

SOP-8



Pin Definition:

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)	I_D (A)
30	26 @ $V_{GS} = 10V$	8.5
	40 @ $V_{GS} = 4.5V$	5

Features

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

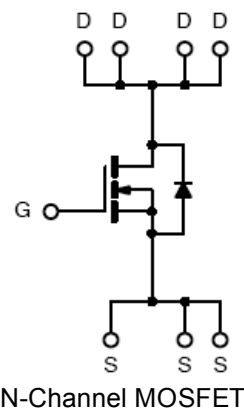
Application

- High-Side DC/DC Conversion
- Notebook
- Sever

Ordering Information

Part No.	Package	Packing
TSM4414CS RL	SOP-8	T&R

Block Diagram



Absolute Maximum Rating ($T_a = 25^\circ\text{C}$ 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	8.5	A
Pulsed Drain Current		I _{DM}	40	A
Continuous Source Current (Diode Conduction) ^{a,b}		I _S	1.0	A
Maximum Power Dissipation	Ta = 25 °C	P _D	3.0	W
	Ta = 75 °C		2.1	
Operating Junction Temperature		T _J	+150	°C
Operating Junction and Storage Temperature Range		T _J , T _{STG}	- 55 to +150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Junction to Case Thermal Resistance	$R_{\theta_{JF}}$	25	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta_{JA}}$	50	$^\circ\text{C/W}$

Notes:

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

Electrical Specifications

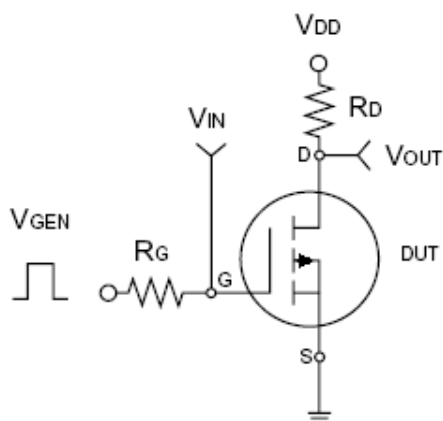
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	30	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.4	3	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 24V, V_{GS} = 0V$	I_{DSS}	--	--	1.0	μA
On-State Drain Current ^a	$V_{DS} \geq 5V, V_{GS} = 10V$	$I_{D(ON)}$	30	--	--	A
Drain-Source On-State Resistance ^a	$V_{GS} = 10V, I_D = 8.5A$	$R_{DS(ON)}$	--	20	26	m Ω
	$V_{GS} = 4.5V, I_D = 5A$		--	30	40	
Forward Transconductance ^a	$V_{DS} = 5V, I_D = 5A$	g_{fs}	--	20	--	S
Diode Forward Voltage	$I_S = 1A, V_{GS} = 0V$	V_{SD}	--	0.76	1.0	V
Dynamic ^b						
Total Gate Charge	$V_{DS} = 15V, I_D = 8.5A,$ $V_{GS} = 10V$	Q_g	--	4.52	--	nC
Gate-Source Charge		Q_{gs}	--	1.24	--	
Gate-Drain Charge		Q_{gd}	--	1.68	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	400.96	--	pF
Output Capacitance		C_{oss}	--	100.47	--	
Reverse Transfer Capacitance		C_{rss}	--	71.82	--	
Switching ^c						
Turn-On Delay Time	$V_{DD} = 15V, R_L = 2.2\Omega,$ $I_D = 1A, V_{GEN} = 10V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	7.42	--	nS
Turn-On Rise Time		t_r	--	3.41	--	
Turn-Off Delay Time		$t_{d(off)}$	--	20.4	--	
Turn-Off Fall Time		t_f	--	3.01	--	

Notes:

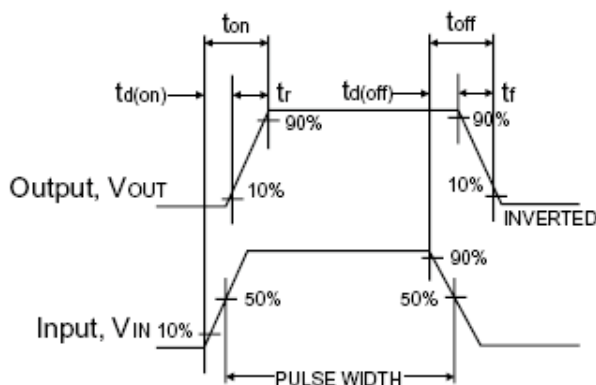
a. pulse test: $PW \leq 300\mu s$, duty cycle $\leq 2\%$

b. For DESIGN AID ONLY, not subject to production testing.

b. Switching time is essentially independent of operating temperature.



