



**AO4410**

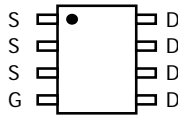
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

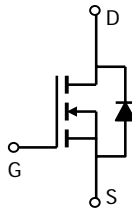
The AO4410 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , shoot-through immunity, body diode characteristics and ultra-low gate resistance. This device is ideally suited for use as a low side switch in Notebook CPU core power conversion. *Standard product AO4410 is Pb-free (meets ROHS & Sony 259 specifications). AO4410L is a Green Product ordering option. AO4410 and AO4410L are electrically identical.*

**Features**

- $V_{DS}$  (V) = 30V
- $I_D$  = 18A ( $V_{GS}$  = 10V)
- $R_{DS(ON)} < 5.5m\Omega$  ( $V_{GS}$  = 10V)
- $R_{DS(ON)} < 6.2m\Omega$  ( $V_{GS}$  = 4.5V)



**SOIC-8**



**Absolute Maximum Ratings  $T_A=25^\circ\text{C}$  unless otherwise noted**

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ\text{C}$	18	A
	$T_A=70^\circ\text{C}$	15	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	80	
Power Dissipation	$T_A=25^\circ\text{C}$	3	W
	$T_A=70^\circ\text{C}$	2.1	
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 <sup>A</sup>	$R_{\theta JA}$	31	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	59	75
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	16	24	$^\circ\text{C/W}$

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> =24V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C		0.005	1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±12V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.8	1.1	1.5	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 6.4	5.5 7.4	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A		5.2	6.2	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =18A		102		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.64	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		9130	10500	pF
C <sub>oss</sub>	Output Capacitance			625		pF
C <sub>riss</sub>	Reverse Transfer Capacitance			387		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.4	0.5	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(4.5V)</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =18A		72.4	85	nC
Q <sub>gs</sub>	Gate Source Charge			13.4		nC
Q <sub>gd</sub>	Gate Drain Charge			16.8		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		11	15	ns
t <sub>r</sub>	Turn-On Rise Time			7	11	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			99	135	ns
t <sub>f</sub>	Turn-Off Fall Time			13	19.5	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =18A, dI/dt=100A/μs		33	40	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =18A, dI/dt=100A/μs		22.2	30	nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> 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. The current rating is based on the ≤ 10s thermal resistance rating.

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 80μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> 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.

