STARPOWER

SEMICONDUCTOR **MOSFET**

MD80HCN500B3S

500V/80A 4 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 DC drives.

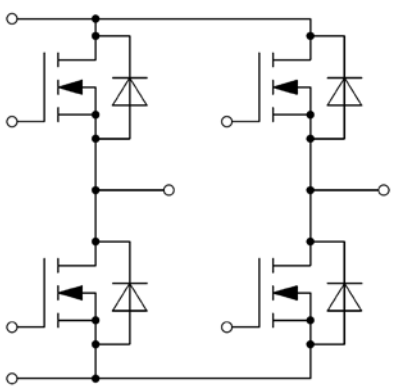
Features

- 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
- UPS equipment
- Plasma cutting

Equivalent Circuit Schematic



Absolute Maximum Ratings T_C=25℃ unless otherwise noted

MOSFET

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	500	V
V_{GSS}	Gate-Source Voltage	±30	V
I_D	Drain Current @ T_C=25℃ @ T_C=100℃	80 52	A
I_{DM}	Pulsed Drain Current	200	A
P_D	Maximum Power Dissipation @ T_j=150℃	661	W

Inverse Diode

Symbol	Description	Value	Unit
I_S	Source Current	80	A
I_{SM}	Pulsed Source Current	200	A

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	℃
T_{jop}	Operating Junction Temperature	-40 to +125	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
M	Terminal Connection Torque, Screw M6 Mounting Torque, Screw M6	2.5 to 5.0 3.0 to 5.0	N.m

MOSFET Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	I_D=40A,V_{GS}=10V, T_j=25℃			32.5	mΩ
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=8.0mA,V_{DS}=V_{GS}, T_j=25℃	3.0		5.0	V
g_{fs}	Forward Transconductance	V_{DS}=20V,I_D=40A	45	70		S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25℃			25	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=V_{GSS},V_{DS}=0V, T_j=25℃			200	nA
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=25V, f=1.0MHz		12.7		nF
C_{oss}	Output Capacitance			1.28		nF
C_{rss}	Reverse Transfer Capacitance			0.12		nF
Q_g	Total Gate Charge	I_D=40A,V_{DS}=250V, V_{GS}=10V		197		nC
Q_{gs}	Gate-Source Charge			70		nC
Q_{gd}	Gate-Drain ("Miller") Charge			64		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=250V,I_D=40A, R_G=1.0Ω,V_{GS}=10V, T_j=25℃		25		ns
t_r	Rise Time			27		ns
$t_{d(off)}$	Turn-Off Delay Time			70		ns
t_f	Fall Time			16		ns

Inverse Diode Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	I_S=80A,V_{GS}=0V,T_j=25℃			1.50	V
t_{rr}	Diode Reverse Recovery Time	V_R=100V,I_F=25A, -di/dt=100A/μs, T_j=25℃, V_{GS}=0V			200	ns
I_{RM}	Peak Reverse Recovery Current			6		A
Q_r	Diode Reverse Recovery Charge			0.6		μC

Module Characteristics T_C=25℃ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{θJC}$	Junction-to-Case(Mosfet)			0.189	K/W
$R_{θCS}$	Case-to-Sink(Mosfet)		0.140		K/W
$R_{θCS}$	Case-to-Sink		0.035		K/W
G	Weight of Module		300		g

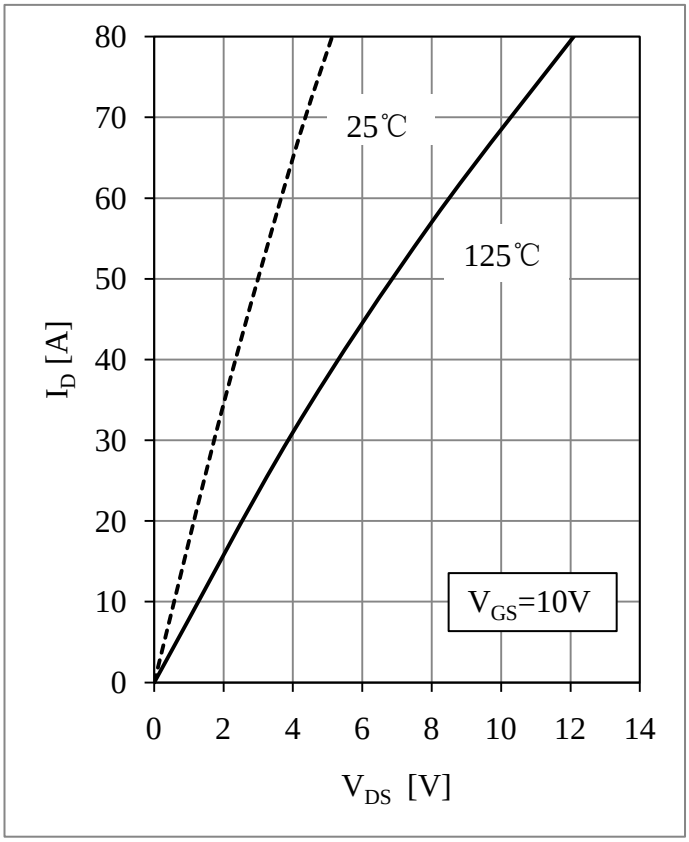


Fig 1. Mosfet Output Characteristics

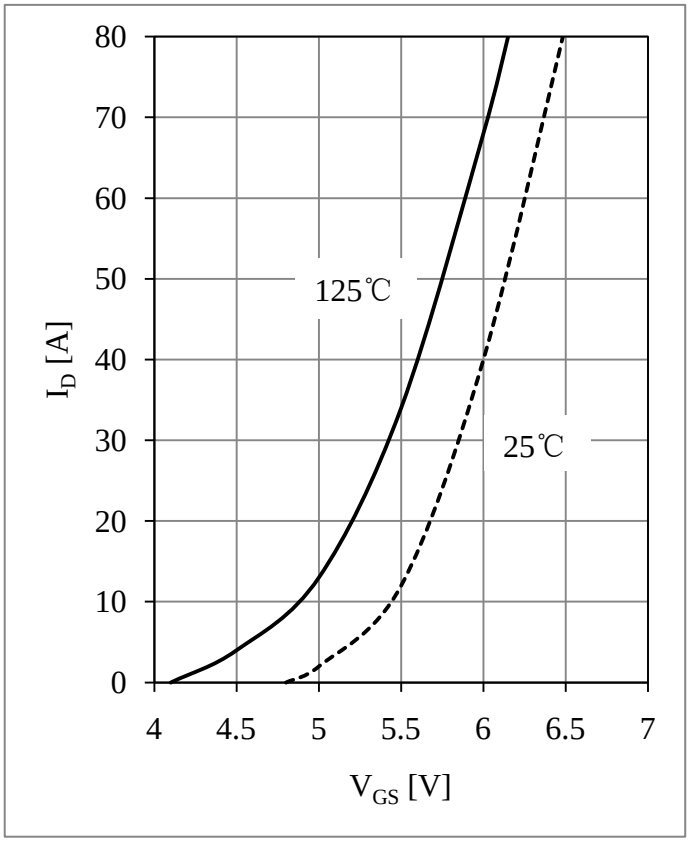


Fig 2. Mosfet Transfer Characteristics

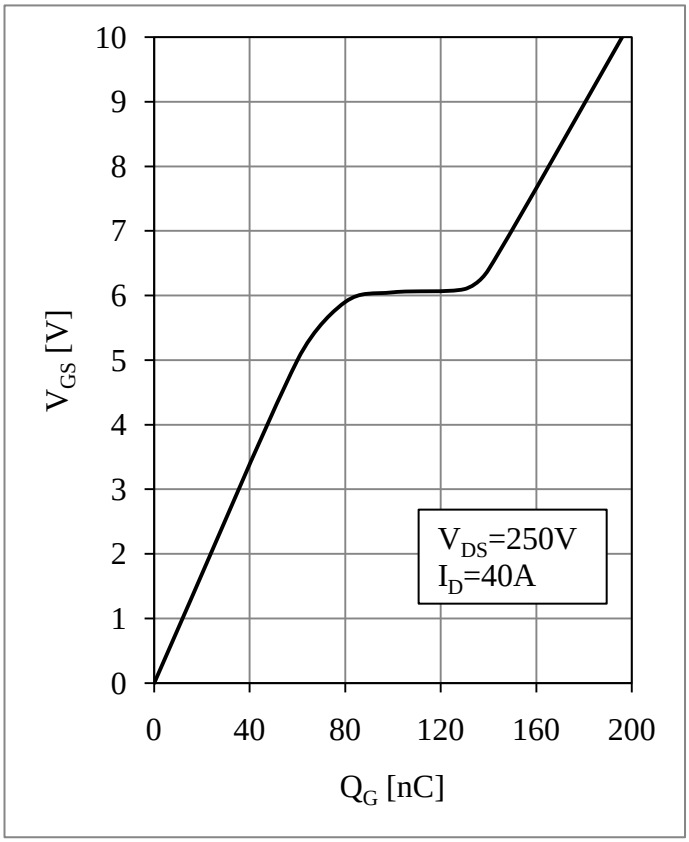


Fig 3. Gate Charge Characteristic

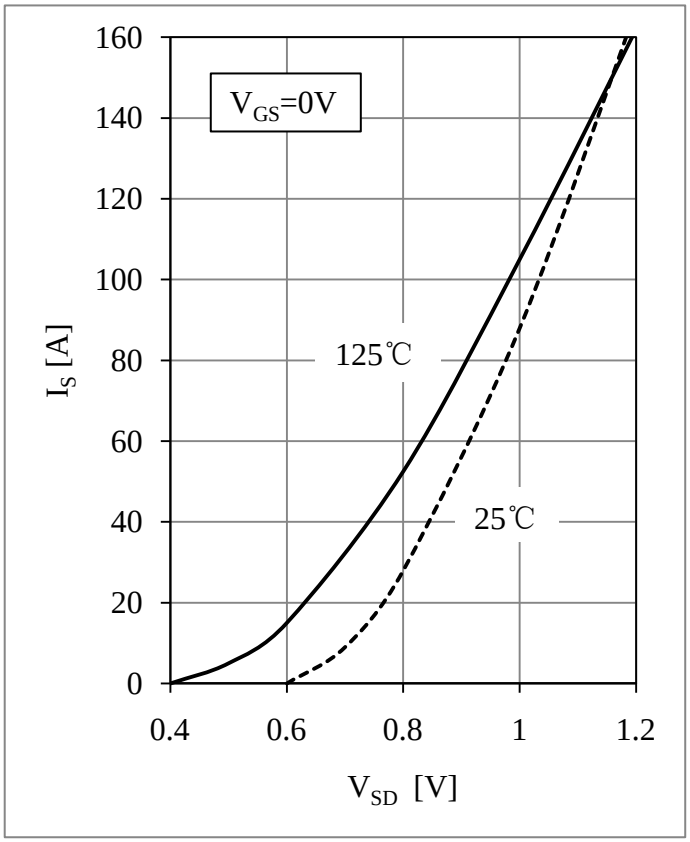


Fig 4. Inverse Diode Output Characteristics

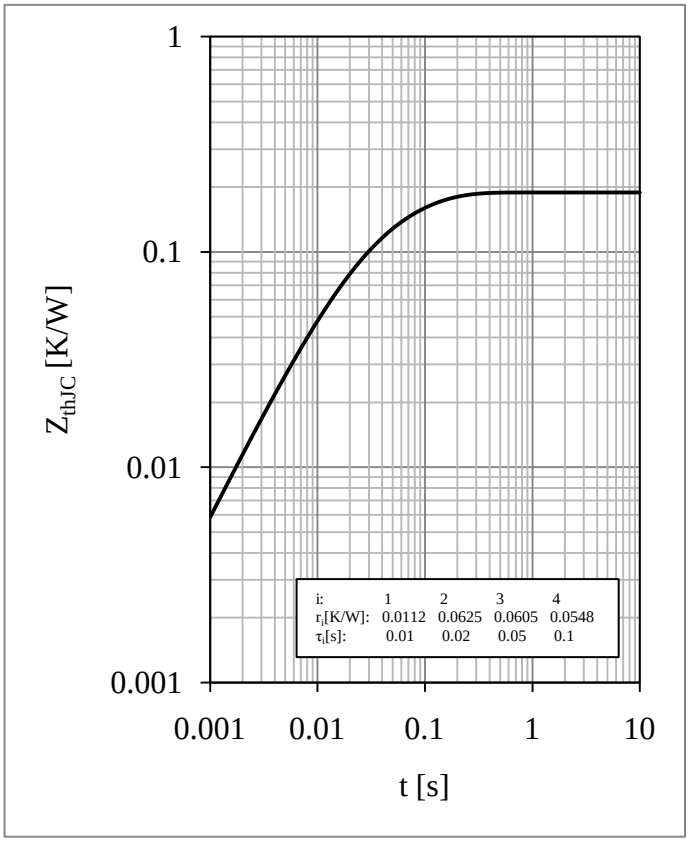
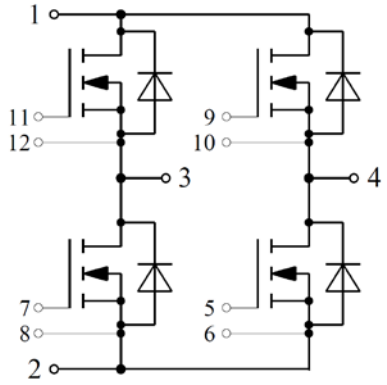


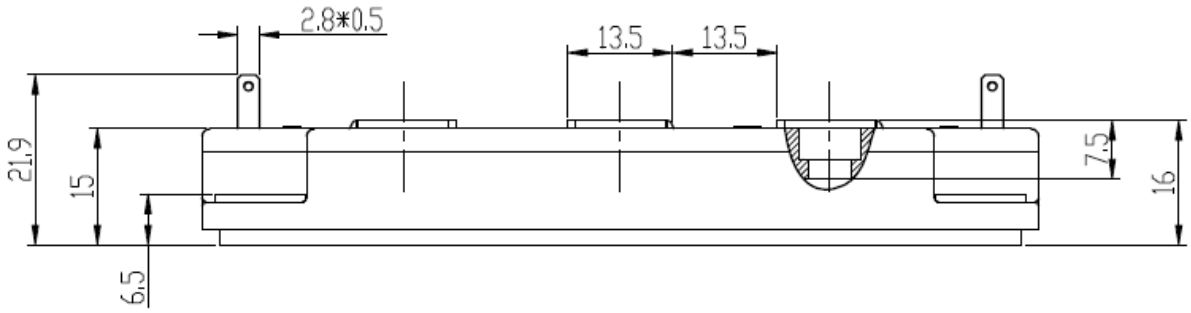
Fig 5. Transient Thermal Impedance

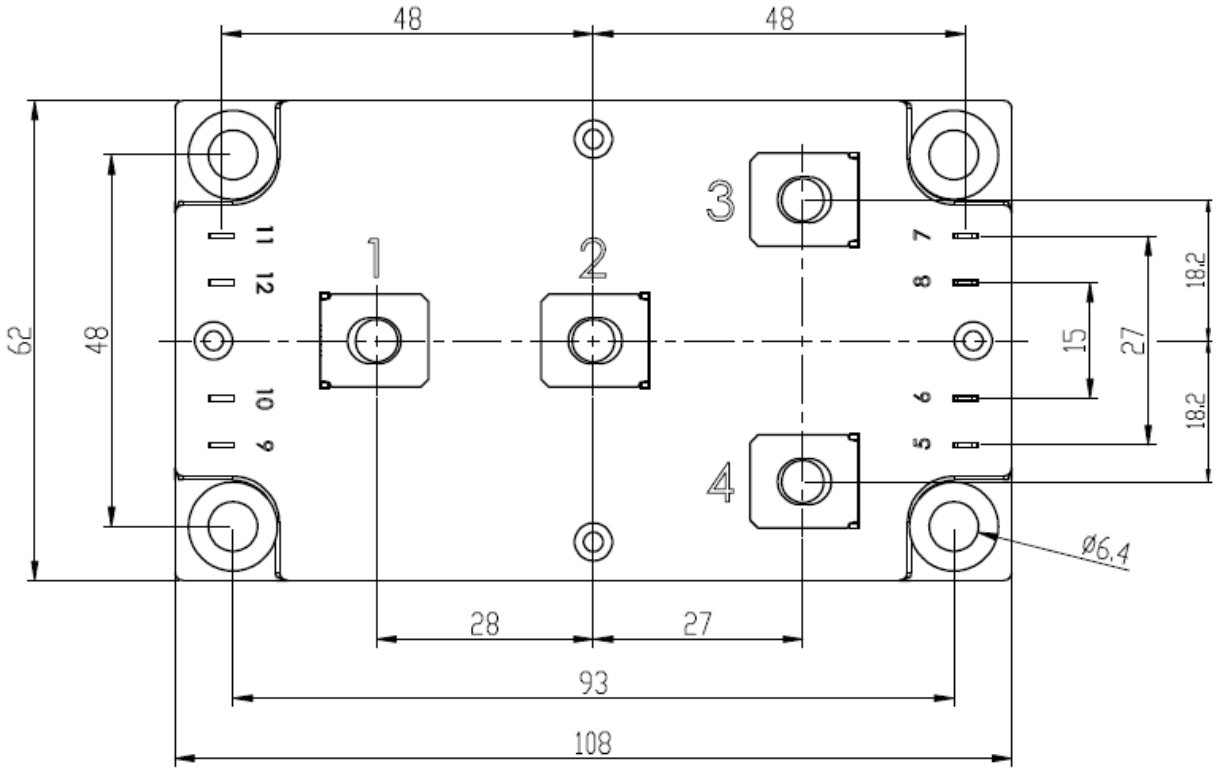
Circuit Schematic



Package Dimensions

Dimensions in Millimeters





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