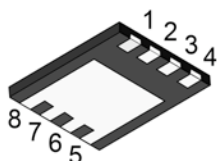


TSM802

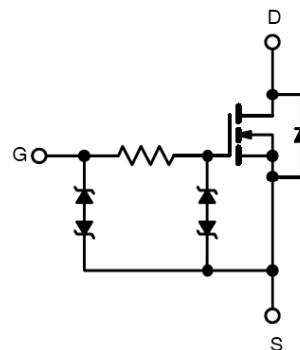
20V N-Channel MOSFET w/ESD Protected

TDFN 3x3

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)
20	25 @ $V_{GS} = 4.5V$	5
	30 @ $V_{GS} = 2.5V$	4
	65 @ $V_{GS} = 1.8V$	2

Block Diagram


N-Channel MOSFET

Features

- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance
- Low Profile 0.75mm (typ.)
- ESD Protect 2KV

Application

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

Ordering Information

Part No.	Package	Packing
TSM802CQ RV	TDFN 3x3	3Kpcs / 7" Reel
TSM802CQ RVG	TDFN 3x3	3Kpcs / 7" Reel
TSM802CQ RK	TDFN 3x3	10Kpcs / 13" Reel
TSM802CQ RKG	TDFN 3x3	10Kpcs / 13" Reel

Note: "G" denotes for Halogen Free

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}	± 12	V
Continuous Drain Current	I_D	6	A
Pulsed Drain Current	I_{DM}	30	A
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	1.4	A
Maximum Power Dissipation	P_D	3.1	W
		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
Junction to Case Thermal Resistance	$R\theta_{JC}$	4.5	$^\circ C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R\theta_{JA}$	48	$^\circ C/W$

Notes:

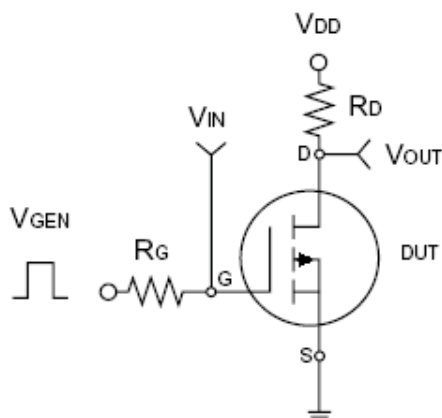
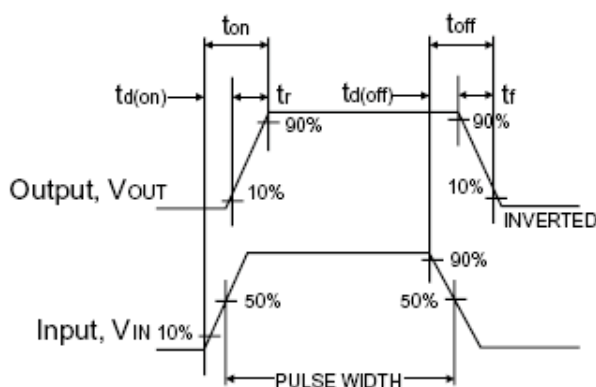
- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on 1"x1" FR4 Board, $t \leq 10$ sec.
- c. Pulse limited $< 5s$ @ $I_D = 10A$ / $V_{GS} = 10V$

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

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	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	0.6	0.8	1.0	V
Gate Body Leakage	$V_{GS} = \pm 12V, V_{DS} = 0V$	I_{GSS}	--	--	± 10	μA
Zero Gate Voltage Drain Current	$V_{DS} = 16V, V_{GS} = 0V$	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	$V_{GS} = 4.5V, I_D = 5A$	$R_{DS(ON)}$	--	18	25	$m\Omega$
	$V_{GS} = 2.5V, I_D = 4A$		--	24	30	
	$V_{GS} = 1.8V, I_D = 2A$		--	39	65	
Forward Transconductance	$V_{DS} = 10V, I_D = 4.5A$	g_{fs}	--	30	--	S
Diode Forward Voltage	$I_S = 2A, V_{GS} = 0V$	V_{SD}	--	0.6	1.2	V
Dynamic ^b						
Total Gate Charge	$V_{DS} = 10V, I_D = 4.5A,$ $V_{GS} = 4.5V$	Q_g	--	15	20	nC
Gate-Source Charge		Q_{gs}	--	3.4	--	
Gate-Drain Charge		Q_{gd}	--	1.2	--	
Input Capacitance	$V_{DS} = 10V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	950	--	pF
Output Capacitance		C_{oss}	--	450	--	
Reverse Transfer Capacitance		C_{rss}	--	135	--	
Switching ^c						
Turn-On Delay Time	$V_{DD} = 10V, R_L = 10\Omega,$ $I_D = 1A, V_{GEN} = 4.5V,$ $R_G = 6\Omega$	$t_{d(on)}$	--	140	200	nS
Turn-On Rise Time		t_r	--	210	250	
Turn-Off Delay Time		$t_{d(off)}$	--	3700	4800	
Turn-Off Fall Time		t_f	--	2000	2600	

