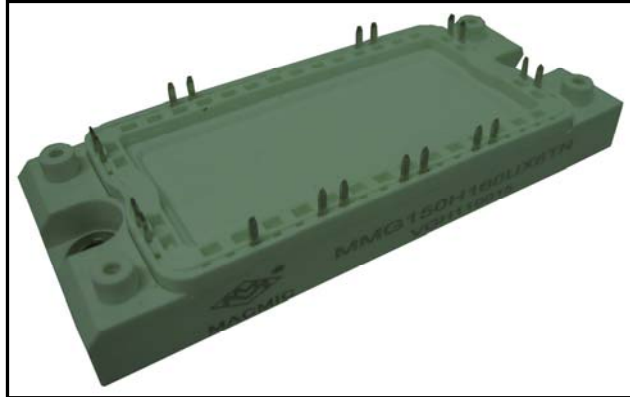


## FEATURES

- Soldering connections for PCB mounting
- Convenient package outline
- Suitable for wave soldering
- High temperature and power cycling capability



## APPLICATIONS

- Drive inverters with brake system

## BRAKE SECTOR

### ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter	Test Conditions	Values	Unit
<b>IGBT</b>				
V <sub>CES</sub>	Collector - Emitter Voltage	T <sub>vj</sub> =25°C	1200	V
V <sub>GES</sub>	Gate - Emitter Voltage		±20	V
I <sub>C</sub>	DC Collector Current	T <sub>C</sub> =25°C	105	A
		T <sub>C</sub> =80°C	75	A
I <sub>CM</sub>	Repetitive Peak Collector Current	t <sub>p</sub> =1ms	150	A
P <sub>tot</sub>	Power Dissipation Per IGBT		348	W
<b>Diode</b>				
V <sub>RRM</sub>	Repetitive Reverse Voltage	T <sub>vj</sub> =25°C	1200	V
I <sub>F(AV)</sub>	Average Forward Current	T <sub>C</sub> =25°C	105	A
		T <sub>C</sub> =80°C	75	A
I <sub>FRM</sub>	Repetitive Peak Forward Current	t <sub>p</sub> =1ms	150	A
I <sup>2</sup> t		T <sub>vj</sub> =125°C, t=10ms, V <sub>R</sub> =0V	1150	A <sup>2</sup> s

