



AO4442

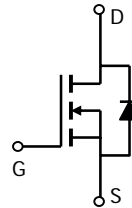
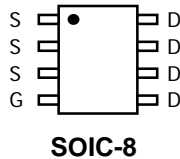
N-Channel Enhancement Mode Field Effect Transistor

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	$T_A=25^\circ C$	A
		$T_A=70^\circ C$	
Pulsed Drain Current ^B	I_{DM}	20	
Power Dissipation	P_D	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
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	$R_{\theta JA}$	$t \leq 10s$	38	$^\circ C/W$
Maximum Junction-to-Ambient ^A		Steady-State	50	
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	24	30	$^\circ C/W$

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=10\text{mA}$, $V_{GS}=0\text{V}$	75			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$T_J=55^\circ\text{C}$			5	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 25\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	2.4	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	20			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=3.1\text{A}$		100	130	m Ω
		$T_J=125^\circ\text{C}$		180	220	
		$V_{GS}=4.5\text{V}$, $I_D=2\text{A}$		120	165	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=3.1\text{A}$		8.2		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.79	1	V
I_S	Maximum Body-Diode Continuous Current				10	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=37.5\text{V}$, $f=1\text{MHz}$		303	350	pF
C_{oss}	Output Capacitance			37		pF
C_{riss}	Reverse Transfer Capacitance			17		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		2.2	3	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=37.5\text{V}$, $I_D=3.1\text{A}$		5.2	6.5	nC
$Q_g(4.5\text{V})$	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 Delay Time			4.5		ns
t_r	Turn-On Rise Time	$V_{GS}=10\text{V}$, $V_{DS}=37.5\text{V}$, $R_L=12\Omega$,		2.3		ns
$t_{D(off)}$	Turn-Off Delay Time	$R_{GEN}=3\Omega$		15.6		ns
t_f	Turn-Off Fall Time			1.9		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=3.1\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		22	30	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=3.1\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		22		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

