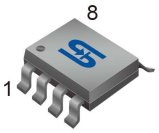
TSM9409

60V 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)
-60	155 @ V_{GS} = -10V	-3.5
	200 @ V_{GS} = 4.5V	-3.1

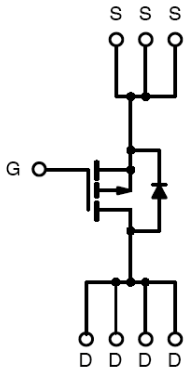
Features

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

Application

- Load Switch
- PA Switch

Block Diagram



P-Channel MOSFET

Ordering Information

Part No.	Package	Packing
TSM9409CS RLG	SOP-8	2.5Kpcs / 13” Reel

Note: “G” denote for Halogen Free Product

Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current		I_D	-3.5	A
Pulsed Drain Current		I_{DM}	-30	A
Continuous Source Current (Diode Conduction)[a,b]		I_S	-2.5	A
Maximum Power Dissipation	T_A = 25°C	P_D	3.0	W
	T_A = 70°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	$R\Theta_{JC}$	30	°C/W
Junction to Ambient Thermal Resistance (PCB mounted)	$R\Theta_{JA}$	50	°C/W

Notes:

a. Pulse width limited by the Maximum junction temperature

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

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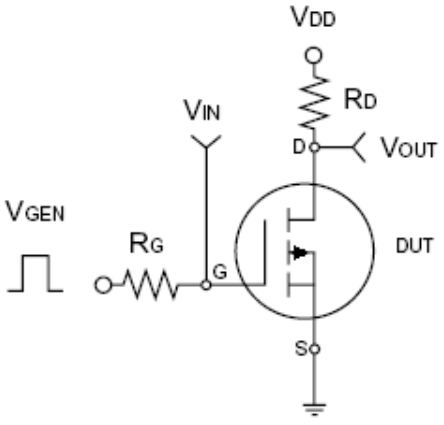
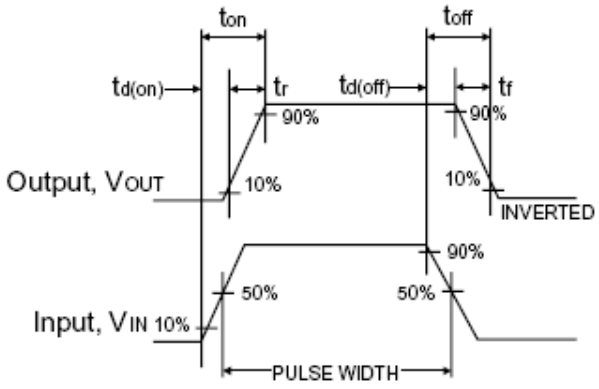
Electrical Specifications (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250uA	BV_{DSS}	-60	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	$V_{GS(TH)}$	-1.0	--	--	V
Gate Body Leakage	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = -60V, V_{GS} = 0V	I_{DSS}	--	--	-1.0	μA
On-State Drain Current[a]	V_{DS} =-5V, V_{GS} = -10V	$I_{D(ON)}$	-20	--	--	A
Drain-Source On-State Resistance[a]	V_{GS} = -10V, I_D = -3.5A	$R_{DS(ON)}$	--	125	155	mΩ
	V_{GS} = -4.5V, I_D = -3.1A		--	153	200	
Forward Transconductance[a]	V_{DS} = -15V, I_D = -3.5A	g_{fs}	--	8	--	S
Diode Forward Voltage	I_S = -2.5A, V_{GS} = 0V	V_{SD}	--	-1.25	-1.5	V
Dynamic[b]						
Total Gate Charge	V_{DS} = -15V, I_D = -3.5A, V_{GS} = -10V	Q_g	--	6	--	nC
Gate-Source Charge		Q_{gs}	--	1.7	--	
Gate-Drain Charge		Q_{gd}	--	1.5	--	
Input Capacitance	V_{DS} = -30V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	540	--	pF
Output Capacitance		C_{oss}	--	60	--	
Reverse Transfer Capacitance		C_{rss}	--	30	--	
Switching[c]						
Turn-On Delay Time	V_{DD} = -15V, R_L = 15Ω, I_D = -1A, V_{GEN} = -10V, R_G = 6Ω	$t_{d(on)}$	--	7	--	nS
Turn-On Rise Time		t_r	--	9	--	
Turn-Off Delay Time		$t_{d(off)}$	--	19	--	
Turn-Off Fall Time		t_f	--	4	--	

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.



