Littelfuse
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Power Module
1200V IGBT Family

MG12300D-BN2MM Series 300A Dual IGBT

RoHS

Features

- High short circuit capability, self limiting short circuit current
- IGBT³ CHIP(Trench+Field Stop technology)
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses

Applications

- Motor drives
- Inverter
- Converter
- SMPS and UPS
- Welder
- Induction Heating

Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E71639

Module Characteristics (T_c = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
$T_{J\ max)}$	Max. Junction Temperature				150	°C
$T_{J\ op}$	Operating Temperature		-40		125	°C
T_{stg}	Storage Temperature		-40		125	°C
V_{isol}	Insulation Test Voltage	AC, t=1min		3000		V
CTI	Comparative Tracking Index	Module case exposed to 0.1% ammonium chloride solution per UL and IEC standards	350			V
Torque	Module-to-Sink	Recommended (M6)	3		5	N·m
Torque	Module Electrodes	Recommended (M6)	2.5		5	N·m
Weight				320		g

Absolute Maximum Ratings (T_c = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	T_J=25°C	1200	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	480	A
		T_C=80°C	300	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	600	A
P_{tot}	Power Dissipation Per IGBT		1450	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_J=25°C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	480	A
		T_C=80°C	300	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	600	A
I^2t		T_J =125°C, t=10ms, V_R=0V	18000	A^2s

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.

Electrical and Thermal Specifications (T_C = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions		Min	Typ	Max	Unit
IGBT							
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}$, I_C=12mA		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C=300A, V_{GE}=15V, T_J=25°C			1.7		V
		I_C=300A, V_{GE}=15V, T_J=125°C			1.9		V
I_{CES}	Collector Leakage Current	V_{CE}=1200V, V_{GE}=0V, T_J=25°C				1	mA
		V_{CE}=1200V, V_{GE}=0V, T_J=125°C				5	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=125°C		-400		400	μA
R_{Gint}	Intergrated Gate Resistor				2.5		Ω
Q_{ge}	Gate Charge	V_{CE}=600V, I_C=300A , V_{GE}=±15V			2.8		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			21		nF
C_{res}	Reverse Transfer Capacitance				0.85		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=600V I_C=300A R_G =2.4Ω V_{GE}=±15V Inductive Load	T_J =25°C		160		ns
			T_J =125°C		170		ns
t_r	Rise Time		T_J =25°C		40		ns
			T_J =125°C		45		ns
$t_{d(off)}$	Turn - off Delay Time		T_J =25°C		450		ns
			T_J =125°C		520		ns
t_f	Fall Time		T_J =25°C		100		ns
			T_J =125°C		160		ns
E_{on}	Turn - on Energy		T_J =25°C		16.5		mJ
			T_J =125°C		25		mJ
E_{off}	Turn - off Energy		T_J =25°C		24.5		mJ
			T_J =125°C		37		mJ
I_{SC}	Short Circuit Current	t_{psc}≤10μS , V_{GE}=15V			1200		A
		T_J=125°C,V_{CC}=900V					
R_{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)					0.085	K/W
Diode							
V_F	Forward Voltage	I_F=300A , V_{GE}=0V, T_J =25°C			1.65		V
		I_F=300A , V_{GE}=0V, T_J =125°C			1.65		V
I_{RRM}	Max. Reverse Recovery Current	I_F=300A , V_R=600V d_{iF}/dt=-6000A/μs T_J=125°C			270		A
Q_{rr}	Reverse Recovery Charge				56		μC
E_{rec}	Reverse Recovery Energy				26		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				0.15		K/W

