



AOD3N80

800V, 2.8A N-Channel MOSFET

General Description

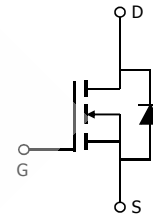
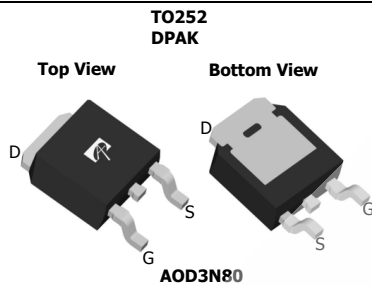
The AOD3N80 has been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.

By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability this part can be adopted quickly into new and existing offline power supply designs.

Product Summary

V_{DS}	900V@150°C
I_D (at $V_{GS}=10V$)	2.8A
$R_{DS(on)}$ (at $V_{GS}=10V$)	< 4.8Ω

100% UIS Tested!
100% R_g Tested!



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	800	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current ^B	I_D	2.8	A
		1.8	
Pulsed Drain Current ^C	I_{DM}	9	
Avalanche Current ^C	I_{AR}	2.2	A
Repetitive avalanche energy ^C	E_{AR}	72	mJ
Single pulsed avalanche energy ^H	E_{AS}	145	mJ
Peak diode recovery dv/dt	dv/dt	5	V/ns
Power Dissipation ^B	P_D	83	W
		0.7	
Junction and Storage Temperature Range	T_J, T_{STG}	-50 to 150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	T_L	300	°C

Thermal Characteristics

Parameter	Symbol	Typical	Maximum	Units
Maximum Junction-to-Ambient ^{A,G}	$R_{\theta JA}$	45	55	°C/W
Maximum Case-to-sink ^A	$R_{\theta CS}$	-	0.5	°C/W
Maximum Junction-to-Case ^{D,F}	$R_{\theta JC}$	1.2	1.5	°C/W

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$	800			V
		$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$, $T_J=150^\circ\text{C}$		900		
$BV_{DSS}/\Delta T_J$	Zero Gate Voltage Drain Current	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$		0.78		$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=800\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=640\text{V}$, $T_J=125^\circ\text{C}$			10	
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	$V_{DS}=5\text{V}$, $I_D=250\mu\text{A}$	3.3	4.2	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=1.5\text{A}$		3.8	4.8	Ω
g_{FS}	Forward Transconductance	$V_{DS}=40\text{V}$, $I_D=1.5\text{A}$		2.5		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.77	1	V
I_S	Maximum Body-Diode Continuous Current				2.8	A
I_{SM}	Maximum Body-Diode Pulsed Current				9	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1\text{MHz}$		510		pF
C_{oss}	Output Capacitance			39		pF
C_{rss}	Reverse Transfer Capacitance			3.7		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		2.9		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=640\text{V}$, $I_D=3\text{A}$		10		nC
Q_{gs}	Gate Source Charge			2.6		nC
Q_{gd}	Gate Drain Charge			2.9		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=400\text{V}$, $I_D=3\text{A}$, $R_G=25\Omega$		21		ns
t_r	Turn-On Rise Time			25		ns
$t_{D(off)}$	Turn-Off DelayTime			34		ns
t_f	Turn-Off Fall Time			19		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=3\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{DS}=100\text{V}$		344		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=3\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{DS}=100\text{V}$		2.2		μC

- A. The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A=25^\circ\text{C}$.
- B. The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$ in a TO252 package, 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 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 $T_{J(MAX)}=150^\circ\text{C}$.
- G. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
- H. $L=60\text{mH}$, $I_{AS}=2.2\text{A}$, $V_{DD}=150\text{V}$, $R_G=10\Omega$, Starting $T_J=25^\circ\text{C}$

