

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 Ω
- 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.

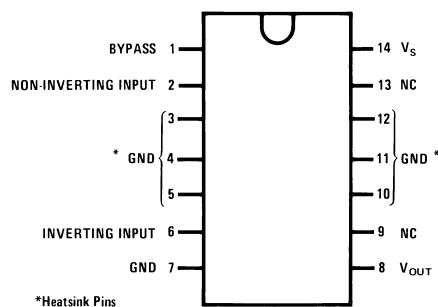
The output is short circuit proof with internal thermal limiting. The package outline is standard dual-in-line. The LM380N uses a copper lead frame. The center three pins on either side comprise a heat sink. This makes the device easy to use in standard PC layouts.

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 AN-69.

Connection Diagrams

(Dual-In-Line Packages, Top View)

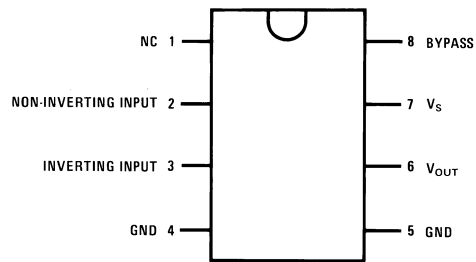


**Figure 1. Order Number LM380N
See NS Package Number N14A**



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**Figure 2. Order Number LM380N-8
See NS Package Number N08E**

Block and Schematic Diagrams

Figure 3. LM380N

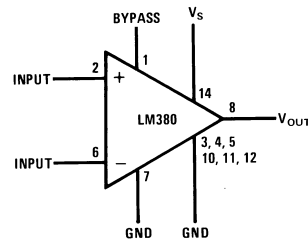
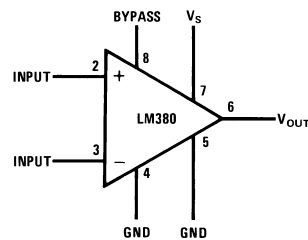
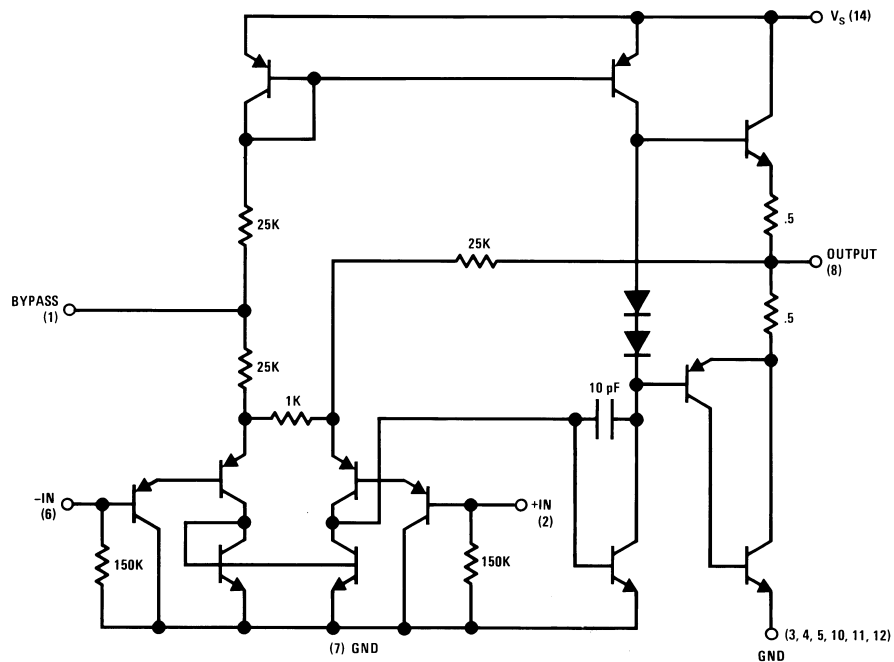


Figure 4. LM380N-8





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 ⁽¹⁾

Supply Voltage	22V
Peak Current	1.3A
Package Dissipation 14-Pin DIP ⁽²⁾	8.3W
Package Dissipation 8-Pin DIP ⁽²⁾	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	
θ_{JC} (14-Pin DIP)	30°C/W
θ_{JC} (8-Pin DIP)	37°C/W
θ_{JA} (14-Pin DIP)	79°C/W
θ_{JA} (8-Pin DIP)	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 guarantee specific performance limits.
- (2) 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 ⁽¹⁾

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$P_{OUT(RMS)}$	Output Power	$R_L = 8\Omega$, THD = 3% ⁽²⁾ ⁽³⁾	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		Ω
THD	Total Harmonic Distortion	⁽³⁾ ⁽⁴⁾		0.2		%
PSRR	Power Supply Rejection Ratio	⁽⁵⁾		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.

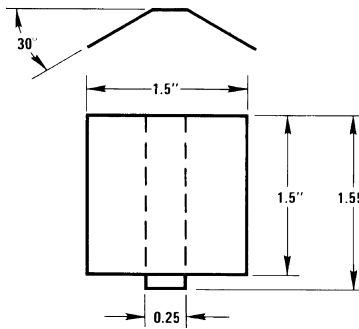
(2) With device Pins 3, 4, 5, 10, 11, 12 soldered into a 1/16" epoxy glass board with 2 ounce copper foil with a minimum surface of 6 square inches.

(3) $C_{BYPASS} = 0.47 \mu fd$ on Pin 1.

(4) The maximum junction temperature of the LM380 is $150^\circ C$.

(5) Rejection ratio referred to the output with $C_{BYPASS} = 5 \mu F$.

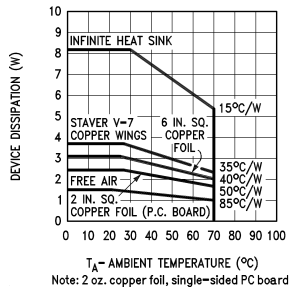
Heat Sink Dimensions



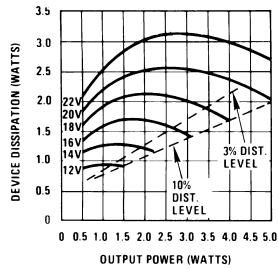
Staver Heat Sink #V-7
 Staver Company
 41 Saxon Ave.
 P.O. Drawer H
 Bayshore, NY 11706
 Tel: (516) 666-8000
 Copper Wings
 2 Required
 Soldered to
 Pins 3, 4, 5,
 10, 11, 12
 Thickness 0.04
 Inches

Typical Performance Characteristics

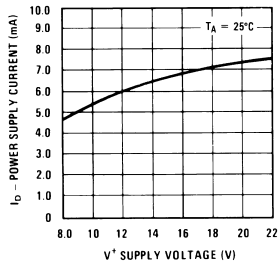
Maximum Device Dissipation vs Ambient Temperature



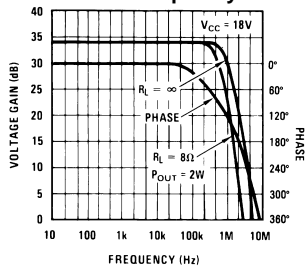
Device Dissipation vs Output Power—8 Ω Load



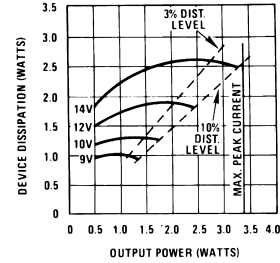
Power Supply Current vs Supply Voltage



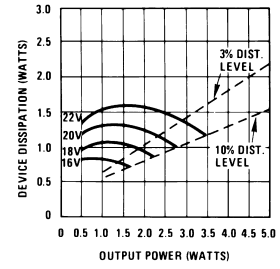
Output Voltage Gain and Phase vs Frequency



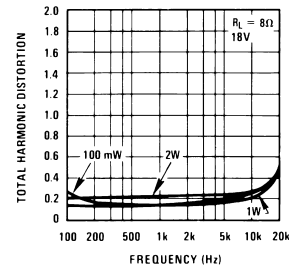
Device Dissipation vs Output Power—4 Ω Load



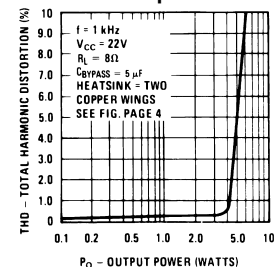
Device Dissipation vs Output Power—16 Ω Load



