TAIWAN SEMICONDUCTOR

Pb RoHS COMPLIANCE

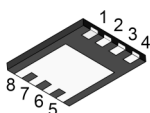# TSM7900D
20V Dual N-Channel MOSFET w/ESD Protected

TDFN 3x3

Pin Definition:
1. Source 1
2. Gate 1
3. Source 2
4. Gate 2
5, 6, 7, 8. Drain

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$(mΩ)	I_D (A)
20	32 @ V_{GS} = 4.5V	6.5
	40 @ V_{GS} = 2.5V	5.0

Features

- Advance Trench Process Technology
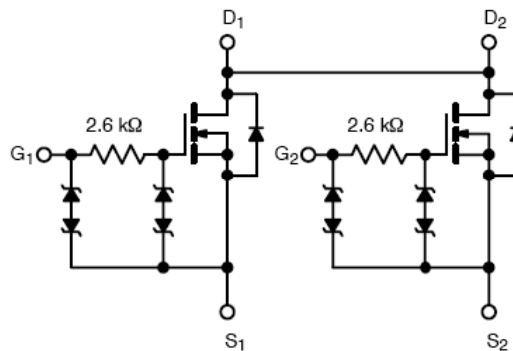- High Density Cell Design for Ultra Low On-resistance
- ESD Protect 2KV

Application

- Specially Designed for Li-on Battery Packs
- Battery Switch Application

Ordering Information

Part No.	Package	Packing
TSM7900DCQ RL	TDFN 3x3	T&R

Block Diagram

Dual N-Channel MOSFET

Absolute Maximum Rating (Ta = 25°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, V_{GS} @4.5V.		I_D	6	A
Pulsed Drain Current, V_{GS} @4.5V		I_{DM}	30	A
Continuous Source Current (Diode Conduction)[a,b]		I_S	1.4	A
Maximum Power Dissipation	Ta = 25 ^{o}C	P_D	1.25	W
	Ta = 75 ^{o}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 Foot (Drain) Thermal Resistance	RΘ$_{JF}$	30	^{o}C/W
Junction to Ambient Thermal Resistance (PCB mounted)	RΘ$_{JA}$	50	^{o}C/W

Notes:

a. Pulse width limited by the Maximum junction temperature

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

Version: A07

Electrical Specifications

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250uA	BV_{DSS}	20	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	$V_{GS(TH)}$	0.6	0.8	1.0	V
Gate Body Leakage	V_{GS} = ±12V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 16V, V_{GS} = 0V	I_{DSS}	--	--	1.0	uA
On-State Drain Current	V_{DS} □5V, V_{GS} = 4.5V	$I_{D(ON)}$	30	--	--	A
Drain-Source On-State Resistance	V_{GS} = 4.5V, I_D = 6.0A	$R_{DS(ON)}$	--	30	35	mΩ
	V_{GS} = 2.5V, I_D = 5.0A		--	35	40	
Forward Transconductance	V_{DS} = 10V, I_D = 6.0A	g_{fs}	--	30	--	S
Diode Forward Voltage	I_S = 1.5A, V_{GS} = 0V	V_{SD}	--	0.6	1.2	V
Dynamic[b]						
Total Gate Charge	V_{DS} = 10V, I_D = 6A, V_{GS} = 4.5V	Q_g	--	15	20	nC
Gate-Source Charge		Q_{gs}	--	3.4	--	
Gate-Drain Charge		Q_{gd}	--	1.2	--	
Input Capacitance	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	950	--	pF
Output Capacitance		C_{oss}	--	450	--	
Reverse Transfer Capacitance		C_{rss}	--	125	--	
Switching[c]						
Turn-On Delay Time	V_{DD} = 10V, R_L = 10Ω, I_D = 1A, V_{GEN} = 4.5V, R_G = 6Ω	$t_{d(on)}$	--	140	200	nS
Turn-On Rise Time		t_r	--	210	250	
Turn-Off Delay Time		$t_{d(off)}$	--	3700	4800	
Turn-Off Fall Time		t_f	--	2000	2600	

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.
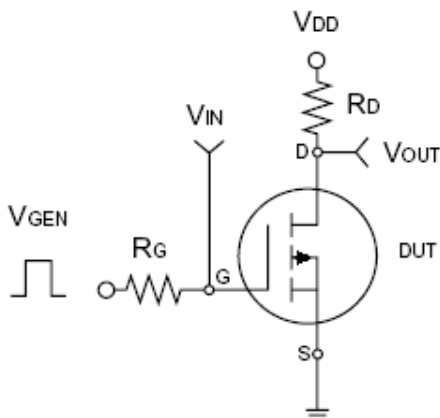
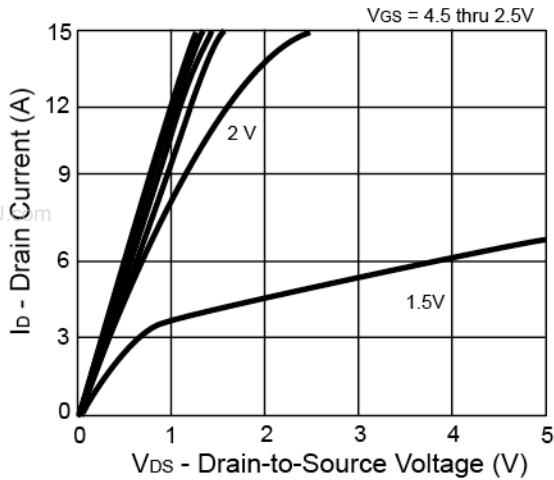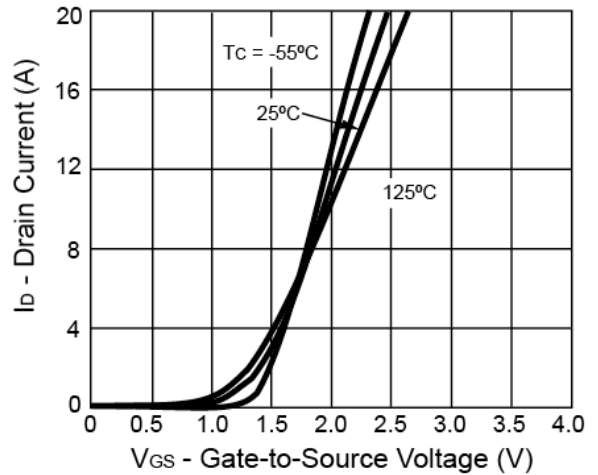**Switching Test Circuit**

