



**AOD422**  
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

The AOD422 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

**Features**

- $V_{DS}$  (V) = 20V
- $I_D$  = 10 A
- $R_{DS(ON)} < 22m\Omega$  ( $V_{GS} = 4.5V$ )
- $R_{DS(ON)} < 26m\Omega$  ( $V_{GS} = 2.5V$ )
- $R_{DS(ON)} < 34m\Omega$  ( $V_{GS} = 1.8V$ )
- ESD Rating: 2000V HBM



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Continuous Drain Current <sup>G</sup>	$I_D$	$T_C=25^\circ C$	A
		$T_C=100^\circ C$	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	30	
Avalanche Current <sup>C</sup>	$I_{AR}$	15	A
Repetitive avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AR}$	2	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$	W
		$T_C=100^\circ C$	
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
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 <sup>A</sup>	$R_{\theta JA}$	$t \leq 10s$	16.7	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	40	
Maximum Junction-to-Case <sup>C</sup>	$R_{\theta JL}$	1.9	2.5	$^\circ C/W$

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	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	20			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=16\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 4.5\text{V}$ $V_{DS}=0\text{V}$ , $V_{GS}=\pm 8\text{V}$			$\pm 1$ $\pm 10$	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	0.4	0.6	1	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$ , $V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5\text{V}$ , $I_D=10\text{A}$ $T_J=125^\circ\text{C}$		18 25	22 31	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}$ , $I_D=8\text{A}$		21	26	$\text{m}\Omega$
		$V_{GS}=1.8\text{V}$ , $I_D=5\text{A}$		26	34	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=10\text{A}$		30		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 <sup>6</sup>				10	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=10\text{V}$ , $f=1\text{MHz}$		1160		pF
$C_{oss}$	Output Capacitance			187		pF
$C_{rss}$	Reverse Transfer Capacitance			146		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		1.5		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=4.5\text{V}$ , $V_{DS}=10\text{V}$ , $I_D=10\text{A}$		16		nC
$Q_{gs}$	Gate Source Charge			0.8		nC
$Q_{gd}$	Gate Drain Charge			3.8		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=5\text{V}$ , $V_{DS}=10\text{V}$ , $R_L=1\Omega$ , $R_{GEN}=3\Omega$		6.2		ns
$t_r$	Turn-On Rise Time			12.7		ns
$t_{D(off)}$	Turn-Off DelayTime			51.7		ns
$t_f$	Turn-Off Fall Time			16		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=10\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		17.6		ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=10\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		6.5		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 Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA}$  and the maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any a given application depends on the user's specific board design, and the maximum temperature of  $150^\circ\text{C}$  may be used if the PCB allows it to.

B: The power dissipation  $P_D$  is based on  $T_{J(MAX)}=150^\circ\text{C}$ , 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  $T_{J(MAX)}=150^\circ\text{C}$ .

D: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to case  $R_{\theta JC}$  and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

F: 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.

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