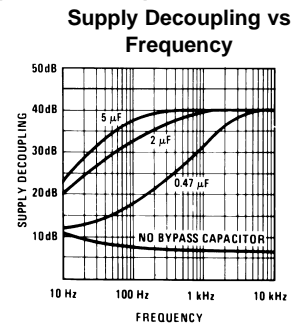
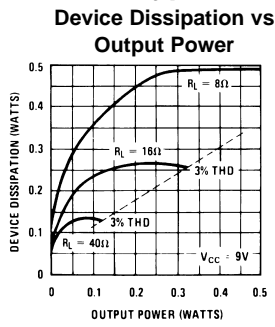
Total Harmonic Distortion vs Frequency



Total Harmonic Distortion vs Output Power



Typical Performance Characteristics (continued)



Typical Applications

Figure 5. Phono Amplifier

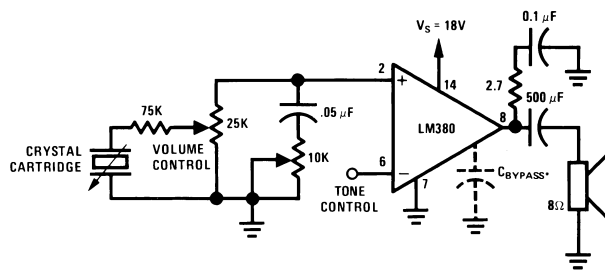


Figure 6. Bridge Amplifier

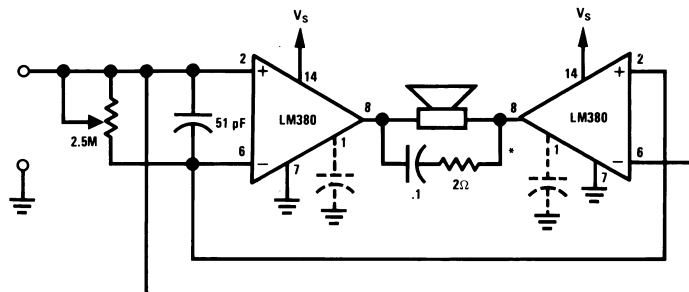
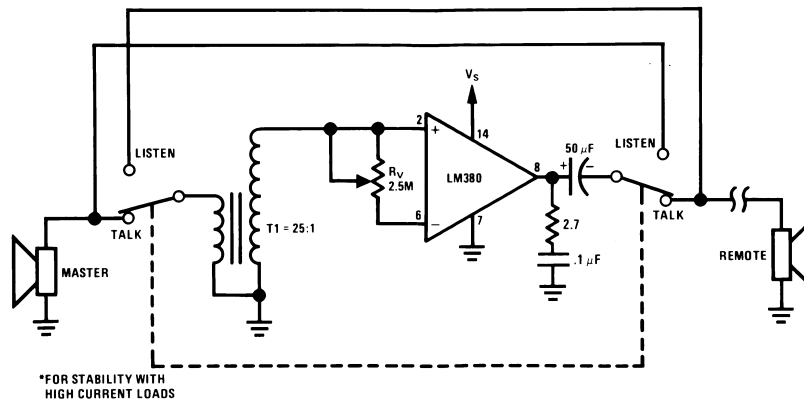
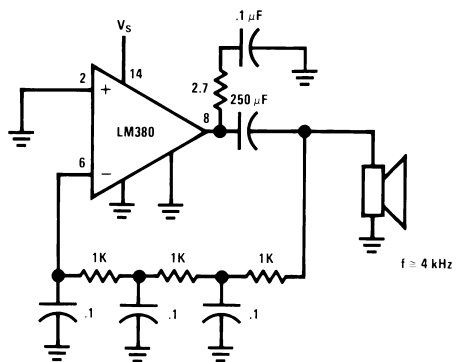


Figure 7. Intercom



*FOR STABILITY WITH HIGH CURRENT LOADS

Figure 8. Phase Shift Oscillator



PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
LM380N	ACTIVE	PDIP	NFF	14	25	TBD	SNPB	Level-1-NA-UNLIM	0 to 70	LM380N	Samples
LM380N-8/NOPB	ACTIVE	PDIP	P	8	40	Green (RoHS & no Sb/Br)	SN	Level-1-NA-UNLIM	0 to 70	LM380N-8	Samples
LM380N/NOPB	ACTIVE	PDIP	NFF	14	25	Pb-Free (RoHS Exempt)	SN	Level-1-NA-UNLIM	0 to 70	LM380N	Samples

(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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

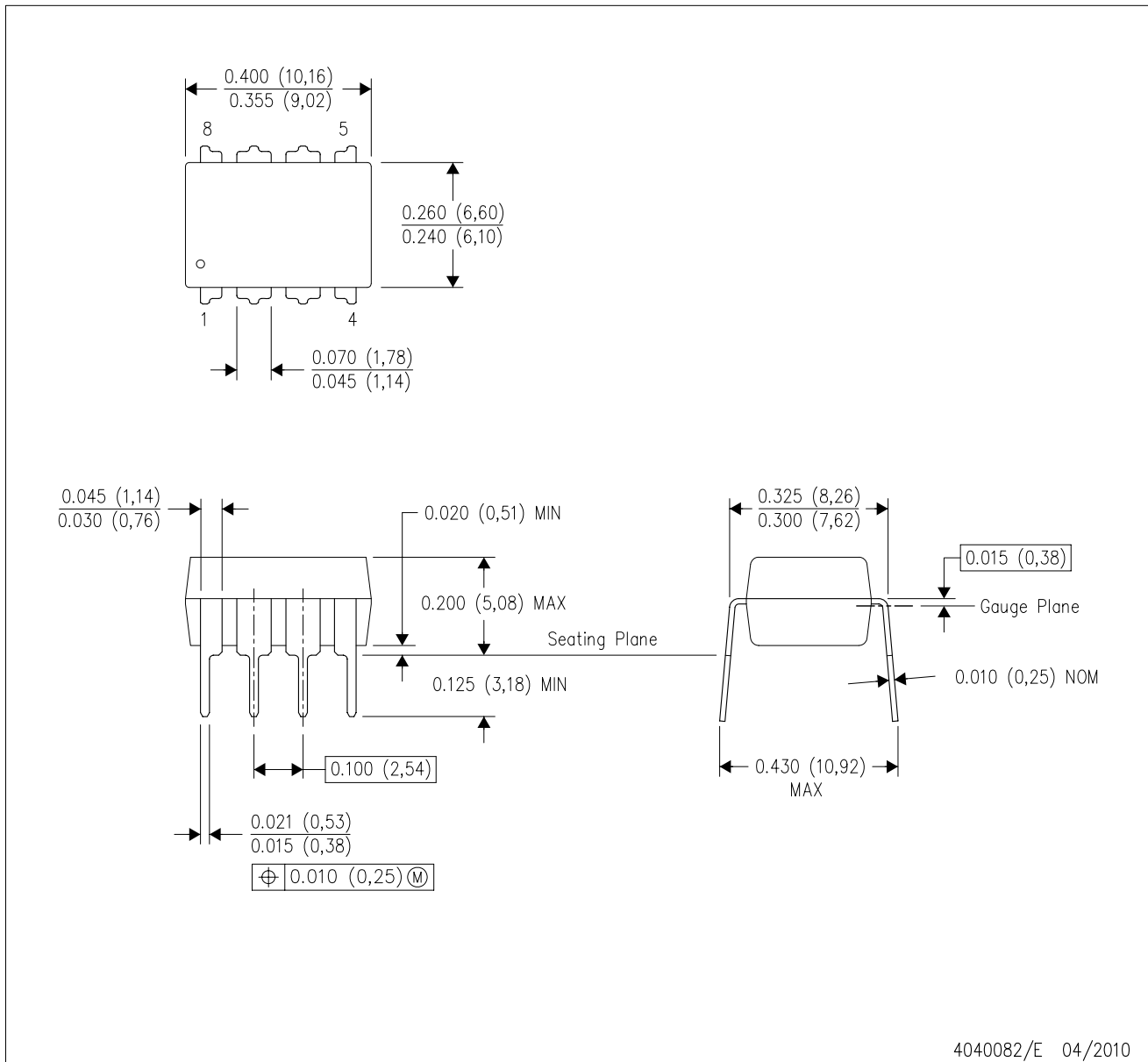
(4) Only one of markings shown within the brackets will appear on the physical device.

