

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****General Description**

The AZ4580 is a monolithic dual low noise operational amplifier. It is specifically designed for audio systems to improve tone control; it can also be used in pre-amplifier, industrial measurement tools and applications where gain and phase matched channels are mandatory.

The IC features internal frequency compensation, low noise, low distortion, high gain and high bandwidth. The AZ4580 can operate under dual power supply voltage up to  $\pm 18V$  or single power supply up to 36V.

The AZ4580 is available in DIP-8, SOIC-8 and TSSOP-8 packages.

**Features**

- Large Signal Voltage Gain: 110dB Typical
- Low Input Noise Voltage:  $0.7\mu V_{RMS}$  (RIAA) Typical
- Wide Gain Bandwidth Product: 15MHz at 10KHz Typical
- Low Distortion: 0.0005% Typical
- Slew Rate:  $7V/\mu s$  Typical

**Applications**

- Audio AC-3 Decoder System
- Audio Amplifier

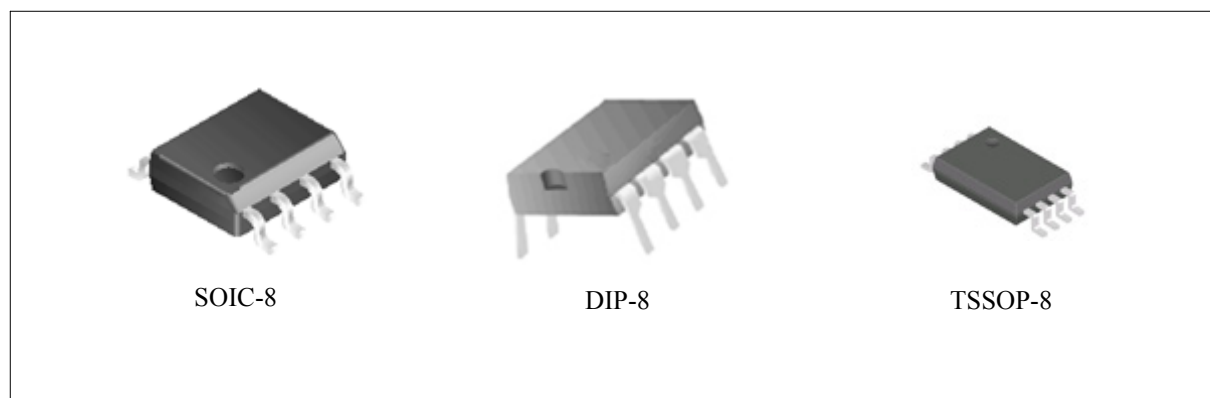


Figure 1. Package Types of AZ4580

# DUAL LOW NOISE OPERATIONAL AMPLIFIERS

**AZ4580**

## Pin Configuration

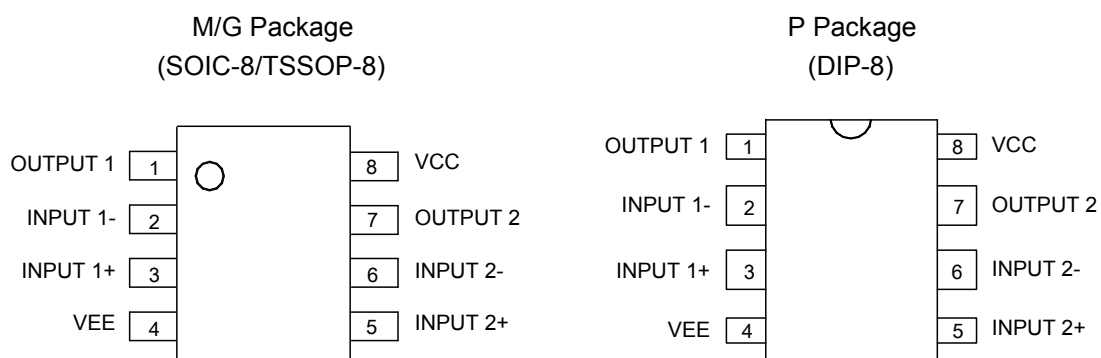


Figure 2. Pin Configuration of AZ4580

## Pin Description

| Pin No. | Function | Pin No. | Function | Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|---------|----------|---------|----------|
| 1       | OUTPUT 1 | 2       | INPUT 1- | 3       | INPUT 1+ | 4       | VEE      |
| 5       | INPUT 2+ | 6       | INPUT 2- | 7       | OUTPUT 2 | 8       | VCC      |

