

### SOT-23



Pin Definition:  
 1. Gate  
 2. Source  
 3. Drain

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
-20	39 @ $V_{GS} = -4.5V$	-4.7
	52 @ $V_{GS} = -2.5V$	-4.1
	68 @ $V_{GS} = -1.8V$	-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
TSM2323CX RFG	SOT-23	3Kpcs / 7" Reel

Note: "G" denote for Green Product

### 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, $V_{GS} @ 4.5V$ .	$I_D$	-4.7	A
Pulsed Drain Current, $V_{GS} @ 4.5V$	$I_{DM}$	-20	A
Continuous Source Current (Diode Conduction) <sup>a,b</sup>	$I_S$	-1.0	A
Maximum Power Dissipation	$P_D$	$T_a = 25^\circ C$	1.25
		$T_a = 70^\circ C$	0.8
Operating Junction Temperature	$T_J$	+150	$^\circ C$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +150	$^\circ C$

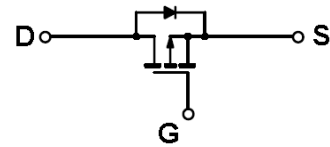
### Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Case Thermal Resistance	$R_{\theta JC}$	75	$^\circ C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	120	$^\circ C/W$

Notes:

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

### Block Diagram



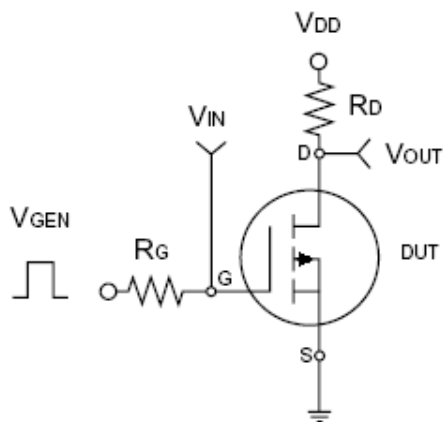
P-Channel MOSFET

### Electrical Specifications

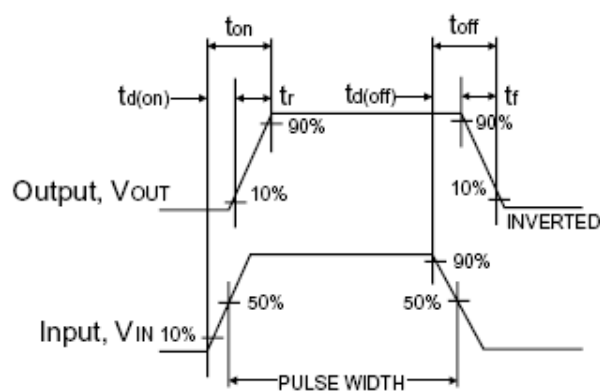
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = -250\mu A$	$BV_{DSS}$	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	$V_{GS(TH)}$	-0.4	--	-1.0	V
Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$	$I_{DSS}$	--	--	-1.0	$\mu A$
Gate Body Leakage	$V_{GS} = \pm 8V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
On-State Drain Current	$V_{DS} \leq -5V, V_{GS} = -4.5V$	$I_{D(ON)}$	-20	--	--	A
Drain-Source On-State Resistance	$V_{GS} = -4.5V, I_D = -4.7A$	$R_{DS(ON)}$	--	31	39	m $\Omega$
	$V_{GS} = -2.5V, I_D = -4.1A$		--	41	52	
	$V_{GS} = -1.8V, I_D = -2.0A$		--	54	68	
Forward Transconductance	$V_{DS} = -5V, I_D = -4.7A$	$g_{fs}$	--	16	--	S
Diode Forward Voltage	$I_S = -1.0A, V_{GS} = 0V$	$V_{SD}$	--	-0.7	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = -10V, I_D = -4.7A, V_{GS} = -4.5V$	$Q_g$	--	12.5	19	nC
Gate-Source Charge		$Q_{gs}$	--	1.7	--	
Gate-Drain Charge		$Q_{gd}$	--	3.3	--	
Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz$	$C_{iss}$	--	1020	--	pF
Output Capacitance		$C_{oss}$	--	191	--	
Reverse Transfer Capacitance		$C_{rss}$	--	140	--	
<b>Switching<sup>b,c</sup></b>						
Turn-On Delay Time	$V_{DD} = -10V, R_L = 10\Omega, I_D = -1A, V_{GEN} = -4.5V, R_G = 6\Omega$	$t_{d(on)}$	--	25	40	nS
Turn-On Rise Time		$t_r$	--	43	65	
Turn-Off Delay Time		$t_{d(off)}$	--	71	110	
Turn-Off Fall Time		$t_f$	--	48	75	

**Notes:**

- a. pulse test:  $PW \leq 300\mu S$ , duty cycle  $\leq 2\%$
- b. Guaranteed by design of component.
- c. Switching time is essentially independent of operating temperature.



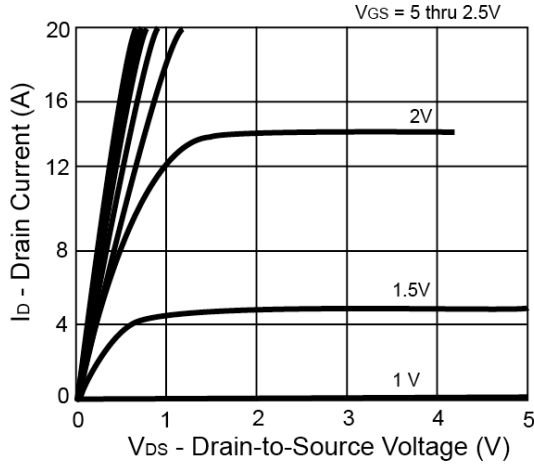
**Switching Test Circuit**



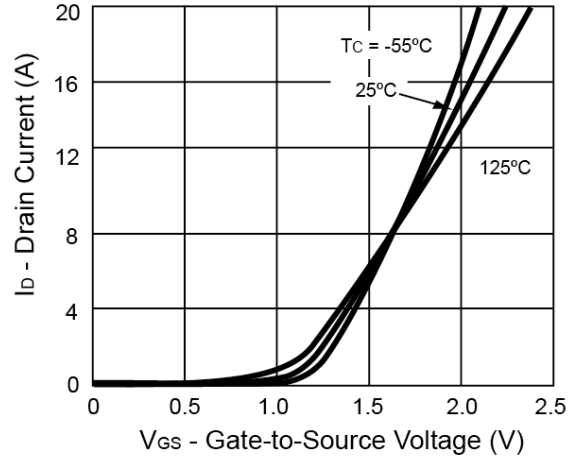
**Switchin Waveforms**

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

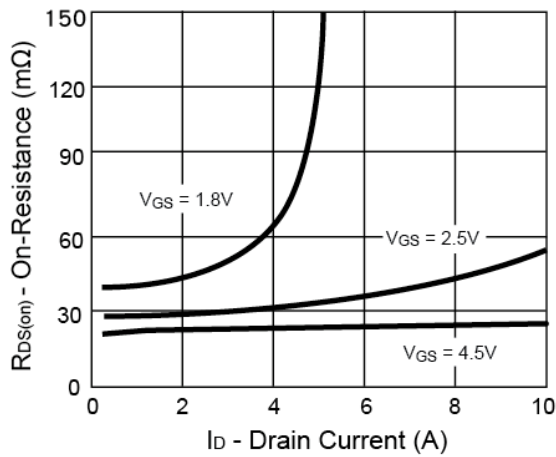
**Output Characteristics**



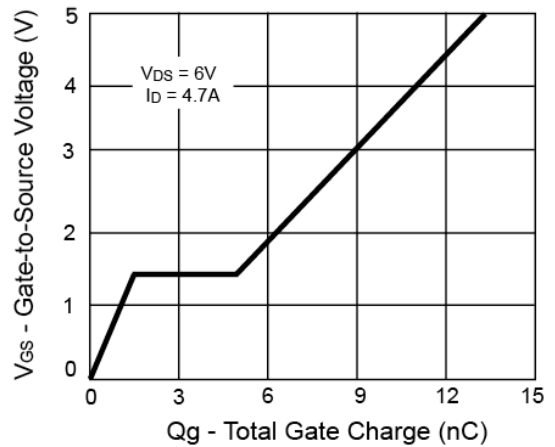
**Transfer Characteristics**



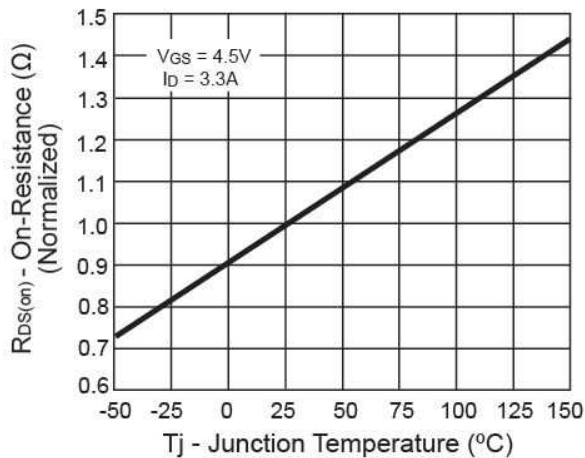
**On-Resistance vs. Drain Current**



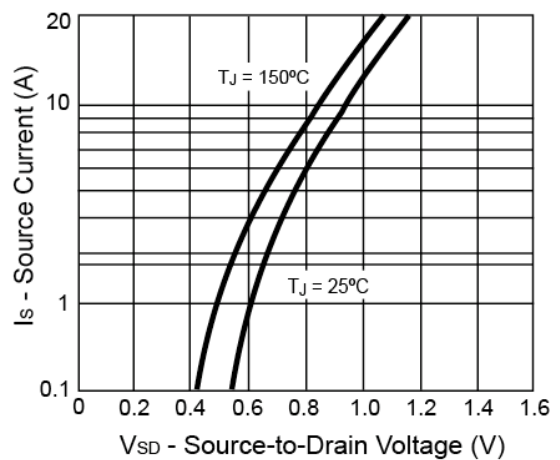
**Gate Charge**



**On-Resistance vs. Junction Temperature**

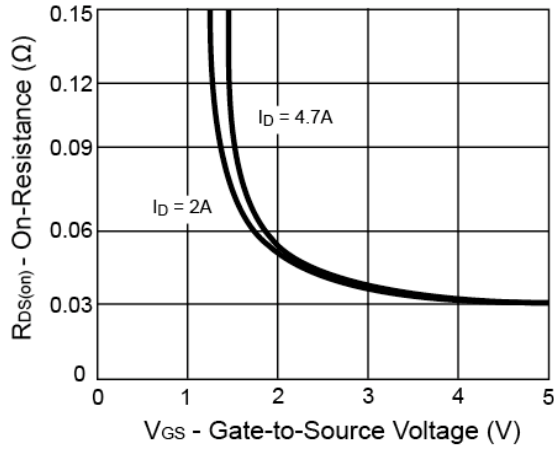


**Source-Drain Diode Forward Voltage**

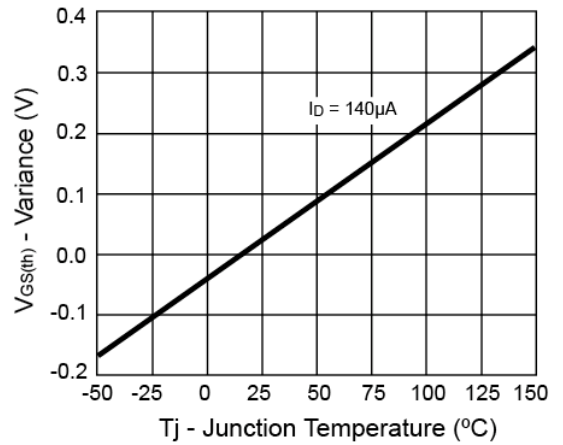


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

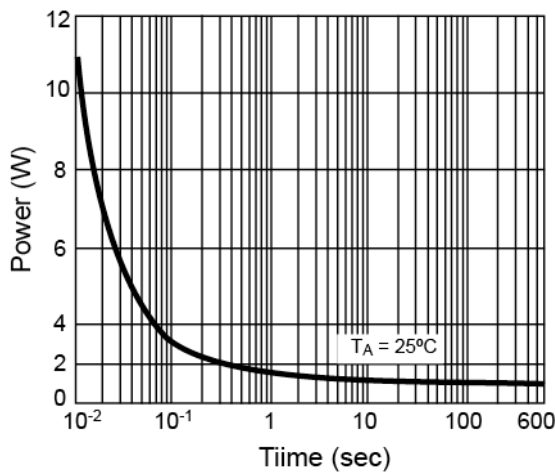
**On-Resistance vs. Gate-Source Voltage**



