STARPOWER

SEMICONDUCTOR **MOSFET**

MD50FFC120C5S

1200V/50A 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 as SMPS and DC drives.

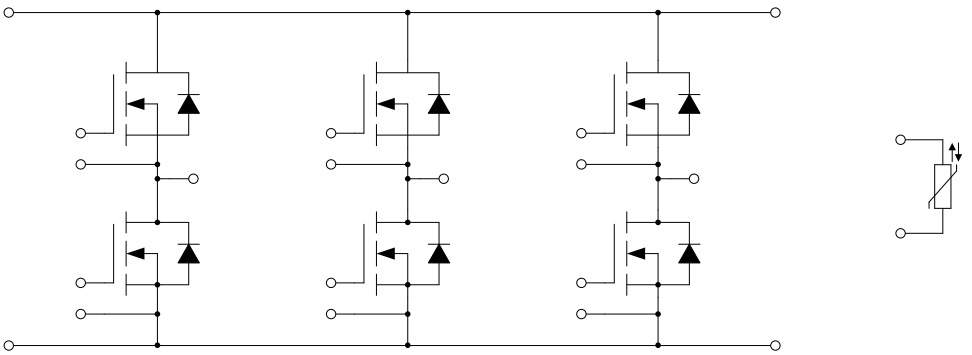
Features

- 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°C unless otherwise noted

MOSFET

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSS}	Gate-Source Voltage	-10/+25	V
I_D	Drain Current @ T_C=25°C @ T_C=100°C	86 50	A
I_{DM}	Pulsed Drain Current	250	A
P_D	Maximum Power Dissipation @ T_j=150°C	297	W

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	250	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	°C
T_{jop}	Operating Junction Temperature	-40 to +125	°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=50A,V_{GS}=18V, T_j=25°C		25.0	34.0	mΩ
		I_D=50A,V_{GS}=18V, T_j=150°C		43.0		
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=12.5mA,V_{DS}=20V, T_j=25°C	2.4	3.0		V
g_{fs}	Forward Transconductance	V_{DS}=20V,I_D=50A, T_j=25°C		23.6		S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25°C			0.1	mA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=V_{GSS},V_{DS}=0V, T_j=25°C			500	nA
R_{Gint}	Internal Gate Resistance			1.50		Ω
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=800V, f=1.0MHz		2.80		nF
C_{oss}	Output Capacitance			0.39		nF
C_{rss}	Reverse Transfer Capacitance			0.02		nF
Q_g	Total Gate Charge	I_D=50A,V_{DS}=800V, V_{GS}=-5/20V		178		nC
Q_{gs}	Gate-Source Charge			35		nC
Q_{gd}	Gate-Drain ("Miller") Charge			32		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=800V,I_D=50A, R_G=2.5Ω,V_{GS}=-5/20V, T_j=25°C		15		ns
t_r	Rise Time			31		ns
$t_{d(off)}$	Turn-Off Delay Time			30		ns
t_f	Fall Time			27		ns
E_{on}	Turn-On Switching Loss			1.4		mJ
E_{off}	Turn-Off Switching Loss			0.3		mJ

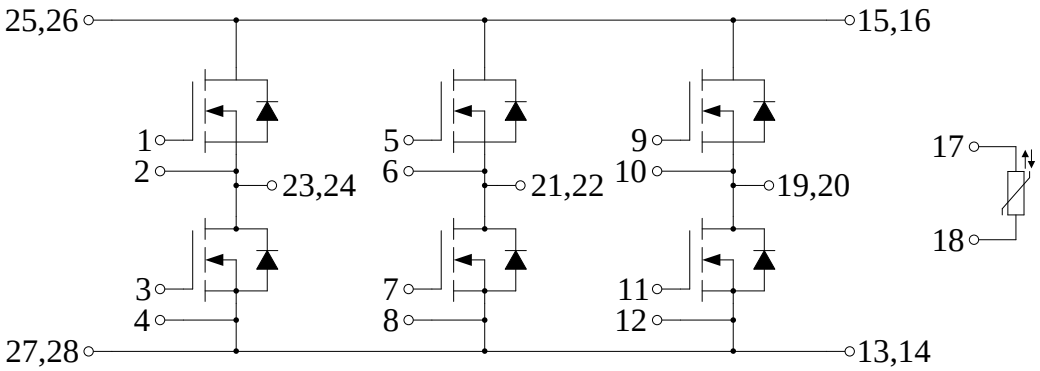
Diode Characteristics T_C=25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=50A,V_{GE}=0V,T_j=25°C		1.50	1.70	V
		I_F=50A,V_{GE}=0V,T_j=150°C		2.00		

Module Characteristics T_C=25°C unless otherwise noted

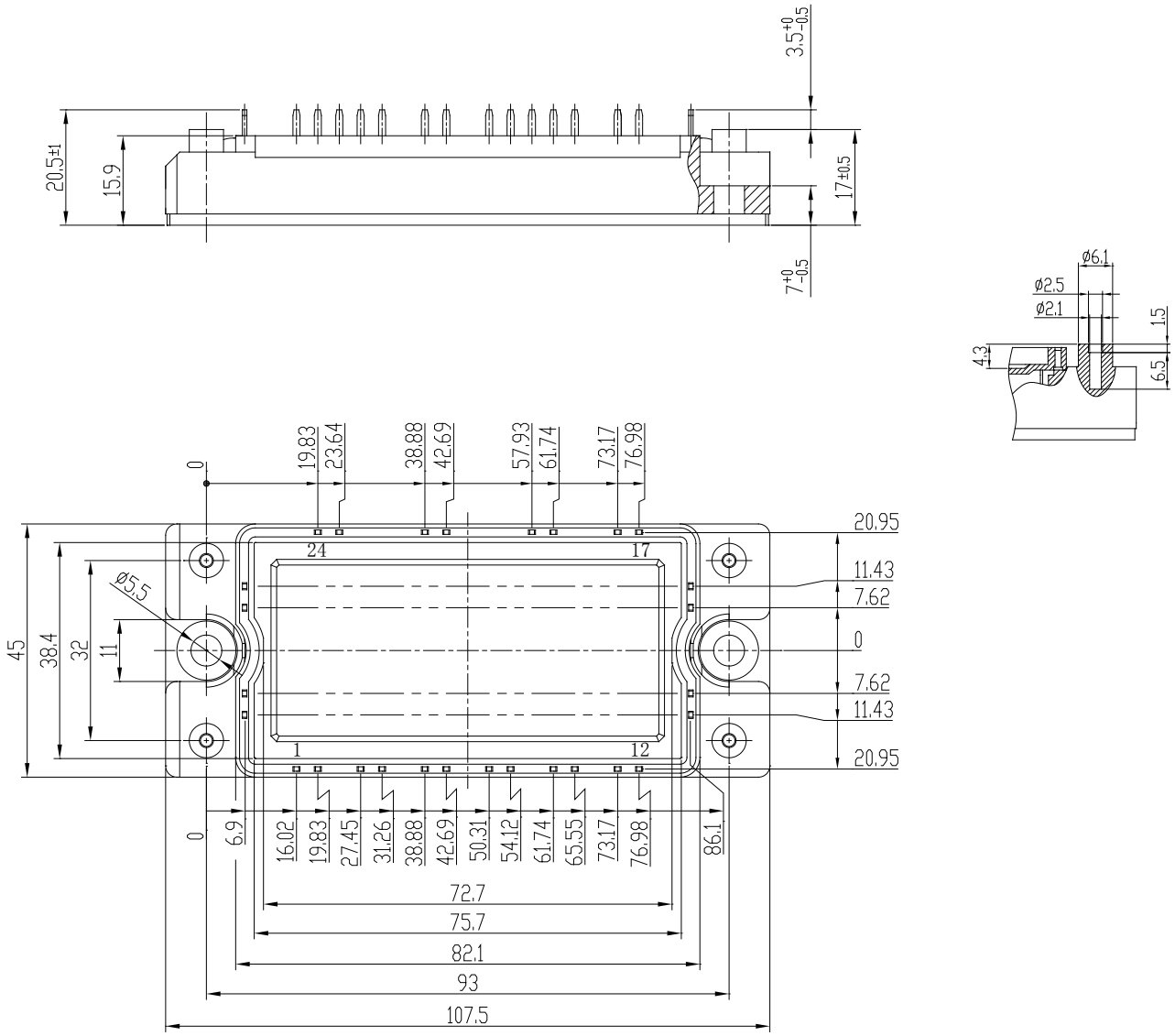
Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case(per MOSFET) Junction-to-Case(per Diode)			0.420 0.503	K/W
R_{thCH}	Case-to-Heatsink (per Module)		0.020		K/W
M	Mounting Torque, Screw M5	3.0		6.0	N.m
G	Weight of Module		200		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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