MMG600WB060DAK6EN

600V 600A IGBT Module

August 2014 **PRELIMINARY** **RoHS Compliant**

FEATURES

- ☐ 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

GWB Series Module

APPLICATIONS

- ☐ High frequency switching application
- ☐ Medical applications
- ☐ Motion/servo control
- ☐ UPS systems

INVERTER SECTOR

ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	T_{vj}=25°C	600	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	700	A
		T_C=50°C	600	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	1200	A
P_{tot}	Power Dissipation Per IGBT		1500	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_{vj}=25°C	600	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	700	A
		T_C=50°C	600	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	1200	A
I^2t		T_{vj} =125°C, t=10ms, V_R=0V	17000	A^2s

INVERTER SECTOR

ELECTRICAL AND THERMAL 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=9.6mA	4.9	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=600A, V_{GE}=15V, T_{vj}=25°C		1.45		V
		I_C=600A, V_{GE}=15V, T_{vj}=125°C		1.6		V
I_{CES}	Collector Leakage Current	V_{CE}=600V, V_{GE}=0V, T_{vj}=25°C			1	mA
		V_{CE}=600V, 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
R_{Gint}	Integrated Gate Resistor			0.68		Ω
Q_{ge}	Gate Charge	V_{CE}=300V, I_C=600A , V_{GE}=±15V		6.5		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		39		nF
C_{res}	Reverse Transfer Capacitance			1.15		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=300V,I_C=600A, R_G =2.4Ω , V_{GE}=±15V, Inductive Load — T_{vj} =25°C		100		ns
		T_{vj} =125°C		110		ns
t_r	Rise Time	T_{vj} =25°C		90		ns
		T_{vj} =125°C		95		ns
$t_{d(off)}$	Turn - off Delay Time	V_{CC}=300V,I_C=600A, R_G =2.4Ω , V_{GE}=±15V, Inductive Load — T_{vj} =25°C		670		ns
		T_{vj} =125°C		710		ns
t_f	Fall Time	T_{vj} =25°C		70		ns
		T_{vj} =125°C		75		ns
E_{on}	Turn - on Energy	V_{CC}=300V,I_C=600A, R_G =2.4Ω , V_{GE}=±15V, Inductive Load — T_{vj} =25°C		8.9		mJ
		T_{vj} =125°C		9.9		mJ
E_{off}	Turn - off Energy	T_{vj} =25°C		21.5		mJ
		T_{vj} =125°C		25		mJ
I_{SC}	Short Circuit Current	t_{psc}≤6μS , V_{GE}=15V T_{vj}=125°C,V_{CC}=360V		3000		A
R_{thJC}	Junction-to-Case Thermal Resistance （ **Per IGBT**）				0.10	K /W
Diode						
V_F	Forward Voltage	I_F=600A , V_{GE}=0V, T_{vj} =25°C		1.55		V
		I_F=600A , V_{GE}=0V, T_{vj} =125°C		1.5		V
t_{rr}	Reverse Recovery Time	I_F=600A , V_R=300V		400		ns
I_{RRM}	Max. Reverse Recovery Current	di_F/dt=-6000A/μs		300		A
E_{rec}	Reverse Recovery Charge	T_{vj} =125°C		9.3		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance （ **Per Diode**）				0.16	K /W

NTC CHARACTERISTIC VALUES

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Resistance	T_C =25°C		5		KΩ
$B_{25/50}$				3375		K

MODULE CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$T_{Vj\ max}$	Max. Junction Temperature				175	°C
$T_{Vj\ op}$	Operating Temperature		-40		150	°C
T_{stg}	Storage Temperature		-40		125	°C
V_{isol}	Insulation Test Voltage	AC, t=1min		3000		V
CTI	Comparative Tracking Index		250			
Torque	Module-to-Sink	Recommended（M5）	2.5		5	N · m
Torque	Module Electrodes	Recommended（M6）	3		5	N · m
Weight				350		g

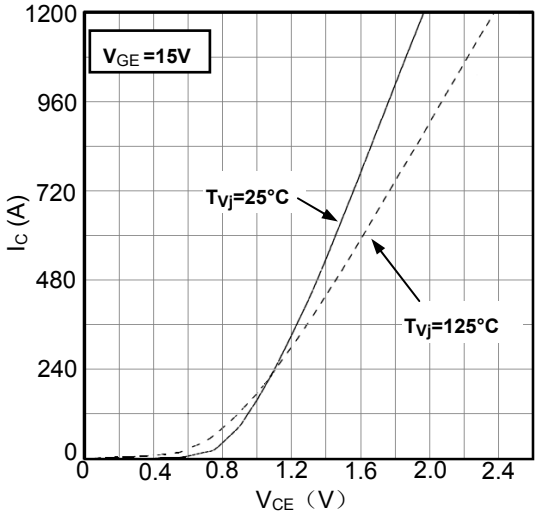


Figure1. Typical Output characteristics
IGBT-inverter

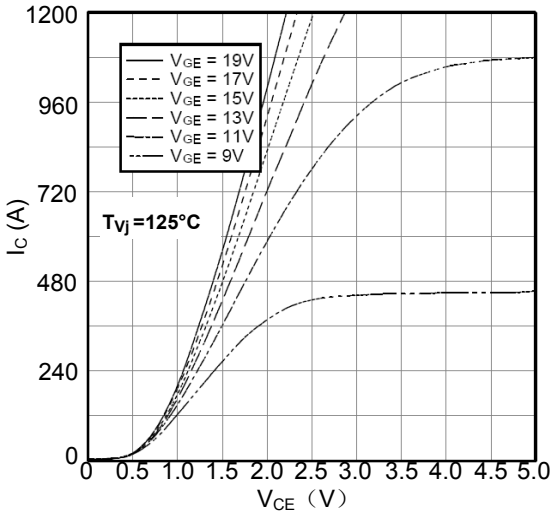


Figure2. Typical Output characteristics
IGBT-inverter

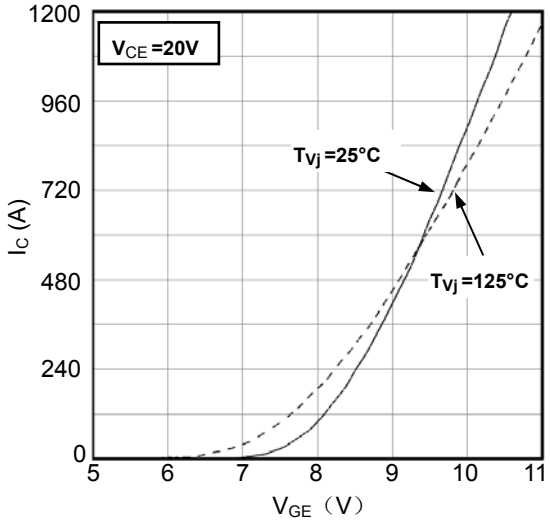


Figure3. Typical Transfer characteristics
