

## PRODUCT FEATURES

- IGBT<sup>3</sup> 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		$\pm 20$	
$I_C$	DC Collector Current	$T_C=25^{\circ}C, T_{Jmax}=150^{\circ}C$	290	A
		$T_C=80^{\circ}C, T_{Jmax}=150^{\circ}C$	200	
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1ms$	400	
$P_{tot}$	Power Dissipation Per IGBT	$T_C=25^{\circ}C, T_{Jmax}=150^{\circ}C$	1050	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		200	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1ms$	400	
$I^2t$		$T_J=125^{\circ}C, t=10ms, V_R=0V$	7750	A <sup>2</sup> S

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## MMG200D120UA6TN

### IGBT

#### 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	$V_{CE}=V_{GE}, I_C=8\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=200\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.7	2.15	
		$I_C=200\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		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			3.8		$\Omega$
$Q_g$	Gate Charge	$V_{CE}=600\text{V}, I_C=200\text{A}, V_{GE}=\pm 15\text{V}$		1.9		$\mu\text{C}$
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		14		nF
$C_{res}$	Reverse Transfer Capacitance			500		pF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}, I_C=200\text{A}$ $R_G=3.6\Omega,$ $V_{GE}=\pm 15\text{V},$ 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	$V_{CC}=600\text{V}, I_C=200\text{A}$ $R_G=3.6\Omega,$ $V_{GE}=\pm 15\text{V},$ 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	$V_{CC}=600\text{V}, I_C=200\text{A}$ $R_G=3.6\Omega,$ $V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		10	mJ
			$T_J=125^\circ\text{C}$		15	mJ
$E_{off}$	Turn off Energy	$V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		16.5	mJ
			$T_J=125^\circ\text{C}$		25	mJ
$I_{SC}$	Short Circuit Current	$t_{psc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}, V_{CC}=900\text{V}$		800		A
$R_{thJC}$	Junction to Case Thermal Resistance ( Per IGBT )				0.12	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	$I_F=200\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.65	2.15	V
		$I_F=200\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.65		
$t_{rr}$	Reverse Recovery Time	$I_F=200\text{A}, V_R=600\text{V}$ $dI_F/dt=-4000\text{A}/\mu\text{s}$ $T_J=125^\circ\text{C}$		290		ns
$I_{RRM}$	Max. Reverse Recovery Current			190		A
$Q_{RR}$	Reverse Recovery Charge			36		$\mu\text{C}$
$E_{rec}$	Reverse Recovery Energy			17		mJ
$R_{thJCD}$	Junction to Case Thermal Resistance ( Per Diode )				0.2	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

