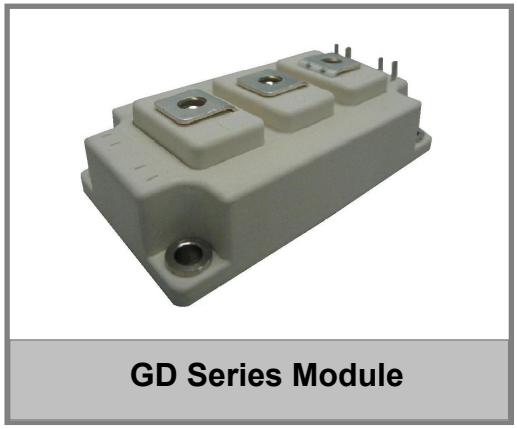
MMG300D170B6EN

1700V 300A IGBT Module

November 2011 **PRELIMINARY** **RoHS Compliant**

FEATURES

- ☐ IGBT^3 CHIP(1700V Trench+Field Stop technology)
- ☐ Low turn-off losses, short tail current
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ DIODE CHIP(1700V EMCON 3 technology)
- ☐ Free wheeling diodes with fast and soft reverse recovery



GD Series Module

APPLICATIONS

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

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	1700	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	400	A
		T_C=80°C	300	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	600	A
P_{tot}	Power Dissipation Per IGBT		1450	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_{vj}=25°C	1700	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	400	A
		T_C=80°C	300	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	600	A
I^2t		T_{vj} =125°C, t=10ms, V_R=0V	14500	A^2s

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=12.0mA	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=300A, V_{GE}=15V, T_{vj}=25°C		2.0	2.45	V
		I_C=300A, V_{GE}=15V, T_{vj}=125°C		2.4		V
I_{CES}	Collector Leakage Current	V_{CE}=1700V, V_{GE}=0V, T_{vj}=25°C			1	mA
		V_{CE}=1700V, V_{GE}=0V, T_{vj}=125°C			10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}±20V, T_{vj}=125°C	-400		400	nA
R_{Gint}	Integrated Gate Resistor			2.5		Ω
Q_{ge}	Gate Charge	V_{CE}=900V, I_C=300A , V_{GE}=±15V		3.5		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz		27		nF
C_{res}	Reverse Transfer Capacitance			0.9		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=900V,I_C=300A, R_G =4.7Ω , V_{GE}=±15V, Inductive Load, T_{vj} =25°C		280		ns
		T_{vj} =125°C		380		ns
t_r	Rise Time	T_{vj} =25°C		80		ns
		T_{vj} =125°C		100		ns
$t_{d(off)}$	Turn - off Delay Time	V_{CC}=900V,I_C=300A, R_G =4.7Ω , V_{GE}=±15V, Inductive Load, T_{vj} =25°C		800		ns
		T_{vj} =125°C		1000		ns
t_f	Fall Time	T_{vj} =25°C		120		ns
		T_{vj} =125°C		200		ns
E_{on}	Turn - on Energy	V_{CC}=900V,I_C=300A, R_G =4.7Ω , V_{GE}=±15V, Inductive Load, T_{vj} =25°C		71		mJ
		T_{vj} =125°C		105		mJ
E_{off}	Turn - off Energy	T_{vj} =25°C		64		mJ
		T_{vj} =125°C		94		mJ
I_{SC}	Short Circuit Current	t_{psc}≤10μS , V_{GE}=15V T_{vj}=125°C,V_{CC}=1000V		1200		A
R_{thJC}	Junction-to-Case Thermal Resistance （ **Per IGBT**）				0.085	K /W
Diode						
V_F	Forward Voltage	I_F=300A , V_{GE}=0V, T_{vj} =25°C		1.8	2.2	V
		I_F=300A , V_{GE}=0V, T_{vj} =125°C		1.9		V
I_{RRM}	Max. Reverse Recovery Current	I_F=300A , V_R=900V di_F/dt=-3600A/μs T_{vj}=125°C		380		A
Q_{rr}	Reverse Recovery Charge			130		μC
E_{rec}	Reverse Recovery Energy			75		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance （ **Per Diode**）				0.13	K /W

MODULE CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$T_{vj\ max}$	Max. Junction Temperature				150	°C
$T_{vj\ op}$	Operating Temperature		-40		125	°C
T_{stg}	Storage Temperature		-40		125	°C
V_{isol}	Insulation Test Voltage	AC, t=1min		4000		V
CTI	Comparative Tracking Index		350			
Torque	Module-to-Sink	Recommended（M6）	3		5	N · m
Torque	Module Electrodes	Recommended（M6）	2.5		5	N · m
Weight				320		g

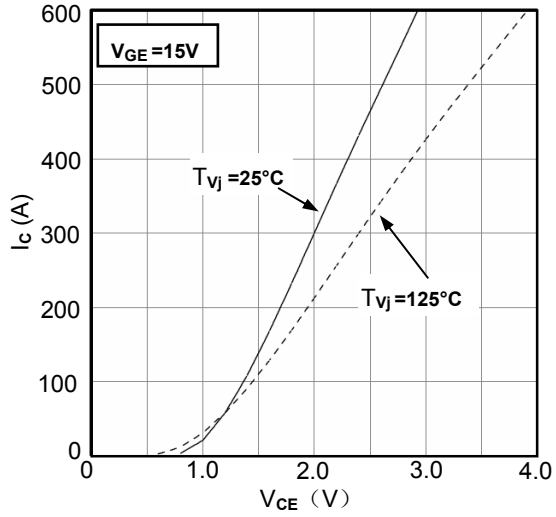


Figure1. Typical Output Characteristics

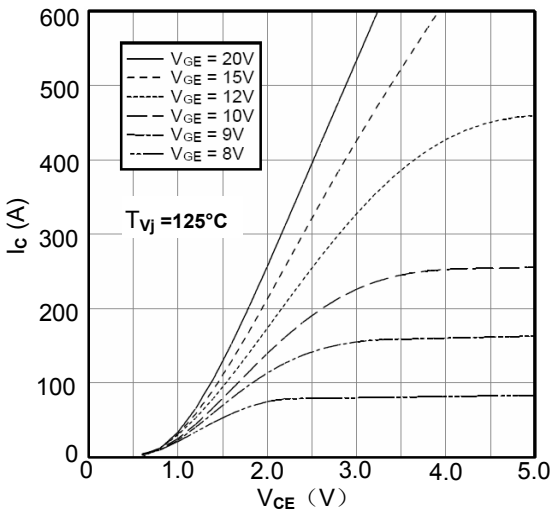


Figure2. Typical Output Characteristics

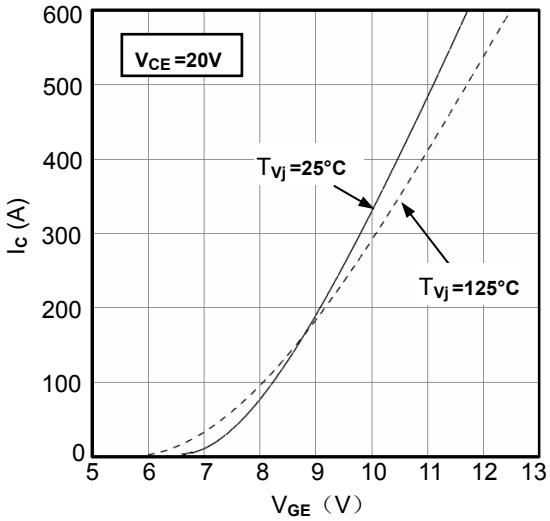


Figure3. Typical Transfer characteristics

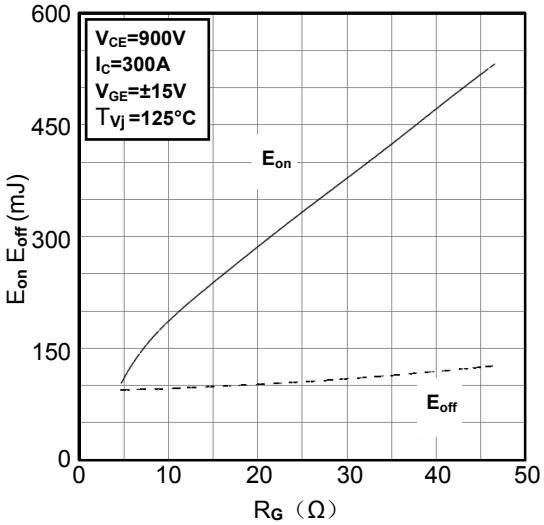


Figure4. Switching Energy vs. Gate Resistor

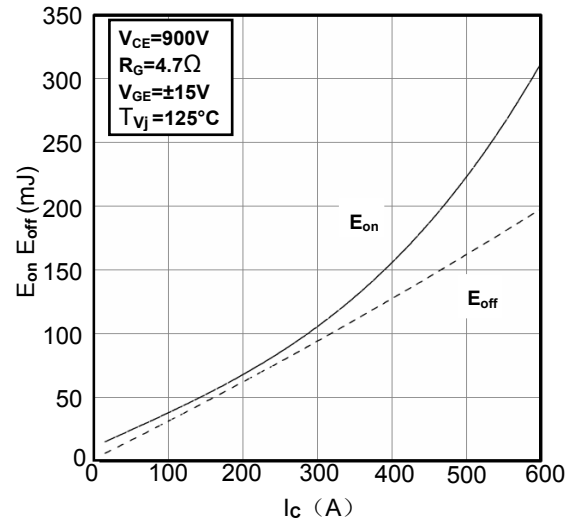


Figure5. Switching Energy vs. Collector Current

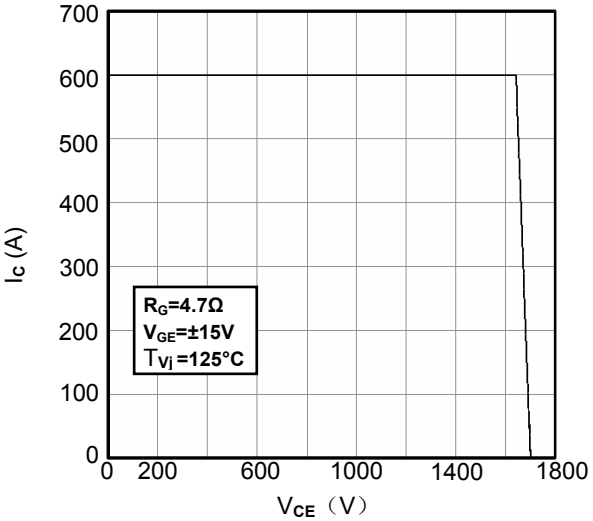


Figure6. Reverse Biased Safe Operating Area

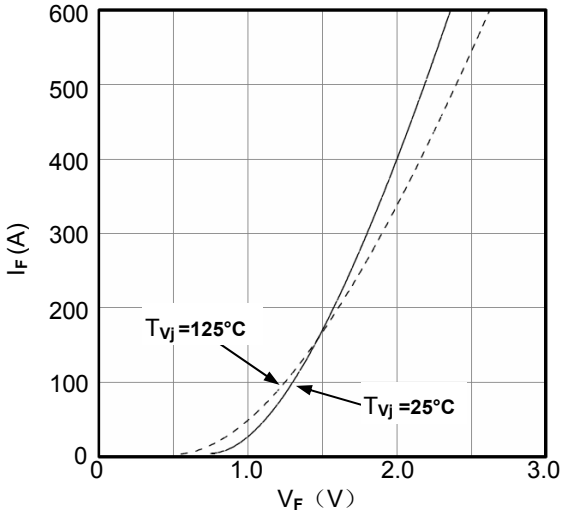


Figure7. Diode Forward Characteristics

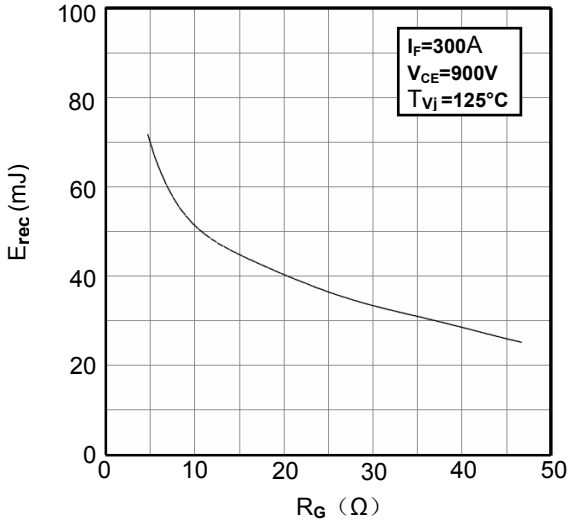


Figure8. Switching Energy vs. Gate Resistor

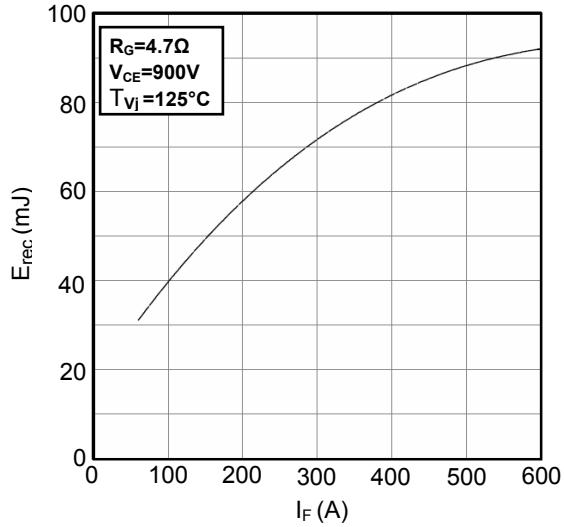


Figure9. Switching Energy vs. Forward Current

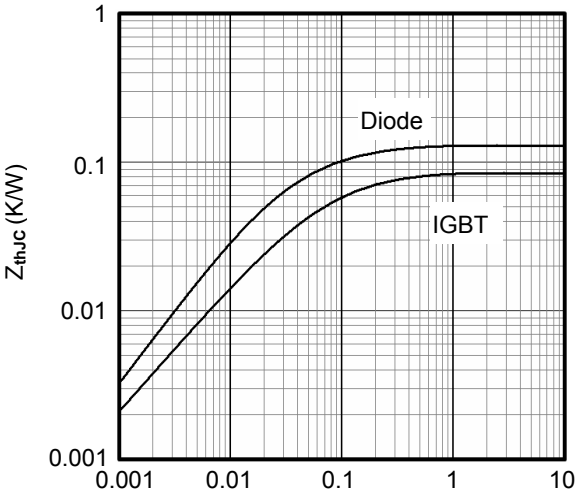


Figure10. Transient Thermal Impedance of Diode and IGBT

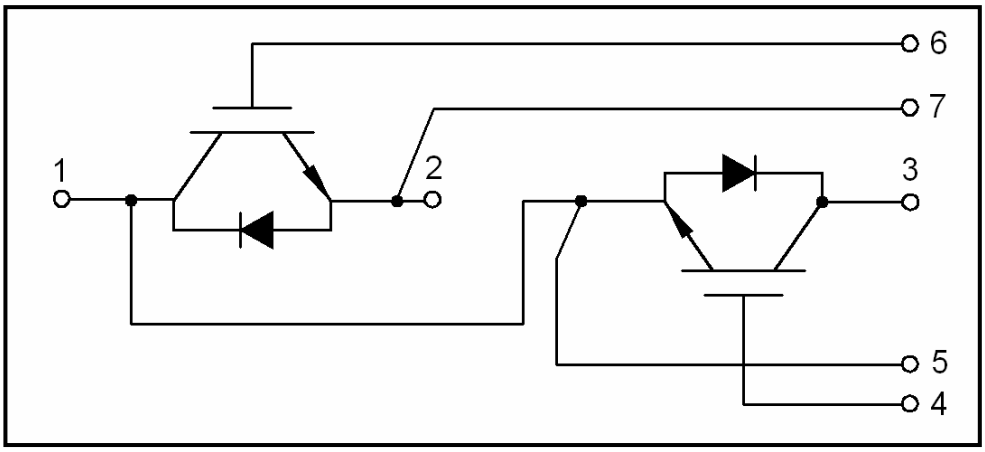
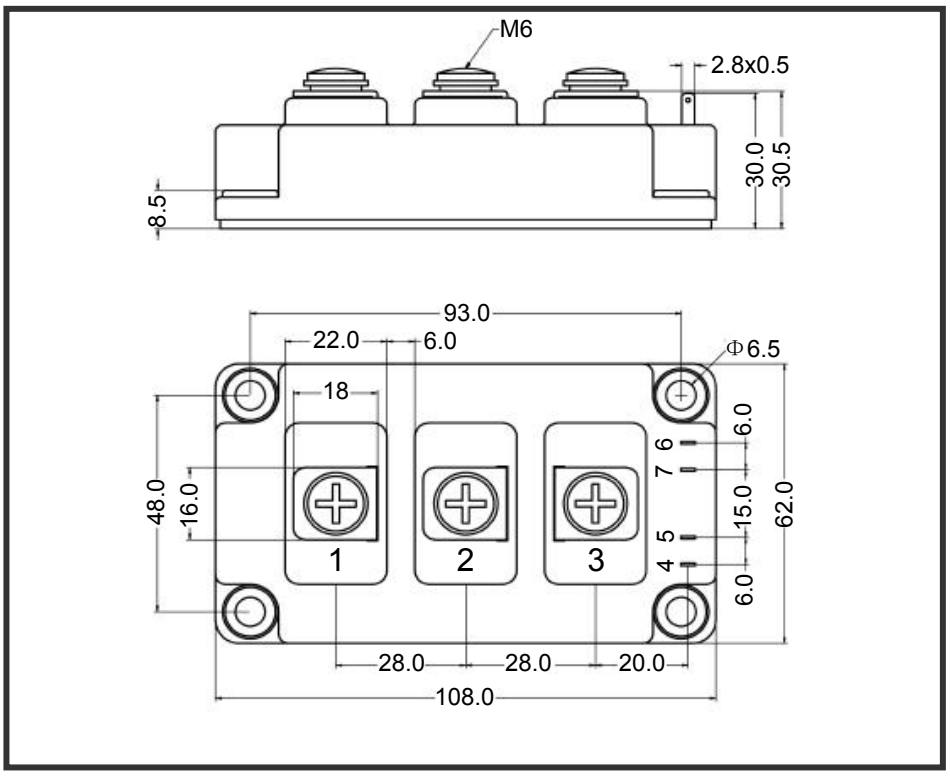


Figure11. Circuit Diagram



Dimensions (mm)
Figure12. Package Outline