

**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

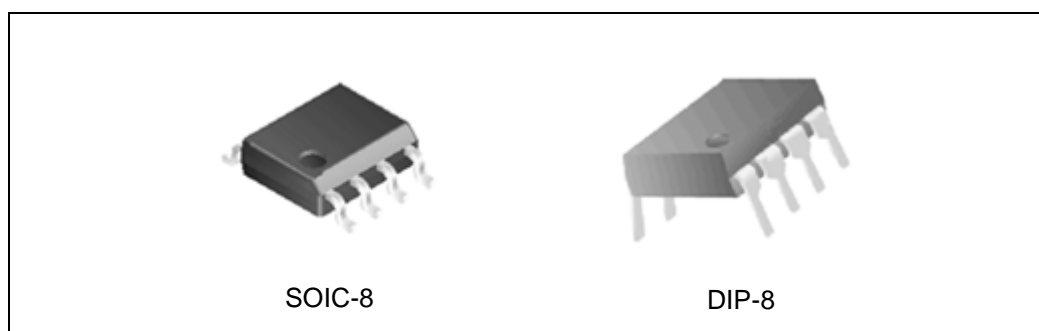


Figure 1. Package Types of AZ386



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

**Pin Configuration**

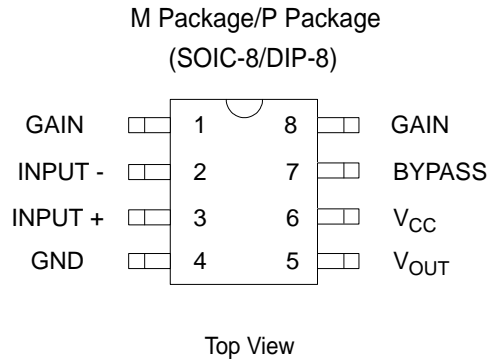


Figure 2. Pin Configuration of AZ386

**Functional Block Diagram**

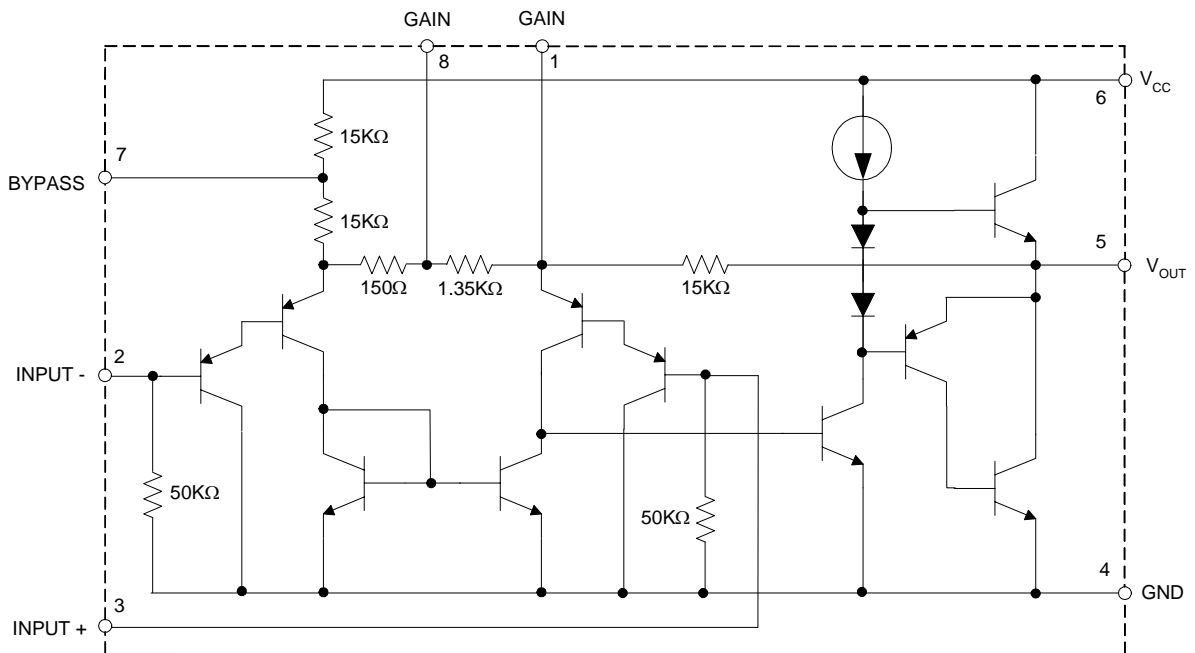
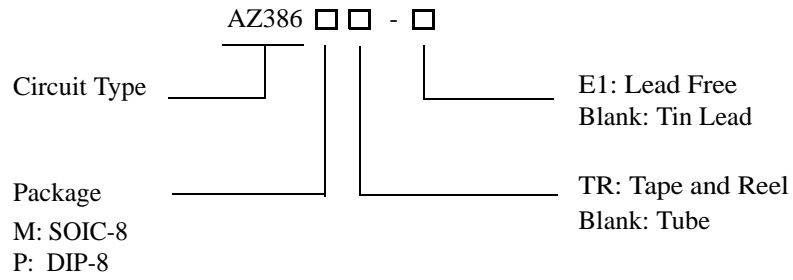


