STARPOWER

SEMICONDUCTOR **MOSFET**

MD300HFR120B3S

1200V/300A 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.

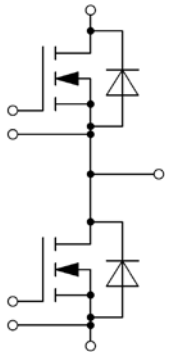
Features

- 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	±20	V
I_D	Drain Current @ T_C=25°C @ T_C=80°C	381 300	A
I_{DM}	Pulsed Drain Current	1096	A

Inverse Diode

Symbol	Description	Value	Unit
I_S	Source Current	300	A
I_{SM}	Pulsed Source Current	1096	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=160A,V_{GS}=18V, T_j=25°C		5.0	6.5	mΩ
		I_D=160A,V_{GS}=18V, T_j=125°C		7.5		
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=80mA,V_{DS}=V_{GS}, T_j=25°C	2.7		5.6	V
g_{fs}	Forward Transconductance	V_{DS}=10V,I_D=160A		66.4		S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25°C			80	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=V_{GSS},V_{DS}=0V, T_j=25°C			0.8	μA
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=800V, f=1MHz		10.7		nF
C_{oss}	Output Capacitance			0.60		nF
C_{rss}	Reverse Transfer Capacitance			0.22		nF
Q_g	Total Gate Charge	I_D=160A,V_{DS}=600V, V_{GS}=18V		856		nC
Q_{gs}	Gate-Source Charge			176		nC
Q_{gd}	Gate-Drain ("Miller") Charge			328		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=400V,I_D=144A, 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=160A, R_G=0Ω,V_{GS}=18V, T_j=25°C		2.26		mJ
E_{off}	Turn-Off Switching Loss			0.94		mJ

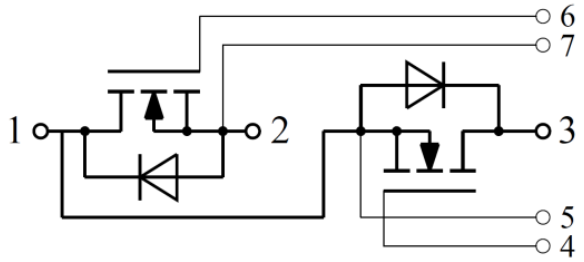
Inverse Diode Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	I_S=160A,V_{GS}=0V,T_j=25°C		3.2		V
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_S=160A, -di/dt=17600A/μs, T_j=25°C		25		ns
Q_r	Diode Reverse Recovery Charge			0.92		μC
I_{RM}	Peak Reverse Recovery Current			72		A

Module Characteristics T_C=25°C unless otherwise noted

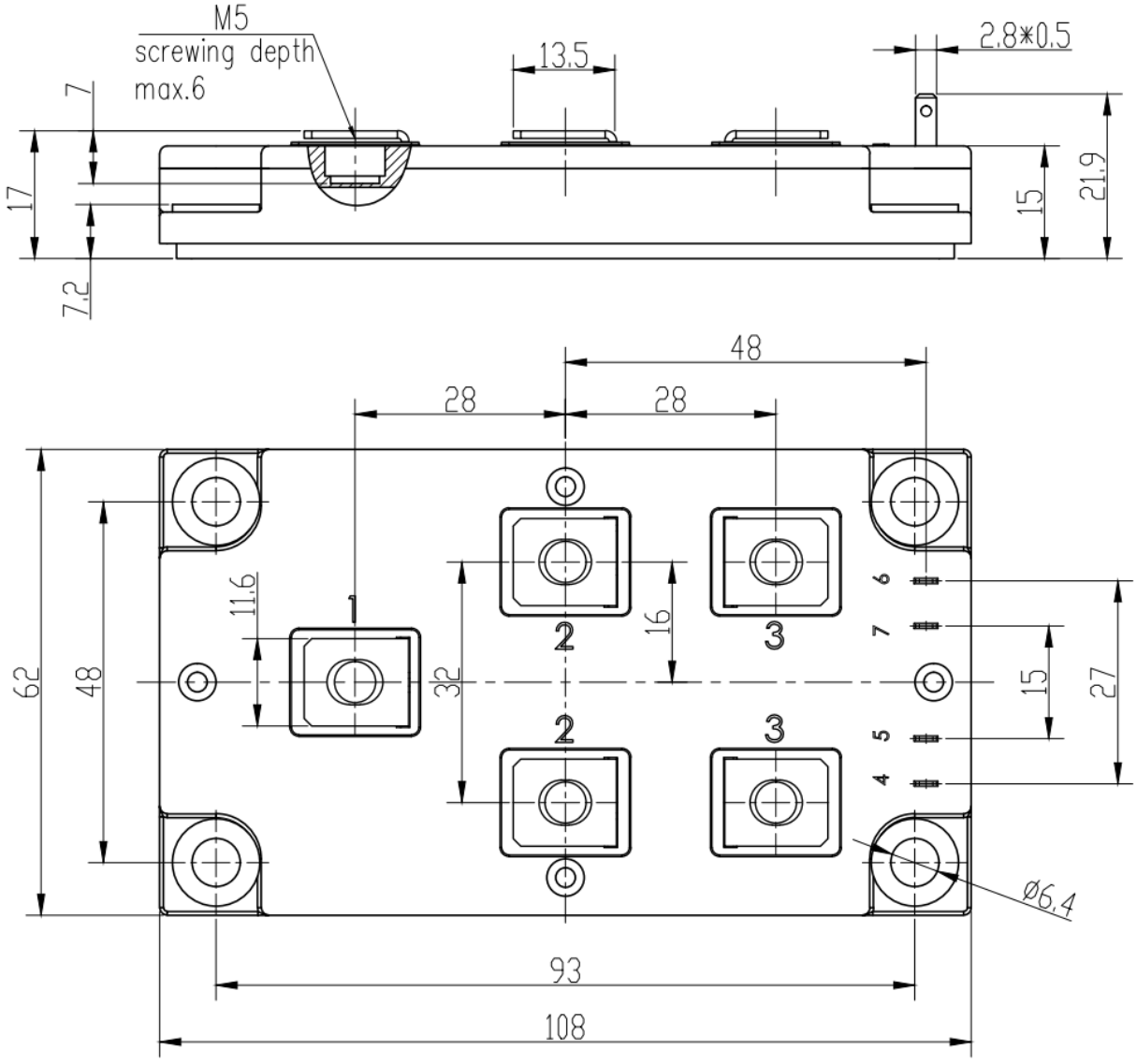
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case(Mosfet)			0.100	K/W
R_{thCH}	Case-to-Heatsink (Mosfet) Case-to-Heatsink (per Module)		0.020 0.010		K/W
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		300		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



Terms and Conditions of Usage

The data contained in this product datasheet is exclusively intended for technically trained staff. you and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you (see www.powersemi.cc), For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers.
Changes of this product data sheet are reserved.