

AOD450

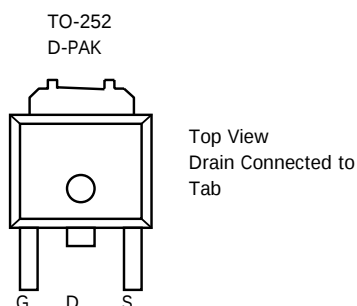
N-Channel Enhancement Mode Field Effect Transistor

General Description

The AOD450 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in inverter, load switching and general purpose applications. *Standard product AOD450 is Pb-free (meets ROHS & Sony 259 specifications). AOD450L is a Green Product ordering option. AOD450 and AOD450L are electrically identical.*

Features

V_{DS} (V) = 200V
 I_D = 3.8A
 $R_{DS(ON)} < 0.7\Omega$ ($V_{GS} = 10V$)



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	3.8	A
$T_C=25^\circ\text{C}$			
$T_C=100^\circ\text{C}$	I_D	2.7	
Pulsed Drain Current ^C	I_{DM}	10	
Avalanche Current ^C	I_{AR}	3	A
Repetitive avalanche energy $L=1.35\text{mH}$ ^C	E_{AR}	6	mJ
Power Dissipation ^B	P_D	25	W
$T_C=25^\circ\text{C}$			
$T_C=100^\circ\text{C}$	P_D	12.5	
Power Dissipation ^A	P_{DSM}	2.1	W
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$	P_{DSM}	1.3	
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 ^A	$R_{\theta JA}$	17.1	30	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	50	60	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Case ^B	$R_{\theta JC}$	4	6	$^\circ\text{C/W}$
Steady-State				

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=10\text{mA}$, $V_{GS}=0\text{V}$	200			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=160\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 30\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	3	5	6	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$	10			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=3.8\text{A}$ $T_J=125^{\circ}\text{C}$		0.55 1.1	0.70 1.32	Ω
g_{FS}	Forward Transconductance	$V_{DS}=15\text{V}$, $I_D=3.8\text{A}$		8.7		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.8	1	V
I_S	Maximum Body-Diode Continuous Current ^G				6	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1\text{MHz}$		215		pF
C_{oss}	Output Capacitance			32		pF
C_{rss}	Reverse Transfer Capacitance			7.2		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		5.5		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=25\text{V}$, $I_D=3.8\text{A}$		3.82		nC
$Q_g(4.5\text{V})$	Total Gate Charge			0.92		nC
Q_{gs}	Gate Source Charge			1.42		nC
Q_{gd}	Gate Drain Charge			1.47		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=25\text{V}$, $R_L=6.5\Omega$, $R_{GEN}=3\Omega$		6.3		ns
t_r	Turn-On Rise Time			3.3		ns
$t_{D(off)}$	Turn-Off DelayTime			10.5		ns
t_f	Turn-Off Fall Time			2.8		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=3.8\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		59		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=3.8\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		142		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² 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°C . The value in any a given application depends on the user's specific board design, and the maximum temperature fo 175°C may be used if the PCB 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.

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 curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=175^{\circ}\text{C}$.

