TSM2306

30V N-Channel MOSFET

TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

SOT-23

Pin Definition:
1. Gate
2. Source
3. Drain

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$(mΩ)	I_D (A)
30	57 @ V_{GS} =10V	3.5
	94 @ V_{GS} =4.5V	2.8

Features

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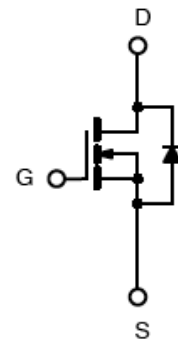- High Density Cell Design for Ultra Low On-resistance

Application

- Load Switch
- PA Switch

Ordering Information

Part No.	Package	Packing
TSM2306CX RF	SOT-23	3Kpcs / 7" Reel

Block Diagram

N-Channel MOSFET

Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current		I_D	3.5	A
Pulsed Drain Current		I_{DM}	±20	A
Continuous Source Current (Diode Conduction)[a,b]		I_S	1.7	A
Maximum Power Dissipation	Ta = 25°C	P_D	1.25	W
	Ta = 75°C		0.8	
Operating Junction Temperature		T_J	+150	^{o}C
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	^{o}C

Thermal Performance

| Parameter	Symbol	Limit	Unit
Junction to Case Thermal Resistance	$R\Theta_{JF}$	75	^{o}C/W
Junction to Ambient Thermal Resistance (PCB mounted)	$R\Theta_{JA}$	130	^{o}C/W

Notes:

a. Pulse width limited by the Maximum junction temperature

b. Surface Mounted on FR4 Board, t ≤ 5 sec.

Version: A09

## Electrical Specifications (Ta = 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}	30	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	$V_{GS(TH)}$	1	--	3	V
Gate Body Leakage	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 30V, V_{GS} = 0V	I_{DSS}	--	--	1.0	µA
On-State Drain Current	V_{DS} ≥ 4.5V, V_{GS} = 10V	$I_{D(ON)}$	6	--	--	A
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 3.5A	$R_{DS(ON)}$	--	46	57	mΩ
	V_{GS} = 4.5V, I_D = 2.8A		--	70	94	
Forward Transconductance	V_{DS} = 15V, I_D = 3.5A	g_{fs}	--	11	--	S
Diode Forward Voltage	I_S = 1.7A, V_{GS} = 0V	V_{SD}	--	--	1.2	V
Dynamic[b]						
Total Gate Charge	V_{DS} = 15V, I_D = 3.5A, V_{GS} = 10V	Q_g	--	4.2	7	nC
Gate-Source Charge		Q_{gs}	--	1.9	--	
Gate-Drain Charge		Q_{gd}	--	1.35	--	
Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	555	--	pF
Output Capacitance		C_{oss}	--	120	--	
Reverse Transfer Capacitance		C_{rss}	--	60	--	
Switching[c]						
Turn-On Delay Time	V_{DD} = 15V, R_L = 15Ω, I_D = 1A, V_{GEN} = 10V, R_G = 6Ω	$t_{d(on)}$	--	4.2	5.5	nS
Turn-On Rise Time		t_r	--	19	25	
Turn-Off Delay Time		$t_{d(off)}$	--	13	17	
Turn-Off Fall Time		t_f	--	9	12	

Notes:
a. pulse test: PW ≤300µS, duty cycle ≤2%
b. For DESIGN AID ONLY, not subject to production testing.
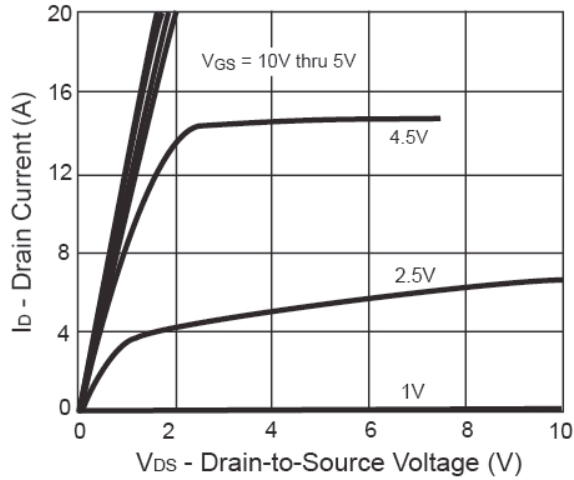b. Switching time is essentially independent of operating temperature.
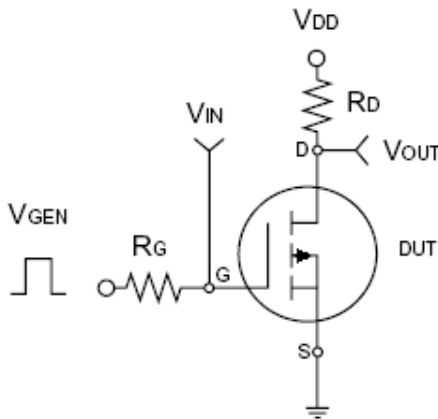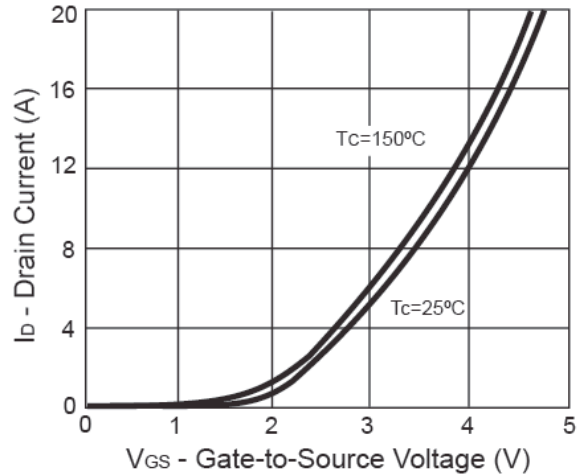

