

# STARPOWER

SEMICONDUCTOR

# MOSFET

## MD2160HFM100B6S

Molding Type Module

100V/2160A 2 in one-package

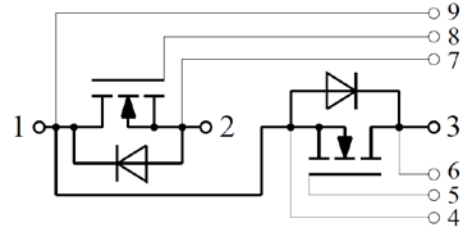
### General Description

STARPOWER MOSFET Power Module provides very low  $R_{DS(on)}$  as well as optimized intrinsic diode. It's designed for the applications such SMPS and DC drives.



### Features

- Low  $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Low inductance case avoid oscillations
- Kelvin source terminals for easy drive
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

### Typical Applications

- Main and auxiliary AC drives of electric vehicles
- DC servo and robot drives
- Battery vehicles
- UPS equipment
- Plasma cutting

**Absolute Maximum Ratings**  $T_C=25^\circ\text{C}$  unless otherwise noted

Symbol	Description	MD2160HFM100B6S	Units
$V_{DSS}$	Drain-Source Voltage	100	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current @ $T_C=25^\circ\text{C}$ @ $T_C=80^\circ\text{C}$	2160	A
		1560	
$I_F$	Diode Forward Current	2160	A
$P_D$	Maximum Power Dissipation @ $T_j=175^\circ\text{C}$	2543	W
$T_{jmax}$	Maximum Junction Temperature	175	$^\circ\text{C}$
$T_{jop}$	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
$V_{ISO}$	Isolation Voltage RMS, $f=50\text{Hz}$ , $t=1\text{min}$	2500	V
Mounting Torque	Power Terminal Screw:M5 Mounting Screw:M5	2.5 to 5.0 3.0 to 5.0	N.m

**Electrical Characteristics of MOSFET**  $T_C=25^\circ\text{C}$  unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$T_j=25^\circ\text{C}$	100			V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=V_{DSS}$ , $V_{GS}=0\text{V}$ , $T_j=25^\circ\text{C}$			240	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=V_{GSS}$ , $V_{DS}=0\text{V}$ , $T_j=25^\circ\text{C}$			1.2	$\mu\text{A}$

**On Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=3.0\text{mA}$ , $V_{DS}=V_{GS}$ , $T_j=25^\circ\text{C}$	2.0		4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=900\text{A}$ , $V_{GS}=10\text{V}$ , $T_j=25^\circ\text{C}$		0.31	0.38	$\text{m}\Omega$
$g_{fs}$	Forward Transconductance	$V_{DS}=50\text{V}$ , $I_D=900\text{A}$	1920			S

**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$R_{Gint}$	Internal Gate Resistance			0.94		$\Omega$
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=65V, I_D=900A,$ $R_G=0.22\Omega, V_{GS}=\pm 10V,$ $T_j=25^\circ C$		25		ns
$t_r$	Rise Time			67		ns
$t_{d(off)}$	Turn-Off Delay Time			78		ns
$t_f$	Fall Time			88		ns
$Q_g$	Total Gate Charge	$I_D=900A, V_{DS}=50V,$ $V_{GS}=10V$		1800		nC
$Q_{gs}$	Gate-Source Charge			420		nC
$Q_{gd}$	Gate-Drain ("Miller") Charge			516		nC
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=50V,$ $f=1.0MHz$		115		nF
$C_{oss}$	Output Capacitance			8.04		nF
$C_{rss}$	Reverse Transfer Capacitance			3.00		nF

**Electrical Characteristics of Inverse Diode**  $T_C=25^\circ C$  unless otherwise

noted

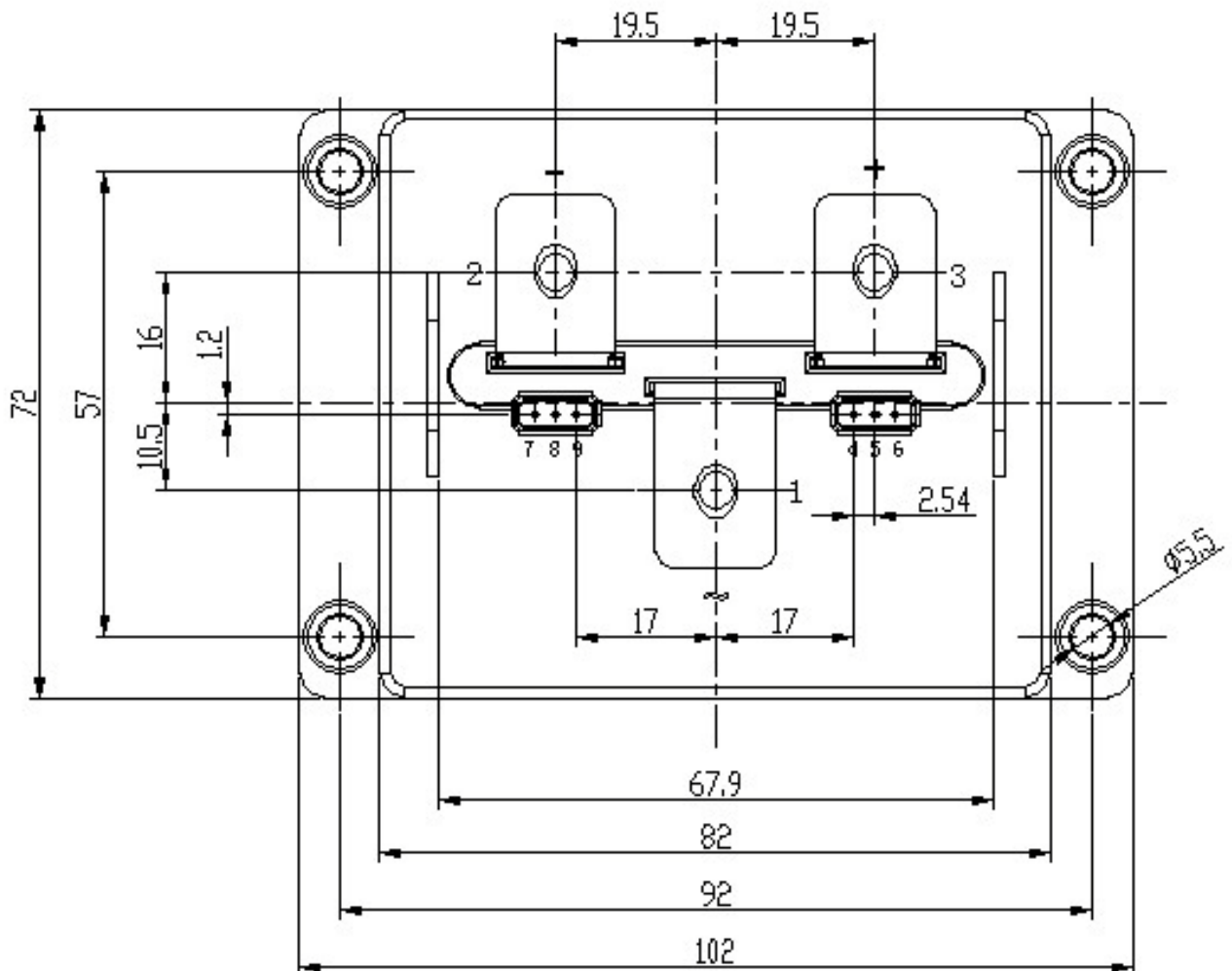
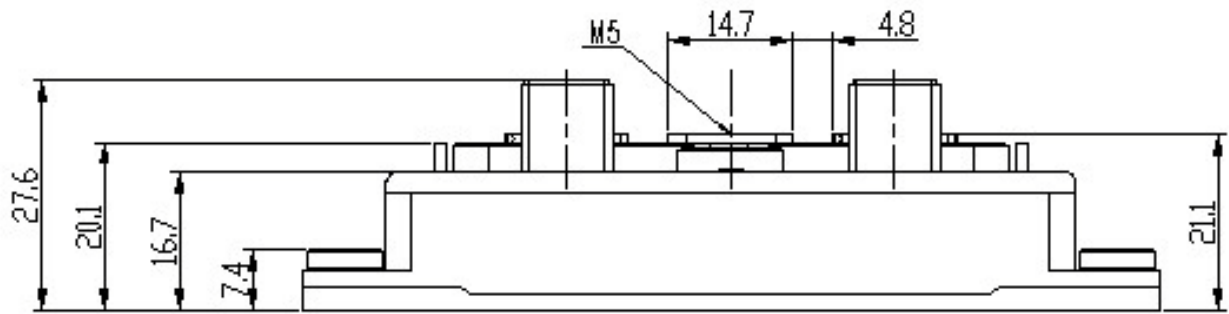
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Diode Forward Voltage	$I_F=900A, V_{GS}=0V, T_j=25^\circ C$			1.30	V
$t_{rr}$	Diode Reverse Recovery Time	$V_R=85V, I_F=900A,$ $di/dt=1200A/\mu s, T_j=25^\circ C$		50		ns
$Q_{rr}$	Diode Reverse Recovery Charge				1.13	

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per MOSFET)		0.059	K/W
Weight	Weight of Module	350		g

**Package Dimensions**

Dimensions in Millimeters



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