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

H: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL CHARACTERISTICS

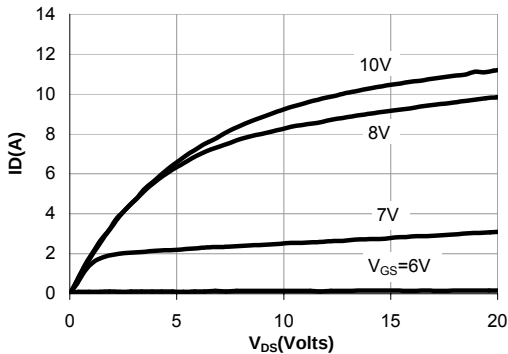


Figure 1: On-Region Characteristics

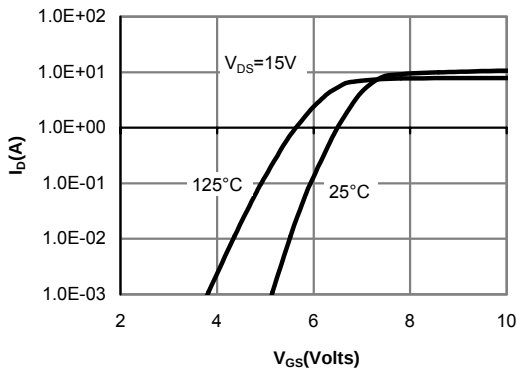


Figure 2: Transfer Characteristics

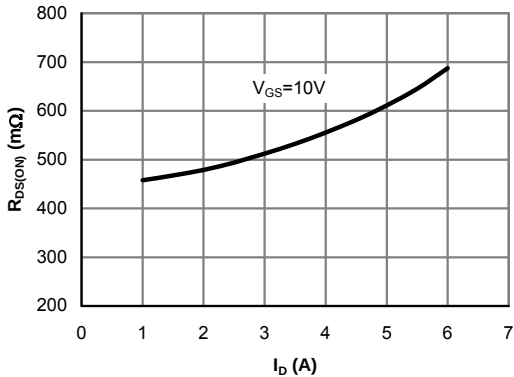


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

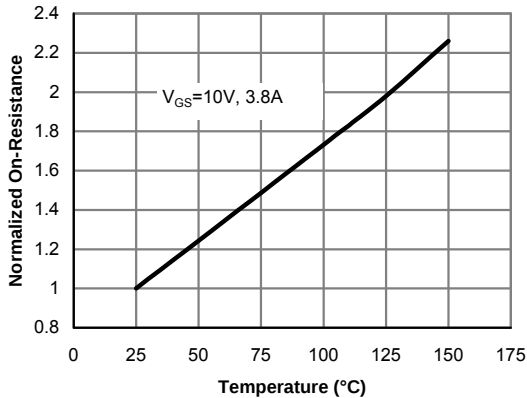


Figure 4: On-Resistance vs. Junction Temperature

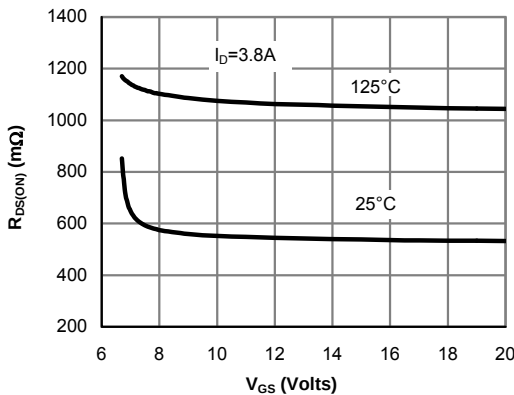


