

STARPOWER

SEMICONDUCTOR

MOSFET

MD75SGC120D6S

1200V/75A 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 solar power.

Features

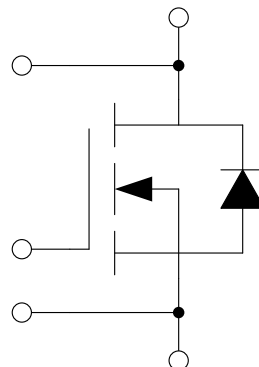
- SiC power MOSFET
- Low $R_{DS(on)}$
- Optimized intrinsic reverse diode
- Avalanche ruggedness
- Low inductance case
- AlN substrate for low thermal resistance
- Isolated copper baseplate using DBC technology



Typical Applications

- Electric vehicle
- Solar Power
- Switching mode power supply

Equivalent Circuit Schematic



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

Symbol	Description	Value	Unit
V_{DSS}	Drain-Source Voltage	1200	V
V_{GSS}	Gate-Source Voltage	-6/+22	V
I_D	Drain Current @ $T_C=25^{\circ}\text{C}$ @ $T_C=100^{\circ}\text{C}$	75	A
		50	A
I_{DM}	Pulsed Drain Current	160	A
P_D	Maximum Power Dissipation @ $T_j=175^{\circ}\text{C}$	361	W

Body Diode

Symbol	Description	Value	Unit
I_S	Source Current	75	A
I_{SM}	Pulsed Source Current	160	A

Module

Symbol	Description	Value	Unit
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, $f=50\text{Hz}$, $t=1\text{min}$	4000	V

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$R_{DS(on)}$	Static Drain-Source On-Resistance	$I_D=20\text{A}, V_{GS}=18\text{V}, T_j=25^\circ\text{C}$		40.0	58.5	m Ω
		$I_D=20\text{A}, V_{GS}=18\text{V}, T_j=150^\circ\text{C}$		62.5		
$V_{GS(th)}$	Gate-Source Threshold Voltage	$I_D=8.8\text{mA}, V_{DS}=10\text{V}, T_j=25^\circ\text{C}$	1.6		4.1	V
g_{fs}	Forward Transconductance	$V_{DS}=10\text{V}, I_D=20\text{A}, T_j=25^\circ\text{C}$		7.4		S
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=V_{DSS}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$			400	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0\text{V}, T_j=25^\circ\text{C}$			100	nA
R_{Gint}	Internal Gate Resistance			4.5		Ω
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=800\text{V}, f=1.0\text{MHz}$		3700		pF
C_{oss}	Output Capacitance			350		pF
C_{rss}	Reverse Transfer Capacitance			40		pF
Q_g	Total Gate Charge	$I_D=20\text{A}, V_{DS}=400\text{V}, V_{GS}=18\text{V}$		212		nC
Q_{gs}	Gate-Source Charge			54.0		nC
Q_{gd}	Gate-Drain ("Miller") Charge			62.0		nC
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=400\text{V}, I_D=20\text{A}, R_G=0\Omega, V_{GS}=18\text{V}, T_j=25^\circ\text{C}$		38		ns
t_r	Rise Time			34		ns
$t_{d(off)}$	Turn-Off Delay Time			70		ns
t_f	Fall Time			28		ns

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
V_{SD}	Diode Forward Voltage	$I_S=20\text{A}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$		1.30	1.75	V	
t_{rr}	Diode Reverse Recovery Time	$V_R=400\text{V}, I_S=20\text{A}, di/dt=300\text{A}/\mu\text{s}, V_{GS}=0\text{V}, T_j=25^\circ\text{C}$		38		ns	
Q_r	Diode Reverse Recovery Charge				120		nC
I_{RM}	Peak Reverse Recovery Current				4.8		A

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

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Junction-to-Case(per MOSFET)			0.415	K/W
R_{thCH}	Case-to-Heatsink (per MOSFET)		0.150		K/W
	Case-to-Heatsink (per module)		0.150		
M	Terminal Connection Torque, Screw M3	2.5		5.0	N.m
	Mounting Torque, Screw M3	2.5		5.0	
G	Weight of Module		35		g

