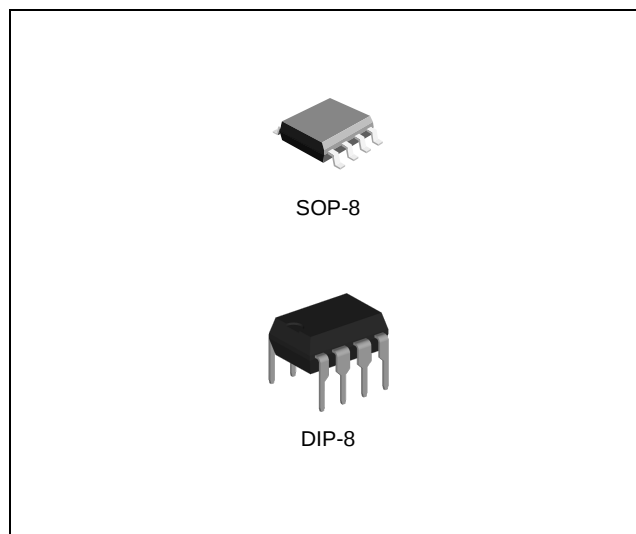


## FEATURES

- Battery operation
- Minimum external parts
- Wide supply voltage range 4V to 12V
- Low quiescent current drain 4mA (Typ.)
- Voltage gains from 20 to 200
- ESD Protection 2kV
- Ground referenced input
- Self-centering output quiescent voltage
- Low distortion

## APPLICATIONS

- AM-FM radio amplifier
- Portable tape player amplifiers
- Intercoms
- TV sound systems
- Line drivers
- Ultrasonic drivers
- Small servo drivers
- Power converters



## ORDERING INFORMATION

| Device | Package |
|--------|---------|
| LM386D | SOP-8   |
| LM386N | DIP-8   |

## DESCRIPTION

The LM386 is a power amplifier designed for use in low voltage consumer applications. The gain is internally set to 20 to keep external part count low, but the addition of an external resistor and capacitor between pins 1 and 8 will increase the gain to any value up to 200. The inputs are ground referenced while the output is automatically biased to one half the supply voltage. The quiescent power drain is only 24 milliwatts when operating from a 6V supply, making the LM386 ideal for battery operation.

## ABSOLUTE MAXIMUM RATINGS (Note 1)

| CHARACTERISTIC                      | SYMBOL   | MIN. | MAX. | UNIT |
|-------------------------------------|----------|------|------|------|
| Supply Voltage                      | $V_{CC}$ | -    | 15   | V    |
| Input Voltage                       | $V_{IN}$ | -0.4 | 0.4  | V    |
| Operating Ambient Temperature Range | $T_A$    | -40  | 85   | °C   |
| Junction Temperature                | $T_J$    | -    | 125  | °C   |

Note1. 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.

## RECOMMENDED OPERATING CONDITIONS (Note 2)

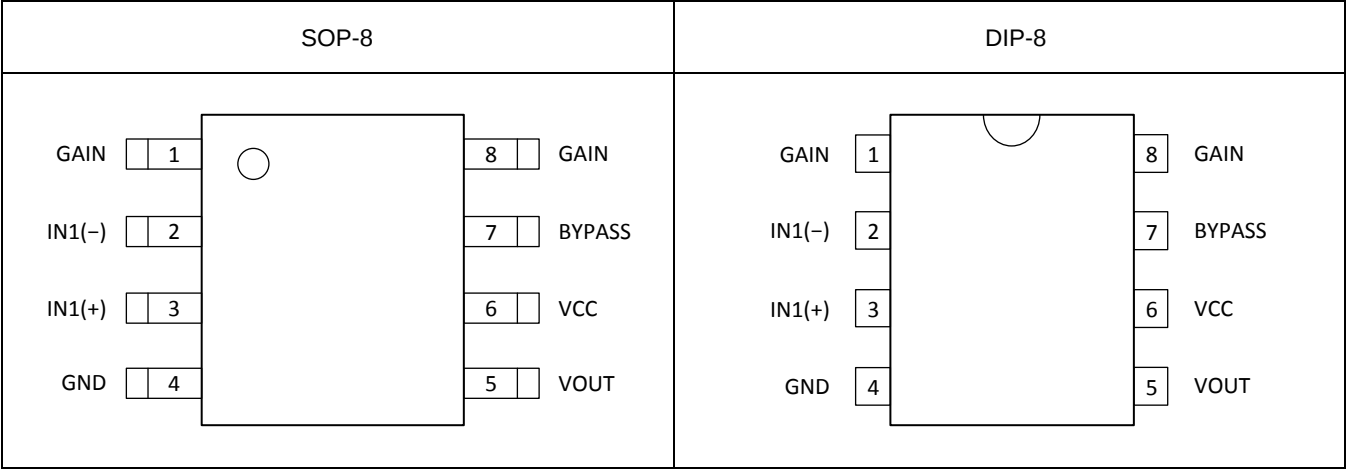
| CHARACTERISTIC                       | SYMBOL   | MIN. | MAX. | UNIT |
|--------------------------------------|----------|------|------|------|
| Supply Voltage                       | $V_{CC}$ | 4    | 12   | V    |
| Operating Free-Air Temperature Range | $T_A$    | 0    | 70   | °C   |

