

SuperMOS – SOP8 -30V 5.8mΩ R_{DS(ON)}, P-channel MOSFET

1. Description

The AO4409-ES uses advanced trench technology MOSFETs to provide excellent R_{DS(ON)} and low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product AO4409-ES Pb-free

2. Features

- -30V R_{DS(ON)}=5.8mΩ(Typ.) @V_{GS}=-10V
R_{DS(ON)}=8.0mΩ(Typ.) @V_{GS}=-4.5V
- Fast Switching
- High density cell design for low R_{DS(on)}
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

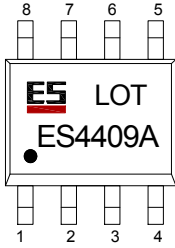
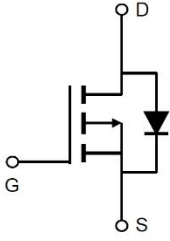
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
AO4409-ES	SOP8	ES4409/LOT	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
4	Gate		
1/2/3	Source		
5/6/7/8	Drain		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limited	Unit
Drain-Source Voltage	BV_{DSS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	-14
		$T_A=100^\circ\text{C}$	-8.8
Maximum Power Dissipation	P_D	$T_A=25^\circ\text{C}$	3
		$T_A=100^\circ\text{C}$	1.2
Pulsed Drain Current	I_{DM}	-53	A
Single Pulse Avalanche Current ^a	I_{AS}	-40	A
Single Pulse Avalanche Energy ^a	E_{AS}	80	mJ
Operating Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{stg}	-55 to +150	°C

Thermal resistance ratings

Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$		41.6	°C/W

Notes:

a: The EAS data shows Max. rating The test condition is $V_{DD} = -25\text{V}$, $V_{GS} = -10\text{V}$, $L = 0.1\text{mH}$

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V, V_{DS}=-30V$			-1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0		-2.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-12A$		5.8	9	m Ω
		$V_{GS}=-4.5V, I_D=-10A$		8	14	
Forward Transconductance	g_{FS}	$V_{DS}=-10V, I_D=-10A$		50		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=-15V$ $f=1MHz$		3100		pF
Output Capacitance	C_{OSS}			430		
Reverse Transfer Capacitance	C_{RSS}			358		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=-10V, V_{DS}=-15V$ $I_D=-12A$		35		nC
Gate-to-Source Charge	Q_{GS}			10		
Gate-to-Drain Charge	Q_{GD}			10.5		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=-10V, V_{DS}=-15V$ $I_D=-12A, R_G=3\Omega$		11		ns
Rise Time	t_r			13.3		
Turn-Off Delay Time	$t_{d(OFF)}$			74		
Fall Time	t_f			35		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=-10A$	-4.5		-1.5	V

7. Typical Characteristic

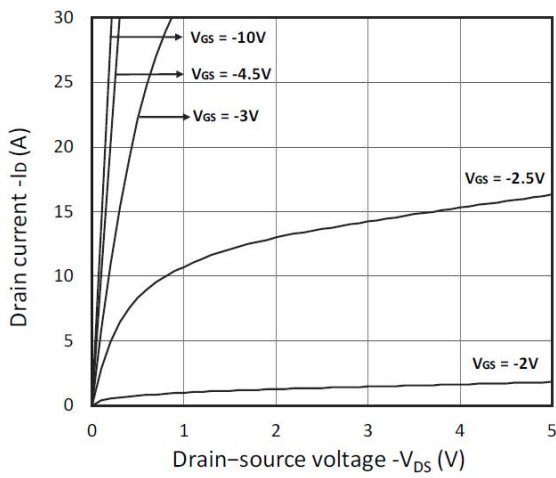


Figure 1. Output Characteristics

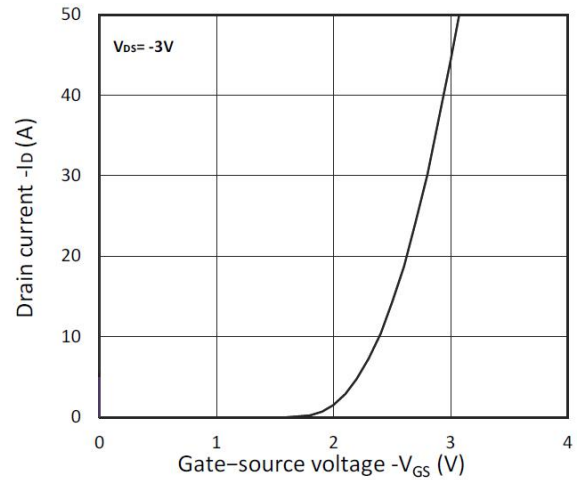


Figure 2. Transfer Characteristics

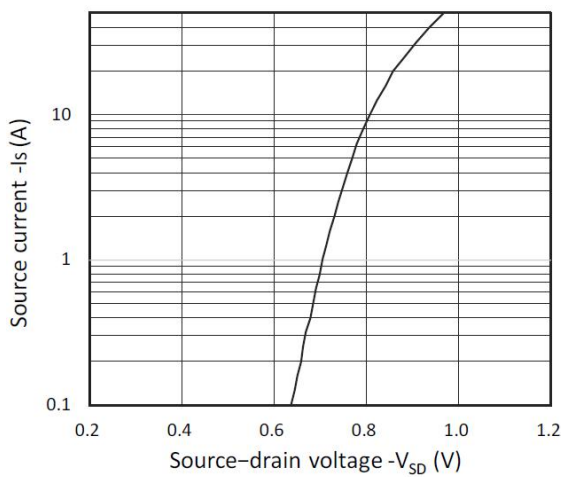


Figure 3. Forward Characteristics of Reverse

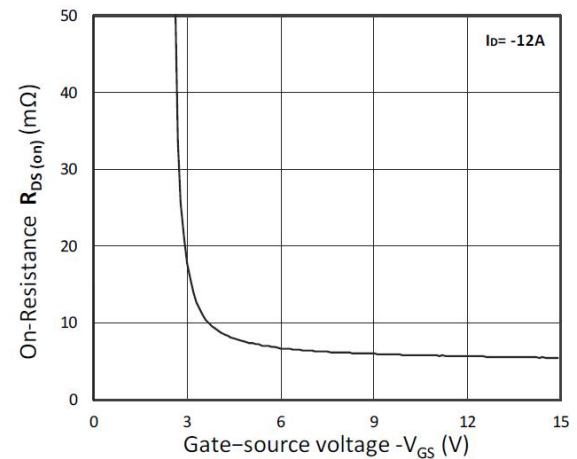


Figure 4. $R_{DS(on)}$ vs. V_{GS}

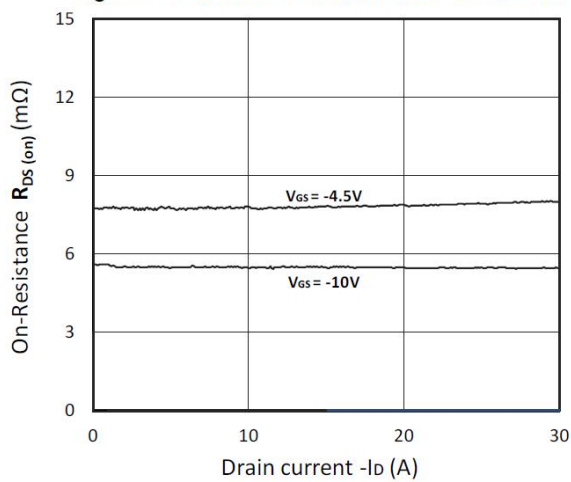


Figure 5. $R_{DS(on)}$ vs. I_D

