

MDD3400

30V N-Channel Enhancement Mode MOSFET

1. Description

This 30V N-channel MOSFET is based on MDD's unique device design to achieve low $R_{DS(ON)}$, fast switching and excellent avalanche characteristics.

2. Features

- High dense cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

3. Description

- Load Switch for Portable Devices
- Switching voltage regulator
- DC-DC convertor

4. Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current (Note 1)	I_D	5.8	A
Pulsed Drain Current (Note 1)	I_{DM}	23	A
Thermal Resistance, Junction-Ambient (Note 2)	$R_{\theta JA}$	100	$^{\circ}\text{C}/\text{W}$
Power Dissipation	P_D	1.5	W
Junction Temperature	T_J	$-50 \sim +150$	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	$-50 \sim +150$	$^{\circ}\text{C}$

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

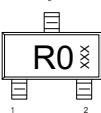
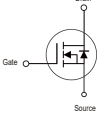
Notes: 1.Pulse width limited by maximum allowable junction temperature

2.The value of P_D & $R_{\theta JA}$ is measured with the device mounted on 1 in2 FR-4 board with 2oz.Copper, double sided, in a still air environment with $T_A=25$.

3.Pulse test ; Pulse width 300us, duty cycle 2%

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5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
1	G	Gate			R0 XXX:Date Code	SOT-23
2	S	Source				
3	D	Drain				

6. $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter		Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		$V_{GS}=0V, I_D=250\mu A$	30	—	—	V
I_{SS}	Gate-Source Leakage Current	Forward	$V_{GS}=20V$	—	—	100	nA
		Reverse	$V_{GS}=-20V$	—	—	-100	nA
I_{DSS}	Drain-Source Leakage Current		$V_{DS}=24V, V_{GS}=0V$	—	—	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage		$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.8	1.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance		$V_{GS}=10V, I_D=5.8A$	—	20	32	m Ω
			$V_{GS}=4.5V, I_D=5A$	—	22	35	m Ω
			$V_{GS}=2.5V, I_D=4A$	—	27	45	m Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=15V$ $f=1MHz$	—	635	—	pF
C_{oss}	Output Capacitance		—	135	—	pF
C_{rss}	Reverse Transfer Capacitance		—	40	—	pF
Q_g	Total Gate Charge	$V_{GS}=4.5V$ $V_{DS}=15V$ $I_D=5A$	—	10.5	—	nC
Q_{gs}	Gate Source Charge		—	1.6	—	nC
Q_{gd}	Gate Drain Charge		—	2.7	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=4.5V$ $V_{DS}=15V$ $I_D=5A$ $R_G=3.3\Omega$	—	7.5	—	ns
t_r	Turn on Rise Time		—	18	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	36	—	ns
t_f	Turn Off Fall Time		—	5	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=3A, V_{GS}=0V$	—	0.82	1.2	V
I_{SD}	Source drain current(Body Diode)	$T_A=25^{\circ}\text{C}$	—	—	1.5	A

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10. Test Circuits And Waveforms

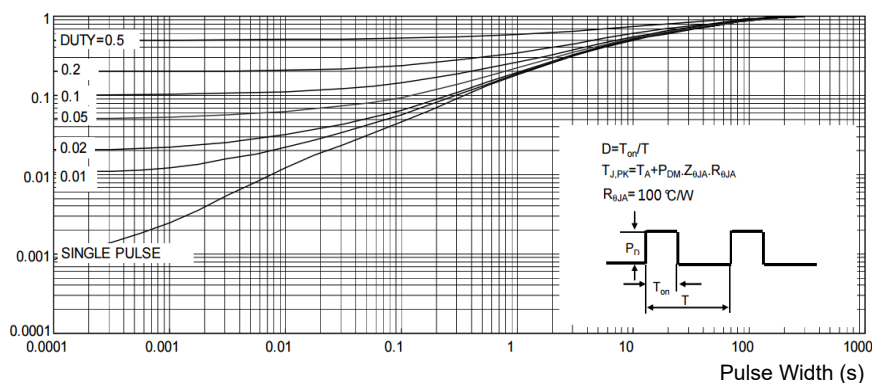


Figure 1. Normalized Maximum Transient Thermal Impedance

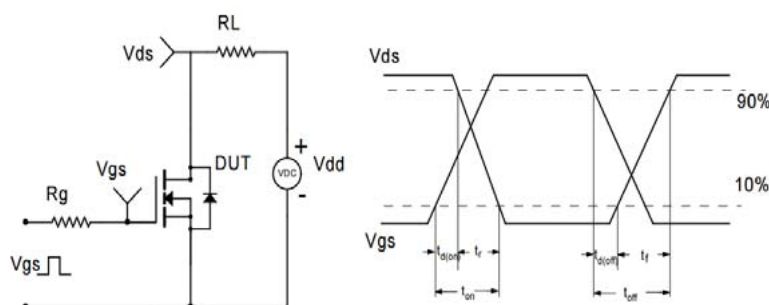


Figure 2. Switching time test circuit & waveforms

The curve above is for reference only.

11. Electrical Characteristics Diagrams

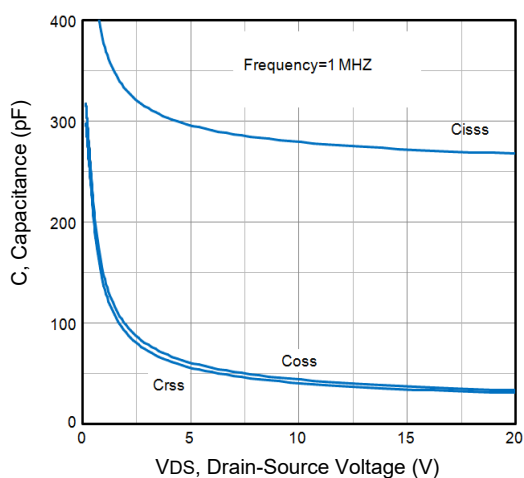


Fig 1. Typical Capacitance Vs. Drain-Source Voltage

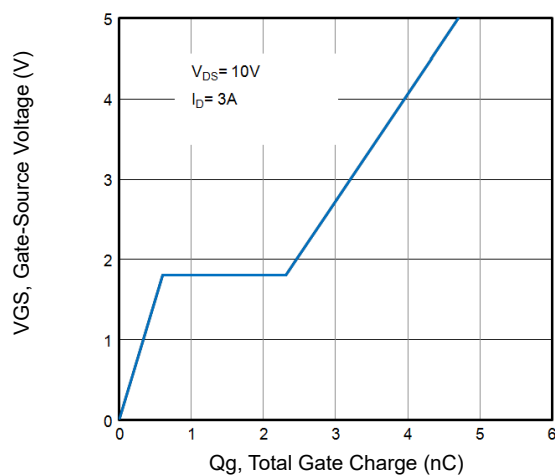


Fig 2. Typical Gate Charge Vs. Gate-Source Voltage

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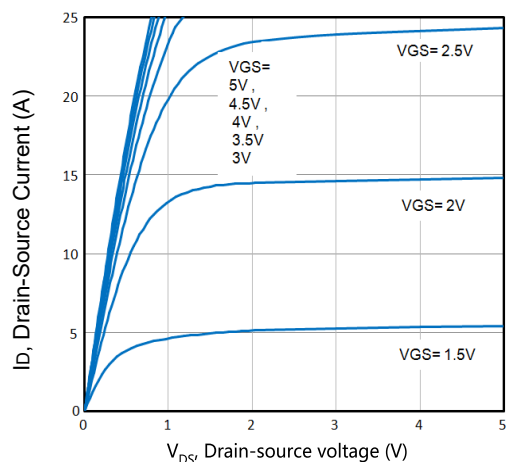


Figure 3. Typ. output characteristics

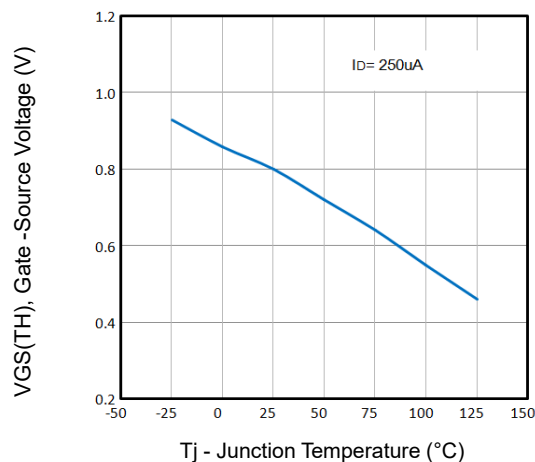


Figure 4. Normalized Threshold Voltage Vs. Temperature

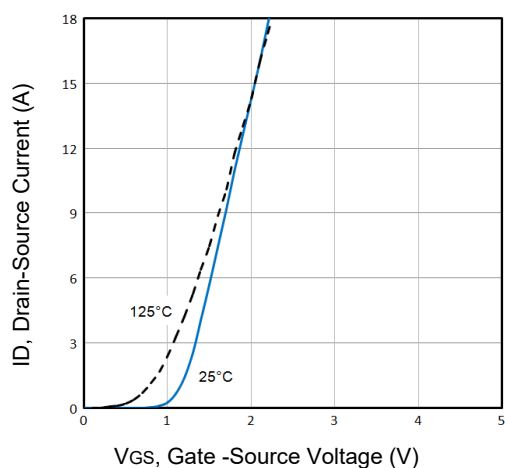


Figure 5. Typical Transfer Characteristics

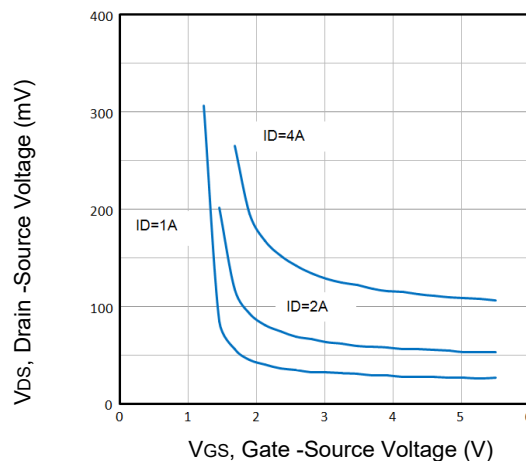


Figure 6. Drain-Source Voltage vs Gate-Source Voltage

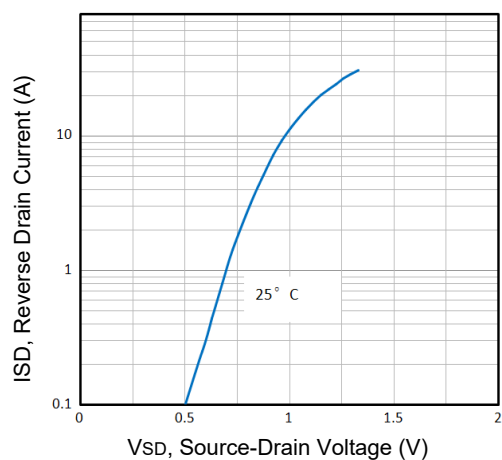


Figure 7. Typical Source-Drain Diode Forward Voltage

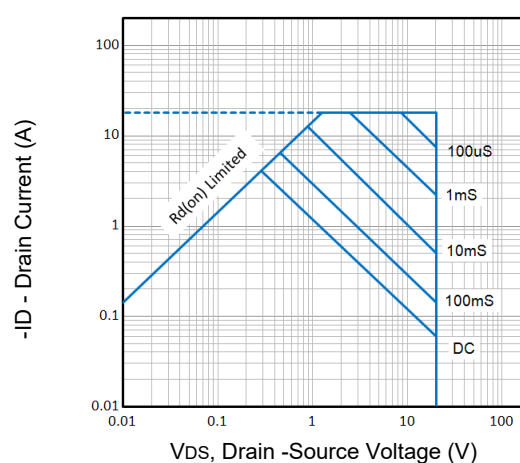
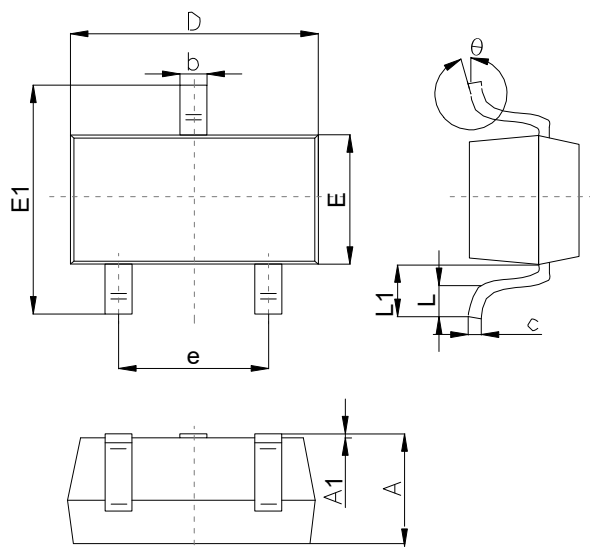


Figure 8. Maximum Safe Operating Area

The curve above is for reference only

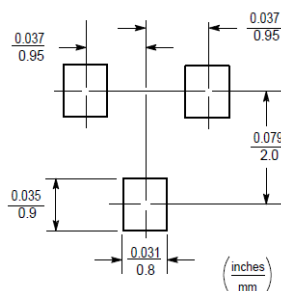
12. Outline Drawing

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°

13. 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.

14. Important Notice and Disclaimer

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