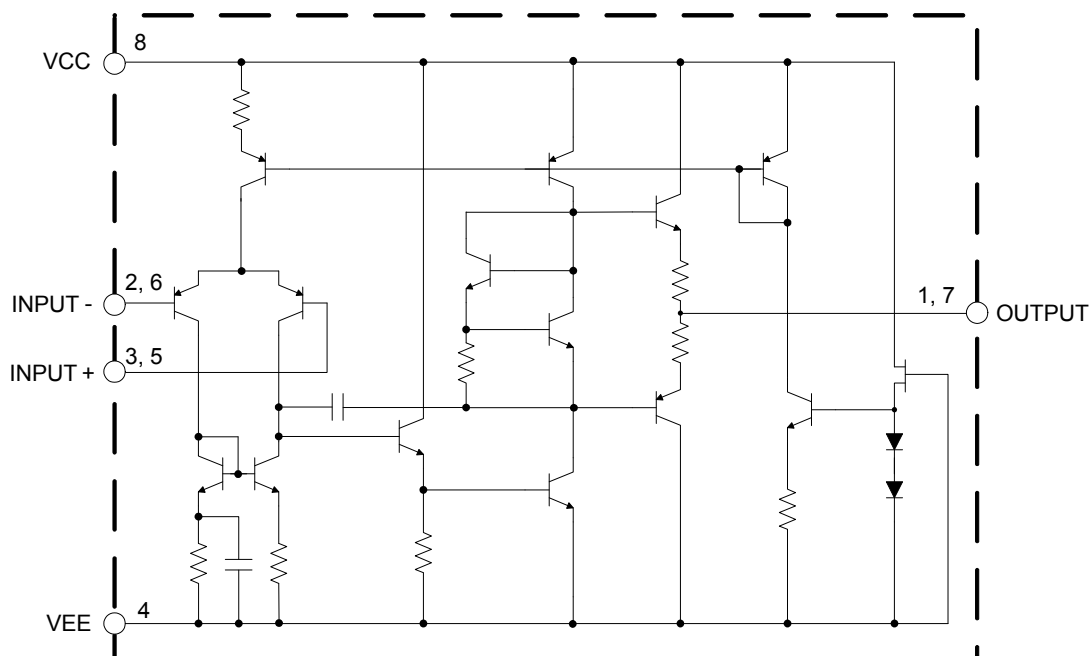
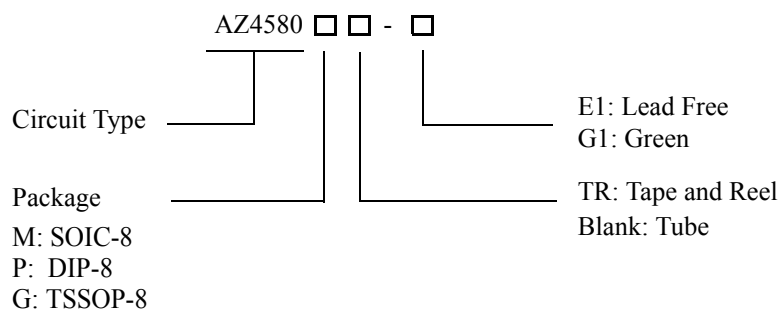
**Functional Block Diagram**


Figure 3. Representative Schematic Diagram of AZ4580 (Each Amplifier)

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****Ordering Information**

| Package | Temperature Range | Part Number  |              | Marking ID |            | Packing Type |
|---------|-------------------|--------------|--------------|------------|------------|--------------|
|         |                   | Lead Free    | Green        | Lead Free  | Green      |              |
| SOIC-8  | -40 to 85°C       | AZ4580M-E1   | AZ4580M-G1   | 4580M-E1   | 4580M-G1   | Tube         |
|         |                   | AZ4580MTR-E1 | AZ4580MTR-G1 | 4580M-E1   | 4580M-G1   | Tape & Reel  |
| DIP-8   | -40 to 85°C       | AZ4580P-E1   | AZ4580P-G1   | AZ4580P-E1 | AZ4580P-G1 | Tube         |
| TSSOP-8 | -40 to 85°C       | AZ4580GTR-E1 | AZ4580GTR-G1 | EG80       | GG80       | Tape & Reel  |

