

STARPOWER

SEMICONDUCTOR

MOSFET

MD100HCC120B3S

1200V/100A 4 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 solar power.

Features

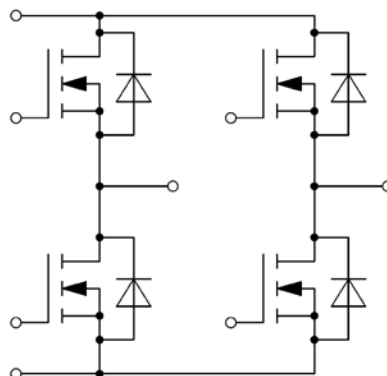
- SiC power MOSFET
- Low $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Low inductance case avoid oscillations
- Kelvin source terminals for easy drive
- Isolated copper baseplate using DBC technology



Typical Applications

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

Equivalent Circuit Schematic



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

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSS}	Gate-Source Voltage	-10/+25	V
I_D	Drain Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	124	A
		100	A
I_{DM}	Pulsed Drain Current	200	A
P_D	Maximum Power Dissipation @ $T_j=150^{\circ}\text{C}$	478	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	100	A
I_{SM}	Pulsed Source Current	200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +150	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	2500	V

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=80\text{A}, V_{GS}=20\text{V}, T_j=25^\circ\text{C}$		20.0	24.5	m Ω
		$I_D=80\text{A}, V_{GS}=20\text{V}, T_j=150^\circ\text{C}$		37.5	52.0	
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=4.0\text{mA}, V_{DS}=10\text{V}, T_j=25^\circ\text{C}$	1.7	2.2		V
g_{fs}	Forward Transconductance	$V_{DS}=20\text{V}, I_D=80\text{A}, T_j=25^\circ\text{C}$		37.2		S
		$V_{DS}=20\text{V}, I_D=80\text{A}, T_j=150^\circ\text{C}$		34.0		
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$			200	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_j=25^\circ\text{C}$			1.0	μA
R_{Gint}	Internal Gate Resistance			1.78		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=1000\text{V}, f=1.0\text{MHz}$		3800		pF
C_{oss}	Output Capacitance			320		pF
C_{rss}	Reverse Transfer Capacitance			26		pF
Q_g	Total Gate Charge	$I_D=80\text{A}, V_{DS}=800\text{V}, V_{GS}=0/20\text{V}$		197		nC
Q_{gs}	Gate-Source Charge			43.2		nC
Q_{gd}	Gate-Drain ("Miller") Charge			72.0		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=800\text{V}, I_D=80\text{A}, R_G=0\Omega, V_{GS}=0/20\text{V}, T_j=25^\circ\text{C}$		12		ns
t_r	Rise Time			18		ns
$t_{d(off)}$	Turn-Off Delay Time			23		ns
t_f	Fall Time			14		ns

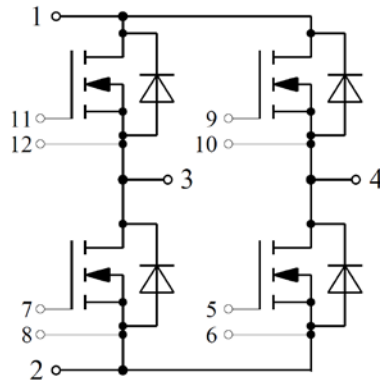
Body Diode Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	$I_S=40\text{A}, V_{GS}=-5\text{V}, T_j=25^\circ\text{C}$		3.30	3.75	V
t_{rr}	Diode Reverse Recovery Time	$V_R=800\text{V}, I_S=80\text{A}, di/dt=1400\text{A}/\mu\text{s}, V_{GS}=-5\text{V}, T_j=25^\circ\text{C}$		40		ns
Q_r	Diode Reverse Recovery Charge			660		nC
I_{RM}	Peak Reverse Recovery Current			25.6		A

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

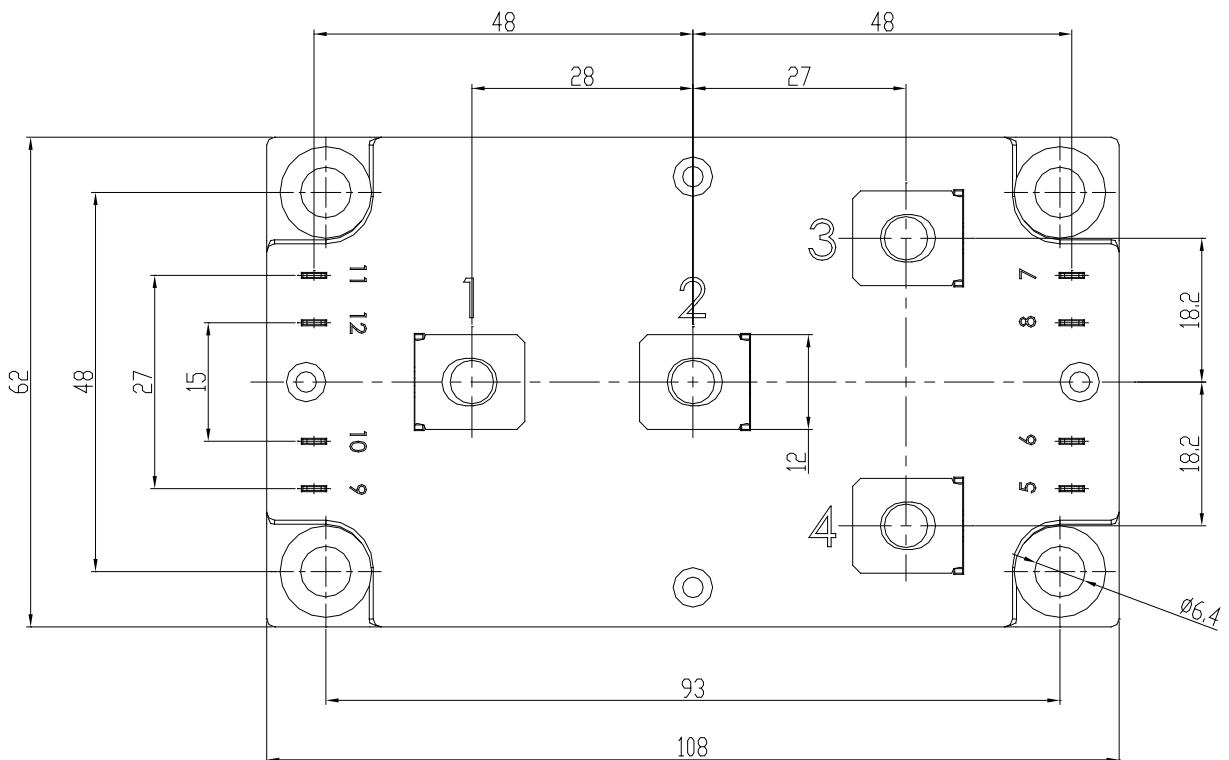
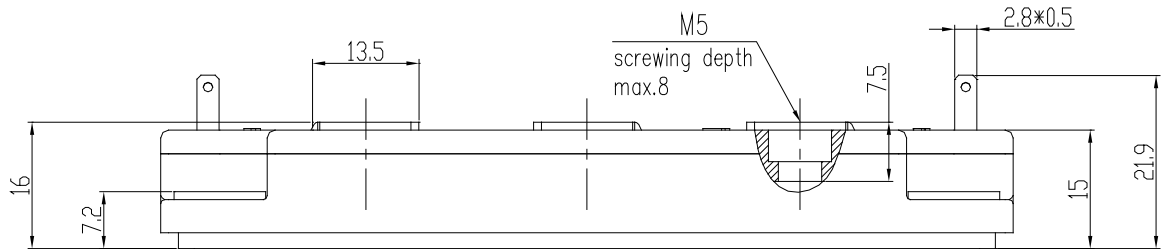
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per MOSFET)			0.261	K/W
R_{thCH}	Case-to-Heatsink (per MOSFET)		0.140		K/W
	Case-to-Heatsink (per module)		0.035		
M	Terminal Connection Torque, Screw M5	2.5		5.0	N.m
	Mounting Torque, Screw M6	3.0		5.0	
G	Weight of Module		300		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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