

SOT-23



Pin Definition:

1. Gate
2. Source
3. Drain

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)	I_D (A)
-20	55 @ $V_{GS} = -4.5V$	-3.2
	80 @ $V_{GS} = -2.5V$	-2.7
	130 @ $V_{GS} = -1.8V$	-2.0

Features

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

Application

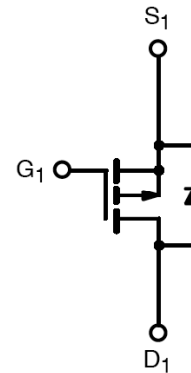
- Battery Management
- High Speed Switch

Ordering Information

Part No.	Package	Packing
TSM2305CX 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}	-20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current	I_D	-3.2	A
Pulsed Drain Current	I_{DM}	-10	A
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	-1	A
Maximum Power Dissipation	$T_A = 25^\circ C$	1.25	W
	$T_A = 75^\circ C$	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	$R_{\theta JC}$	80	$^\circ C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	150	$^\circ C/W$

Notes:

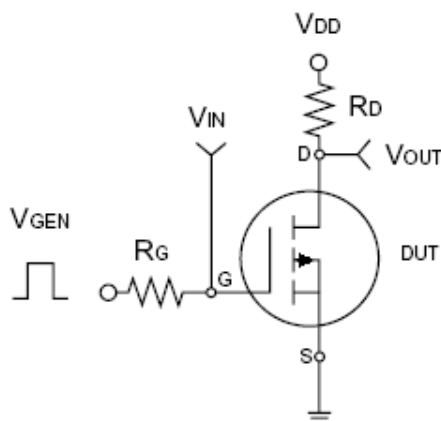
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on a 1 in² pad of 2oz Cu, $t \leq 10$ sec.

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

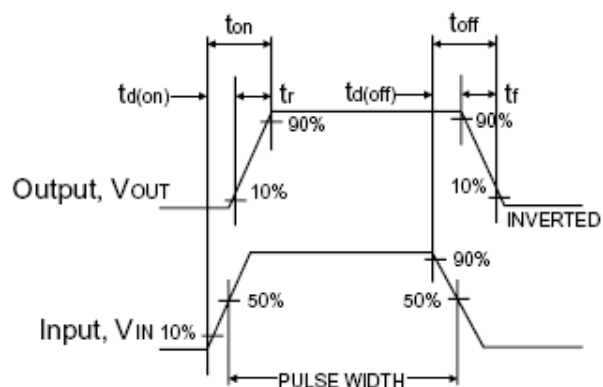
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	-0.45	-0.7	-1	V
Gate Body Leakage	$V_{GS} = \pm 8V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$	I_{DSS}	--	--	1.0	μA
Drain-Source On-State Resistance	$V_{GS} = -4.5V, I_D = -3.2A$	$R_{DS(ON)}$	--	44	55	m Ω
	$V_{GS} = -2.5V, I_D = -2.7A$		--	65	80	
	$V_{GS} = -1.8V, I_D = -2.0A$		--	90	130	
Diode Forward Voltage	$I_S = -1A, V_{GS} = 0V$	V_{SD}	--	-0.8	-1.3	V
Dynamic ^b						
Gate Resistance	$V_{GS} = V_{DS} = 0V, f = 1MHz$	R_g	--	10	--	Ω
Total Gate Charge	$V_{DS} = -10V, I_D = -3.2A, V_{GS} = -4.5V$	Q_g	--	10	20	nC
Gate-Source Charge		Q_{gs}	--	0.7	--	
Gate-Drain Charge		Q_{gd}	--	4	--	
Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz$	C_{iss}	--	990	--	pF
Output Capacitance		C_{oss}	--	125	--	
Reverse Transfer Capacitance		C_{rss}	--	100	--	
Switching ^{b,c}						
Turn-On Delay Time	$V_{DD} = -10V, R_L = 15\Omega, I_D = -1A, V_{GEN} = -4.5V, R_G = 6\Omega$	$t_{d(on)}$	--	12	24	nS
Turn-On Rise Time		t_r	--	23	50	
Turn-Off Delay Time		$t_{d(off)}$	--	50	100	
Turn-Off Fall Time		t_f	--	18	35	

Notes:

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



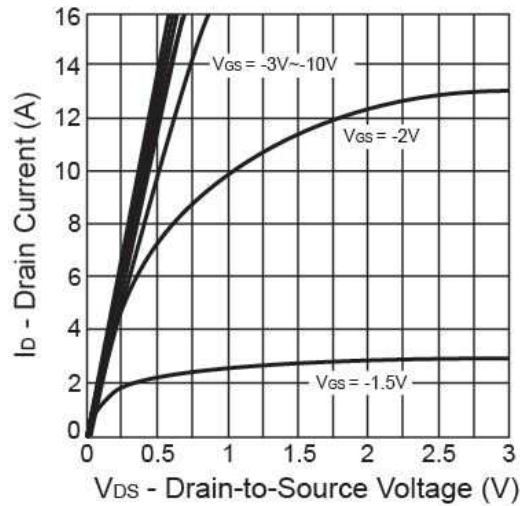
Switching Test Circuit



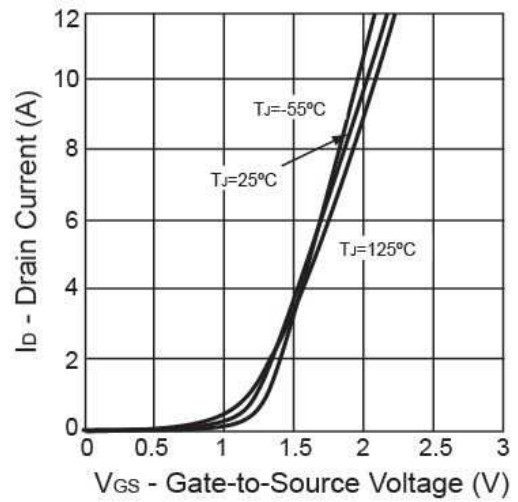
Switchin Waveforms

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

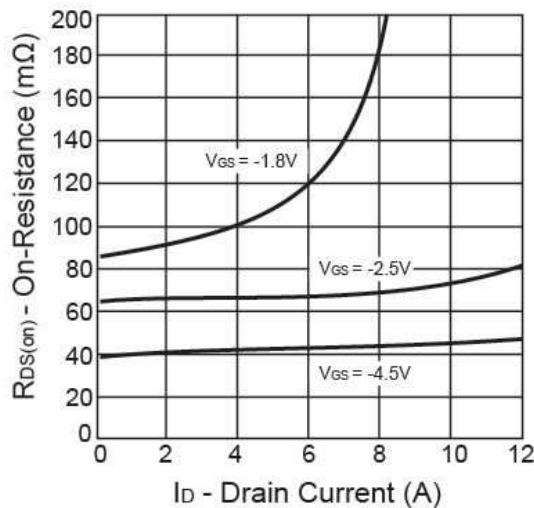
Output Characteristics



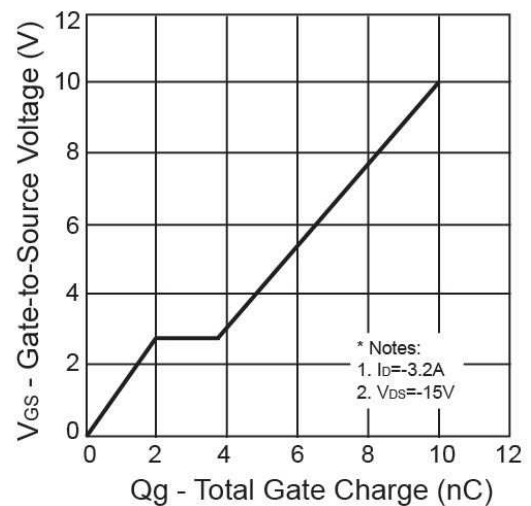
Transfer Characteristics



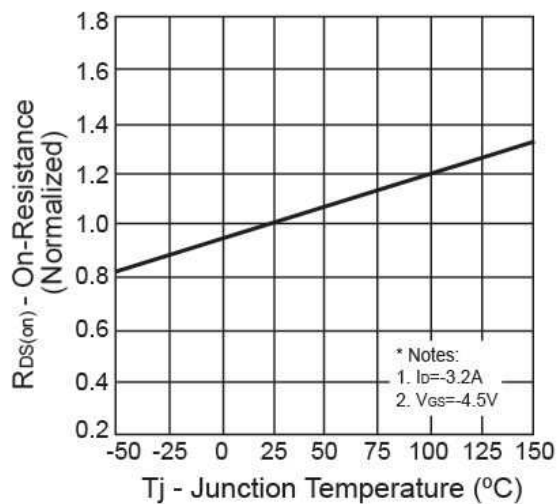
On-Resistance vs. Drain Current



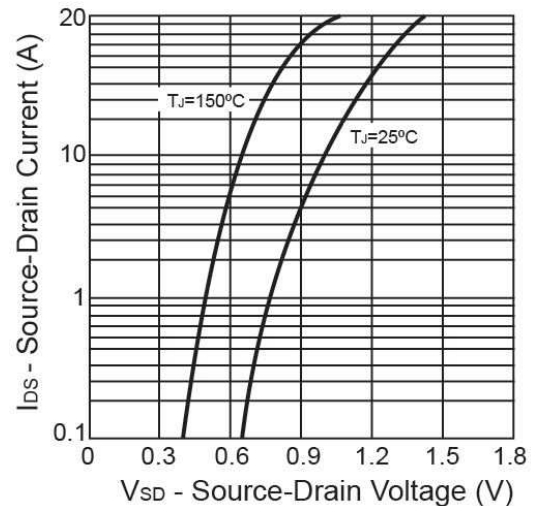
Gate Charge



On-Resistance vs. Junction Temperature

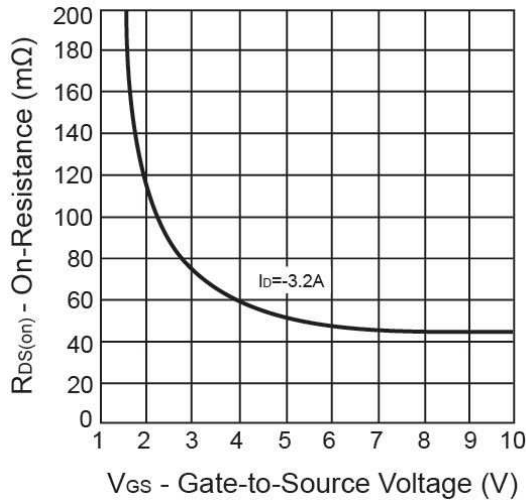


Source-Drain Diode Forward Voltage

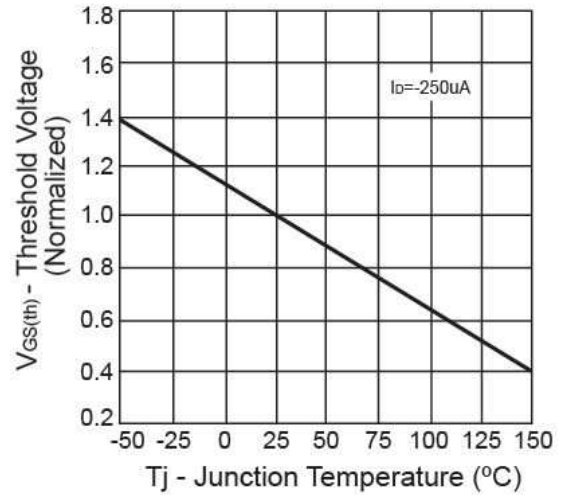


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

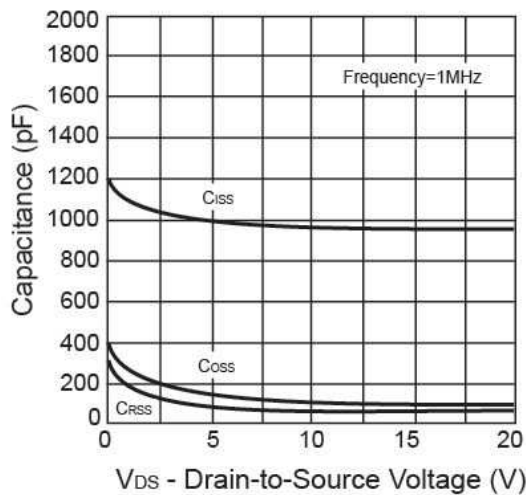
On-Resistance vs. Gate-Source Voltage



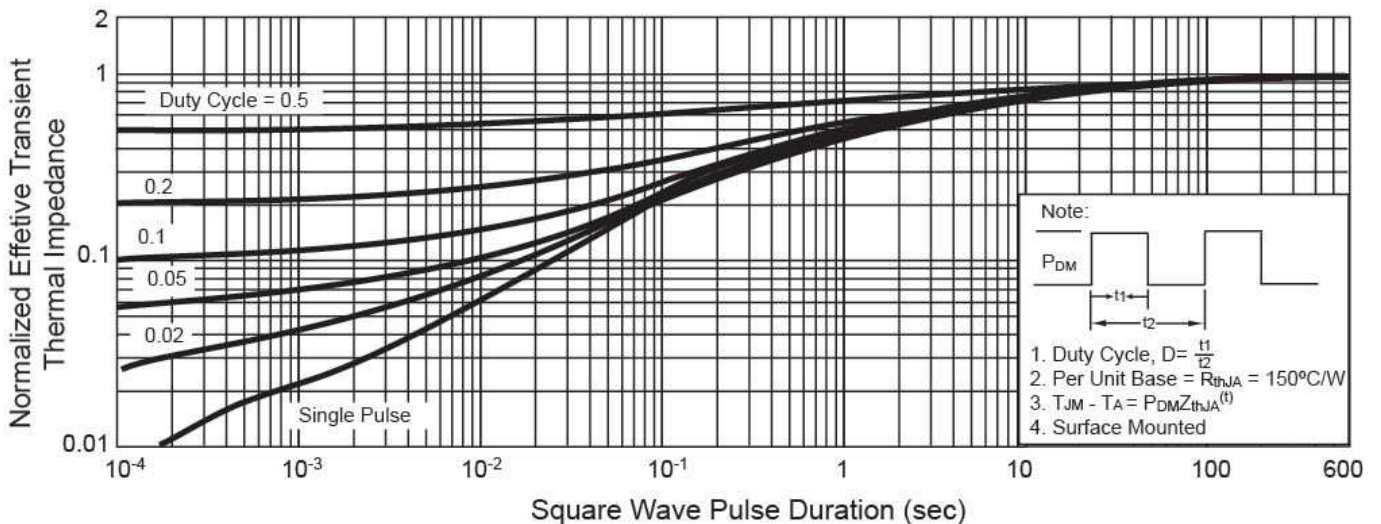
Threshold Voltage



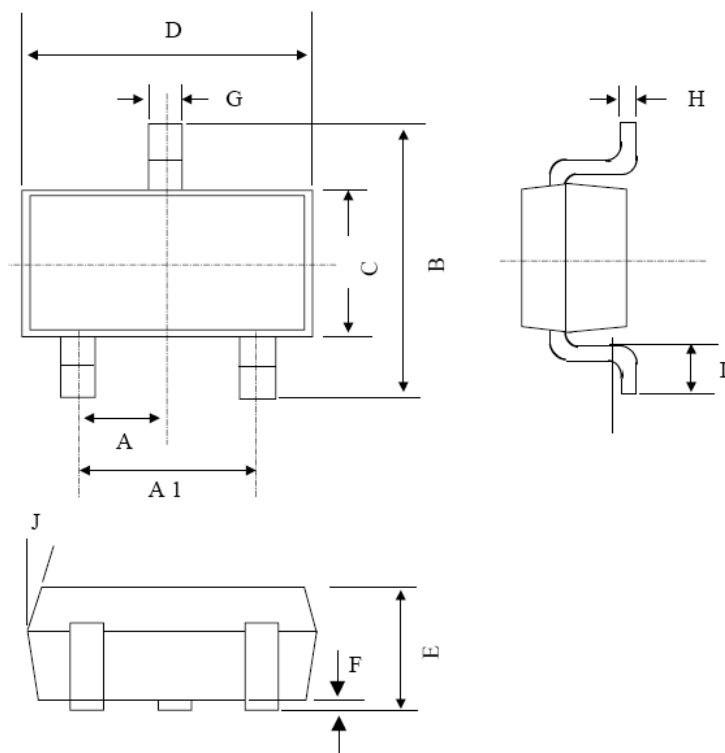
Capacitance



Normalized Thermal Transient Impedance, Junction-to-Ambient

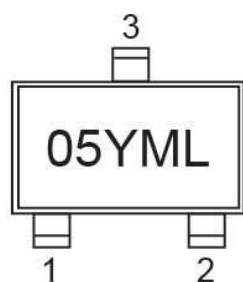


SOT-23 Mechanical Drawing



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



05 = 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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