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****Absolute Maximum Ratings (Note 1)**

| Parameter                                | Smbol            | Value      |     | Unit |
|------------------------------------------|------------------|------------|-----|------|
| Power Supply Voltage                     | V <sub>CC</sub>  | + 20       |     | V    |
|                                          | V <sub>EE</sub>  | - 20       |     |      |
| Input Voltage                            | V <sub>I</sub>   | ± 15       |     | V    |
| Differential Input Voltage               | V <sub>ID</sub>  | ± 30       |     | V    |
| Operating Junction Temperature           | T <sub>J</sub>   | 150        |     | °C   |
| Storage Temperature Range                | T <sub>STG</sub> | -65 to 150 |     | °C   |
| Lead Temperature (Soldering 10s)         | T <sub>L</sub>   | 260        |     | °C   |
| Power Dissipation (T <sub>A</sub> =25°C) | P <sub>D</sub>   | TSSOP-8    | 400 | mW   |
|                                          |                  | SOIC-8     | 500 |      |
|                                          |                  | DIP-8      | 800 |      |

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.

**Recommended Operating Conditions**

| Parameter                   | Min     | Max      | Unit |
|-----------------------------|---------|----------|------|
| Supply Voltage              | $\pm 2$ | $\pm 18$ | V    |
| Operating Temperature Range | -40     | 85       | °C   |

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****Electrical Characteristics**Operating Conditions:  $V_{CC}=+15V$ ,  $V_{EE}=-15V$ ,  $T_A=25^{\circ}C$  unless otherwise specified.

| Parameter                                | Conditions                                          | Min      | Typ        | Max | Unit          |
|------------------------------------------|-----------------------------------------------------|----------|------------|-----|---------------|
| Supply Current                           | no load                                             |          | 4          | 7   | mA            |
| Input Offset Voltage                     | $R_S \leq 10K\Omega$                                |          | 0.5        | 3   | mV            |
| Input Offset Current                     | $V_{CM}=0V$                                         |          | 5          | 100 | nA            |
| Input Bias Current                       | $V_{CM}=0V$                                         |          | 150        | 500 | nA            |
| Input Common Mode Voltage Range          |                                                     | $\pm 12$ | $\pm 13.5$ |     | V             |
| Common Mode Rejection Ratio              | $V_{CM}=0V$ to $V_{CC}-1.5V$ , $R_S \leq 10K\Omega$ | 80       | 110        |     | dB            |
| Large Signal Voltage Gain                | $R_L=2K\Omega$ , $V_O=\pm 10V$                      | 90       | 110        |     | dB            |
| Power Supply Rejection Ratio             | $R_S \leq 10K\Omega$                                | 80       | 110        |     | dB            |
| Output Sink Current                      | $V-=1V$ , $V+=0V$ , $V_O=2V$                        |          | 80         |     | mA            |
| Output Source Current                    | $V+=1V$ , $V-=0V$ , $V_O=2V$                        |          | 45         |     | mA            |
| Slew Rate                                | $R_L \geq 2K\Omega$                                 |          | 7          |     | V/ $\mu$ S    |
| Gain Bandwidth Product                   | $R_L=2K\Omega$ , $f=10KHz$                          |          | 15         |     | MHz           |
| Total Harmonic Distortion                | $A_V=20dB$ , $V_O=5V$<br>$R_L=2K\Omega$ , $f=1KHz$  |          | 0.0005     |     | %             |
| Equivalent Input Noise Voltage           | RIAA $R_S=50\Omega$ , 30KHz LPF                     |          | 0.7        |     | $\mu V_{RMS}$ |
| Thermal Resistance<br>(Junction to Case) | DIP-8                                               |          | 43         |     | $^{\circ}C/W$ |
|                                          | SOIC-8                                              |          | 63         |     |               |

