

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 [SNAA086](#).

Connection Diagrams

(Dual-In-Line Packages, Top View)

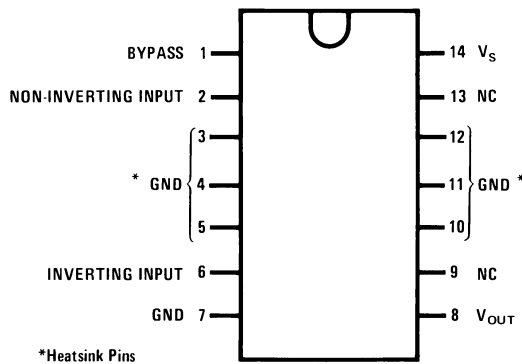


Figure 1. 14-Pin PDIP
See NFF0014A Package

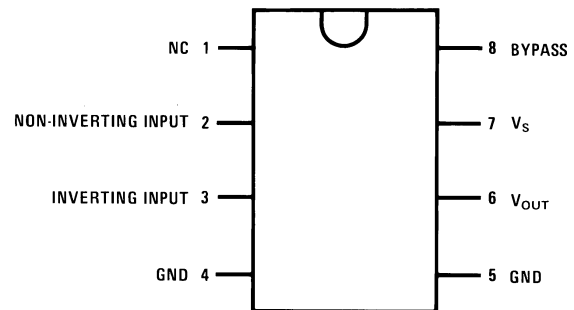


Figure 2. 8-Pin PDIP
See P Package



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Block and Schematic Diagrams

