

## P-Channel MOSFET MEM2309SG Series

### Description:

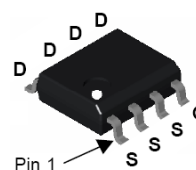
#### MEM2309SG Series P-channel

enhancement mode field-effect transistor, produced with high cell density DMOS trench technology, which is especially used to minimize on-state resistance.

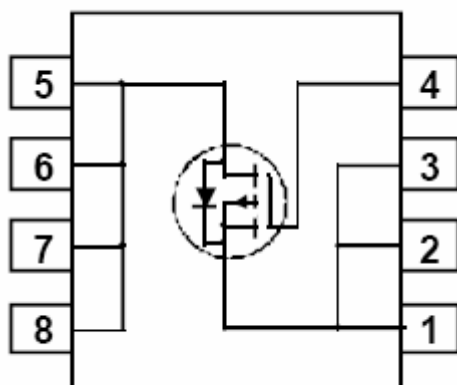
This device particularly suits low voltage applications, and low power dissipation.

### Feature:

- -30V/-6A  
 $R_{DS(ON)} = 53m\Omega @ V_{GS} = -10V, I_D = -6A$   
 $R_{DS(ON)} = 68m\Omega @ V_{GS} = -4.5V, I_D = -4A$
- High Density Cell Design For Ultra Low On-Resistance
- Surface mount package: SOP8



### Pin Configuration:



### Typical Application:

- Power management
- Load switch
- Battery protection

### Absolute Maximum Ratings:

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DSS}$	-30V	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	$I_D$	-6	A
Total Power Dissipation	$P_d$	2	W
Operating Temperature Range	$T_{Opr}$	150	$^{\circ}C$
Storage Temperature Range	$T_{stg}$	-65/150	$^{\circ}C$

## Electrical Characteristics:

### MEM2309SG

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	-34		V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1.1	-1.3	-2	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =20V		5	30	nA
		V <sub>DS</sub> =0V, V <sub>GS</sub> =-20V		-5	-30	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-24V V <sub>GS</sub> =0V		-6	-300	nA
Static Drain-Source On-Resistance	R <sub>DS(ON)1</sub>	V <sub>GS</sub> =-10V,I <sub>D</sub> =-6A	33	53	65	mΩ
	R <sub>DS(ON)2</sub>	V <sub>GS</sub> =-4.5V,I <sub>D</sub> =-4A	50	68	80	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -5 V, I <sub>D</sub> = -5.3 A		10		S
Drain-Source Diode Forward Current	I <sub>S</sub>				-2.1	A
Source-drain (diode forward) voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V,I <sub>D</sub> =-1A		-0.8	-1.2	V
Dynamic Characteristics						
Input Capacitance	Ciss	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0 V, f = 1 MHz		530		pF
Output Capacitance	Coss			140		
Reverse Transfer Capacitance	Crss			70		
Switching Characteristics						
Turn-On Delay Time	td(on)	V <sub>DD</sub> = -15 V, I <sub>D</sub> =-1 A, V <sub>GEN</sub> = -10 V, R <sub>g</sub> = 6 Ω		8	15	ns
Rise Time	tr			15	25	
Turn-Off Delay Time	td(off)			15	25	
Fall-Time	tf			10	15	
Total Gate Charge	Qg	V <sub>DS</sub> = -15 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -4A		10	15	nc
Gate-Source Charge	Qgs			2.2		
Gate-Drain Charge	Qgd			2.0		

## Typical Performance Characteristics:

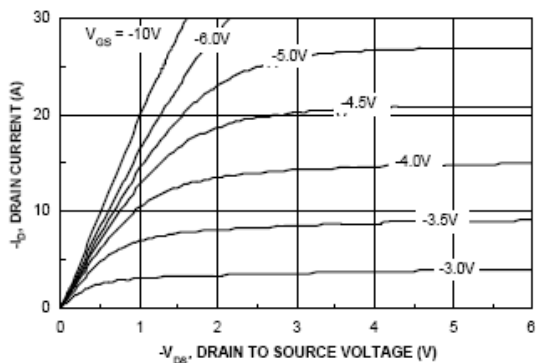


Figure 1. On-Region Characteristics.

