



February 2011

PRELIMINARY

MMG150Q120B

1200V 150A IGBT Module

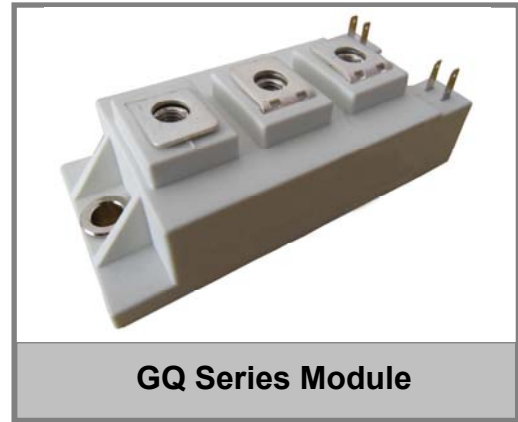
RoHS Compliant

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		150	A
I_{CM}	Peak Collector Current	Limited by T_{vjmax}	300	A
P_{tot}	Power Dissipation Per IGBT		830	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.	200	A
		$T_c=85^\circ\text{C}$ 180° rect.	150	A
$I_{F(RMS)}$	RMS Forward Current		250	A
I_{FSM}	Non-Repetitive Surge	$T_{vj}=45^\circ\text{C}, V_R=0V, t=10\text{ms}, \text{Sine}$	850	A
	Forward Current	$T_{vj}=45^\circ\text{C}, V_R=0V, t=8.3\text{ms}, \text{Sine}$	900	A

MMG150Q120B

ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
IGBT						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=6\text{mA}$	5.2	6	7	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V}, T_{Vj}=25^\circ\text{C}$		1.8		V
		$I_C=150\text{A}, V_{GE}=15\text{V}, T_{Vj}=125^\circ\text{C}$		2.0		V
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{Vj}=25^\circ\text{C}$			1	mA
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{Vj}=125^\circ\text{C}$			5	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 15\text{V}, T_{Vj}=125^\circ\text{C}$	-400		400	nA
Q_{ge}	Gate Charge	$V_{CE}=600\text{V}, I_C=150\text{A}, V_{GE}=\pm 15\text{V}$		1.56		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		11		nF
C_{res}	Reverse Transfer Capacitance			0.52		nF
$t_{d(on)}$	Turn - on Delay Time	$V_{CC}=600\text{V}, I_C=150\text{A}$	$T_{Vj}=25^\circ\text{C}$		150	ns
		$R_G=7.5\ \Omega$	$T_{Vj}=125^\circ\text{C}$		160	ns
t_r	Rise Time	$V_{GE}=\pm 15\text{V}$	$T_{Vj}=25^\circ\text{C}$		65	ns
		Inductive Load	$T_{Vj}=125^\circ\text{C}$		65	ns
$t_{d(off)}$	Turn - off Delay Time	$V_{CC}=600\text{V}, I_C=150\text{A}$	$T_{Vj}=25^\circ\text{C}$		440	ns
		$R_G=7.5\ \Omega$	$T_{Vj}=125^\circ\text{C}$		500	ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V}$	$T_{Vj}=25^\circ\text{C}$		55	ns
		Inductive Load	$T_{Vj}=125^\circ\text{C}$		70	ns
E_{on}	Turn - on Switching Energy	$V_{CC}=600\text{V}, I_C=150\text{A}$	$T_{Vj}=25^\circ\text{C}$		14.9	mJ
		$R_G=7.5\ \Omega$	$T_{Vj}=125^\circ\text{C}$		20.6	mJ
E_{off}	Turn - off Switching Energy	$V_{GE}=\pm 15\text{V}$	$T_{Vj}=25^\circ\text{C}$		9.8	mJ
		Inductive Load	$T_{Vj}=125^\circ\text{C}$		15.6	mJ
I_{sc}	Short Circuit Current	$t_{psc}\leq 10\ \mu\text{s}, V_{GE}=15\text{V}, T_{Vj}=150^\circ\text{C}$ $V_{CC}=900\text{V}, V_{CEMCHIP}\leq 1200\text{V}$		800		A
Free-Wheeling Diode						
V_F	Forward Voltage	$I_F=150\text{A}, V_{GE}=0\text{V}, T_{Vj}=25^\circ\text{C}$		2.0		V
		$I_F=150\text{A}, V_{GE}=0\text{V}, T_{Vj}=125^\circ\text{C}$		2.05		V
I_{RRM}	Max. Reverse Recovery Current	$I_F=150\text{A}, V_R=600\text{V}$		145		A
Q_{rr}	Reverse Recovery Charge	$di_F/dt=-3000\text{A}/\mu\text{s}$		15		μC
E_{rec}	Reverse Recovery Energy	$T_{Vj}=125^\circ\text{C}$		7.6		mJ

