

AD845

FEATURES

Replaces Hybrid Amplifiers in Many Applications

AC PERFORMANCE:

Settles to 0.01% in 350 ns

100 V/ μ s Slew Rate

12.8 MHz Min Unity Gain Bandwidth

1.75 MHz Full Power Bandwidth at 20 V p-p

DC PERFORMANCE:

0.25 mV Max Input Offset Voltage

5 μ V/ $^{\circ}$ C Max Offset Voltage Drift

0.5 nA Input Bias Current

250 V/mV Min Open-Loop Gain

4 μ V p-p Max Voltage Noise, 0.1 Hz to 10 Hz

94 dB Min CMRR

Available in Plastic Mini-DIP, Hermetic CERDIP, and SOIC Packages. Also Available in Tape and Reel in Accordance with EIA-481A Standard

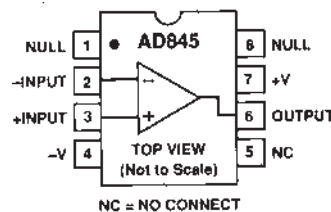
GENERAL DESCRIPTION

The AD845 is a fast, precise, N channel JFET input, monolithic operational amplifier. It is fabricated using Analog Devices' complementary bipolar (CB) process. Advanced laser-wafer trimming technology enables the very low input offset voltage and offset voltage drift performance to be realized. This precision, when coupled with a slew rate of 100 V/ μ s, a stable unity gain bandwidth of 16 MHz, and a settling time of 350 ns to 0.01%—while driving a parallel load of 100 pF and 500 Ω —represents a combination of features unmatched by any FET input IC amplifier. The AD845 can easily be used to upgrade many existing designs that use BiFET or FET input hybrid amplifiers and, in some cases, those which use bipolar input op amps.

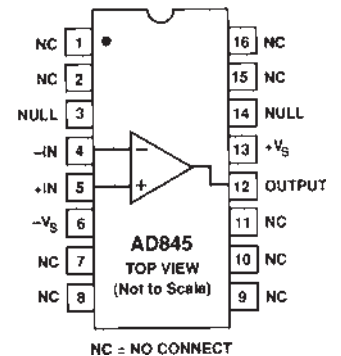
The AD845 is ideal for use in applications such as active filters, high speed integrators, photodiode preamps, sample-and-hold amplifiers, and log amplifiers, and for buffering A/D and D/A converters. The 250 μ V max input offset voltage makes offset nulling unnecessary in many applications. The common-mode rejection ratio of 110 dB over a ± 10 V input voltage range represents exceptional performance for a JFET input high speed op amp. This, together with a minimum open-loop gain of 250 V/mV ensures that 12-bit performance is achieved, even in unity gain buffer circuits.

CONNECTION DIAGRAMS

Plastic Mini-DIP (N) Package
and CERDIP (Q) Package



16-Lead SOIC
(R-16) Package



The AD845 conforms to the standard op amp pinout except that offset nulling is to V^+ . The AD845J and AD845K grade devices are available specified to operate over the commercial 0°C to 70°C temperature range. AD845A and AD845B devices are specified for operation over the -40°C to $+85^{\circ}\text{C}$ industrial temperature range. The AD845S is specified to operate over the full military temperature range of -55°C to $+125^{\circ}\text{C}$. Both the industrial and military versions are available in 8-lead CERDIP packages. The commercial version is available in an 8-lead plastic mini-DIP and 16-lead SOIC; J and S grade chips are also available.

PRODUCT HIGHLIGHTS

1. The high slew rate, fast settling time, and dc precision of the AD845 make it ideal for high speed applications requiring 12-bit accuracy.
2. The performance of circuits using the LF400, HA2520, HA2522, HA2525, HA2620, HA2622, HA2625, 3550, OPA605, and LH0062 can be upgraded in most cases.
3. The AD845 is unity gain stable and internally compensated.
4. The AD845 is specified while driving 100 pF/500 Ω loads.

AD845—SPECIFICATIONS (@ 25°C and ±15 V dc, unless otherwise noted.)

