

# STARPOWER

SEMICONDUCTOR

# MOSFET

## MD630HFN150B3S

Molding Type Module

150V/630A 2 in one-package

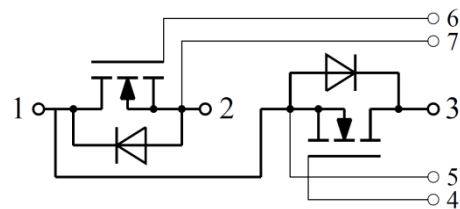
### General Description

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

Symbol	Description	MD630HFN150B3S	Units
$V_{DSS}$	Drain-Source Voltage	150	V
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Drain Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=80^{\circ}\text{C}$	630	A
		446	
$I_F$	Diode Forward Current	630	A
$P_D$	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	2381	W
$T_{jmax}$	Maximum Junction Temperature	175	$^{\circ}\text{C}$
$T_{jop}$	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
$V_{ISO}$	Isolation Voltage RMS, $f=50\text{Hz}$ , $t=1\text{min}$	2500	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**  $T_C=25^{\circ}\text{C}$  unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$T_j=25^{\circ}\text{C}$	150			V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=V_{DSS}$ , $V_{GS}=0\text{V}$ , $T_j=25^{\circ}\text{C}$			150	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=V_{GSS}$ , $V_{DS}=0\text{V}$ , $T_j=25^{\circ}\text{C}$			600	nA

**On Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=1.5\text{mA}$ , $V_{DS}=V_{GS}$ , $T_j=25^{\circ}\text{C}$	3.0		5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=378\text{A}$ , $V_{GS}=10\text{V}$ , $T_j=25^{\circ}\text{C}$			2.5	$\text{m}\Omega$
$g_{fs}$	Forward Transconductance	$V_{DS}=50\text{V}$ , $I_D=348\text{A}$	282			S

**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$R_{Gint}$	Internal Gate Resistance			0.45		$\Omega$
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=75V, I_D=348A,$ $R_G=0.58\Omega, V_{GS}=\pm 10V,$ $T_j=25^\circ C$		25		ns
$t_r$	Rise Time			140		ns
$t_{d(off)}$	Turn-Off Delay Time			55		ns
$t_f$	Fall Time			65		ns
$Q_g$	Total Gate Charge	$I_D=348A, V_{DS}=120V,$ $V_{GS}=10V$		1560		nC
$Q_{gs}$	Gate-Source Charge			318		nC
$Q_{gd}$	Gate-Drain ("Miller") Charge			900		nC
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=25V,$ $f=1.0MHz$		40.9		nF
$C_{oss}$	Output Capacitance			9.42		nF
$C_{rss}$	Reverse Transfer Capacitance			2.88		nF
$L_{CE}$	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^\circ C$		0.35		m $\Omega$

**Electrical Characteristics of Inverse Diode**  $T_C=25^\circ C$  unless otherwise

noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Diode Forward Voltage	$I_F=348A, V_{GS}=0V, T_j=25^\circ C$			1.30	V
$t_{rr}$	Diode Reverse Recovery Time	$V_R=75V, I_F=348A,$ $di/dt=600A/\mu s, T_j=25^\circ C$		290		ns
$Q_{rr}$	Diode Reverse Recovery Charge				17.9	

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per MOSFET)		0.063	K/W
$R_{\theta CS}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

