



February 2011

PRELIMINARY

MMG200Q120B

1200V 200A IGBT Module

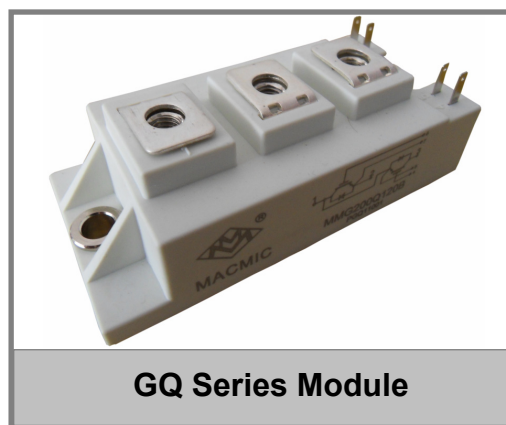
RoHS Compliant

FEATURES

- Ultra Low Loss
- High Ruggedness
- High Short Circuit Capability
- $V_{CE(sat)}$ With Positive Temperature Coefficient
- With Fast Free-Wheeling Diodes

APPLICATIONS

- Inverter
- Converter
- Welder
- SMPS and UPS
- Induction Heating



GQ Series Module

ABSOLUTE MAXIMUM RATINGS

$T_c=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	$V_{GE}=0V, T_{vj} \geq 25^\circ\text{C}$	1200	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_C	DC Collector Current		200	A
I_{CM}	Peak Collector Current	Limited by T_{vjmax}	400	A
P_{tot}	Power Dissipation Per IGBT		1050	W
T_{vj}	Junction Temperature Range		-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-40 to +125	$^\circ\text{C}$
V_{isol}	Insulation Test Voltage	AC, $t=1\text{min}$	3000	V
Free-Wheeling Diode				
V_{RRM}	Repetitive Reverse Voltage		1200	V
$I_{F(AV)}$	Average Forward Current	$T_c=25^\circ\text{C}$ 180° rect.	300	A
		$T_c=95^\circ\text{C}$ 180° rect.	200	A
$I_{F(RMS)}$	RMS Forward Current		420	A
I_{FSM}	Non-Repetitive Surge	$T_{vj}=45^\circ\text{C}, V_R=0V, t=10\text{ms}, \text{Sine}$	1750	A
	Forward Current	$T_{vj}=45^\circ\text{C}, V_R=0V, t=8.3\text{ms}, \text{Sine}$	1850	A

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ELECTRICAL CHARACTERISTICS

T_c=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
IGBT						
V _{GE(th)}	Gate - Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =8mA	5.2	6	7	V
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =200A, V _{GE} =15V, T _{Vj} =25°C		1.8		V
		I _C =200A, V _{GE} =15V, T _{Vj} =125°C		2.0		V
I _{CEs}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _{Vj} =25°C			1	mA
		V _{CE} =1200V, V _{GE} =0V, T _{Vj} =125°C			5	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±15V, T _{Vj} =125°C	-400		400	nA
Q _{ge}	Gate Charge	V _{CE} =600V, I _C =200A, V _{GE} =±15V		2.1		μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz		14.9		nF
C _{res}	Reverse Transfer Capacitance			0.7		nF
t _{d(on)}	Turn - on Delay Time	V _{CC} =600V, I _C =200A, T _{Vj} =25°C		130		ns
		R _G =5.1 Ω, T _{Vj} =125°C		140		ns
t _r	Rise Time	V _{GE} =±15V, T _{Vj} =25°C		65		ns
		Inductive Load, T _{Vj} =125°C		65		ns
t _{d(off)}	Turn - off Delay Time	V _{CC} =600V, I _C =200A, T _{Vj} =25°C		430		ns
		R _G =5.1 Ω, T _{Vj} =125°C		500		ns
t _f	Fall Time	V _{GE} =±15V, T _{Vj} =25°C		65		ns
		Inductive Load, T _{Vj} =125°C		80		ns
E _{on}	Turn - on Switching Energy	V _{CC} =600V, I _C =200A, T _{Vj} =25°C		17.2		mJ
		R _G =5.1 Ω, T _{Vj} =125°C		24.8		mJ
E _{off}	Turn - off Switching Energy	V _{GE} =±15V, T _{Vj} =25°C		13.6		mJ
		Inductive Load, T _{Vj} =125°C		21.6		mJ
I _{sc}	Short Circuit Current	t _{psc} ≤10μs, V _{GE} =15V, T _{Vj} =150°C V _{CC} =900V, V _{CEMCHIP} ≤1200V		900		A
Free-Wheeling Diode						
V _F	Forward Voltage	I _F =200A, V _{GE} =0V, T _{Vj} =25°C		1.85		V
		I _F =200A, V _{GE} =0V, T _{Vj} =125°C		1.95		V
I _{RRM}	Max. Reverse Recovery Current	I _F =200A, V _R =600V		135		A
Q _{rr}	Reverse Recovery Charge	di _F /dt=-2400A/μs		17.5		μC
E _{rec}	Reverse Recovery Charge	T _{Vj} =125°C		8.5		mJ