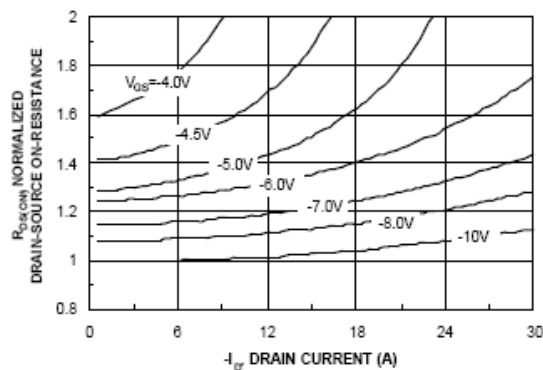


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

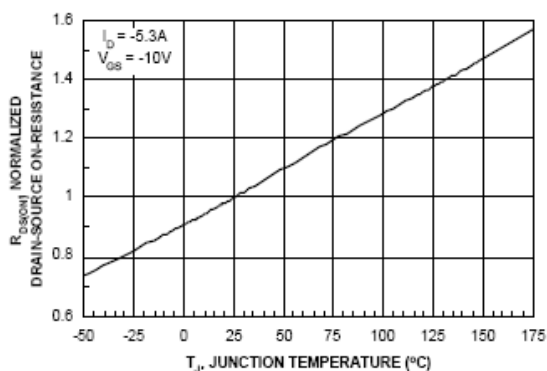


Figure 3. On-Resistance Variation with Temperature.

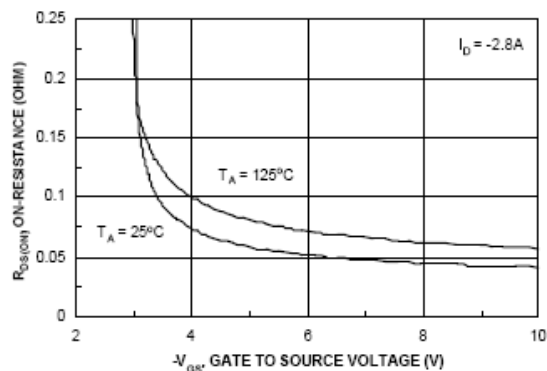


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

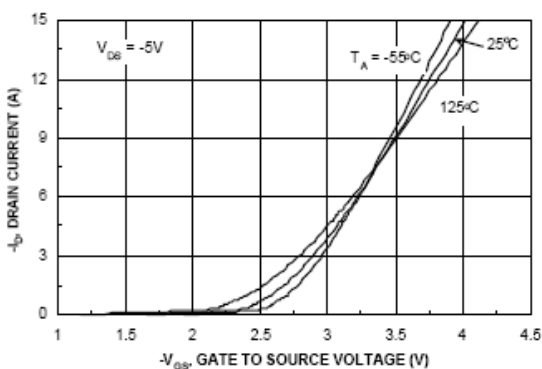


Figure 5. Transfer Characteristics.

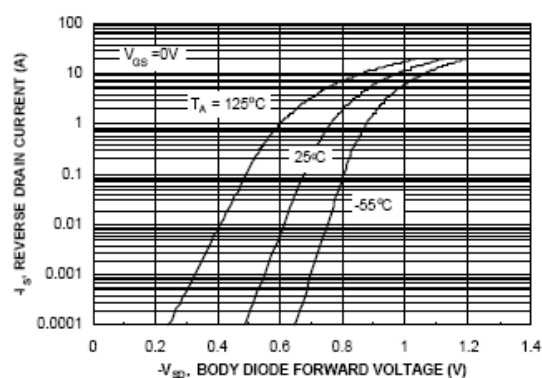


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

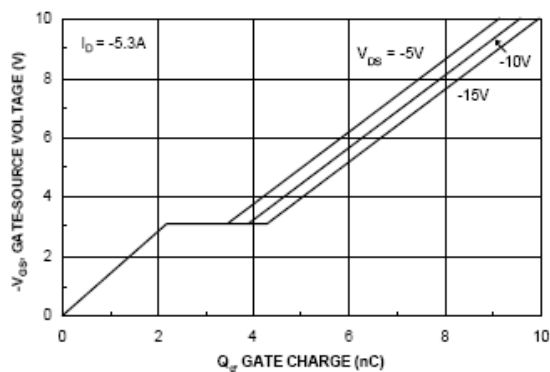


Figure 7. Gate Charge Characteristics.

