

**LOW VOLTAGE AUDIO POWER AMPLIFIER****AZ386****General Description**

The AZ386 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 pin 1 and pin 8 will increase the gain to any value from 20 to 200.

The inputs are ground referenced while the output automatically biases to one-half the supply voltage. The quiescent power drain is only 24mW when operating from a 5V supply, making the AZ386 ideal for battery operation.

This IC is available in SOIC-8 and DIP-8 packages.

**Features**

- Wide Supply Voltage Range: 4V to 16V
- Low Quiescent Current Drain: 6mA
- Voltage Gains from 20 to 200
- Battery Operation
- Minimum External Parts
- Low Power Dissipation
- Low Distortion

**Applications**

- AM-FM Radio Amplifier
- Cordless Phone
- TV Sound Systems
- Portable Tape Player Amplifier
- Intercoms
- Line Drivers
- Ultrasonic Drivers
- Small Servo Drivers
- Power Converters

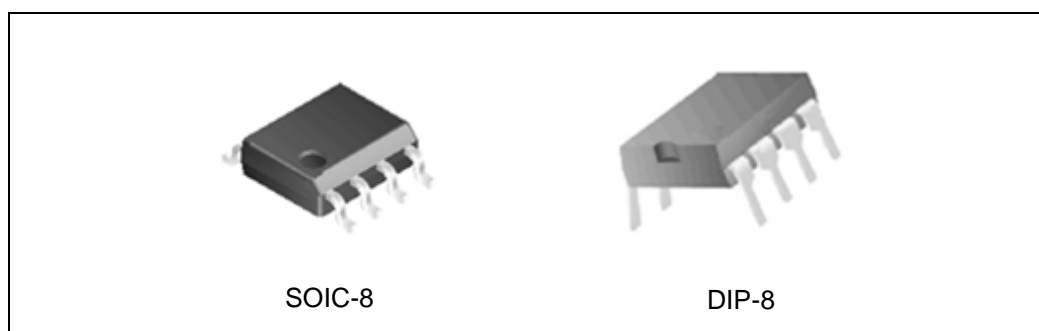


Figure 1. Package Types of AZ386



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Pin Configuration**

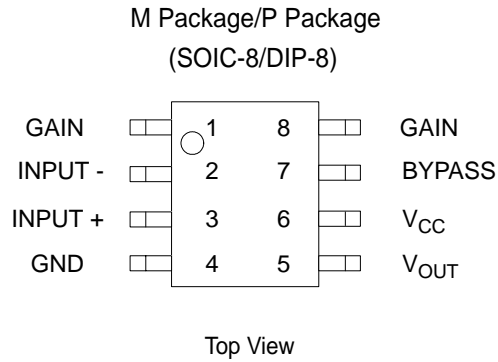


Figure 2. Pin Configuration of AZ386

**Functional Block Diagram**

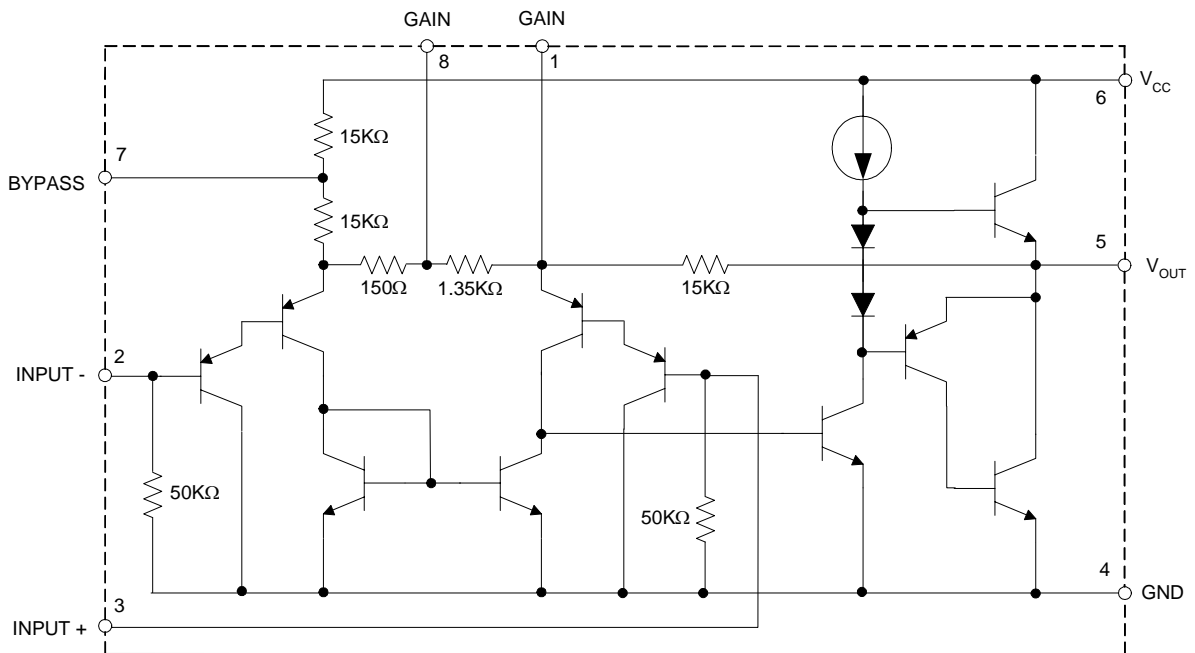


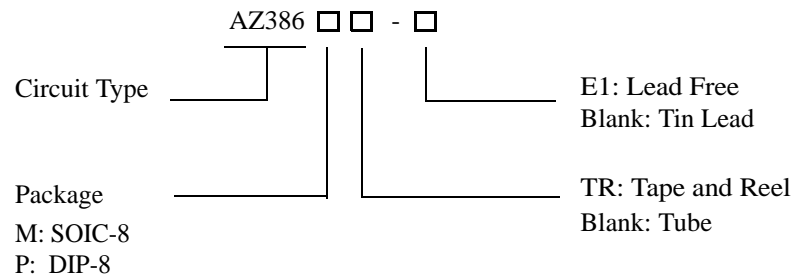
Figure 3. Functional Block Diagram of AZ386



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Ordering Information**



| Package | Temperature Range | Part Number |             | Marking ID |           | Packing Type |
|---------|-------------------|-------------|-------------|------------|-----------|--------------|
|         |                   | Tin Lead    | Lead Free   | Tin Lead   | Lead Free |              |
| SOIC-8  | 0 to 70°C         | AZ386M      | AZ386M-E1   | 386M       | 386M-E1   | Tube         |
|         |                   | AZ386MTR    | AZ386MTR-E1 | 386M       | 386M-E1   | Tape & Reel  |