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R _{thJC}	Junction-to-Case Thermal Resistance	Per IGBT			0.12	K/W
R _{thJCD}	Junction-to-Case Thermal Resistance	Per Inverse Diode			0.25	K/W
Torque	Module-to-Sink	Recommended (M6)	3		5	N·m
Torque	Module Electrodes	Recommended (M6)	2.5		5	N·m
Weight				190		g

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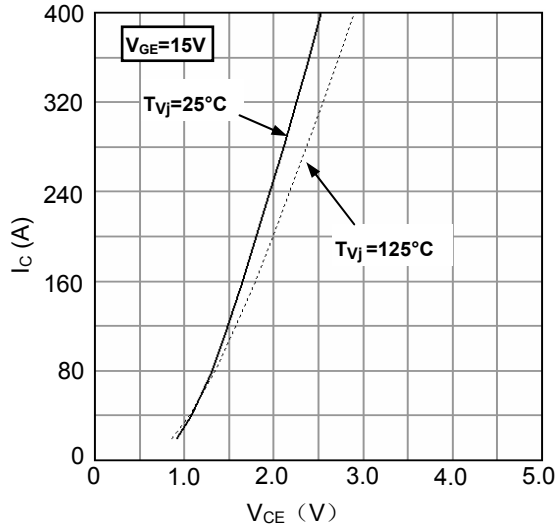