Switching Test Circuit
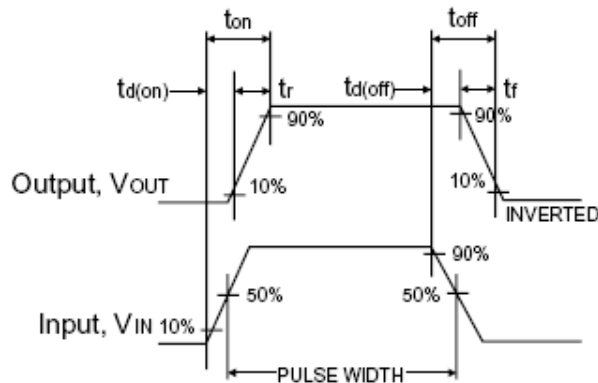
Switchin Waveforms

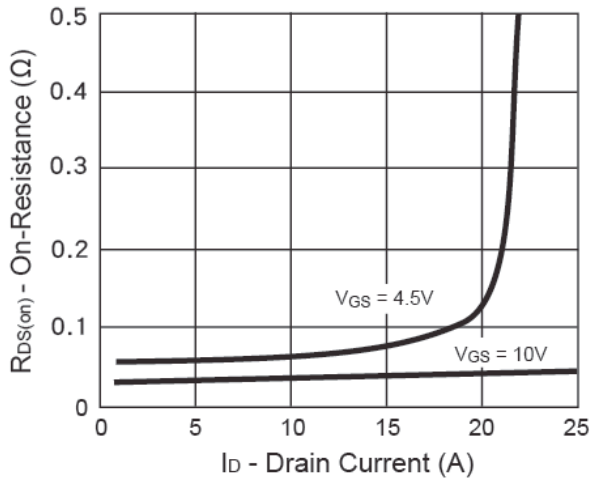## Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)
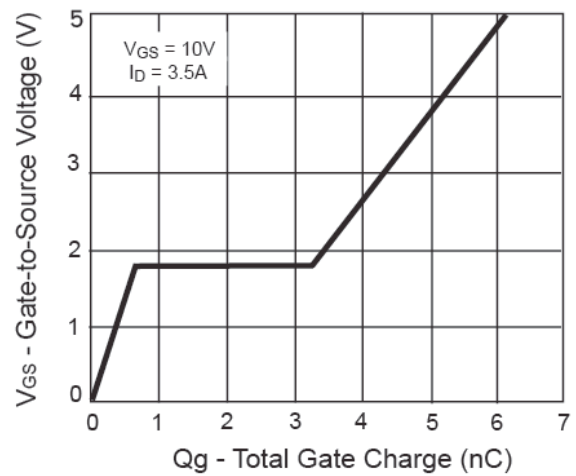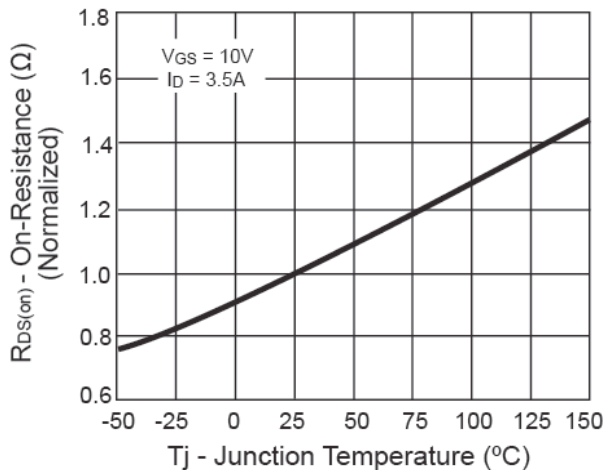
Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