Figure 1: Typical Output Characteristics

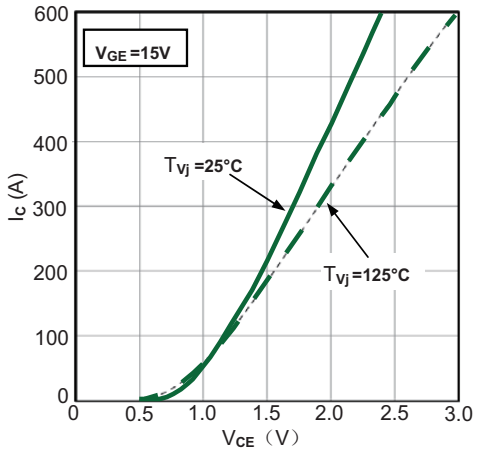


Figure 2: Typical Output Characteristics

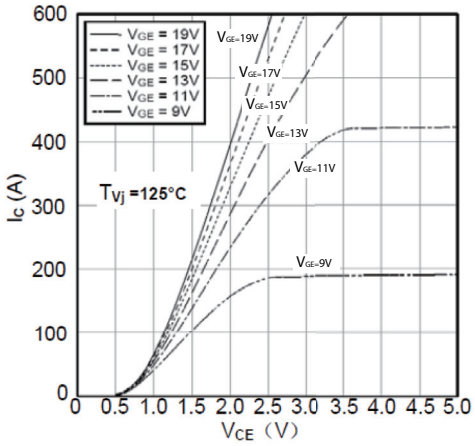


Figure 3: Typical Transfer characteristics

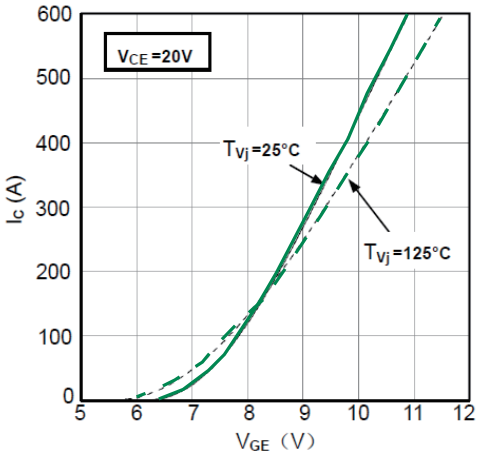


Figure 4: Switching Energy vs. Gate Resistor

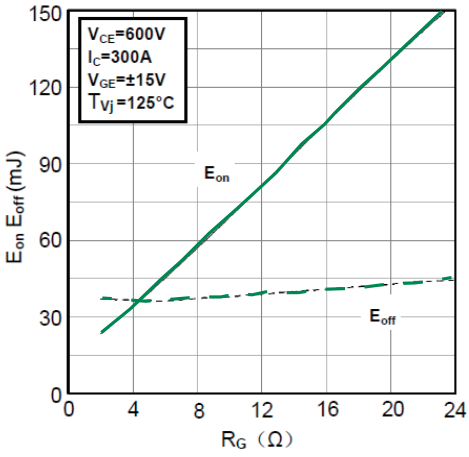


Figure 5: Switching Energy vs. Collector Current

