

STARPOWER

SEMICONDUCTOR

MOSFET

MD300HFC170C2S

1700V/300A 2 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 as SMPS and DC drives.

Features

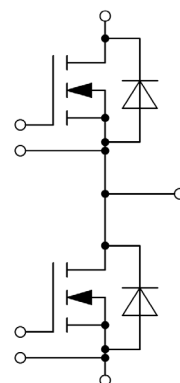
- SiC power MOSFET
- Low $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Low inductance case avoid oscillations
- Kelvin source terminals for easy drive
- Isolated copper baseplate using DBC technology



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	1700	V
V_{GSS}	Gate-Source Voltage	-10/+22	V
I_D	Drain Current @ $T_C=25^\circ\text{C}$ @ $T_C=100^\circ\text{C}$	430	A
		300	
I_{DM}	Pulsed Drain Current	960	A
P_D	Maximum Power Dissipation @ $T_j=150^\circ\text{C}$	1453	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	300	A
I_{SM}	Pulsed Source Current	960	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
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	$I_D=300\text{A}, V_{GS}=18\text{V}, T_j=25^\circ\text{C}$		7.5	11.7	$\text{m}\Omega$
		$I_D=300\text{A}, V_{GS}=18\text{V}, T_j=125^\circ\text{C}$		16.0		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=60.0\text{mA}, V_{DS}=10\text{V}, T_j=25^\circ\text{C}$	2.4	3.1		V
g_{fs}	Forward Transconductance	$V_{DS}=18\text{V}, I_D=300\text{A}, T_j=25^\circ\text{C}$		126		S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$			1.0	mA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_j=25^\circ\text{C}$			600	nA
R_{Gint}	Internal Gate Resistance			0.22		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=1000\text{V}, f=1.0\text{MHz}$		22.0		nF
C_{oss}	Output Capacitance			1.03		nF
C_{rss}	Reverse Transfer Capacitance			0.04		nF
Q_g	Total Gate Charge	$I_D=300\text{A}, V_{DS}=1200\text{V}, V_{GS}=-5\dots+18\text{V}$		942		nC
Q_{gs}	Gate-Source Charge			1369		nC
Q_{gd}	Gate-Drain ("Miller") Charge			294		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=1200\text{V}, I_D=300\text{A}, R_G=0.4\Omega, V_{GS}=-5/+18\text{V}, T_j=25^\circ\text{C}$		18		ns
t_r	Rise Time			25		ns
$t_{d(off)}$	Turn-Off Delay Time			35		ns
t_f	Fall Time			19		ns
E_{on}	Turn-On Switching Loss	$V_{DD}=1200\text{V}, I_D=300\text{A}, R_G=0.4\Omega,$		15.6		mJ
E_{off}	Turn-Off Switching Loss	$V_{GS}=-5/+18\text{V}, T_j=150^\circ\text{C}$		4.20		mJ

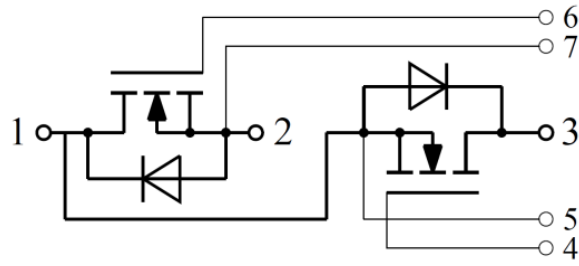
Diode Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=300\text{A}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$		1.60	1.90	V
		$I_F=300\text{A}, V_{GS}=0\text{V}, T_j=175^\circ\text{C}$		2.50	2.80	V
Q_C	Total Capacitive Charge	$V_R=1100\text{V}, T_j=25^\circ\text{C}$		2220		nC

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

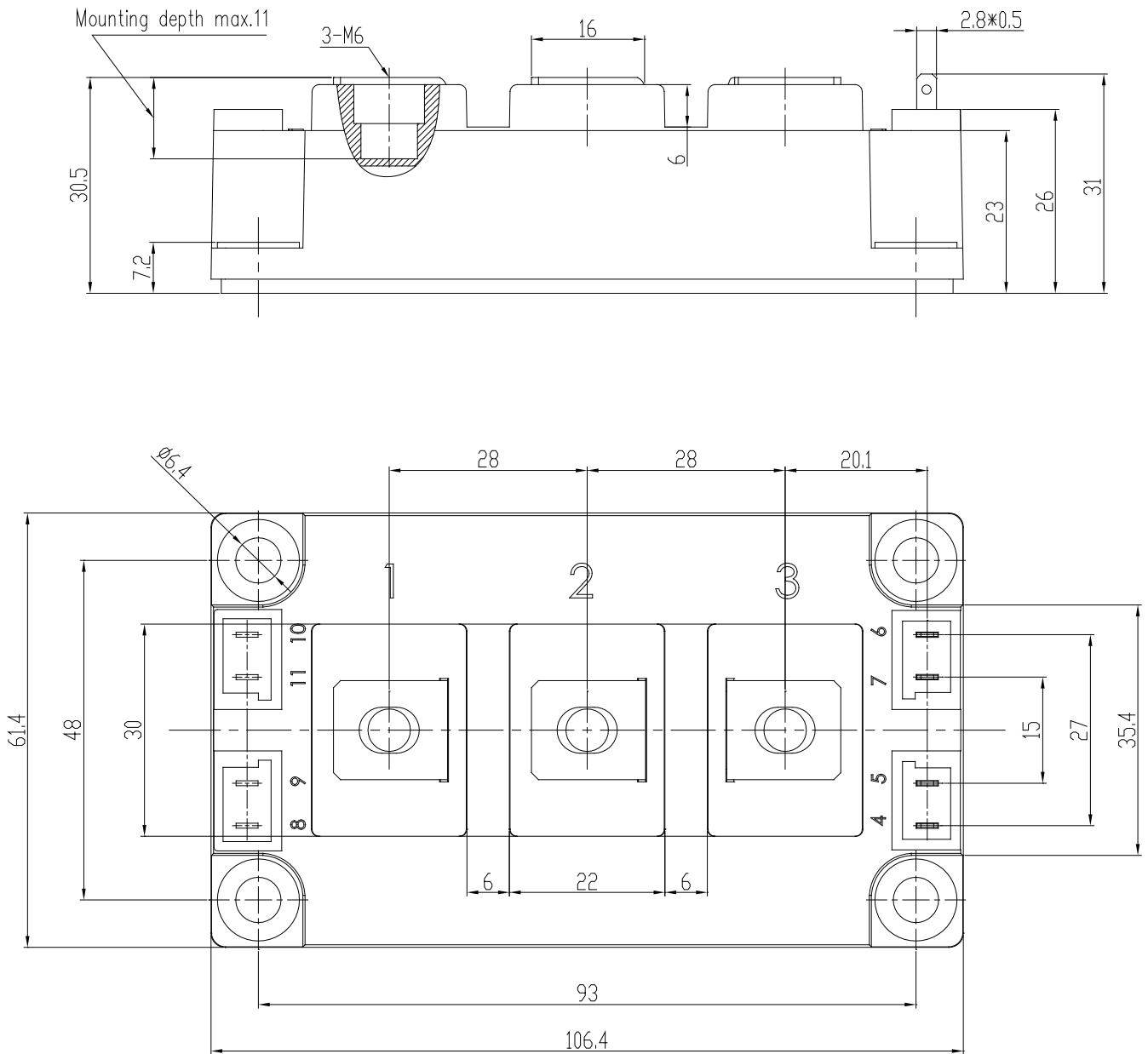
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		15	20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		0.35		m Ω
R_{thJC}	Junction-to-Case(Per MOSFET) Junction-to-Case(Per Diode)			0.086 0.078	K/W
R_{thCH}	Case-to-Sink(Per MOSFET) Case-to-Sink(Per Diode) Case-to-Sink(Per Module)		0.147 0.133 0.035		K/W
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M6	2.5 3.0		5.0 5.0	N.m
G	Weight of Module		300		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.