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

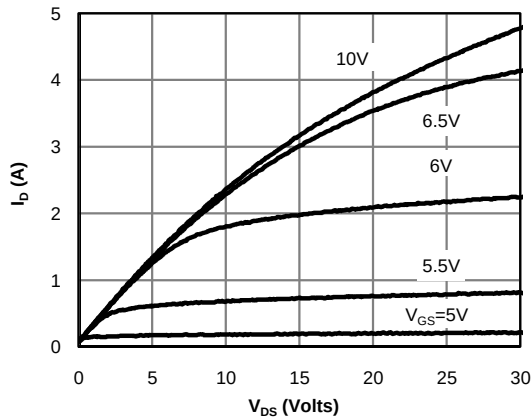


Fig 1: On-Region Characteristics

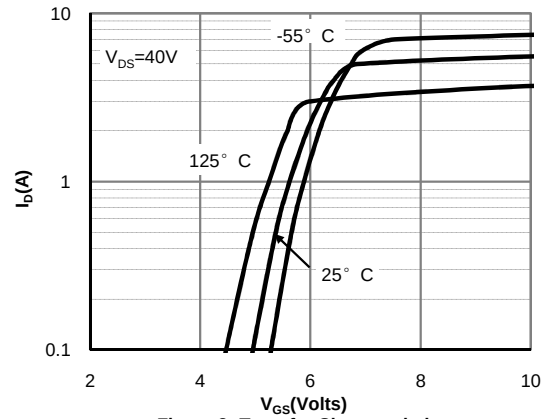


Figure 2: Transfer Characteristics

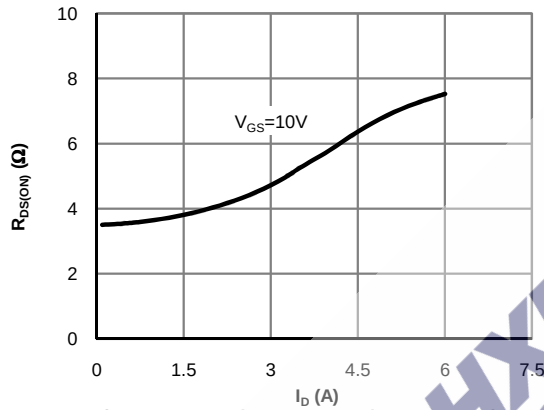


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

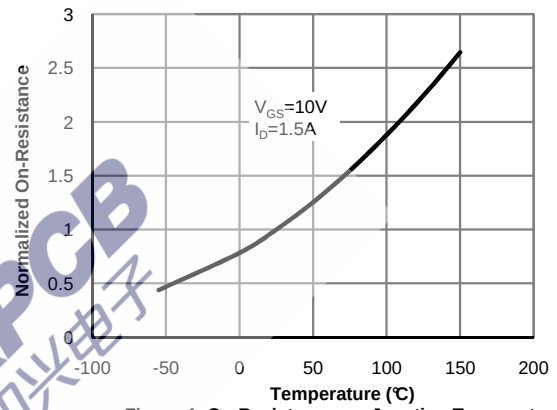


Figure 4: On-Resistance vs. Junction Temperature

