

## 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

## APPLICATIONS

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



## INVERTER SECTOR

### 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	$T_{vj}=25^{\circ}\text{C}$	600	V
$V_{GES}$	Gate - Emitter Voltage		$\pm 20$	V
$I_C$	DC Collector Current	$T_C=25^{\circ}\text{C}$	550	A
		$T_C=50^{\circ}\text{C}$	450	A
$I_{CM}$	Repetitive Peak Collector Current	$t_p=1\text{ms}$	900	A
$P_{tot}$	Power Dissipation Per IGBT		1154	W
<b>Diode</b>				
$V_{RRM}$	Repetitive Reverse Voltage	$T_{vj}=25^{\circ}\text{C}$	600	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^{\circ}\text{C}$	550	A
		$T_C=50^{\circ}\text{C}$	450	A
$I_{FRM}$	Repetitive Peak Forward Current	$t_p=1\text{ms}$	900	A
$I^2t$		$T_{vj}=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	12500	$\text{A}^2\text{s}$

**INVERTER SECTOR**

**ELECTRICAL AND THERMAL CHARACTERISTICS**

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>IGBT</b>						
V <sub>GE(th)</sub>	Gate - Emitter Threshold Voltage	V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =7.2mA	4.9	5.8	6.5	V
V <sub>CE(sat)</sub>	Collector - Emitter Saturation Voltage	I <sub>C</sub> =450A, V <sub>GE</sub> =15V, T <sub>Vj</sub> =25°C		1.45		V
		I <sub>C</sub> =450A, V <sub>GE</sub> =15V, T <sub>Vj</sub> =125°C		1.6		V
I <sub>ces</sub>	Collector Leakage Current	V <sub>CE</sub> =600V, V <sub>GE</sub> =0V, T <sub>Vj</sub> =25°C			1	mA
		V <sub>CE</sub> =600V, V <sub>GE</sub> =0V, T <sub>Vj</sub> =125°C			5	mA
I <sub>GES</sub>	Gate Leakage Current	V <sub>CE</sub> =0V, V <sub>GE</sub> ± 15V, T <sub>Vj</sub> =125°C	-400		400	nA
R <sub>Gint</sub>	Integrated Gate Resistor			0.67		Ω
Q <sub>ge</sub>	Gate Charge	V <sub>CE</sub> =300V, I <sub>C</sub> =450A, V <sub>GE</sub> = ± 15V		4.8		μC
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f =1MHz		28		nF
C <sub>res</sub>	Reverse Transfer Capacitance				0.85	
t <sub>d(on)</sub>	Turn - on Delay Time	V <sub>CC</sub> =300V, I <sub>C</sub> =450A, T <sub>Vj</sub> =25°C		75		ns
		R <sub>G</sub> =1.5 Ω, T <sub>Vj</sub> =125°C		80		ns
t <sub>r</sub>	Rise Time	V <sub>GE</sub> = ± 15V, T <sub>Vj</sub> =25°C		65		ns
		Inductive Load T <sub>Vj</sub> =125°C		70		ns
t <sub>d(off)</sub>	Turn - off Delay Time	V <sub>CC</sub> =300V, I <sub>C</sub> =450A, T <sub>Vj</sub> =25°C		470		ns
		R <sub>G</sub> =1.5 Ω, T <sub>Vj</sub> =125°C		500		ns
t <sub>f</sub>	Fall Time	V <sub>GE</sub> = ± 15V, T <sub>Vj</sub> =25°C		70		ns
		Inductive Load T <sub>Vj</sub> =125°C		95		ns
E <sub>on</sub>	Turn - on Energy	V <sub>CC</sub> =300V, I <sub>C</sub> =450A, T <sub>Vj</sub> =25°C		4.95		mJ
		R <sub>G</sub> =1.5 Ω, T <sub>Vj</sub> =125°C		6.30		mJ
E <sub>off</sub>	Turn - off Energy	V <sub>GE</sub> = ± 15V, T <sub>Vj</sub> =25°C		15.0		mJ
		Inductive Load T <sub>Vj</sub> =125°C		17.5		mJ
I <sub>sc</sub>	Short Circuit Current	t <sub>psc</sub> ≤ 6μS, V <sub>GE</sub> =15V T <sub>Vj</sub> =125°C, V <sub>CC</sub> =360V		2250		A
R <sub>thJC</sub>	Junction-to-Case Thermal Resistance ( Per IGBT )				0.13	K /W
<b>Diode</b>						
V <sub>F</sub>	Forward Voltage	I <sub>F</sub> =450A, V <sub>GE</sub> =0V, T <sub>Vj</sub> =25°C		1.55		V
		I <sub>F</sub> =450A, V <sub>GE</sub> =0V, T <sub>Vj</sub> =125°C		1.5		V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =450A, V <sub>R</sub> =300V		300		ns
I <sub>RRM</sub>	Max. Reverse Recovery Current	di <sub>F</sub> /dt=-5900A/μs		290		A
E <sub>rec</sub>	Reverse Recovery Charge	T <sub>Vj</sub> =125°C		7.5		mJ
R <sub>thJCD</sub>	Junction-to-Case Thermal Resistance ( Per Diode )				0.24	K /W

# MMG450WB060B6EN

## NTC CHARACTERISTIC VALUES

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{25}$	Resistance	$T_C=25^{\circ}\text{C}$		5		$\text{K}\Omega$
$B_{25/50}$				3375		K

## MODULE CHARACTERISTICS

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

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

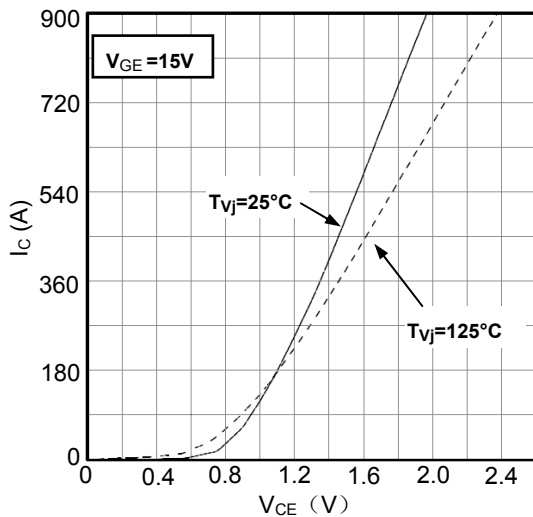


Figure1. Typical Output characteristics IGBT-inverter

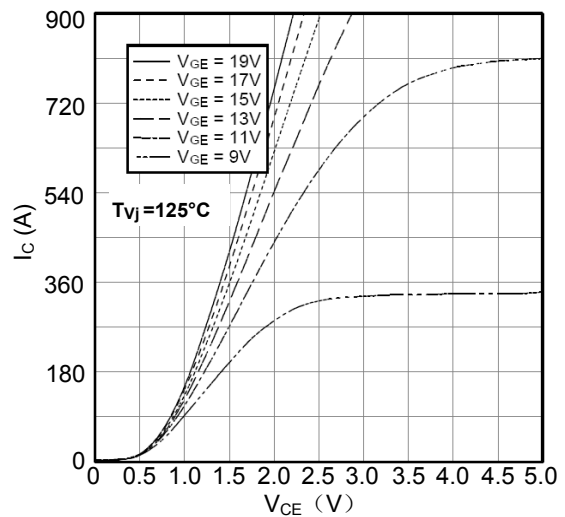


Figure2. Typical Output characteristics IGBT-inverter

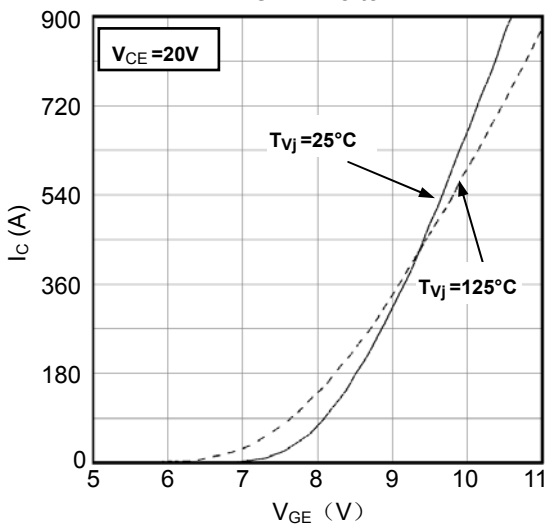


Figure3. Typical Transfer characteristics IGBT-inverter

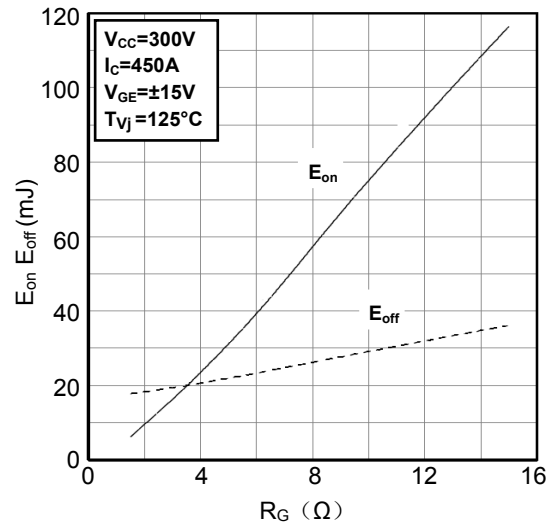


Figure4. Switching Energy vs. Gate Resistor IGBT-inverter

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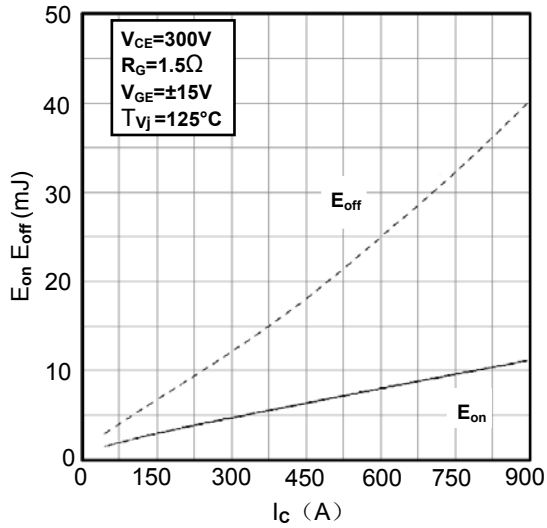