| DIP-8   | 0 to 70°C         | AZ386P      | AZ386P-E1   | AZ386P     | AZ386P-E1 | Tube         |

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**LOW VOLTAGE AUDIO POWER AMPLIFIER****AZ386****Absolute Maximum Ratings (Note 1)**

| Parameter                    | Symbol        | Value                        |      | Unit |
|------------------------------|---------------|------------------------------|------|------|
| Power Supply Voltage         | $V_{CC}$      | 18                           |      | V    |
| Package Dissipation (Note 2) | $P_D$         | AZ386P                       | 1.25 | W    |
|                              |               | AZ386M                       | 0.73 | W    |
| Input Voltage                | $V_{IN}$      | -0.4 to 0.4                  |      | V    |
| Junction Temperature         | $T_J$         | 150                          |      | °C   |
| Storage Temperature Range    | $T_{STG}$     | -55 to 150                   |      | °C   |
| Soldering Information        |               | DIP-8 Soldering<br>(10 sec.) | 260  | °C   |
|                              |               | SOIC-8 (15 sec.)             | 215  |      |
| Thermal Resistance           | $\theta_{JA}$ | DIP-8                        | 107  | °C/W |
|                              |               | SOIC-8                       | 172  |      |

Note 1: Stresses greater than 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 Ratings" for extended periods may affect device reliability.

Note 2: For operation in ambient temperatures ( $T_A$ ) above 25°C, the device must be derated based on a 150°C maximum junction temperature and 1) a thermal resistance of 107°C/W junction to ambient for the Dual-in-Line package and 2) a thermal resistance of 172°C/W for the small outline package.