Switchin Waveforms

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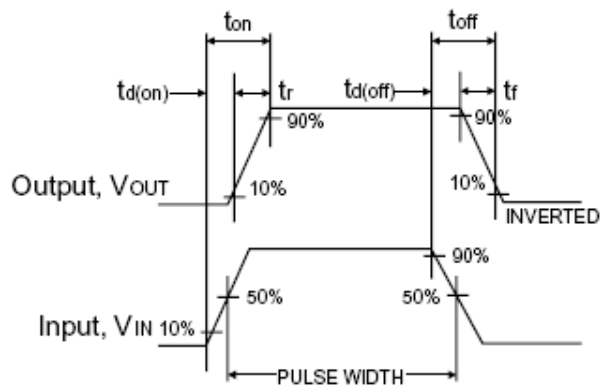
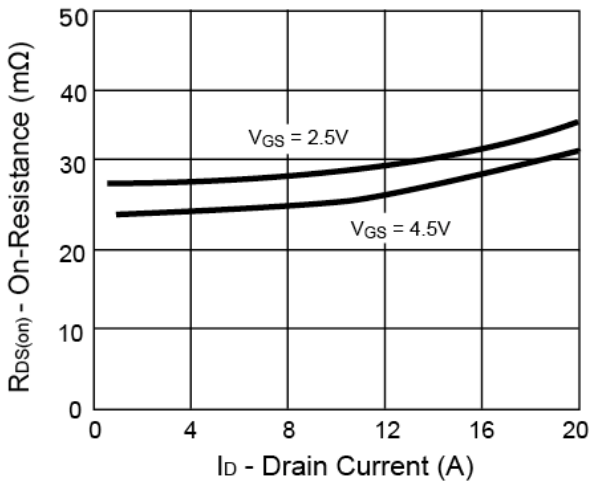## Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)
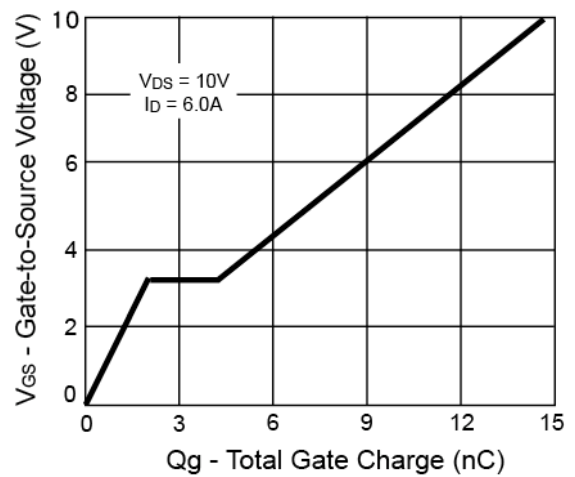
Output Characteristics
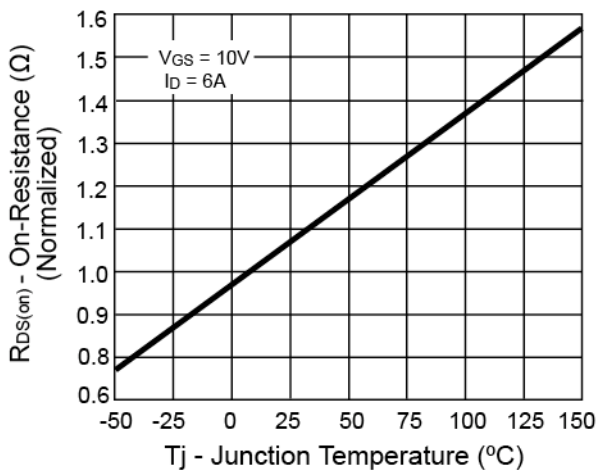

