

SOT-23

Pin Definition:

1. Gate
2. Source
3. Drain

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (mA)
60	7.5 @ $V_{GS} = 10V$	300
	7.5 @ $V_{GS} = 4.5V$	200

Features

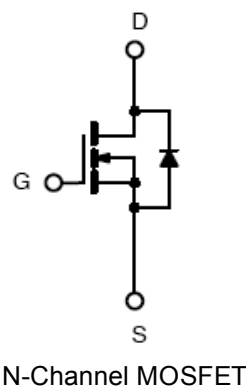
- Fast Switching Speed
- Low Input and Output Leakage

Application

- Direct Logic-Level Interface: TTL/CMOS
- Solid-State Relays

Ordering Information

Part No.	Package	Packing
TSM2N7002CX RF	SOT-23	3Kpcs / 7" Reel

Block Diagram

Absolute Maximum Rating ($T_a = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	300	mA
Pulsed Drain Current	I_{DM}	800	mA
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	300	mA
Maximum Power Dissipation	P_D	350	mW
		220	
Operating Junction Temperature	T_J	+150	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Lead Temperature (1/8" from case)	T_L	5	S
Junction to Ambient Thermal Resistance (PCB mounted)	$R\theta_{JA}$	357	$^\circ\text{C/W}$

Notes:

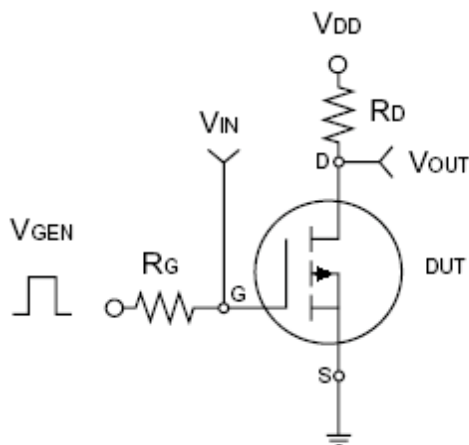
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on FR4 Board, $t \leq 5$ sec.

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

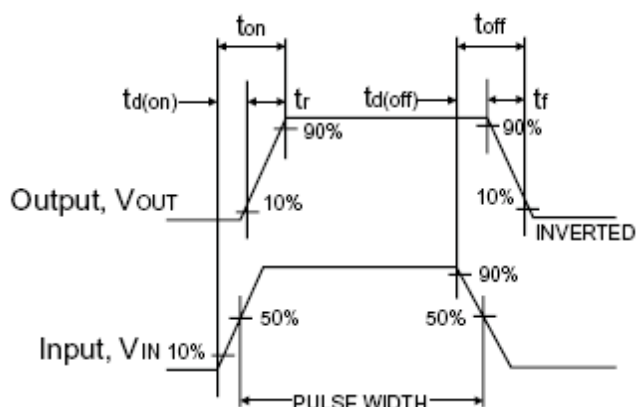
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 10\mu A$	BV_{DSS}	60	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.0	--	2.5	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	I_{DSS}	--	--	1.0	μA
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 300mA$	$R_{DS(ON)}$	--	--	7.5	Ω
	$V_{GS} = 4.5V, I_D = 200mA$		--	--	7.5	
Forward Transconductance	$V_{DS} = 15V, I_D = 300mA$	g_{fs}	--	320	--	mS
Diode Forward Voltage	$I_S = 300mA, V_{GS} = 0V$	V_{SD}	--	0.9	1.2	V
Dynamic ^b						
Total Gate Charge	$V_{DS} = 10V, I_D = 250mA,$ $V_{GS} = 4.5V$	Q_g	--	0.4	0.6	nC
Gate-Source Charge		Q_{gs}	--	0.06	--	
Gate-Drain Charge		Q_{gd}	--	0.06	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	50	--	pF
Output Capacitance		C_{oss}	--	25	--	
Reverse Transfer Capacitance		C_{rss}	--	5	--	
Switching ^c						
Turn-On Delay Time	$V_{DD} = 30V,$ $I_D = 100mA, V_{GEN} = 10V,$ $R_G = 10\Omega$	$t_{d(on)}$	--	7.5	20	nS
Turn-On Rise Time		t_r	--	6	--	
Turn-Off Delay Time		$t_{d(off)}$	--	7.5	20	
Turn-Off Fall Time		t_f	--	3	--	

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.

