

HSM150M12BM2

1.2kV, 12 mΩ All-Silicon Carbide Half-Bridge HIGHFEL Module

V_{DS}	1.2 kV
$I_{ID}(@90^{\circ}C)$	150A
$R_{DS(on)}$	12 mΩ

Features

- Low On-Resistance and High Current Density
- Low Capacitance for High Frequency Operation
- Ease of Temperature Sensing by Embedded NTC
- Copper Baseplate and AlN-AMB Insulator
- Positive Temperature Coefficient Device
- RoHS Compliant and Halogen Free

System Benefits

- Higher System Efficiency
- Increase Parallel Device Convenience
- Temperature Independent Switching Behavior
- Allow High Frequency Operation
- Realize Compact and Lightweight Systems

Applications

- Induction Heating
- Motor Drives
- Solar and Wind Inverters
- UPS and SMPS
- Traction

Package 62mm x 106mm x 30mm



Part Number	Package	Marking
HSM150M12BM2	Half-Bridge Module	HSM150M12BM2

Maximum Ratings ($T_c = 25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Notes
V_{DSmax}	Drain - Source Voltage	1.2	kV		
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute Maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended Operational Values	
I_D	Continuous Drain Current	215	A	$V_{GS} = 20 V, T_c = 25^{\circ}C$	
		150		$V_{GS} = 20 V, T_c = 90^{\circ}C$	
$I_{D(pulse)}$	Pulsed Drain Current	800	A	Pulse width t_p limited by T_{jmax}	
T_{jmax}	Junction Temperature	150	$^{\circ}C$		
T_c, T_{STG}	Case and Storage Temperature Range	-40 to +125	$^{\circ}C$		
V_{isol}	Case Isolation Voltage	3.0	kV	AC, 50 Hz, 1 min	
L_{Stray}	Stray Inductance	15	nH	Measured between terminals 2 and 3	
P_D	Power Dissipation	1660	W	$T_c = 25^{\circ}C, T_j = 150^{\circ}C$	

Electrical Characteristics (T_c = 25 °C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V _{DSS}	Drain - Source Blocking Voltage	1.2			kV	V _{GS} = 0 V, I _D = 2 mA	
V _{GS(th)}	Gate Threshold Voltage	1.8	2.5		V	V _{DS} = 10 V, I _D = 15 mA	
I _{DSS}	Zero Gate Voltage Drain Current		600	2000	μA	V _{DS} = 1.2 kV, V _{GS} = 0V	
			1500	3000		V _{DS} = 1.2 kV, V _{GS} = 0V, T _J = 150 °C	
I _{GSS}	Gate-Source Leakage Current		1.5	100	nA	V _{GS} = 20 V, V _{DS} = 0V	
R _{DS(on)}	On State Resistance		12	14	mΩ	V _{GS} = 20 V, I _{DS} = 300 A	
			17			V _{GS} = 20 V, I _{DS} = 300 A, T _J = 150 °C	
g _{fs}	Transconductance		60		S	V _{DS} = 20 V, I _{DS} = 150A	
			55			V _{DS} = 20 V, I _D = 150A, T _J = 150 °C	
C _{iss}	Input Capacitance		13.3		nF	V _{GS} =0V, V _{DS} =800V f =1MHz, V _{AC} =25mV	
C _{oss}	Output Capacitance		0.7				
C _{rss}	Reverse Transfer Capacitance		0.12				
E _{on}	Turn-On Switching Energy		380		μJ	V _{DS} =800V, V _{GS} =0/20V, I _D =120A, R _{G(ext)} = 0.5 Ω	
E _{off}	Turn-Off Switching Energy		420		μJ		
R _{G(int)}	Internal Gate Resistance		0.2		Ω	ff =1MHz, V _{AC} =25mV	
Q _{GS}	Gate-Source Charge		180		nC	V _{DS} =800V, V _{GS} =-5/+20V, I _D =120A	
Q _{GD}	Gate-Drain Charge		390				
Q _G	Total Gate Charge		750				
t _{d(on)}	Turn-on delay time		250		ns	V _{DS} =800V, V _{GS} =-4/20V, I _D =120A, R _L =6.7Ω, R _{G(ext)} = 0.5 Ω	
t _r	Rise Time		100		ns		
t _{d(off)}	Turn-off delay time		250		ns		
t _f	Fall Time		43		ns		
V _{SD}	Diode Forward Voltage		1.6	2.0	V	V _{GS} =-5V, I _S =120A, T _J =25°C	
			2.3			V _{GS} =-5V, I _S =120A, T _J =25°C	
Q _C	Total Capacitive Charge		1.0		μC		

Note: The reverse recovery is purely capacitive

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
R _{thJCM}	Thermal Resistance Junction-to-Case for MOSFET		0.070	0.075	°C/W	T _c = 90 °C, P _D = 150 W	
R _{thJCD}	Thermal Resistance Junction-to-Case for Diode		0.073	0.076		T _c = 90 °C, P _D = 130 W	

Additional Module Data

Symbol	Parameter	Max.	Unit	Test Condition
W	Weight	300	g	
M	Mounting Torque	5	Nm	To heatsink and terminals
	Clearance Distance	9	mm	Terminal to terminal
	Creepage Distance	30	mm	Terminal to terminal
		40	mm	Terminal to baseplate

Schematic Package Dimensions (mm)

