STARPOWER

SEMICONDUCTOR **MOSFET**

MD120HFR120C2S

1200V/120A 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.

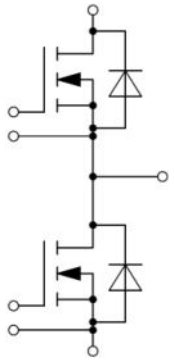
Features

- 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(DC)	-4/+22	V
V_{GSS_surge}	Gate-Source Surge Voltage(t_{surge}<300nsec)	-4/+26	V
V_{GS_op}	Recommended Drive Voltage	0/+18	V
I_D	Drain Current @ T_C=25°C @ T_C=120°C	200 120	A
I_{DM}	Pulsed Drain Current	548	A

Inverse Diode

Symbol	Description	Value	Unit
I_S	Source Current	120	A
I_{SM}	Pulsed Source Current	548	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	°C
T_{jop}	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature Range	-40 to +125	°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=80A,V_{GS}=18V, T_j=25°C		10	13	mΩ
		I_D=80A,V_{GS}=18V, T_j=125°C		15		
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=40mA,V_{DS}=V_{GS}, T_j=25°C	2.7		5.6	V
g_{fs}	Forward Transconductance	V_{DS}=10V,I_D=80A		33.2		S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25°C			40	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=V_{GSS},V_{DS}=0V, T_j=25°C			0.4	μA
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=800V, f=1MHz		5.35		nF
C_{oss}	Output Capacitance			0.30		nF
C_{rss}	Reverse Transfer Capacitance			0.11		nF
Q_g	Total Gate Charge	I_D=80A,V_{DS}=600V, V_{GS}=18V		428		nC
Q_{gs}	Gate-Source Charge			88		nC
Q_{gd}	Gate-Drain ("Miller") Charge			164		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=400V,I_D=72A, R_G=0Ω,V_{GS}=18V, T_j=25°C		21		ns
t_r	Rise Time			39		ns
$t_{d(off)}$	Turn-Off Delay Time			49		ns
t_f	Fall Time			24		ns
E_{on}	Turn-On Switching Loss	V_{DS}=600V,I_D=80A, R_G=0Ω,V_{GS}=18V, T_j=25°C		1.13		mJ
E_{off}	Turn-Off Switching Loss			0.47		mJ

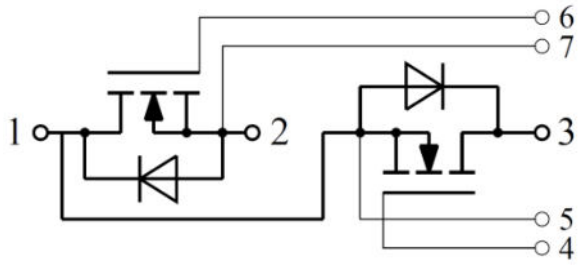
Inverse Diode Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	I_S=80A,V_{GS}=0V,T_j=25°C		3.2		V
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_S=80A, -di/dt=8800A/μs, T_j=25°C		25		ns
Q_r	Diode Reverse Recovery Charge			0.46		μC
I_{RM}	Peak Reverse Recovery Current			36		A

