

## 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.

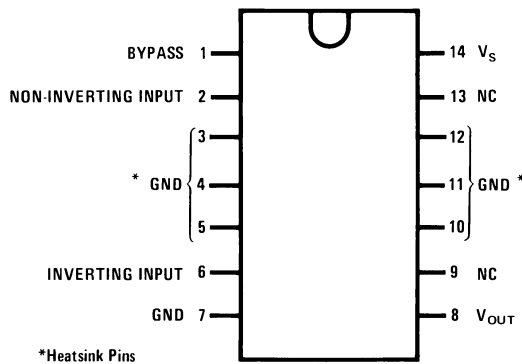
The output is short circuit proof with internal thermal limiting. The package outline is standard dual-in-line. The LM380N uses a copper lead frame. The center three pins on either side comprise a heat sink. This makes the device easy to use in standard PC layouts.

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.

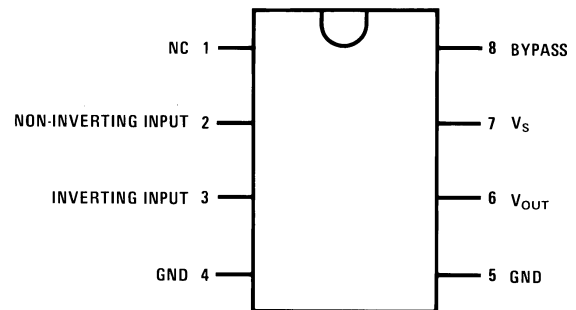
A selected part for more power on higher supply voltages is available as the LM384. For more information see [SNAA086](#).