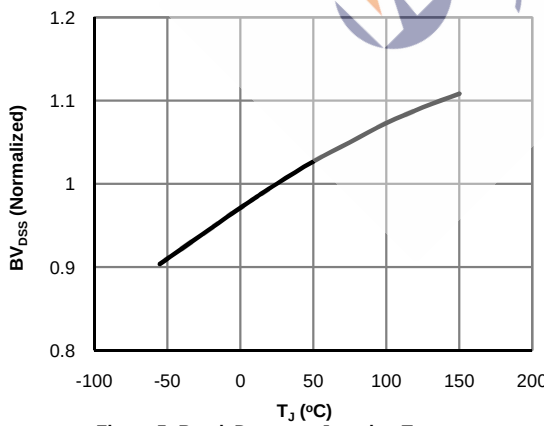


Figure 5: Break Down vs. Junction Temperature

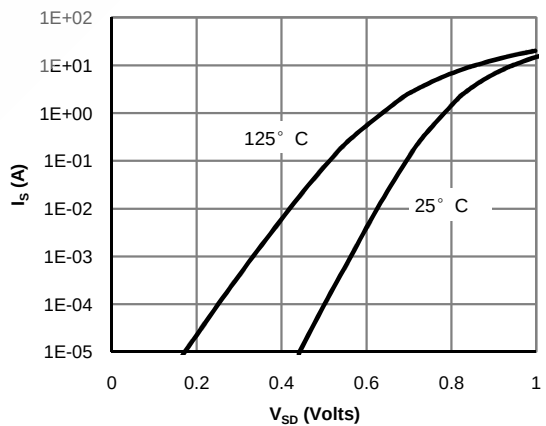


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

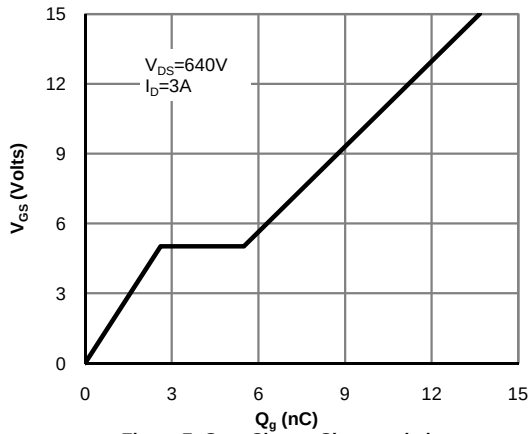


Figure 7: Gate-Charge Characteristics

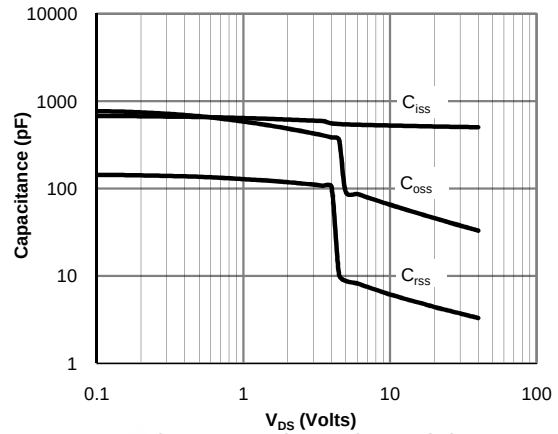


Figure 8: Capacitance Characteristics

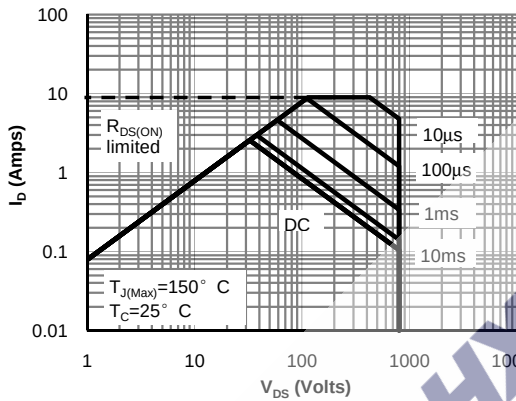


