



ALPHA & OMEGA
SEMICONDUCTOR



AO4430

N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4430/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, shoot-through immunity, body diode characteristics and ultra-low gate resistance. This device is ideally suited for use as a low side switch in Notebook CPU core power conversion.

AO4430 and AO4430L are electrically identical.

-RoHS Compliant

-AO4430L is Halogen Free

Features

$V_{DS} (V) = 30V$

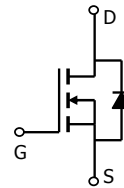
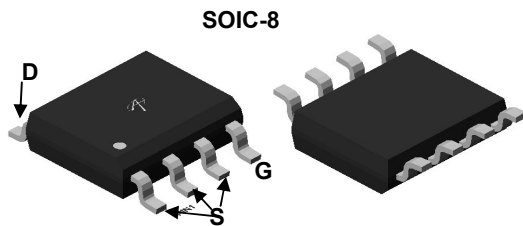
$I_D = 18A (V_{GS} = 10V)$

$R_{DS(ON)} < 5.5m\Omega (V_{GS} = 10V)$

$R_{DS(ON)} < 7.5m\Omega (V_{GS} = 4.5V)$

100% UIS Tested!

100% Rg Tested!



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^{AF}	I_D	18	A
$T_A=25^\circ C$			
$T_A=70^\circ C$		15	
Pulsed Drain Current ^B	I_{DM}	80	
Power Dissipation	P_D	3	W
$T_A=25^\circ C$			
$T_A=70^\circ C$		2.1	
Avalanche Current ^B	I_{AR}	30	A
Repetitive avalanche energy 0.3mH ^B	E_{AR}	135	mJ
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	31	40	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	59	75	$^\circ C/W$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	16	24	$^\circ C/W$
Steady-State				

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} = ±20V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =250μA	1	1.8	2.5	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	80			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =18A T _J =125°C		4.7 6.5	5.5 8	mΩ
		V _{GS} =4.5V, I _D =15A		6.2	7.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =18A		82		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				4.5	A
DYNAMIC PARAMETERS						
C _{ISS}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz	4660	6060	7270	pF
C _{OSS}	Output Capacitance		425	638	960	pF
C _{rss}	Reverse Transfer Capacitance		240	355	530	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	0.2	0.45	0.9	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =18A	80	103	124	nC
Q _g (4.5V)	Total Gate Charge		37	48	58	nC
Q _{gs}	Gate Source Charge			18		nC
Q _{gd}	Gate Drain Charge			15		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.83Ω, R _{GEN} =3Ω		12	16	ns
t _r	Turn-On Rise Time			8	12	ns
t _{D(off)}	Turn-Off DelayTime			51.5	70	ns
t _f	Turn-Off Fall Time			8.8	14	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =18A, dI/dt=100A/μs		33.5	44	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =18A, dI/dt=100A/μs		22	30	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 <300 μs 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 t ≤ 10s junction to ambient thermal resistance rating.

