

**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=1min	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**

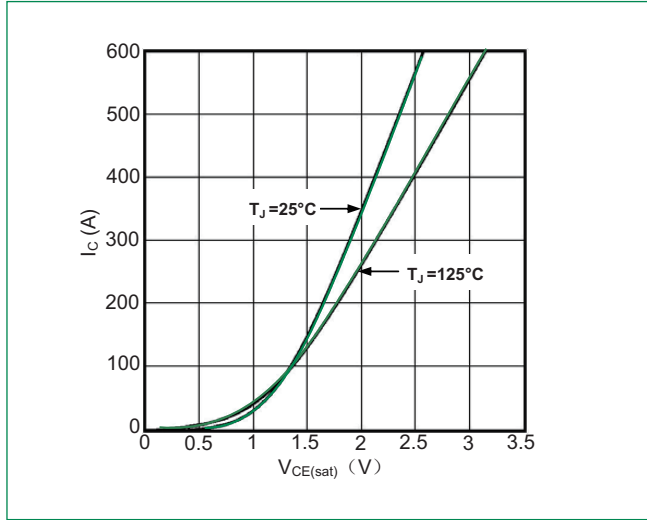
The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

MG12300D-BA1MM

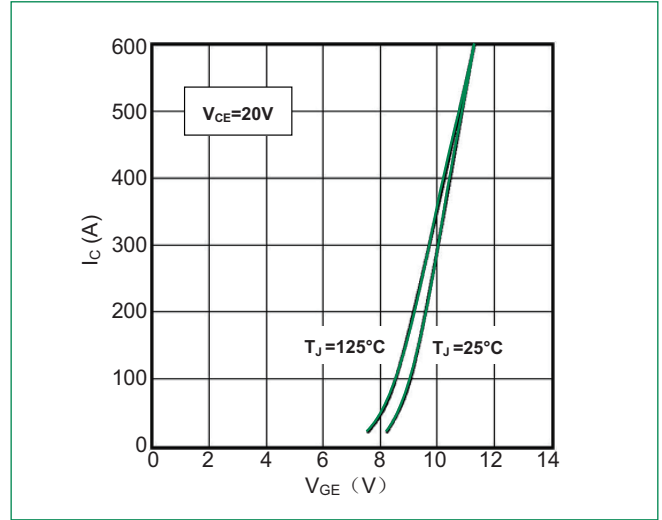
### Electrical and Thermal Specifications ( $T_c = 25^\circ\text{C}$ , unless otherwise specified)

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		$\mu\text{C}$	

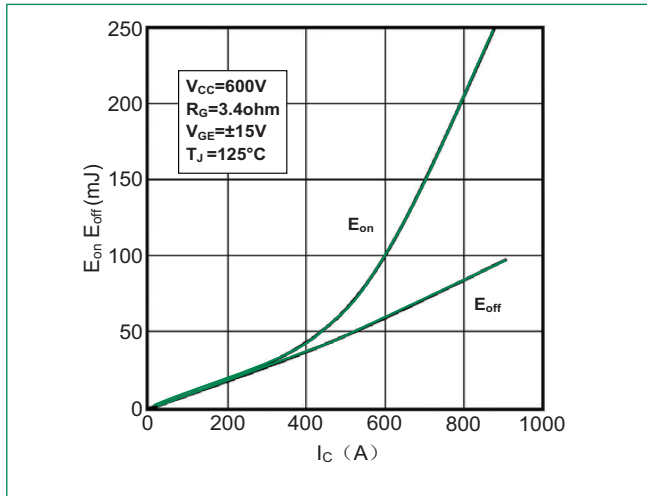
**Figure 1: Typical Output Characteristics**



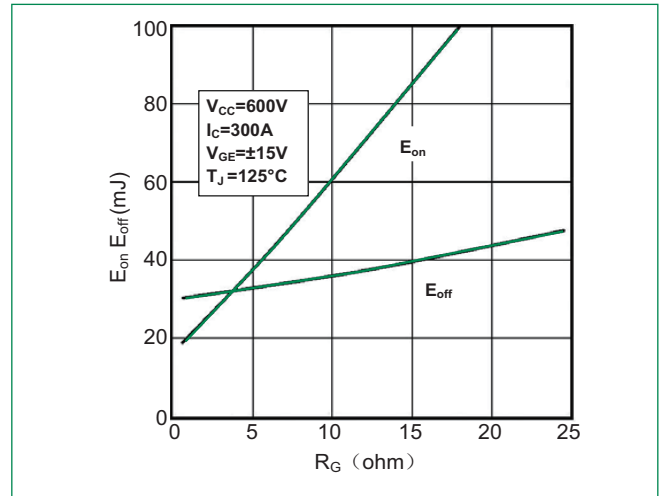
**Figure 2: Typical Transfer characteristics**



