

MG12150S-DEN2MM



Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E71639

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

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

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
$T_{j, max}$	Max. Junction Temperature				150	$^\circ\text{C}$
$T_{j op}$	Operating Temperature		-40		125	$^\circ\text{C}$
T_{stg}	Storage Temperature		-40		125	$^\circ\text{C}$
V_{isol}	Insulation Test Voltage	AC, $t = 1\text{ min}$		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 ($T_c = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	$T_j = 25\text{ }^\circ\text{C}$	1200	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_C	DC Collector Current	$T_c = 25\text{ }^\circ\text{C}$	200	A
		$T_c = 80\text{ }^\circ\text{C}$	150	A
I_{CM}	Repetitive Peak Collector Current	$t_p = 1\text{ ms}$	300	A
P_{tot}	Power Dissipation Per IGBT		625	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	$T_j = 25\text{ }^\circ\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current	$T_c = 25\text{ }^\circ\text{C}$	200	A
		$T_c = 80\text{ }^\circ\text{C}$	150	A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ ms}$	300	A
I^2t		$T_j = 125\text{ }^\circ\text{C}$, $t = 10\text{ ms}$, $V_R = 0\text{ V}$	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.

IGBT Power Module

1200 V 150 A in AC Switch Configuration

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

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit	
IGBT							
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE} = V_{GE}, I_C = 6\text{ mA}$	5.0	5.8	6.5	V	
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C = 150\text{ A}, V_{GE} = 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$		1.7		V	
		$I_C = 150\text{ A}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$		1.9		V	
I_{CES}	Collector Leakage Current	$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$			1	mA	
		$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			5	mA	
I_{GES}	Gate Leakage Current	$V_{CE} = 0\text{ V}, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-400		400	nA	
R_{Gint}	Integrated Gate Resistor			5		Ω	
Q_{ge}	Gate Charge	$V_{CC} = 600\text{ V}, I_C = 150\text{ A}, V_{GE} = \pm 15\text{ V}$		1.4		μC	
C_{ies}	Input Capacitance	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		10.5		nF	
C_{res}	Reverse Transfer Capacitance				0.4		nF
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{ V}$ $I_C = 150\text{ A}$ $R_G = 2.4\text{ }\Omega$ $V_{GE} = \pm 15\text{ V}$ Inductive Load	$T_J = 25\text{ }^\circ\text{C}$		260	ns	
			$T_J = 125\text{ }^\circ\text{C}$		290	ns	
t_r	Rise Time		$T_J = 25\text{ }^\circ\text{C}$		30		ns
			$T_J = 125\text{ }^\circ\text{C}$		50	ns	
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25\text{ }^\circ\text{C}$		420		ns
			$T_J = 125\text{ }^\circ\text{C}$		520	ns	
t_f	Fall Time		$T_J = 25\text{ }^\circ\text{C}$		70		ns
			$T_J = 125\text{ }^\circ\text{C}$		90	ns	
E_{on}	Turn-on Energy		$T_J = 25\text{ }^\circ\text{C}$		12		mJ
			$T_J = 125\text{ }^\circ\text{C}$		16	mJ	
E_{off}	Turn-off Energy	$T_J = 25\text{ }^\circ\text{C}$		11		mJ	
		$T_J = 125\text{ }^\circ\text{C}$		14.5	mJ		
I_{SC}	Short Circuit Current	$t_{psc} \leq 10\text{ }\mu\text{S}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}, V_{CC} = 900\text{ V}$		600		A	
R_{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)				0.2	K/W	
Diode							
V_F	Forward Voltage	$I_F = 150\text{ A}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$		1.65		V	
		$I_F = 150\text{ A}, V_{GE} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		1.65		V	
I_{RRM}	Max. Reverse Recovery Current	$I_F = 150\text{ A}, V_R = 600\text{ V}$ $di_p/dt = -4000\text{ A}/\mu\text{s}$ $T_J = 125\text{ }^\circ\text{C}$		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	

Figure 1: Typical Output Characteristics

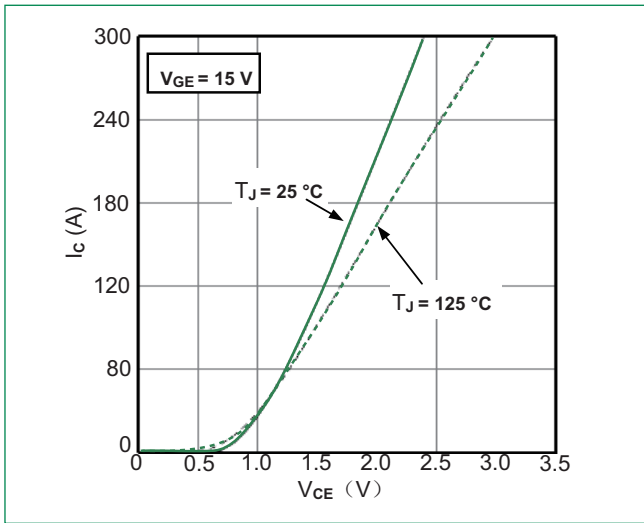


Figure 2: Typical Output characteristics

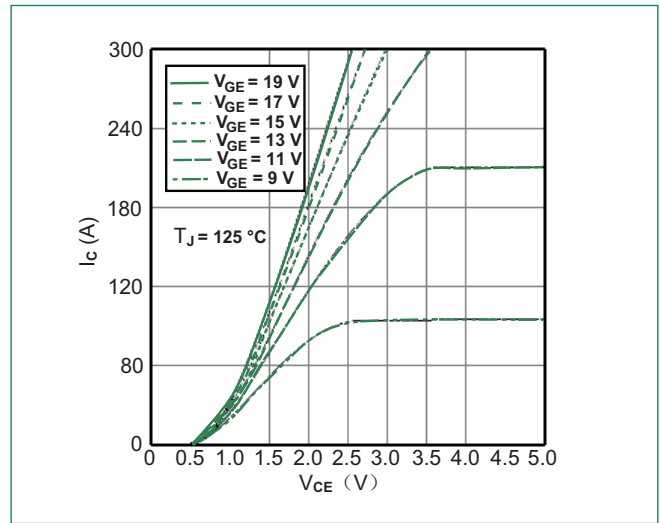


Figure 3: Typical Transfer characteristics

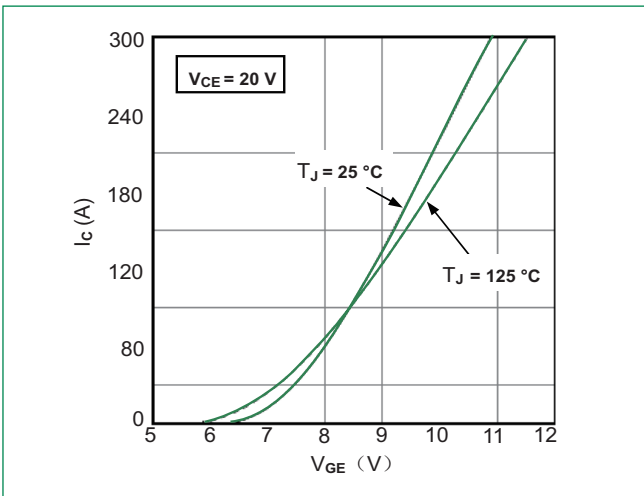


Figure 4: Switching Energy vs. Gate Resistor

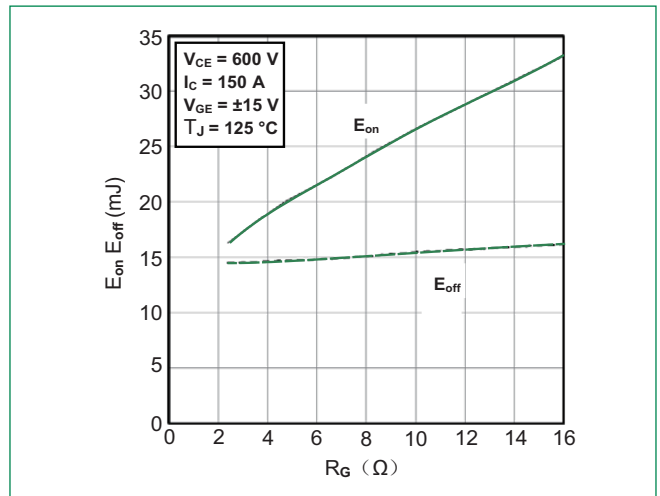


Figure 5: Switching Energy vs. Collector Current

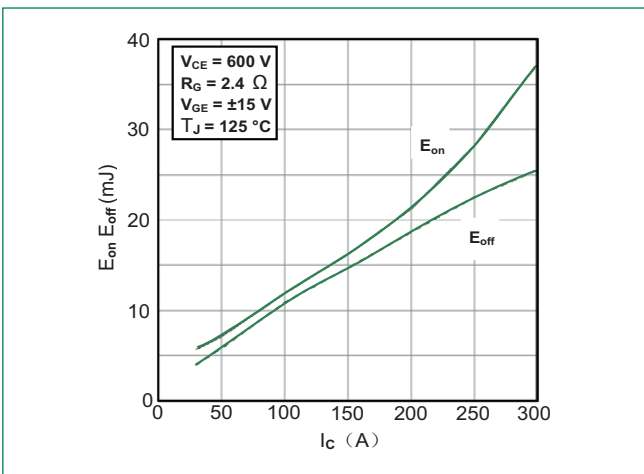


Figure 6: Reverse Biased Safe Operating Area

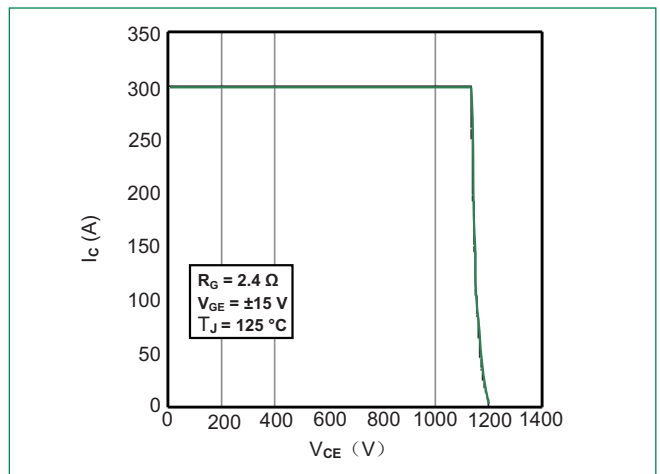


Figure 7: Diode Forward Characteristics

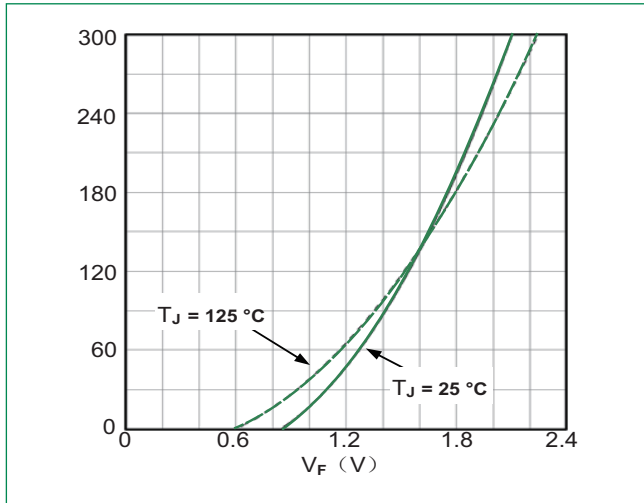


Figure 8: Switching Energy vs. Gate Resistor

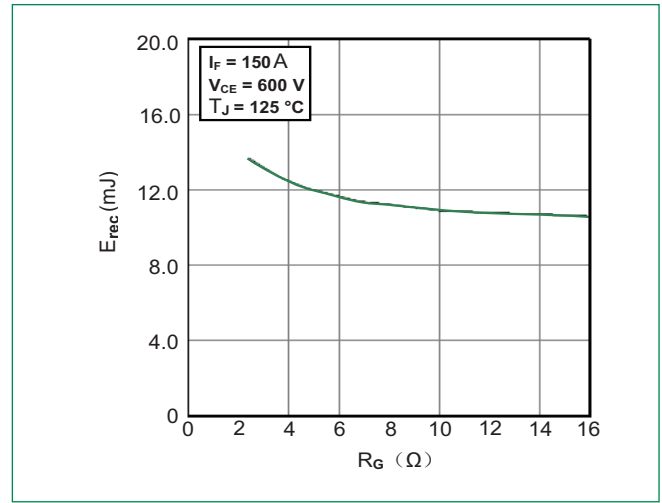


Figure 9: Switching Energy vs. Forward Current

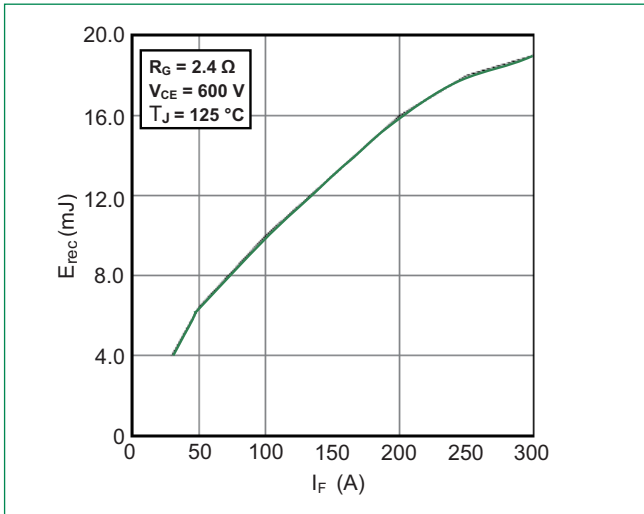
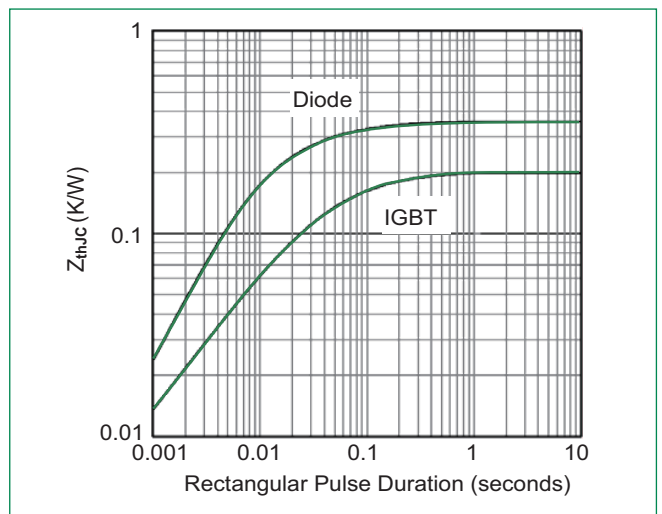
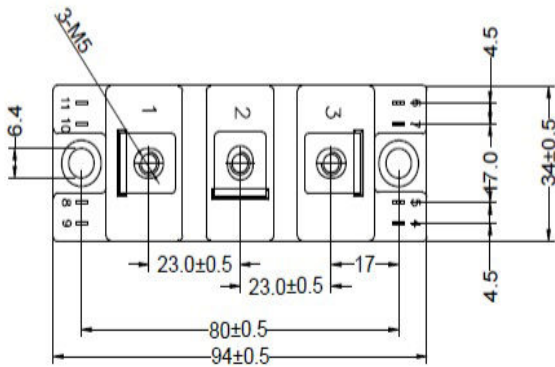
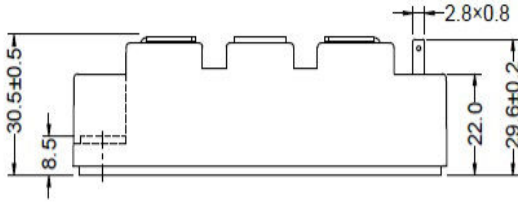


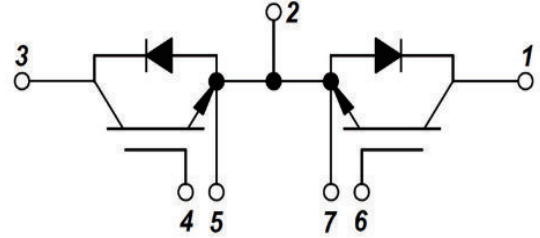
Figure 10: Transient Thermal Impedance



Dimensions-Package S



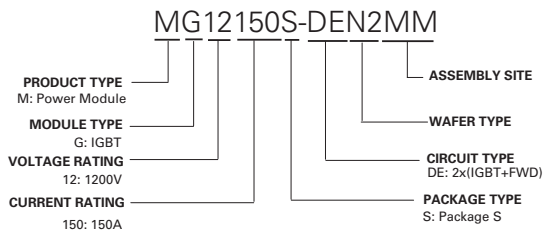
Circuit Diagram



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

