

Pin Definition:

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)	I_D (A)
20	30 @ $V_{GS} = 4.5V$	4.5
	35 @ $V_{GS} = 2.5V$	3.5
	45 @ $V_{GS} = 1.8V$	2.0

Features

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

Application

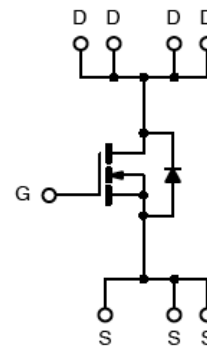
- Specially Designed for Li-on Battery Packs
- Battery Switch Application

Ordering Information

Part No.	Package	Packing
TSM4424CS RL	SOP-8	2.5Kpcs / 13" Reel
TSM4424CS RLG	SOP-8	2.5Kpcs / 13" Reel

Note: "G" denotes Halogen Free Product.

Block Diagram



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current	I_D	8	A
Pulsed Drain Current	I_{DM}	30	A
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	2.2	A
Maximum Power Dissipation	P_D	$T_a = 25^{\circ}C$	2.5
		$T_a = 75^{\circ}C$	1.3
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	$R_{\theta_{JA}}$	52.5	$^{\circ}C/W$

Notes:

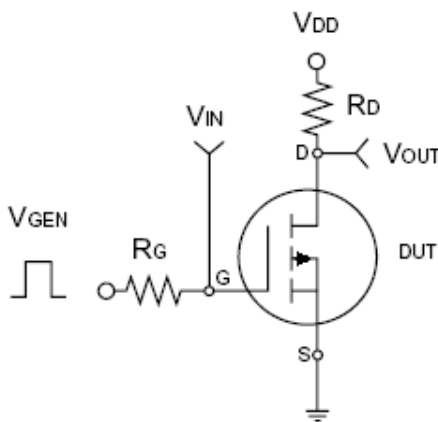
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on FR4 Board, $t \leq 5$ sec.

Electrical Specifications

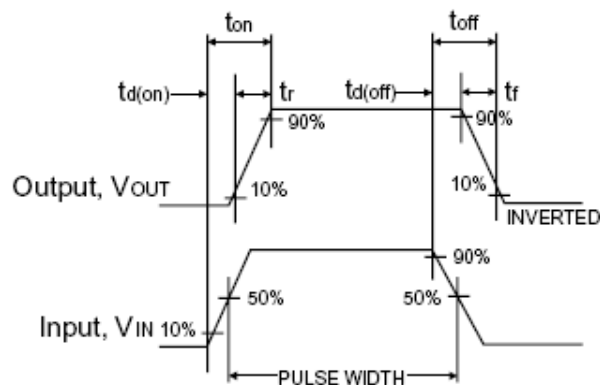
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	--	0.65	1	V
Gate Body Leakage	$V_{GS} = \pm 8V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 20V, V_{GS} = 0V$	I_{DSS}	--	--	1.0	μA
On-State Drain Current	$V_{DS} = 5V, V_{GS} = 4.5V$	$I_{D(ON)}$	30	--	--	A
Drain-Source On-State Resistance	$V_{GS} = 4.5V, I_D = 4.5A$	$R_{DS(ON)}$	--	23	30	m Ω
	$V_{GS} = 2.5V, I_D = 3.5A$		--	25	35	
	$V_{GS} = 1.8V, I_D = 2.0A$		--	35	45	
Forward Transconductance	$V_{DS} = 10V, I_D = 6A$	g_{fs}	--	40	--	S
Diode Forward Voltage	$I_S = 1.7A, V_{GS} = 0V$	V_{SD}	--	0.8	1.2	V
Dynamic^b						
Total Gate Charge	$V_{DS} = 10V, I_D = 4.5A, V_{GS} = 4.5V$	Q_g	--	11.2	14	nC
Gate-Source Charge		Q_{gs}	--	1.4	--	
Gate-Drain Charge		Q_{gd}	--	2.2	--	
Input Capacitance	$V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz$	C_{iss}	--	500	--	pF
Output Capacitance		C_{oss}	--	300	--	
Reverse Transfer Capacitance		C_{rss}	--	140	--	
Switching^{b,c}						
Turn-On Delay Time	$V_{DD} = 10V, R_L = 10\Omega, I_D = 1A, V_{GEN} = 4.5V, R_G = 6\Omega$	$t_{d(on)}$	--	15	25	nS
Turn-On Rise Time		t_r	--	30	60	
Turn-Off Delay Time		$t_{d(off)}$	--	35	70	
Turn-Off Fall Time		t_f	--	15	45	

