

### Features

- Supply Range: 2.1V to 5.5V
- Supply Current: 0.4mA
- Input Offset Voltage: 3mV (MAX)
- Gain Bandwidth: 10MHz
- Rail-to-Rail Input and Output
- Slew rate: 8.5V/ $\mu$ s
- Operating Temperature: -40°C ~ +85°C
- Type Package: SOT353

### Applications

- Temperature Sensors
- Battery-Powered Instruments
- Smoke/Gas/Environment Sensors
- Medical Equipment
- Portable Instruments and Mobile Device
- Active Filters
- Piezo Electrical Transducer Amplifier
- Sensor Interface
- Handheld Test Equipment

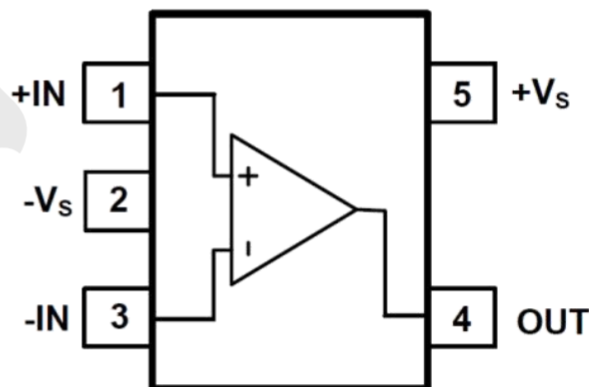
### General Description

The families of products offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth(10MHz) and slew rate (8.5V/ $\mu$ s). The operational amplifiers are unity gain stable and feature an ultra-low input bias current.

The has lower offset voltage, which is guaranteed not upper than 0.5mV at 25°C with  $V_s = 5V$ ,  $V_{CM} = V_s/2$ .

The families of operational amplifiers under single supplies of 2.1V to 5.5V or dual power supplies of  $\pm 1.05V$  to  $\pm 2.75V$ . The devices are ideal for sensor interfaces, active filters and portable applications.

