



AO4414A

N-Channel Enhancement Mode Field Effect Transistor

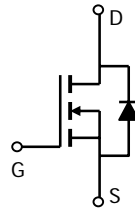
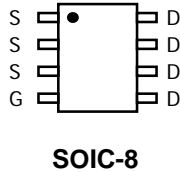


General Description

The AO4414A uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications. The source leads are separated to allow a Kelvin connection to the source, which may be used to bypass the source inductance. *Standard Product AO4414A is Pb-free (meets ROHS & Sony 259 specifications). AO4414AL is a Green Product ordering option. AO4414A and AO4414AL are electrically identical.*

Features

- $V_{DS} (V) = 30V$
- $I_D = 8.5A (V_{GS} = 10V)$
- $R_{DS(ON)} < 26m\Omega (V_{GS} = 10V)$
- $R_{DS(ON)} < 40m\Omega (V_{GS} = 4.5V)$



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 ^A	$T_A=25^\circ C$	8.5	A
	$T_A=70^\circ C$	7.1	
Pulsed Drain Current ^B	I_{DM}	50	
Power Dissipation	$T_A=25^\circ C$	3	W
	$T_A=70^\circ C$	2.1	
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	$R_{\theta JA}$	$t \leq 10s$	34	$^\circ C/W$
Maximum Junction-to-Ambient ^A		Steady-State	62	
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	18	24	$^\circ C/W$

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} =24V, V _{GS} =0V T _J =55°C		0.004	1	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	3	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =8.5A T _J =125°C		17	26	mΩ
		V _{GS} =4.5V, I _D =5A		24	30	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =8.5A	10	24		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.77	1	V
I _S	Maximum Body-Diode Continuous Current				4.3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		621	820	pF
C _{oss}	Output Capacitance			118		pF
C _{rss}	Reverse Transfer Capacitance			85		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.8	1.5	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =8.5A		11.3	17	nC
Q _g (4.5V)	Total Gate Charge			5.7	8	nC
Q _{gs}	Gate Source Charge			2.1		nC
Q _{gd}	Gate Drain Charge			3		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =1.8Ω, R _{GEN} =3Ω		4.5	6.5	ns
t _r	Turn-On Rise Time			3.1	5	ns
t _{D(off)}	Turn-Off Delay Time			15.1	23	ns
t _f	Turn-Off Fall Time			2.7	5	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =8.5A, dI/dt=100A/μs		15.5	21	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =8.5A, dI/dt=100A/μs		7.1	10	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 t ≤ 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 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 0: December 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