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case Thermal Resistance	Per IGBT			0.15	K/W
R_{thJCD}	Junction-to-Case Thermal Resistance	Per Inverse Diode			0.3	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

MMG150Q120B

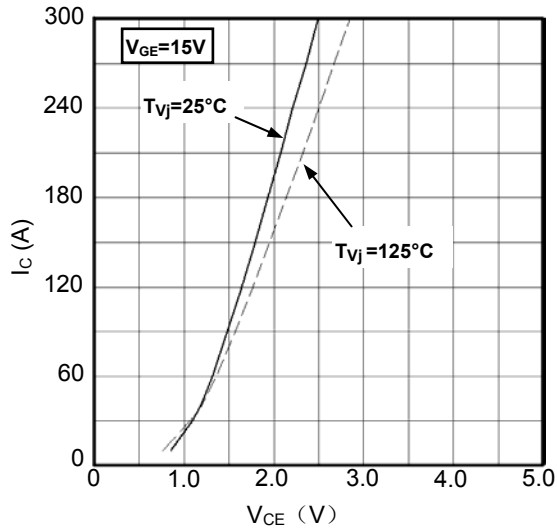


Figure1. Typical Output characteristics

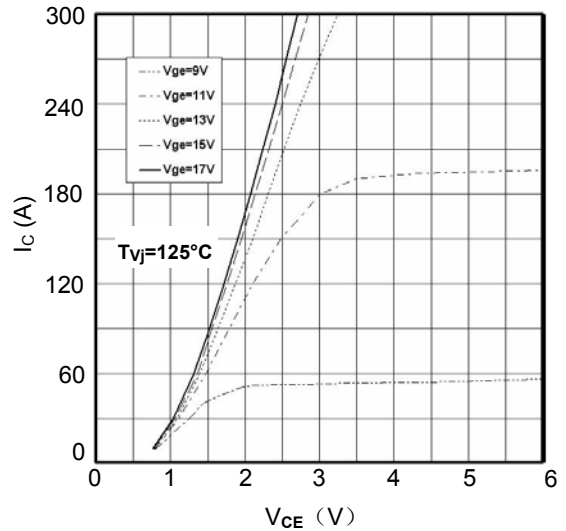


