



ALPHA & OMEGA
SEMICONDUCTOR



AO4427

P-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4427/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications. The device is ESD protected.

AO4427 and AO4427L are electrically identical.

-RoHS Compliant

-AO4427L is Halogen Free

Features

V_{DS} (V) = -30V

I_D = -12.5 A (V_{GS} = -20V)

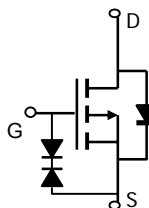
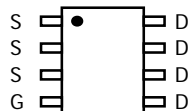
$R_{DS(ON)} < 12m\Omega$ (V_{GS} = -20V)

$R_{DS(ON)} < 14m\Omega$ (V_{GS} = -10V)

ESD Rating: 2KV HBM

Ciss, Coss, Crss Tested

SOIC-8
Top View



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^{AF}	I_D	-12.5	A
		-10.5	
Pulsed Drain Current ^B	I_{DM}	-60	
Power Dissipation ^A	P_D	3	W
		2.1	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{AF}	$R_{\theta JA}$	28	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		54	75	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	21	30	$^\circ\text{C/W}$

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =-250μA, V _{GS} =0V	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±25V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =-250μA	-1.7	-2.5	-3	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-60			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-20V, I _D =-12.5A T _J =125°C		9.4 12.2	12 15	mΩ
		V _{GS} =-10V, I _D =-10A		11.5	14	mΩ
		V _{GS} =-4.5V, I _D =-5A		32		mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-12.5A		24		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V			-1	V
I _S	Maximum Body-Diode Continuous Current				-4.2	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		2330	2900	pF
C _{oss}	Output Capacitance			480		pF
C _{rss}	Reverse Transfer Capacitance			320	448	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	3.4	6.8	10	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-12.5A		41	52	nC
Q _{gs}	Gate Source Charge			10		nC
Q _{gd}	Gate Drain Charge			12		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =1.2Ω, R _{GEN} =3Ω		12.8		ns
t _r	Turn-On Rise Time			10.3		ns
t _{D(off)}	Turn-Off DelayTime			49.5		ns
t _f	Turn-Off Fall Time			29		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-12.5A, dI/dt=100A/μs		28	35	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-12.5A, dI/dt=100A/μs		20		nC

A: The value of R_{θJA} is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

F: The current rating is based on the ≤ 10s junction to ambient thermal resistance rating.

Rev7: MAY 2008

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

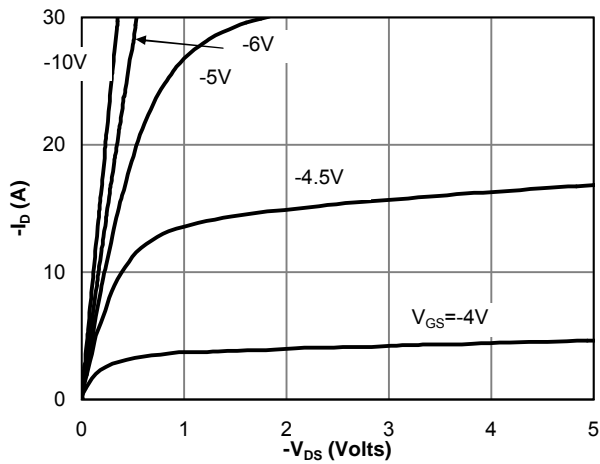


Figure 1: On-Region Characteristics

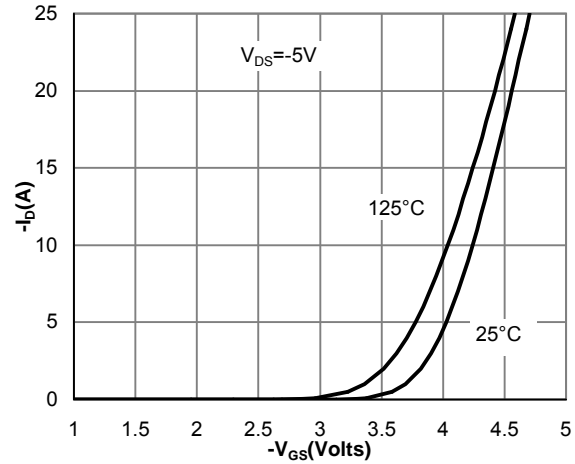


Figure 2: Transfer Characteristics

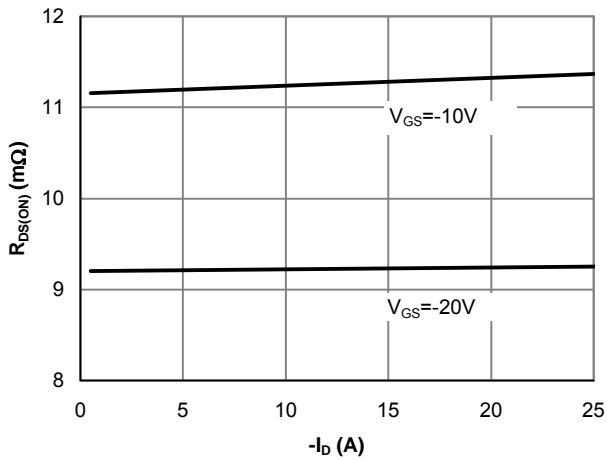


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

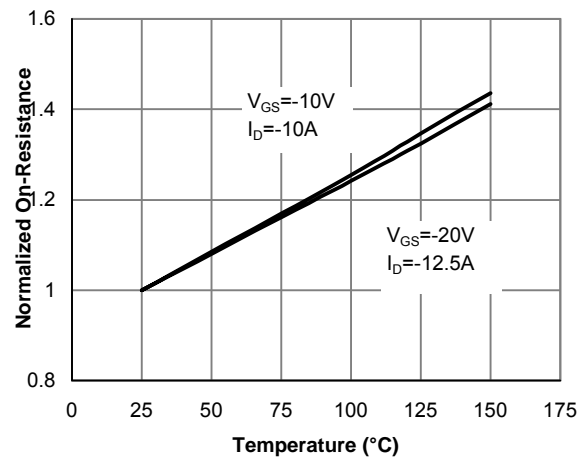


Figure 4: On-Resistance vs. Junction Temperature

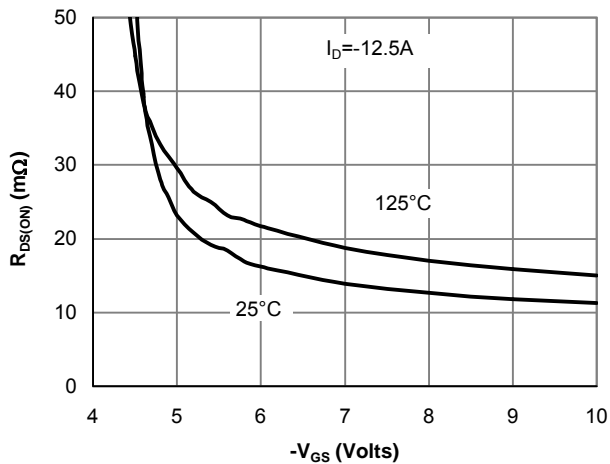


Figure 5: On-Resistance vs. Gate-Source Voltage

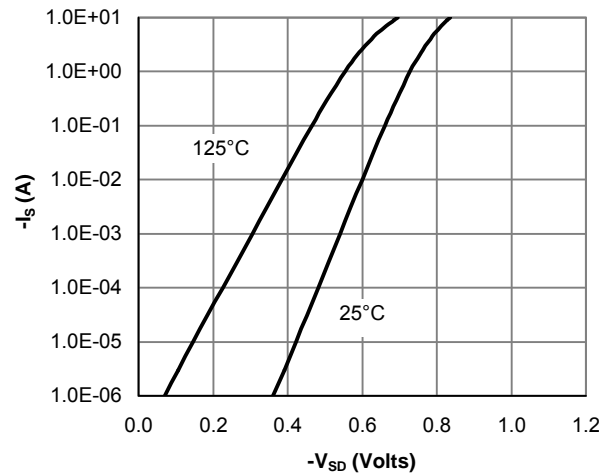


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

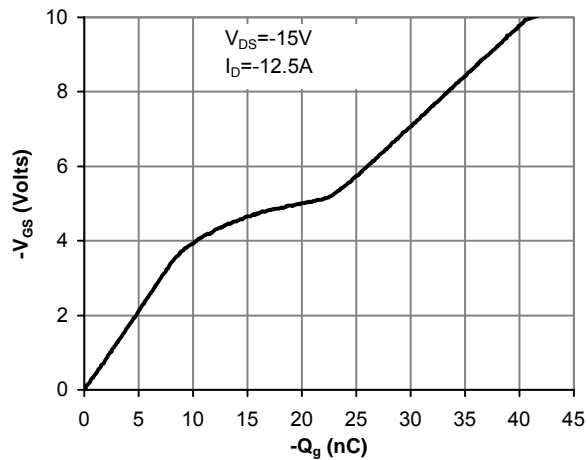


Figure 7: Gate-Charge Characteristics

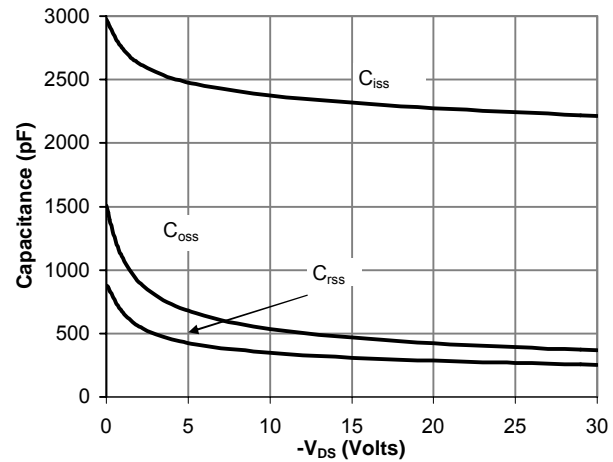


Figure 8: Capacitance Characteristics

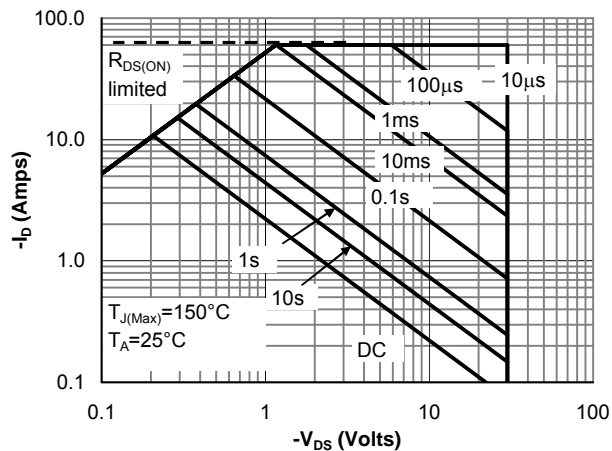


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

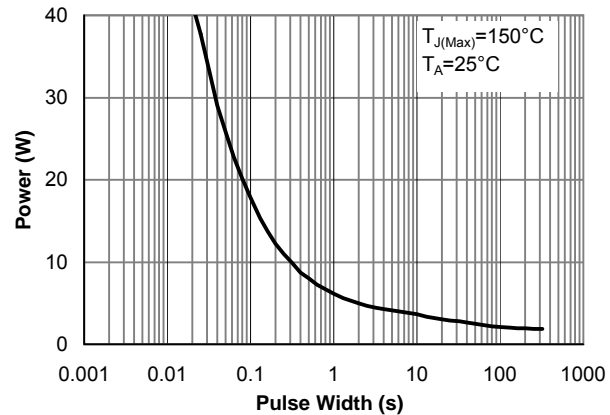


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

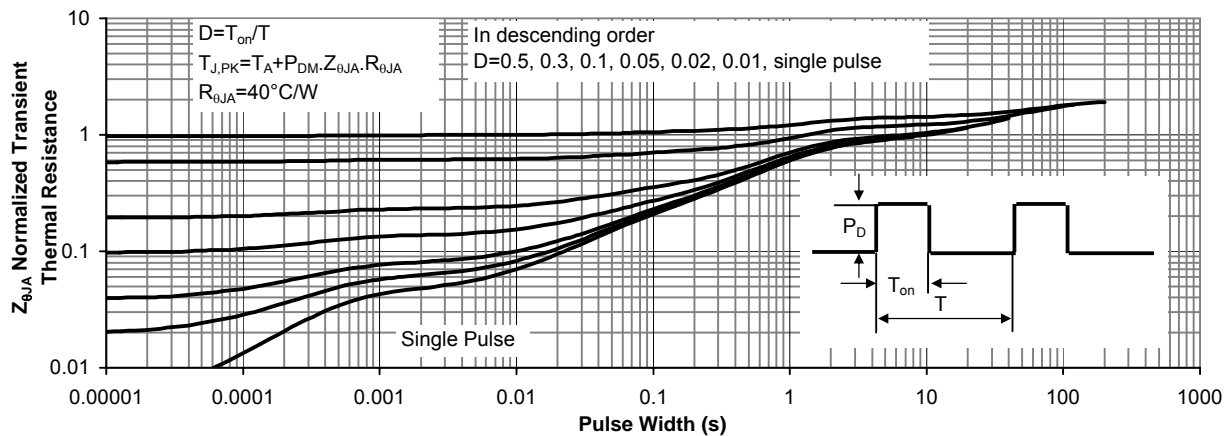


Figure 11: Normalized Maximum Transient Thermal Impedance