


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)
30	15 @ $V_{GS} = 10V$	11
	24 @ $V_{GS} = 4.5V$	10

Features

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

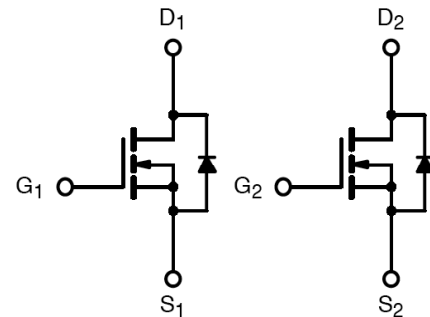
Application

- Load Switch
- PWM Application

Ordering Information

Part No.	Package	Packing
TSM4416DCS RL	SOP-8	2.5Kpcs / 13" Reel
TSM4416DCS RLG	SOP-8	2.5Kpcs / 13" Reel

Note: "G" denotes Halogen Free Product.

Block Diagram


Dual N-Channel MOSFET

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}	± 20	V
Continuous Drain Current	I_D	11	A
Pulsed Drain Current	I_{DM}	40	A
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	2.6	A
Maximum Power Dissipation	P_D	$T_a = 25^{\circ}C$	2.5
		$T_a = 75^{\circ}C$	1.6
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
Thermal Resistance Junction to Foot	$R_{\theta_{JF}}$	25	$^{\circ}C/W$
Thermal Resistance Junction to Ambient	$R_{\theta_{JA}}$	50	$^{\circ}C/W$

Notes:

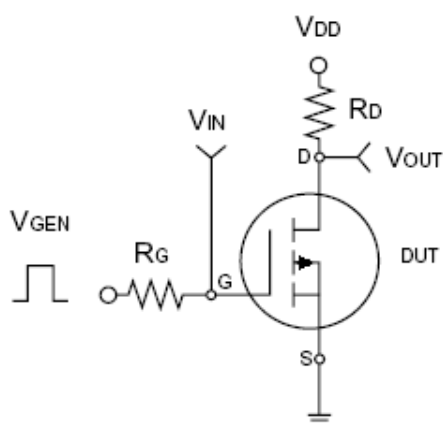
- Pulse width limited by the Maximum junction temperature
- Surface Mounted on FR4 Board, $t \leq 5$ sec.

Electrical Specifications

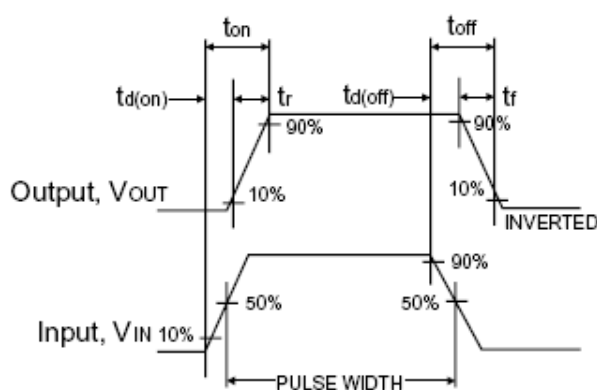
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	30	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.8	3	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 24V, V_{GS} = 0V$	I_{DSS}	--	--	-1.0	μA
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 10A$	$R_{DS(ON)}$	--	12	15	m Ω
	$V_{GS} = 4.5V, I_D = 10A$		--	16	24	
Forward Transconductance	$I_S = 1A, V_{GS} = 0V$	g_{fs}	--	17	--	S
Diode Forward Voltage	$V_{GS} = 0V, I_D = 250\mu A$	V_{SD}	--	0.71	1.0	V
Dynamic^b						
Total Gate Charge	$V_{DS} = 15V, I_D = 10A, V_{GS} = 5V$	Q_g	--	7.7	10.01	nC
Gate-Source Charge		Q_{gs}	--	1.6	2.08	
Gate-Drain Charge		Q_{gd}	--	3.1	4.03	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz$	C_{iss}	--	890	--	pF
Output Capacitance		C_{oss}	--	159.6	--	
Reverse Transfer Capacitance		C_{rss}	--	83.2	--	
Switching^{b,c}						
Turn-On Delay Time	$V_{DD} = 15V, I_D = 10A, V_{GEN} = 10V, R_G = 0.3\Omega$	$t_{d(on)}$	--	11.1	22.2	nS
Turn-On Rise Time		t_r	--	8.4	16.8	
Turn-Off Delay Time		$t_{d(off)}$	--	25.3	50.6	
Turn-Off Fall Time		t_f	--	2.8	5.6	

