



### SOT-23



#### Pin Definition:

1. Gate
2. Source
3. Drain

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
-30	180 @ $V_{GS} = -10V$	-1.3
	300 @ $V_{GS} = -4.5V$	-1.1

### Features

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

### Application

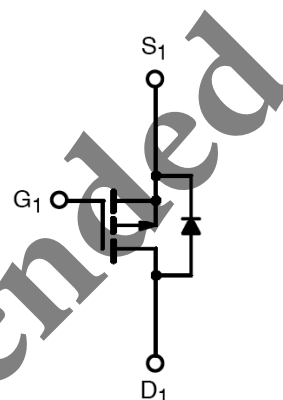
- Portable Devices
- High Speed Switch

### Ordering Information

Part No.	Package	Packing
TSM2303CX RFG	SOT-23	3Kpcs / 7" Reel

**Note:** "G" denotes Halogen Free Product.

### Block Diagram



P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	-1.3	A
Pulsed Drain Current	$I_{DM}$	-10	A
Continuous Source Current (Diode Conduction) <sup>a,b</sup>	$I_S$	-1.3	A
Maximum Power Dissipation	$P_D$	$T_A = 25^\circ C$	0.7
		$T_A = 75^\circ C$	0.45
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	$R_{\theta_{JC}}$	80	$^\circ C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta_{JA}}$	140	$^\circ C/W$

#### Notes:

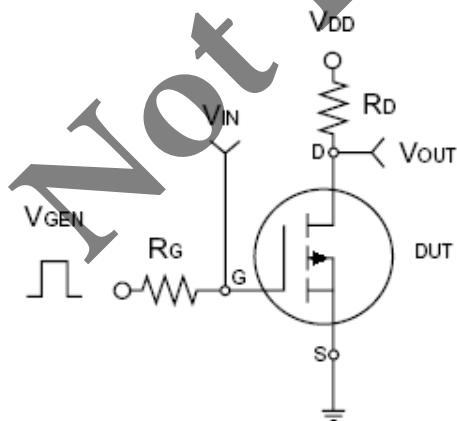
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on a 1 in<sup>2</sup> pad of 2oz Cu,  $t \leq 5$  sec.

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

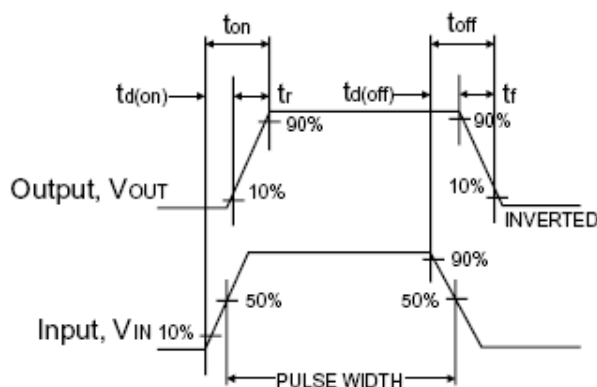
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	-30	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	-1	--	-3	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = -30V, V_{GS} = 0V$	$I_{DSS}$	--	--	1.0	$\mu A$
Drain-Source On-State Resistance	$V_{GS} = -10V, I_D = -1.3A$	$R_{DS(ON)}$	--	150	180	m $\Omega$
	$V_{GS} = -4.5V, I_D = -1.1A$		--	250	300	
Forward Transconductance <sup>a</sup>	$V_{DS} = -15V, I_D = -1.3A$	$g_{fs}$	--	5	--	S
Diode Forward Voltage	$I_S = -1.3A, V_{GS} = 0V$	$V_{SD}$	--	--	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = -10V, I_D = -1.3A,$ $V_{GS} = -4.5V$	$Q_g$	--	10	15	nC
Gate-Source Charge		$Q_{gs}$	--	1.9	--	
Gate-Drain Charge		$Q_{gd}$	--	2	--	
Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	565	--	pF
Output Capacitance		$C_{oss}$	--	126	--	
Reverse Transfer Capacitance		$C_{rss}$	--	75	--	
<b>Switching<sup>b,c</sup></b>						
Turn-On Delay Time	$V_{DD} = -10V, R_L = 15\Omega,$ $I_D = -1A, V_{GEN} = -4.5V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	10	--	nS
Turn-On Rise Time		$t_r$	--	9	--	
Turn-Off Delay Time		$t_{d(off)}$	--	27	--	
Turn-Off Fall Time		$t_f$	--	7	--	

#### Notes:

- a. pulse test:  $PW \leq 300\mu S$ , duty cycle  $\leq 2\%$
- b. For DESIGN AID ONLY, not subject to production testing.
- c. Switching time is essentially independent of operating temperature.



