

### SOT-23



#### Pin Definition:

1. Gate
2. Source
3. Drain

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
-20	130 @ $V_{GS} = -4.5V$	-2.8
	190 @ $V_{GS} = -2.5V$	-2.0

### Features

- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance

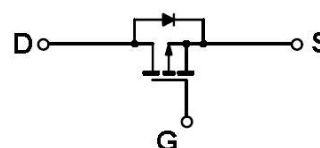
### Application

- Load Switch
- PA Switch

### Ordering Information

Part No.	Package	Packing
TSM2301CX RF	SOT-23	3Kpcs / 7" Reel

### Block Diagram



P-Channel MOSFET

### Absolute Maximum Rating ( $T_a = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current, $V_{GS} @ 4.5V$ .	$I_D$	-2.8	A
Pulsed Drain Current, $V_{GS} @ 4.5V$	$I_{DM}$	-8	A
Continuous Source Current (Diode Conduction) <sup>a,b</sup>	$I_S$	-0.72	A
Maximum Power Dissipation	$P_D$	$T_a = 25^\circ C$	0.9
		$T_a = 75^\circ C$	0.57
Operating Junction Temperature	$T_J$	+150	$^\circ C$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Lead Temperature (1/8" from case)	$T_L$	5	S
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	120	$^\circ C/W$

#### Notes:

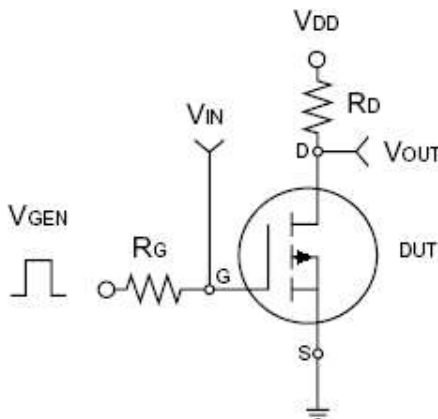
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on FR4 Board,  $t \leq 5$  sec.
- c. Surface Mounted on FR4 Board,

### Electrical Specifications (Ta = 25°C unless otherwise noted)

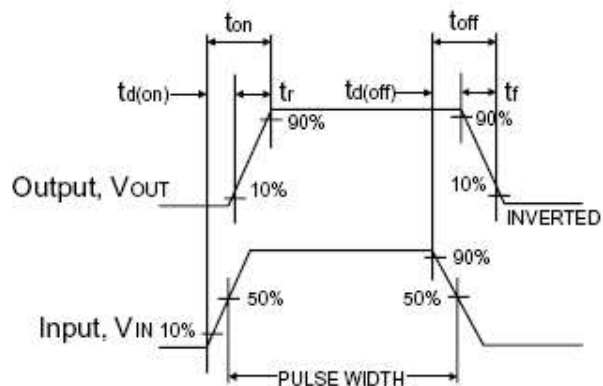
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	BV <sub>DSS</sub>	-20	--	--	V
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	V <sub>GS(TH)</sub>	-0.45	--	-0.95	V
Gate Body Leakage	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±100	nA
Zero Gate Voltage Drain Current	V <sub>DS</sub> = -9.6V, V <sub>GS</sub> = 0V	I <sub>DSS</sub>	--	--	-1.0	μA
On-State Drain Current <sup>a</sup>	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -5V	I <sub>D(ON)</sub>	-6	--	--	A
Drain-Source On-State Resistance <sup>a</sup>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -2.8A	R <sub>DS(ON)</sub>	--	85	130	mΩ
	V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2.0A		--	122	190	
Forward Transconductance <sup>a</sup>	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4A	g <sub>fs</sub>	--	6.5	--	S
Diode Forward Voltage	I <sub>S</sub> = -0.75A, V <sub>GS</sub> = 0V	V <sub>SD</sub>	--	-0.8	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	V <sub>DS</sub> = -6V, I <sub>D</sub> = -2.8A, V <sub>GS</sub> = -4.5V	Q <sub>g</sub>	--	5.4	10	nC
Gate-Source Charge		Q <sub>gs</sub>	--	0.8	--	
Gate-Drain Charge		Q <sub>gd</sub>	--	1.1	--	
Input Capacitance	V <sub>DS</sub> = -6V, V <sub>GS</sub> = 0V, f = 1.0MHz	C <sub>iss</sub>	--	447	--	pF
Output Capacitance		C <sub>oss</sub>	--	127	--	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	80	--	
<b>Switching<sup>c</sup></b>						
Turn-On Delay Time	V <sub>DD</sub> = -6V, R <sub>L</sub> = 6Ω, I <sub>D</sub> = -1A, V <sub>GEN</sub> = -4.5V, R <sub>G</sub> = 6Ω	t <sub>d(on)</sub>	--	5	25	nS
Turn-On Rise Time		t <sub>r</sub>	--	19	60	
Turn-Off Delay Time		t <sub>d(off)</sub>	--	95	110	
Turn-Off Fall Time		t <sub>f</sub>	--	65	80	

Notes:

- pulse test: PW = 300μS, duty cycle = 2%
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.



