



## Description

The AO4459 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



SOP-8

## General Features

$V_{DS} = -30V$   $I_D = -5.8A$

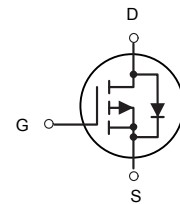
$R_{DS(ON)} < 55m\Omega$  @  $V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



P-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AO4459	SOP-8	9435 XXX YYYY	3000

## Absolute Maximum Ratings (Tc=25°C unless otherwise noted )

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	- 30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_A=25^\circ C$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	-5.8	A
IDM	Pulsed Drain Current <sup>1</sup>	-20	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	2.5	W
	Linear Derating Factor	0.02	W/°C
TSTG	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	50	°C/W



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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-5.1A$	-	43	55	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4.2A$	-	62	90	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-15V, I_D=-4.5A$	4	7	-	S
<b>Dynamic Characteristics (Note 4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	520	-	PF
Output Capacitance	$C_{oss}$		-	130	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	70	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-1A, V_{GS}=-10V, R_{GEN}=6\Omega$	-	7	-	nS
Turn-on Rise Time	$t_r$		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14	-	nS
Turn-Off Fall Time	$t_f$		-	9	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-5.1A, V_{GS}=-10V$	-	11	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	3	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-5.1A$	-	-	-1.2	V

#### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production



### Typical Electrical and Thermal Characteristics

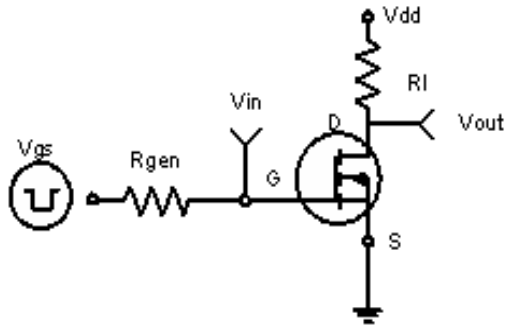


Figure 1: Switching Test Circuit

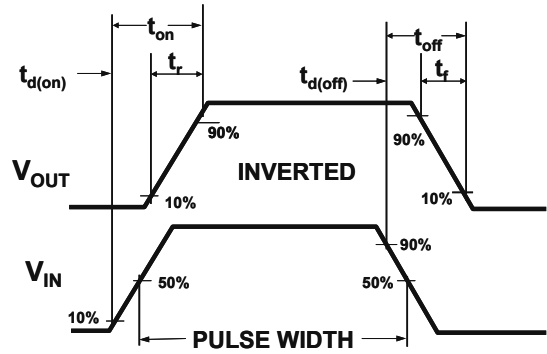


Figure 2: Switching Waveforms

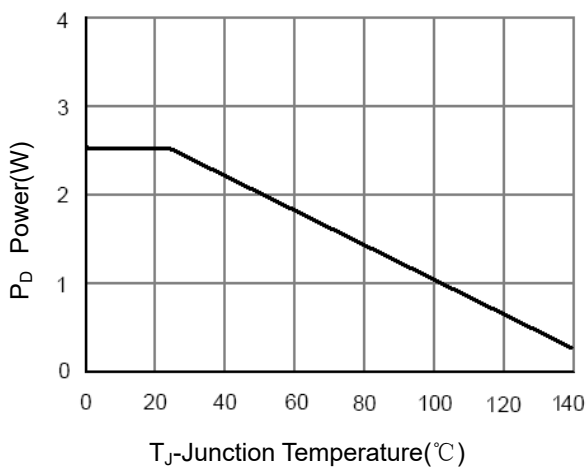


Figure 3 Power Dissipation

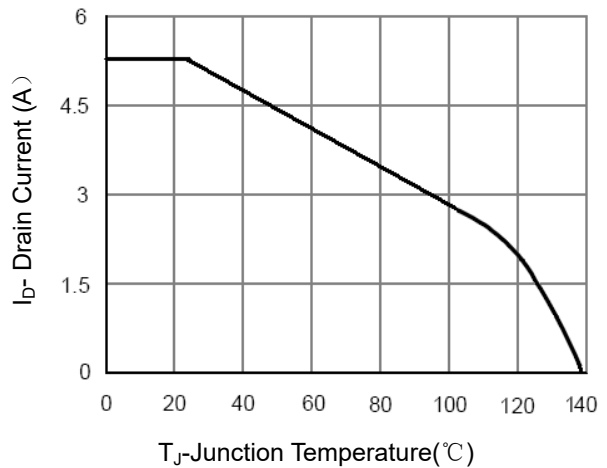


Figure 4 Drain Current

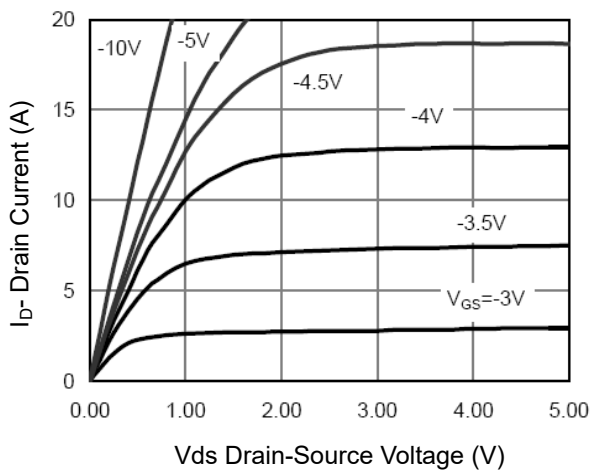


Figure 5 Output Characteristics

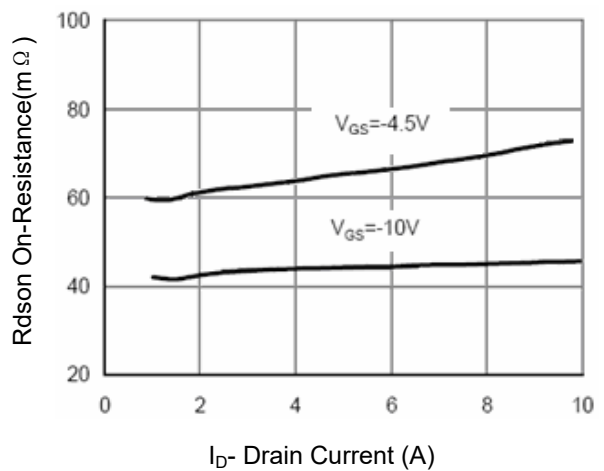
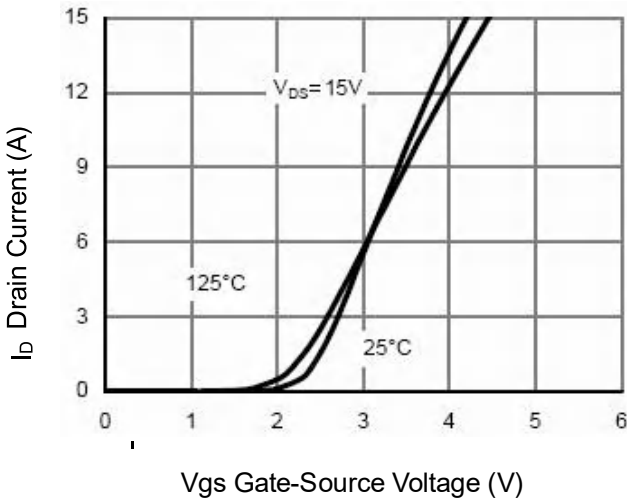


