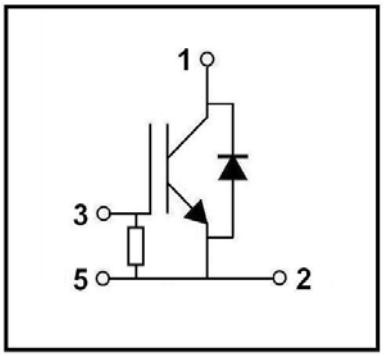
MMG600K120U6TN

1200V 600A IGBT Module

December 2010 **PRELIMINARY** **RoHS Compliant**

FEATURES

- Ultra Low Loss
- High Ruggedness
- High Short Circuit Capability
- Positive Temperature Coefficient
- With Fast Free-Wheeling Diodes
- 10K Ω Gate Protected Resistance Inside



APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage		1200	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	900	A
		T_C=80°C	600	A
I_{Cpuls}	Pulsed Collector Current	T_C=25°C, t_p=1ms	1800	A
		T_C=80°C, t_p=1ms	1200	A
P_{tot}	Power Dissipation Per IGBT		2800	W
T_J	Junction Temperature Range		-40 to +150	°C
T_{STG}	Storage Temperature Range		-40 to +125	°C
V_{isol}	Insulation Test Voltage	AC, t=1min	3000	V
Free-Wheeling Diode				
V_{RRM}	Repetitive Reverse Voltage		1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	600	A
		T_C=80°C	400	A
$I_{F(RMS)}$	RMS Forward Current		600	A
I_{FSM}	Non-Repetitive Surge Forward Current	T_J=45°C, t=10ms, Sine	3800	A
		T_J=45°C, t=8.3ms, Sine	4300	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=24mA	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=600A, V_{GE}=15V, T_J=25°C		1.7		V
		I_C=600A, V_{GE}=15V, T_J=125°C		2.0		V
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25°C			5	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V, V_{GE}=±20V			400	nA
R_{Gint}	Integrated Gate Resistor			1.3		Ω
Q_{ge}	Gate Charge	V_{CC}=600V, I_C=600A , V_{GE}=±15V		5600		nC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		42		nF
C_{res}	Reverse Transfer Capacitance			1.7		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=600V, I_C=600A		250		ns
t_r	Rise Time	R_G =1.2Ω, V_{GE}=±15V		90		ns
$t_{d(off)}$	Turn - off Delay Time	T_J=25°C		550		ns
t_f	Fall Time	Inductive Load		130		ns
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=600V, I_C=600A		300		ns
t_r	Rise Time	R_G =1.2Ω, V_{GE}=±15V		100		ns
$t_{d(off)}$	Turn - off Delay Time	T_J=125°C		650		ns
t_f	Fall Time	Inductive Load		180		ns
E_{on}	Turn - on Switching Energy	V_{CC}=600V, I_C=600A T_J=25°C		33		mJ
		R_G =1.2Ω T_J=125°C		50		mJ
E_{off}	Turn - off Switching Energy	V_{GE}=±15V T_J=25°C		58		mJ
		Inductive Load T_J=125°C		88		mJ
Free-Wheeling Diode						
V_F	Forward Voltage	I_F=600A , V_{GE}=0V, T_J=25°C		1.65	2.15	V
		I_F=600A , V_{GE}=0V, T_J=125°C		1.65		V
I_{RRM}	Max. Reverse Recovery Current	I_F=600A , V_R=600V		540		A
Q_{rr}	Reverse Recovery Charge	di_F/dt=-5000A/μs		115		μC
E_{rec}	Reverse Recovery Charge	T_J=125°C		52.0		mJ

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case Thermal Resistance	Per IGBT			0.045	K /W
R_{thJCD}	Junction-to-Case Thermal Resistance	Per Inverse Diode			0.08	K /W
Torque	Module-to-Sink	Recommended（M6）	3		5	N · m
Torque	Module Electrodes	Recommended（M6）	2.5		5	N · m
Torque	Module Electrodes	Recommended（M4）	0.7		1.1	N · m
Weight				325		g

