

## FEATURES

- IGBT<sup>3</sup> 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



## APPLICATIONS

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

## ABSOLUTE MAXIMUM RATINGS

$T_C=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
<b>IGBT</b>				
$V_{CES}$	Collector - Emitter Voltage	$T_{vj}=25^{\circ}\text{C}$	1700	V
$V_{GES}$	Gate - Emitter Voltage		$\pm 20$	V
$I_c$	DC Collector Current	$T_C=25^{\circ}\text{C}$	400	A
		$T_C=80^{\circ}\text{C}$	300	A
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1\text{ms}$	600	A
$P_{tot}$	Power Dissipation Per IGBT		1450	W
<b>Diode</b>				
$V_{RRM}$	Repetitive Reverse Voltage	$T_{vj}=25^{\circ}\text{C}$	1700	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^{\circ}\text{C}$	400	A
		$T_C=80^{\circ}\text{C}$	300	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ms}$	600	A
$I^2t$		$T_{vj}=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	14500	$\text{A}^2\text{s}$

## MMG300D170B6EN

### ELECTRICAL AND THERMAL CHARACTERISTICS $T_C=25^\circ\text{C}$ unless otherwise specified

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

**MODULE CHARACTERISTICS**

*T<sub>C</sub>=25°C unless otherwise specified*

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
T <sub>vj max</sub>	Max. Junction Temperature				175	°C
T <sub>vj op</sub>	Operating Temperature		-40		150	°C
T <sub>stg</sub>	Storage Temperature		-40		150	°C
V <sub>isol</sub>	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

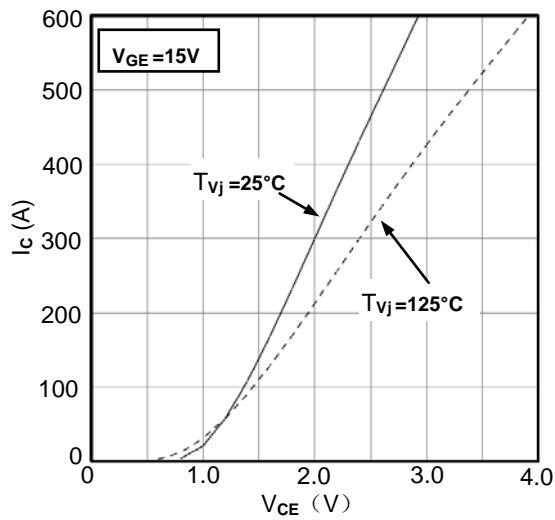


Figure1. Typical Output Characteristics

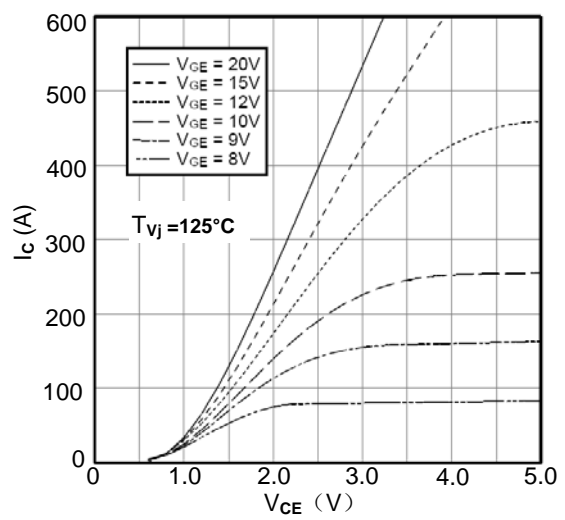


Figure2. Typical Output Characteristics

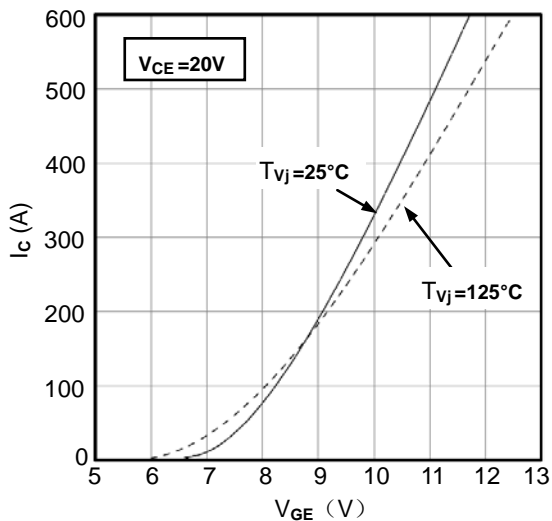


Figure3. Typical Transfer characteristics

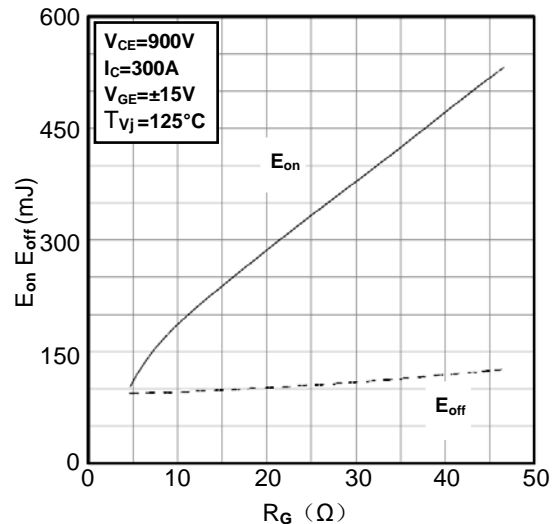


Figure4. Switching Energy vs. Gate Resistor

# MMG300D170B6EN

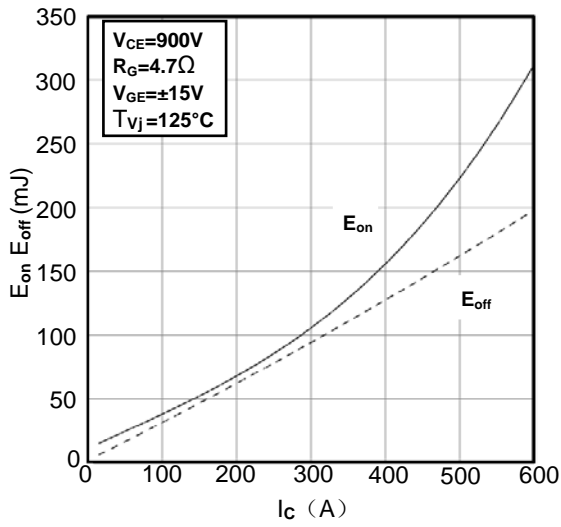


Figure 5. Switching Energy vs. Collector Current

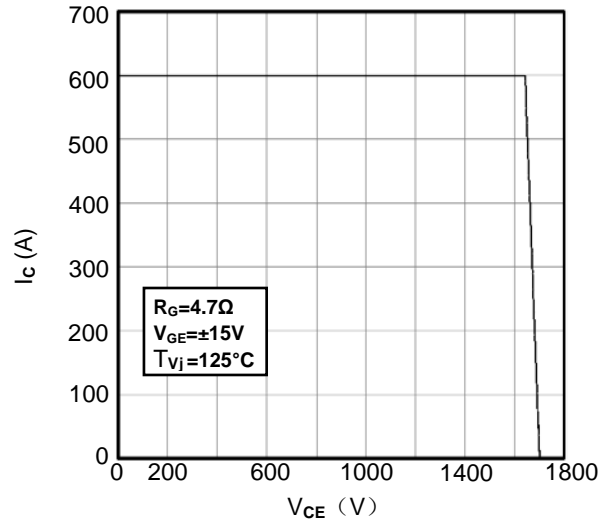


Figure 6. Reverse Biased Safe Operating Area

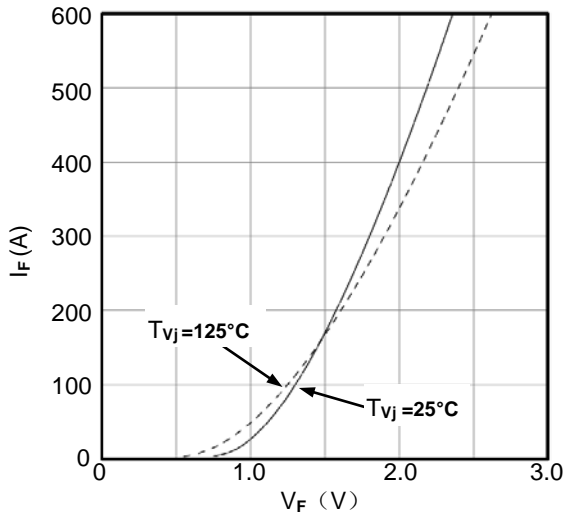


Figure 7. Diode Forward Characteristics

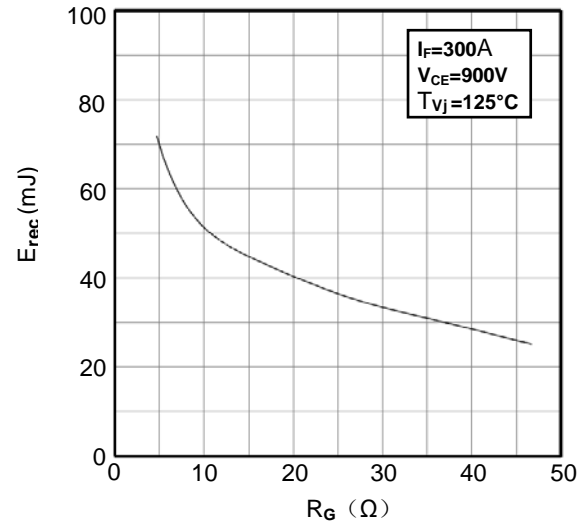


Figure 8. Switching Energy vs. Gate Resistor

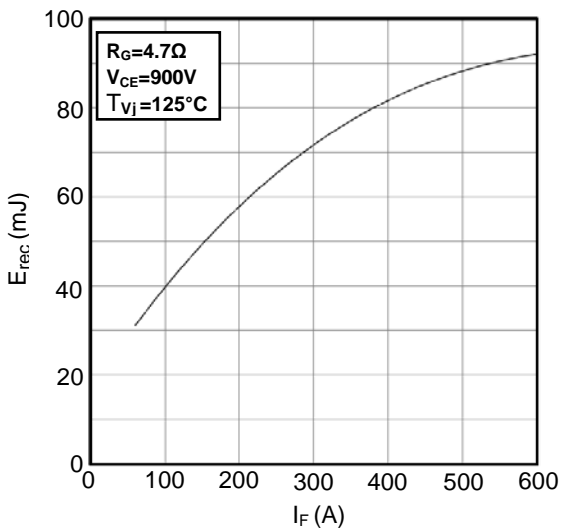


Figure 9. Switching Energy vs. Forward Current

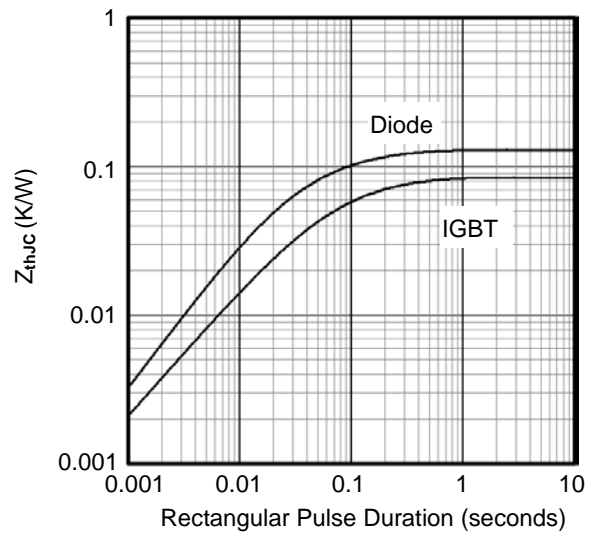


Figure 10. Transient Thermal Impedance of Diode and IGBT

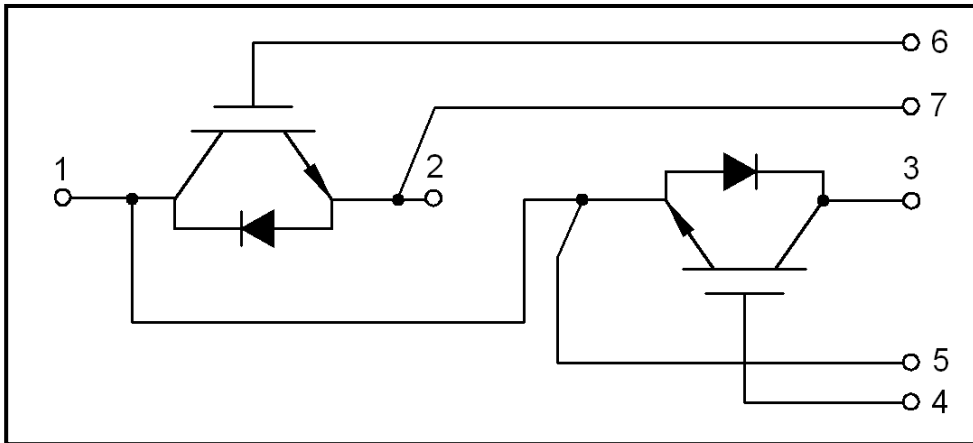
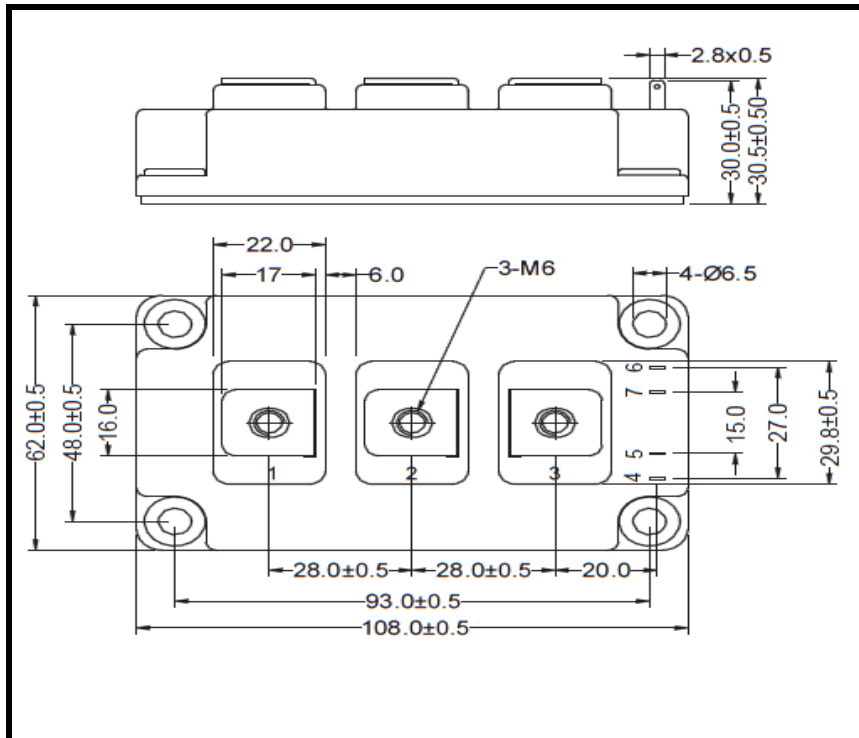


Figure11. Circuit Diagram



Dimensions (mm)  
Figure12. Package Outline