Littelfuse
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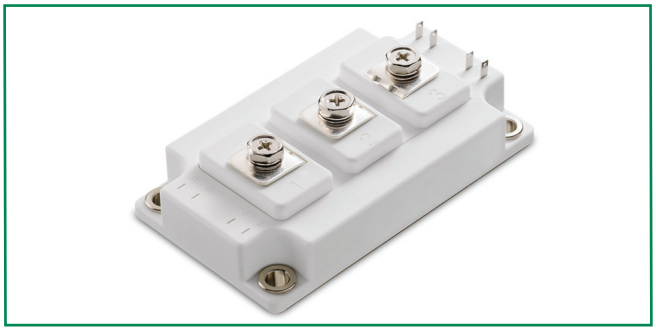
Power Module
600V IGBT Family

MG06400D-BN1MM Series 400A Dual IGBT

RoHS



Features

- Ultra low loss
- High ruggedness
- High short circuit capability
- Positive temperature coefficient

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		150	°C
T_{STG}	Storage Temperature Range		-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
R_{thJC}	Junction-to-Case Thermal Resistance	Per IGBT			0.09	K/W
R_{thJCD}	Junction-to-Case Thermal Resistance	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				310		g

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

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage		600	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	460	A
		T_C=50°C	400	A
I_{Cpuls}	Pulsed Collector Current	T_C=25°C, t_p=1ms	920	A
		T_C=50°C, t_p=1ms	800	A
P_{tot}	Power Dissipation Per IGBT		1400	W
Free-Wheeling Diode				
V_{RRM}	Repetitive Reverse Voltage		600	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	400	A
		T_C=50°C	320	A
$I_{F(RMS)}$	RMS Forward Current		570	A
I_{FSM}	Non-Repetitive Surge Forward Current	T_J=45°C, t=10ms, Sine	1200	A
		T_J=45°C, t=8.3ms, Sine	1320	A

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 Characteristics (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=8mA		4.5	5.5	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_c=400A, V_{GE}=15V, T_J=25°C			1.95	2.45	V
		I_C=400A, V_{GE}=15V, T_J=125°C			2.2		V
I_{CES}	Collector Leakage Current	V_{CE}=600V, V_{GE}=0V, T_J=25°C				1	mA
		V_{CE}=600V, V_{GE}=0V, T_J=125°C			2		mA
I_{GES}	Gate Leakage Current	V_{CE}=0V, V_{GE}=±20V		1.2		1.2	μA
R_{Gint}	Intergrated Gate Resistor				2.5		Ω
Q_{ge}	Gate Charge	V_{CE}=300V, I_C=400A , V_{GE}=±15V			1.8		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			18		nF
C_{oes}	Output Capacitance				1.8		nF
C_{res}	Reverse Transfer Capacitance				1.6		nF
$t_{d(on)}$	Turn - on Delay Time	V_{CC}=300V I_C=400A R_G =3Ω V_{GE}=±15V Inductive Load	T_J =25°C		195		ns
			T_J =125°C		220		ns
t_r	Rise Time		T_J =25°C		65		ns
			T_J=125°C		80		ns
$t_{d(off)}$	Turn - off Delay Time		T_J =25°C		295		ns
			T_J =125°C		350		ns
t_f	Fall Time		T_J =25°C		45		ns
			T_J=125°C		60		ns
E_{on}	Turn - on Energy		T_J =25°C		6.5		mJ
			T_J =125°C		10		mJ
E_{off}	Turn - off Energy		T_J =25°C		9.5		mJ
			T_J=125°C		14.5		mJ
Free-Wheeling Diode							
V_F	Forward Voltage	I_F=400A , V_{GE}=0V,T_J =25°C			1.25	1.6	V
		I_F=400A , V_{GE}=0V, T_J =125°C			1.2		V
T_{rr}	Reverse Recovery Time	I_F=400A , V_R=300V d_{iF}/dt=-2000A/μs T_J =125°C			249		ns
I_{RRM}	Reverse Recovery Charge				214		A
Q_{rr}	Reverse Recovery Charge				31		μC