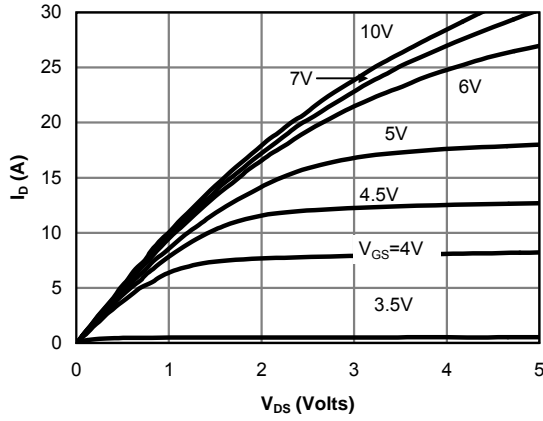


Fig 1: On-Region Characteristics

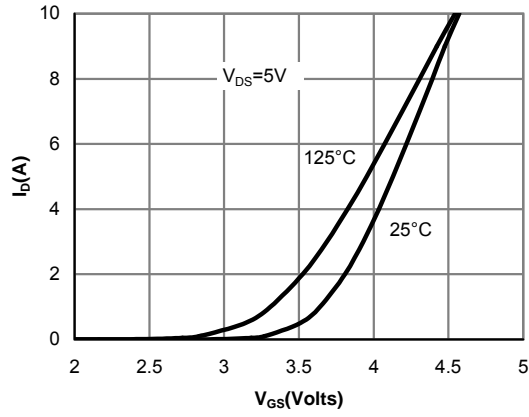


Figure 2: Transfer Characteristics

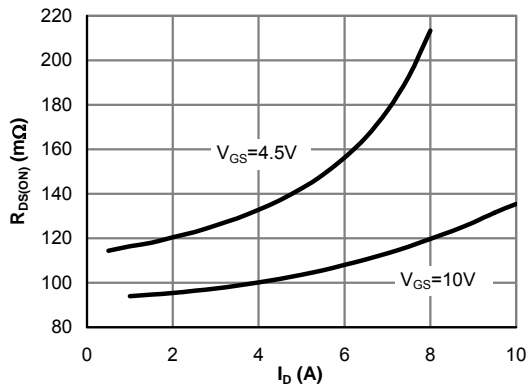


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

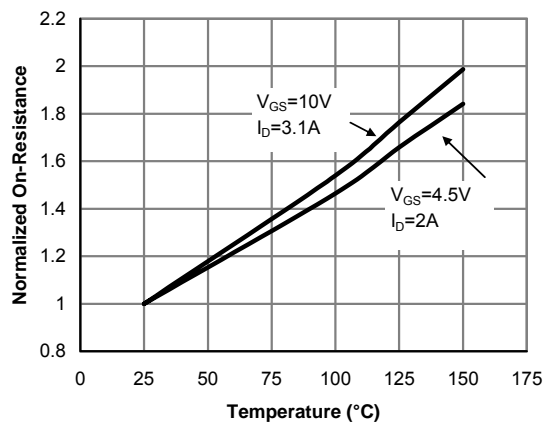


Figure 4: On-Resistance vs. Junction Temperature

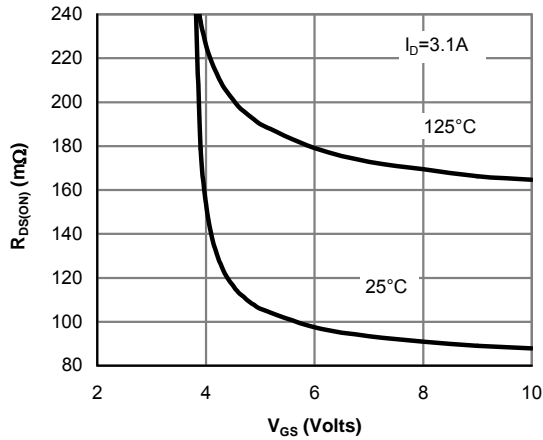


Figure 5: On-Resistance vs. Gate-Source Voltage

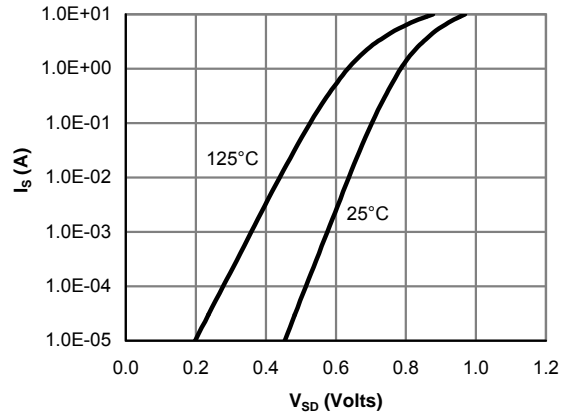