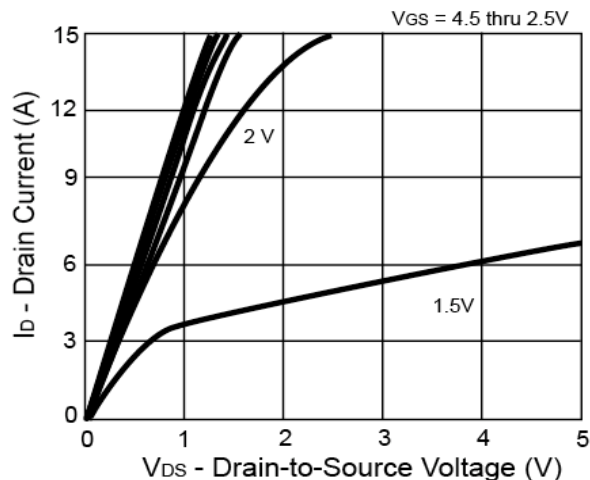
Notes:

- 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.

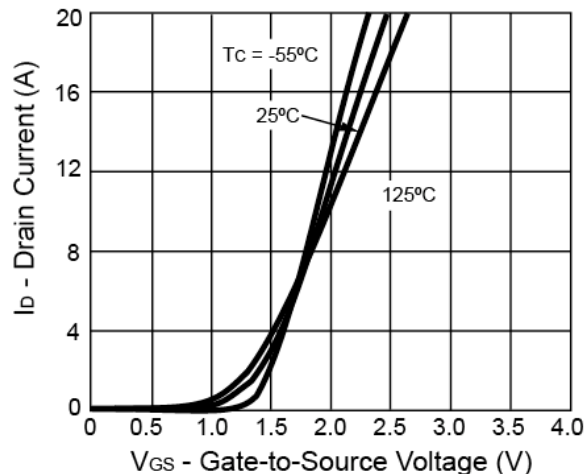

Switching Test Circuit

Switchin Waveforms

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

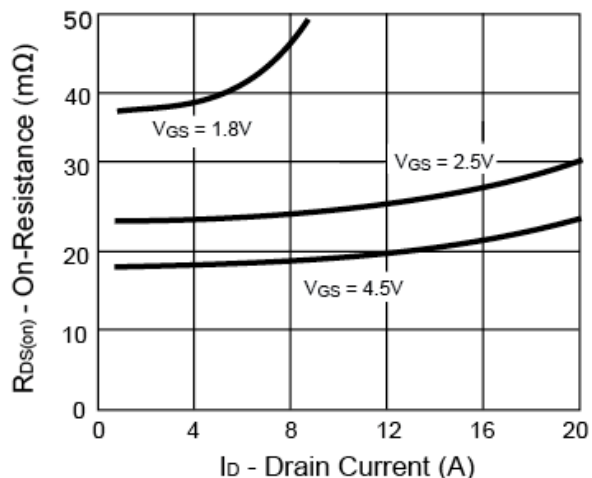
Output Characteristics



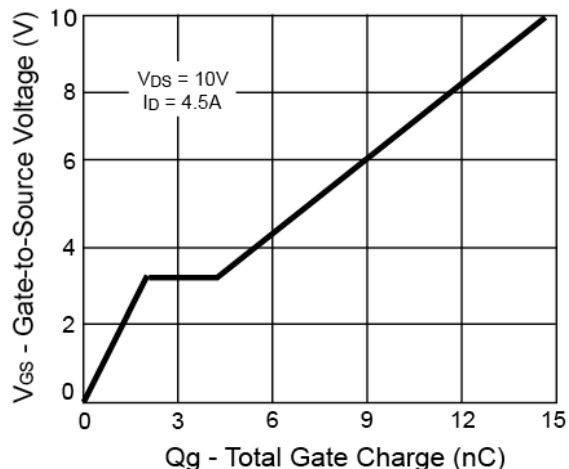
Transfer Characteristics



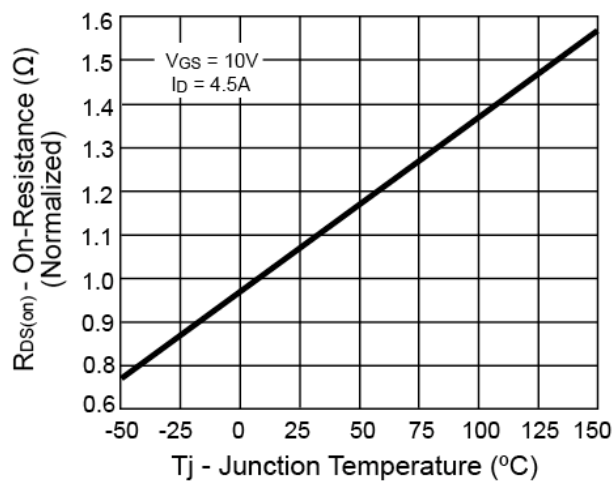
On-Resistance vs. Drain Current



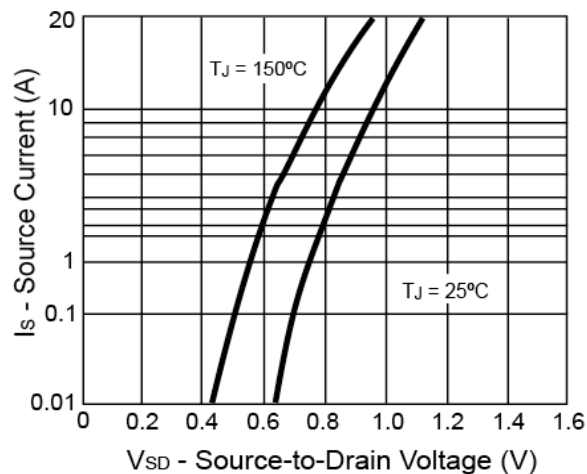
Gate Charge



On-Resistance vs. Junction Temperature

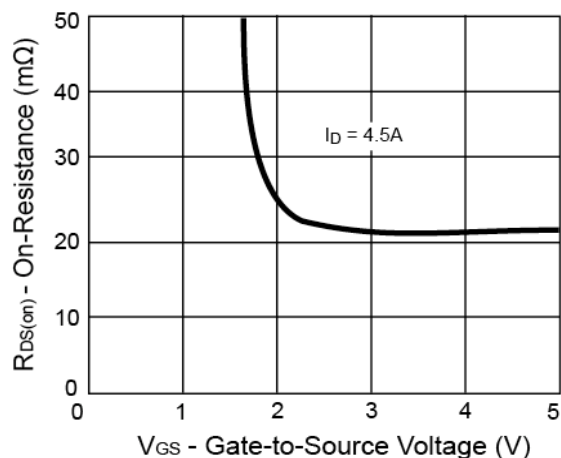


Source-Drain Diode Forward Voltage

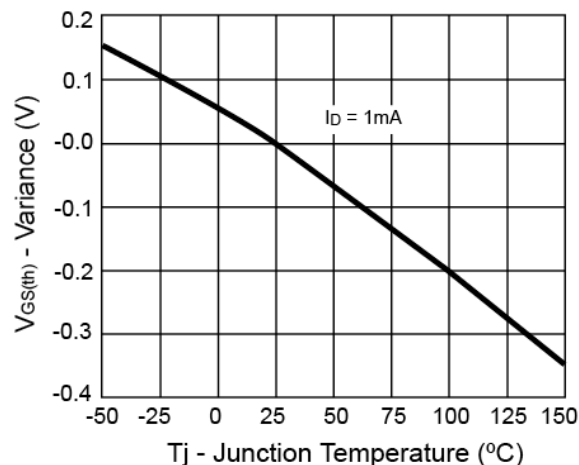


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

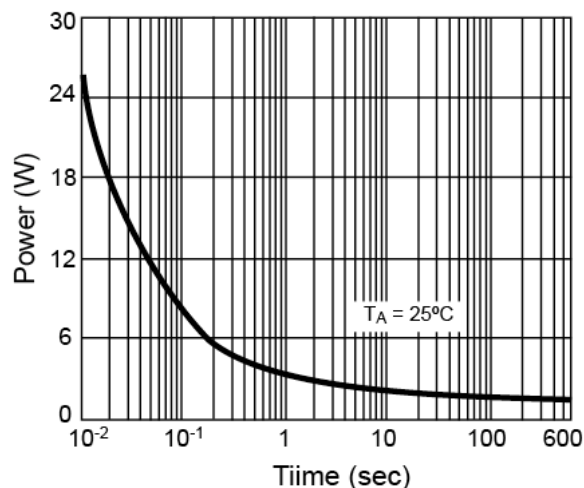
On-Resistance vs. Gate-Source Voltage



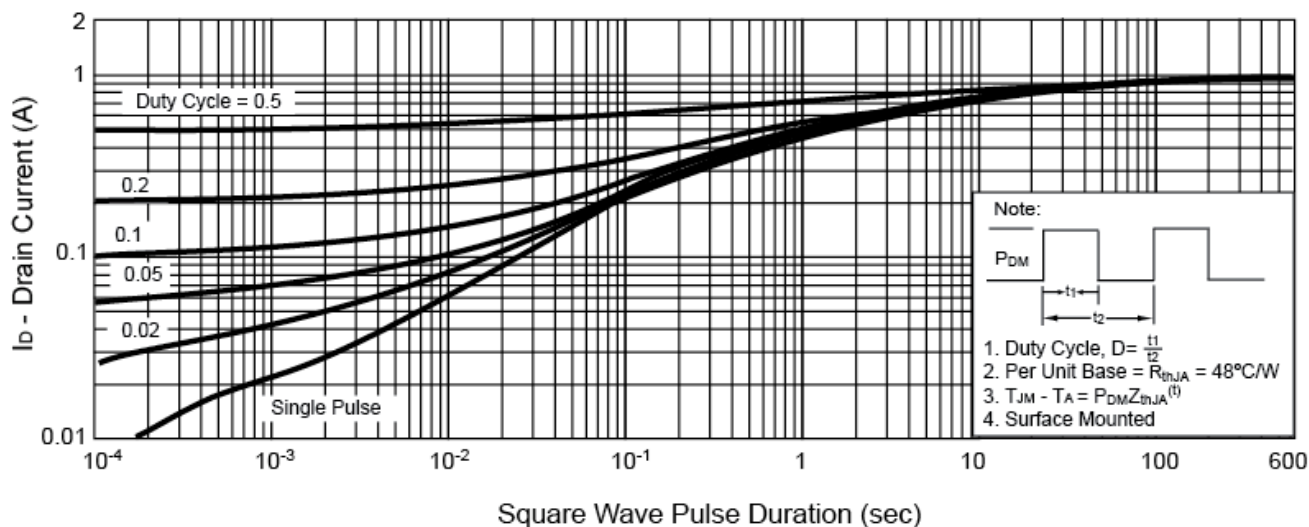
Threshold Voltage



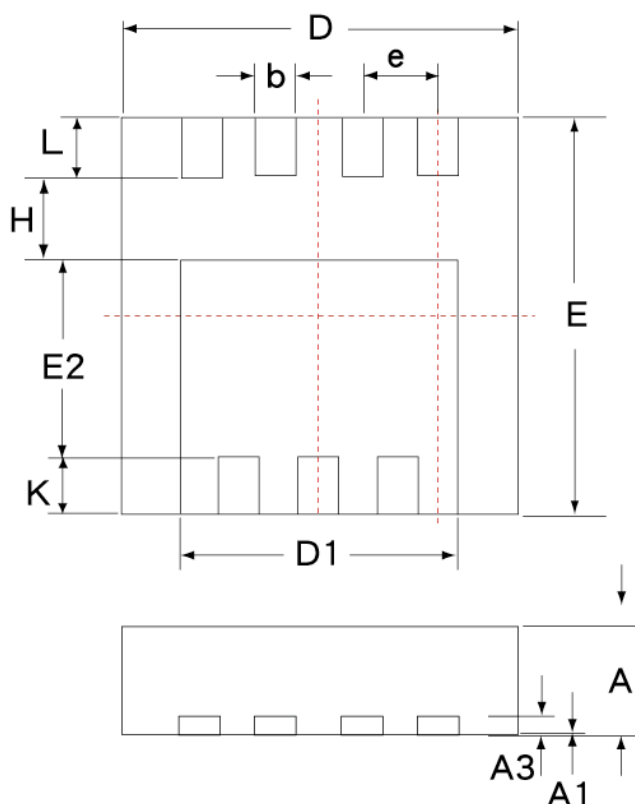
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient

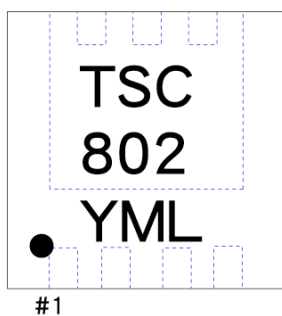


TDFN 3x3 Mechanical Drawing



TDFN 3x3 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	0.65	0.85	0.026	0.034
A1	0.00	0.05	0.000	0.002
A3	0.15	0.25	0.006	0.010
b	0.20	0.30	0.008	0.012
D	2.90	3.10	0.114	0.122
D1	2.20	2.30	0.086	0.090
E	2.90	3.10	0.114	0.122
E2	1.49	1.59	0.058	0.063
e	0.625	0.675	0.025	0.027
K	0.25	0.35	0.010	0.014
L	0.35	0.45	0.014	0.017
H	0.61	0.71	0.024	0.028

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

TSM802

20V N-Channel MOSFET w/ESD Protected

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