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P-Channel Power MOSFET

-20V, -2.8A, 130mΩ

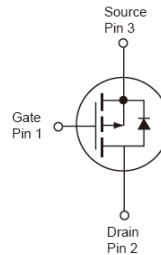
Features

- 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	mΩ
	$V_{GS} = -2.5V$	190	
Q_g		7.2	nC


SOT-23

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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ 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)	$T_C = 25^\circ\text{C}$	I_D	-2.8	A
	$T_C = 100^\circ\text{C}$		-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	$T_A = 25^\circ\text{C}$	P_{DTOT}	0.7	W
	$T_A = 70^\circ\text{C}$		0.45	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE

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

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} = 0V, I _D = 250μA	BV _{DSS}	-20	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(th)}	-0.6	-0.7	-1	V
Gate Body Leakage	V _{GS} = ±12V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} = 0V	I _{DSS}	--	--	1.0	μA
Drain-Source On-State Resistance	V _{GS} = -4.5V, I _D = -2.8A	R _{DS(on)}	--	90	130	mΩ
	V _{GS} = -2.5V, I _D = -2.0A		--	120	190	
Dynamic ^(Note 5)						
Gate Resistance	V _{GS} = V _{DS} =0V, f=1MHz	R _g	--	7.5	--	Ω
Total Gate Charge	V _{DS} = -6V, I _D = -2.8A, V _{GS} = -4.5V	Q _g	--	7.2	--	nC
Gate-Source Charge		Q _{gs}	--	2.2	--	
Gate-Drain Charge		Q _{gd}	--	1.2	--	
Input Capacitance	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	480	--	pF
Output Capacitance		C _{oss}	--	460	--	
Reverse Transfer Capacitance		C _{rss}	--	10	--	
Switching ^(Note 6)						
Turn-On Delay Time	V _{DD} = -6V, R _L = 6Ω, V _{GEN} = -4.5V, R _G = 6Ω	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 = -1A, V _{GS} = 0V	V _{SD}	--	-0.7	-1.3	V

Notes:

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

ORDERING INFORMATION

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

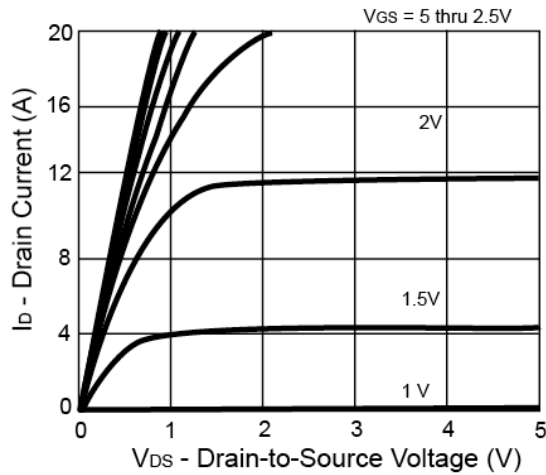
Note:

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

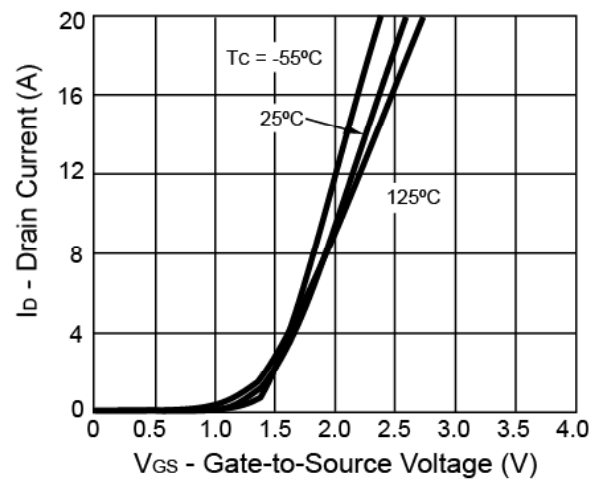
CHARACTERISTICS CURVES

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

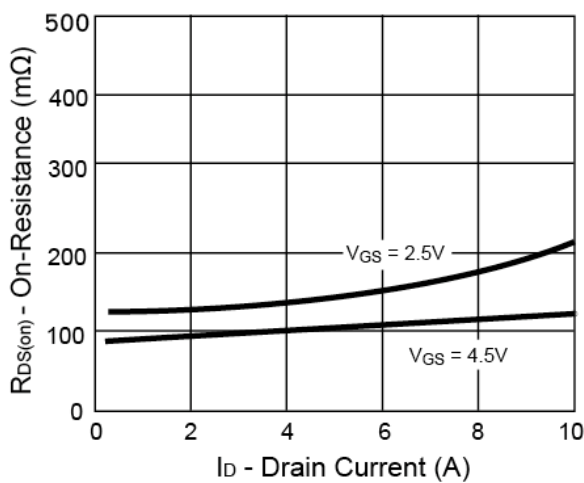
Output Characteristics



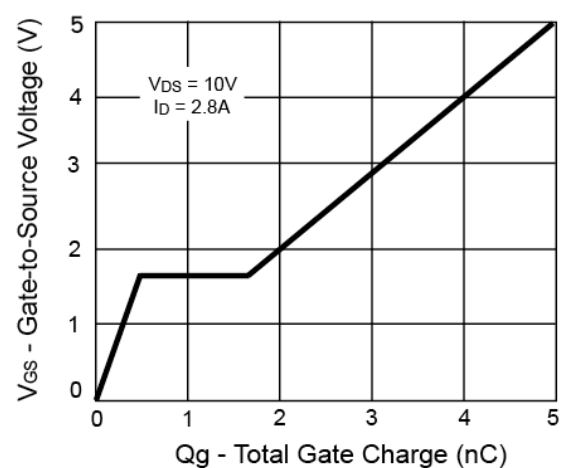
Transfer Characteristics



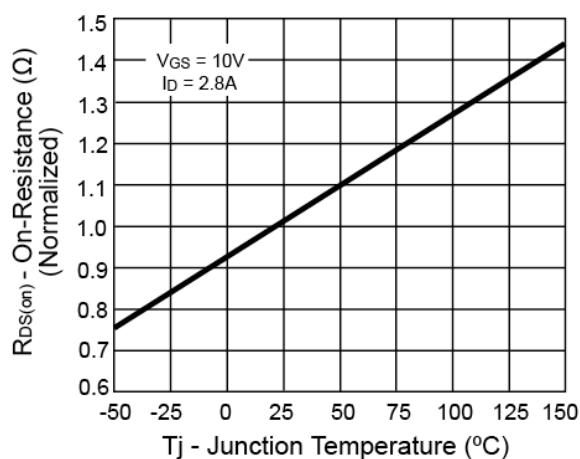
On-Resistance vs. Drain Current



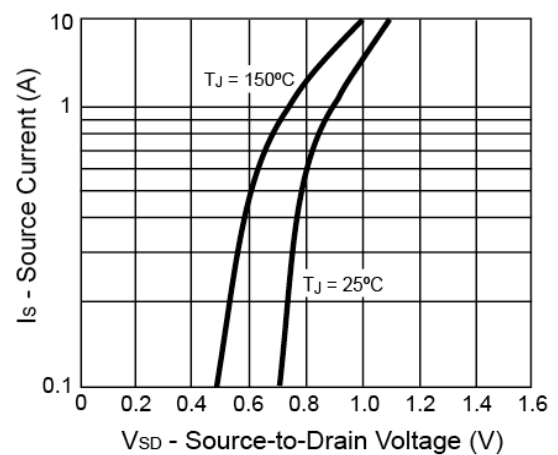
Gate Charge



On-Resistance vs. Junction Temperature



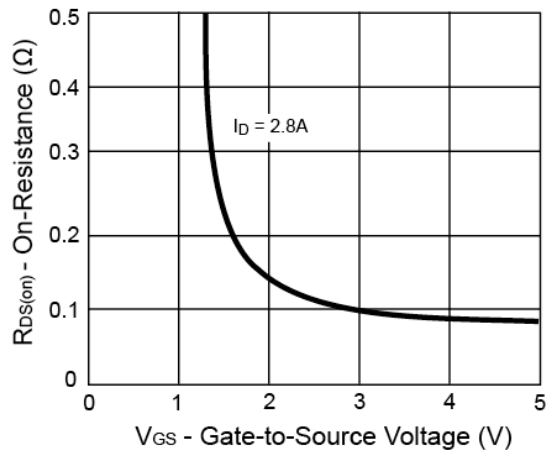
Source-Drain Diode Forward Voltage



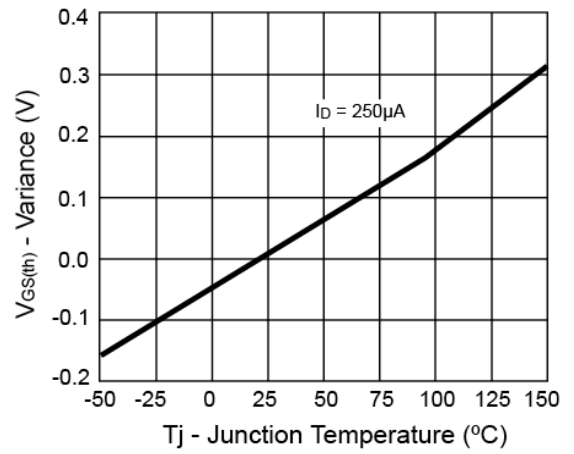
Electrical Characteristics Curve

(T_c = 25°C, unless otherwise noted)