Notes:

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



Switching Test Circuit

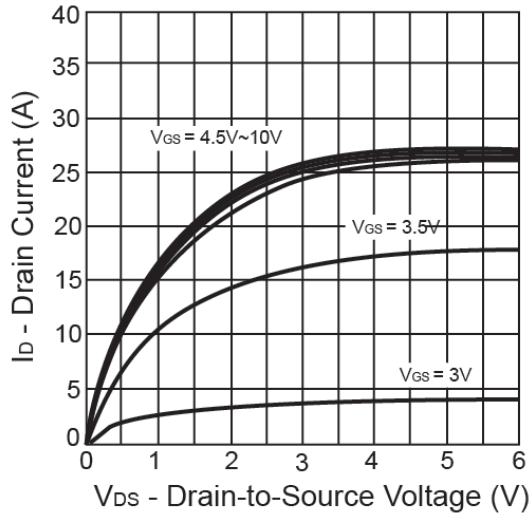


Switchin Waveforms

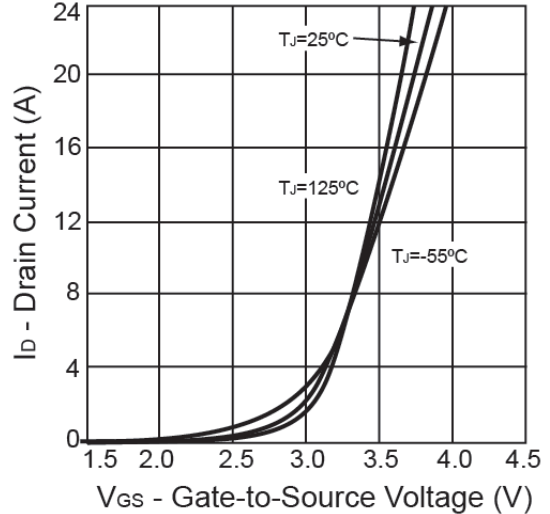


Electrical Characteristics Curve ($T_A=25^\circ\text{C}$, unless otherwise noted)