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

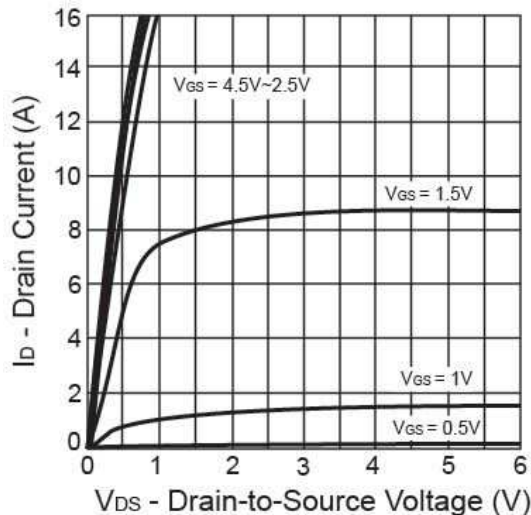


Switchin Waveforms

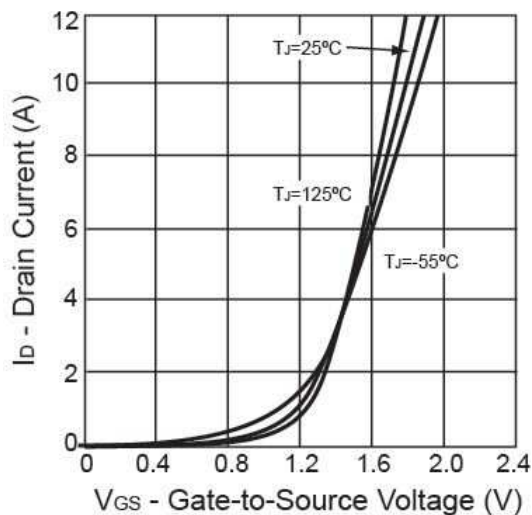


Electrical Characteristics Curve ($T_A=25^\circ\text{C}$, unless otherwise noted)

