Low Cost JFET Input Operational Amplifiers

ADTL082/ADTL084

FEATURES

TL082/TL084 compatible
Low input bias current: 10 pA maximum
Offset voltage
- **5.5 mV maximum (ADTL082A/ADTL084A)**
- **9 mV maximum (ADTL082J/ADTL084J)**

±15 V operation
Low noise: 16 nV/√Hz
Wide bandwidth: 5 MHz
Slew rate: 20 V/μs
CMRR: 80 dB minimum
Total harmonic distortion: 0.001%
Supply current: 1.2 mA typical
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

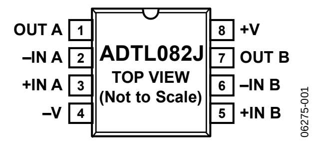

Figure 1. 8-Lead SOIC_N (R-8)

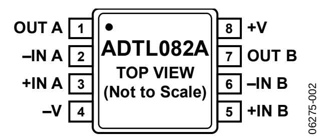

Figure 2. 8-Lead MSOP (RM-8)

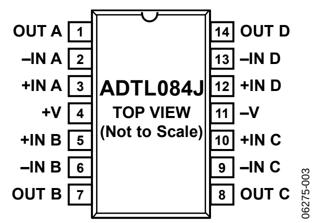

Figure 3. 14-Lead SOIC_N (R-14)

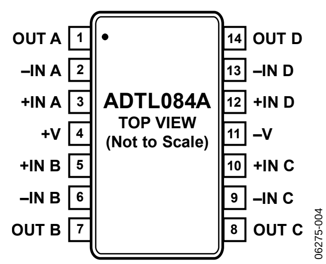

Figure 4. 14-Lead TSSOP (RU-14)

GENERAL DESCRIPTION

The ADTL082 and ADTL084 are JFET input amplifiers that provide industry-leading performance over TL08x devices. The ADTL082A and ADTL084A are improved versions of TL08x A, I, and Q grades. The ADTL082J and ADTL084J are industry alternatives to 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 rates.

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 grade amplifiers are available in both leaded and lead-free packaging.

The ADTL082A and ADTL084A are specified over the extended industrial (−40°C to +125°C) temperature range. The ADTL082J and ADTL084J are specified over the commercial (0°C to 70°C) temperature range.

Rev. B

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4/07—Rev. 0 to Rev. A
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1/07—Revision 0: Initial Version

SPECIFICATIONS

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

Table 1.

			J Grade			A Grade			
Parameter	**Symbol**	**Conditions**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
INPUT CHARACTERISTICS									
Offset Voltage	V_{OS}			2	9		1.5	5.5	mV
		0°C ≤ T_A ≤ +70°C			10			8	mV
		−40°C ≤ T_A ≤ +125°C						9	mV
Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	0°C ≤ T_A ≤ +70°C		15					µV/°C
		−40°C ≤ T_A ≤ +125°C					10		µV/°C
Input Bias Current	I_B			2	100		2	100	pA
		0°C ≤ T_A ≤ +70°C			3			3	nA
		−40°C ≤ T_A ≤ +125°C						5	nA
Input Offset Current	I_{OS}			2	100		2	100	pA
		0°C ≤ T_A ≤ 70°C			3			3	nA
		−40°C ≤ T_A ≤ +125°C						5	nA
Input Voltage Range	V_{CM}		−11		+15	−11		+15	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = −11 V to +15 V	80	86		80	86		dB
Input Impedance	R_{IN}			10^{12}			10^{12}		Ω
Large Signal Voltage Gain	A_{VO}	R_L = 2 kΩ, V_O = −10 V to +10 V	100	200		100	200		V/mV
		0°C ≤ T_A ≤ 70°C	90	200		90	200		V/mV
		−40°C ≤ T_A ≤ +125°C				50	200		V/mV
OUTPUT CHARACTERISTICS									
Maximum Output Voltage Swing	V_O	R_L = 10 kΩ	±12	±13.5		±13	±13.5		V
		0°C ≤ T_A ≤ +70°C	±12			±13			V
		−40°C ≤ T_A ≤ +125°C				±13			V
		R_L = 2 kΩ				±12.5	±13.3		V
		0°C ≤ T_A ≤ +70°C	±10			±12			V
		−40°C ≤ T_A ≤ +125°C				±12			V
Short-Circuit Output Current	I_{SC}			±27			±27		mA
POWER SUPPLY									
Power Supply Rejection Ratio	PSRR	V_{DD} = 8 V to 36 V	80	86		80	86		dB
Supply Current per Amplifier	I_{SY}			1.2	1.8		1.2	1.8	mA
		0°C ≤ T_A ≤ +70°C			1.9			1.9	mA
		−40°C ≤ T_A ≤ +125°C						2.0	mA
DYNAMIC PERFORMANCE									
Slew Rate	SR			20			20		V/µs
Gain Bandwidth Product	GBP			5			5		MHz
Phase Margin	φ_M			63			63		Degrees
Total Harmonic Distortion	THD	V_{IN} = 6 V rms, f = 1 kHz, A_V = +1, R_L = 2 kΩ		0.001			0.001		%
Channel Separation	CS	f = 10 kHz		120			120		dB
NOISE PERFORMANCE									
Voltage Noise Density	e_n	f = 1 kHz		16			16		nV/√Hz

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage	±18 V or +36 V
Input Voltage	±V supply
Differential Input Voltage	±V supply
Output Short Circuit to GND	Indefinite
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−40°C to +125°C
Lead Temperature (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_N (R-14)	120	36	°C/W
14-Lead TSSOP (RU-14)	180	35	°C/W

POWER SEQUENCING

The op amp supplies must be established simultaneously with, or before, the application of any input signals.

If this is not possible, the input current must be limited to 10 mA.

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.

TYPICAL PERFORMANCE CHARACTERISTICS

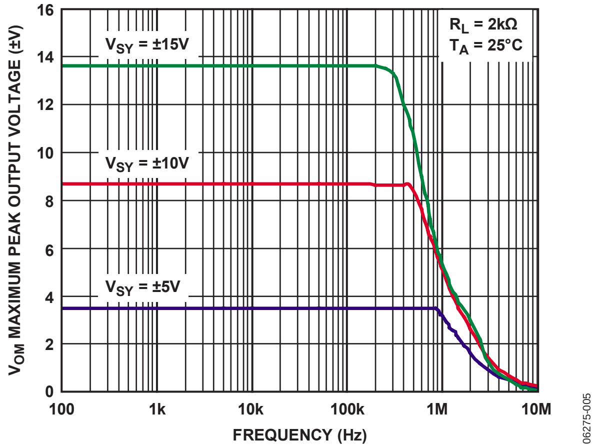