### 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

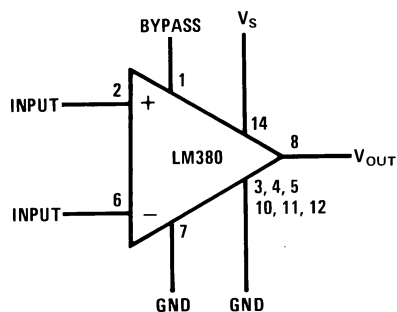


Figure 3. 14-Pin PDIP

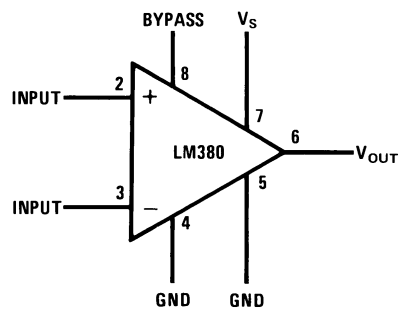


Figure 4. 8-Pin PDIP

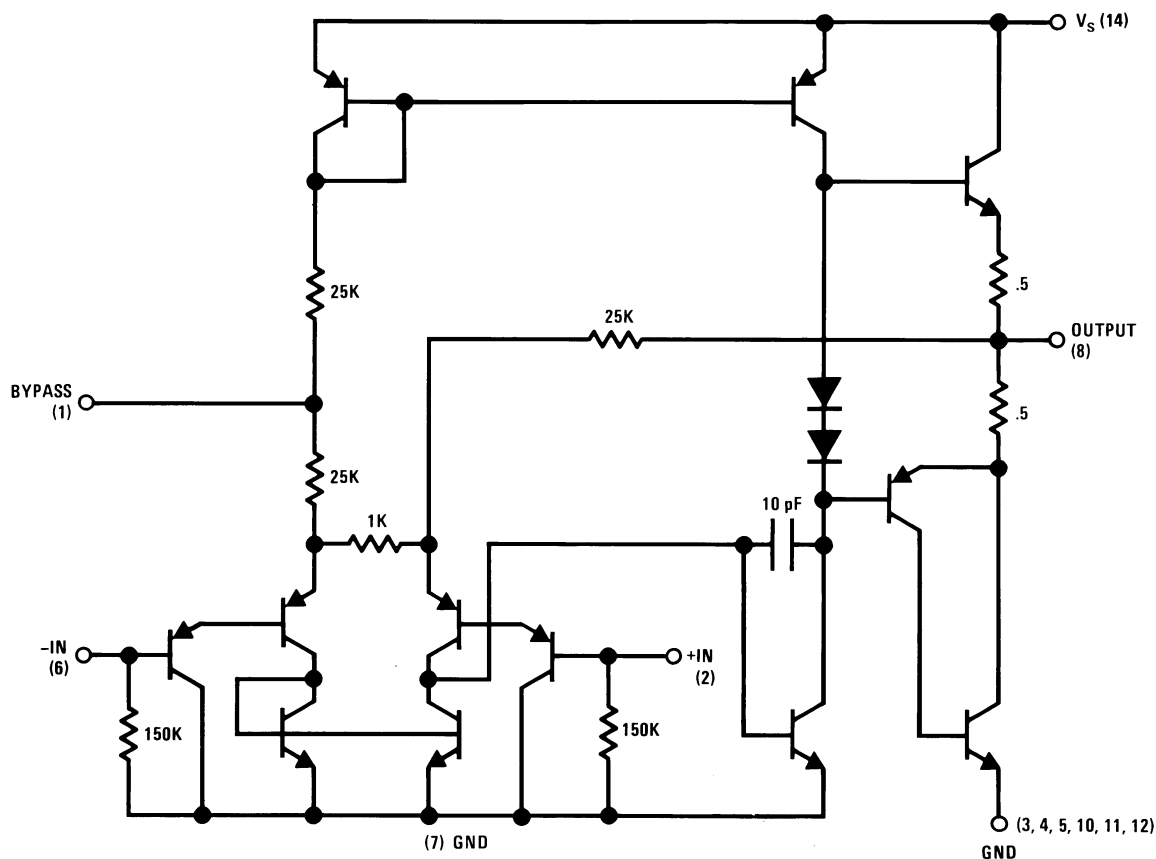


Figure 5.



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         |

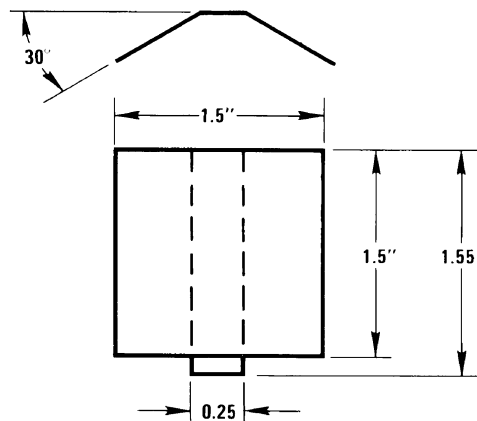
- "Absolute Maximum Ratings" indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not ensure specific performance limits.
- If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.
- 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         |

- $V_S = 18V$  and  $T_A = 25^\circ C$  unless otherwise specified.
- 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.
- $C_{BYPASS} = 0.47 \mu fd$  on Pin 1.
- The maximum junction temperature of the LM380 is 150°C.
- Rejection ratio referred to the output with  $C_{BYPASS} = 5 \mu F$ .

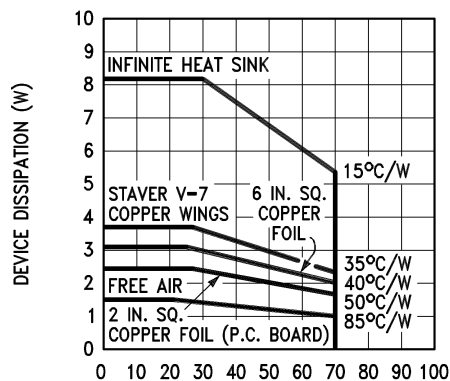
## Heat Sink Dimensions



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

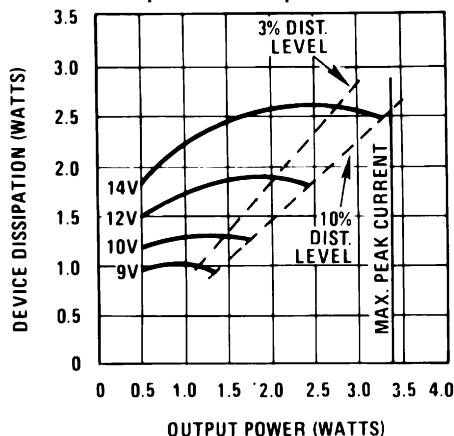


Figure 7.

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

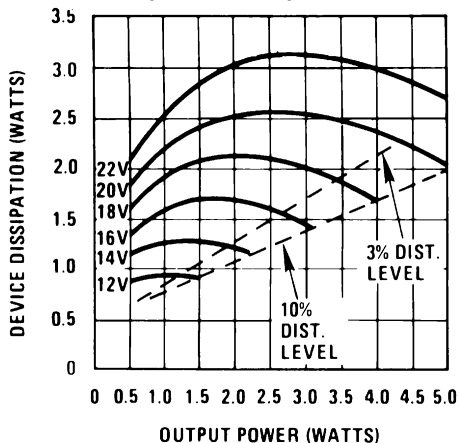


Figure 8.

