Littelfuse
Expertise Applied | Answers Delivered

IGBT Power Module
1200 V 150 A in AC Switch Configuration

MG12150S-DEN2MM

RoHS

Features

- High short circuit capability, self limiting short circuit current
- IGBT technology with trench gate and field stop architecture
- Low $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Low switching losses

Applications

- Bidirectional switching in:
  - UPS
  - Solar energy systems
  - Motor control

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 = 1 min		3000		V
Torque	Module-to-Sink	Recommended (M6)	3		5	N·m
Torque	Module Electrodes	Recommended (M5)	2.5		5	N·m
Weight				160		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	200	A
		T_C = 80 °C	150	A
I_{CM}	Repetitive Peak Collector Current	t_p = 1 ms	300	A
P_{tot}	Power Dissipation Per IGBT		625	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_J = 25 °C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C = 25 °C	200	A
		T_C = 80 °C	150	A
I_{FRM}	Repetitive Peak Forward Current	t_p = 1 ms	300	A
I^2t		T_J = 125 °C, t = 10 ms, V_R = 0 V	4350	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.

Revised:06/30/16

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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 = 6 mA		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	I_C = 150 A, V_{GE} = 15 V, T_J = 25 °C			1.7		V
		I_C = 150 A, V_{GE} = 15 V, T_J = 125 °C			1.9		V
I_{CES}	Collector Leakage Current	V_{CE} = 1200 V, V_{GE} = 0 V, T_J = 25 °C				1	mA
		V_{CE} = 1200 V, V_{GE} = 0 V, T_J = 125 °C				5	mA
I_{GES}	Gate Leakage Current	V_{CE} = 0 V, V_{GE} = ±15 V, T_J = 125 °C		-400		400	nA
R_{Gint}	Integrated Gate Resistor				5		Ω
Q_{ge}	Gate Charge	V_{CC} = 600 V, I_C = 150 A , V_{GE} = ±15 V			1.4		µC
C_{ies}	Input Capacitance	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz			10.5		nF
C_{res}	Reverse Transfer Capacitance				0.4		nF
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600 V I_C = 150 A R_G = 2.4 Ω V_{GE} = ±15 V Inductive Load	T_J = 25 °C		260		ns
			T_J = 125 °C		290		ns
t_r	Rise Time		T_J = 25 °C		30		ns
			T_J = 125 °C		50		ns
$t_{d(off)}$	Turn-off Delay Time		T_J = 25 °C		420		ns
			T_J = 125 °C		520		ns
t_f	Fall Time		T_J = 25 °C		70		ns
			T_J = 125 °C		90		ns
E_{on}	Turn-on Energy		T_J = 25 °C		12		mJ
			T_J = 125 °C		16		mJ
E_{off}	Turn-off Energy		T_J = 25 °C		11		mJ
			T_J = 125 °C		14.5		mJ
I_{SC}	Short Circuit Current	t_{psc}≤10 µS , V_{GE} = 15 V; T_J = 125 °C, V_{CC} = 900 V			600		A
R_{thJC}	Junction-to-Case Thermal Resistance **(Per IGBT)**					0.2	K/W
Diode							
V_F	Forward Voltage	I_F = 150 A , V_{GE}= 0 V, T_J =25 °C			1.65		V
		I_F = 150 A , V_G =0 V, T_J =125 °C			1.65		V
I_{RRM}	Max. Reverse Recovery Current	I_F =150 A , V_R = 600 V di_F/dt = -4000 A/µs T_J = 125 °C			210		A
Q_{rr}	Reverse Recovery Charge				30.0		µC
E_{rec}	Reverse Recovery Energy				13		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance **(Per Diode)**					0.36	K/W

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Figure 1: Typical Output Characteristics

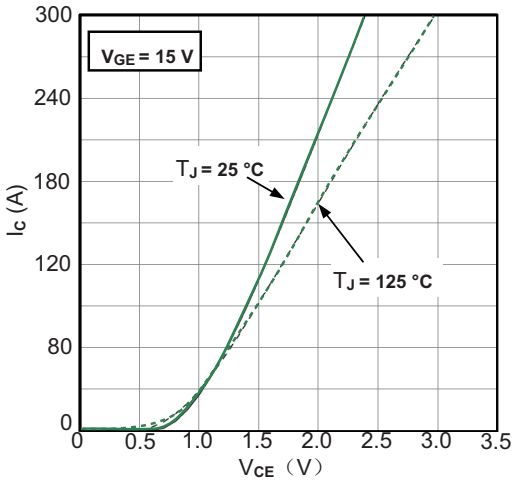

Figure 2: Typical Output characteristics

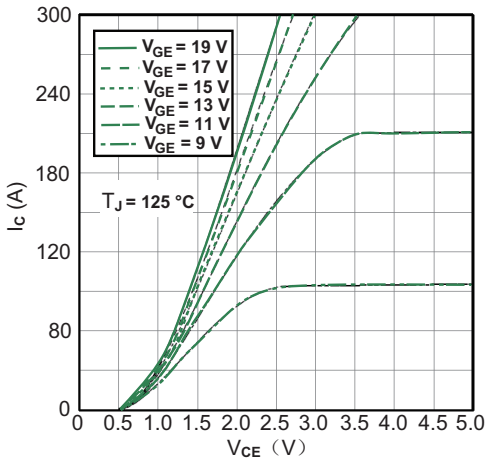

Figure 3: Typical Transfer characteristics

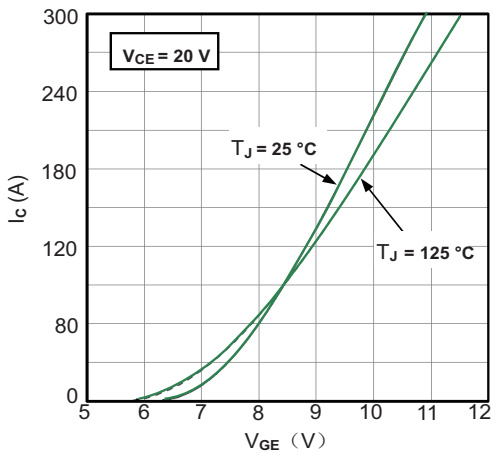

Figure 4: Switching Energy vs. Gate Resistor

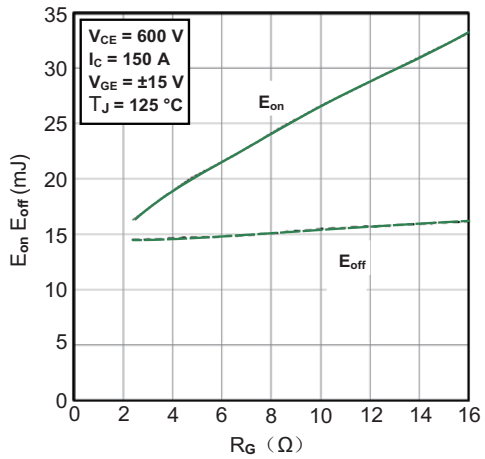

Figure 5: Switching Energy vs. Collector Current

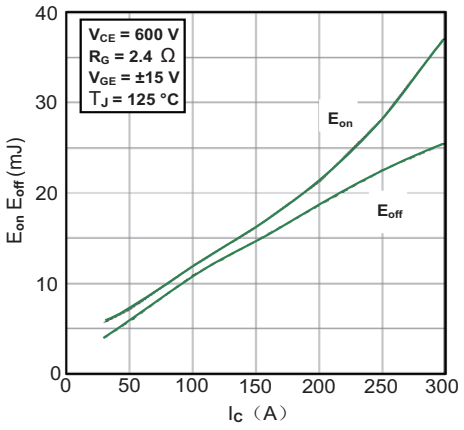

Figure 6: Reverse Biased Safe Operating Area

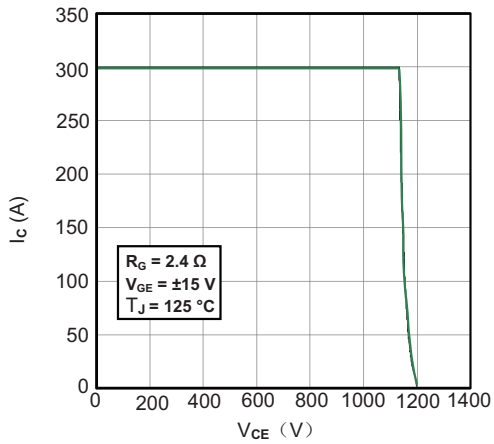

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Figure 7: Diode Forward Characteristics

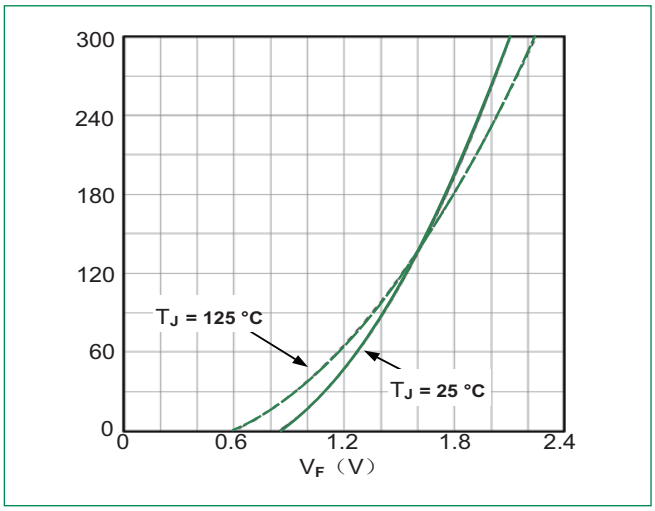


Figure 8: Switching Energy vs. Gate Resistor

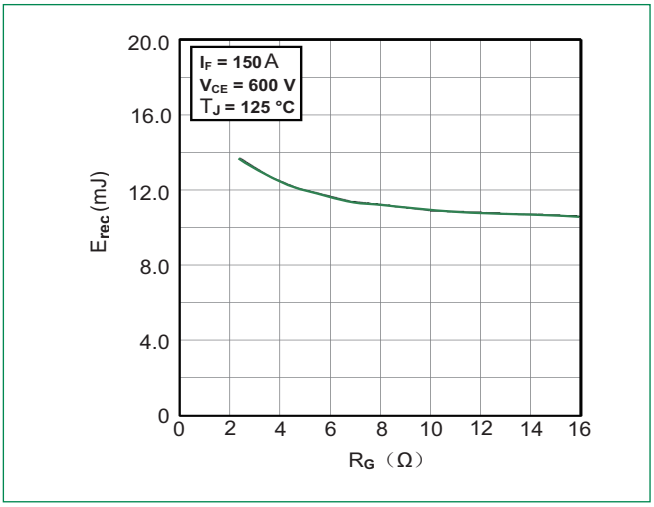


Figure 9: Switching Energy vs. Forward Current

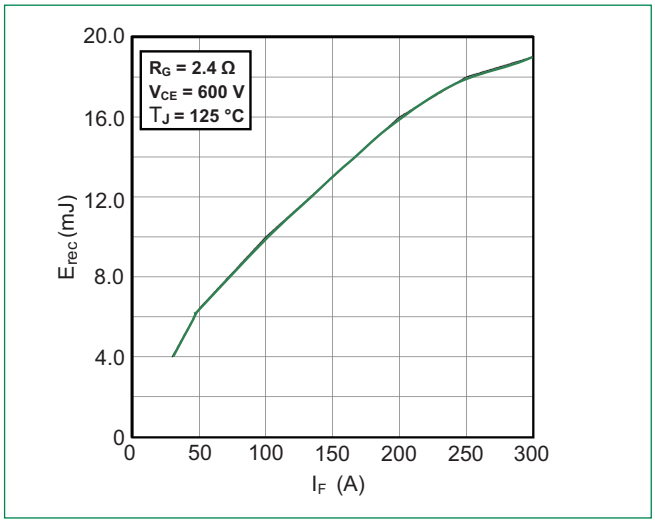
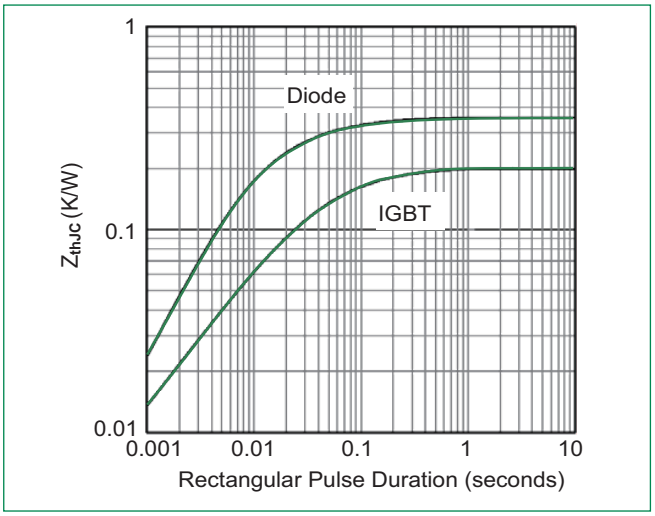


Figure 10: Transient Thermal Impedance



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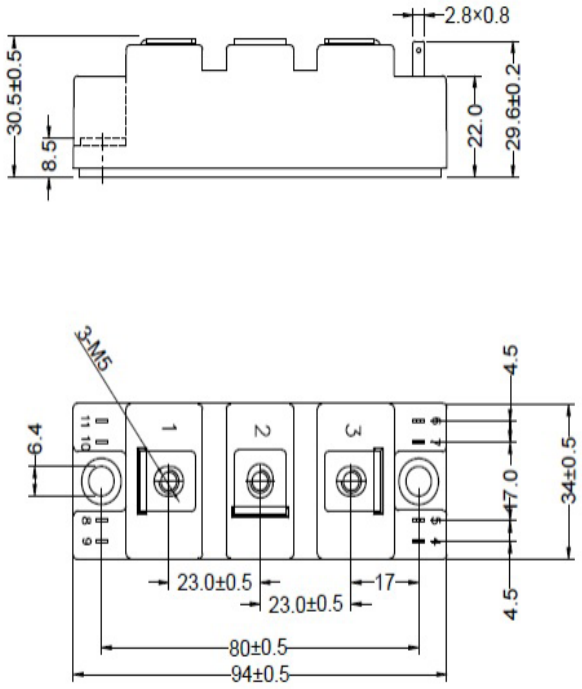
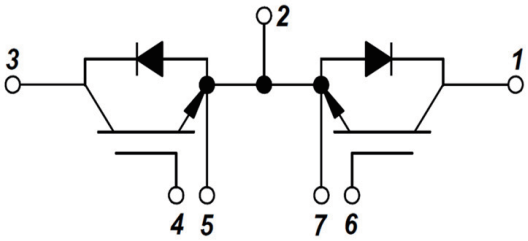
Dimensions-Package S



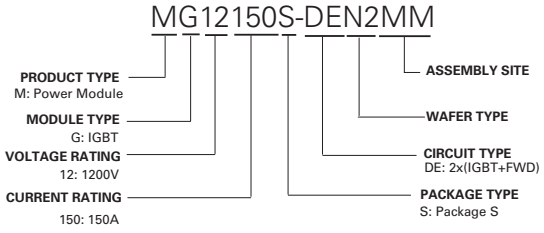
Circuit Diagram



Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q
MG12150S-DEN2MM	MG12150S-DEN2MM	160 g	Bulk Pack	100

Part Numbering System



Part Marking System