

**AOD4110**  
**N-Channel Enhancement Mode Field Effect Transistor**  
**SRFET™**

**General Description**

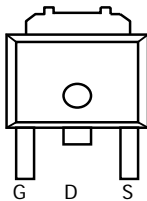
The AOD4110 uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent  $R_{DS(ON)}$ , and low gate charge. This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications. *Standard Product AOD4110 is Pb-free (meets ROHS & Sony 259 specifications).*

**Features**

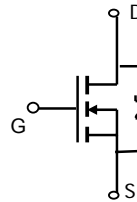
$V_{DS}$  (V) = 30V  
 $I_D = 40A$  ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 7.2m\Omega$  ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 10.5m\Omega$  ( $V_{GS} = 4.5V$ )

**UIS Tested!**  
**R<sub>g</sub>, C<sub>iss</sub>, C<sub>oss</sub>, C<sub>rss</sub> Tested**

TO-252 D-PAK



Top View  
Drain Connected to Tab



**SRFET™**  
**Soft Recovery MOSFET:**  
**Integrated Schottky Diode**

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B</sup>	$I_D$	$T_C=25^\circ\text{C}^G$	40
		$T_C=100^\circ\text{C}^G$	40
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	180	A
Continuous Drain Current <sup>A</sup>	$I_{DSM}$	$T_A=25^\circ\text{C}$	22
		$T_A=70^\circ\text{C}$	18
Avalanche Current <sup>C</sup>	$I_{AR}$	25	A
Repetitive avalanche energy $L=0.3mH^C$	$E_{AR}$	94	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	63
		$T_C=100^\circ\text{C}$	31
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ\text{C}$	6
		$T_A=70^\circ\text{C}$	4
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>	$R_{\theta JA}$	$t \leq 10s$	15	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	41	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>D</sup>	$R_{\theta JC}$	2	2.4	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}$ , $V_{GS}=0\text{V}$ $T_J=125^\circ\text{C}$			0.1 20	mA
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			0.1	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.3	1.6	2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$ , $V_{DS}=5\text{V}$	180			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=20\text{A}$ $T_J=125^\circ\text{C}$		6 9.0	7.2 11.0	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=20\text{A}$		8.5	10.5	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=20\text{A}$		55		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.37	0.5	V
$I_S$	Maximum Body-Diode + Schottky Continuous Current <sup>†</sup>				40	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance			2154	2650	pF
$C_{oss}$	Output Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		474		pF
$C_{rss}$	Reverse Transfer Capacitance			185		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		0.75	1.1	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge			37	45	
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=20\text{A}$		17.8		nC
$Q_{gs}$	Gate Source Charge			6.6		nC
$Q_{gd}$	Gate Drain Charge			7.6		nC
$t_{D(on)}$	Turn-On DelayTime			6.8		ns
$t_r$	Turn-On Rise Time	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=0.75\Omega$ , $R_{GEN}=3\Omega$		7.2		ns
$t_{D(off)}$	Turn-Off DelayTime			25.2		ns
$t_f$	Turn-Off Fall Time			5.8		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=20\text{A}$ , $dI/dt=300\text{A}/\mu\text{s}$		12	18	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$ , $dI/dt=300\text{A}/\mu\text{s}$		10.5		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  $P_{DSM}$  and current rating  $I_{DSM}$  are based on  $T_{J(MAX)}=150^\circ\text{C}$ , using  $t \leq 10\text{s}$  junction-to-ambient thermal resistance. The value in any given application depends on the user's specific board design, and the maximum temperature of  $175^\circ\text{C}$  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 in 2 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.