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

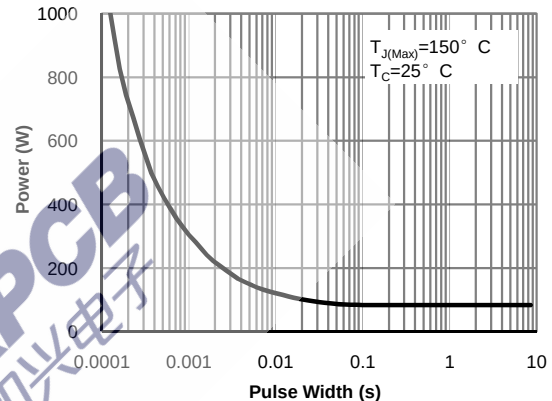


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

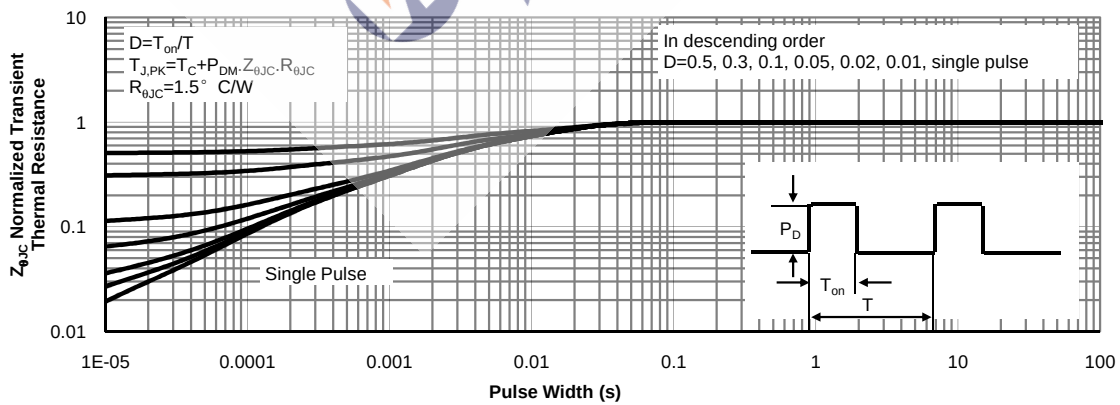


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

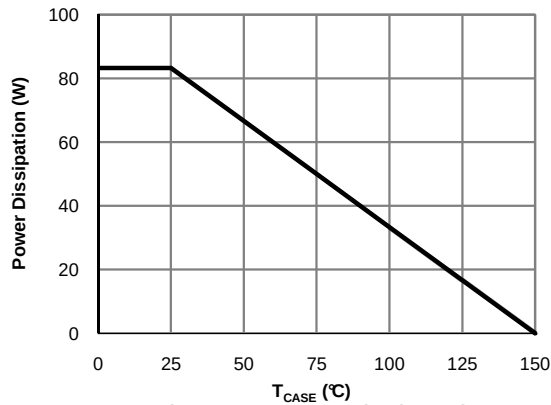


Figure 12: Power De-rating (Note B)

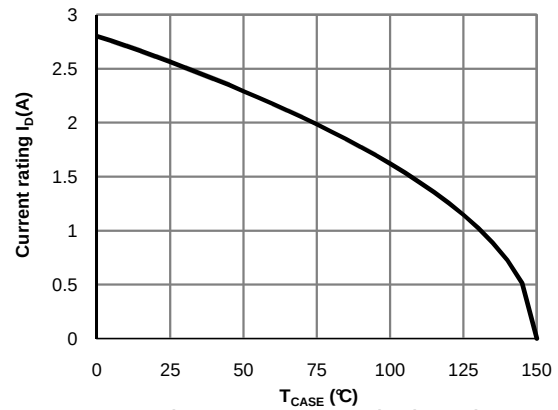


Figure 13: Current De-rating (Note B)

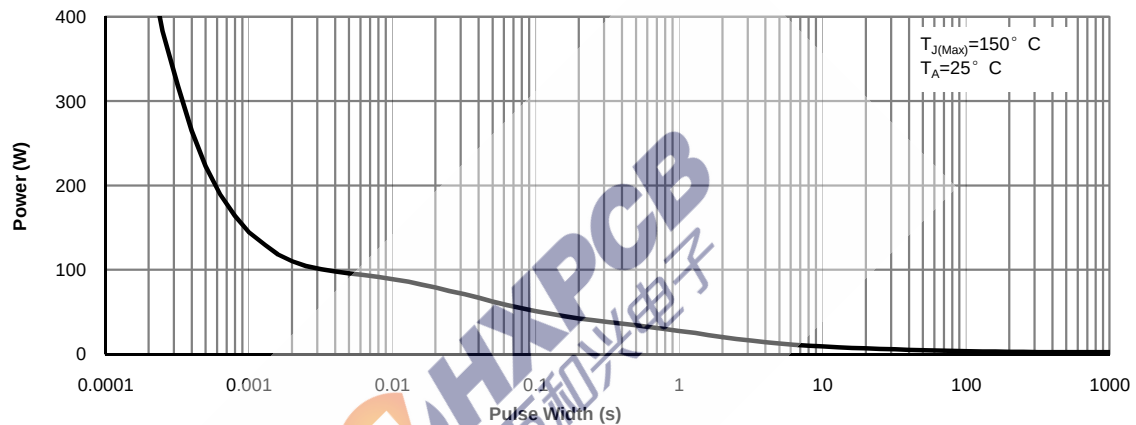


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

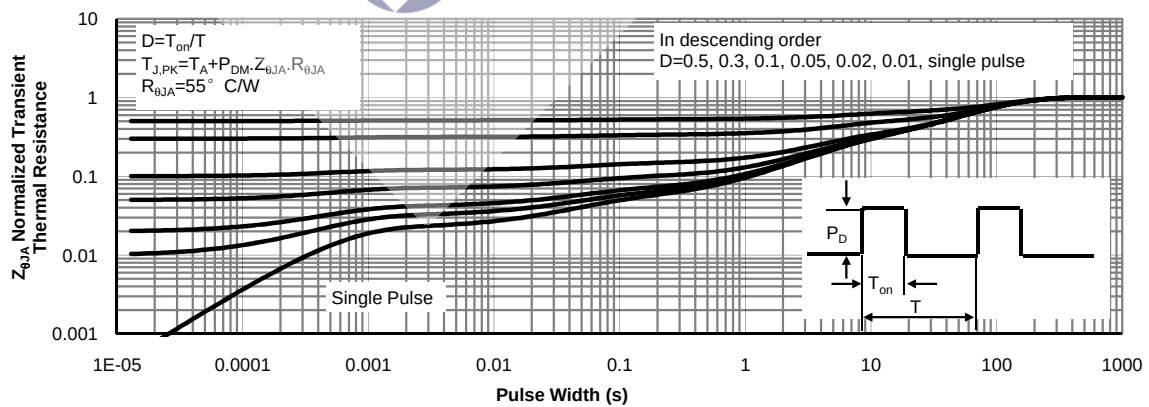
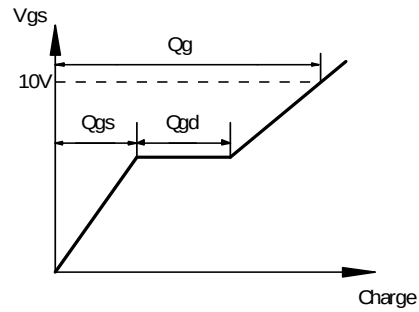
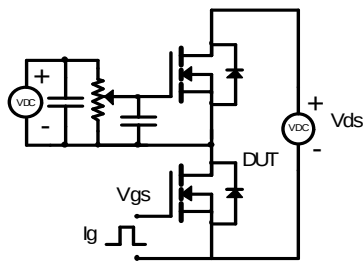
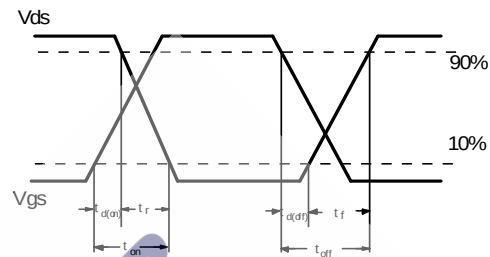
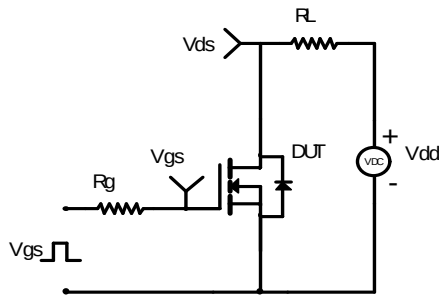


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

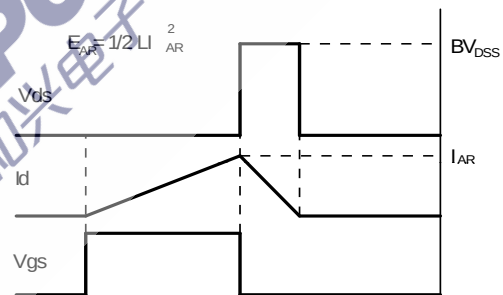
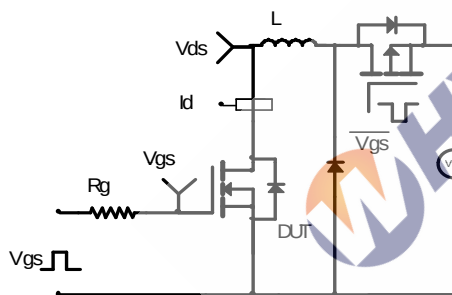
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

