N-Channel Power MOSFET

20V, 3.9A, 65mΩ

FEATURES

- Low $R_{DS(ON)}$ to minimize conductive losses
- Low gate charge for fast power switching
- Compliant to RoHS directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

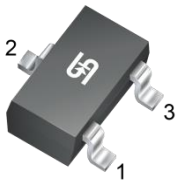
KEY PERFORMANCE PARAMETERS			
PARAMETER		**VALUE**	**UNIT**
V_{DS}		20	V
$R_{DS(on)}$ (max)	V_{GS} = 4.5V	65	mΩ
	V_{GS} = 2.5V	95	
Q_g		7.8	nC

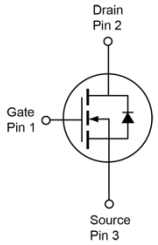
APPLICATIONS

- Load switch
- Backlights

Pb-Free RoHS COMPLIANT HALOGEN FREE

SOT-23





Note: MSL 3 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS (T_A = 25°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)	T_C = 25°C	I_D	3.9	A
	T_A = 25°C		3.2	
Pulsed Drain Current		I_{DM}	15.6	A
Total Power Dissipation	T_C = 25°C	P_D	1.5	W
	T_C = 125°C		0.3	
Total Power Dissipation	T_A = 25°C	P_D	1	W
	T_A = 125°C		0.2	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150	°C

THERMAL PERFORMANCE			
PARAMETER	**SYMBOL**	**LIMIT**	**UNIT**
Junction to Case Thermal Resistance	$R_{\Theta JC}$	84	°C/W
Junction to Ambient Thermal Resistance	$R_{\Theta JA}$	124	°C/W

Thermal Performance Note: $R_{\Theta JA}$ 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.

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP**	**MAX**	**UNIT**
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	20	--	--	V
Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	$V_{GS(TH)}$	0.65	0.9	1.2	V
Gate-Source Leakage Current	V_{GS} = ±8V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Drain-Source Leakage Current	V_{GS} = 0V, V_{DS} = 20V	I_{DSS}	--	--	1	μA
	V_{GS} = 0V, V_{DS} = 20V T_J = 125°C		--	--	100	
Drain-Source On-State Resistance (Note 2)	V_{GS} = 4.5V, I_D = 3.2A	$R_{DS(on)}$	--	34	65	mΩ
	V_{GS} = 2.5V, I_D = 3.2A		--	45	95	
Forward Transconductance (Note 2)	V_{DS} = 5V, I_D = 3.2A	g_{fs}	--	19	--	S
Dynamic (Note 3)						
Total Gate Charge	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 3.2A	Q_g	--	7.8	--	nC
Total Gate Charge	V_{GS} = 2.5V, V_{DS} = 10V, I_D = 3.2A	Q_g	--	5	--	
Gate-Source Charge		Q_{gs}	--	1	--	
Gate-Drain Charge		Q_{gd}	--	2.5	--	
Input Capacitance	V_{GS} = 0V, V_{DS} = 10V f = 1.0MHz	C_{iss}	--	587	--	pF
Output Capacitance		C_{oss}	--	94	--	
Reverse Transfer Capacitance		C_{rss}	--	64	--	
Gate Resistance	f = 1.0MHz, open drain	R_g	--	1.6	--	Ω
Switching (Note 3)						
Turn-On Delay Time	V_{GS} = 4.5V, V_{DS} = 10V, I_D = 3.2A, R_G = 2Ω,	$t_{d(on)}$	--	5.4	--	ns
Turn-On Rise Time		t_r	--	26.4	--	
Turn-Off Delay Time		$t_{d(off)}$	--	16.4	--	
Turn-Off Fall Time		t_f	--	15.8	--	
Source-Drain Diode						
Forward Voltage (Note 2)	V_{GS} = 0V, I_S = 3.2A	V_{SD}	--	--	1.2	V
Reverse Recovery Time	I_S = 3.2A , dI/dt = 100A/μs	t_{rr}	--	19	--	ns
Reverse Recovery Charge		Q_{rr}	--	8	--	nC

Notes:

1. Silicon limited current only.
2. Pulse test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.
3. Switching time is essentially independent of operating temperature.

