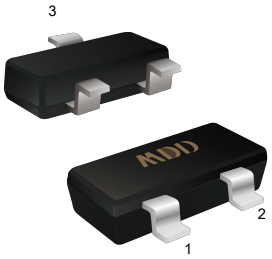
MDD2302

20V N-Channel Enhancement Mode MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$Typ	I_D Max
20V	25mΩ@4.5V	4A
	28mΩ@2.5V	

SOT-23



1. Gate
2. Source
3. Drain

Features

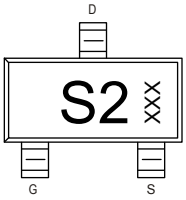
Advanced trench process technology

High Density Cell Design For Ultra Low On-Resistance

Application

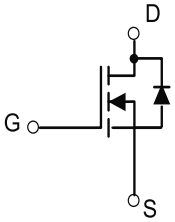
- Load Switch
- Switching circuits
- High-speed line driver
- Power Management Functions

Marking



XXX:Date Code

Equivalent Circuit



Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current	I_D	4	A
Pulsed Drain Current (Note 1)	I_{DM}	12	A
Power Dissipation(Note 2)	P_D	1.25	W
Thermal Resistance from Junction to Ambient(Note 2)	$R_{\theta JA}$	100	℃/W
Junction Temperature and Storage Temperature	T_J,T_{stg}	-50 ~150	℃

Notes: Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Ta = 25℃ unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20	--	--	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V, V_{GS}=0V	--	--	1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±10V, V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	0.5	0.8	1.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance(Note 3)	V_{GS}=4.5V, I_D=4A	--	25	30	mΩ
		V_{GS}=2.5V, I_D=3A	--	28	35	mΩ

Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{DS}=10V V_{GS}=0V f=1MHz	--	340	--	pF
C_{oss}	Output Capacitance		--	115	--	pF
C_{rss}	Reverse Transfer Capacitance		--	33	--	pF
Q_g	Total Gate Charge	V_{DS}=10V V_{GS}=4.5V I_D=3A	--	5.4	--	nC
Q_{gs}	Gate Source Charge		--	0.65	--	nC
Q_{gd}	Gate Drain Charge		--	1.6	--	nC

Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	V_{DS}=10V V_{GS} =4.5V I_D=3A R_G=6Ω R_L=5.5Ω	--	12	--	ns
t_r	Turn on Rise Time		--	36	--	ns
$t_{d(off)}$	Turn Off Delay Time		--	34	--	ns
t_f	Turn Off Fall Time		--	10	--	ns

Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
I_{SD}	Source drain current(Body Diode)	T_A=25℃	--	--	1.6	A
V_{SD}	Drain-Source Diode Forward Voltage	I_S=1A, V_{GS}=0V	--	--	1.2	V

Notes:
1.Pulse width limited by maximum allowable junction temperature
2.The value of P_D&$R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz.Copper, double sided, in a still air environment with Ta=25℃.
3.Pulse test ; Pulse width≤300us, duty cycle≤2%

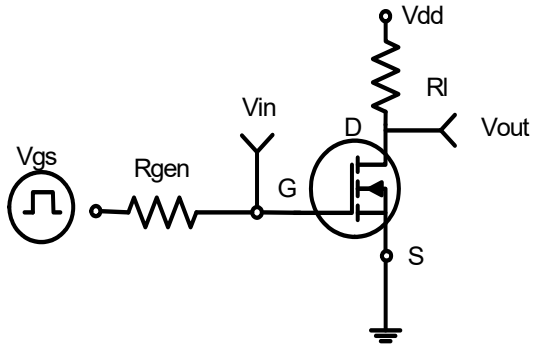


Figure 1:Switching Test Circuit

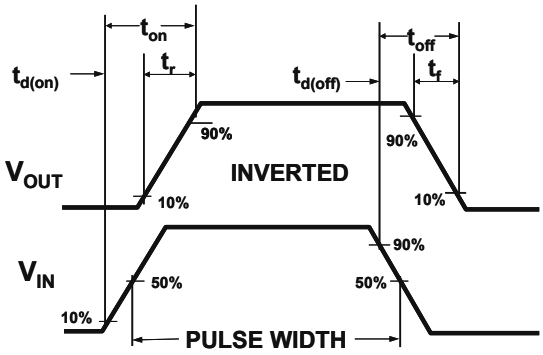


Figure 2:Switching Waveforms

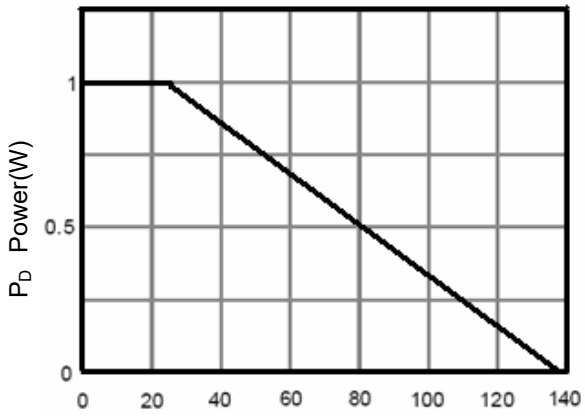


Figure 3 Power Dissipation

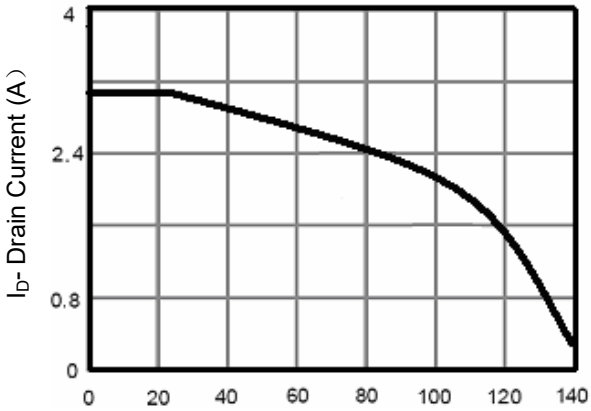


Figure 4 Drain Current

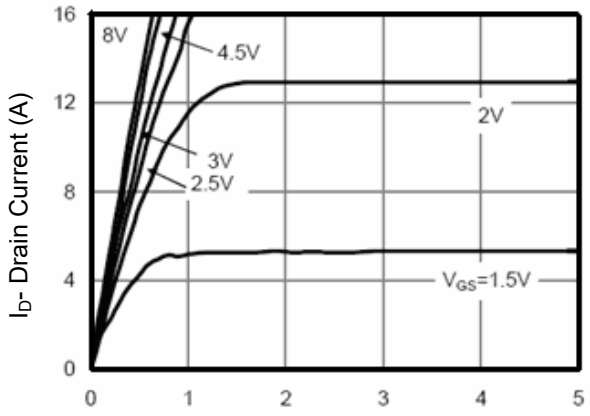


Figure 5 Output Characteristics

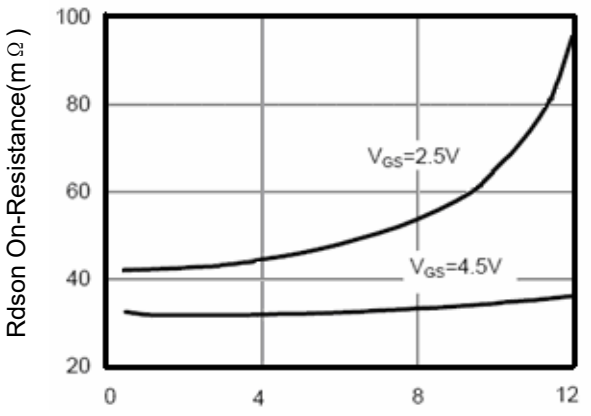
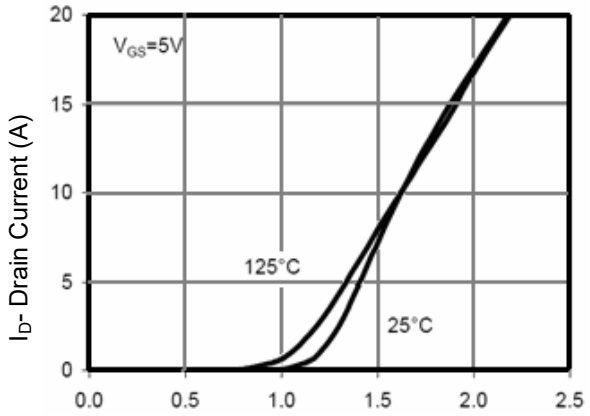
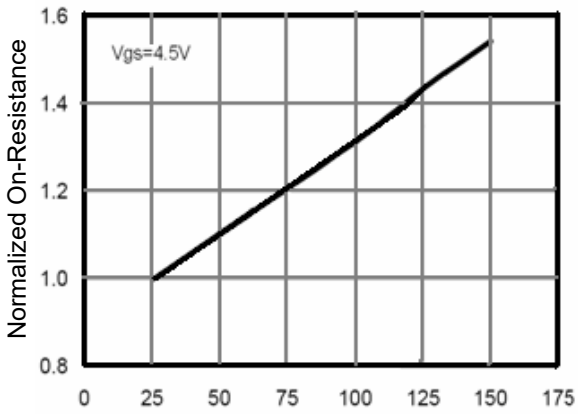


Figure 6 Drain-Source On-Resistance



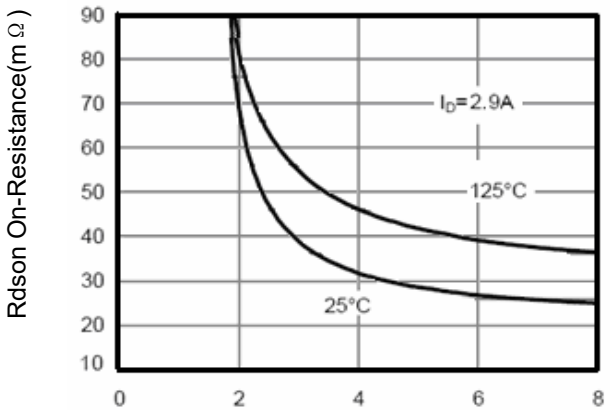
Vgs Gate-Source Voltage (V)

Figure 7 Transfer Characteristics



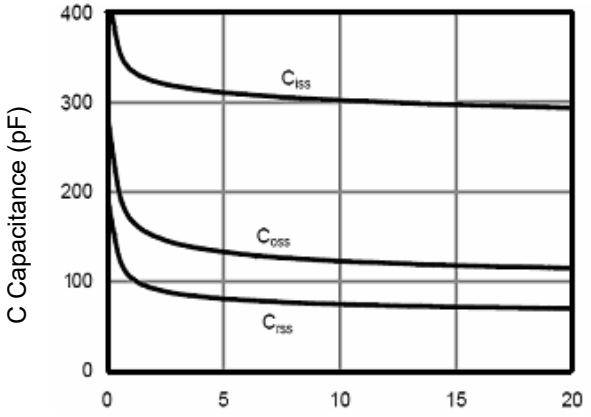
T_J-Junction Temperature(℃)

Figure 8 Drain-Source On-Resistance



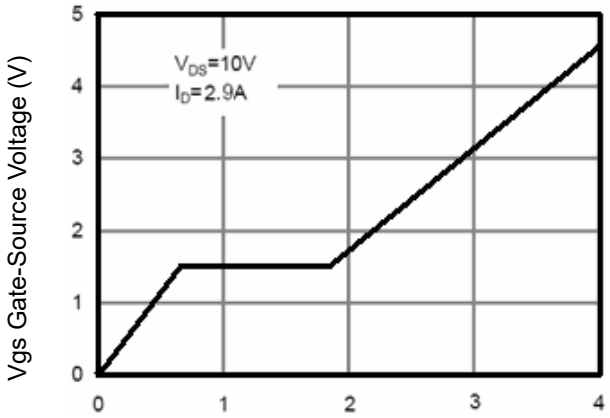
Vgs Gate-Source Voltage (V)

Figure 9 Rdson vs Vgs



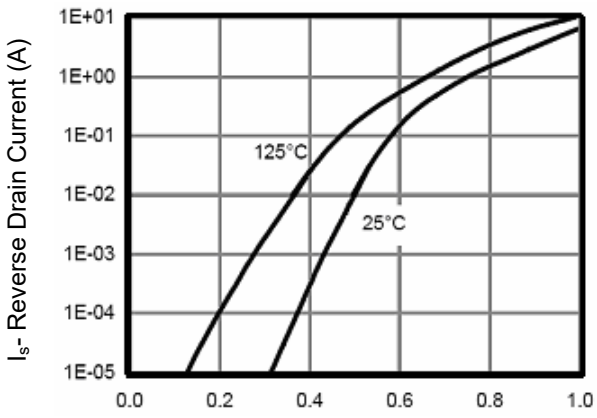
Vds Drain-Source Voltage (V)

Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)

Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)

Figure 12 Source- Drain Diode Forward

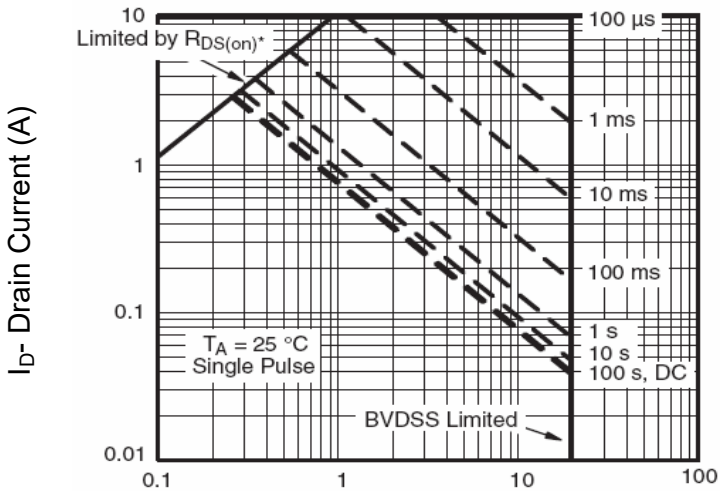


Figure 13 Safe Operation Area

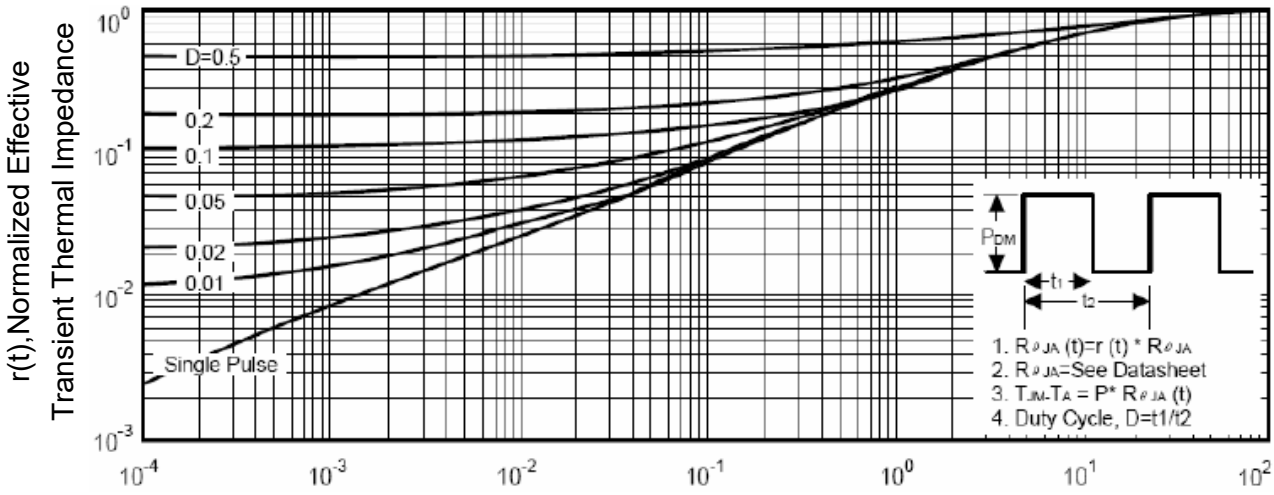
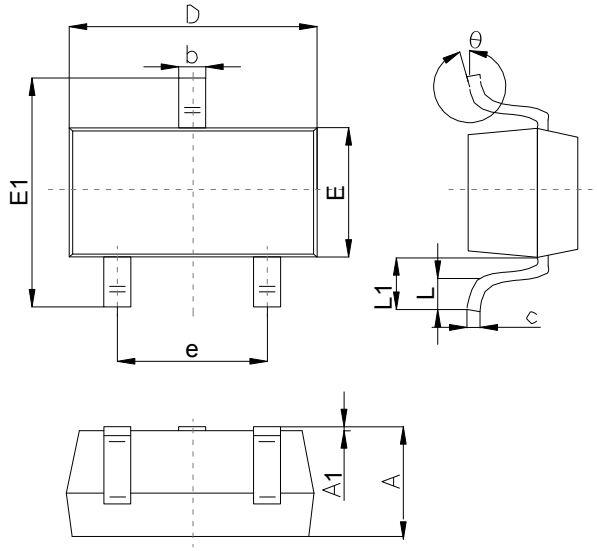


Figure 14 Normalized Maximum Transient Thermal Impedance

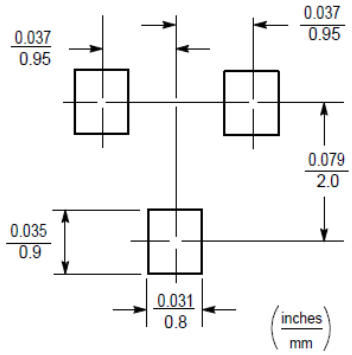
Outlitne Drawing

SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		
	Min	Typ	Max
A	0.65		1.40
A1	0.00		0.20
b	0.30		0.55
c	0.08		0.20
D	2.70		3.10
E	1.15		1.65
E1	2.10		2.80
e	1.70		2.10
L	0.15		0.50
L1	0.35		0.70
θ	0°		12°

Suggested Pad Layout



Note:
1.Controlling dimension:in/millimeters.
2.General tolerance: ±0.05mm.
3.The pad layout is for reference purposes only.