Amplifiers Appilications

Operational Amplifier

■ Features

- **Bandwidth – 290 MHz (G = 1, –3 dB)**
- **110 mA Output Current Drive (Typical)**
- **Wide Supply Range ±5 V to ±15 V**
- **Supply Current . . . 1.9 mA/Channel**
- **7.5 nV/√Hz Voltage Noise**
- **Very Low Distortion**
  – THD = –80 dBc (f = 1 MHz, R_L = 150 Ω)

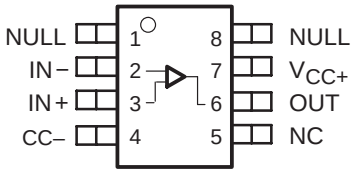
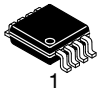
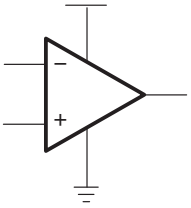


Figure 1. Pinout (Top View)



Operational Amplifier



■ Recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	Split supply	±4.5		±16	V
	Single supply	9		32	
Operating free-air temperature, T_A	C suffix	0		70	°C
	I suffix	–40		85	
	M suffix	–55		125	

xxx : Marking code

LLLL : Lot code or datecode abbreviation (From A~Z,a~z,1~9)

ORDERING INFORMATION

Device	Marking Code	Package	Shipping†
ALT1110CSTR	ACI	SOP8	2500 / Tape & Reel
ALT1110IMTR	ACJ	MSOP8	2500 / Tape & Reel

Absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} ..... ±16.5 V
Input voltage, V_I ..... $\pm V_{CC}$
Output current, I_O ..... 175 mA
Differential input voltage, V_{ID} ..... ±4 V
Continuous total power dissipation ..... See Dissipation Rating Table
Maximum junction temperature, T_J ..... 150°C
Operating free-air temperature, T_A, C ..... 0°C to 70°C
I ..... -40°C to 85°C
Storage temperature, T_{stg} ..... –65°C to 150°C

Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
NOTE 1: All voltage values, except differential voltages, are with respect to GND.

operating characteristics at specified free-air temperature, Vcc = 15V (unless otherwise noted)

dynamic performance

PARAMETER		TEST CONDITIONS†		MIN	TYP	MAX	UNIT
BW	Unity-gain bandwidth (–3 dB)	Gain = 1	V_{CC} = ±15 V		290		MHz
			V_{CC} = ±5 V		270		
	Bandwidth for 0.1 dB flatness	Gain = 1	V_{CC} = ±15 V		70		MHz
			V_{CC} = ±5 V		35		
	Full power bandwidth (see Note 2)	V_{CC} = ±15 V, R_L = 150 Ω	$V_{O(PP)}$ = 20 V,		4.9		MHz
		V_{CC} = ±5 V, R_L = 150 Ω,	$V_{O(PP)}$ = 5 V,		16		
SR	Slew rate	Gain = –1, R_L = 150 Ω	V_{CC} = ±15 V		310		V/µs
			V_{CC} = ±5 V		260		
t_s	Settling time to 0.1%	V_I = –2.5 V to 2.5 V, Gain = –1	V_{CC} = ±15 V		37		ns
			V_{CC} = ±5 V		35		
	Settling time to 0.01%	V_I = –2.5 V to 2.5 V, Gain = –1	V_{CC} = ±15 V		90		ns
			V_{CC} = ±5 V		70		

† Full range = 0°C to 70°C for the C suffix and –40°C to 85°C for the I suffix.

noise/distortion performance

PARAMETER		TEST CONDITIONS†		MIN	TYP	MAX	UNIT
THD	Total harmonic distortion	V_{CC} = ±15 V, $V_{O(PP)}$ = 2 V	f_c = 1 MHz,		–80		dBc
V_n	Input voltage noise	V_{CC} = ±5 V or ±15 V,	f = 10 kHz		7.5		nV/√Hz
I_n	Input current noise	V_{CC} = ±5 V or ±15 V,	f = 10 kHz		1		pA/√Hz
	Differential gain error	Gain = 2, R_L = 150 Ω, NTSC	V_{CC} = ±15 V		0.01%		
			V_{CC} = ±5 V		0.01%		
	Differential phase error	Gain = 2, R_L = 150 Ω, NTSC	V_{CC} = ±15 V		0.01°		
			V_{CC} = ±5 V		0.001°		

† Full range = 0°C to 70°C for the C suffix and –40°C to 85°C for the I suffix.

TYPICAL CHARACTERISTICS

INPUT OFFSET VOLTAGE vs FREE-AIR TEMPERATURE

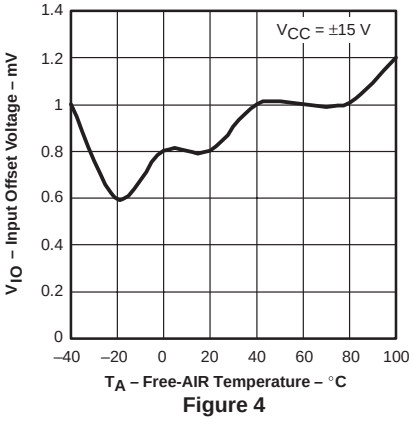


Figure 4

INPUT BIAS CURRENT vs FREE-AIR TEMPERATURE

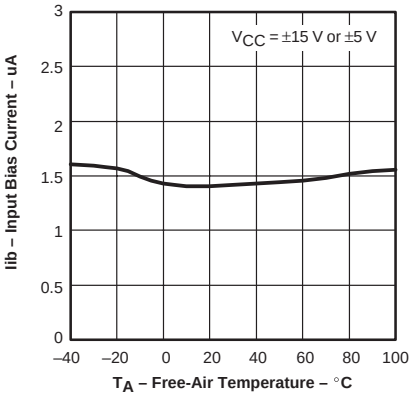


Figure 5

OUPUT VOLTAGE vs SUPPLY VOLTAGE

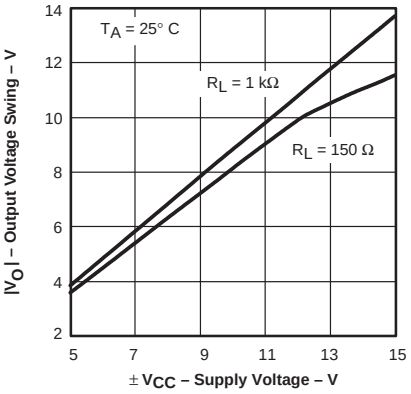


Figure 6

MAXIMUM OUTPUT VOLTAGE SWING vs FREE-AIR TEMPERATURE

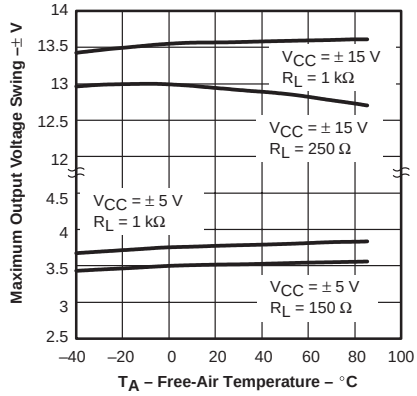


Figure 7

COMMON-MODE INPUT VOLTAGE vs SUPPLY VOLTAGE

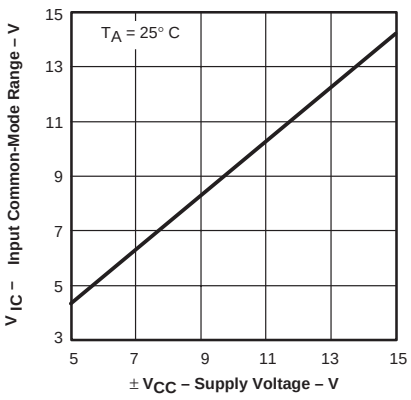


Figure 8

PSRR vs FREQUENCY

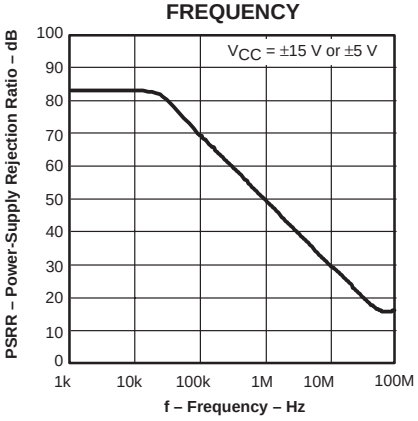


Figure 9

CMRR vs FREQUENCY

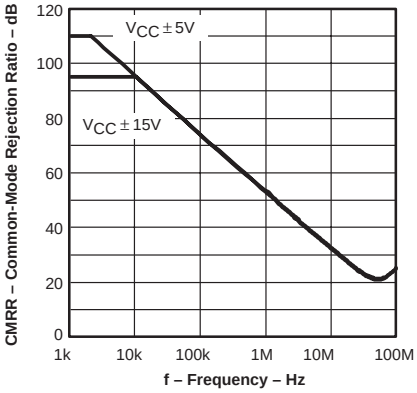


Figure 10

CROSSTALK vs FREQUENCY

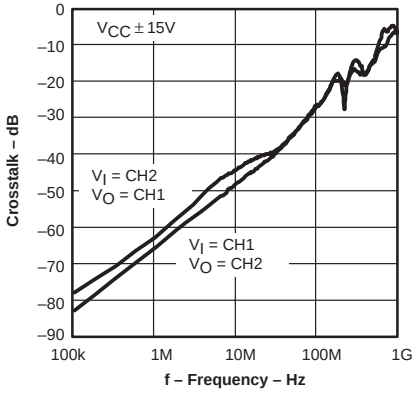


Figure 11

OPEN-LOOP GAIN RESPONSE

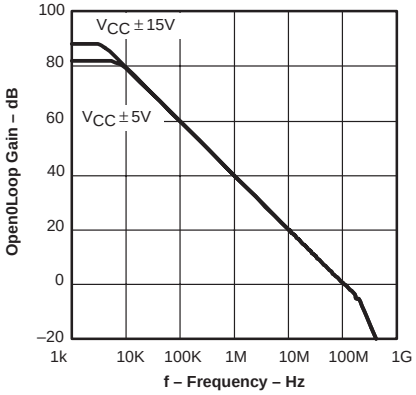


Figure 12

TYPICAL CHARACTERISTICS

DISTORTION vs FREQUENCY

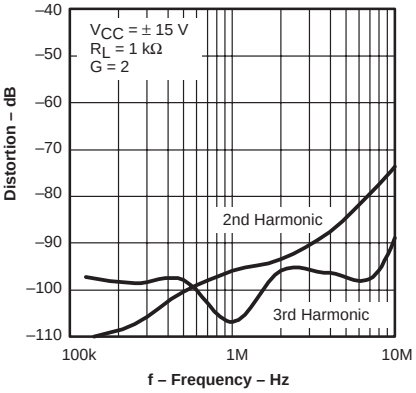


Figure 13

DISTORTION vs FREQUENCY

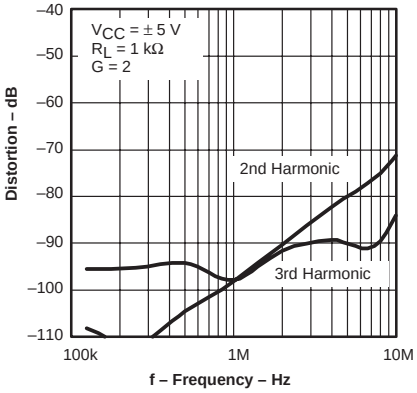


Figure 14

DISTORTION vs FREQUENCY

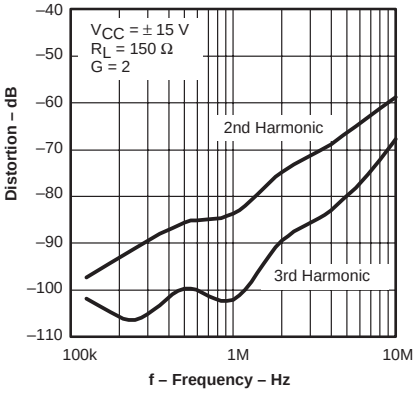


Figure 15

DISTORTION vs FREQUENCY

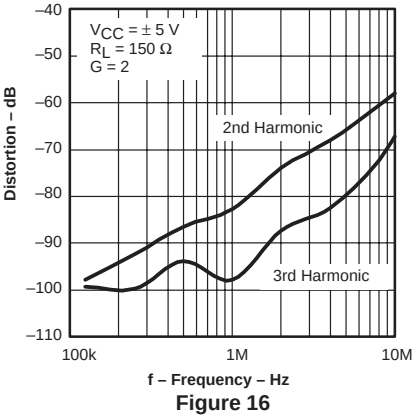


Figure 16

OUTPUT AMPLITUDE vs FREQUENCY

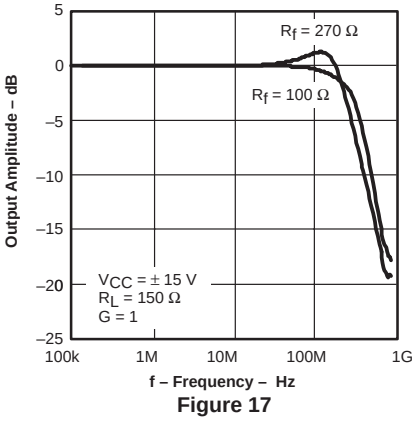


Figure 17

OUTPUT AMPLITUDE vs FREQUENCY

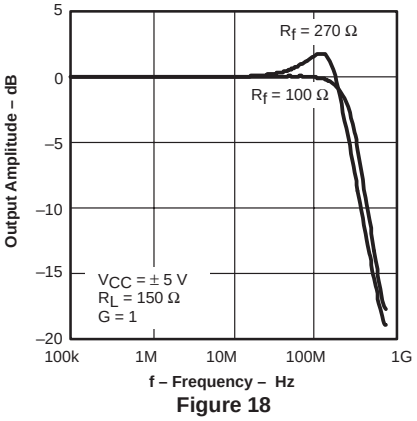


Figure 18

NOISE SPECTRAL DENSITY vs FREQUENCY

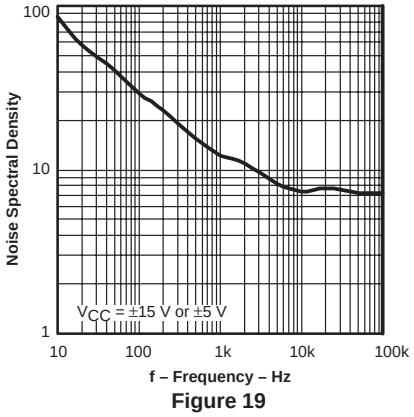


Figure 19

DIFFERENTIAL PHASE vs NUMBER OF 150-Ω LOADS

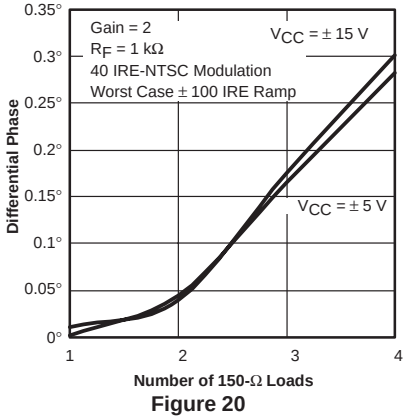
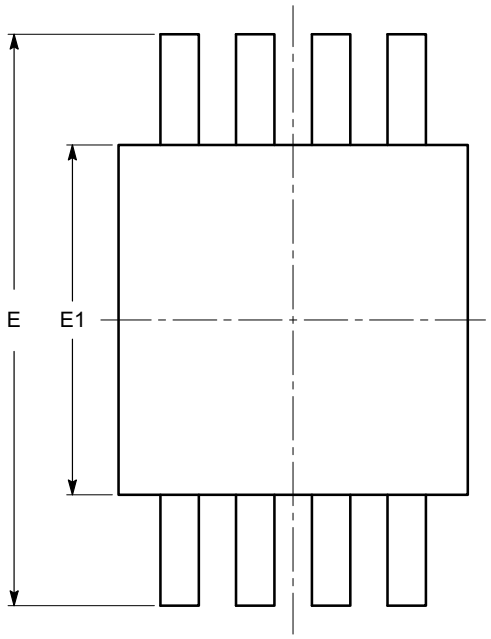


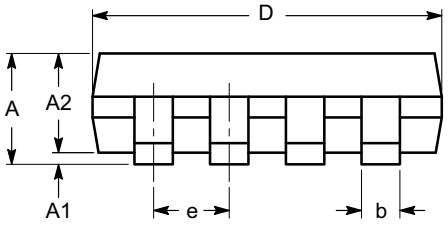
Figure 20

MSOP8 PACKAGE FIGURE

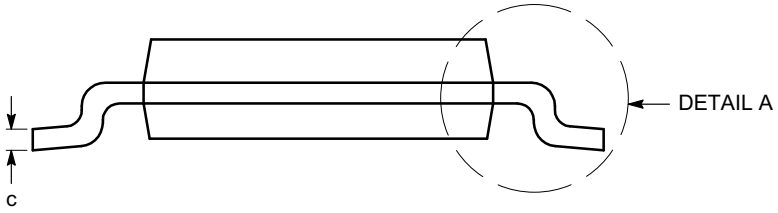


TOP VIEW

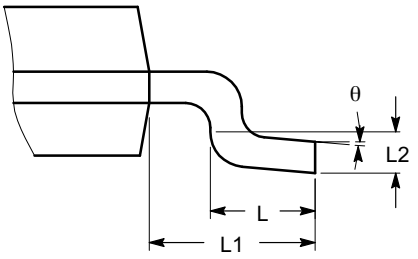
SYMBOL	MIN	NOM	MAX
A			1.10
A1	0.05	0.10	0.15
A2	0.75	0.85	0.95
b	0.22		0.38
c	0.13		0.23
D	2.90	3.00	3.10
E	4.80	4.90	5.00
E1	2.90	3.00	3.10
e		0.65 BSC	
L	0.40	0.60	0.80
L1		0.95 REF	
L2		0.25 BSC	
θ	0°		6°



SIDE VIEW



END VIEW

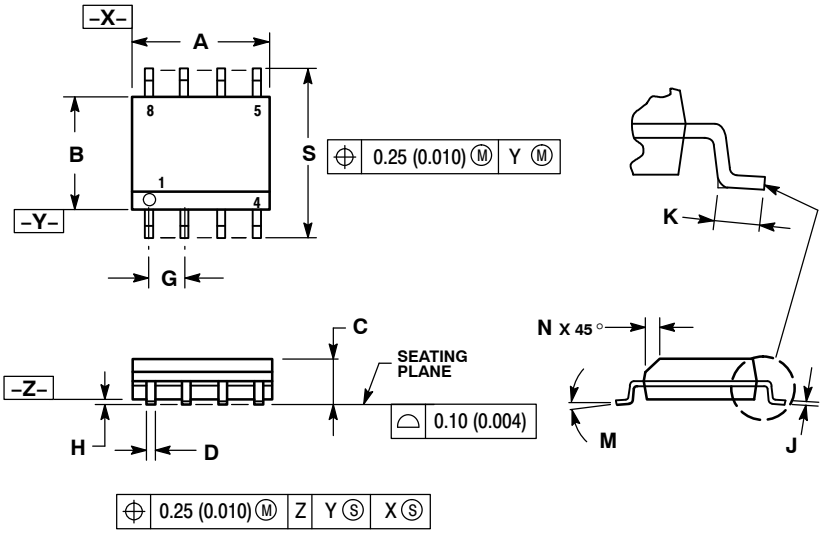


DETAIL A

Notes:

(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-187.

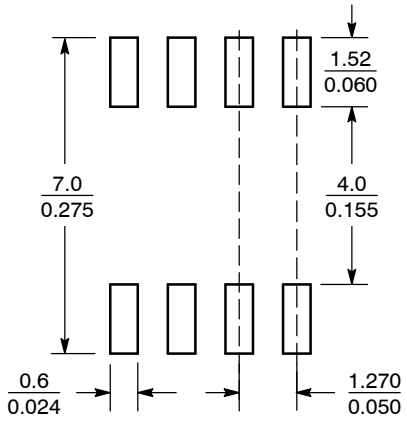
SOP8 PACKAGE FIGURE



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751–01 THRU 751–06 ARE OBSOLETE. NEW STANDARD IS 751–07.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

SOLDERING FOOTPRINT*



SCALE 6:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

TAPE AND REEL BOX DIMENSIONS