Parameter	Conditions	AD845J/A			AD845K/B			AD845S			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
INPUT OFFSET VOLTAGE ¹	T _{MIN} to T _{MAX}	Initial Offset			0.7	1.5	0.1	0.25	0.25	1.0	mV
		Offset Drift				2.5	1.5	0.4		2.0	mV
				20		5.0			10	μV/°C	
INPUT BIAS CURRENT ²	V _{CM} = 0 V T _{MIN} to T _{MAX}	Initial			0.75	2	0.5	1	0.75	2	nA
					45/75	18/38	500				nA
INPUT OFFSET CURRENT	V _{CM} = 0 V T _{MIN} to T _{MAX}	Initial			25	300	15	100	25	300	pA
					3/6.5	1.2/2.6	20				nA
INPUT CHARACTERISTICS		Input Resistance			10 ¹¹		10 ¹¹		10 ¹¹		kΩ
		Input Capacitance			4.0		4.0		4.0		pF
INPUT VOLTAGE RANGE	V _{CM} = ±10 V	Differential			±20		±20		±20		V
		Common-Mode			±10	+10.5/-13	±10	+10.5/-13	±10	+10.5/-13	V
		Common-Mode Rejection			86	110	94	113	86	110	dB
INPUT VOLTAGE NOISE	0.1 Hz to 10 Hz	f = 10 Hz			4		4		4		μV p-p
		f = 100 Hz			80		80		80		nV/√Hz
		f = 1 kHz			60		60		60		nV/√Hz
		f = 10 kHz			25		25		25		nV/√Hz
		f = 100 kHz			18		18		18		nV/√Hz
		f = 100 kHz			12		12		12		nV/√Hz
INPUT CURRENT NOISE	f = 1 kHz				0.1		0.1		0.1	pA/√Hz	
OPEN-LOOP GAIN	V _O = ±10 V R _{LOAD} ≥ 2 kΩ R _{LOAD} ≥ 500 Ω T _{MIN} -T _{MAX}	200			500	250	500	200	500		V/mV
		100			250	125	250	100	250		V/mV
		70				75		50			V/mV
OUTPUT CHARACTERISTICS	R _{LOAD} ≥ 500 Ω Short Circuit Open Loop	Voltage			±12.5		±12.5		±12.5		V
		Current				50		50		50	mA
		Output Resistance				5		5		5	Ω
FREQUENCY RESPONSE	Unity Gain V _O = ±10 V R _{LOAD} = 500 Ω	Small Signal			12.8	16	13.6	16	13.6	16	MHz
		Full Power Bandwidth ³				1.75		1.75		1.75	MHz
		Rise Time				20		20		20	ns
		Overshoot				20		20		20	%
		Slew Rate			80	100	94	100	94	100	V/μs
		Settling Time									
		10 V Step C _{LOAD} = 100 pF R _{LOAD} = 500 Ω to 0.01% to 0.1%		350		350	500	350	500	ns	
				250		250		250		ns	
DIFFERENTIAL GAIN	f = 4.4 MHz				0.04		0.04		0.04	%	
DIFFERENTIAL PHASE	f = 4.4 MHz				0.02		0.02		0.02	Degree	
POWER SUPPLY	V _S = ±5 to ±15 V T _{MIN} to T _{MAX}	Rated Performance			±15		±15		±15		V
		Operating Range			±4.75	±18	±4.75	±18	±4.75	±18	V
		Rejection Ratio			88	110	95	113	88	110	dB
		Quiescent Current				10	12	10	12	10	12

NOTES

¹Input offset voltage specifications are guaranteed after five minutes of operation at T_A = 25°C.

²Bias current specifications are guaranteed maximum at either input after five minutes of operation at T_A = 25°C.

³FPBW = slew rate/2 π V peak.

⁴S grade T_{MIN}-T_{MAX} are tested with automatic test equipment at T_A = -55°C and T_A = +125°C.

All min and max specifications are guaranteed. Specifications shown in **boldface** are tested on all production units at final electrical test. Results from these tests are used to calculate outgoing quality levels.

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS¹

Supply Voltage	±18 V
Internal Power Dissipation ²	
Plastic Mini-DIP	1.6 W
CERDIP	1.4 W
16-Lead SOIC	1.5 W
Input Voltage	+V _S
Output Short-Circuit Duration	Indefinite
Differential Input Voltage	+V _S and -V _S
Storage Temperature Range	
Q	-65°C to +150°C
N, R	-65°C to +125°C
Lead Temperature Range (Soldering 60 sec)	300°C

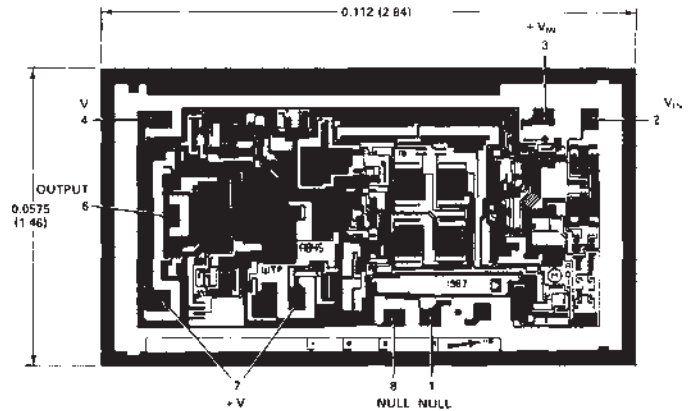
NOTES

¹Stresses 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 sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

²Mini-DIP package: $\theta_{JA} = 100^\circ\text{C/W}$; CERDIP package: $\theta_{JA} = 110^\circ\text{C/W}$; SOIC package: $\theta_{JA} = 100^\circ\text{C/W}$.