Rev0: Apr.2007

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

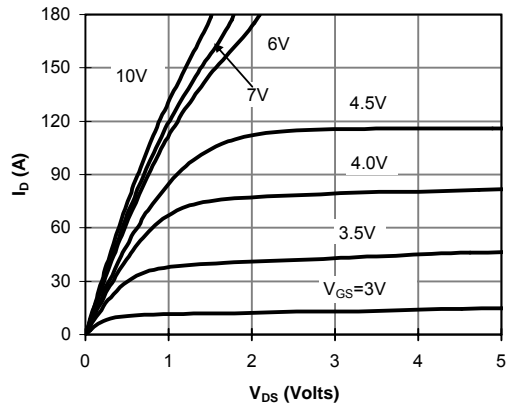


Figure 1: On-Region Characteristics

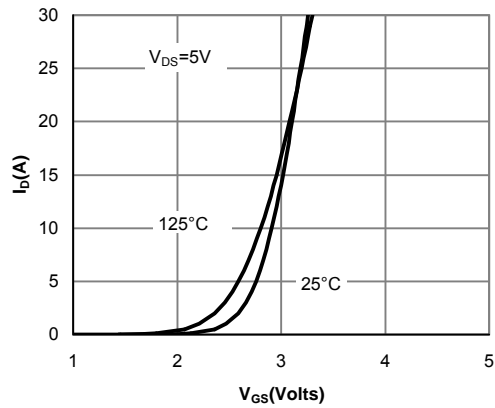


Figure 2: Transfer Characteristics

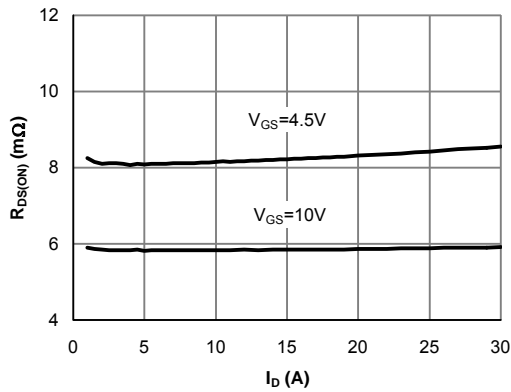


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

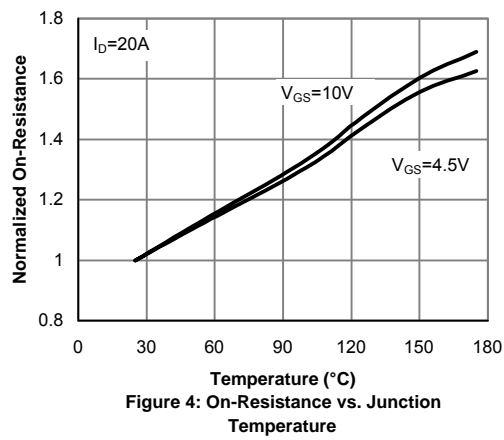


Figure 4: On-Resistance vs. Junction Temperature

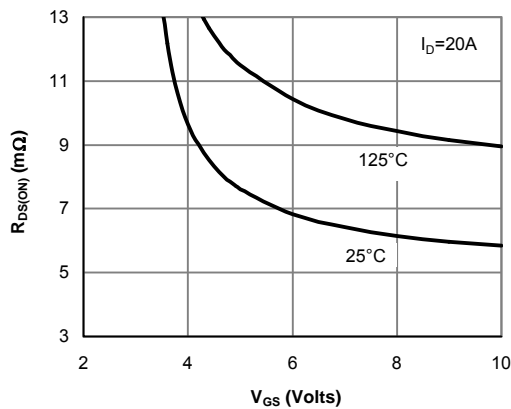


Figure 5: On-Resistance vs. Gate-Source Voltage