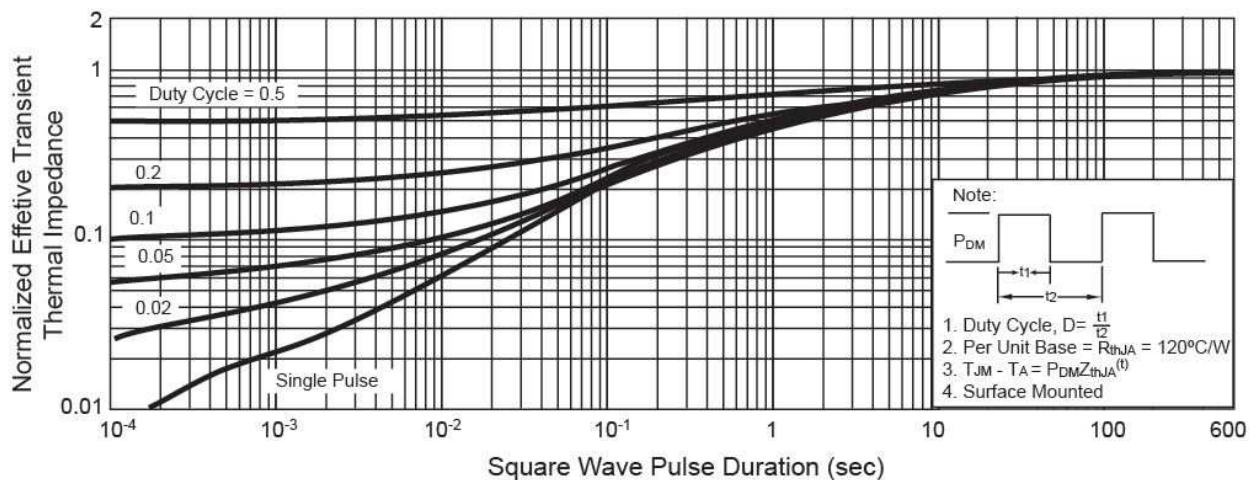
**Threshold Voltage**



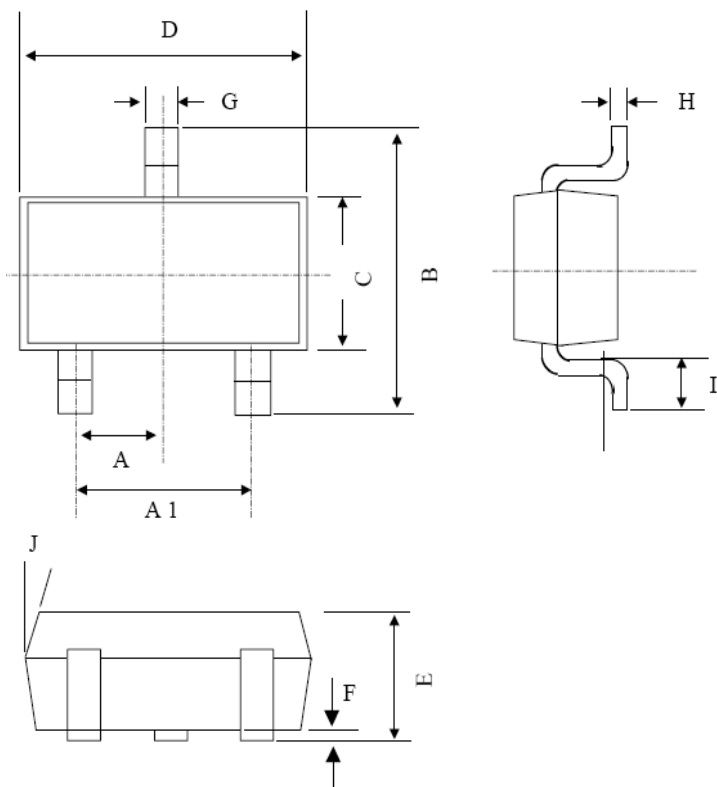
**Single Pulse Power**



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

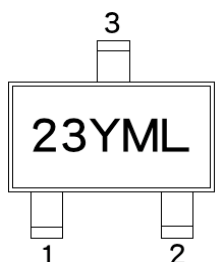


**SOT-23 Mechanical Drawing**



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**



- 23** = Device Code
- Y** = Year Code
- M** = Month Code for Halogen Free Product
  - O** =Jan    **P** =Feb    **Q** =Mar    **R** =Apr
  - S** =May    **T** =Jun    **U** =Jul    **V** =Aug
  - W** =Sep    **X** =Oct    **Y** =Nov    **Z** =Dec
- L** = Lot Code

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