

**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.

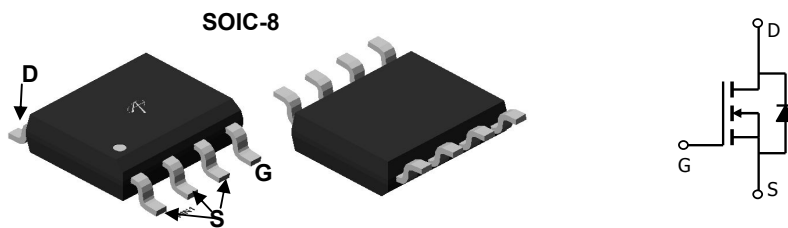
AO4430 and AO4430L are electrically identical.

- 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	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>AF</sup>	$I_D$	$T_A=25^\circ C$	18
		$T_A=70^\circ C$	15
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	80	A
Power Dissipation	$P_D$	$T_A=25^\circ C$	3
		$T_A=70^\circ C$	2.1
Avalanche Current <sup>B</sup>	$I_{AR}$	30	A
Repetitive avalanche energy 0.3mH <sup>B</sup>	$E_{AR}$	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 <sup>A</sup>	$R_{\theta JA}$	$t \leq 10s$	31	40
		Steady-State	59	75
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	16	24	$^\circ C/W$

Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.8	2.5	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V	80			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =18A T <sub>J</sub> =125°C		4.7 6.5	5.5 8	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A		6.2	7.5	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =18A		82		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.7	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				4.5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz	4660	6060	7270	pF
C <sub>OSS</sub>	Output Capacitance		425	638	960	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		240	355	530	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	0.2	0.45	0.9	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =18A	80	103	124	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge		37	48	58	nC
Q <sub>gs</sub>	Gate Source Charge			18		nC
Q <sub>gd</sub>	Gate Drain Charge			15		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.83Ω, R <sub>GEN</sub> =3Ω		12	16	ns
t <sub>r</sub>	Turn-On Rise Time			8	12	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			51.5	70	ns
t <sub>f</sub>	Turn-Off Fall Time			8.8	14	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =18A, di/dt=100A/μs		33.5	44	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =18A, di/dt=100A/μs		22	30	nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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<sub>A</sub>=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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

