



# TSM2302

## 20V N-Channel Enhancement Mode MOSFET

SOT-23



Pin assignment:

1. Gate
2. Source
3. Drain

**$V_{DS} = 20V$**

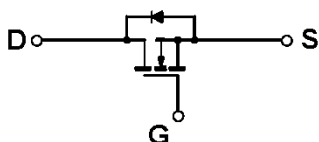
**$R_{DS(on)}, V_{GS} @ 4.5V, I_{DS} @ 3.6A = 65m\Omega$**

**$R_{DS(on)}, V_{GS} @ 2.5V, I_{DS} @ 3.1A = 95m\Omega$**

### Features

- ✧ Advanced trench process technology
- ✧ Excellent thermal and electrical capabilities
- ✧ High density cell design for ultra low on-resistance
- ✧ Compact and low profile SOT-23 package

### Block Diagram



### Ordering Information

Part No.	Packing	Package
TSM2302CX	Tape & Reel	SOT-23

### Absolute Maximum Rating ( $T_a = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20V	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current	$I_D$	2.4	A
Pulsed Drain Current	$I_{DM}$	10	A
Maximum Power Dissipation	$T_a = 25^\circ C$	$P_D$	W
		1.25	
	$T_a = 75^\circ C$	0.8	
Operating Junction Temperature	$T_J$	+150	$^\circ C$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Lead Temperature (1/8" from case)	$T_L$	5	S
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta ja}$	100	$^\circ C/W$

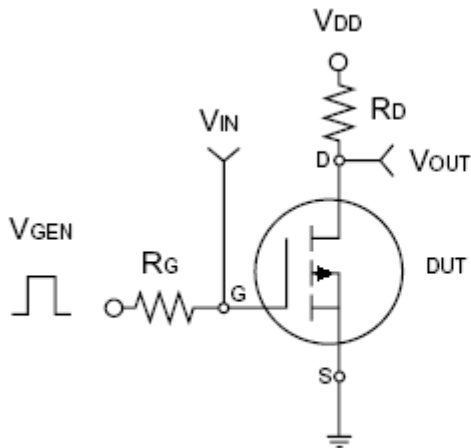
Note: Surface mounted on FR4 board  $t \leq 5sec$ .

## Electrical Characteristics

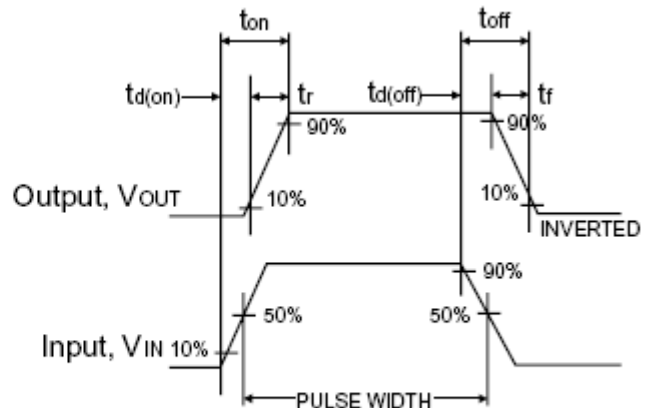
Rate  $I_D = 2.4A$ , ( $T_a = 25^\circ C$  unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	20	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 4.5V, I_D = 3.6A$	$R_{DS(ON)}$	--	50	65	mΩ
Drain-Source On-State Resistance	$V_{GS} = 2.5V, I_D = 3.1A$	$R_{DS(ON)}$	--	75	95	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	0.45	--	--	V
Zero Gate Voltage Drain Current	$V_{DS} = 20V, V_{GS} = 0V$	$I_{DSS}$	--	--	1.0	uA
Gate Body Leakage	$V_{GS} = \pm 8V, V_{DS} = 0V$	$I_{GSS}$	--	--	± 100	nA
On-State Drain Current	$V_{DS} \geq 5V, V_{GS} = 4.5V$	$I_{D(ON)}$	6	--	--	A
Forward Transconductance	$V_{DS} = 5V, I_D = 3.6A$	$g_{fs}$	--	10	--	S
Dynamic						
Total Gate Charge	$V_{DS} = 10V, I_D = 3.6A,$ $V_{GS} = 4.5V$	$Q_g$	--	5.2	10	nC
Gate-Source Charge		$Q_{gs}$	--	0.65	--	
Gate-Drain Charge		$Q_{gd}$	--	1.5	--	
Turn-On Delay Time	$V_{DD} = 10V, R_L = 10\Omega,$ $I_D = 1A, V_{GEN} = 4.5V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	7	15	nS
Turn-On Rise Time		$t_r$	--	55	80	
Turn-Off Delay Time		$t_{d(off)}$	--	16	60	
Turn-Off Fall Time		$t_f$	--	10	25	
Input Capacitance	$V_{DS} = 10V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	450	--	pF
Output Capacitance		$C_{oss}$	--	70	--	
Reverse Transfer Capacitance		$C_{rss}$	--	43	--	
Source-Drain Diode						
Max. Diode Forward Current		$I_S$	--	--	1.6	A
Diode Forward Voltage	$I_S = 1.0A, V_{GS} = 0V$	$V_{SD}$	--	0.75	1.2	V

Note : pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$

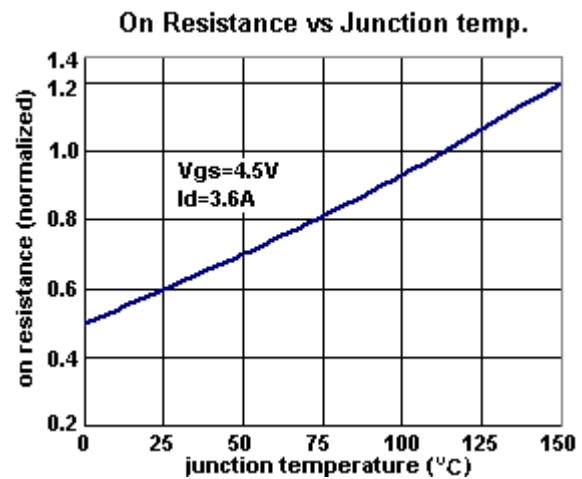
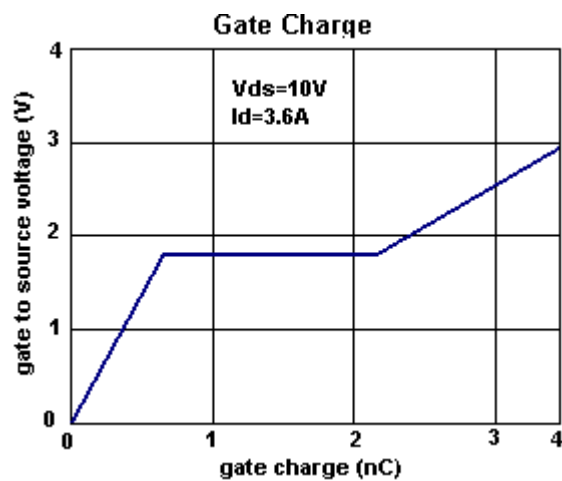
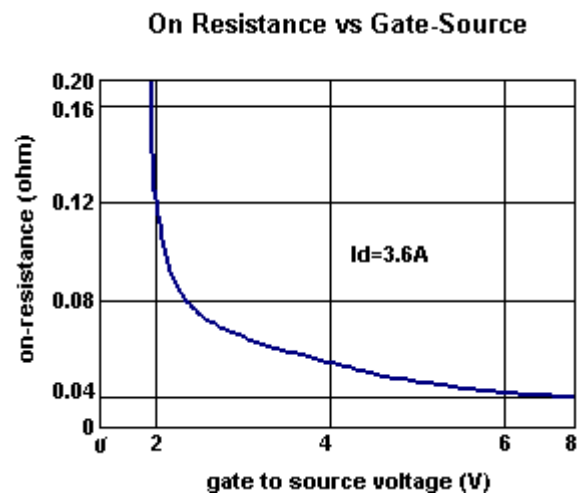
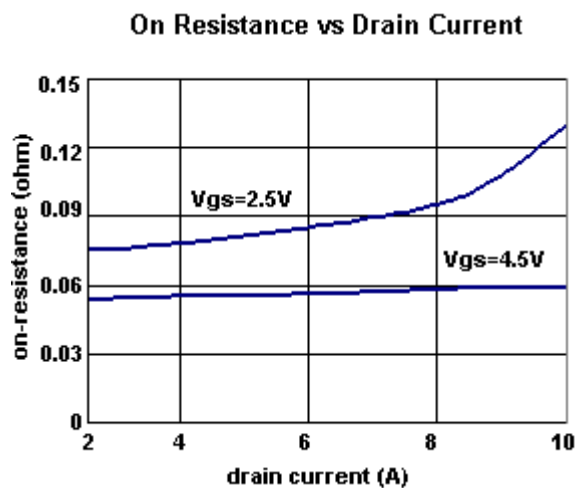
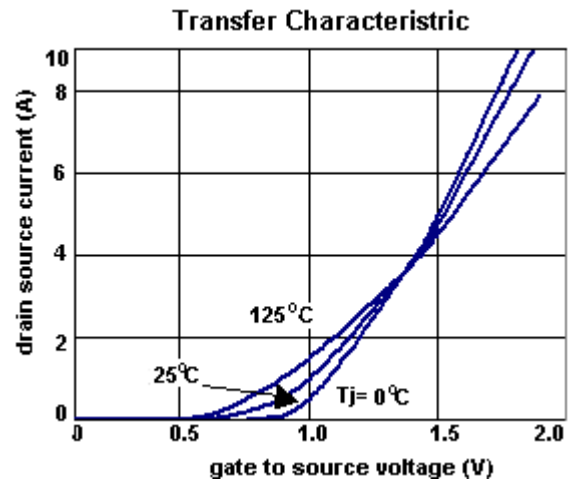
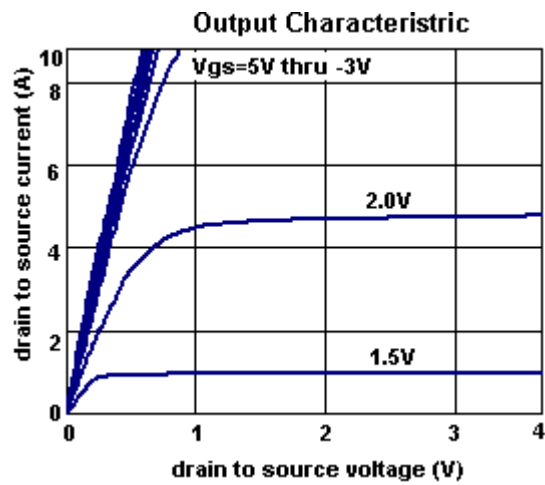