Figure1. Typical Output characteristics

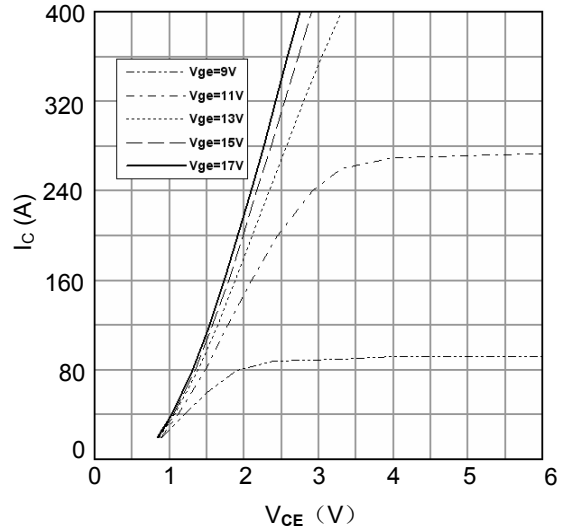


Figure2. Typical Output characteristics

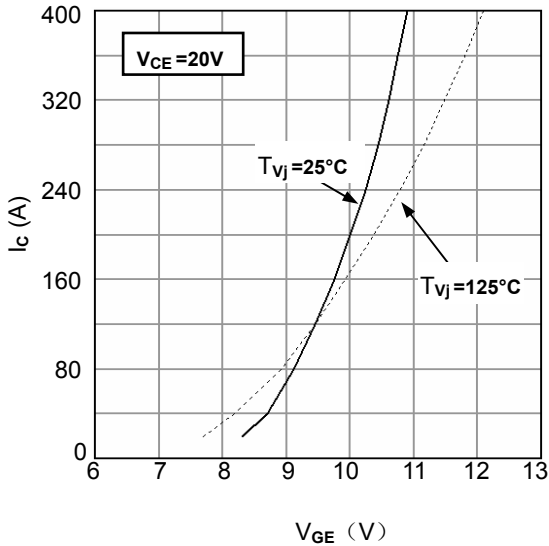


Figure3. Typical Transfer characteristics

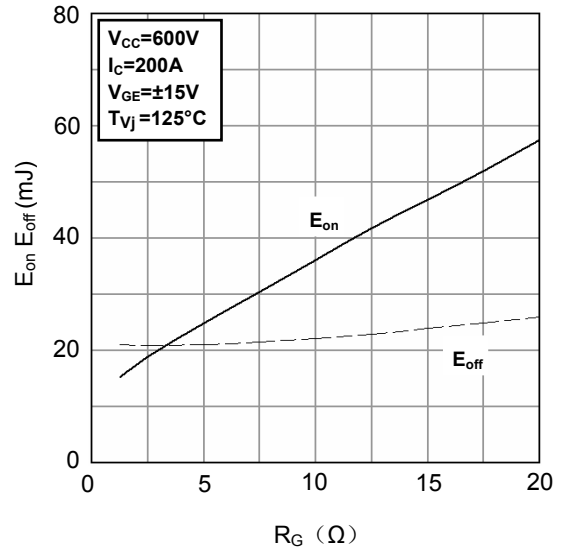


Figure4. Switching Energy vs. Gate Resistor

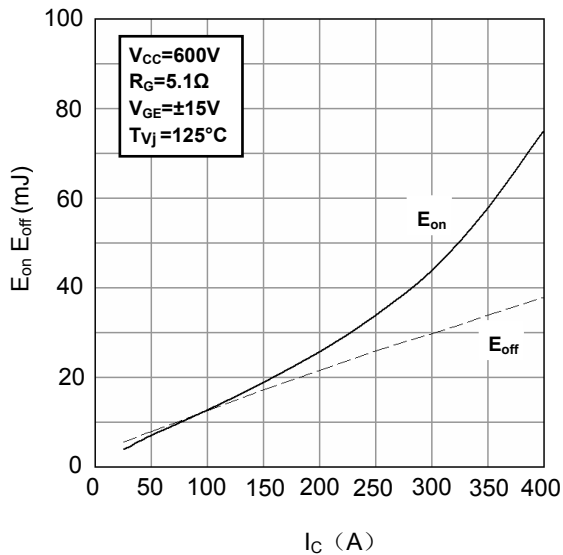


Figure5. Switching Energy vs. Collector Current

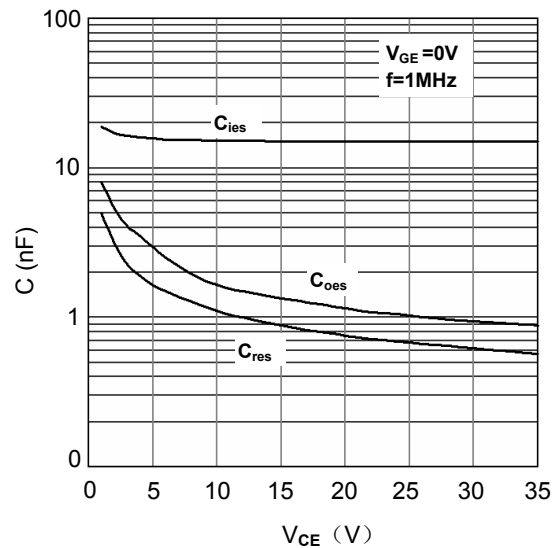


Figure6. Typical Capacitances vs. V_{CE}

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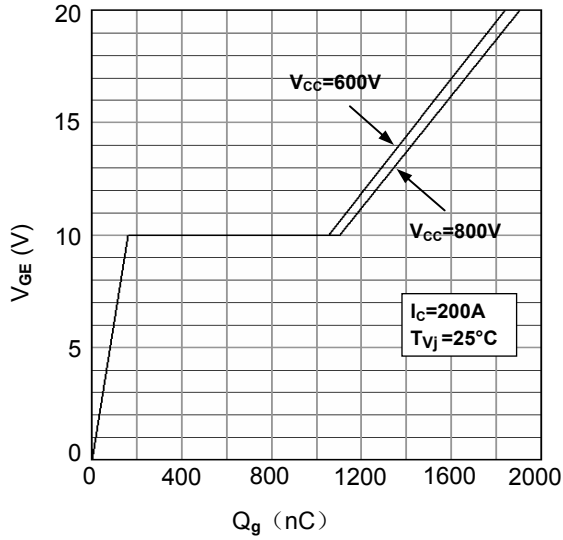