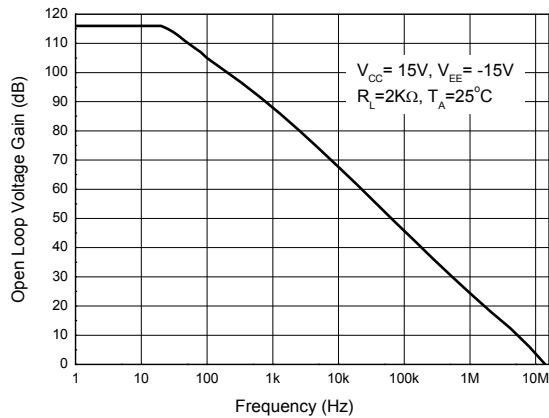
**Typical Performance Characteristics**

Figure 4. Open Loop Voltage Gain vs. Frequency

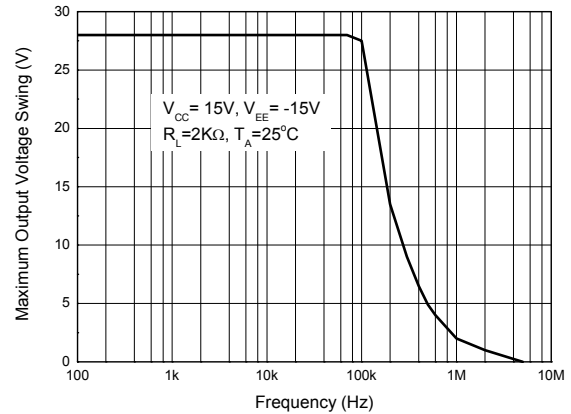


Figure 5. Maximum Output Voltage Swing vs. Frequency

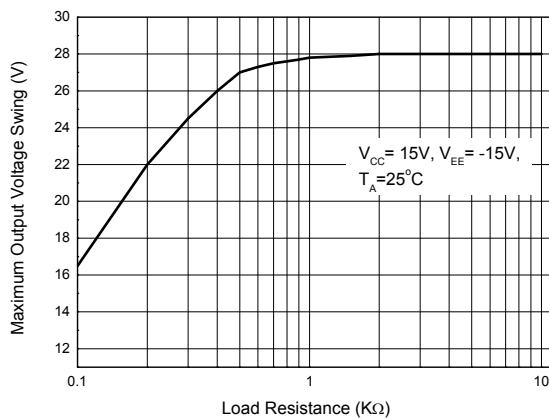


Figure 6. Maximum Output Voltage Swing vs. Load Resistance

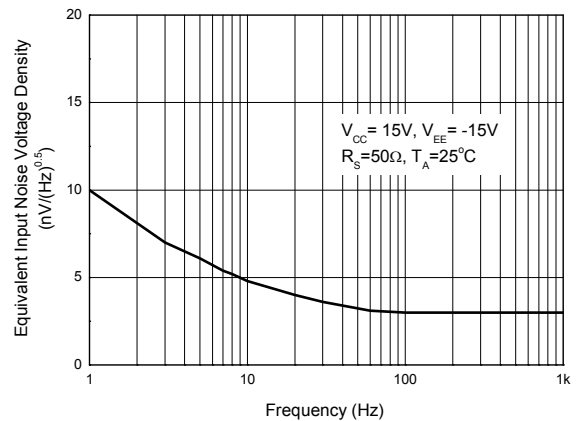


Figure 7. Equivalent Input Noise Voltage Density vs. Frequency

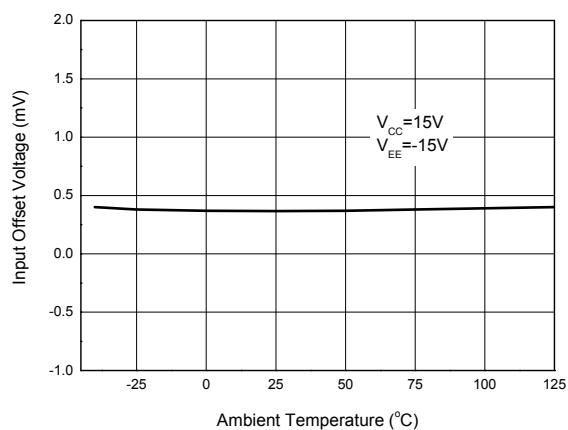
**Typical Performance Characteristics (Continued)**