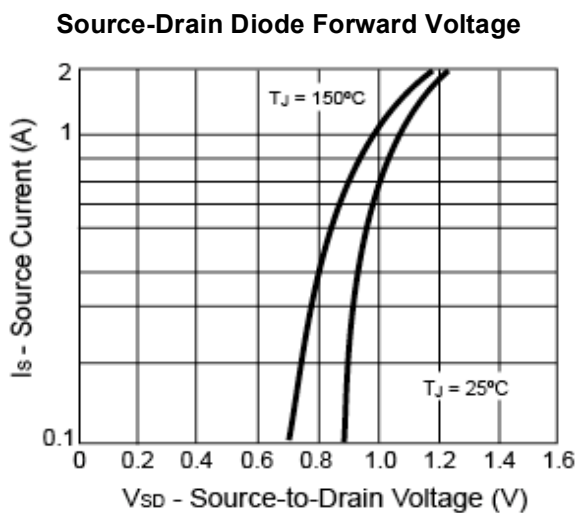
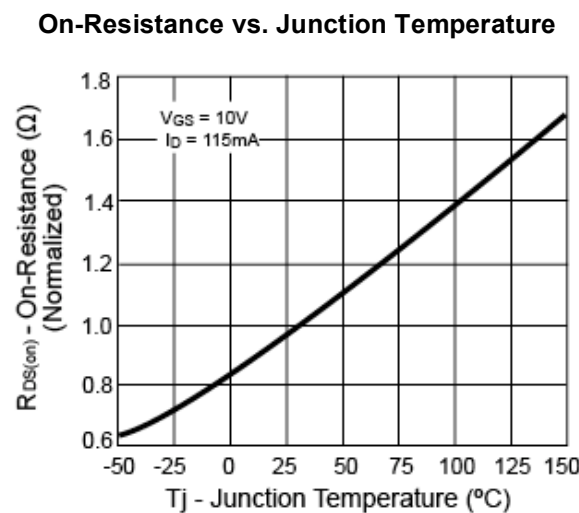
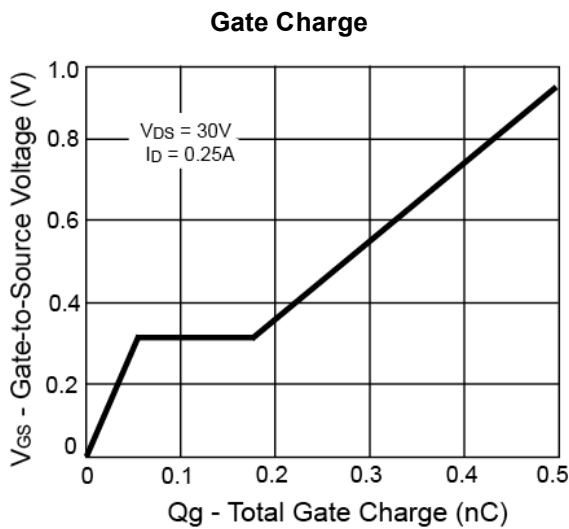
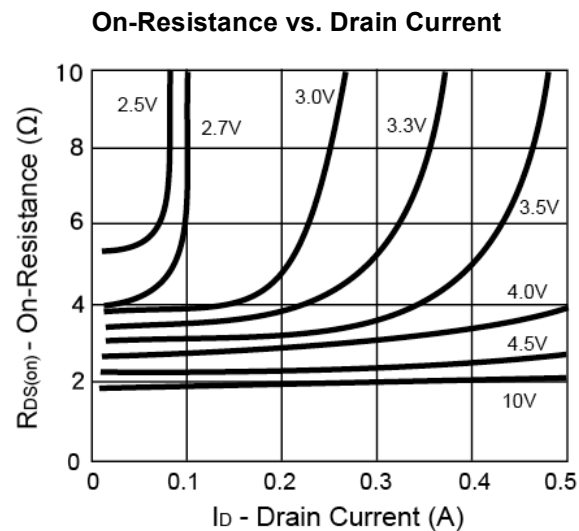
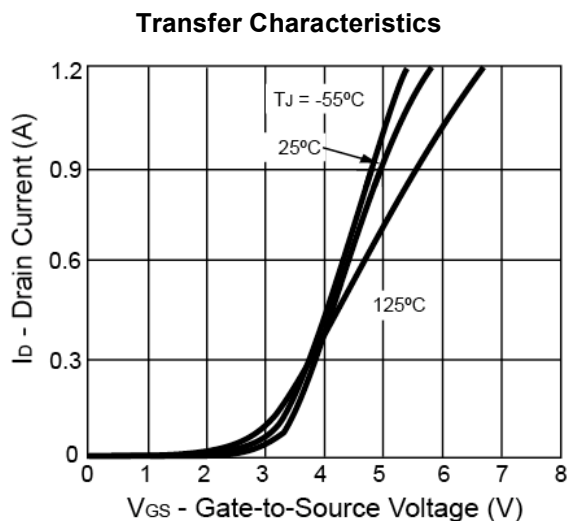
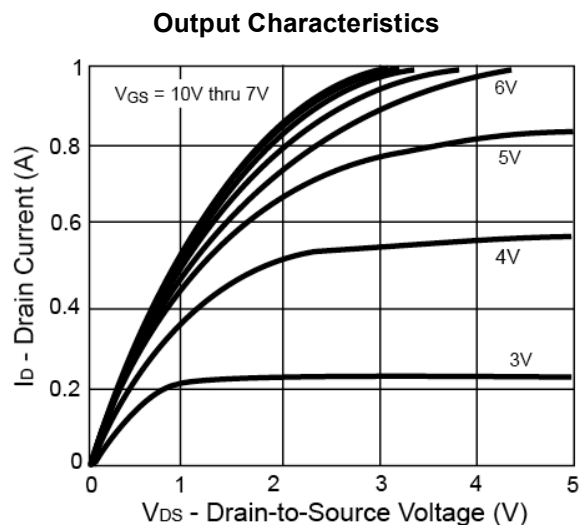