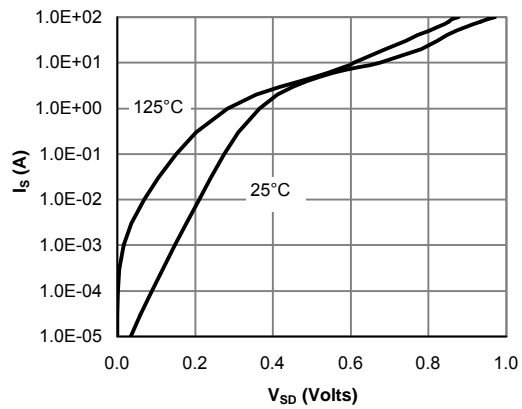


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

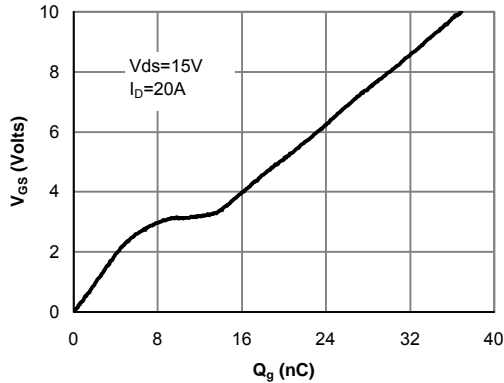


Figure 7: Gate-Charge Characteristics

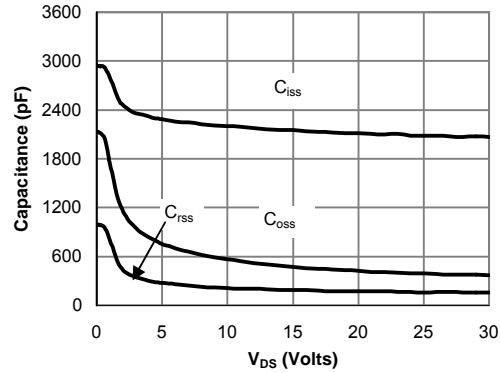


Figure 8: Capacitance Characteristics

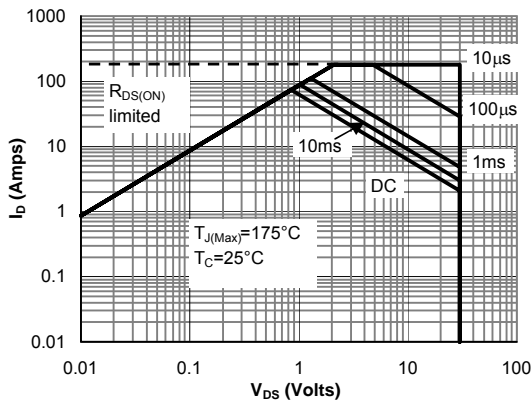


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

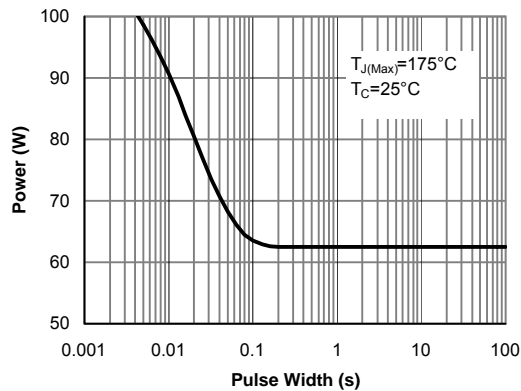


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

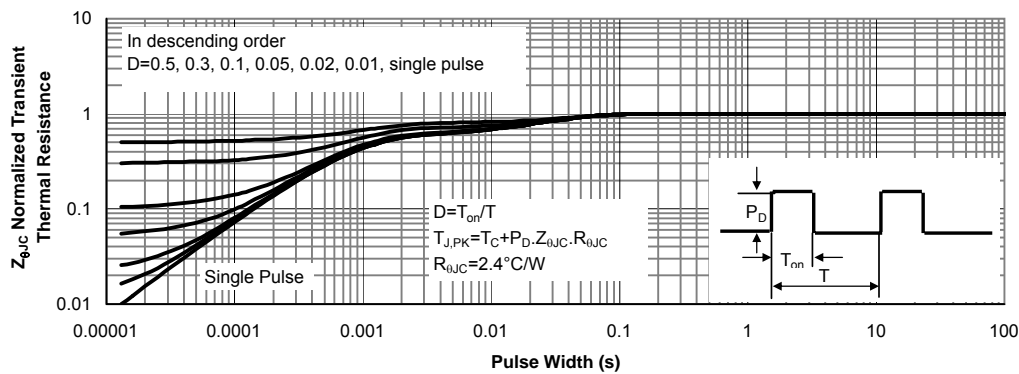