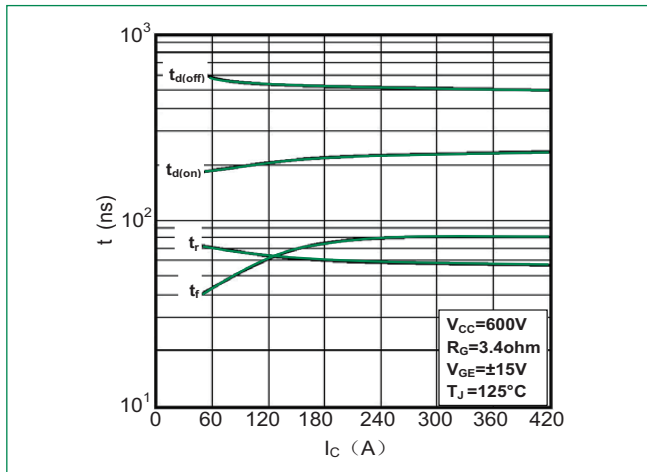
**Figure 3: Switching Energy vs. Collector Current**



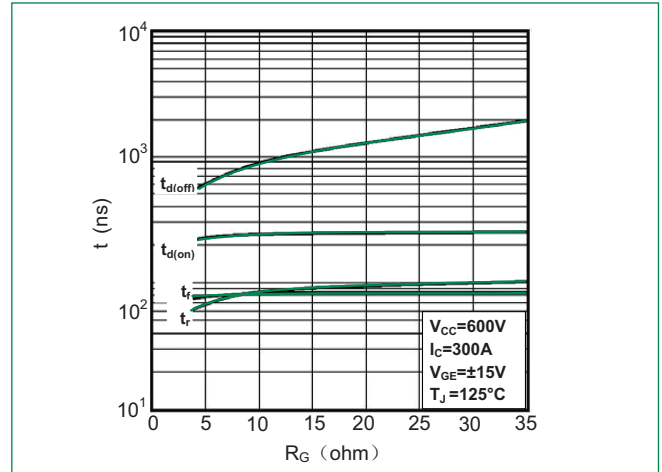
**Figure 4: Switching Energy vs. Gate Resistor**



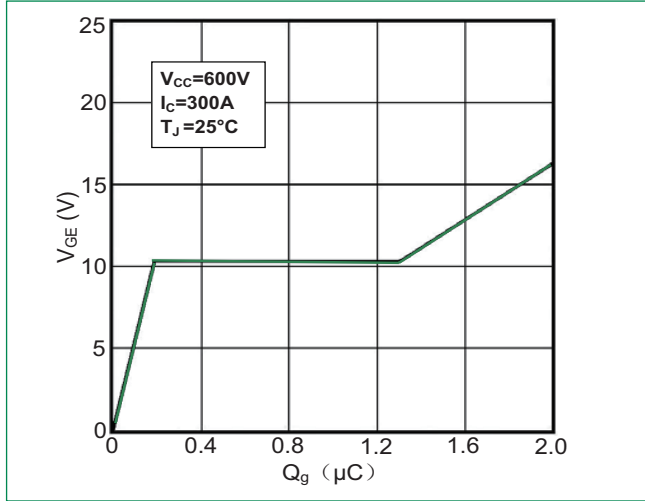
**Figure 5: Switching Times vs. Collector Current**



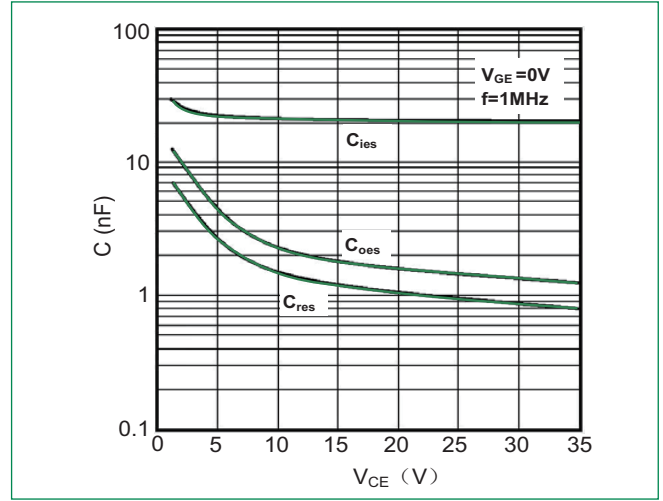
**Figure 6: Switching Times vs. Gate Resistor**