Figure5. Switching Energy vs. Collector Current IGBT-inverter

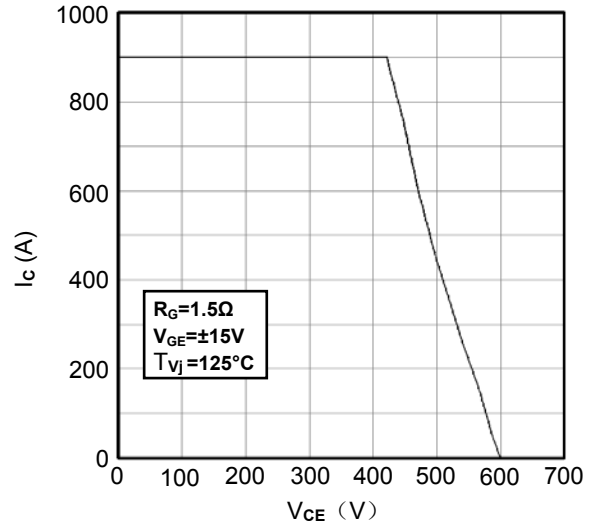


Figure6. Reverse Biased Safe Operating Area IGBT-inverter

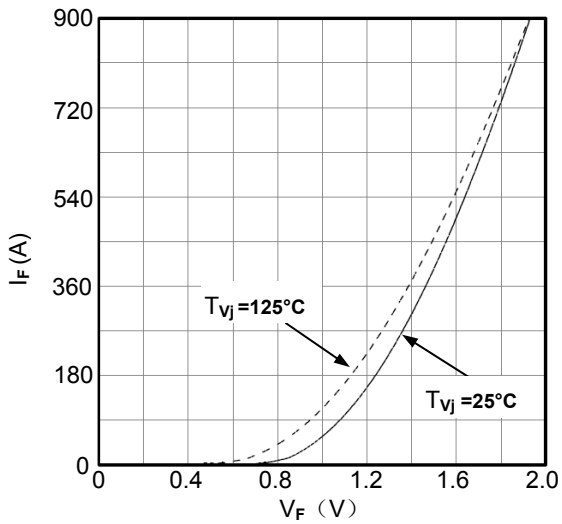


Figure7. Diode Forward Characteristics Diode -inverter

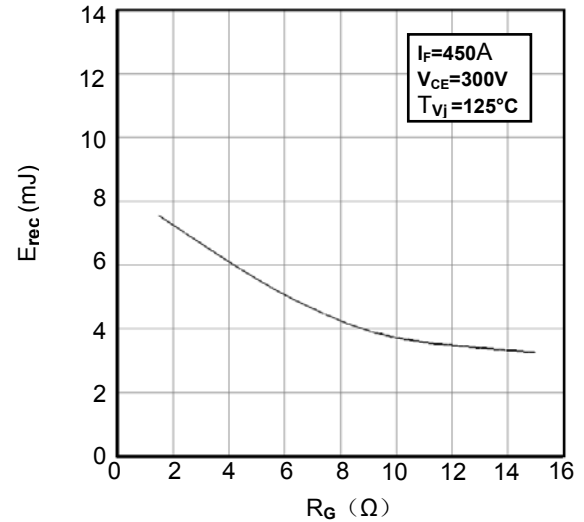


Figure8. Switching Energy vs. Gate Resistor Diode -inverter

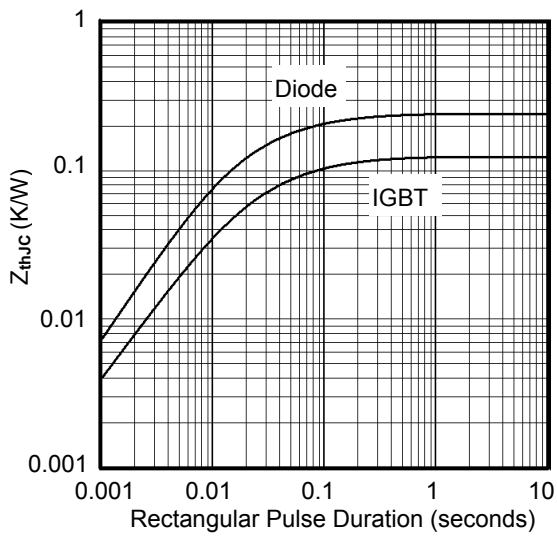


Figure9. Transient Thermal Impedance of Diode and IGBT-inverter

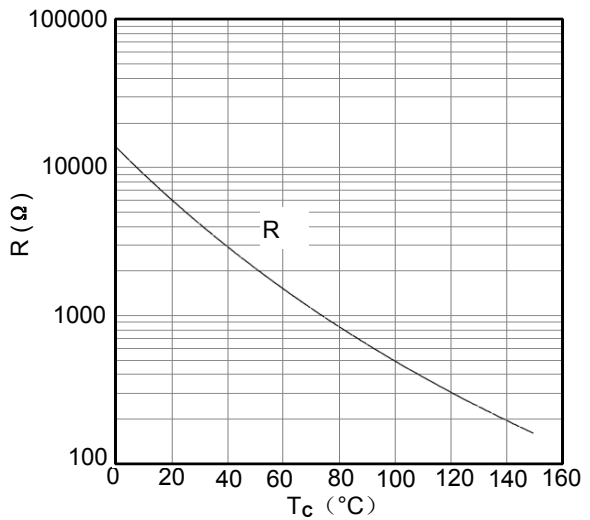