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

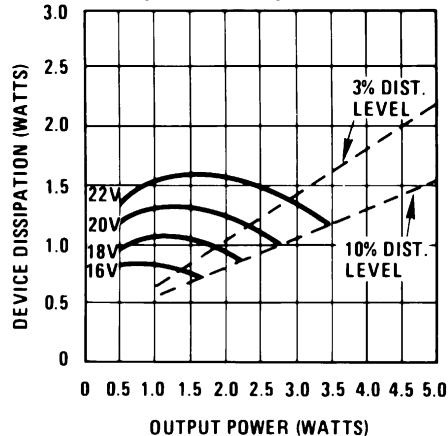


Figure 9.

Power Supply Current vs Supply Voltage

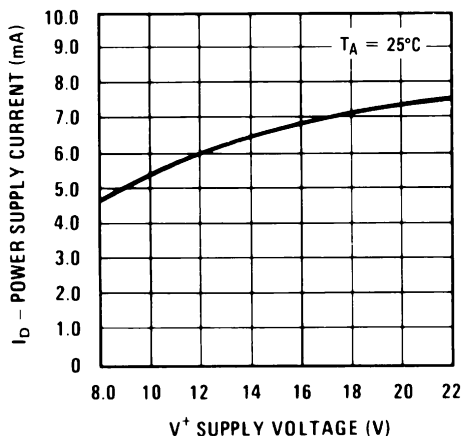


Figure 10.

Total Harmonic Distortion vs Frequency

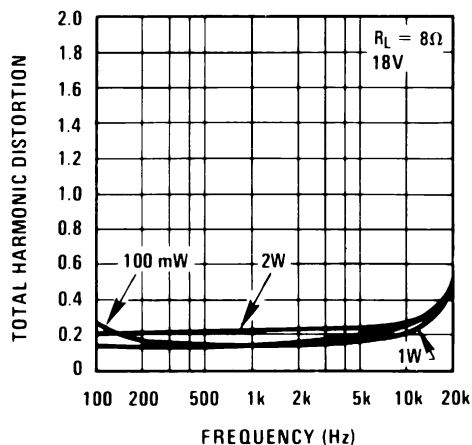


Figure 11.

### Typical Performance Characteristics (continued)

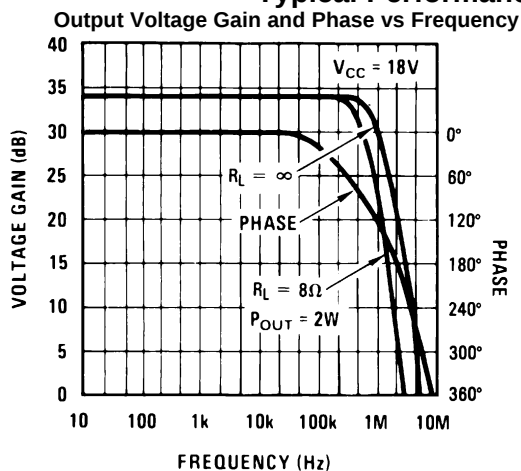


Figure 12.

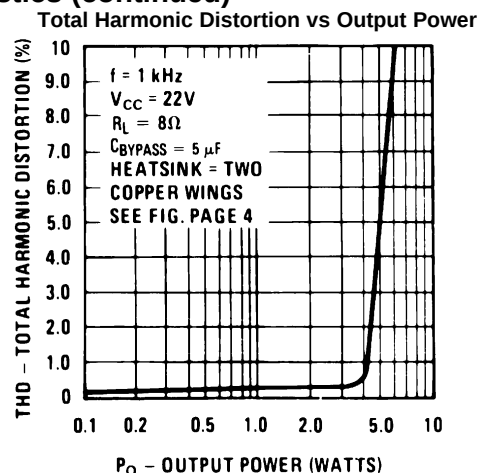


Figure 13.

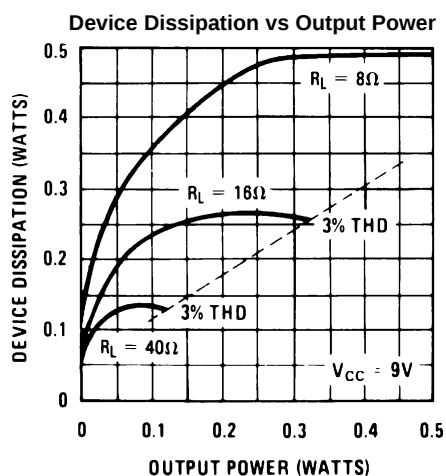


Figure 14.