Figure 1: Typical Output Characteristics

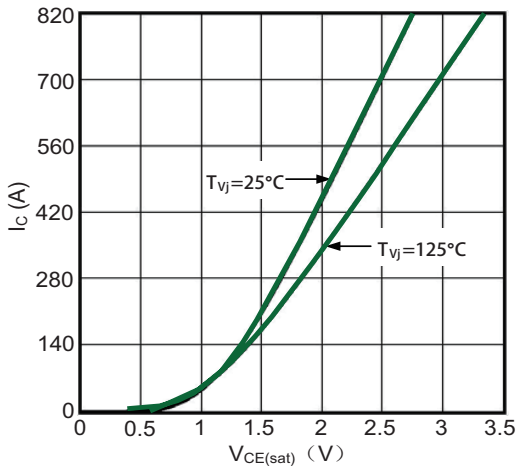


Figure 2: Typical Transfer Characteristics

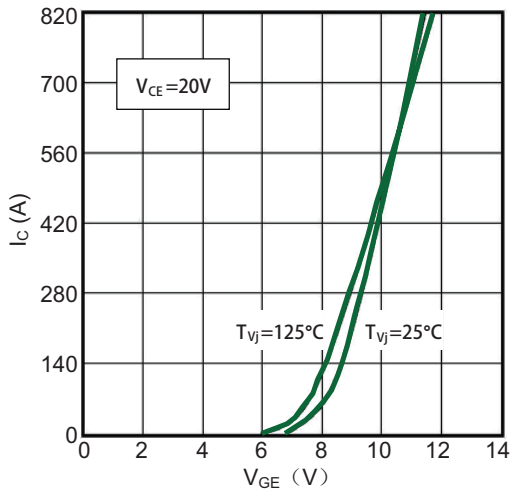


Figure 3: Switching Energy vs. Collector Current

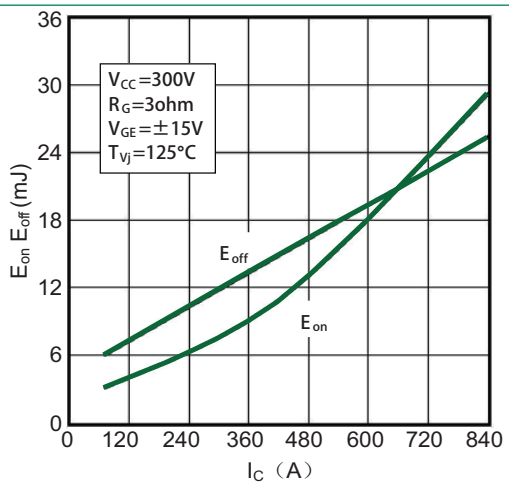


Figure 4: Switching Energy vs. Gate Resistor

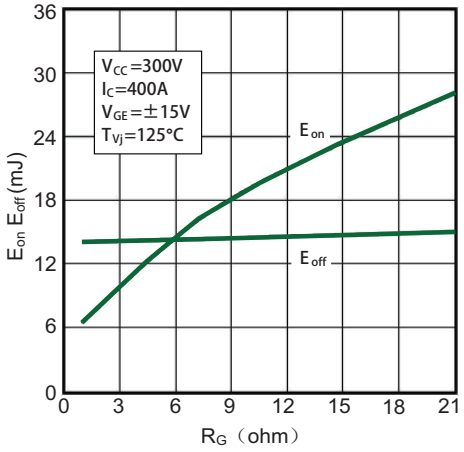


Figure 5: Switching Times vs. Collector Current