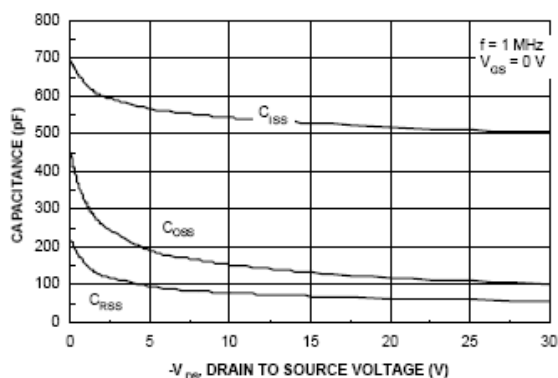


Figure 8. Capacitance Characteristics.

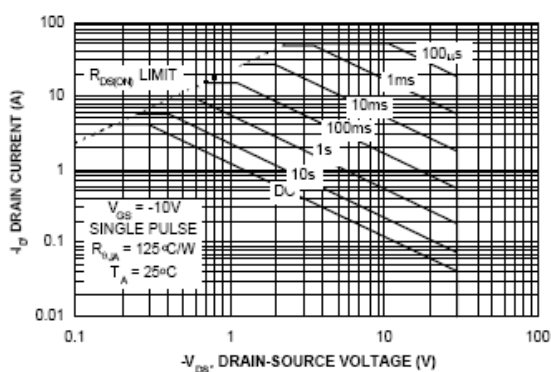


Figure 9. Maximum Safe Operating Area.

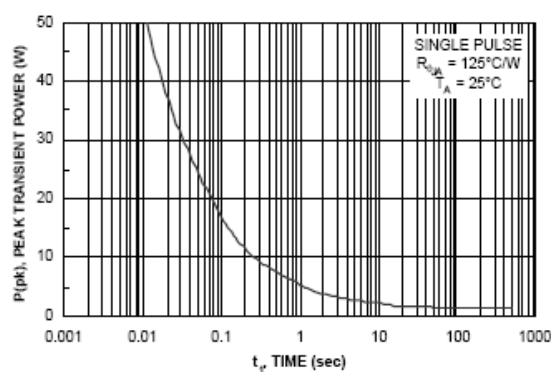


Figure 10. Single Pulse Maximum Power Dissipation.