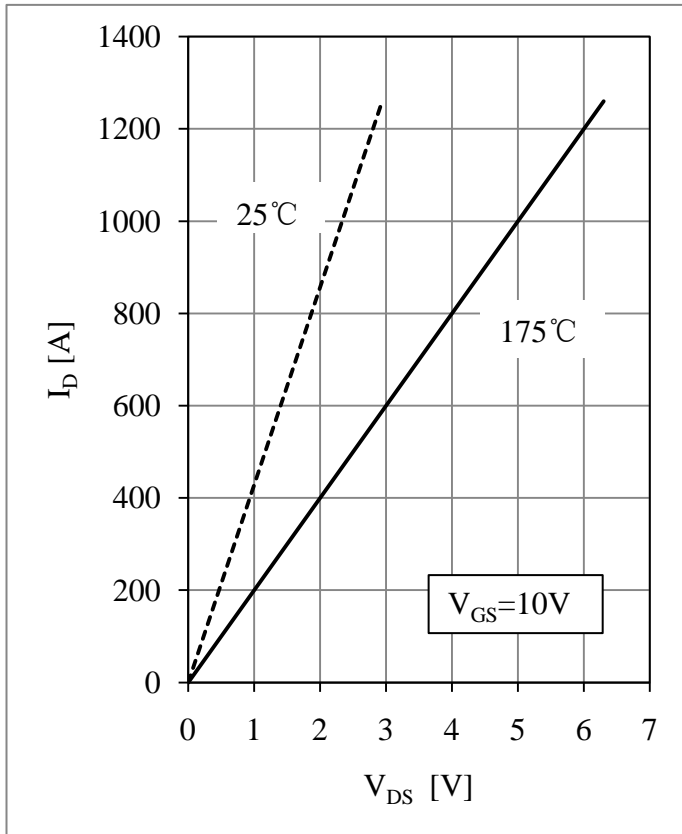


Fig 1. Mosfet Output Characteristic

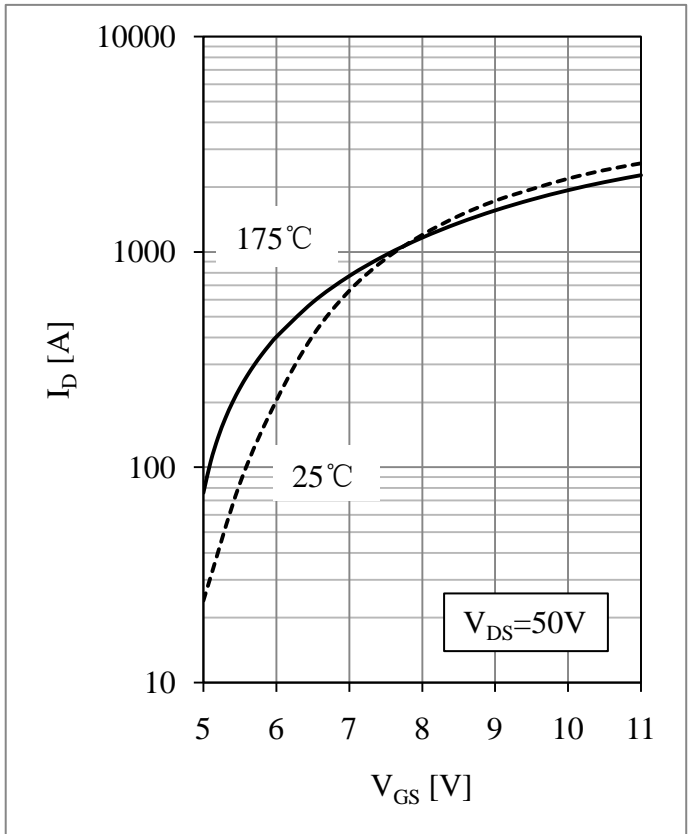


Fig 2. Mosfet Transfer Characteristic

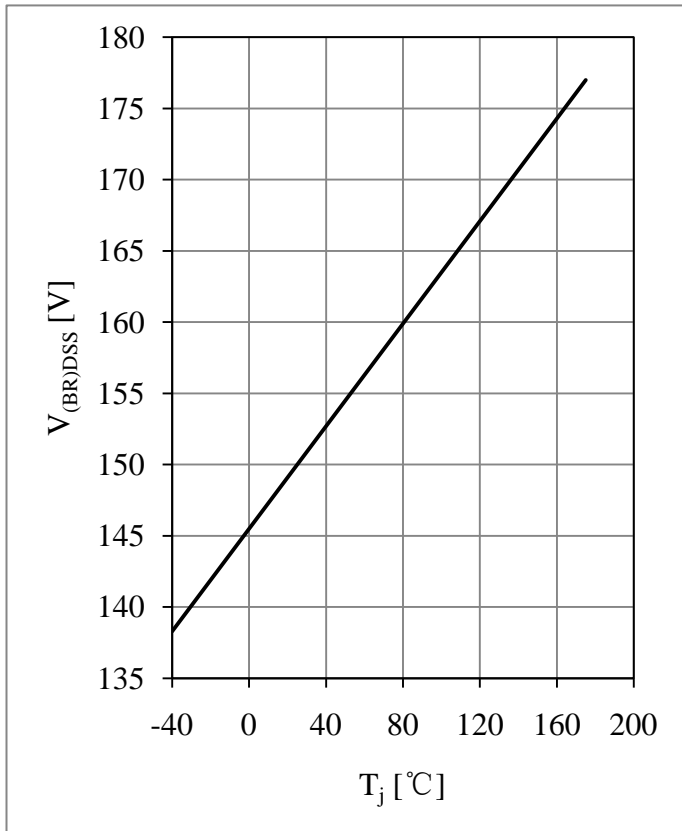


Fig 3. Brakedown Voltage vs. Temperature

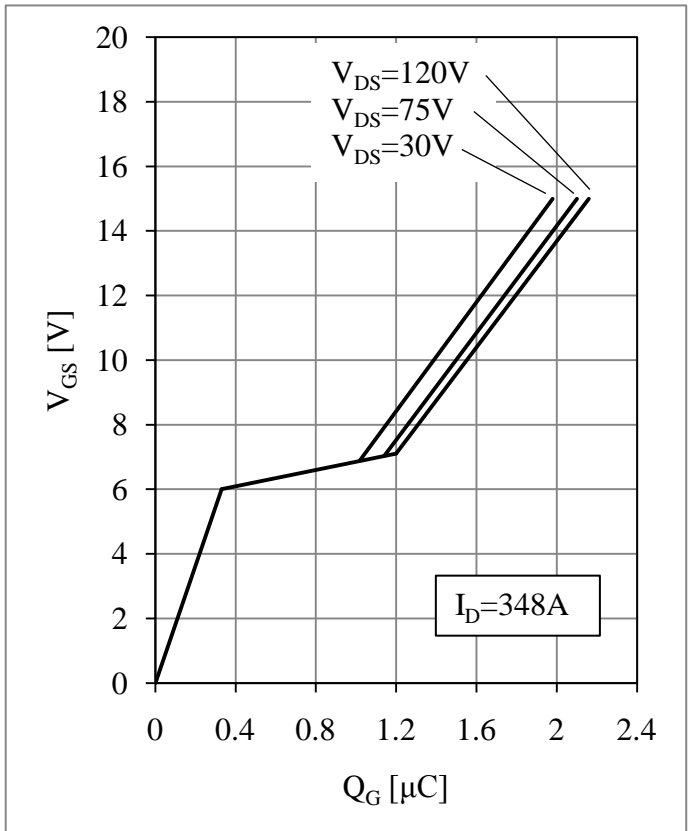


Fig 4. Gate Charge Characteristic

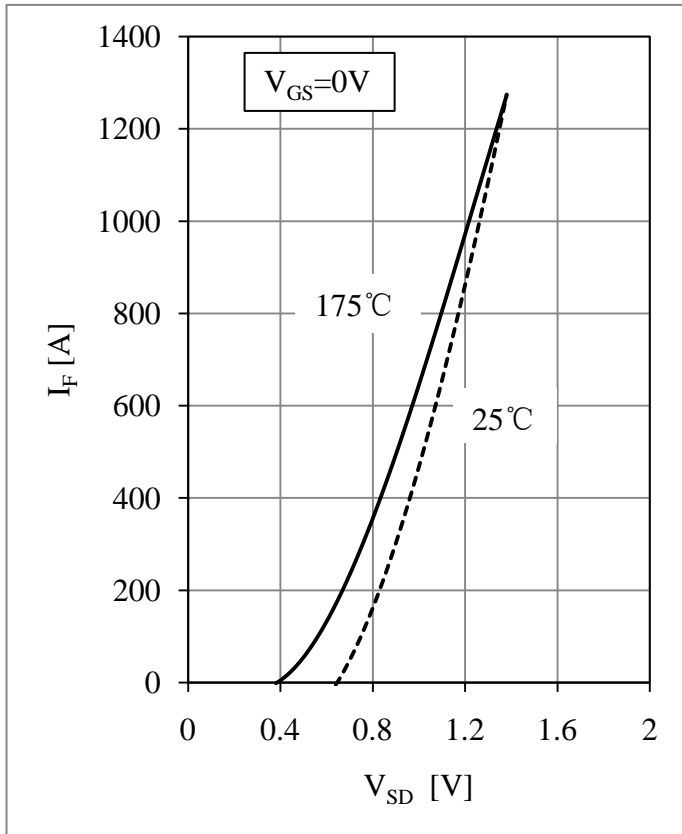


Fig 5. Inverse Diode Output Characteristic

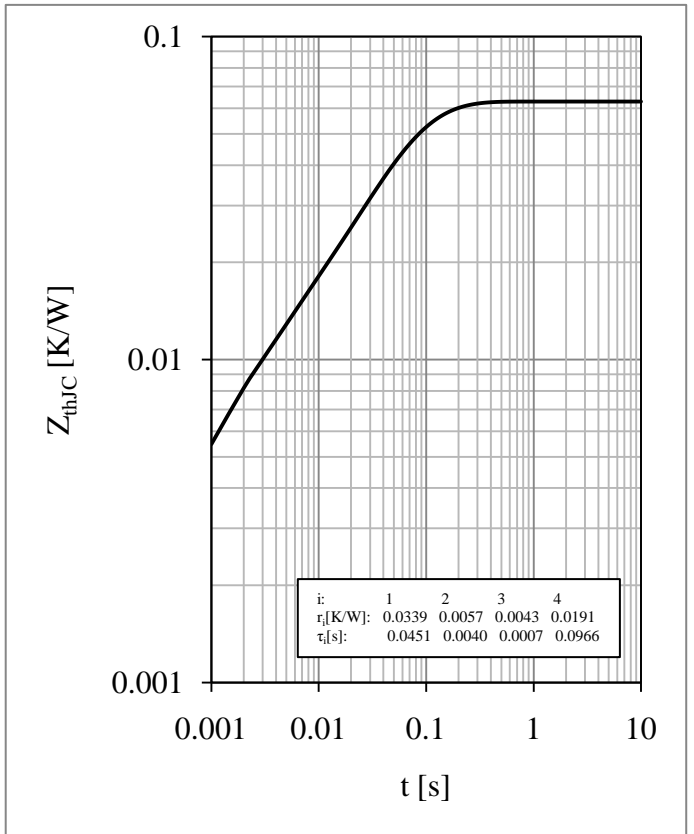
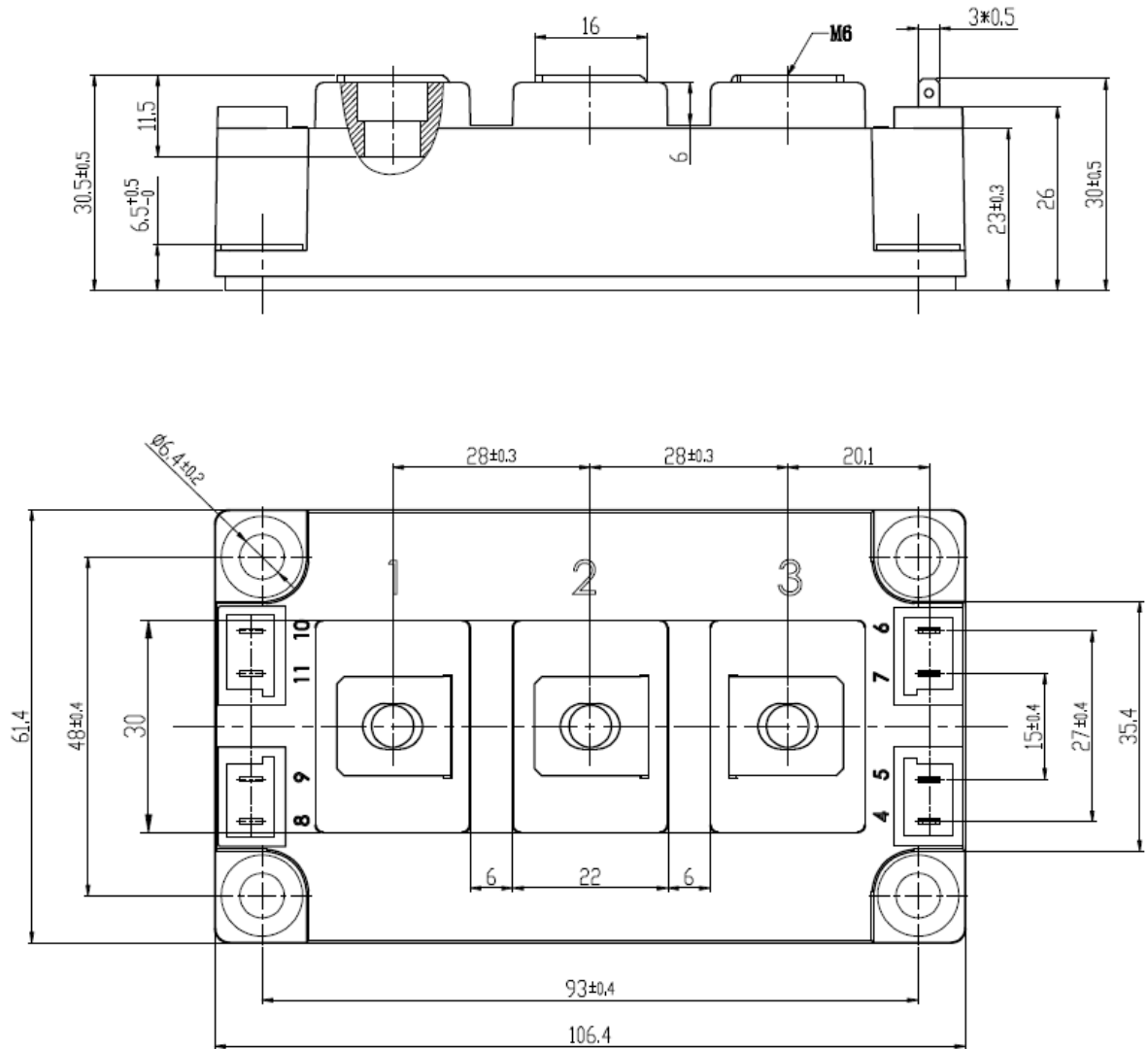


Fig 6. Transient Thermal Impedance

**Package Dimensions**

Dimensions in Millimeters



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