

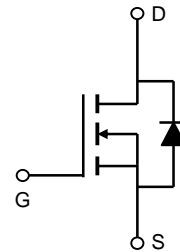
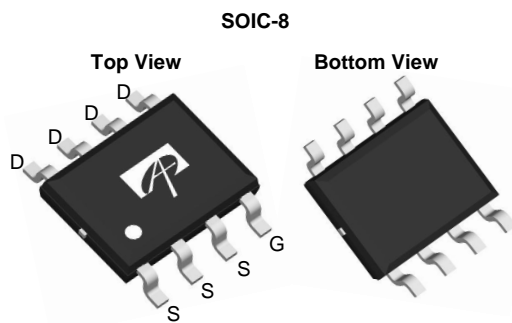
General Description

The AO4420A uses advanced trench technology to provide excellent $R_{DS(ON)}$, shoot-through immunity and body diode characteristics. This device is suitable for use as a synchronous switch in PWM applications.

Product Summary

V_{DS} (V) = 30V
 $I_D = 13.7A$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 10.5m\Omega$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 12m\Omega$ ($V_{GS} = 4.5V$)

100% UIS Tested
 100% Rg Tested



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}	± 12	V
Continuous Drain Current ^{AF}	$T_A=25^\circ\text{C}$	13.7	A
	$T_A=70^\circ\text{C}$	9.7	
Pulsed Drain Current ^B	I_{DM}	60	
Avalanche Current ^B	I_{AR}	20	A
Repetitive avalanche energy $L=0.3\text{mH}$ ^B	E_{AR}	60	mJ
Power Dissipation	$T_A=25^\circ\text{C}$	3.1	W
	$T_A=70^\circ\text{C}$	2	
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 ^A	$R_{\theta JA}$	28	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	54	75
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	21	30	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		0.004	1	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}= \pm 12\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.6	1.1	2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=13.7\text{A}$ $T_J=125^\circ\text{C}$		8.3	10.5	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=12.7\text{A}$		9.7	12	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=13.7\text{A}$	30	37		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.76	1	V
I_S	Maximum Body-Diode Continuous Current				5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		3656	4050	pF
C_{oss}	Output Capacitance			256		pF
C_{rss}	Reverse Transfer Capacitance			168		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		0.86	1.1	Ω
SWITCHING PARAMETERS						
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=4.5\text{V}, V_{DS}=15\text{V}, I_D=13.7\text{A}$		30.5	36	nC
Q_{gs}	Gate Source Charge			4.6		nC
Q_{gd}	Gate Drain Charge			8.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=1.1\Omega,$ $R_{GEN}=3\Omega$		5.5	9	ns
t_r	Turn-On Rise Time			3.4	7	ns
$t_{D(off)}$	Turn-Off DelayTime			49.8	75	ns
t_f	Turn-Off Fall Time			5.9	11	ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=13.7\text{A}, dl/dt=100\text{A}/\mu\text{s}$		22.5	28	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=13.7\text{A}, dl/dt=100\text{A}/\mu\text{s}$		12.5	16	nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² 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.

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 <300 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.

