



AO4447AL

P-Channel Enhancement Mode Field Effect Transistor

General Description

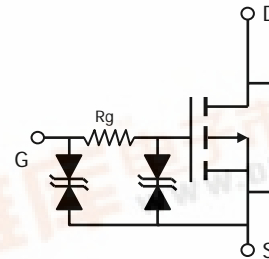
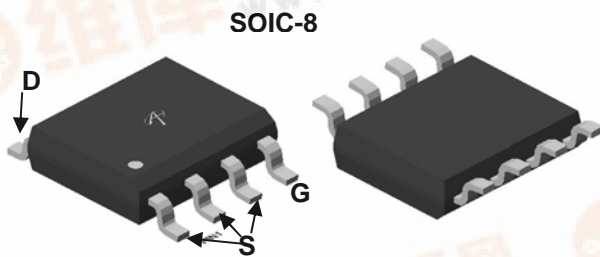
The AO4447AL uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is ideal for load switch and battery protection applications.

- RoHS Compliant
- Halogen Free

Features

- V_{DS} (V) = -30V
- I_D = -17A (V_{GS} = -10V)
- $R_{DS(ON)} < 7m\Omega$ (V_{GS} = -10V)
- $R_{DS(ON)} < 8m\Omega$ (V_{GS} = -4.5V)
- $R_{DS(ON)} < 9m\Omega$ (V_{GS} = -4V)

ESD Protected!



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	-17
		$T_A=70^\circ\text{C}$	-13
Pulsed Drain Current ^C	I_{DM}	-160	A
Power Dissipation ^B	P_D	$T_A=25^\circ\text{C}$	3.1
		$T_A=70^\circ\text{C}$	2.0
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	31	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{AD}		59	75	$^\circ\text{C/W}$
Maximum Junction-to-Lead	$R_{\theta JL}$	16	24	$^\circ\text{C/W}$



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 T _J = 55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} = 0V, V _{GS} = ±16V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.8	-1.3	-1.6	V
I _{D(ON)}	On state drain current	V _{GS} = -10V, V _{DS} = -5V	-160			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = -10V, I _D = -17A T _J = 125°C		5.5 7	7 8.5	mΩ
		V _{GS} = -4.5V, I _D = -15A		6.5	8	
		V _{GS} = -4V, I _D = -13A		6.9	9	
g _{FS}	Forward Transconductance	V _{DS} = -5V, I _D = -17A		70		S
V _{SD}	Diode Forward Voltage	I _S = -1A, V _{GS} = 0V		-0.62	-1	V
I _S	Maximum Body-Diode Continuous Current				-3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = -15V, f = 1MHz		4580	5500	pF
C _{oss}	Output Capacitance			755		pF
C _{rss}	Reverse Transfer Capacitance			564		pF
R _g	Gate resistance	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz		160	210	Ω
SWITCHING PARAMETERS						
Q _g (-10V)	Total Gate Charge	V _{GS} = -10V, V _{DS} = -15V, I _D = -17A		87	105	nC
Q _g (-4.5V)	Total Gate Charge			41		nC
Q _{gs}	Gate Source Charge			12.8		nC
Q _{gd}	Gate Drain Charge			17		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} = -10V, V _{DS} = 15V R _L = -0.9Ω, R _{GEN} = 3Ω		180		ns
t _r	Turn-On Rise Time			260		ns
t _{D(off)}	Turn-Off Delay Time			1.2		μs
t _f	Turn-Off Fall Time			9.7		μs
t _{rr}	Body Diode Reverse Recovery Time	I _F = -17A, di/dt = 300A/μs		32	40	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F = -17A, di/dt = 300A/μs		77		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.

B: The power dissipation P_D is based on T_{J(MAX)} = 150°C, using ≤ 10s junction-to-ambient thermal resistance.

C: Repetitive rating, pulse width limited by junction temperature T_{J(MAX)} = 150°C. Ratings are based on low frequency and duty cycles to keep initial T_J = 25°C.

D: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)} = 150°C. The SOA curve provides a single pulse rating.

