STARPOWER

SEMICONDUCTOR **MOSFET**

MD680HFN100B3S

Molding Type Module

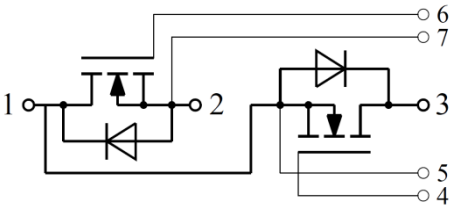
100V/680A 2 in one-package

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 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



Equivalent Circuit Schematic

Typical Applications

- Main and auxiliary AC drives of electric vehicles
- DC servo and robot drives
- Battery vehicles
- UPS equipment
- Plasma cutting

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	MD680HFN100B3S	Units
V_{DSS}	Drain-Source Voltage	100	V
V_{GSS}	Gate-Source Voltage	±30	V
I_D	Drain Current @ T_C=25℃ @ T_C=100℃	680 480	A
I_F	Diode Forward Current	680	A
P_D	Maximum Power Dissipation @ T_j=175℃	1595	W
T_{jmax}	Maximum Junction Temperature	175	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
Mounting Torque	Power Terminal Screw:M6 Mounting Screw:M6	2.5 to 5.0 3.0 to 5.0	N.m

Electrical Characteristics of MOSFET T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	T_j=25℃	100			V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=V_{DSS},V_{GS}=0V, T_j=25℃			1.0	mA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=V_{GSS},V_{DS}=0V, T_j=25℃			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate-Source Threshold Voltage	I_D=1.0mA,V_{DS}=V_{GS}, T_j=25℃	3.0	4.1	5.0	V
$R_{DS(on)}$ (chip)	Static Drain-Source On-Resistance	I_D=400A,V_{GS}=10V, T_j=25℃			2.25	mΩ
g_{fs}	Forward Transconductance	V_{DS}=50V,I_D=400A	208			S
$V_{DS(on)}$ (terminal)	Drain-Source On-Resistance Voltage	I_D=400A,V_{GS}=10V, T_j=25℃		0.71	1.00	V

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
R_{Gint}	Internal Gate Resistance			0.68		Ω
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=50V,I_D=400A, R_G=0.26Ω,V_{GS}=±10V, T_j=25℃		25		ns
t_r	Rise Time			270		ns
$t_{d(off)}$	Turn-Off Delay Time			45		ns
t_f	Fall Time			140		ns
Q_g	Total Gate Charge	I_D=400A,V_{DS}=80V, V_{GS}=10V		1040		nC
Q_{gs}	Gate-Source Charge			196		nC
Q_{gd}	Gate-Drain ("Miller") Charge			640		nC
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=25V, f=1.0MHz		27.2		nF
C_{oss}	Output Capacitance			9.88		nF
C_{rss}	Reverse Transfer Capacitance			3.96		nF
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance,Terminal to Chip	T_C=25℃		0.35		mΩ

Electrical Characteristics of Inverse Diode T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD} (chip)	Diode Forward Voltage	I_S=400A,V_{GS}=0V,T_j=25℃			1.30	V
V_{SD} (terminal)	Diode Forward Voltage	I_S=400A,V_{GS}=0V,T_j=25℃		0.89	1.30	V
t_{rr}	Diode Reverse Recovery Time	V_R=50V,I_F=400A, di/dt=400A/μs, T_j=25℃		220		ns
Q_{rr}	Diode Reverse Recovery Charge			6.56		μC

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per MOSFET)		0.094	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