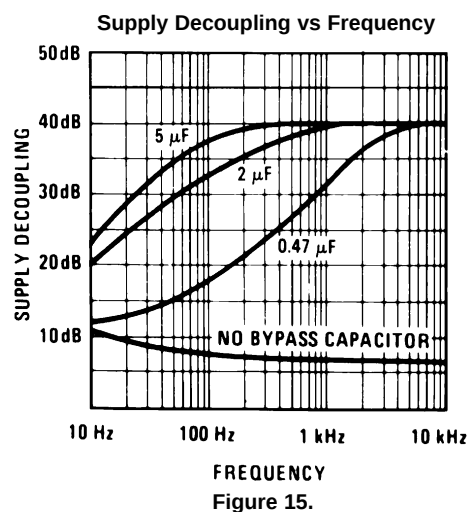


Figure 15.

## Typical Applications

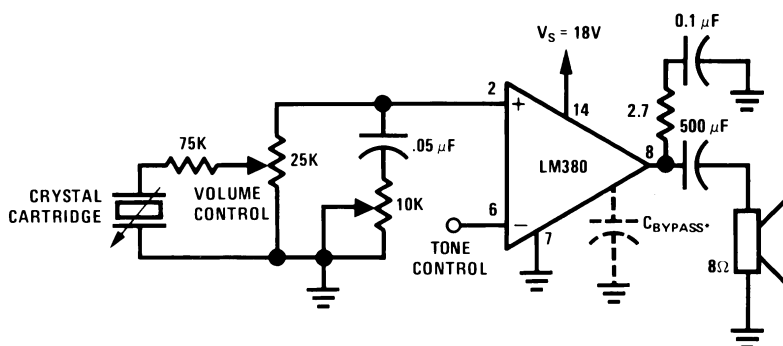


Figure 16. Phono Amplifier

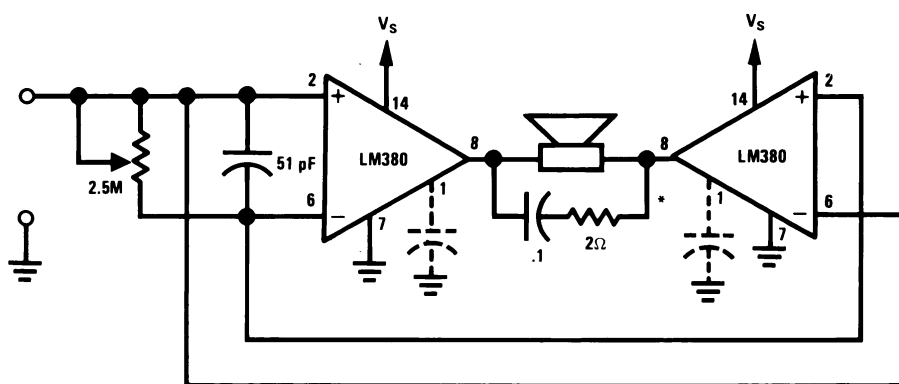


Figure 17. Bridge Amplifier

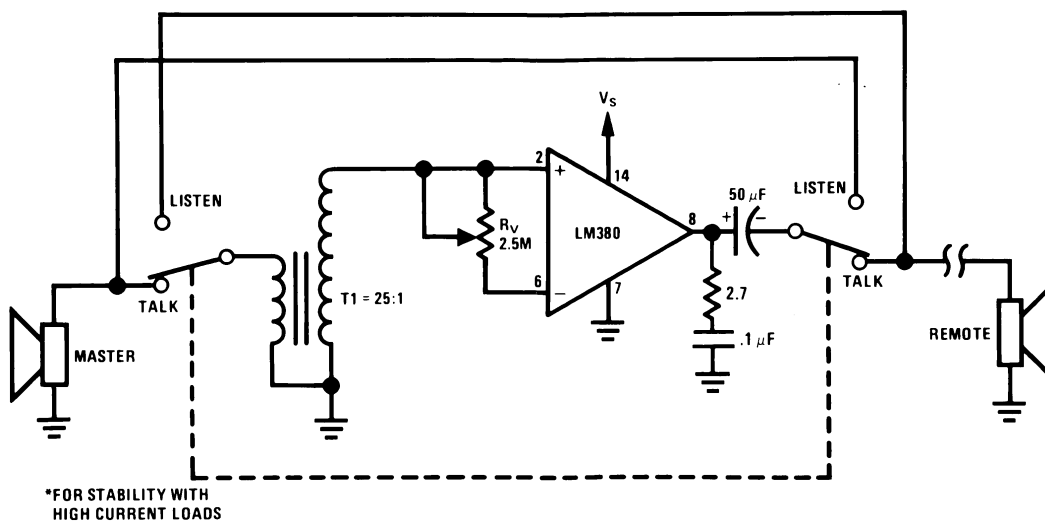


Figure 18. Intercom

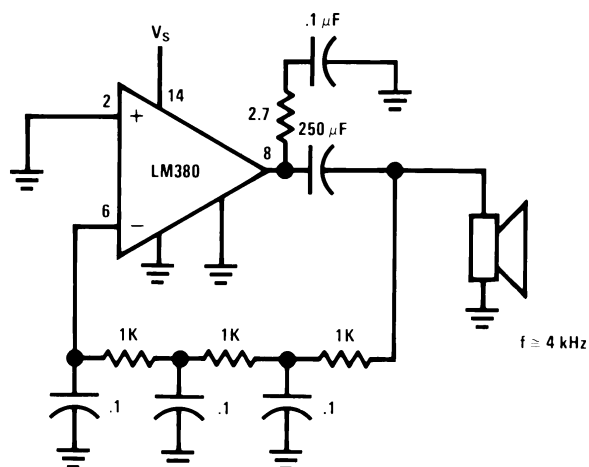


Figure 19. Phase Shift Oscillator

## REVISION HISTORY

| Changes from Revision B (April 2013) to Revision C         | Page              |
|------------------------------------------------------------|-------------------|
| • Changed layout of National Data Sheet to TI format ..... | <a href="#">8</a> |

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| LM380N-8/NOPB    | ACTIVE        | PDIP         | P                  | 8    | 40             | Green (RoHS<br>& no Sb/Br) | Call TI   SN            | Level-1-NA-UNLIM     | 0 to 70      | LM<br>380N-8            | <a href="#">Samples</a> |
| LM380N/NOPB      | ACTIVE        | PDIP         | NFF                | 14   | 25             | Green (RoHS<br>& no Sb/Br) | SN                      | Level-1-NA-UNLIM     | 0 to 70      | LM380N                  | <a href="#">Samples</a> |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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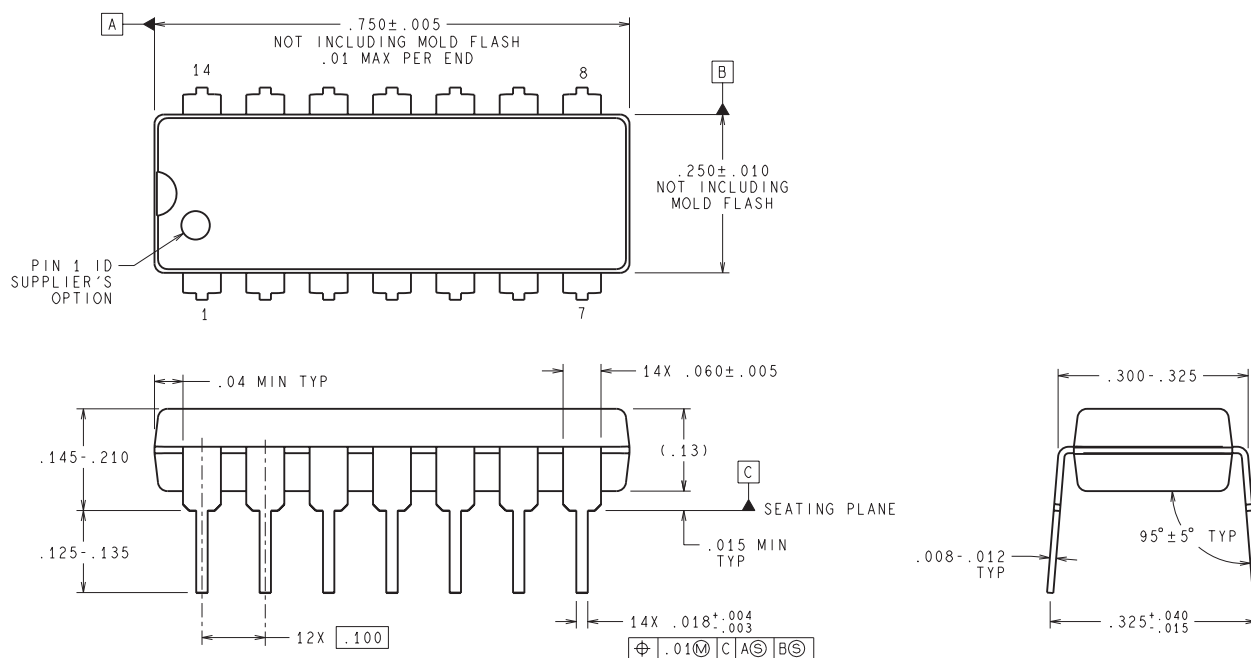
P (R-PDIP-T8)

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)

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