Switching Test Circuit

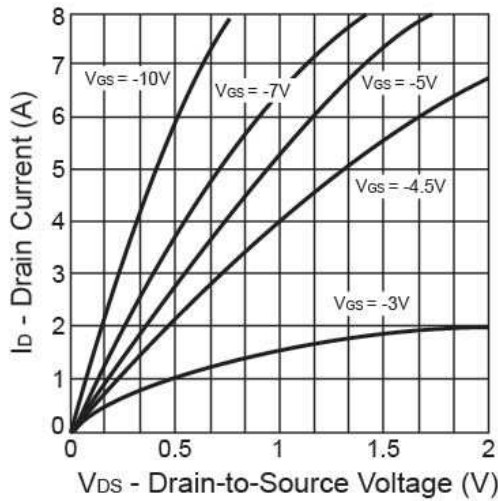


Switchin Waveforms

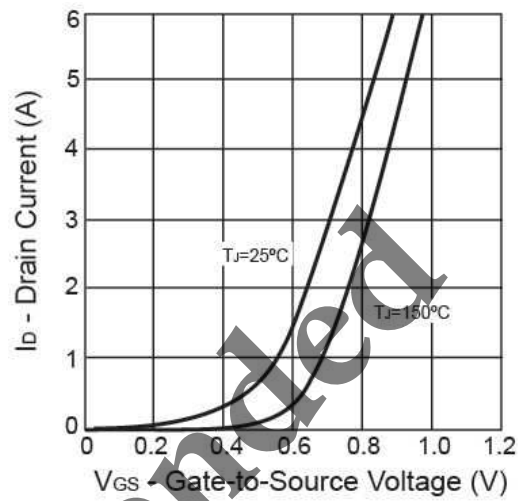


**Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)

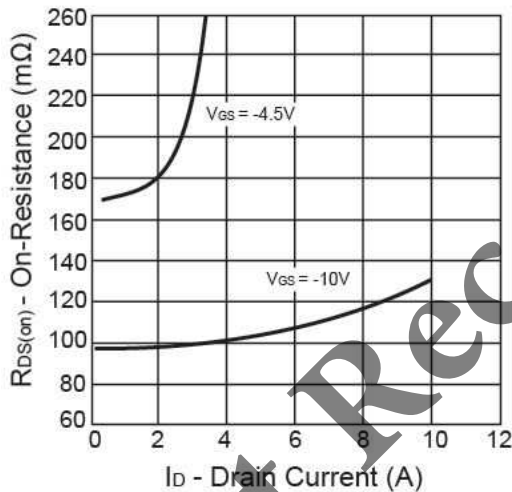
**Output Characteristics**



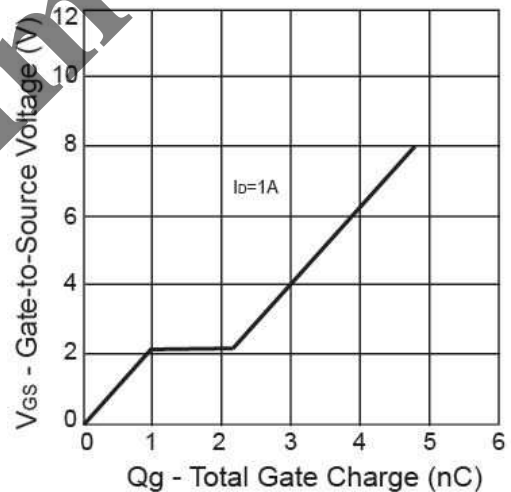
**Transfer Characteristics**



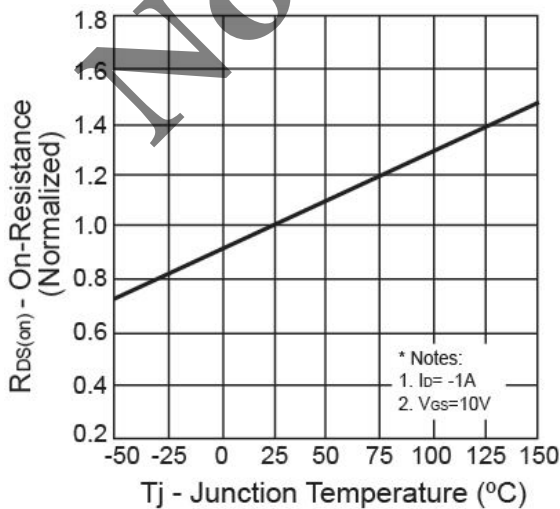