**Recommended Operating Conditions**

| Parameter                   | Min | Max | Unit |
|-----------------------------|-----|-----|------|
| Operating Temperature Range | 0   | 70  | °C   |

**LOW VOLTAGE AUDIO POWER AMPLIFIER****AZ386****Electrical Characteristics (Note 3)**Operating Conditions:  $T_A=25^{\circ}\text{C}$  unless otherwise specified.

| Parameter                    | Symbol     | Test Conditions                                                                                              | Min | Typ  | Max | Unit             |
|------------------------------|------------|--------------------------------------------------------------------------------------------------------------|-----|------|-----|------------------|
| Supply Voltage               | $V_{CC}$   |                                                                                                              | 4   |      | 16  | V                |
| Quiescent Current            | $I_Q$      | $V_{CC}=6\text{V}$ , $V_{IN}=0$                                                                              |     | 6    | 8   | mA               |
| Output Power                 | $P_{OUT}$  | $V_{CC}=6\text{V}$ , $R_L=8\Omega$ , THD=10%                                                                 | 250 | 300  |     | mW               |
|                              |            | $V_{CC}=9\text{V}$ , $R_L=8\Omega$ , THD=10%                                                                 | 500 | 800  |     | mW               |
|                              |            | $V_{CC}=16\text{V}$ , $R_L=32\Omega$ , THD=10%                                                               | 700 | 1000 |     | mW               |
| Voltage Gain                 | $G_V$      | $V_{CC}=6\text{V}$ , $f=1\text{KHz}$<br>$10\mu\text{F}$ from Pin 1 to 8                                      |     | 26   |     | dB               |
|                              |            |                                                                                                              |     |      | 45  |                  |
| Bandwidth                    | BW         | $V_{CC}=6\text{V}$ , Pins 1 and 8 open                                                                       |     | 500  |     | KHz              |
| Total Harmonic Distortion    | THD        | $V_{CC}=6\text{V}$ , $R_L=8\Omega$ , $P_{OUT}=125\text{mW}$<br>$f=1\text{KHz}$ , Pins 1 and 8 open           |     | 0.27 |     | %                |
| Power Supply Rejection Ratio | PSRR       | $V_{CC}=6\text{V}$ , $f=1\text{KHz}$ , $C_{BYPASS}=10\mu\text{F}$ ,<br>Pins 1 and 8 open, Referred to Output |     | 45   |     | dB               |
| Input Resistance             | $R_{IN}$   |                                                                                                              |     | 70   |     | $\text{K}\Omega$ |
| Input Bias Current           | $I_{BIAS}$ | $V_{CC}=6\text{V}$ , Pins 2 and 3 open                                                                       |     | 10   |     | nA               |

Note 3: All voltages are measured with respect to the ground pin, unless otherwise specified.



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Typical Performance Characteristics**

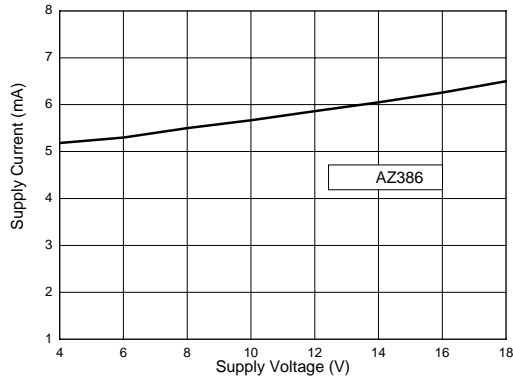


Figure 4. Quiescent Supply Current vs. Supply Voltage

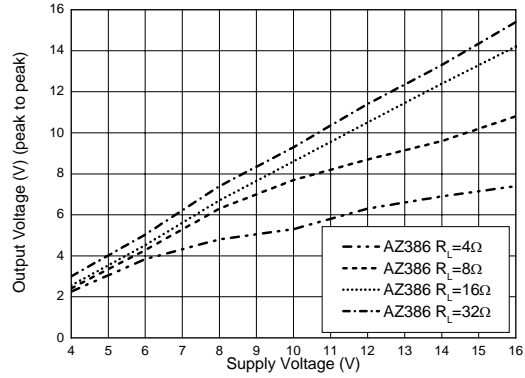


Figure 5. Peak-to-Peak Output Voltage Swing vs. Supply Voltage

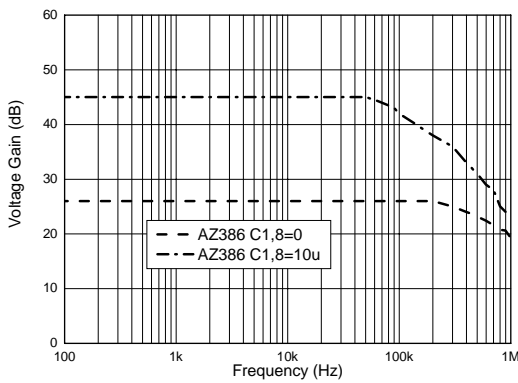


Figure 6. Voltage Gain vs. Frequency

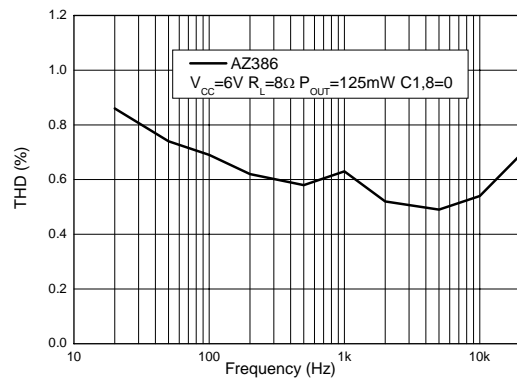


Figure 7. Distortion vs. Frequency

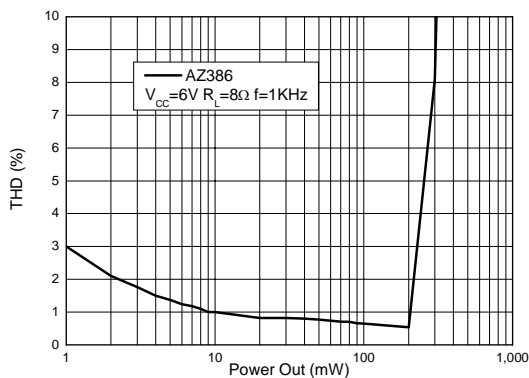


Figure 8. Distortion vs. Output Power

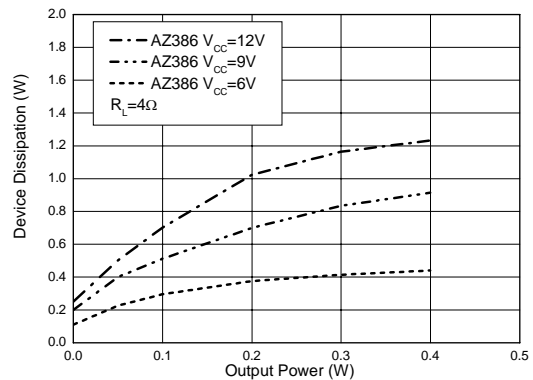


Figure 9. Device Dissipation vs. Output Power (4Ω Load)



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Typical Performance Characteristics (Continued)**

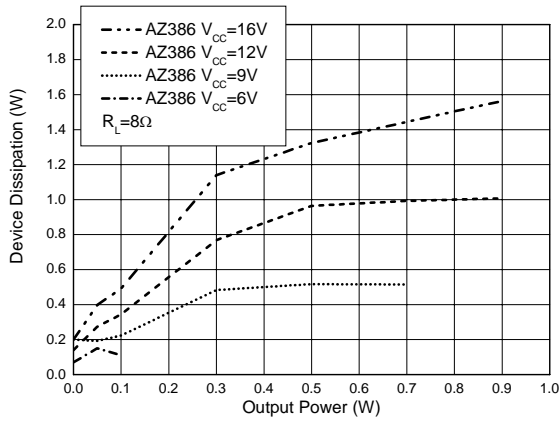


Figure 10. Device Dissipation vs. Output Power (8Ω Load)

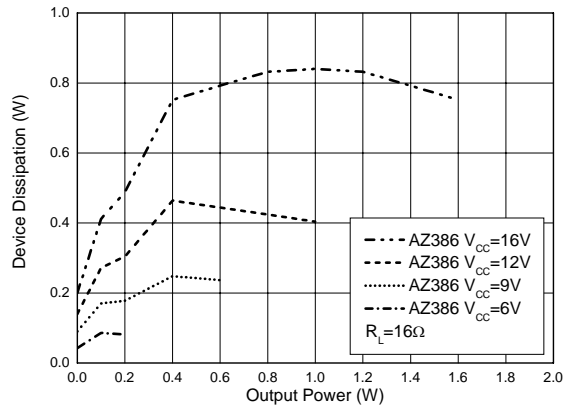


Figure 11. Device Dissipation vs. Output Power (16Ω Load)

