

### General Description

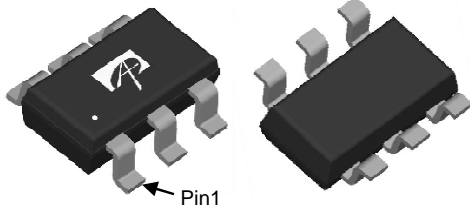
The AO6420 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for use as a load switch or in PWM applications.

### Product Summary

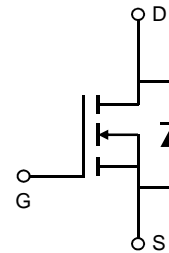
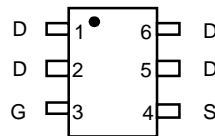
$V_{DS}$  (V) = 60V  
 $I_D$  = 4.2A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 60m $\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)}$  < 75m $\Omega$  ( $V_{GS}$  = 4.5V)



TSOP6  
 Top View Bottom View



Top View



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>A,F</sup>	$T_A=25^\circ\text{C}$	4.2	A
	$T_A=70^\circ\text{C}$	3.4	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	20	
Power Dissipation	$T_A=25^\circ\text{C}$	2.00	W
	$T_A=70^\circ\text{C}$	1.28	
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 <sup>A</sup>	$R_{\theta JA}$	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	74	
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	35	40	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=60\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	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	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	$V_{GS}=10\text{V}, I_D=4.2\text{A}$ $T_J=125^\circ\text{C}$		50	60	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=3\text{A}$		60	75	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D=4.2\text{A}$		13		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.78	1	V
$I_S$	Maximum Body-Diode Continuous Current				3	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$		450	540	pF
$C_{oss}$	Output Capacitance			60		pF
$C_{rss}$	Reverse Transfer Capacitance			25		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.65	2	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=30\text{V}, I_D=4.2\text{A}$		9.5	11.5	nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.3	5.5	nC
$Q_{gs}$	Gate Source Charge			1.6		nC
$Q_{gd}$	Gate Drain Charge			2.2		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=30\text{V}, R_L=7\Omega,$ $R_{GEN}=3\Omega$		5.1	7	ns
$t_r$	Turn-On Rise Time			2.6	4	ns
$t_{D(off)}$	Turn-Off Delay Time			15.9	20	ns
$t_f$	Turn-Off Fall Time			2	3	ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=4.2\text{A}, dI/dt=100\text{A}/\mu\text{s}$		25.1	35	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=4.2\text{A}, dI/dt=100\text{A}/\mu\text{s}$		28.7		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> 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  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> 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: N-CHANNEL

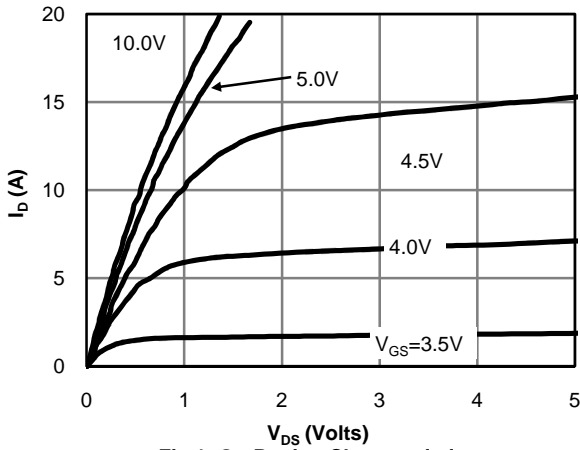


Fig 1: On-Region Characteristics

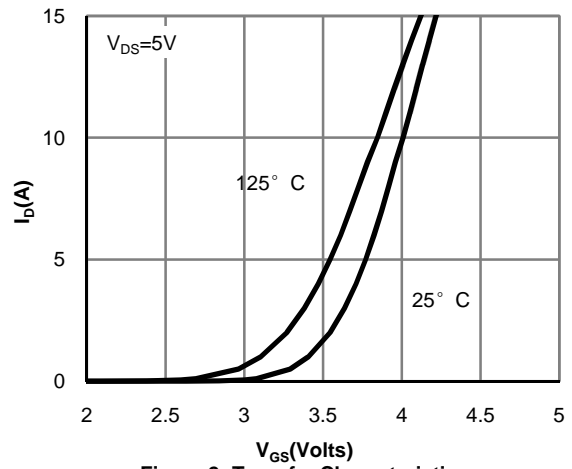


Figure 2: Transfer Characteristics

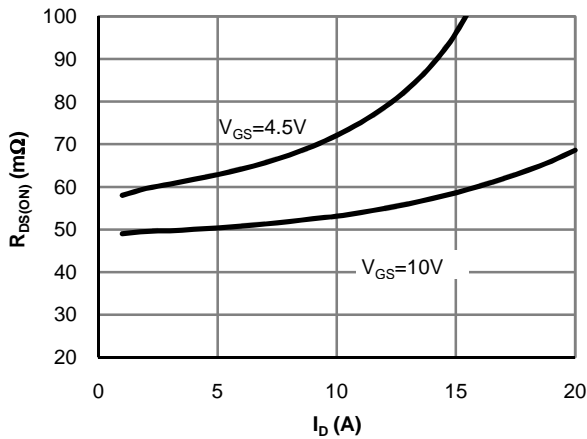


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

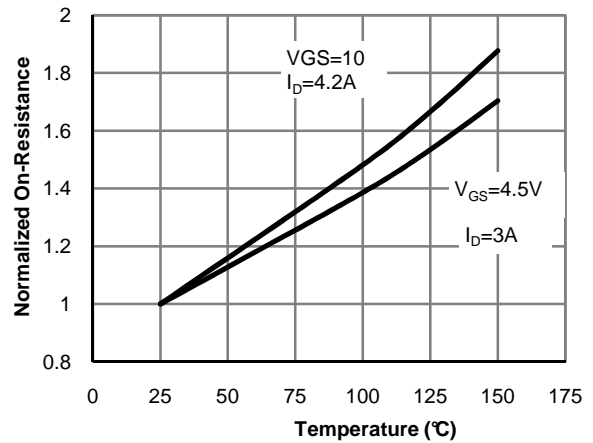


Figure 4: On-Resistance vs. Junction Temperature

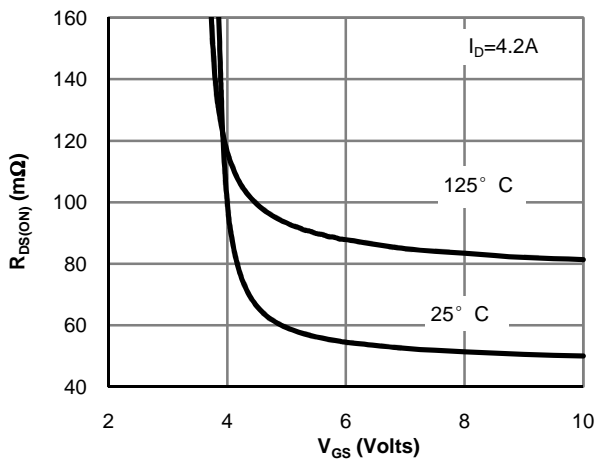


Figure 5: On-Resistance vs. Gate-Source Voltage

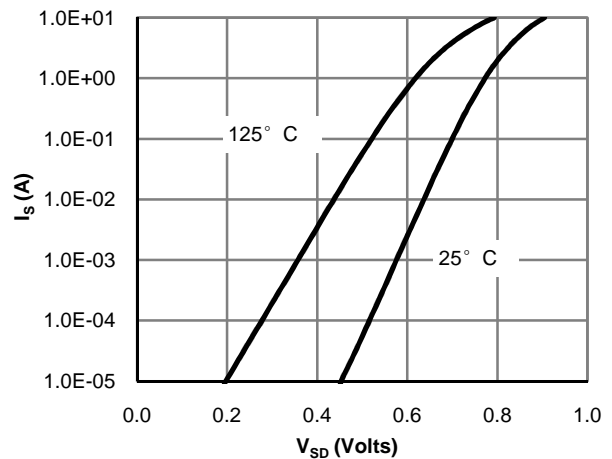


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CANNEL

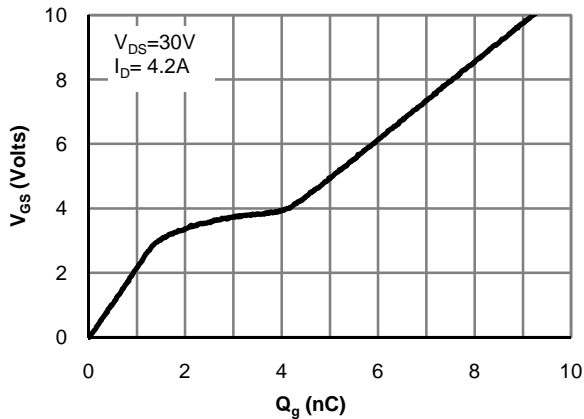


Figure 7: Gate-Charge Characteristics

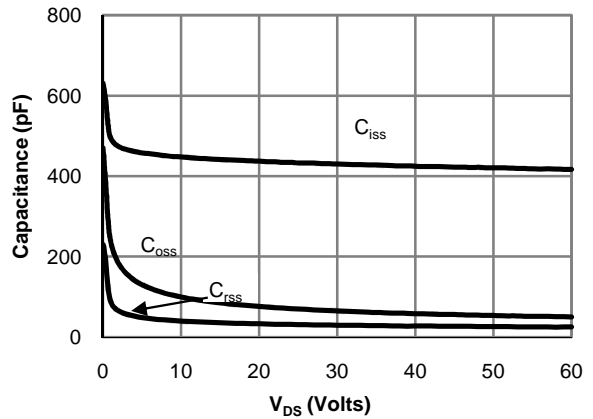


Figure 8: Capacitance Characteristics

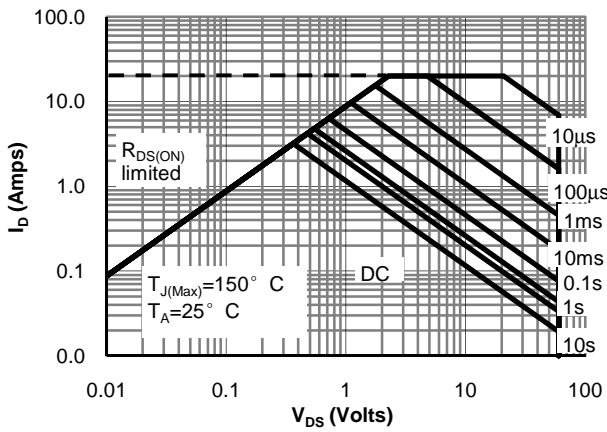


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

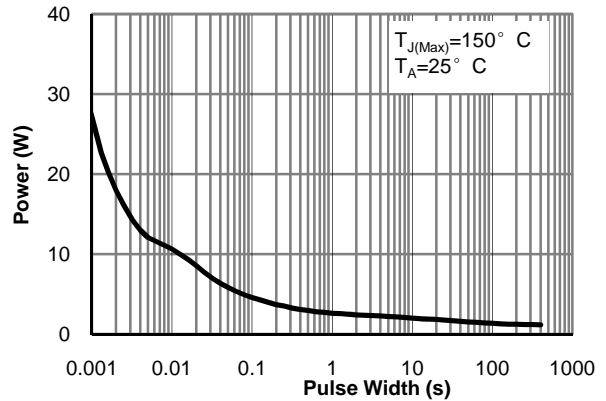


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

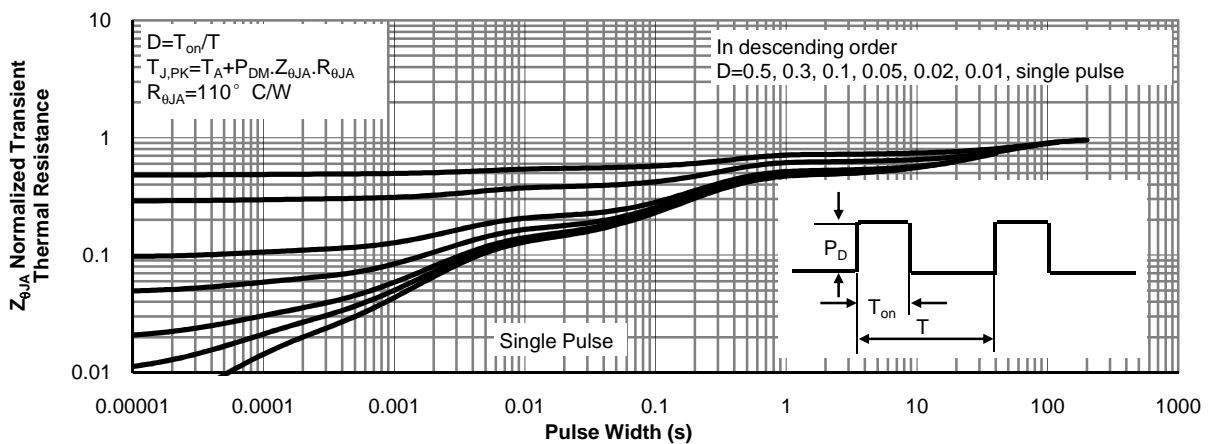


Figure 11: Normalized Maximum Transient Thermal Impedance