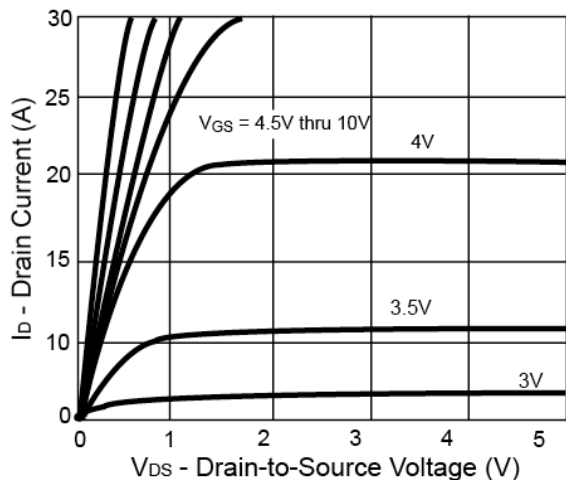
Switching Test Circuit



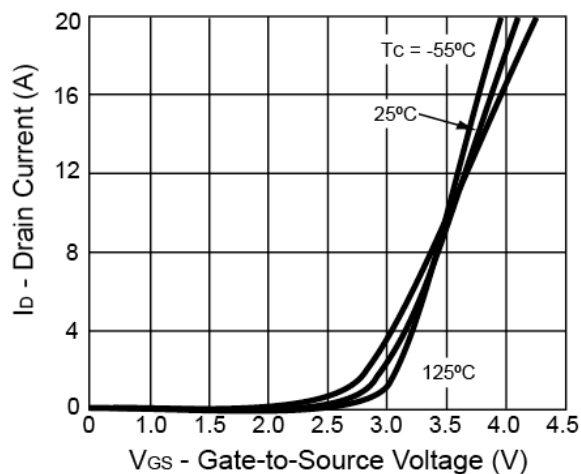
Switchin Waveforms

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

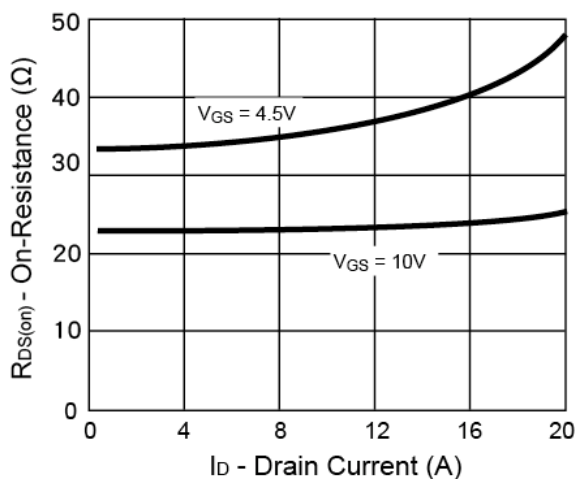
Output Characteristics



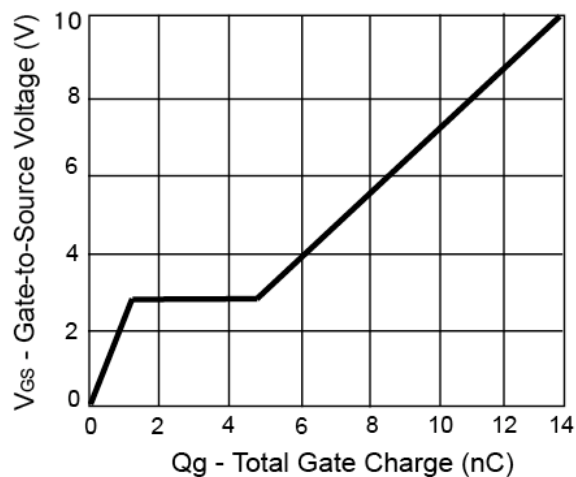
Transfer Characteristics



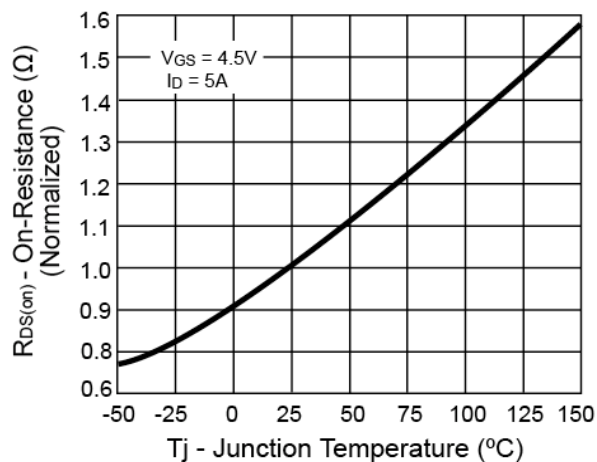