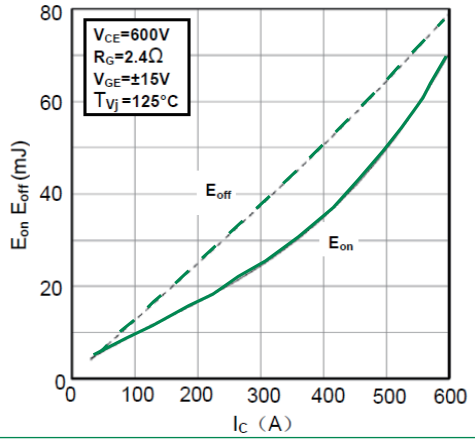


Figure 6: Reverse Biased Safe Operating Area

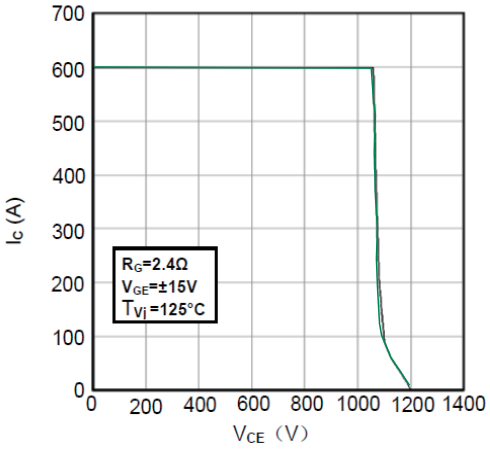


Figure 7: Diode Forward Characteristics

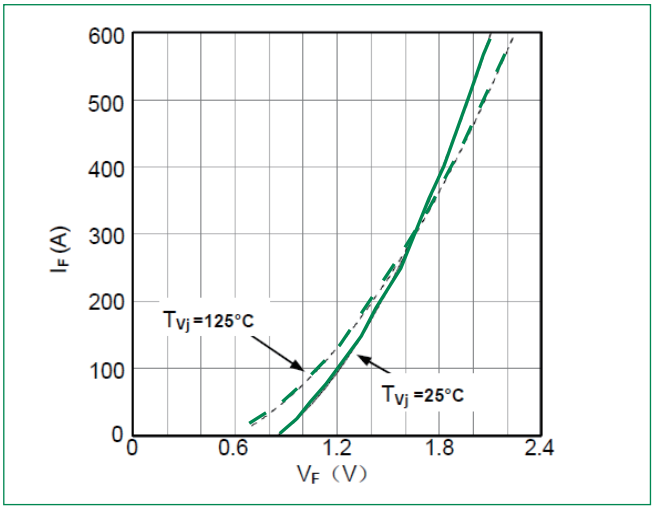


Figure 8: Switching Energy vs. Gate Resistort

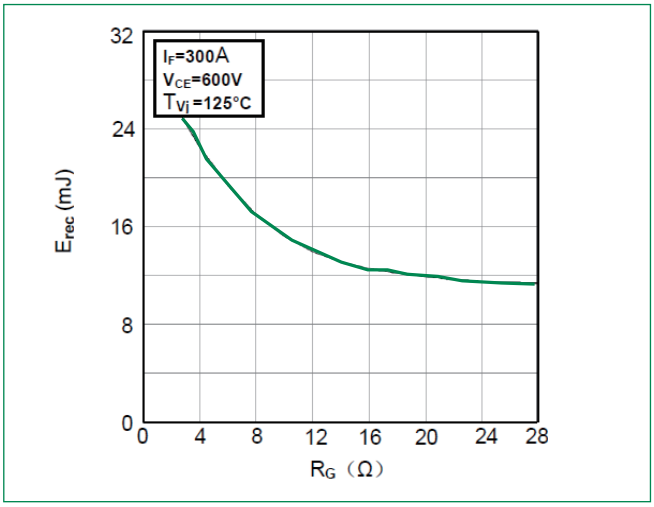


Figure 9: Switching Energy vs. Forward Current

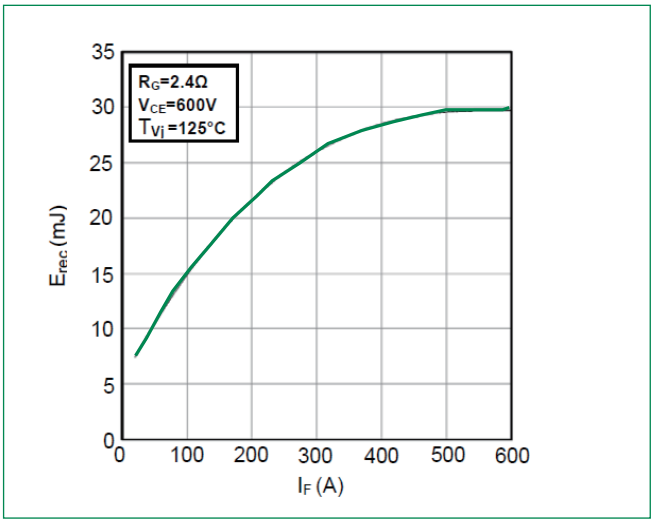
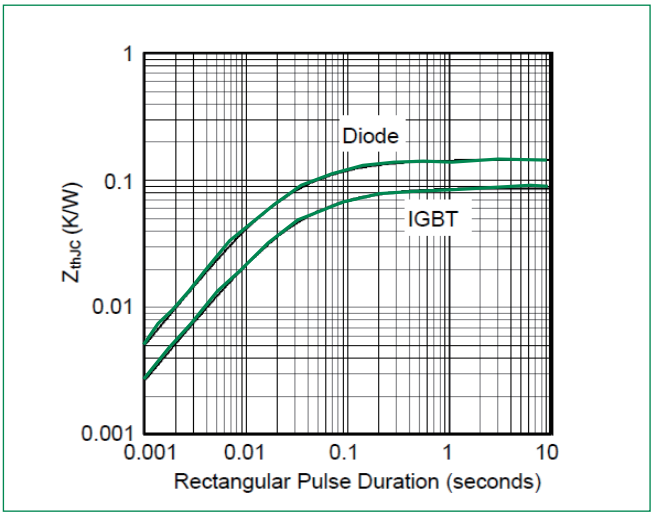