Note 2. The device is not guaranteed to function outside its operating ratings.

## ORDERING INFORMATION

| Package | Order No. | Description                       | Supplied As | Status |
|---------|-----------|-----------------------------------|-------------|--------|
| SOP-8   | LM386D    | Low Voltage Audio Power Amplifier | Tape & Reel | Active |
| DIP-8   | LM386N    | Low Voltage Audio Power Amplifier | Tube        | Active |

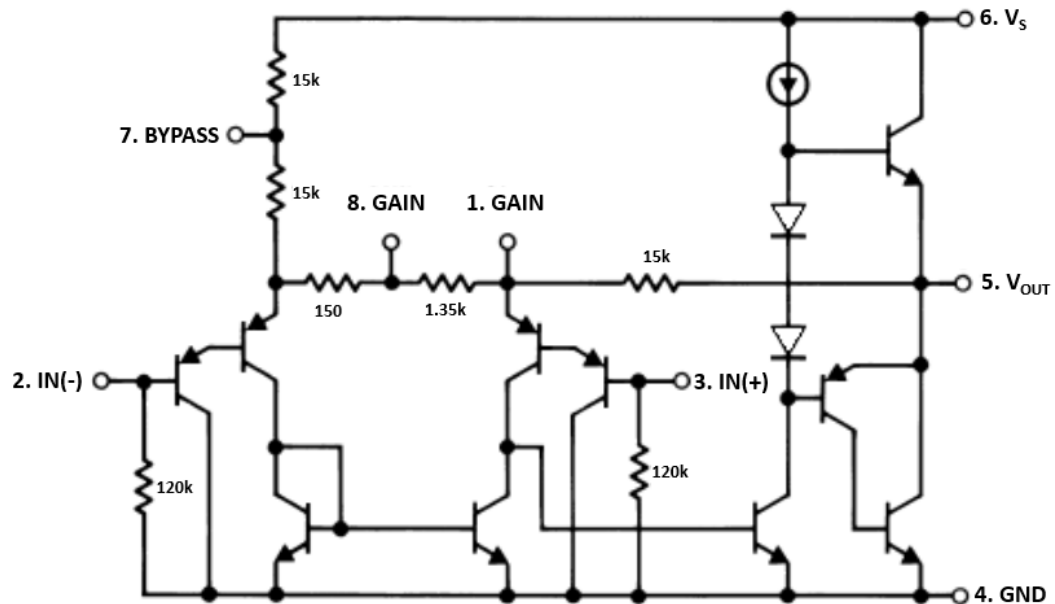
PIN CONFIGURATION



PIN DESCRIPTION

| Pin No. |       | Pin Name  | Pin Function           |
|---------|-------|-----------|------------------------|
| SOP-8   | DIP-8 |           |                        |
| 1       | 1     | GAIN      | Gain Setting           |
| 2       | 2     | INPUT (-) | Inverting Input        |
| 3       | 3     | INPUT (+) | Noninverting Input     |
| 4       | 4     | GND       | Ground                 |
| 5       | 5     | VOUT      | Output                 |
| 6       | 6     | VCC       | Power Supply Voltage   |
| 7       | 7     | BYPASS    | Bypass Decoupling Path |
| 8       | 8     | GAIN      | Gain Setting           |

## FUNCTIONAL BLOCK DIAGRAM



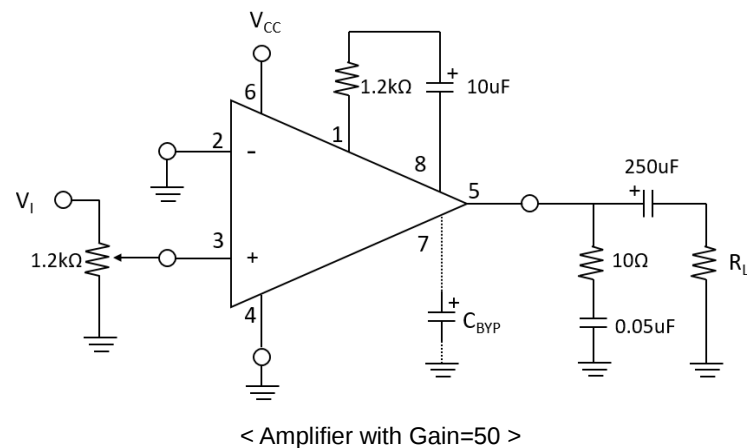
## ELECTRICAL CHARACTERISTICS

Specifications with standard type face are for  $T_A = 25^\circ\text{C}$ ,  $R_L = 8\Omega$ ,  $V_{CC} = 6\text{V}$ ,  $f = 1\text{kHz}$  unless otherwise noted.

| SYMBOL     | PARAMETER                 | TEST CONDITION                                     | MIN | TYP | MAX | UNIT       |
|------------|---------------------------|----------------------------------------------------|-----|-----|-----|------------|
| $V_{CC}$   | Operating Supply Voltage  |                                                    | 4   | -   | 12  | V          |
| $I_Q$      | Quiescent Current         | $V_{IN} = 0\text{V}$                               | -   | 4   | 8   | mA         |
| $P_{OUT}$  | Output Power              | $V_{CC} = 6\text{V}$ , THD = 10%                   | 250 | 325 | -   | mW         |
|            |                           | $V_{CC} = 9\text{V}$ , THD = 10%                   | 500 | 700 | -   |            |
| $A_V$      | Voltage Gain              | Pin 1 and Pin 8 Open                               | -   | 26  | -   | dB         |
|            |                           | 10 $\mu\text{F}$ from Pin 1 to Pin 8               | -   | 46  | -   |            |
| BW         | Bandwidth                 | 10 $\mu\text{F}$ from Pin 1 to Pin 8               | -   | 60  | -   | kHz        |
|            |                           | Pin 1 and Pin 8 Open                               | -   | 300 | -   |            |
| THD        | Total Harmonic Distortion | $P_{OUT} = 125\text{mW}$ ,<br>Pin 1 and Pin 8 Open | -   | 0.2 | -   | %          |
| $R_{IN}$   | Input Resistance          |                                                    | -   | 120 | -   | k $\Omega$ |
| $I_{BIAS}$ | Input Bias Current        | Pin 2 and Pin 3 Open                               | -   | 250 | -   | nA         |

## APPLICATION INFORMATION

The LM386 is a mono low voltage amplifier that can be used in a variety of applications. It can drive loads from  $4\Omega$  to  $32\Omega$ . The gain is internally set to 20 but it can be modified from 20 to 200 by placing a resistor and capacitor between pins 1 and 8. This device comes in three different 8-pin packages as DIP-8 and SOP-8 to fit in different applications. As this is an Op Amp it can be used in different configurations to fit in several applications. The internal gain setting resistor allows the LM386 to be used in a very low part count system. In addition, a series resistor can be placed between pins 1 and 5 to modify the gain and frequency response for specific applications.



## TYPICAL OPERATING CHARACTERISTICS

T.B.D.

## REVISION NOTICE

The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.