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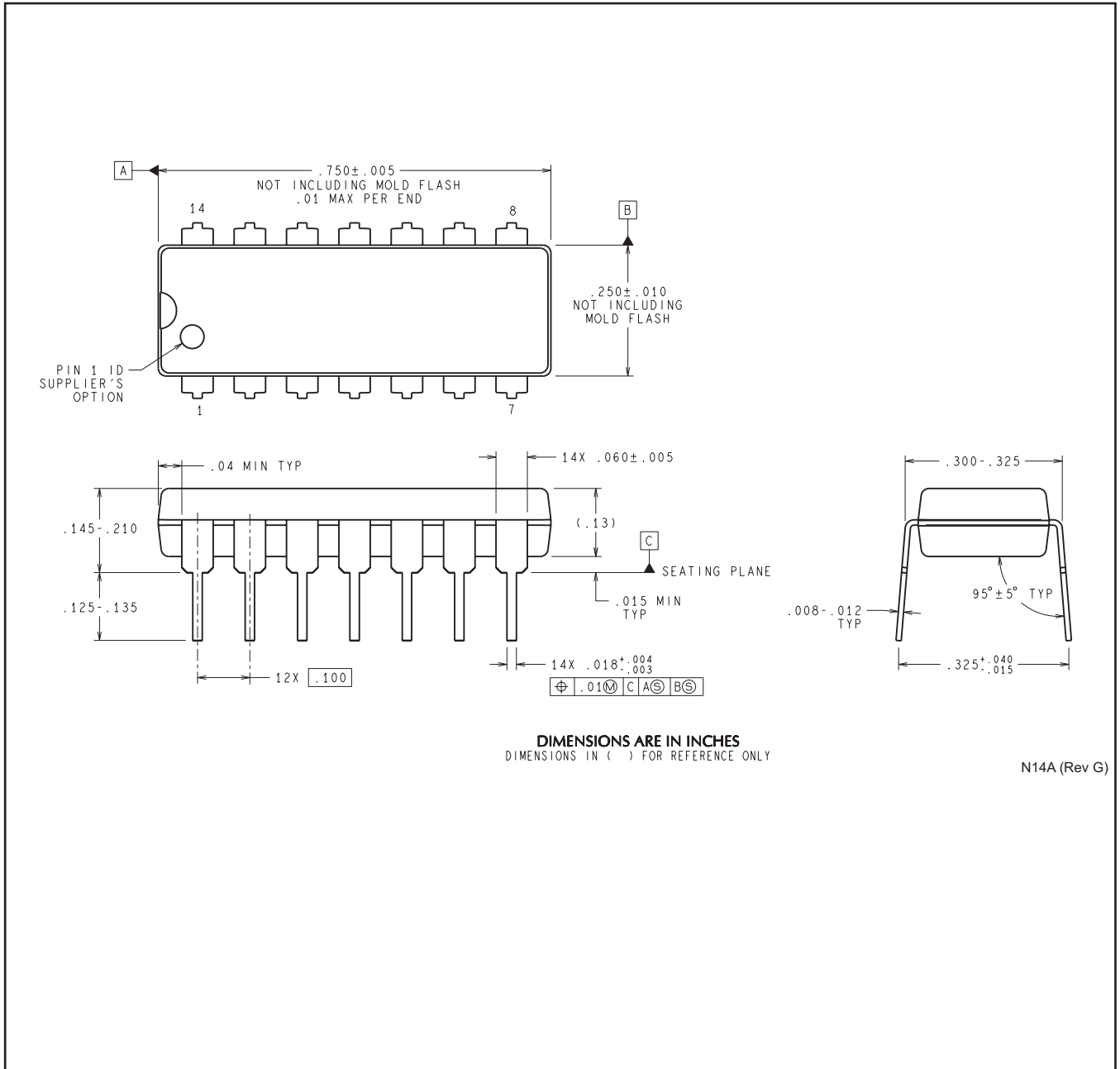
P (R-PDIP-T8)

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



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