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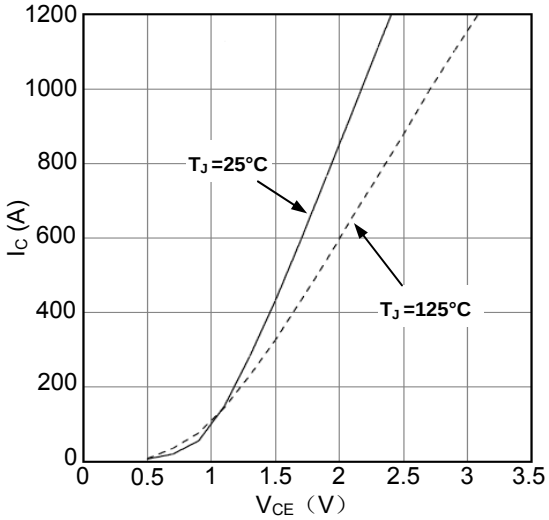


Figure1. Typical Output characteristics

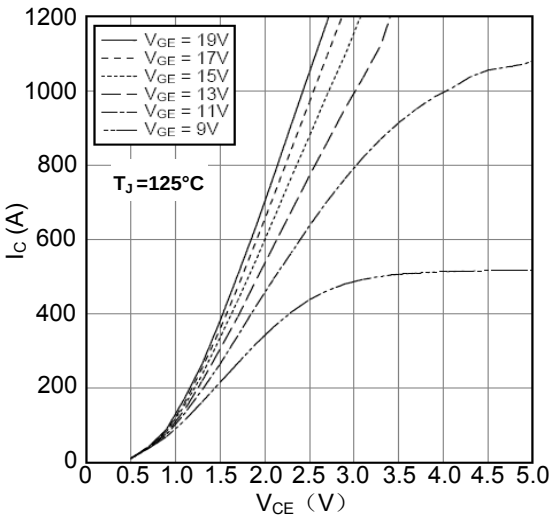


Figure2. Typical Output characteristics

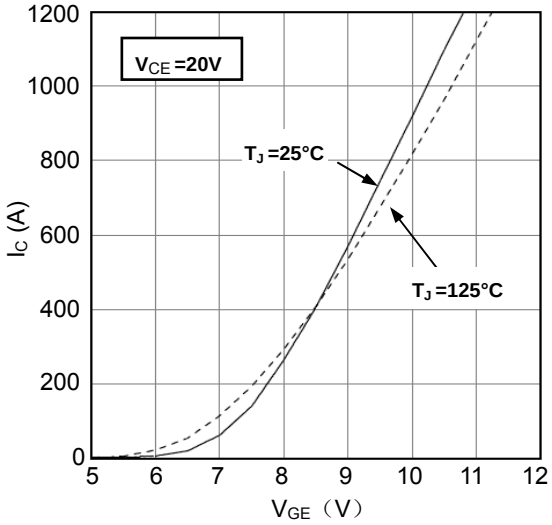


Figure3. Typical Transfer characteristics

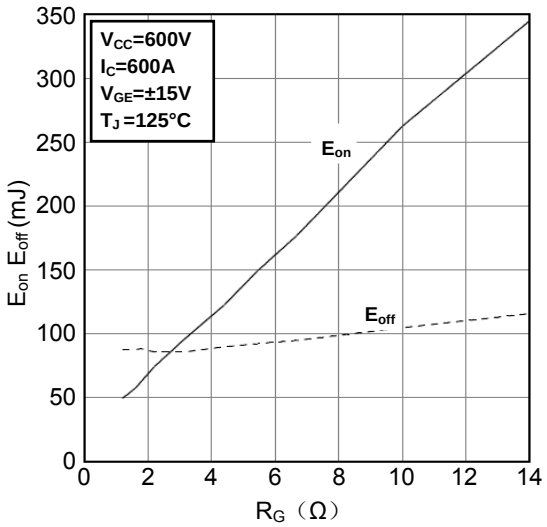