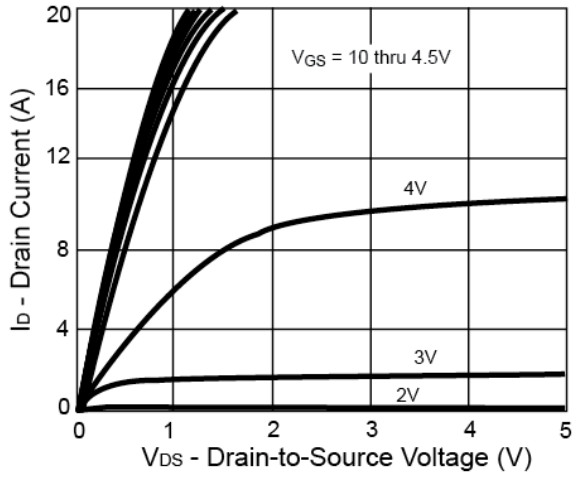
Switching Test Circuit



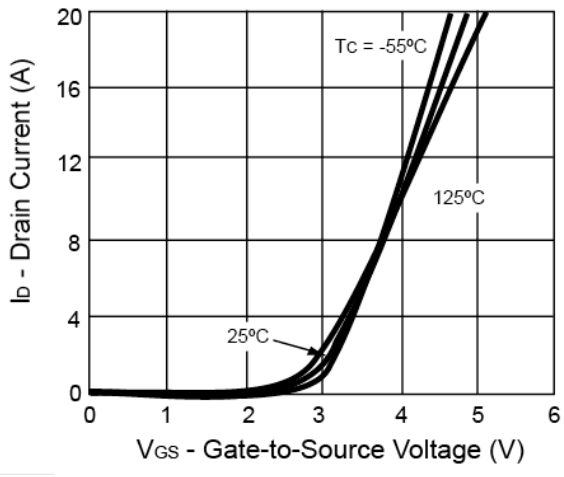
Switchin Waveforms

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

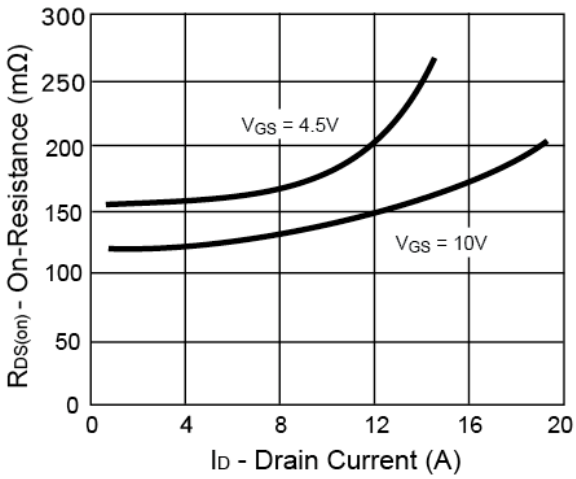
Output Characteristics



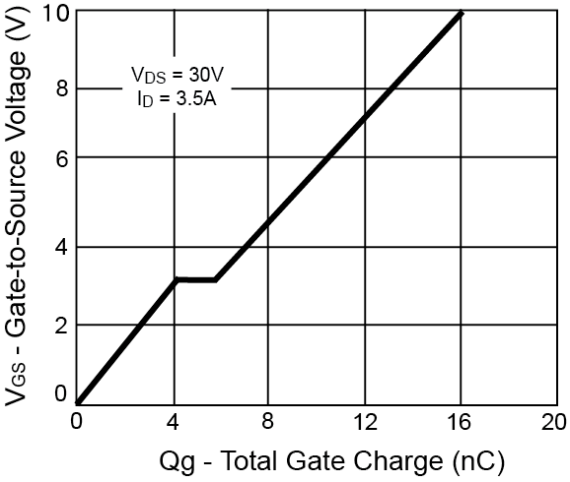
Transfer Characteristics



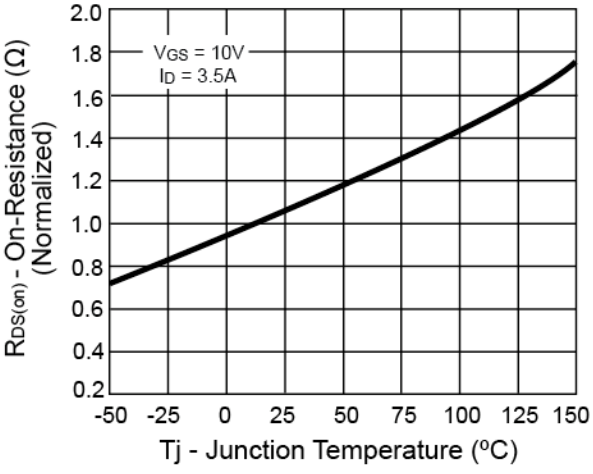
