

**SOP-8**

**Pin Definition:**

- |             |            |
|-------------|------------|
| 1. Source 1 | 8. Drain 1 |
| 2. Gate 1   | 7. Drain 1 |
| 3. Source 2 | 6. Drain 2 |
| 4. Gate 2   | 5. Drain 2 |

**PRODUCT SUMMARY**

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
30	36 @ $V_{GS} = 10V$	5.9
	53 @ $V_{GS} = 4.5V$	4.9

**Features**

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

**Application**

- High-Side DC/DC Conversion
- Notebook
- Server

**Ordering Information**

Part No.	Package	Packing
TSM4936DCS RLG	SOP-8	2.5Kpcs / 13" Reel

**Note:** "G" denote for Halogen Free Product

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

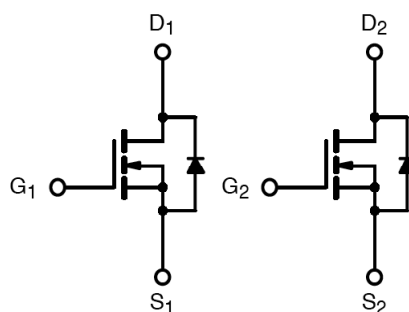
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	5.9	A
Pulsed Drain Current	$I_{DM}$	40	A
Continuous Source Current (Diode Conduction) <sup>a,b</sup>	$I_S$	1.0	A
Maximum Power Dissipation	$P_D$	$T_a = 25^\circ C$	3.0
		$T_a = 75^\circ C$	2.1
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
Junction to Case Thermal Resistance	$R_{\theta JC}$	32	$^\circ C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta JA}$	50	$^\circ C/W$

Notes:

- a. Pulse width limited by the Maximum junction temperature  
b. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

**Block Diagram**


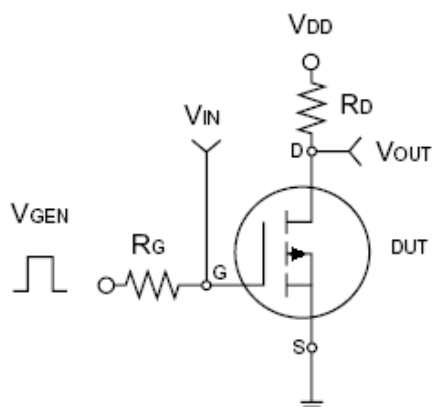
Dual N-Channel MOSFET

### Electrical Specifications

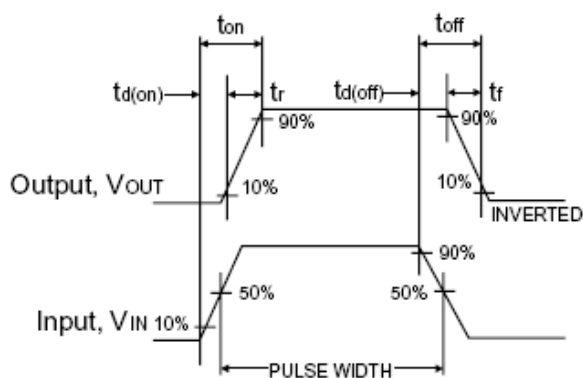
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	30	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.4	3	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = 24V, V_{GS} = 0V$	$I_{DSS}$	--	--	1.0	$\mu A$
On-State Drain Current <sup>a</sup>	$V_{DS} \geq 5V, V_{GS} = 10V$	$I_{D(ON)}$	30	--	--	A
Drain-Source On-State Resistance <sup>a</sup>	$V_{GS} = 10V, I_D = 5.9A$	$R_{DS(ON)}$	--	32	36	m $\Omega$
	$V_{GS} = 4.5V, I_D = 4.9A$		--	42	53	
Forward Transconductance <sup>a</sup>	$V_{DS} = 15V, I_D = 5.9A$	$g_{fs}$	--	15	--	S
Diode Forward Voltage	$I_S = 1A, V_{GS} = 0V$	$V_{SD}$	--	0.76	1.0	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = 15V, I_D = 5.9A,$ $V_{GS} = 10V$	$Q_g$	--	13	--	nC
Gate-Source Charge		$Q_{gs}$	--	4.2	--	
Gate-Drain Charge		$Q_{gd}$	--	3.1	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	610	--	pF
Output Capacitance		$C_{oss}$	--	100	--	
Reverse Transfer Capacitance		$C_{rss}$	--	77	--	
<b>Switching<sup>c</sup></b>						
Turn-On Delay Time	$V_{DD} = 15V, R_L = 15\Omega,$ $I_D = 1A, V_{GEN} = 10V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	9.1	--	nS
Turn-On Rise Time		$t_r$	--	16.5	--	
Turn-Off Delay Time		$t_{d(off)}$	--	23	--	
Turn-Off Fall Time		$t_f$	--	3.5	--	