Figure7. Gate Charge characteristics

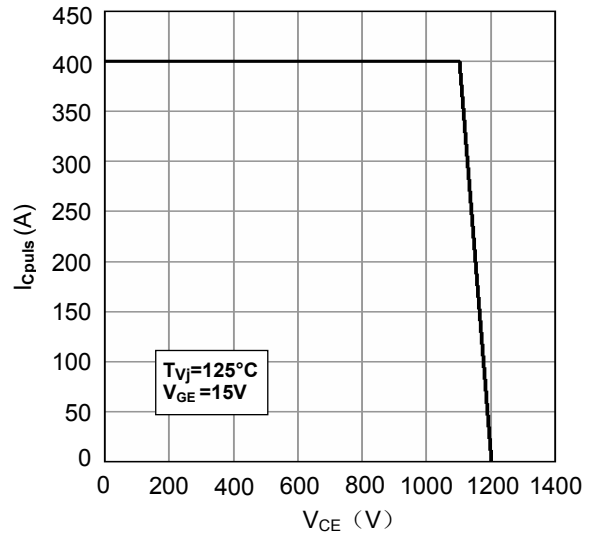


Figure8. Reverse Biased Safe Operating Area

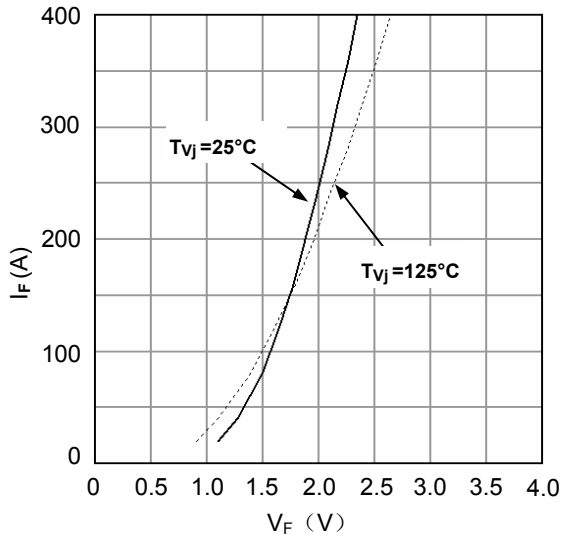


Figure9. Diode Forward Characteristics

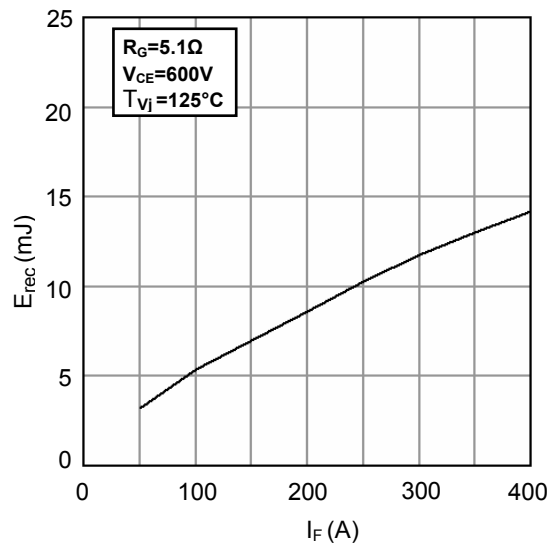
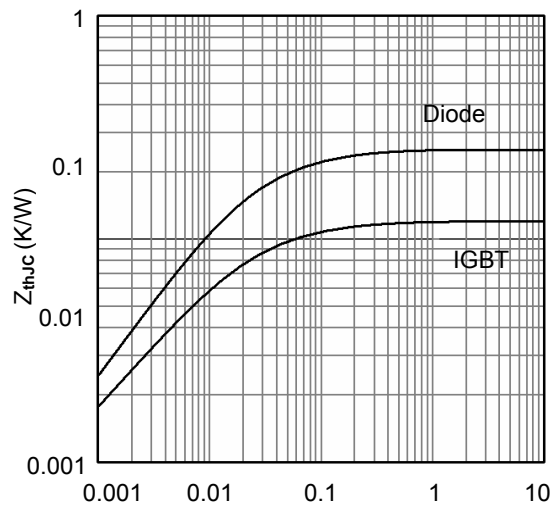


Figure10. Switching Energy vs. I_F



Rectangular Pulse Duration (seconds)
Figure11. Transient Thermal Impedance

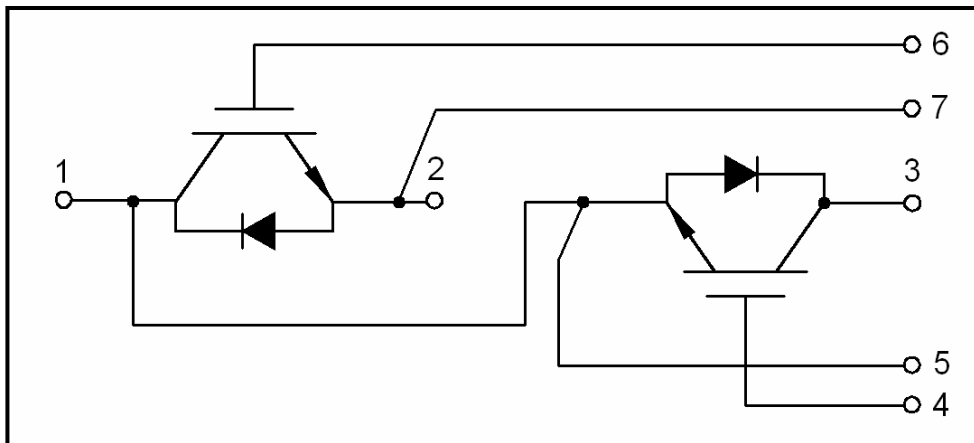
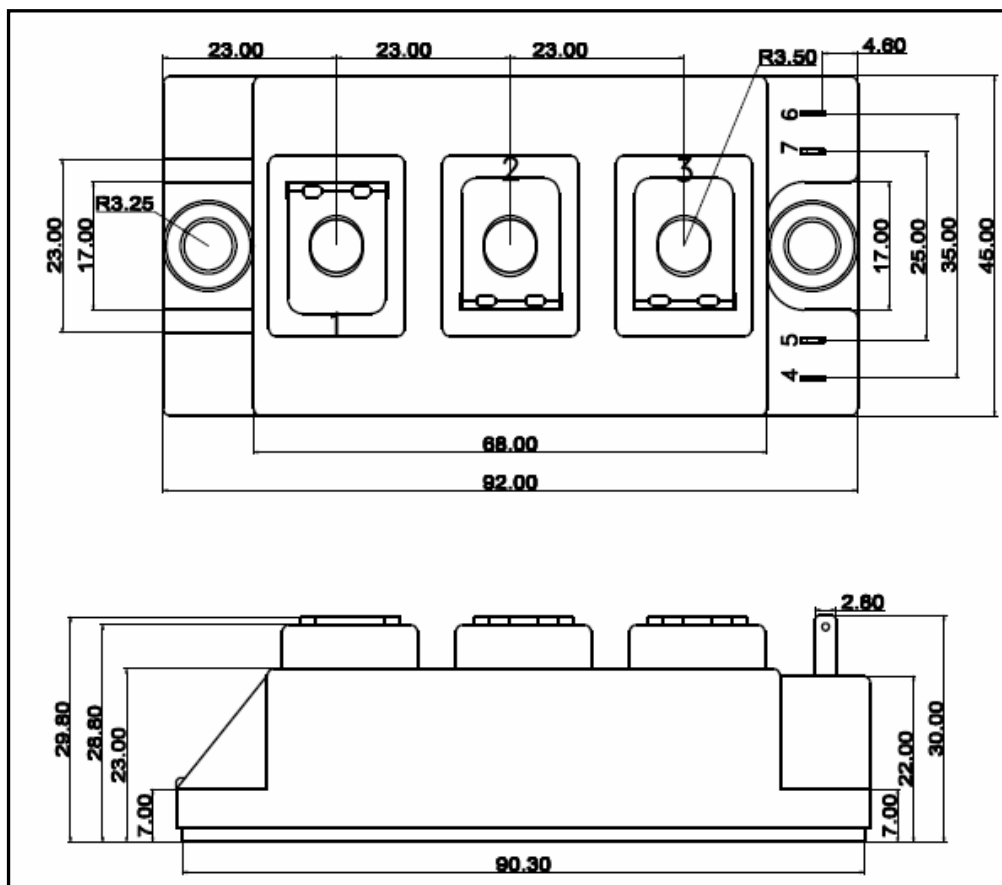


Figure12. Circuit Diagram



Dimensions (mm)
Figure13. Package Outline