**Typical Applications (Note 4)**

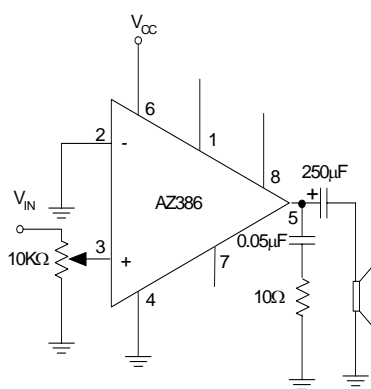


Figure 12. Amplifier With Gain=20

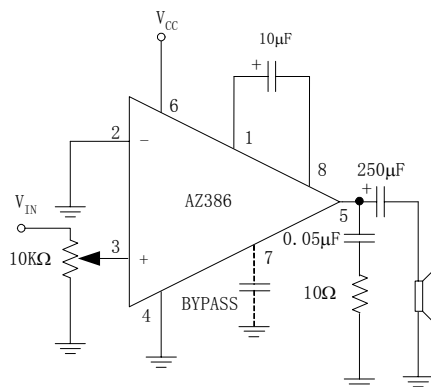


Figure 13. Amplifier With Gain=200



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Typical Applications (Note 4) (Continued)**

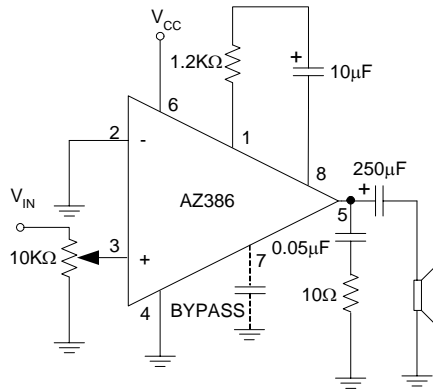


Figure 14. Amplifier With Gain=50

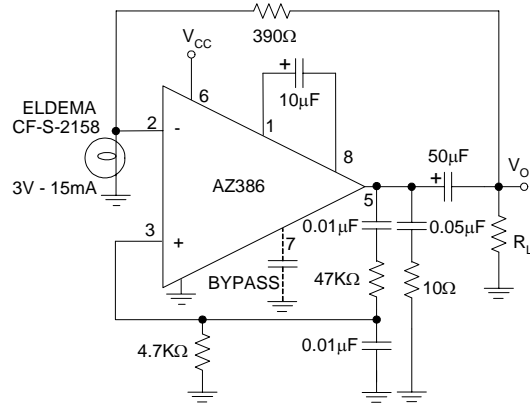


Figure 15. Low Distortion Power Wienbridge Oscillator

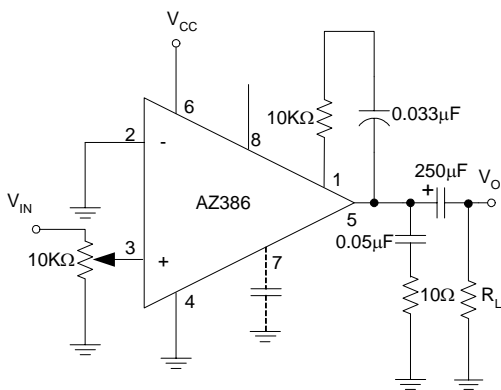


Figure 16. Amplifier With Bass Boost

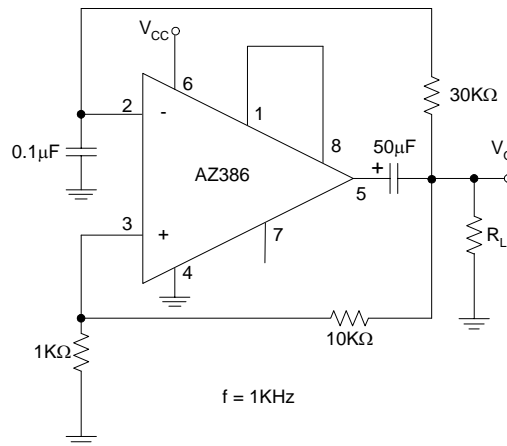


Figure 17. Square Wave Oscillator

Note 4: The R-C series circuit from output to ground, which will make the output stable, is depended on the different capacitive load in the circuit, the correct values for the R and C can be determined through experimental methods.