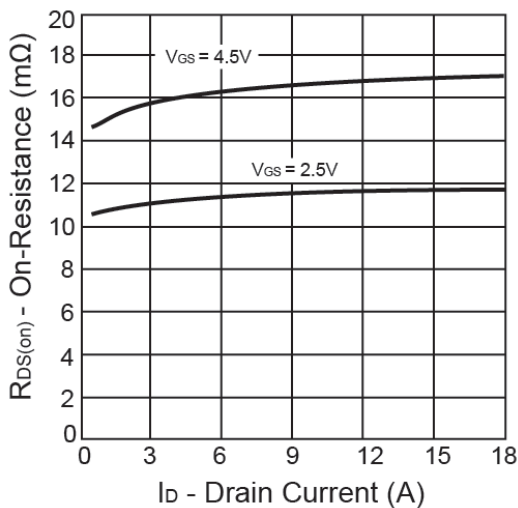
Output Characteristics



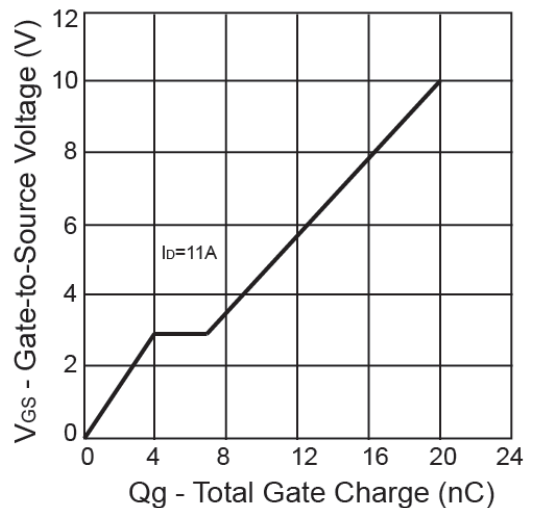
Transfer Characteristics



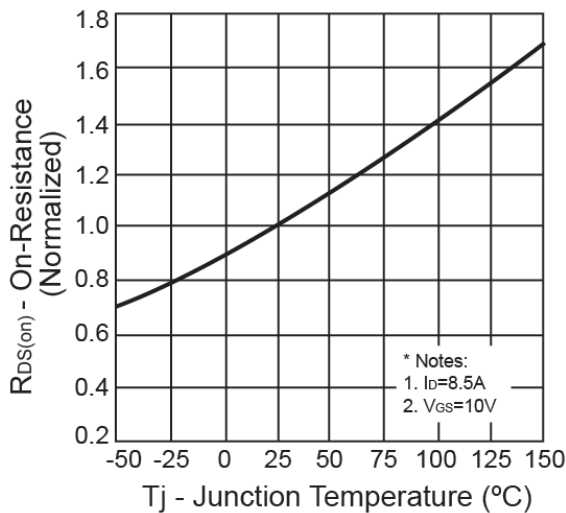
On-Resistance vs. Drain Current



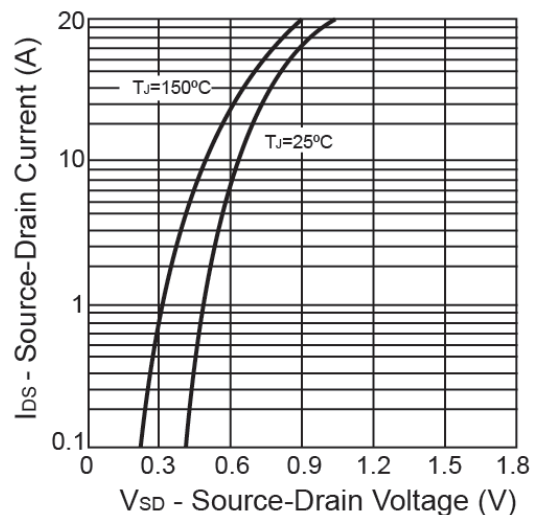
Gate Charge



On-Resistance vs. Junction Temperature

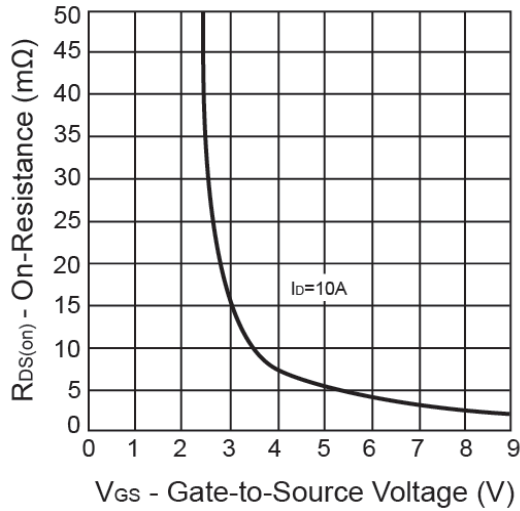


Source-Drain Diode Forward Voltage

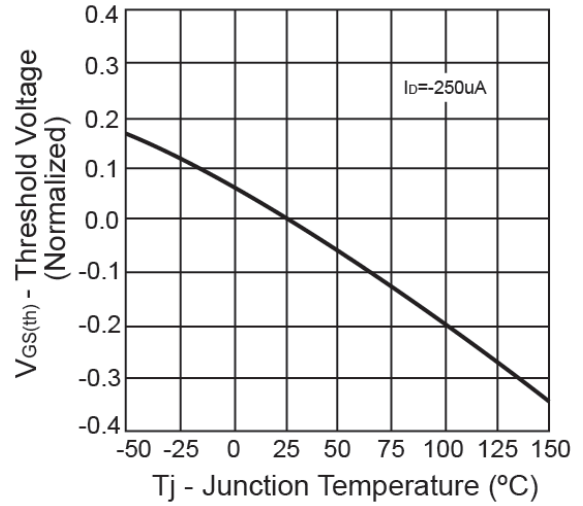