Rev5: Nov 2008

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

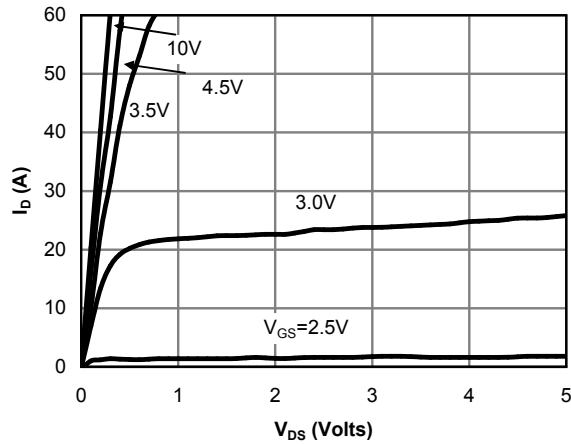


Fig 1: On-Region Characteristics

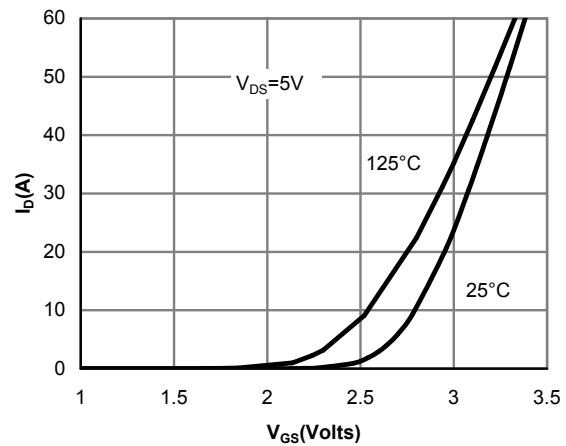


Figure 2: Transfer Characteristics

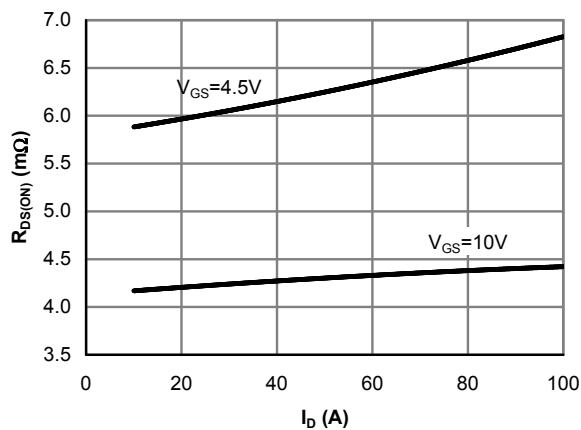


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

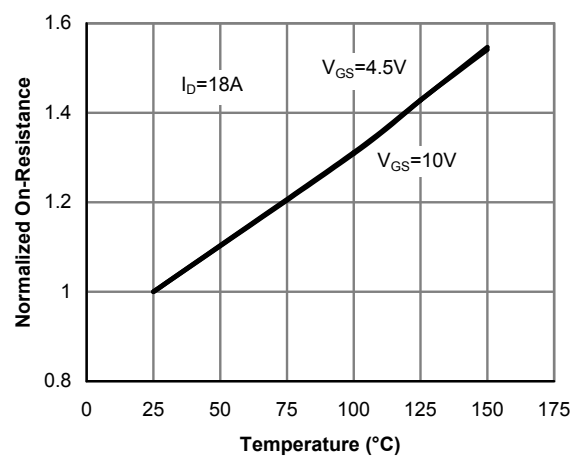


Figure 4: On-Resistance vs. Junction Temperature

