STARPOWER

SEMICONDUCTOR **MOSFET**

MD25CUR120D6S

1200V/25A 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.

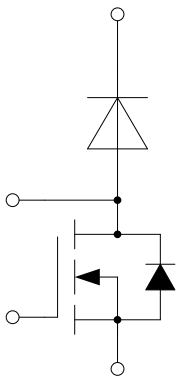
Features

- 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	25	A
I_{DM}	Pulsed Drain Current	77	A
P_D	Maximum Power Dissipation @ T_j=175°C	111	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	25	A
I_{SM}	Pulsed Source Current	77	A

Diode

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	25	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	77	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=10A,V_{GS}=18V, T_j=25°C		80	100	mΩ
		I_D=10A,V_{GS}=18V, T_j=125°C		120		
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=5.0mA,V_{DS}=10V, T_j=25°C	2.7		5.6	V
g_{fs}	Forward Transconductance	V_{DS}=10V,I_D=10A, T_j=25°C		4.4		S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25°C			10	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			12.0		Ω
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=800V, f=1.0MHz		785		pF
C_{oss}	Output Capacitance			75		pF
C_{rss}	Reverse Transfer Capacitance			35		pF
Q_g	Total Gate Charge	I_D=10A,V_{DS}=600V, V_{GS}=18V		60		nC
Q_{gs}	Gate-Source Charge			15		nC
Q_{gd}	Gate-Drain ("Miller") Charge			25		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=400V,I_D=10A, 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=10A,V_{GS}=0V,T_j=25°C		3.20	3.65	V
t_{rr}	Diode Reverse Recovery Time	V_R=600V,I_S=10A, di/dt=1100A/μs,V_{GS}=0V, T_j=25°C		17		ns
Q_r	Diode Reverse Recovery Charge			50		nC
I_{RM}	Peak Reverse Recovery Current			6.0		A

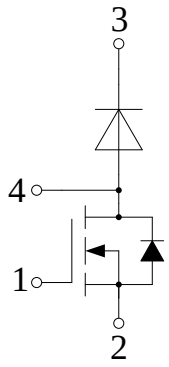
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	I_S=20A,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		20		μA

Module Characteristics T_C=25°C unless otherwise noted

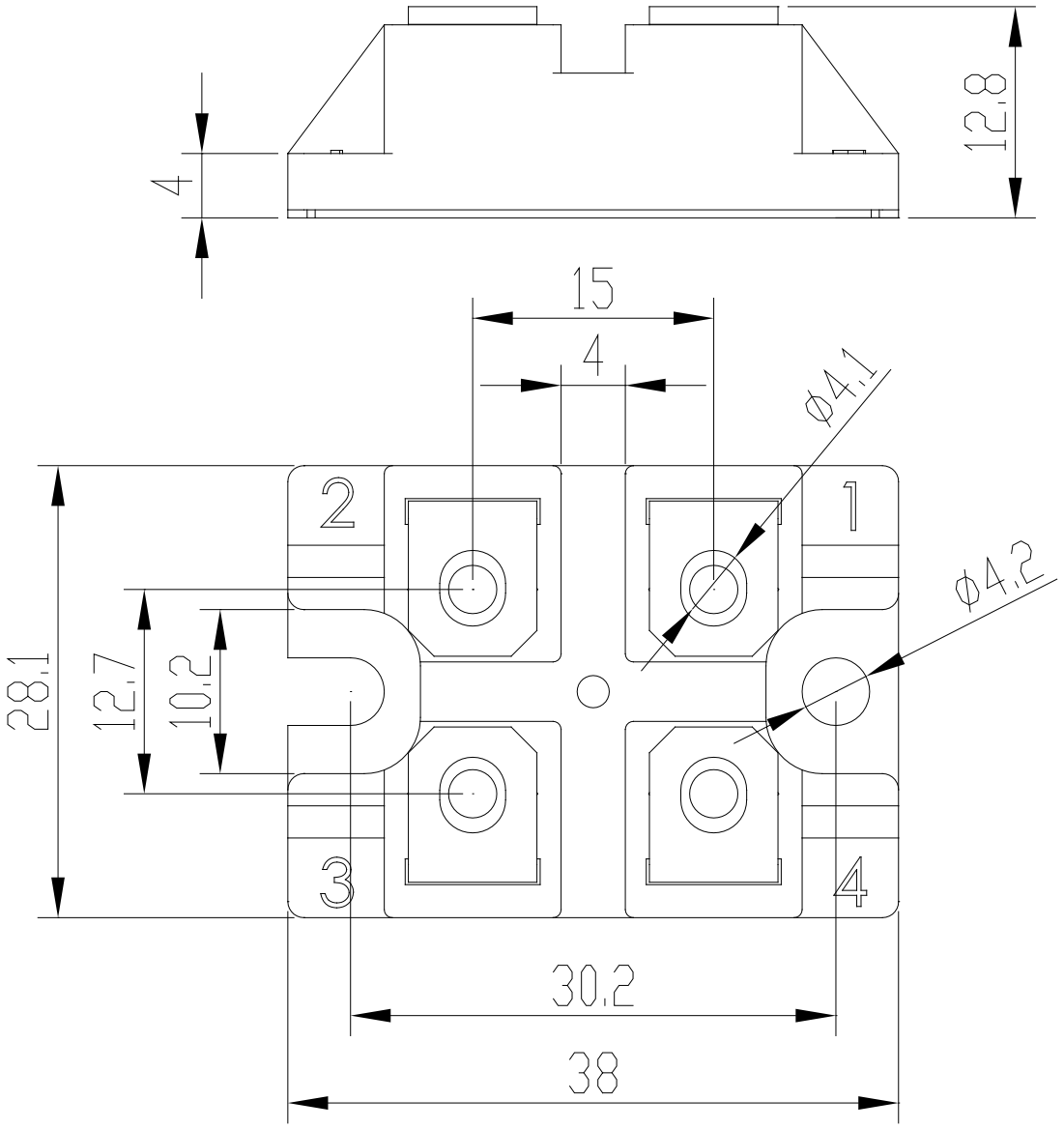
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per MOSFET) Junction-to-Case (per Diode)			1.348 1.048	K/W
R_{thCH}	Case-to-Heatsink (per MOSFET) Case-to-Heatsink (per Diode) Case-to-Heatsink (per module)		0.343 0.267 0.150		K/W
M	Terminal Connection Torque, Screw M4 Mounting Torque, 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



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.