Figure4. Switching Energy vs. Gate Resistor

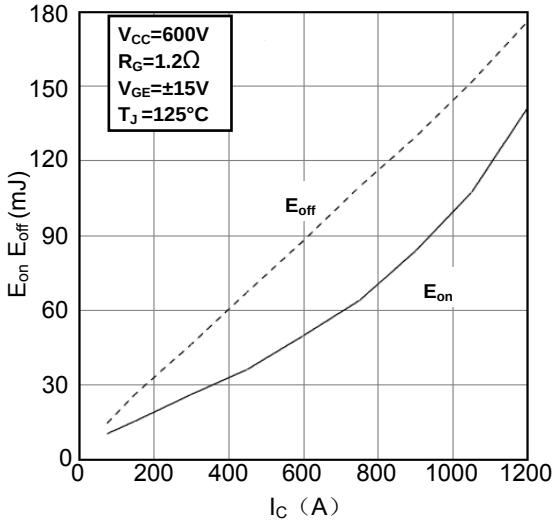


Figure5. Switching Energy vs. Collector Current

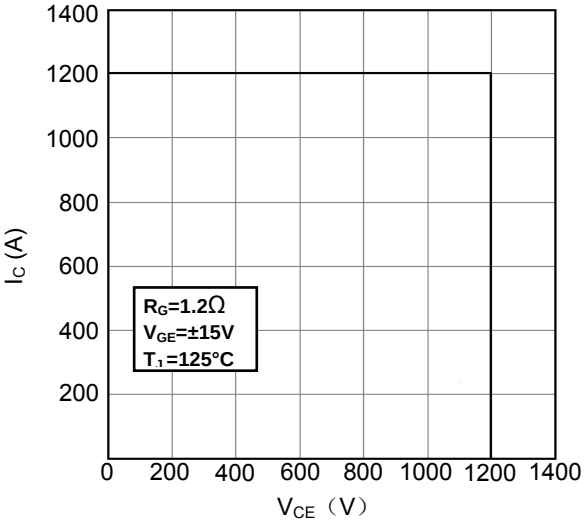


Figure6. Reverse Biased Safe Operating Area

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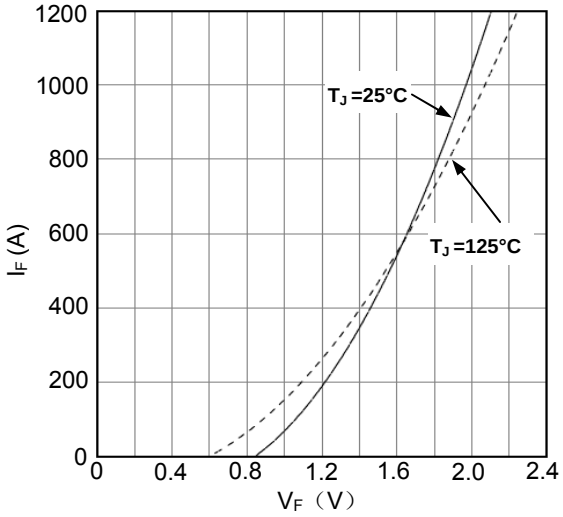