Rev 0: Aug 2008

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

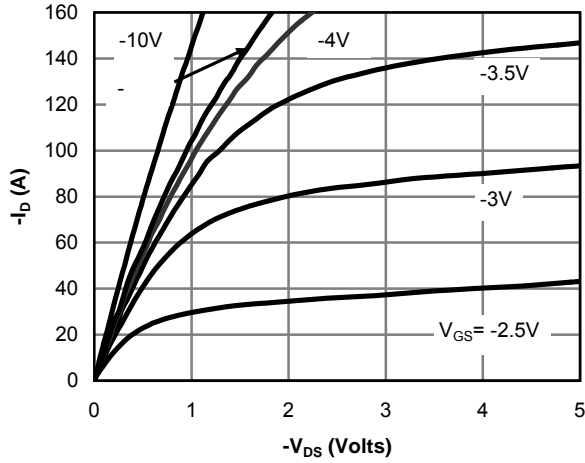


Figure 1: On-Region Characteristics(Note E)

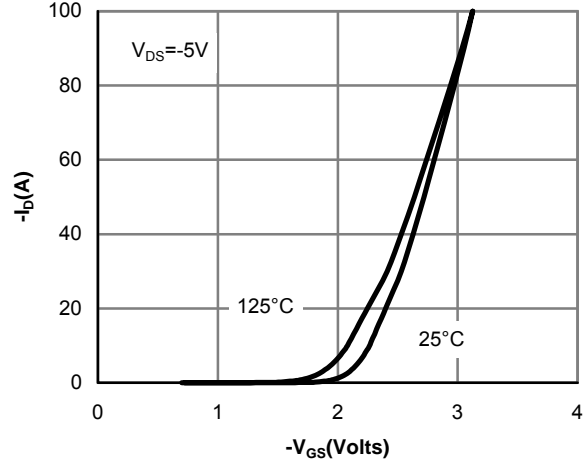


Figure 2: Transfer Characteristics(Note E)

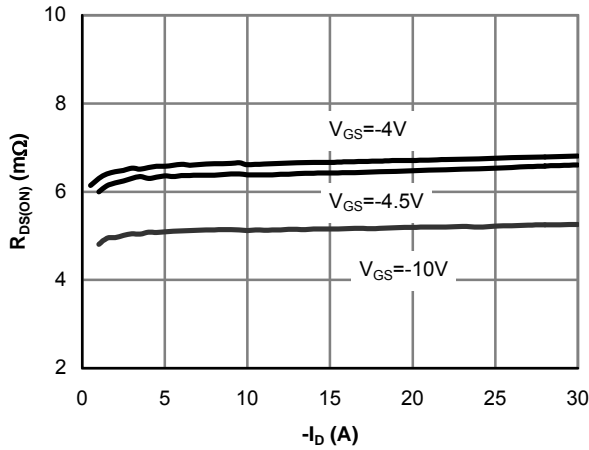


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

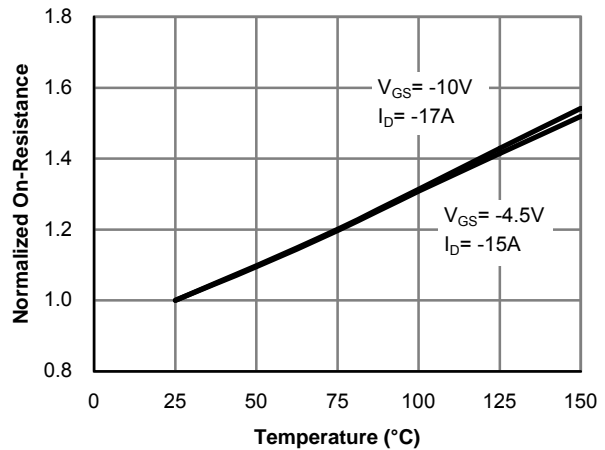


Figure 4: On-Resistance vs. Junction Temperature(Note E)

