

### FEATURES

#### AC PERFORMANCE

Unity-Gain Bandwidth: 40 MHz

Fast Settling: 110 ns to 0.01%

Slew Rate: 300 V/ $\mu$ s

Full Power Bandwidth: 4.7 MHz for 20 V p-p into a 500  $\Omega$  Load

#### DC PERFORMANCE

Input Offset Voltage: 1 mV max

Input Voltage Noise: 13 nV/ $\sqrt{\text{Hz}}$  typ

Open-Loop Gain: 45 V/mV into a 1 k $\Omega$  Load

Output Current: 50 mA min

Supply Current: 12 mA max

#### APPLICATIONS

High Speed Signal Conditioning

Video and Pulse Amplifiers

Data Acquisition Systems

Line Drivers

Active Filters

Available in 14-Pin Plastic DIP, Hermetic Cerdip, 12-Pin

TO-8 Metal Can and 20-Pin LCC Packages

Chips and MIL-STD-883B Parts Available

### PRODUCT DESCRIPTION

The AD841 is a member of the Analog Devices family of wide bandwidth operational amplifiers. This high speed/high precision family includes, among others, the AD840, which is stable at a gain of 10 or greater, and the AD842, which is stable at a gain of two or greater and has 100 mA minimum output current drive. These devices are fabricated using Analog Devices' junction isolated complementary bipolar (CB) process. This process permits a combination of dc precision and wideband ac performance previously unobtainable in a monolithic op amp. In addition to its 40 MHz unity-gain bandwidth product, the AD841 offers extremely fast settling characteristics, typically settling to within 0.01% of final value in 110 ns for a 10 volt step.

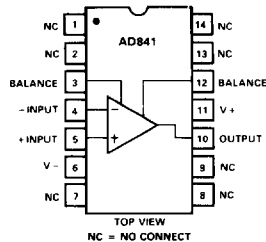
Unlike many high frequency amplifiers, the AD841 requires no external compensation. It remains stable over its full operating temperature range. It also offers a low quiescent current of 12 mA maximum, a minimum output current drive capability of 50 mA, a low input voltage noise of 13 nV/ $\sqrt{\text{Hz}}$  and low input offset voltage of 1 mV maximum.

The 300 V/ $\mu$ s slew rate of the AD841, along with its 40 MHz gain bandwidth, ensures excellent performance in video and pulse amplifier applications. This amplifier is well suited for use in high frequency signal conditioning circuits and wide bandwidth active filters. The extremely rapid settling time of the AD841 makes it the preferred choice for data acquisition applications which require 12-bit accuracy. The AD841 is also appropriate for other applications such as high speed DAC and ADC buffer amplifiers and other wide bandwidth circuitry.

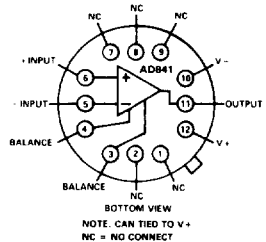
This is an abridged data sheet. To obtain the most recent version or complete data sheet, call our fax retrieval system at 1-800-446-6212.

### CONNECTION DIAGRAMS

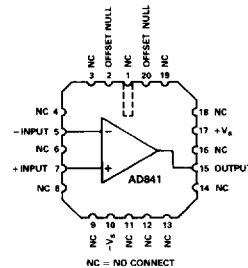
Plastic DIP (N) Package  
and  
Cerdip (Q) Package



TO-8 (H) Package



LCC (E) Package



### APPLICATION HIGHLIGHTS

1. The high slew rate and fast settling time of the AD841 make it ideal for DAC and ADC buffers, and all types of video instrumentation circuitry.
2. The AD841 is a precision amplifier. It offers accuracy to 0.01% or better and wide bandwidth performance previously available only in hybrids.
3. The AD841's thermally balanced layout and the speed of the CB process allow the AD841 to settle to 0.01% in 110 ns without the long "tails" that occur with other fast op amps.
4. Laser wafer trimming reduces the input offset voltage to 1 mV max on the K grade, thus eliminating the need for external offset nulling in many applications. Offset null pins are provided for additional versatility.
5. The AD841 is an enhanced replacement for the HA2541.

# SPECIFICATIONS (@ +25°C and ±15 V dc, unless otherwise noted)

# AD841

Model	Conditions	AD841J			AD841K			AD841S <sup>1</sup>			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
INPUT OFFSET VOLTAGE <sup>2</sup> Offset Drift	$T_{\min}$ - $T_{\max}$	0.8	2.0		0.5	1.0		0.5	2.0		mV
			5.0			3.3			5.5		mV
INPUT BIAS CURRENT Input Offset Current	$T_{\min}$ - $T_{\max}$	3.5	8		3.5	5		3.5	8		μA
			10			6			12		μA
		0.1	0.4		0.1	0.2		0.1	0.4		μA
	$T_{\min}$ - $T_{\max}$		0.5			0.3			0.6		μA
INPUT CHARACTERISTICS	Differential Mode										
Input Resistance		200			200			200			kΩ
Input Capacitance		2			2			2			pF
INPUT VOLTAGE RANGE											
Common Mode		±10	12		±10	12		±10	12		V
Common Mode Rejection	$V_{CM} = \pm 10$ V	86	100		103	109		86	100		dB
	$T_{\min}$ - $T_{\max}$	80			100			80			dB
INPUT VOLTAGE NOISE	$f = 1$ kHz		15			15			15		nV/√Hz
Wideband Noise	10 Hz to 10 MHz		47			47			47		μV rms
OPEN-LOOP GAIN	$V_O = \pm 10$ V $R_{LOAD} \geq 500 \Omega$ $T_{\min}$ - $T_{\max}$	25	45		25	45		25	45		V/mV
		12			20			12			V/mV
OUTPUT CHARACTERISTICS											
Voltage	$R_{LOAD} \geq 500 \Omega$ $T_{\min}$ - $T_{\max}$	±10			±10			±10			V
Current	$V_{OUT} = \pm 10$ V	50			50			50			mA
OUTPUT RESISTANCE	Open Loop		5			5			5		Ω
FREQUENCY RESPONSE											
Unity Gain Bandwidth	$V_{OUT} = 90$ mV p-p		40			40			40		MHz
Full Power Bandwidth <sup>3</sup>	$V_O = 20$ V p-p $R_{LOAD} \geq 500 \Omega$	3.1	4.7		3.1	4.7		3.1	4.7		MHz
Rise Time <sup>4</sup>	$A_V = -1$		10			10			10		ns
Overshoot <sup>4</sup>	$A_V = -1$		10			10			10		%
Slew Rate <sup>4</sup>	$A_V = -1$	200	300		200	300		200	300		V/μs
Settling Time - 10 V Step	$A_V = -1$ to 0.1% to 0.01%		90			90			90		ns
			110			110			110		ns
OVERDRIVE RECOVERY	- Overdrive + Overdrive	200 700			200 700			200 700			ns ns
DIFFERENTIAL GAIN	$f = 4.4$ MHz		0.03			0.03			0.03		%
Differential Phase	$f = 4.4$ MHz		0.022			0.022			0.022		Degree
POWER SUPPLY											
Rated Performance			±15			±15			±15		V
Operating Range		±5		±18	±5		±18	±5		±18	V
Quiescent Current	$T_{\min}$ - $T_{\max}$		11	12		11	12		11	12	mA
				14			14			16	mA
Power Supply Rejection Ratio	$V_S = \pm 5$ V to ±18 V $T_{\min}$ - $T_{\max}$	86	100		90	100		86	100		dB
		80			86			80			dB
TEMPERATURE RANGE											
Rated Performance <sup>5</sup>		0		+75	0		+75	-55		+125	°C
PACKAGE OPTIONS <sup>6</sup>											
LCC (E-20A)											
Cerdip (Q-14)											
Plastic (N-14)											
TO-8 (H-12)											
Chips											
			AD841JQ AD841JN AD841JH AD841J CHIPS			AD841KQ AD841KN AD841KH			AD841SE, AD841SE/883B AD841SQ, AD841SQ/883B		
									AD841SH, AD841SH/883B AD841S CHIPS		

## NOTES

<sup>1</sup>Standard Military Drawing Available: 5962-89641012A - (SE/883B); 5962-8964101CA - (SQ/883B)

<sup>2</sup>Input offset voltage specifications are guaranteed after 5 minutes at  $T_A = +25^\circ\text{C}$ .

<sup>3</sup>Full power bandwidth = Slew Rate/ $2\pi V_{PEAK}$ .

<sup>4</sup>Refer to Figure 19.

<sup>5</sup>"S" grade  $T_{\min}$  and  $T_{\max}$  specifications are tested with automatic test equipment at  $T_A = -55^\circ\text{C}$  and  $T_A = +125^\circ\text{C}$ .

<sup>6</sup>For outline information see Package Information section.

All min and max specifications are guaranteed. Specifications shown in boldface are tested on all production units.

Specifications subject to change without notice.

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# AD841

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

Supply Voltage	±18 V
Internal Power Dissipation <sup>2</sup>	
TO-8 (H)	1.4 W
Plastic (N)	1.5 W
Cerdip (Q)	1.3 W
Input Voltage	±V <sub>S</sub>
Differential Input Voltage	±6 V
Storage Temperature Range	
Q, H, E	-65°C to +150°C
N	-65°C to +125°C
Junction Temperature	+175°C
Lead Temperature Range (Soldering 60 sec)	+300°C

## NOTES

<sup>1</sup>Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only, and 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.

<sup>2</sup>Maximum internal power dissipation is specified so that T<sub>J</sub> does not exceed +175°C at an ambient temperature of +25°C.

### Thermal Characteristics:

	θ <sub>JC</sub>	θ <sub>JA</sub>	θ <sub>SA</sub>	Recommended Heat Sink:
Cerdip Package	35°C/W	110°C/W	38°C/W	Aavid Engineering °#602B
TO-8 Package	30°C/W	100°C/W	37°C/W	
Plastic Package	30°C/W	100°C/W		
LCC Package	35°C/W	150°C/W		

## METALIZATION PHOTOGRAPH

Contact factory for latest dimensions.  
Dimensions shown in inches and (mm).

