

P-Channel Power MOSFET

-20V, -2.8A, 100mΩ

Features

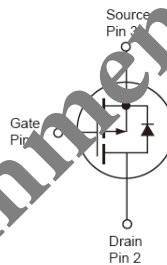
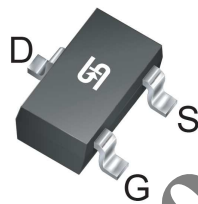
- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance

KEY PERFORMANCE PARAMETERS

PARAMETER		VALUE	UNIT
V_{DS}		-20	V
$R_{DS(on)}$ (max)	$V_{GS} = -4.5V$	100	mΩ
	$V_{GS} = -2.5V$	150	
	$V_{GS} = -1.8V$	190	
Q_g		5.8	nC

Application

- Load Switch
- PA Switch


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}	± 8	V
Continuous Drain Current (Note 1)	$V_{GS} = 4.5V$	I_D	-2.8	A
Pulsed Drain Current (Note 2)	$V_{GS} = 4.5V$	I_{DM}	-8	A
Continuous Source Current (Diode Conduction)		I_S	-0.72	A
Total Power Dissipation	$T_A = 25^\circ\text{C}$	P_{DTOT}	0.9	W
	$T_A = 75^\circ\text{C}$		0.57	
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)	$R_{\theta JA}$	120	$^\circ\text{C/W}$
Lead Temperature (1/8" from case)	T_L	5	S

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 _A = 25°C unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static ^(Note 3)						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250uA	BV _{DSS}	-20	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	V _{GS(TH)}	-0.45	--	-0.95	V
Gate Body Leakage	V _{GS} = ±8V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = -9.6V, V _{GS} = 0V	I _{DSS}	--	--	-1.0	μA
On-State Drain Current	V _{DS} ≥ -10V, V _{GS} = -5V	I _{D(ON)}	-6	--	--	A
Drain-Source On-State Resistance	V _{GS} = -4.5V, I _D = -2.8A	R _{DS(ON)}	--	80	100	mΩ
	V _{GS} = -2.5V, I _D = -2.0A		--	110	150	
	V _{GS} = -1.8V, I _D = -2.0A		--	150	190	
Forward Transconductance	V _{DS} = -5V, I _D = -4A	g _{fs}	--	6.5	--	S
Dynamic ^(Note 4)						
Total Gate Charge	V _{DS} = -6V, I _D = -2.8A, V _{GS} = -4.5V	Q _g	--	5.8	--	nC
Gate-Source Charge		Q _{gs}	--	0.85	--	
Gate-Drain Charge		Q _{gd}	--	1.7	--	
Input Capacitance	V _{DS} = -6V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	415	--	pF
Output Capacitance		C _{oss}	--	223	--	
Reverse Transfer Capacitance		C _{rss}	--	87	--	
Switching ^(Note 5)						
Turn-On Delay Time	V _{DS} = -6V, R _L = 6Ω, I _D = -1A, V _{GEN} = -4.5V, R _G = 6Ω	t _{d(on)}	--	13	--	ns
Turn-On Rise Time		t _r	--	36	--	
Turn-Off Delay Time		t _{d(off)}	--	42	--	
Turn-Off Fall Time		t _f	--	34	--	
Source-Drain Diode ^(Note 3)						
Forward On Voltage	I _S = -0.75A, V _{GS} = 0V	V _{SD}	--	- 0.8	-1.2	V

Notes:

- Pulse width limited by the maximum junction temperature.
- Surface Mounted on FR4 Board, $t \leq 5$ 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
TSM2301BCX RFG	SOT-23	3,000pcs / 7"Reel

Note:

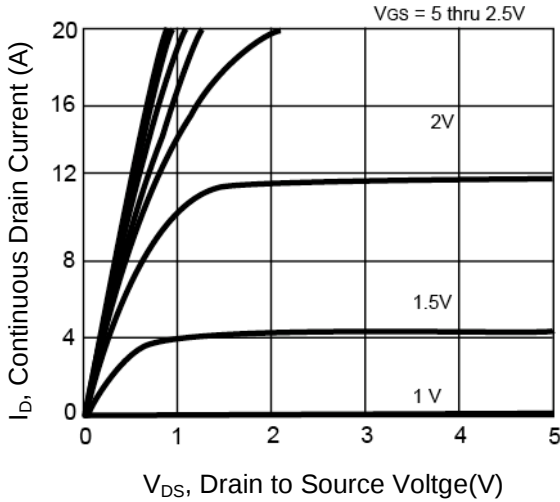
1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