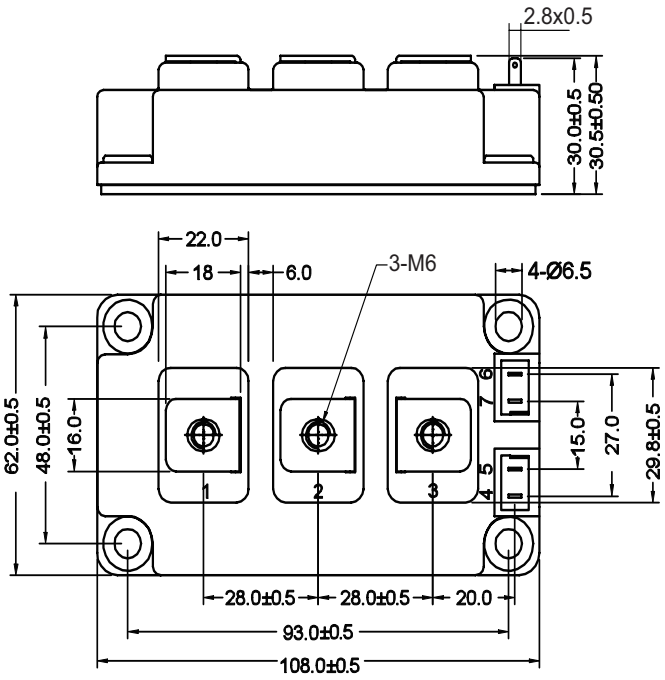


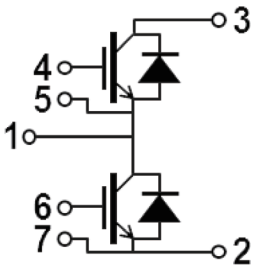
Figure 10: Transient Thermal Impedance

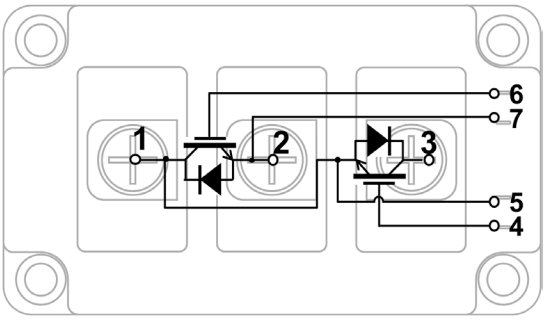


Dimensions-Package D



Circuit Diagram and Pin Assignment

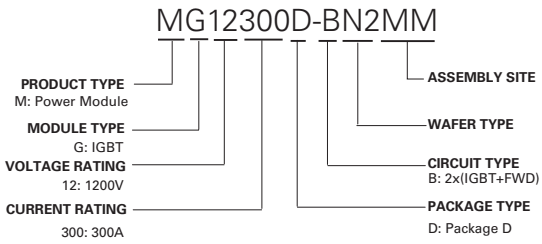




Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q
MG12300D-BN2MM	MG12300D-BN2MM	320g	Bulk Pack	60

Part Numbering System



Part Marking System