



**AOD442, AOD442L**  
**N-Channel Enhancement Mode Field Effect Transistor**

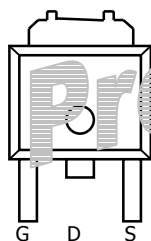
**General Description**

The AOD442 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , shoot-through immunity and body diode characteristics. This device is ideally suited for use as a low side switch in CPU core power conversion.

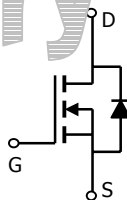
**Features**

- $V_{DS}$  (V) = 60V
- $I_D$  = 38A
- $R_{DS(ON)} < 20m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 25m\Omega$  ( $V_{GS} = 4.5V$ )

TO-252  
D-PAK



Top View  
Drain Connected  
to Tab



**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>B,G</sup>	$I_D$	$T_C=25^\circ\text{C}$ <sup>G</sup>	A
		$T_C=100^\circ\text{C}$ <sup>B</sup>	
Pulsed Drain Current	$I_{DM}$	100	
Avalanche Current <sup>C</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	140	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	W
		$T_C=100^\circ\text{C}$	
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	14.2	20	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	40	50
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	1.4	2.5	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=48\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		0.005	1	$\mu\text{A}$
$I_{GSS}$	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	2.2	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$ , $V_{DS}=5\text{V}$	100			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=20\text{A}$ $T_J=125^\circ\text{C}$		15.4	20	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=20\text{A}$		18.4	25	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=20\text{A}$		53		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					A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=30\text{V}$ , $f=1\text{MHz}$		1750	2100	pF
$C_{oss}$	Output Capacitance			150		pF
$C_{rss}$	Reverse Transfer Capacitance			106		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		0.6	0.8	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $I_D=20\text{A}$		42	58	nC
$Q_g(4.5\text{V})$	Total Gate Charge			21	30	nC
$Q_{gs}$	Gate Source Charge			6.4		nC
$Q_{gd}$	Gate Drain Charge			12		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $R_L=0.75\Omega$ , $R_{GEN}=3\Omega$		8.5		ns
$t_r$	Turn-On Rise Time			15.5		ns
$t_{D(off)}$	Turn-Off Delay Time			30.5		ns
$t_f$	Turn-Off Fall Time			9.5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=20\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		39	50	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		55		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 steady-state  $R_{\theta JA}$  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 fo  $175^\circ\text{C}$  may be used if the PCB or heatsink allows it.

B: The power dissipation  $P_D$  is based on  $T_{J(MAX)}=175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

C: Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=175^\circ\text{C}$ .

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 the package current capability.