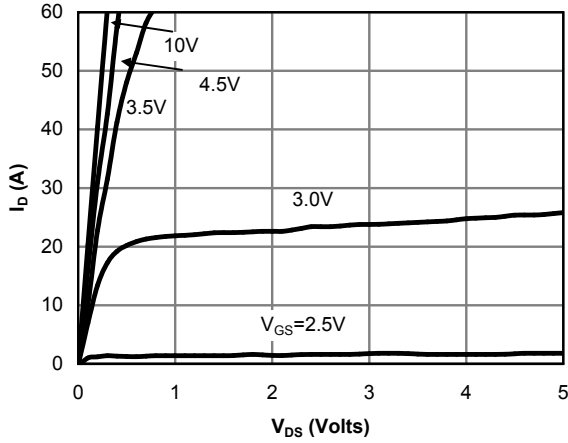


Fig 1: On-Region Characteristics

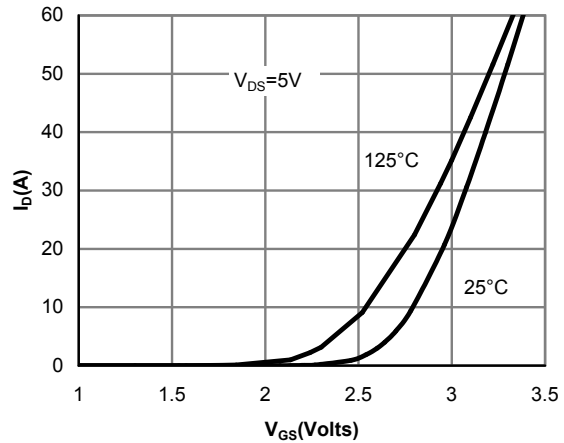


Figure 2: Transfer Characteristics

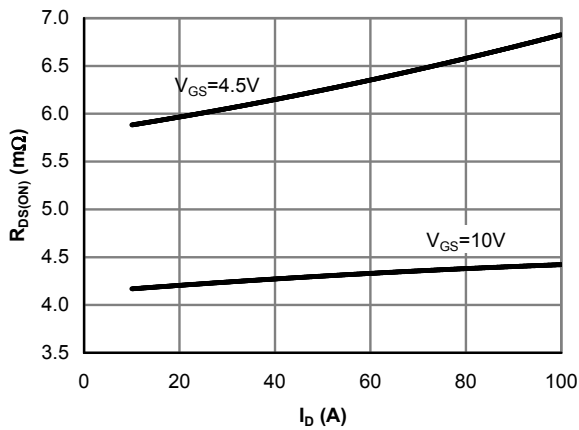


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

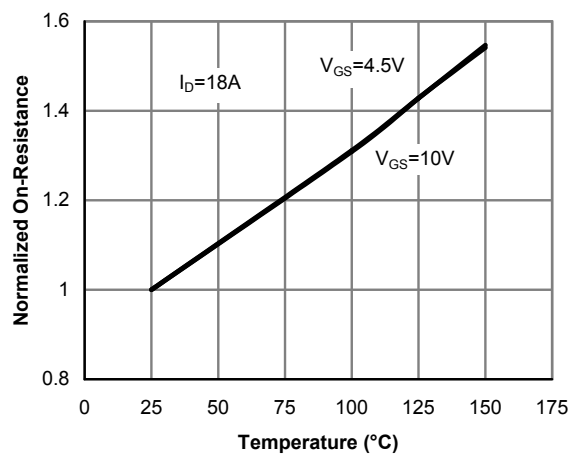


Figure 4: On-Resistance vs. Junction Temperature

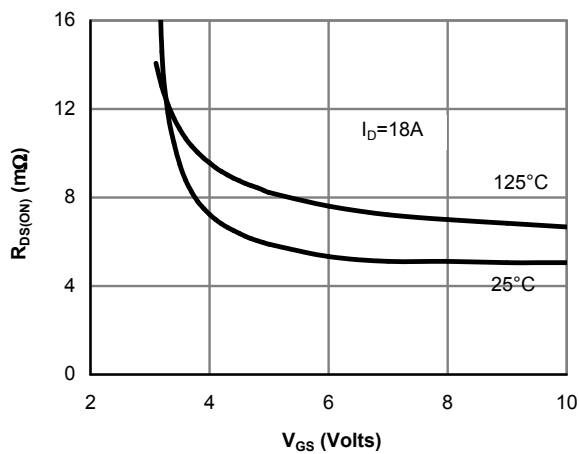


Figure 5: On-Resistance vs. Gate-Source Voltage