Not Recommended

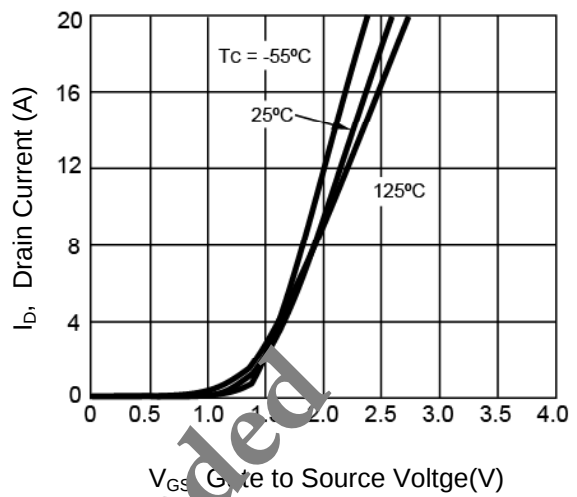
CHARACTERISTICS CURVES

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

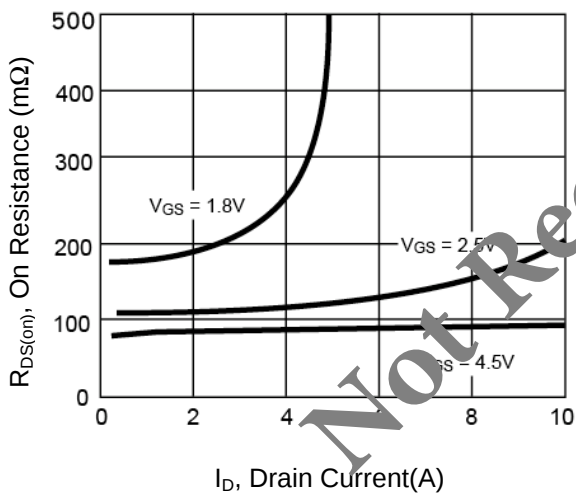
Output Characteristics



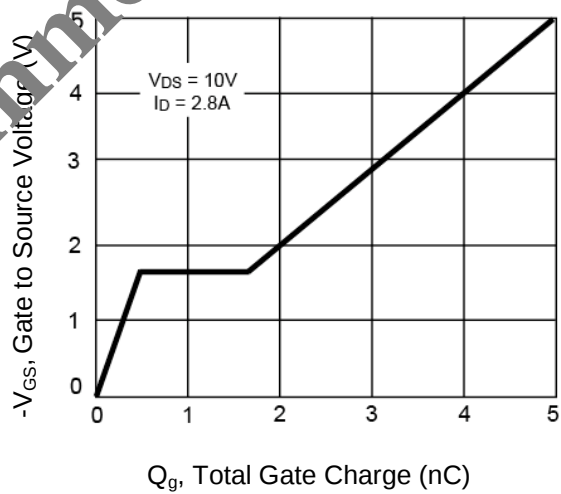
Transfer Characteristics



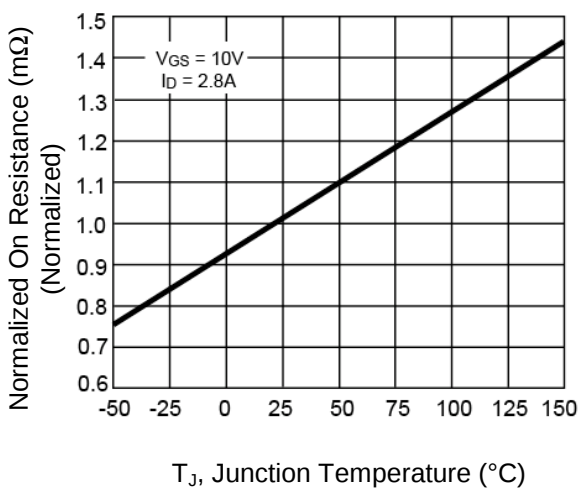
On-Resistance vs. Drain Current



