



AOD410
N-Channel Enhancement Mode Field Effect Transistor

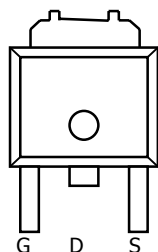
General Description

The AOD410 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

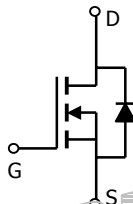
Features

- V_{DS} (V) = 30V
- I_D = 8A
- $R_{DS(ON)} < 65m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 100m\Omega$ ($V_{GS} = 4.5V$)

TO-252
D-PAK



Top View
Drain Connected to
Tab



Preliminary

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}	± 20	V
Continuous Drain Current ^F	I_D	$T_A = 25^\circ\text{C}$	A
		$T_A = 70^\circ\text{C}$	
Pulsed Drain Current ^B	I_{DM}	20	
Power Dissipation ^A	P_D	$T_A = 25^\circ\text{C}$	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 ^A	$R_{\theta JA}$	$t \leq 10s$	24	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	45	
Maximum Junction-to-Case ^C	$R_{\theta JL}$	8	12	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	1.8	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$, $V_{DS}=5\text{V}$	15			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=8\text{A}$ $T_J=125^\circ\text{C}$		48 76	65 100	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=6\text{A}$		75	100	
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=8\text{A}$		6.2		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.75	1	V
I_S	Maximum Body-Diode Continuous Current				4.3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		288		pF
C_{oss}	Output Capacitance			57		pF
C_{rss}	Reverse Transfer Capacitance			39		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		3		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=8\text{A}$		6.72		nC
$Q_g(4.5\text{V})$	Total Gate Charge			3.34		nC
Q_{gs}	Gate Source Charge			0.76		nC
Q_{gd}	Gate Drain Charge			1.78		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=1.8\Omega$, $R_{GEN}=3\Omega$		3.7		ns
t_r	Turn-On Rise Time			3.7		ns
$t_{D(off)}$	Turn-Off Delay Time			15.6		ns
t_f	Turn-Off Fall Time			2.6		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=8\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		12.6		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=8\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		5.1		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 value in any a given application depends on the user's specific board design. The power dissipation is provided based on the maximum value of $R_{\theta JA}$ for $t < 10\text{s}$.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using 300 μs pulses, duty cycle 0.5% max.

E: 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.

F: The maximum current rating is either limited by bond-wires, or set by steady-state $R_{\theta JC}$.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

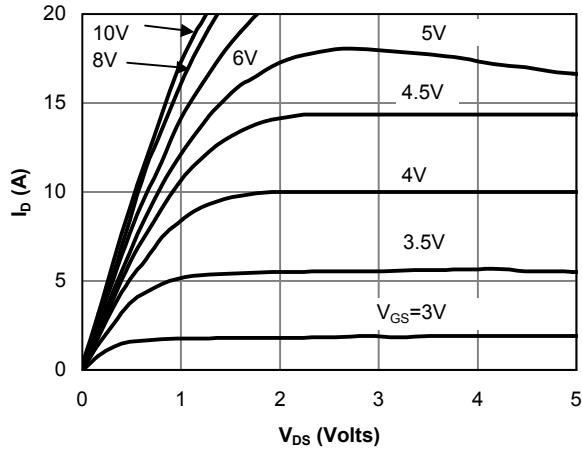


Fig 1: On-Region Characteristics

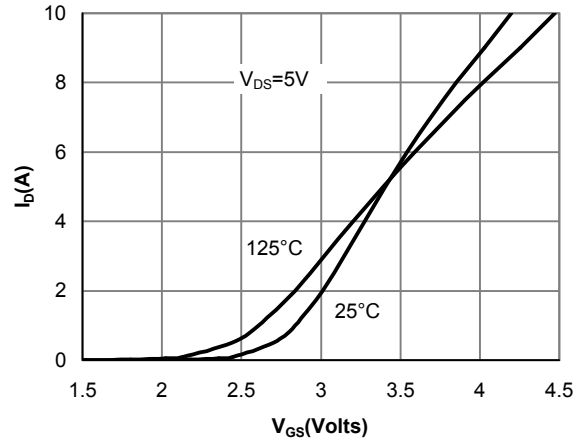


Figure 2: Transfer Characteristics

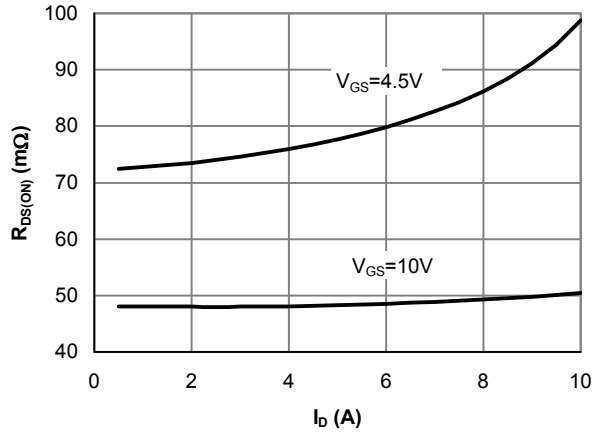


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

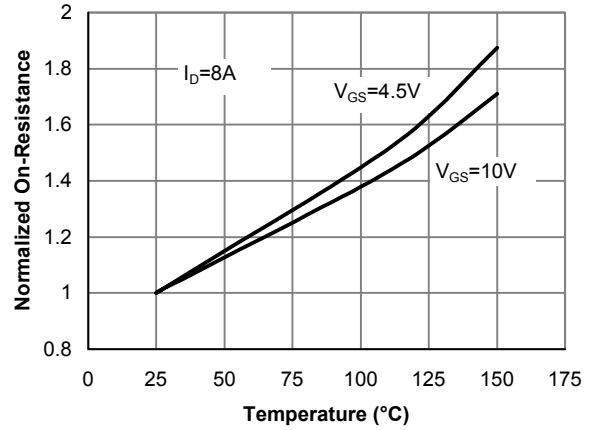


Figure 4: On-Resistance vs. Junction Temperature

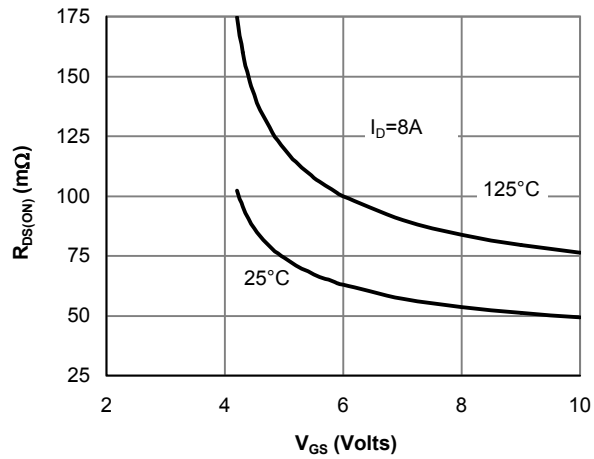


Figure 5: On-Resistance vs. Gate-Source Voltage

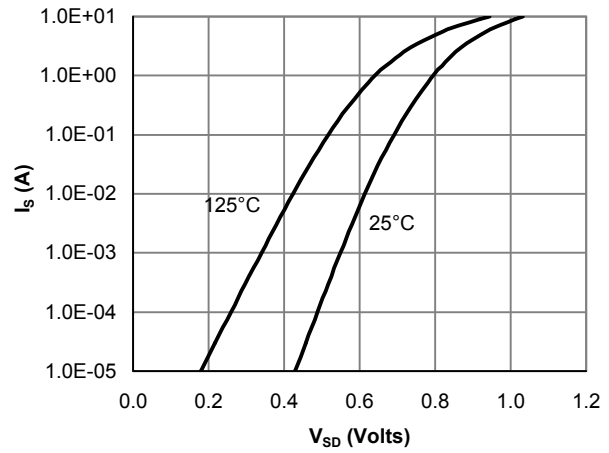