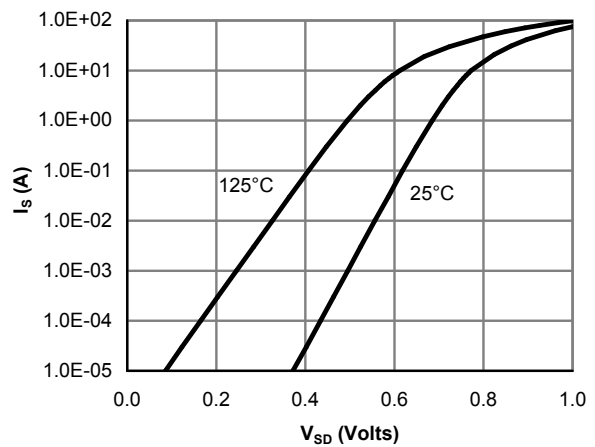


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

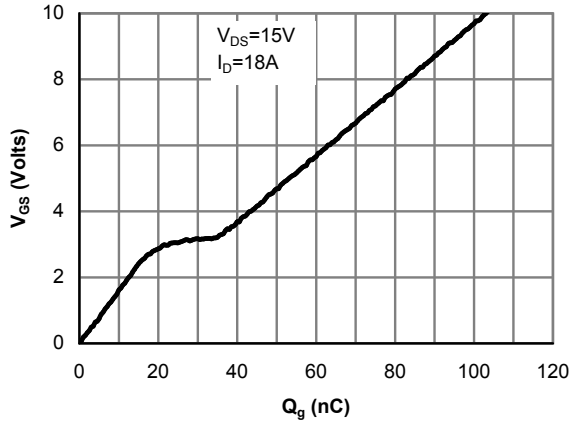


Figure 7: Gate-Charge Characteristics

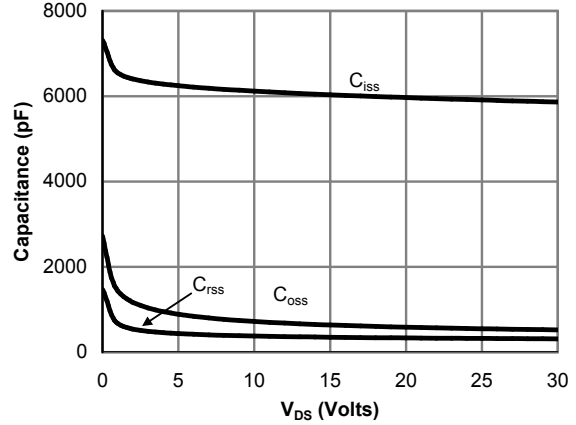


Figure 8: Capacitance Characteristics

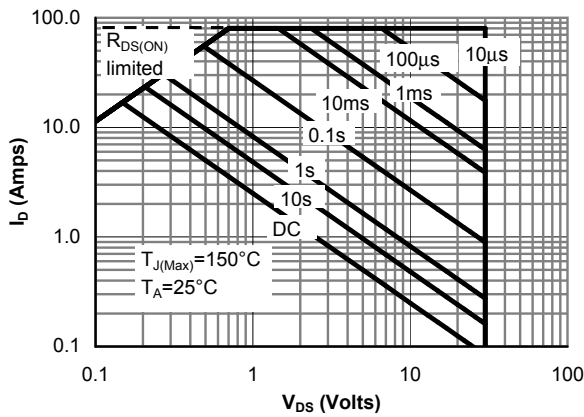


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

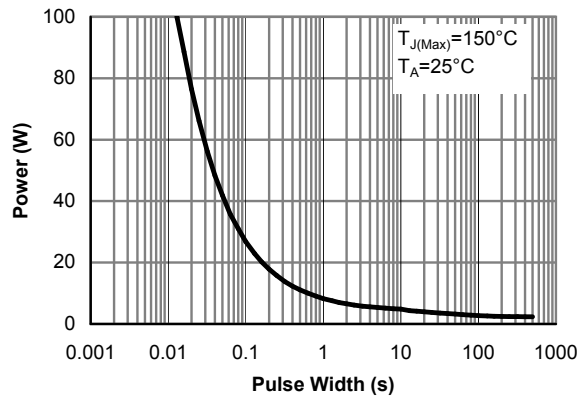


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

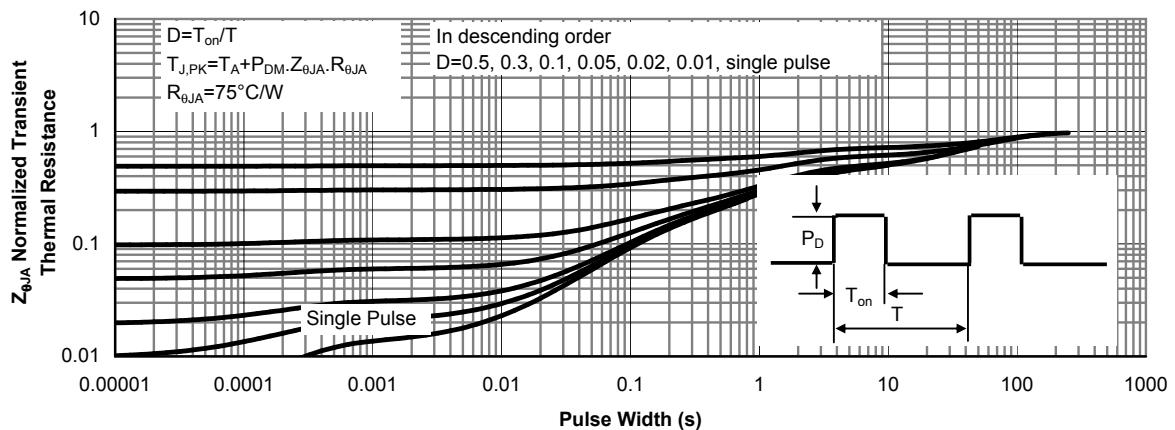
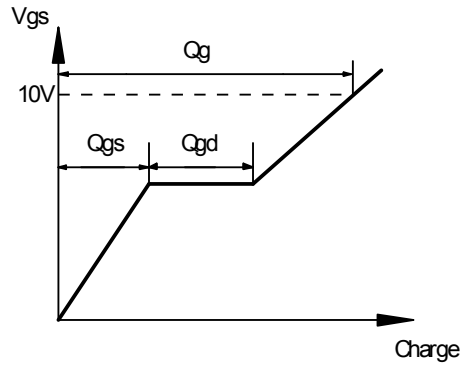
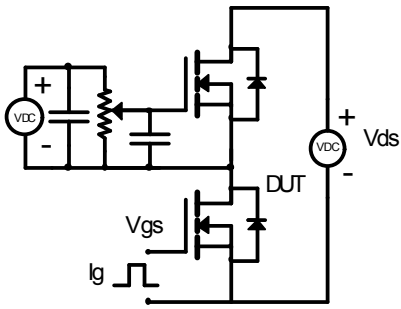
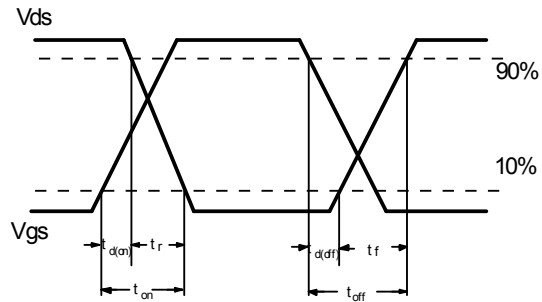
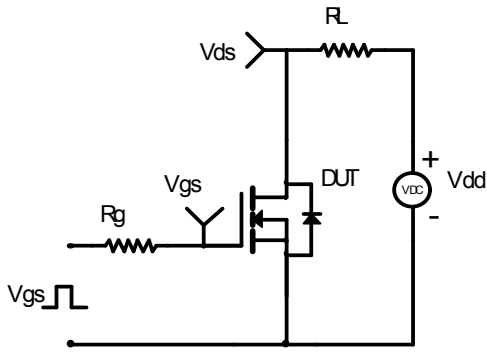


Figure 11: Normalized Maximum Transient Thermal Impedance

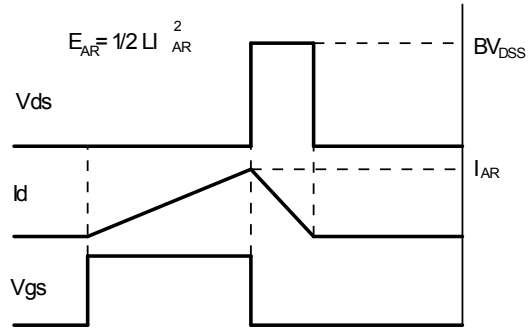
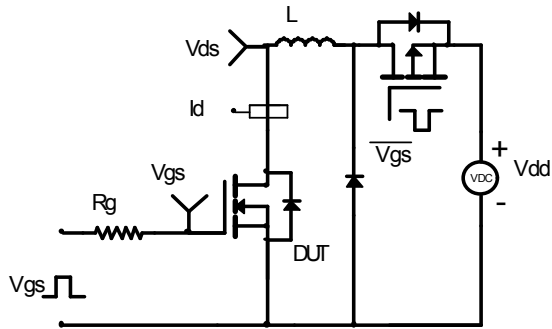
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

