



ALPHA & OMEGA
SEMICONDUCTOR



AO4442

N-Channel Enhancement Mode Field Effect Transistor

General Description

The AO4442 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages from 4.5V to 25V. This device is suitable for use as a load switch or in PWM applications. *Standard Product AO4442 is Pb-free (meets ROHS & Sony 259 specifications). AO4442L is a Green Product ordering option. AO4442 and AO4442L are electrically identical.*

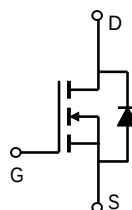
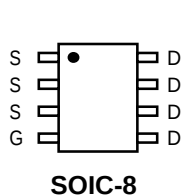
Features

$V_{DS} (V) = 75V$

$I_D = 3.1A (V_{GS} = 10V)$

$R_{DS(ON)} < 130m\Omega (V_{GS} = 10V)$

$R_{DS(ON)} < 165m\Omega (V_{GS} = 4.5V)$



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	75	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^A	I_D	3.1	A
		2.5	
Pulsed Drain Current ^B	I_{DM}	20	
Power Dissipation	P_D	2.5	W
		1.6	
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	$R_{\theta JA}$	38	50	$^\circ C/W$
Maximum Junction-to-Ambient ^A		69	80	$^\circ C/W$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	24	30	$^\circ C/W$

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 =10mA, V _{GS} =0V	75			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±25V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1	2.4	3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =3.1A T _J =125°C		100 180	130 220	mΩ
		V _{GS} =4.5V, I _D =2A		120	165	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =3.1A		8.2		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.79	1	V
I _S	Maximum Body-Diode Continuous Current				10	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =37.5V, f=1MHz		303	350	pF
C _{oss}	Output Capacitance			37		pF
C _{rss}	Reverse Transfer Capacitance			17		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		2.2	3	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =37.5V, I _D =3.1A		5.2	6.5	nC
Q _g (4.5V)	Total Gate Charge			2.46	3.5	nC
Q _{gs}	Gate Source Charge			1		nC
Q _{gd}	Gate Drain Charge			1.34		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =37.5V, R _L =12Ω, R _{GEN} =3Ω		4.5		ns
t _r	Turn-On Rise Time			2.3		ns
t _{D(off)}	Turn-Off DelayTime			15.6		ns
t _f	Turn-Off Fall Time			1.9		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =3.1A, dI/dt=100A/μs		22	30	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =3.1A, dI/dt=100A/μs		22		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 80 μs 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