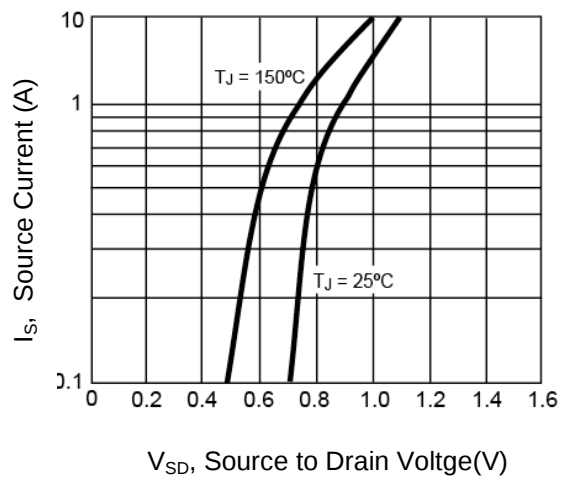
Gate Charge



On-Resistance vs. Junction Temperature



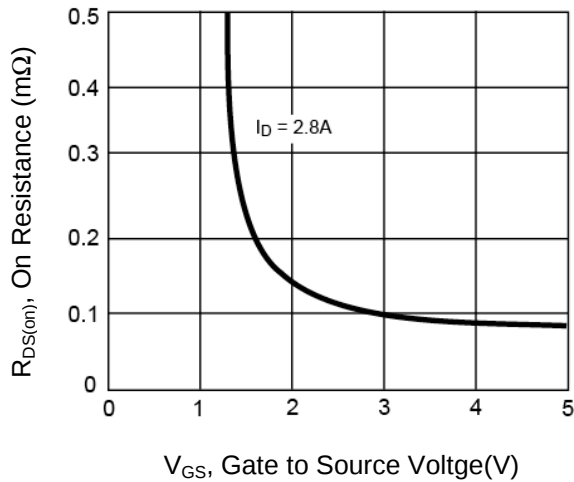
Source-Drain Diode Forward Voltage



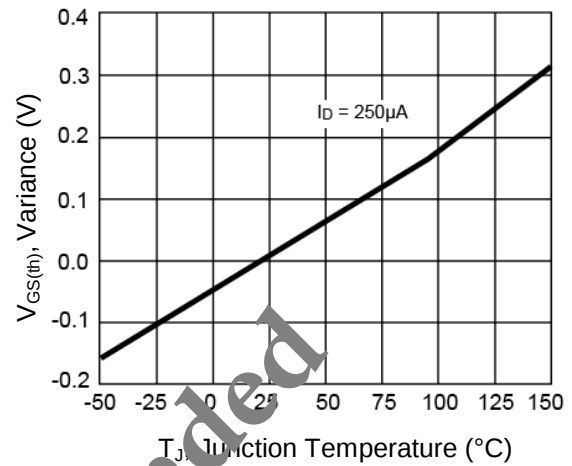
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($T_A = 25^\circ\text{C}$ unless otherwise noted)

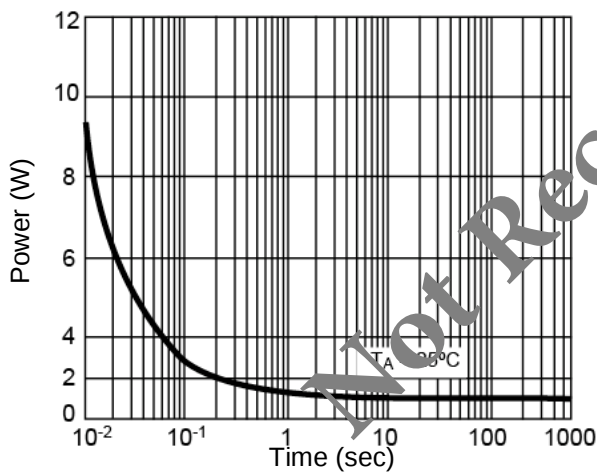
On-Resistance vs. Gate-Source Voltage



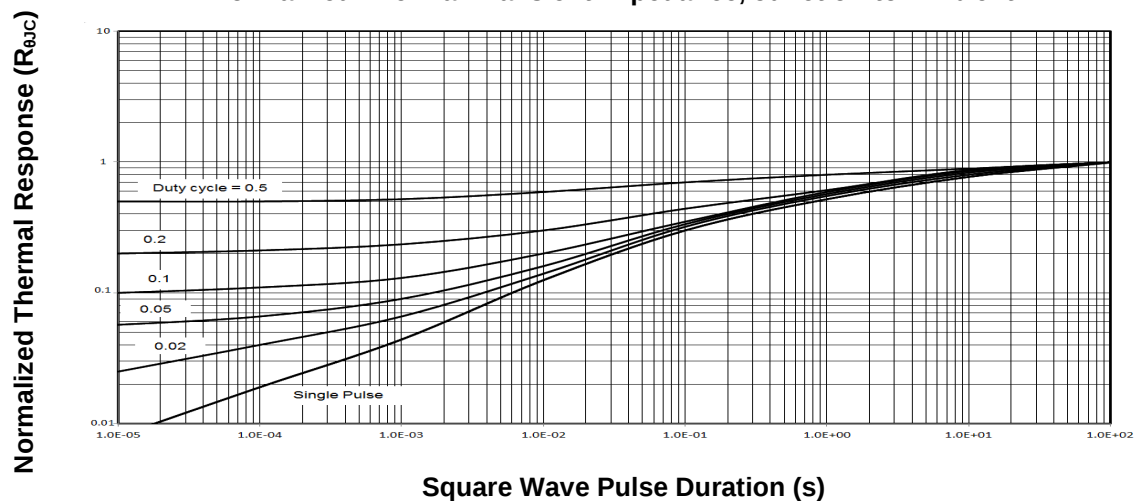
Threshold Voltage



Single Pulse Power

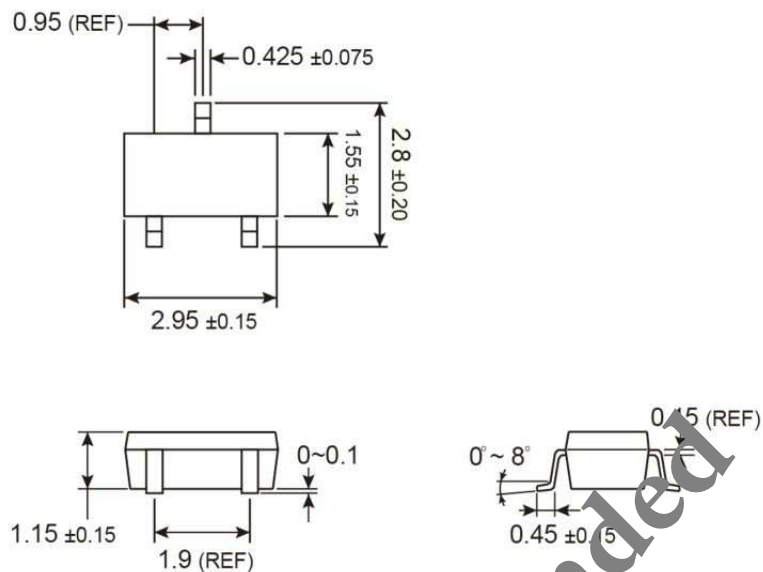


Normalized Thermal Transient Impedance, Junction-to-Ambient

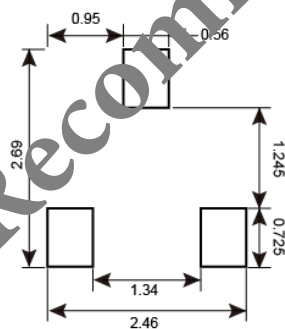


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

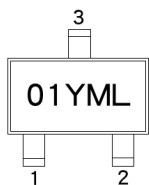
SOT-23



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



- 01** = 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

Not Recommended

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