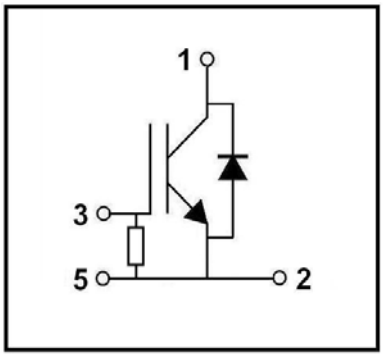
MMG600K120U6TN

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

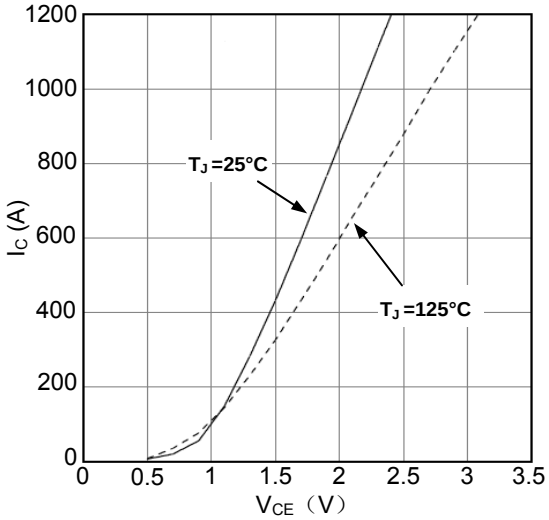


Figure1. Typical Output characteristics

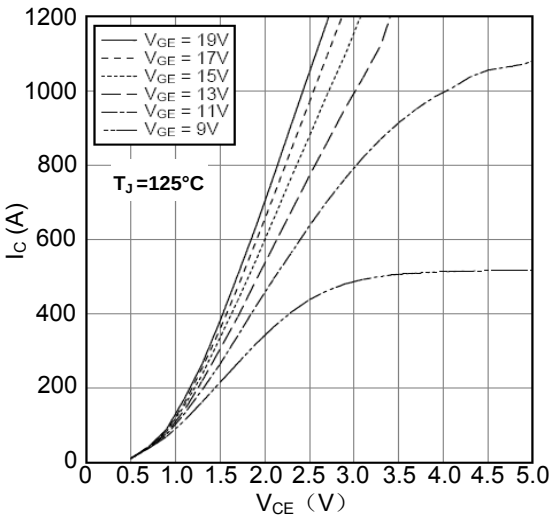


Figure2. Typical Output characteristics

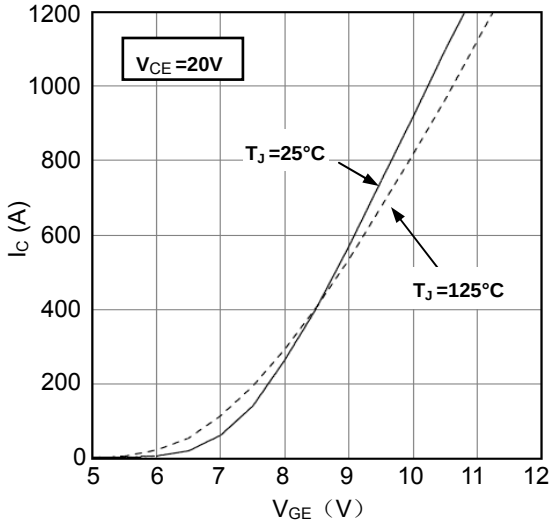


Figure3. Typical Transfer characteristics

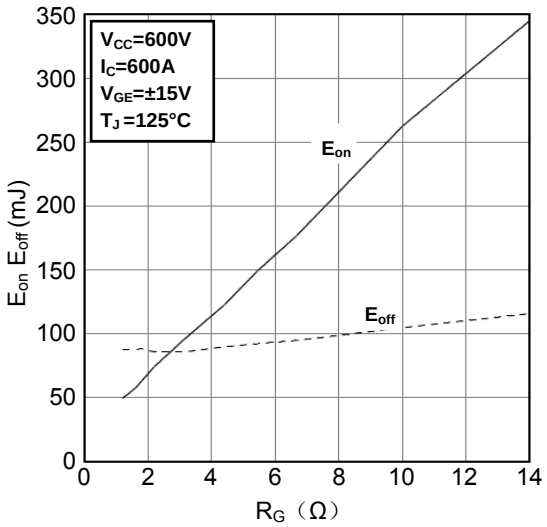