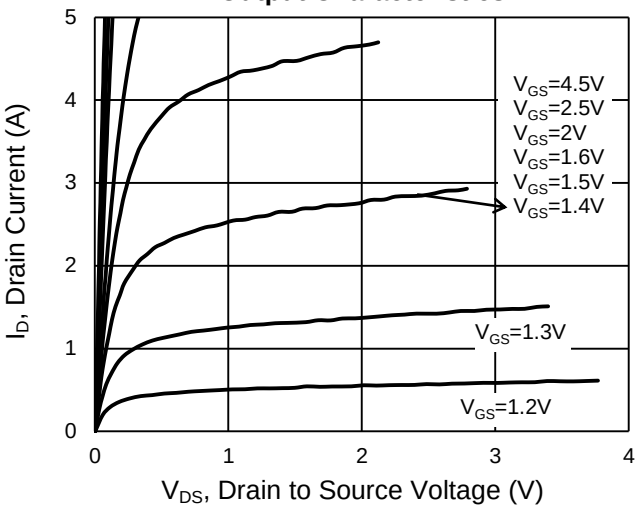
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM2302CX RFG	SOT-23	3,000pcs / 7” Reel

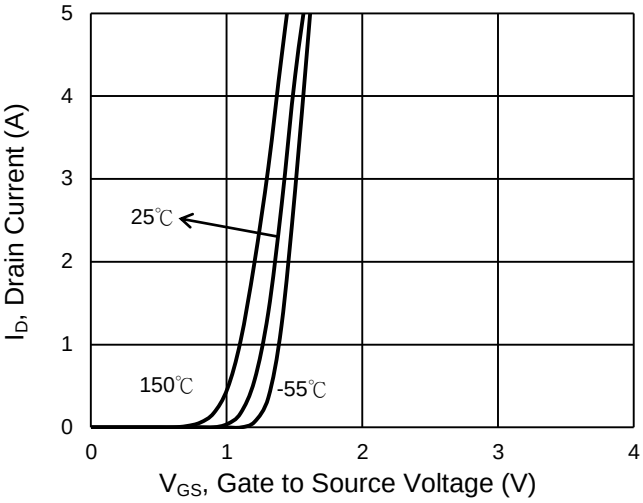
CHARACTERISTICS CURVES

(T_A = 25°C unless otherwise noted)

