

STARPOWER

SEMICONDUCTOR

MOSFET

MD35SGR120D6S

1200V/35A 1 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.

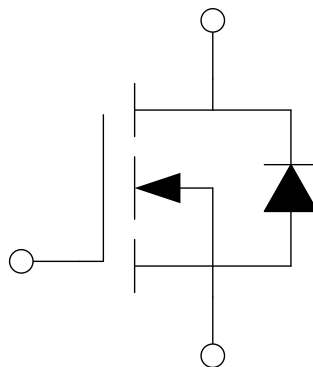
Features

- SiC power MOSFET
- Low $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Low inductance case
- 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 $T_C=25^{\circ}\text{C}$ 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 @ $T_C=25^{\circ}\text{C}$ @ $T_C=100^{\circ}\text{C}$	50	A
		35	
I_{DM}	Pulsed Drain Current	137	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	208	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	35	A
I_{SM}	Pulsed Source Current	137	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	175	$^{\circ}\text{C}$
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, $f=50\text{Hz}$, $t=1\text{min}$	4000	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	$I_D=20\text{A}, V_{GS}=18\text{V}, T_j=25^\circ\text{C}$		40.0	50.0	$\text{m}\Omega$
		$I_D=20\text{A}, V_{GS}=20\text{V}, T_j=125^\circ\text{C}$		60.0		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=10.0\text{mA}, V_{DS}=10\text{V}, T_j=25^\circ\text{C}$	2.7		5.6	V
g_{fs}	Forward Transconductance	$V_{DS}=10\text{V}, I_D=20\text{A}, T_j=25^\circ\text{C}$		8.3		S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$			10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_j=25^\circ\text{C}$			100	μA
R_{Gint}	Internal Gate Resistance			7.0		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=800\text{V}, f=1.0\text{MHz}$		1337		pF
C_{oss}	Output Capacitance			76		pF
C_{rss}	Reverse Transfer Capacitance			27		pF
Q_g	Total Gate Charge	$I_D=20\text{A}, V_{DS}=600\text{V}, V_{GS}=18\text{V}$		107		nC
Q_{gs}	Gate-Source Charge			22		nC
Q_{gd}	Gate-Drain ("Miller") Charge			41		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=400\text{V}, I_D=18\text{A}, R_G=0\Omega, V_{GS}=0/18\text{V}, T_j=25^\circ\text{C}$		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	$V_{DS}=600\text{V}, I_D=20\text{A}, R_G=0\Omega, V_{GS}=0/18\text{V}$		0.28		mJ
E_{off}	Turn-Off Switching Loss			0.12		mJ

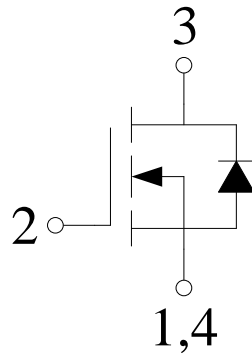
Body Diode Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
V_{SD}	Diode Forward Voltage	$I_S=20\text{A}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$		3.20	3.65	V	
t_{rr}	Diode Reverse Recovery Time	$V_R=600\text{V}, I_S=20\text{A}, di/dt=1100\text{A}/\mu\text{s}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$		25		ns	
Q_r	Diode Reverse Recovery Charge				115		nC
I_{RM}	Peak Reverse Recovery Current				9.0		A

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

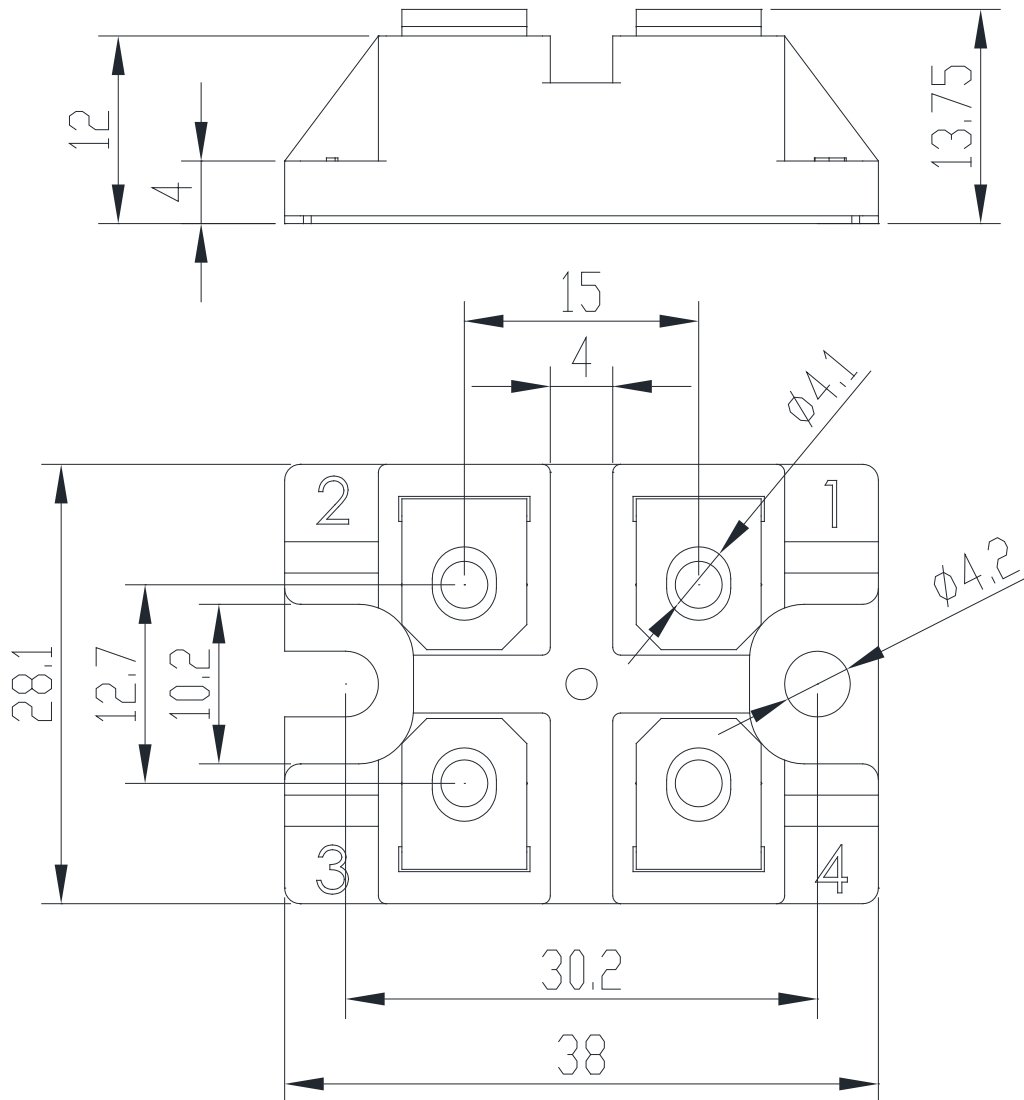
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case (per MOSFET)			0.720	K/W
R_{thCH}	Case-to-Heatsink (per Module)		0.15		K/W
M	Terminal Connection Torque, Screw M4	1.1		1.5	N.m
	Mounting Torque, Screw M4	1.1		1.5	
G	Weight of Module		35		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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