



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)
-30	21 @ $V_{GS} = -10V$	-9.1
	35 @ $V_{GS} = -4.5V$	-6.9

Features

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

Application

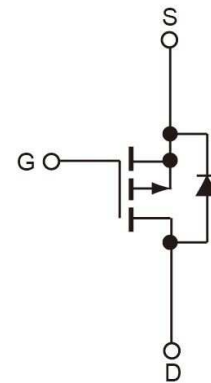
- DC-DC Conversion
- Battery Switch

Ordering Information

Part No.	Package	Packing
TSM4435BCS RL	SOP-8	2.5Kpcs / 13" Reel
TSM4435BCS RLG	SOP-8	2.5Kpcs / 13" Reel

Note: "G" denote for Halogen Free Product

Block Diagram



P-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	-9.1	A
Pulsed Drain Current	I_{DM}	-50	A
Continuous Source Current (Diode Conduction) ^{a,b}	I_S	-2.1	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
Junction to Foot (Drain) Thermal Resistance	$R_{\theta_{JF}}$	22	$^\circ C/W$
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\theta_{JA}}$	50	$^\circ C/W$

Notes:

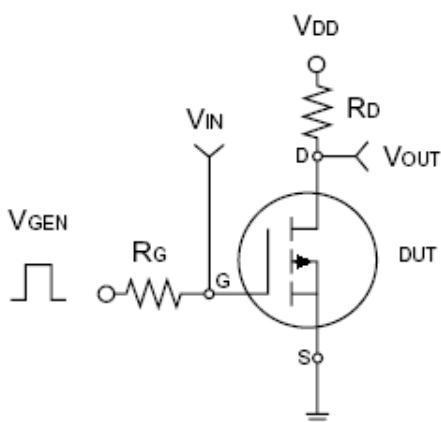
- Pulse width limited by the Maximum junction temperature
- Surface Mounted on FR4 Board, $t \leq 10$ sec.

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

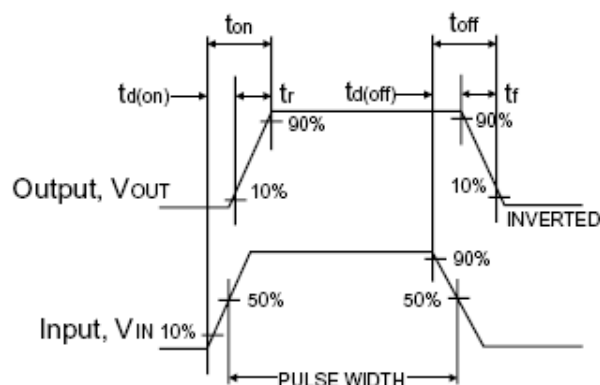
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$	BV_{DSS}	-30	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	$V_{GS(TH)}$	-1	--	-3	V
Gate Body Leakage	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$	I_{DSS}	--	--	-1.0	μA
On-State Drain Current ^a	$V_{DS} = -5\text{V}, V_{GS} = -10\text{V}$	$I_{D(ON)}$	-40	--	--	A
Drain-Source On-State Resistance ^a	$V_{GS} = -10\text{V}, I_D = -9.1\text{A}$	$R_{DS(ON)}$	--	17	21	m Ω
	$V_{GS} = -4.5\text{V}, I_D = -6.9\text{A}$		--	25	35	
Forward Transconductance ^a	$V_{DS} = -10\text{V}, I_D = -9.1\text{A}$	g_{fs}	--	24	--	S
Diode Forward Voltage	$I_S = -2.1\text{A}, V_{GS} = 0\text{V}$	V_{SD}	--	-0.8	-1.2	V
Dynamic^b						
Total Gate Charge	$V_{DS} = -15\text{V}, I_D = -9.1\text{A}, V_{GS} = -10\text{V}$	Q_g	--	33	70	nC
Gate-Source Charge		Q_{gs}	--	5.8	--	
Gate-Drain Charge		Q_{gd}	--	8.6	--	
Input Capacitance	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$	C_{iss}	--	1573	1900	pF
Output Capacitance		C_{oss}	--	319	--	
Reverse Transfer Capacitance		C_{rss}	--	211	295	
Switching^{b,c}						
Turn-On Delay Time	$V_{DD} = -15\text{V}, R_L = 15\Omega, I_D = -1\text{A}, V_{GEN} = -10\text{V}, R_G = 6\Omega$	$t_{d(on)}$	--	10	15	nS
Turn-On Rise Time		t_r	--	15	25	
Turn-Off Delay Time		$t_{d(off)}$	--	110	170	
Turn-Off Fall Time		t_f	--	70	110	

Notes:

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



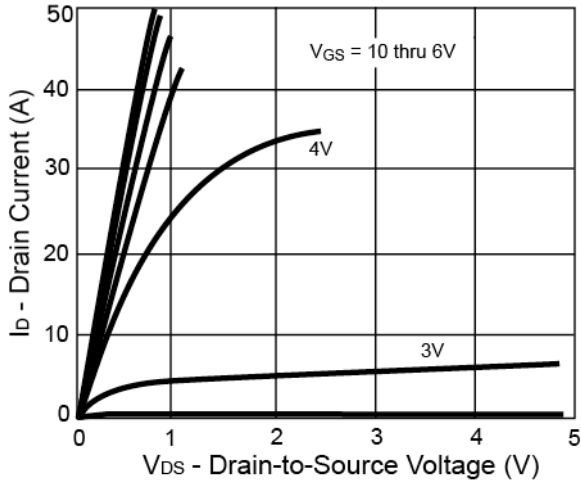
Switching Test Circuit



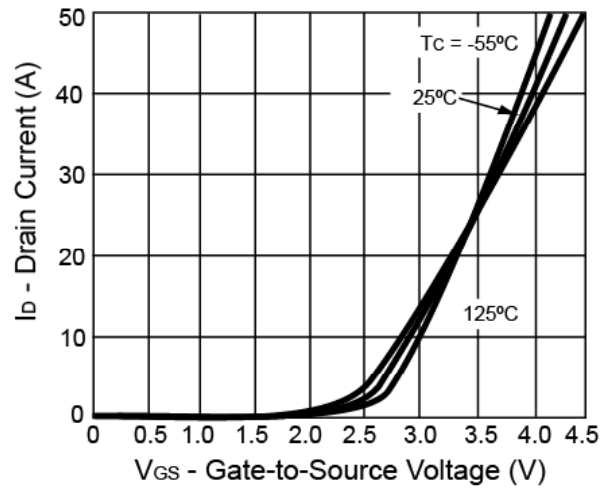
Switchin Waveforms

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

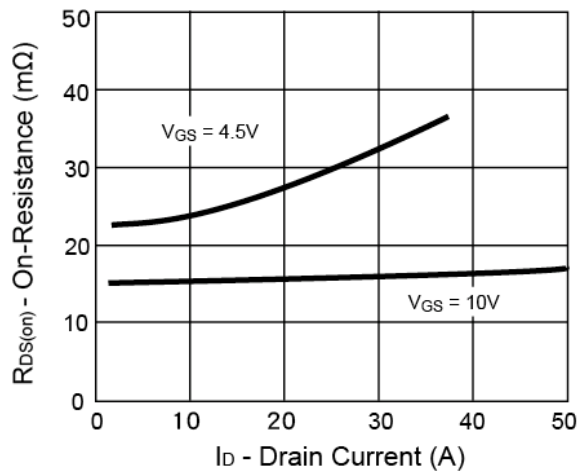
Output Characteristics



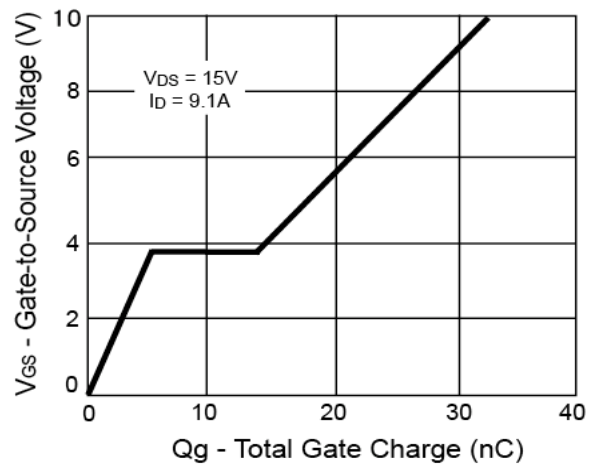
Transfer Characteristics



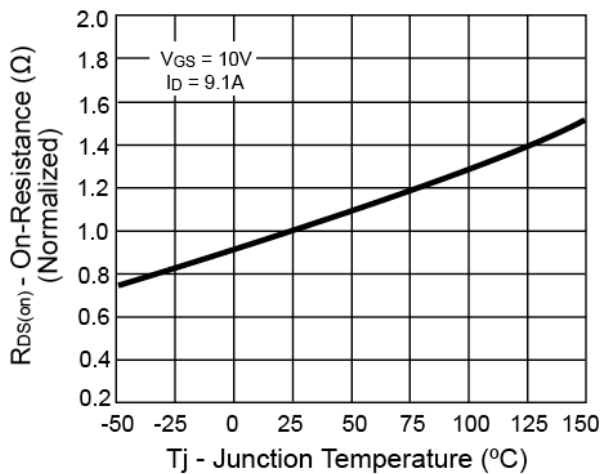
On-Resistance vs. Drain Current



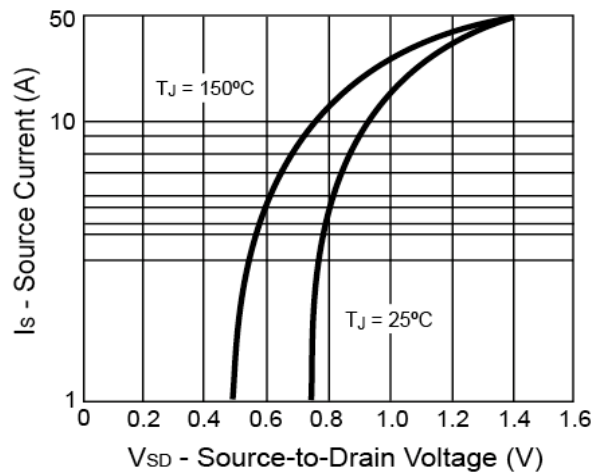
Gate Charge



On-Resistance vs. Junction Temperature

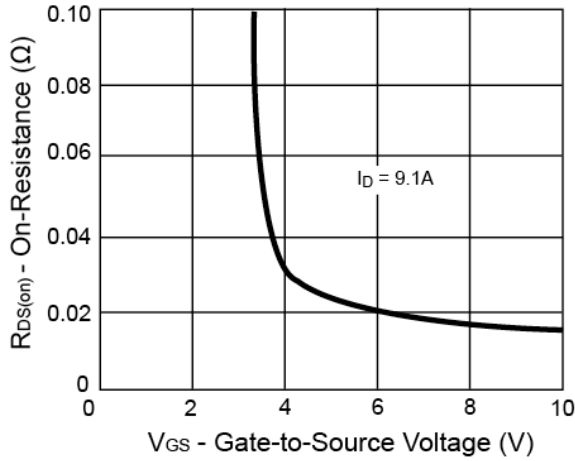


Source-Drain Diode Forward Voltage

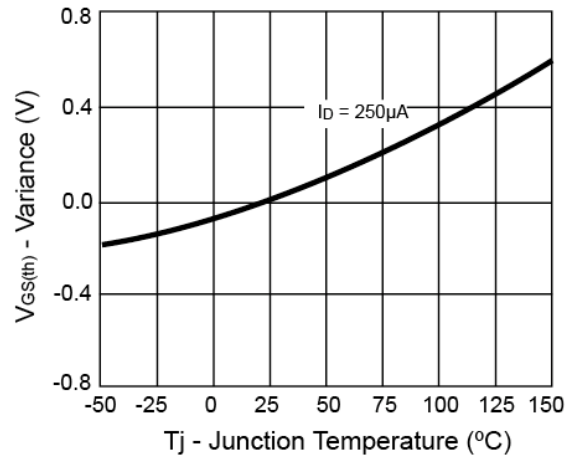


Electrical Characteristics Curve ($T_A = 25^\circ\text{C}$, unless otherwise noted)

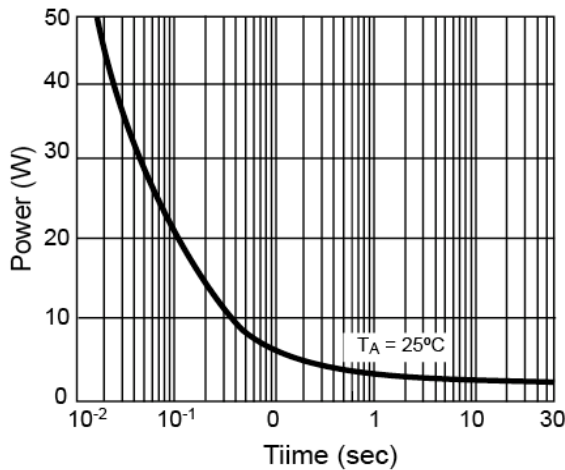
On-Resistance vs. Gate-Source Voltage



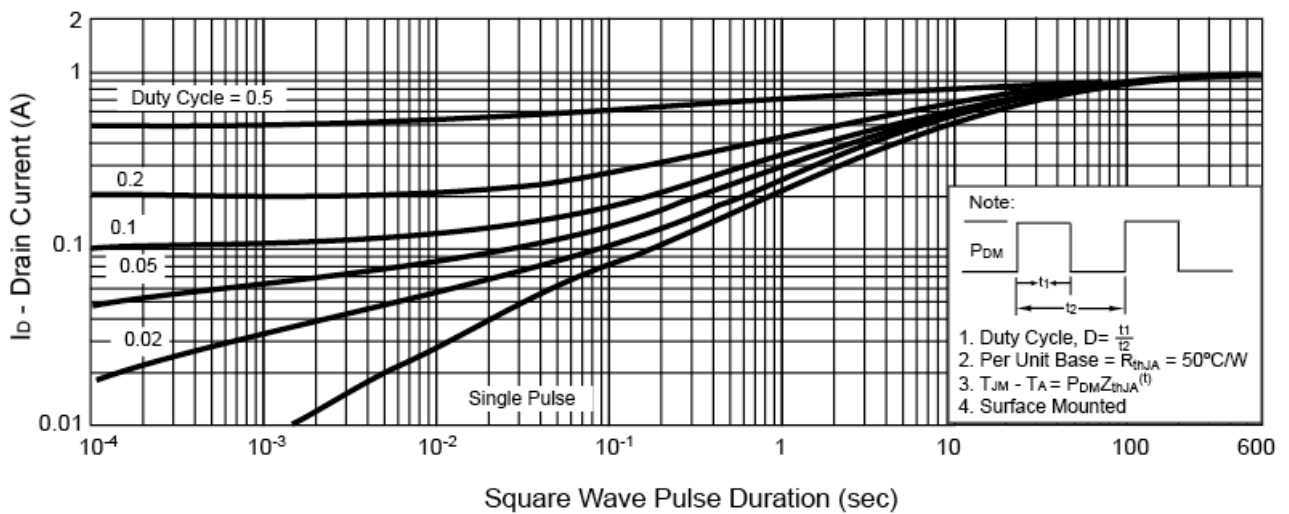
Threshold Voltage



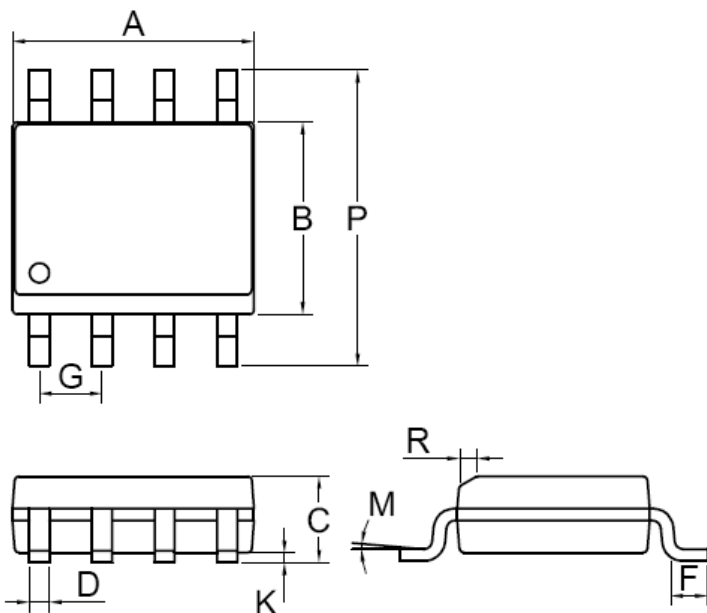
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient

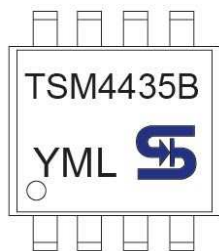


SOP-8 Mechanical Drawing



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

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)
- = Month Code for Halogen Free Product
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

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