N-Channel 20V (D-S)MOSFET

General Description

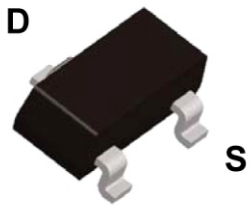
This miniature surface mount MOSFET uses advanced Trench process, low $R_{DS(ON)}$ assures minimal power loss and energy convert, which makes this device ideal for use in power management circuit.

Applications

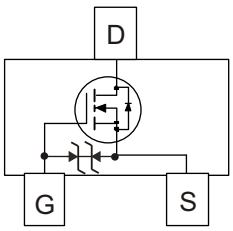
- Load switching
- Low current DC-DC converters
- Small power management

Features

- V_{DS} (V)=20V
- I_D(A)=4.9A(V_{GS}=4.5V)
- $R_{DS(on)}$= 42 mΩ @ V_{GS}=4.5V
- $R_{DS(on)}$= 66 mΩ @ V_{GS}=2.5V
- $R_{DS(on)}$= 112 mΩ @ V_{GS}=1.8V
- ESD Rating: 3000V HBM
- Low gate charge
- Fast switching speed
- High performance trench technology



SOT-23



Top View

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}	±12	
Continuous Drain Current [a]	T_A=25℃	I_D	4.9	A
	T_A=70℃		3.9	
Pulsed Drain Current [b]		I_{DM}	19	
Continuous Source Current (Diode Conduction) [a]		I_S	3.2	A
Power Dissipation [a]	T_A=25℃	P_D	1.4	W
	T_A=70℃		0.9	
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
MI3472	M03S	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 = 250 uA	0. 5	0. 7	1	V
Gate-Body Leakage	I_{GSS}	V_{DS}=0V,V_{GS}=±12V			±10	uA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V			1	uA
		V_{DS}=20V,V_{GS}=0V, T_J=85℃			30	uA
On-State Drain Current [c]	$I_{D(on)}$	V_{DS}=5V,V_{GS}=4. 5V	19			A
Drain-Source On-Resistance [c]	$R_{DS(on)}$	V_{GS}=4. 5V,I_D=4. 8		35	42	mΩ
		V_{GS}=2. 5 V, I_D=2. 0A		47	66	mΩ
		V_{GS}=1. 8 V, I_D=1. 0A		70	112	mΩ
Forward Tranconductance [c]	g_{fs}	V_{DS}=5V,I_D=3. 6A		20		S
Diode Forward Voltage	V_{SD}	I_S=1. 2A,V_{GS}=0V		0.7	1. 3	V
Dynamic						
Input Capacitance	C_{iss}	V_{DS}=10V,V_{GS}=0V f=1MHz		315		pF
Output Capacitance	C_{oss}			65		pF
Reverse Transfer Capacitance	C_{rss}			50		pF
Switching						
Total Gate Charge	Q_g	V_{DS}=10V,V_{GS}=4. 5V I_D=4. 8A		4.5	6	nC
Gate-Source Charge	Q_{gs}			0.5		nC
Gate-Drain Charge	Q_{gd}			1.7		nC
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=10V, I_D=1.0A, R_G=10 ohm, V_{GEN}=4. 5V		4.5	9	ns
Rise Time	t_r			15	25	ns
Turn-Off Delay Time	$t_{d(off)}$			20	40	ns
Fall-Time	t_f			5	10	ns

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

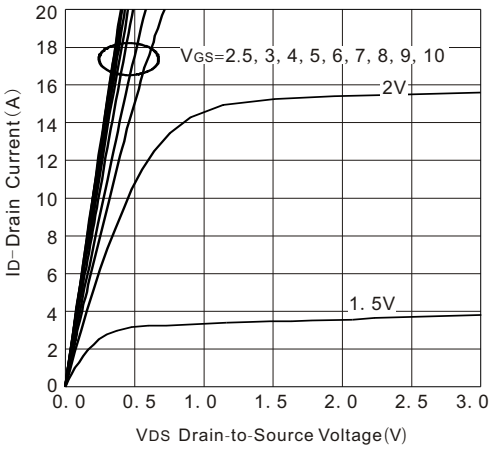


Figure1: Output Characteristics

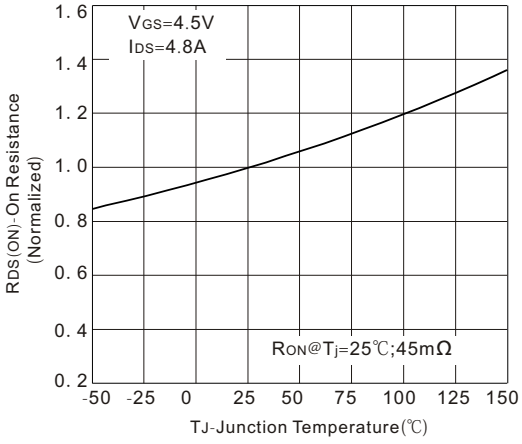


Figure 2: On-Resistance vs.Junction Temperature

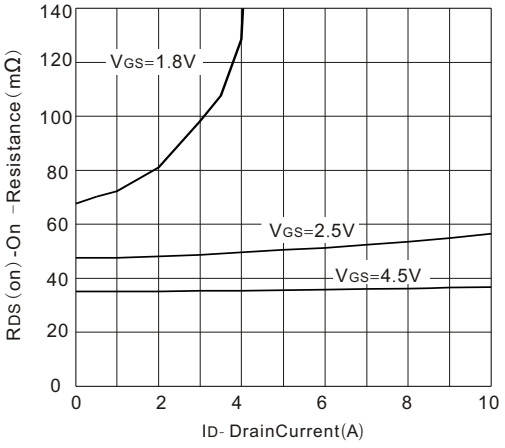


Figure 3: On-Resistance vs Drain Current

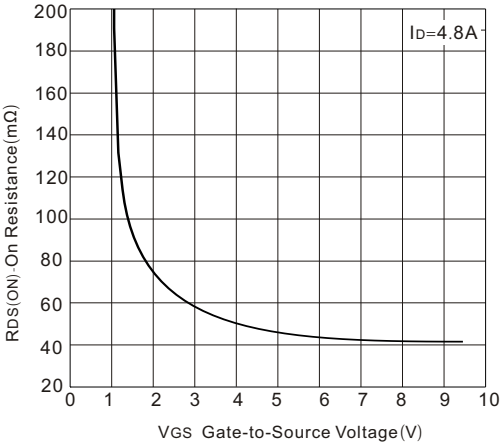


Figure 4: On-Resistance vs.Gate-to-Source Voltage

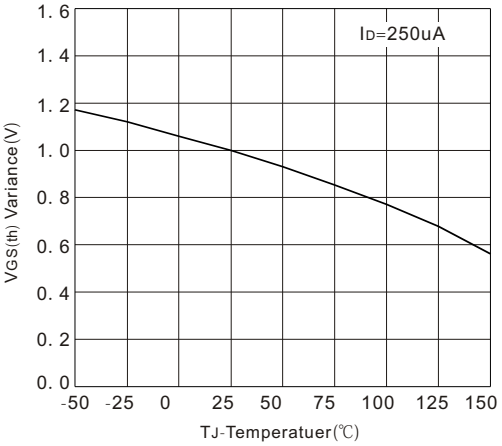


Figure5: Threshold Voltage

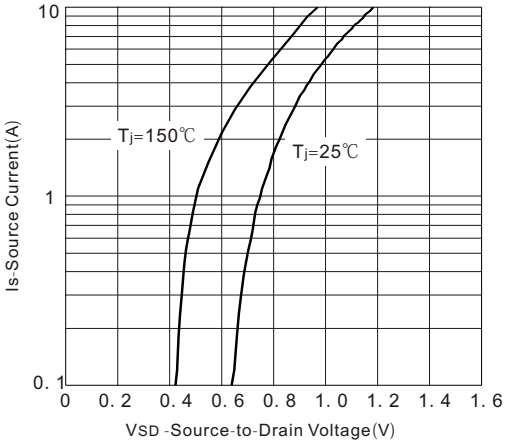
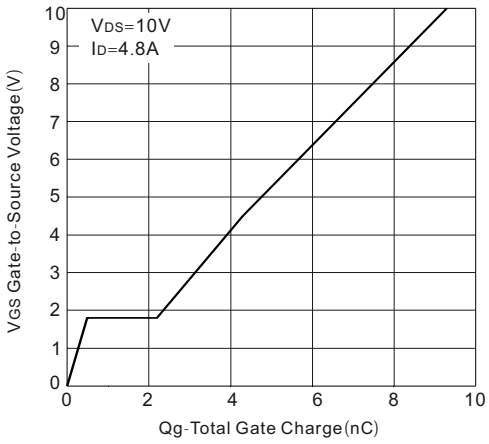


Figure6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics



Figur 7 :Gate Change

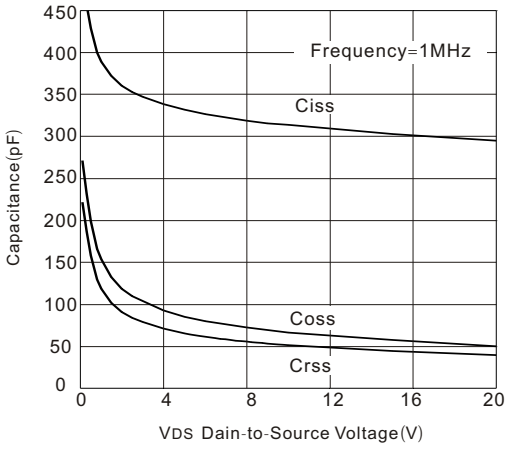


Figure 8: Capacitance

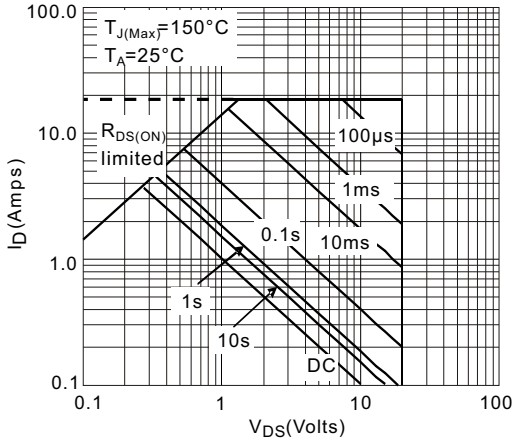


Figure 9: Maximum Forward Biased Safe Operating Area (Note d)

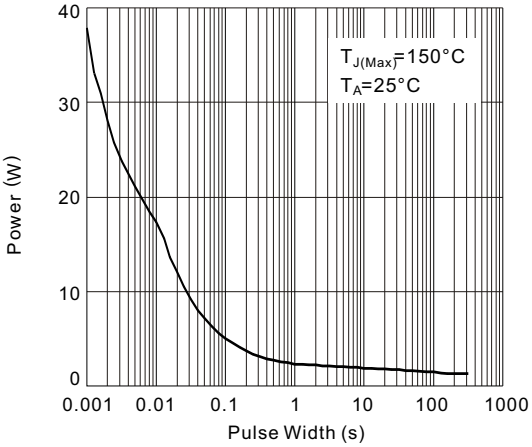


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note d)

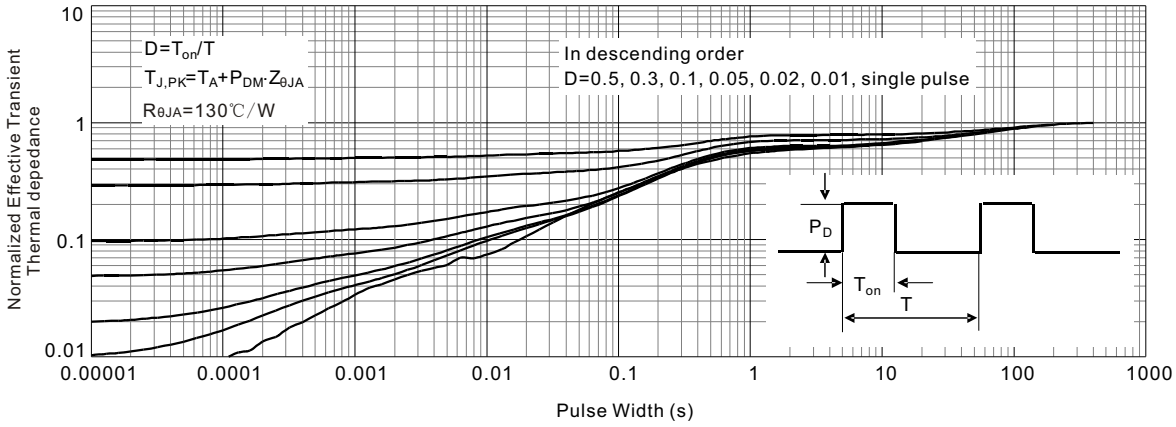
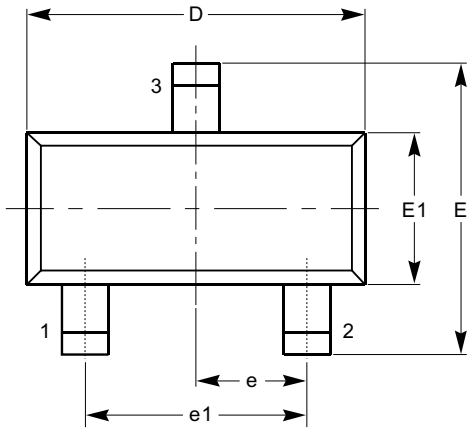


Figure 11: Normalized Maximum Transient Thermal Impedance

Note d: These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

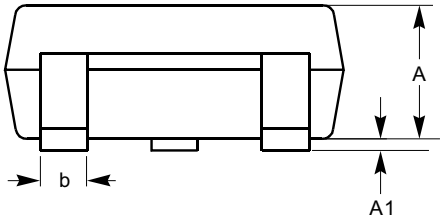
Package

SOT -23 3-Lead

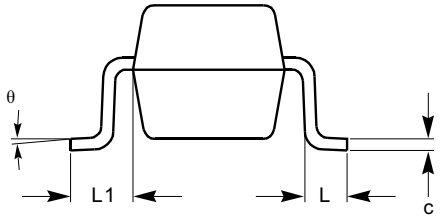


TOP VIEW

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	0.400 REF		
L1	0.540 REF		
θ	0°	5°	8°



SIDE VIEW



END VIEW

Notes:

(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC TO-236.

Doc.SOT233-090701