F: The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

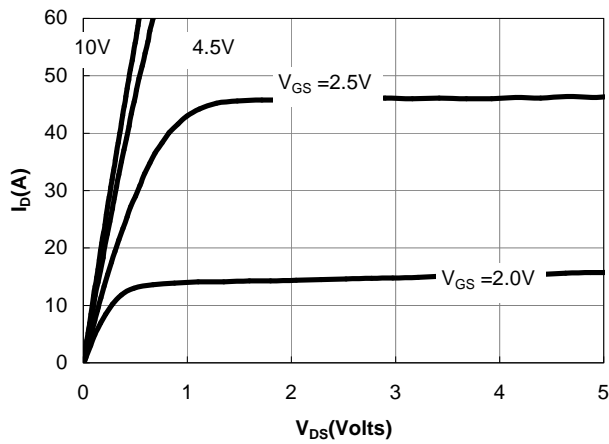


Figure 1: On-Regions Characteristics

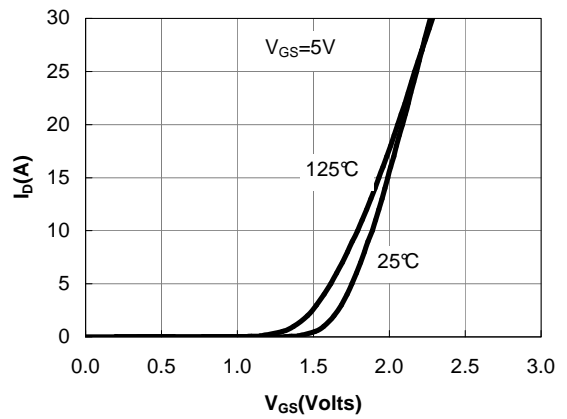


Figure 2: Transfer Characteristics

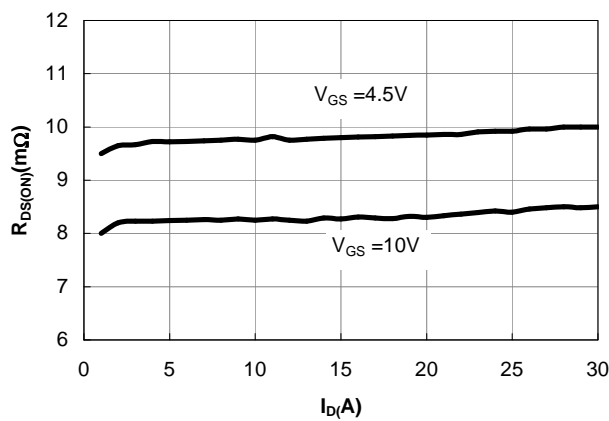


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

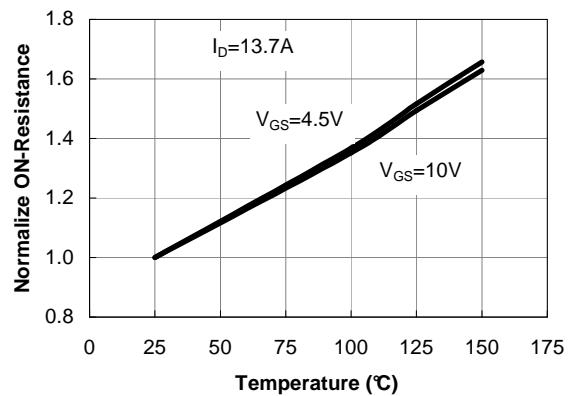


Figure 4: On-Resistance vs. Junction Temperature

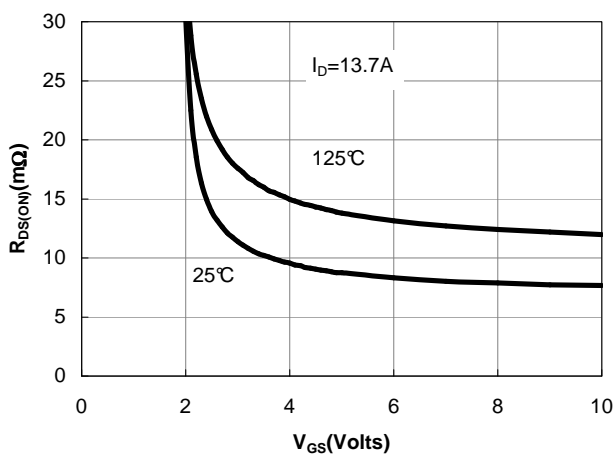


Figure 5: On-Resistance vs. Gate-Source Voltage

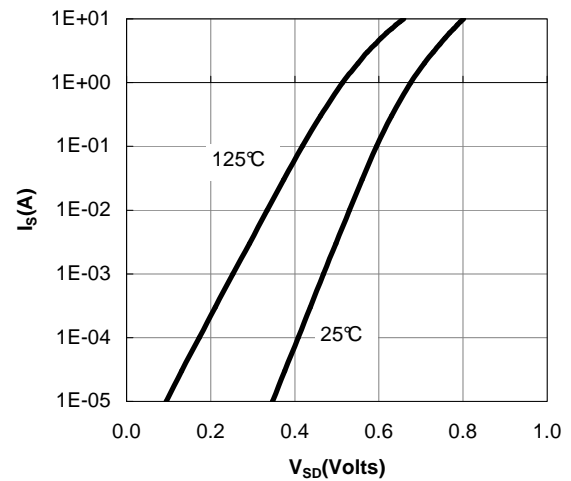


