N-Channel 20V (D-S)MOSFET

General Description

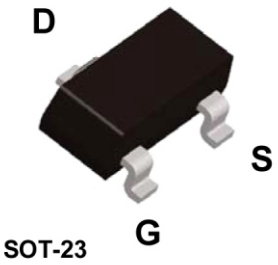
This miniature surface monut MOSFET uses advanced trench process , low $R_{DS(on)}$ assures minimal power loss and energy conversion, which makes this device ideal for use in power management circuit.

Features

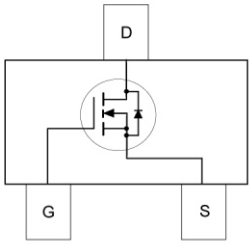
- V_{DS} (V) = 20V
- I_D(A) = 6.0A (V_{GS} = 4.5V)
- $R_{DS(on)}$ = 24mΩ @ V_{GS} = 4.5V
- $R_{DS(on)}$ = 33mΩ @ V_{GS} = 2.5V
- $R_{DS(on)}$ = 52mΩ @ V_{GS} =1.8V
- Low gate charge
- Fast switching speed

Applications

- Load switch
- DC-DC converters
- Power management



SOT-23



Absolute Maximum Ratings (T_A = 25℃ Unless Otherwise Noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	
Continuous Drain Current [a]	T_A=25℃	I_D	6.0	A
	T_A=70℃		4.8	
Pulsed Drain Current [b]		I_{DM}	24	
Continuous Source Current (Diode Conduction) [a]		I_S	1.5	A
Power Dissipation [a]	T_A=25℃	P_D	1.4	W
	T_A=70℃		1.0	
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55 to 150	℃

Thermal Resistance Ratings

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient [a]	t<= 10 sec	$R_{\theta JA}$	90	℃/W
	Steady-State		130	

Package Outlines and Ordering Information

Device	Device Marking	Reel Size	Tape Width	Quantity
MI2312	MPDS	7''	8mm	3000 units

Specifications (T_A = 25℃ Unless Otherwise Noted)

Parameter	Symbol	Test Conditions	Limits			Units
			Min	Typ	Max	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS},I_D = 250uA	0.60	0.85	1.20	
Gate-Body Leakage	I_{GSS}	V_{DS}=0V,V_{GS}=±8V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V			1	uA
		V_{DS}=20V,V_{GS}=0V,T_J=55℃			10	
On-State Drain Current [c]	$I_{D(on)}$	V_{DS}=5V,V_{GS}=4.5V	24			A
Drain-Source On-Resistance [c]	$R_{DS(on)}$	V_{GS}=4.5V,I_D=6.0A		23	24	mΩ
		V_{GS}=2.5 V, I_D=2.8A		30	33	
		V_{GS}=1.8 V, I_D=2.0A		48	52	
Forward Tranconductance [c]	g_{fs}	V_{DS}=5V,I_D=6.0A		20		S
Diode Forward Voltage	V_{SD}	I_S=1.0A,V_{GS}=0V		0.70	1.20	V
Dynamic						
Input Capicitance	C_{iss}	V_{DS} = 10V,V_{GS} = 0V f= 1MHz		880		pF
Output capacitance	C_{oss}			180		
Reverse Transfer Capacitance	C_{rss}			85		
Total Gate Charge	Q_g	V_{DS}=10V,V_{GS}=4.5V I_D =6.0 A		7.0	10	nC
Gate-Source Charge	Q_{gs}			1.20		
Gate-Drain Charge	Q_{gd}			1.90		
Switching						
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=10V, I_D=1.0A, R_G=6 ohm,V_{GEN}=4.5V		9	17	ns
Rise Time	t_r			11	18	
Turn-Off Delay Time	$t_{d(off)}$			18	29	
Fall-Time	t_f			5	10	

Notes: a. Surface Mounted on 1" x 1" FR4 Board.
b. Pulse width limited by maximum junction temperature
c. Pulse test: PW <= 300us duty cycle <= 2%.

Typical Electrical and Thermal Characteristics

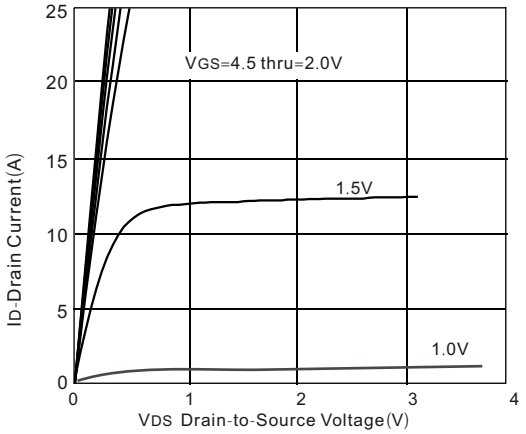


Figure1: Output Characteristics

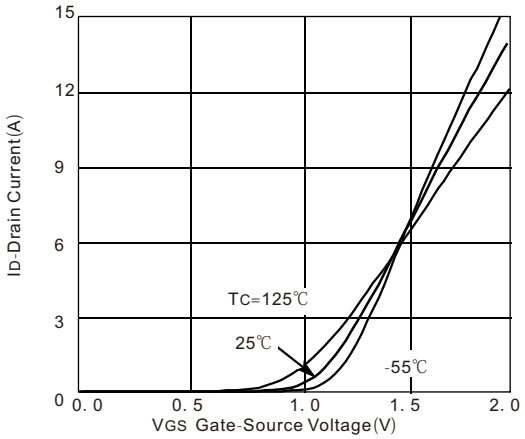


Figure2: Transfer Characteristics

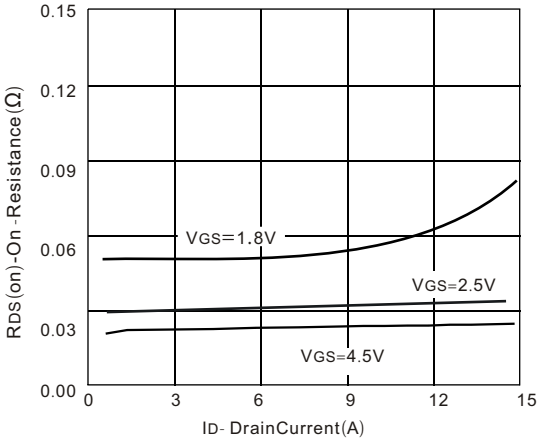


Figure3: On-Resistance vs Drain Current

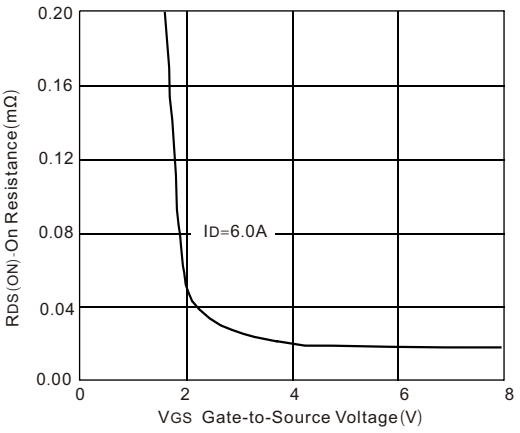
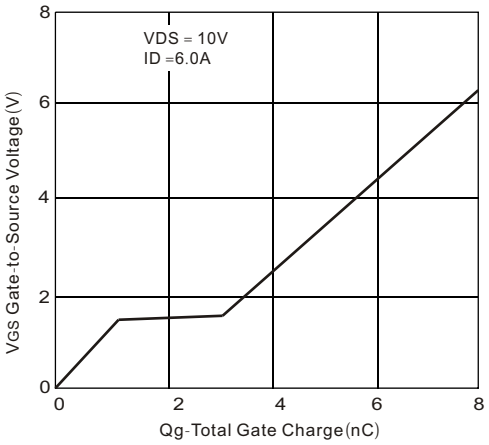


Figure4: On-Resistance vs.Gate-to-Source Voltage



Figur5 :Gate Change

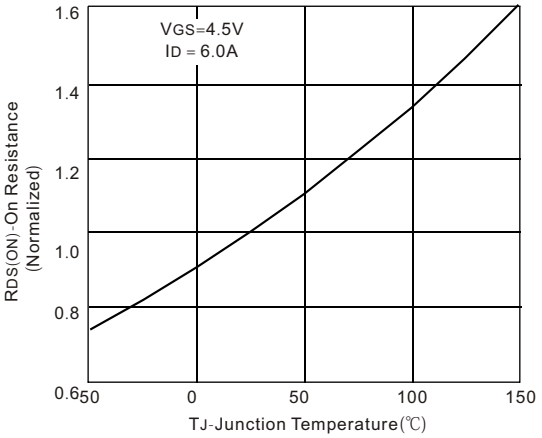


Figure6: On-Resistance vs.Junction Temperature

Typical Electrical and Thermal Characteristics

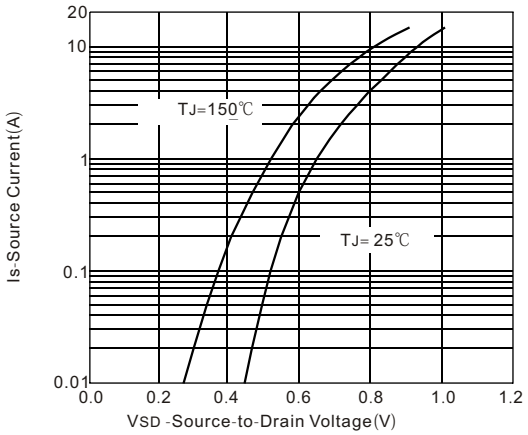


Figure7: Source-Drain Diode Forward Voltage

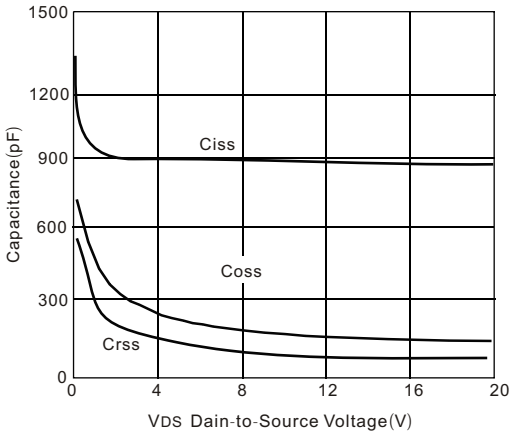


Figure8: Capacitance

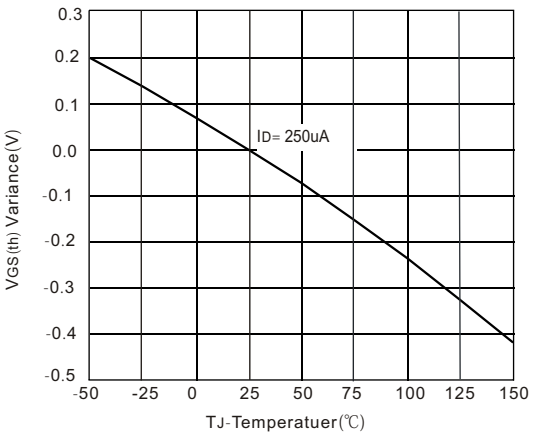


Figure9: Threshold Voltage

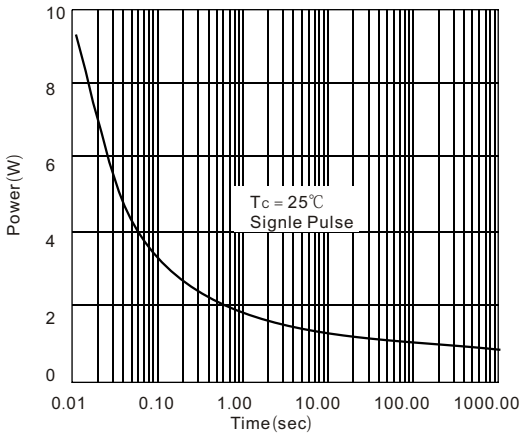


Figure10: Single Pluse Power

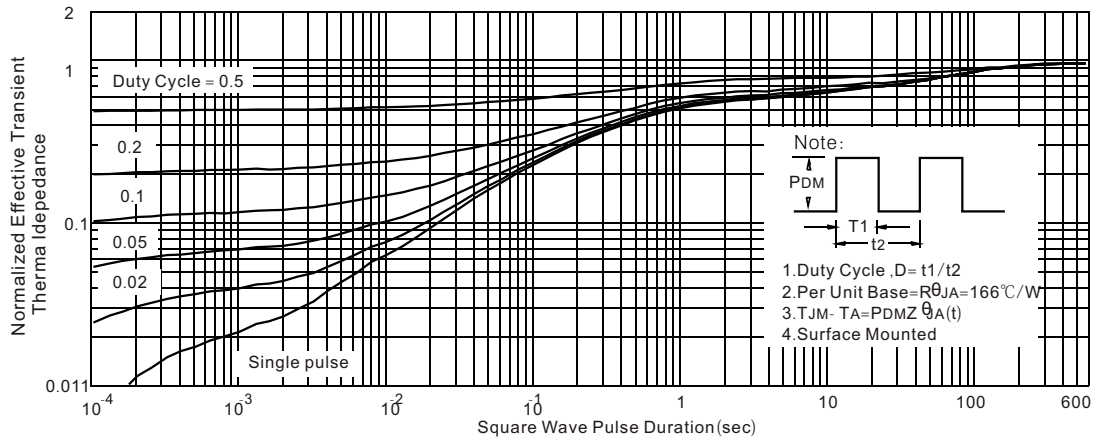
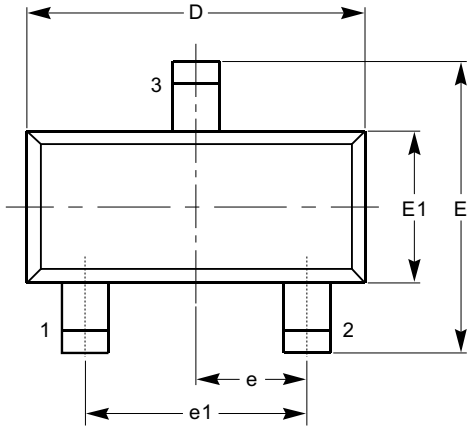


Figure11: Normalized Thermal Taransient Impendance,Junction-to -Ambient

Package Outline

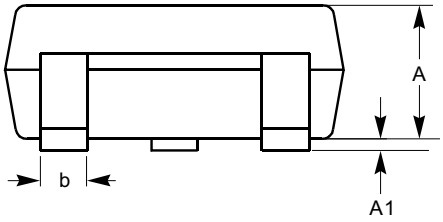
SOT23_3Lead



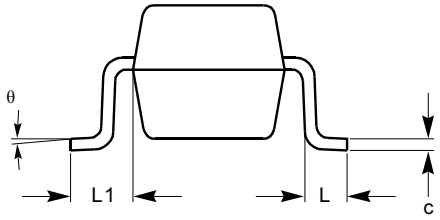
TOP VIEW

Unit: mm

Symbol	Min	Nom	Max
A	0.70	1.00	1.15
A1	0.00	---	0.13
b	0.30	0.40	0.50
c	0.08	0.13	0.20
D	2.80	2.90	3.10
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95 BSC		
e1	1.90 BSC		
L	0.40 REF		
L1	0.54 REF		
θ	0°	5°	8°



SIDE VIEW



END VIEW

Notes:

(1) All dimensions are in millimeters.Angles in degrees.
(2) Package body sizes exclude mold flash and gate burrs.
(3) Complies with JEDEC TO-236.

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