ALPHA & OMEGA SEMICONDUCTOR
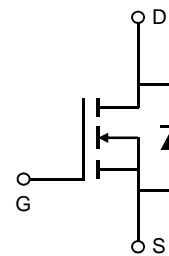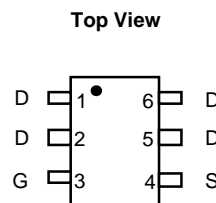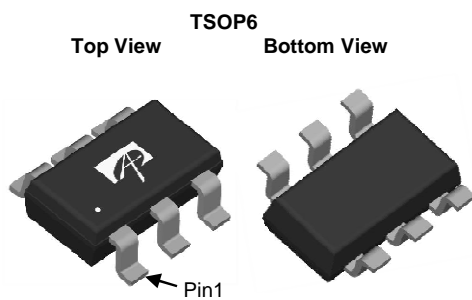
AO6420
60V N-Channel MOSFET

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)
$R_{DS(ON)}$ < 60mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 75mΩ (V_{GS} = 4.5V)

Green Product

TSOP6

Top View   Bottom View

Pin1

Top View

D	1 •	6	D
D	2	5	D
G	3	4	S

Absolute Maximum Ratings T_A=25°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,F]	T_A=25°C	I_D	4.2	A
	T_A=70°C		3.4	
Pulsed Drain Current [B]		I_{DM}	20	
Power Dissipation	T_A=25°C	P_D	2.00	W
	T_A=70°C		1.28	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		74	110	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	35	40	°C/W

N Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0V		60			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=60V, V_{GS}=0V				1	μA
			T_J=55℃			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±20V				100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250μA		1	2.3	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=4.2A			50	60	mΩ
			T_J=125℃		85		
		V_{GS}=4.5V, I_D=3A			60	75	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=4.2A			13		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V			0.78	1	V
I_S	Maximum Body-Diode Continuous Current					3	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, f=1MHz			450	540	pF
C_{oss}	Output Capacitance				60		pF
C_{rss}	Reverse Transfer Capacitance				25		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			1.65	2	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=30V, I_D=4.2A			9.5	11.5	nC
Q_g(4.5V)	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 DelayTime	V_{GS}=10V, V_{DS}=30V, R_L=7Ω, R_{GEN}=3Ω			5.1	7	ns
t_r	Turn-On Rise Time				2.6	4	ns
$t_{D(off)}$	Turn-Off DelayTime				15.9	20	ns
t_f	Turn-Off Fall Time				2	3	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=4.2A, dI/dt=100A/μs			25.1	35	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=4.2A, dI/dt=100A/μs			28.7		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 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 $R_{\theta JA}$ is the sum of the thermal impedence 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 in ^{2} FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The SOA curve provides a single pulse rating.
F.The current rating is based on the t ≤ 10s thermal resistance rating.
Rev2: Feb. 2012

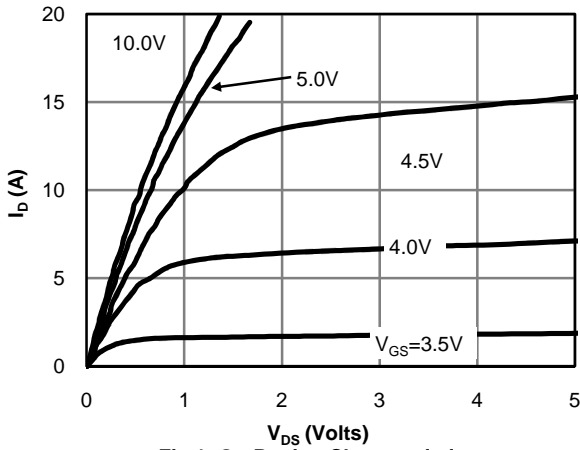**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL**
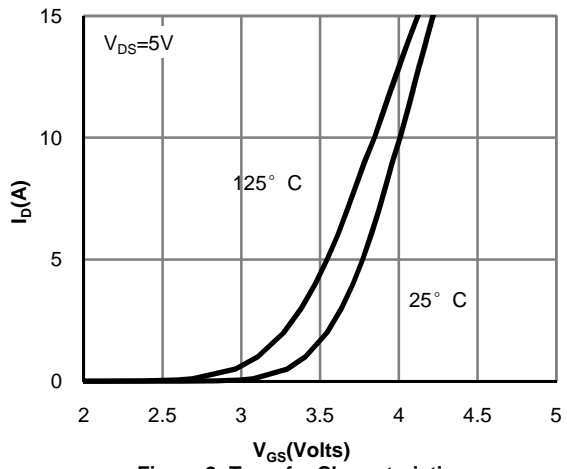
Fig 1: On-Region Characteristics

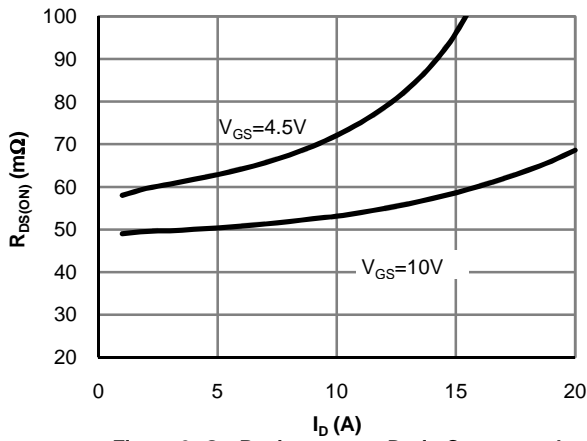Figure 2: Transfer Characteristics

Figure 3: On-Resistance vs. Drain Current and Gate Voltage
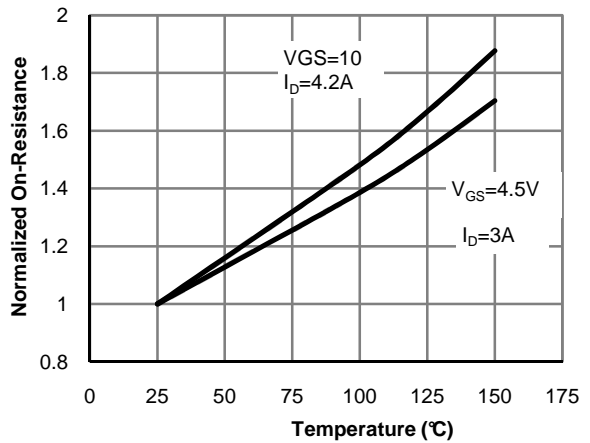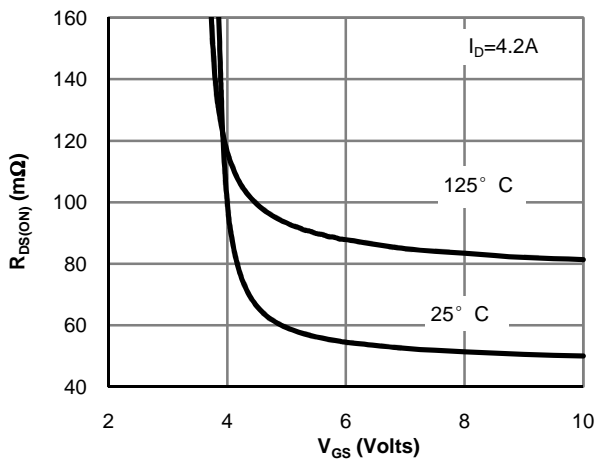
Figure 4: On-Resistance vs. Junction Temperature

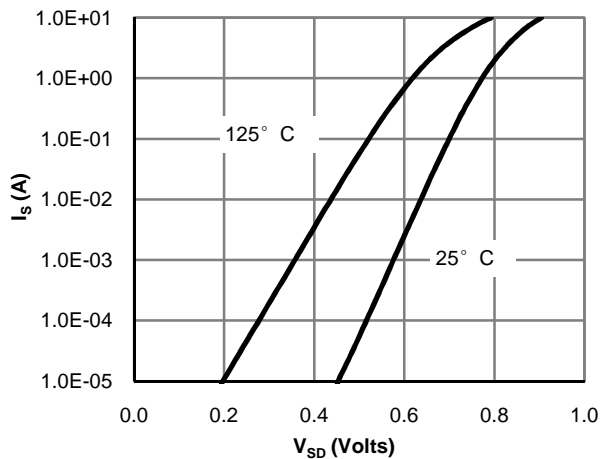Figure 5: On-Resistance vs. Gate-Source Voltage

Figure 6: Body-Diode Characteristics

AO6420

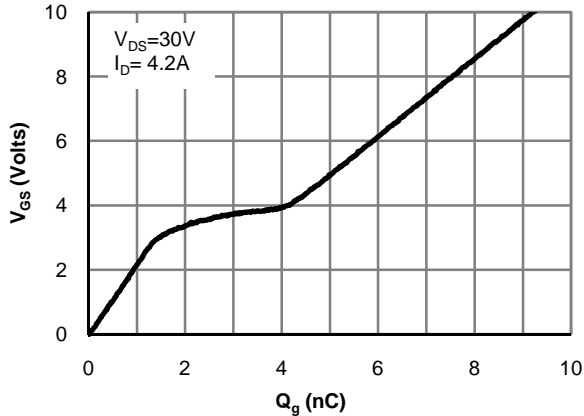## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

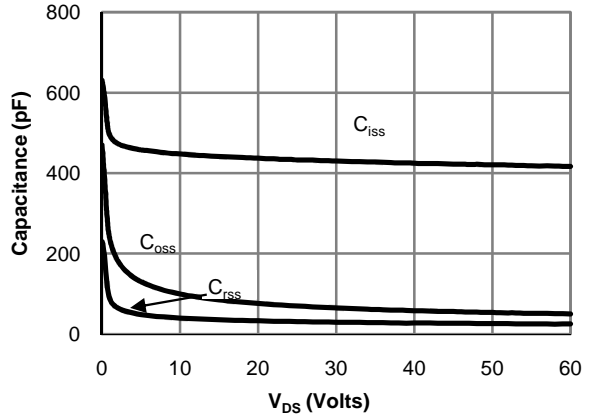Figure 7: Gate-Charge Characteristics

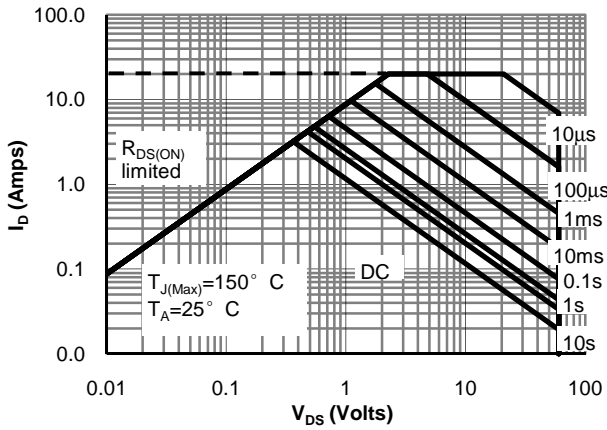Figure 8: Capacitance Characteristics

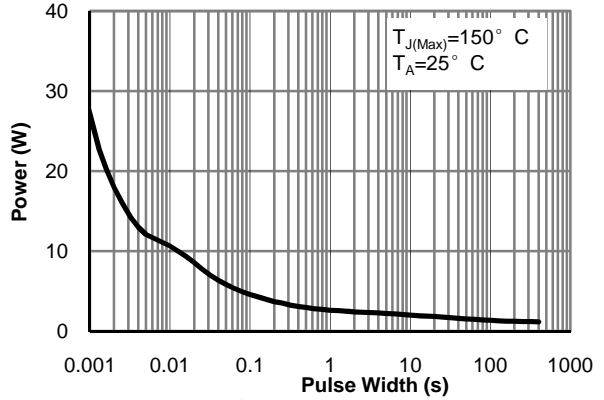Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

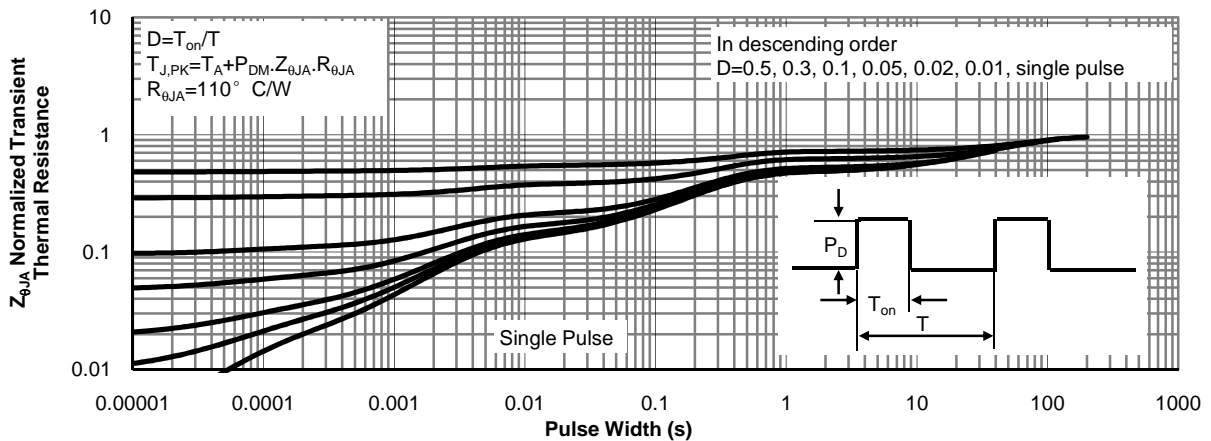Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

Figure 11: Normalized Maximum Transient Thermal Impedance

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