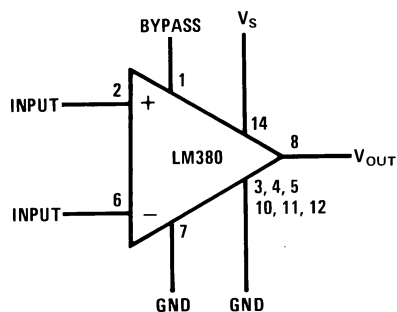


Figure 3. 14-Pin PDIP

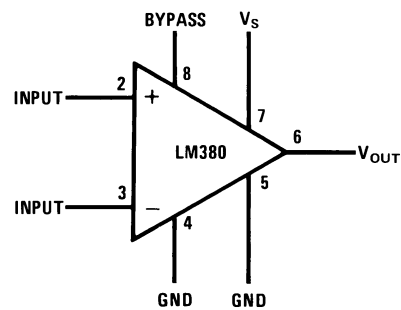


Figure 4. 8-Pin PDIP

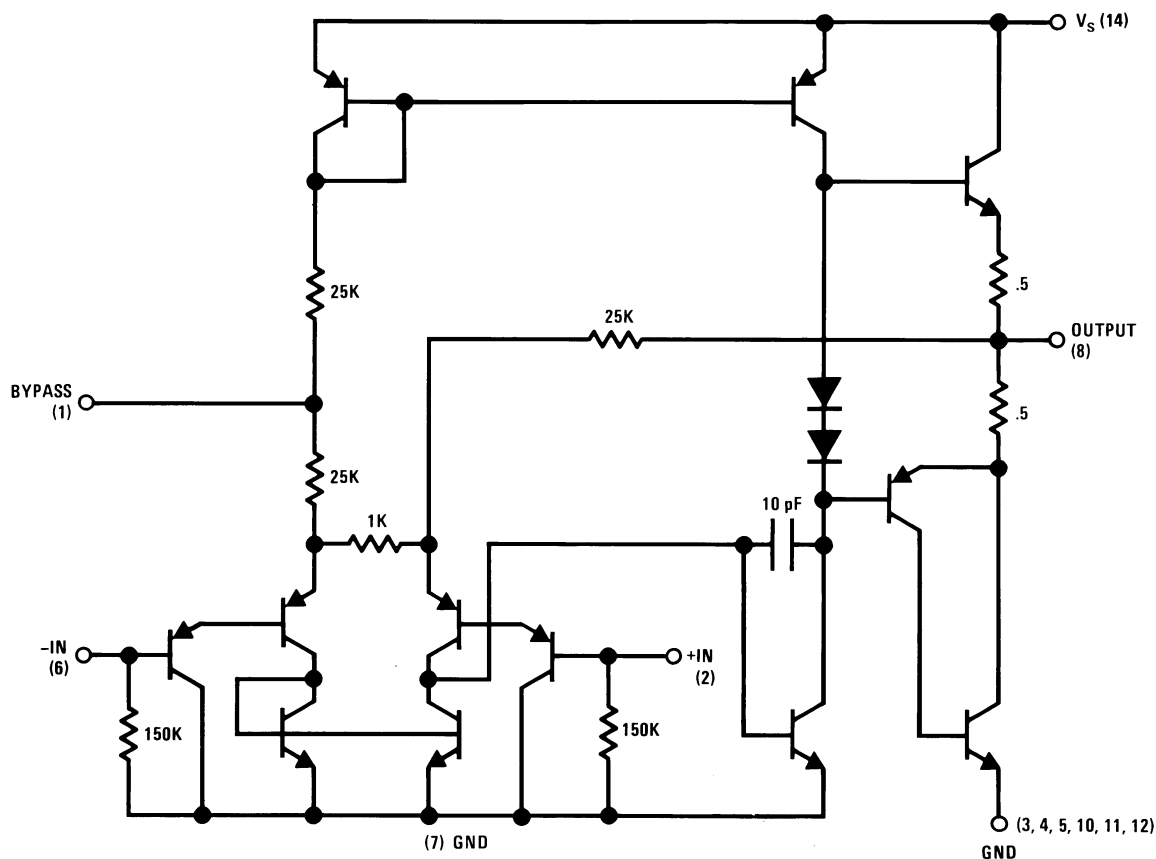


Figure 5.



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⁽¹⁾⁽²⁾

Supply Voltage		22V
Peak Current		1.3A
Package Dissipation	14-Pin PDIP ⁽³⁾	8.3W
	8-Pin PDIP ⁽³⁾	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 PDIP)	30°C/W
	θ_{JC} (8-Pin PDIP)	37°C/W
	θ_{JA} (14-Pin PDIP)	79°C/W
	θ_{JA} (8-Pin PDIP)	107°C/W

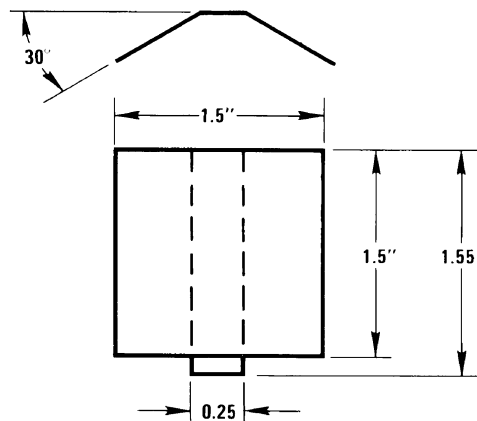
- (1) "Absolute Maximum Ratings" indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not ensure specific performance limits.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments 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⁽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	See ⁽³⁾⁽⁴⁾		0.2		%
PSRR	Power Supply Rejection Ratio	See ⁽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°C.
- (5) Rejection ratio referred to the output with $C_{BYPASS} = 5 \mu F$.