**On-Resistance vs. Drain Current**



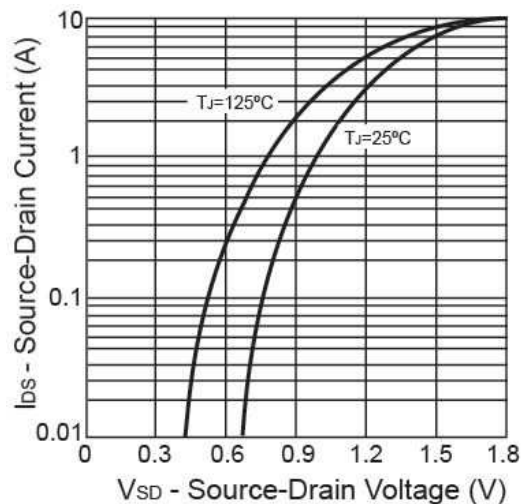
**Gate Charge**



**On-Resistance vs. Junction Temperature**



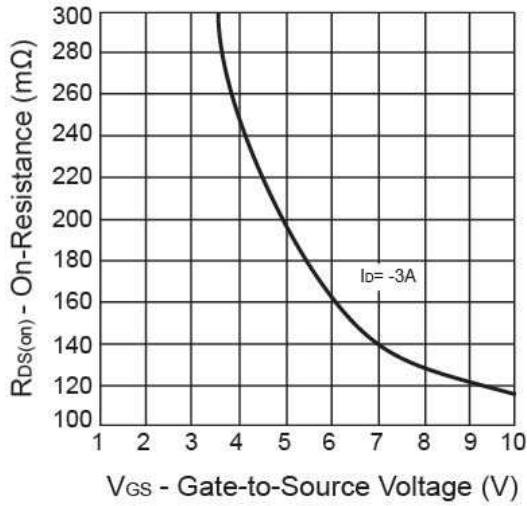
**Source-Drain Diode Forward Voltage**



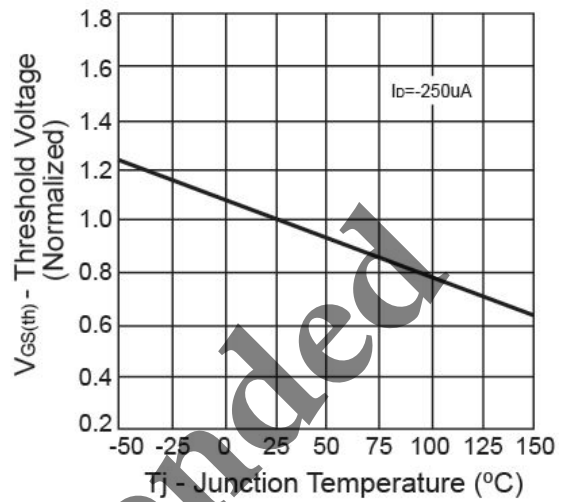


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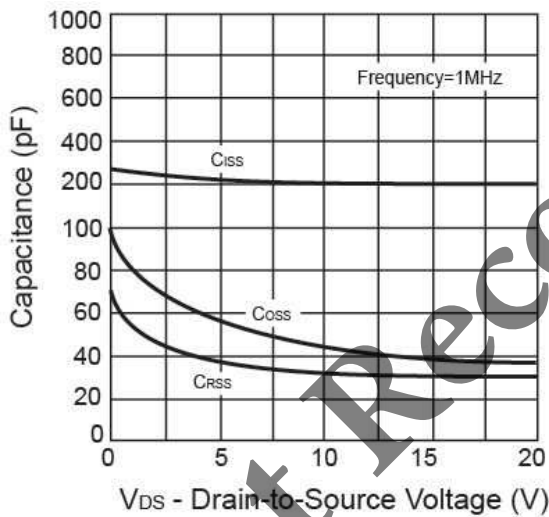
**On-Resistance vs. Gate-Source Voltage**



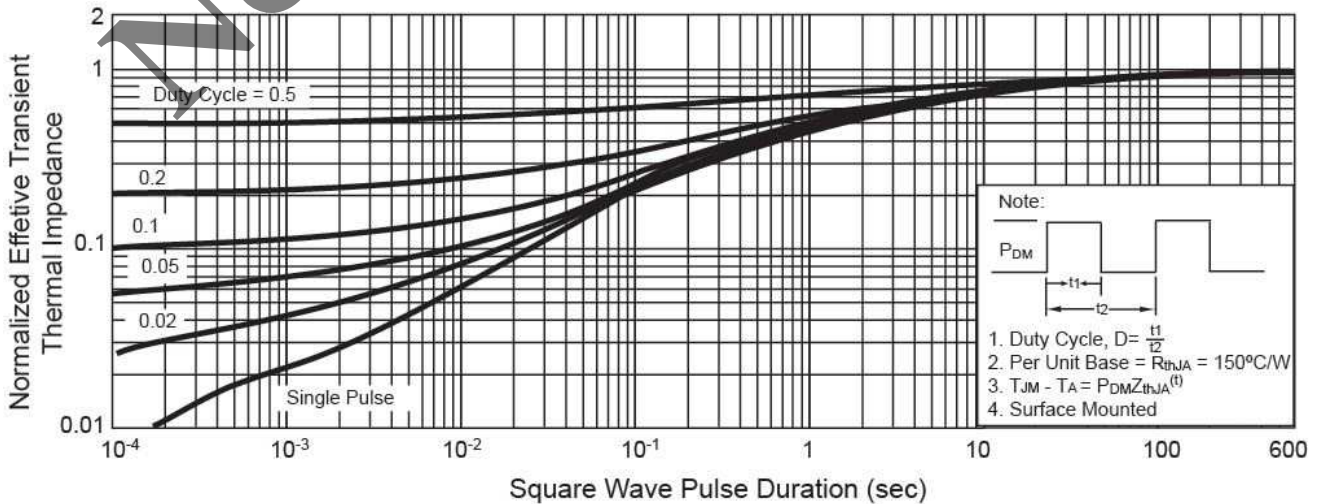
**Threshold Voltage**



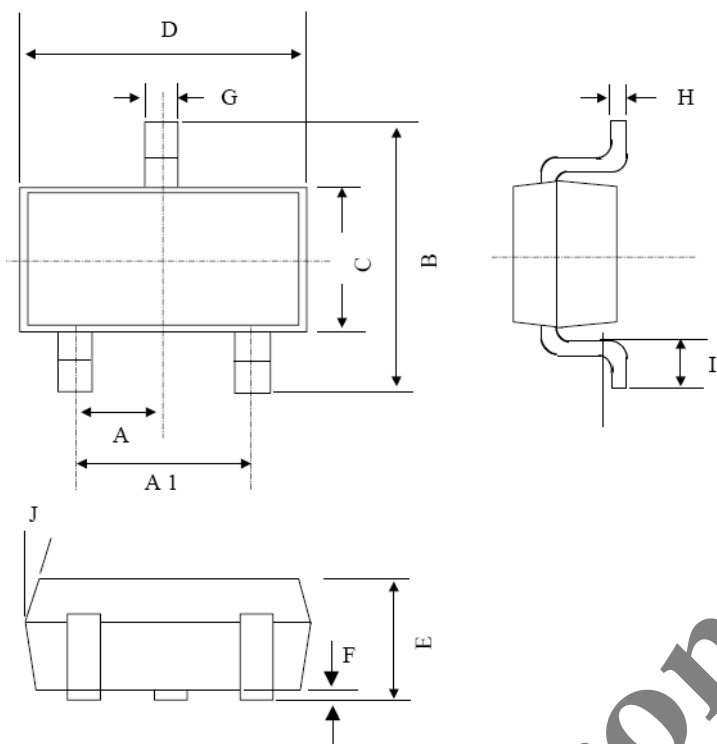
**Capacitance**



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

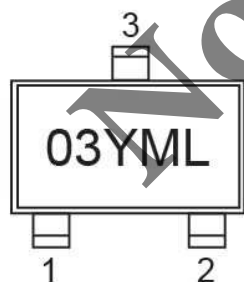


**SOT-23 Mechanical Drawing**



DIM	SOT-23 DIMENSION			
	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**



- 03** = 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

**Not Recommended**

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