



SOT-23



Pin Definition:

1. Gate
2. Source
3. Drain

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)	I_D (A)
-20	52 @ $V_{GS}=-4.5V$	-3.2
	71 @ $V_{GS}=-2.5V$	-2.7
	108 @ $V_{GS}=-1.8V$	-2.0

Features

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

Application

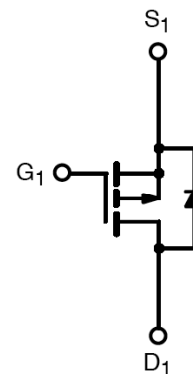
- Battery Management
- High Speed Switch

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	P_D	$T_A=25^{\circ}C$	1.25
		$T_A=75^{\circ}C$	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:

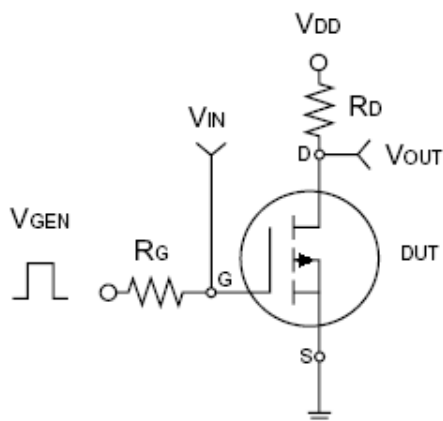
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on a 1 in² pad of 2oz Cu, $t \leq 10$ sec.

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

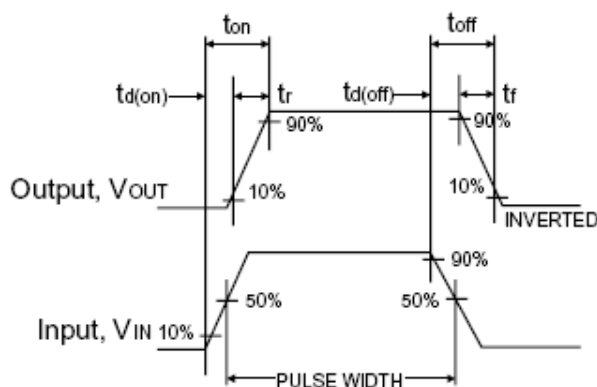
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	-0.45	-0.7	-1	V
Gate Body Leakage	$V_{GS} = \pm 8V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero 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	52	m Ω
	$V_{GS} = -2.5V, I_D = -2.7A$		--	65	71	
	$V_{GS} = -1.8V, I_D = -2.0A$		--	90	108	
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

