Precision, 16 MHz CBFET Op Amp

AD845

FEATURES

Replaces Hybrid Amplifiers in Many Applications

AC PERFORMANCE:

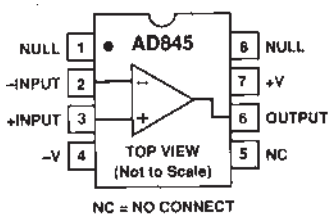
Settles to 0.01% in 350 ns
100 V/μs Slew Rate
12.8 MHz Min Unity Gain Bandwidth
1.75 MHz Full Power Bandwidth at 20 V p-p

DC PERFORMANCE:

0.25 mV Max Input Offset Voltage
5 μV/°C Max Offset Voltage Drift
0.5 nA Input Bias Current
250 V/mV Min Open-Loop Gain
4 μV 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

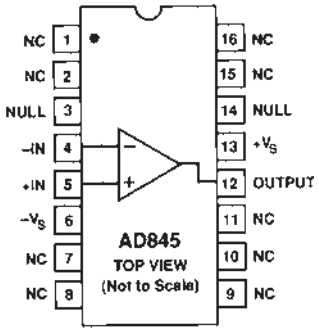
CONNECTION DIAGRAMS

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



NC = NO CONNECT

16-Lead SOIC (R-16) Package



NC = NO CONNECT

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/μs, 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 μV 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.

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°C industrial temperature range. The AD845S is specified to operate over the full military temperature range of –55°C to +125°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 Min	AD845J/A Typ	AD845J/A Max	AD845K/B Min	AD845K/B Typ	AD845K/B Max	AD845S Min	AD845S Typ	AD845S Max	Unit
INPUT OFFSET VOLTAGE[1]											
Initial Offset			0.7	**1.5**		0.1	**0.25**		0.25	**1.0**	mV
	T_{MIN} to T_{MAX}			2.5			**0.4**			2.0	mV
Offset Drift				20		1.5	**5.0**			**10**	µV/°C
INPUT BIAS CURRENT[2]											
Initial	V_{CM} = 0 V		0.75	**2**		0.5	**1**		0.75	**2**	nA
	T_{MIN} to T_{MAX}			45/75			**18/38**			**500**	nA
INPUT OFFSET CURRENT											
Initial	V_{CM} = 0 V		25	**300**		15	**100**		25	**300**	pA
	T_{MIN} to T_{MAX}			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											
Differential			±20			±20			±20		V
Common-Mode		**±10**	+10.5/–13		**±10**	+10.5/–13		**±10**	+10.5/–13		V
Common-Mode Rejection	V_{CM} = ±10 V	**86**	110		**94**	113		**86**	110		dB
INPUT VOLTAGE NOISE	0.1 Hz to 10 Hz		4			4			4		µV p-p
	f = 10 Hz		80			80			80		nV/√Hz
	f = 100 Hz		60			60			60		nV/√Hz
	f = 1 kHz		25			25			25		nV/√Hz
	f = 10 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	**200**	500		**250**	500		**200**	500		V/mV
	R_{LOAD} ≥ 500 Ω	**100**	250		**125**	250		**100**	250		V/mV
	T_{MIN}–T_{MAX}	70			**75**			**50**			V/mV
OUTPUT CHARACTERISTICS											
Voltage	R_{LOAD} ≥ 500 Ω	**±12.5**			**±12.5**			**±12.5**			V
Current	Short Circuit		50			50			50		mA
Output Resistance	Open Loop		5			5			5		Ω
FREQUENCY RESPONSE											
Small Signal	Unity Gain	12.8	16		13.6	16		13.6	16		MHz
Full Power Bandwidth[3]	V_O = ±10 V										
	R_{LOAD} = 500 Ω		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%		350			350	500		350	500	ns
	to 0.1%		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											
Rated Performance			±15			±15			±15		V
Operating Range		**±4.75**		**±18**	**±4.75**		**±18**	**±4.75**		**±18**	V
Rejection Ratio	V_S = ±5 to ±15 V	**88**	110		**95**	113		**88**	110		dB
Quiescent Current	T_{MIN} to T_{MAX}		10	12		10	**12**		10	**12**	mA

NOTES

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

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

[3]FPBW = slew rate/2 π V peak.

[4]S 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.