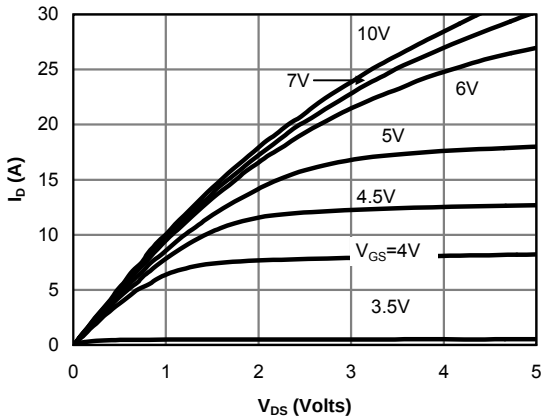


Fig 1: On-Region Characteristics

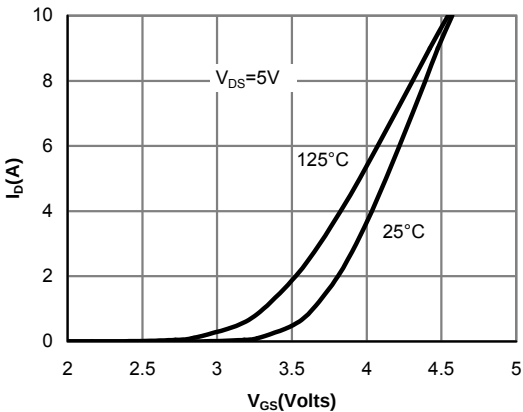


Figure 2: Transfer Characteristics

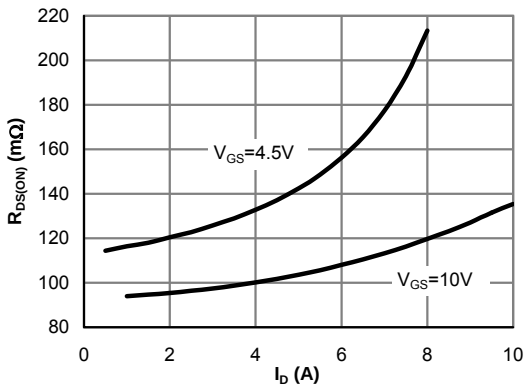


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

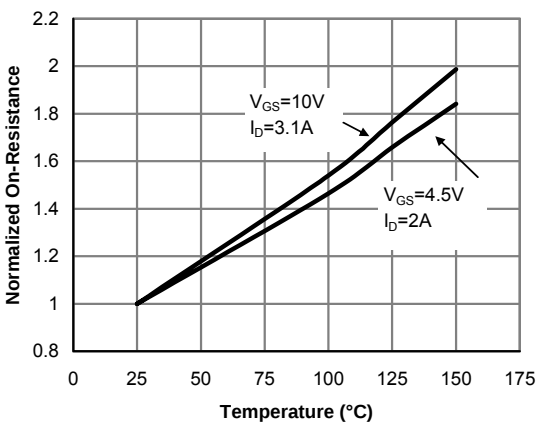


Figure 4: On-Resistance vs. Junction Temperature

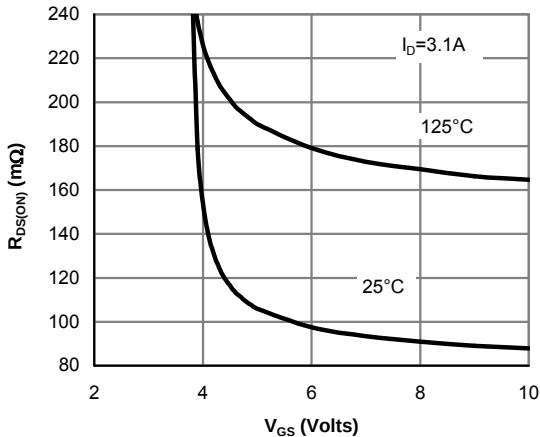


Figure 5: On-Resistance vs. Gate-Source Voltage

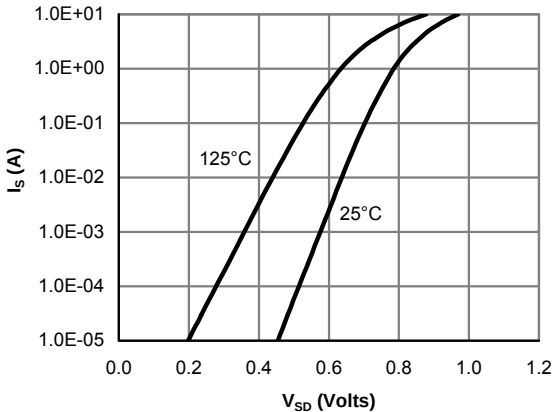


