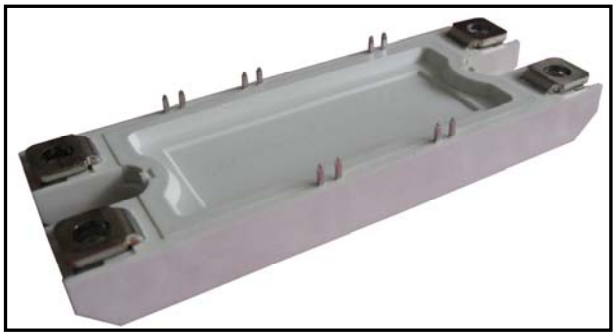
MMG75HB120H6HN

1200V 75A Four-Pack Module

July 2013 **PRELIMINARY** **RoHS Compliant**

FEATURES

- ☐ High short circuit capability,self limiting short circuit current
- ☐ IGBT CHIP(T4 Fast Trench+Field Stop technology)
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Low switching losses
- ☐ $T_{Vj\ max}$ =175°C



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	1200	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	100	A
		T_C=80°C	75	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	150	A
P_{tot}	Power Dissipation Per IGBT		465	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_{vj}=25°C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	100	A
		T_C=80°C	75	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	150	A
I^2t		T_{vj} =125°C, t=10ms, V_R=0V	1150	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=3.0mA		5.4	6	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=75A, V_{GE}=15V, T_{vj}=25°C			2.1	2.5	V
		I_C=75A, V_{GE}=15V, T_{vj}=125°C			2.5		V
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_{vj}=25°C				2	mA
		V_{CE}=1200V, V_{GE}=0V, T_{vj}=125°C				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}±15V, T_{vj}=125°C		-400		400	nA
R_{Gint}	Integrated Gate Resistor				10		Ω
Q_g	Gate Charge	V_{CE}=600V, I_C=75A , V_{GE}=15V			0.35		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			4.4		nF
C_{res}	Reverse Transfer Capacitance				0.24		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=600V,I_C=75A, R_G =10Ω , V_{GE}=±15V, Inductive Load	T_{vj} =25°C		150		ns
			T_{vj} =125°C		160		ns
			T_{vj} =150°C		170		ns
t_r	Rise Time		T_{vj} =25°C		70		ns
			T_{vj} =125°C		80		ns
			T_{vj} =150°C		85		ns
$t_{d(off)}$	Turn - off Delay Time	V_{CC}=600V,I_C=75A, R_G =10Ω , V_{GE}=±15V, Inductive Load	T_{vj} =25°C		400		ns
			T_{vj} =125°C		450		ns
			T_{vj} =150°C		480		ns
t_f	Fall Time		T_{vj} =25°C		40		ns
			T_{vj} =125°C		60		ns
			T_{vj} =150°C		70		ns
E_{on}	Turn - on Energy	V_{CC}=600V,I_C=75A, R_G =10Ω , V_{GE}=±15V, Inductive Load	T_{vj} =125°C		11		mJ
			T_{vj} =150°C		12		mJ
E_{off}	Turn - off Energy		T_{vj} =125°C		4.5		mJ
			T_{vj} =150°C		4.8		mJ
I_{SC}	Short Circuit Current	t_{psc}≤10μS , V_{GE}=15V T_{vj}=125°C,V_{CC}=600V			300		A
R_{thJC}	Junction-to-Case Thermal Resistance （ **Per IGBT**）					0.32	K /W
Diode							
V_F	Forward Voltage	I_F=75A , V_{GE}=0V, T_{vj} =25°C			1.65	2.15	V
		I_F=75A , V_{GE}=0V, T_{vj} =125°C			1.65		V
t_{rr}	Reverse Recovery Time	I_F=75A , V_R=600V di_F/dt=-1500A/μs T_{vj} =125°C			210		ns
I_{RRM}	Max. Reverse Recovery Current				78		A
E_{rec}	Reverse Recovery Energy				5.8		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance （ **Per Diode**）					0.6	K /W

NTC SECTOR

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（M6）	3		5	N · m
Torque	Module Electrodes	Recommended（M5）	2.5		5	N · m
Weight				200		g

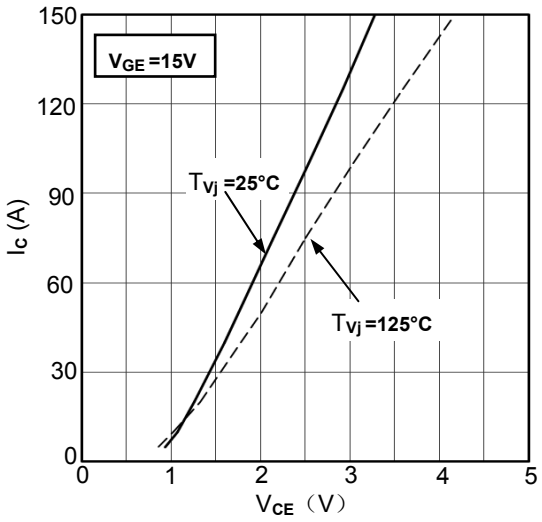


Figure1. Typical Output Characteristics
IGBT-inverter

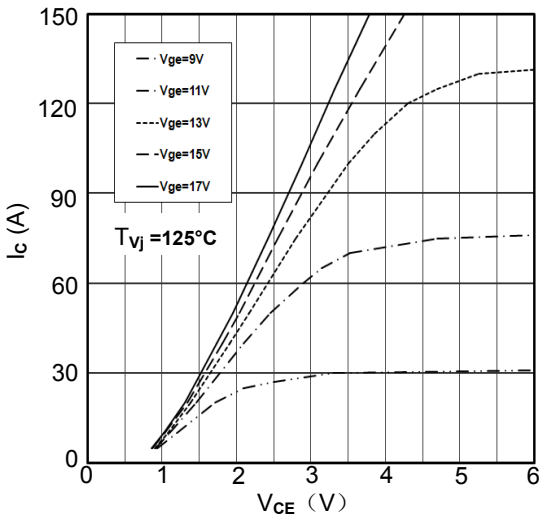


Figure2. Typical Output Characteristics
IGBT-inverter

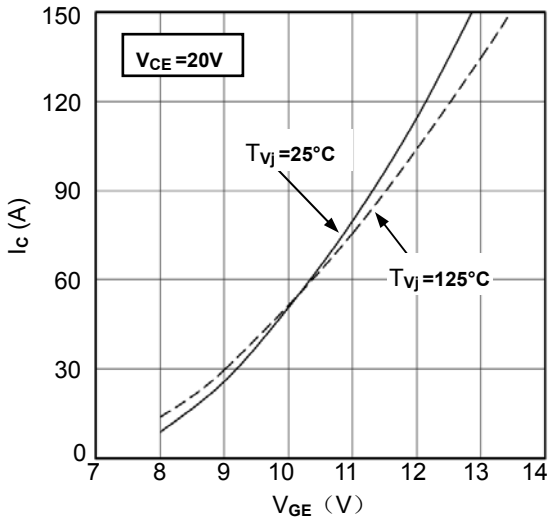


Figure3. Typical Transfer characteristics
IGBT-inverter

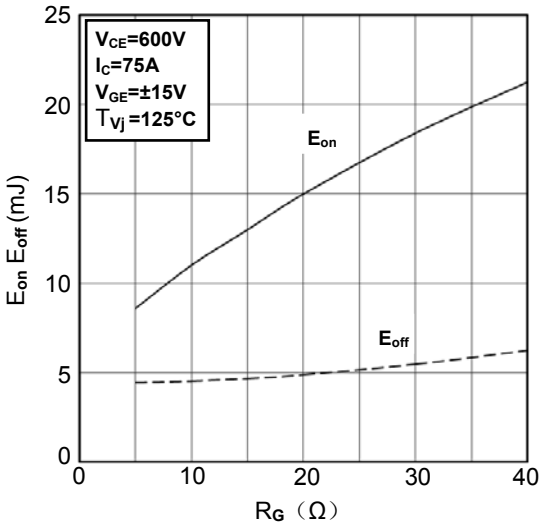


Figure4. Switching Energy vs. Gate Resistor
IGBT-inverter

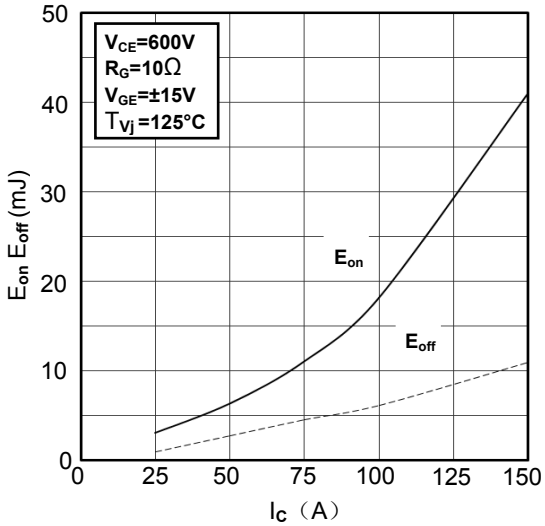


Figure5. Switching Energy vs. Collector Current
IGBT-inverter

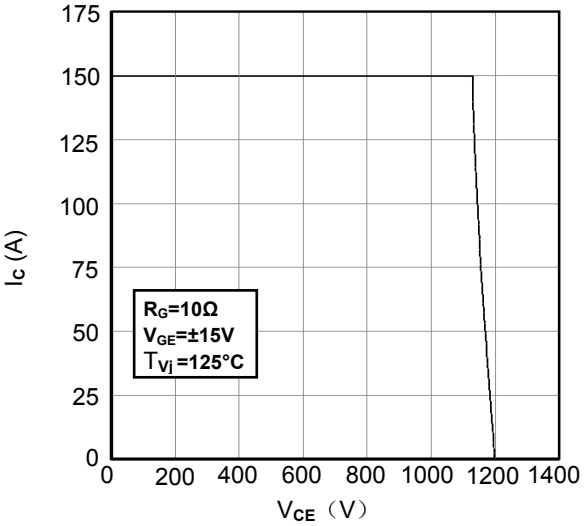


Figure6. Reverse Biased Safe Operating Area
IGBT-inverter

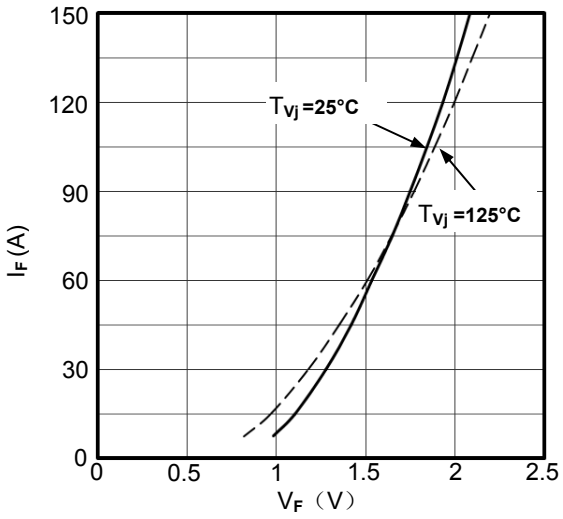


Figure7. Diode Forward Characteristics
Diode-inverter

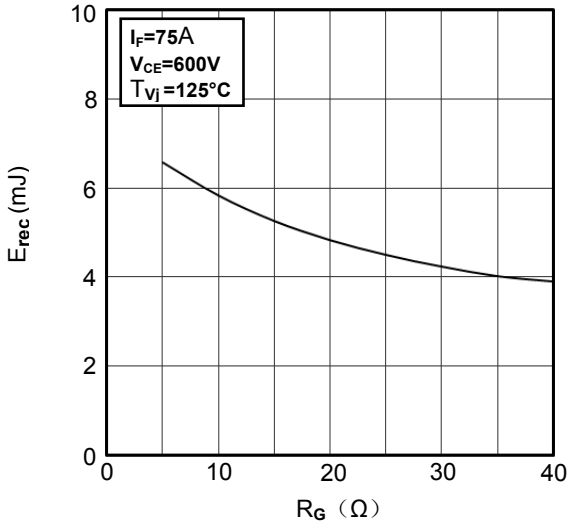


Figure8. Switching Energy vs. Gate Resistor
Diode-inverter

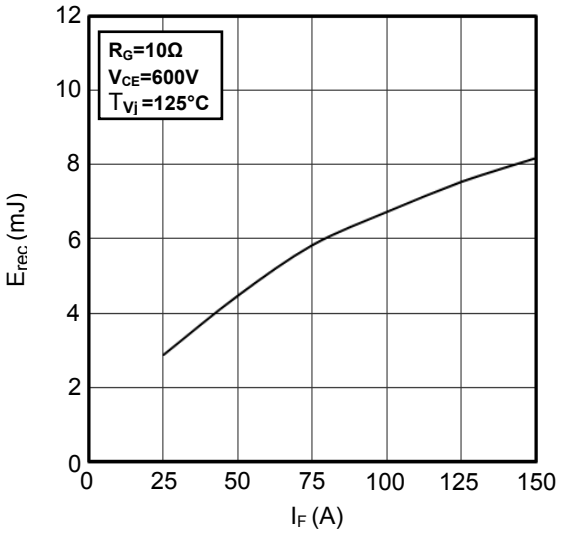


Figure9. Switching Energy vs. Forward Current Diode-inverter

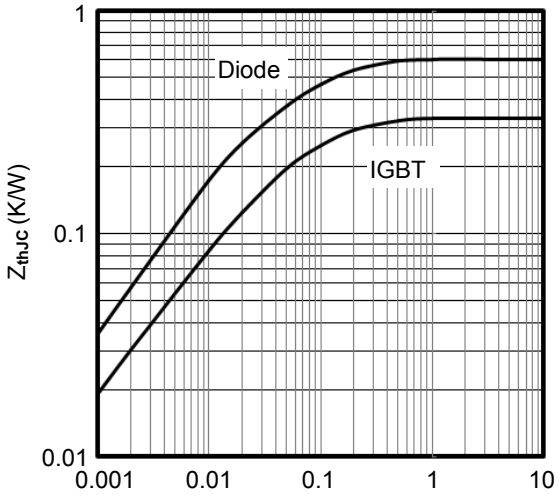


Figure10. Transient Thermal Impedance of Diode and IGBT-inverter

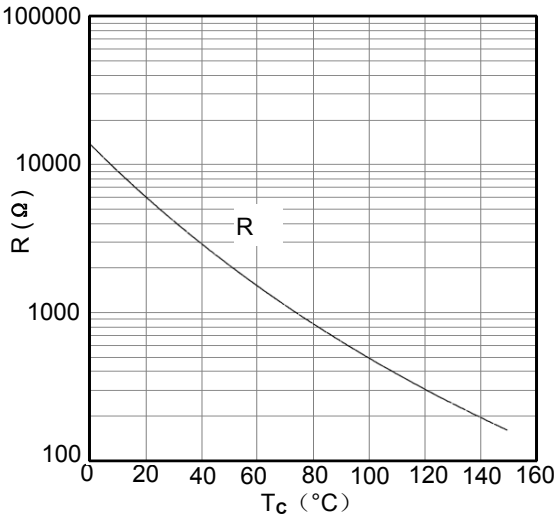


Figure11. NTC Characteristics

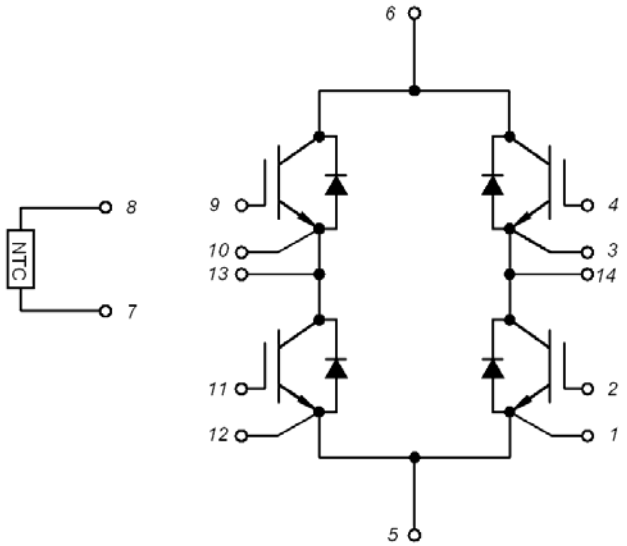
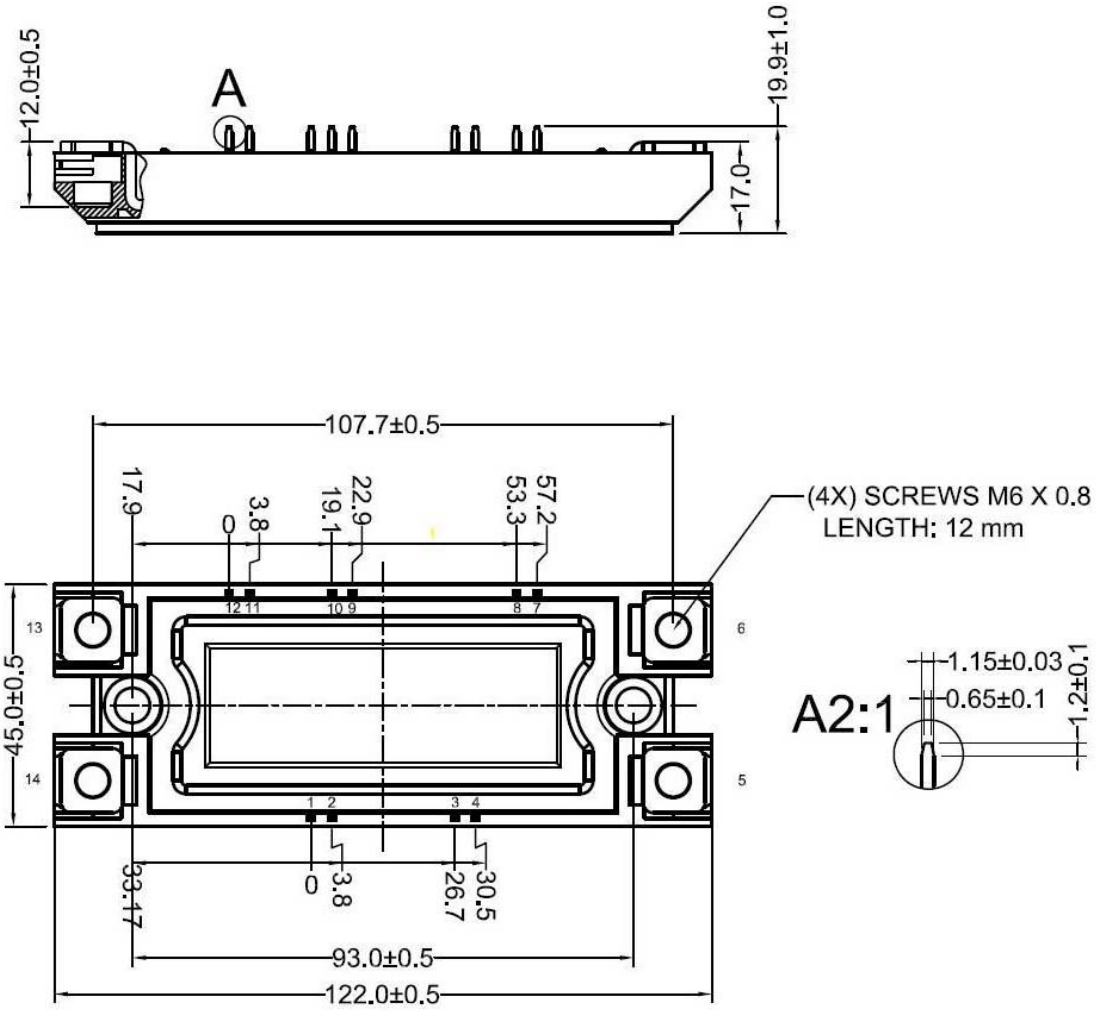


Figure12. Circuit Diagram



Dimensions (mm)
Figure13. Package Outline