Figure 8. Input Offset Voltage vs. Temperature

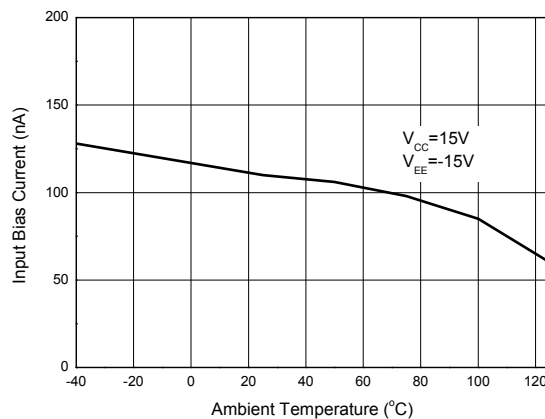


Figure 9. Input Bias Current vs. Temperature

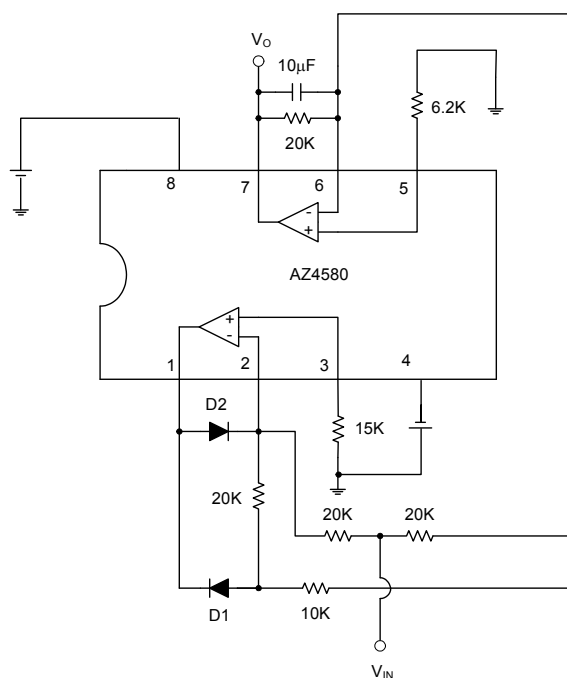
