



AO4425

P-Channel Enhancement Mode Field Effect Transistor

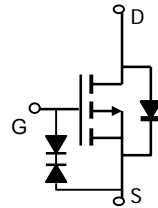
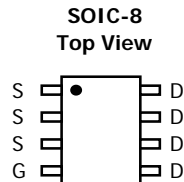


General Description

The AO4425 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. *Standard Product AO4425 is Pb-free (meets ROHS & Sony 259 specifications). AO4425L is a Green Product ordering option. AO4425 and AO4425L are electrically identical.*

Features

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



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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	$T_A=25^\circ\text{C}$ $T_A=70^\circ\text{C}$	I_D	-14
			-11
Pulsed Drain Current ^B	I_{DM}	-50	A
Power Dissipation ^A	$T_A=25^\circ\text{C}$ $T_A=70^\circ\text{C}$	P_D	3.1
			2
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 ^A	$R_{\theta JA}$	26	40	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	50	75	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	14	24	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
B _V 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 T _J =55°C			-100 -500	nA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V V _{DS} =0V, V _{GS} =±25V			±1 ±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 T _J =125°C V _{GS} =-10V, I _D =-14A		7.7 11	10 13.5	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 _{riss}	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	
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-14A, dI/dt=100A/μs		33		nC

A: The value of R_{θJA} is measured with the device mounted on 1in² 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 ≤ 10s thermal resistance rating.

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 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in² 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 1 : July 2005