On-Resistance vs. Drain Current



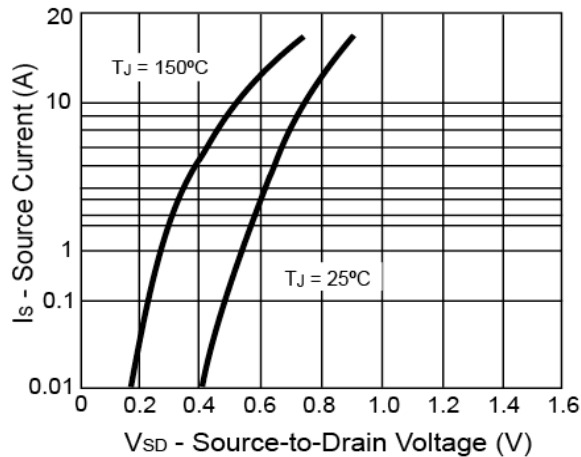
Gate Charge



On-Resistance vs. Junction Temperature

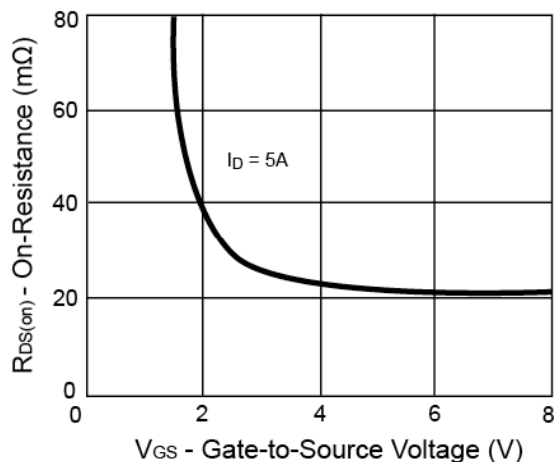


Source-Drain Diode Forward Voltage

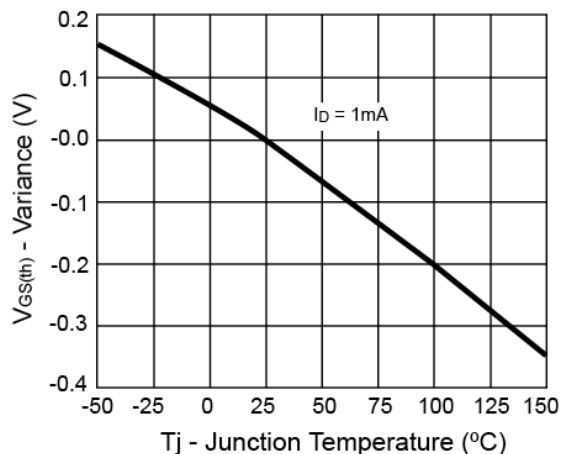


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

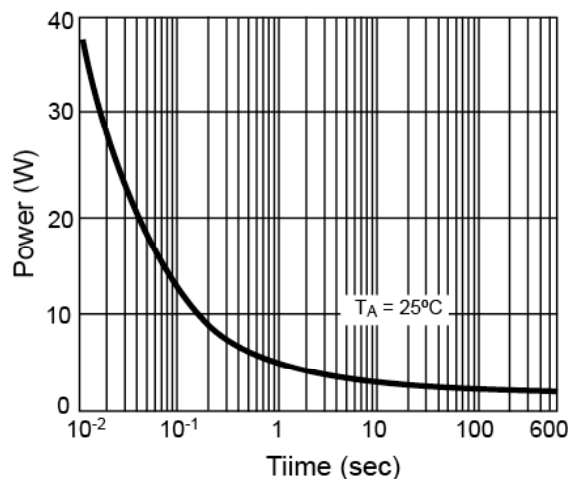
On-Resistance vs. Gate-Source Voltage



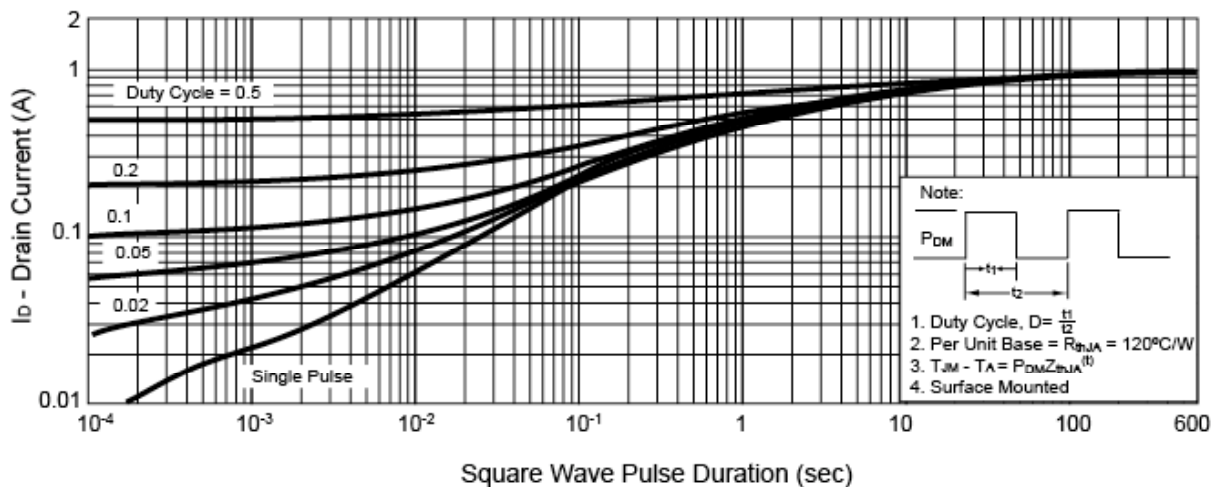
Threshold Voltage



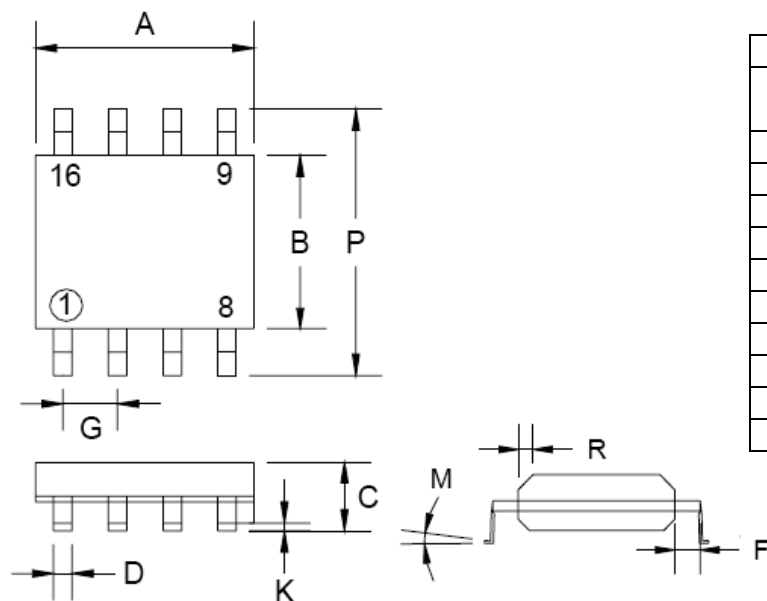
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient



SOP-8 Mechanical Drawing



DIM	SOP-8 DIMENSION			
	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

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