Switching Test Circuit

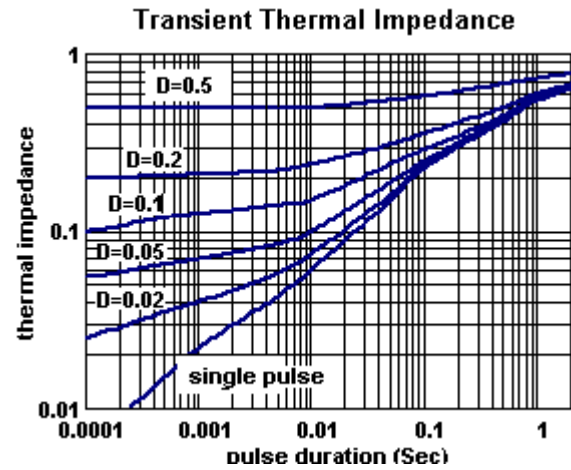
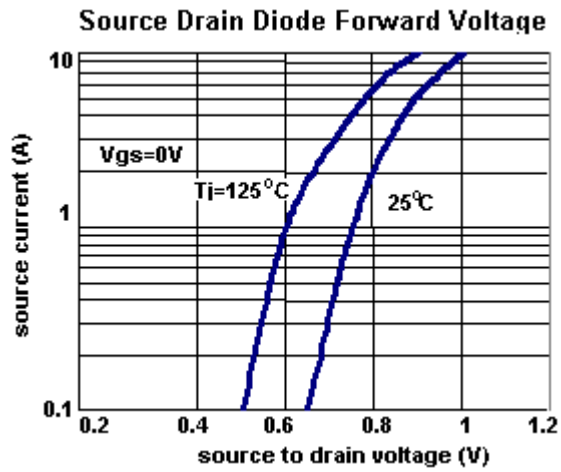


Switchin Waveforms

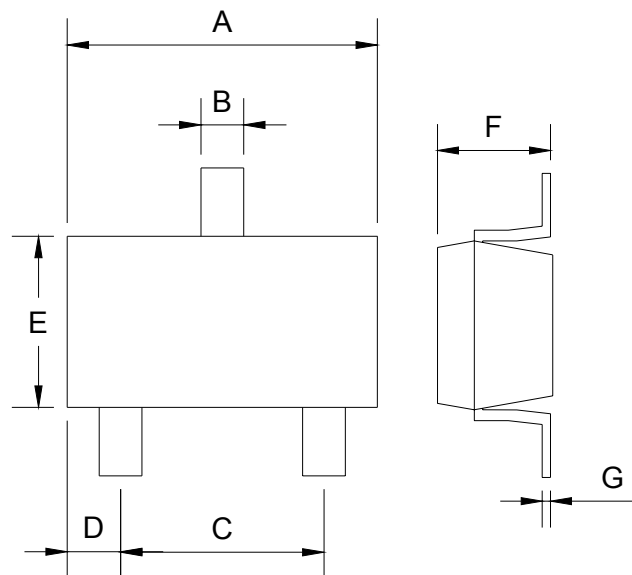
# **Typical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ unless otherwise noted)



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## SOT-23 Mechanical Drawing



SOT-23 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.88	2.91	0.113	0.115
B	0.39	0.42	0.015	0.017
C	1.78	2.03	0.070	0.080
D	0.51	0.61	0.020	0.024
E	1.59	1.66	0.063	0.065
F	1.04	1.08	0.041	0.043
G	0.07	0.09	0.003	0.004