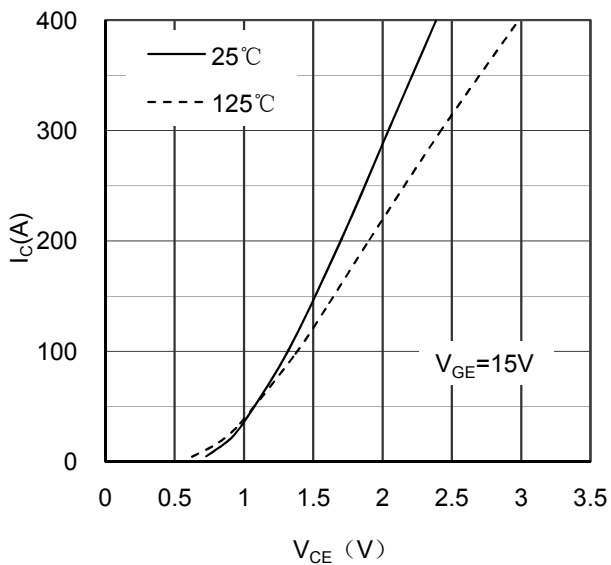


Figure 1. Typical Output Characteristics IGBT

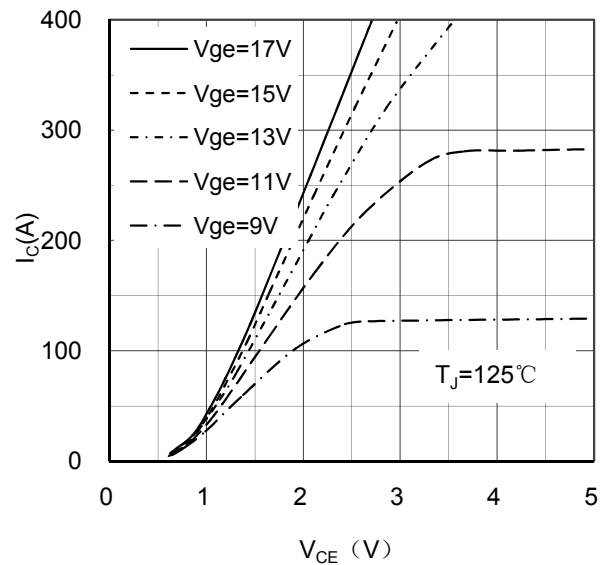


Figure 2. Typical Output Characteristics IGBT

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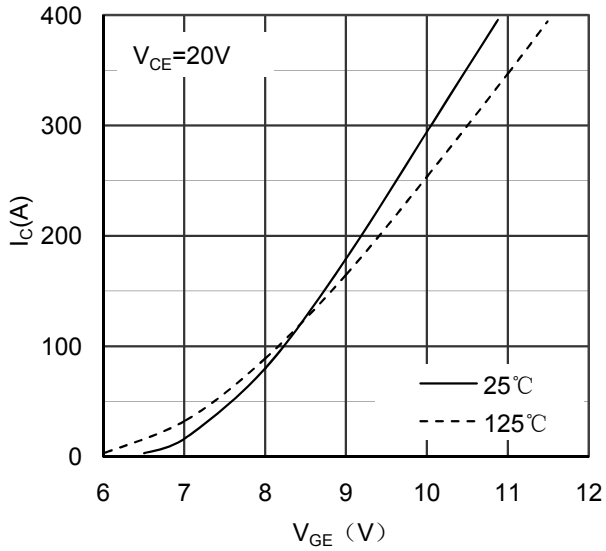


Figure 3. Typical Transfer characteristics IGBT

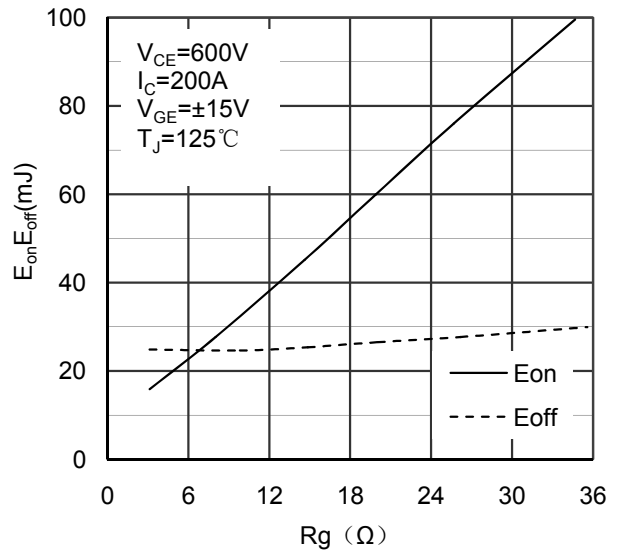


Figure 4. Switching Energy vs Gate Resistor IGBT

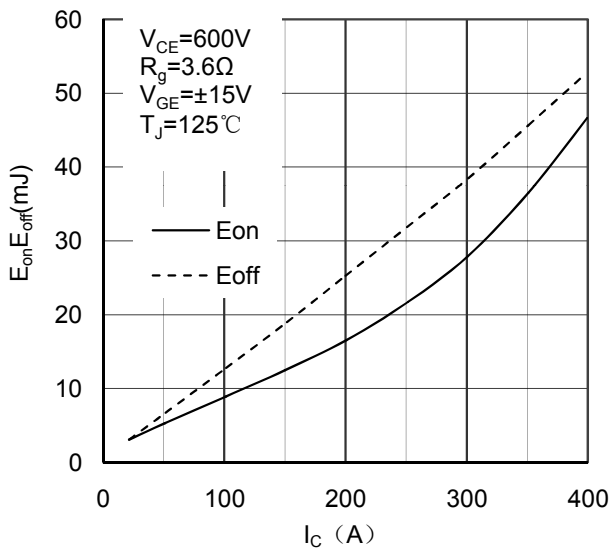


Figure 5. Switching Energy vs Collector Current IGBT

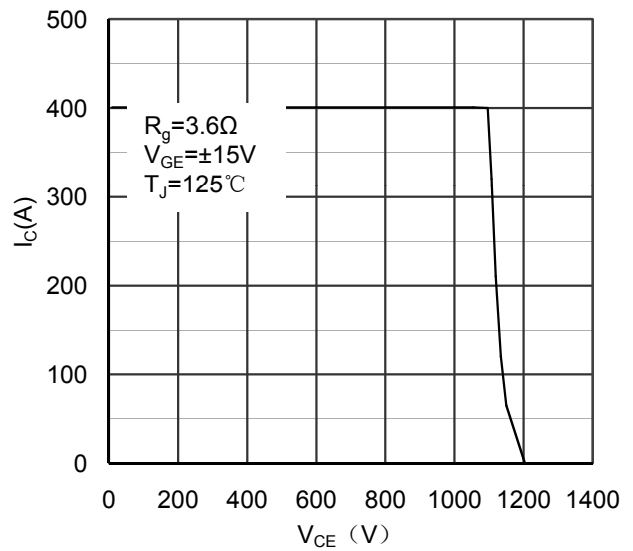


Figure 6. Reverse Biased Safe Operating Area IGBT

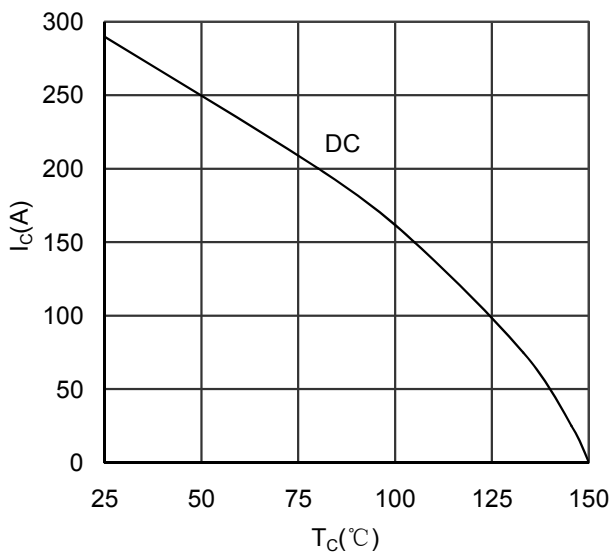


Figure 7. Collector Current vs Case temperature IGBT

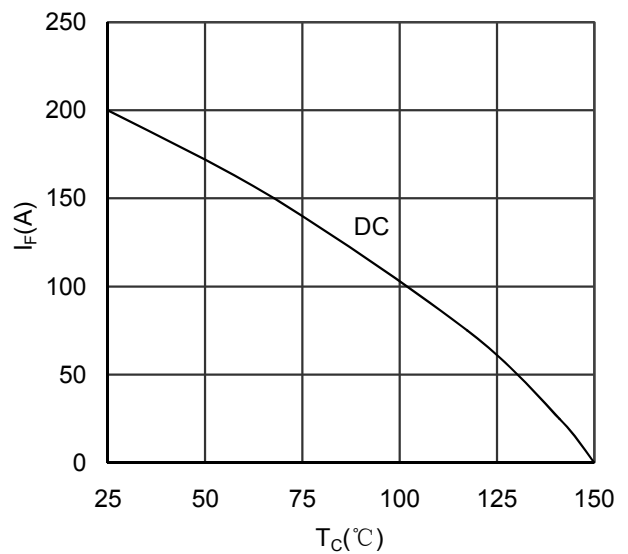


Figure 8. Forward current vs Case temperature Diode

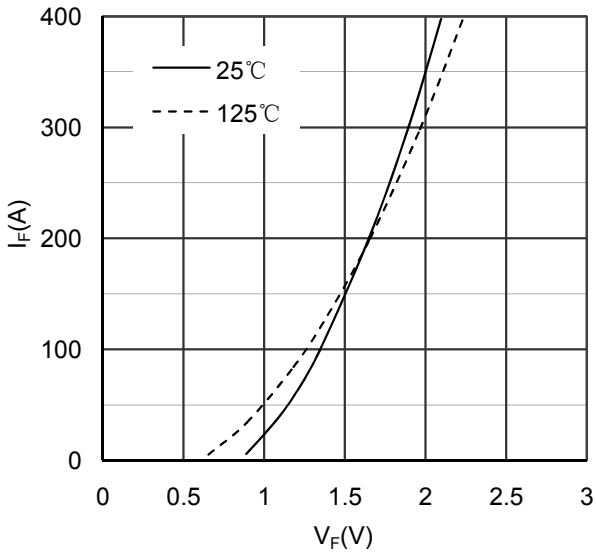


Figure 9. Diode Forward Characteristics Diode

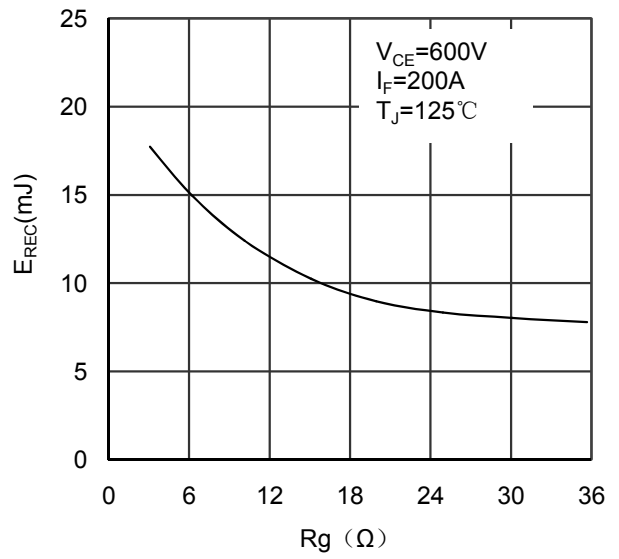


Figure 10. Switching Energy vs Gate Resistor Diode

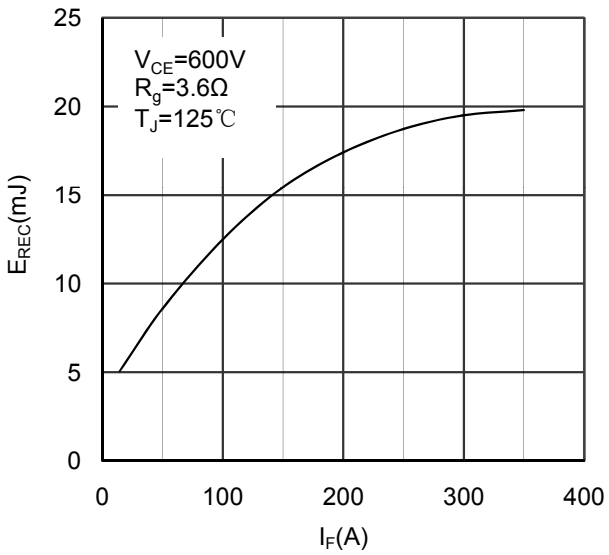


