



ALPHA & OMEGA
SEMICONDUCTOR, LTD

AOD420

N-Channel Enhancement Mode Field Effect Transistor

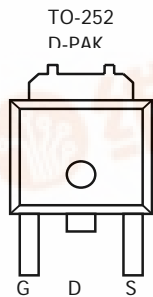


General Description

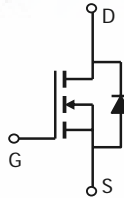
The AOD420 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications. Standard Product AOD420 is Pb-free (meets ROHS & Sony 259 specifications). AOD420L is a Green Product ordering option. AOD420 and AOD420L are electrically identical.

Features

- $V_{DS} (V) = 30V$
- $I_D = 10A (V_{GS} = 10V)$
- $R_{DS(ON)} < 28m\Omega (V_{GS} = 10V)$
- $R_{DS(ON)} < 42m\Omega (V_{GS} = 4.5V)$



Top View
Drain Connected to Tab



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^G	I_D	$T_C=25^\circ C$	10
		$T_C=100^\circ C$	10
Pulsed Drain Current ^C	I_{DM}	30	A
Avalanche Current ^C	I_{AR}	15	A
Repetitive avalanche energy $L=0.1mH$ ^C	E_{AR}	36	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ C$	60
		$T_C=100^\circ C$	30
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ C$	2.5
		$T_A=70^\circ C$	1.6
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	$t \leq 10s$	16.7	$^\circ C/W$
Maximum Junction-to-Ambient ^A		Steady-State	40	$^\circ C/W$
Maximum Junction-to-Case ^B	$R_{\theta JC}$	1.9	2.5	$^\circ C/W$



AOD420

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =55°C			1 5	μA
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	1.8	3	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =10A T _J =125°C		21 31	28 40	mΩ
		V _{GS} =4.5V, I _D =7A		32.5	42	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =10A		15.6		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.75	1	V
I _S	Maximum Body-Diode Continuous Current				10	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		710	850	pF
C _{oss}	Output Capacitance			120		pF
C _{rss}	Reverse Transfer Capacitance			72		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.1	3.6	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =10A		14.4	18	nC
Q _{g(4.5V)}	Total Gate Charge			7	8.4	nC
Q _{gs}	Gate Source Charge			2.6		nC
Q _{gd}	Gate Drain Charge			2.7		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =1.5Ω, R _{GEN} =3Ω		5.6		ns
t _r	Turn-On Rise Time			2.4		ns
t _{D(off)}	Turn-Off Delay Time			15.6		ns
t _f	Turn-Off Fall Time			2.2		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =10A, di/dt=100A/μs		13.4	21	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =10A, di/dt=100A/μs		4.4		nC

A: The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B: The power dissipation P_D is based on T_{J(MAX)}=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=175°C.

D: The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

F: 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°C. The SOA curve provides a single pulse rating.

G: The maximum current rating is limited by bond-wires. Rev4: August 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