Transfer Characteristics

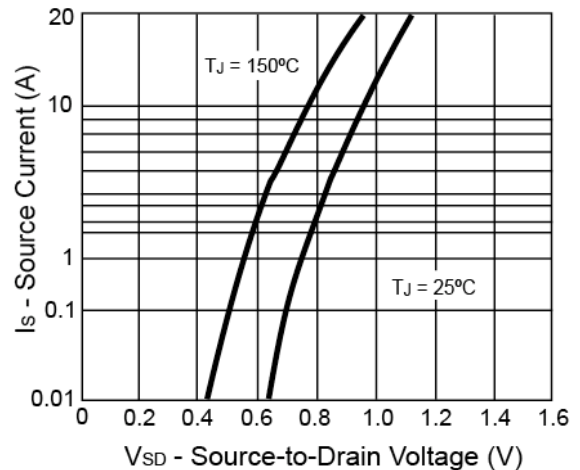### On-Resistance vs. Drain Current

Gate Charge

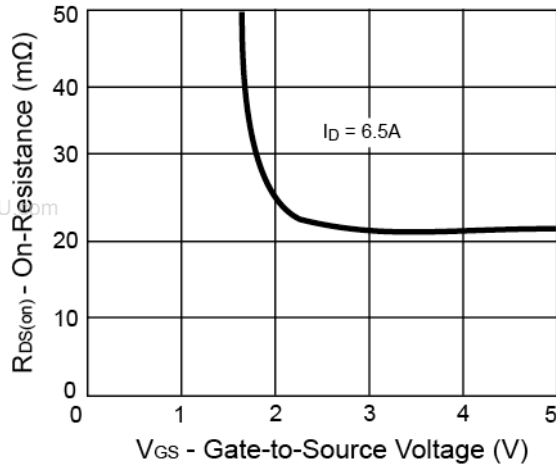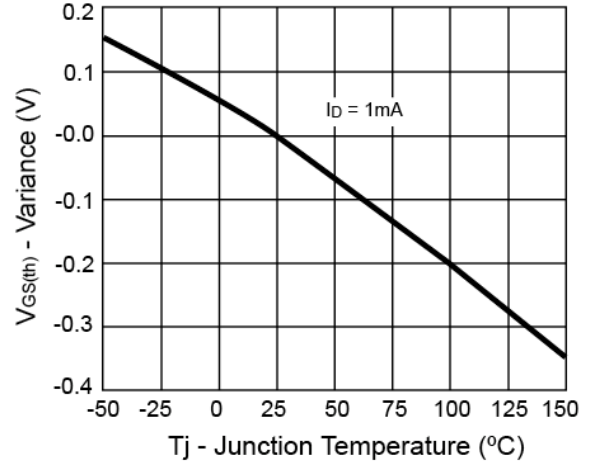### On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

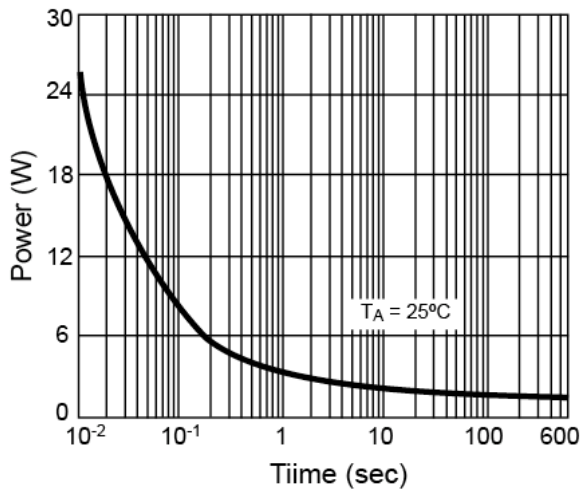**Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)
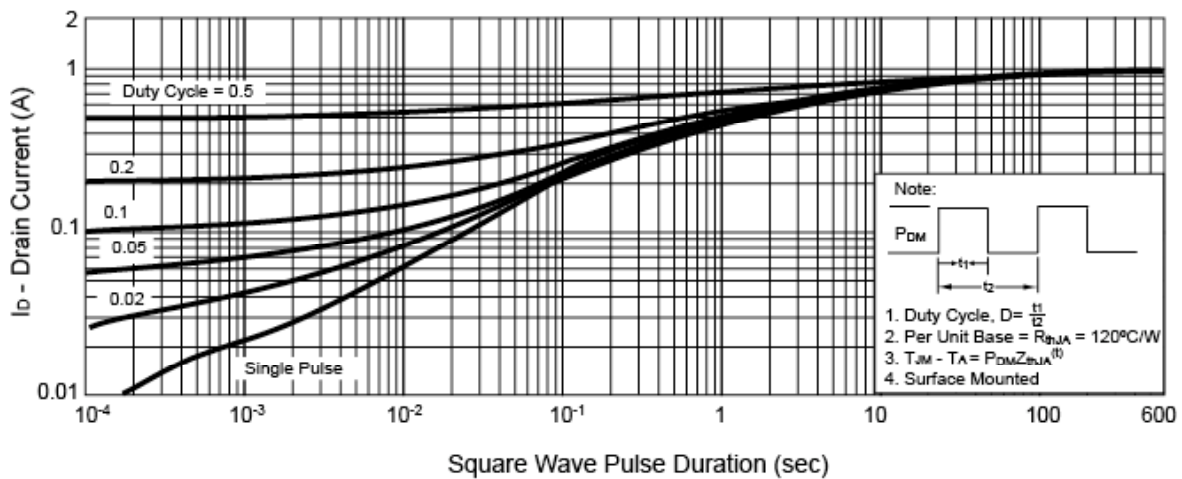
On-Resistance vs. Gate-Source Voltage