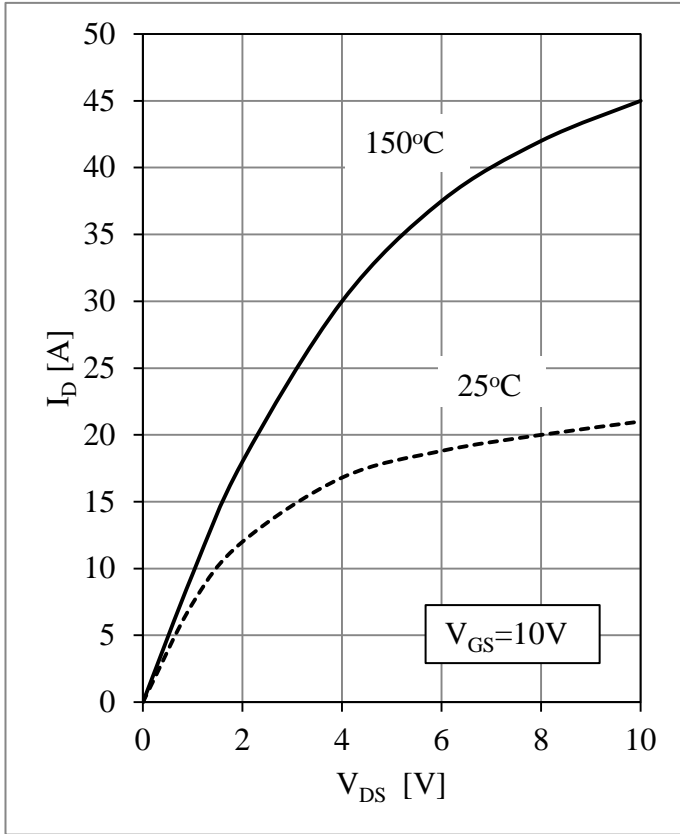


Fig 1. MOSFET Output Characteristics

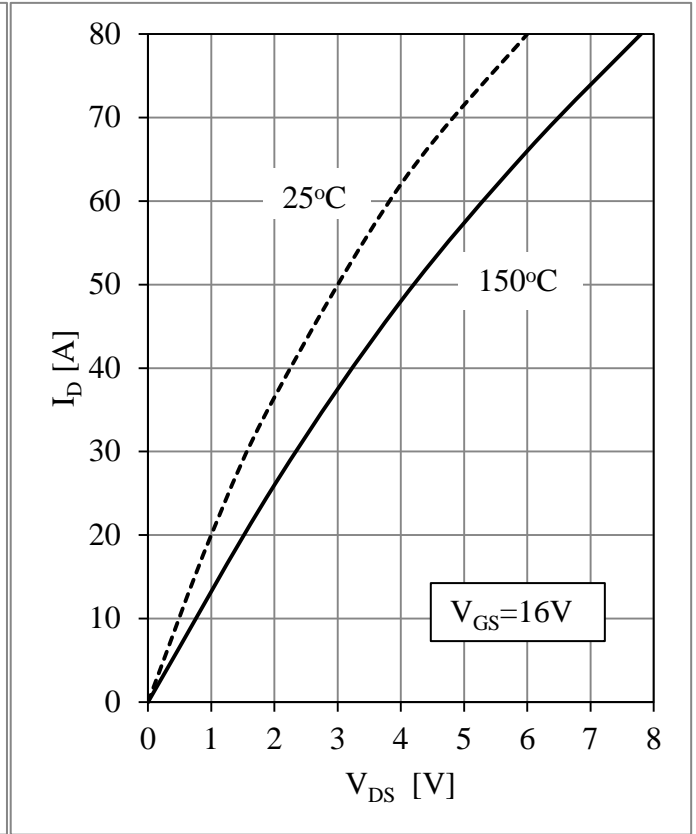


Fig 2. MOSFET Output Characteristics

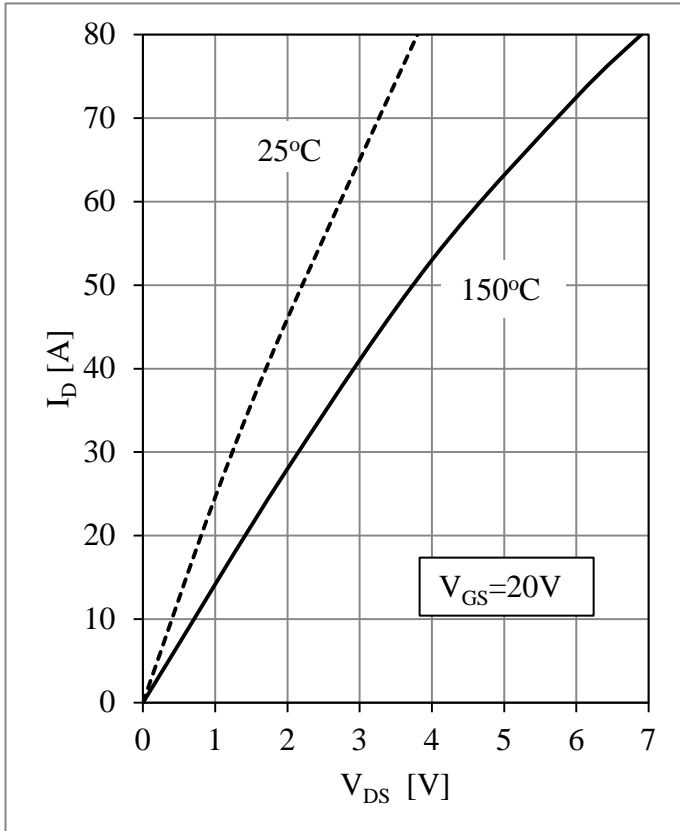


Fig 3. MOSFET Output Characteristics

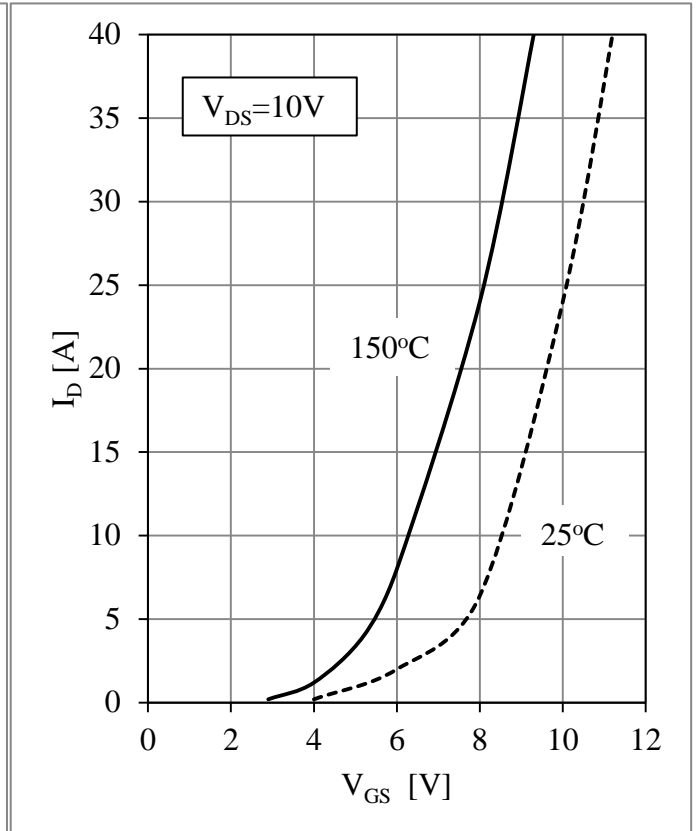


Fig 4. MOSFET Transfer Characteristics

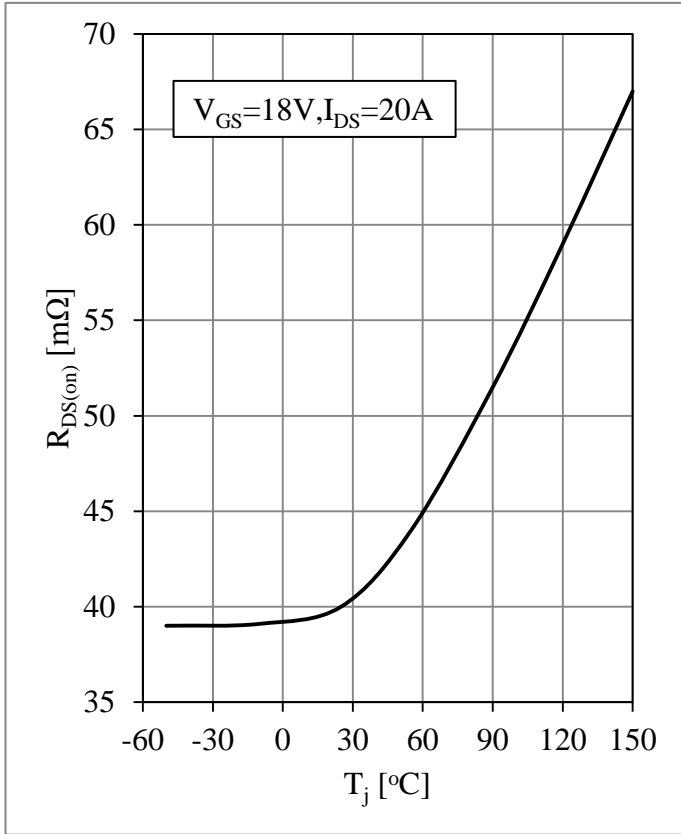


Fig 5. MOSFET On-Resistance vs. Temperature

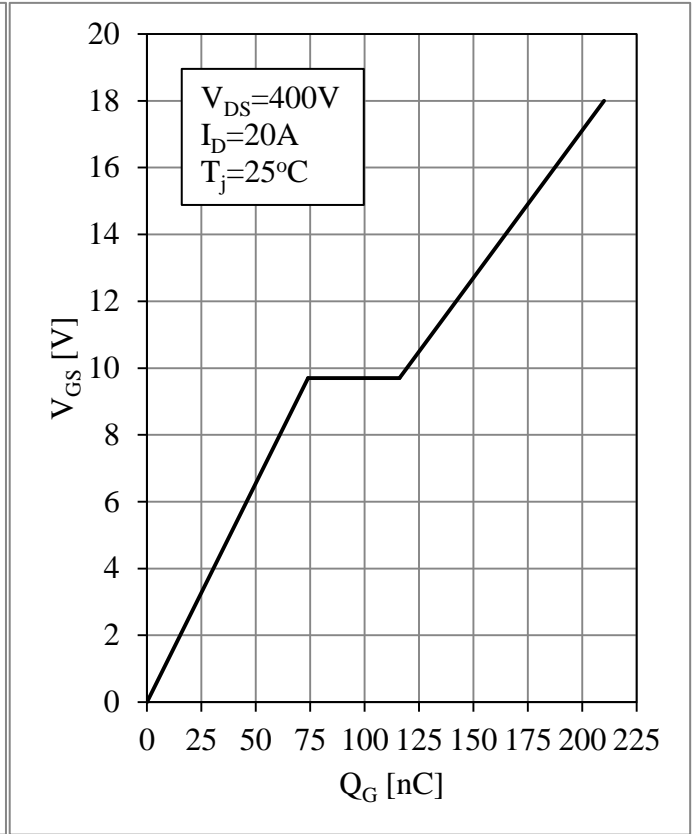


Fig 6. MOSFET Gate Charge Characteristic

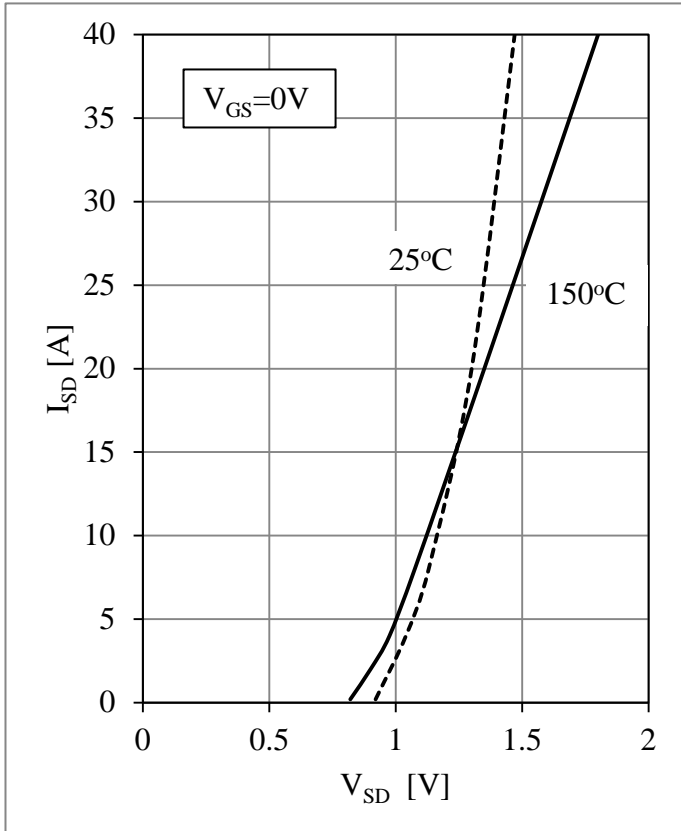


Fig 7. Body Diode Output Characteristics

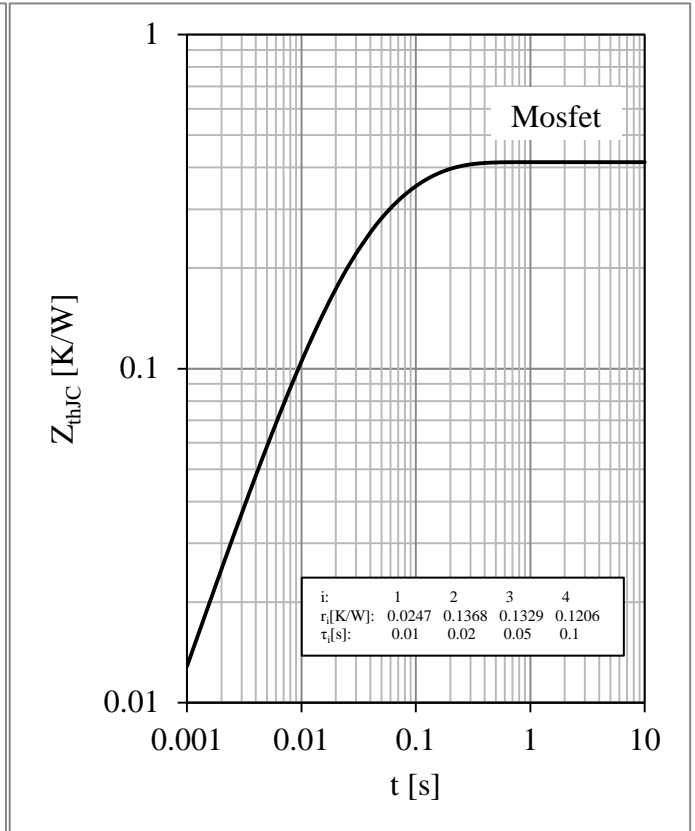
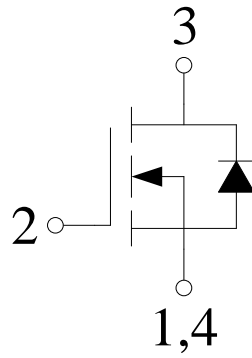


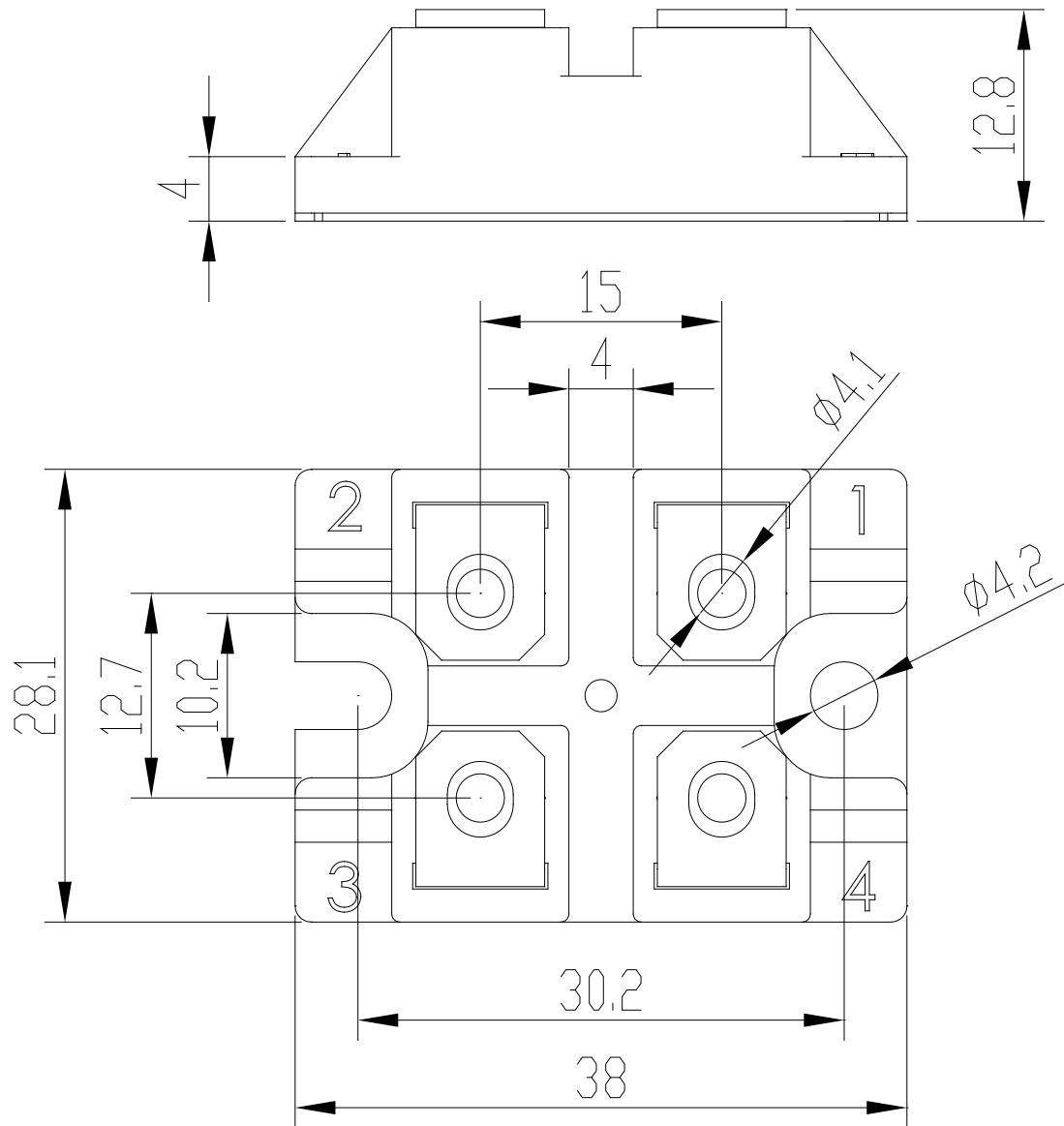
Fig 8. MOSFET Transient Thermal Impedance

Circuit Schematic



Package Dimensions

Dimensions in Millimeters



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