# MMG150H160UX6TN

## BRAKE SECTOR

### 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	$V_{CE}=V_{GE}, I_C=3.0\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=75\text{A}, V_{GE}=15\text{V}, T_{VJ}=25^\circ\text{C}$		1.7		V
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_{VJ}=125^\circ\text{C}$		1.9		V
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{VJ}=25^\circ\text{C}$			1	mA
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{VJ}=125^\circ\text{C}$			10	mA
$I_{GES}$	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE} \pm 15\text{V}, T_{VJ}=125^\circ\text{C}$	-400		400	nA
$R_{Gint}$	Integrated Gate Resistor			10		$\Omega$
$Q_{ge}$	Gate Charge	$V_{CE}=600\text{V}, I_C=75\text{A}, V_{GE} = \pm 15\text{V}$		0.7		$\mu\text{C}$
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		5.3		nF
$C_{res}$	Reverse Transfer Capacitance				0.2	
$t_{d(on)}$	Turn - on Delay Time	$V_{CC}=600\text{V}, I_C=75\text{A},$ $R_G = 4.7 \Omega,$	$T_{VJ} = 25^\circ\text{C}$	260		ns
			$T_{VJ} = 125^\circ\text{C}$	290		ns
$t_r$	Rise Time	$V_{GE} = \pm 15\text{V},$ Inductive Load	$T_{VJ} = 25^\circ\text{C}$	30		ns
			$T_{VJ} = 125^\circ\text{C}$	50		ns
$t_{d(off)}$	Turn - off Delay Time	$V_{CC}=600\text{V}, I_C=75\text{A},$ $R_G = 4.7 \Omega,$	$T_{VJ} = 25^\circ\text{C}$	420		ns
			$T_{VJ} = 125^\circ\text{C}$	520		ns
$t_f$	Fall Time	$V_{GE} = \pm 15\text{V},$ Inductive Load	$T_{VJ} = 25^\circ\text{C}$	70		ns
			$T_{VJ} = 125^\circ\text{C}$	90		ns
$E_{on}$	Turn - on Energy	$V_{CC}=600\text{V}, I_C=75\text{A},$ $R_G = 4.7 \Omega,$	$T_{VJ} = 25^\circ\text{C}$	6.6		mJ
			$T_{VJ} = 125^\circ\text{C}$	9.4		mJ
$E_{off}$	Turn - off Energy	$V_{GE} = \pm 15\text{V},$ Inductive Load	$T_{VJ} = 25^\circ\text{C}$	6.8		mJ
			$T_{VJ} = 125^\circ\text{C}$	8.0		mJ
$I_{sc}$	Short Circuit Current	$t_{psc} \leq 10\mu\text{S}, V_{GE}=15\text{V}$ $T_{VJ}=125^\circ\text{C}, V_{CC}=900\text{V}$		300		A
$R_{thJC}$	Junction-to-Case Thermal Resistance ( Per IGBT )				0.36	K / W
<b>Diode</b>						
$V_F$	Forward Voltage	$I_F=75\text{A}, V_{GE}=0\text{V}, T_{VJ} = 25^\circ\text{C}$		1.65		V
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_{VJ} = 125^\circ\text{C}$		1.65		V
$t_{rr}$	Reverse Recovery Time	$I_F=75\text{A}, V_R=600\text{V}$		300		ns
$I_{RRM}$	Max. Reverse Recovery Current	$di_F/dt=-2000\text{A}/\mu\text{s}$		85		A
$E_{rec}$	Reverse Recovery Energy	$T_{VJ} = 125^\circ\text{C}$		6.5		mJ
$R_{thJCD}$	Junction-to-Case Thermal Resistance ( Per Diode )				0.6	K / W

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## DIODE-RECTIFIER SECTOR

### ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter	Test Conditions	Values	Unit
$V_{RRM}$	Repetitive Reverse Voltage	$T_{Vj}=25^{\circ}\text{C}$	1600	V
$I_{d(AV)}$	Average Output Current	$T_C=85^{\circ}\text{C}$	150	A
$I_{FSM}$	Non-Repetitive Surge Forward Current	$T_{Vj}=45^{\circ}\text{C}$ , $t=10\text{ms}$ , 50Hz	450	A
		$T_{Vj}=45^{\circ}\text{C}$ , $t=8.3\text{ms}$ , 60Hz	400	A
$I^2t$		$T_{Vj}=45^{\circ}\text{C}$ , $t=10\text{ms}$ , 50Hz	1012	$\text{A}^2\text{s}$
		$T_{Vj}=45^{\circ}\text{C}$ , $t=8.3\text{ms}$ , 60Hz	800	$\text{A}^2\text{s}$

## DIODE-RECTIFIER SECTOR

### ELECTRICAL AND THERMAL CHARACTERISTICS

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_F$	Forward Voltage	$I_F=75\text{A}$ , $T_{Vj}=25^{\circ}\text{C}$		1.25	1.35	V
		$I_F=75\text{A}$ , $T_{Vj}=125^{\circ}\text{C}$		1.15		V
$I_R$	Reverse Leakage Current	$V_R=1600\text{V}$ , $T_{Vj}=25^{\circ}\text{C}$			50	$\mu\text{A}$
		$V_R=1600\text{V}$ , $T_{Vj}=125^{\circ}\text{C}$			1	mA
$V_{T0}$	Threshold Voltage				0.8	V
$r_T$	Forward Slope Resistance				7.3	$\text{m}\Omega$
$R_{thJCD}$	Junction-to-Case Thermal Resistance ( Per Diode )				0.66	$\text{K/W}$

## NTC SECTOR

### 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				150	$^{\circ}\text{C}$
$T_{Vj\text{op}}$	Operating Temperature		-40		125	$^{\circ}\text{C}$
$T_{\text{stg}}$	Storage Temperature		-40		125	$^{\circ}\text{C}$
$V_{\text{isol}}$	Insulation Test Voltage	AC, $t=1\text{min}$		3000		V
$M_d$	Mounting Torque	Recommended (M5)	2.5		5	$\text{N}\cdot\text{m}$
Weight				200		g

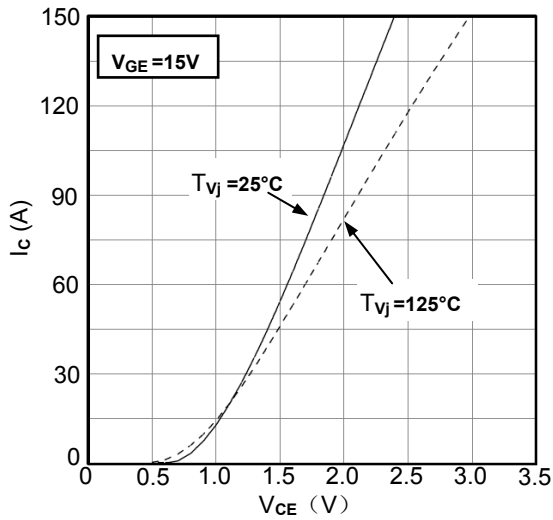


Figure1. Typical Output Characteristics IGBT-Brake

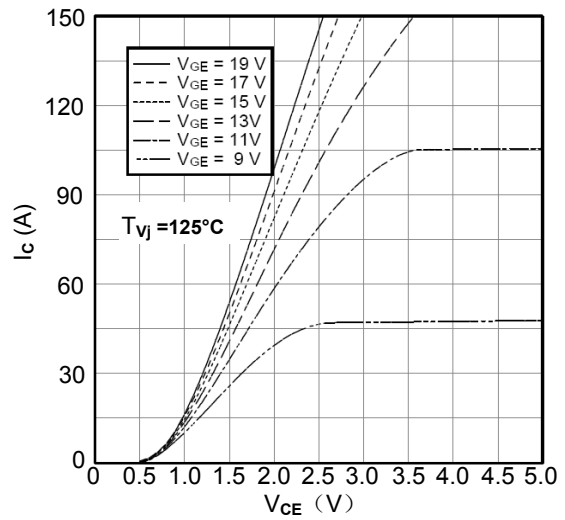


Figure2. Typical Output Characteristics IGBT- Brake

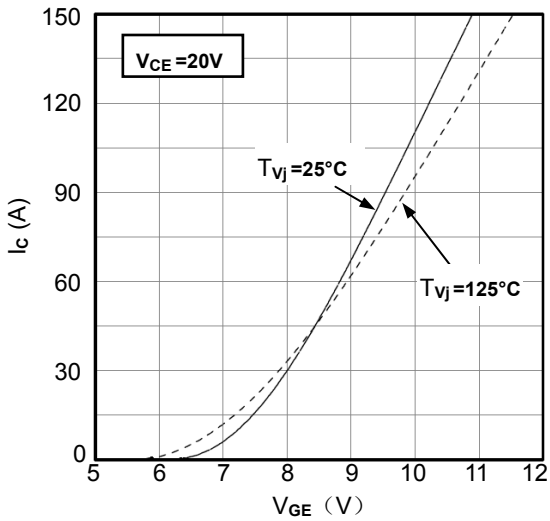


Figure3. Typical Transfer characteristics IGBT- Brake

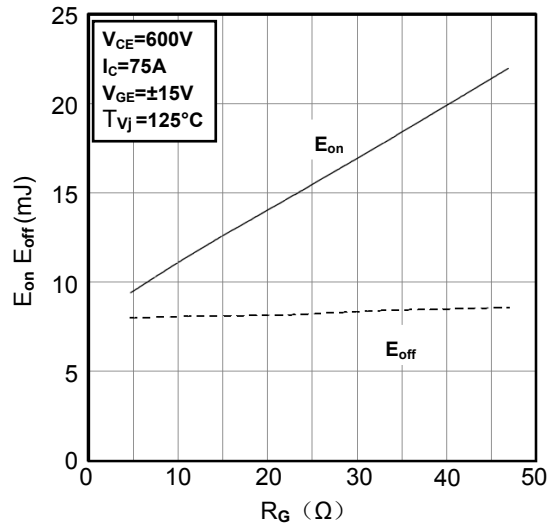


Figure4. Switching Energy vs. Gate Resistor IGBT- Brake

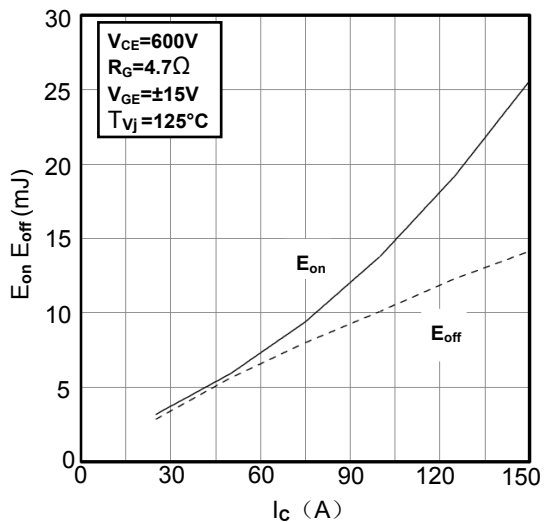


Figure5. Switching Energy vs. Collector Current IGBT- Brake

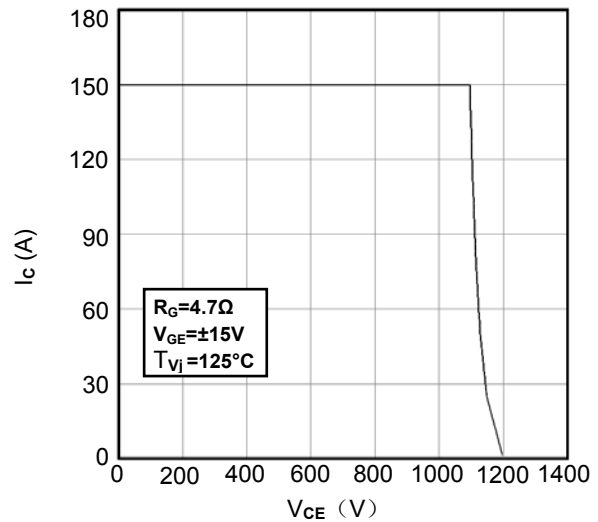


Figure6. Reverse Biased Safe Operating Area IGBT- Brake

**MMG150H160UX6TN**

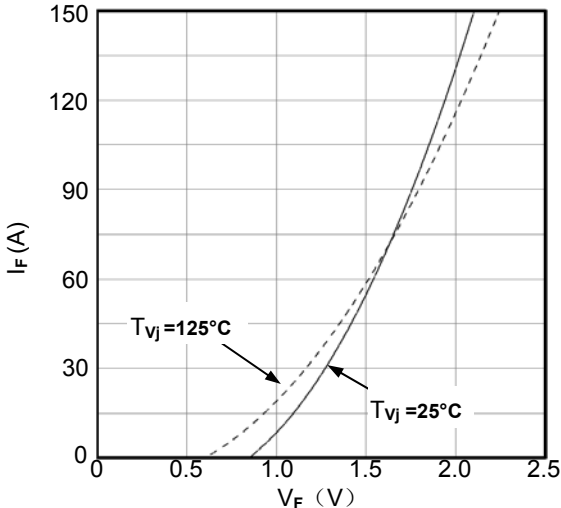


Figure7. Diode Forward Characteristics  
Diode - Brake

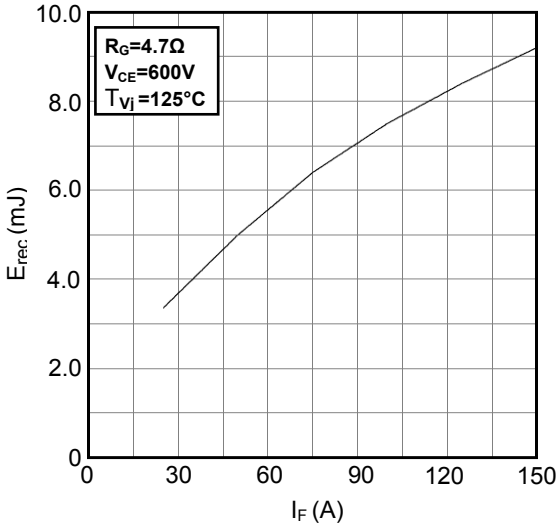


Figure8. Switching Energy vs. Forward Current  
Diode- Brake

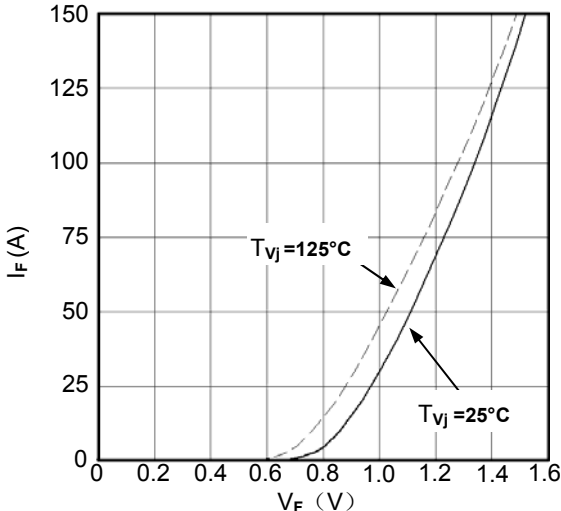


Figure9. Diode Forward Characteristics  
Diode- rectifier

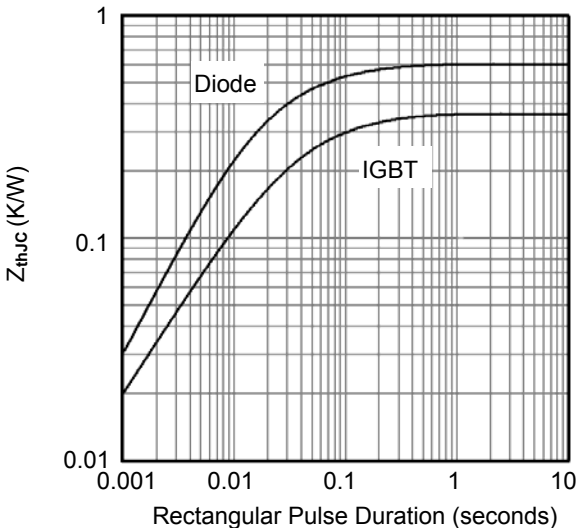


Figure10. Transient Thermal Impedance of  
Diode and IGBT- Brake

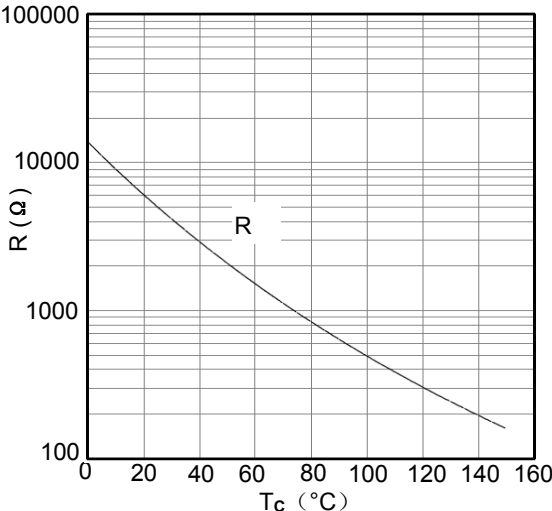


Figure11. NTC Characteristics

