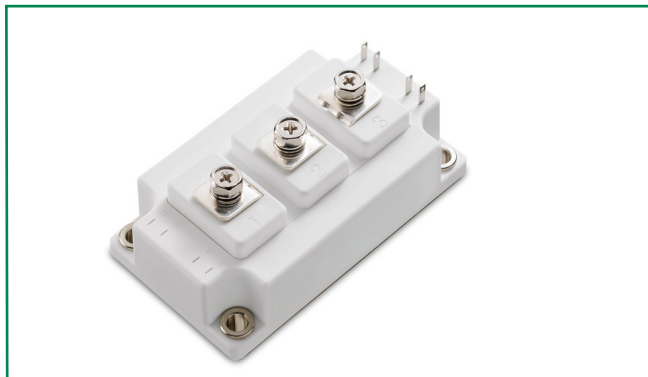


### MG12300D-BA1MM



#### Features

- Ultra low loss
- High ruggedness
- High short circuit capability
- Positive temperature coefficient
- With fast free-wheeling diodes

#### Applications

- Inverter
- Converter
- Welder
- SMPS and UPS
- Induction heating

#### Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E71639

#### Module Characteristics ( $T_c = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
$R_{thJC}$	Junction-to-Case Thermal Resistance	Per IGBT			0.07	K/W
$R_{thJD}$		Per Inverse Diode			0.15	K/W
Torque	Module-to-Sink	Recommended (M6)	3		5	N-m
Torque	Module Electrodes	Recommended (M6)	2.5		5	N-m
Weight				285		g

#### Absolute Maximum Ratings ( $T_c = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
<b>IGBT</b>				
$V_{CES}$	Collector - Emitter Voltage		1200	V
$V_{GES}$	Gate - Emitter Voltage		$\pm 20$	V
$I_c$	DC Collector Current	$T_c=25^\circ\text{C}$	450	A
		$T_c=80^\circ\text{C}$	310	A
$I_{cpuls}$	Pulsed Collector Current	$T_c=25^\circ\text{C}, t_p=1\text{ms}$	900	A
		$T_c=80^\circ\text{C}, t_p=1\text{ms}$	620	
$P_{tot}$	Power Dissipation Per IGBT		1800	W
$T_J$	Junction Temperature Range		-40 to +150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range		-40 to +125	$^\circ\text{C}$
$V_{isol}$	Insulation Test Voltage	AC, $t=1\text{min}$	3000	V
<b>Diode</b>				
$V_{RRM}$	Repetitive Reverse Voltage		1200	V
$I_{F(AV)}$	Average Forward Current	$T_c=25^\circ\text{C}$	380	A
		$T_c=80^\circ\text{C}$	260	A
$I_{F(RMS)}$	RMS Forward Current		380	A
$I_{FSM}$	Non-Repetitive Surge Forward Current	$T_J=45^\circ\text{C}, t=10\text{ms}, \text{Sine}$	2260	A
		$T_J=45^\circ\text{C}, t=8.3\text{ms}, \text{Sine}$	2560	

Life Support Note:

#### Not Intended for Use in Life Support or Life Saving Applications

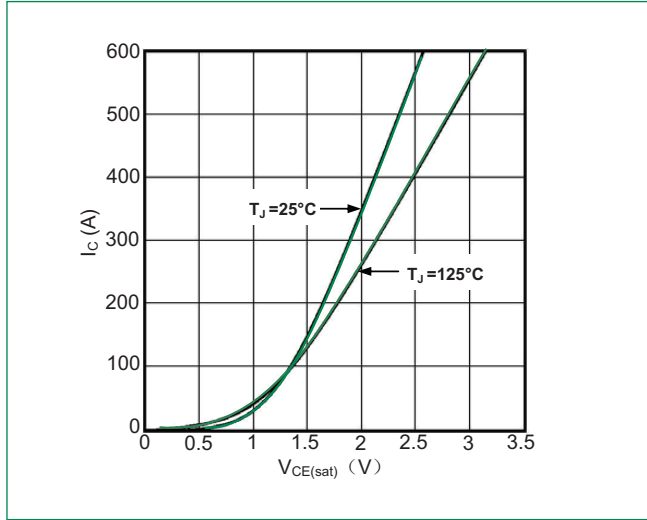
The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

