ALPHA & OMEGA SEMICONDUCTOR

AOD2N100
1000V,2A N-Channel MOSFET
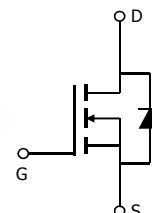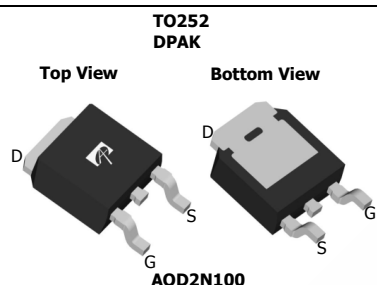
General Description

The AOD2N100 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}	1100V@150℃
I_D (at V_{GS}=10V)	2A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 9Ω

100% UIS Tested!
100% R_g Tested!

Green Product

TO252
DPAK

Top View   Bottom View

AOD2N100

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	1000	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current[B]	T_C=25℃	I_D	2	A
	T_C=100℃		1.2	
Pulsed Drain Current [C]		I_{DM}	7	
Avalanche Current [C]		I_{AR}	1.9	A
Repetitive avalanche energy [C]		E_{AR}	54	mJ
Single pulsed avalanche energy [H]		E_{AS}	108	mJ
Peak diode recovery dv/dt		dv/dt	5	V/ns
Power Dissipation [B]	T_C=25℃	P_D	83	W
	Derate above 25°C		0.7	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-50 to 150	℃
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	℃

Thermal Characteristics

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

Electrical Characteristics (T$_J$=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV$_{DSS}$	Drain-Source Breakdown Voltage	I$_D$=250µA, V$_{GS}$=0V, T$_J$=25℃	1000			V
		I$_D$=250µA, V$_{GS}$=0V, T$_J$=150℃		1100		
BV$_{DSS}$/∆TJ	Zero Gate Voltage Drain Current	ID=250µA, VGS=0V		1		V/°C
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=1000V, V$_{GS}$=0V			1	µA
		V$_{DS}$=800V, T$_J$=125℃			10	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$=±30V			±100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=5V, I$_D$=250µA	3.3	4	4.5	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=1A		7.5	9	Ω
g$_{FS}$	Forward Transconductance	V$_{DS}$=40V, I$_D$=1A		2		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V		0.76	1	V
I$_S$	Maximum Body-Diode Continuous Current				2	A
I$_{SM}$	Maximum Body-Diode Pulsed Current				7	A
DYNAMIC PARAMETERS						
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=25V, f=1MHz	380	477	580	pF
C$_{oss}$	Output Capacitance		20	31	45	pF
C$_{rss}$	Reverse Transfer Capacitance		1.5	2.7	4.0	pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz	1.5	3.1	4.8	Ω
SWITCHING PARAMETERS						
Q$_g$	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=800V, I$_D$=2A	6	9.7	15	nC
Q$_{gs}$	Gate Source Charge			2.6		nC
Q$_{gd}$	Gate Drain Charge			3.5		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=500V, I$_D$=2A, R$_G$=25Ω		20		ns
t$_r$	Turn-On Rise Time			19		ns
t$_{D(off)}$	Turn-Off DelayTime			29		ns
t$_f$	Turn-Off Fall Time			21		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=2A,dI/dt=100A/µs,V$_{DS}$=100V	220	287	350	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=2A,dI/dt=100A/µs,V$_{DS}$=100V	1.5	2.2	3.0	µC

A. The value of R$_{θJA}$ is measured with the device in a still air environment with T$_A$=25°C.
B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=150°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°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 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°C.
G.These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T$_A$=25°C.
H. L=60mH, I$_{AS}$=1.9A, V$_{DD}$=150V, R$_G$=10Ω, Starting T$_J$=25°C

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
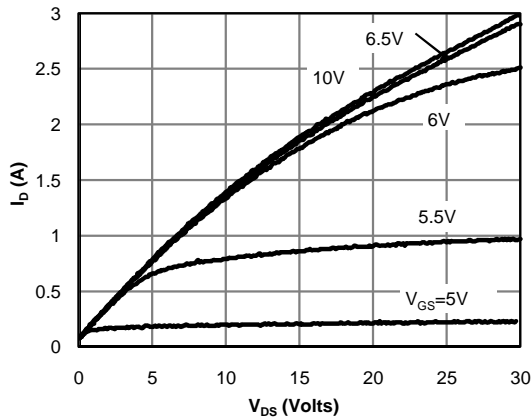

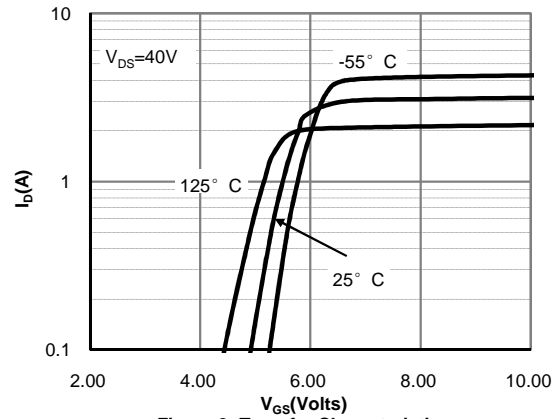Fig 1: On-Region Characteristics
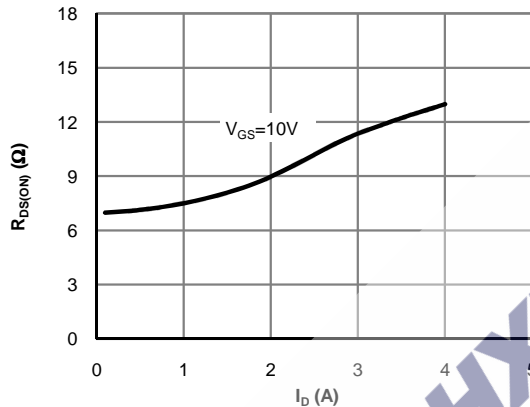

Figure 2: Transfer Characteristics
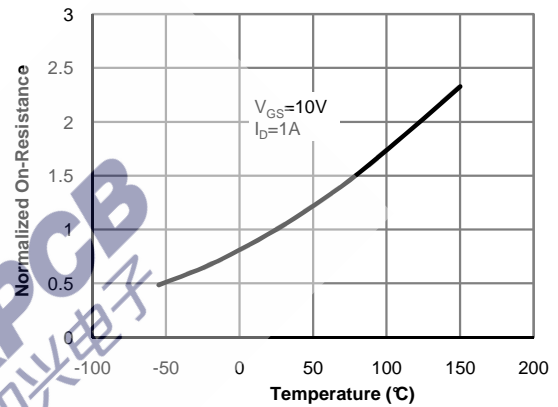

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

Figure 4: On-Resistance vs. Junction Temperature
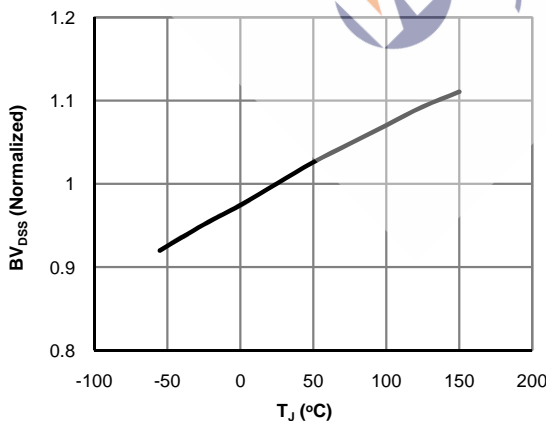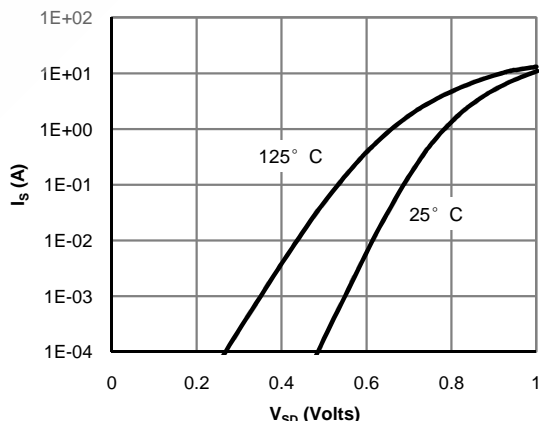