Figure4. Switching Energy vs. Gate Resistor

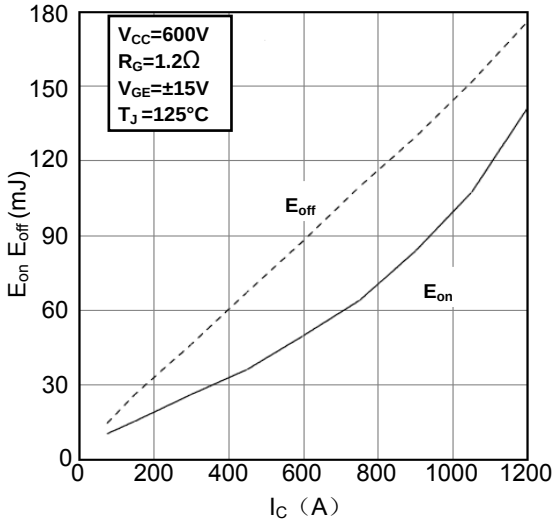


Figure5. Switching Energy vs. Collector Current

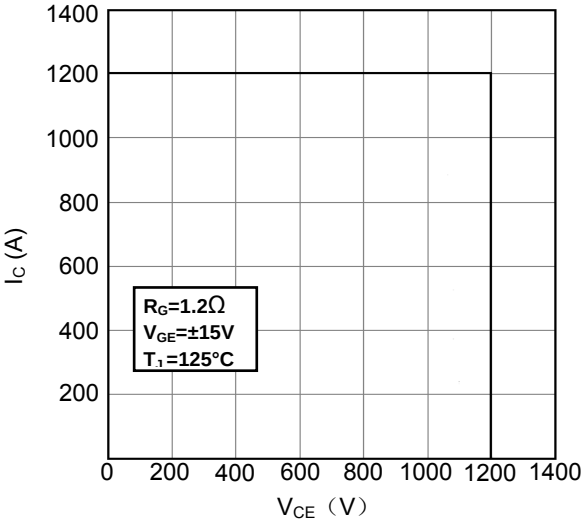


Figure6. Reverse Biased Safe Operating Area

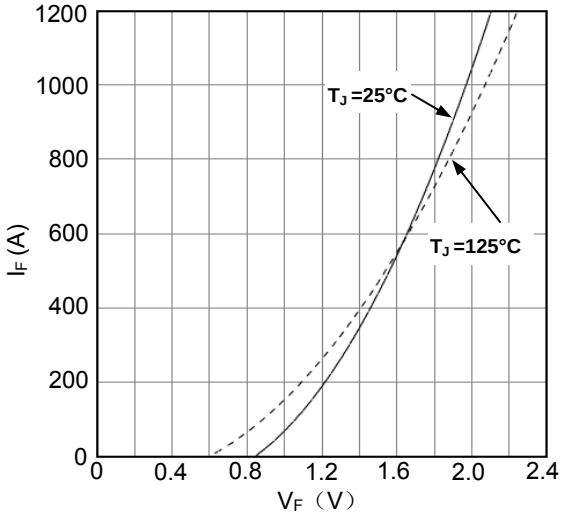


Figure7. Diode Forward Characteristics

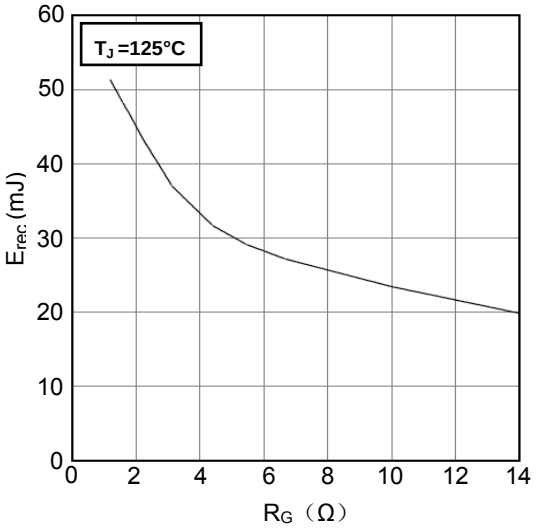


