TAIWAN SEMICONDUCTOR

Pb Pb-Free **RoHS** COMPLIANT

TSM4425
30V P-Channel MOSFET

SOP-8

Pin Definition:
1. Source   8. Drain
2. Source   7. Drain
3. Source   6. Drain
4. Gate   5. Drain

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$(mΩ)	I_D (A)
-30	14 @ V_{GS} = -10V	-11
	20 @ V_{GS} = -4.5V	-8.5

Features

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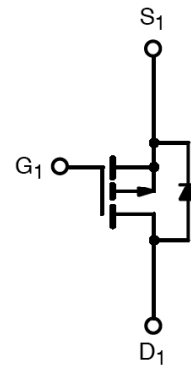- High Density Cell Design for Ultra Low On-resistance

Application

- Load Switches
- Notebook PCs
- Desktop PCs

Ordering Information

Part No.	Package	Packing
TSM4425CS RLG	SOP-8	2.5Kpcs / 13" Reel

Note: "G" denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

Block Diagram

P-Channel MOSFET

Absolute Maximum Rating (T_C = 25°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}	-50	A
Continuous Source Current (Diode Conduction)[a,b]		I_S	-2.1	A
Maximum Power Dissipation	Ta = 25°C	P_D	2.5	W
	Ta = 75°C		1.6	
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 Foot Thermal Resistance	$R_{\Theta JF}$	18	°C/W
Junction to Ambient Thermal Resistance (PCB mounted)	$R_{\Theta JA}$	52.5	°C/W

Notes:

a. Pulse width limited by the Maximum junction temperature

b. Surface Mounted on FR4 Board, t ≤ 10 sec.

## Electrical Specifications (T_C = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250uA	BV_{DSS}	-30	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250µA	$V_{GS(TH)}$	-1	--	-3	V
Gate Body Leakage	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = -30V, V_{GS} = 0V	I_{DSS}	--	--	-1.0	µA
On-State Drain Current[a]	V_{DS} = -5V, V_{GS} = -10V	$I_{D(ON)}$	-50	--	--	A
Drain-Source On-State Resistance[a]	V_{GS} = -10V, I_D = -11A	$R_{DS(ON)}$	--	10	12	mΩ
	V_{GS} = -4.5V, I_D = -8.5A		--	15	19	
Forward Transconductance[a]	V_{DS} = -15V, I_D = -11A	g_{fs}	--	23	--	S
Diode Forward Voltage	I_S = -2.1A, V_{GS} = 0V	V_{SD}	--	--	-1.3	V
Dynamic[b]						
Total Gate Charge	V_{DS} = -15V, I_D = -11A, V_{GS} = -10V	Q_g	--	64	--	nC
Gate-Source Charge		Q_{gs}	--	11	--	
Gate-Drain Charge		Q_{gd}	--	25	--	
Input Capacitance	V_{DS} = -8V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	3680	--	pF
Output Capacitance		C_{oss}	--	930	--	
Reverse Transfer Capacitance		C_{rss}	--	620	--	
Switching[c]						
Turn-On Delay Time	V_{DD} = -15V, R_L = 15Ω, I_D = -1A, V_{GEN} = -10V, R_G = 6Ω	$t_{d(on)}$	--	15	--	ns
Turn-On Rise Time		t_r	--	13	--	
Turn-Off Delay Time		$t_{d(off)}$	--	100	--	
Turn-Off Fall Time		t_f	--	53	--	

Notes:
a. pulse test: PW ≤ 300µs, duty cycle ≤ 2%
b. For DESIGN AID ONLY, not subject to production testing.
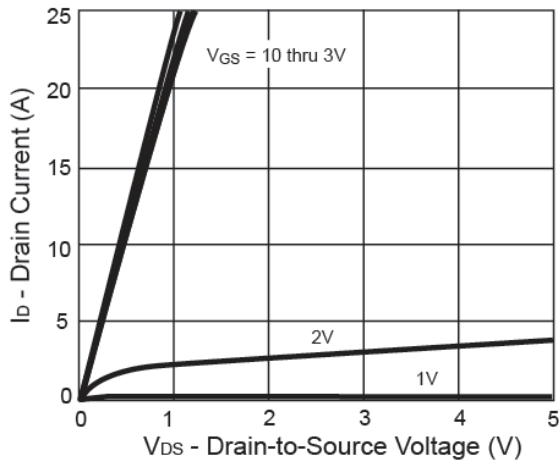b. Switching time is essentially independent of operating temperature.
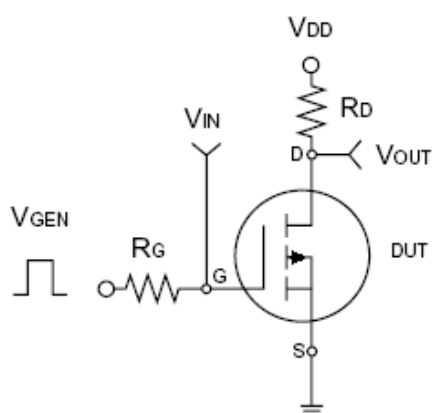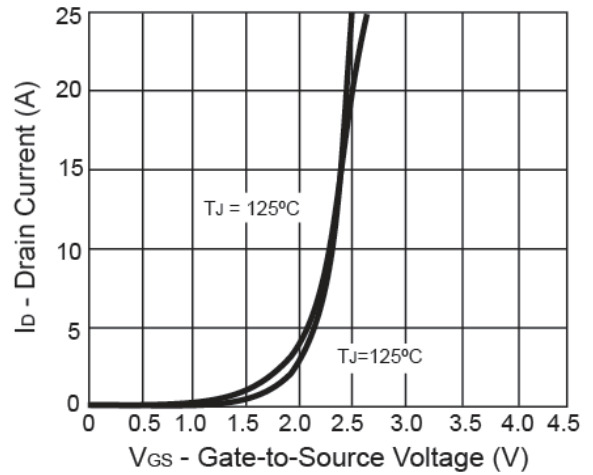

Switching Test Circuit
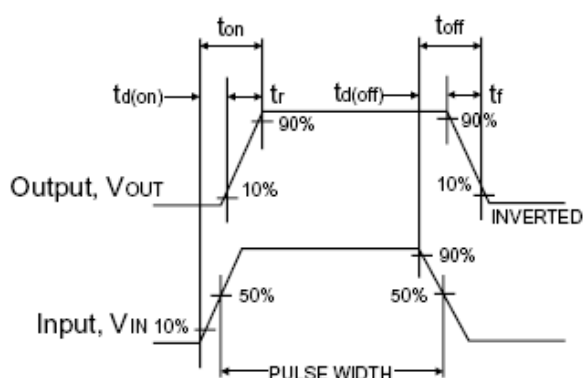
Switchin Waveforms
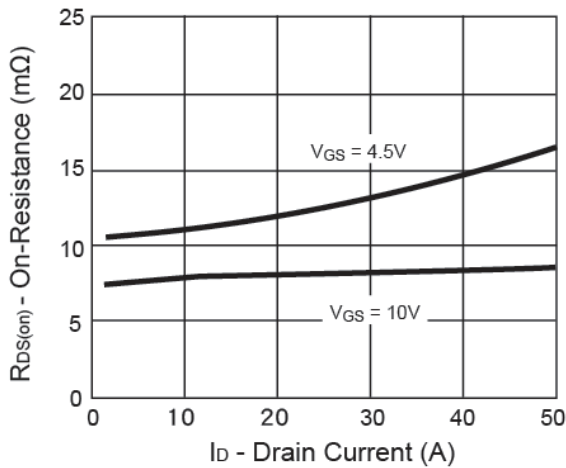
Electrical Characteristics Curve

Output Characteristics

V_{GS} = 10 thru 3V

2V

1V

I_D - Drain Current (A)

V_{DS} - Drain-to-Source Voltage (V)

Transfer Characteristics

T_J = 125ºC

T_J=125ºC

I_D - Drain Current (A)

V_{GS} - Gate-to-Source Voltage (V)

On-Resistance vs. Drain Current

V_{GS} = 4.5V

V_{GS} = 10V

$R_{DS(on)}$ - On-Resistance (mΩ)

I_D - Drain Current (A)

Gate Charge

V_{DS} = 15V
I_D = 11A

V_{GS} - Gate-to-Source Voltage (V)

Q_g - Total Gate Charge (nC)
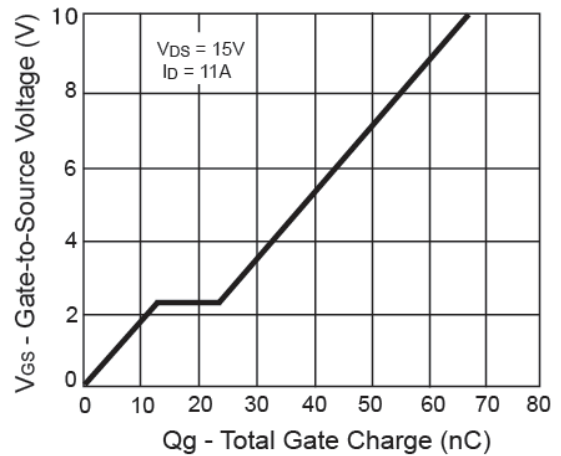
On-Resistance vs. Junction Temperature

V_{GS} = 10V
I_D = 11A

$R_{DS(on)}$ - On-Resistance (Ω) (Normalized)

T_j - Junction Temperature (ºC)
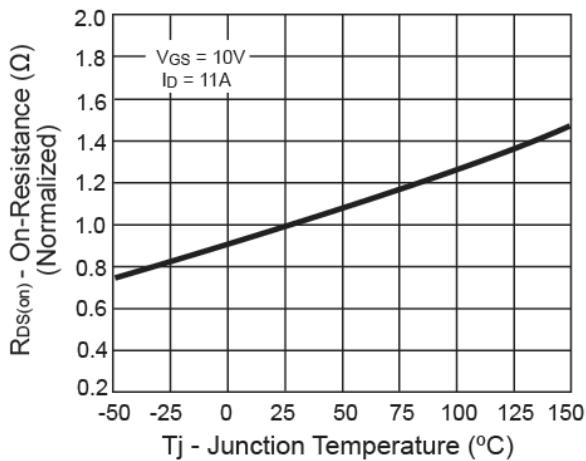
Source-Drain Diode Forward Voltage

T_J = 150ºC

T_J = 25ºC
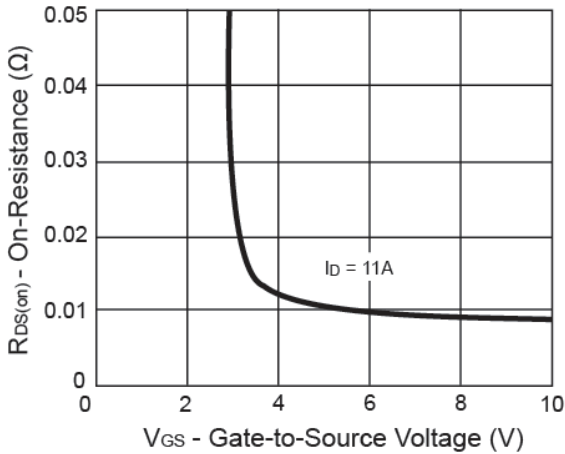
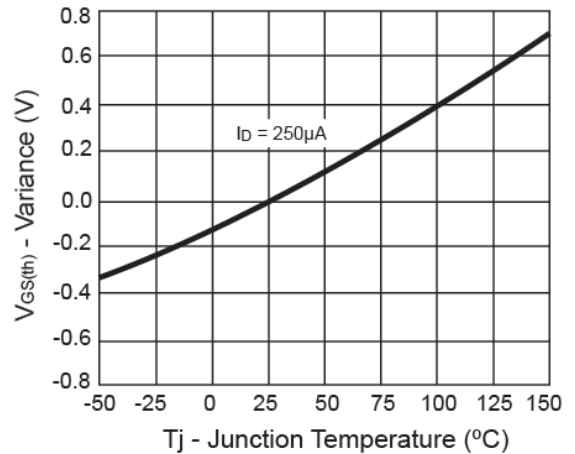I_S - Source Current (A)

V_{SD} - Source-to-Drain Voltage (V)
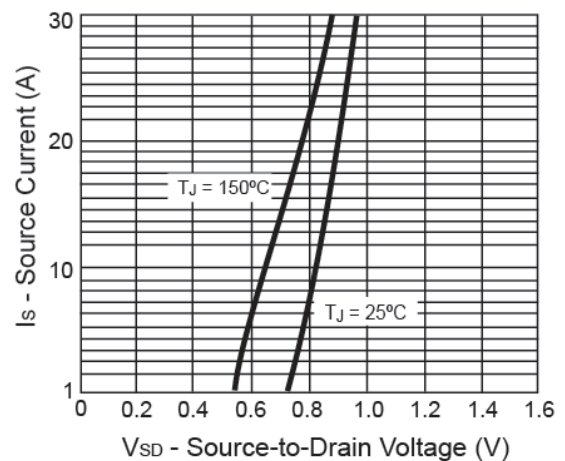
Electrical Characteristics Curve

On-Resistance vs. Gate-Source Voltage

$I_D = 11A$

Threshold Voltage

$I_D = 250\mu A$

Single Pulse Power

$T_A = 25^oC$
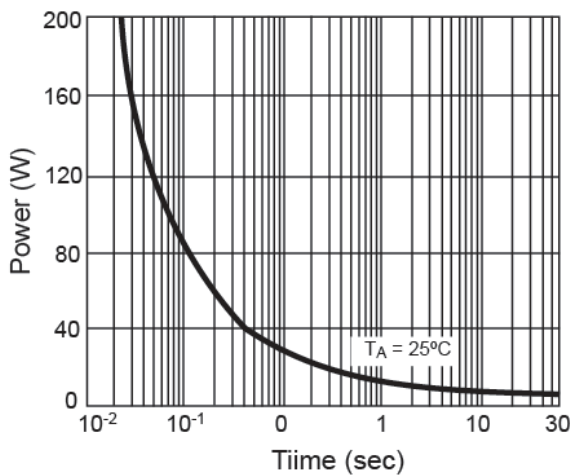
Normalized Thermal Transient Impedance, Junction-to-Ambient

Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse

Note:

P_{DM}

t1
t2

1. Duty Cycle, D= $\frac{t1}{t2}$
2. Per Unit Base = R_{thJA}=52.5ºC/W
3. T_{JM} - T_A = $P_{DM}Z_{thJA}^{(t)}$
4. Surface Mounted
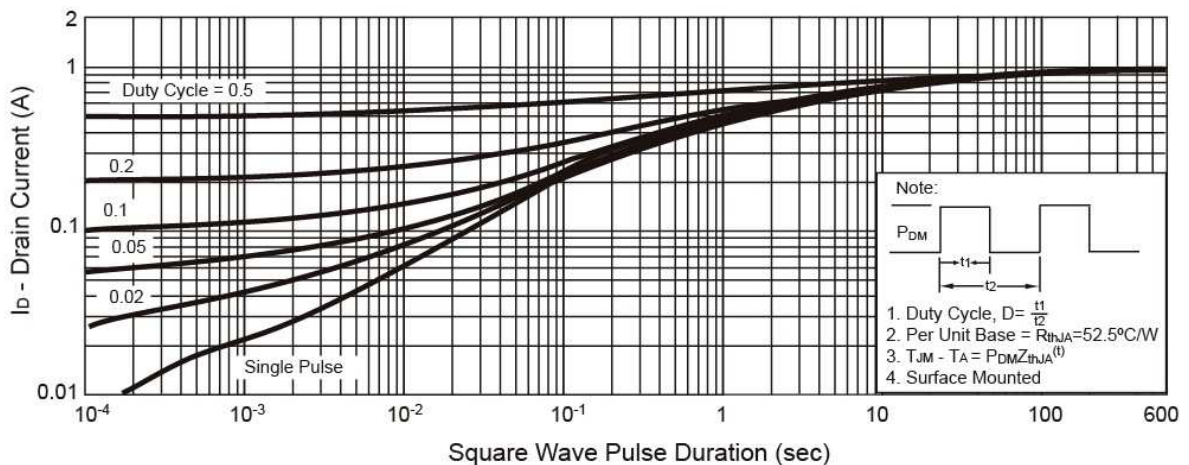
SOP-8 Mechanical Drawing
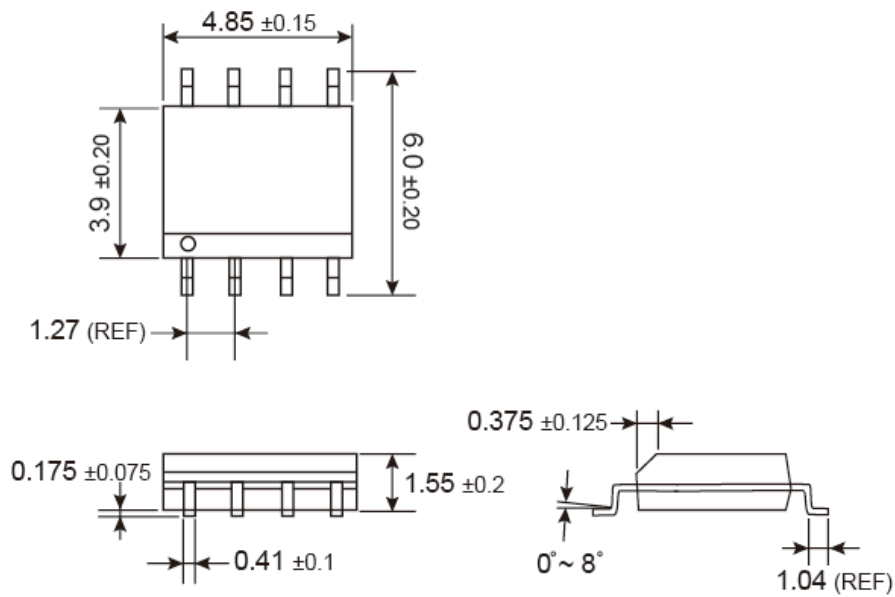
Marking Diagram
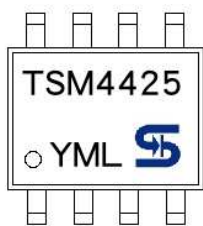
Y = Year Code

M = 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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