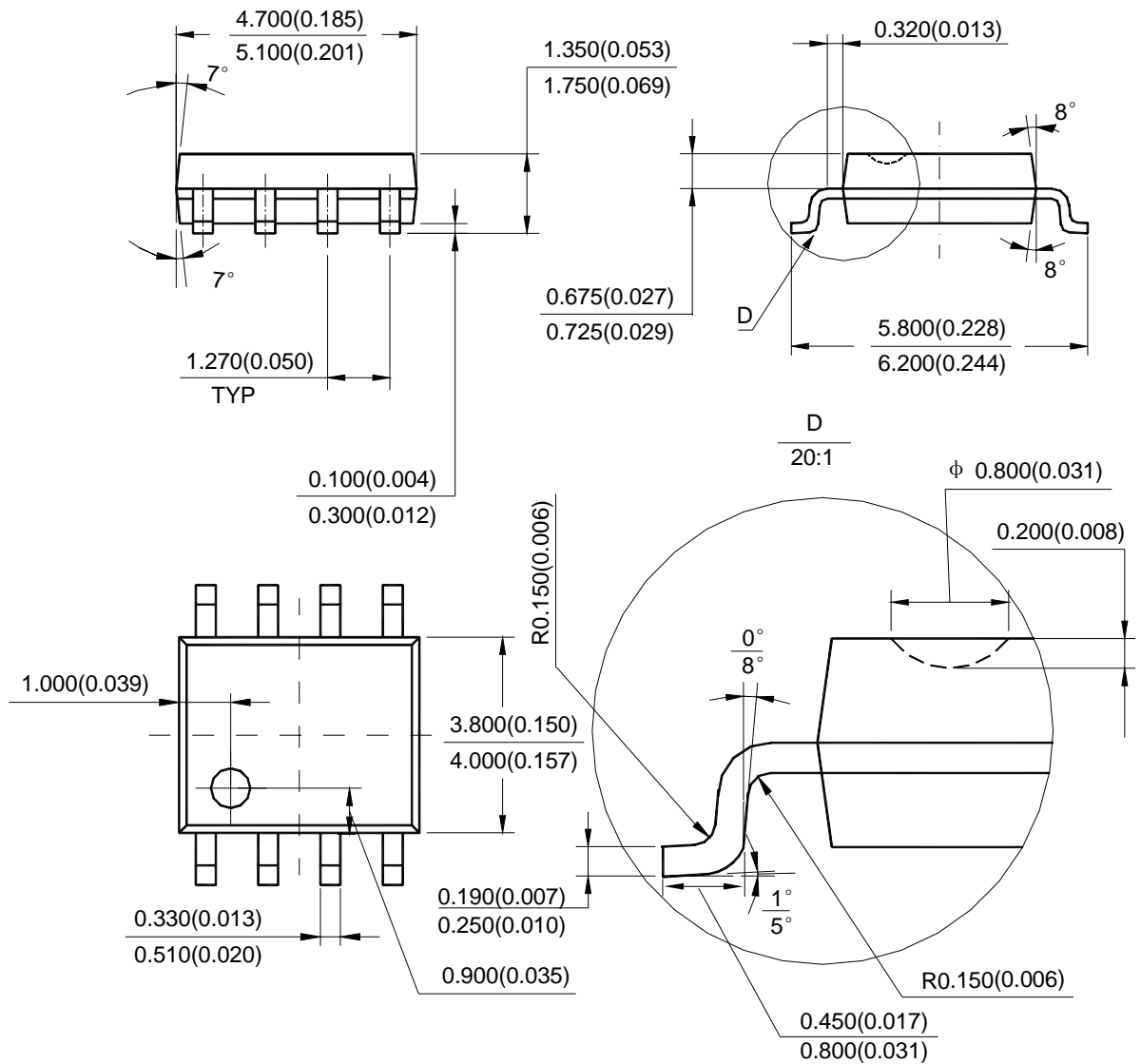
**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Mechanical Dimensions**