Figure2. Typical Output characteristics

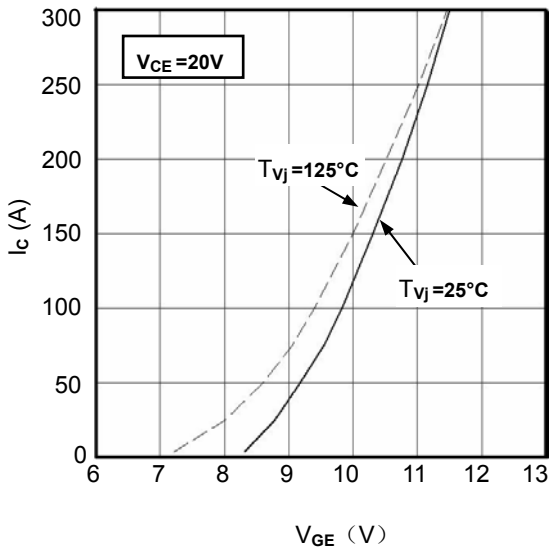


Figure3. Typical Transfer characteristics

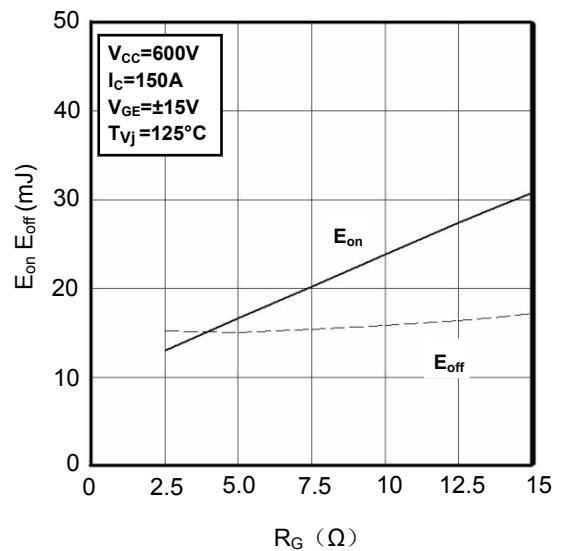


Figure4. Switching Energy vs. Gate Resistor

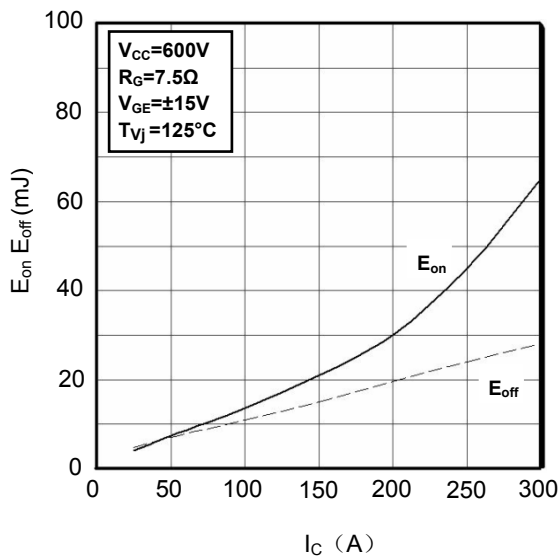


Figure5. Switching Energy vs. Collector Current

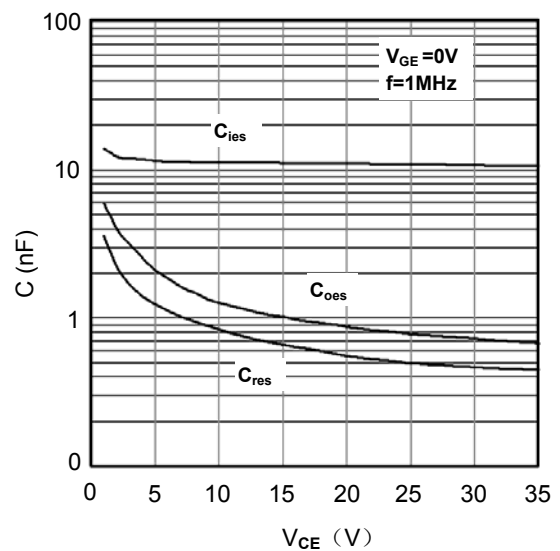


Figure6. Typical Capacitances vs. V_{CE}

