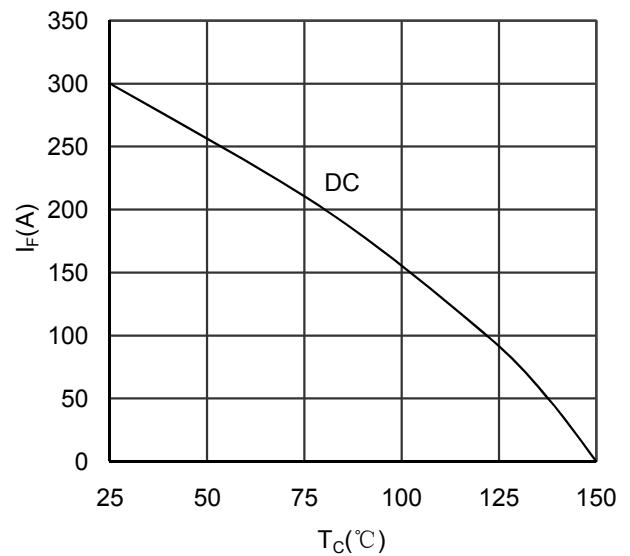


Figure 8. Forward current vs Case temperature Diode

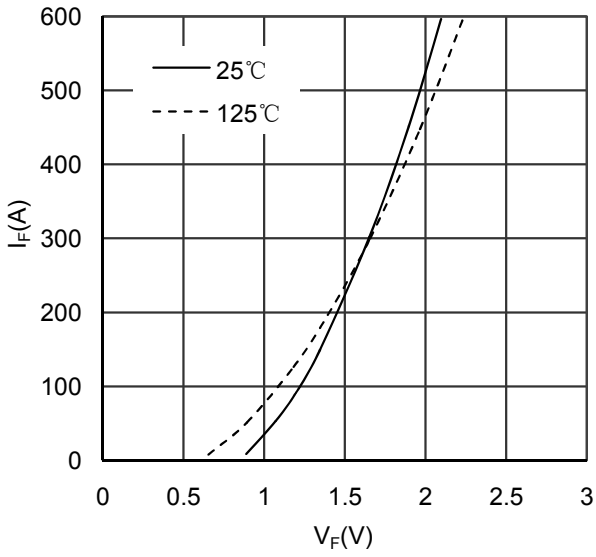


Figure 9. Diode Forward Characteristics Diode

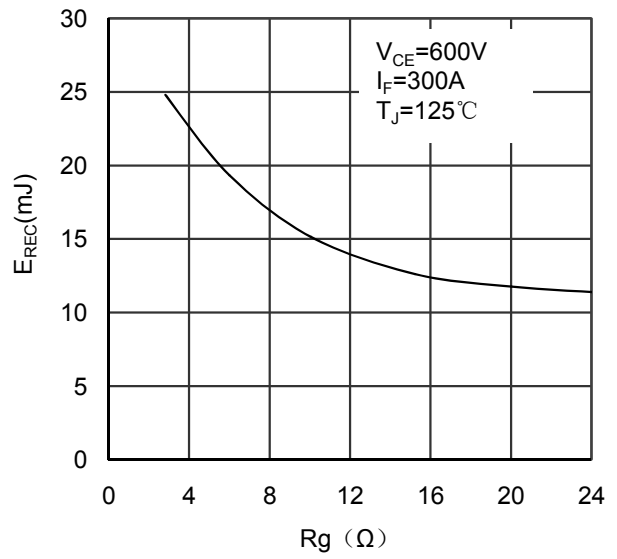


Figure 10. Switching Energy vs Gate Resistor Diode

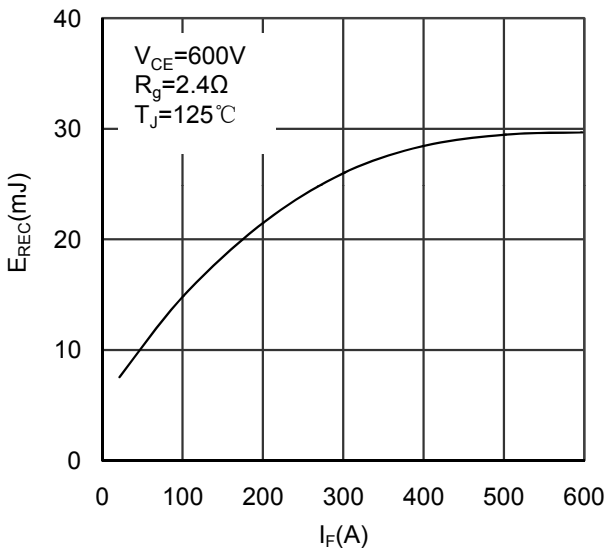


