ALPHA & OMEGA
SEMICONDUCTOR

RoHS Compliant

AO4430
N-Channel Enhancement Mode Field Effect Transistor

General Description

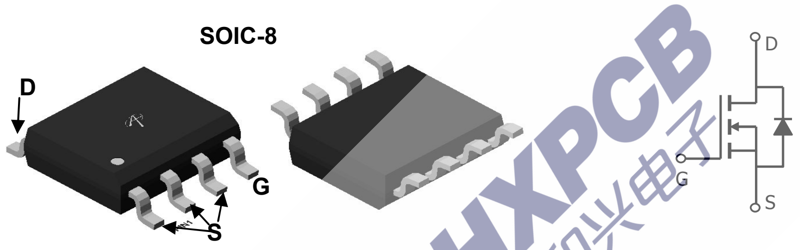
The AO4430/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, shoot-through immunity, body diode characteristics and ultra-low gate resistance. This device is ideally suited for use as a low side switch in Notebook CPU core power conversion.
AO4430 and AO4430L are electrically identical.
-RoHS Compliant
-AO4430L is Halogen Free

Features

V_{DS} (V) = 30V
I_D = 18A (V_{GS} = 10V)
$R_{DS(ON)}$ < 5.5mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 7.5mΩ (V_{GS} = 4.5V)

100% UIS Tested!
100% Rg Tested!

SOIC-8



Absolute Maximum Ratings T_A=25°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]	T_A=25°C	I_D	18	A
	T_A=70°C		15	
Pulsed Drain Current [B]		I_{DM}	80	
Power Dissipation	T_A=25°C	P_D	3	W
	T_A=70°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	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	31	40	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		59	75	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	16	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		30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V				1	µA
			T_J=55°C			5	
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			4.7	5.5	mΩ
			T_J=125°C		6.5	8	
		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 $R_{\theta JA}$ 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.
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 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

