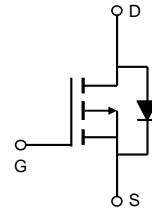
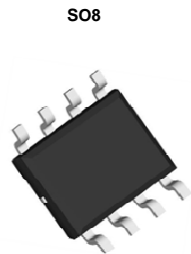


General Description

The AO4421 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Features

V_{DS}	-60V
I_D (at $V_{GS}=-10V$)	-6.2A
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 40m Ω
$R_{DS(ON)}$ (at $V_{GS} = -4.5V$)	< 50m Ω



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^A	I_D	$T_A=25^{\circ}C$	-6.2
		$T_A=70^{\circ}C$	-5
Pulsed Drain Current ^B	I_{DM}	-40	A
Power Dissipation ^A	P_D	$T_A=25^{\circ}C$	3.1
		$T_A=70^{\circ}C$	2
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	$t \leq 10s$	$R_{\theta JA}$	24	40	$^{\circ}C/W$
Maximum Junction-to-Ambient ^A	Steady-State		54	75	$^{\circ}C/W$
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$	21	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	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-60			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-48\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1	-2	-3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-6.2\text{A}$ $T_J=125^\circ\text{C}$		32 53	40 70	m Ω
		$V_{GS}=-4.5\text{V}, I_D=-5\text{A}$		40	50	
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-6.2\text{A}$		18		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.74	-1	V
I_S	Maximum Body-Diode Continuous Current				-4.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-30\text{V}, f=1\text{MHz}$		2417	2900	pF
C_{oss}	Output Capacitance			179		pF
C_{rss}	Reverse Transfer Capacitance			120		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.9	2.3	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}, V_{DS}=-30\text{V}, I_D=-6.2\text{A}$		46.5	55	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			22.7		nC
Q_{gs}	Gate Source Charge			9.1		nC
Q_{gd}	Gate Drain Charge			9.2		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}, V_{DS}=-30\text{V}, R_L=4.7\Omega,$ $R_{GEN}=3\Omega$		9.8		ns
t_r	Turn-On Rise Time			6.1		ns
$t_{D(off)}$	Turn-Off DelayTime			44		ns
t_f	Turn-Off Fall Time			12.7		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-6.2\text{A}, dl/dt=100\text{A}/\mu\text{s}$		34	42	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-6.2\text{A}, dl/dt=100\text{A}/\mu\text{s}$		47		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 a 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 6,12,14 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.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

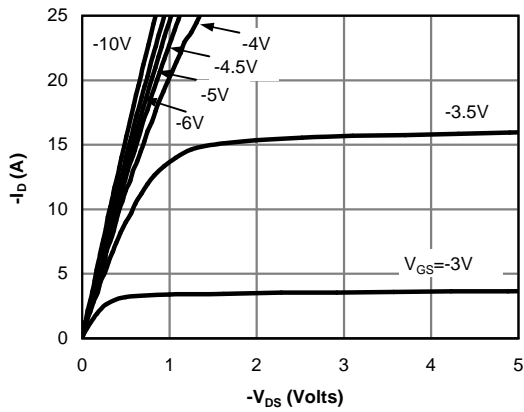


Fig 1: On-Region Characteristics

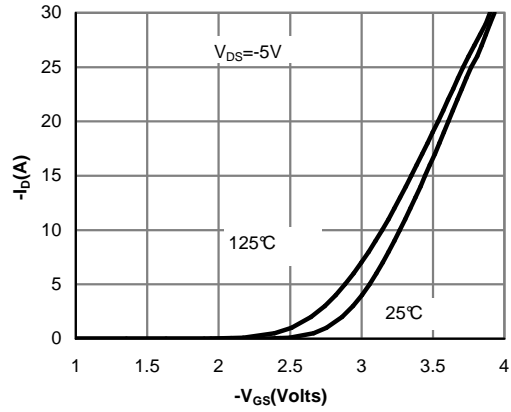


Figure 2: Transfer Characteristics

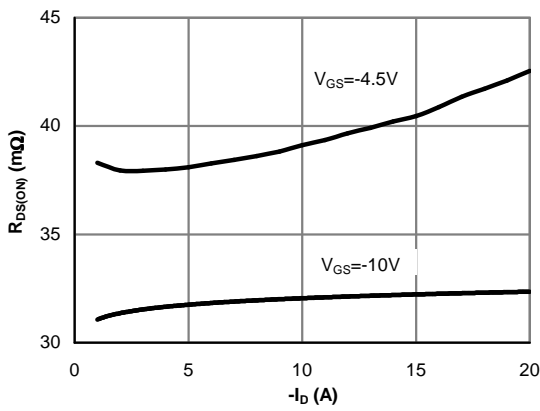


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

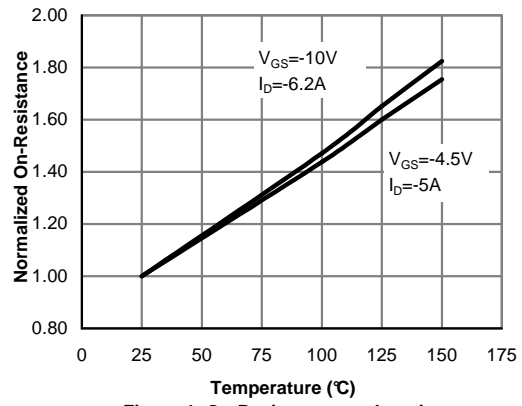


Figure 4: On-Resistance vs. Junction Temperature

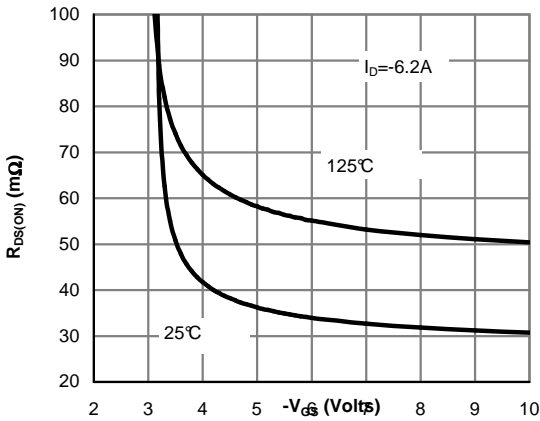


Figure 5: On-Resistance vs. Gate-Source Voltage

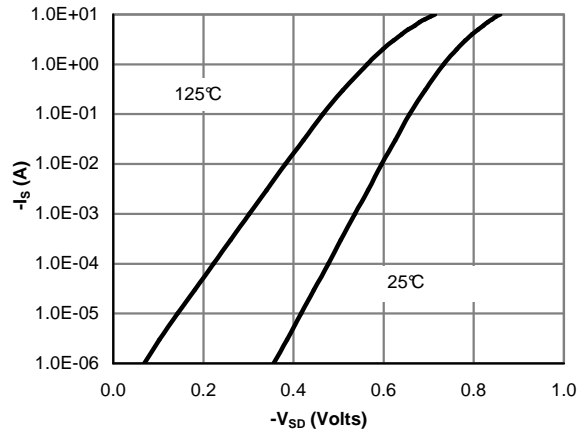