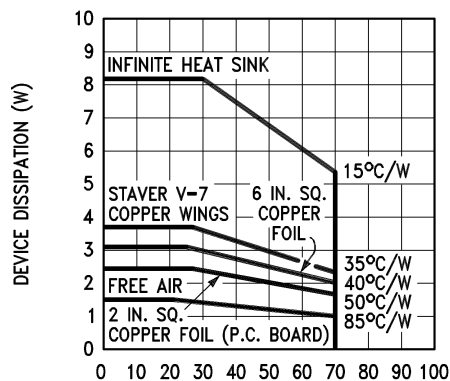
Heat Sink Dimensions



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 Ω Load

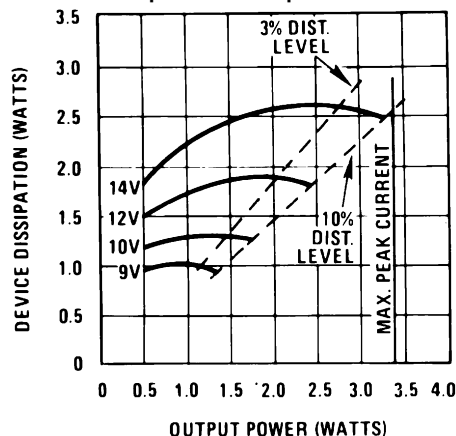


Figure 7.

Device Dissipation vs Output Power—8 Ω Load

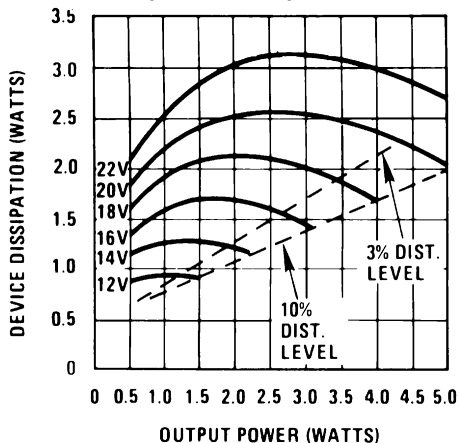


Figure 8.

Device Dissipation vs Output Power—16 Ω Load

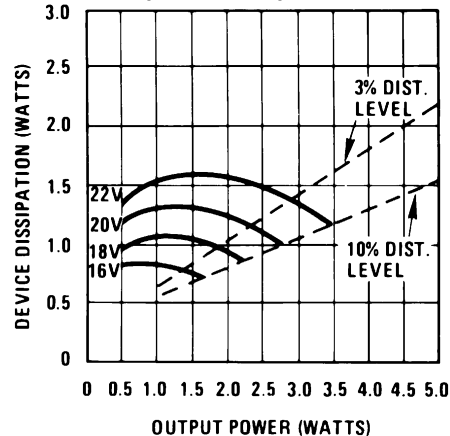


Figure 9.

Power Supply Current vs Supply Voltage

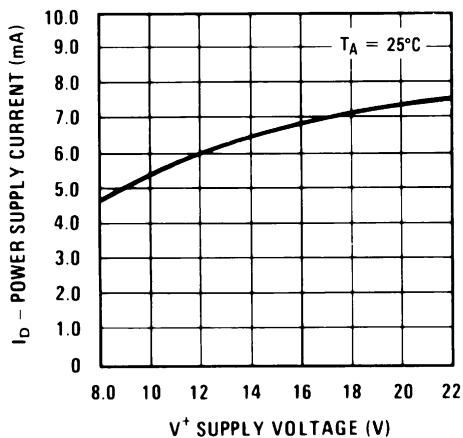


Figure 10.

Total Harmonic Distortion vs Frequency

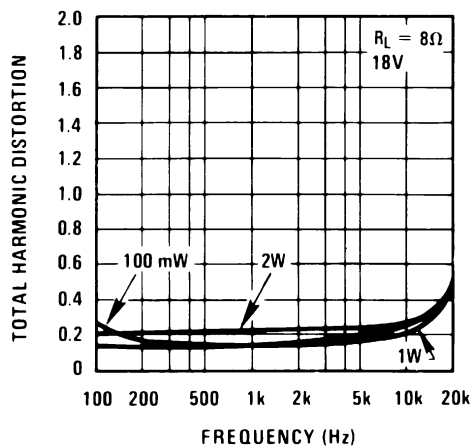


Figure 11.