Figure 3. Functional Block Diagram of AZ386



**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 (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	$G_V$	$V_{CC}=6\text{V}$ , $f=1\text{KHz}$ $10\mu\text{F}$ 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	$V_{CC}=6\text{V}$ , $R_L=8\Omega$ , $P_{OUT}=125\text{mW}$ $f=1\text{KHz}$ , Pins 1 and 8 open		0.27		%
Power Supply Rejection Ratio	PSRR	$V_{CC}=6\text{V}$ , $f=1\text{KHz}$ , $C_{BYPASS}=10\mu\text{F}$ , 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**

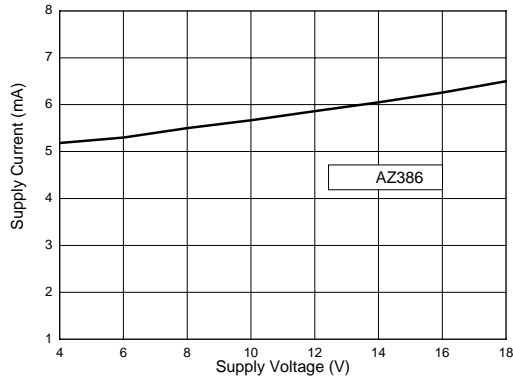


Figure 4. Quiescent Supply Current vs. Supply Voltage

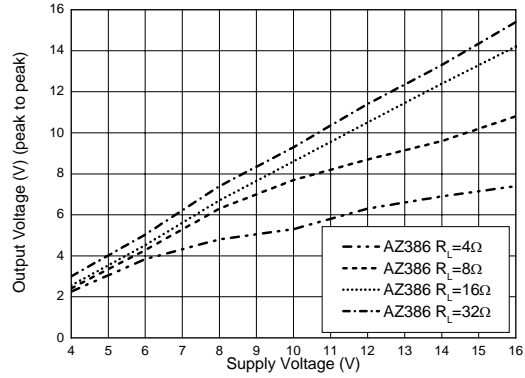