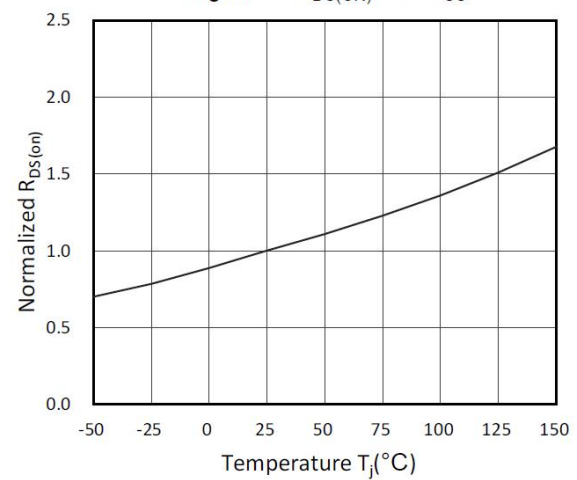


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

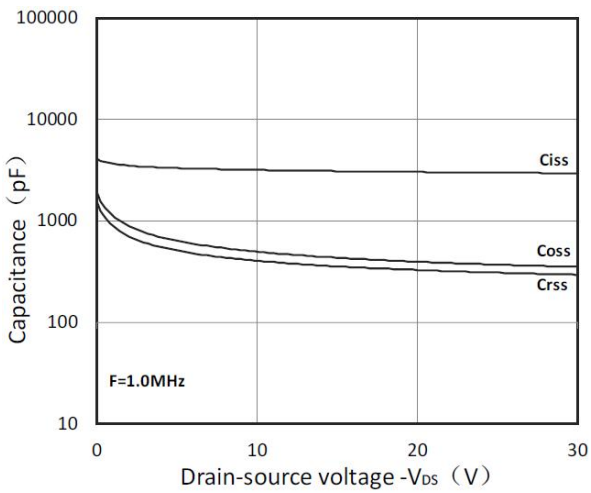


Figure 7. Capacitance Characteristics

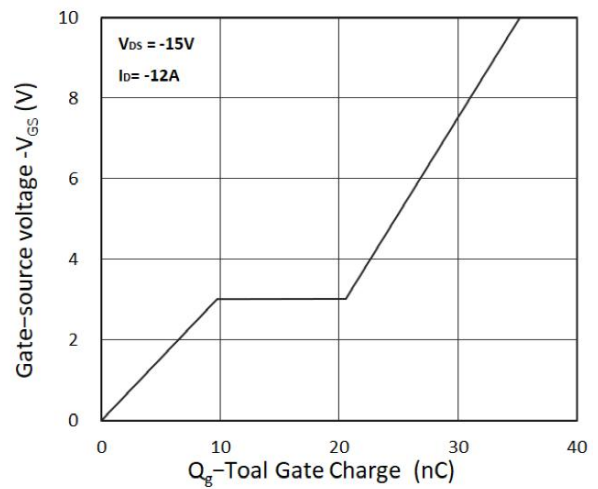


Figure 8. Gate Charge Characteristics

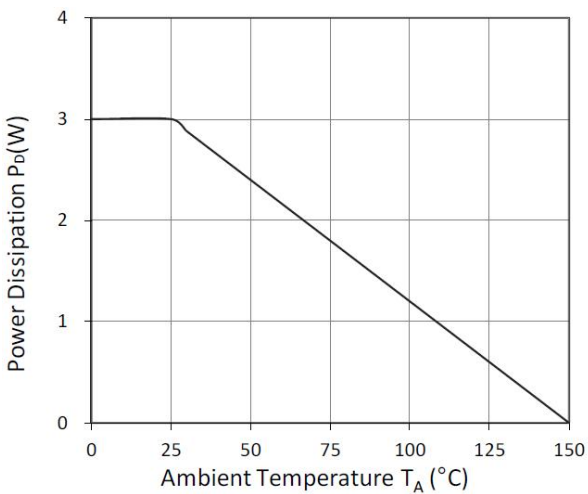


Figure 9. Power Dissipation

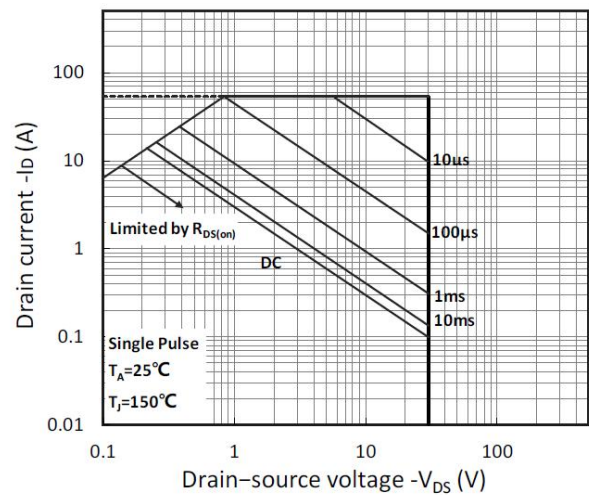


Figure 10. Safe Operating Area

