P-Channel 20V (D-S) MOSFET

General Description

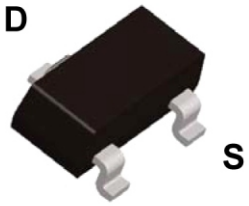
This miniature surface mount MOSFET uses advanced Trench process, low $R_{DS(ON)}$ assures minimal power loss and energy convert, which makes this device ideal for use in power management circuit.

Features

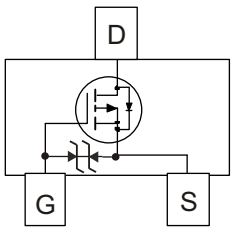
- V_{DS} (V)=-20V
- I_D(A)=-3.4A(V_{GS}=-4.5V)
- $R_{DS(on)}$= 90 mΩ @ V_{GS}=-4.5V
- $R_{DS(on)}$= 135 mΩ @ V_{GS}=-2.5V
- $R_{DS(on)}$= 230 mΩ @ V_{GS}=-1.8V
- ESD Rating: 3000V HBM
- Low gate charge
- Fast switching speed
- High performance trench technology

Applications

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



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	-3.4	A
	T_A=70℃		-2.7	
Pulsed Drain Current [b]		I_{DM}	-13	
Continuous Source Current (Diode Conduction) [a]		I_S	-2.0	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
MI3475	M06S	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. 45	-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	-13			A
Drain-Source On-Resistance [c]	$R_{DS(on)}$	V_{GS}=-4.5V,I_D=-3.3A		70	90	mΩ
		V_{GS}=-2.5 V, I_D=-1.8A		110	135	mΩ
		V_{GS}=-1.8 V, I_D=-0.5A		150	230	mΩ
Forward Tranconductance [c]	g_{fs}	V_{DS}=-5V,I_D=-3.3A		9		S
Diode Forward Voltage	V_{SD}	I_S=-1A,V_{GS}=0V		-0.8	-1. 3	V
Dynamic						
Input Capacitance	C_{iss}	V_{DS}=-10V,V_{GS}=0V f=1MHz		370		pF
Output Capacitance	C_{oss}			65		pF
Reverse Transfer Capacitance	C_{rss}			45		pF
Switching						
Total Gate Charge	Q_g	V_{DS}=-10V,V_{GS}=-4.5V I_D=-3.3A		3.9	6	nC
Gate-Source Charge	Q_{gs}			0.5		nC
Gate-Drain Charge	Q_{gd}			1.4		nC
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=-10V, I_D=-2.2A, R_G=6 ohm, V_{GEN}=-4.5V		6	12	ns
Rise Time	t_r			13	26	ns
Turn-Off Delay Time	$t_{d(off)}$			25	50	ns
Fall-Time	t_f			15	32	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

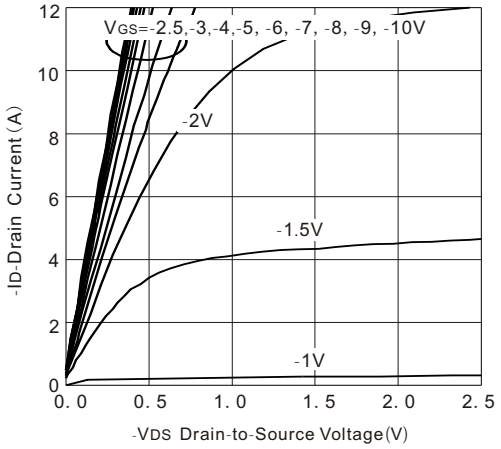


Figure1: Output Characteristics

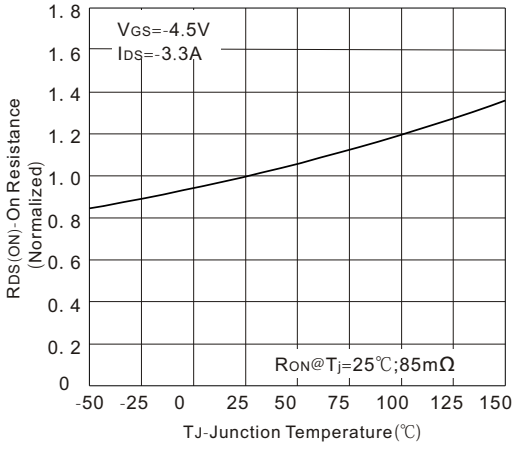


Figure 2: On-Resistance vs.Junction Temperature

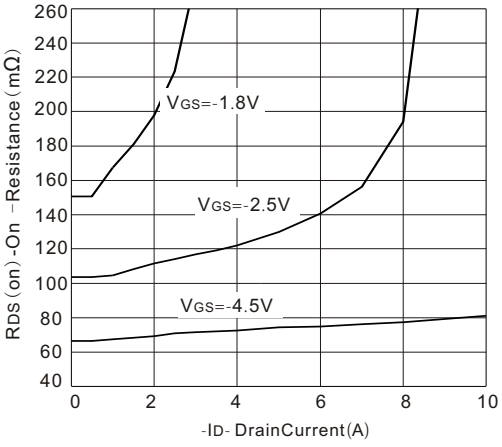


Figure 3: On-Resistance vs Drain Current

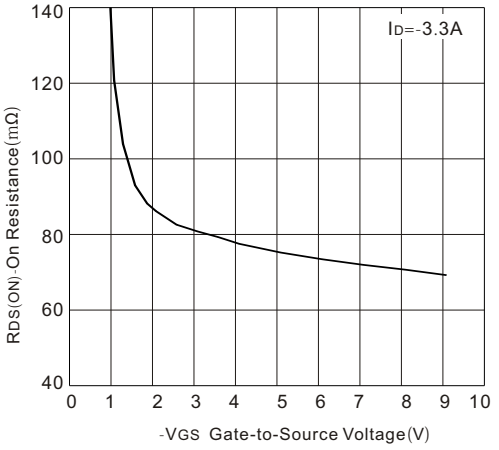


Figure 4: On-Resistance vs.Gate-to-Source Voltage

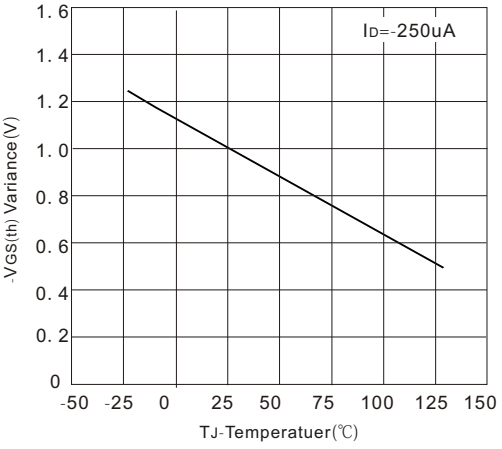


Figure5: Threshold Voltage

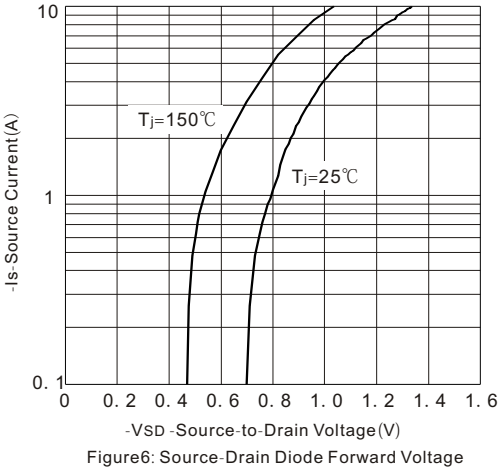
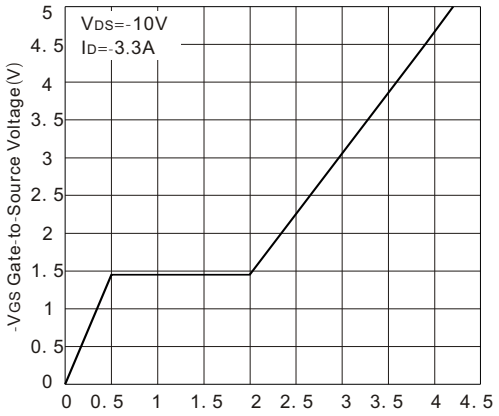


Figure6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics



Figur 7 :Gate Change

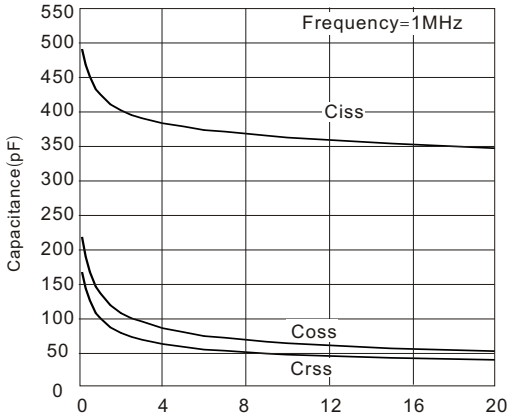


Figure 8: Capacitance

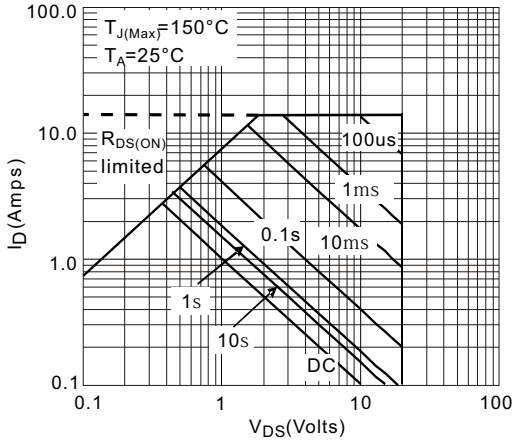


Figure 9: Maximum Forward Biased Safe Operating Area (Note d)

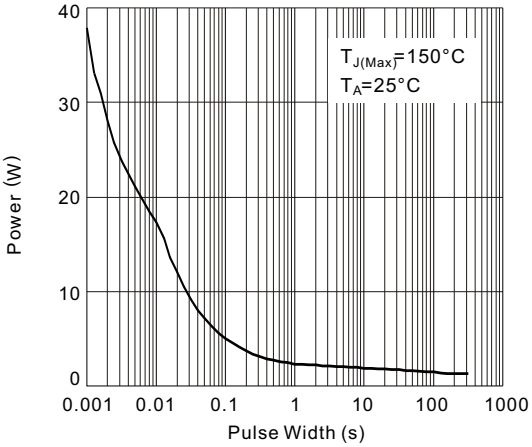


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note d)

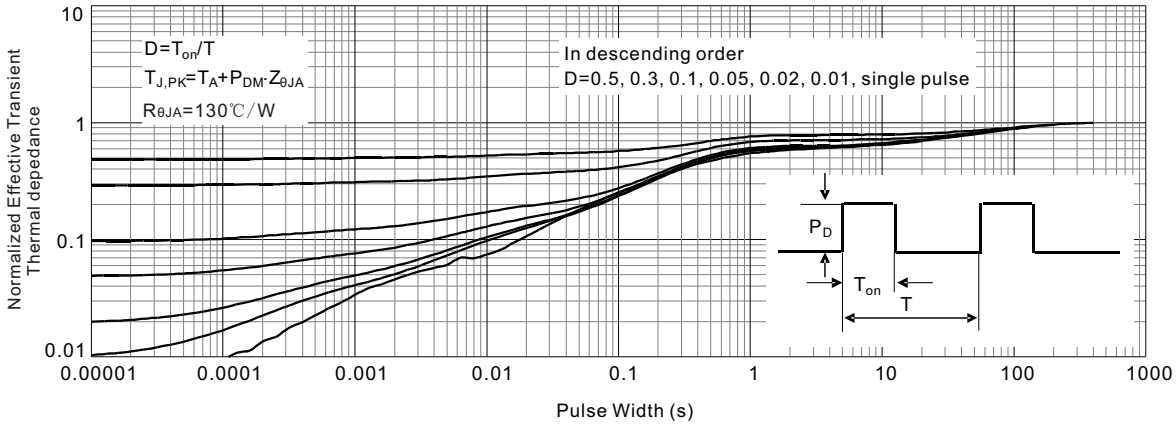
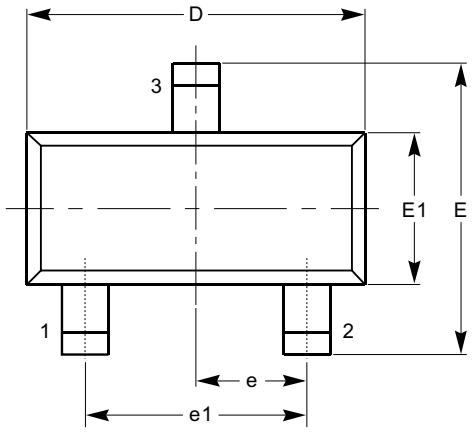


Figure 11: Normalized Maximum Transient Thermal Impedance

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.

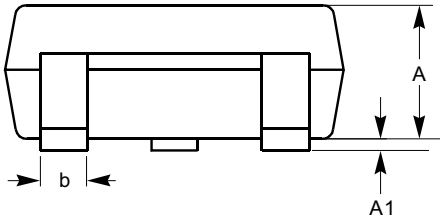
Package

SOT -23 3-Lead

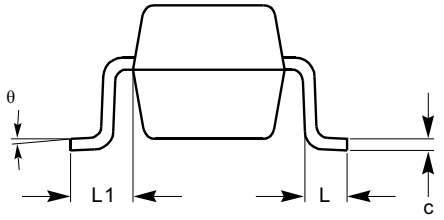


TOP VIEW

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