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

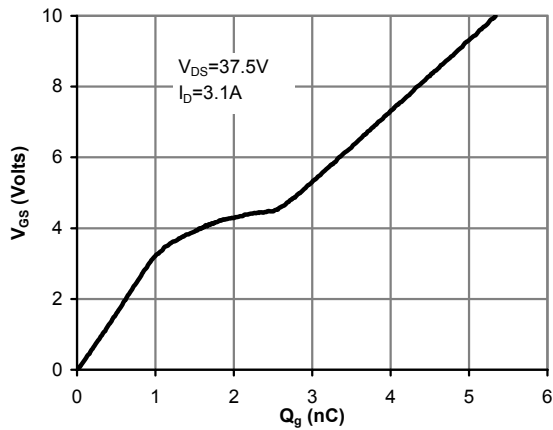


Figure 7: Gate-Charge Characteristics

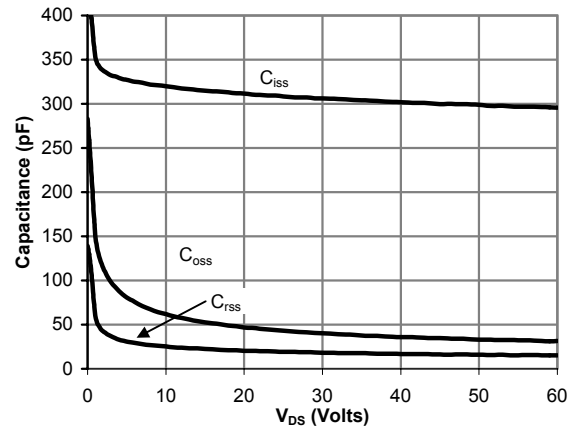


Figure 8: Capacitance Characteristics

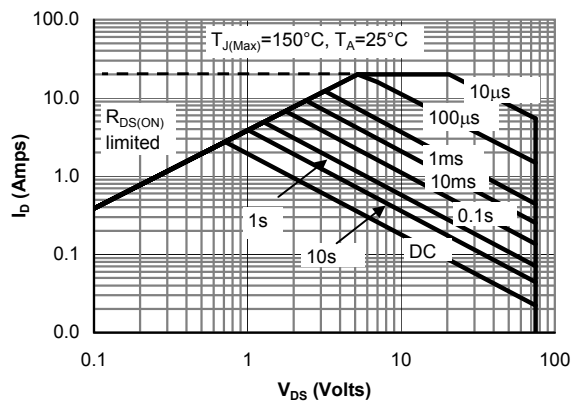


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

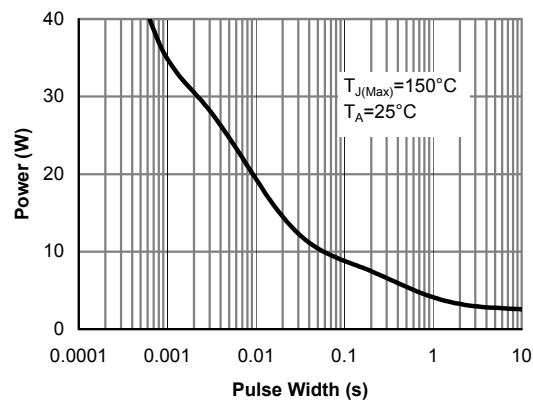


Figure 10: Single Pulse Power Rating Junction-to-Case (Note E)

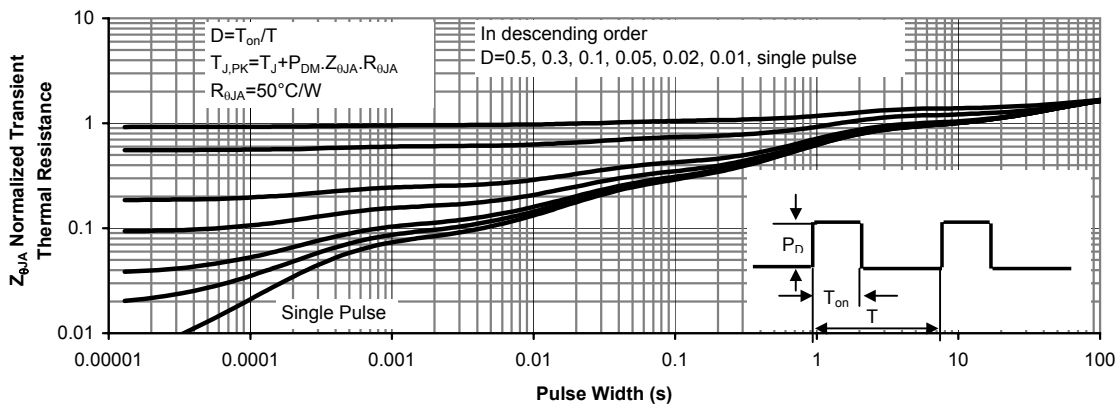


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)