# HSM150M12BM2

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

| | |
|---|---|
| $V_{DS}$ | 1.2 kV |
| $I_{ID(@90°C)}$ | 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

## Package 62mm x 106mm x 30mm


## 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

| Part Number | Package | Marking |
|---|---|---|
| HSM150M12BM2 | Half-Bridge Module | HSM150M12BM2 |

## Maximum Ratings ($T_C$ = 25˚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 ˚C | |
| | | 150 | | $V_{GS}$ = 20 V, $T_C$ = 90 ˚C | |
| $I_{D(pulse)}$ | Pulsed Drain Current | 800 | A | Pulse width $t_p$ limited by $T_{jmax}$ | |
| $T_{Jmax}$ | Junction Temperature | 150 | ˚C | | |
| $T_C$ ,$T_{STG}$ | Case and Storage Temperature Range | -40 to +125 | ˚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 ˚C, $T_J$ = 150 ˚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 | VGS=0V, VDS=800V f =1MHz, VAC=25mV | |
| $C_{oss}$ | Output Capacitance | | 0.7 | | | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | 0.12 | | | | |
| $E_{on}$ | Turn-On Switching Energy | | 380 | | UJ | VDS=800V, VGS=0/20V, ID=120A, RG(ext)= 0.5 Ω | |
| $E_{Off}$ | Turn-Off Switching Energy | | 420 | | UJ | | |
| $R_{G\ (int)}$ | Internal Gate Resistance | | 0.2 | | Ω | ff =1MHz, VAC=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 | VDS=800V, VGS=-4/20V, ID=120A, RL=6.7Ω, RG(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 | VGS=-5V, IS=120A, TJ=25°C | |
| | | | 2.3 | | | VGS=-5V, IS=120A, TJ=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 Juction-to-Case for MOSFET | | 0.070 | 0.075 | °C/W | $T_c$ = 90 °C, $P_D$ = 150 W | |
| $R_{thJCD}$ | Thermal Resistance Juction-to-Case for Diode | | 0.073 | 0.076 | | $T_c$ = 90 °C, $P_D$ = 130 W | |

**Schematic** **Package Dimensions (mm)**