Figure 5. Peak-to-Peak Output Voltage Swing vs. Supply Voltage

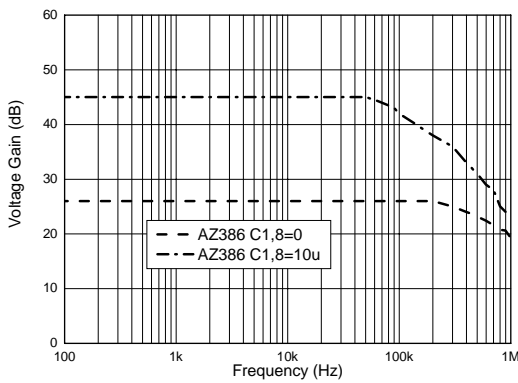


Figure 6. Voltage Gain vs. Frequency

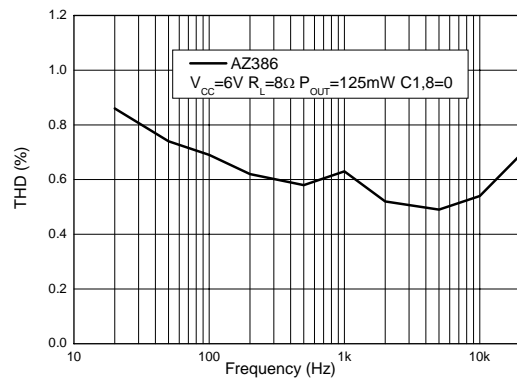


Figure 7. Distortion vs. Frequency

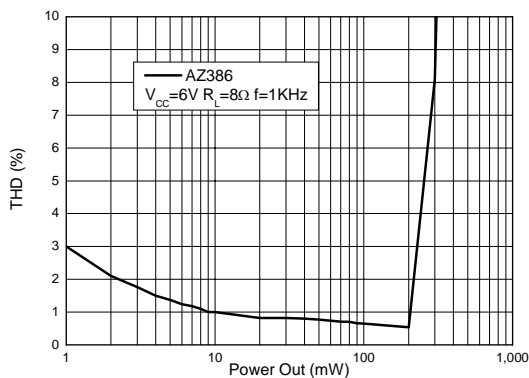


Figure 8. Distortion vs. Output Power

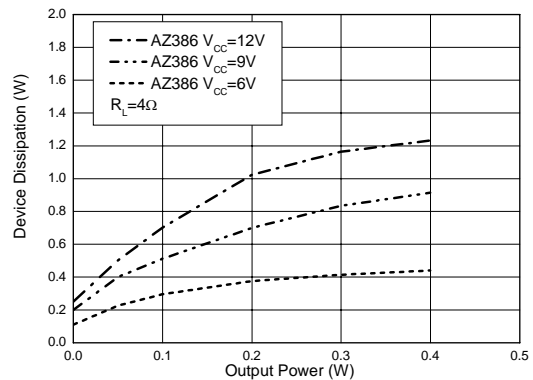


Figure 9. Device Dissipation vs. Output Power (4Ω Load)



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Typical Performance Characteristics (Continued)**

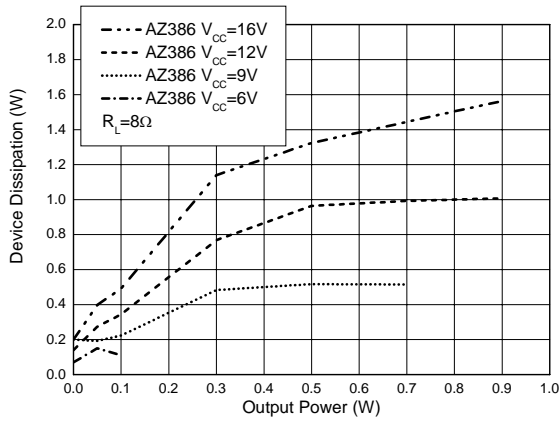


Figure 10. Device Dissipation vs. Output Power (8Ω Load)

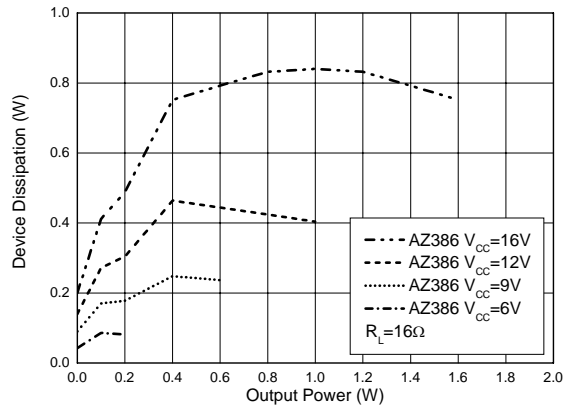


Figure 11. Device Dissipation vs. Output Power (16Ω Load)

**Typical Applications**

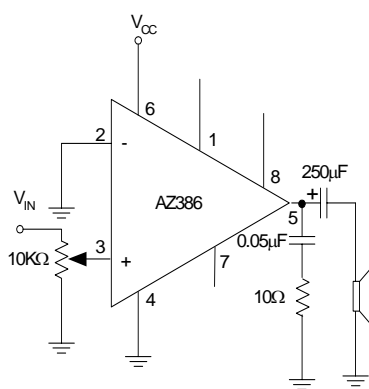


Figure 12. Amplifier With Gain=20

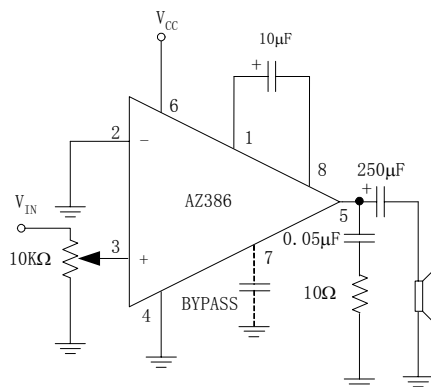


Figure 13. Amplifier With Gain=200



**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Typical Applications (Continued)**

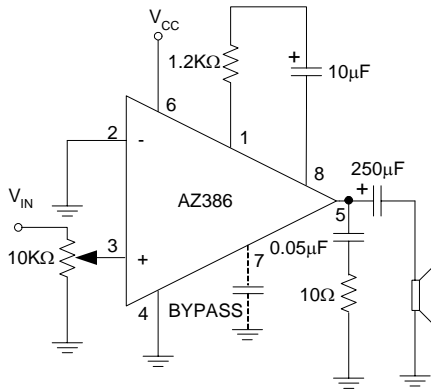


Figure 14. Amplifier With Gain=50

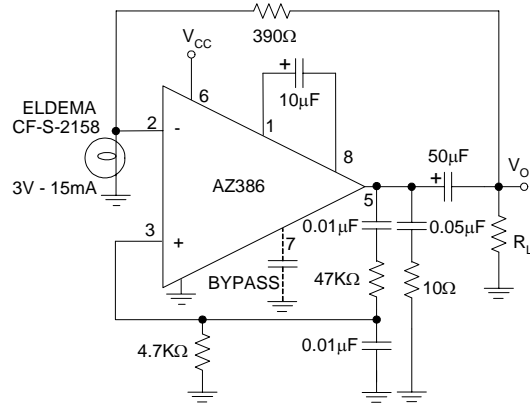


Figure 15. Low Distortion Power Wienbridge Oscillator

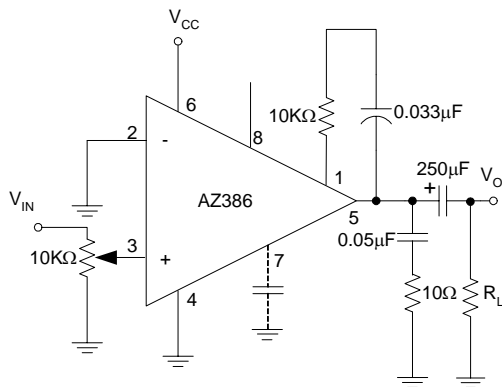


Figure 16. Amplifier With Bass Boost

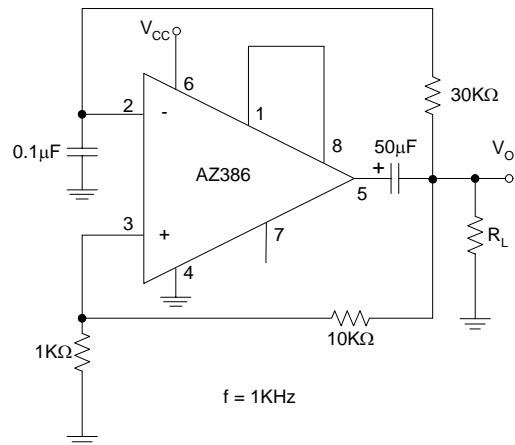


Figure 17. Square Wave Oscillator





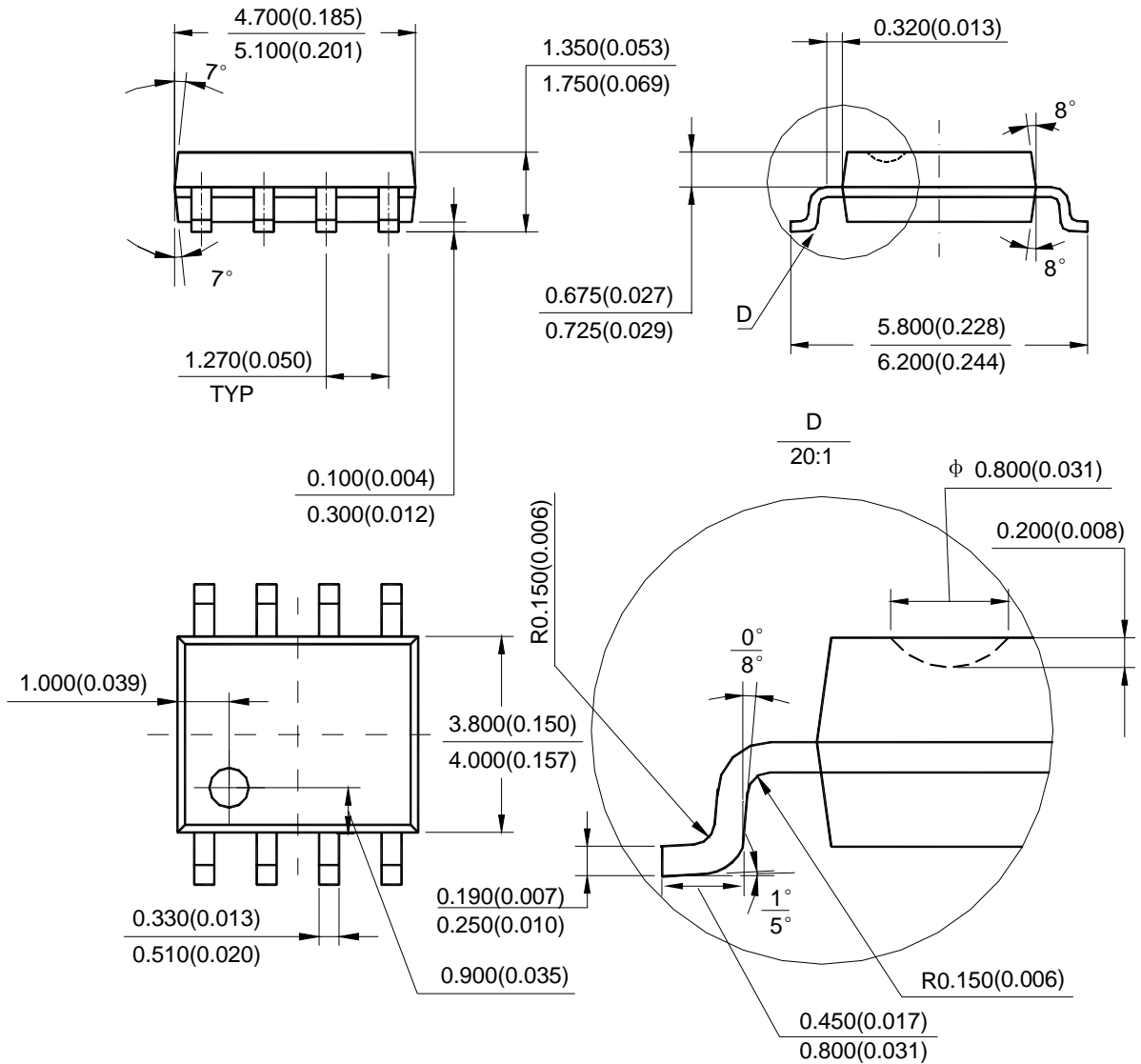
### LOW VOLTAGE AUDIO POWER AMPLIFIER

AZ386

#### Mechanical Dimensions

SOIC-8

Unit: mm(inch)





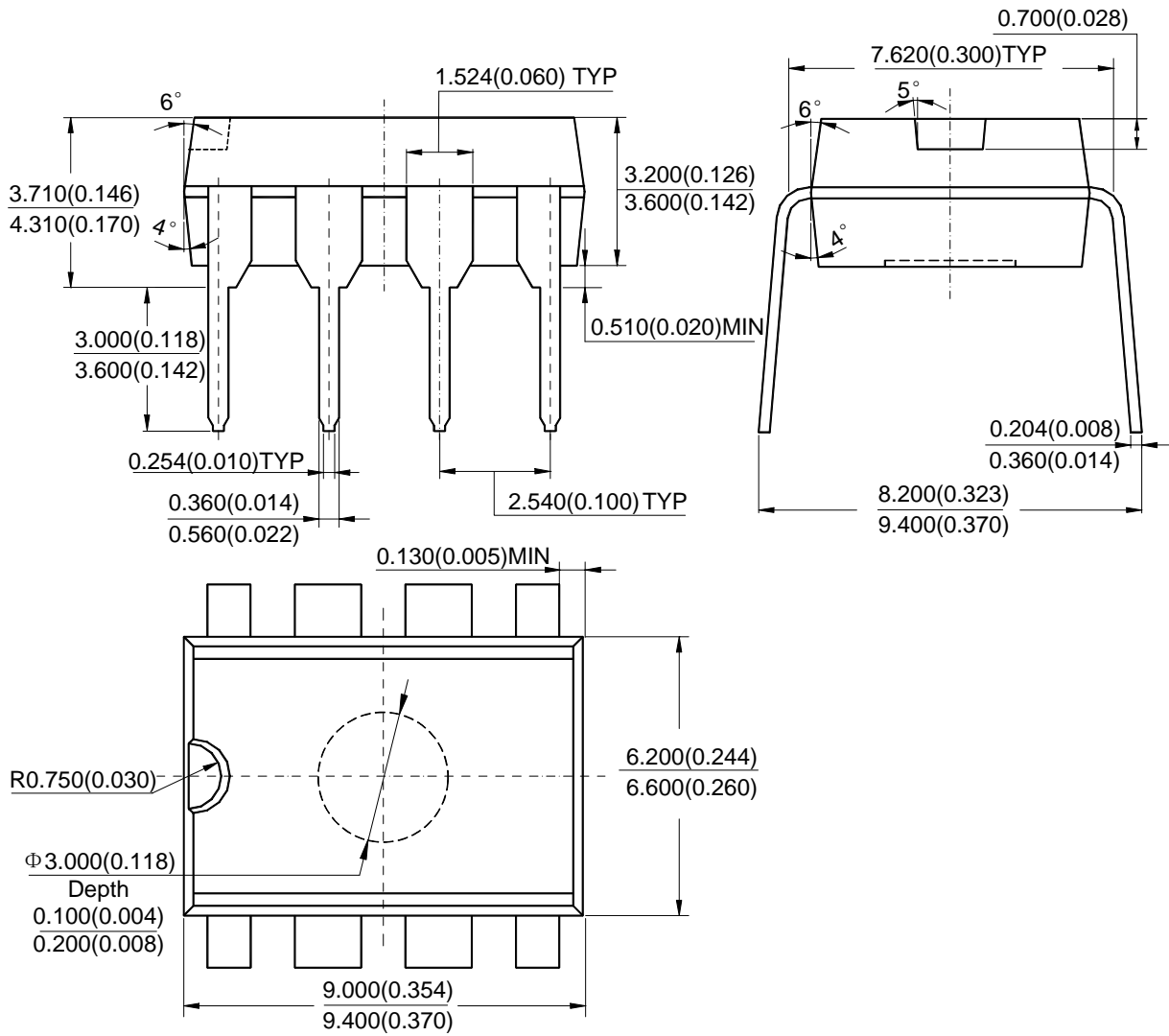
**LOW VOLTAGE AUDIO POWER AMPLIFIER**

**AZ386**

**Mechanical Dimensions (Continued)**

**DIP-8**

**Unit: mm(inch)**





BCD Semiconductor Manufacturing Limited

<http://www.bcdsemi.com>

#### IMPORTANT NOTICE

BCD Semiconductor Manufacturing Limited reserves the right to make changes without further notice to any products or specifications herein. BCD Semiconductor Manufacturing Limited does not assume any responsibility for use of any its products for any particular purpose, nor does BCD Semiconductor Manufacturing Limited assume any liability arising out of the application or use of any its products or circuits. BCD Semiconductor Manufacturing Limited does not convey any license under its patent rights or other rights nor the rights of others.

---

#### MAIN SITE

**BCD Semiconductor Manufacturing Limited**  
- Wafer Fab  
**Shanghai SIM-BCD Semiconductor Manufacturing Limited**  
800, Yi Shan Road, Shanghai 200233, China  
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

**BCD Semiconductor Manufacturing Limited**  
- IC Design Group  
**Advanced Analog Circuits (Shanghai) Corporation**  
8F, Zone B, 900, Yi Shan Road, Shanghai 200233, China  
Tel: +86-21-6495 9539, Fax: +86-21-6485 9673

#### REGIONAL SALES OFFICE

**Shenzhen Office**  
**Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd. Shenzhen Office**  
**Advanced Analog Circuits (Shanghai) Corporation Shenzhen Office**  
Room E, 5F, Noble Center, No.1006, 3rd Fuzhong Road, Futian District, Shenzhen 518026, China  
Tel: +86-755-8826 7951, Fax: +86-755-8826 7865

**Taiwan Office**  
**BCD Semiconductor (Taiwan) Company Limited**  
4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei,  
Taiwan  
Tel: +886-2-2656 2808, Fax: +886-2-2656 2806

**USA Office**  
**BCD Semiconductor Corporation**  
3170 De La Cruz Blvd., Suite 105,  
Santa Clara,  
CA 95054-2411, U.S.A