ALPHA & OMEGA SEMICONDUCTOR

AO4425
P-Channel Enhancement Mode Field Effect Transistor

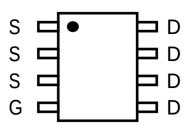
General Description

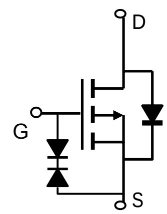
The AO4425/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications. It is ESD protected. *AO4425 and AO4425L are electrically identical.*
-RoHS Compliant
-AO4425L is Halogen Free

Features

V_{DS} (V) = -38V
I_D = -14A (V_{GS} = -20V)
$R_{DS(ON)}$ < 10mΩ (V_{GS} = -20V)
$R_{DS(ON)}$ < 11mΩ (V_{GS} = -10V)
ESD Rating: 4000V HBM

SOIC-8
Top View





Absolute Maximum Ratings T_A=25°C unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	-38	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current [A]	T_A=25°C	I_D	-14	A
	T_A=70°C		-11	
Pulsed Drain Current [B]		I_{DM}	-50	
Power Dissipation [A]	T_A=25°C	P_D	3.1	W
	T_A=70°C		2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	26	40	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		50	75	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	14	24	°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	-38			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V			-100	nA
		T_J=55°C			-500	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V			±1	µA
		V_{DS}=0V, V_{GS}=±25V			±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA	-2	-2.5	-3.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V	-50			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-20V, I_D=-14A		7.7	10	mΩ
		T_J=125°C		11	13.5	
		V_{GS}=-10V, I_D=-14A		8.8	11	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-14A		43		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		0.71	1	V
I_S	Maximum Body-Diode Continuous Current				4.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-20V, f=1MHz		3800		pF
C_{oss}	Output Capacitance			560		pF
C_{rss}	Reverse Transfer Capacitance			350		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		7.5		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-20V, I_D=-14A		63		nC
Q_{gs}	Gate Source Charge			14.1		nC
Q_{gd}	Gate Drain Charge			16.1		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-20V, R_L=1.35Ω, R_{GEN}=3Ω		12.4		ns
t_r	Turn-On Rise Time			9.2		ns
$t_{D(off)}$	Turn-Off DelayTime			97.5		ns
t_f	Turn-Off Fall Time			45.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-14A, dI/dt=100A/µs		35		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-14A, dI/dt=100A/µs		33		nC

A: The value of $R_{\theta JA}$ 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. The current rating is based on the t≤ 10s thermal resistance rating.
B: Repetitive rating, pulse width limited by junction temperature.
C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.
D. The static characteristics in Figures 1 to 6,12,14 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.
Rev 2 : Jan 2008

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

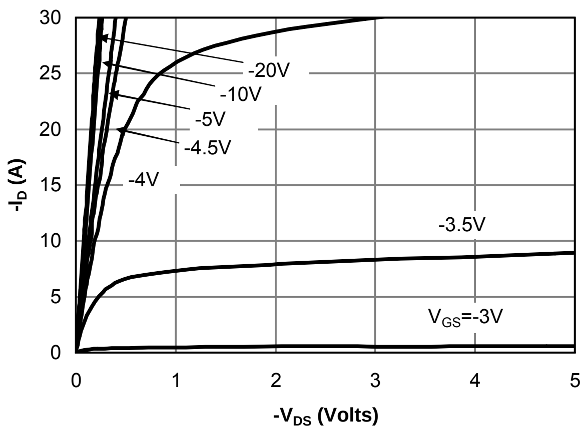


Fig 1: On-Region Characteristics

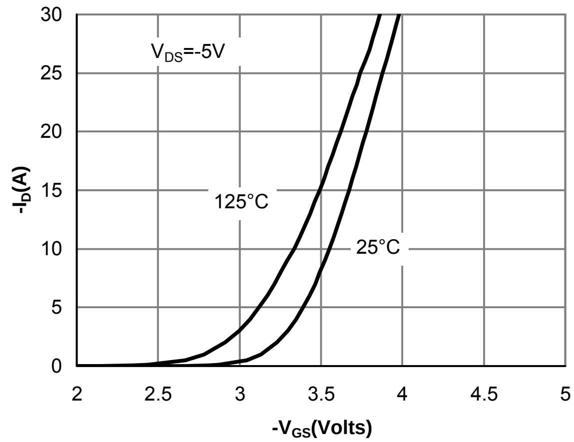


Figure 2: Transfer Characteristics

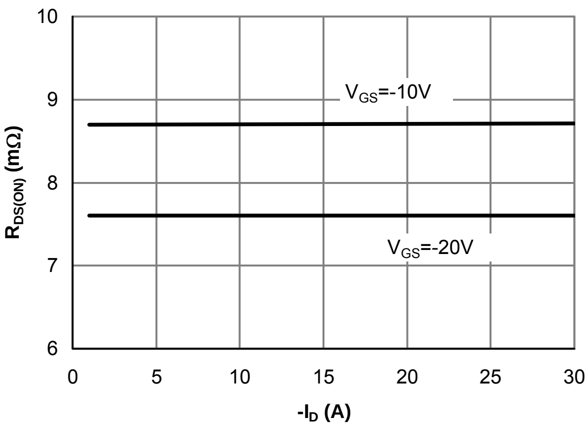


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

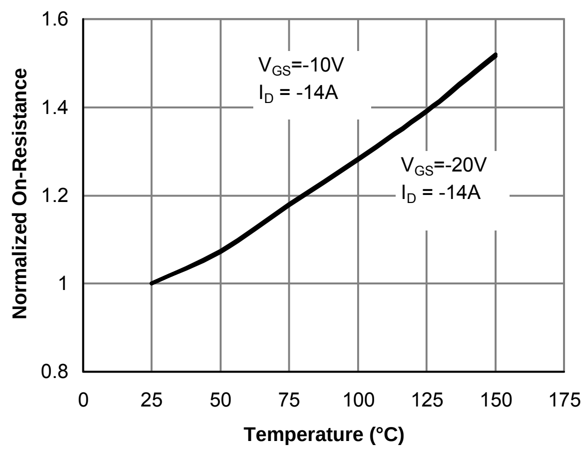


Figure 4: On-Resistance vs. Junction Temperature

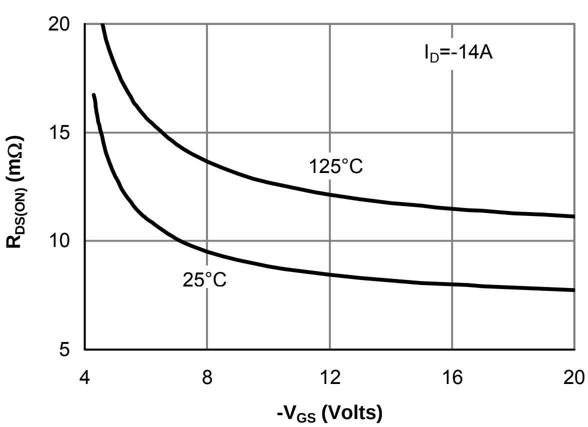


Figure 5: On-Resistance vs. Gate-Source Voltage

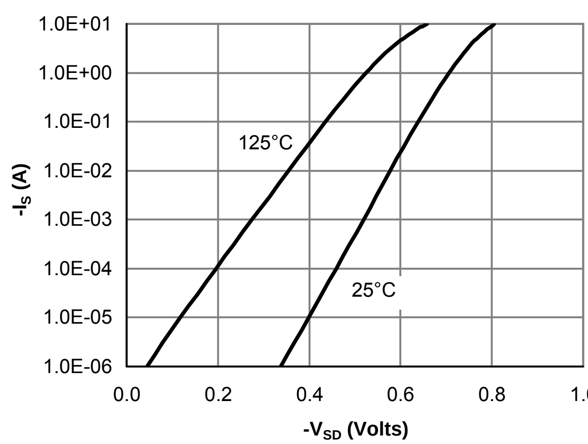


