

P-Channel Power MOSFET

-20V, -2.8A, 130mΩ

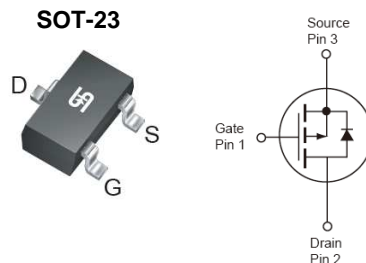
Features

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

Application

- Telecom power
- Consumer Electronics

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
V_{DS}	-20	V
$R_{DS(on)}$ (max)	$V_{GS} = -4.5V$	130
	$V_{GS} = -2.5V$	190
Q_g	7.2	nC



Notes: Moisture sensitivity level: level 3. Per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$ unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current (Note 1)	I_D	$T_C = 25^\circ C$	-2.8
		$T_C = 100^\circ C$	-1.6
Pulsed Drain Current (Note 2)	I_{DM}	-10	A
Continuous Source Current (Diode Conduction) (Note 3)	I_S	-1	A
Total Power Dissipation	P_{DTOT}	$T_A = 25^\circ C$	0.7
		$T_A = 70^\circ C$	0.45
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150	$^\circ C$

THERMAL PERFORMANCE			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	175	$^\circ C/W$

Notes: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JA}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 PCB in still air.

ELECTRICAL SPECIFICATIONS ($T_C = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static (Note 4)						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	BV_{DSS}	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(th)}$	-0.6	-0.7	-1	V
Gate Body Leakage	$V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$	I_{DSS}	--	--	1.0	μA
Drain-Source On-State Resistance	$V_{GS} = -4.5\text{V}, I_D = -2.8\text{A}$	$R_{DS(on)}$	--	90	130	m Ω
	$V_{GS} = -2.5\text{V}, I_D = -2.0\text{A}$		--	120	190	
Dynamic (Note 5)						
Gate Resistance	$V_{GS} = V_{DS} = 0\text{V}, f = 1\text{MHz}$	R_g	--	7.5	--	Ω
Total Gate Charge	$V_{DS} = -6\text{V}, I_D = -2.8\text{A},$ $V_{GS} = -4.5\text{V}$	Q_g	--	7.2	--	nC
Gate-Source Charge		Q_{gs}	--	2.2	--	
Gate-Drain Charge		Q_{gd}	--	1.2	--	
Input Capacitance	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	C_{iss}	--	480	--	pF
Output Capacitance		C_{oss}	--	460	--	
Reverse Transfer Capacitance		C_{rss}	--	10	--	
Switching (Note 6)						
Turn-On Delay Time	$V_{DD} = -6\text{V}, R_L = 6\Omega,$ $V_{GEN} = -4.5\text{V},$ $R_G = 6\Omega$	$t_{d(on)}$	--	38	--	ns
Turn-On Rise Time		t_r	--	25	--	
Turn-Off Delay Time		$t_{d(off)}$	--	43	--	
Turn-Off Fall Time		t_f	--	5	--	
Source-Drain Diode (Note 4)						
Forward On Voltage	$I_S = -1\text{A}, V_{GS} = 0\text{V}$	V_{SD}	--	-0.7	-1.3	V

Notes:

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3. Surface Mounted on a 1 in² pad of 2oz Cu, $t \leq 10$ sec.
4. Pulse test: $PW \leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM2301ACX RFG	SOT-23	3,000 pcs / 7" Reel

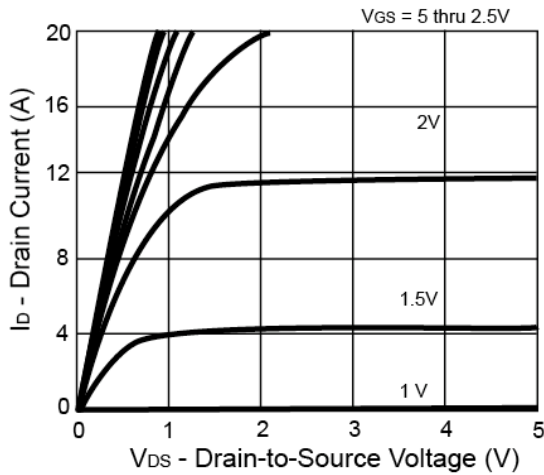
Note:

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

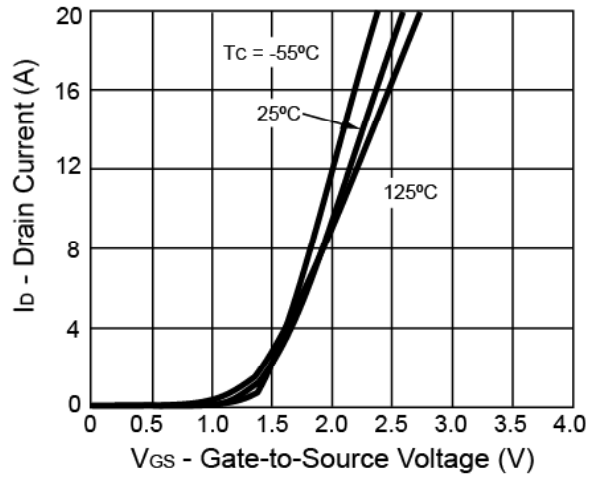
CHARACTERISTICS CURVES

($T_C = 25^\circ\text{C}$ unless otherwise noted)

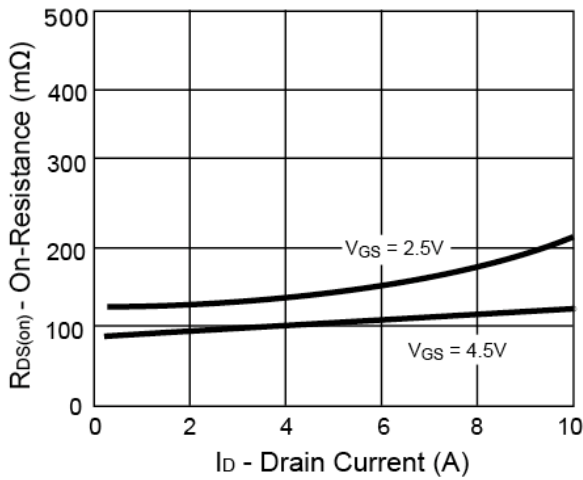
Output Characteristics



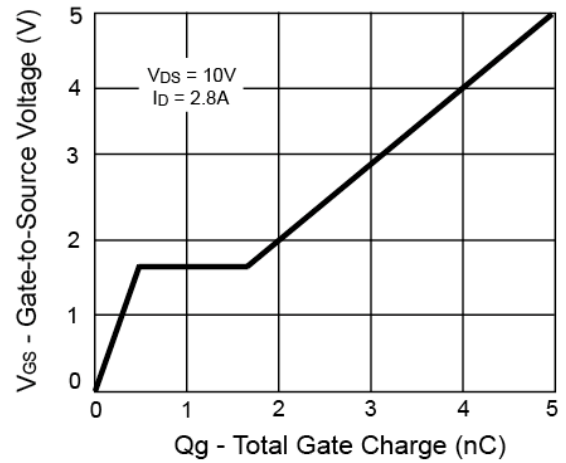
Transfer Characteristics



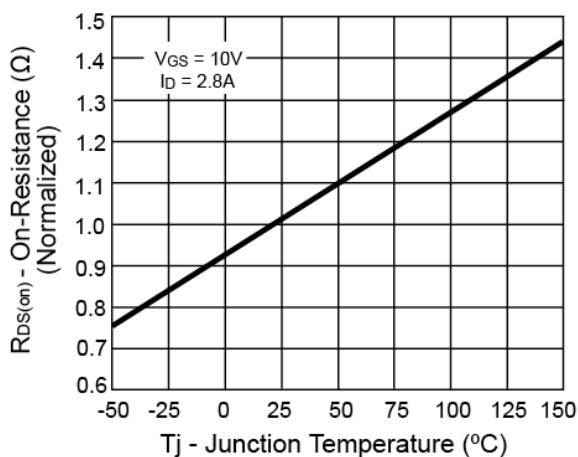