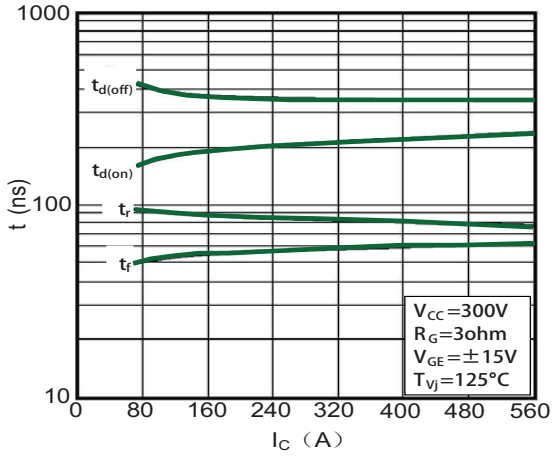


Figure 6: Switching Times vs. Gate Resistor

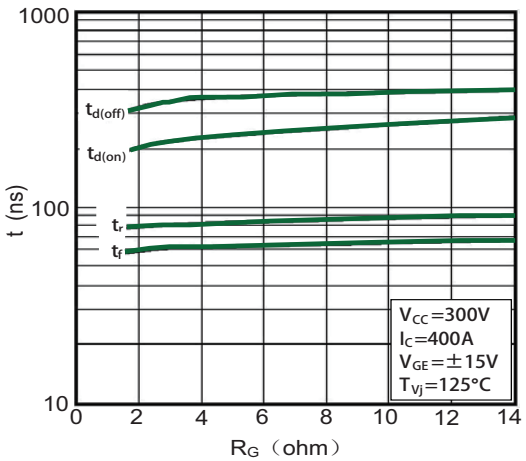


Figure 7: Diode Forward Characteristics

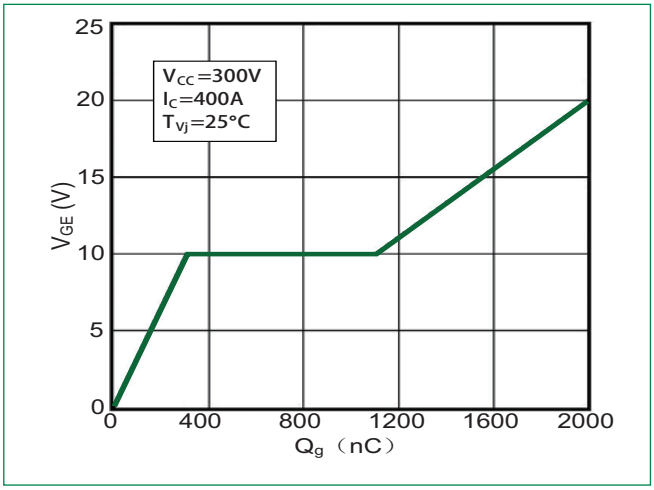


Figure 8: Typical Capacitances vs. V_{CE}

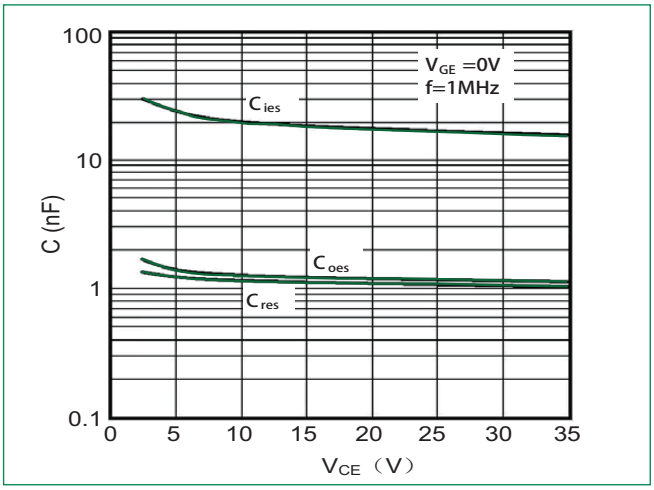


Figure 9: Reverse Biased Safe Operating Area

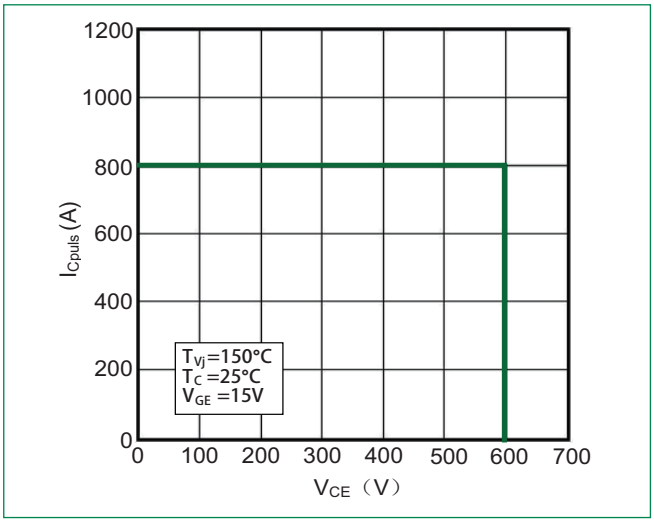


Figure 10: Short Circuit Safe Operating Area

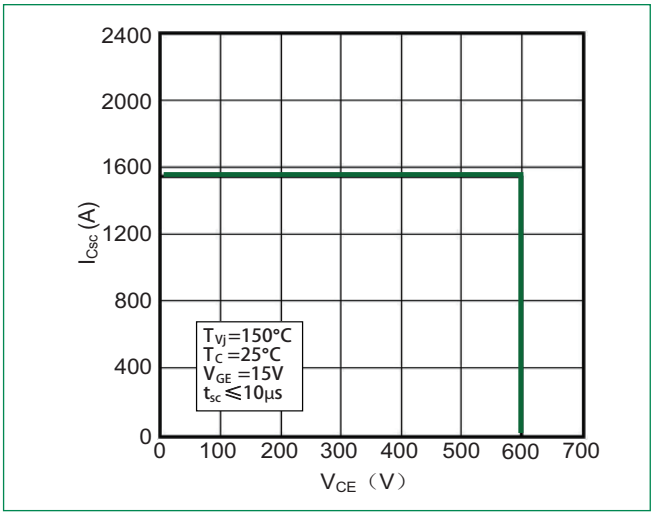


Figure 11: Rated Current vs. T_c

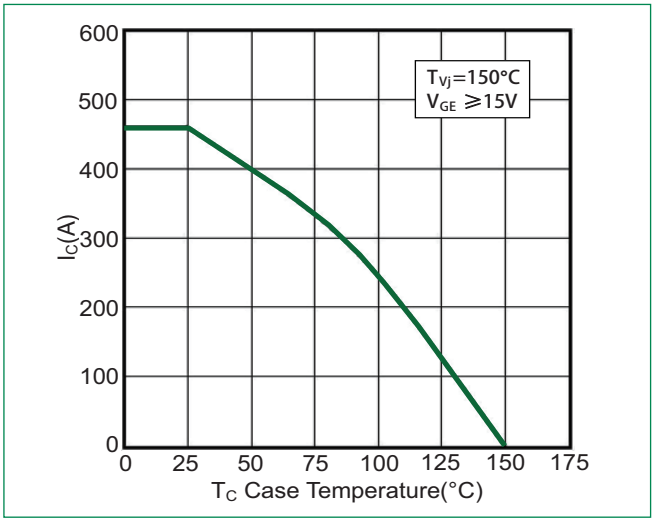


Figure12: Diode Forward Characteristics

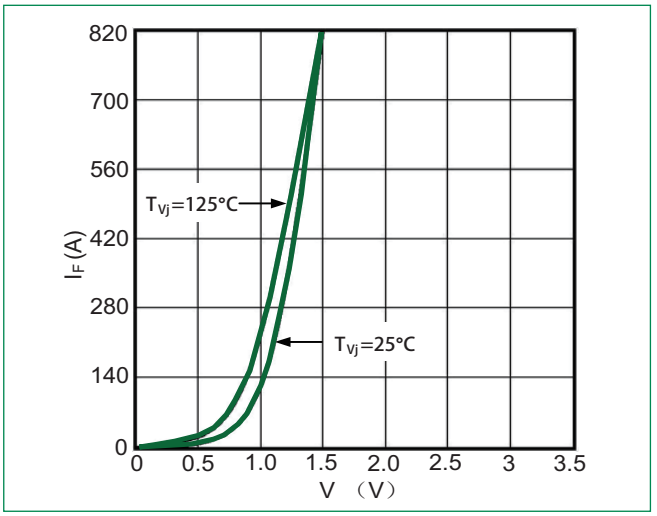


Figure 13: Transient Thermal Impedance of IGBT

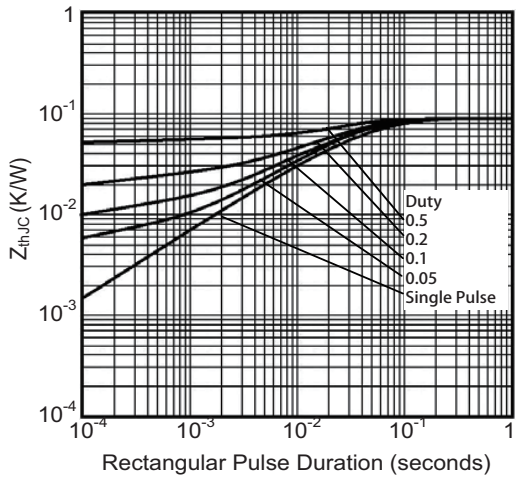
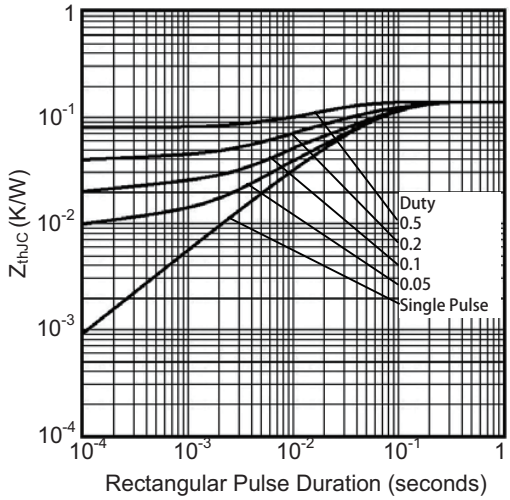
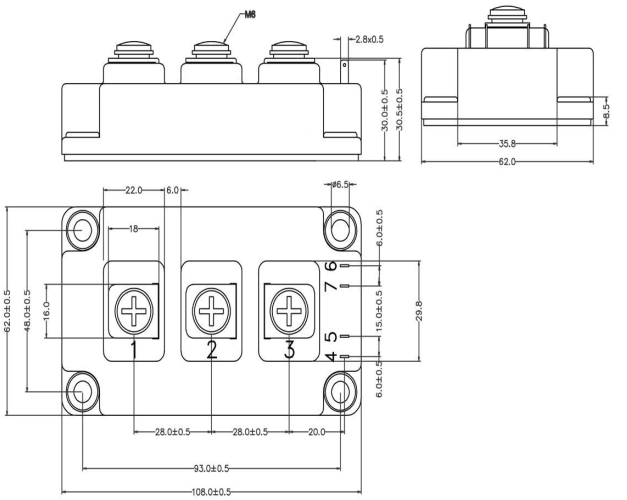


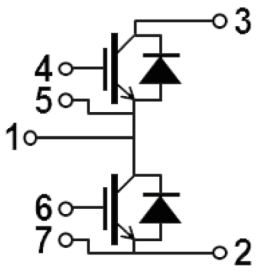
Figure 14: Transient Thermal Impedance of Diode

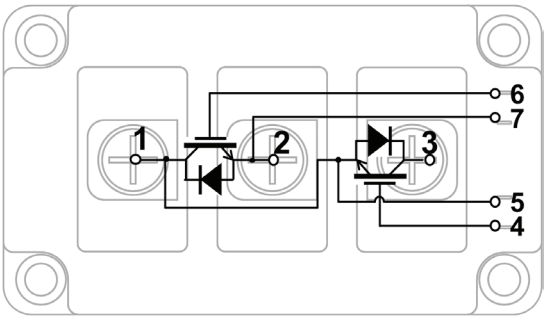


Dimensions-Package D



Circuit Diagram and Pin Assignment

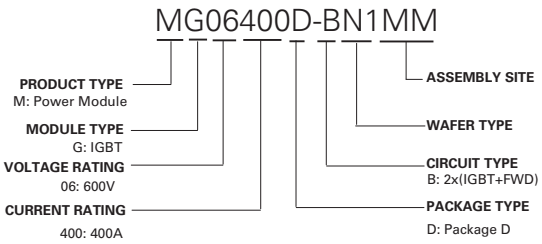




Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q
MG06400D-BN1MM	MG06400D-BN1MM	310g	Bulk Pack	60

Part Numbering System



Part Marking System