Module Characteristics T_C=25°C unless otherwise noted

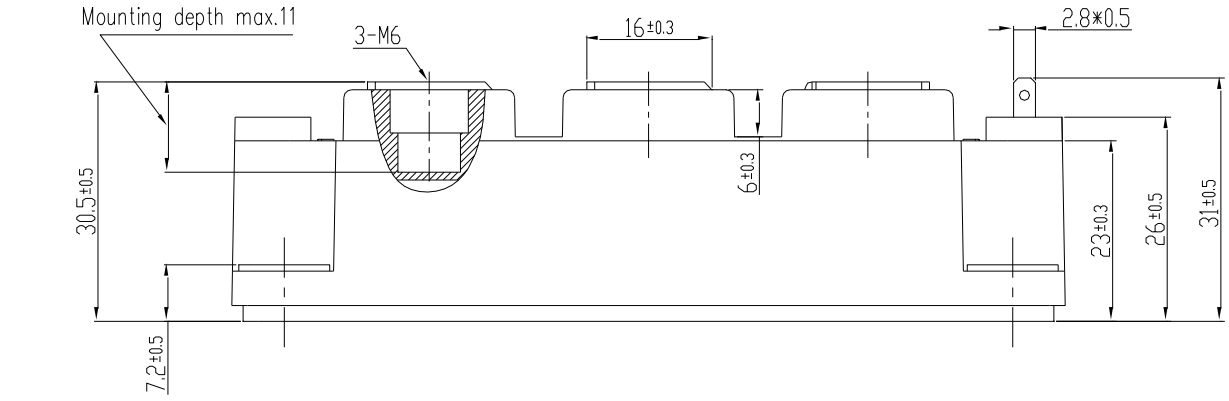
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case(Mosfet)			0.181	K/W
R_{thCH}	Case-to-Heatsink (Mosfet) Case-to-Heatsink (per Module)		0.020 0.010		K/W
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		300		g

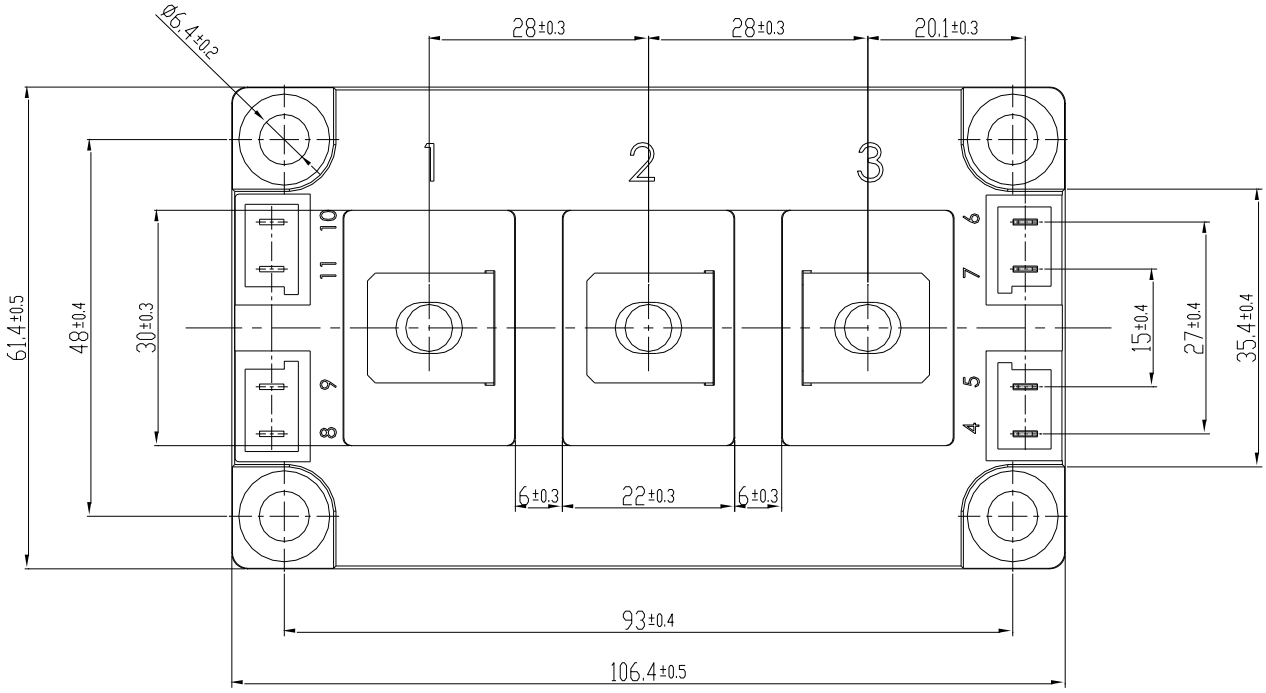
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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