

## LM380 2.5W Audio Power Amplifier

Check for Samples: [LM380](#)

### FEATURES

- **Wide Supply Voltage Range:** 10V-22V
- **Low Quiescent Power Drain:** 0.13W ( $V_S = 18V$ )
- **Voltage Gain Fixed at 50**
- **High Peak Current Capability:** 1.3A
- **Input Referenced to GND**
- **High Input Impedance:** 150k $\Omega$
- **Low Distortion**
- **Quiescent Output Voltage is at One-Half of the Supply Voltage**
- **Standard Dual-In-Line Package**

### DESCRIPTION

The LM380 is a power audio amplifier for consumer applications. In order to hold system cost to a minimum, gain is internally fixed at 34 dB. A unique input stage allows ground referenced input signals. The output automatically self-centers to one-half the supply voltage.

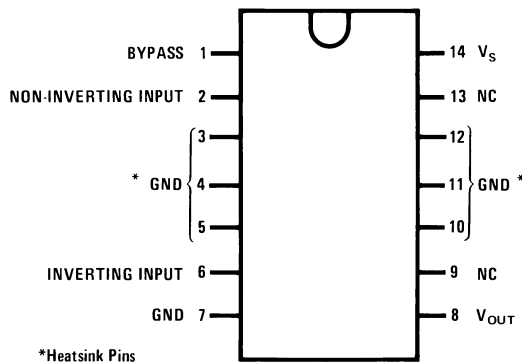
The output is short circuit proof with internal thermal limiting. The package outline is standard dual-in-line. The LM380N uses a copper lead frame. The center three pins on either side comprise a heat sink. This makes the device easy to use in standard PC layouts.

Uses include simple phonograph amplifiers, intercoms, line drivers, teaching machine outputs, alarms, ultrasonic drivers, TV sound systems, AM-FM radio, small servo drivers, power converters, etc.

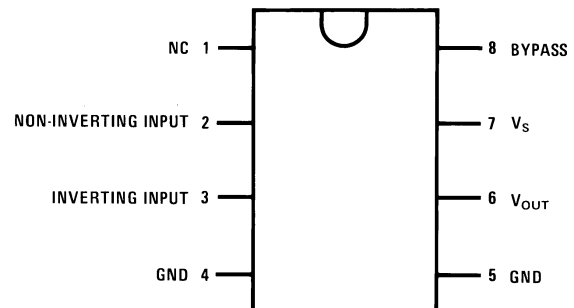
A selected part for more power on higher supply voltages is available as the LM384. For more information see [SNAA086](#).

### Connection Diagrams

(Dual-In-Line Packages, Top View)



**Figure 1. 14-Pin PDIP  
See NFF0014A Package**



**Figure 2. 8-Pin PDIP  
See P Package**



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

## Block and Schematic Diagrams

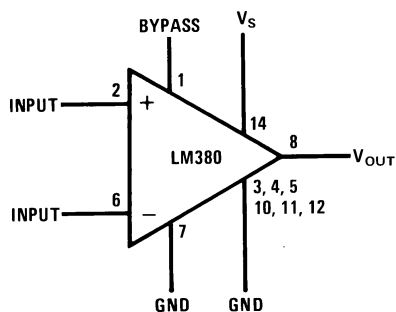


Figure 3. 14-Pin PDIP

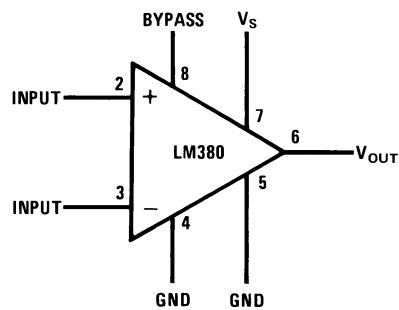


Figure 4. 8-Pin PDIP

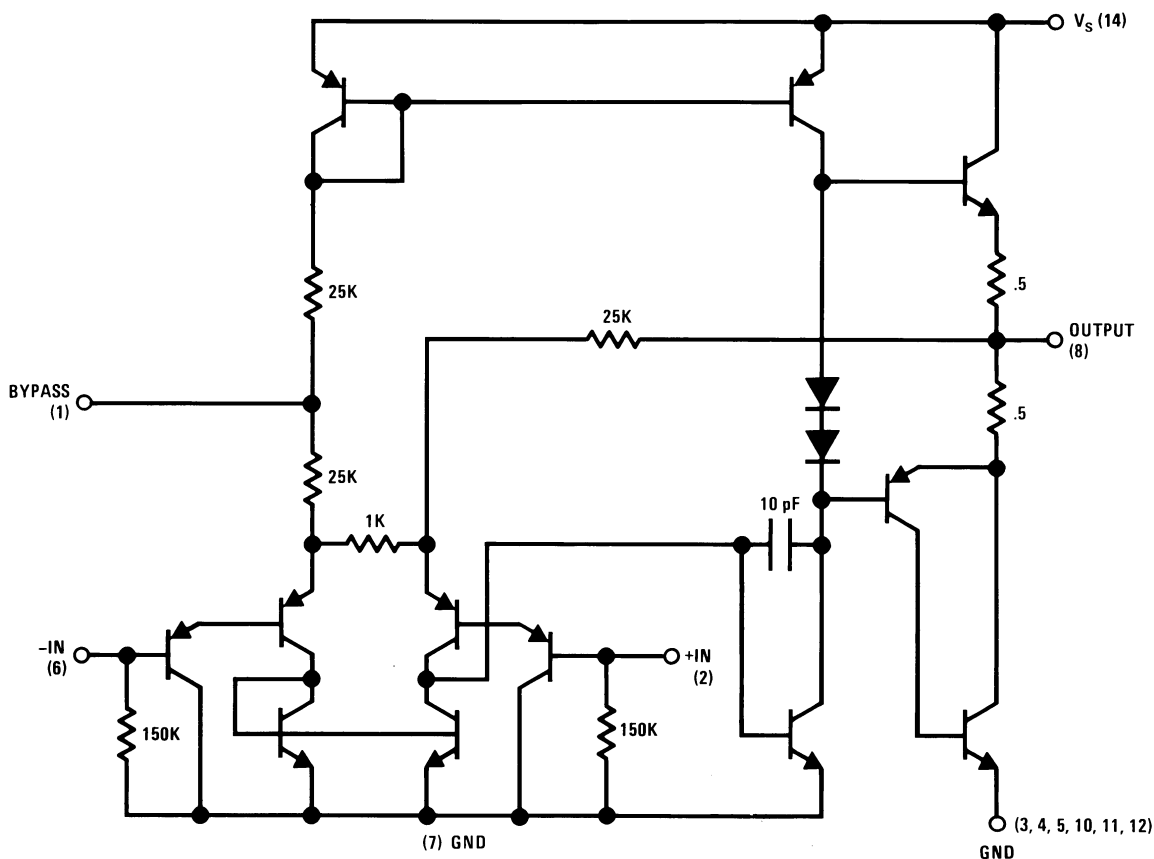


Figure 5.



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## Absolute Maximum Ratings<sup>(1)(2)</sup>

Supply Voltage		22V
Peak Current		1.3A
Package Dissipation	14-Pin PDIP <sup>(3)</sup>	8.3W
	8-Pin PDIP <sup>(3)</sup>	1.67W
Input Voltage		±0.5V
Storage Temperature		–65°C to +150°C
Operating Temperature		0°C to +70°C
Junction Temperature		+150°C
Lead Temperature (Soldering, 10 sec.)		+260°C
ESD rating to be determined		
Thermal Resistance	$\theta_{JC}$ (14-Pin PDIP)	30°C/W
	$\theta_{JC}$ (8-Pin PDIP)	37°C/W
	$\theta_{JA}$ (14-Pin PDIP)	79°C/W
	$\theta_{JA}$ (8-Pin PDIP)	107°C/W

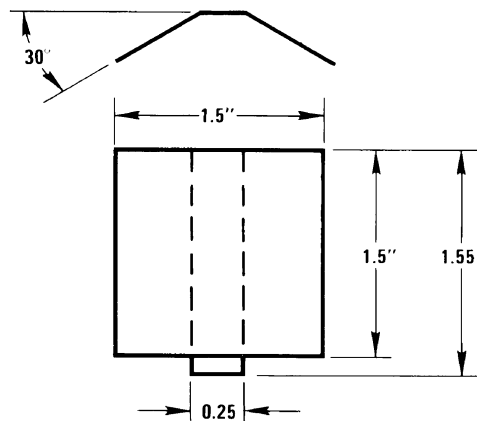
- (1) "Absolute Maximum Ratings" indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not ensure specific performance limits.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.
- (3) The package is to be derated at 15°C/W junction to heat sink pins for 14-pin pkg; 75°C/W for 8-pin.

## Electrical Characteristics<sup>(1)</sup>

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$P_{OUT(RMS)}$	Output Power	$R_L = 8\Omega$ , THD = 3% <sup>(2)(3)</sup>	2.5			W
$A_V$	Gain		40	50	60	V/V
$V_{OUT}$	Output Voltage Swing	$R_L = 8\Omega$		14		$V_{p-p}$
$Z_{IN}$	Input Resistance			150k		$\Omega$
THD	Total Harmonic Distortion	See <sup>(3)(4)</sup>		0.2		%
PSRR	Power Supply Rejection Ratio	See <sup>(5)</sup>		38		dB
$V_S$	Supply Voltage		10		22	V
BW	Bandwidth	$P_{OUT} = 2W$ , $R_L = 8\Omega$		100k		Hz
$I_Q$	Quiescent Supply Current			7	25	mA
$V_{OUTQ}$	Quiescent Output Voltage		8	9.0	10	V
$I_{BIAS}$	Bias Current	Inputs Floating		100		nA
$I_{SC}$	Short Circuit Current			1.3		A

- (1)  $V_S = 18V$  and  $T_A = 25^\circ C$  unless otherwise specified.
- (2) With device Pins 3, 4, 5, 10, 11, 12 soldered into a 1/16" epoxy glass board with 2 ounce copper foil with a minimum surface of 6 square inches.
- (3)  $C_{BYPASS} = 0.47 \mu fd$  on Pin 1.
- (4) The maximum junction temperature of the LM380 is 150°C.
- (5) Rejection ratio referred to the output with  $C_{BYPASS} = 5 \mu F$ .

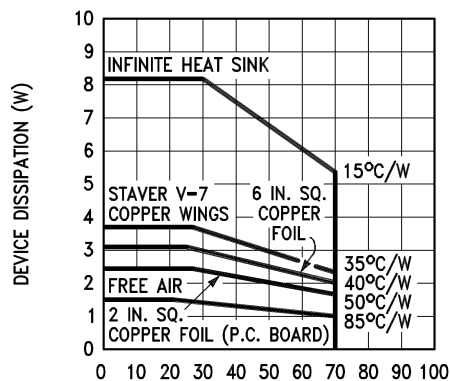
## Heat Sink Dimensions



Staver Heat Sink #V-7  
Staver Company  
41 Saxon Ave.  
P.O. Drawer H  
Bayshore, NY 11706  
Tel: (516) 666-8000  
Copper Wings  
2 Required  
Soldered to  
Pins 3, 4, 5,  
10, 11, 12  
Thickness 0.04  
Inches

## Typical Performance Characteristics

Maximum Device Dissipation vs Ambient Temperature



$T_A$  – AMBIENT TEMPERATURE ( $^{\circ}\text{C}$ )  
Note: 2 oz. copper foil, single-sided PC board.

Figure 6.

Device Dissipation vs Output Power—4 $\Omega$  Load

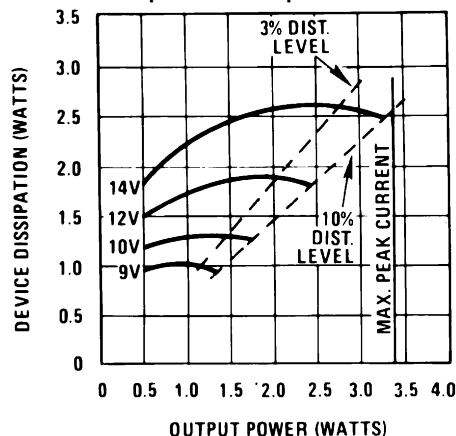


Figure 7.

Device Dissipation vs Output Power—8 $\Omega$  Load

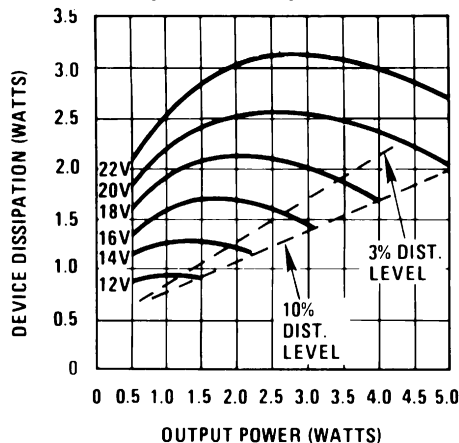


Figure 8.

Device Dissipation vs Output Power—16 $\Omega$  Load

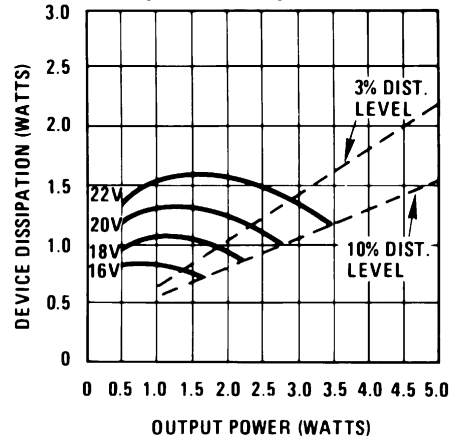


Figure 9.

Power Supply Current vs Supply Voltage

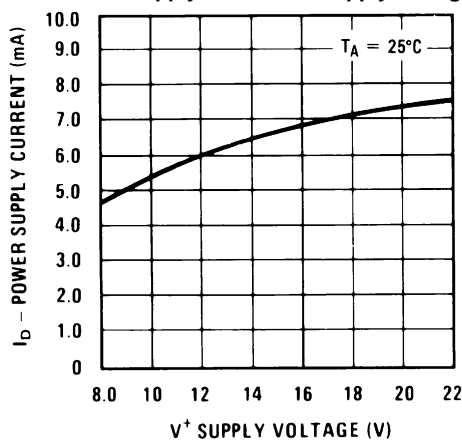


Figure 10.

Total Harmonic Distortion vs Frequency

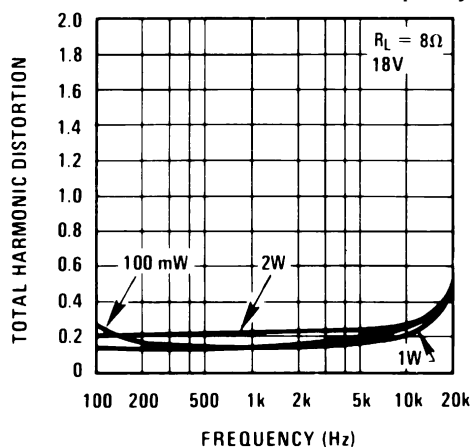


Figure 11.

### Typical Performance Characteristics (continued)

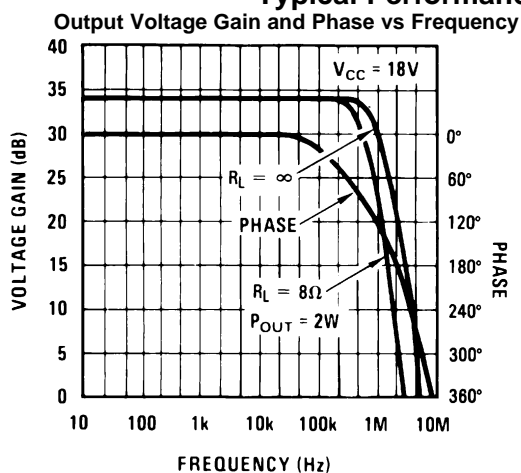


Figure 12.

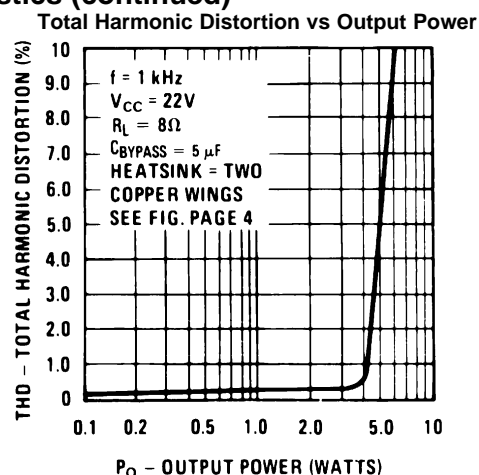


Figure 13.

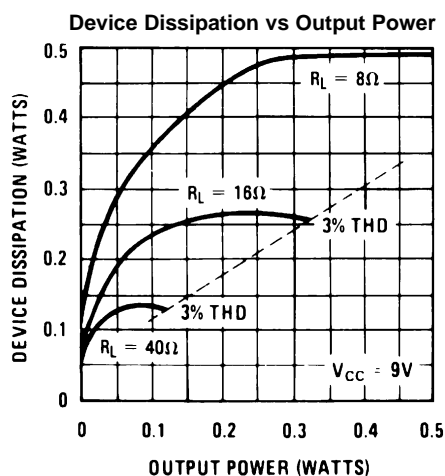


Figure 14.

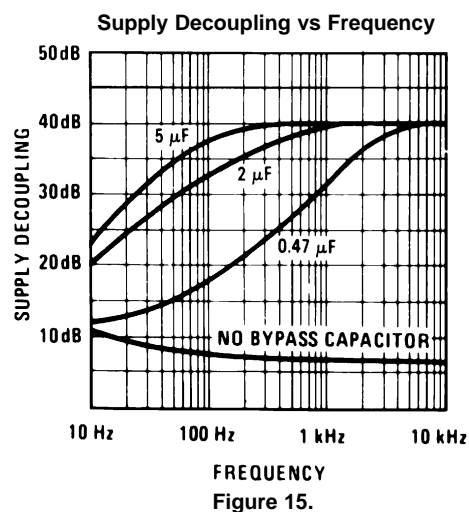


Figure 15.

## Typical Applications

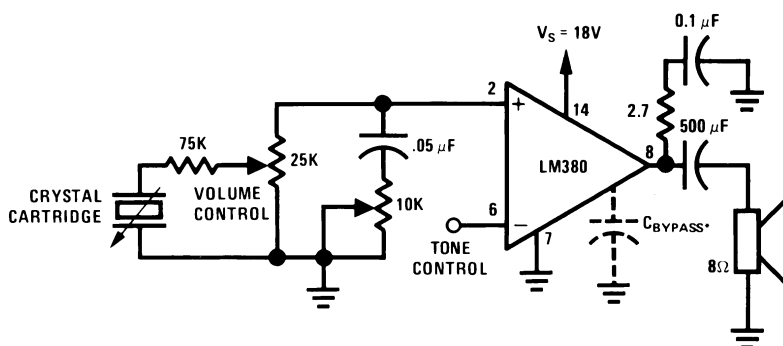


Figure 16. Phono Amplifier

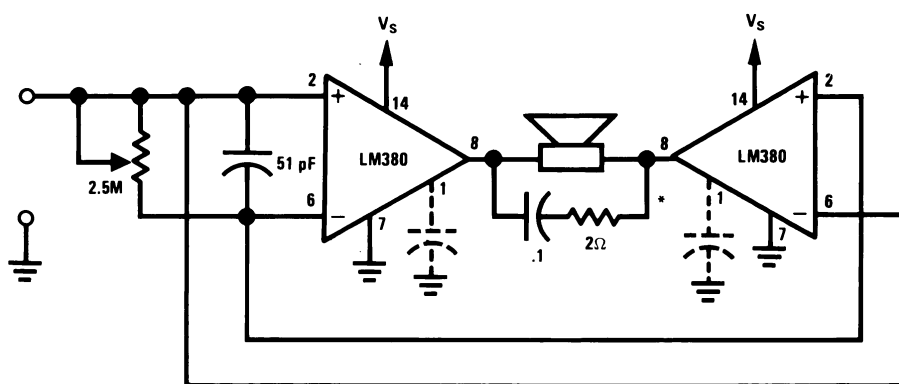


Figure 17. Bridge Amplifier

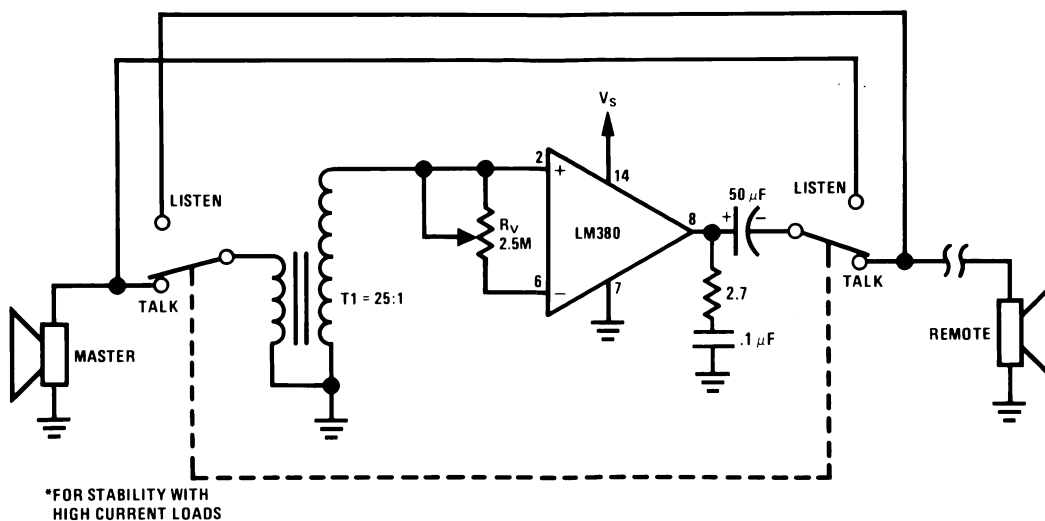


Figure 18. Intercom

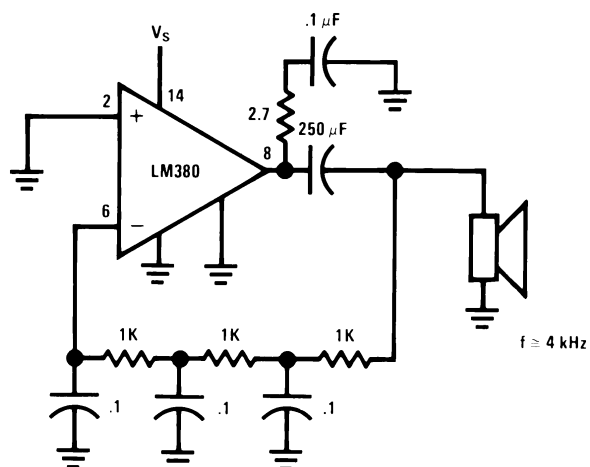


Figure 19. Phase Shift Oscillator



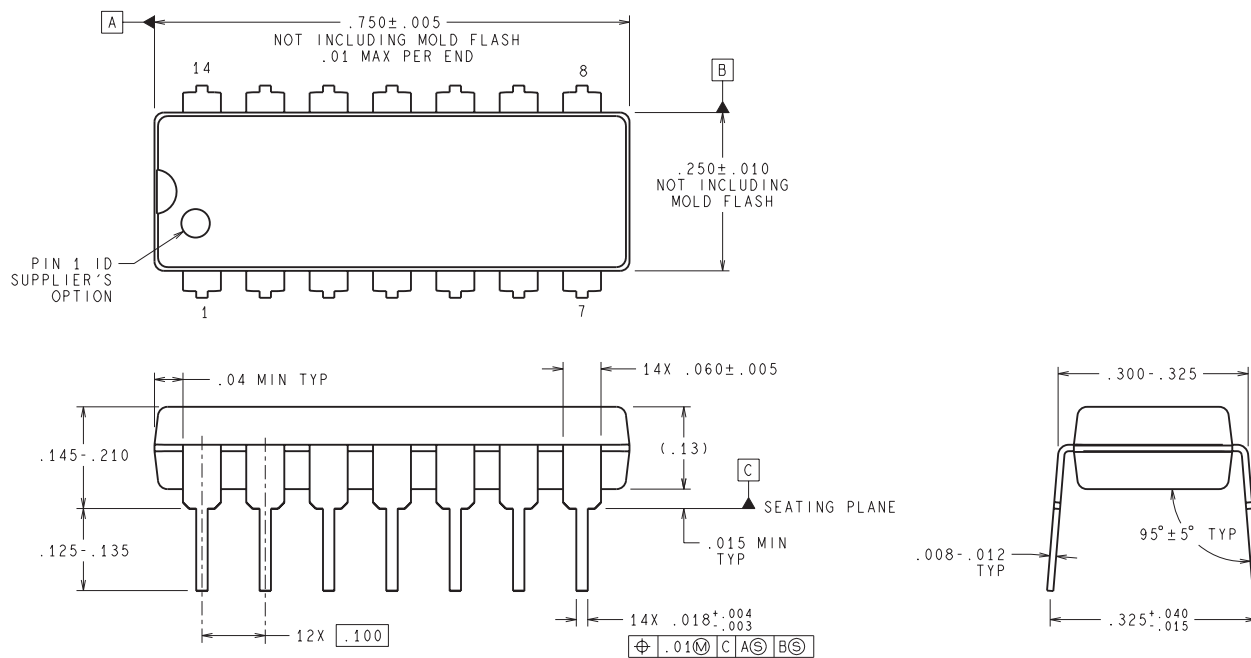
P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Falls within JEDEC MS-001 variation BA.

NFF0014A



**DIMENSIONS ARE IN INCHES**  
 DIMENSIONS IN ( ) FOR REFERENCE ONLY

N14A (Rev G)