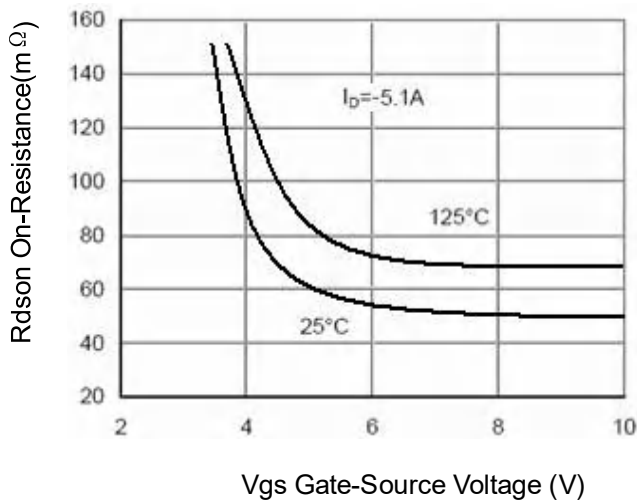
Figure 6 Drain-Source On-Resistance



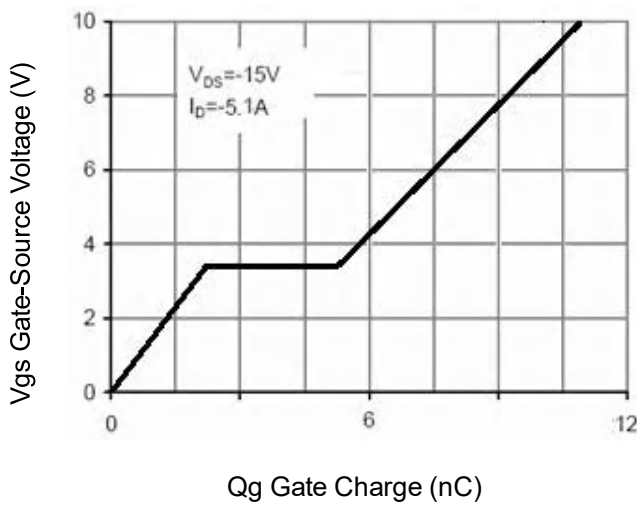
**Figure 5 Output Characteristics**



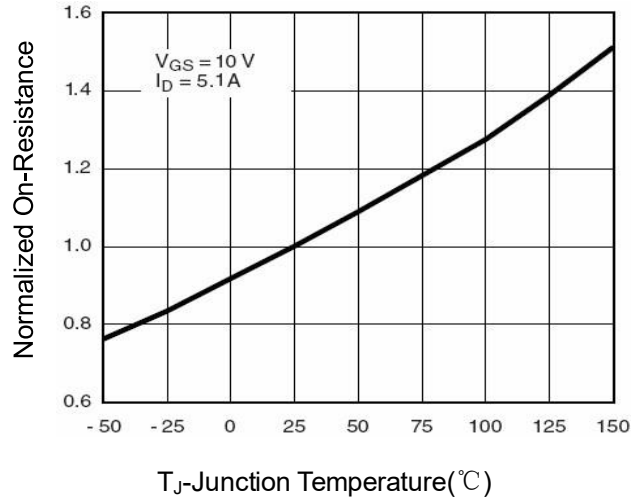
**Figure 7 Transfer Characteristics**



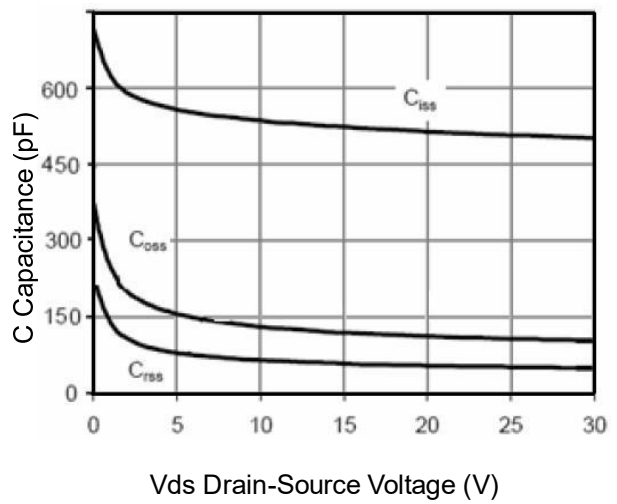
**Figure 9 Rdson vs Vgs**



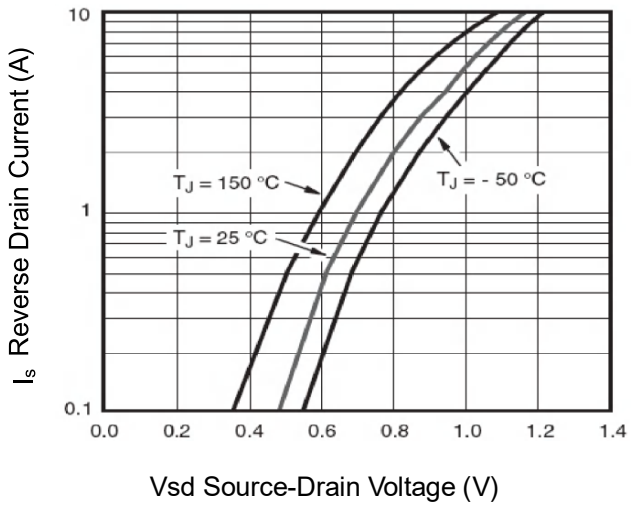
**Figure 11 Gate Charge**



**Figure 10 Capacitance vs Vds**



**Figure 12 Source- Drain Diode Forward**



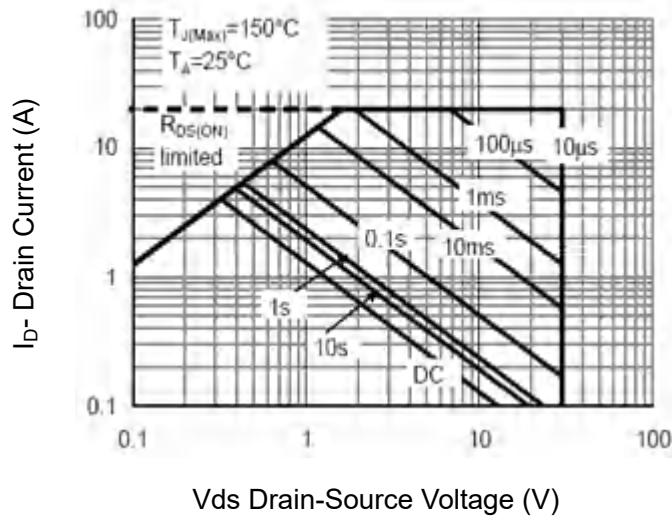


Figure 13 Safe Operation Area

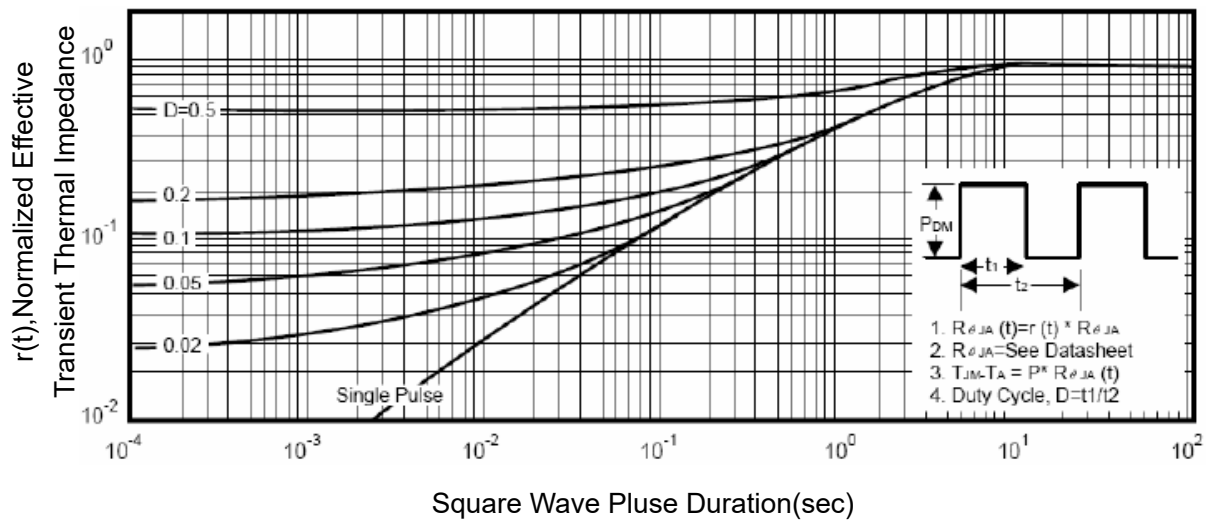
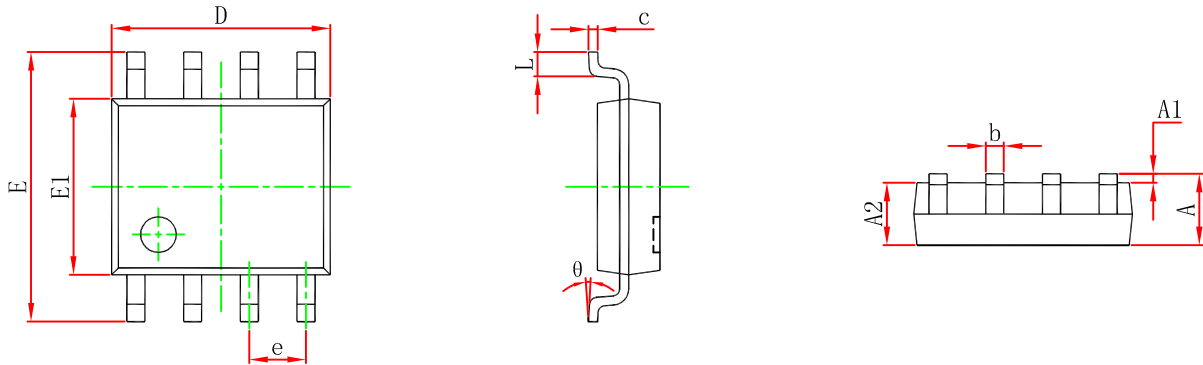


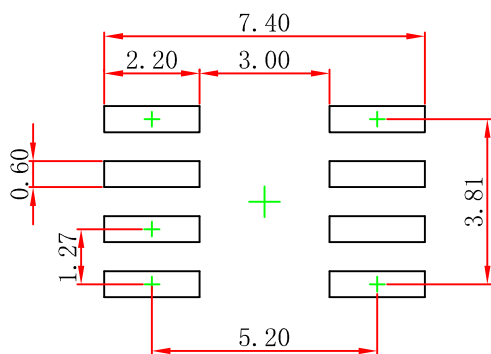
Figure 14 Normalized Maximum Transient Thermal Impedance



### SOP-8 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05\text{mm}$ .
  3. The pad layout is for reference purposes only.



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