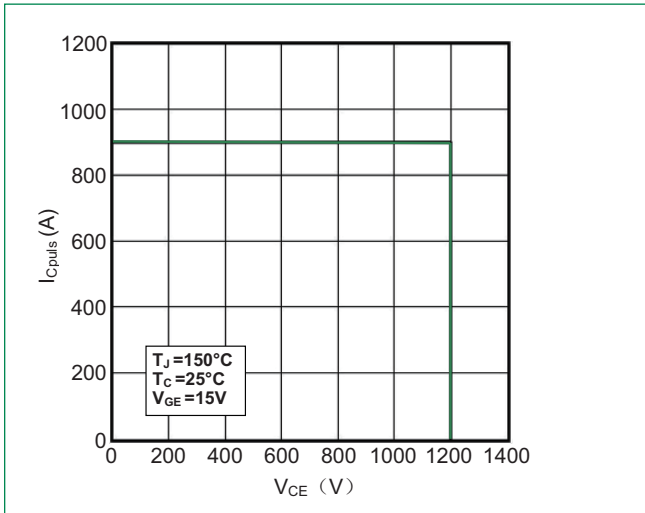
**Figure 7: Gate Charge characteristics**



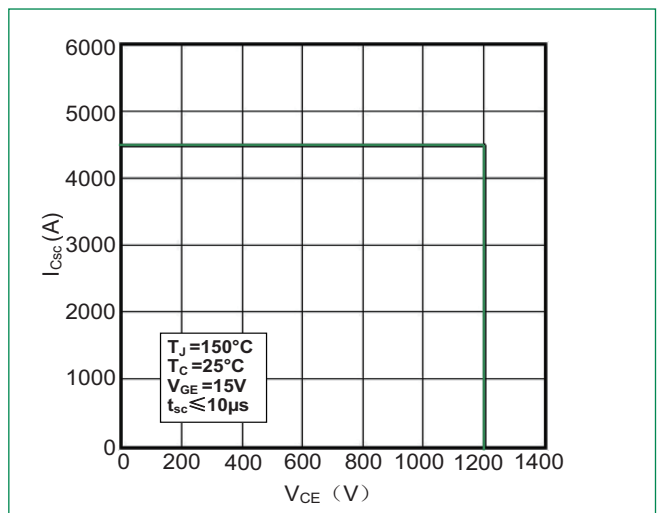
**Figure 8: Typical Capacitances vs.  $V_{CE}$**



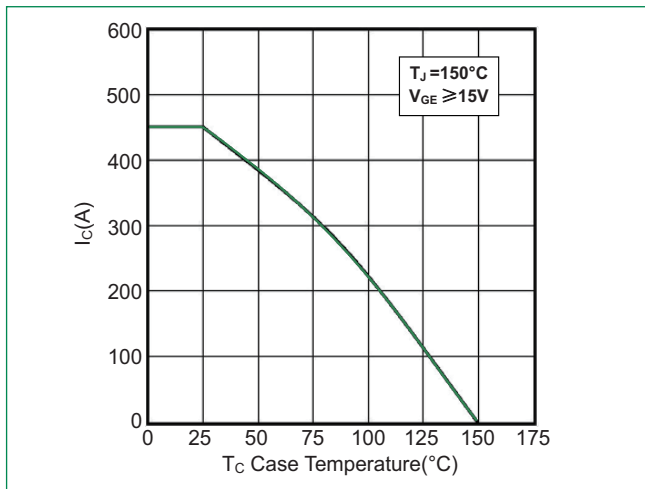
**Figure 9: Reverse Biased Safe Operating Area**



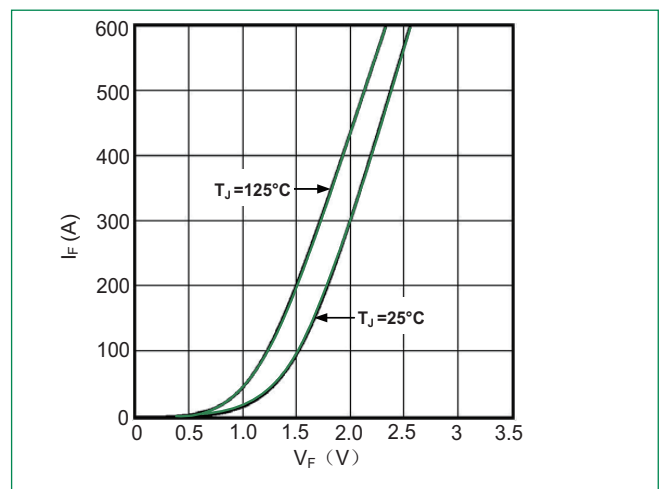
**Figure 10: Short Circuit Safe Operating Area**