Typical Performance Characteristics (continued)

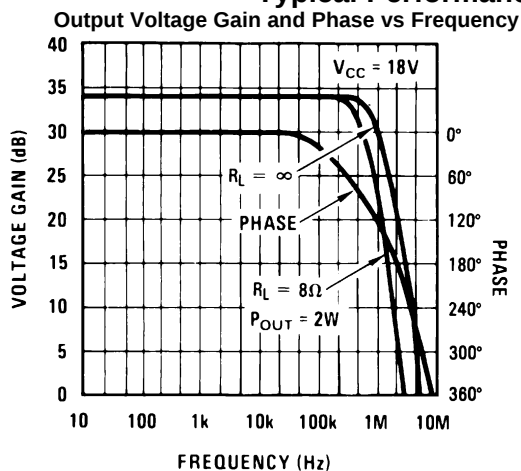


Figure 12.

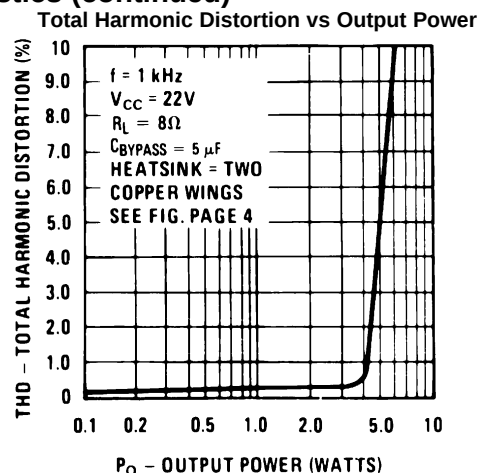


Figure 13.

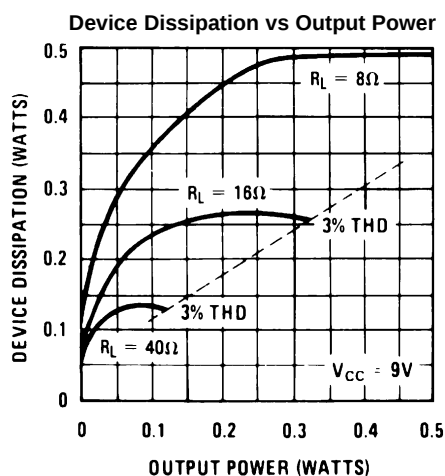


Figure 14.

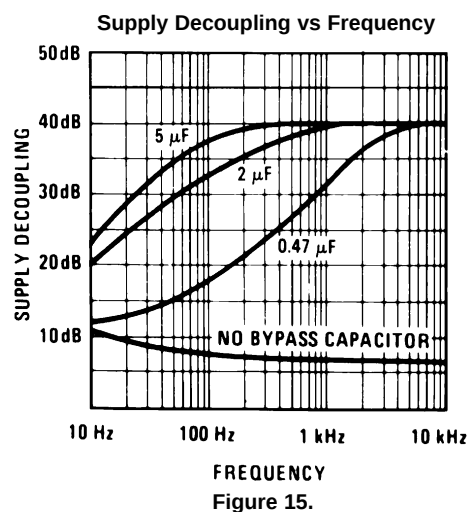


Figure 15.

