



**AOD410**  
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

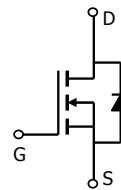
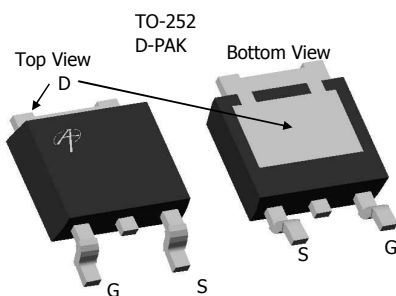
The AOD410 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for use as a load switch or in PWM applications.

- RoHS Compliant
- Halogen Free\*

**Features**

$V_{DS} (V) = 30V$   
 $I_D = 8A (V_{GS} = 10V)$   
 $R_{DS(ON)} < 65m\Omega (V_{GS} = 10V)$   
 $R_{DS(ON)} < 105m\Omega (V_{GS} = 4.5V)$

**100% UIS Tested!**  
**100% Rg Tested!**



**Absolute Maximum Ratings  $T_A=25^\circ C$  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>G</sup>	$I_D$	$T_C=25^\circ C$	8
		$T_C=100^\circ C$	6
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	20	A
Avalanche Current <sup>C</sup>	$I_{AR}$	8	A
Repetitive avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AR}$	10	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$	25
		$T_C=100^\circ C$	12.5
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$	2.1
		$T_A=70^\circ C$	1.33
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	20	30	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	46	60
Maximum Junction-to-Case <sup>C</sup>	$R_{\theta JL}$	5.3	7	$^\circ C/W$

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	$V_{DS}=24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1	$\mu\text{A}$
					5	
$I_{GSS}$	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	$V_{GS}=4.5\text{V}$ , $V_{DS}=5\text{V}$	10			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	65	m $\Omega$
				76	100	
		$V_{GS}=4.5\text{V}$ , $I_D=2\text{A}$		75	105	m $\Omega$
$g_{FS}$	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
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		288		pF
$C_{oss}$	Output Capacitance			57		pF
$C_{riss}$	Reverse Transfer Capacitance			39		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		3		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA}$  and the maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any a given application depends on the user's specific board design, and the maximum temperature for  $175^\circ\text{C}$  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 tests are performed with the device mounted on 1 in<sup>2</sup> 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.

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

\*This device is guaranteed green after data code 8X11 (Sep 1<sup>ST</sup> 2008).

Rev4: Oct 2008

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

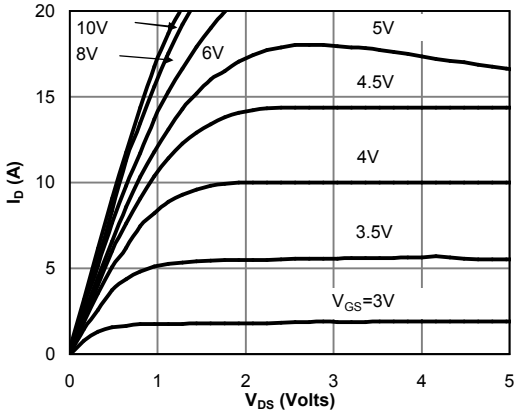


Fig 1: On-Region Characteristics

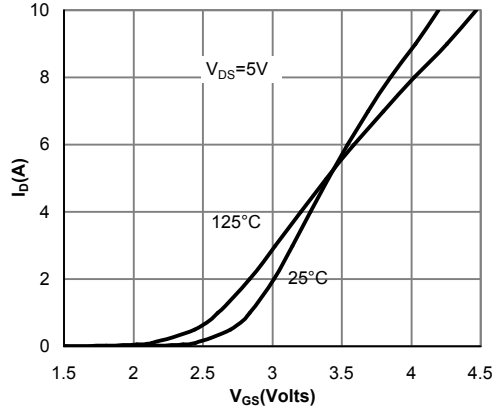


Figure 2: Transfer Characteristics

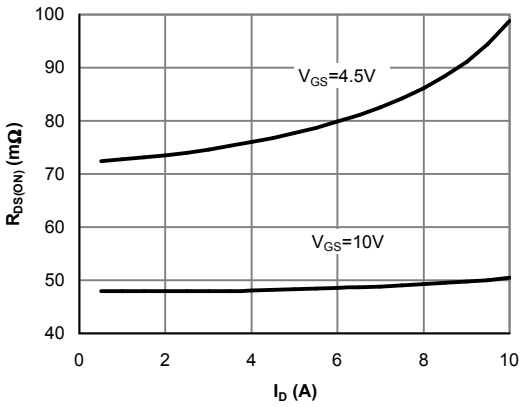


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

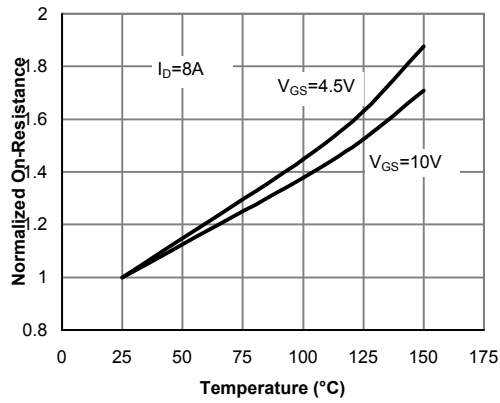


Figure 4: On-Resistance vs. Junction Temperature

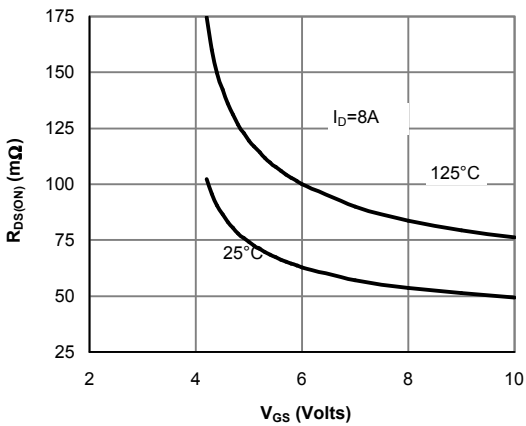


Figure 5: On-Resistance vs. Gate-Source Voltage

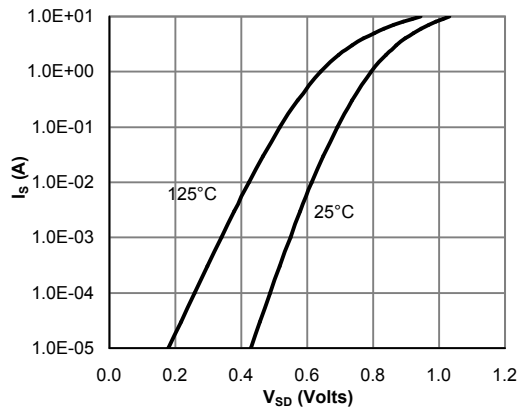


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

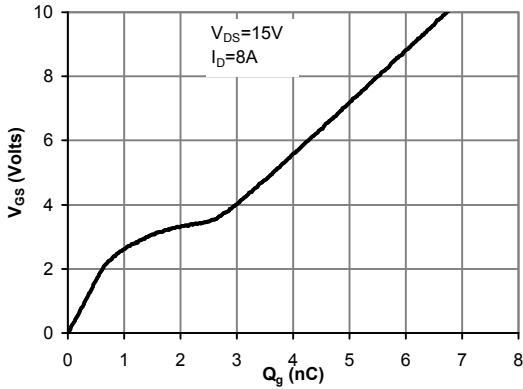


Figure 7: Gate-Charge Characteristics

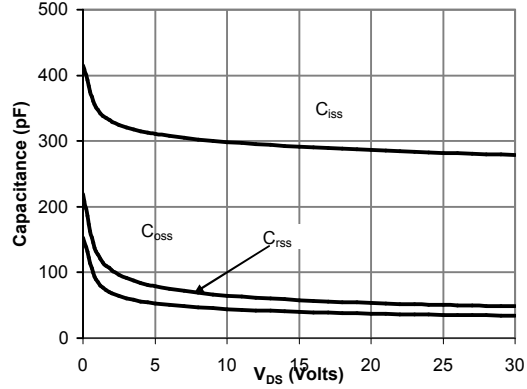


Figure 8: Capacitance Characteristics

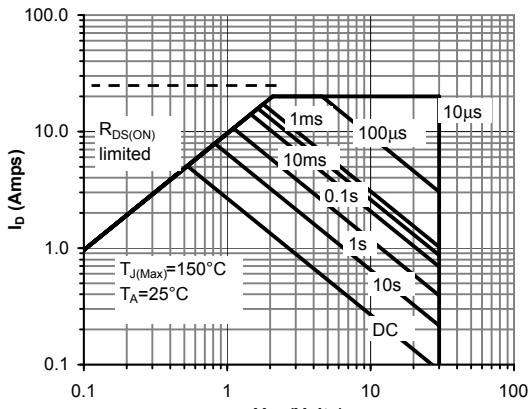


Figure 9: Maximum Biased Safe Operating Area (Note F)

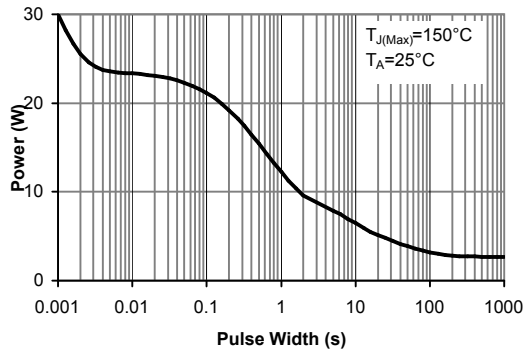


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

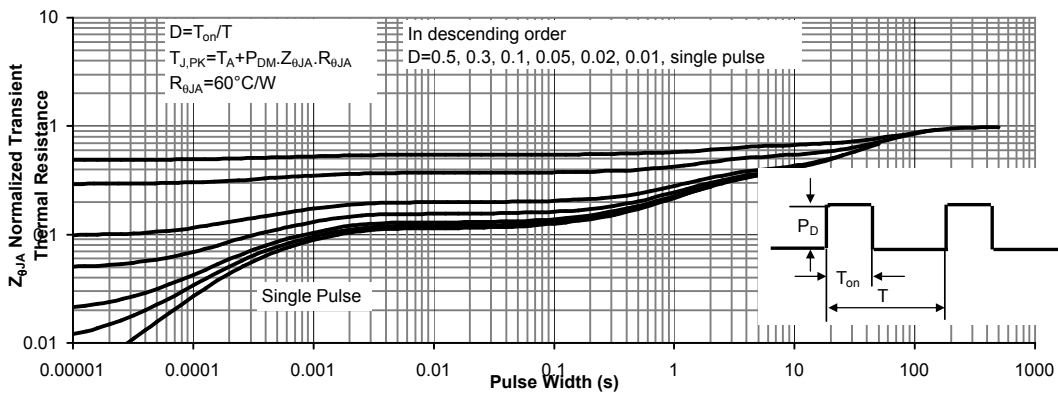
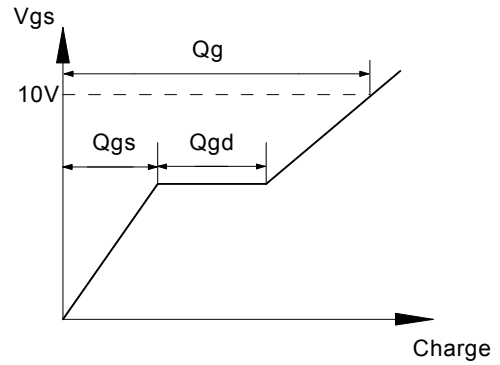
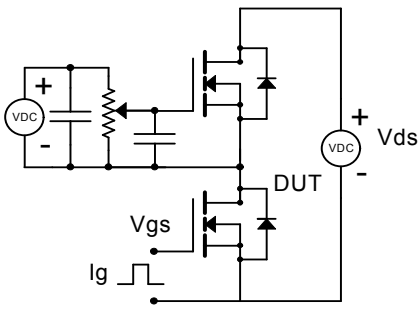
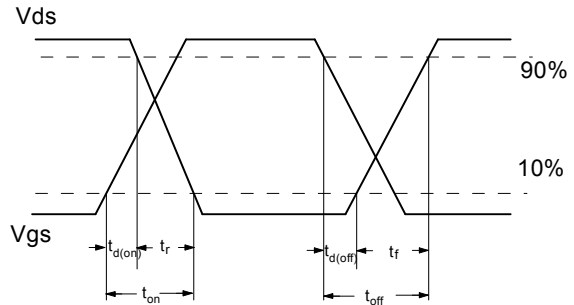
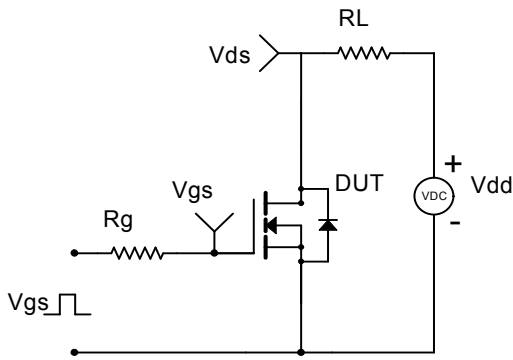


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

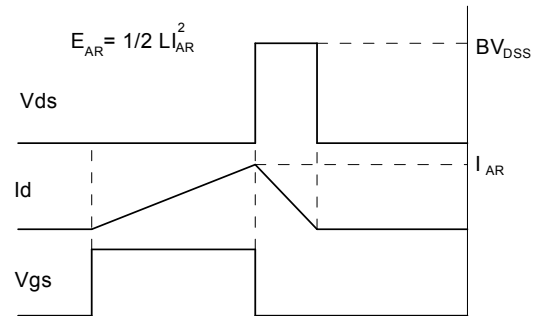
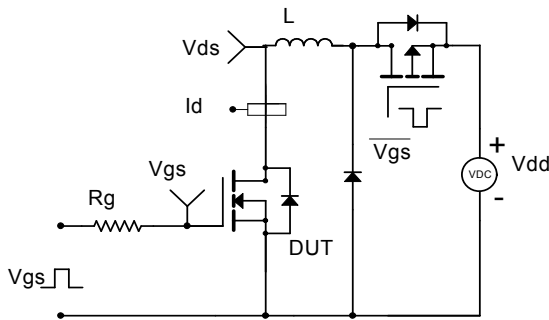
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

