STARPOWER

SEMICONDUCTOR **MOSFET**

MD50CUR120D6S

1200V/50A chopper 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.

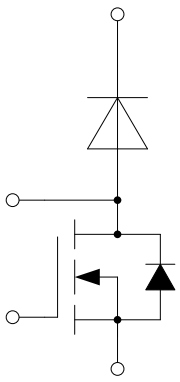
Features

- SiC power MOSFET
- Low $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Avalanche ruggedness
- Low inductance case
- AlN substrate for low thermal resistance
- Isolated copper baseplate using DBC technology

Typical Applications

- Electric vehicle
- Solar Power
- Switching mode power supply

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25°C unless otherwise noted

MOSFET

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSS}	Gate-Source Voltage	-4/+22	V
I_D	Drain Current	50	A
I_{DM}	Pulsed Drain Current	154	A
P_D	Maximum Power Dissipation @ T_j=175°C	222	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	50	A
I_{SM}	Pulsed Source Current	154	A

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	154	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 T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	I_D=20A,V_{GS}=18V, T_j=25°C		40.0	50.0	mΩ
		I_D=20A,V_{GS}=18V, T_j=125°C		60.0		
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=10.0mA,V_{DS}=10V, T_j=25°C	2.7		5.6	V
g_{fs}	Forward Transconductance	V_{DS}=10V,I_D=20A, T_j=25°C		8.8		S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25°C			20	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=V_{GSS},V_{DS}=0V, T_j=25°C			200	nA
R_{Gint}	Internal Gate Resistance			7.25		Ω
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=800V, f=1.0MHz		1570		pF
C_{oss}	Output Capacitance			150		pF
C_{rss}	Reverse Transfer Capacitance			70		pF
Q_g	Total Gate Charge	I_D=20A,V_{DS}=600V, V_{GS}=18V		120		nC
Q_{gs}	Gate-Source Charge			30		nC
Q_{gd}	Gate-Drain ("Miller") Charge			50		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=400V,I_D=20A, R_G=0Ω,V_{GS}=18V, T_j=25°C		15		ns
t_r	Rise Time			22		ns
$t_{d(off)}$	Turn-Off Delay Time			29		ns
t_f	Fall Time			24		ns

Body Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	I_S=20A,V_{GS}=0V,T_j=25°C		3.20	3.65	V
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_S=20A, di/dt=2200A/μs,V_{GS}=0V, T_j=25°C		17		ns
Q_r	Diode Reverse Recovery Charge			100		nC
I_{RM}	Peak Reverse Recovery Current			12.0		A

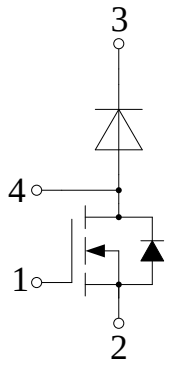
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	I_S=40A,V_{GS}=0V,T_j=25°C		1.40	1.85	V
I_{RM}	Peak Reverse Recovery Current	V_R=1200V,V_{GS}=0V, T_j=25°C		40		μA

Module Characteristics T_C=25°C unless otherwise noted

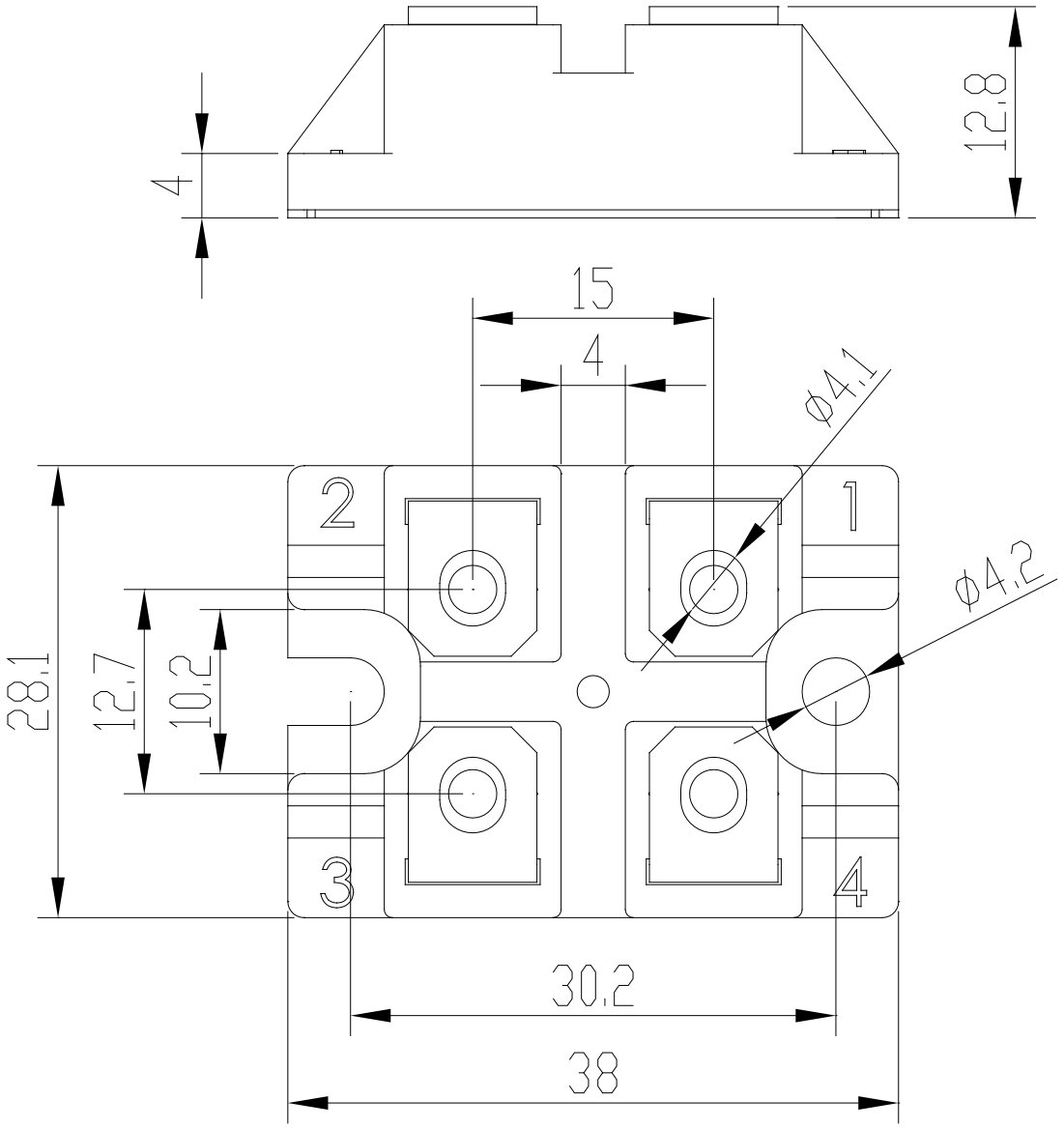
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per MOSFET) Junction-to-Case (per Diode)			0.674 0.524	K/W
R_{thCH}	Case-to-Heatsink (per MOSFET) Case-to-Heatsink (per Diode) Case-to-Heatsink (per module)		0.343 0.267 0.150		K/W
M	Terminal Connection Torque, Screw M4 Mounting Torque, Screw M4	1.1 1.1		1.5 1.5	N.m
G	Weight of Module		35		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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