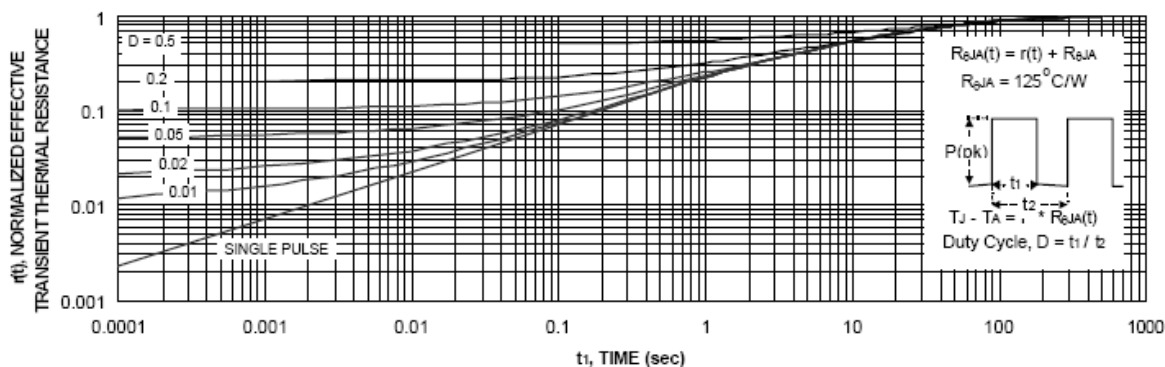
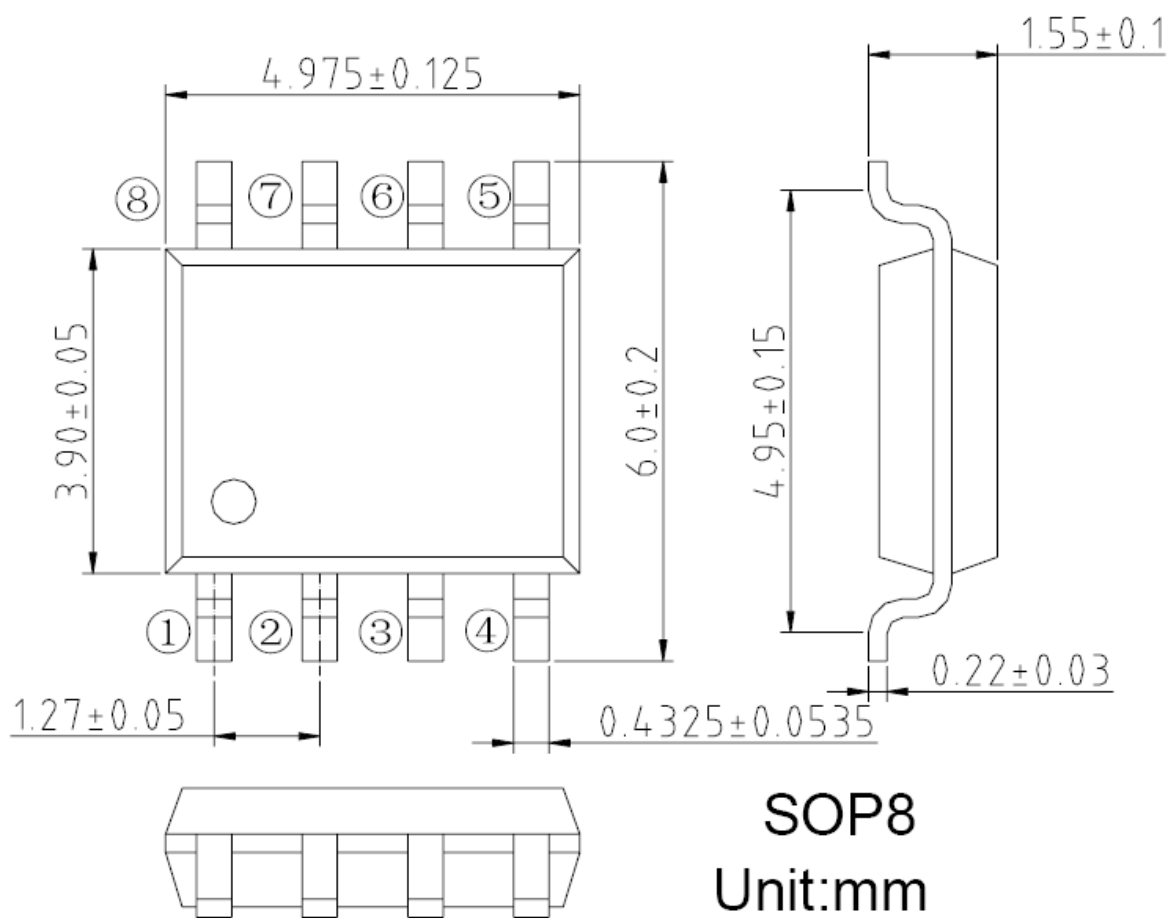


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c.  
Transient thermal response will change depending on the circuit board design.

**Package Information:**



- The information described herein is subject to change without notice.
- Nanjing Micro One Electronics Inc is not responsible for any problems caused by circuits or diagrams described herein whose related industrial properties, patents, or other rights belong to third parties. The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.
- Use of the information described herein for other purposes and/or reproduction or copying without the express permission of Nanjing Micro One Electronics Inc is strictly prohibited.
- The products described herein cannot be used as part of any device or equipment affecting the human body, such as exercise equipment, medical equipment, security systems, gas equipment, or any apparatus installed in airplanes and other vehicles, without prior written permission of Nanjing Micro One Electronics Inc.
- Although Nanjing Micro One Electronics Inc exerts the greatest possible effort to ensure high quality and reliability, the failure or malfunction of semiconductor products may occur. The user of these products should therefore give thorough consideration to safety design, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue.