

STARPOWER

SEMICONDUCTOR

MOSFET

MD200HFC120C2S

1200V/200A 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

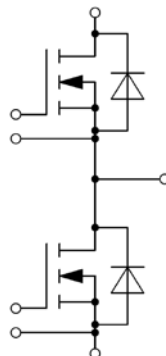
- SiC power MOSFET
- Low $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Chip sintering technology
- Low inductance case avoid oscillations
- Isolated copper baseplate using DBC technology



Typical Applications

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

Equivalent Circuit Schematic



Absolute Maximum Ratings**MOSFET**

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSS}	Gate-Source Voltage	-5/+20	V
I_D	Drain Current @ $T_C=25^{\circ}C$	277	A
	@ $T_C=110^{\circ}C$	200	
I_{DM}	Pulsed Drain Current	1000	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}C$	1153	W

DIODE

Symbol	Description	Value	Unit
I_F	Source Current	200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}C$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}C$
T_{STG}	Storage Temperature Range	-40 to +150	$^{\circ}C$
V_{ISO}	Isolation Voltage RMS, f=50Hz, t=1min	4000	V

MOSFET Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=200A, V_{GS}=20V, T_j=25^\circ C$		6.2	8.5	m Ω
		$I_D=200A, V_{GS}=20V, T_j=150^\circ C$		10.7		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=50mA, V_{DS}=V_{GS}, T_j=25^\circ C$	2.4	3.0		V
g_{fs}	Forward Transconductance	$V_{DS}=20V, I_D=200A$		94.4		S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0V, T_j=25^\circ C$			400	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0V, T_j=25^\circ C$			2.4	μA
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=1000V, f=1MHz$		11.2		nF
C_{oss}	Output Capacitance			0.88		nF
C_{rss}	Reverse Transfer Capacitance			0.06		nF
Q_g	Total Gate Charge	$I_D=200A, V_{DS}=800V, V_{GS}=-5/20V$		644		nC
Q_{gs}	Gate-Source Charge			184		nC
Q_{gd}	Gate-Drain ("Miller") Charge			200		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800V, I_D=200A, R_G=0.6\Omega, V_{GS}=-5/20V, T_j=25^\circ C$		14		ns
t_r	Rise Time			32		ns
$t_{d(off)}$	Turn-Off Delay Time			29		ns
t_f	Fall Time			28		ns
E_{on}	Turn-On Switching Loss	$V_{DS}=800V, I_D=200A, R_G=0.6\Omega, V_{GS}=-5/20V, T_j=25^\circ C$		5.6		mJ
E_{off}	Turn-Off Switching Loss			1.2		mJ

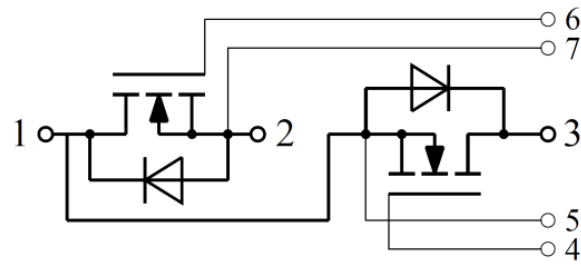
DIODE Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=200A, V_{GS}=0V, T_j=25^\circ C$		1.60	1.80	V
		$I_F=200A, V_{GS}=0V, T_j=150^\circ C$		2.25	2.70	
Q_C	Total Capacitive Charge	$V_R=800V, T_j=25^\circ C$		984		nC