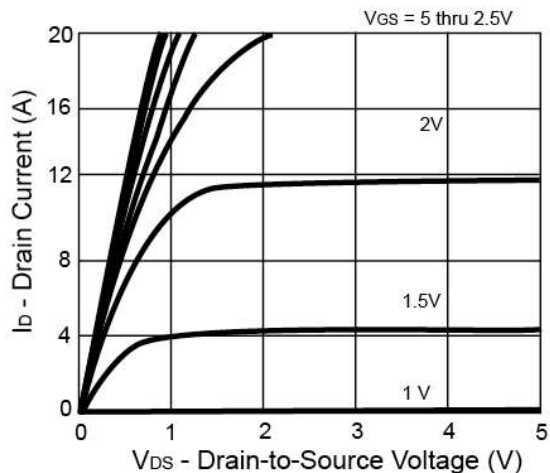
Switching Test Circuit



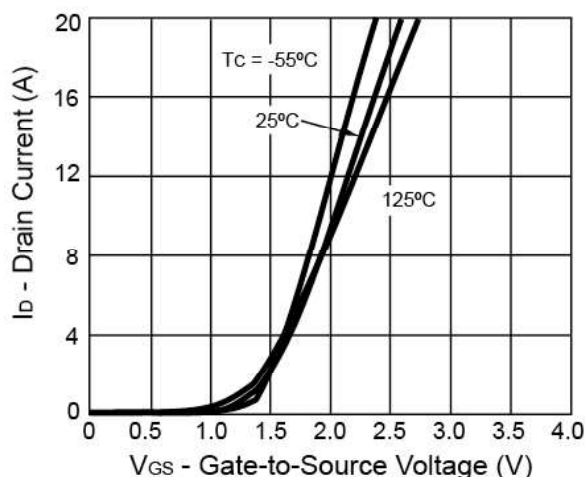
Switchin Waveforms

**Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)

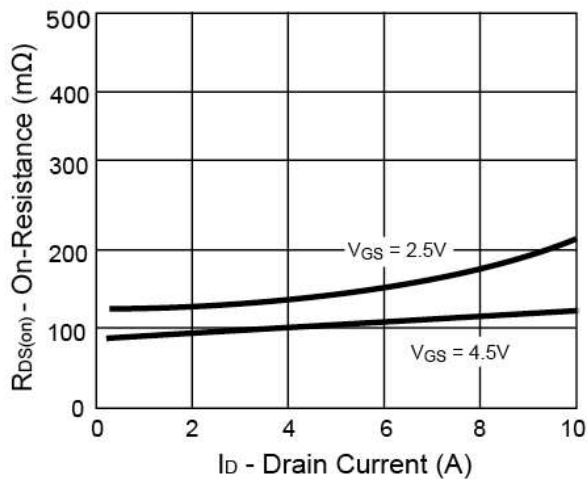
**Output Characteristics**



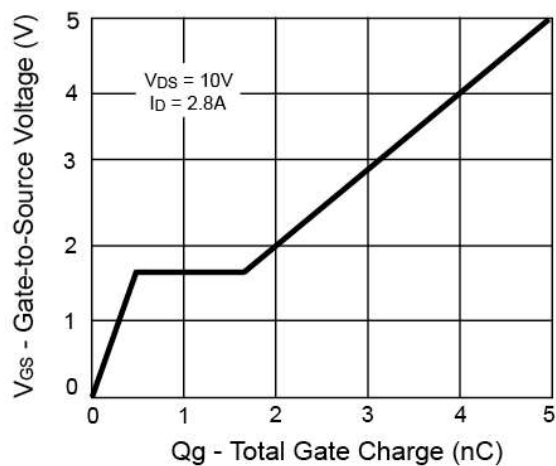
**Transfer Characteristics**



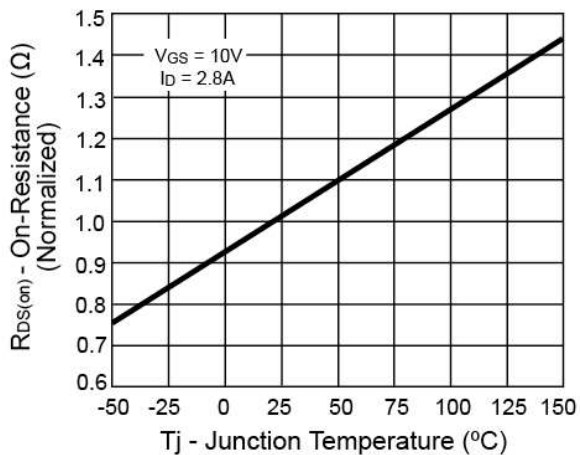
**On-Resistance vs. Drain Current**



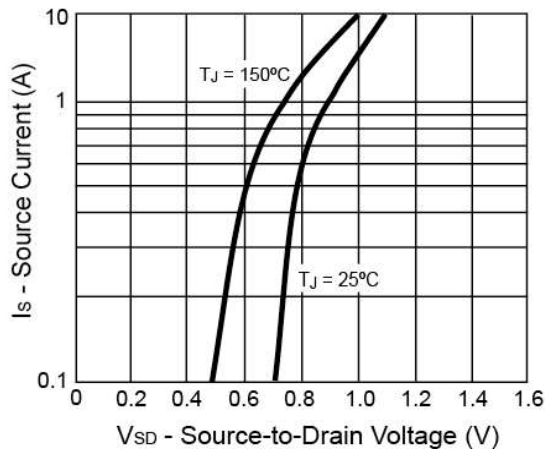
**Gate Charge**



**On-Resistance vs. Junction Temperature**

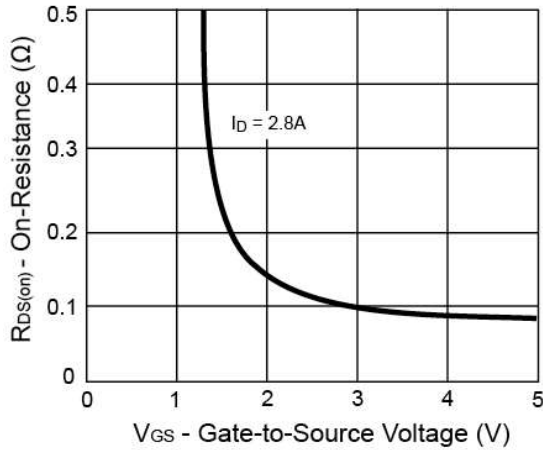


**Source-Drain Diode Forward Voltage**

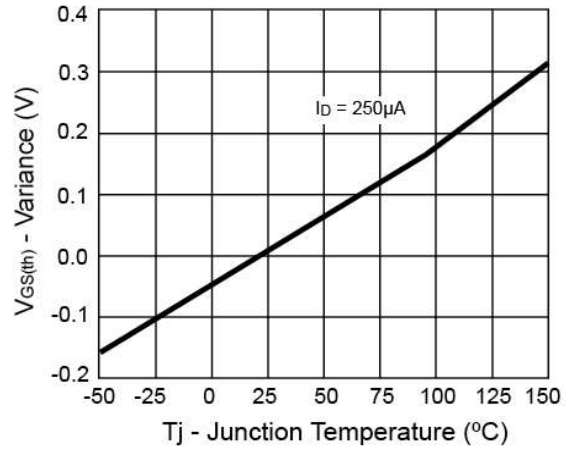


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

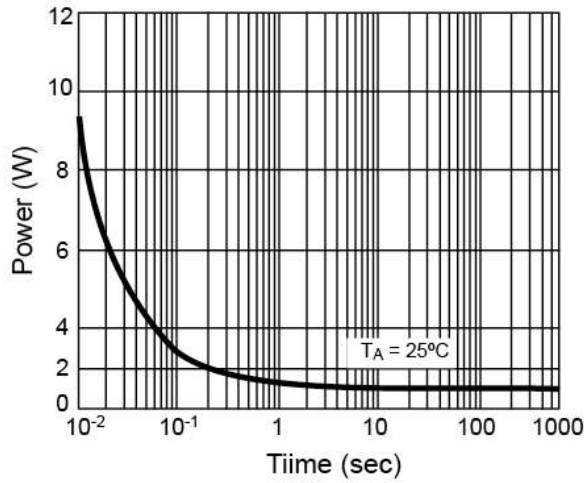
**On-Resistance vs. Gate-Source Voltage**



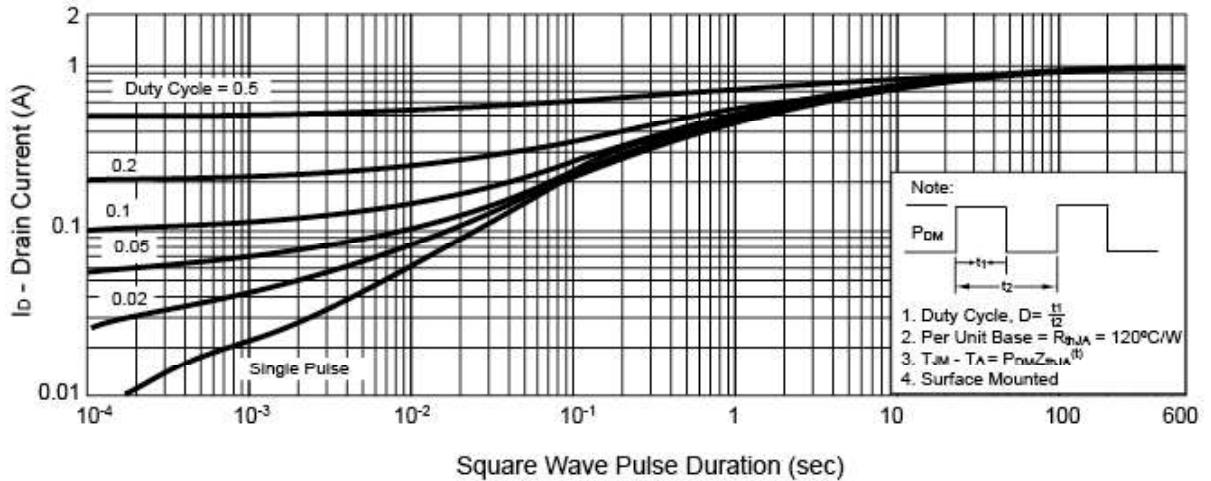
**Threshold Voltage**



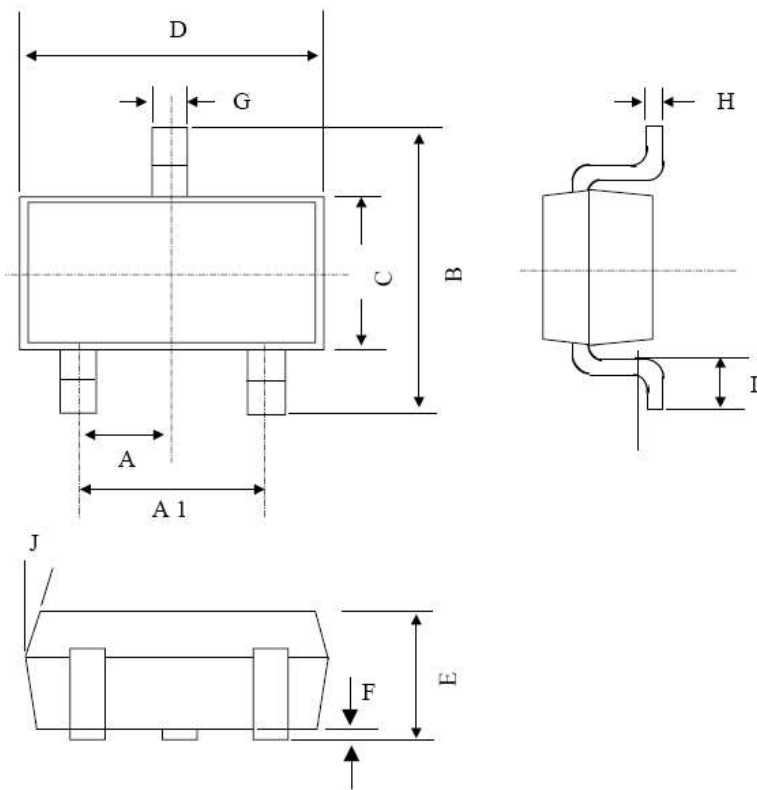
**Single Pulse Power**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

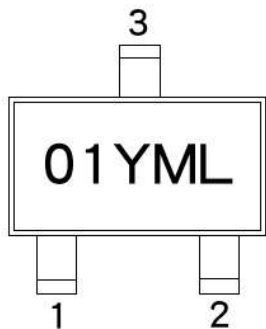


## SOT-23 Mechanical Drawing



SOT-23 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	0.95 BSC		0.037 BSC	
A1	1.9 BSC		0.074 BSC	
B	2.60	3.00	0.102	0.118
C	1.40	1.70	0.055	0.067
D	2.80	3.10	0.110	0.122
E	1.00	1.30	0.039	0.051
F	0.00	0.10	0.000	0.004
G	0.35	0.50	0.014	0.020
H	0.10	0.20	0.004	0.008
I	0.30	0.60	0.012	0.024
J	5°	10°	5°	10°

## Marking Diagram



- 01** = Device Code
- Y** = Year Code
- M** = Month Code  
(A=Jan, B=Feb, C=Mar, D=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- L** = Lot Code

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