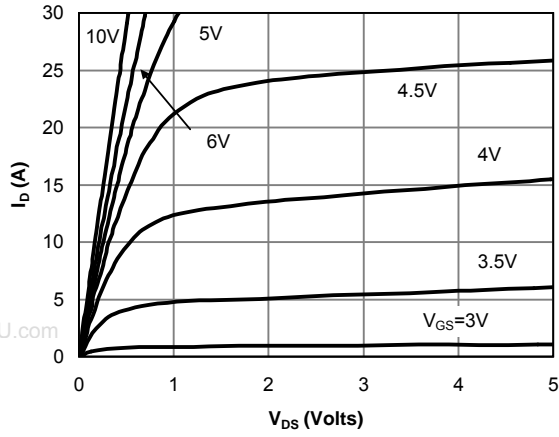


Fig 1: On-Region Characteristics

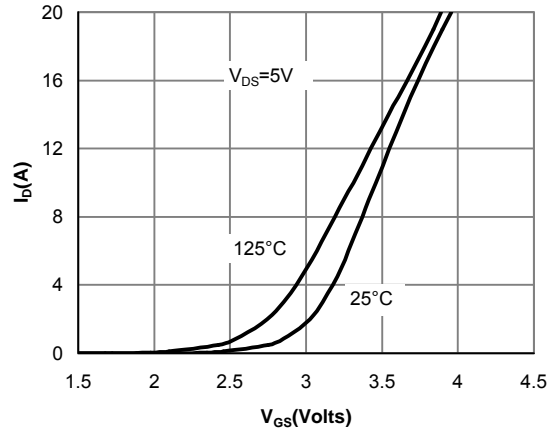


Figure 2: Transfer Characteristics

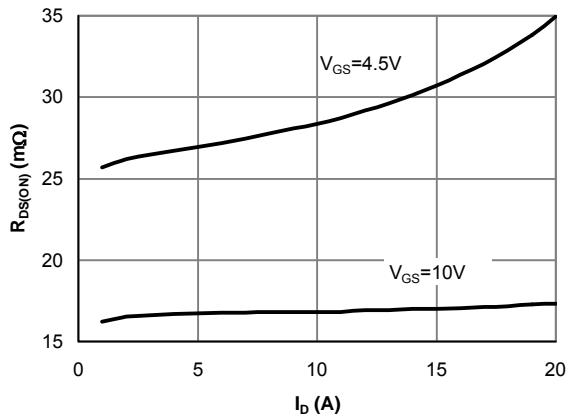


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

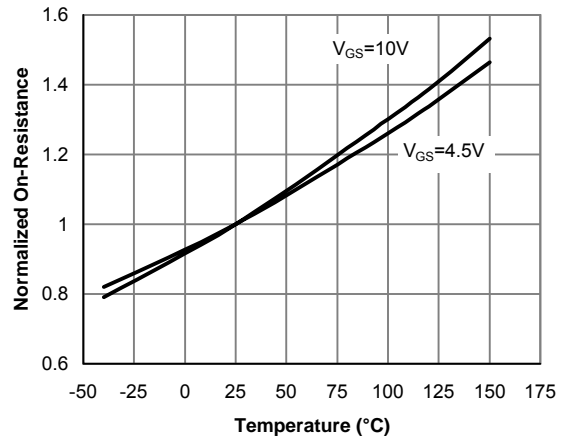


Figure 4: On-Resistance vs. Junction Temperature

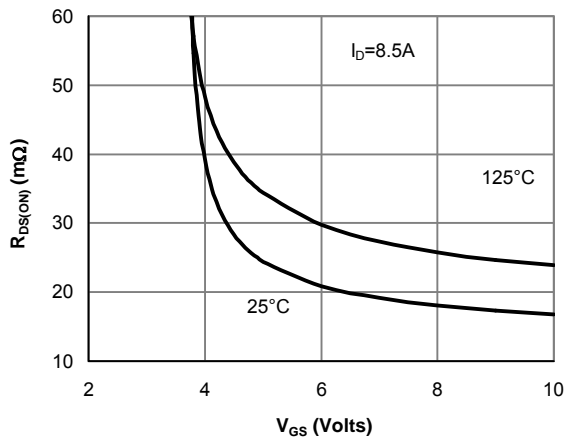


Figure 5: On-Resistance vs. Gate-Source Voltage

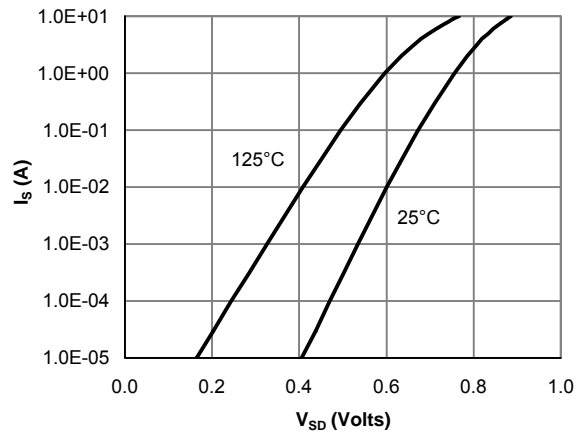