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

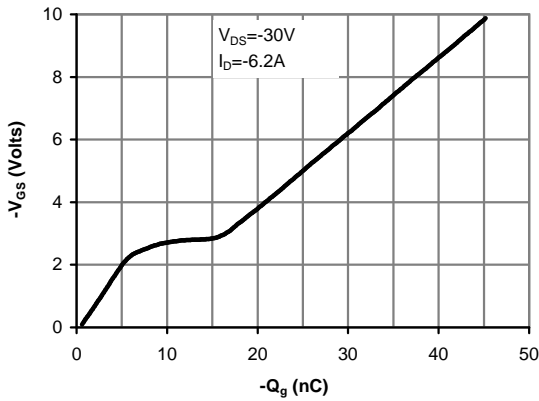


Figure 7: Gate-Charge Characteristics

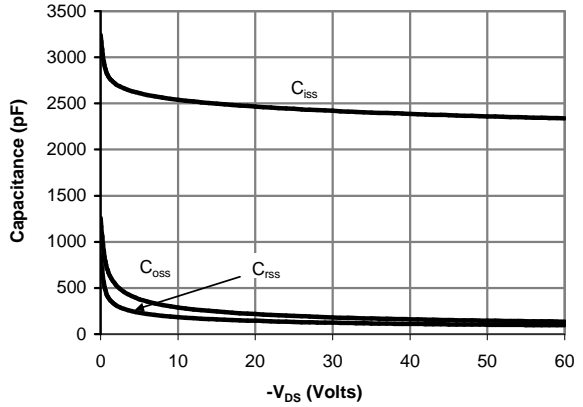


Figure 8: Capacitance Characteristics

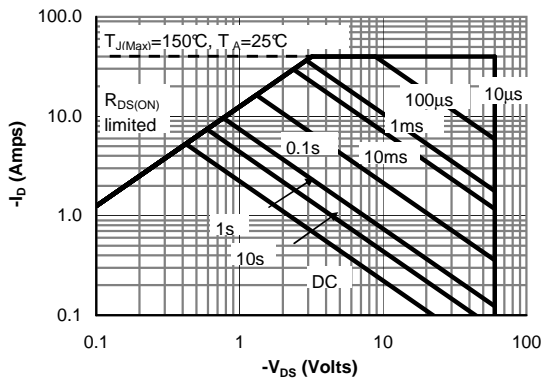


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

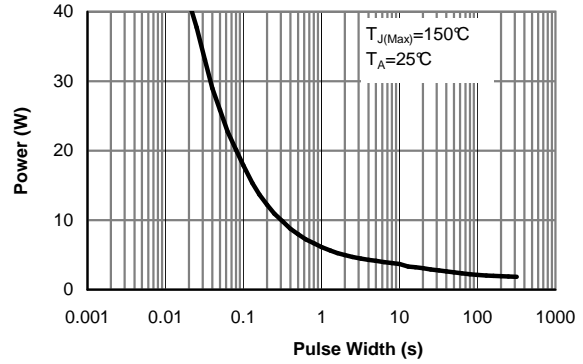


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

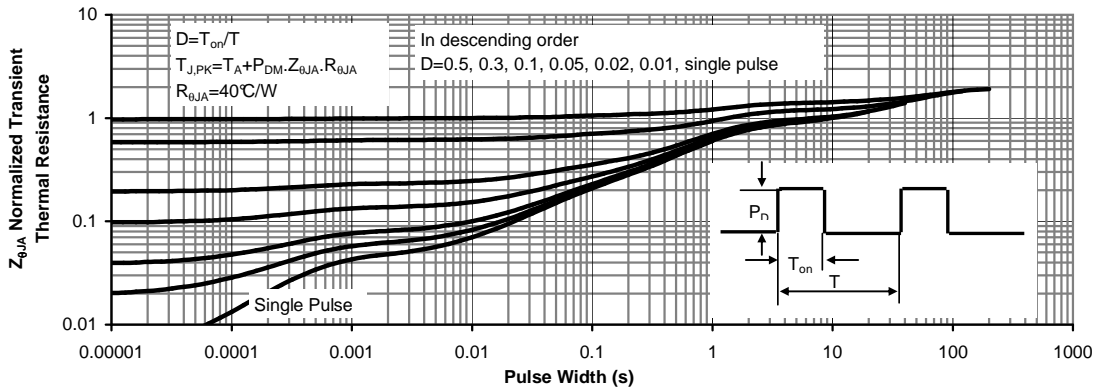


Figure 11: Normalized Maximum Transient Thermal Impedance