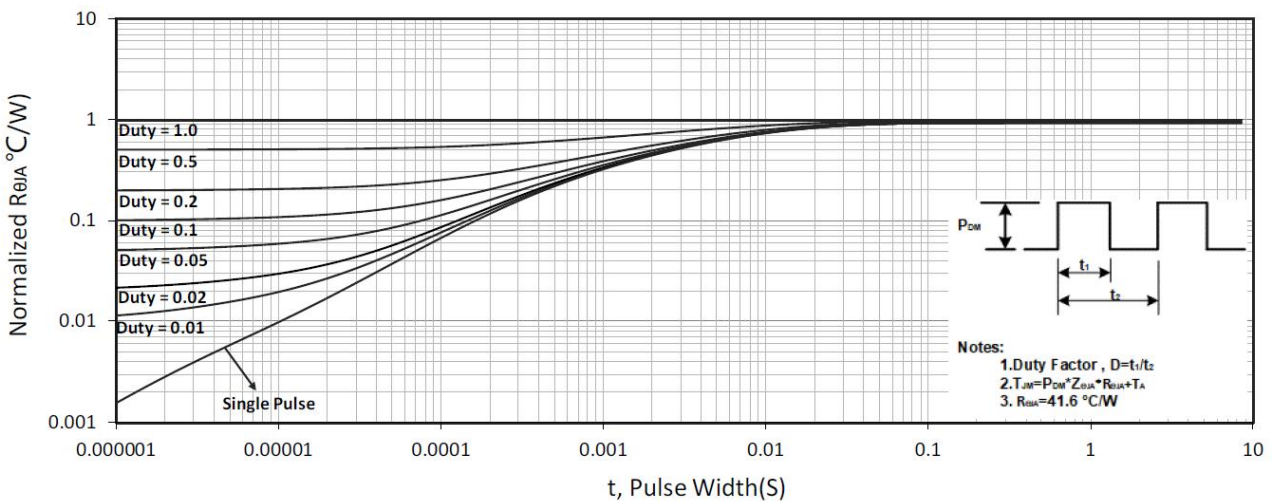
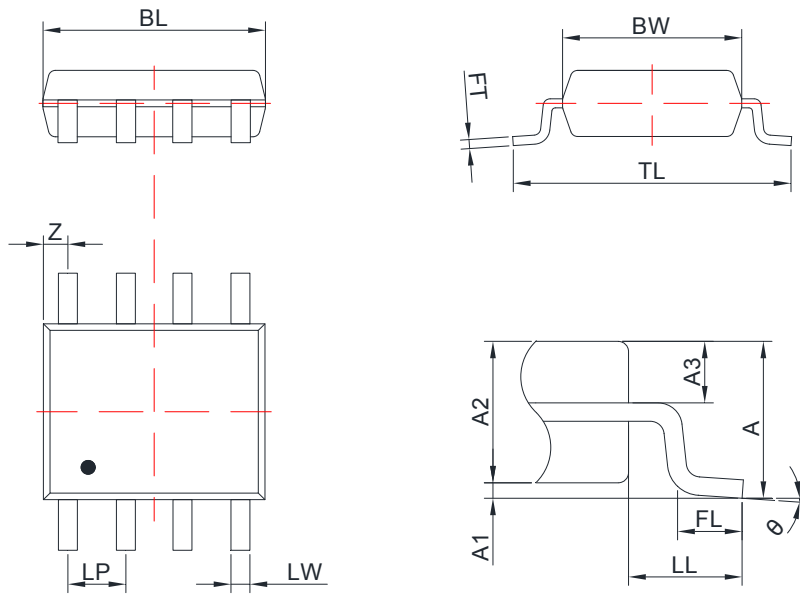


Figure 11. Normalized Maximum Transient Thermal Impedance

8. Dimension (SOP8)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	1.75		FL	0.50	0.80
A1	0.05	0.15	LP	1.25	1.30
A2	1.40	1.50	LL	1.1 BSC	
A3	0.623 BSC		LW	0.38	0.43
BL	4.80	5.00	TL	5.90	6.10
BW	3.70	4.10	Z	0.54	
FT	0.20	0.21	θ	0°	8°

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