

SOT-23



Pin Definition:

1. Gate
2. Source
3. Drain

Key Parameter Performance

Parameter	Value	Unit
V_{DS}	20	V
$R_{DS(on)}$ (max)	$V_{GS} = 4.5V$	33
	$V_{GS} = 2.5V$	40
	$V_{GS} = 1.8V$	51
Q_g	11	nC

Features

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

Application

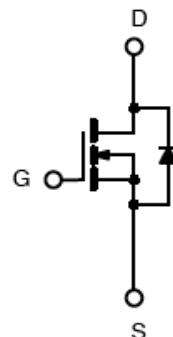
- Load Switch
- PA Switch

Ordering Information

Part No.	Package	Packing
TSM2312CX RFG	SOT-23	3,000pcs / 7" Reel

Note: "G" denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

Block Diagram



N-Channel MOSFET

Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current	I_D	4.9	A
Pulsed Drain Current ^(Note 1)	I_{DM}	15	A
Continuous Source Current (Diode Conduction) ^(Note 2)	I_S	1.0	A
Maximum Power Dissipation	P_D	0.75	W
		0.48	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Thermal Performance

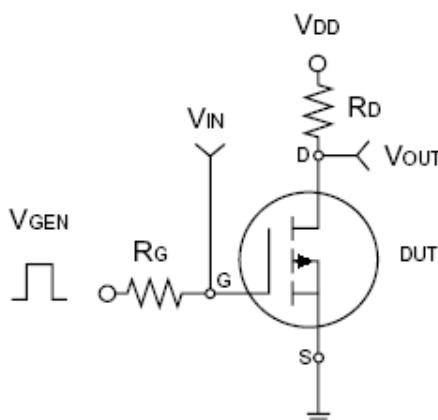
Parameter	Symbol	Limit	Unit
Thermal Resistance Junction to Lead	R_{eJL}	75	°C/W
Thermal Resistance Junction to Ambient	R_{eJA}	140	°C/W

Electrical Specifications

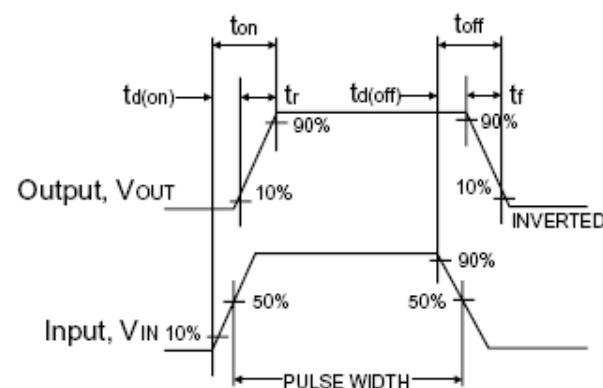
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static ^(Note 3)						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	0.45	0.65	1.0	V
Gate Body Leakage	$V_{GS} = \pm 8V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 16V, V_{GS} = 0V$	I_{DSS}	--	--	1.0	μA
On-State Drain Current	$V_{DS} = 10V, V_{GS} = 4.5V$	$I_{D(ON)}$	15	--	--	A
	$V_{GS} = 4.5V, I_D = 4.9A$		--	27	33	
Drain-Source On-State Resistance	$V_{GS} = 2.5V, I_D = 4.4A$	$R_{DS(ON)}$	--	33	40	$m\Omega$
	$V_{GS} = 1.8V, I_D = 3.9A$		--	42	51	
Forward Transconductance	$V_{DS} = 15V, I_D = 5.0A$	g_{fs}	--	40	--	S
Diode Forward Voltage	$I_S = 1.0A, V_{GS} = 0V$	V_{SD}	--	0.8	1.2	V
Dynamic ^(Note 4)						
Total Gate Charge	$V_{DS} = 10V, I_D = 5.0A, V_{GS} = 4.5V$	Q_g	--	11	14	nC
Gate-Source Charge		Q_{gs}	--	1.5	--	
Gate-Drain Charge		Q_{gd}	--	2.1	--	
Input Capacitance	$V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz$	C_{iss}	--	500	--	pF
Output Capacitance		C_{oss}	--	300	--	
Reverse Transfer Capacitance		C_{rss}	--	140	--	
Switching ^(Note 5)						
Turn-On Delay Time	$V_{DD} = 10V, R_L = 10\Omega, I_D = 1A, V_{GEN} = 4.5V, R_G = 6\Omega$	$t_{d(on)}$	--	15	25	ns
Turn-On Rise Time		t_r	--	40	60	
Turn-Off Delay Time		$t_{d(off)}$	--	48	70	
Turn-Off Fall Time		t_f	--	31	45	

Notes:

1. Pulse width limited by the maximum junction temperature
2. Surface Mounted on FR4 Board $t \leq 5$ sec.
3. Pulse test: PW $\leq 300\mu s$, duty cycle $\leq 2\%$
4. For DESIGN AID ONLY, not subject to production testing.
5. Switching time is essentially independent of operating temperature.



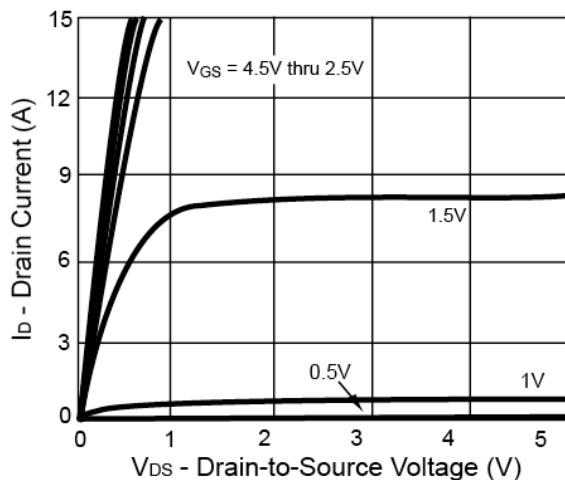
Switching Test Circuit



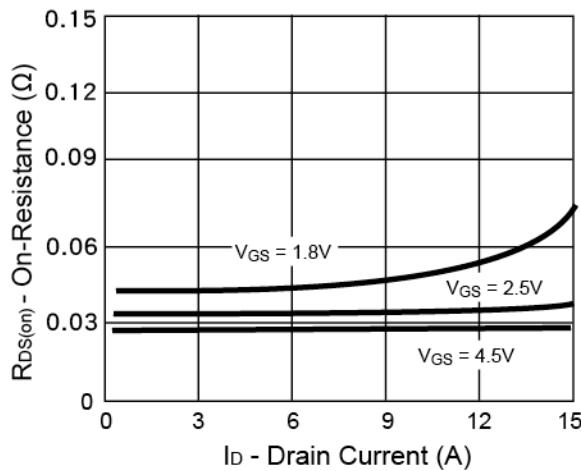
Switching Waveforms

Electrical Characteristics Curve

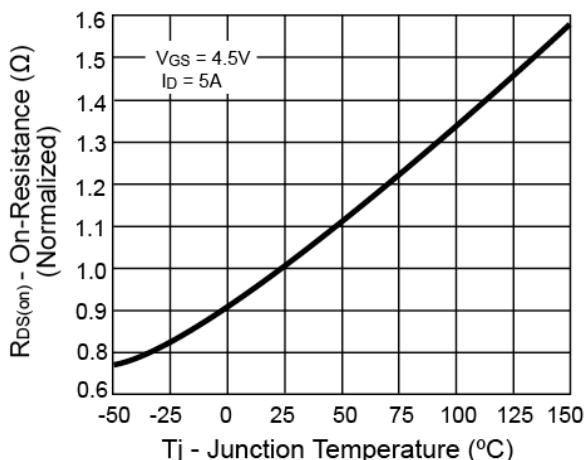
Output Characteristics



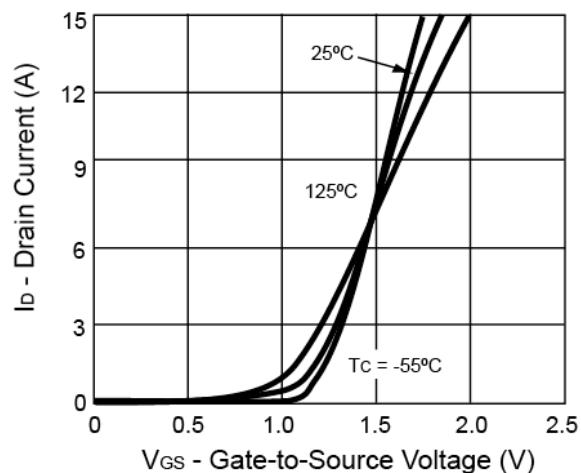
On-Resistance vs. Drain Current



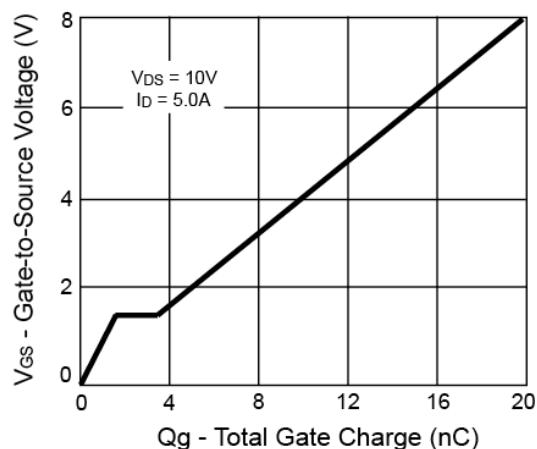
On-Resistance vs. Junction Temperature



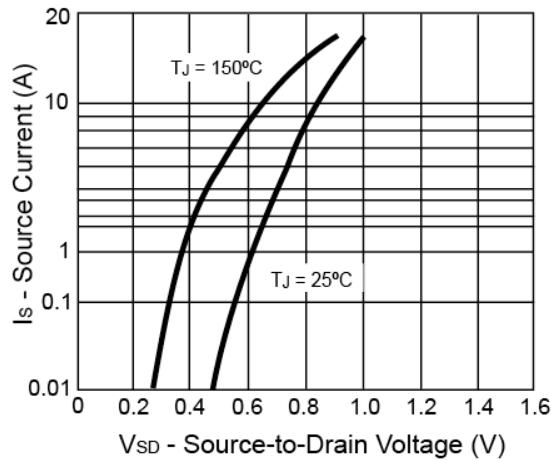
Transfer Characteristics



Gate Charge

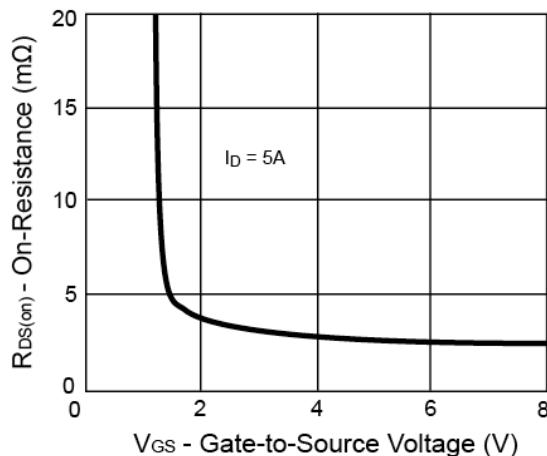


Source-Drain Diode Forward Voltage

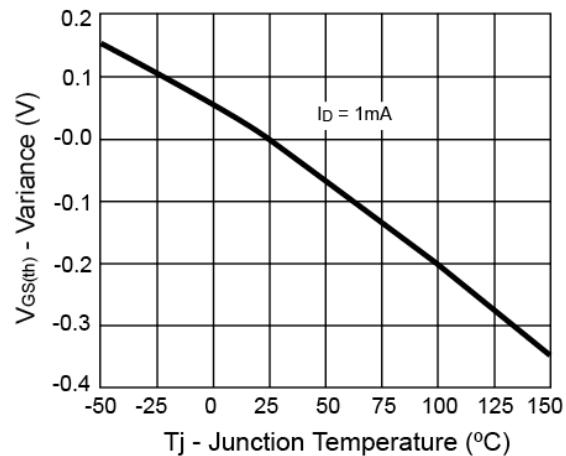


Electrical Characteristics Curve

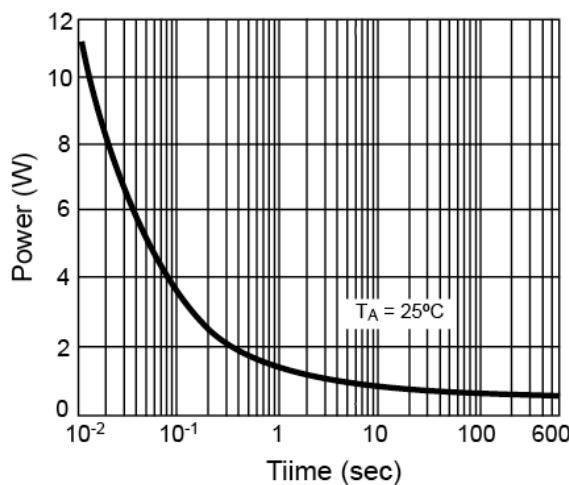
On-Resistance vs. Gate-Source Voltage



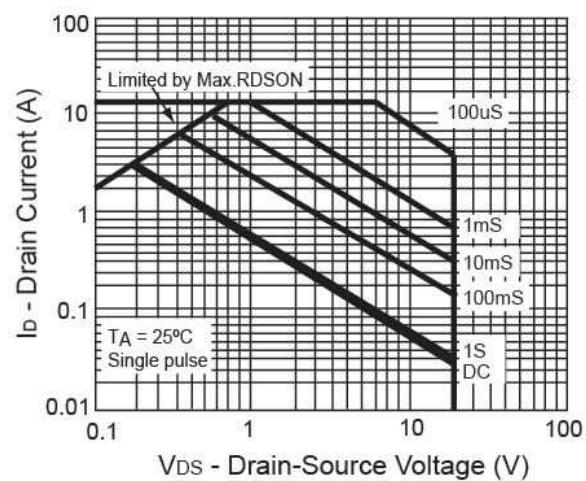
Threshold Voltage



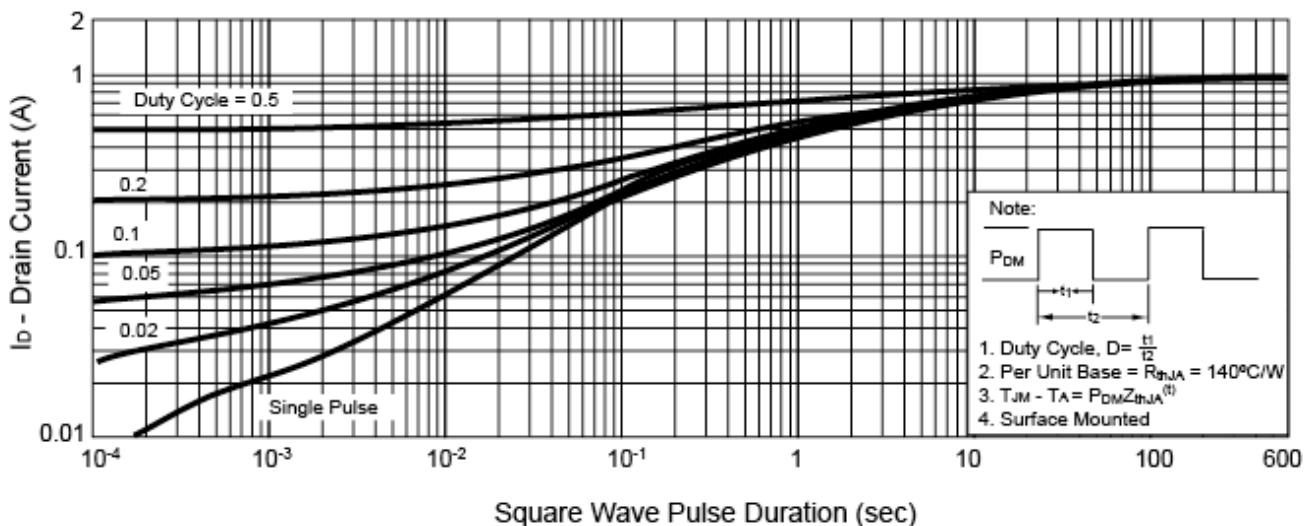
Single Pulse Power



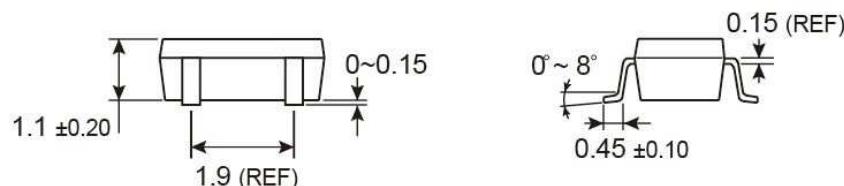
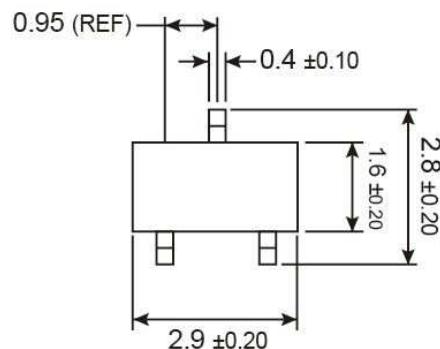
Safety Operation Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

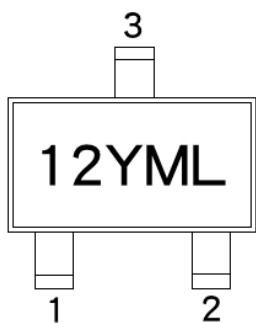


SOT-23 Mechanical Drawing



Unit: Millimeters

Marking Diagram



12 = 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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