**Notes:**

- a. pulse test:  $PW \leq 300\mu S$ , duty cycle  $\leq 2\%$
- b. For DESIGN AID ONLY, not subject to production testing.
- b. Switching time is essentially independent of operating temperature.



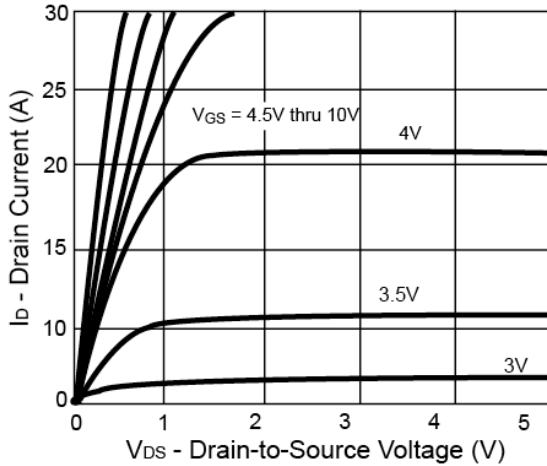
**Switching Test Circuit**



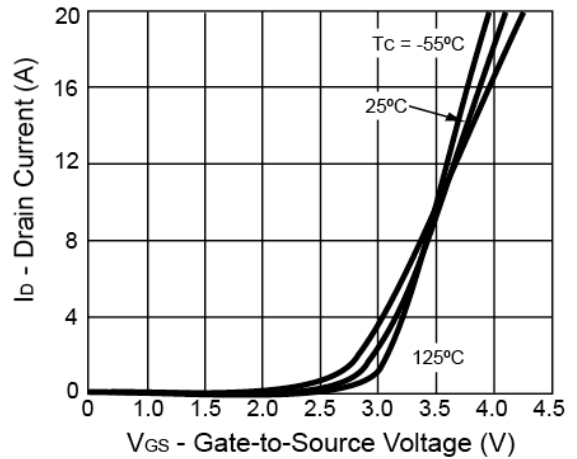
**Switchin Waveforms**

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

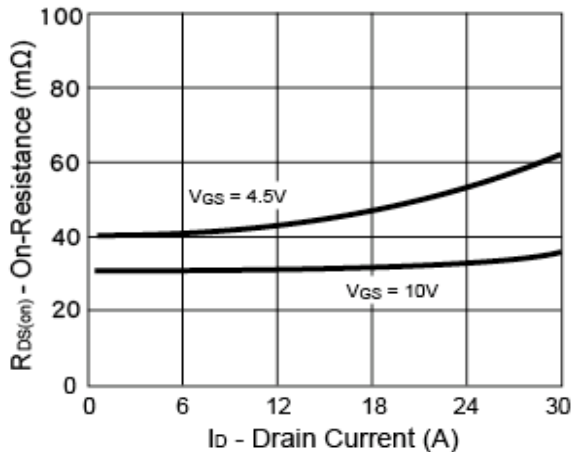
**Output Characteristics**



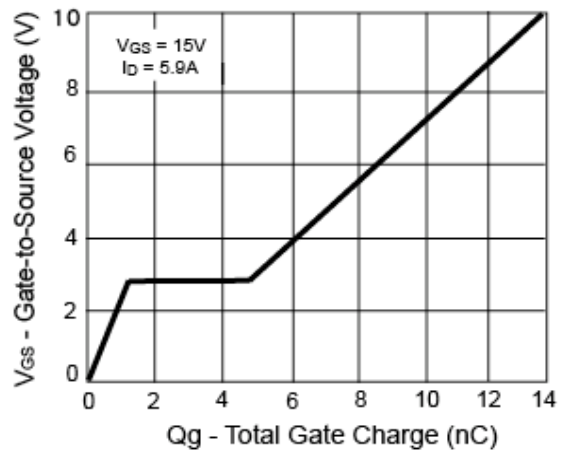
**Transfer Characteristics**



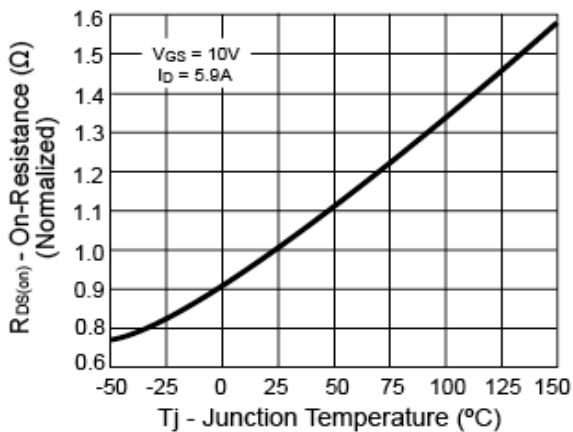
**On-Resistance vs. Drain Current**



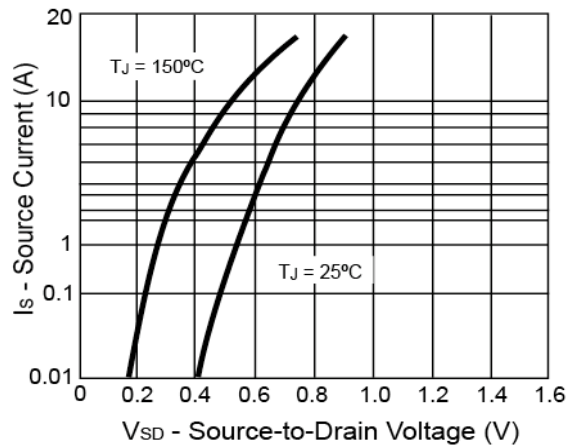
**Gate Charge**



**On-Resistance vs. Junction Temperature**

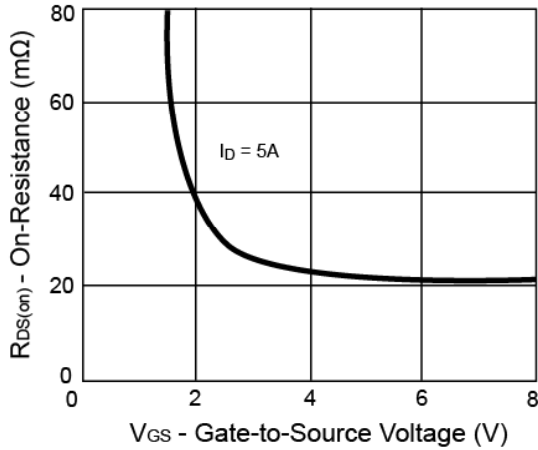


**Source-Drain Diode Forward Voltage**

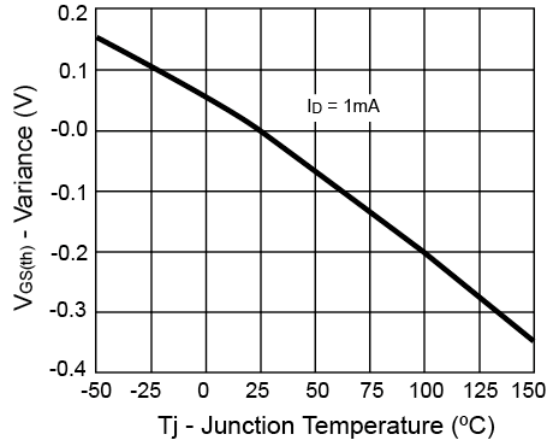


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

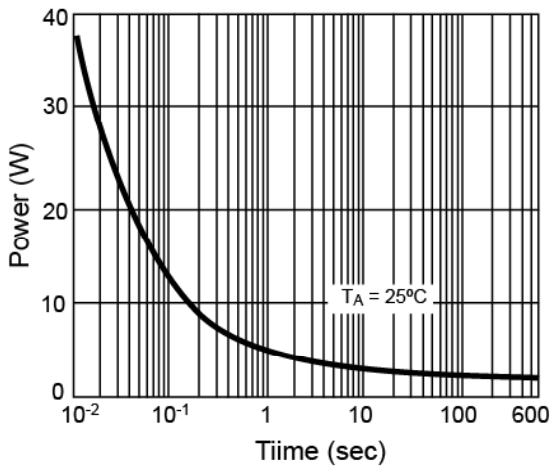
**On-Resistance vs. Gate-Source Voltage**



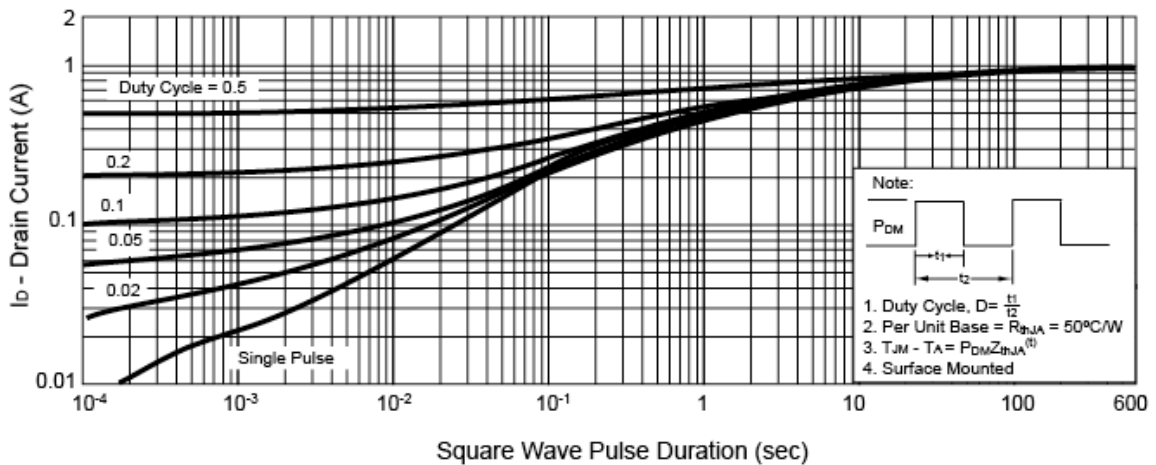
**Threshold Voltage**



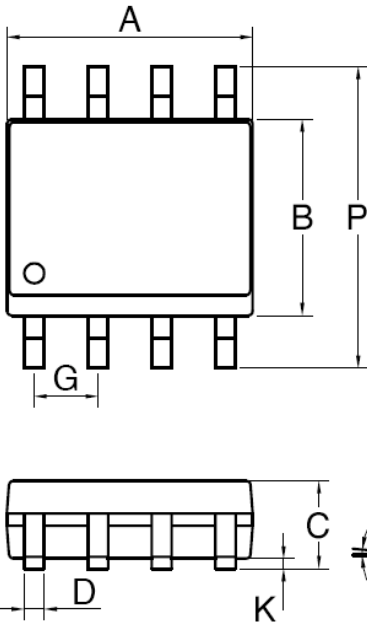
**Single Pulse Power**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

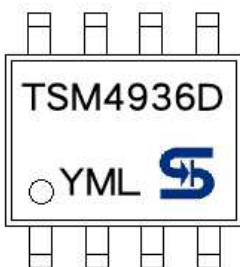


**SOP-8 Mechanical Drawing**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

**Marking Diagram**



- 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

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