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

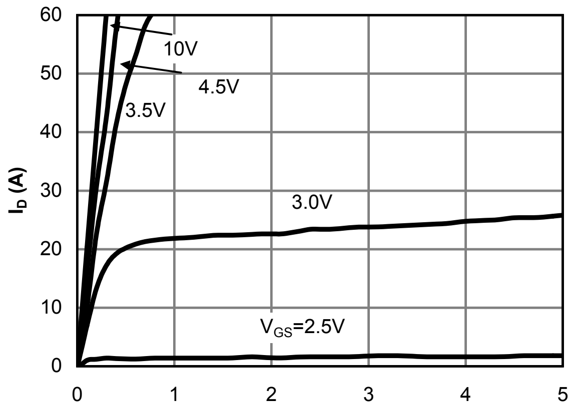


Fig 1: On-Region Characteristics

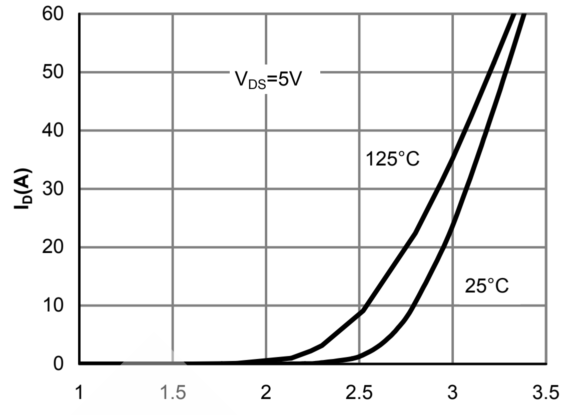


Figure 2: Transfer Characteristics

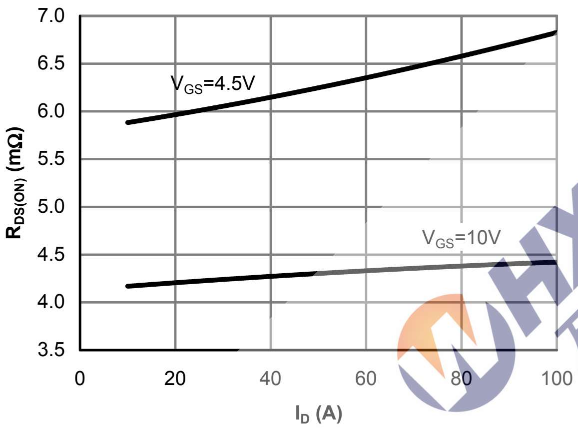


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

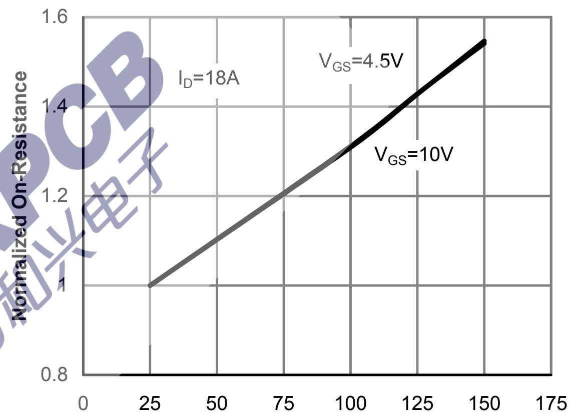


Figure 4: On-Resistance vs. Junction Temperature