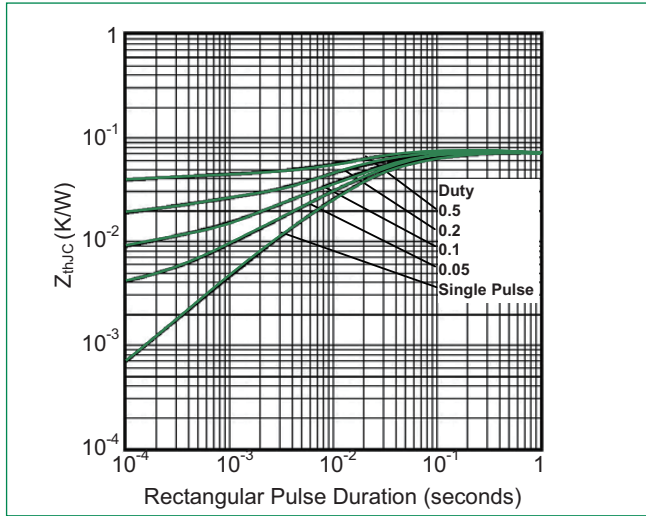
**Figure 11: Rated Current vs.  $T_C$**



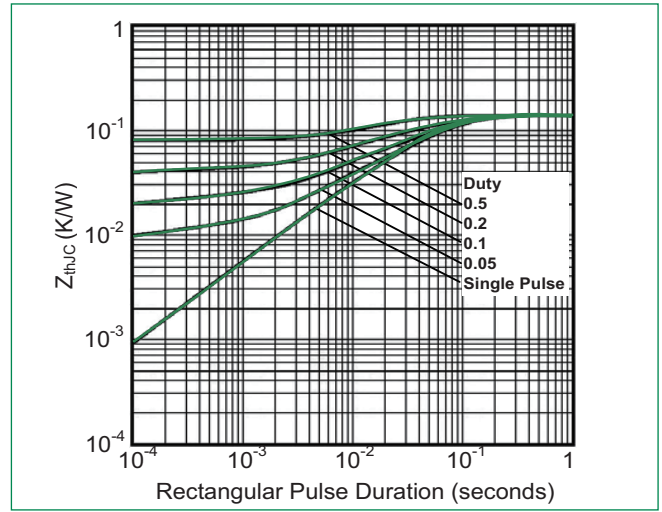
**Figure 12: Diode Forward Characteristics**



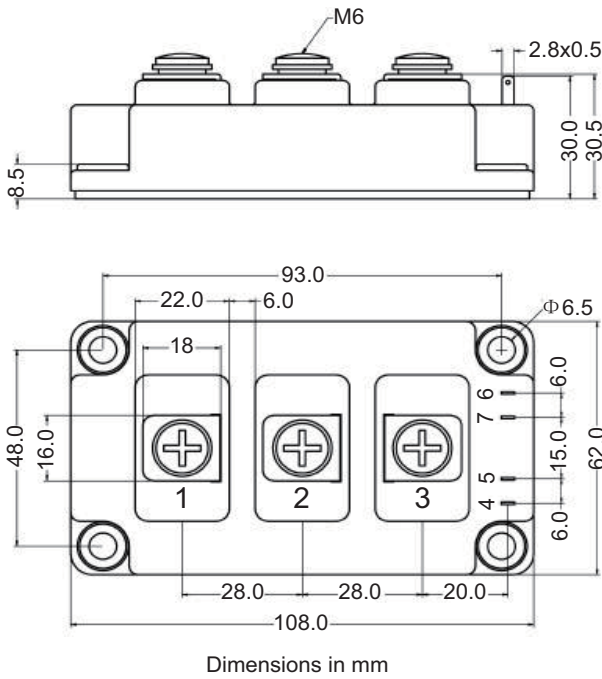
**Figure 13: Transient Thermal Impedance of IGBT**



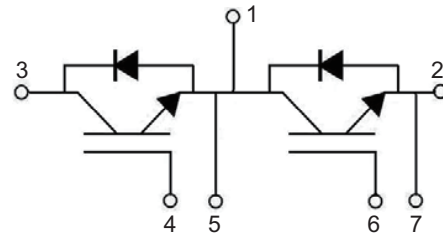
**Figure 14: Transient Thermal Impedance of Diode**



**Dimensions-Package D**



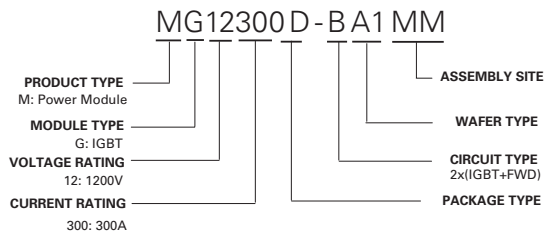
**Circuit Diagram**



### 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