**Typical Applications**

Figure 10. Application of AZ4580 in an AC/DC Converter

### Typical Applications (Continued)

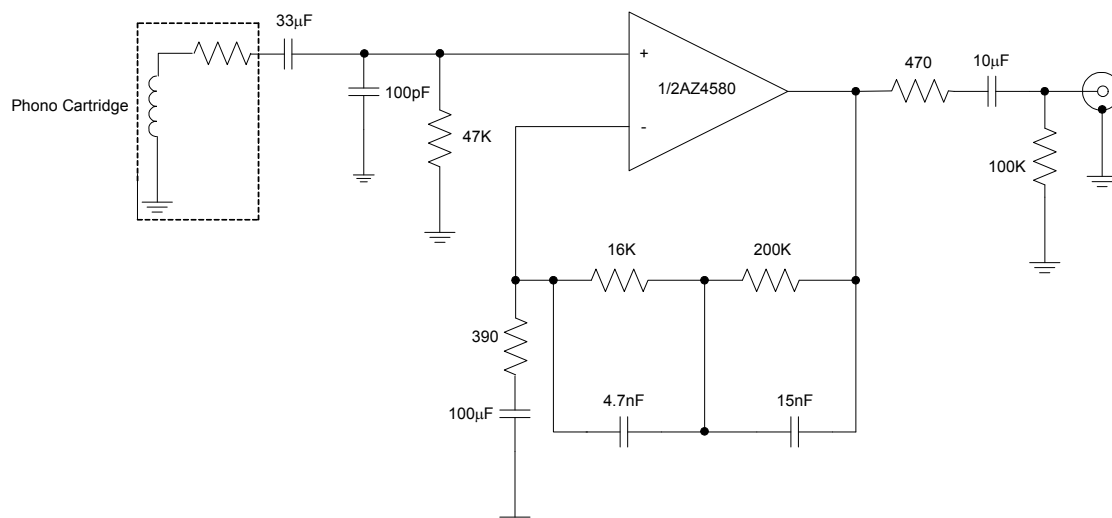


Figure 11. Application of AZ4580 in a RIAA Preamp

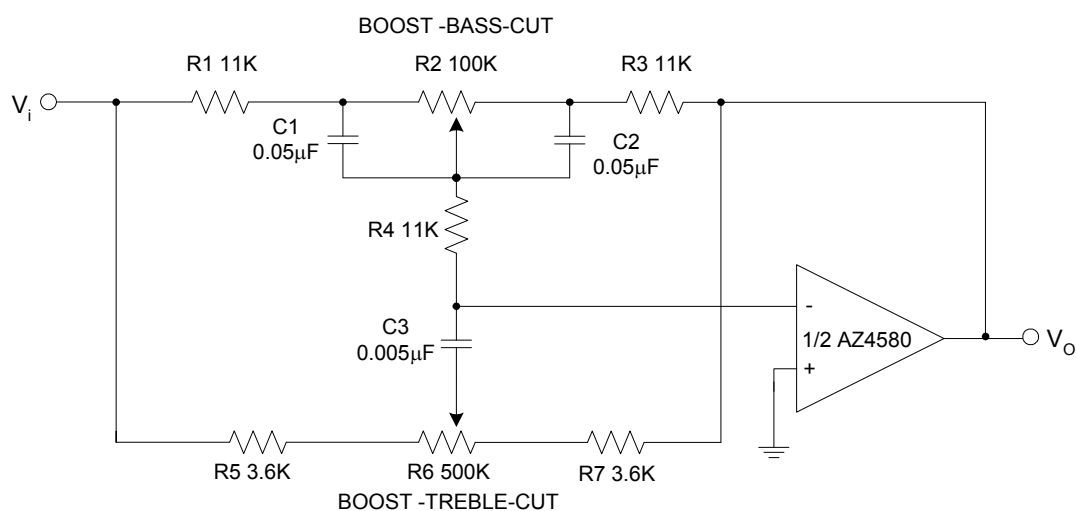
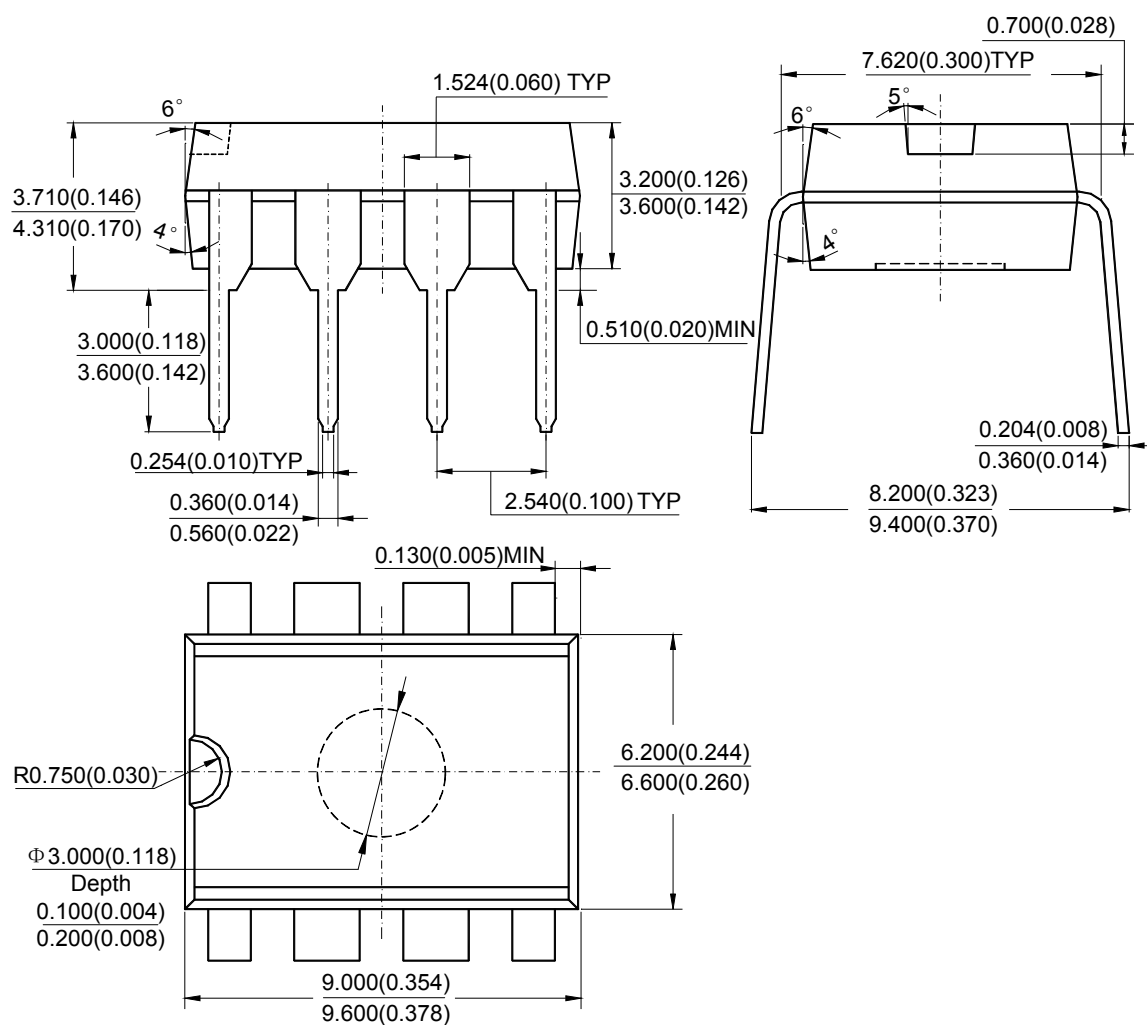
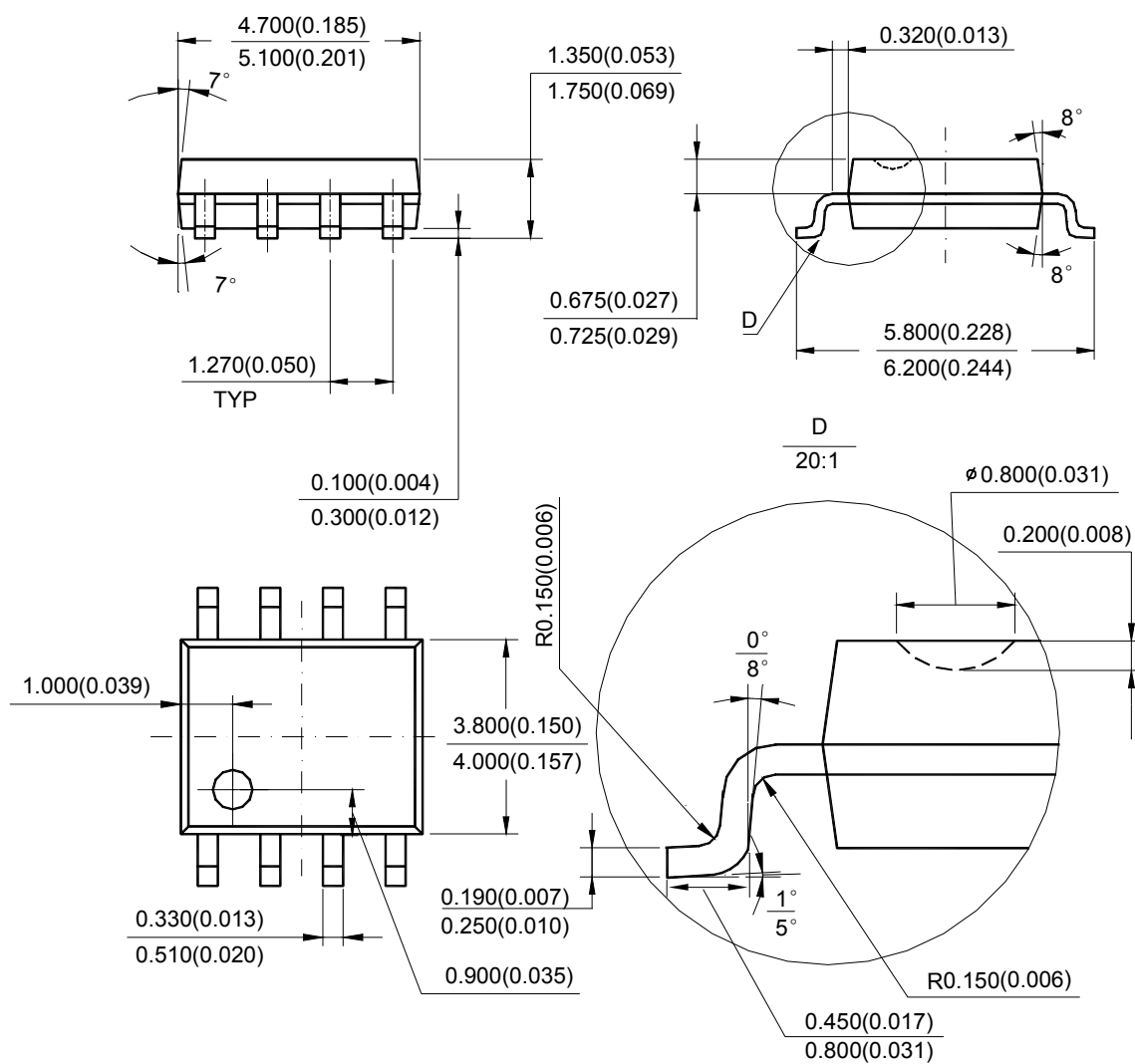