Typical Applications

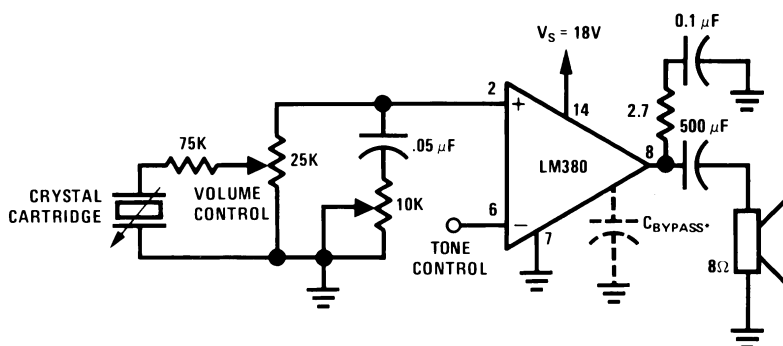


Figure 16. Phono Amplifier

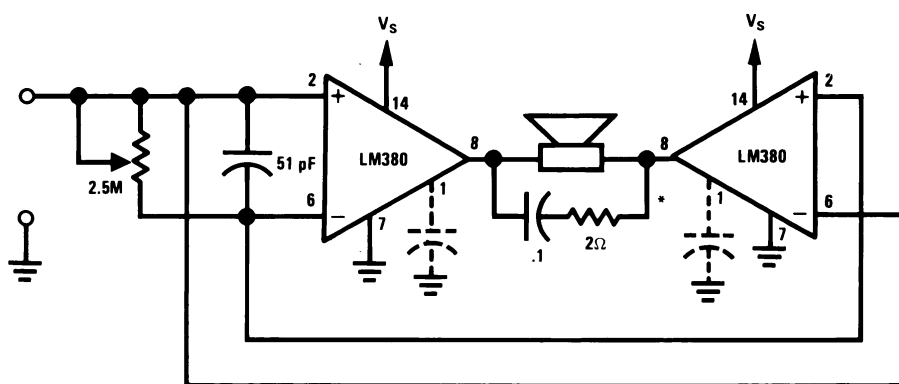
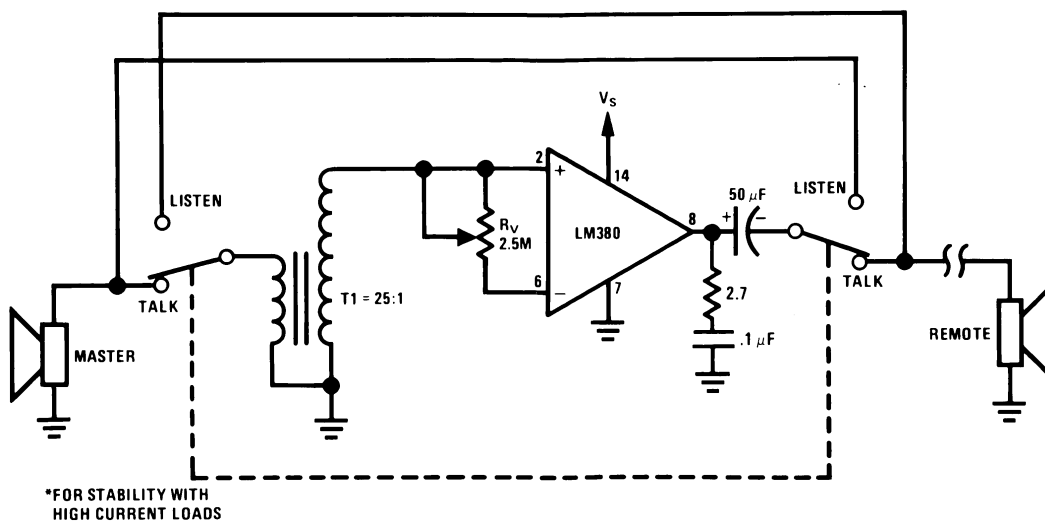