METALIZATION PHOTOGRAPH

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



SUBSTRATE CONNECTED TO +V_S

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option ¹
AD845JN	0°C to 70°C	8-Lead PDIP	N-8
AD845KN	0°C to 70°C	8-Lead PDIP	N-8
AD845JR-16	0°C to 70°C	16-Lead SOIC	R-16
AD845JR-16-REEL	0°C to 70°C	Tape and Reel	R-16
AD845JR-16-REEL7	0°C to 70°C	Tape and Reel	R-16
AD845AQ	-40°C to +85°C	8-Lead CERDIP	Q-8
AD845BQ	-40°C to +85°C	8-Lead CERDIP	Q-8
AD845SQ	-55°C to +125°C	8-Lead CERDIP	Q-8
AD845SQ/883B	-55°C to +125°C	8-Lead CERDIP	Q-8
5962-8964501PA ²	-55°C to +125°C	8-Lead CERDIP	Q-8
AD845JCHIPS	0°C to 70°C	Die	

NOTES

¹N = Plastic DIP; Q = CERDIP; R = Small Outline IC (SOIC).

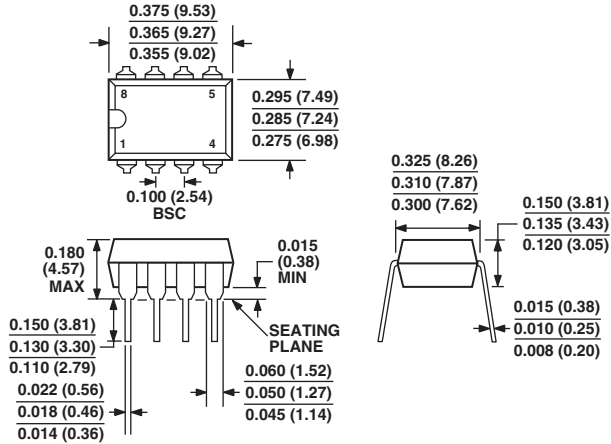
²See military data sheet.

OUTLINE DIMENSIONS

8-Lead Plastic Dual In-Line Package [PDIP]

(N-8)

Dimensions shown in inches and (millimeters)



COMPLIANT TO JEDEC STANDARDS MO-095AA

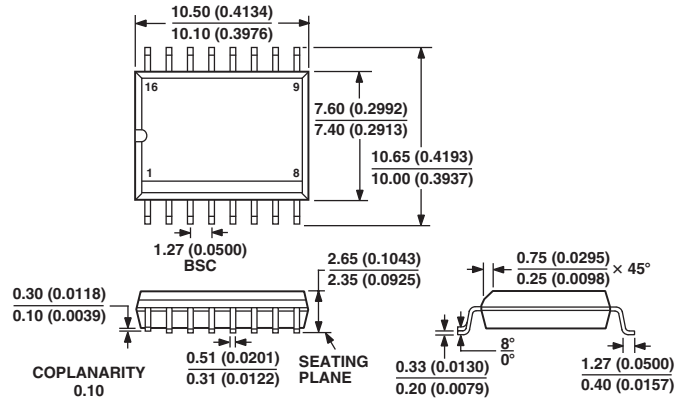
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16-Lead Standard Small Outline Package [SOIC]

Wide Body

(R-16)

Dimensions shown in millimeters and (inches)

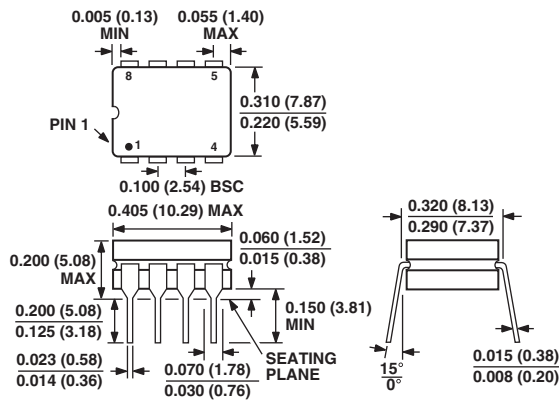


COMPLIANT TO JEDEC STANDARDS MS-013AA
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8-Lead Ceramic Dual In-Line Package [CERDIP]

(Q-8)

Dimensions shown in inches and (millimeters)



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