

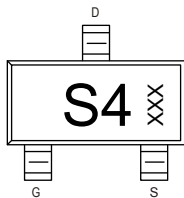
Description

- The MDD2304 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge.
- It can be used in a wide variety of applications.

General Features

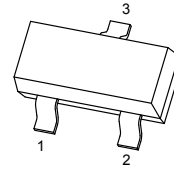
- Low RDS(on) @VGS=10V
- 5V Logic Level Control
- N Channel SOT23 Package
- Pb-Free, RoHS Compliant

Marking



XXX:Date Code

SOT-23

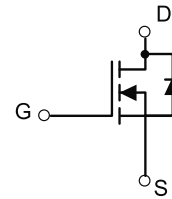


1. Gate
2. Source
3. Drain

Application

- DC-to-DC converters
- Power management in battery-driven portables
- Low-side load switch
- Switching circuits
- High-speed line driver

Equivalent Circuit



Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	2.5	A
Pulsed Drain Current (Note 1)	I_{DM}	10	A
Power Dissipation	P_D	0.25	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	500	°C/W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{stg}	-50 ~ +150	°C

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.

30V N-Channel Enhancement Mode MOSFET

T_a = 25℃ unless otherwise specified

Symbol	Parameter		Condition	Min	Typ	Max	Unit
V_{(BR)DSS}	Drain-Source Breakdown Voltage		V_{GS}=0V, I_D=250μA	30	--	--	V
I_{DSS}	Drain-Source Leakage Current	T _A =25℃	V_{DS}=30V, V_{GS}=0V	--	--	1	uA
		T _A =125℃	V_{DS}=24V, V_{GS}=0V	--	--	100	uA
I_{GSS}	Gate-Source Leakage Current		V_{DS}=±20V, V_{GS}=0V	--	--	±100	nA
V_{GS(TH)}	Gate Threshold Voltage		V_{DS}=V_{GS}, I_D=250μA	1.0	1.6	2.5	V
R_{DS(ON)}	Drain-Source On-State Resistance(Note 2)		V_{GS}=10V, I_D=3.6A	--	26	35	mΩ
			V_{GS}=4.5V, I_D=2.0A	--	39	53	mΩ

Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{DS}=15V V_{GS}=0V f=1MHz	--	240	--	pF
C_{oss}	Output Capacitance		--	110	--	pF
C_{rss}	Reverse Transfer Capacitance		--	17	--	pF
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_D=4A	--	4.5	--	nC
Q_{gs}	Gate Source Charge		--	0.8	--	nC
Q_{gd}	Gate Drain Charge		--	1.0	--	nC

Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t_{d(on)}	Turn on Delay Time	V_{DS}=15V, V_{GS}=10V, I_D=1A, R_G=6.0Ω	--	8	--	ns
t_r	Turn on Rise Time		--	12	--	ns
t_{d(off)}	Turn Off Delay Time		--	17	--	ns
t_f	Turn Off Fall Time		--	8	--	ns

Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
I_{SD}	Source drain current(Body Diode)	T_A=25℃	--	--	1.8	A
V_{SD}	Drain-Source Diode Forward Voltage	I_S=4A, V_{GS}=0V	--	0.85	1.2	V

Notes: ①Pulse width limited by maximum allowable junction temperature
 ②Pulse test ; Pulse width≤300us, duty cycle≤2%

■ TYPICAL CHARACTERISTICS

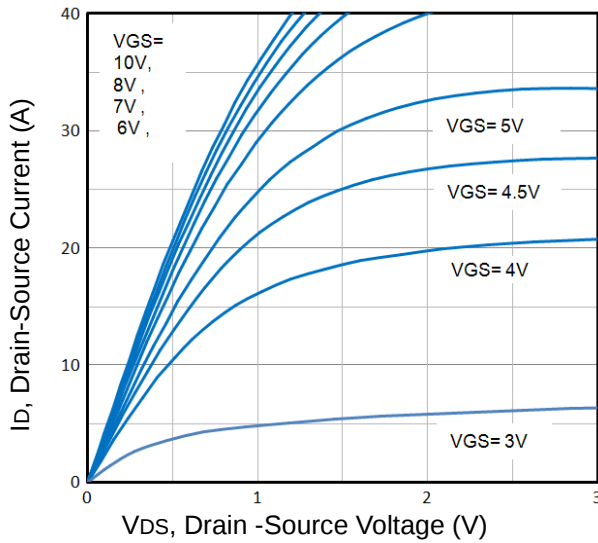


Fig1. Typical Output Characteristics

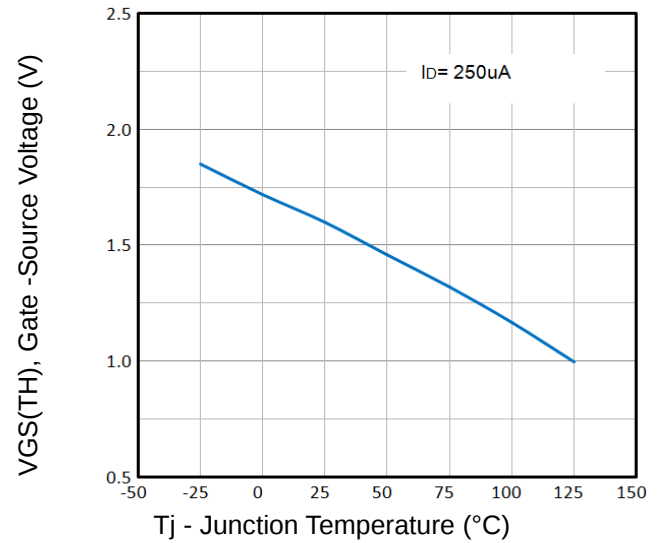


Fig2. Normalized Threshold Voltage Vs. Temperature

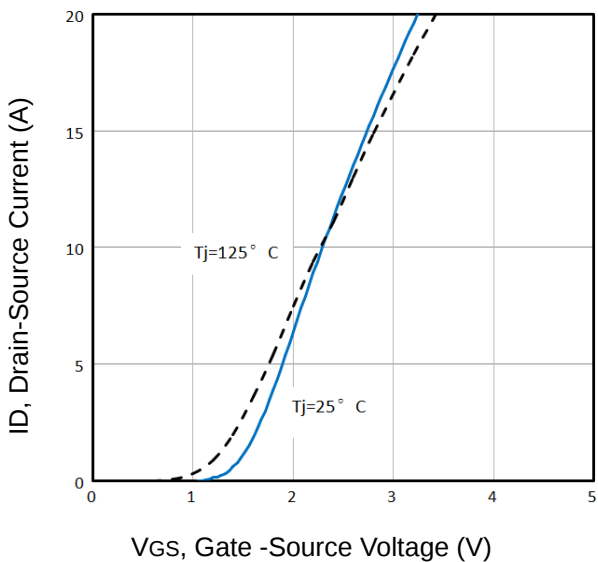


Fig3. Typical Transfer Characteristics

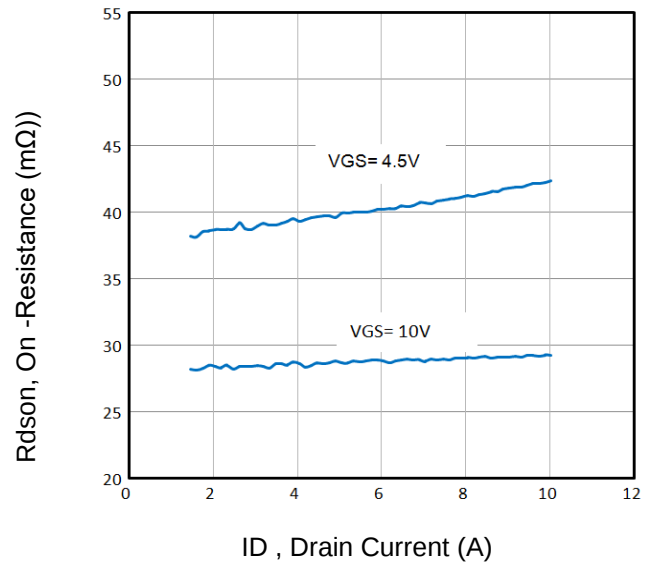


Fig4. On-Resistance vs. Drain Current and Gate

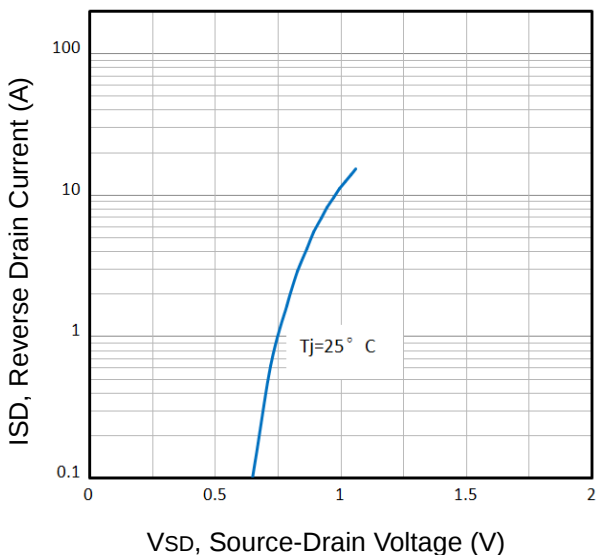


Fig5. Typical Source-Drain Diode Forward Voltage

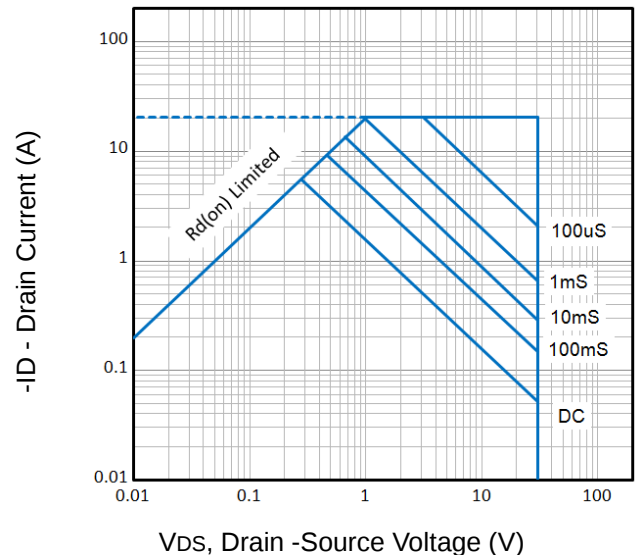


Fig6. Maximum Safe Operating Area

30V N-Channel Enhancement Mode MOSFET

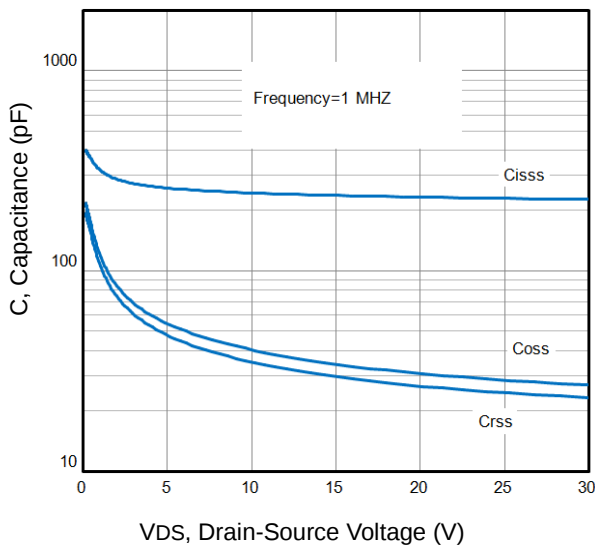


Fig7. Typical Capacitance Vs. Drain-Source Voltage

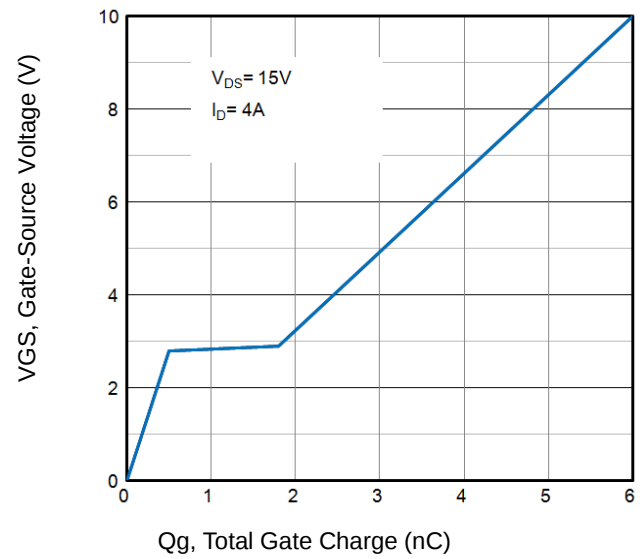


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

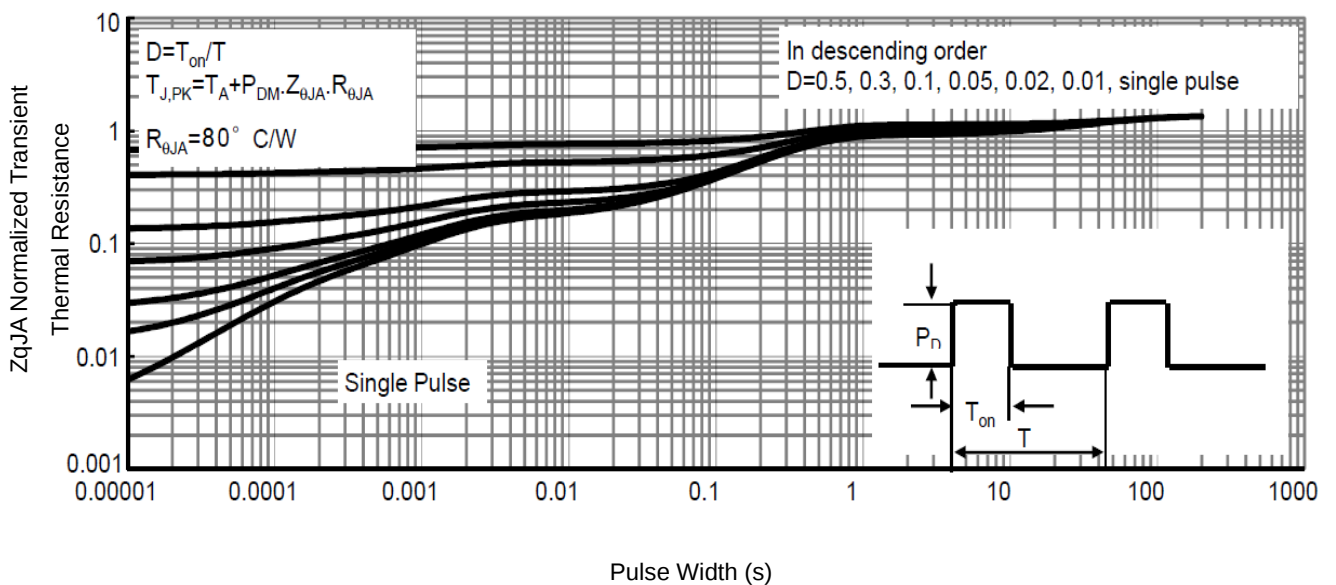


Fig9. Normalized Maximum Transient Thermal Impedance

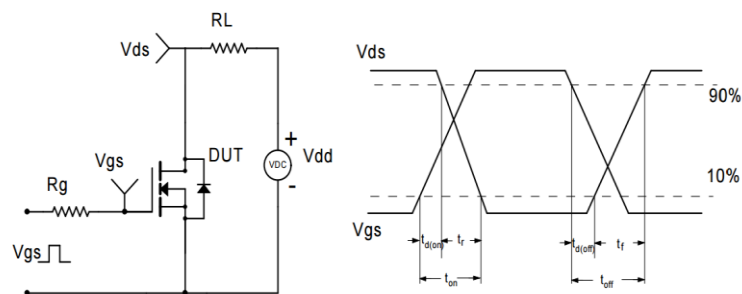
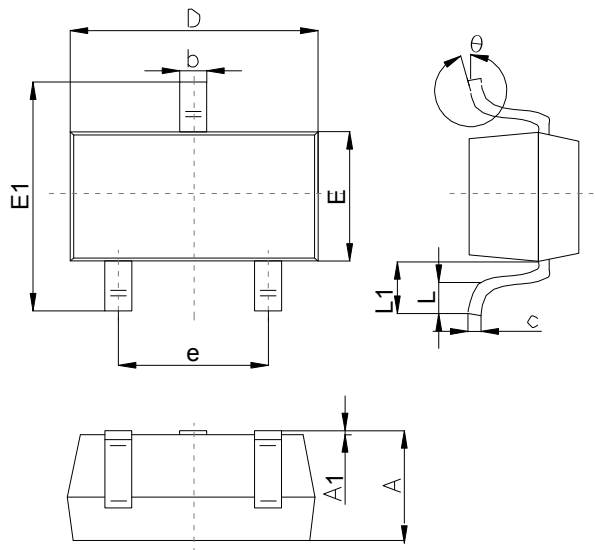


Fig10. Switching Time Test Circuit and waveforms

The curve above is for reference only.

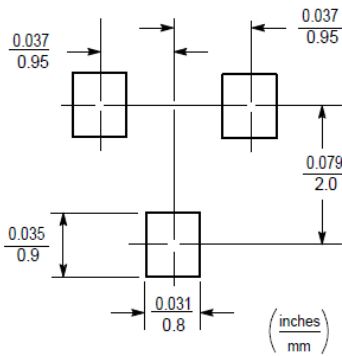
Outlitne Drawing

SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		
	Min	Typ	Max
A	0.90		1.40
A1	0.00		0.10
b	0.30		0.50
c	0.08		0.20
D	2.80	2.90	3.10
E	1.20		1.60
E1	2.25		2.80
e	1.80	1.90	2.00
L	0.10		0.50
L1	0.4		0.55
θ	0°		10°

Suggested Pad Layout



- Note:
- 1. Controlling dimension: in/millimeters.
 - 2. General tolerance: $\pm 0.05\text{mm}$.
 - 3. The pad layout is for reference purposes only.