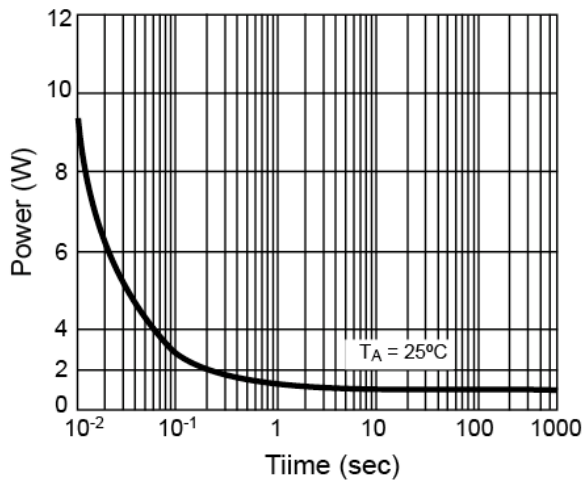
On-Resistance vs. Gate-Source Voltage



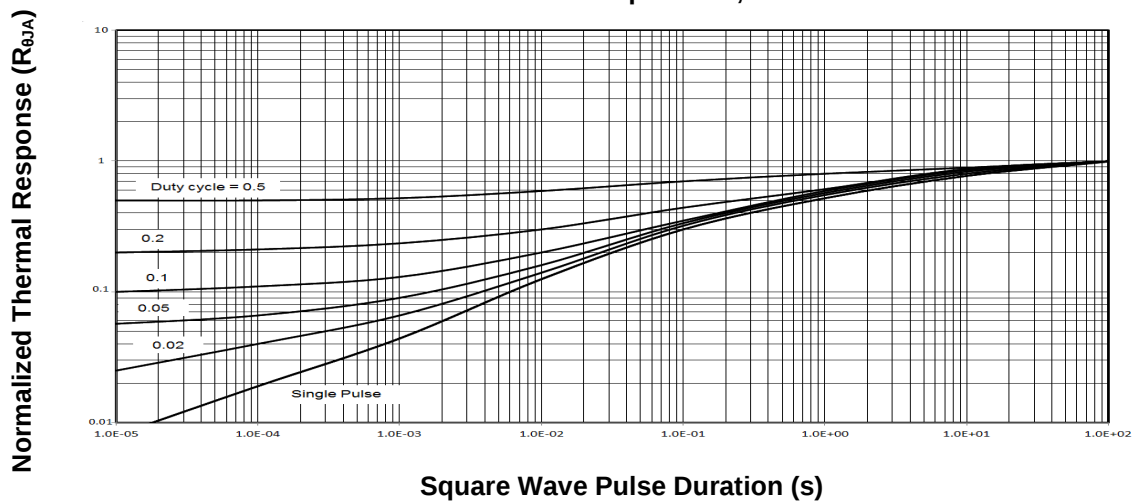
Threshold Voltage



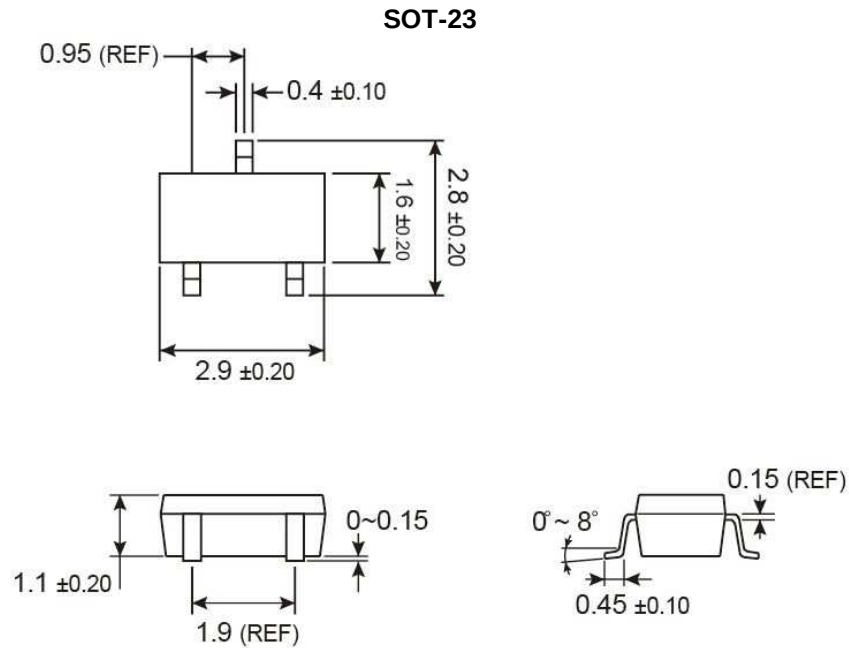
Single Pulse Power



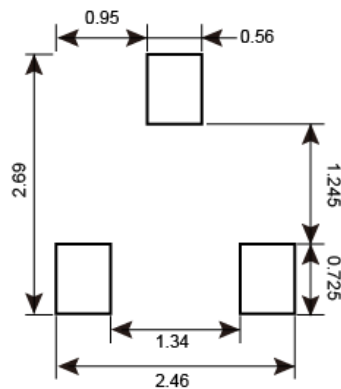
Normalized Thermal Transient Impedance, Junction-to-Ambient



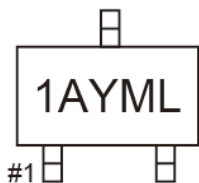
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)



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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