Module Characteristics $T_c=25^{\circ}\text{C}$ unless otherwise noted

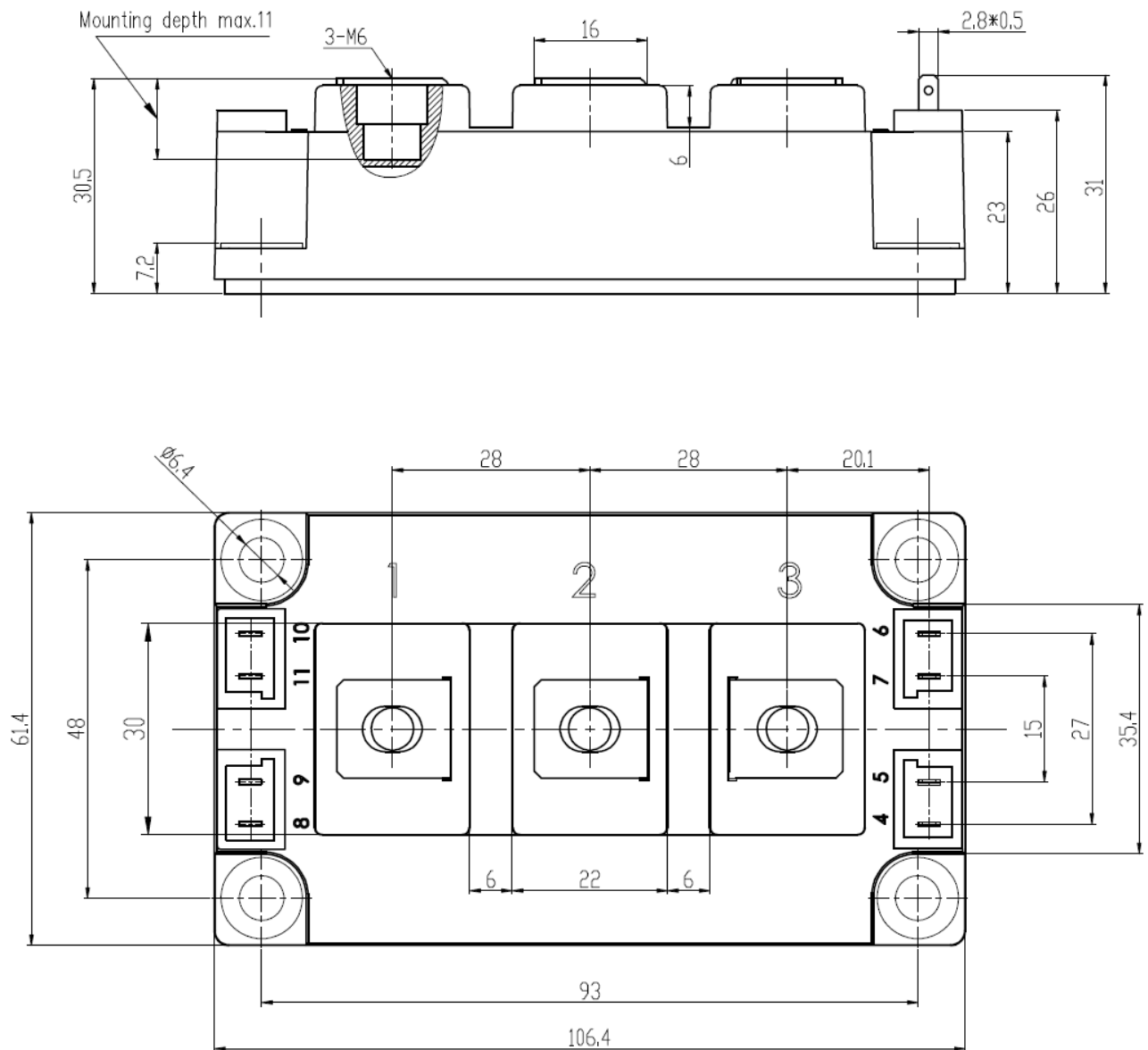
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case(per MOSFET)			0.130	K/W
	Junction-to-Case(per DIODE)			0.151	
R_{thCH}	Case-to-Heatsink (per MOSFET)		0.037		K/W
	Case-to-Heatsink (per DIODE)		0.043		
	Case-to-Heatsink (per Module)		0.010		
M	Terminal Connection Torque, Screw M6	2.5		5.0	N.m
	Mounting Torque, Screw M6	3.0		5.0	
G	Weight of Module		300		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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