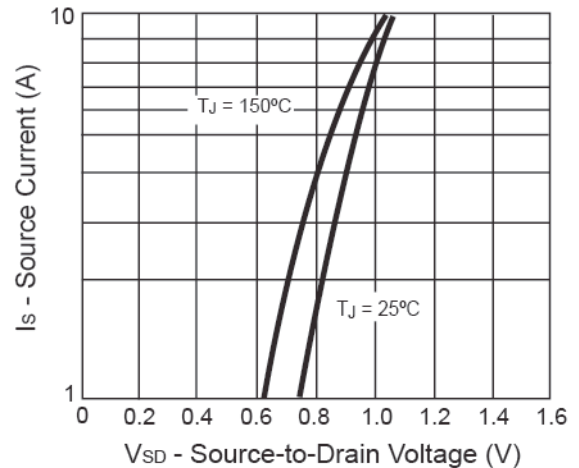### Gate Charge
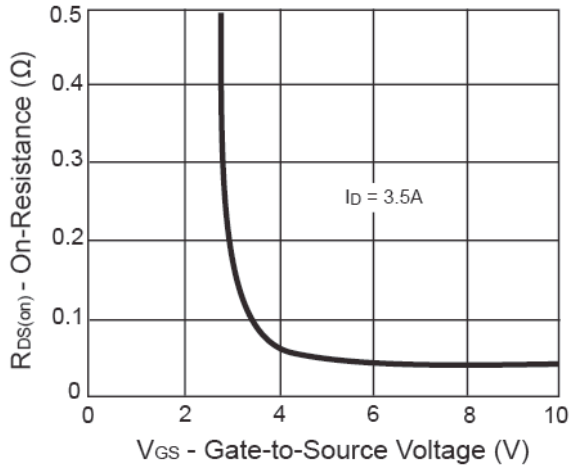

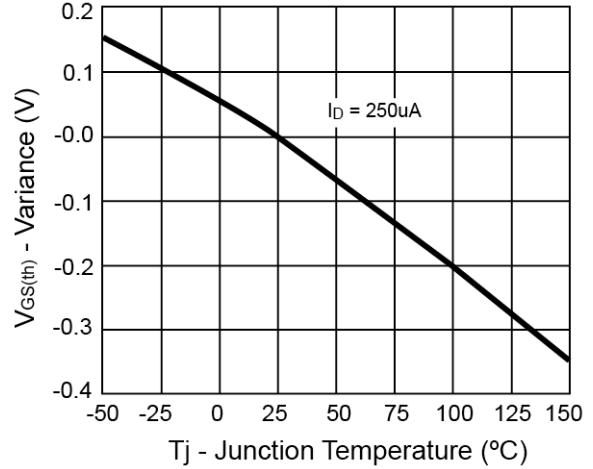### On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

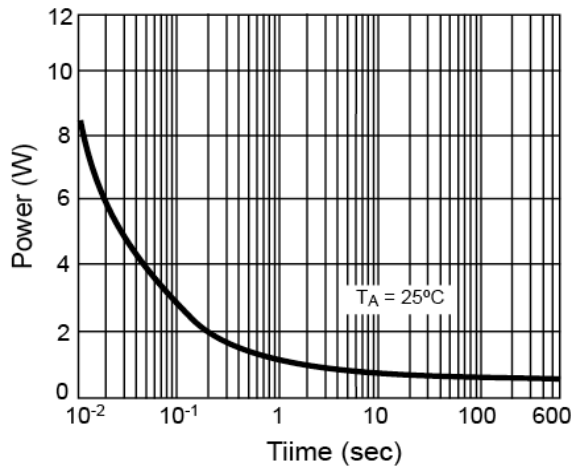## Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)
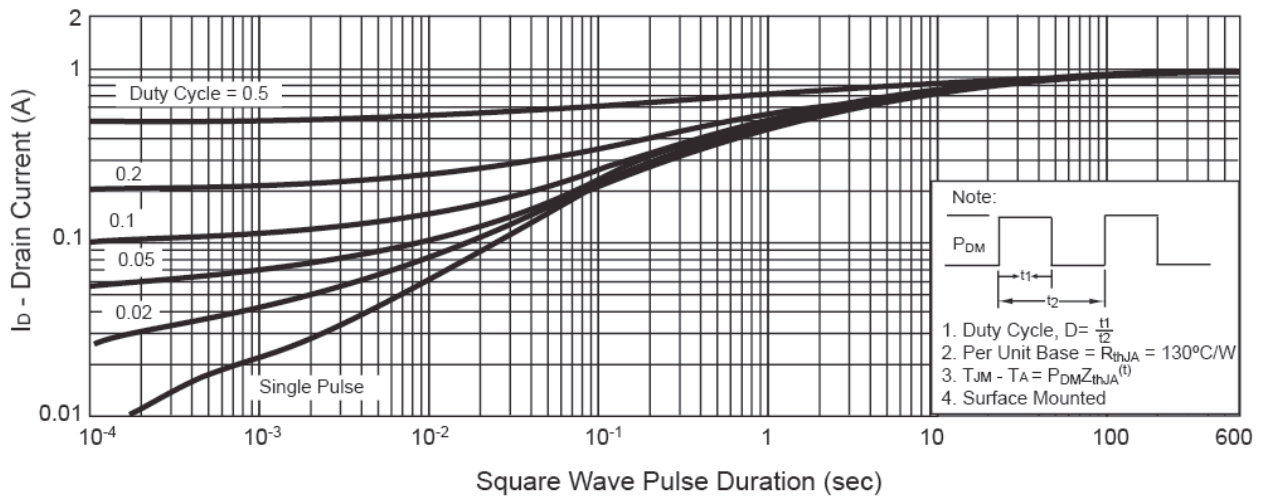
On-Resistance vs. Gate-Source Voltage