Figure 17. Bridge Amplifier



*FOR STABILITY WITH
HIGH CURRENT LOADS

Figure 18. Intercom

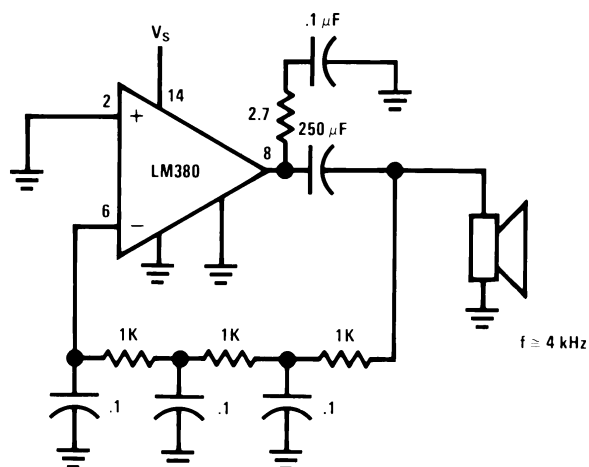


Figure 19. Phase Shift Oscillator

REVISION HISTORY

Changes from Revision B (April 2013) to Revision C

Page

- Changed layout of National Data Sheet to TI format [8](#)

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LM380N-8/NOPB	Active	Production	PDIP (P) 8	40 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM 380N-8
LM380N-8/NOPB.B	Active	Production	PDIP (P) 8	40 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM 380N-8
LM380N-8/NOPBG4	Active	Production	PDIP (P) 8	40 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM 380N-8
LM380N-8/NOPBG4.B	Active	Production	PDIP (P) 8	40 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM 380N-8
LM380N/NOPB	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM380N
LM380N/NOPB.B	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM380N
LM380N/NOPBG4	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM380N
LM380N/NOPBG4.B	Active	Production	PDIP (N) 14	25 TUBE	Yes	NIPDAU	Level-1-NA-UNLIM	0 to 70	LM380N

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

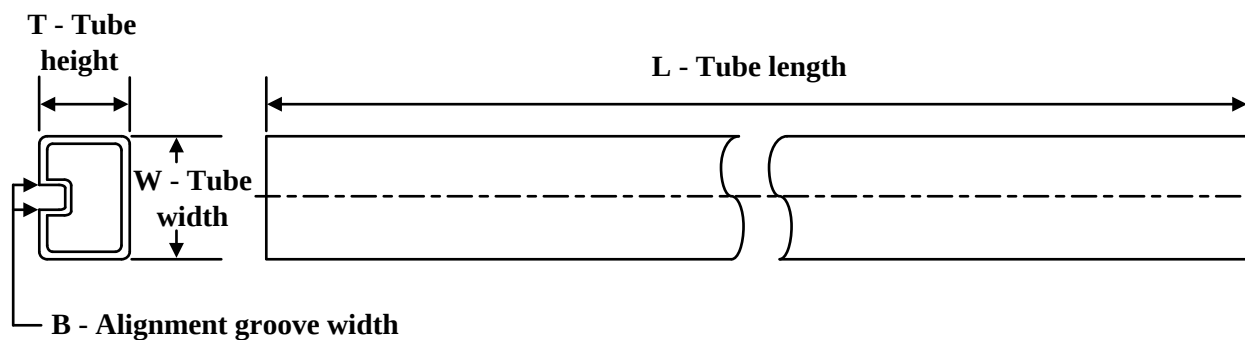
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
LM380N-8/NOPB	P	PDIP	8	40	502	14	11938	4.32
LM380N-8/NOPB.B	P	PDIP	8	40	502	14	11938	4.32
LM380N-8/NOPBG4	P	PDIP	8	40	502	14	11938	4.32
LM380N-8/NOPBG4.B	P	PDIP	8	40	502	14	11938	4.32
LM380N/NOPB	N	PDIP	14	25	502	14	11938	4.32
LM380N/NOPB.B	N	PDIP	14	25	502	14	11938	4.32
LM380N/NOPBG4	N	PDIP	14	25	502	14	11938	4.32
LM380N/NOPBG4.B	N	PDIP	14	25	502	14	11938	4.32

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.

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

NOTES:

- A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 The 20 pin end lead shoulder width is a vendor option, either half or full width.

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