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

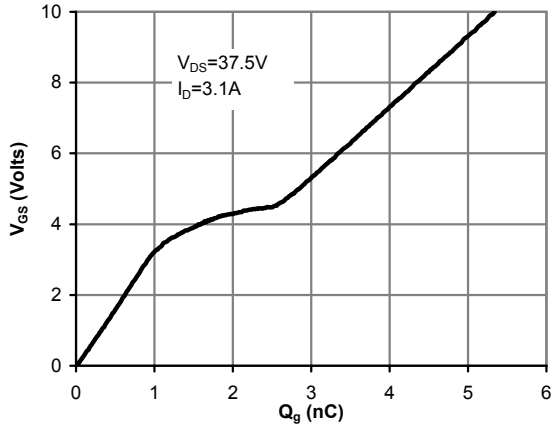


Figure 7: Gate-Charge Characteristics

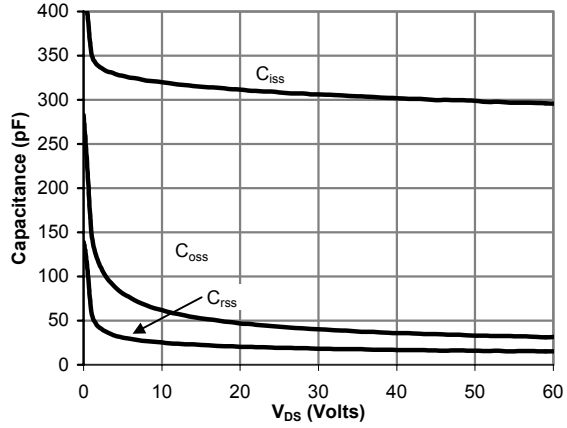


Figure 8: Capacitance Characteristics

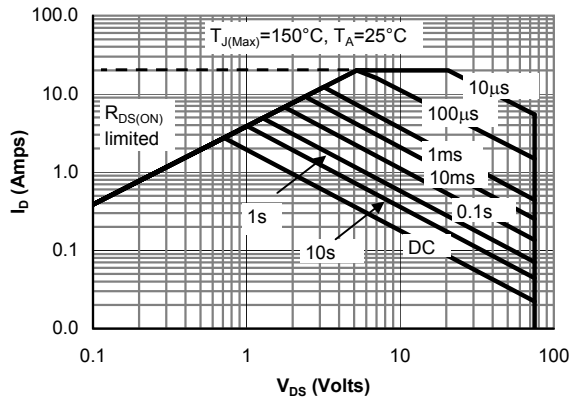


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

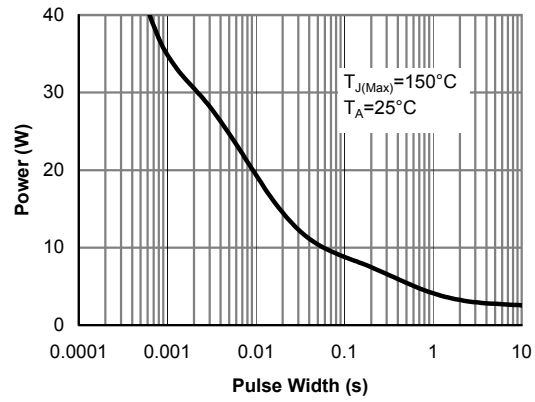


Figure 10: Single Pulse Power Rating Junction-to-Case (Note E)

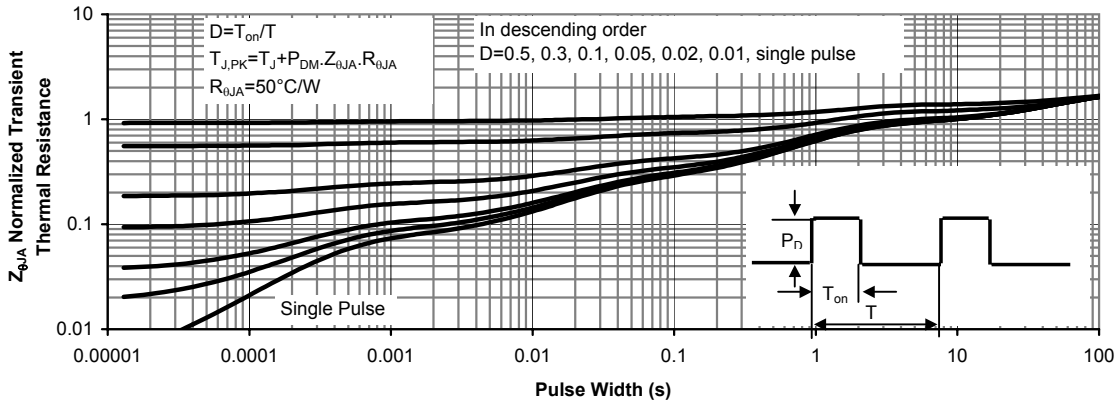


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)