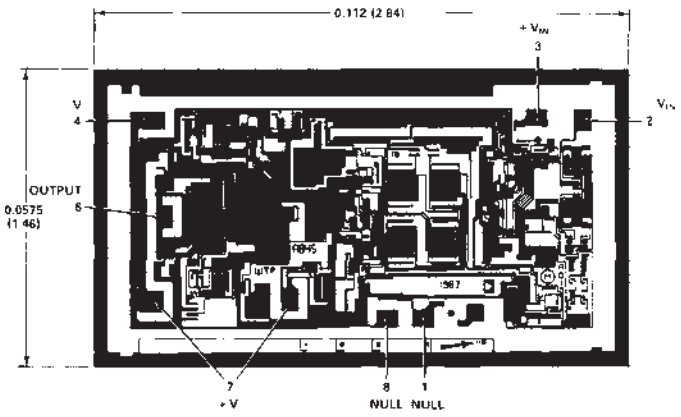
ABSOLUTE MAXIMUM RATINGS[1]

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
[1]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 sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
[2]Mini-DIP package: θ_{JA} = 100°C/W; CERDIP package: θ_{JA} = 110°C/W; SOIC package: θ_{JA} = 100°C/W.

METALIZATION PHOTOGRAPH

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



SUBSTRATE CONNECTED TO $+V_S$

ORDERING GUIDE

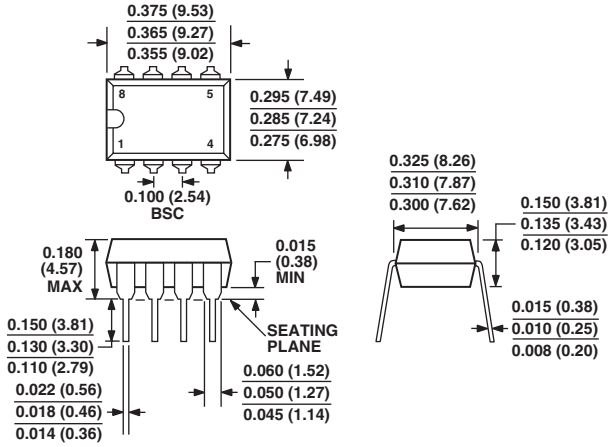
Model	Temperature Range	Package Description	Package Option[1]
AD845JN	0°C to 70°C	8-Lead PDIP	N-8
AD845KN	0°C to 70°C	8-Lead PDIP	N-8
AD845JR-16	0°C to 70°C	16-Lead SOIC	R-16
AD845JR-16-REEL	0°C to 70°C	Tape and Reel	R-16
AD845JR-16-REEL7	0°C to 70°C	Tape and Reel	R-16
AD845AQ	–40°C to +85°C	8-Lead CERDIP	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
[1]N = Plastic DIP; Q = CERDIP; R = Small Outline IC (SOIC).
[2]See military data sheet.

OUTLINE DIMENSIONS

8-Lead Plastic Dual In-Line Package [PDIP]
(N-8)

Dimensions shown in inches and (millimeters)

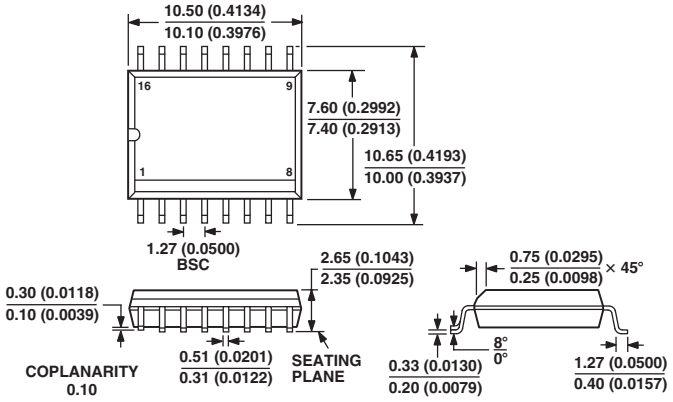


COMPLIANT TO JEDEC STANDARDS MO-095AA

CONTROLLING DIMENSIONS ARE IN INCHES; MILLIMETER DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF INCH EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN

16-Lead Standard Small Outline Package [SOIC]
Wide Body
(R-16)

Dimensions shown in millimeters and (inches)

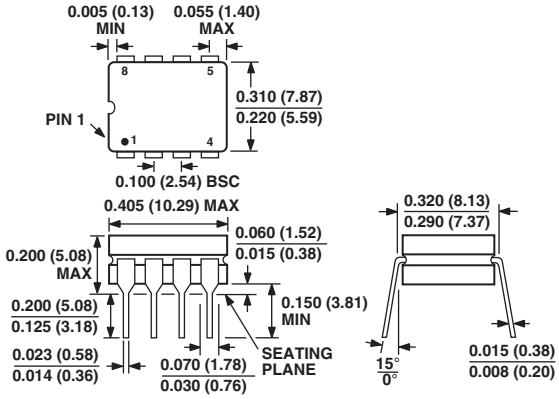


COMPLIANT TO JEDEC STANDARDS MS-013AA

CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN

8-Lead Ceramic Dual In-Line Package [CERDIP]
(Q-8)

Dimensions shown in inches and (millimeters)



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