STARPOWER

SEMICONDUCTOR **MOSFET**

MD15FSR120L2SF

1200V/15A 6 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.

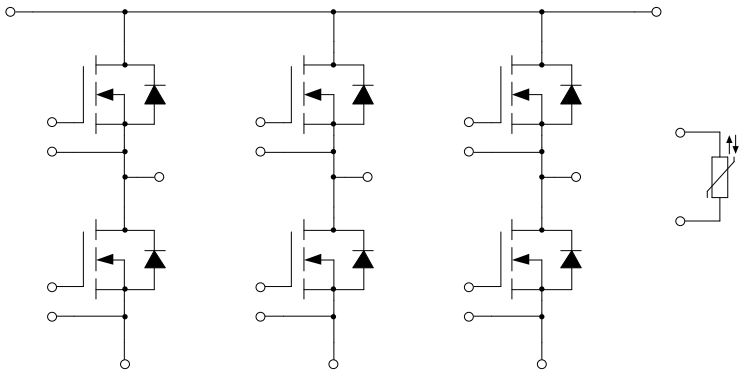
Features

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

Typical Applications

- Uninterruptible power supply
- 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 @ T_C=25°C @ T_C=100°C	23 16	A
I_{DM}	Pulsed Drain Current	52	A
P_D	Maximum Power Dissipation @ T_j=175°C	98	W

Inverse Diode

Symbol	Description	Value	Unit
I_S	Source Current @ T_C=100°C	TBD	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	2500	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=12A,V_{GS}=18V, T_j=25°C		62	78	mΩ
		I_D=12A,V_{GS}=18V, T_j=150°C		124		
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=6.45mA,V_{DS}=10V, T_j=25°C	2.8		4.8	V
g_{fs}	Forward Transconductance	V_{DS}=10V,I_D=12A, T_j=25°C		8.3		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			100	nA
R_{Gint}	Internal Gate Resistance			4.0		Ω
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=800V, f=1.0MHz		1498		pF
C_{oss}	Output Capacitance			45		pF
C_{rss}	Reverse Transfer Capacitance			3		pF
Q_g	Total Gate Charge	I_D=12A,V_{DS}=800V, V_{GS}=18V		64		nC
Q_{gs}	Gate-Source Charge			14		nC
Q_{gd}	Gate-Drain ("Miller") Charge			17		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=800V,I_D=12A, R_G=0Ω,V_{GS}=0/18V, T_j=25°C		4.4		ns
t_r	Rise Time			11		ns
$t_{d(off)}$	Turn-Off Delay Time			22		ns
t_f	Fall Time			10		ns
E_{on}	Turn-On Switching Loss	V_{DS}=800V,I_D=12A, R_G=0Ω,V_{GS}=0/18V, T_j=25°C		0.13		mJ
E_{off}	Turn-Off Switching Loss			0.01		mJ

Inverse Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_S=12A,V_{GS}=0V,T_j=25°C		3.3		V
t_{rr}	Diode Reverse Recovery Time	V_R=800V,I_S=12A, di/dt=3800A/μs,V_{GS}=0V, T_j=25°C		8.1		ns
Q_r	Diode Reverse Recovery Charge			105		nC
I_{rm}	Peak Reverse Recovery Current			26		A

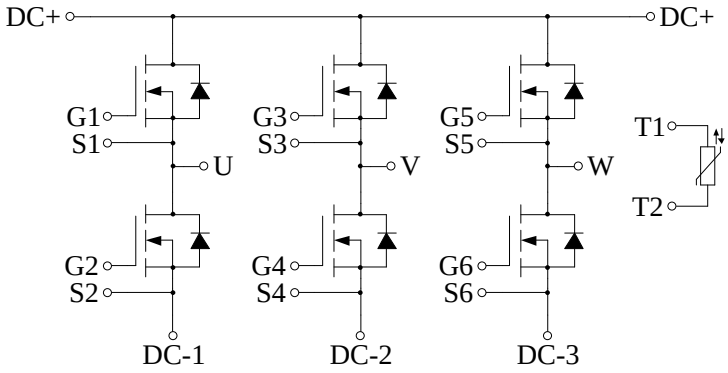
NTC Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated Resistance			5.0		kΩ
ΔR/R	Deviation of R_{100}	T_C=100 °C,R_{100}=493.3Ω	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3411		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3433		K

Module Characteristics T_C=25°C unless otherwise noted

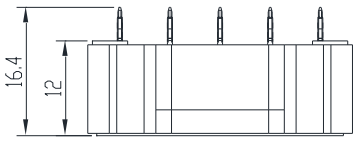
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per MOSFET)		1.384	1.522	K/W
R_{thCH}	Case-to-Heatsink (per MOSFET) Case-to-Heatsink (per Module)		0.348 0.058		K/W
F	Mounting Force Per Clamp	20		50	N.m
G	Weight of Module		24		g

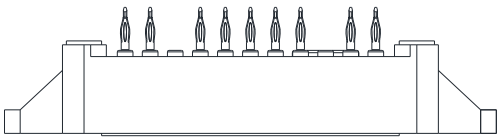
Circuit Schematic

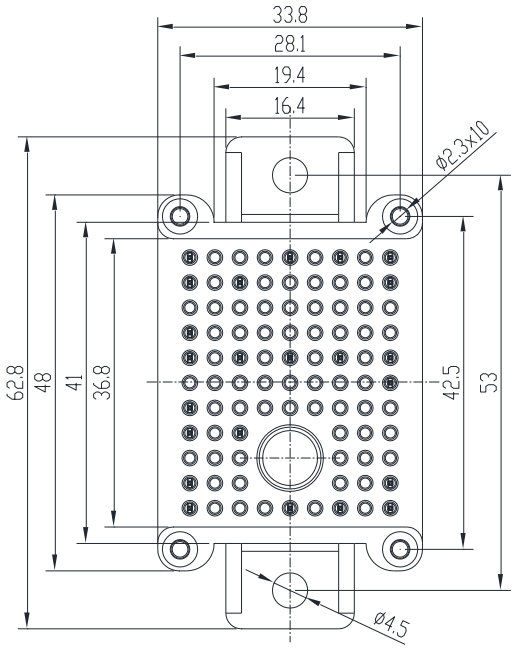


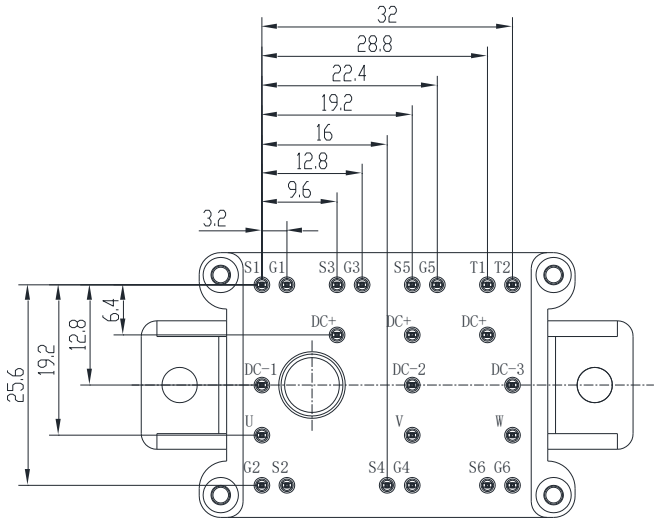
Package Dimensions

Dimensions in Millimeters









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