

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 Ω)	I_D (A)
60	55 @ $V_{GS} = 10V$	4.5
	75 @ $V_{GS} = 4.5V$	3.9

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
TSM4946DCS RL	SOP-8	2.5Kpcs / 13" Reel
TSM4946DCS RLG	SOP-8	2.5Kpcs / 13" Reel

Note: "G" denote for Green Product

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	4.5	A
Pulsed Drain Current	I_{DM}	30	A
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	2	A
Maximum Power Dissipation	P_D	2.4	W
		1.7	
Operating Junction Temperature	T_J	+150	$^{\circ}C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150	$^{\circ}C$

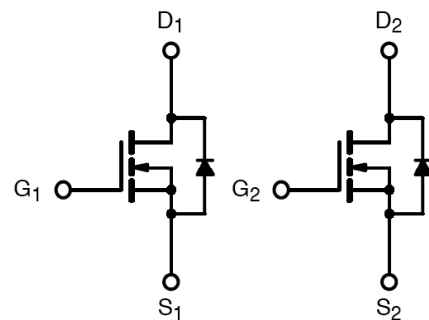
Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Case Thermal Resistance	$R_{\theta_{JF}}$	32	$^{\circ}C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta_{JA}}$	62.5	$^{\circ}C/W$

Notes:

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

Block Diagram



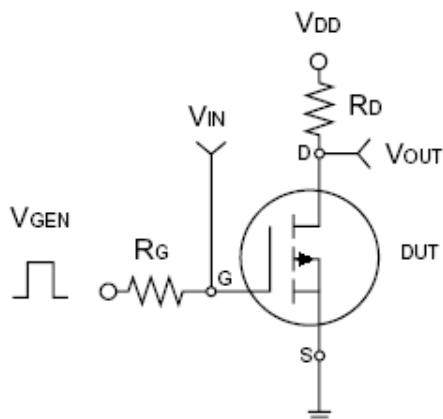
Dual N-Channel MOSFET

Electrical Specifications

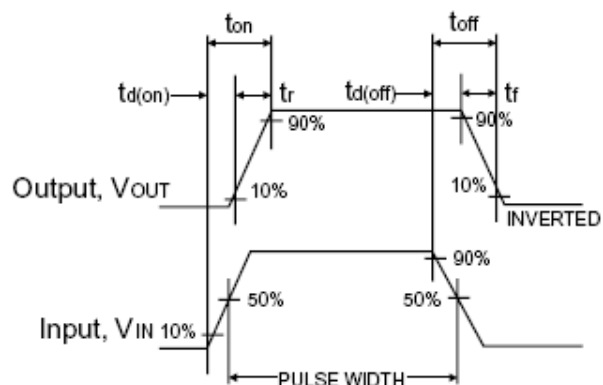
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	60	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	--	3	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	I_{DSS}	--	--	2	μA
On-State Drain Current ^a	$V_{DS} = 5V, V_{GS} = 10V$	$I_{D(ON)}$	20	--	--	A
Drain-Source On-State Resistance ^a	$V_{GS} = 10V, I_D = 4.5A$	$R_{DS(ON)}$	--	45	55	m Ω
	$V_{GS} = 4.5V, I_D = 3.9A$		--	55	75	
Forward Transconductance ^a	$V_{DS} = 15V, I_D = 4.5A$	g_{fs}	--	13	--	S
Diode Forward Voltage	$I_S = 2A, V_{GS} = 0V$	V_{SD}	--	0.9	1.2	V
Dynamic ^b						
Total Gate Charge	$V_{DS} = 30V, I_D = 4.5A, V_{GS} = 10V$	Q_g	--	19	30	nC
Gate-Source Charge		Q_{gs}	--	4	--	
Gate-Drain Charge		Q_{gd}	--	3	--	
Input Capacitance	$V_{DS} = 24V, V_{GS} = 0V, f = 1.0MHz$	C_{iss}	--	910	--	pF
Output Capacitance		C_{oss}	--	145	--	
Reverse Transfer Capacitance		C_{rss}	--	67	--	
Switching ^c						
Turn-On Delay Time	$V_{DD} = 30V, R_L = 30\Omega, I_D = 1A, V_{GEN} = 10V, R_G = 6\Omega$	$t_{d(on)}$	--	13	20	nS
Turn-On Rise Time		t_r	--	11	20	
Turn-Off Delay Time		$t_{d(off)}$	--	36	60	
Turn-Off Fall Time		t_f	--	11	20	

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.