Switching Test Circuit



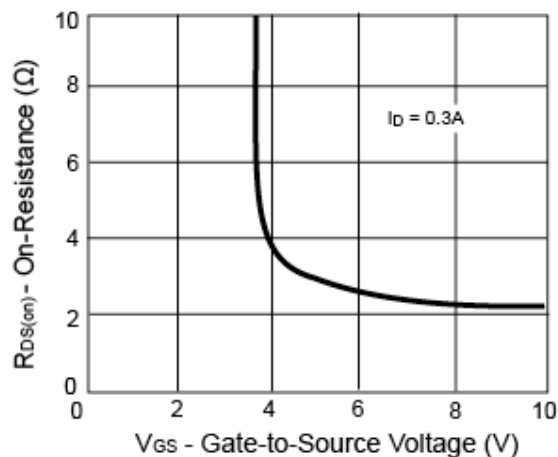
Switchin Waveforms

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

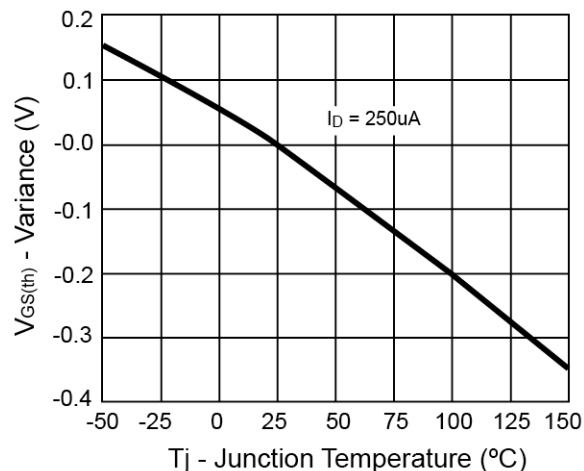


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

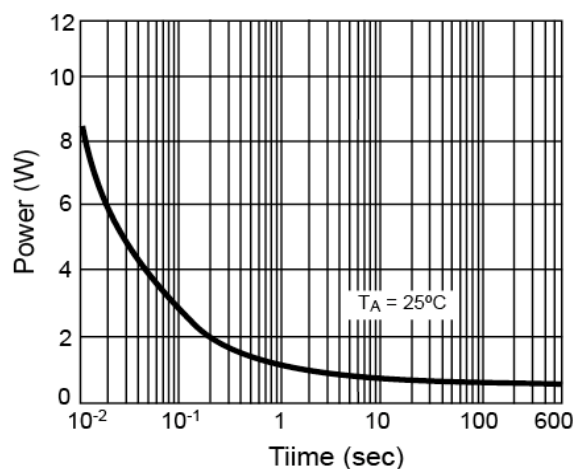
On-Resistance vs. Gate-Source Voltage



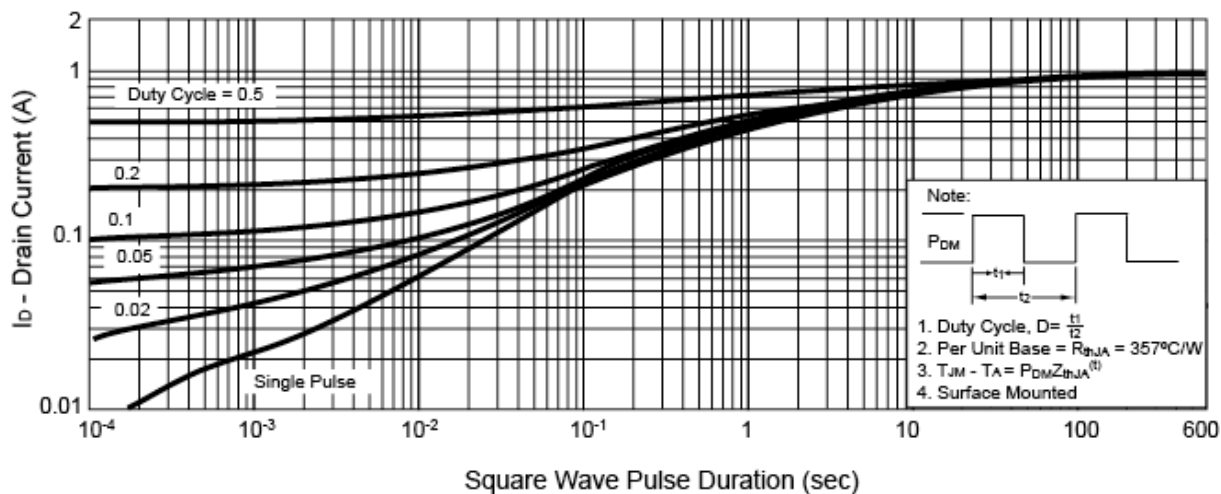
Threshold Voltage



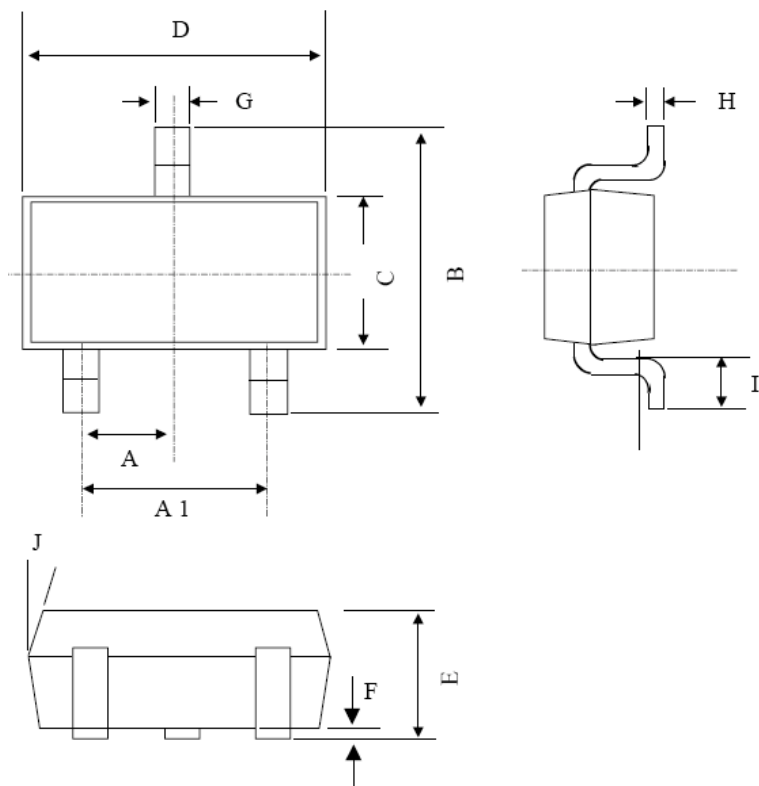
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient

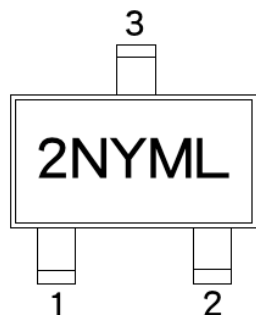


SOT-23 Mechanical Drawing



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



2N = Device Code
Y = Year Code
M = Month Code
 (A=Jan, B=Feb, C=Mar, D=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
L = Lot Code

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