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

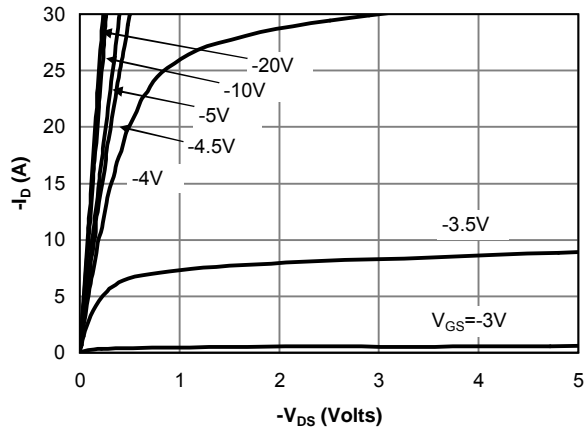


Fig 1: On-Region Characteristics

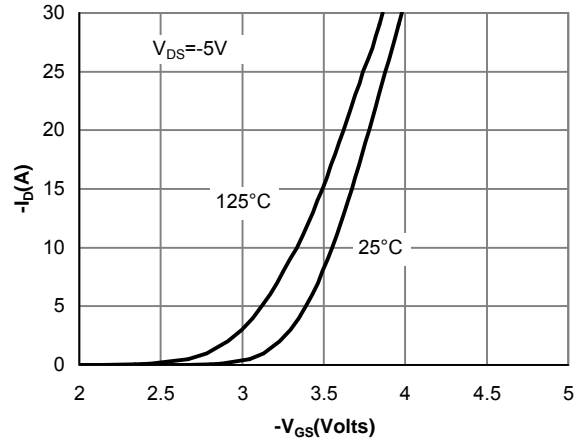


Figure 2: Transfer Characteristics

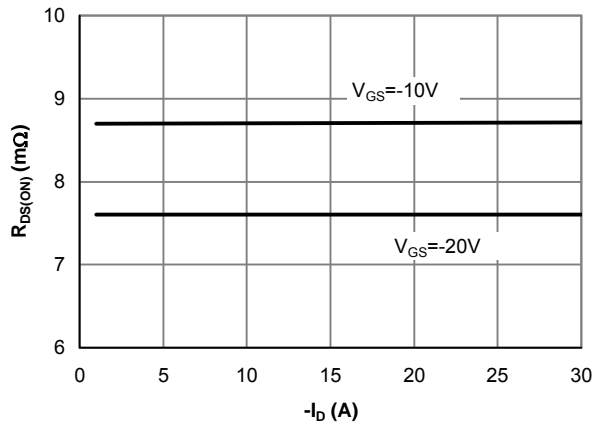


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

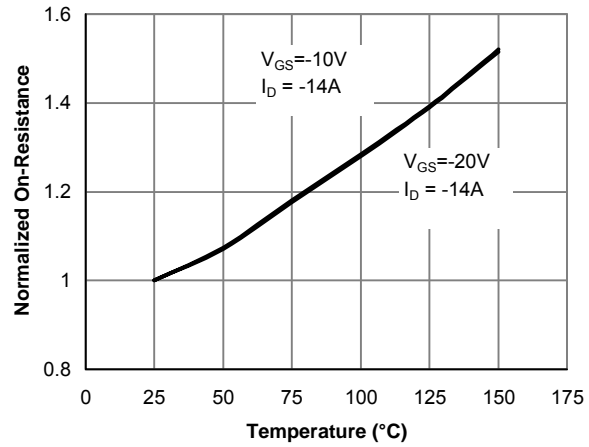


Figure 4: On-Resistance vs. Junction Temperature

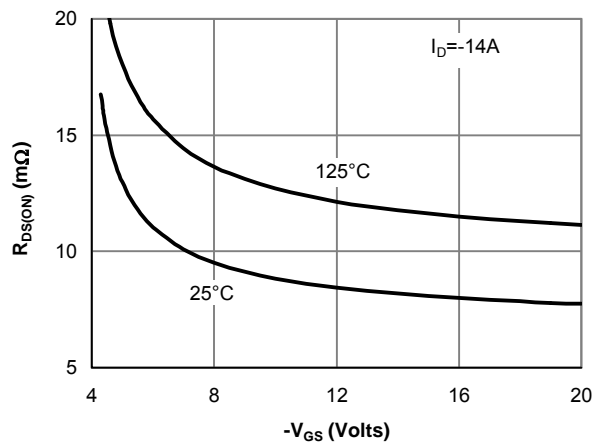


Figure 5: On-Resistance vs. Gate-Source Voltage

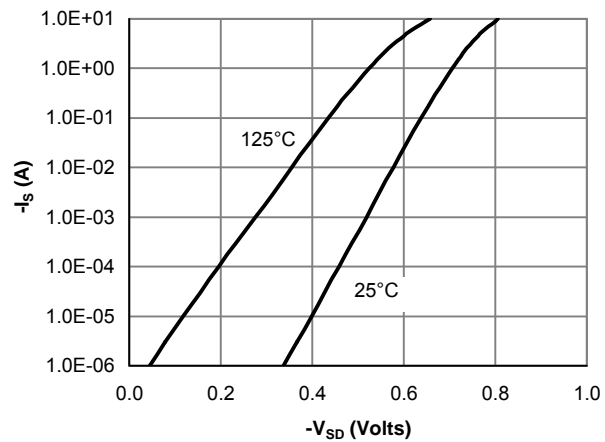


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

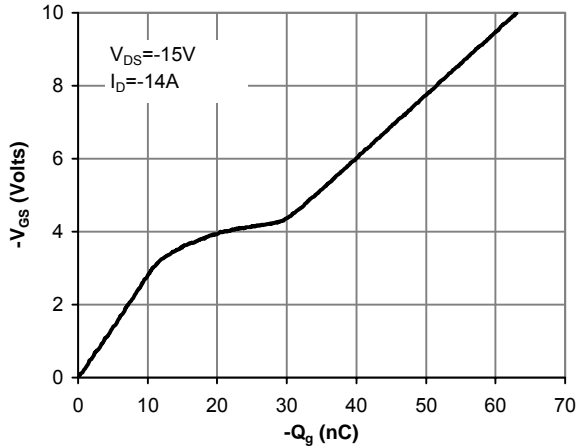


Figure 7: Gate-Charge Characteristics

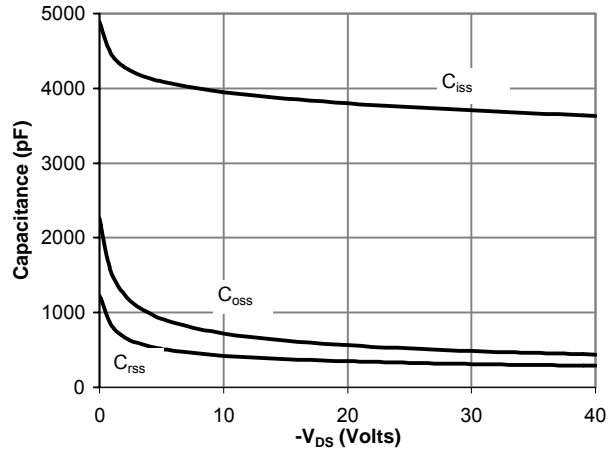


Figure 8: Capacitance Characteristics

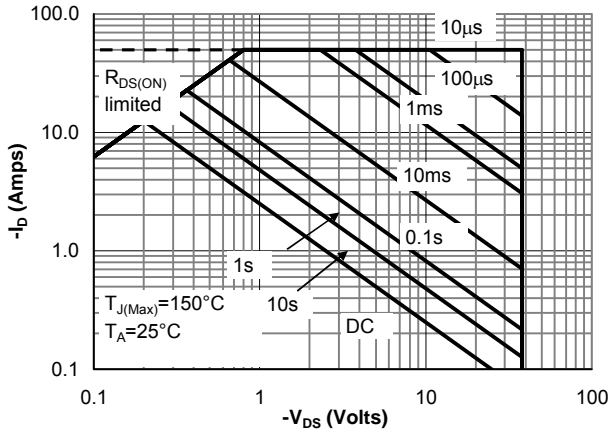


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

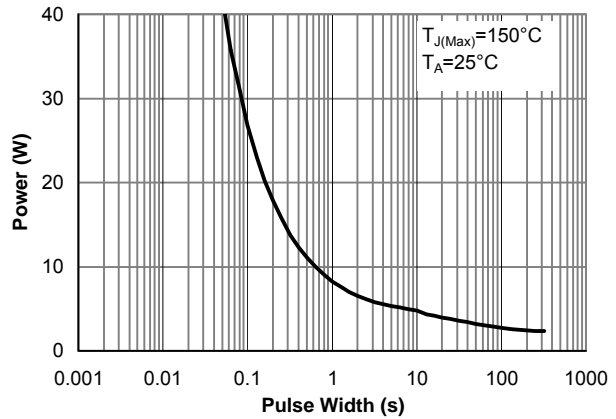


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

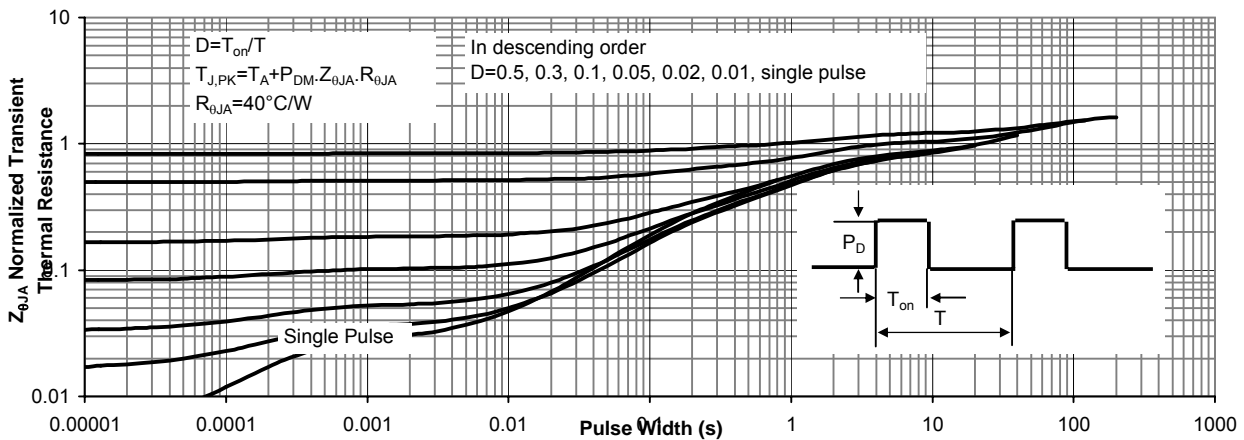


Figure 11: Normalized Maximum Transient Thermal Impedance