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

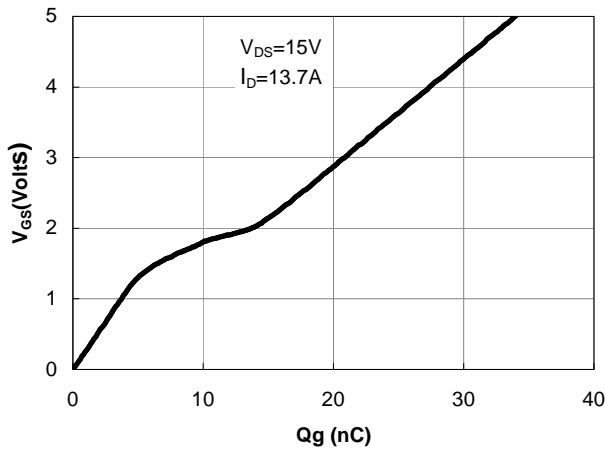


Figure 7: Gate-Charge Characteristics

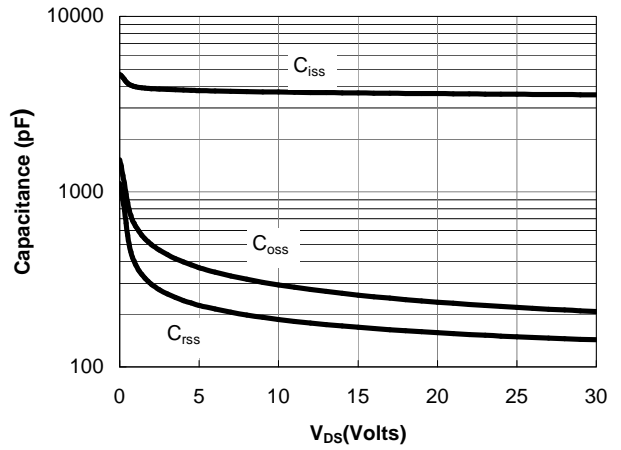


Figure 8: Capacitance Characteristics

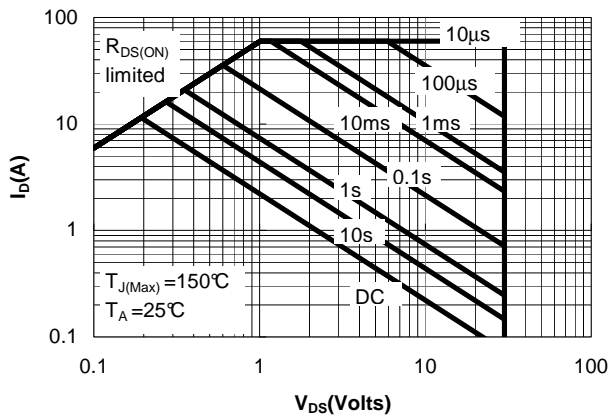


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

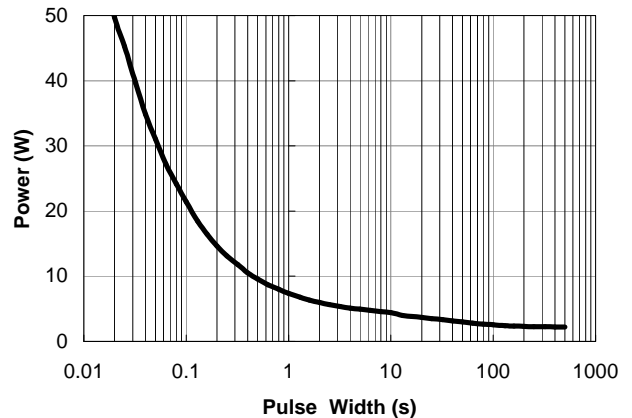


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

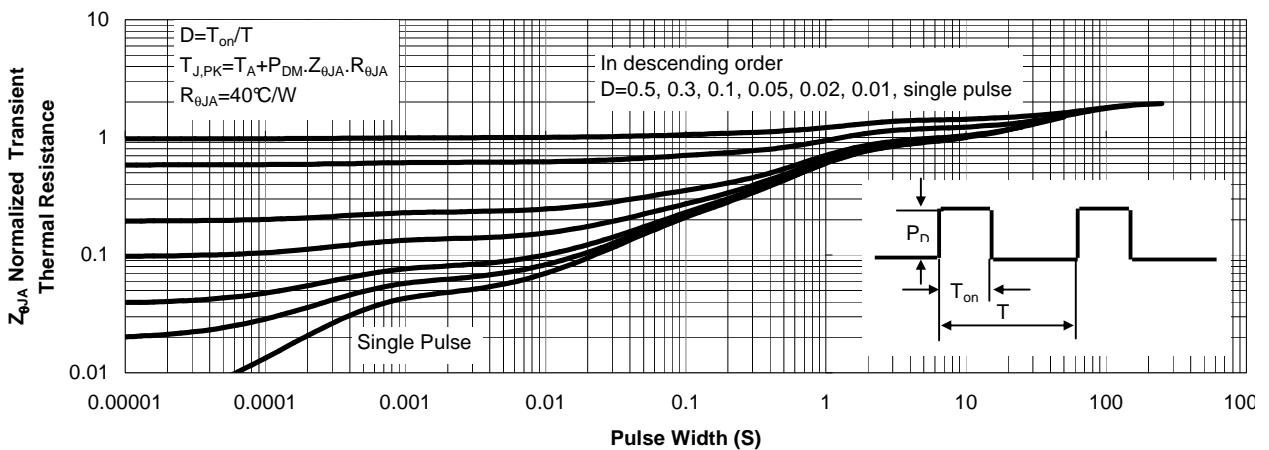


Figure 11: Normalized Maximum Transient Thermal Impedance