IGBT-inverter

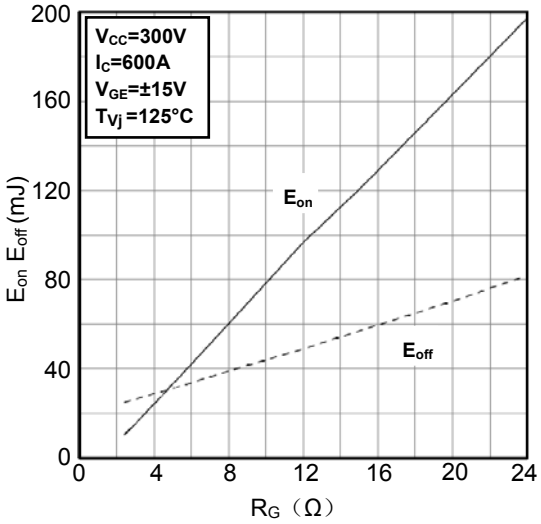


Figure4. Switching Energy vs. Gate Resistor
IGBT-inverter

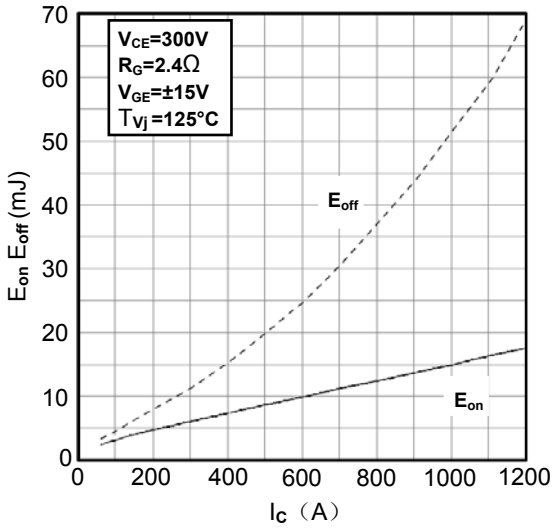


Figure5. Switching Energy vs. Collector Current
IGBT-inverter

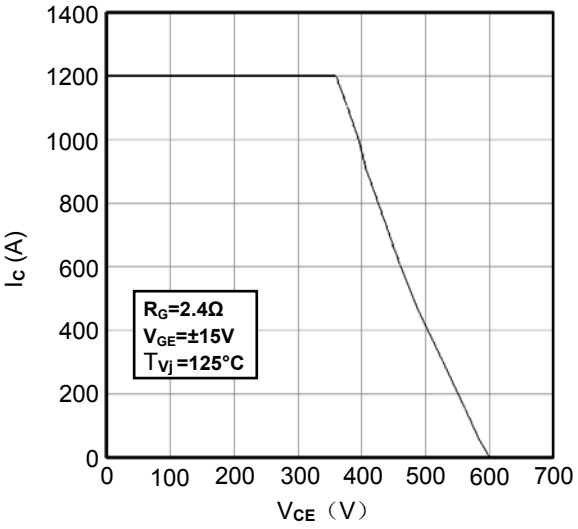


Figure6. Reverse Biased Safe Operating Area
IGBT-inverter

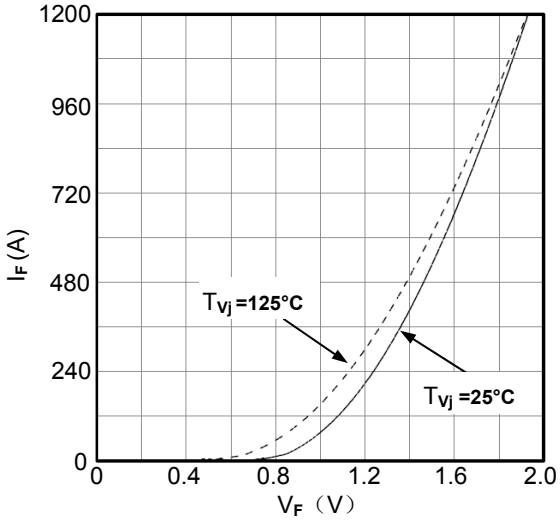


Figure7. Diode Forward Characteristics
Diode -inverter

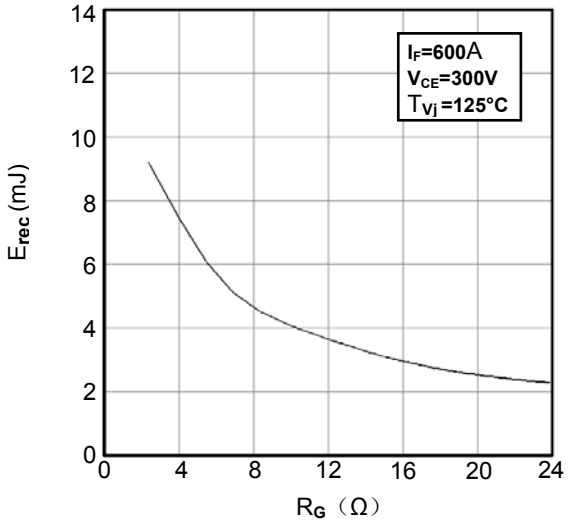


Figure8. Switching Energy vs. Gate Resistor
Diode -inverter

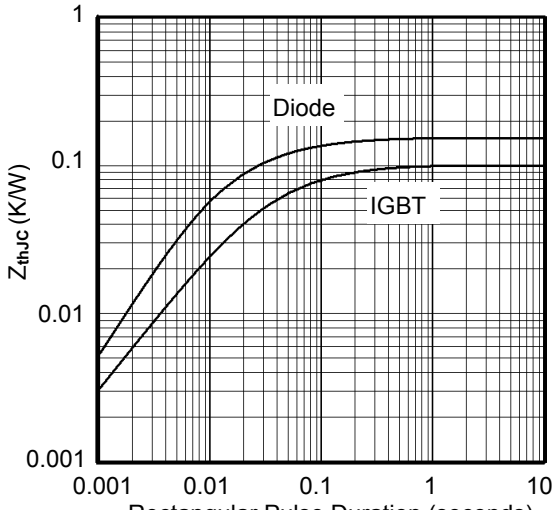


Figure9. Transient Thermal Impedance of
Diode and IGBT-inverter

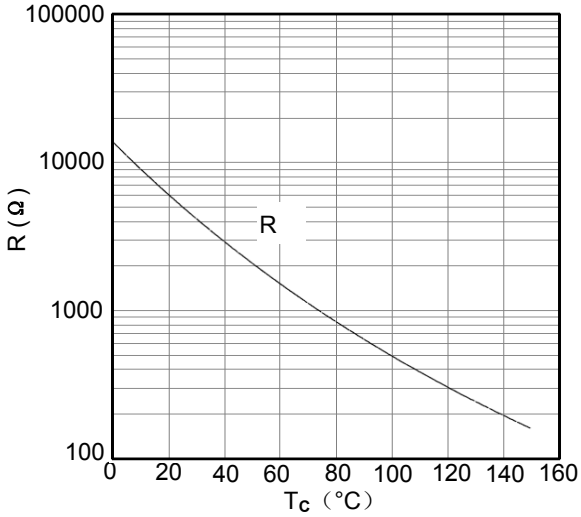


Figure10. NTC Characteristics

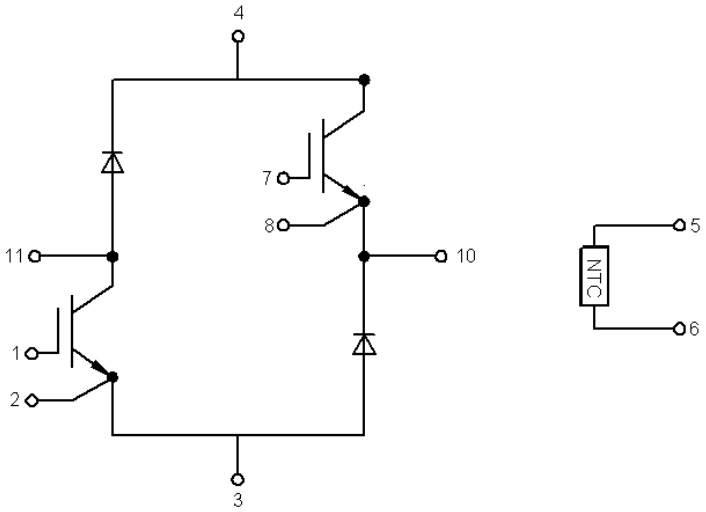
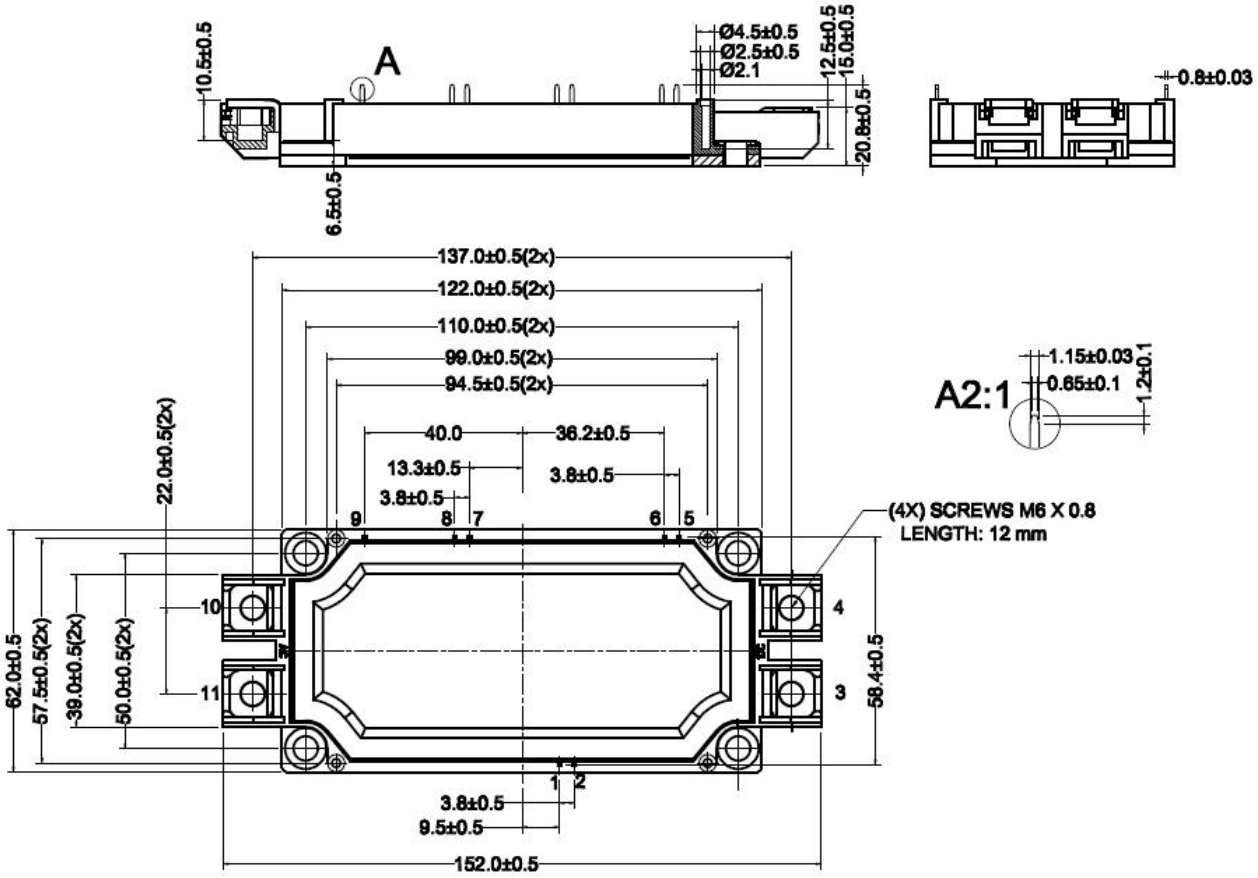


Figure11. Circuit Diagram



Dimensions (mm)
Figure12. Package Outline