On-Resistance vs. Drain Current



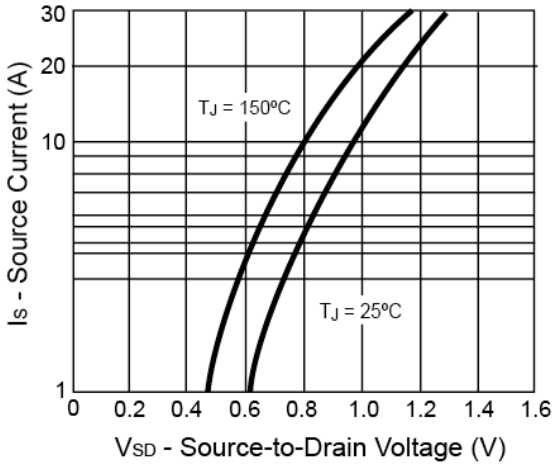
Gate Charge



On-Resistance vs. Junction Temperature

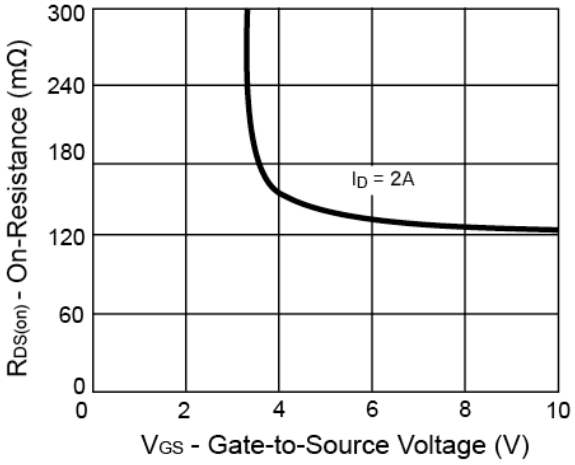


Source-Drain Diode Forward Voltage

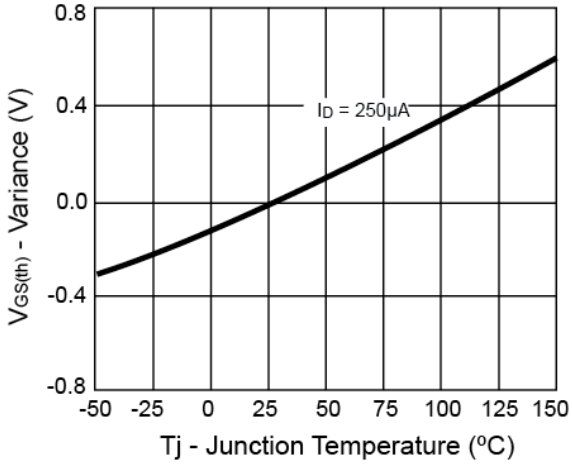


Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

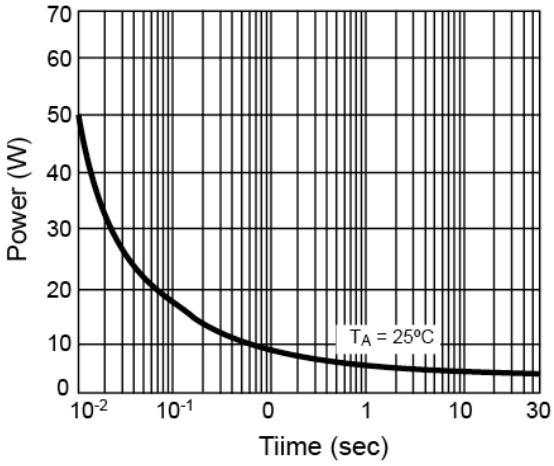
On-Resistance vs. Gate-Source Voltage



