Low Cost JFET Input Operational Amplifiers

Preliminary Technical Data

ADTL082/ADTL084

FEATURES

- TL082 / TL084 compatible
- Low input bias current: 10 pA max
- Offset voltage: 5mV max (ADTL082A/ADTL084A)
  9 mV max (ADTL082/ADTL084)
- ±5 V to ±15 V operation
- Low noise: 15 nV/√Hz
- Wide bandwidth: 6 MHz
- Slew rate: 20V/µs
- CMRR: 80 dB min
- Total Harmonic Distortion: 0.003 %
- Supply current: 1.2 mA typ
- Unity-gain stable

APPLICATIONS

- General purpose amplification
- Power control and monitoring
- Active filters
- Industrial / process control
- Data acquisition
- Sample and hold circuits
- Integrators
- Input buffering

PIN CONFIGURATIONS

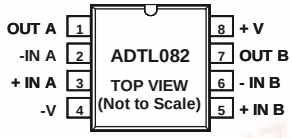

Figure 1. 8-Lead SOIC (R-8)

Figure 2. 8-Lead MSOP (RM-8)

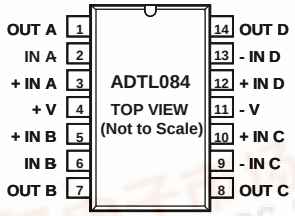

Figure 3. 14-Lead SOIC (R-14)

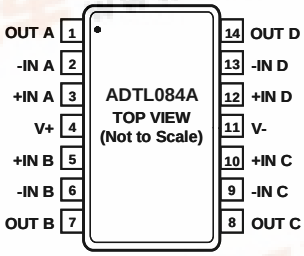

Figure 4. 14-Lead TSSOP (RU-14)

GENERAL DESCRIPTION

The ADTL082 and ADTL084 are JFET-input amplifiers providing industry-leading performance over TL08x devices. The ADTL082A and ADTL084A are improved versions of TL08x A-, I- and Q- grades. The ADTL082 and ADTL084 offer improvements over the TL08x standard and C-grades.

The ADTL08x family offers lower noise, offset voltage, offset drift over temperature, and bias current over the TL08x. In addition, the ADLT08x family has better common-mode rejection and slew rate.

These op amps are ideal for various applications including process control, industrial and instrumentation equipment, active filtering, data conversion, buffering, and power control and monitoring.

The A-grade amplifiers are available in lead-free packaging. The standard grades are available in both leaded and lead-free packaging. For high precision grades of these devices, see the ADA4000-2 (dual) and ADA4000-4 (quad).

The ADTL082A and ADTL084A are specified over the extended industrial (-40° to 125°C) temperature range. The ADTL082 and ADTL084 are specified over the commercial (0° to 70°C) temperature range.

Rev. PrA

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700 www.analog.com

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REVISION HISTORY

1/06—Rev Pr0: Initial Version

3/06—Rev PrA

SPECIFICATIONS

V_{CC} = ±15 V, V_{CM}= 0 V, T_A = 25°C, over all grades unless otherwise noted

Table 1.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}	ADTL082 / ADTL084		2	9	mV
		0°C ≤ T_A ≤ 70°C			15	mV
		ADTL082A / ADTL084A		1.5	5	mV
		-40°C ≤ T_A ≤ 125°C (A grade)			9	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	0°C ≤ T_A ≤ 70°C (all grades)		2.0	6.5	µV/°C
		-40°C ≤ T_A ≤ 125°C (A grade)		2.0	7.5	µV/°C
Input Bias Current	I_B			0.2	20	pA
		0°C ≤ T_A ≤ 70°C (all grades)			100	pA
		-40°C ≤ T_A ≤ 125°C (A grade)			550	pA
Input Offset Current	I_{OS}			0.1	0.5	pA
		0°C ≤ T_A ≤ 70°C (all grades)			50	pA
		-40°C ≤ T_A ≤ 125°C (A grade)			250	pA
Input Voltage Range	V_{CM}		-11		12	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = 0 V to 5.0 V	80	86		dB
Open-Loop Input Impedance	R_{IN}			10		MΩ
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, V_O = -10 V to 10 V	160	700		V/mV
OUTPUT CHARACTERISTICS						
Maximum Output Voltage Swing	$V_{O,MAX}$	R_L = 10 kΩ	±12	±13.5		V
		0°C ≤ T_A ≤ 70°C (all grades)	±12			V
		-40°C ≤ T_A ≤ 125°C (A grade)	±12			V
		R_L = 2 kΩ	±11	±13		V
		0°C ≤ T_A ≤ 70°C (all grades)	±10	±12		V
		-40°C ≤ T_A ≤ 125°C (A grade)	±10	±12		V
Short-Circuit Output Current	I_{SC}			±20		mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	V_{DD} = 5.V to 30 V	80	86		dB
Supply Current per Amplifier	I_{SY}			1.0	1.2	mA
		0°C ≤ T_A ≤ 70°C (all grades)			2.2	mA
		-40°C ≤ T_A ≤ 125°C (A grade)			2.5	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L = 2 kΩ		20		V/µs
Gain Bandwidth Product	GBP			6		MHz
Phase Margin	ϕ_M			74		Degrees
Total Harmonic Distortion	THD	V_{IN} = 6 V_{RMS}, f = 1 kHz, A_V = +1, R_L = 2kΩ		0.003		%
Channel Separation	CS	f = 10 kHz		120		dB
NOISE PERFORMANCE						
Voltage Noise Density	e_n	f = 1 kHz		15		nV/√Hz

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage	36V
Input Voltage	GND to V_{DD}
Differential Input Voltage	TBD
Output Short-Circuit to GND	Indefinite
Storage Temperature Range	-65°C to +150°C
Operating Temperature Range	-40°C to +125°C
Lead Temperature Range (Soldering 60 sec)	300°C
Junction Temperature	150°C

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.

THERMAL RESISTANCE

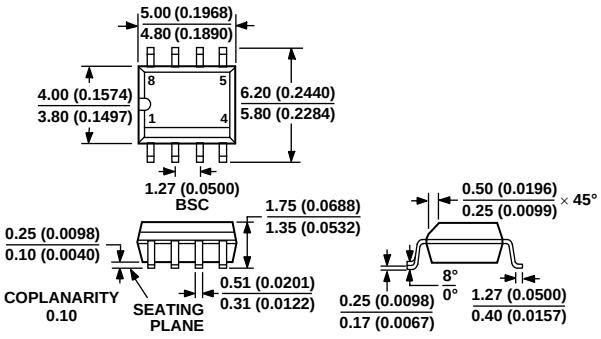
Table 3. Thermal Resistance

Package Type	θ_{JA}	θ_{JC}	Unit
8-Lead SOIC_N (R-8)	158	43	°C/W
8-Lead MSOP (RM-8)	210	45	°C/W
14-Lead SOIC (R-14)	120	36	°C/W
14-Lead TSSOP (RU-14)	180	35	°C/W

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

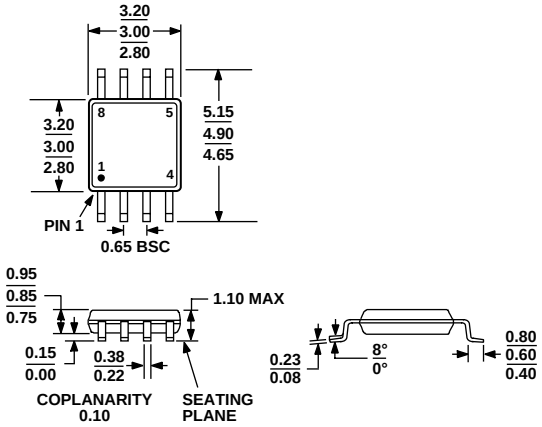
OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AA