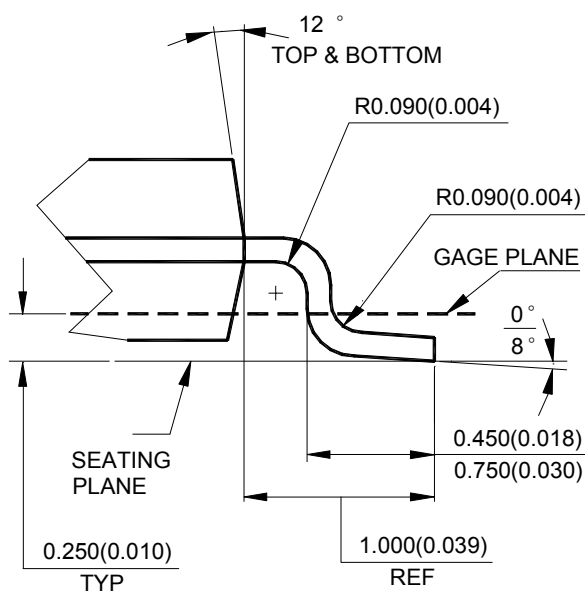
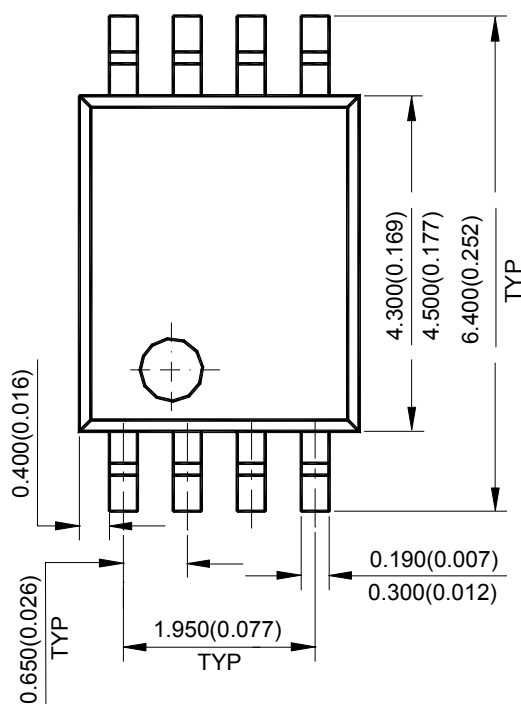
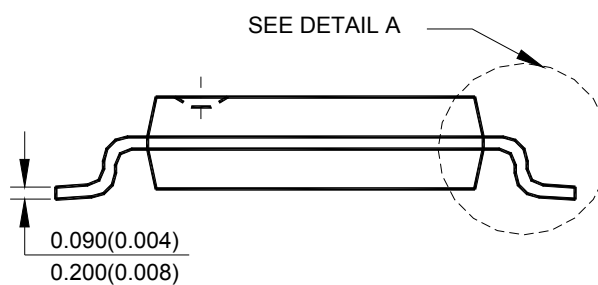
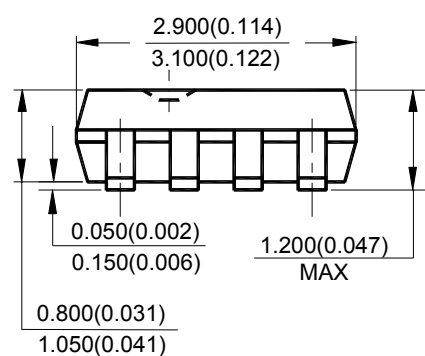
Figure 12. Application of AZ4580 in Tone Control

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****Mechanical Dimensions****DIP-8****Unit: mm(inch)**

Note: Eject hole, oriented hole and mold mark is optional.

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****Mechanical Dimensions (Continued)****SOIC-8****Unit: mm(inch)**

Note: Eject hole, oriented hole and mold mark is optional.

**DUAL LOW NOISE OPERATIONAL AMPLIFIERS****AZ4580****Mechanical Dimensions (Continued)****TSSOP-8****Unit: mm(inch)**

DETAIL A

Note: Eject hole, oriented hole and mold mark is optional.



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