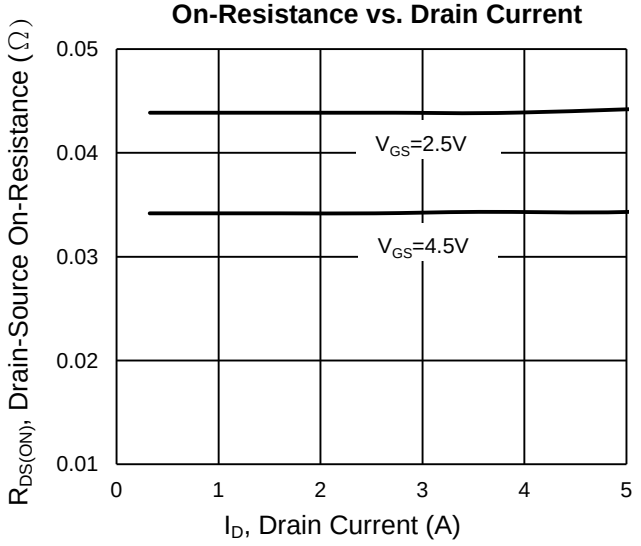
Output Characteristics



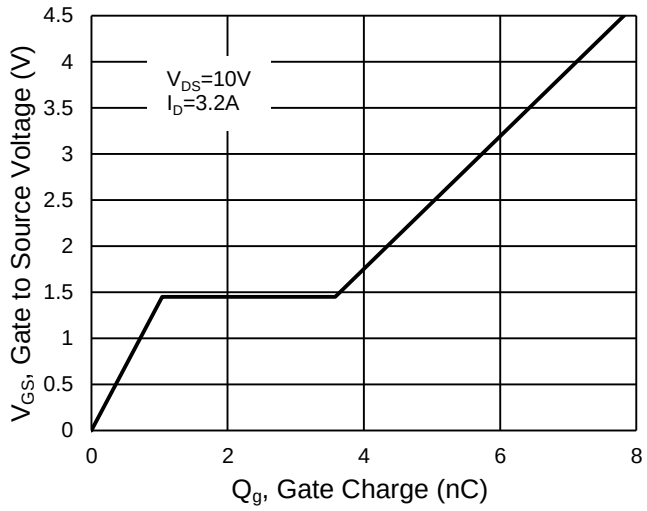
Transfer Characteristics



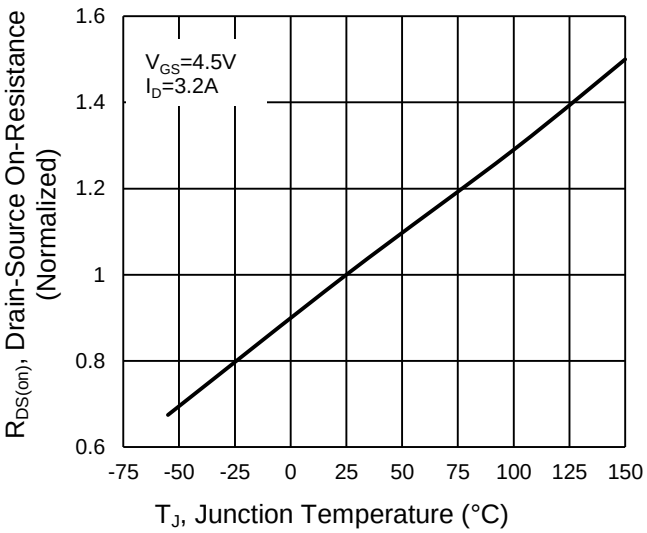
On-Resistance vs. Drain Current



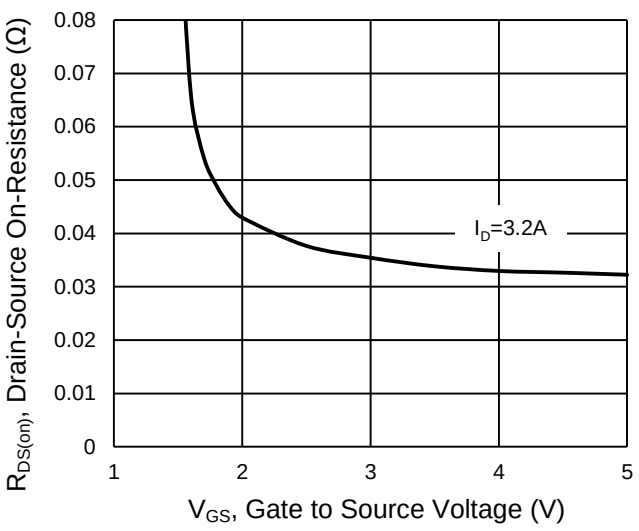
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



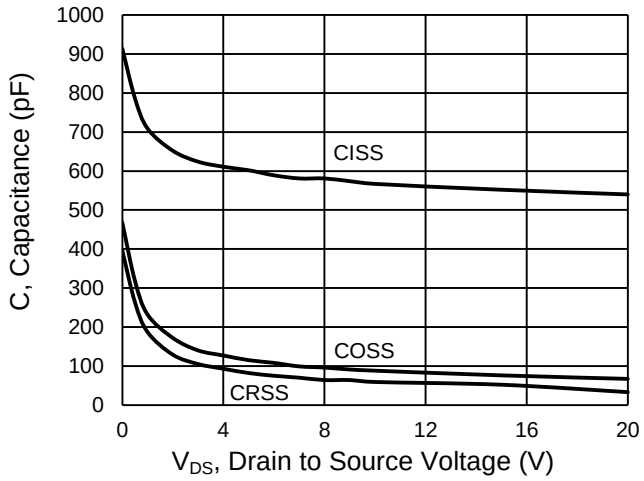
On-Resistance vs. Gate-Source Voltage



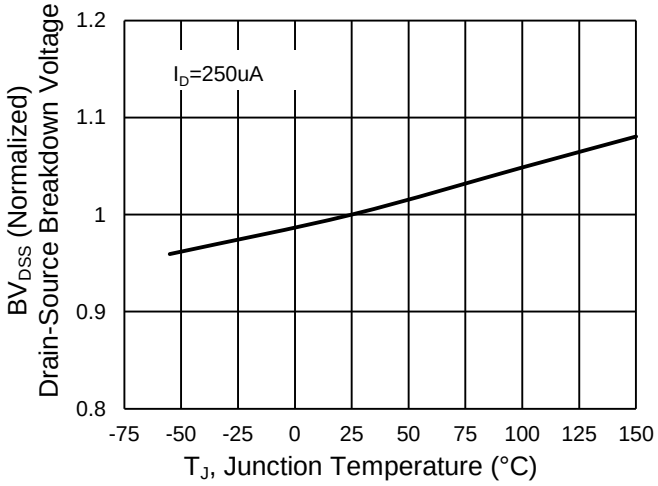
CHARACTERISTICS CURVES

(T_A = 25°C unless otherwise noted)

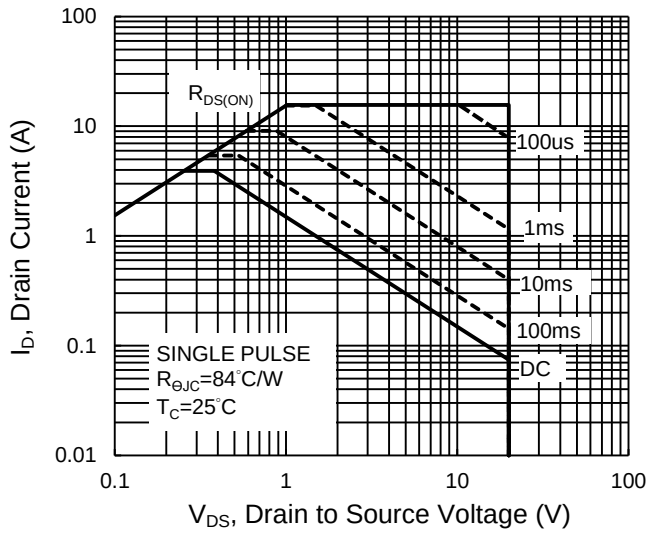
Capacitance vs. Drain-Source Voltage



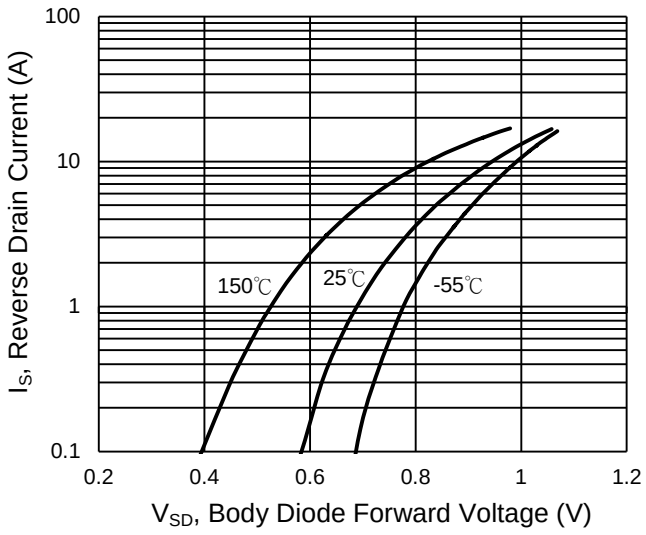
BV_{DSS} vs. Junction Temperature



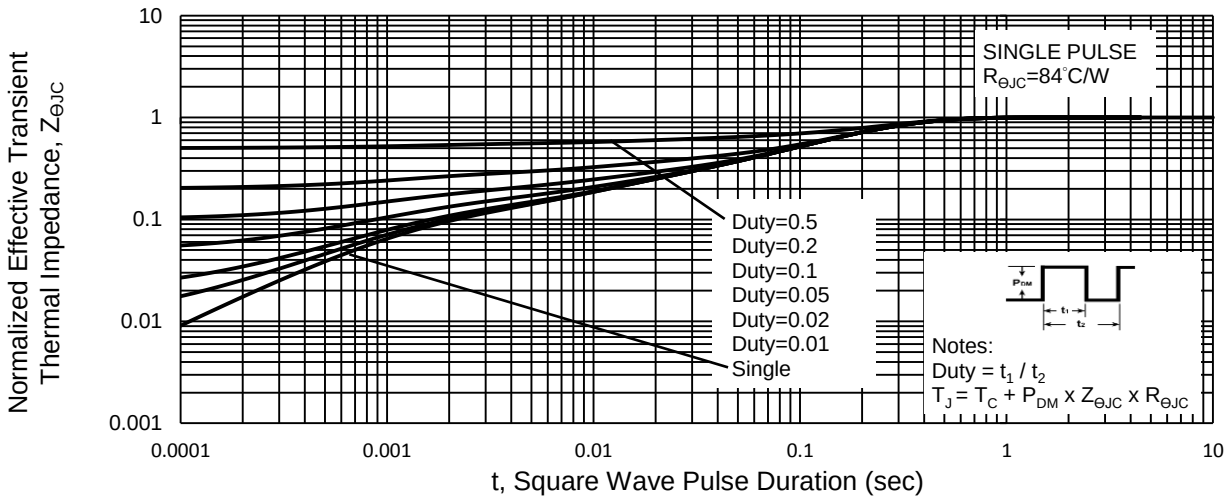
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

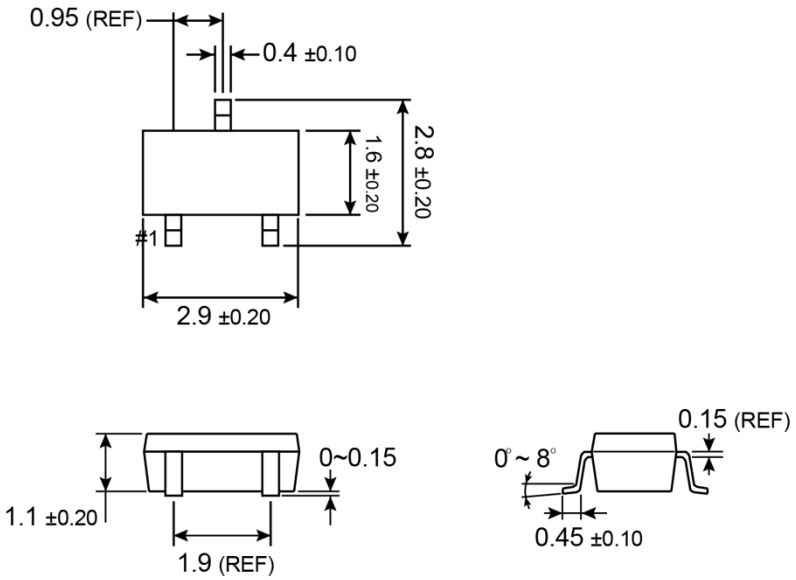


Normalized Thermal Transient Impedance, Junction-to-Case

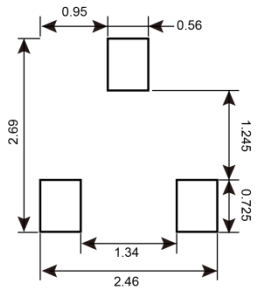


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

SOT-23



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM

2 = Device Code
Y = Year Code
M = Month Code

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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