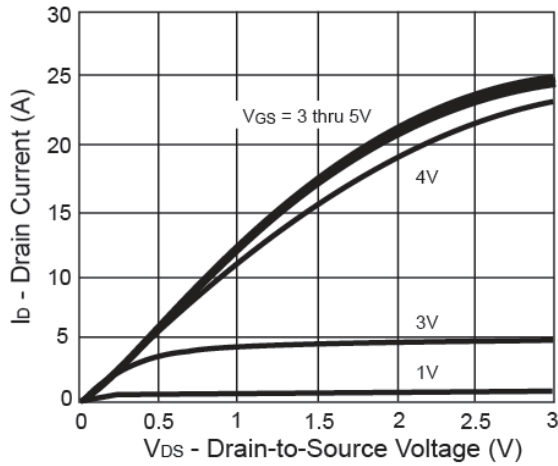
Switching Test Circuit



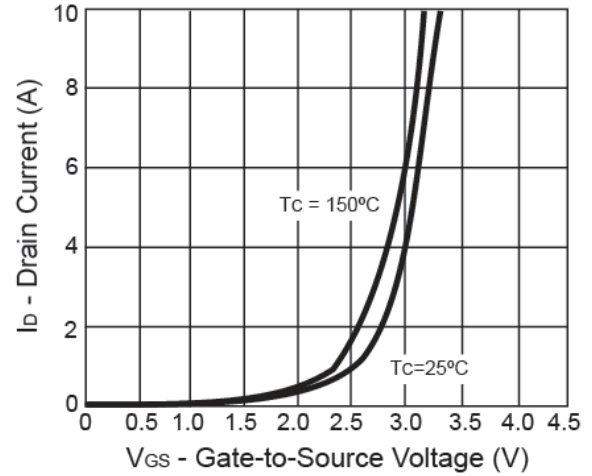
Switchin Waveforms

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

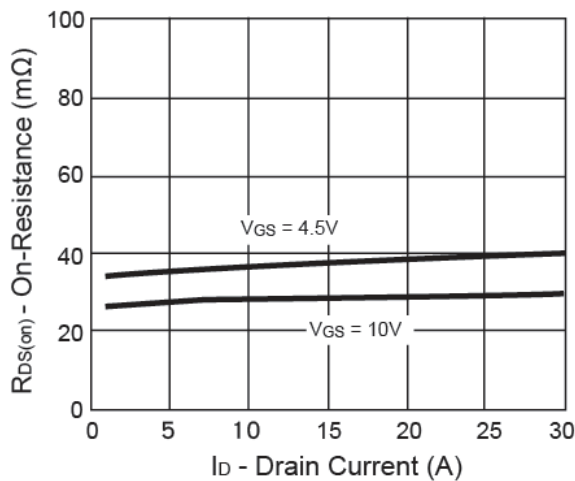
Output Characteristics



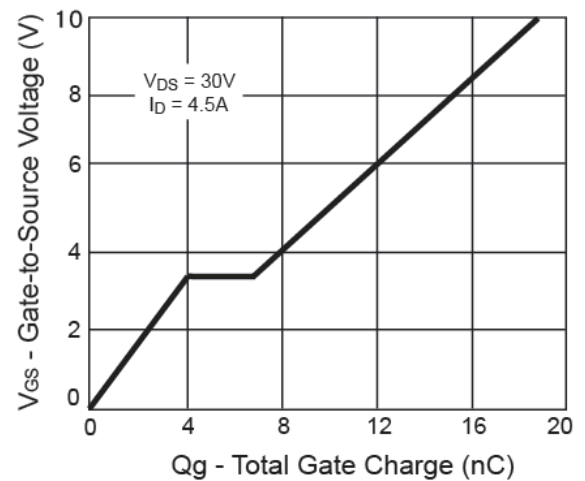
Transfer Characteristics



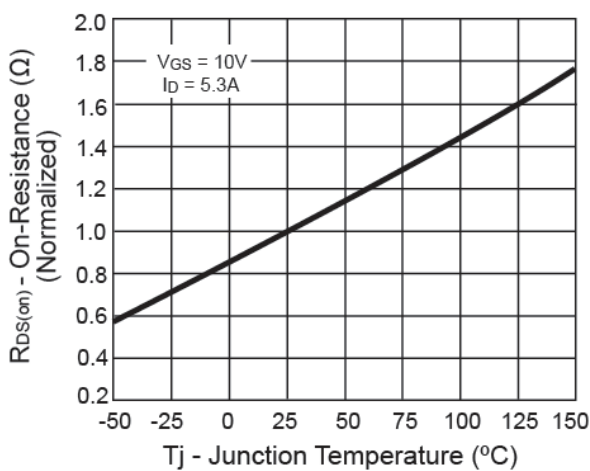
On-Resistance vs. Drain Current



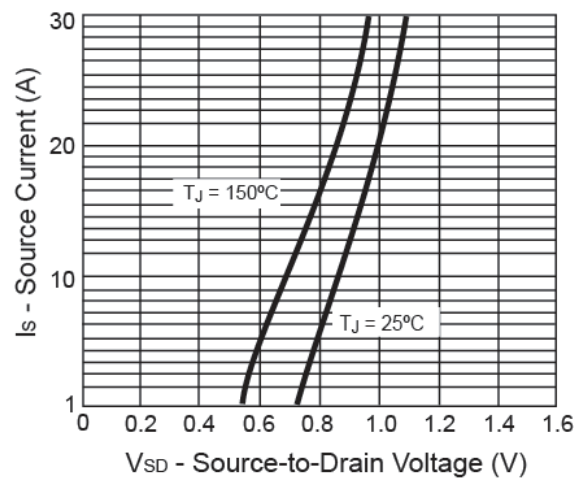
Gate Charge



On-Resistance vs. Junction Temperature

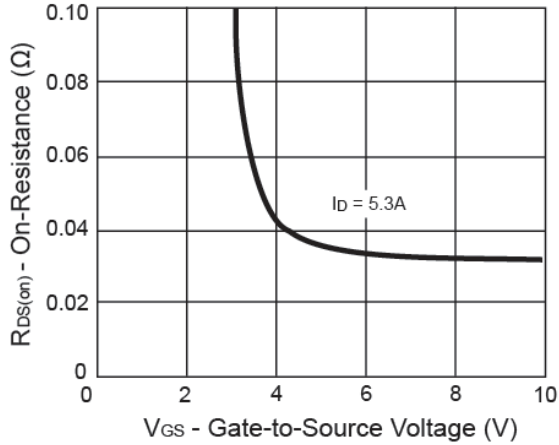


Source-Drain Diode Forward Voltage

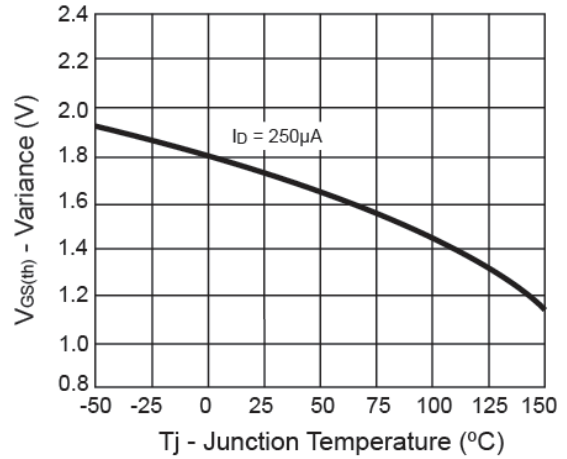


Electrical Characteristics Curve ($T_A = 25^\circ\text{C}$, unless otherwise noted)

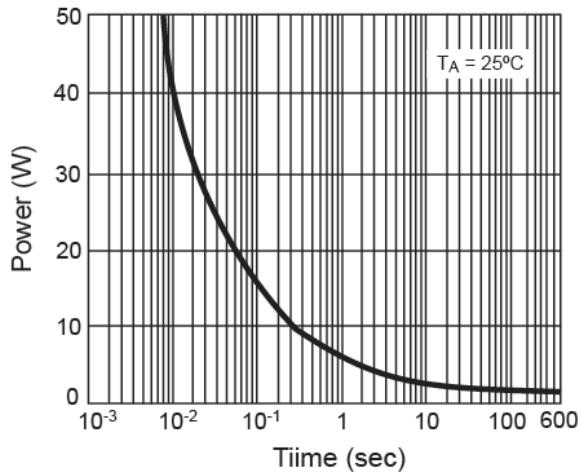
On-Resistance vs. Gate-Source Voltage



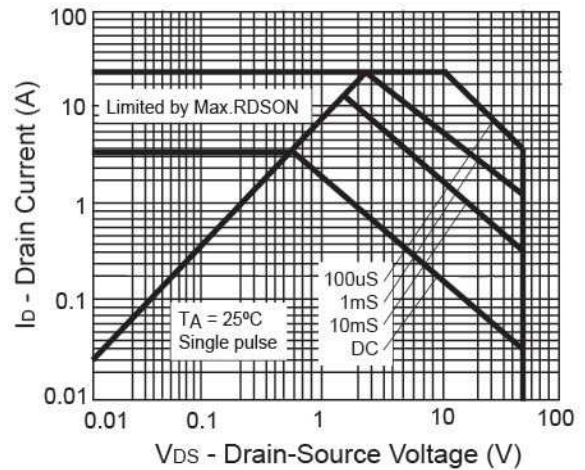
Threshold Voltage



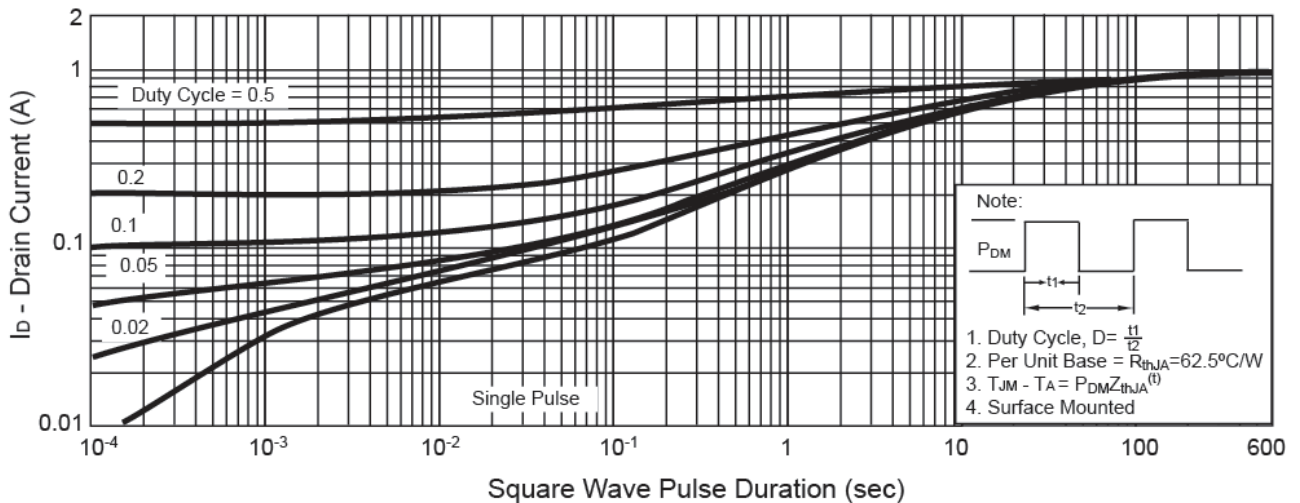
Single Pulse Power



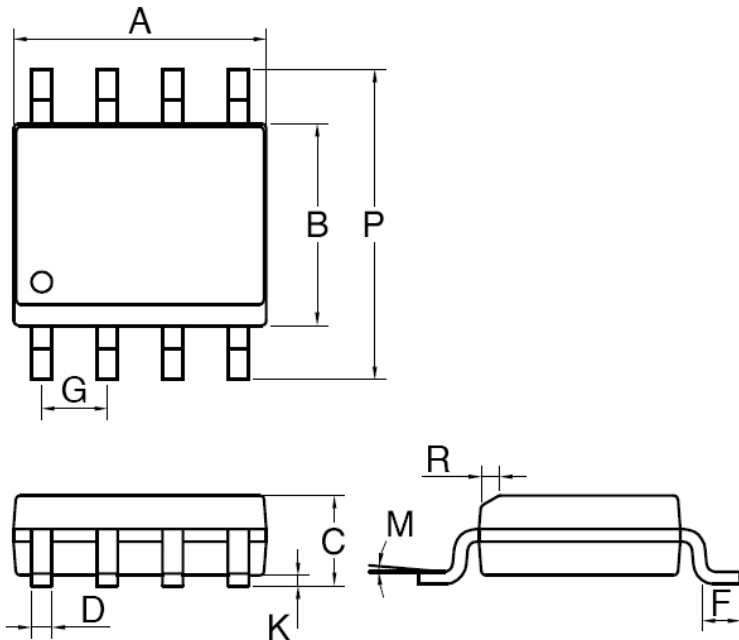
Safety Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

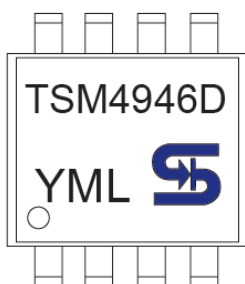


SOP-8 Mechanical Drawing



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
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
 = Month Code for Halogen Free Product
 (O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
L = Lot Code

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