I_D = 6.5A

$R_{DS(on)}$ - On-Resistance (mΩ)

V_{GS} - Gate-to-Source Voltage (V)

Threshold Voltage

I_D = 1mA

$V_{GS(th)}$ - Variance (V)

T_j - Junction Temperature (°C)

Single Pulse Power

T_A = 25°C

Power (W)

Tiime (sec)

Normalized Thermal Transient Impedance, Junction-to-Ambient

Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse

I_D - Drain Current (A)

Square Wave Pulse Duration (sec)

Note:
P_{DM}
t_1
t_2
1. Duty Cycle, D = $\frac{t_1}{t_2}$
2. Per Unit Base = R_{thJA} = 120°C/W
3. T_{JM} - T_A = $P_{DM}Z_{thJA}^{(t)}$
4. Surface Mounted

Version: A07

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Pb RoHS COMPLIANCE

TDFN Mechanical Drawing

www.DataSheet4U.com
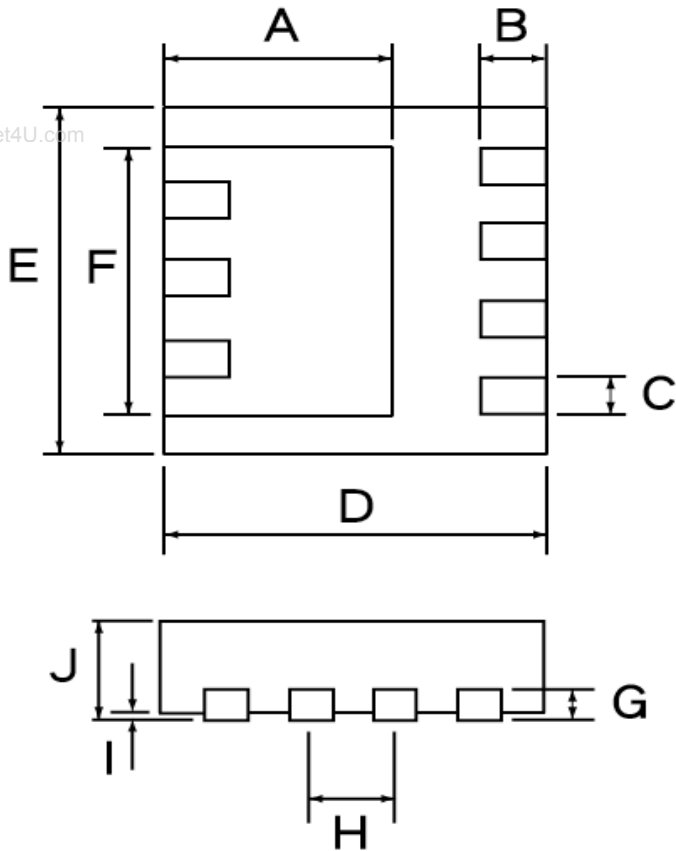
TDFN 3x3 DIMENSION			
DIM	MILLIMETERS		
	MIN.	TYP.	MAX.
A	1.750	1.800	1.850
B	0.470	0.520	0.570
C	0.270	0.320	0.370
D	2.950	3.000	3.050
E	2.950	3.000	3.050
F	2.250	2.300	2.350
G	0.177	0.203	0.280
H	0.610	0.660	0.710
I	0.005	0.020	0.050
J	0.650	0.750	0.850

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