Figure 5: Break Down vs. Junction Temperature

Figure 6: Body-Diode Characteristics

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

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

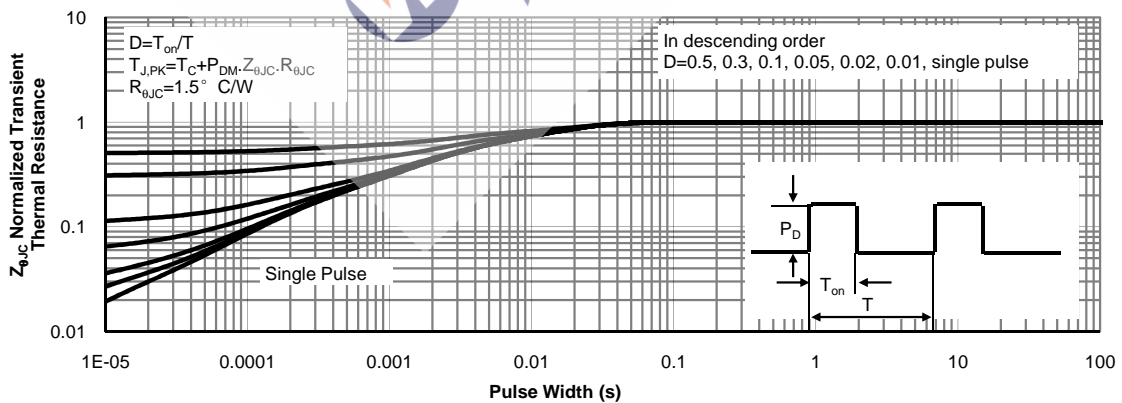Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

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

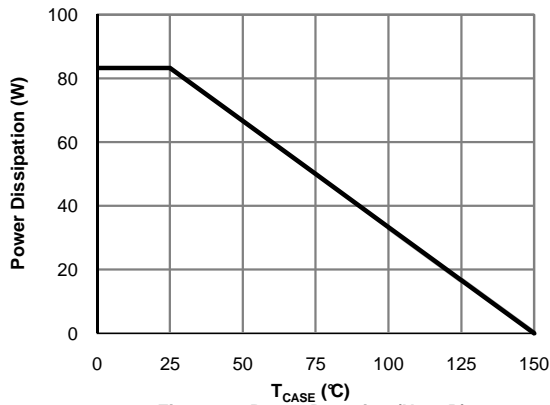**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**
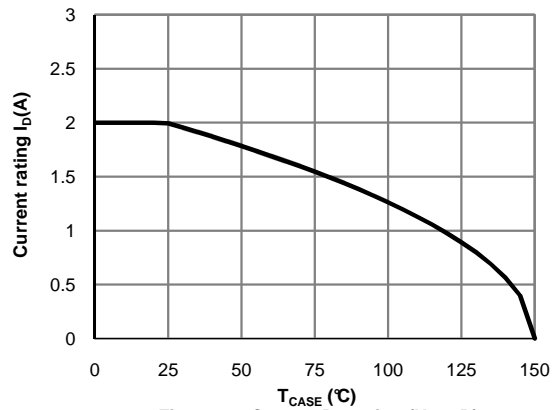

Figure 12: Power De-rating (Note B)

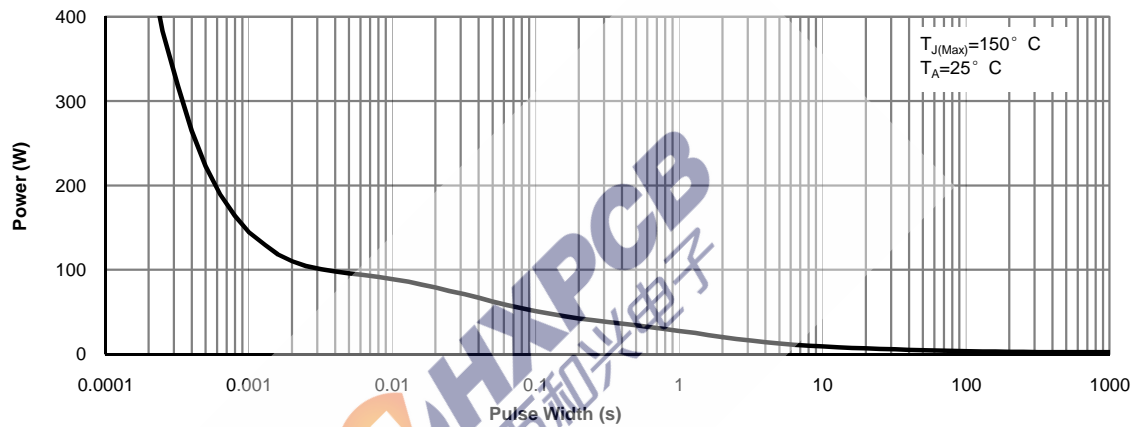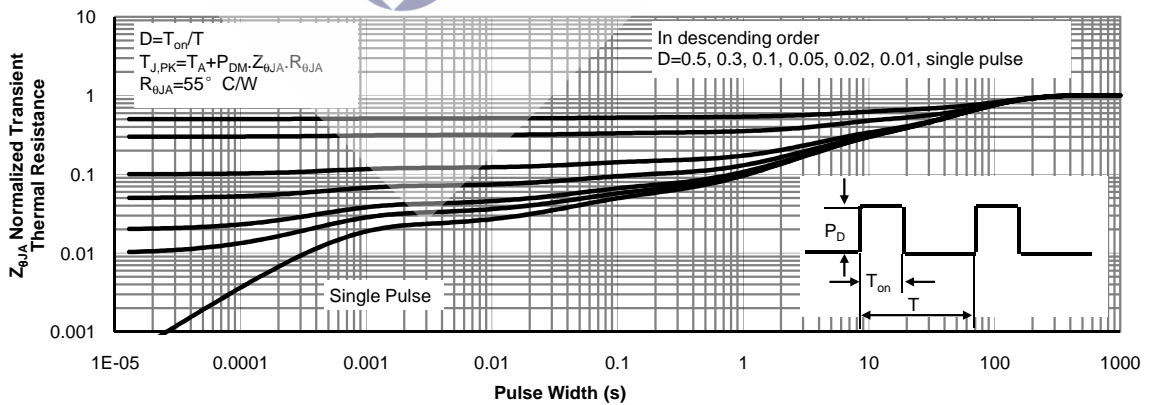Figure 13: Current De-rating (Note B)

$T_{J(Max)}=150°C$
$T_A=25°C$

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

$D=T_{on}/T$
$T_{J,PK}=T_A+P_{DM} \cdot Z_{\theta JA} \cdot R_{\theta JA}$
$R_{\theta JA}=55°C/W$

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse
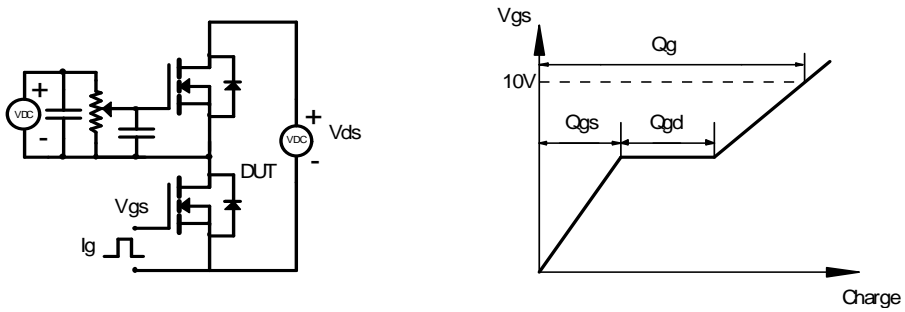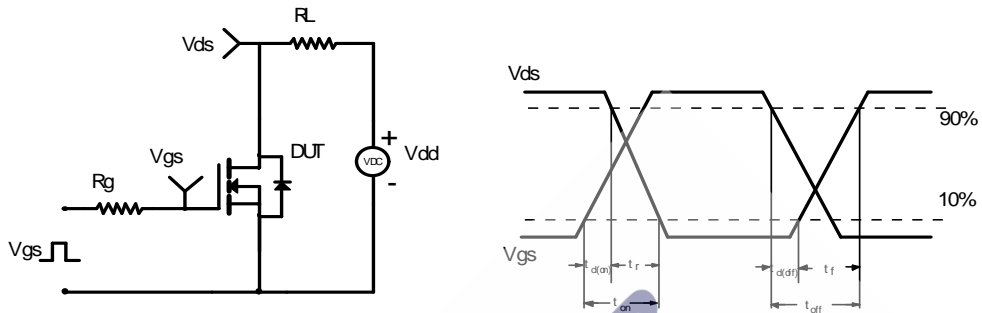
Single Pulse

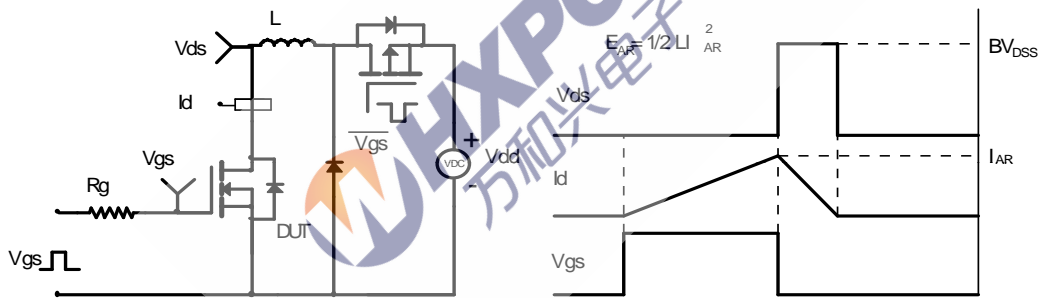Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$