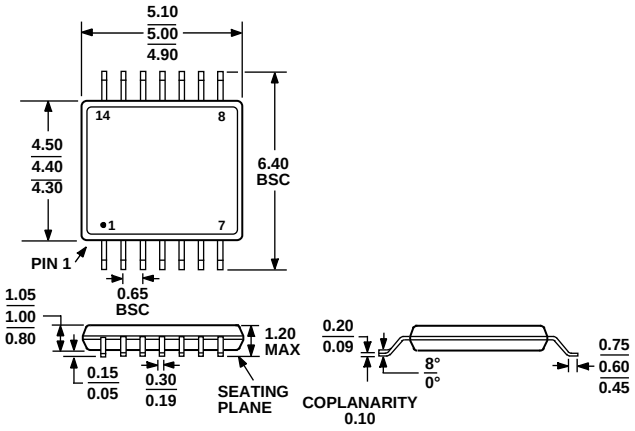
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS (IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 22. 8-Lead Small Outline Package [SOIC_N]
Narrow Body (R-8)
Dimensions shown in millimeters and (inches)



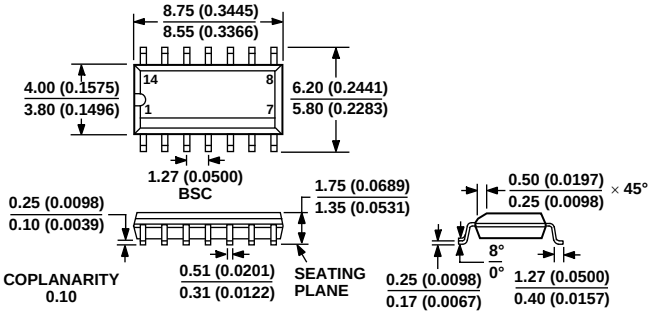
COMPLIANT TO JEDEC STANDARDS MO-187-AA

Figure 23. 8-Lead Mini Small Outline Package [MSOP]
(RM-8)
Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MO-153-AB-1

Figure 24. 14-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-14)
Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS MS-012-AB

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.

Figure 25. 14-LeadStandard Small Outline Package [SOIC]
(R-14)
Dimensions shown in millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
ADTL082R	0°C to +70°C	8-Lead SOIC_N	R-8
ADTL082R-REEL	0°C to +70°C	8-Lead SOIC_N	R-8
ADTL082R-REEL7	0°C to +70°C	8-Lead SOIC_N	R-8
ADTL082RZ[1]	0°C to +70°C	8-Lead SOIC_N	R-8
ADTL082RZ-REEL[1]	0°C to +70°C	8-Lead SOIC_N	R-8
ADTL082RZ-REEL7[1]	0°C to +70°C	8-Lead SOIC_N	R-8
ADTL082ARZ[1]	−40°C to +125°C	8-Lead SOIC_N	R-8
ADTL082ARZ-REEL[1]	−40°C to +125°C	8-Lead SOIC_N	R-8
ADTL082ARZ-REEL7[1]	−40°C to +125°C	8-Lead SOIC_N	R-8
ADTL082ARUZ[1]	−40°C to +125°C	8-lead MSOP	RM-8
ADTL082ARUZ-REEL[1]	−40°C to +125°C	8-lead MSOP	RM-8
ADTL084R	0°C to +70°C	14-Lead SOIC_N	R-14
ADTL084R-REEL	0°C to +70°C	14-Lead SOIC_N	R-14
ADTL084R-REEL7	0°C to +70°C	14-Lead SOIC_N	R-14
ADTL084RZ[1]	0°C to +70°C	14-Lead SOIC_N	R-14
ADTL084RZ-REEL[1]	0°C to +70°C	14-Lead SOIC_N	R-14
ADTL084RZ-REEL7[1]	0°C to +70°C	14-Lead SOIC_N	R-14
ADTL084ARZ[1]	−40°C to +125°C	14-Lead SOIC_N	R-14
ADTL084ARZ-REEL[1]	−40°C to +125°C	14-Lead SOIC_N	R-14
ADTL084ARZ-REEL7[1]	−40°C to +125°C	14-Lead SOIC_N	R-14
ADTL084ARUZ[1]	−40°C to +125°C	14-lead TSSOP	RU-14
ADTL084ARUZ-REEL[1]	−40°C to +125°C	14-lead TSSOP	RU-14

[1] Z = Pb-free part