Figure7. Diode Forward Characteristics

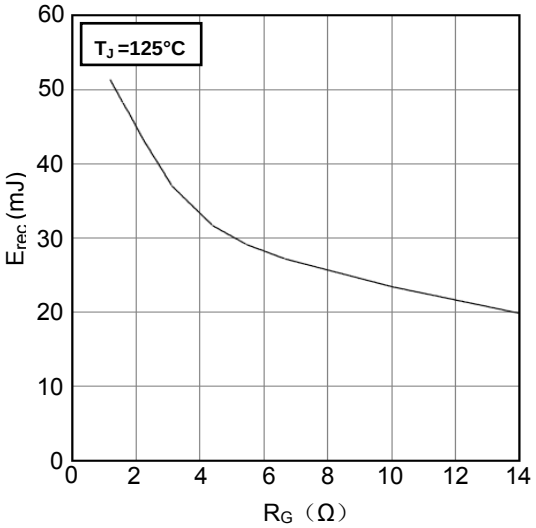


Figure8. Switching Energy vs. Gate Resistor

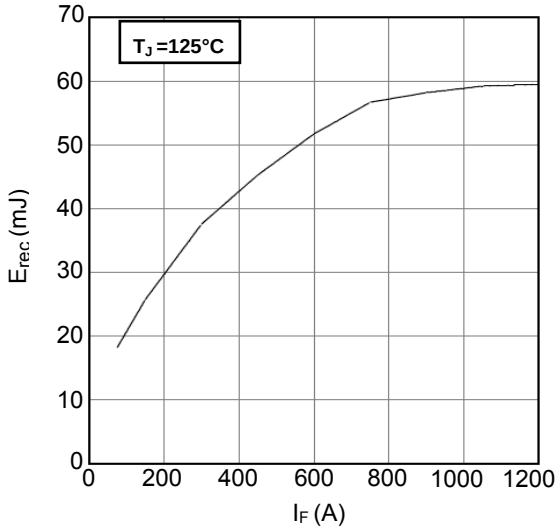


Figure9. Switching Energy vs. Forward Current

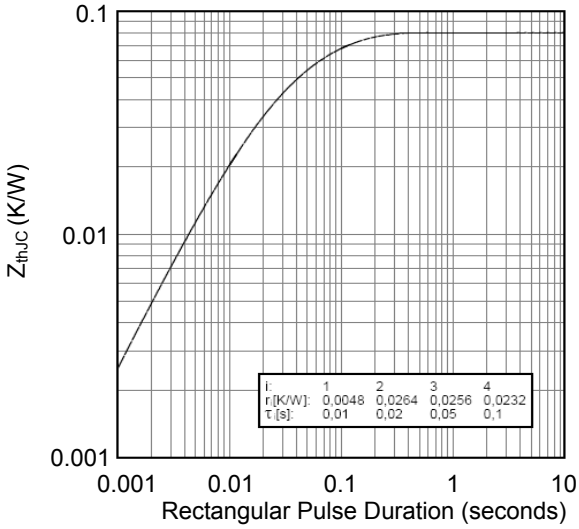


Figure10. Transient Thermal Impedance of Diode

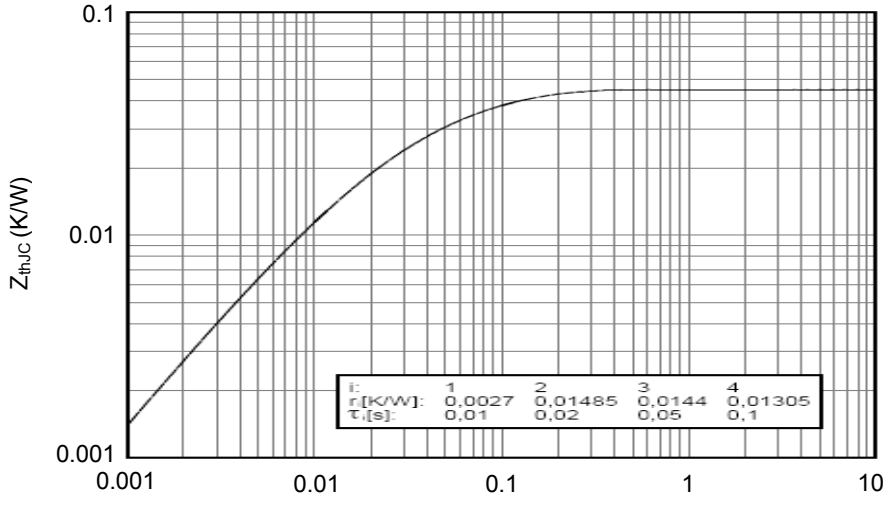
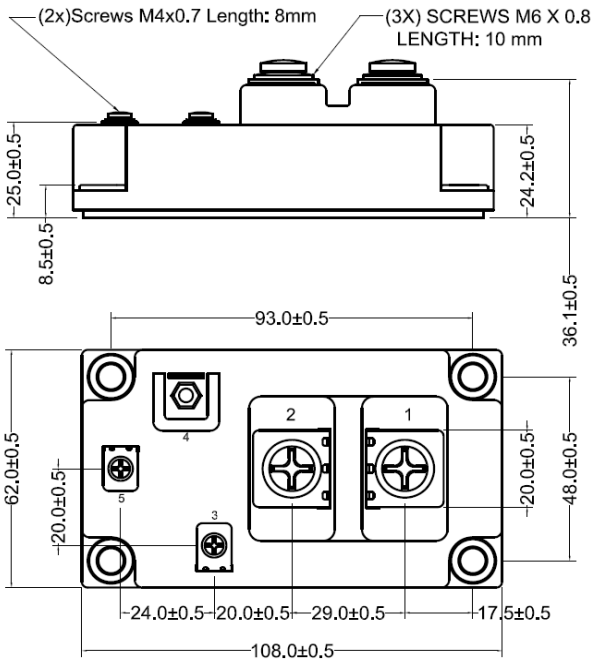


Figure11. Transient Thermal Impedance of IGBT

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Dimensions in mm

Figure12. Package Outlines

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