Figure 11. Switching Energy vs Forward Current Diode

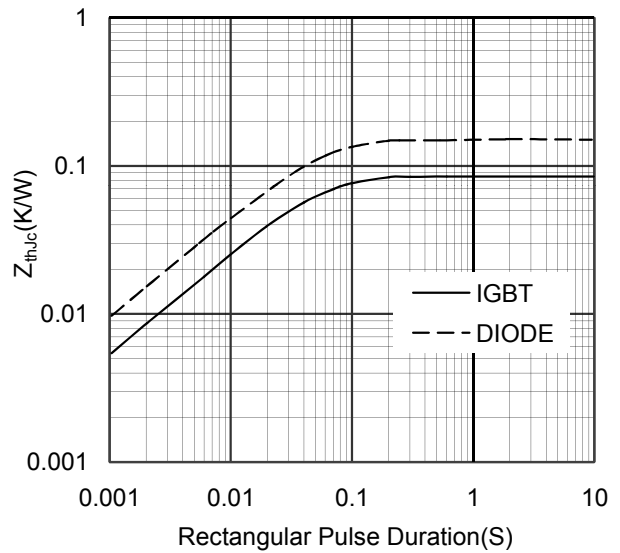


Figure 12. Transient Thermal Impedance of Diode and IGBT

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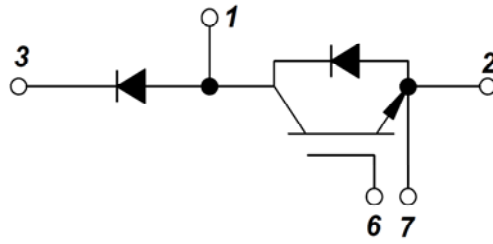
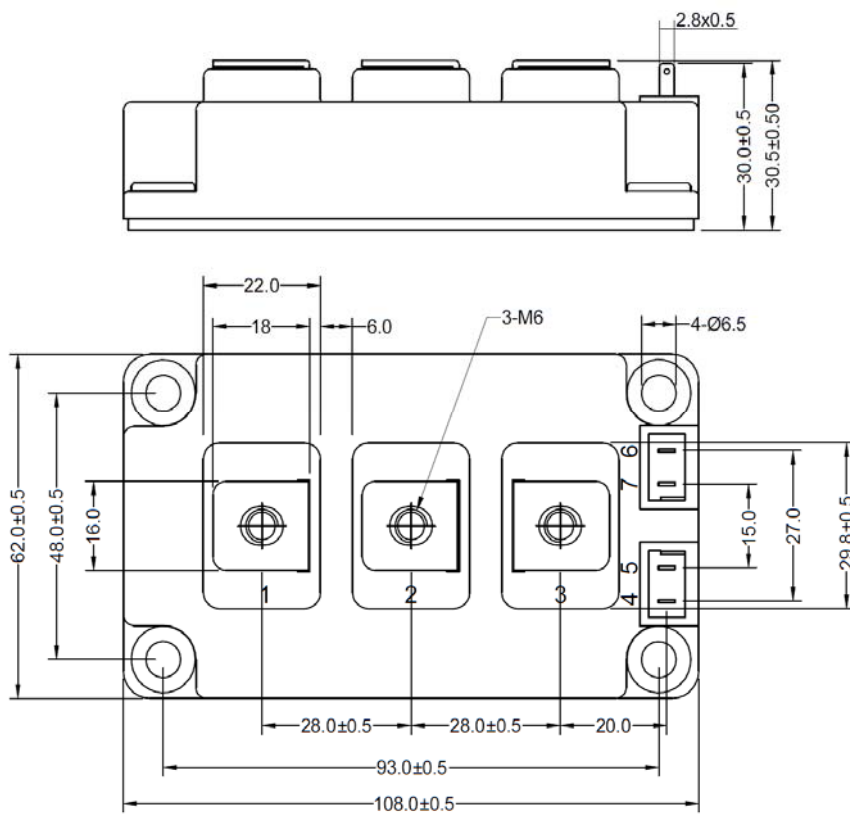


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline