

MG12150D-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			0.11	K/W
R_{thJD}		Per Inverse Diode			0.27	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
IGBT				
V_{CES}	Collector - Emitter Voltage		1200	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_c	DC Collector Current	$T_c=25^\circ\text{C}$	210	A
		$T_c=80^\circ\text{C}$	150	A
I_{cpuls}	Pulsed Collector Current	$T_c=25^\circ\text{C}, t_p=1\text{ms}$	420	A
		$T_c=80^\circ\text{C}, t_p=1\text{ms}$	300	
P_{tot}	Power Dissipation Per IGBT		1100	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
Diode				
V_{RRM}	Repetitive Reverse Voltage		1200	V
$I_{F(AV)}$	Average Forward Current	$T_c=25^\circ\text{C}$	180	A
		$T_c=80^\circ\text{C}$	120	A
$I_{F(RMS)}$	RMS Forward Current		180	A
I_{FSM}	Non-Repetitive Surge Forward Current	$T_J=45^\circ\text{C}, t=10\text{ms}, \text{Sine}$	860	A
		$T_J=45^\circ\text{C}, t=8.3\text{ms}, \text{Sine}$	900	

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.

MG12150D-BA1MM

Electrical and Thermal Specifications ($T_c = 25^\circ\text{C}$, 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	6.2	7.0	V	
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.8		V	
		$I_C=150\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		2.0		V	
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		0.4	1.0	mA	
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		4.0		mA	
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}$	-200		200	nA	
Q_{ge}	Gate Charge	$V_{CC}=600\text{V}, I_C=150\text{A}, V_{GE}=\pm 15\text{V}$		1550		nC	
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		11		nF	
C_{oes}	Output Capacitance			0.8			
C_{res}	Reverse Transfer Capacitance			0.52			
$t_{d(on)}$	Turn - on Delay Time	$V_{CC}=600\text{V}$ $I_C=150\text{A}$ $R_G=7.5\Omega$ $V_{GE}=\pm 15\text{V}$ Inductive Load	$T_J=25^\circ\text{C}$		150		ns
			$T_J=125^\circ\text{C}$		160		ns
t_r	Rise Time		$T_J=25^\circ\text{C}$		65		ns
			$T_J=125^\circ\text{C}$		65		ns
$t_{d(off)}$	Turn - off Delay Time		$T_J=25^\circ\text{C}$		440		ns
			$T_J=125^\circ\text{C}$		500		ns
t_f	Fall Time		$T_J=25^\circ\text{C}$		55		ns
			$T_J=125^\circ\text{C}$		70		ns
E_{on}	Turn - on Energy		$T_J=25^\circ\text{C}$		14.9		mJ
			$T_J=125^\circ\text{C}$		20.6		mJ
E_{off}	Turn - off Energy	$T_J=25^\circ\text{C}$		9.8		mJ	
		$T_J=125^\circ\text{C}$		15.6		mJ	
Diode							
V_F	Forward Voltage	$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		2.0	2.48	V	
		$I_F=150\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.7	2.20	V	
t_{rr}	Reverse Recovery Time	$I_F=150\text{A}, V_R=800\text{V}$ $di_F/dt=-1000\text{A}/\mu\text{s}$ $T_J=125^\circ\text{C}$		240		ns	
I_{RRM}	Max. Reverse Recovery Current			85		A	
Q_{rr}	Reverse Recovery Charge			10.5		μC	

Figure 1: Typical Output Characteristics

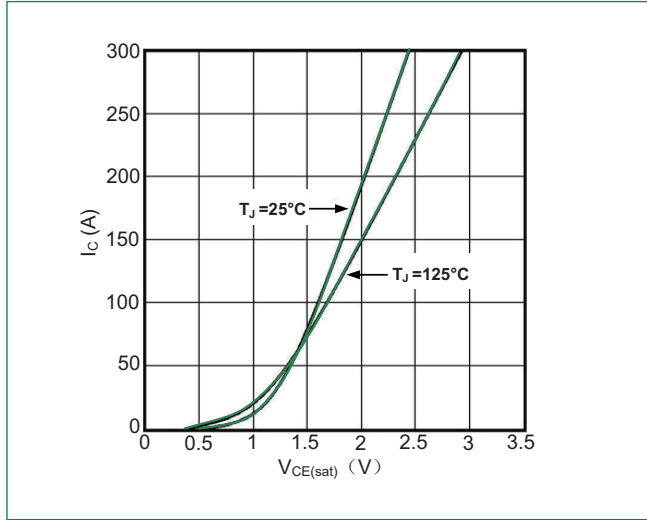


Figure 2: Typical Transfer characteristics

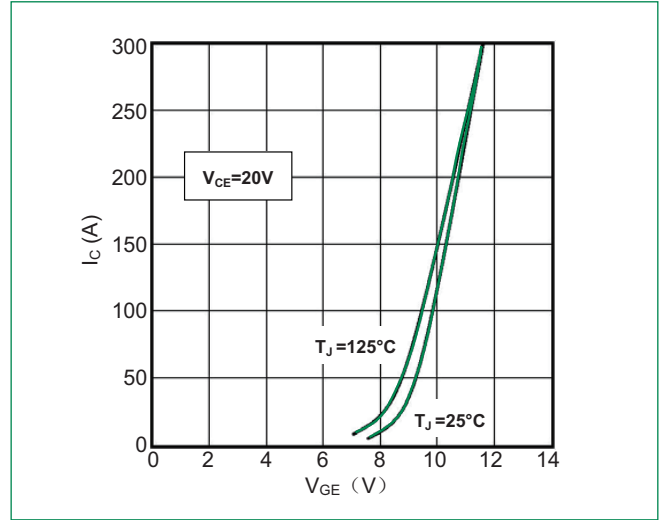


Figure 3: Switching Energy vs. Collector Current

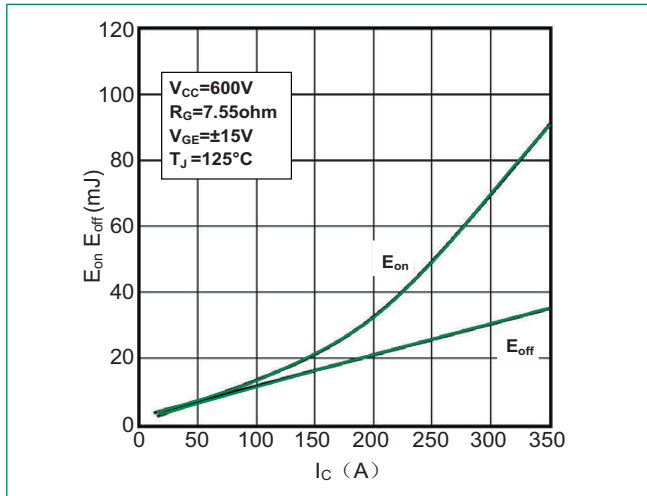


Figure 4: Switching Energy vs. Gate Resistor

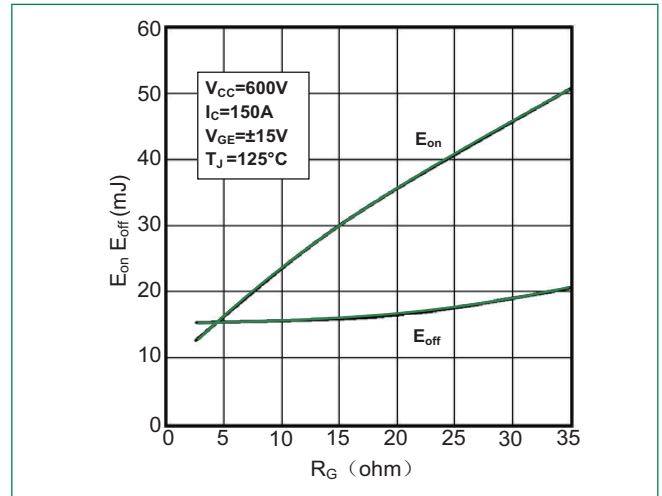


Figure 5: Switching Times vs. Collector Current

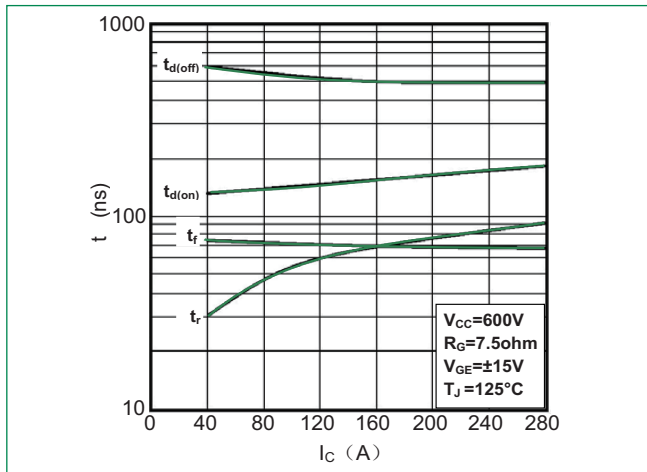


Figure 6: Switching Times vs. Gate Resistor

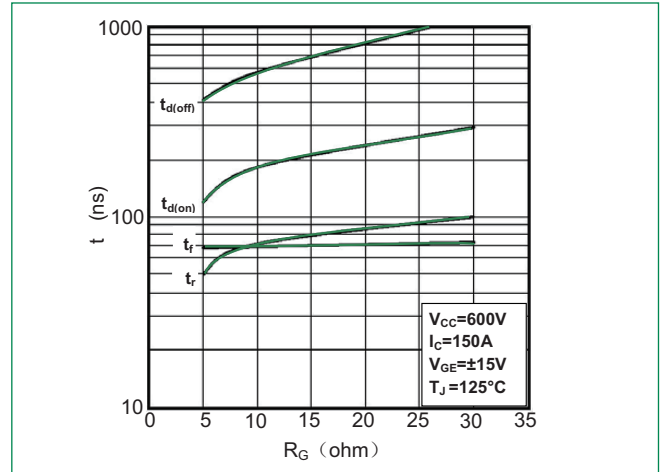


Figure 7: Gate Charge characteristics

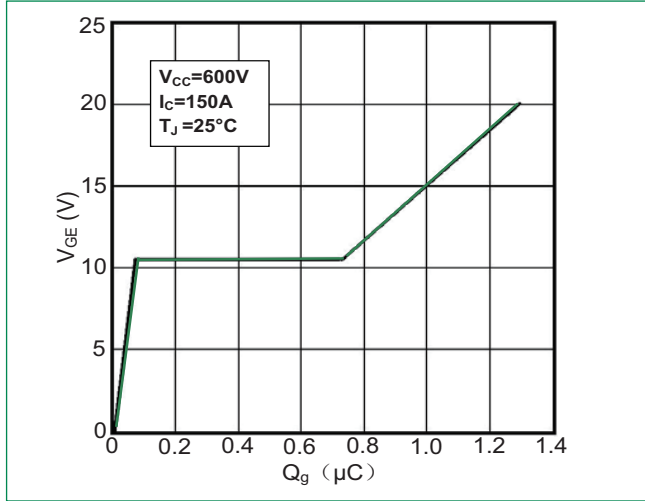


Figure 8: Typical Capacitances vs. V_{CE}

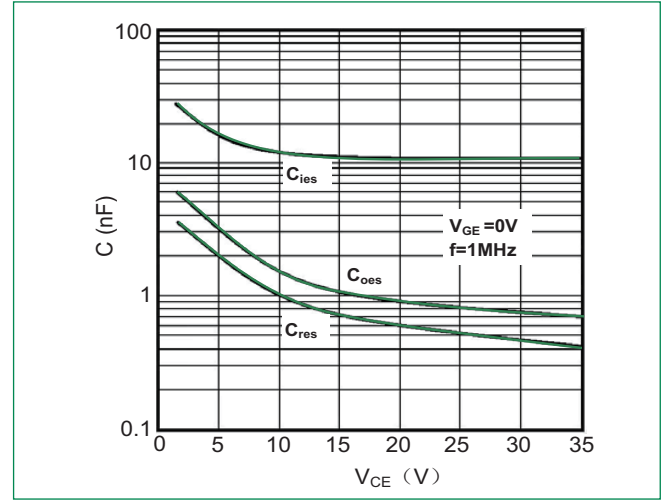


Figure 9: Reverse Biased Safe Operating Area

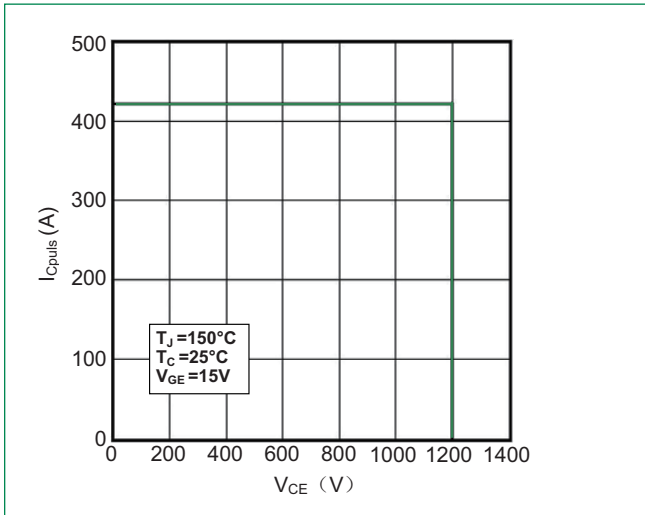


