

SOT-23



SOT-323



Pin Definition:

1. Gate
2. Source
3. Drain

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (mA)
60	3 @ V _{GS} = 10V	300
	4 @ V _{GS} = 4.5V	200

Features

- Low On-Resistance: 3Ω
- Low Input and Output Leakage

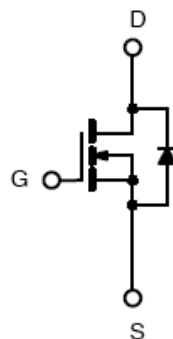
Application

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

Ordering Information

Part No.	Package	Packing
TSM2N7002ECX RF	SOT-23	3Kpcs / 7" Reel
TSM2N7002ECU RF	SOT-323	3Kpcs / 7" Reel

Block Diagram



N-Channel MOSFET

Absolute Maximum Rating (T_a = 25°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}	1	A
Continuous Source Current (Diode Conduction) ^{a,b}	I _S	300	mA
Maximum Power Dissipation	P _D	T _a = 25°C	350
		T _a = 75°C	220
Operating Junction Temperature	T _J	+150	°C
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Lead Temperature (1/8" from case)	T _L	5	S
Junction to Ambient Thermal Resistance (PCB mounted)	Rθ _{JA}	357	°C/W

Notes:

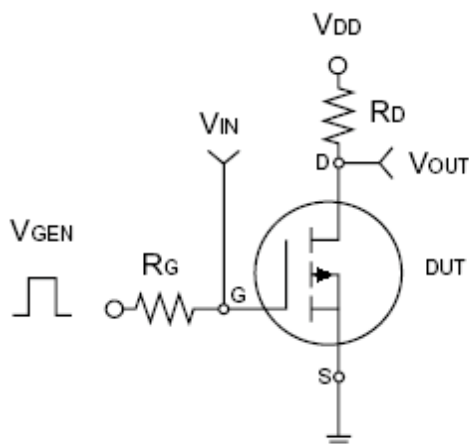
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on FR4 Board, t ≤ 5 sec.
- c. The power dissipation of the package may result in a continuous drain current.

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

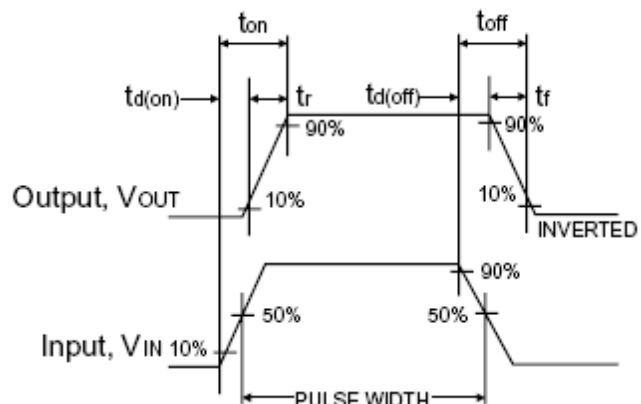
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 10μA	BV _{DSS}	60	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	1.0	--	2.5	V
Gate Body Leakage	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = 60V, V _{GS} = 0V	I _{DSS}	--	--	1.0	μA
On-State Drain Current	V _{GS} = 10V, V _{DS} = 7.5V	I _{D(ON)}	800	1300	--	mA
	V _{GS} = 4.5V, V _{DS} = 10V		500	700	--	
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 300mA	R _{DS(ON)}	--	1.9	3	Ω
	V _{GS} = 4.5V, I _D = 200mA		--	2.7	4	
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}	--	20	50	pF
Output Capacitance		C _{oss}	--	11	25	
Reverse Transfer Capacitance		C _{rss}	--	4	5	
Switching^c						
Turn-On Delay Time	V _{DD} = 30V, I _D = 100mA, V _{GEN} = 10V, R _G = 10Ω	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:

- a. pulse test: PW ≤ 300μs, duty cycle ≤ 2%
- b. For DESIGN AID ONLY, not subject to production testing.
- b. Switching time is essentially independent of operating temperature.



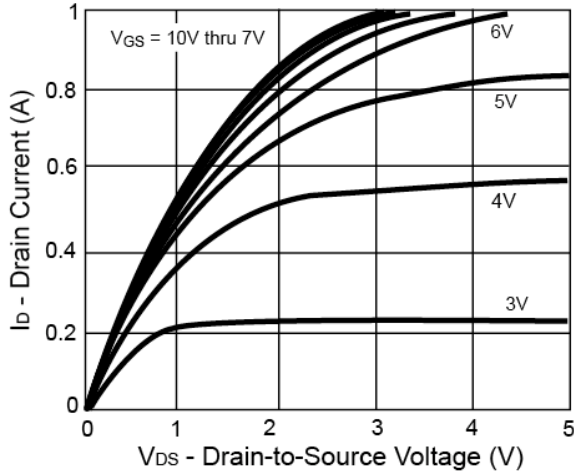
Switching Test Circuit



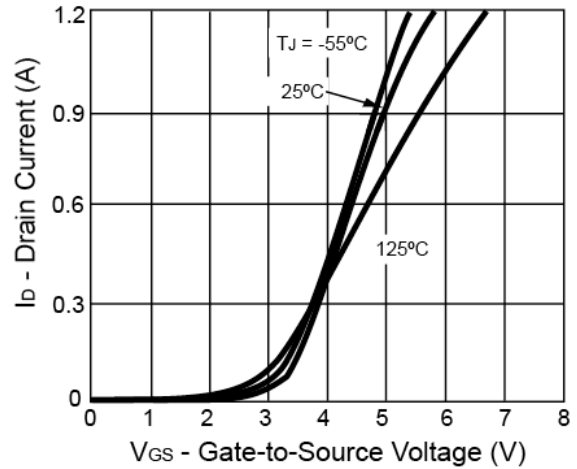
Switchin Waveforms

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

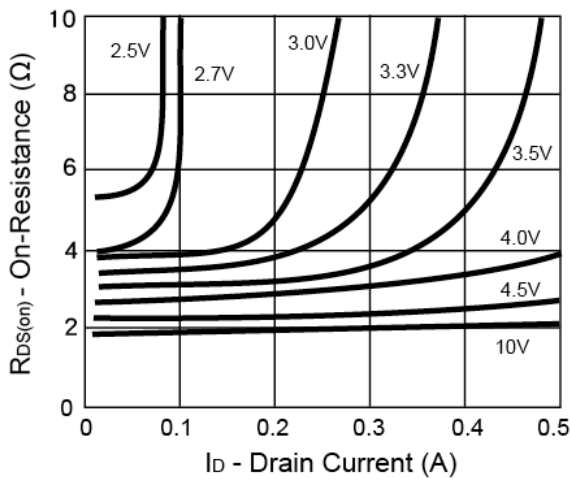
Output Characteristics



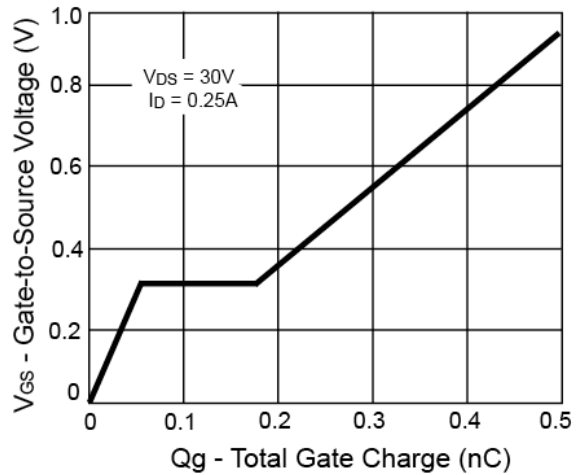
Transfer Characteristics



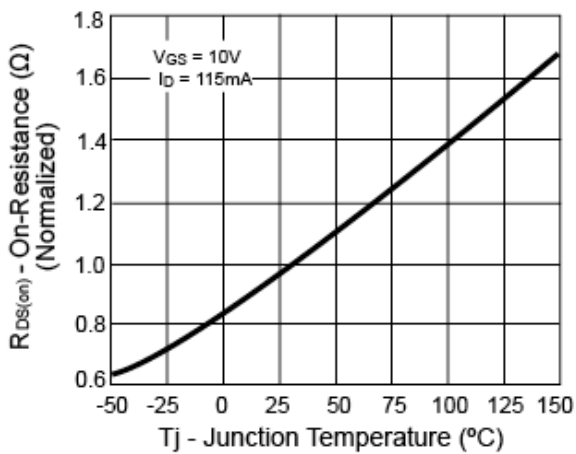
On-Resistance vs. Drain Current



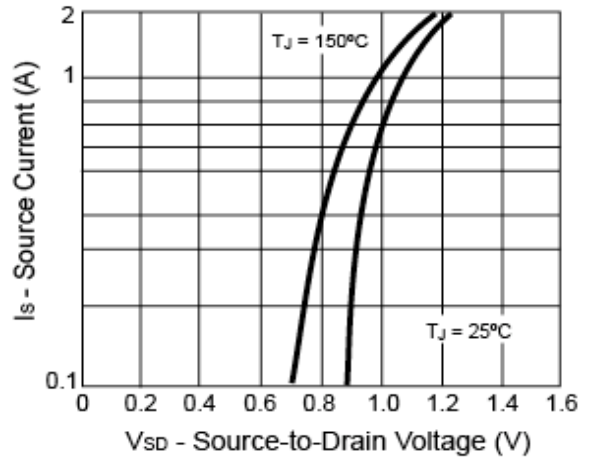
Gate Charge



On-Resistance vs. Junction Temperature

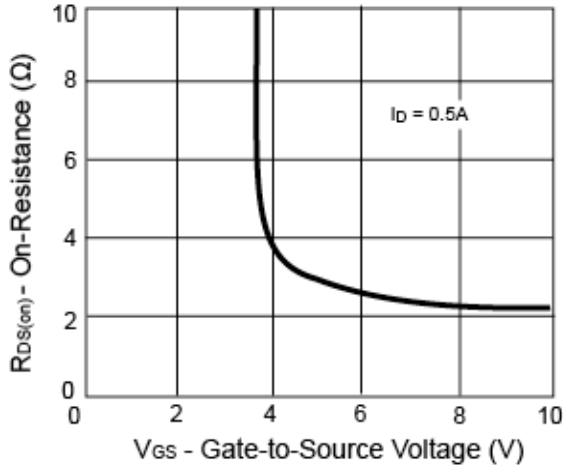


Source-Drain Diode Forward Voltage

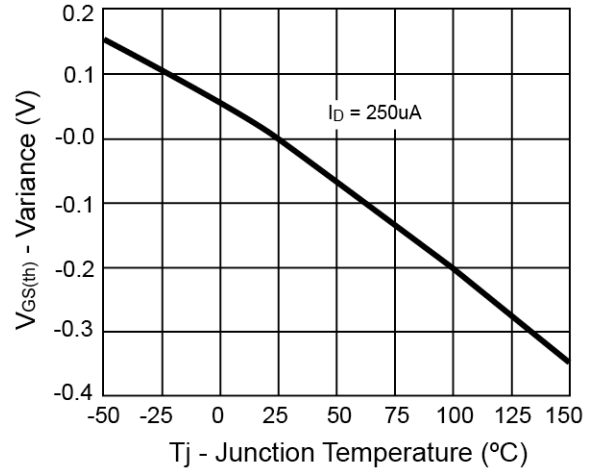


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

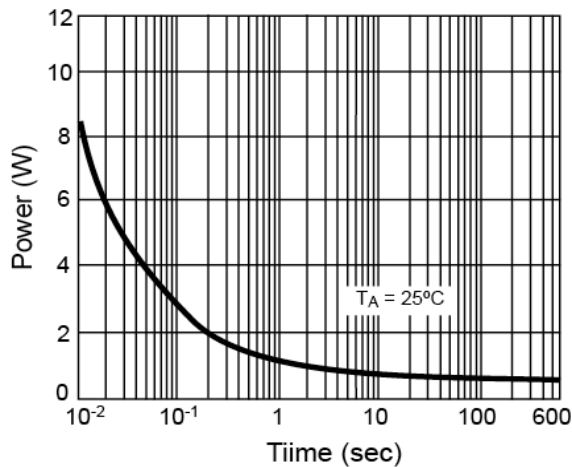
On-Resistance vs. Gate-Source Voltage



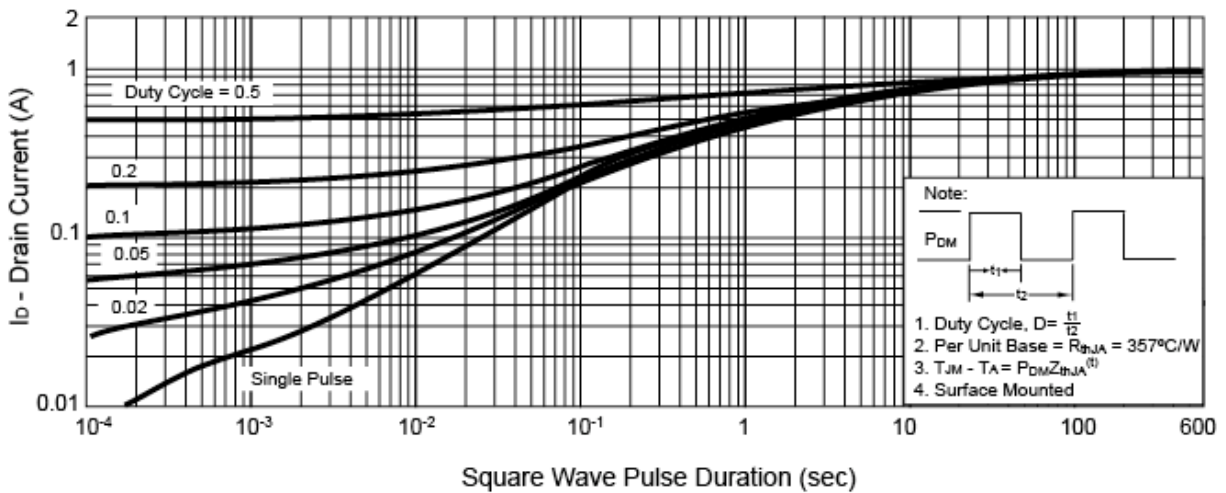
Threshold Voltage



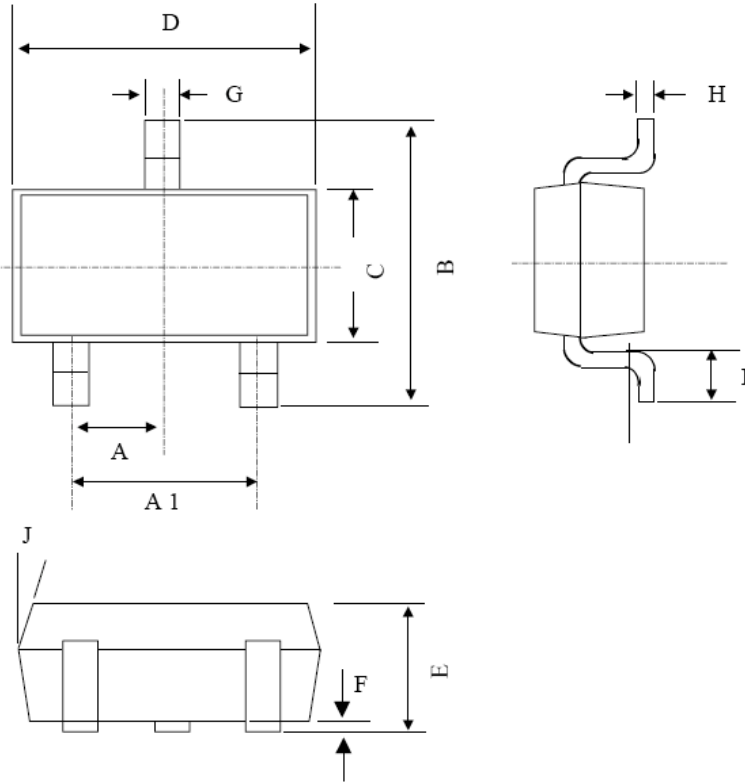
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient

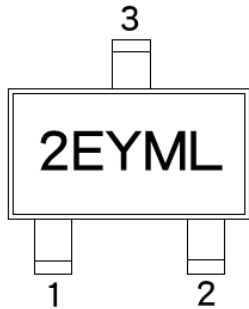


SOT-23 Mechanical Drawing



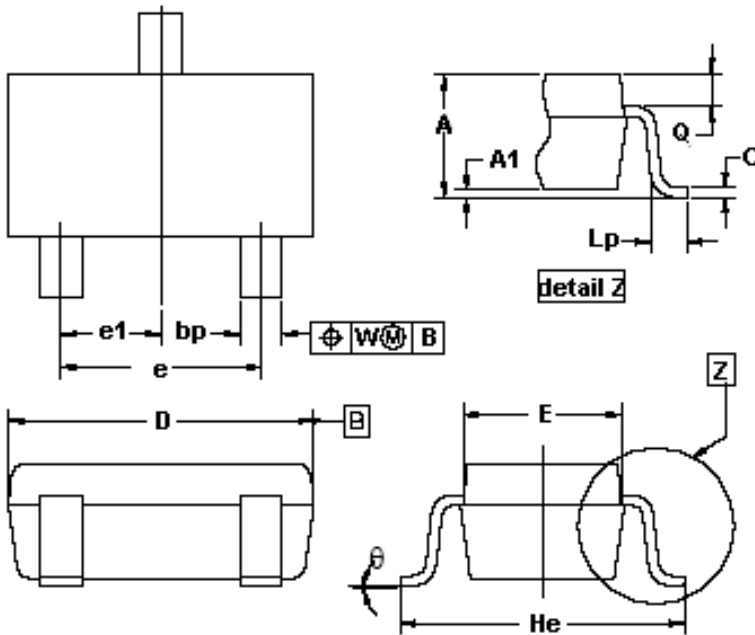
SOT-23 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	0.95 BSC		0.037 BSC	
A1	1.9 BSC		0.074 BSC	
B	2.60	3.00	0.102	0.118
C	1.40	1.70	0.055	0.067
D	2.80	3.10	0.110	0.122
E	1.00	1.30	0.039	0.051
F	0.00	0.10	0.000	0.004
G	0.35	0.50	0.014	0.020
H	0.10	0.20	0.004	0.008
I	0.30	0.60	0.012	0.024
J	5°	10°	5°	10°

Marking Diagram



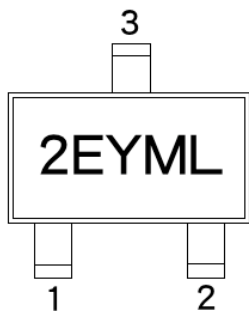
2E = Device Code
Y = Year Code
M = Month Code
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
L = Lot Code

SOT-323 Mechanical Drawing



DIM	SOT-323 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.10	0.0315	0.0433
A1	--	0.10	--	0.0039
bp	0.30	0.40	0.0118	0.0157
C	0.10	0.25	0.0039	0.0098
D	1.80	2.20	0.0709	0.0866
E	1.15	1.35	0.0453	0.0531
e	1.30	--	0.0512	--
e1	0.65	--	0.0256	--
He	2.00	2.20	0.0787	0.0866
Lp	0.15	0.45	0.0059	0.0177
Q	0.13	0.23	0.0051	0.0091
W	0.20	--	0.0079	--
Ø	10°	--	10°	--

Marking Diagram



- 2E** = 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

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.