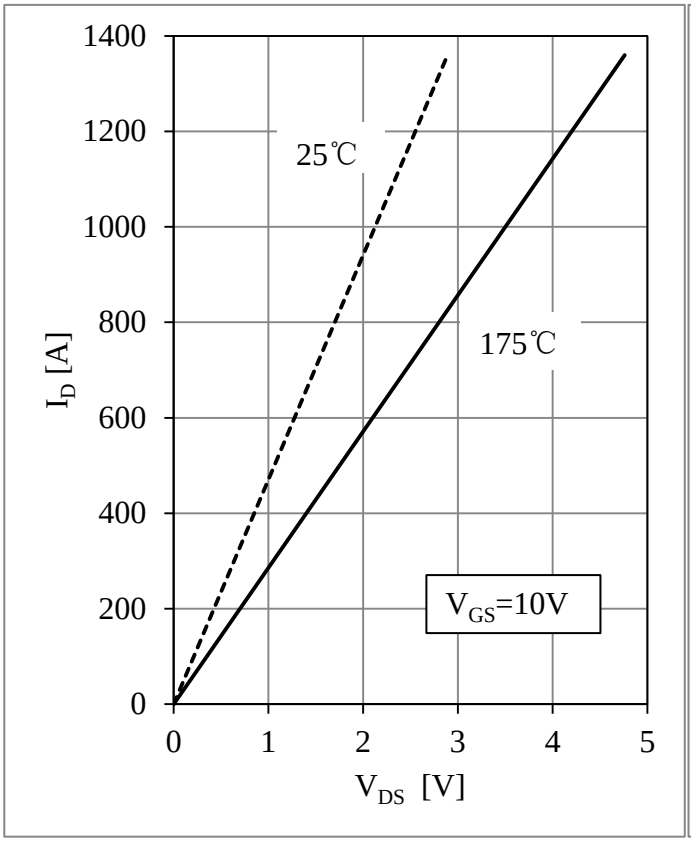


Fig 1. Mosfet Output Characteristic

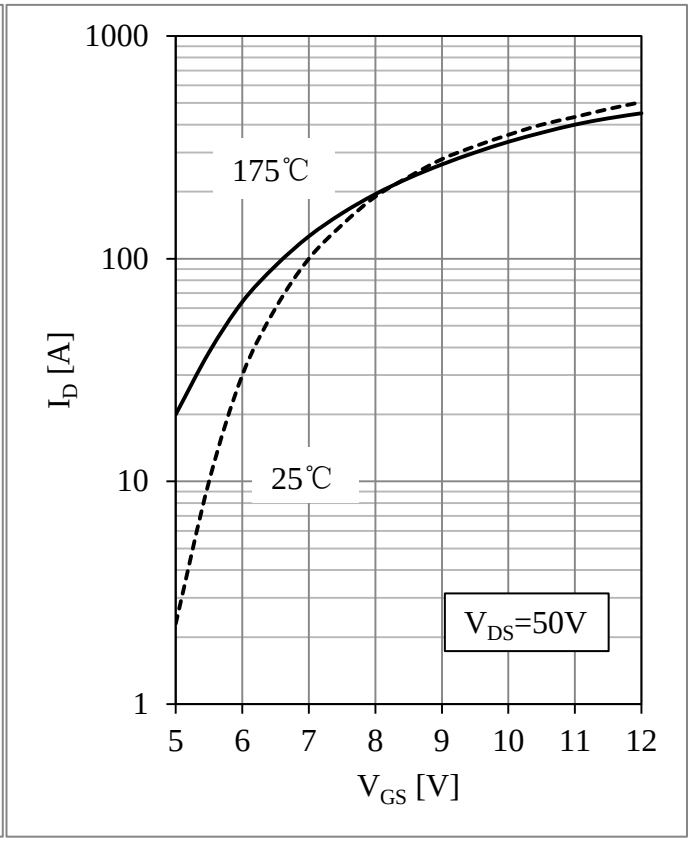


Fig 2. Mosfet Transfer Characteristic

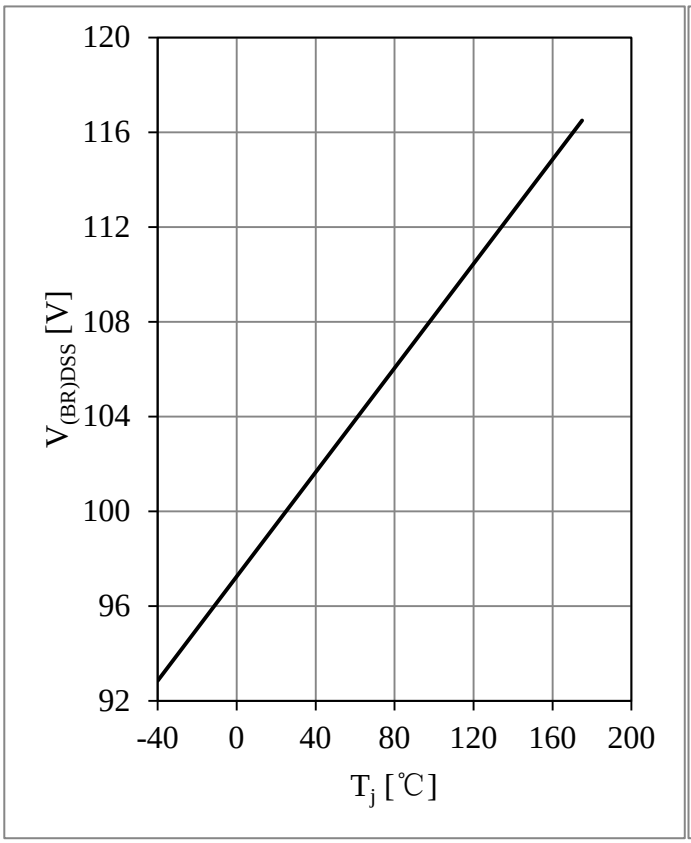


Fig 3. Brakedown Voltage vs. Temperature

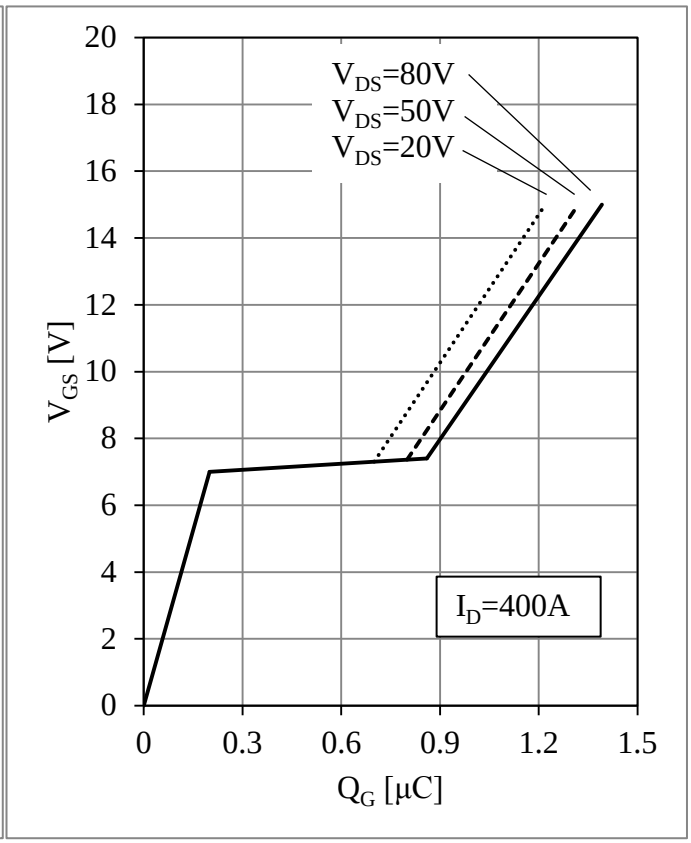


Fig 4. Gate Charge Characteristic

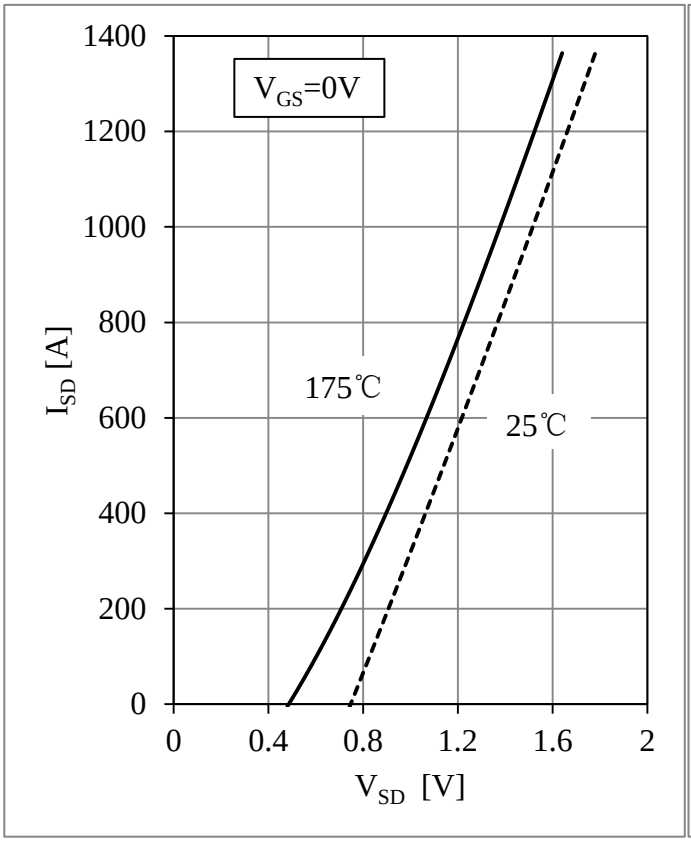


Fig 5. Inverse Diode Output Characteristic

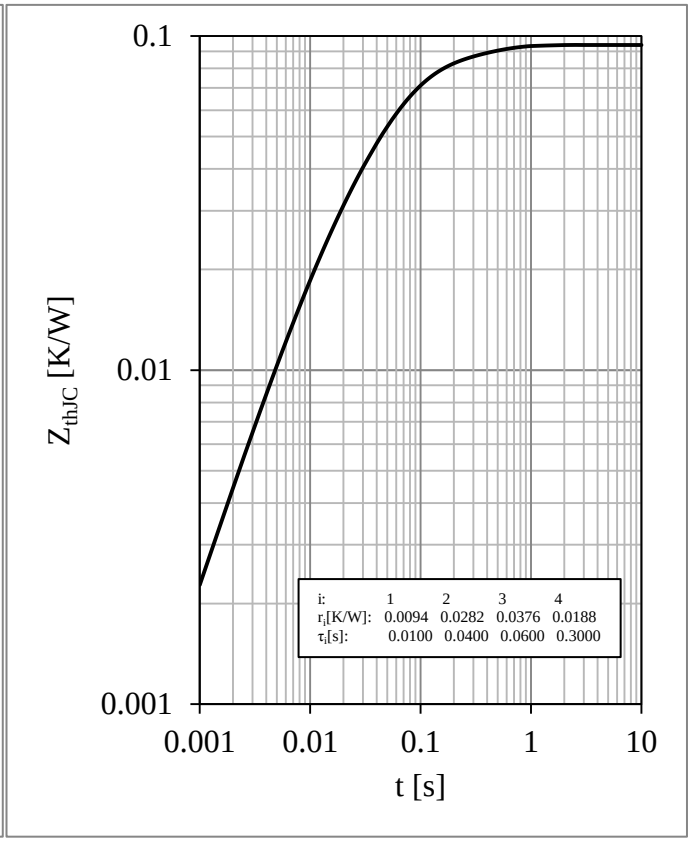
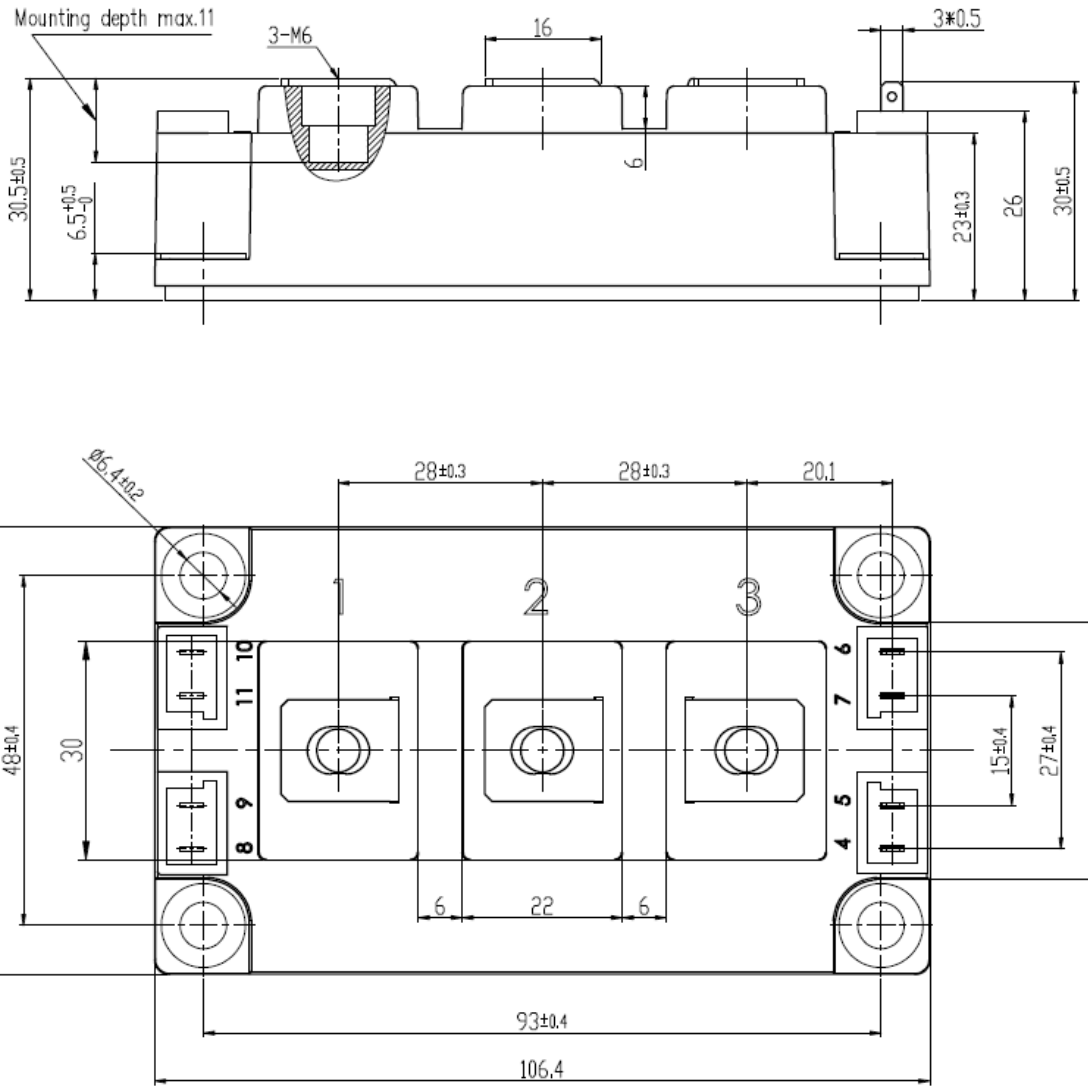


Fig 6. Transient Thermal Impedance

Package Dimensions

Dimensions in Millimeters



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