Rev 4 : May 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

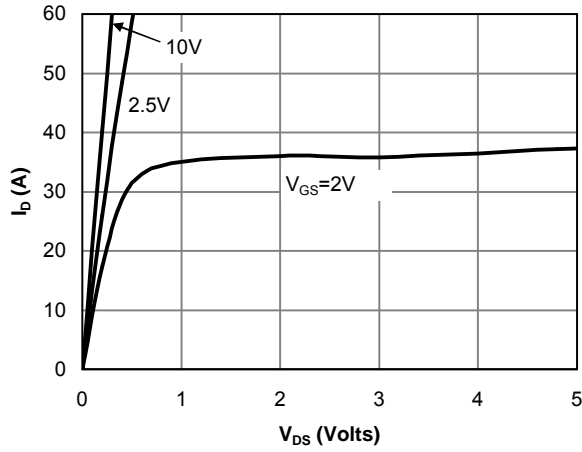


Fig 1: On-Region Characteristics

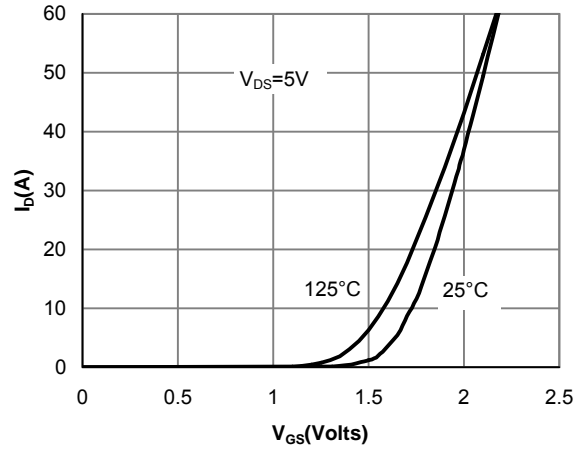


Figure 2: Transfer Characteristics

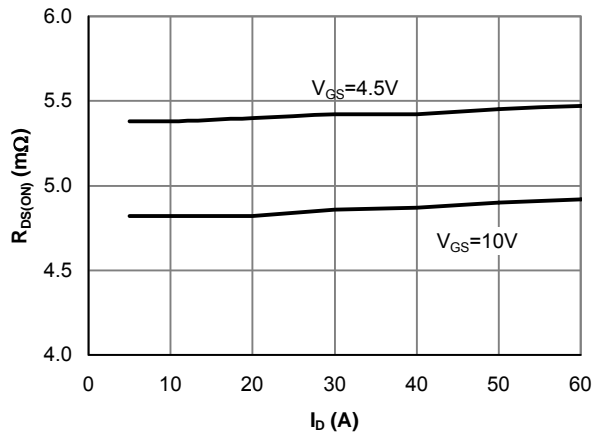


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

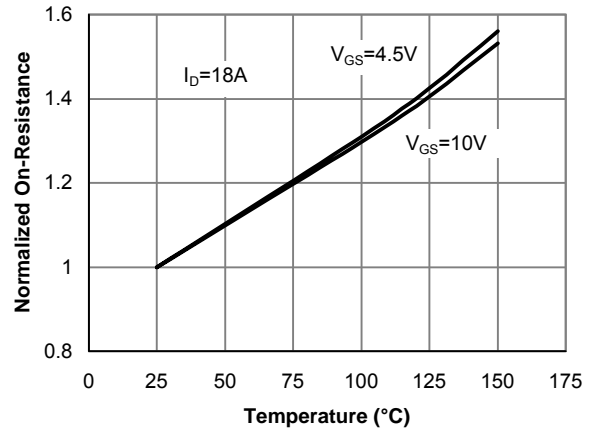


Figure 4: On-Resistance vs. Junction Temperature

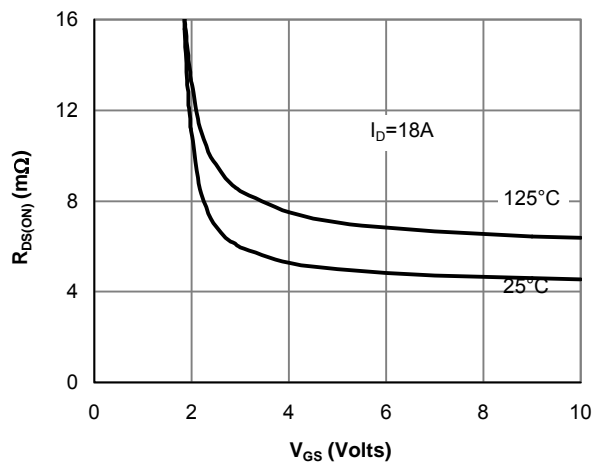


Figure 5: On-Resistance vs. Gate-Source Voltage

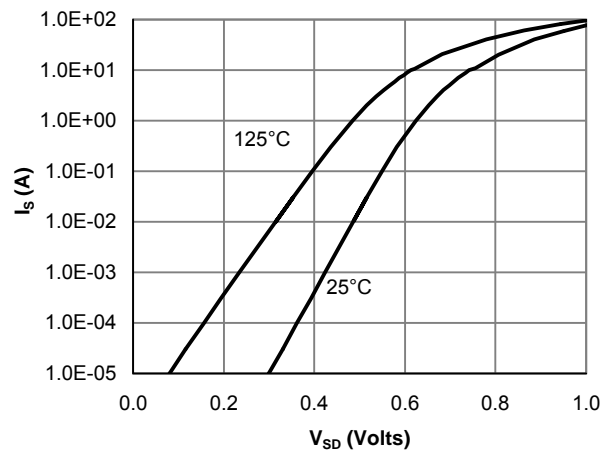


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

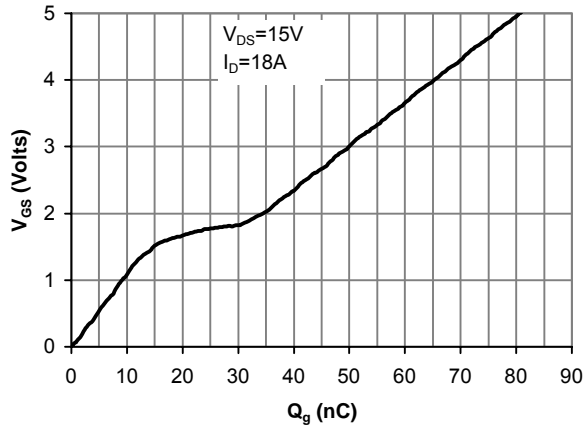


Figure 7: Gate-Charge Characteristics

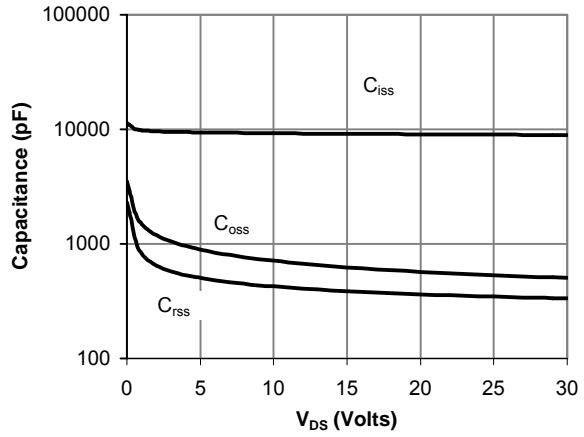


Figure 8: Capacitance Characteristics

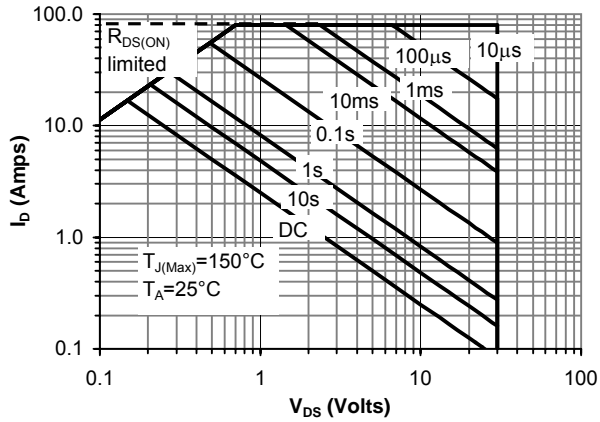


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

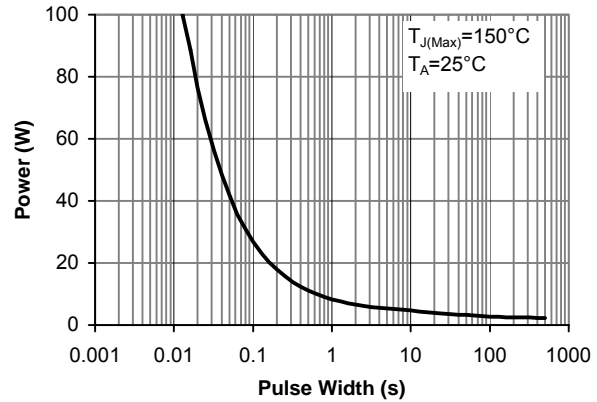


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

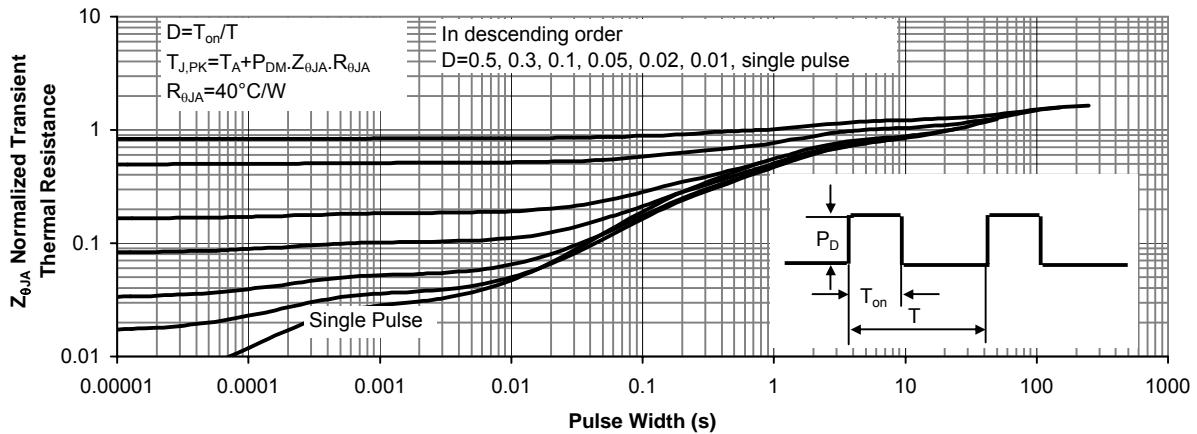


Figure 11: Normalized Maximum Transient Thermal Impedance