Figure10. NTC Characteristics

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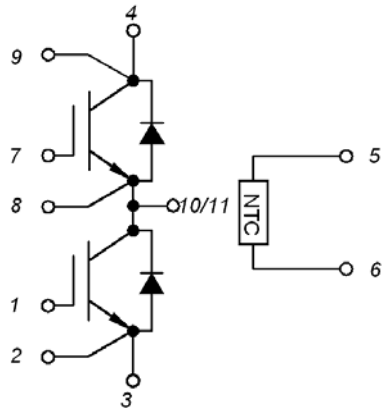
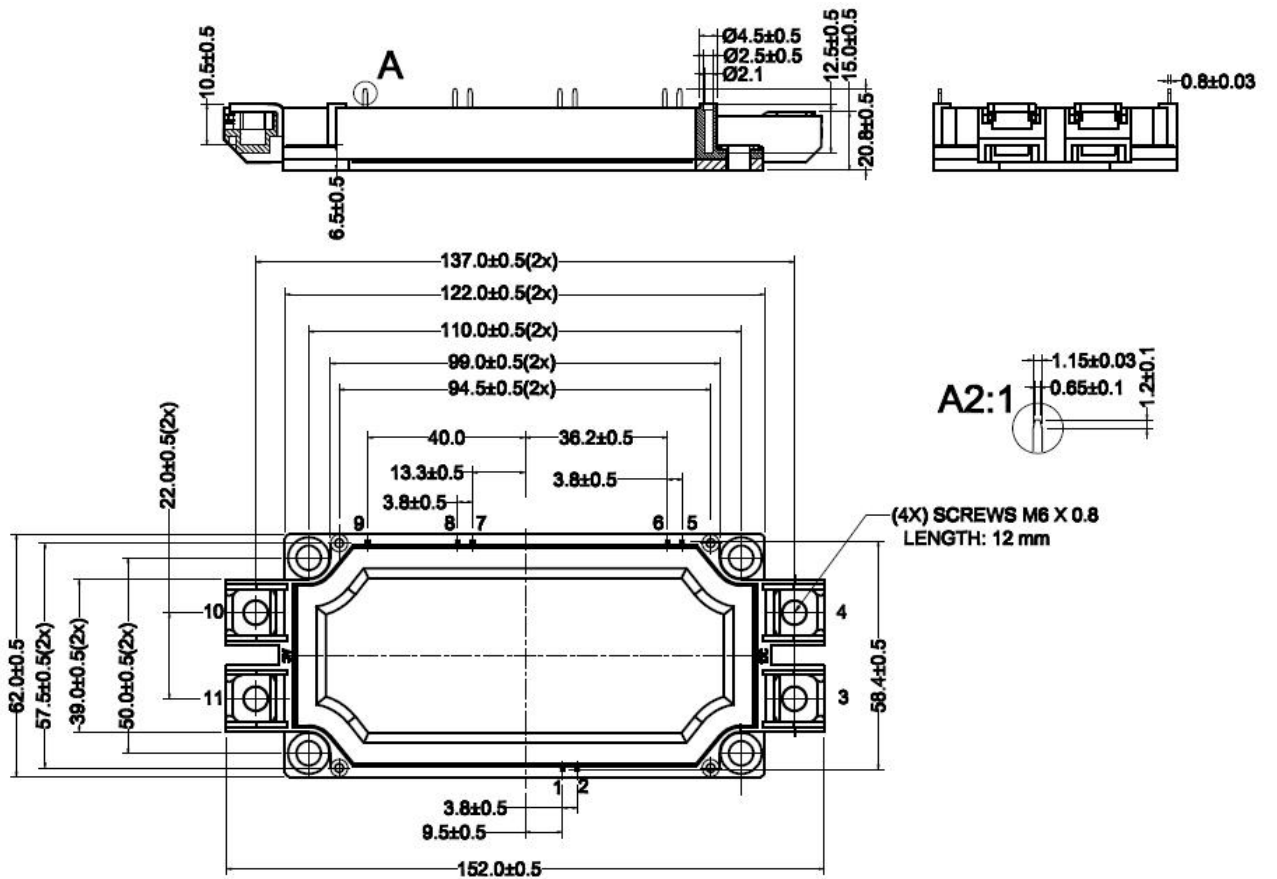


Figure11. Circuit Diagram



Dimensions (mm)  
Figure12. Package Outline