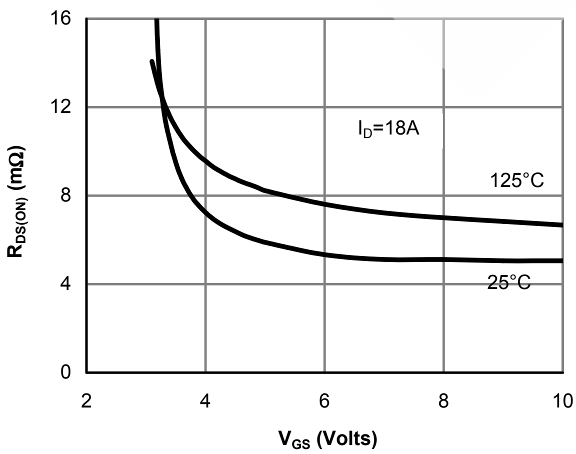


Figure 5: On-Resistance vs. Gate-Source Voltage

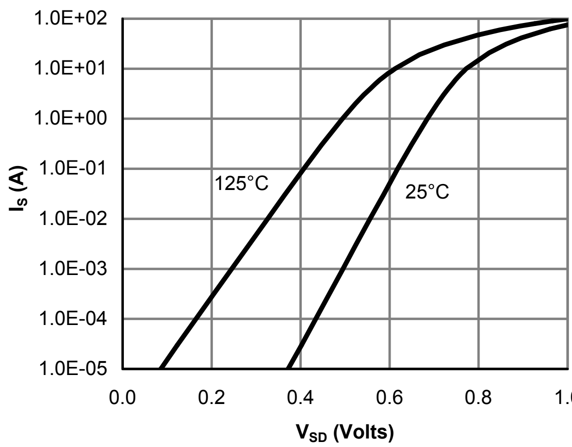


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

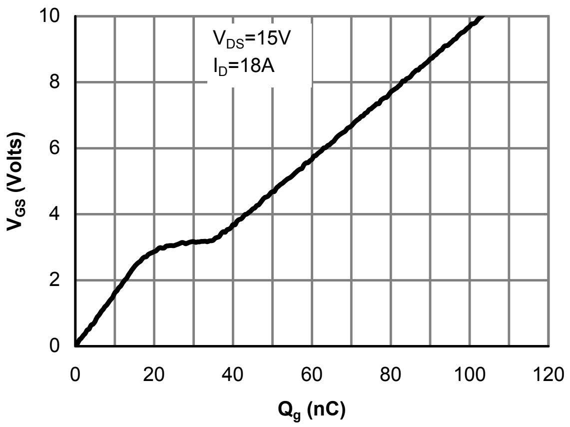


Figure 7: Gate-Charge Characteristics

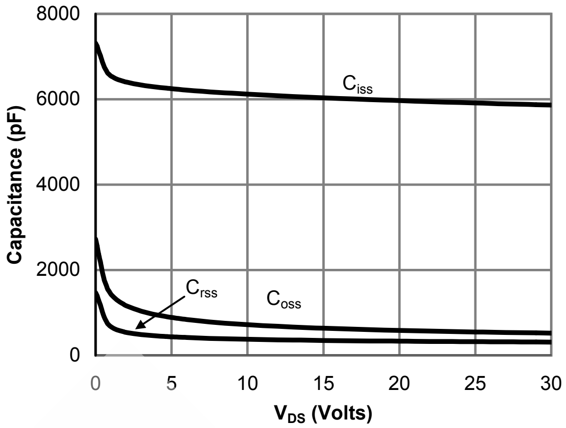


Figure 8: Capacitance Characteristics

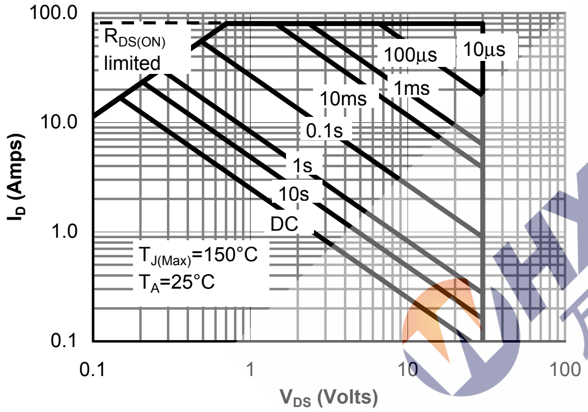


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

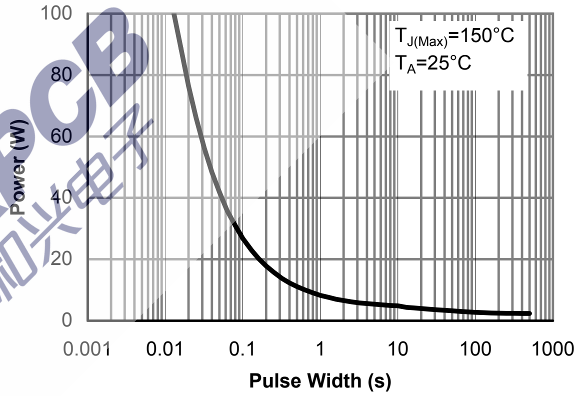


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

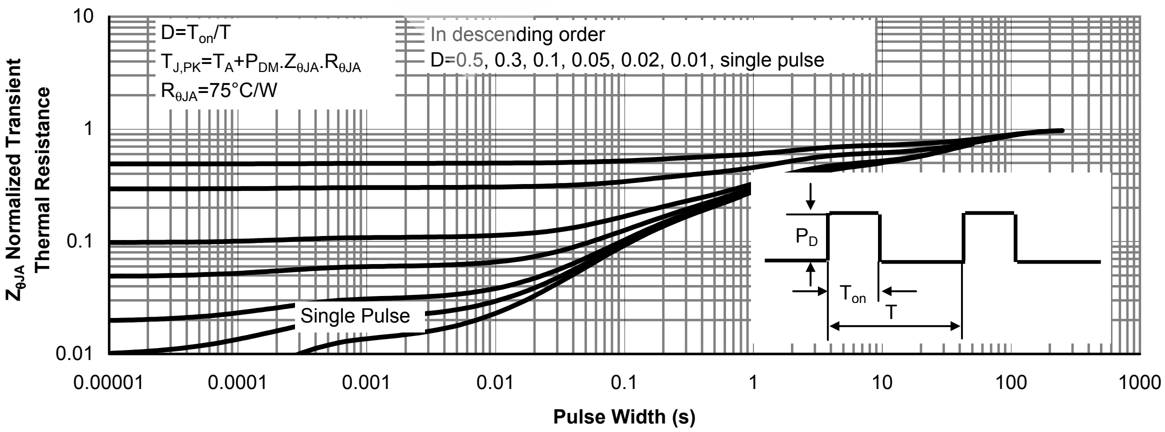
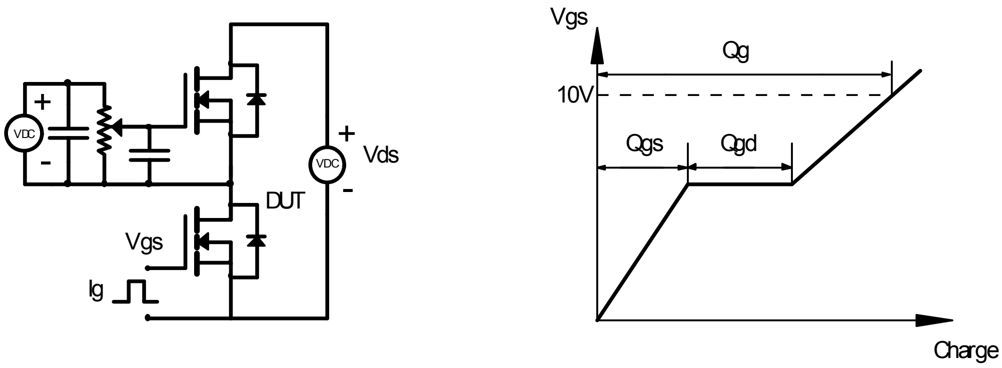
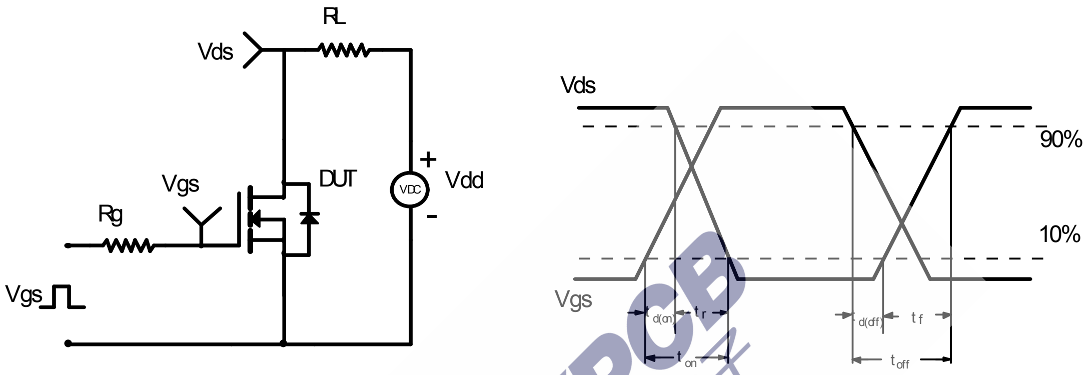


Figure 11: Normalized Maximum Transient Thermal Impedance

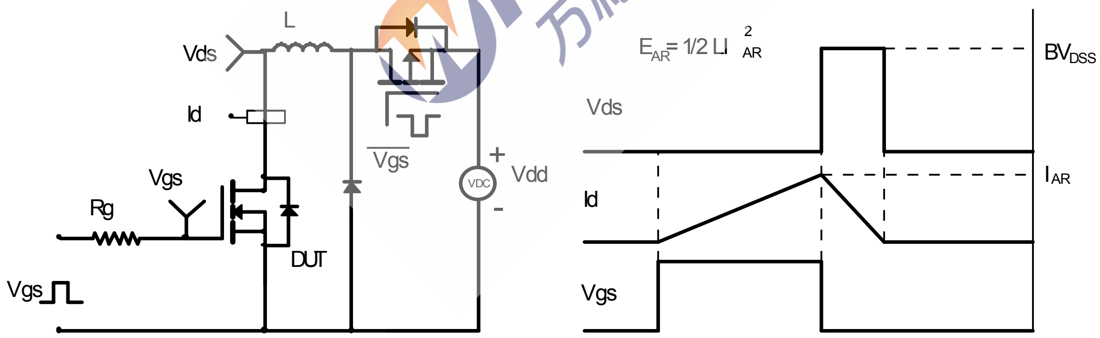
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms