High-Speed, Low-Power Dual Operational Amplifier

AD826

FEATURES

High Speed:
- **50 MHz Unity Gain Bandwidth**
- **350 V/μs Slew Rate**
- **70 ns Settling Time to 0.01%**

Low Power:
- **7.5 mA Max Power Supply Current Per Amp**

Easy to Use:
- **Drives Unlimited Capacitive Loads**
- **50 mA Min Output Current Per Amplifier**
- **Specified for +5 V, ±5 V and ±15 V Operation**
- **2.0 V p-p Output Swing into a 150 Ω Load (V_S = +5 V)**

Good Video Performance
- **Differential Gain & Phase Error of 0.07% & 0.11°**

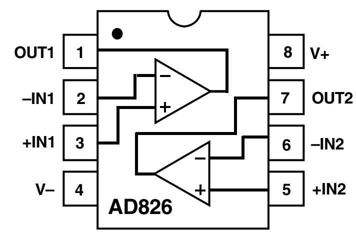
Excellent DC Performance:
- **2.0 mV Max Input Offset Voltage**

APPLICATIONS
- **Unity Gain ADC/DAC Buffer**
- **Cable Drivers**
- **8- and 10-Bit Data Acquisition Systems**
- **Video Line Driver**
- **Active Filters**

PRODUCT DESCRIPTION

The AD826 is a dual, high speed voltage feedback op amp. It is ideal for use in applications which require unity gain stability and high output drive capability, such as buffering and cable driving. The 50 MHz bandwidth and 350 V/μs slew rate make the AD826 useful in many high speed applications including: video, CATV, copiers, LCDs, image scanners and fax machines.

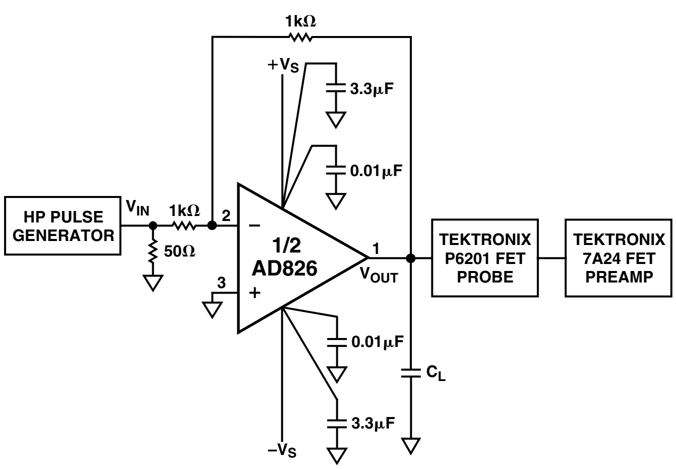
CONNECTION DIAGRAM
8-Lead Plastic Mini-DIP and SO Package

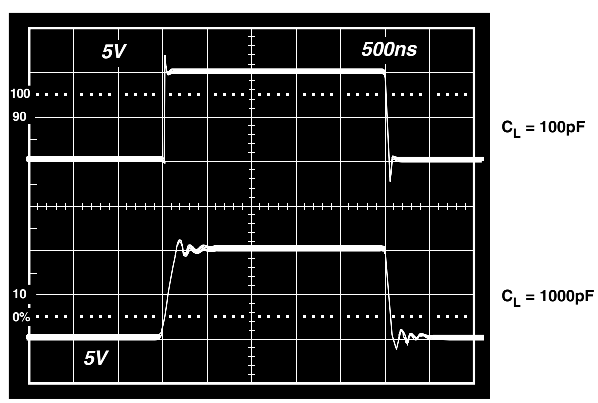


The AD826 features high output current drive capability of 50 mA min per amp, and is able to drive unlimited capacitive loads. With a low power supply current of 15 mA max for both amplifiers, the AD826 is a true general purpose operational amplifier.

The AD826 is ideal for power sensitive applications such as video cameras and portable instrumentation. The AD826 can operate from a single +5 V supply, while still achieving 25 MHz of bandwidth. Furthermore the AD826 is fully specified from a single +5 V to ±15 V power supplies.

The AD826 excels as an ADC/DAC buffer or active filter in data acquisition systems and achieves a settling time of 70 ns to 0.01%, with a low input offset voltage of 2 mV max. The AD826 is available in small 8-lead plastic mini-DIP and SO packages.





Driving a Large Capacitive Load

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AD826–SPECIFICATIONS (@ T_A = +25°C, unless otherwise noted)

Parameter	Conditions	V_S	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE						
Unity Gain Bandwidth		±5 V	30	35		MHz
		±15 V	45	50		MHz
		0, +5 V	25	29		MHz
Bandwidth for 0.1 dB Flatness	Gain = +1	±5 V	10	20		MHz
		±15 V	25	55		MHz
		0, +5 V	10	20		MHz
Full Power Bandwidth[1]	V_{OUT} = 5 V p-p					
	R_{LOAD} = 500 Ω	±5 V		15.9		MHz
	V_{OUT} = 20 V p-p					
	R_{LOAD} = 1 kΩ	±15 V		5.6		MHz
Slew Rate	R_{LOAD} = 1 kΩ	±5 V	200	250		V/µs
	Gain = –1	±15 V	300	350		V/µs
		0, +5 V	150	200		V/µs
Settling Time to 0.1%	–2.5 V to +2.5 V	±5 V		45		ns
	0 V–10 V Step, A_V = –1	±15 V		45		ns
to 0.01%	–2.5 V to +2.5 V	±5 V		70		ns
	0 V–10 V Step, A_V = –1	±15 V		70		ns
NOISE/HARMONIC PERFORMANCE						
Total Harmonic Distortion	F_C = 1 MHz	±15 V		–78		dB
Input Voltage Noise	f = 10 kHz	±5 V, ±15 V		15		nV/√Hz
Input Current Noise	f = 10 kHz	±5 V, ±15 V		1.5		pA/√Hz
Differential Gain Error	NTSC	±15 V		0.07	0.1	%
(R1 = 150 Ω)	Gain = +2	±5 V		0.12	0.15	%
		0, +5 V		0.15		%
Differential Phase Error	NTSC	±15 V		0.11	0.15	Degrees
(R1 = 150 Ω)	Gain = +2	±5 V		0.12	0.15	Degrees
		0, +5 V		0.15		Degrees
DC PERFORMANCE						
Input Offset Voltage		±5 V to ±15 V		0.5	2	mV
	T_{MIN} to T_{MAX}				3	mV
Offset Drift				10		µV/°C
Input Bias Current		±5 V, ±15 V		3.3	6.6	µA
	T_{MIN}				10	µA
	T_{MAX}				4.4	µA
Input Offset Current		±5 V, ±15 V		25	300	nA
	T_{MIN} to T_{MAX}				500	nA
Offset Current Drift				0.3		nA/°C
Open-Loop Gain	V_{OUT} = ±2.5 V	±5 V				
	R_{LOAD} = 500 Ω		2	4		V/mV
	T_{MIN} to T_{MAX}		1.5			V/mV
	R_{LOAD} = 150 Ω		1.5	3		V/mV
	V_{OUT} = ±10 V	±15 V				
	R_{LOAD} = 1 kΩ		3.5	6		V/mV
	T_{MIN} to T_{MAX}		2	5		V/mV
	V_{OUT} = ±7.5 V	±15 V				
	R_{LOAD} = 150 Ω (50 mA Output)		2	4		V/mV
INPUT CHARACTERISTICS						
Input Resistance				300		kΩ
Input Capacitance				1.5		pF
Input Common-Mode Voltage Range		±5 V	+3.8	+4.3		V
			–2.7	–3.4		V
		±15 V	+13	+14.3		V
			–12	–13.4		V
		0, +5 V	+3.8	+4.3		V
			+1.2	+0.9		V
Common-Mode Rejection Ratio	V_{CM} = ±2.5 V, T_{MIN}–T_{MAX}	±5 V	80	100		dB
	V_{CM} = ±12 V	±15 V	86	120		dB
	T_{MIN} to T_{MAX}	±15 V	80	100		dB

Parameter	Conditions	V_S	Min	Typ	Max	Unit
OUTPUT CHARACTERISTICS						
Output Voltage Swing	R_{LOAD} = 500 Ω	±5 V	3.3	3.8		±V
	R_{LOAD} = 150 Ω	±5 V	3.2	3.6		±V
	R_{LOAD} = 1 kΩ	±15 V	13.3	13.7		±V
	R_{LOAD} = 500 Ω	±15 V	12.8	13.4		±V
	R_{LOAD} = 500 Ω	0, +5 V	+1.5, +3.5			V
Output Current		±15 V	50			mA
		±5 V	50			mA
		0, +5 V	30			mA
Short-Circuit Current		±15 V		90		mA
Output Resistance	Open Loop			8		Ω
MATCHING CHARACTERISTICS						
Dynamic						
Crosstalk	f = 5 MHz	±15 V		–80		dB
Gain Flatness Match	G = +1, f = 40 MHz	±15 V		0.2		dB
Slew Rate Match	G = –1	±15 V		10		V/µs
DC						
Input Offset Voltage Match	T_{MIN}–T_{MAX}	±5 V to ±15 V		0.5	2	mV
Input Bias Current Match	T_{MIN}–T_{MAX}	±5 V to ±15 V		0.06	0.8	µA
Open-Loop Gain Match	V_O = ±10 V, R_{LOAD} = 1 kΩ, T_{MIN}–T_{MAX}	±15 V	0.15	0.01		mV/V
Common-Mode Rejection Ratio Match	V_{CM} = ±12 V, T_{MIN}–T_{MAX}	±15 V	80	100		dB
Power Supply Rejection Ratio Match	±5 V to ±15 V, T_{MIN}–T_{MAX}		80	100		dB
POWER SUPPLY						
Operating Range	Dual Supply		±2.5		±18	V
	Single Supply		+5		+36	V
Quiescent Current/Amplifier		±5 V		6.6	7.5	mA
	T_{MIN} to T_{MAX}	±5 V			7.5	mA
		±15 V			7.5	mA
	T_{MIN} to T_{MAX}	±15 V		6.8	7.5	mA
Power Supply Rejection Ratio	V_S = ±5 V to ±15 V, T_{MIN} to T_{MAX}		75	86		dB

NOTES
[1]Full power bandwidth = slew rate/2 π V_{PEAK}.
Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS[1]

Supply Voltage . . . . ±18 V
Internal Power Dissipation[2]
Plastic (N) . . . . See Derating Curves
Small Outline (R) . . . . See Derating Curves
Input Voltage (Common Mode) . . . . $±V_S$
Differential Input Voltage . . . . ±6 V
Output Short Circuit Duration . . . . See Derating Curves
Storage Temperature Range (N, R) . . . . –65°C to +125°C
Operating Temperature Range . . . . –40°C to +85°C
Lead Temperature Range (Soldering 10 seconds) . . . +300°C

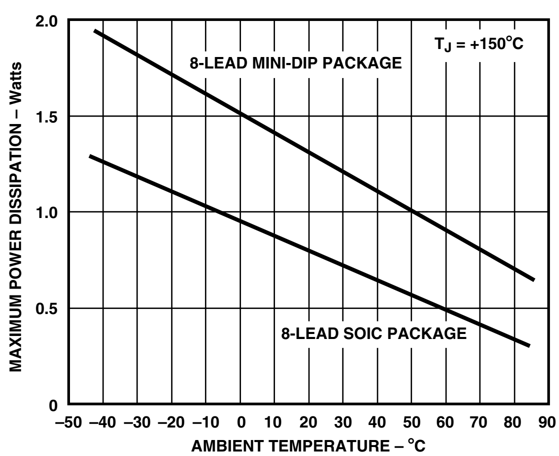
NOTES
[1]Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability .
[2]Specification is for device in free air: 8-lead plastic package, θ_{JA} = 100°C/watt; 8-lead SOIC package, θ_{JA} = 155°C/watt.

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
AD826AN	–40°C to +85°C	8-Lead Plastic DIP	N-8
AD826AR	–40°C to +85°C	8-Lead Plastic SOIC	SO-8
AD826AR-REEL7	–40°C to +85°C	7” Tape & Reel SOIC	SO-8
AD826AR-REEL	–40°C to +85°C	13” Tape & Reel SOIC	SO-8

ESD SUSCEPTIBILITY

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 volts, which readily accumulate on the human body and on test equipment, can discharge without detection. Although the AD826 features proprietary ESD protection circuitry, permanent damage may still occur on these devices if they are subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid any performance degradation or loss of functionality.

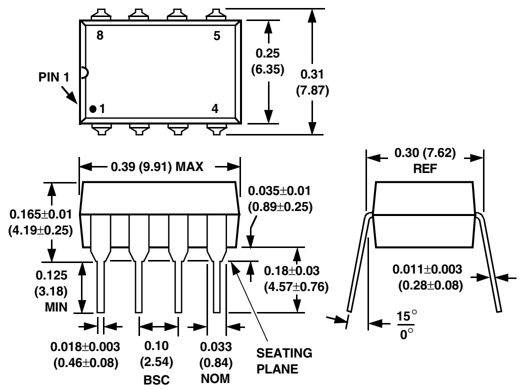


Maximum Power Dissipation vs. Temperature for Different Package Types

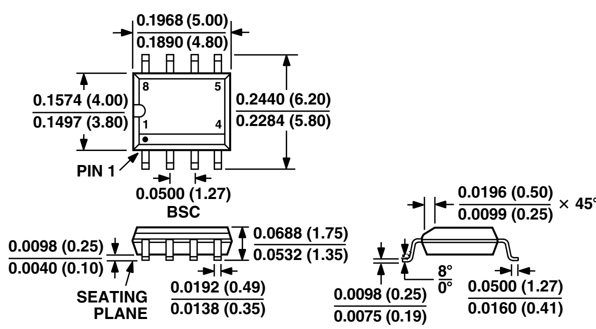
OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).

8-Lead Plastic Mini-DIP (N) Package



8-Lead SO (R) Package



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C1807a–0–6/00 (rev. B) 00877

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