Figure8. Switching Energy vs. Gate Resistor

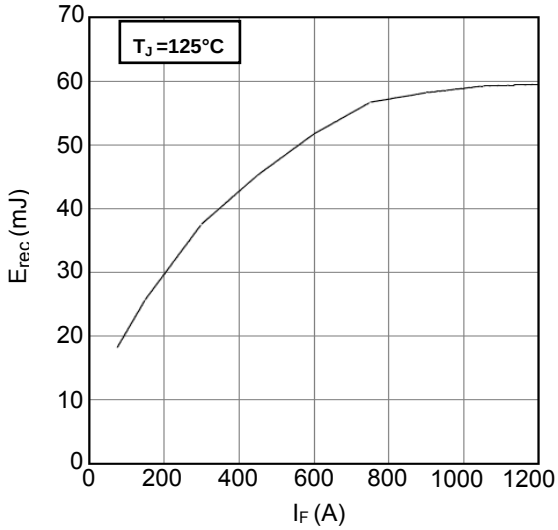


Figure9. Switching Energy vs. Forward Current

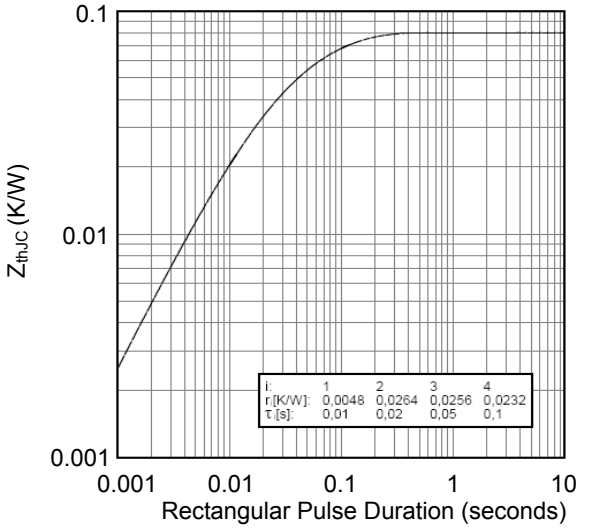


Figure10. Transient Thermal Impedance of Diode

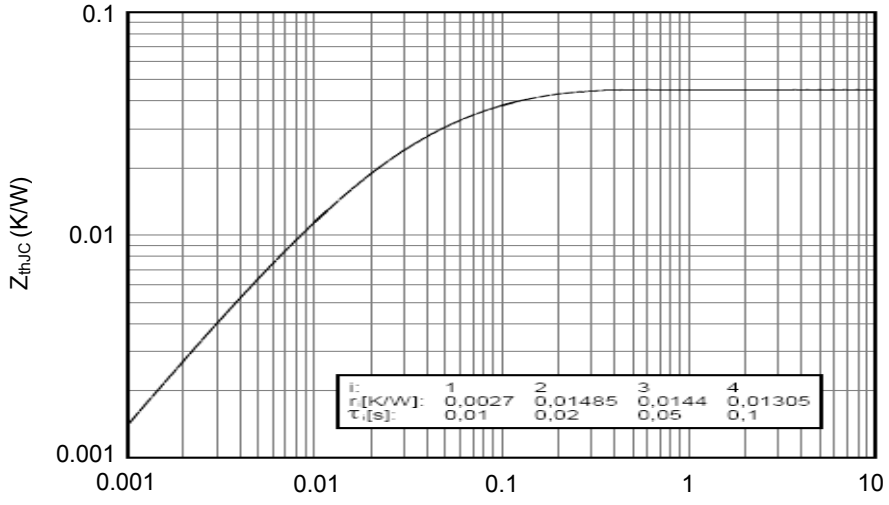
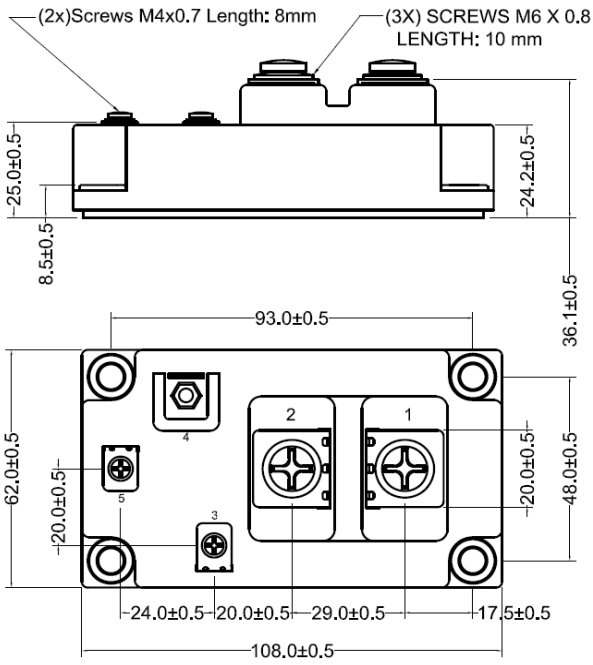


Figure11. Transient Thermal Impedance of IGBT



Dimensions in mm

Figure12. Package Outlines