$I_D = 3.5A$

Y-axis: $R_{DS(on)}$ - On-Resistance (Ω)
X-axis: V_{GS} - Gate-to-Source Voltage (V)

Threshold Voltage

$I_D = 250uA$

Y-axis: $V_{GS(th)}$ - Variance (V)
X-axis: Tj - Junction Temperature (°C)

Single Pulse Power

$T_A = 25°C$

Y-axis: Power (W)
X-axis: Tiime (sec)

Normalized Thermal Transient Impedance, Junction-to-Ambient

Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse

Y-axis: I_D - Drain Current (A)
X-axis: Square Wave Pulse Duration (sec)

Note:

P_{DM}

1. Duty Cycle, $D = \frac{t1}{t2}$
2. Per Unit Base = R_{thJA} = 130°C/W
3. $T_{JM} - T_A = P_{DM}Z_{thJA}{}^{(t)}$
4. Surface Mounted

SOT-23 Mechanical Drawing
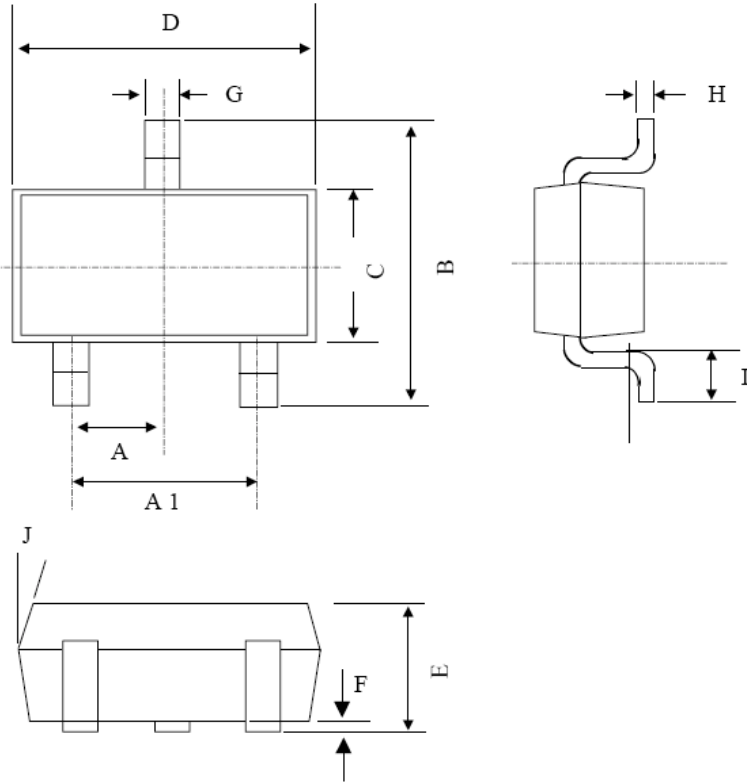
DIM	SOT-23 DIMENSION			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	0.95 BSC		0.037 BSC	
A1	1.9 BSC		0.074 BSC	
B	2.60	3.00	0.102	0.118
C	1.40	1.70	0.055	0.067
D	2.80	3.10	0.110	0.122
E	1.00	1.30	0.039	0.051
F	0.00	0.10	0.000	0.004
G	0.35	0.50	0.014	0.020
H	0.10	0.20	0.004	0.008
I	0.30	0.60	0.012	0.024
J	5º	10º	5º	10º

Marking Diagram
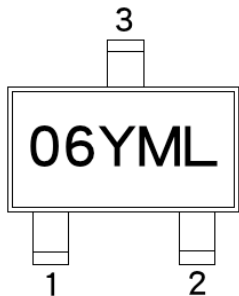
06 = Device Code

Y = Year Code

M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)

L = Lot Code

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