Electrical Characteristics Curve ($T_A=25^\circ\text{C}$, unless otherwise noted)

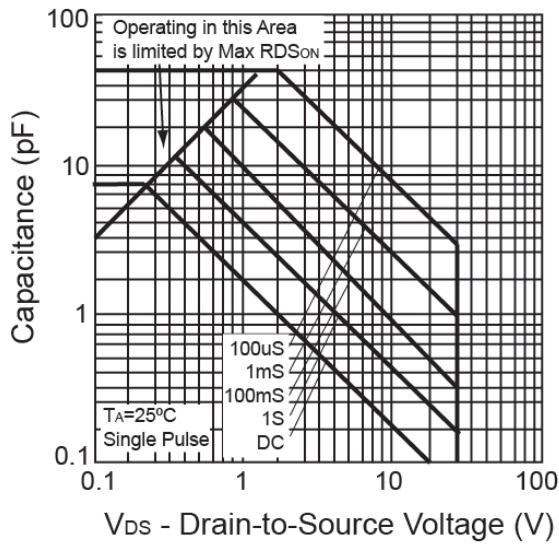
On-Resistance vs. Gate-Source Voltage



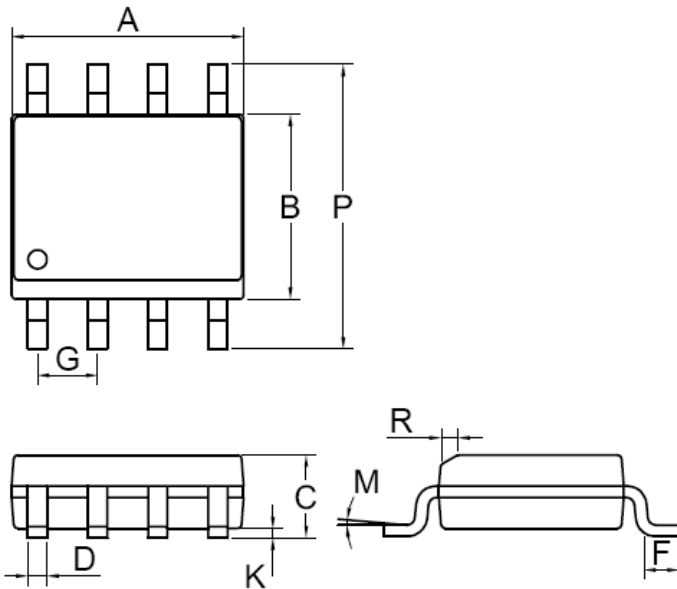
Threshold Voltage



Safety Operation Area

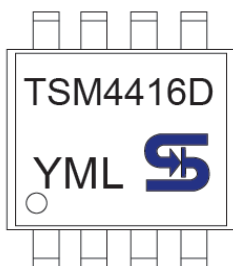


SOP-8 Mechanical Drawing



SOP-8 DIMENSION				
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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