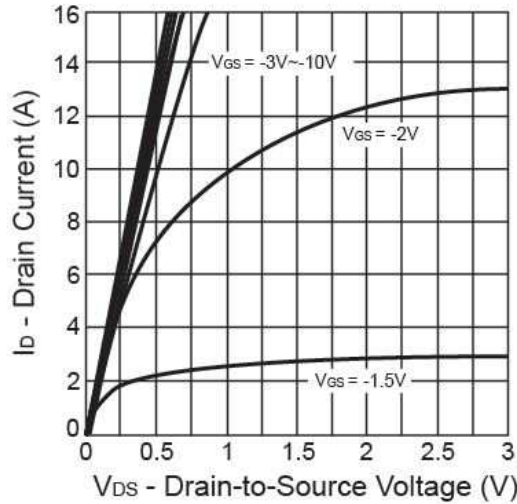


Switchin Waveforms

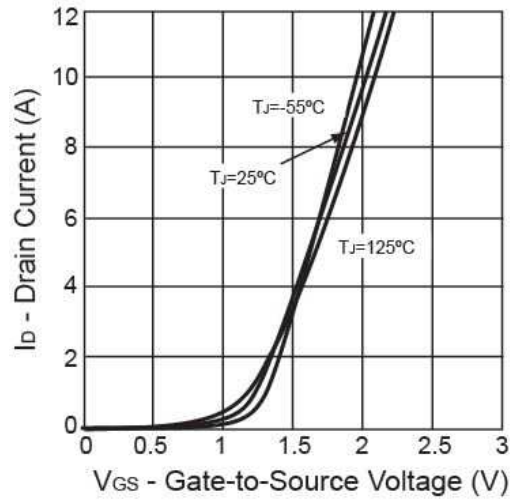


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

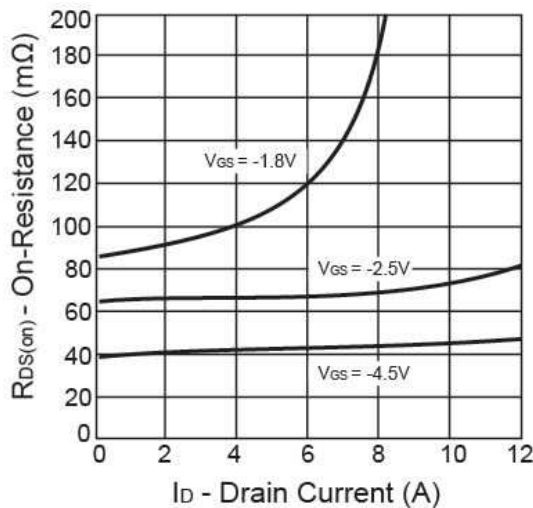
Output Characteristics



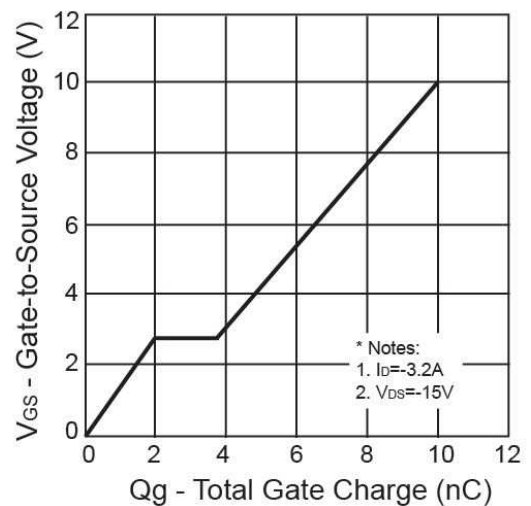
Transfer Characteristics



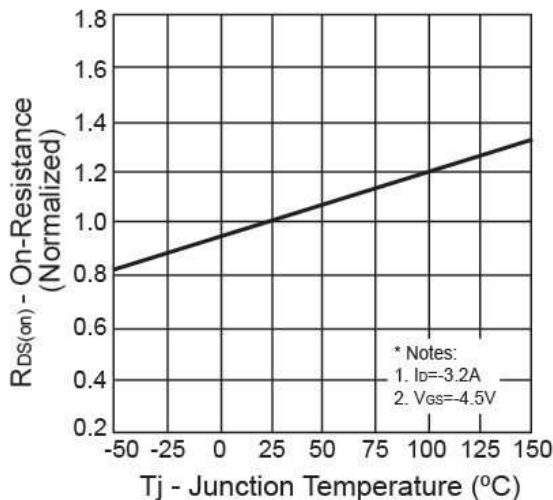
On-Resistance vs. Drain Current