Figure 5. Maximum Peak Output Voltage vs. Frequency

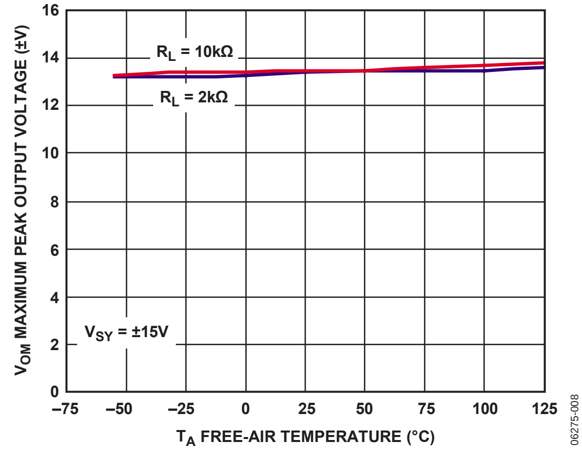

Figure 8. Maximum Peak Output Voltage vs. Free-Air Temperature

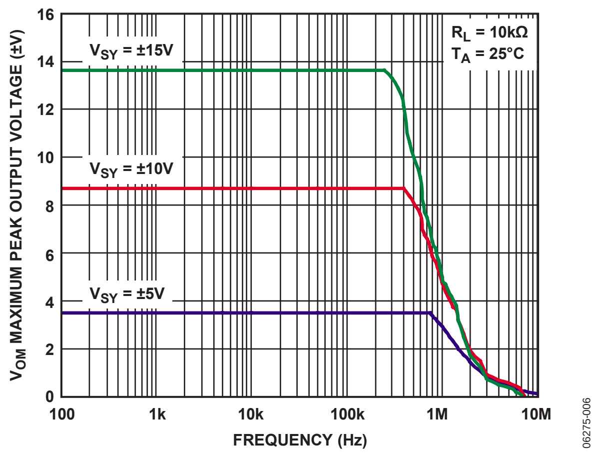

Figure 6. Maximum Peak Output Voltage vs. Frequency

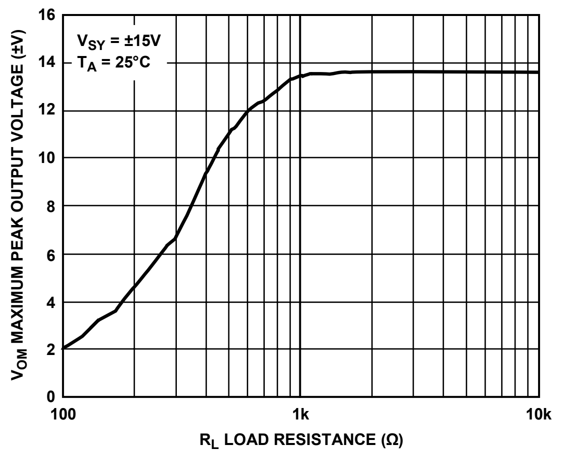

Figure 9. Maximum Peak Output Voltage vs. Load Resistance

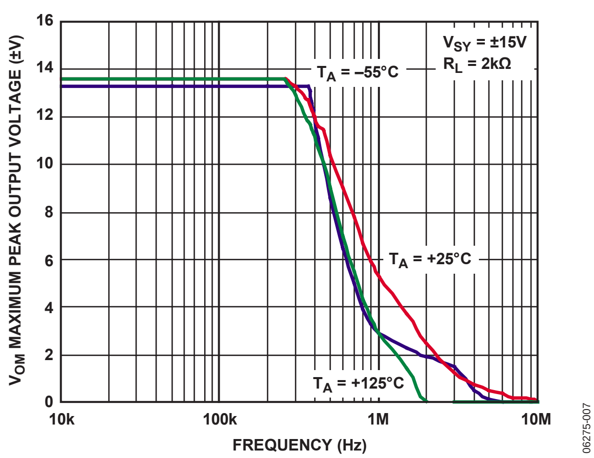

Figure 7. Maximum Peak Output Voltage vs. Frequency

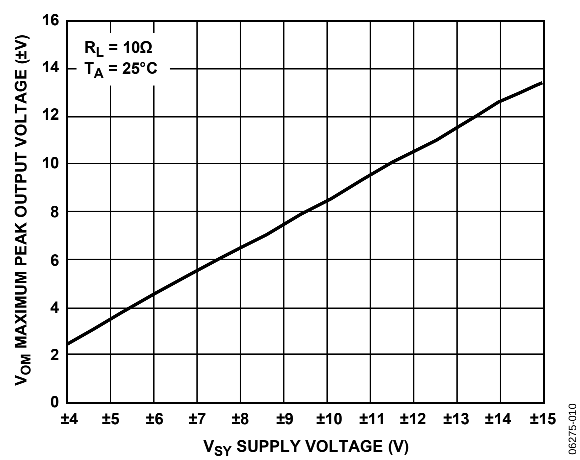

Figure 10. Maximum Peak Output Voltage vs. Supply Voltage

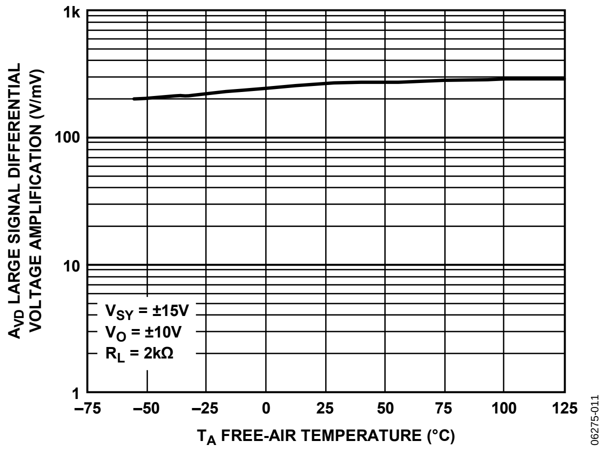

Figure 11. Large Signal Differential Voltage Amplification vs. Free-Air Temperature

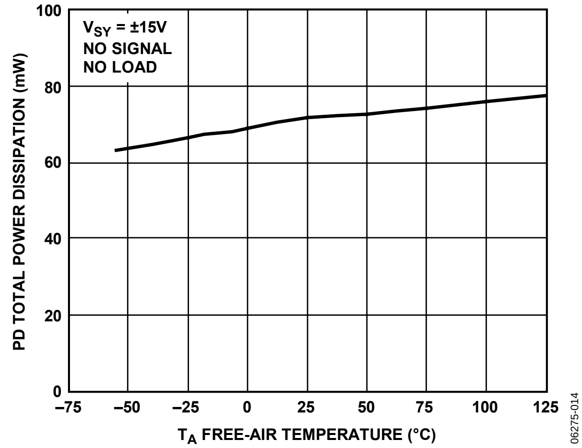

Figure 14. Total Power Dissipation vs. Free-Air Temperature

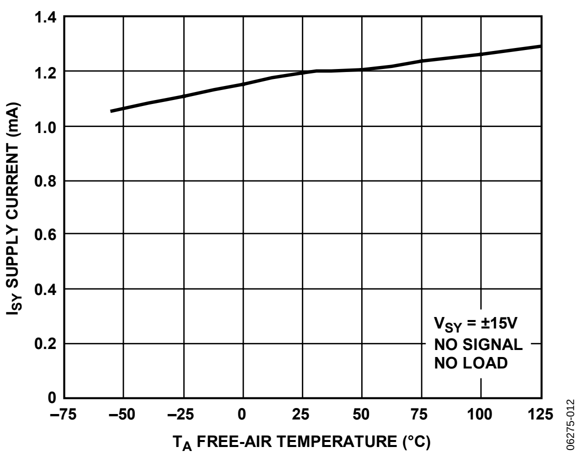

Figure 12. Supply Current Per Amplifier vs. Free-Air Temperature

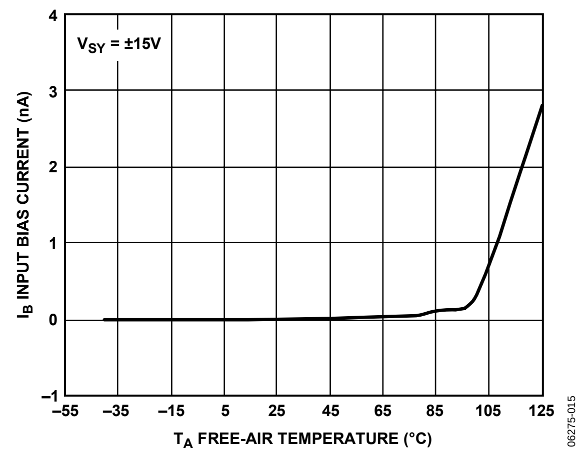

Figure 15. Input Bias Current vs. Free-Air Temperature

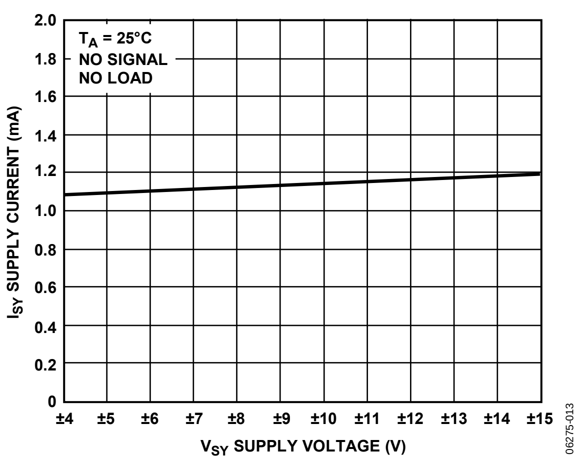

Figure 13. Supply Current vs. Supply Voltage

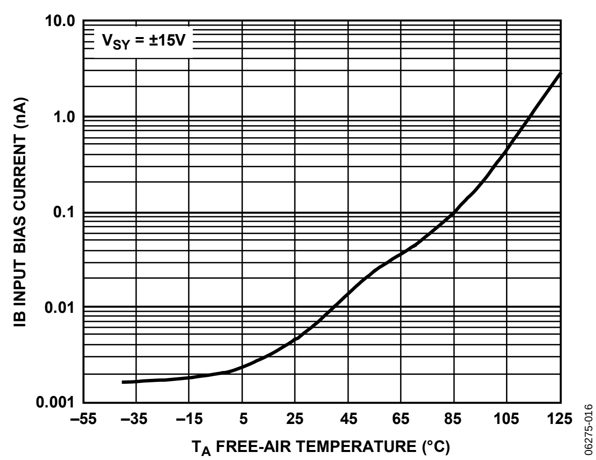

Figure 16. Input Bias Current vs. Free-Air Temperature

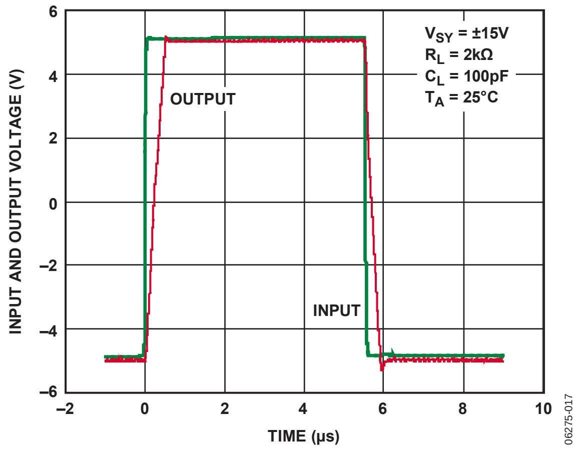

Figure 17. Large Signal Response

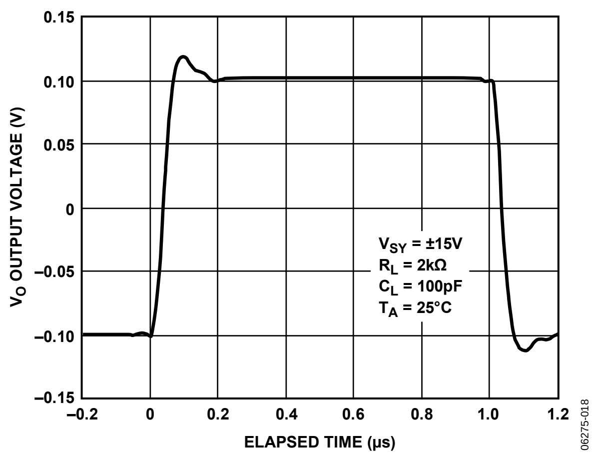

Figure 18. Small Signal Response

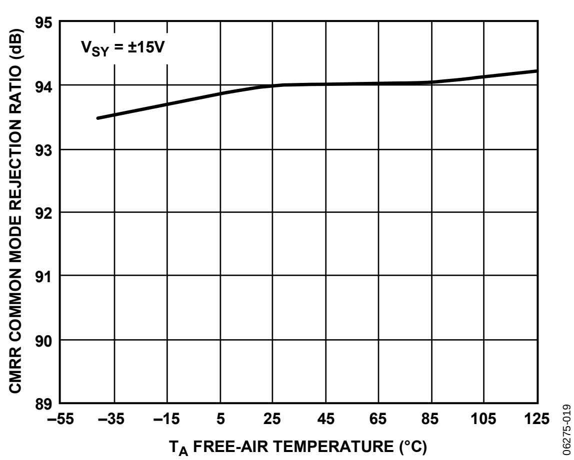

Figure 19. Common-Mode Rejection Ratio vs. Free-Air Temperature

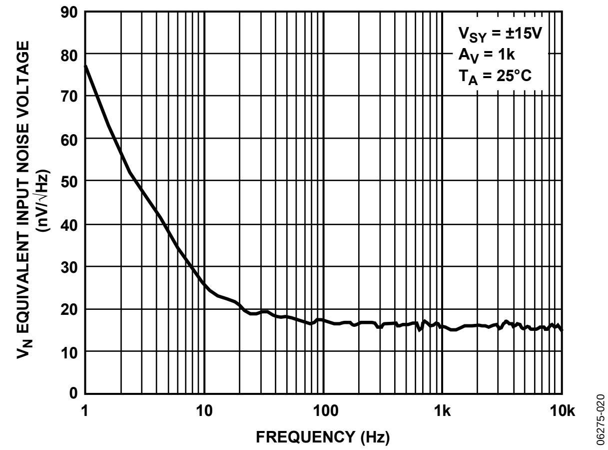

Figure 20. Voltage Noise Density vs. Frequency

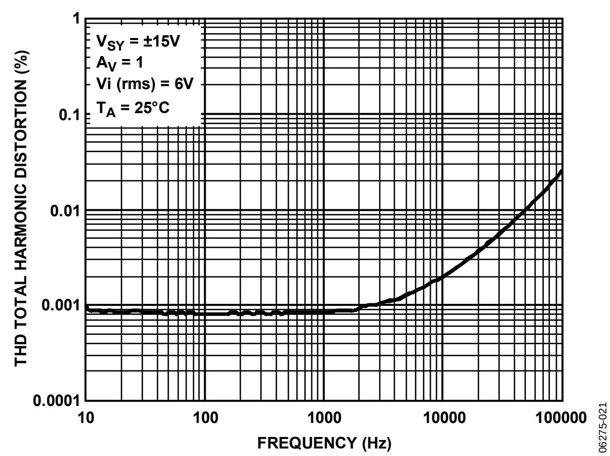

Figure 21. Total Harmonic Distortion vs. Frequency

OUTLINE DIMENSIONS

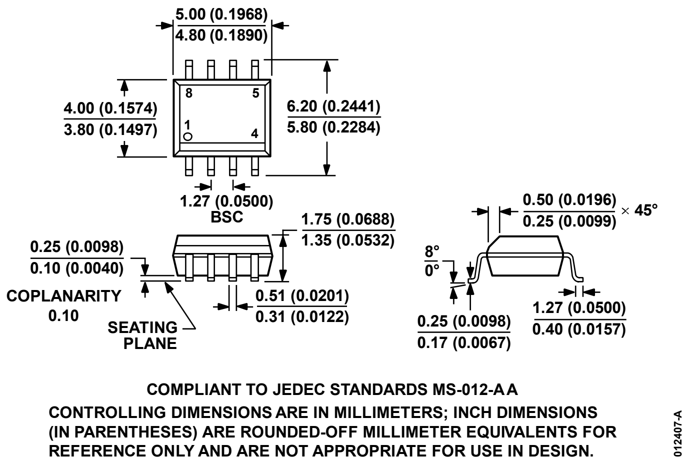

Figure 22. 8-Lead Standard Small Outline Package [SOIC_N]
Narrow Body (R-8)
Dimensions shown in millimeters and (inches)

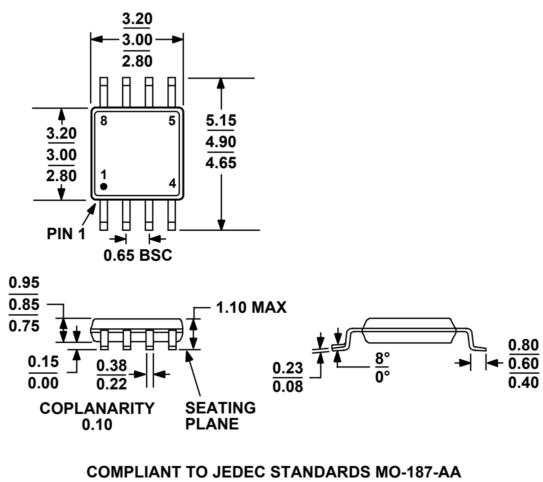

Figure 23. 8-Lead Mini Small Outline Package [MSOP]
(RM-8)
Dimensions shown in millimeters

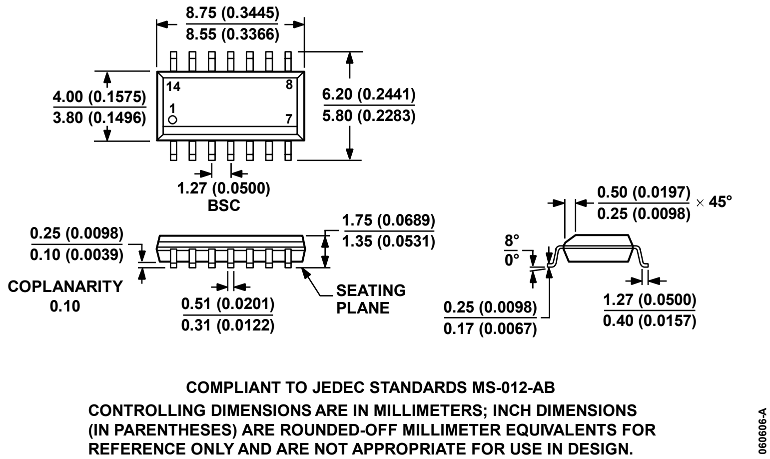

Figure 24. 14-Lead Standard Small Outline Package [SOIC_N]
Narrow Body (R-14)
Dimensions shown in millimeters and (inches)

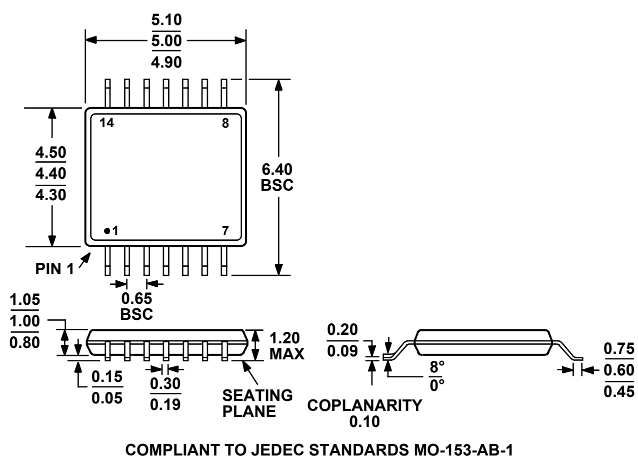

Figure 25. 14-Lead Thin Shrink Small Outline Package [TSSOP]
(RU-14)
Dimensions shown in millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option	Branding
ADTL082JR	0°C to +70°C	8-Lead SOIC_N	R-8	
ADTL082JR-REEL	0°C to +70°C	8-Lead SOIC_N	R-8	
ADTL082JR-REEL7	0°C to +70°C	8-Lead SOIC_N	R-8	
ADTL082JRZ[1]	0°C to +70°C	8-Lead SOIC_N	R-8	
ADTL082JRZ-REEL[1]	0°C to +70°C	8-Lead SOIC_N	R-8	
ADTL082JRZ-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	
ADTL082ARMZ-R2[1]	−40°C to +125°C	8-Lead MSOP	RM-8	A18
ADTL082ARMZ-REEL[1]	−40°C to +125°C	8-Lead MSOP	RM-8	A18
ADTL084JR	0°C to +70°C	14-Lead SOIC_N	R-14	
ADTL084JR-REEL	0°C to +70°C	14-Lead SOIC_N	R-14	
ADTL084JR-REEL7	0°C to +70°C	14-Lead SOIC_N	R-14	
ADTL084JRZ[1]	0°C to +70°C	14-Lead SOIC_N	R-14	
ADTL084JRZ-REEL[1]	0°C to +70°C	14-Lead SOIC_N	R-14	
ADTL084JRZ-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 = RoHS Compliant Part.

NOTES

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