Figure 5: On-Resistance vs. Gate-Source Voltage

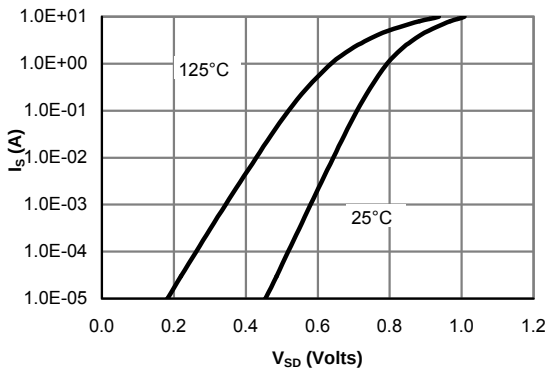


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

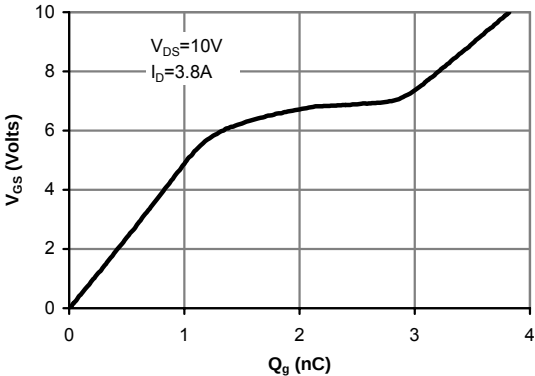


Figure 7: Gate-Charge Characteristics

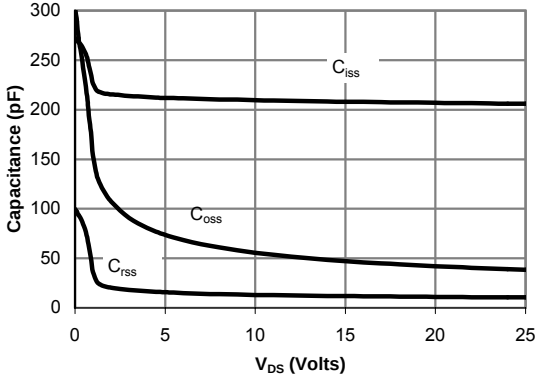


Figure 8: Capacitance Characteristics

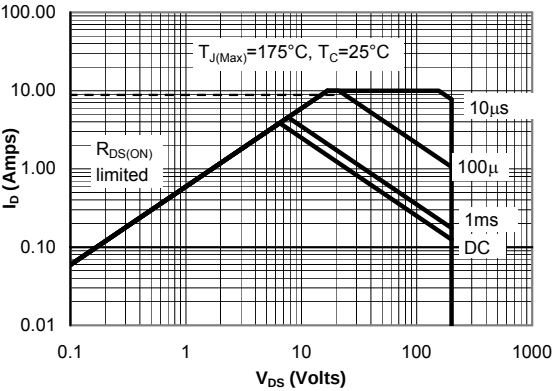


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

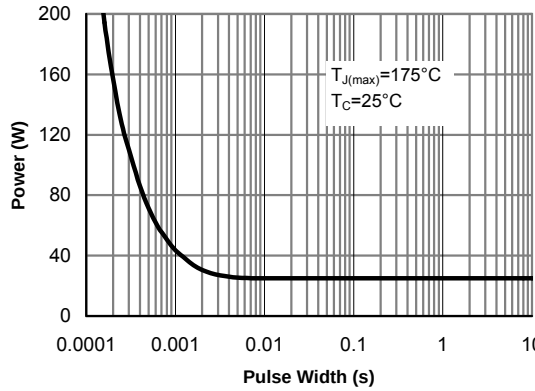


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

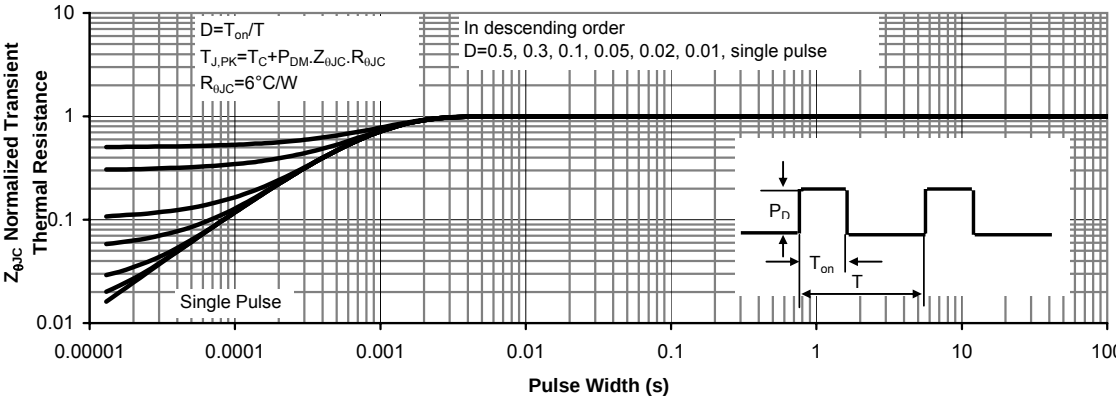


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

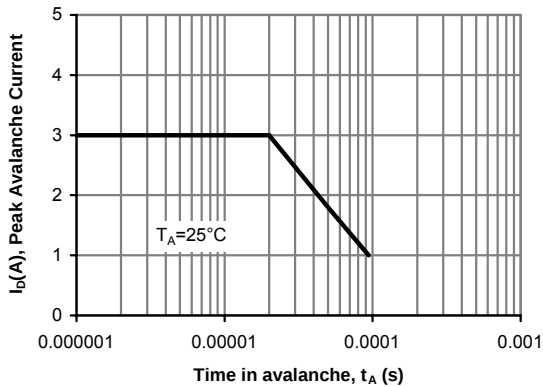


Figure 12: Single Pulse Avalanche capability

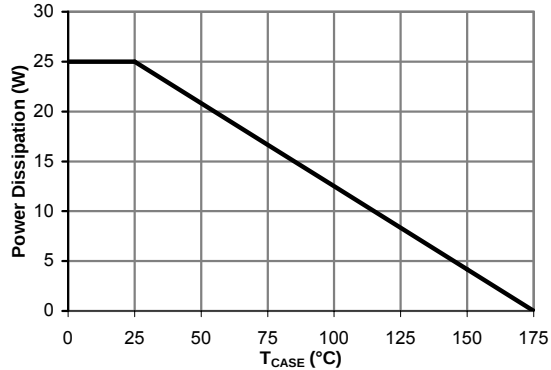


Figure 13: Power De-rating (Note B)

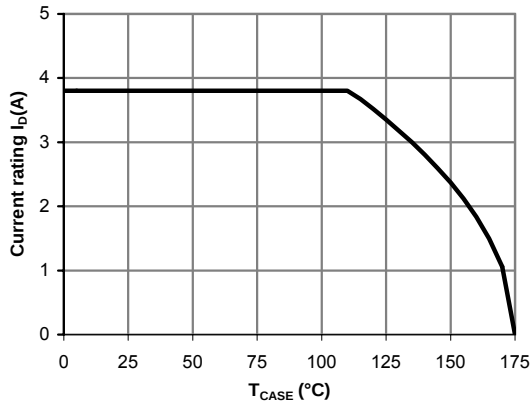


Figure 14: Current De-rating (Note B)

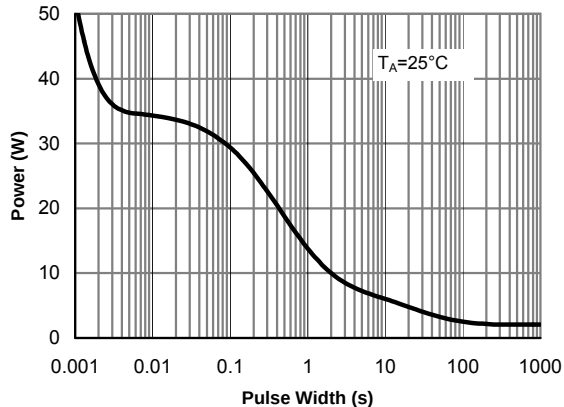


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

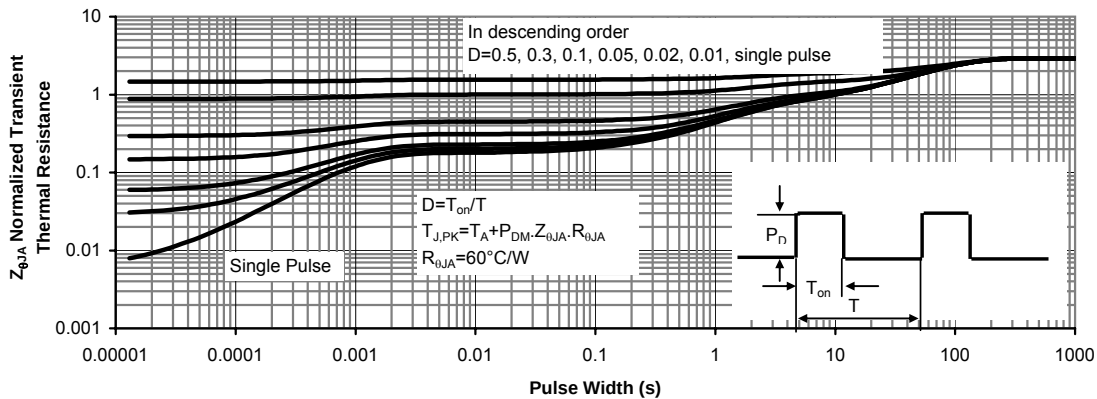


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)