MMG150Q120B

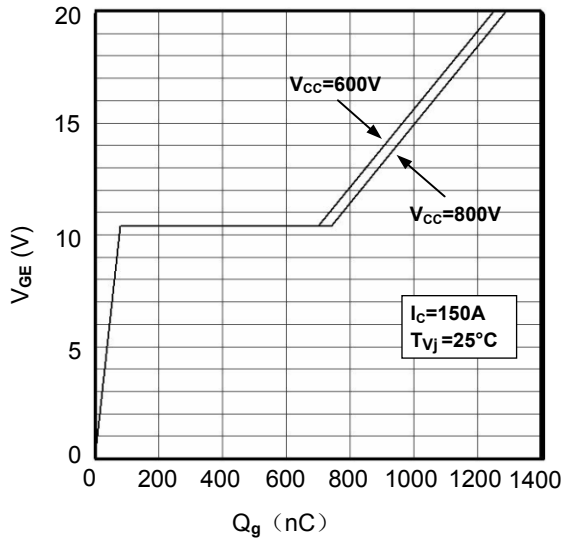


Figure 7. Gate Charge characteristics

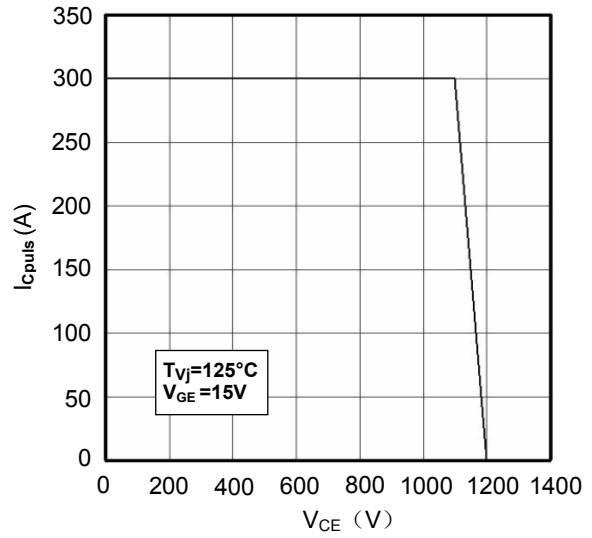


Figure 8. Reverse Biased Safe Operating Area

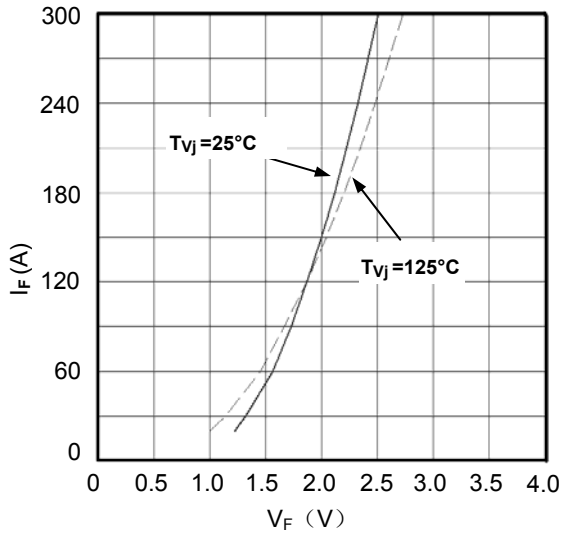


Figure 9. Diode Forward Characteristics

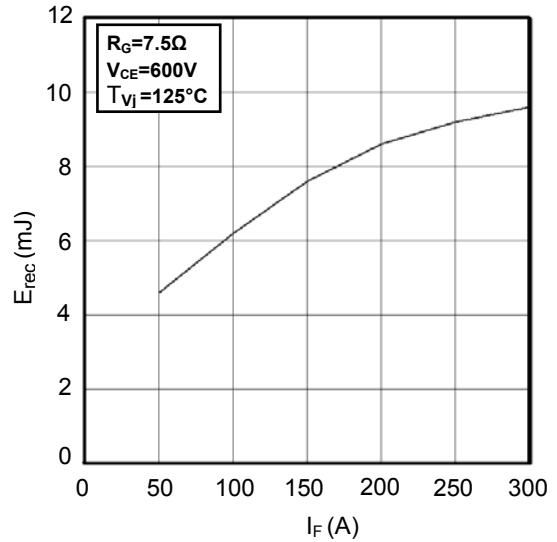
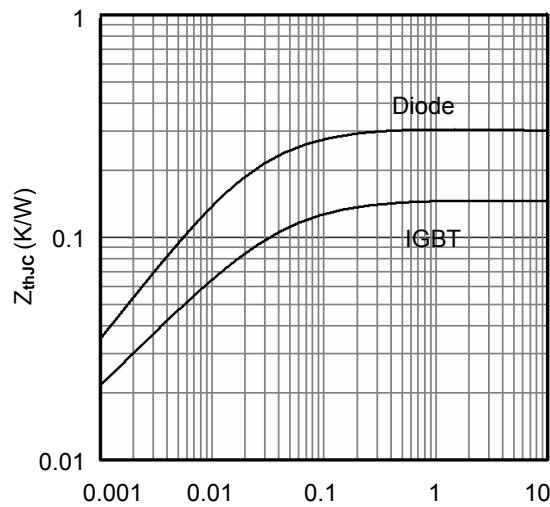