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

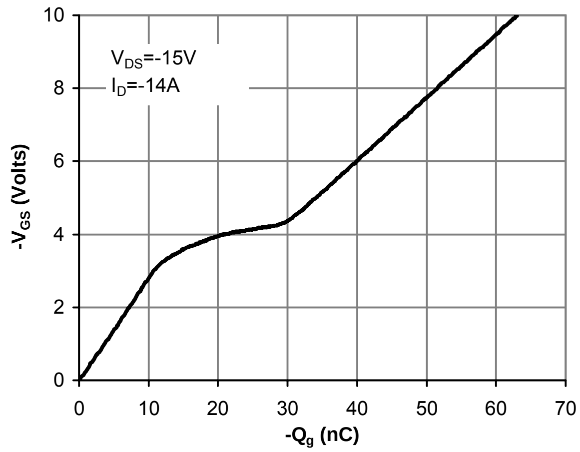


Figure 7: Gate-Charge Characteristics

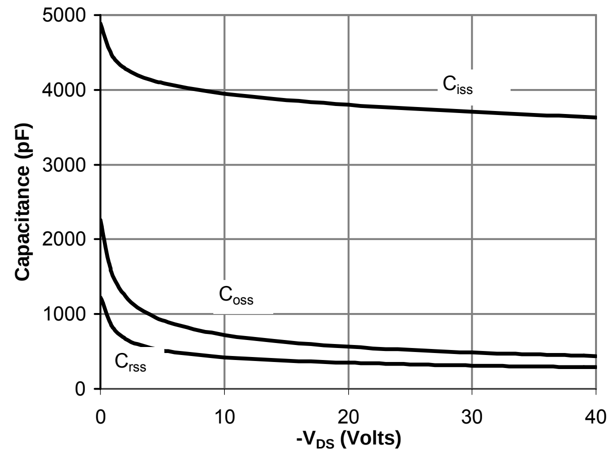


Figure 8: Capacitance Characteristics

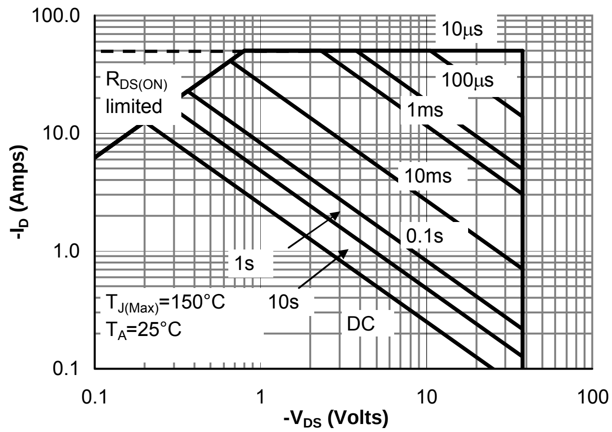


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

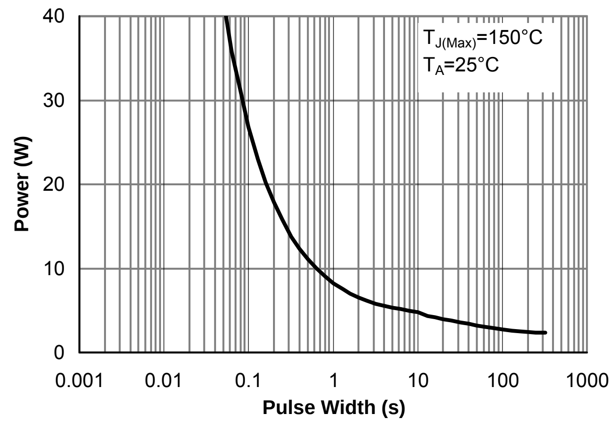


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

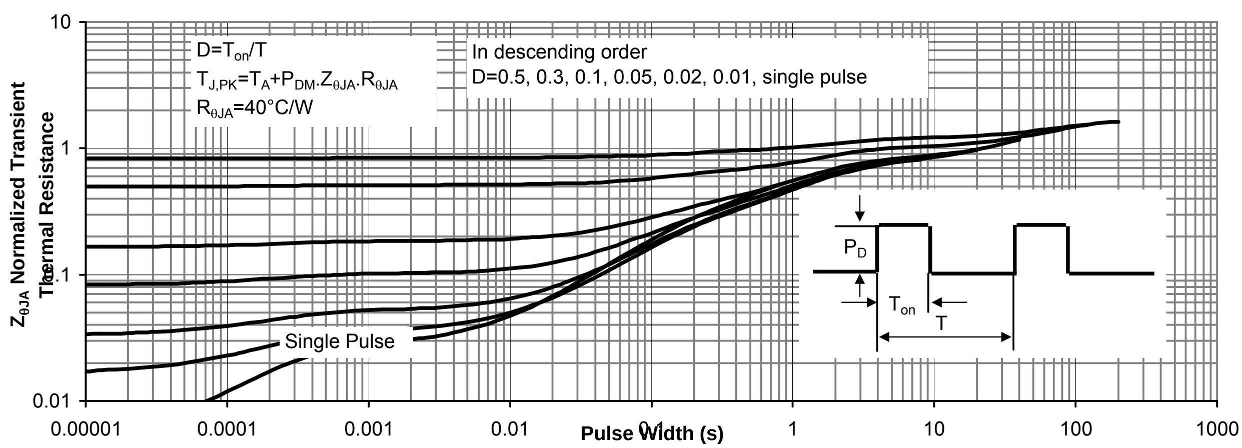


Figure 11: Normalized Maximum Transient Thermal Impedance