



P-Channel 20V (D-S) MOSFET

General Description

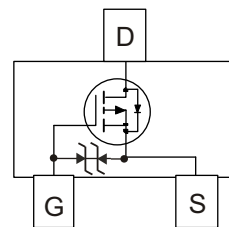
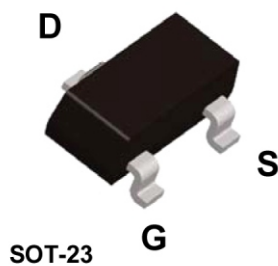
This miniature surface mount MOSFET uses advanced Trench process, low $R_{DS(on)}$ assures minimal power loss and energy convert, which makes this device ideal for use in power management circuit.

Applications

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

Features

- $V_{DS}(V)=-20V$
- $I_D(A)=-3.6A(V_{GS}=-4.5V)$
- $R_{DS(on)}=70\text{ m}\Omega @ V_{GS}=-4.5V$
- $R_{DS(on)}=110\text{ m}\Omega @ V_{GS}=-2.5V$
- $R_{DS(on)}=250\text{ m}\Omega @ V_{GS}=-1.8V$
- ESD Rating: 3000V HBM
- Low gate charge
- Fast switching speed
- High performance trench technology



Top View

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ^a	$T_A=25^\circ\text{C}$	-3.6	A
	$T_A=70^\circ\text{C}$	-2.8	
Pulsed Drain Current ^b	I_{DM}	-14	
Continuous Source Current (Diode Conduction) ^a	I_S	-2.3	A
Power Dissipation ^a	$T_A=25^\circ\text{C}$	1.4	W
	$T_A=70^\circ\text{C}$	0.9	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient ^a	$t \leq 10\text{ sec}$	90	$^\circ\text{C}/\text{W}$
	Steady-State	130	



Package Outlines and Ordering Information

Device	Device Marking	Reel Size	Tape Width	Quantity
MI3473	M04S	7"	8mm	3000 units

Specifications (TA = 25°C Unless Otherwise Noted)

Parameter	Symbol	Test Conditions	Limits			Units
			Min	Typ	Max	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-0.75	-1	V
Gate-Body Leakage	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-20V, V_{GS}=0V$			-1	μA
		$V_{DS}=-20V, V_{GS}=0V, T_J=85^\circ C$			-30	
On-State Drain Current ^c	$I_{D(on)}$	$V_{DS}=-5V, V_{GS}=4.5V$	-14			A
Drain-Source On-Resistance ^c	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-3.6A$		55	70	m Ω
		$V_{GS}=-2.5V, I_D=-2A$		80	110	
		$V_{GS}=-1.8V, I_D=-1A$		135	250	
Forward Transconductance ^c	g_{fs}	$V_{DS}=-5V, I_D=-3.6A$		11		S
Diode Forward Voltage	V_{SD}	$I_S=-1.2A, V_{GS}=0V$		-0.7	-1.1	V
Dynamic						
Input Capacitance	C_{iss}	$V_{DS}=-10V, V_{GS}=0V$ $f=1MHz$		550		pF
Output Capacitance	C_{oss}			90		
Reverse Transfer Capacitance	C_{rss}			80		
Switching						
Total Gate Charge	Q_g	$V_{DS}=-10V, V_{GS}=-4.5V$ $I_D=-3.6A$		6.2	9	nC
Gate-Source Charge	Q_{gs}			1.3		
Gate-Drain Charge	Q_{gd}			1.2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=-10V, I_D=-2.2A,$ $R_G=6\text{ ohm}, V_{GEN}=-4.5V$		5	8	ns
Rise Time	t_r			12	24	
Turn-Off Delay Time	$t_{d(off)}$			30	65	
Fall-Time	t_f			22	37	

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

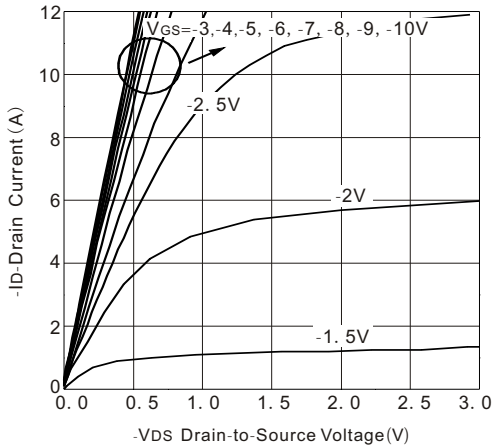


Figure 1: Output Characteristics

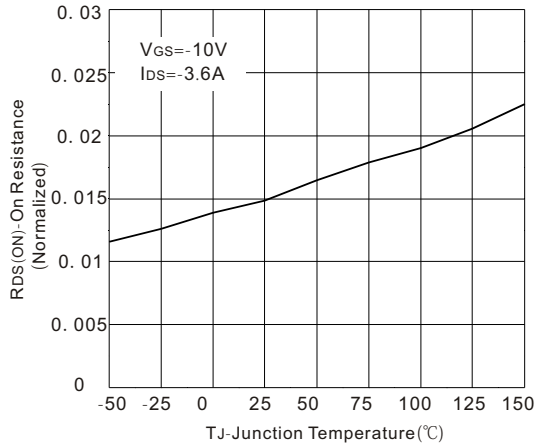


Figure 2: On-Resistance vs. Junction Temperature

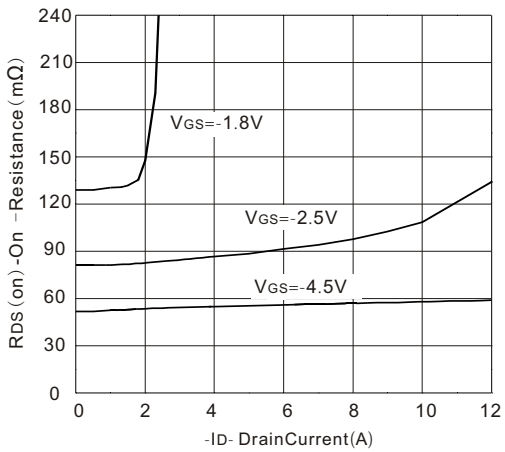


Figure 3: On-Resistance vs Drain Current

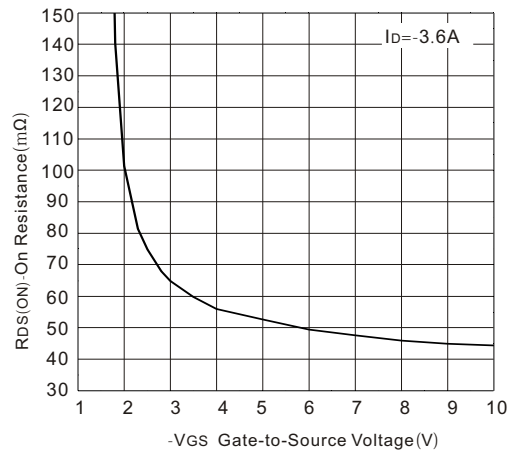


Figure 4: On-Resistance vs. Gate-to-Source Voltage

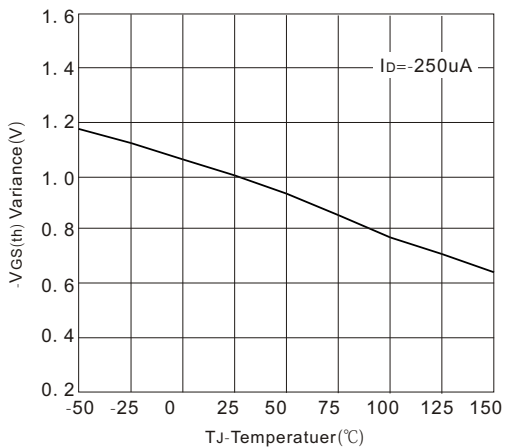


Figure 5: Threshold Voltage

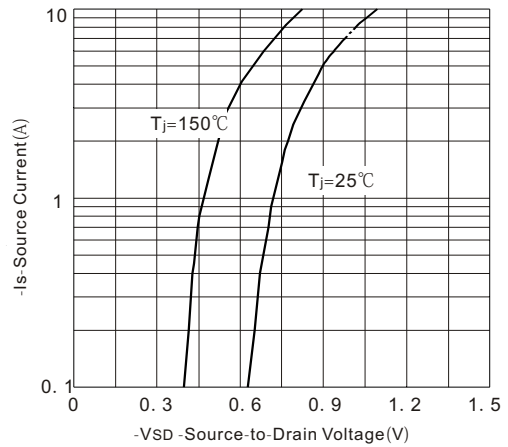


Figure 6: Source-Drain Diode Forward Voltage



Typical Electrical and Thermal Characteristics

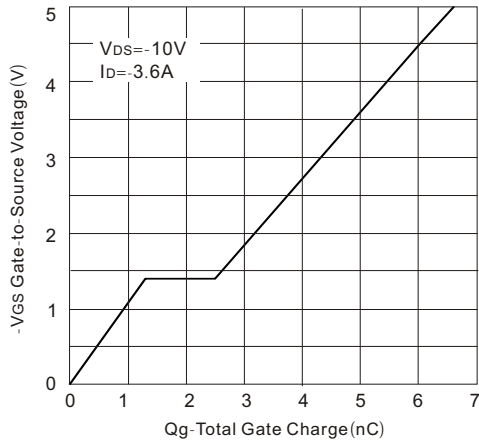


Figure 7: Gate Change

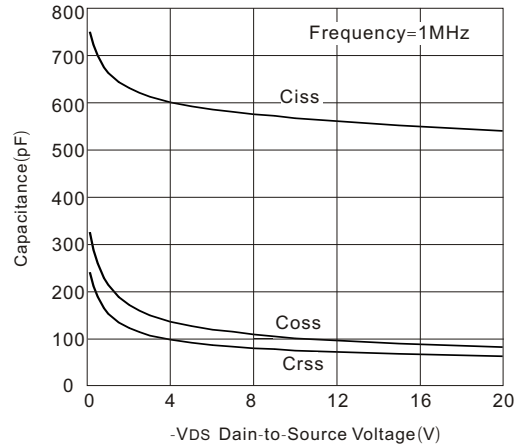


Figure 8: Capacitance

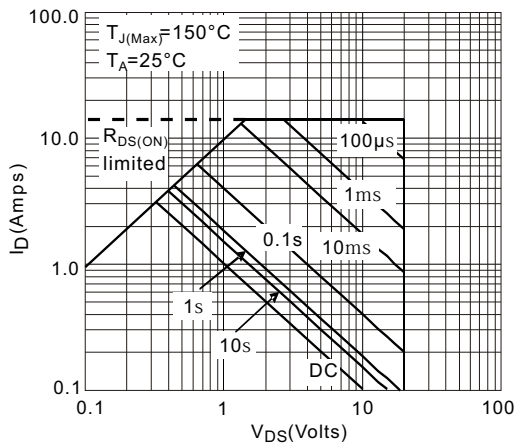


Figure 9: Maximum Forward Biased Safe Operating Area (Note d)

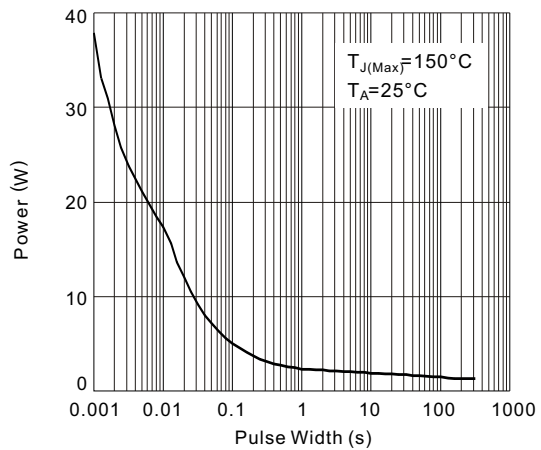


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note d)

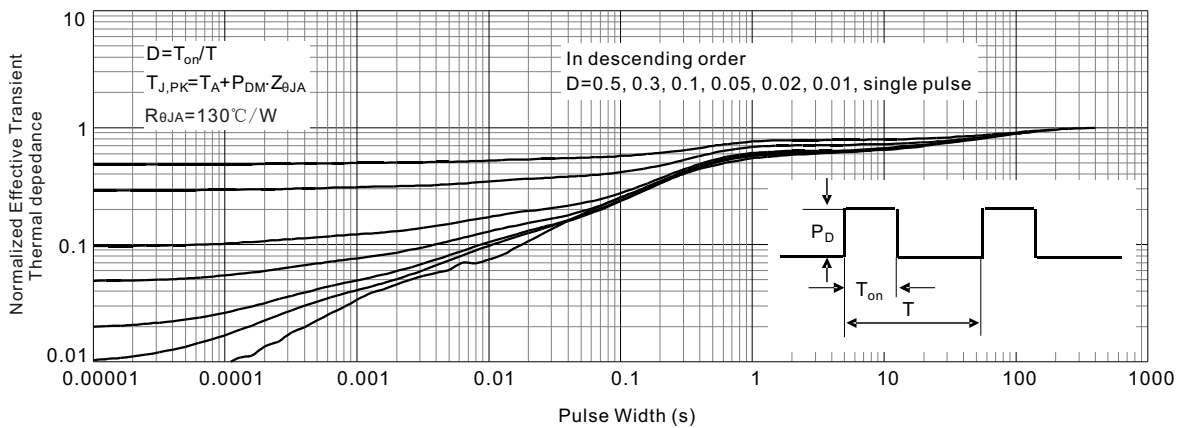
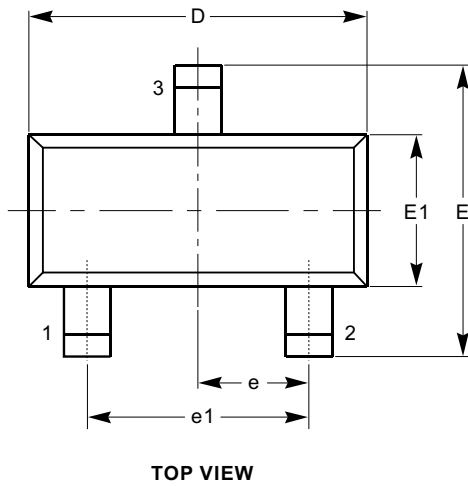


Figure 11: Normalized Maximum Transient Thermal Impedance

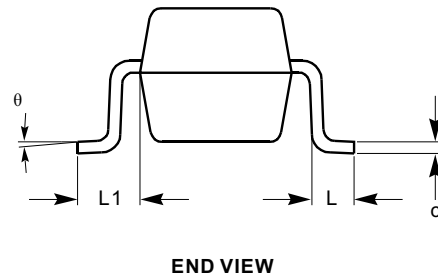
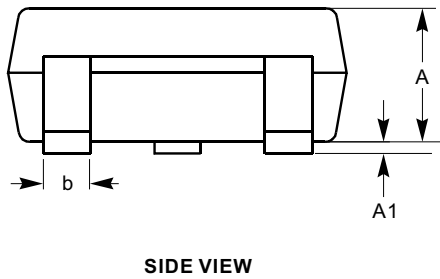
Note d: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with TA=25°C. The SOA curve provides a single pulse rating.

Package

SOT -23 3-Lead



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°



Notes:

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

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