Figure 10: Short Circuit Safe Operating Area

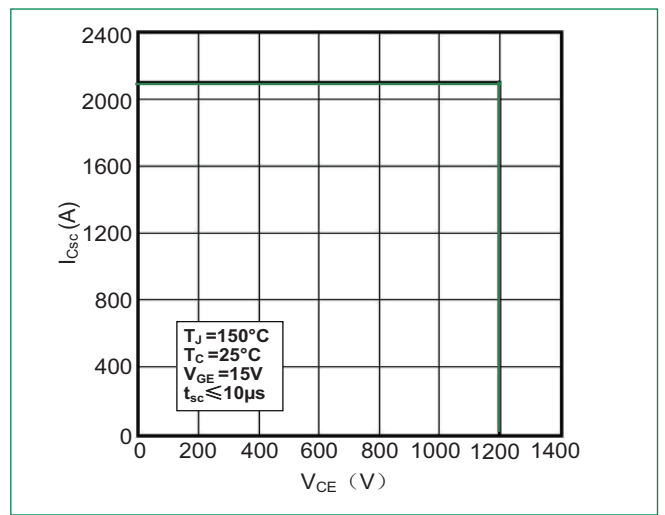


Figure 11: Rated Current vs. T_C

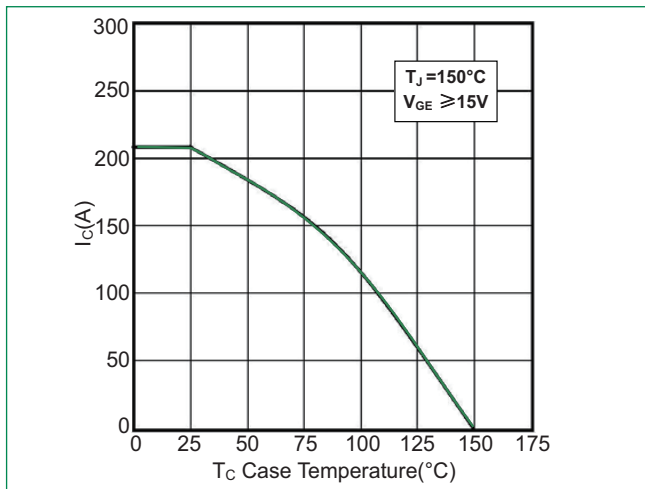


Figure 12: Diode Forward Characteristics

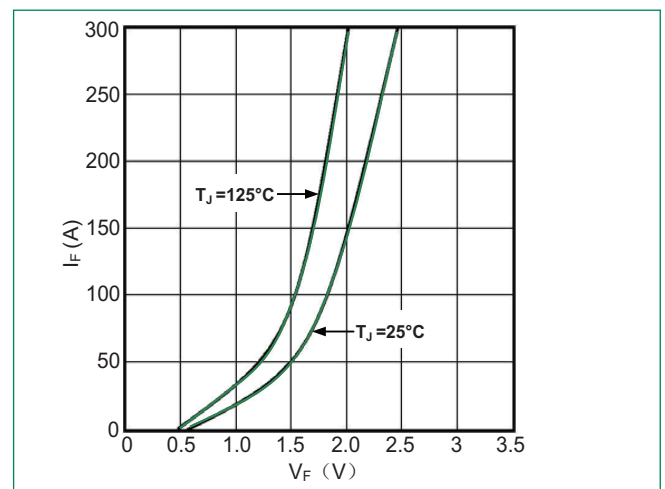


Figure 13: Transient Thermal Impedance of IGBT

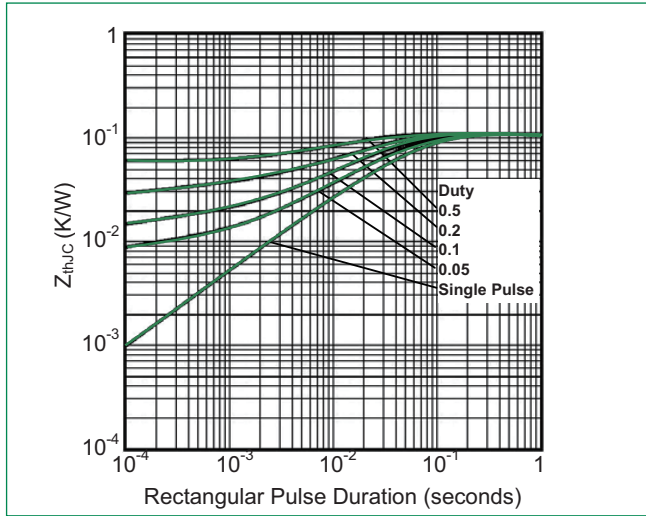
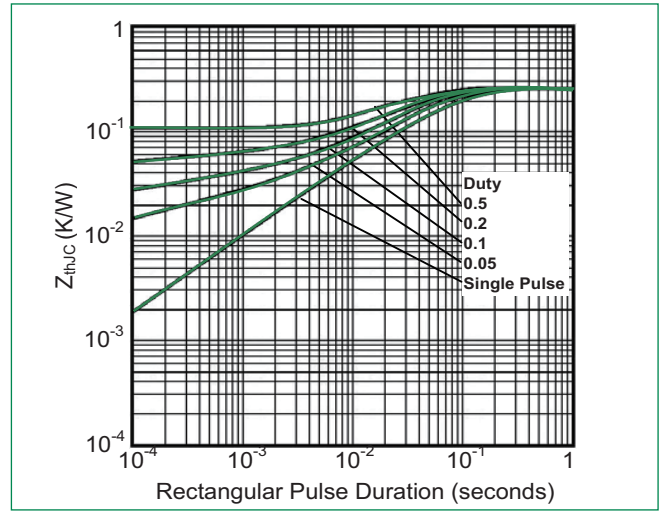
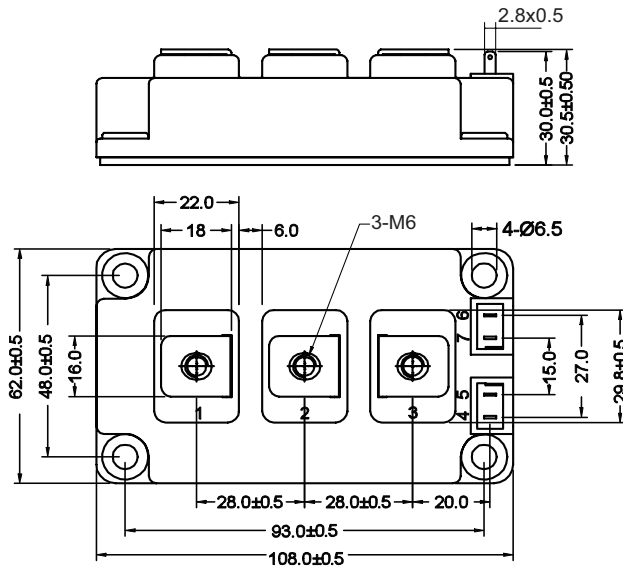


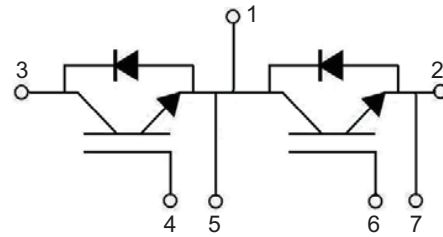
Figure 14: Transient Thermal Impedance of Diode



Dimensions-Package D



Circuit Diagram



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[FD401R17KF6C_B2](#) [FD-DF80R12W1H3_B52](#) [FF200R06YE3](#) [FF300R12KE4_E](#) [FF450R12ME4P](#) [FF600R12IP4V](#) [FP10R06W1E3_B11](#)
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