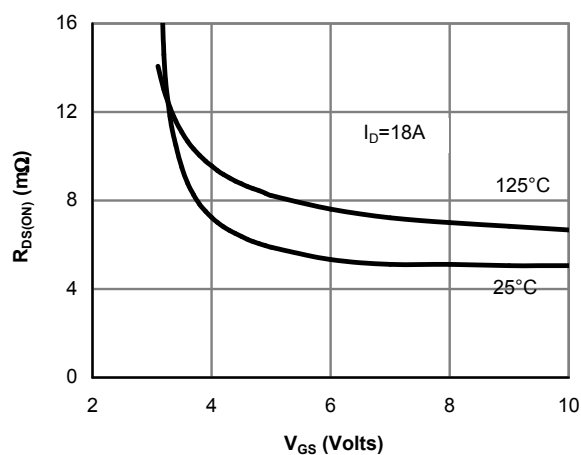


Figure 5: On-Resistance vs. Gate-Source Voltage

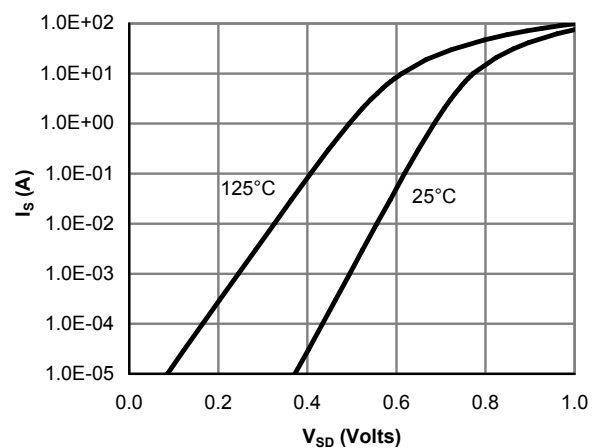
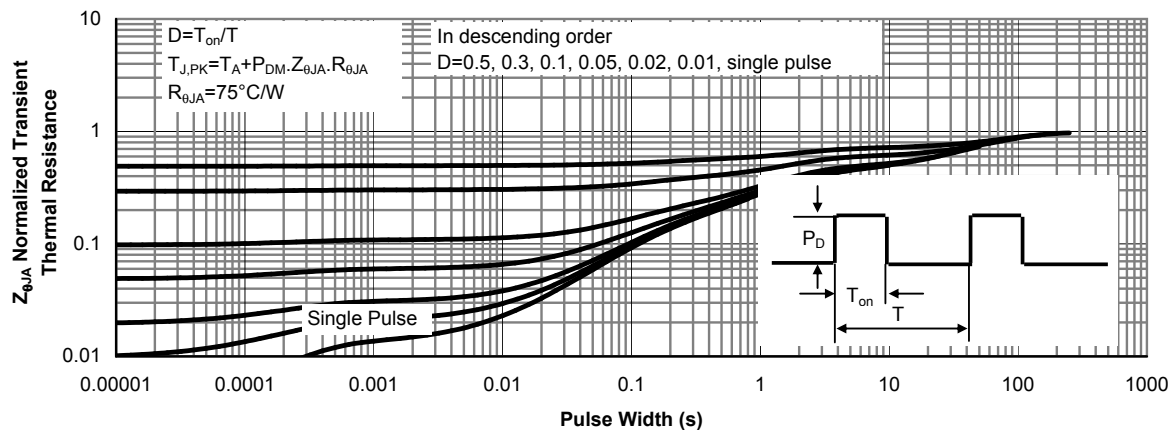
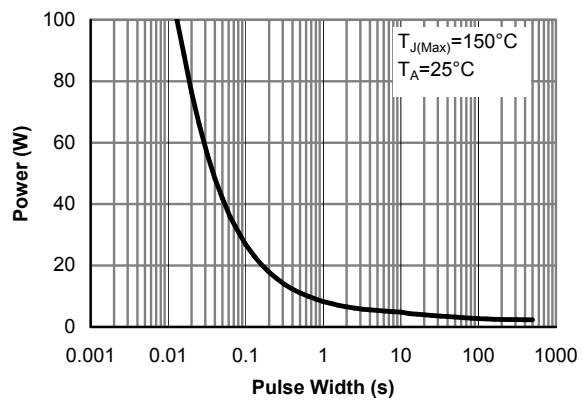
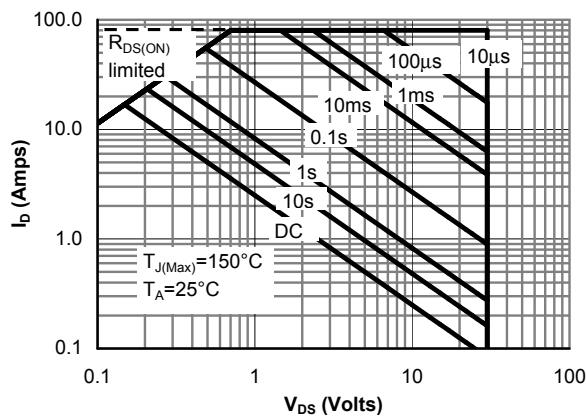
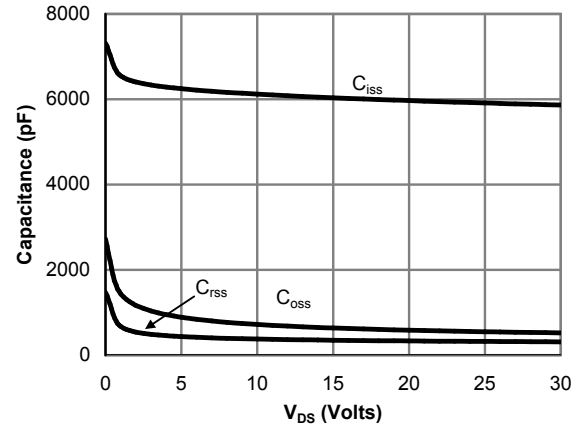
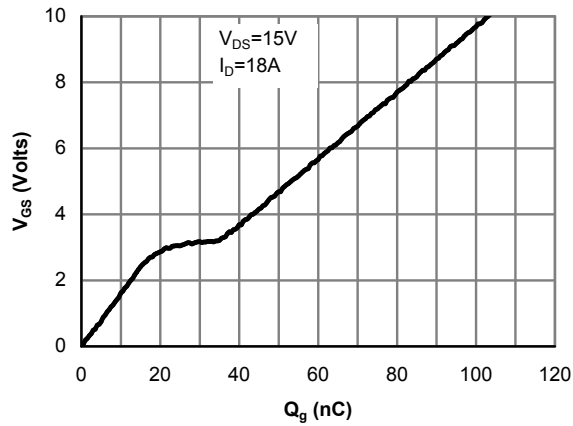
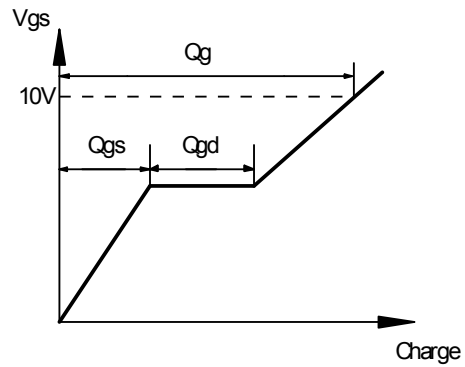
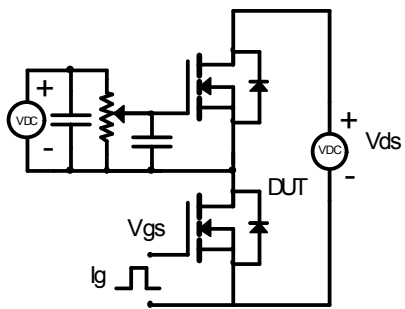


Figure 6: Body-Diode Characteristics

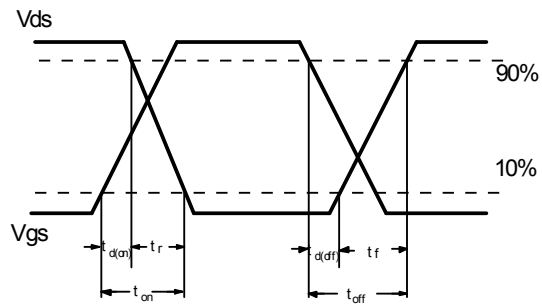
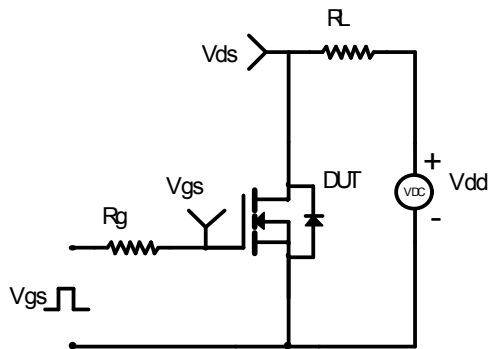
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



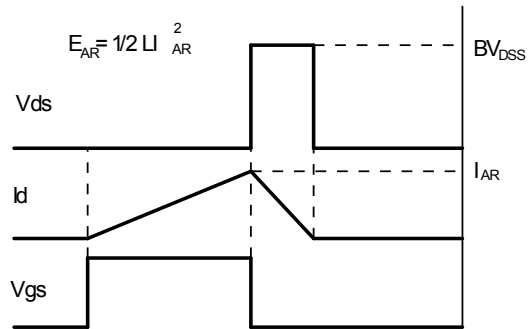
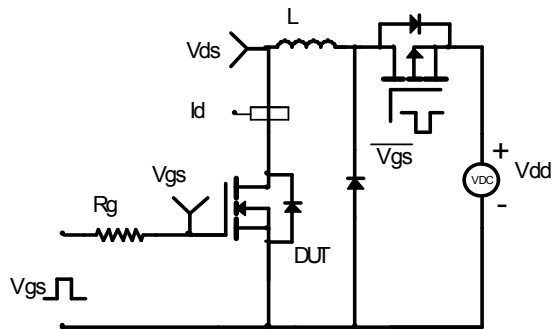
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