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

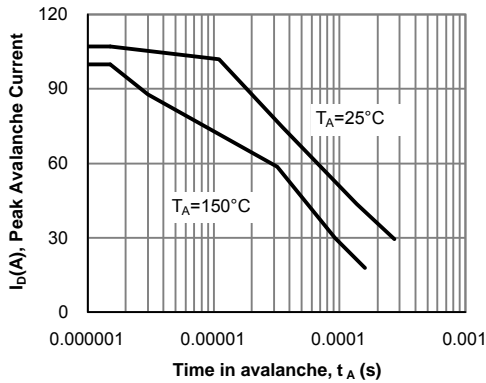


Figure 12: Single Pulse Avalanche capability

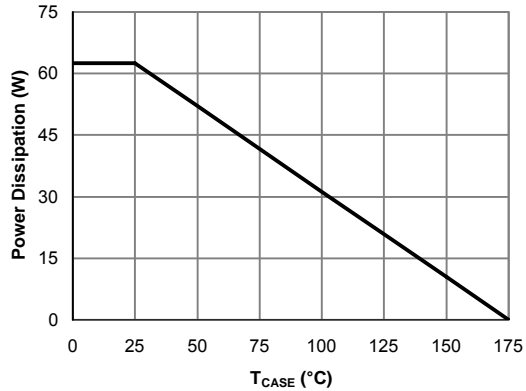


Figure 13: Power De-rating (Note B)

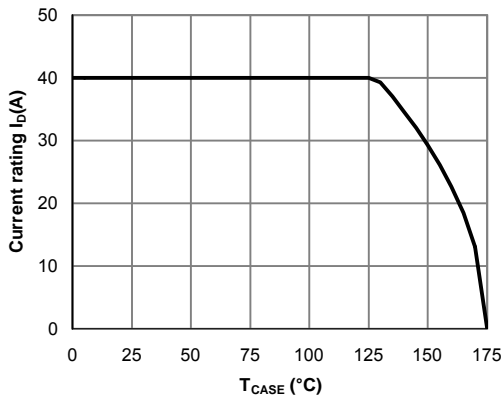


Figure 14: Current De-rating (Note B,G)

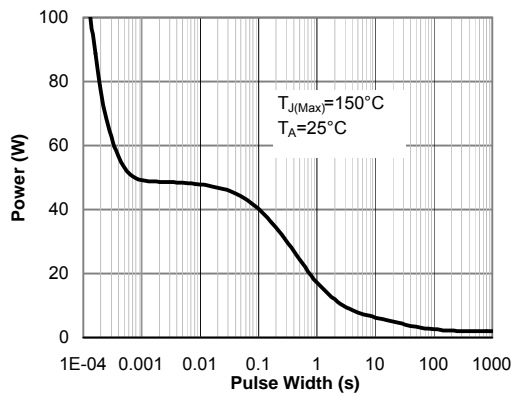


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

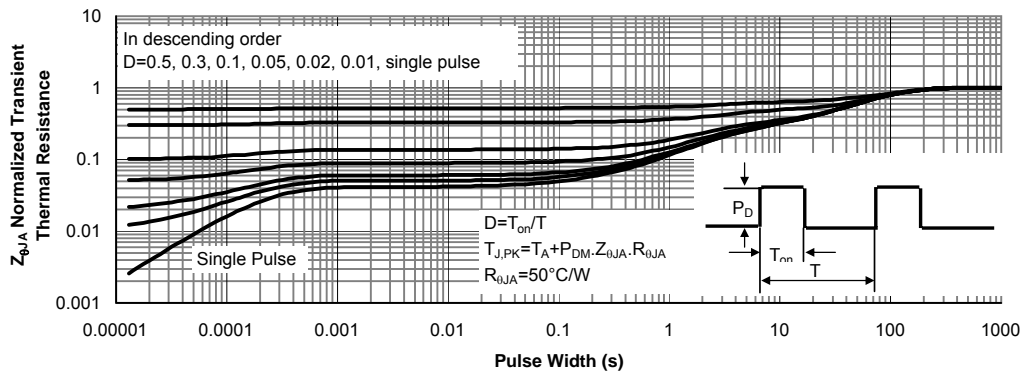


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)