Figure 11. Switching Energy vs Forward Current Diode

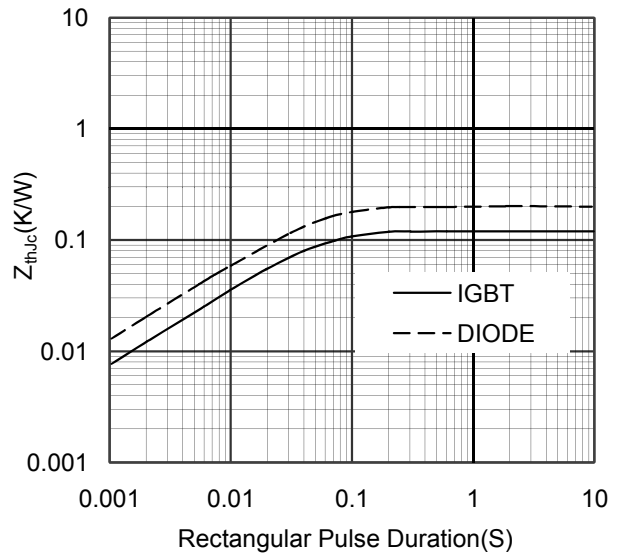


Figure 12. Transient Thermal Impedance of Diode and IGBT

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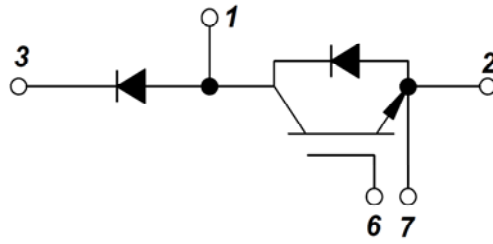
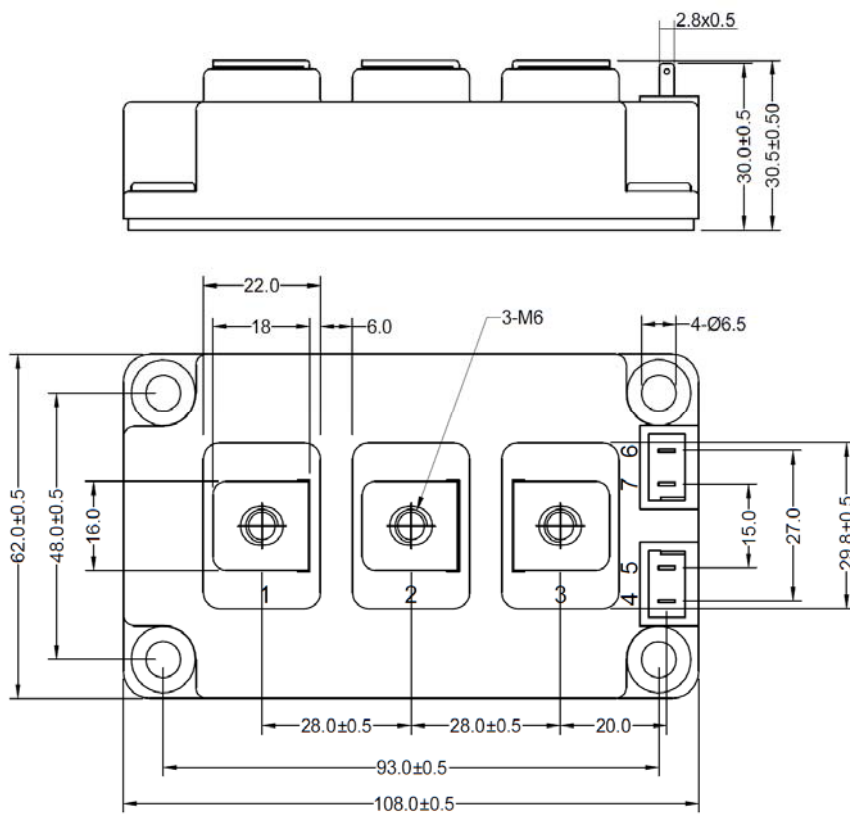


Figure 13. Circuit Diagram



Dimensions in (mm)

Figure 14. Package Outline