MG12300D-BA1MM

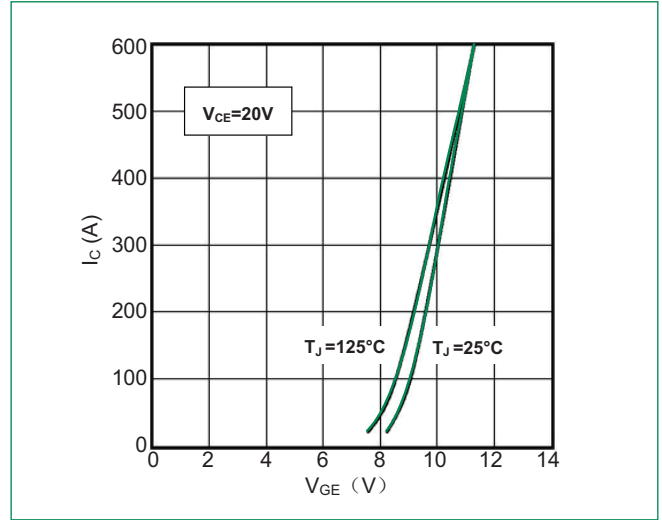
### Electrical and Thermal Specifications ( $T_c = 25^\circ\text{C}$ , unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit	
<b>IGBT</b>							
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=12\text{mA}$	5.0	6.2	7.0	V	
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.9		V	
		$I_C=300\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.1		V	
$I_{CES}$	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		0.4	2	mA	
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		10		mA	
$I_{GES}$	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}$	-400		400	nA	
$Q_{ge}$	Gate Charge	$V_{CC}=600\text{V}, I_C=300\text{A}, V_{GE}=\pm 15\text{V}$		3060		nC	
$C_{ies}$	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		21.2		nF	
$C_{oes}$	Output Capacitance			1.42			
$C_{res}$	Reverse Transfer Capacitance			0.94			
$t_{d(on)}$	Turn - on Delay Time	Inductive Load $V_{CC}=600\text{V}$ $I_C=300\text{A}$ $R_G=3.4\Omega$ $V_{GE}=\pm 15\text{V}$	$T_J=25^\circ\text{C}$		190		ns
			$T_J=125^\circ\text{C}$		220		ns
$t_r$	Rise Time		$T_J=25^\circ\text{C}$		60		ns
			$T_J=125^\circ\text{C}$		60		ns
$t_{d(off)}$	Turn - off Delay Time		$T_J=25^\circ\text{C}$		460		ns
			$T_J=125^\circ\text{C}$		530		ns
$t_f$	Fall Time		$T_J=25^\circ\text{C}$		55		ns
			$T_J=125^\circ\text{C}$		75		ns
$E_{on}$	Turn - on Energy		$T_J=25^\circ\text{C}$		22.4		mJ
			$T_J=125^\circ\text{C}$		33.4		mJ
$E_{off}$	Turn - off Energy	$T_J=25^\circ\text{C}$		19.6		mJ	
		$T_J=125^\circ\text{C}$		30.6		mJ	
<b>Diode</b>							
$V_F$	Forward Voltage	$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		2.0	2.44	V	
		$I_F=300\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.7	2.20	V	
$t_{rr}$	Reverse Recovery Time	$I_F=300\text{A}, V_R=800\text{V}$ $di_F/dt=-1000\text{A}/\mu\text{s}$ $T_J=125^\circ\text{C}$		410		ns	
$I_{RRM}$	Max. Reverse Recovery Current			120		A	
$Q_{rr}$	Reverse Recovery Charge			25		$\mu\text{C}$	

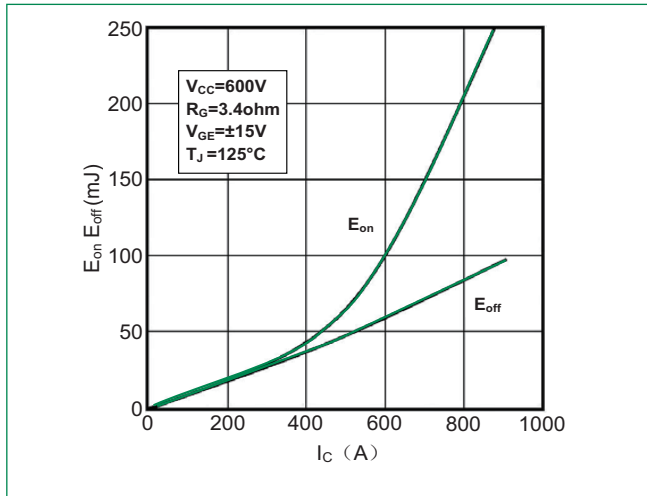
**Figure 1: Typical Output Characteristics**



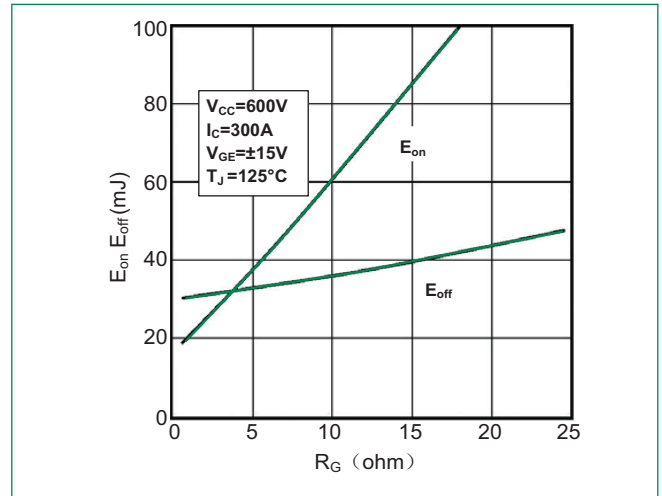
**Figure 2: Typical Transfer characteristics**



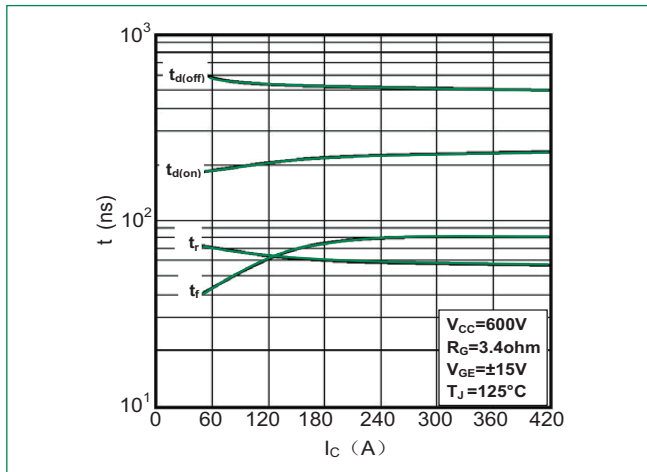
**Figure 3: Switching Energy vs. Collector Current**



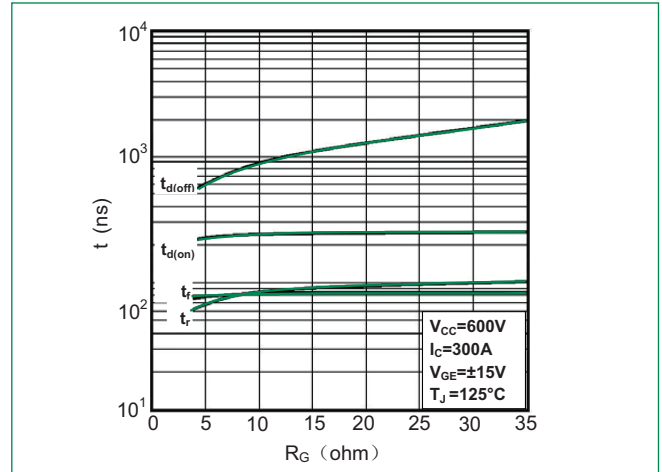
**Figure 4: Switching Energy vs. Gate Resistor**



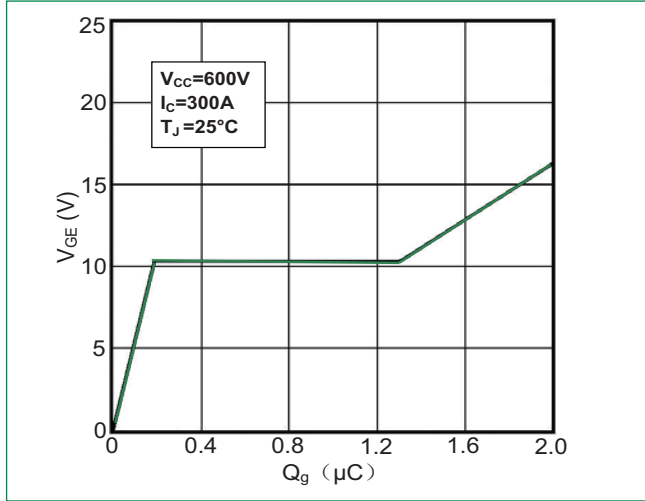
**Figure 5: Switching Times vs. Collector Current**



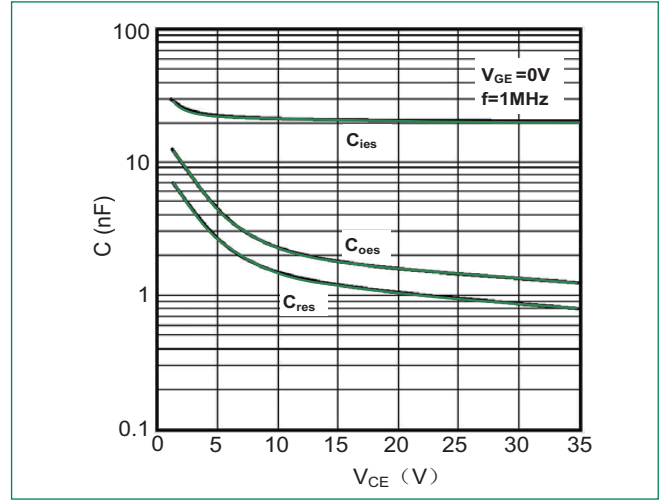
**Figure 6: Switching Times vs. Gate Resistor**



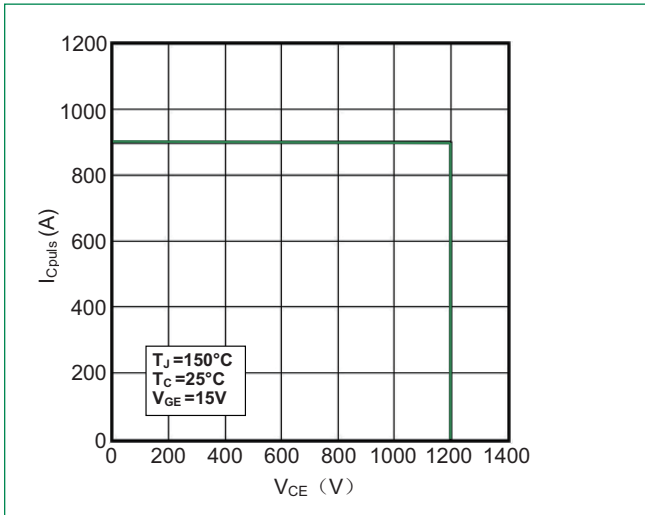
**Figure 7: Gate Charge characteristics**



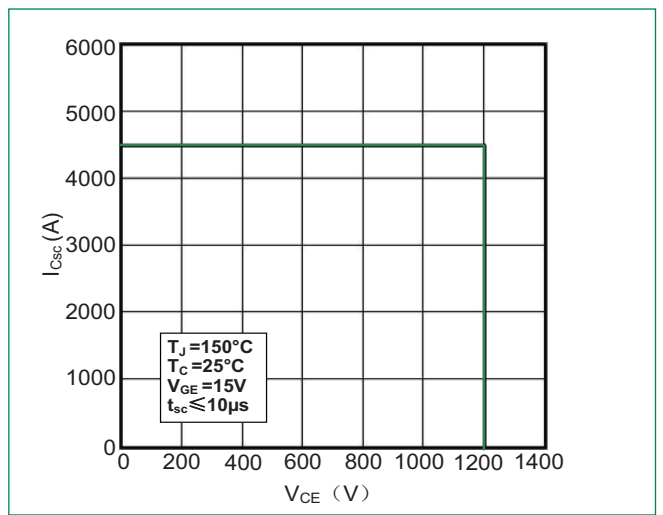
**Figure 8: Typical Capacitances vs.  $V_{CE}$**



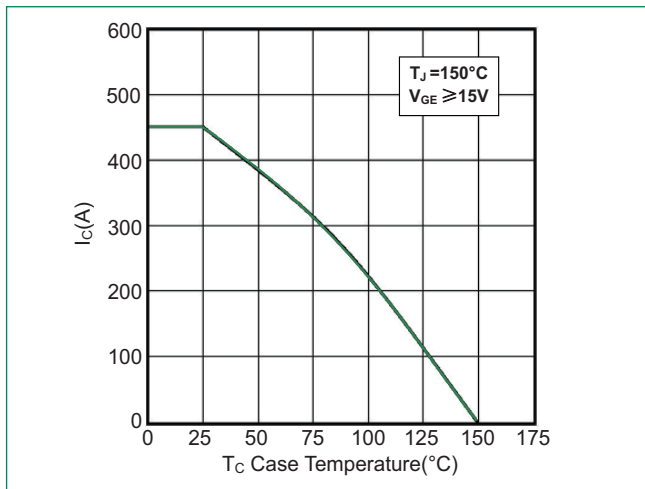
**Figure 9: Reverse Biased Safe Operating Area**



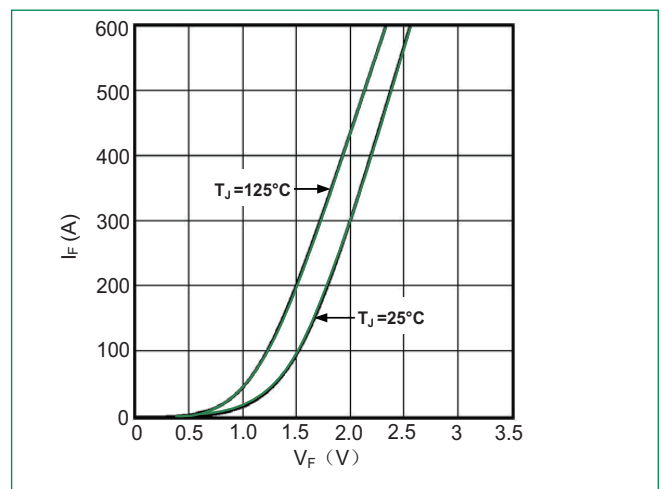
**Figure 10: Short Circuit Safe Operating Area**



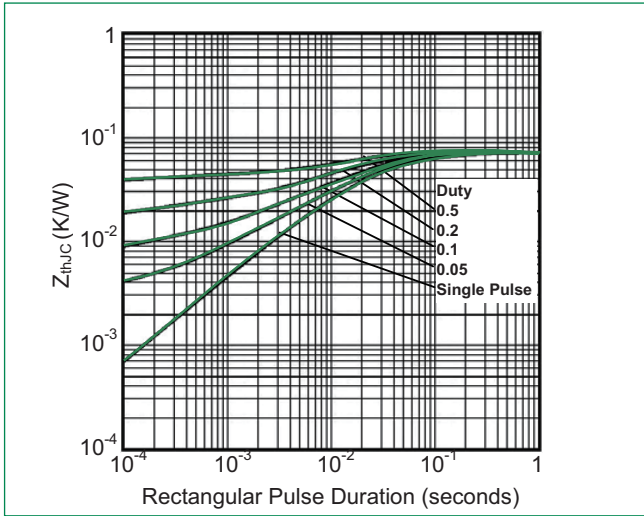
**Figure 11: Rated Current vs.  $T_C$**



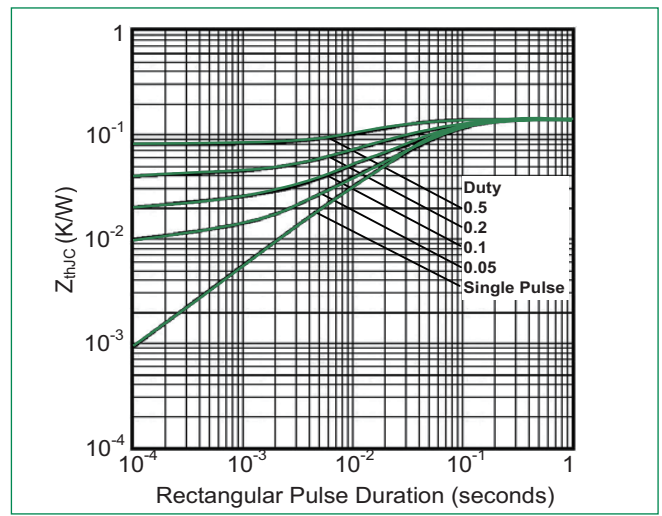
**Figure 12: Diode Forward Characteristics**



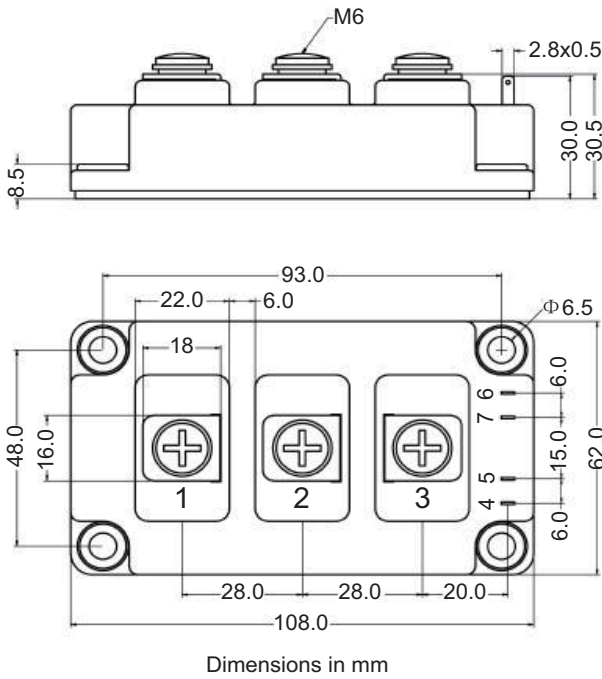
**Figure 13: Transient Thermal Impedance of IGBT**



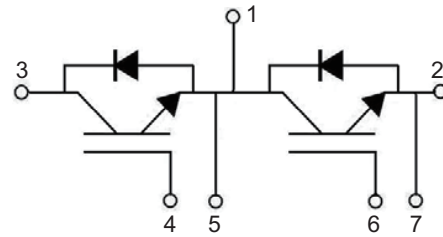
**Figure 14: Transient Thermal Impedance of Diode**



**Dimensions-Package D**



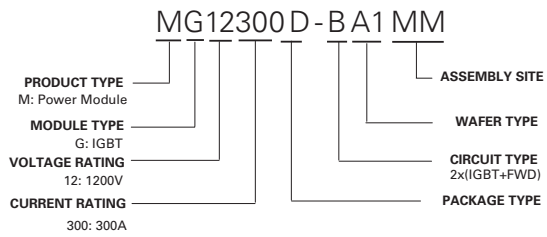
**Circuit Diagram**



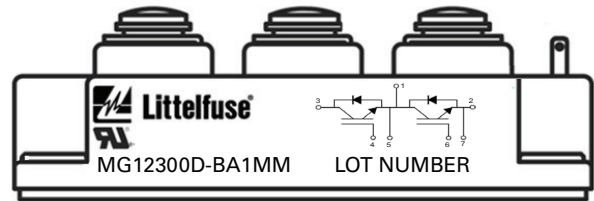
### Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q
MG12300D-BA1MM	MG12300D-BA1MM	285g	Bulk Pack	60

### Part Numbering System



### Part Marking System



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