On-Resistance vs. Drain Current



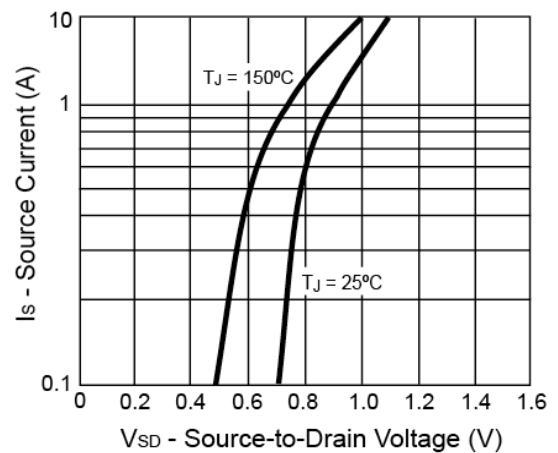
Gate Charge



On-Resistance vs. Junction Temperature

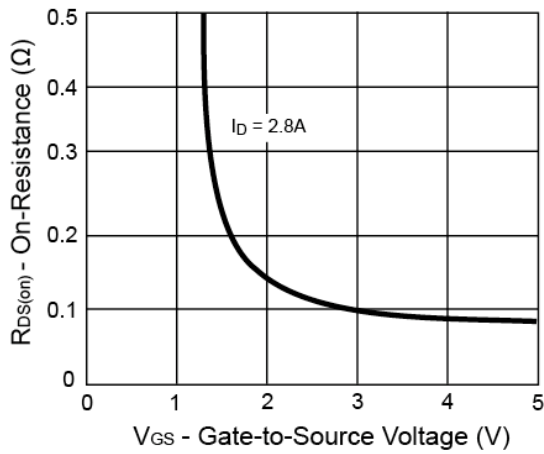


Source-Drain Diode Forward Voltage

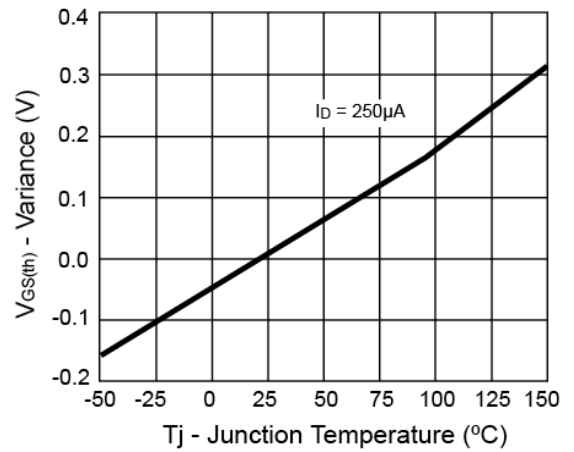


Electrical Characteristics Curve
(Tc= 25°C, unless otherwise noted)

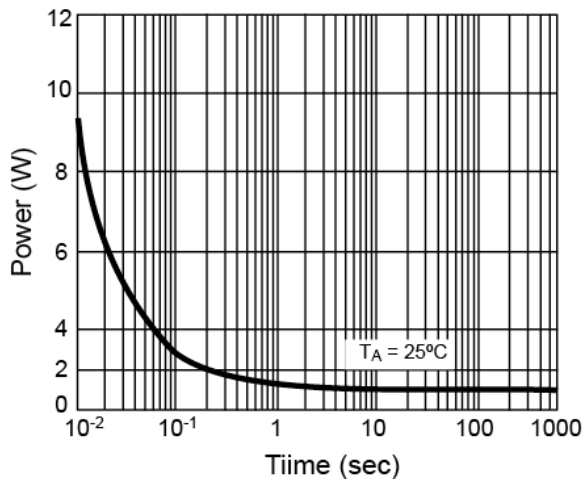
On-Resistance vs. Gate-Source Voltage



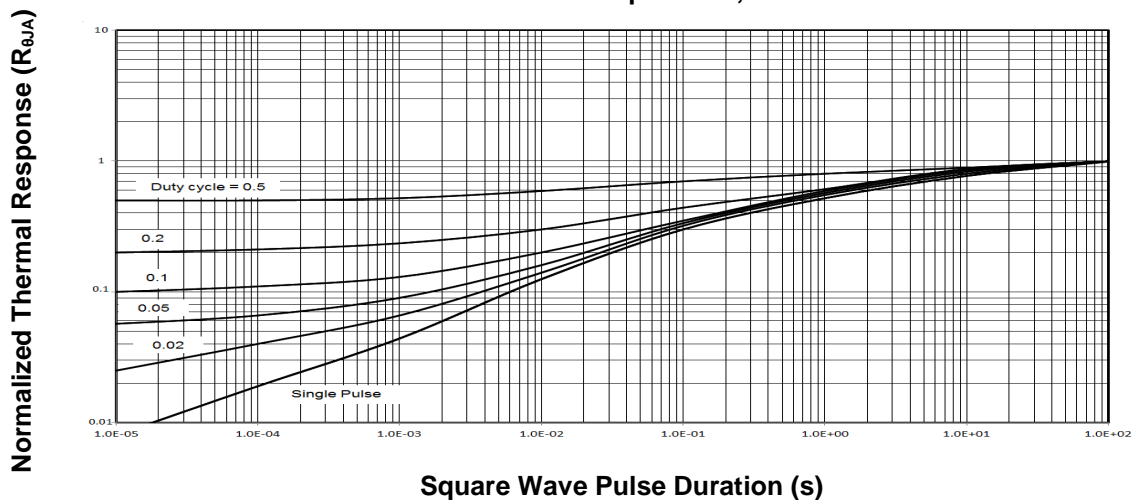
Threshold Voltage



Single Pulse Power

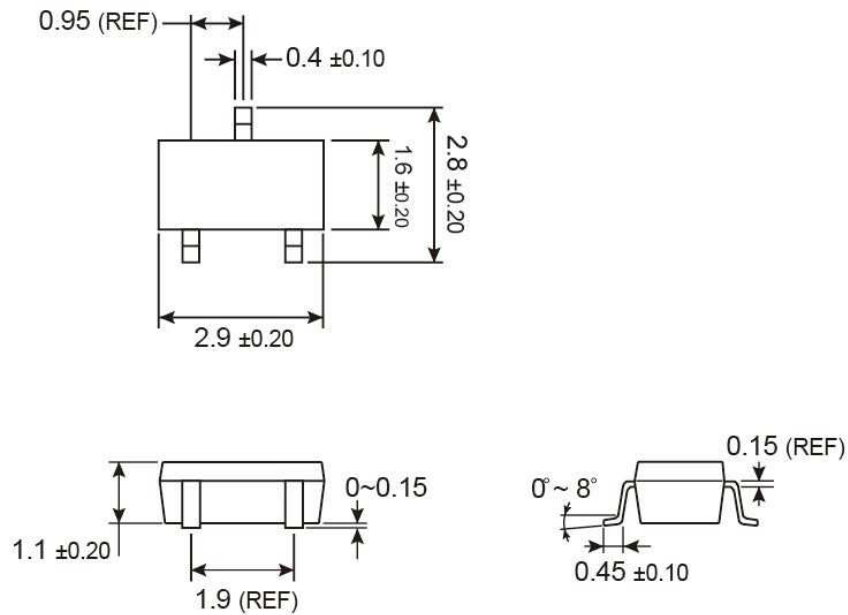


Normalized Thermal Transient Impedance, Junction-to-Ambient

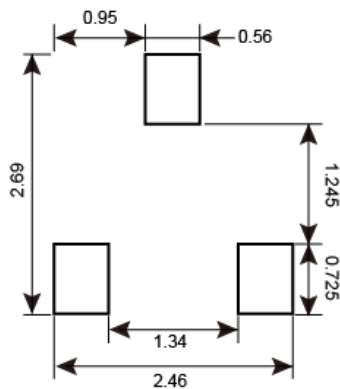


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

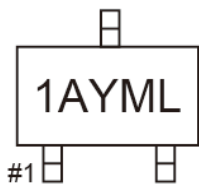
SOT-23



SUGGESTED PAD LAYOUT (Unit: Millimeters)



Marking Diagram



- 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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