**SOIC-8**

**Unit: mm(inch)**



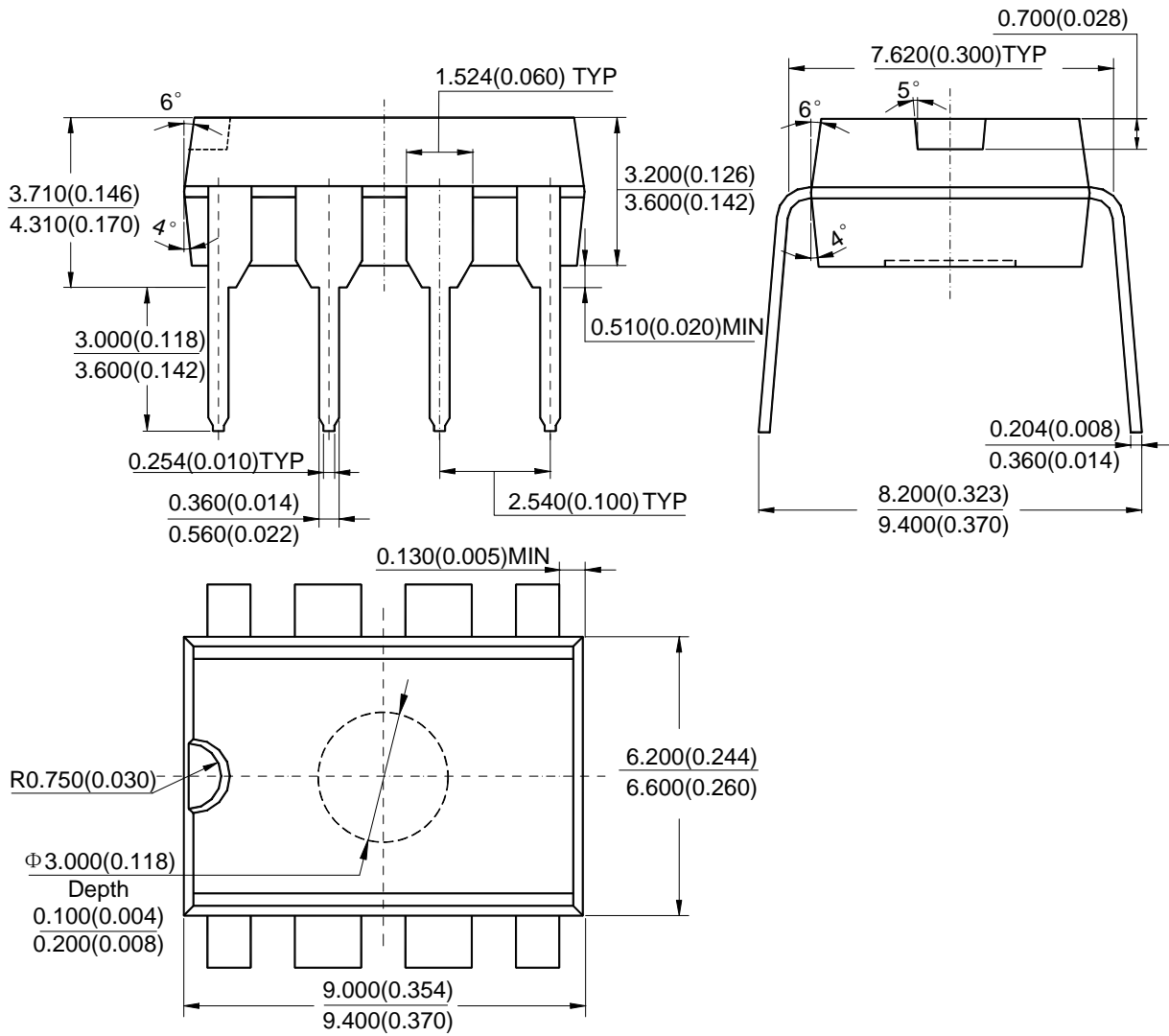


**LOW VOLTAGE AUDIO POWER AMPLIFIER** **AZ386**

**Mechanical Dimensions (Continued)**

**DIP-8**

**Unit: mm(inch)**





## **BCD Semiconductor Manufacturing Limited**

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