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

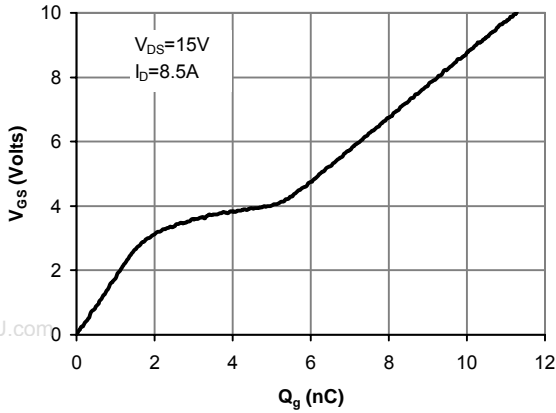


Figure 7: Gate-Charge Characteristics

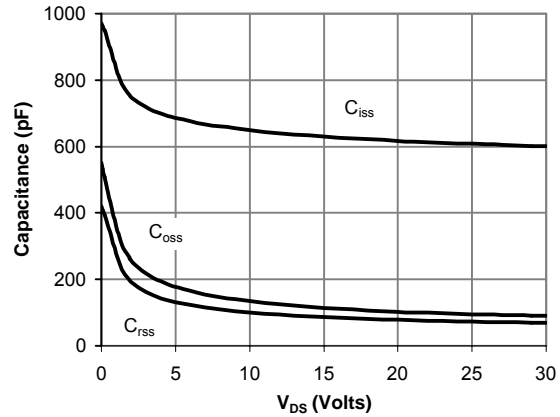


Figure 8: Capacitance Characteristics

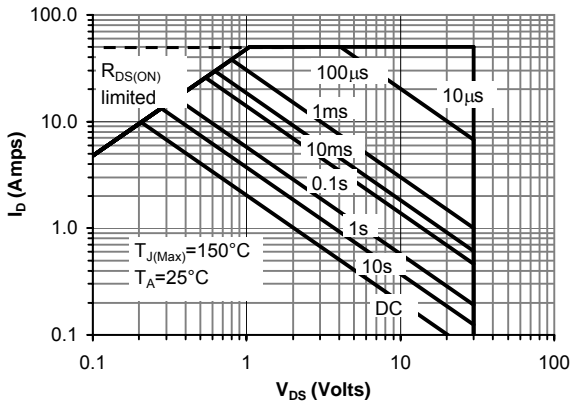


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

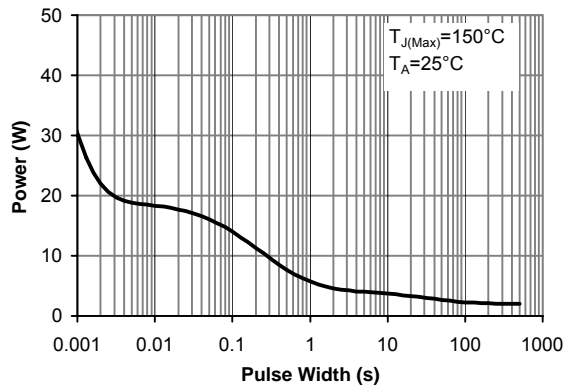


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

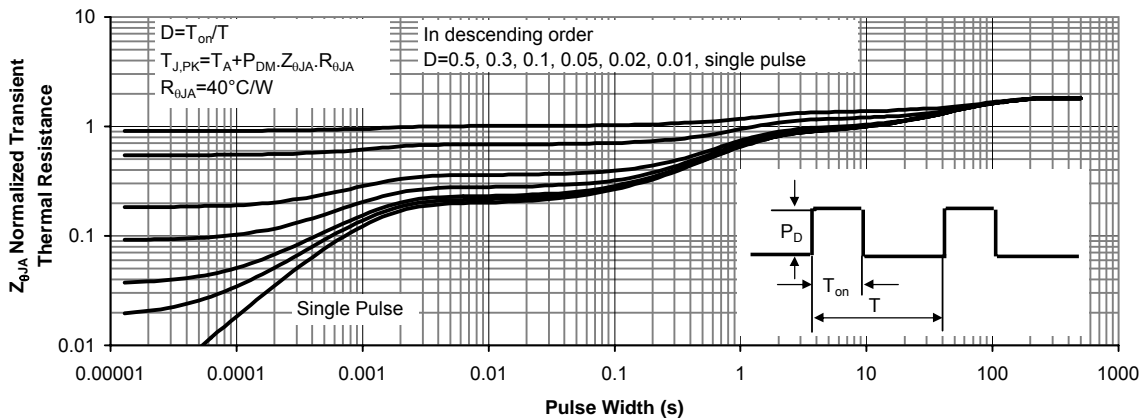


Figure 11: Normalized Maximum Transient Thermal Impedance