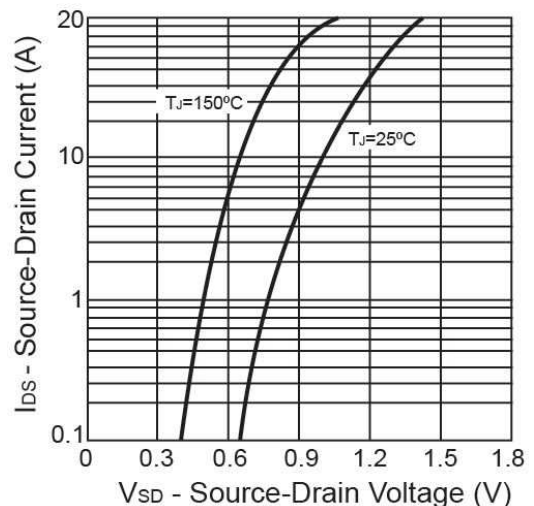
Gate Charge



On-Resistance vs. Junction Temperature



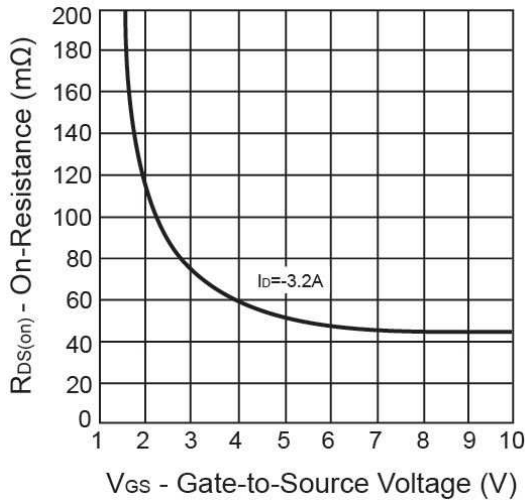
Source-Drain Diode Forward Voltage



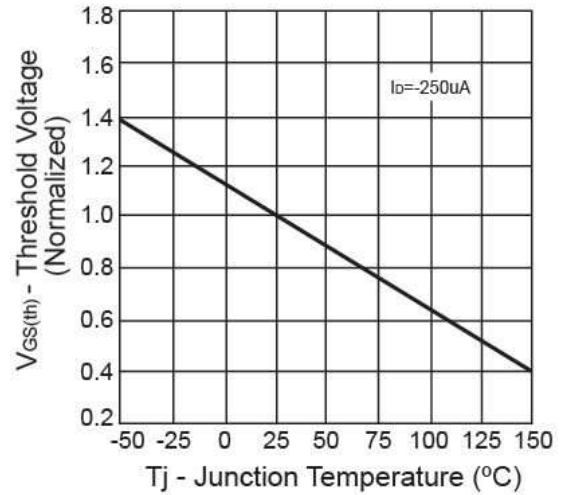


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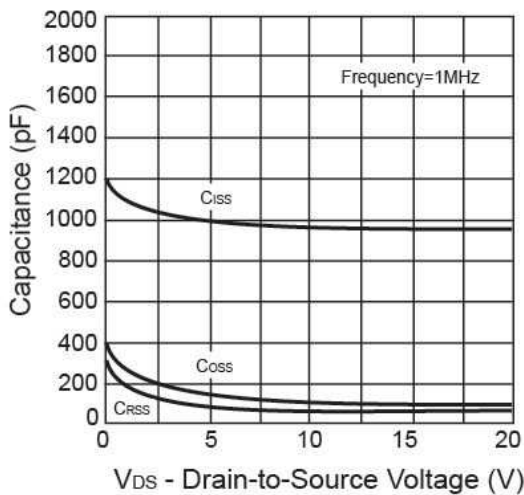
On-Resistance vs. Gate-Source Voltage



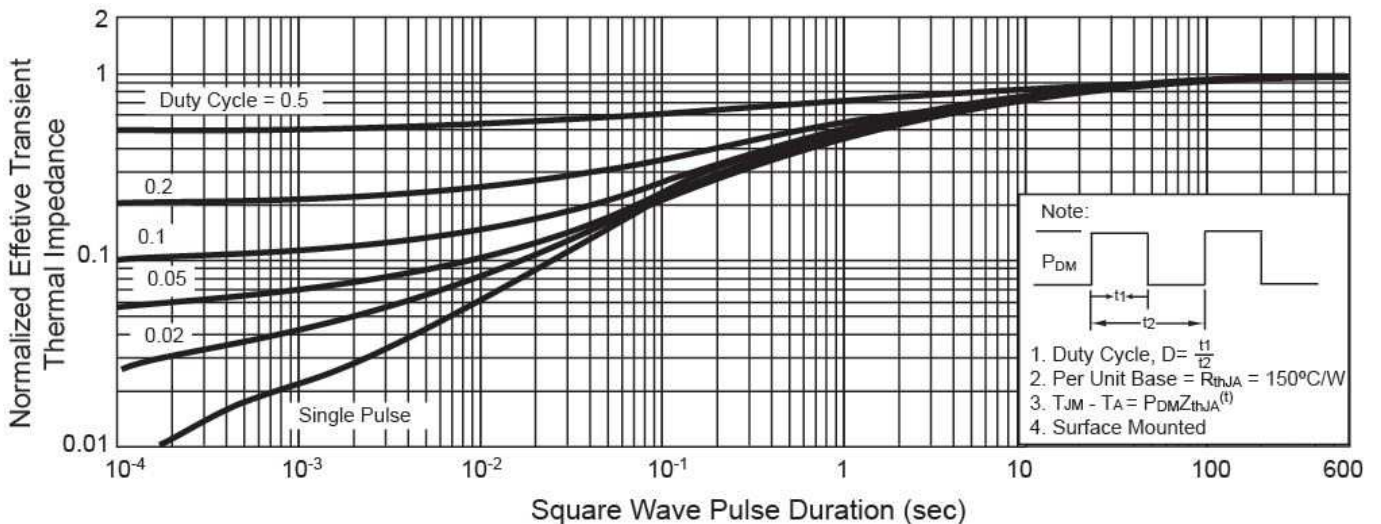
Threshold Voltage



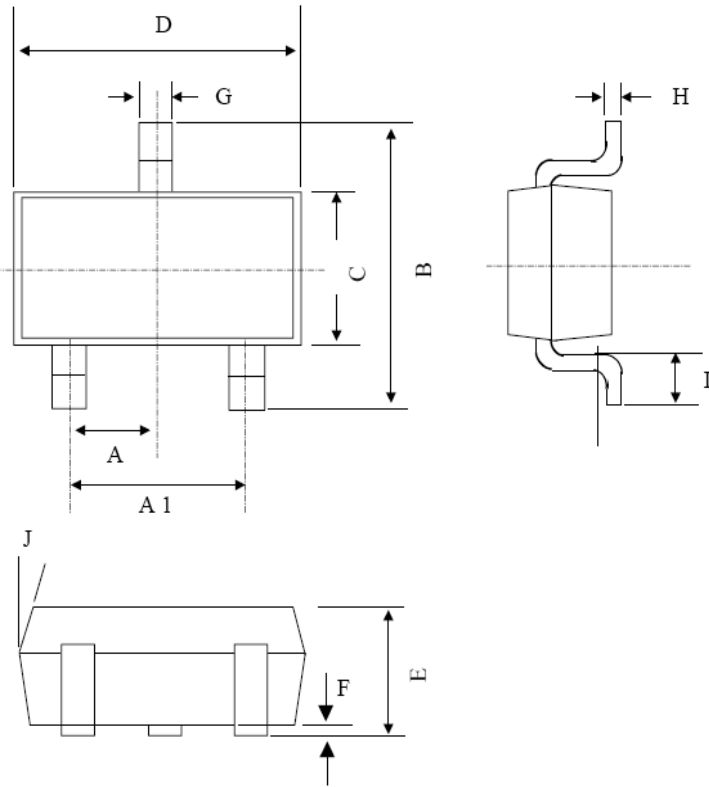
Capacitance



Normalized Thermal Transient Impedance, Junction-to-Ambient

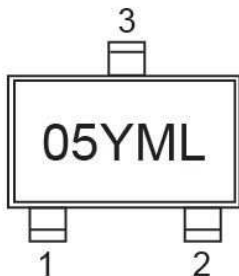


SOT-23 Mechanical Drawing



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	2.25	2.55	0.089	0.100
C	1.20	1.40	0.047	0.055
D	2.80	3.00	0.110	0.118
E	0.90	1.15	0.035	0.045
F	0.00	0.10	0.000	0.004
G	0.30	0.50	0.012	0.020
H	0.08	0.15	0.003	0.006
I	0.30	0.50	0.012	0.020
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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