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

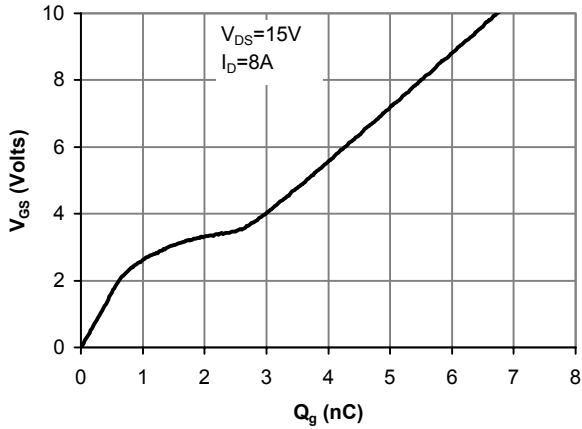


Figure 7: Gate-Charge Characteristics

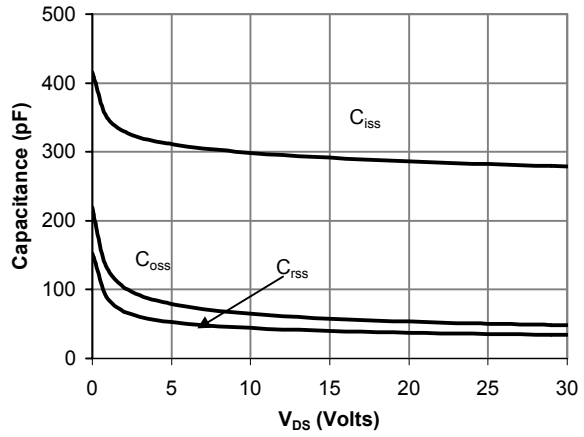


Figure 8: Capacitance Characteristics

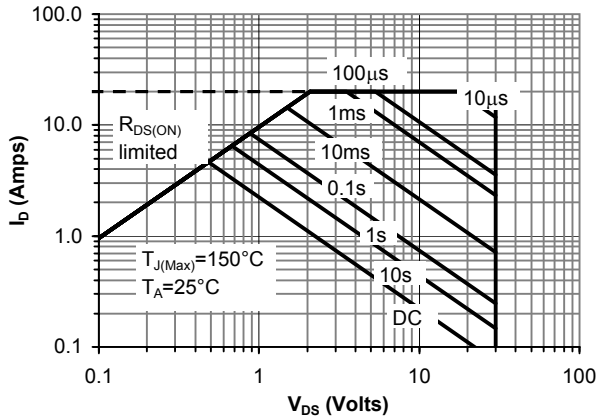


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

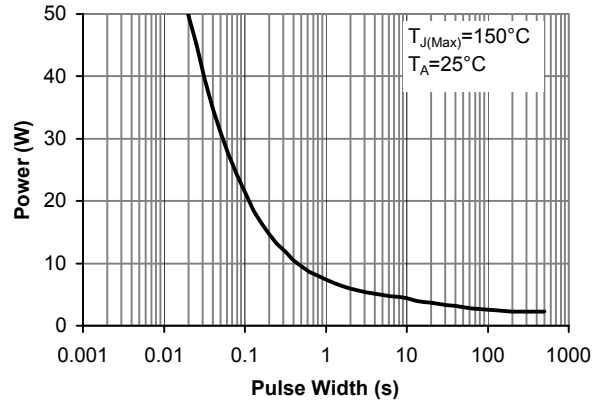


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

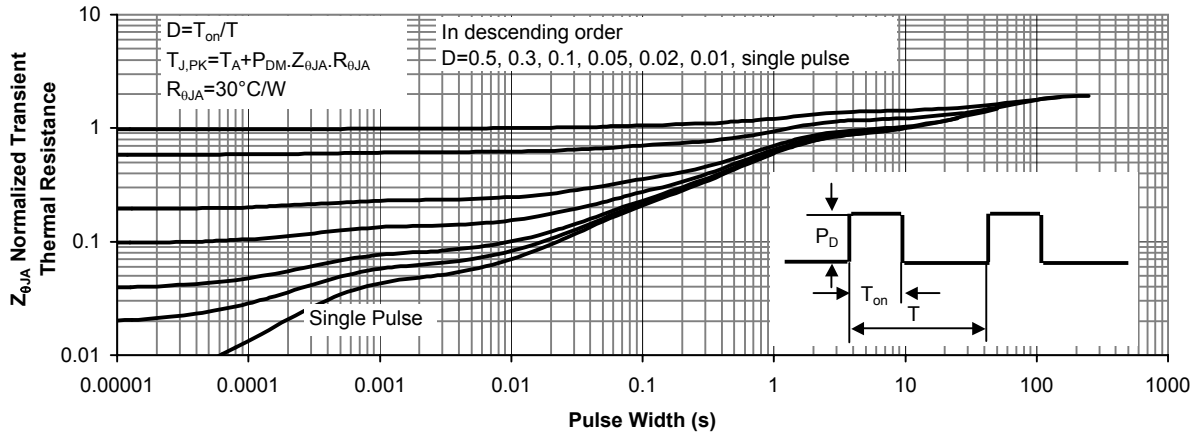


Figure 11: Normalized Maximum Transient Thermal Impedance