Figure 10. Switching Energy vs. I_F



Rectangular Pulse Duration (seconds)
Figure 11. Transient Thermal Impedance

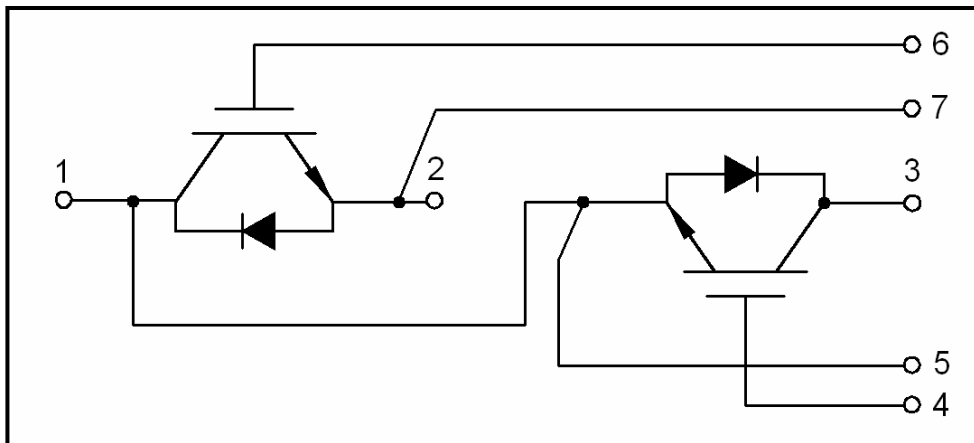
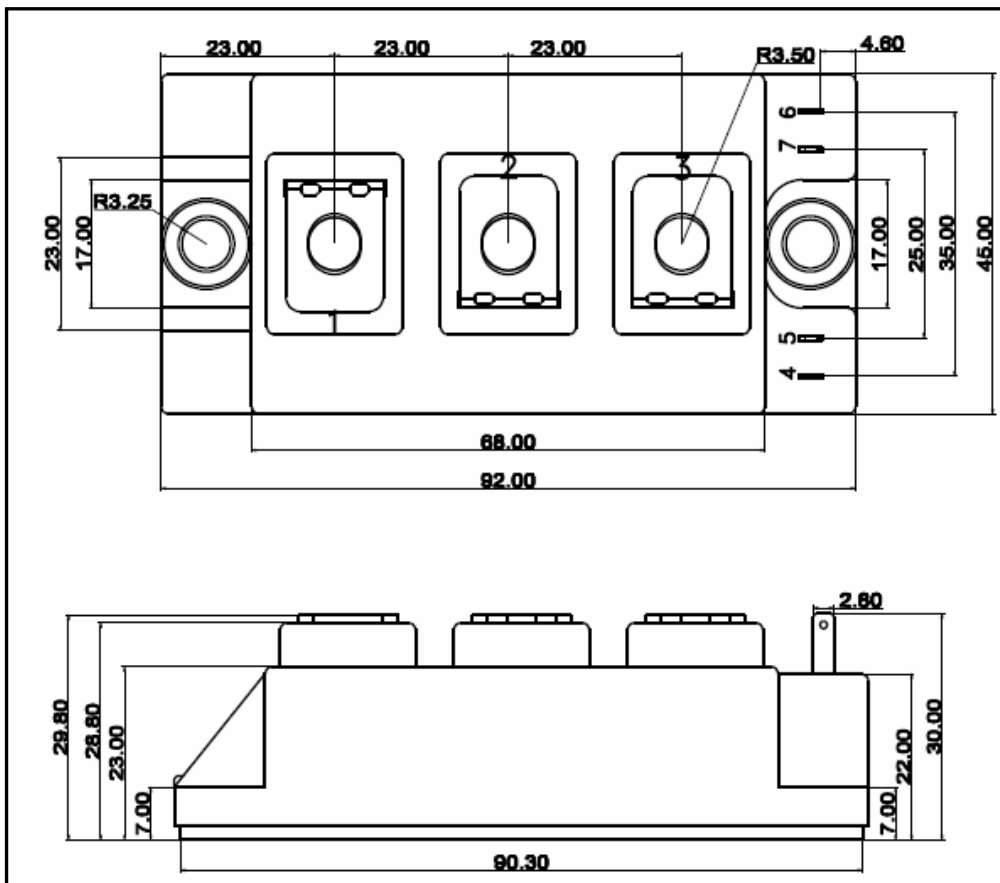


Figure12. Circuit Diagram



Dimensions (mm)
Figure13. Package Outline