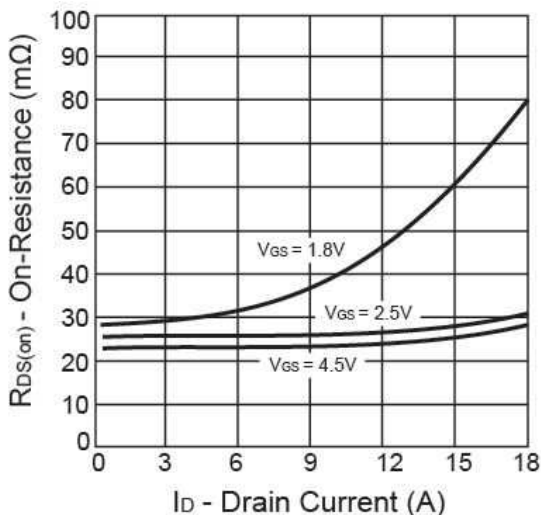
Output Characteristics



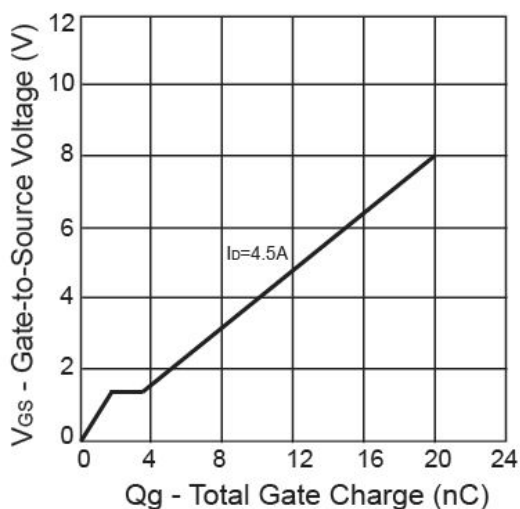
Transfer Characteristics



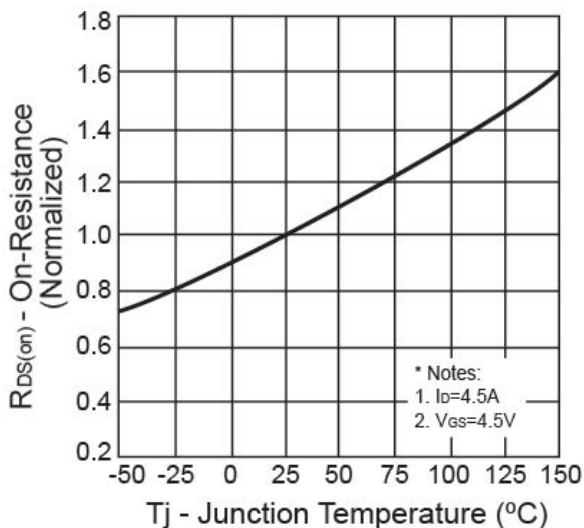
On-Resistance vs. Drain Current



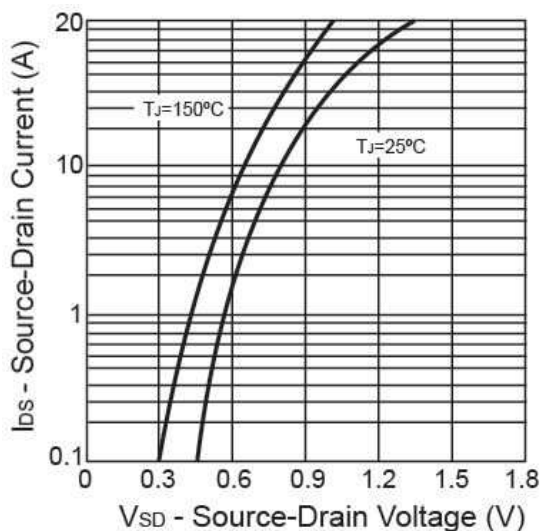
Gate Charge



On-Resistance vs. Junction Temperature

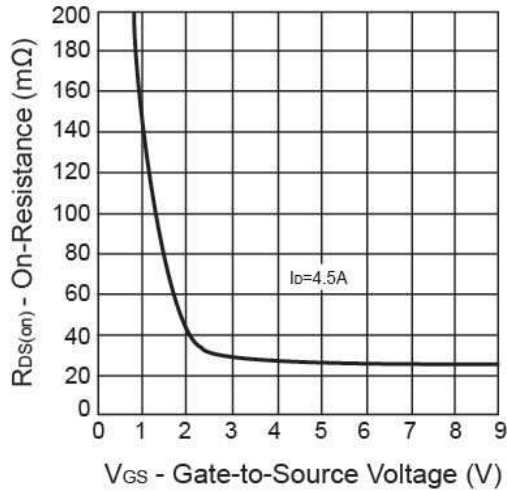


Source-Drain Diode Forward Voltage

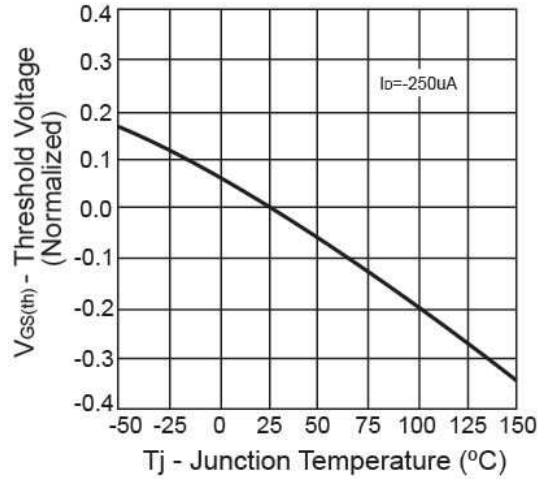


Electrical Characteristics Curve ($T_A=25^\circ\text{C}$, unless otherwise noted)

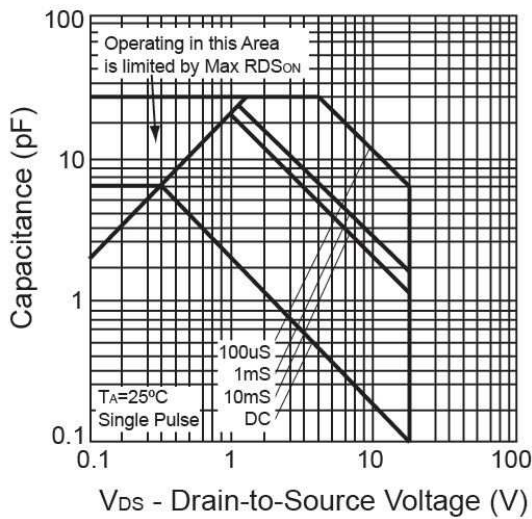
On-Resistance vs. Gate-Source Voltage



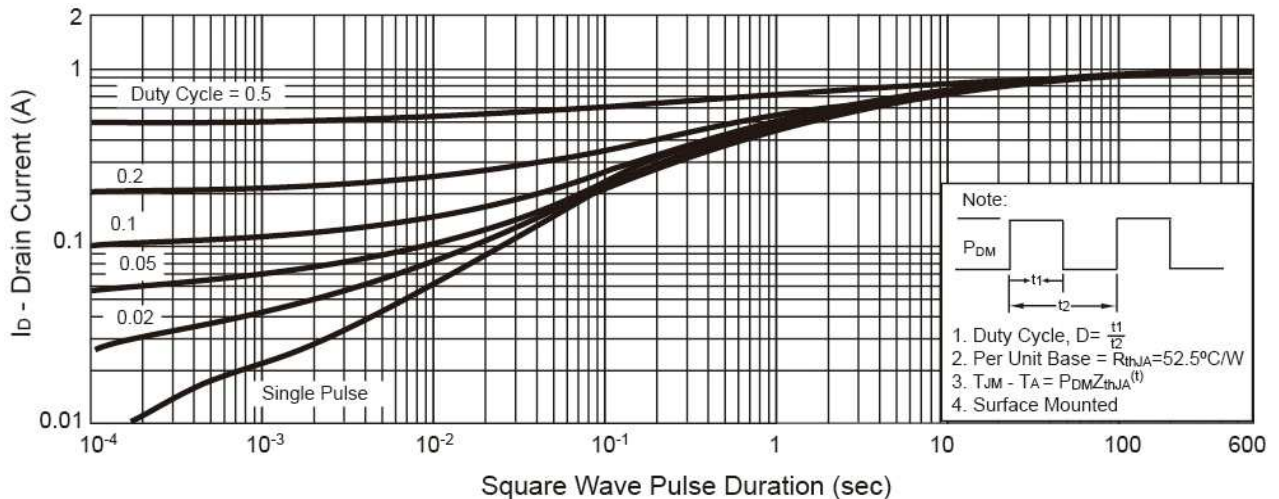
Threshold Voltage



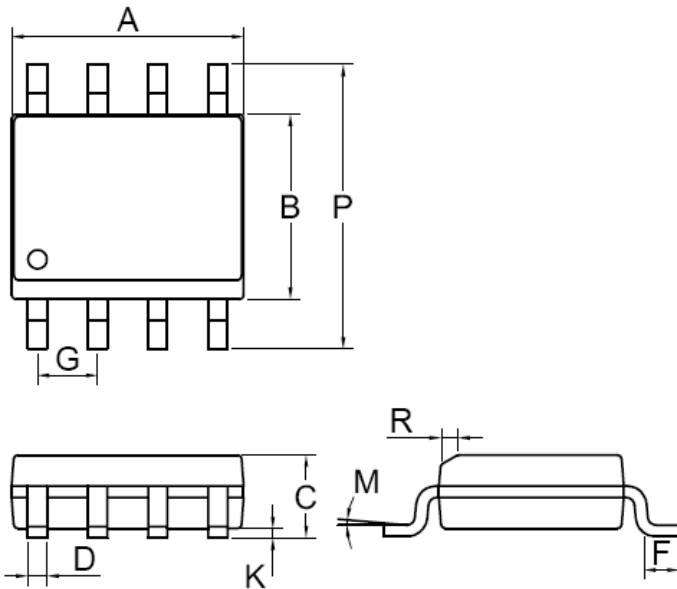
Safety Operation Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

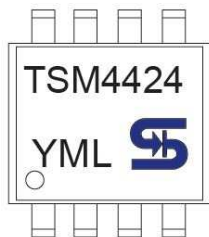


SOP-8 Mechanical Drawing



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**=Apr, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
- L** = Lot Code

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