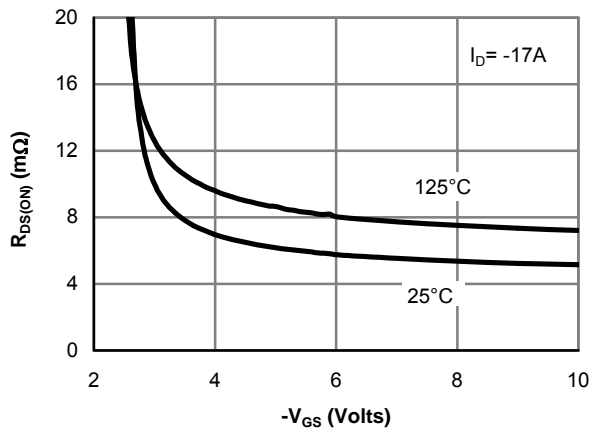


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

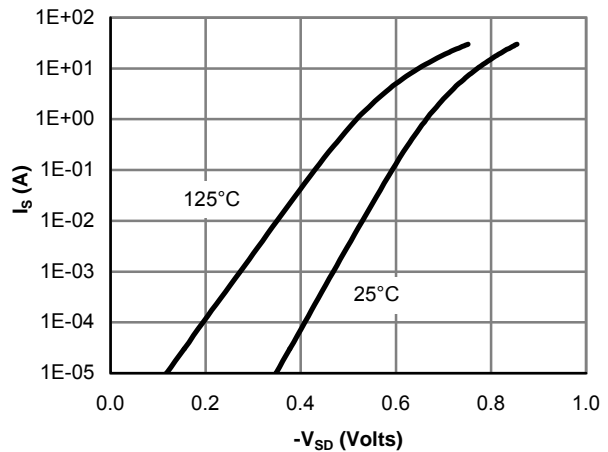


Figure 6: Body-Diode Characteristics(Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

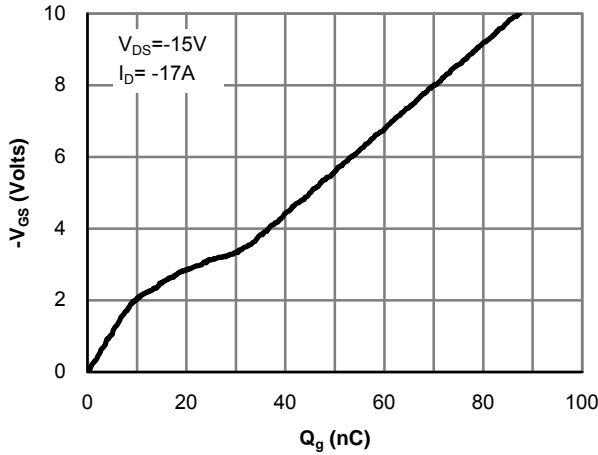


Figure 7: Gate-Charge Characteristics

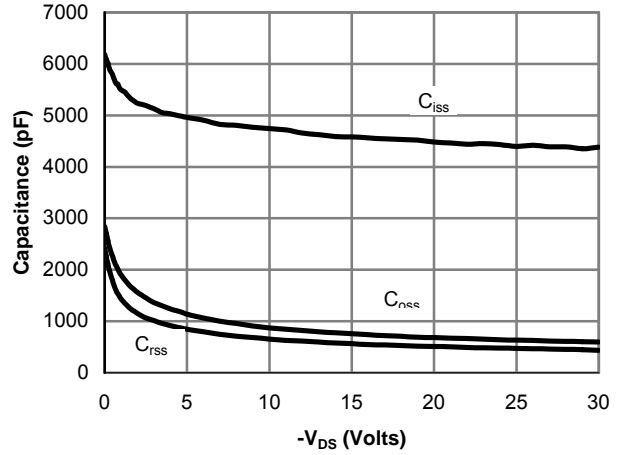


Figure 8: Capacitance Characteristics

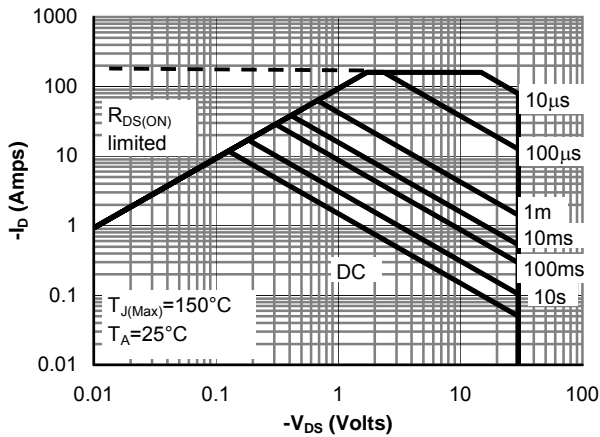


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

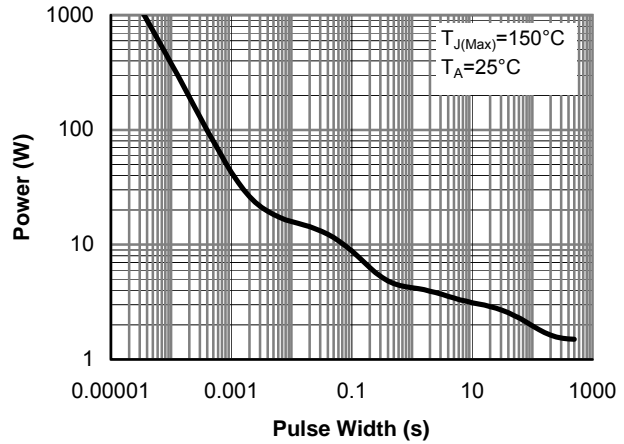


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

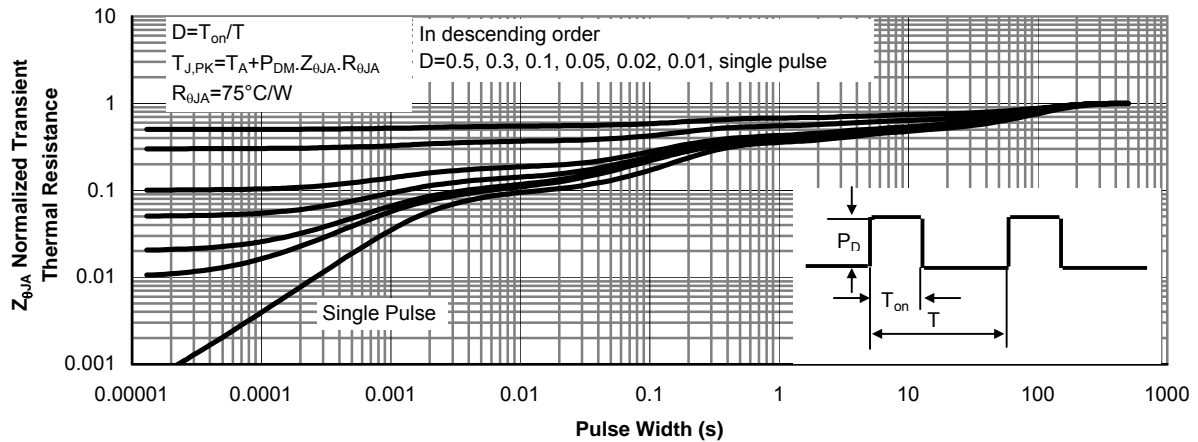
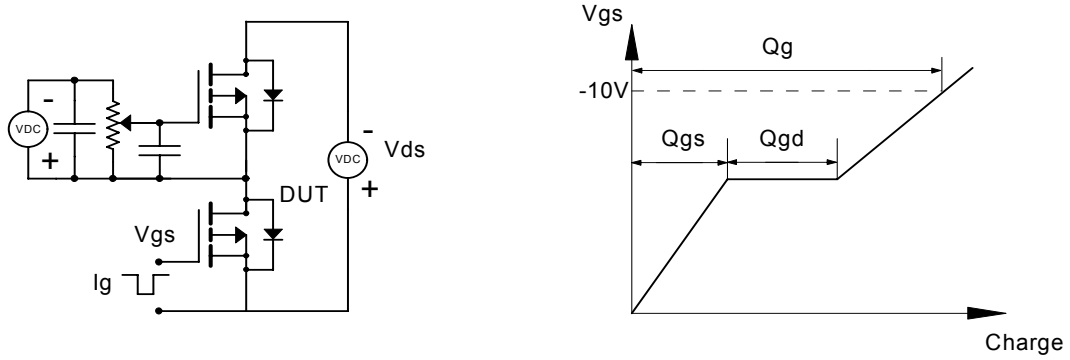
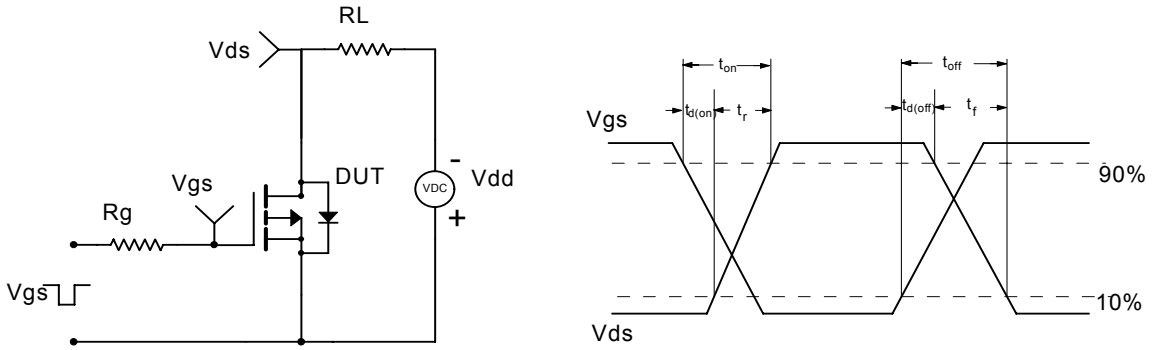


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

