

STARPOWER

SEMICONDUCTOR

SiC MOSFET

MD30HTL120P8HT

1200V/3.00mΩ 6 in one-package

General Description

STARPOWER SiC MOSFET Power Module provides very low $R_{DS(on)}$ as well as high blocking voltage.

It's designed for the applications such as hybrid and electric vehicle.

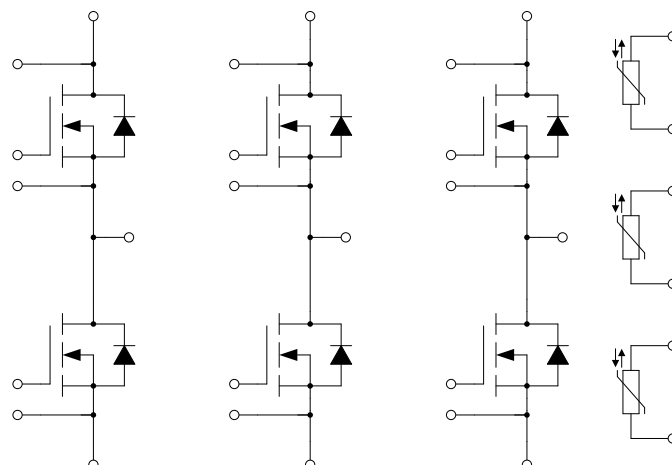
Features

- SiC power MOSFET
- High blocking voltage with low $R_{DS(on)}$
- Easy to parallel and simple to drive
- Low inductance case avoid oscillations
- Isolated copper pinfin baseplate using Si_3N_4 AMB technology

Typical Applications

- Automotive application
- Hybrid and electric vehicle
- Inverter for motor drive

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_F=25^{\circ}\text{C}$ unless otherwise noted**MOSFET**

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSSmax}	Gate-Source Voltage	-8/+19	V
V_{GSSop}	Gate-Source Voltage	-4/+15	V
I_D	Drain Current @ $T_F=60^{\circ}\text{C}$ $T_{vj}=200^{\circ}\text{C}$	330	A
I_{DRM}	Repetitive Peak Drain Current $t_p=1\text{ms}$	660	A
P_D	Maximum Power Dissipation @ $T_F=60^{\circ}\text{C}$ $T_{vj}=200^{\circ}\text{C}$	740	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	TBD	A

Module

Symbol	Description	Value	Unit
T_{vjmax}	Maximum Junction Temperature	200	$^{\circ}\text{C}$
T_{vjop}	Operating Junction Temperature continuous For 10s within a period of 30s, occurrence maximum 3000 times over lifetime	-40 to +185 +185 to +200	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}$, $t=1\text{min}$	3000	V

MOSFET Characteristics $T_F=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=314\text{A}, V_{GS}=15\text{V}, T_{vj}=25^{\circ}\text{C}$		3.00		$\text{m}\Omega$
		$I_D=314\text{A}, V_{GS}=15\text{V}, T_{vj}=175^{\circ}\text{C}$		5.48		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=88\text{mA}, V_{DS}=V_{GS}, T_{vj}=25^{\circ}\text{C}$	1.8	2.5	3.2	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			500	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=15\text{V}, V_{DS}=0\text{V}, T_{vj}=25^{\circ}\text{C}$			400	nA
R_{Gint}	Internal Gate Resistance			1.0		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=1000\text{V}, f=100\text{kHz}$		27.9		nF
C_{oss}	Output Capacitance			0.89		nF
C_{rss}	Reverse Transfer Capacitance			0.06		nF
Q_g	Total Gate Charge	$I_D=314\text{A}, V_{DS}=800\text{V}, V_{GS}=-4/+15\text{V}$		1.03		μC
$t_{d(on)}$	Turn-On Delay Time	TBD		TBD		ns
t_r	Rise Time			TBD		ns
$t_{d(off)}$	Turn-Off Delay Time			TBD		ns
t_f	Fall Time			TBD		ns
E_{on}	Turn-On Switching Loss			TBD		mJ
E_{off}	Turn-Off Switching Loss			TBD		mJ
$t_{d(on)}$	Turn-On Delay Time	TBD		TBD		ns
t_r	Rise Time			TBD		ns
$t_{d(off)}$	Turn-Off Delay Time			TBD		ns
t_f	Fall Time			TBD		ns
E_{on}	Turn-On Switching Loss			TBD		mJ
E_{off}	Turn-Off Switching Loss			TBD		mJ
$t_{d(on)}$	Turn-On Delay Time	TBD		TBD		ns
t_r	Rise Time			TBD		ns
$t_{d(off)}$	Turn-Off Delay Time			TBD		ns
t_f	Fall Time			TBD		ns
E_{on}	Turn-On Switching Loss			TBD		mJ
E_{off}	Turn-Off Switching Loss			TBD		mJ

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	$I_{SD}=160\text{A}, V_{GS}=-4\text{V}, T_{vj}=25^{\circ}\text{C}$		4.20		V
		$I_{SD}=160\text{A}, V_{GS}=-4\text{V}, T_{vj}=175^{\circ}\text{C}$		TBD		
Q_r	Diode Reverse Recovery Charge	TBD		TBD		μC
I_{rrm}	Peak Reverse Recovery Current			TBD		A
E_{rec}	Reverse Recovery Energy			TBD		mJ
Q_r	Diode Reverse Recovery Charge	TBD		TBD		μC
I_{rrm}	Peak Reverse Recovery Current			TBD		A
E_{rec}	Reverse Recovery Energy			TBD		mJ
Q_r	Diode Reverse Recovery Charge	TBD		TBD		μC
I_{rrm}	Peak Reverse Recovery Current			TBD		A
E_{rec}	Reverse Recovery Energy			TBD		mJ

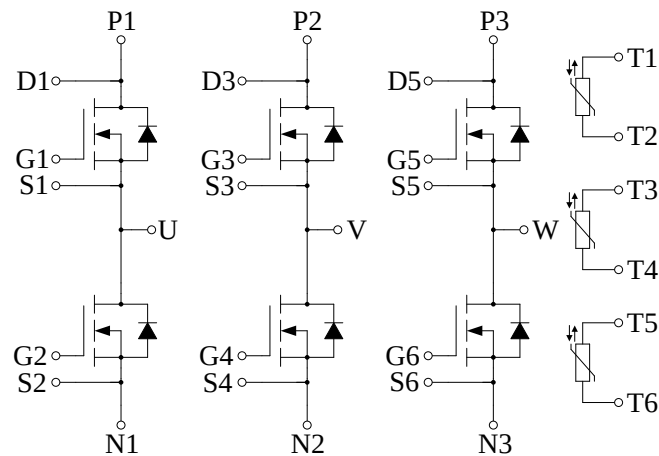
NTC Characteristics $T_F=25^{\circ}\text{C}$ unless otherwise noted

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

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

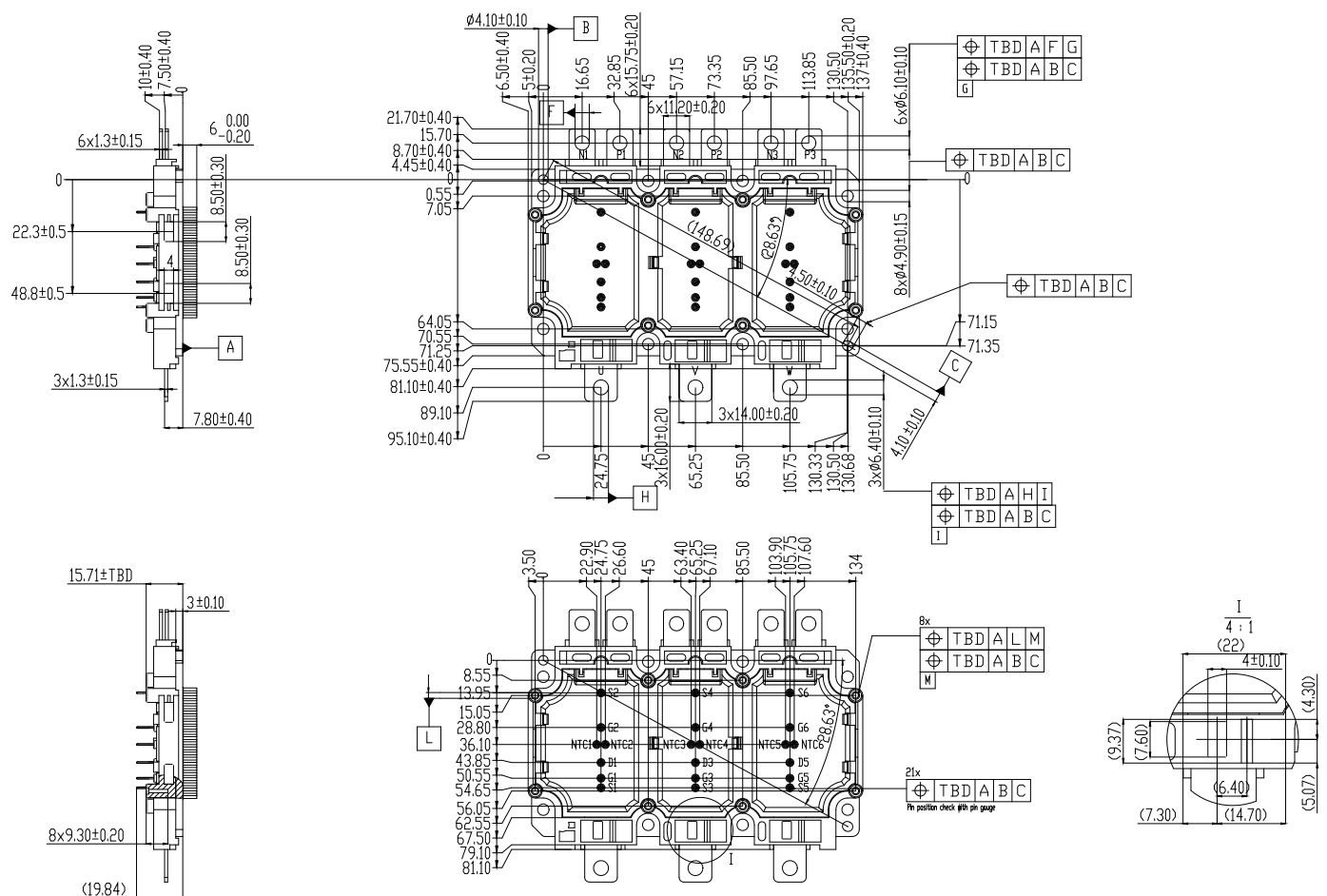
Symbol	Parameter	Min.	Typ.	Max.	Unit
L_{CE}	Stray Inductance		TBD		nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip		TBD		$\text{m}\Omega$
R_{thJF}	Junction-to-Cooling Fluid (per MOSFET) $\Delta V/\Delta t=10.0\text{dm}^3/\text{min}, T_F=60^{\circ}\text{C}$			0.189	K/W
G	Weight of Module		TBD		g

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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