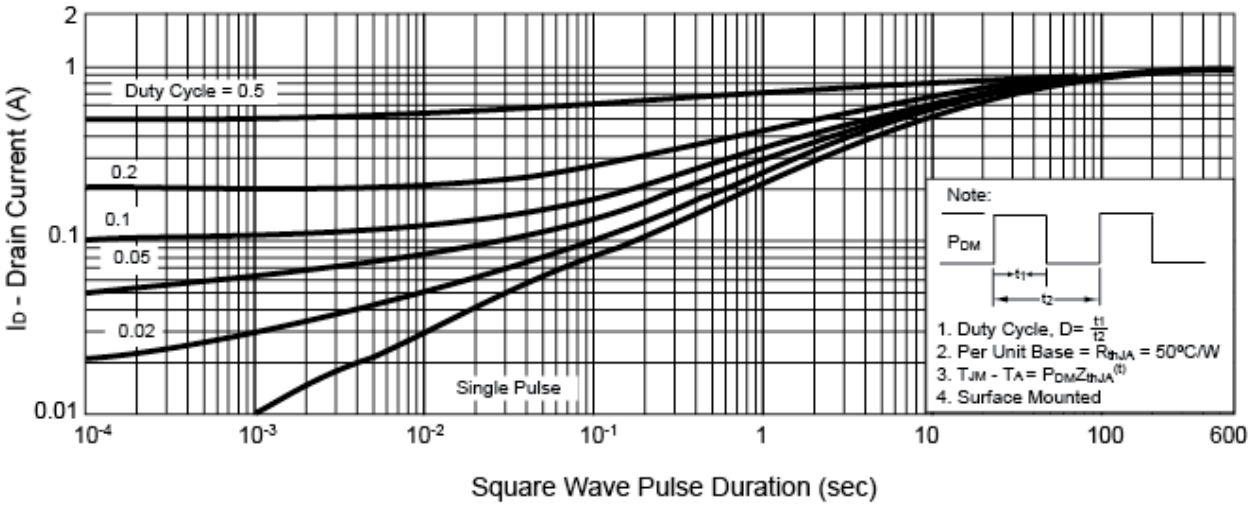
Threshold Voltage



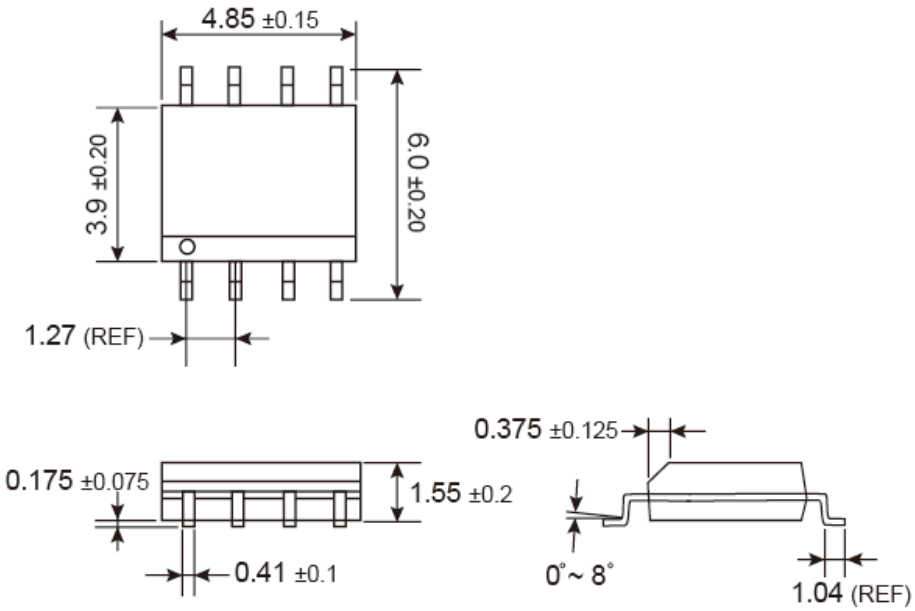
Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient

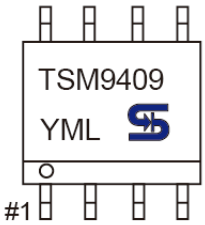


SOP-8 Mechanical Drawing



Unit: Millimeters

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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