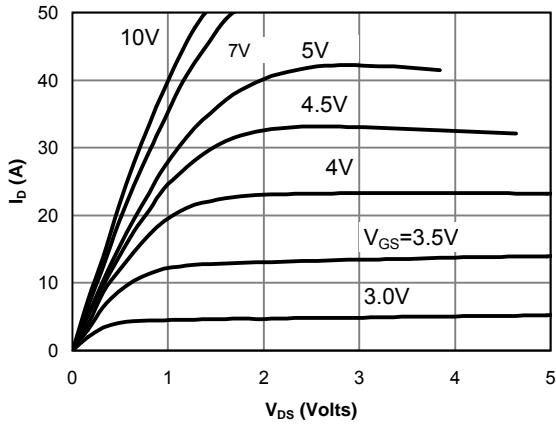


Fig 1: On-Region Characteristics

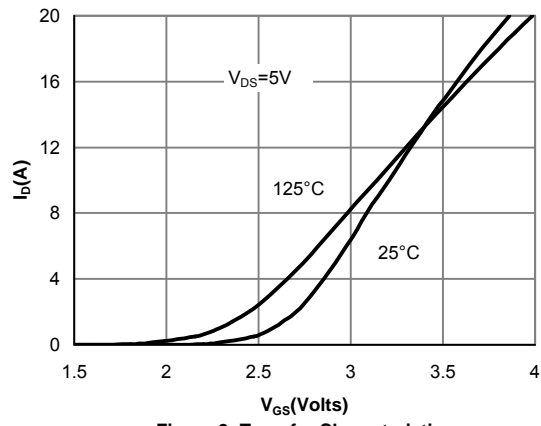


Figure 2: Transfer Characteristics

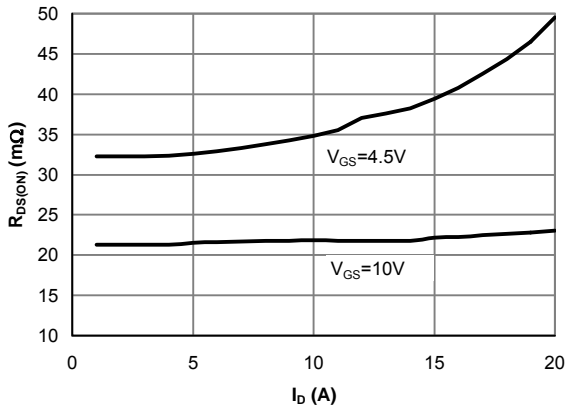


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

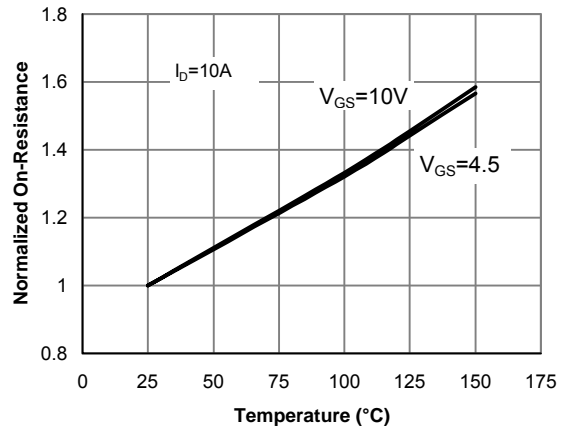


Figure 4: On-Resistance vs. Junction Temperature

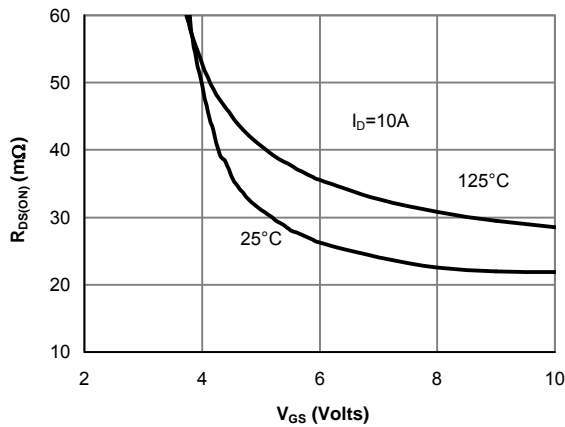


Figure 5: On-Resistance vs. Gate-Source Voltage

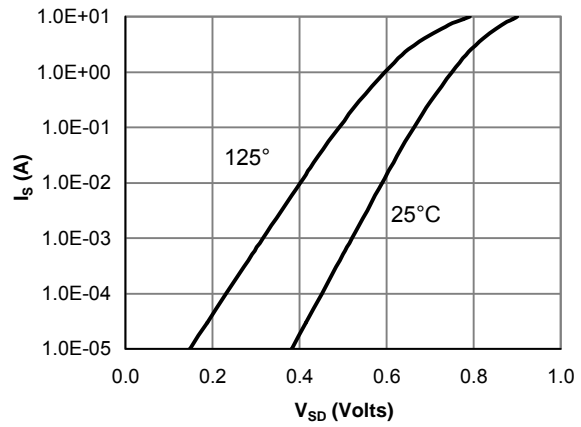


Figure 6: Body-Diode Characteristics

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