### Pinout (top view)



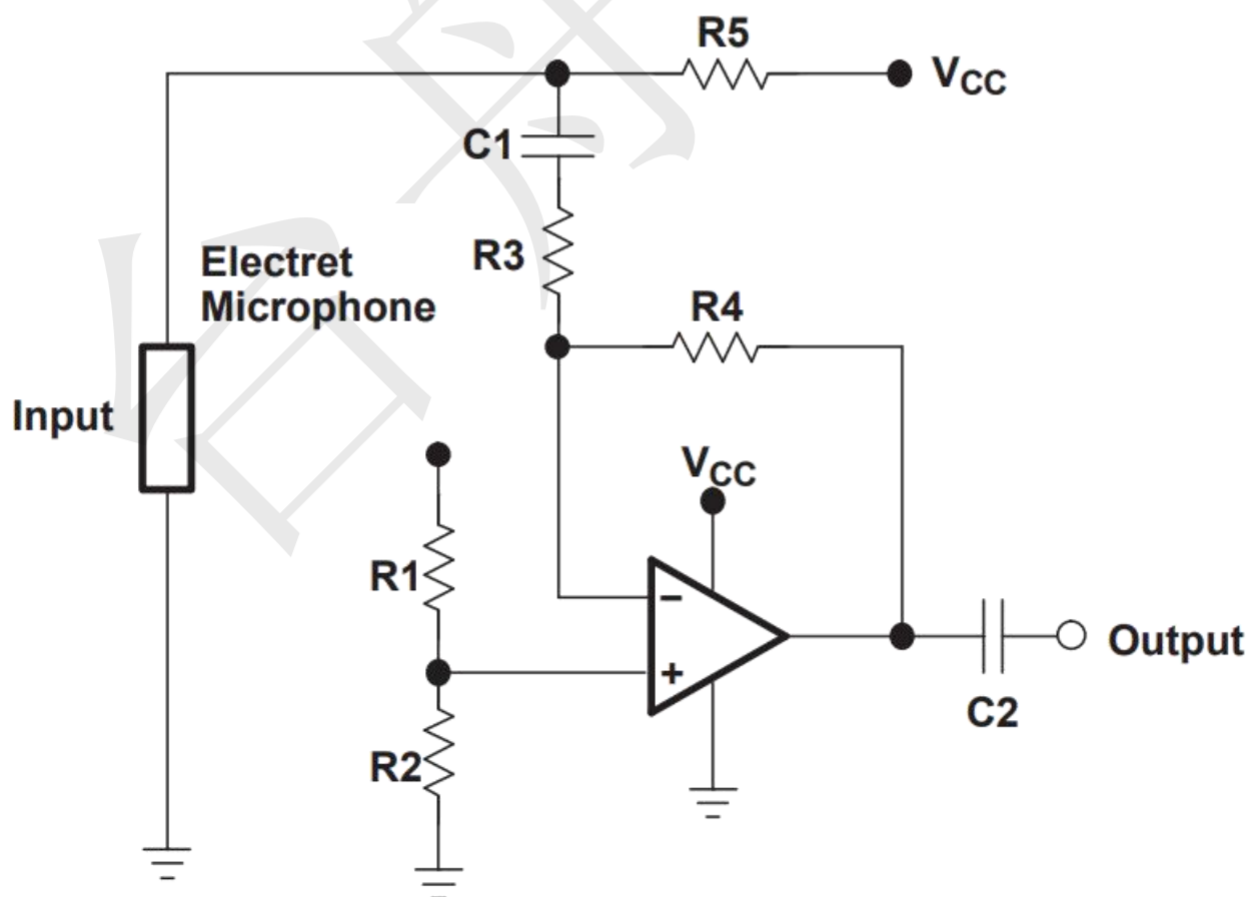
### Pin Configurations

| Pin Number | Pin Name | Pin Function                      |
|------------|----------|-----------------------------------|
| 1          | +IN      | In-phase input                    |
| 2          | -Vs      | Chip Supply Voltage(Negative)/GND |
| 3          | -IN      | Reverse input                     |
| 4          | OUT      | Output                            |
| 5          | +Vs      | Chip Supply Voltage(Positive)/VDD |

### Absolute Maximum Ratings (@TA = +25°C, unless otherwise specified.)

| Condition   |                                       | Rating            | UNIT |
|-------------|---------------------------------------|-------------------|------|
| VDD to GND  | Power Supply Voltage                  | -0.5V~+7V         | V    |
| IN+ or IN-  | Signal Input Terminals Voltage        | GND-0.5V~VDD+0.5V | V    |
| IIN         | Signal Input Terminals Current        | -10 ~ +10         | mA   |
| IOUT        | Signal output Terminals Current       | -150 ~ +150       | mA   |
| IOUT to GND | Output Short-Circuit                  | Continuous        | mA   |
| LT          | Lead Temperature (Soldering, 10 sec.) | 260               | °C   |
| TA          | Operating Temperature Range           | -40      125      | °C   |
| TJ          | Junction Temperature                  | -40      150      | °C   |
| Tstg        | Storage Temperature Range             | -65      150      | °C   |

### Typical Application



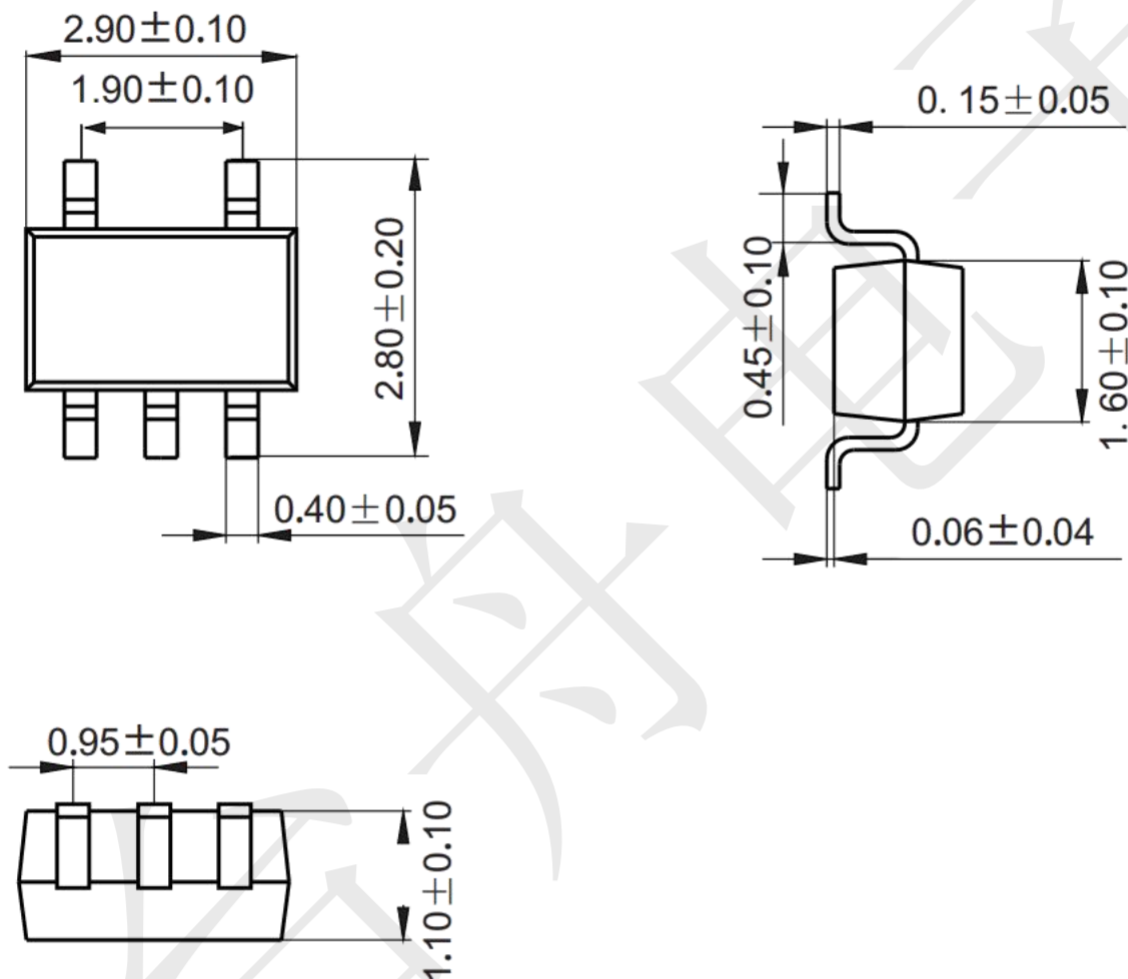
### Electrical Characteristics

(At  $T_A=+25^{\circ}\text{C}$ ,  $V_S=5\text{V}$ ,  $R_L=10\text{k}\Omega$  connected to  $V_S/2$ , and  $V_{OUT}=V_S/2$ , unless otherwise noted.)

| PARAMETER                          | SYMBOL             | CONDITIONS                                               | MIN  | TYP  | MAX | UNIT   |
|------------------------------------|--------------------|----------------------------------------------------------|------|------|-----|--------|
| POWER SUPPLY                       |                    |                                                          |      |      |     |        |
| Operating Voltage Range            | V <sub>S</sub>     |                                                          | 2.1  | --   | 5.5 | V      |
| Quiescent Current/Amplifier        | I <sub>Q</sub>     | V <sub>S</sub> =5V, IN+=V-, IN-=OUT                      | --   | 0.4  | --  | mA     |
| Power-Supply Rejection Ratio       | PSRR               | V <sub>S</sub> =2.5V to 5.5V, V <sub>CM</sub> =(V-)+0.5V | 75   | --   | --  | dB     |
| Turn-on Time                       | t <sub>ON</sub>    |                                                          | --   | 12   | --  | μs     |
| INPUT                              |                    |                                                          |      |      |     |        |
| Input Offset Voltage               | V <sub>OS</sub>    | V <sub>CM</sub> = V <sub>S</sub> /2,                     | -3   | ±0.2 | +3  | mV     |
| Input Offset Voltage Average Drift | V <sub>OS</sub> TC | T <sub>A</sub> =-40℃~+125℃                               | --   | ±2.6 | --  | uV/℃   |
| Input Bias Current                 | I <sub>B</sub>     |                                                          | -10  | ±1   | +10 | pA     |
| Input Offset Current               | I <sub>OS</sub>    |                                                          | -10  | ±1   | +10 | pA     |
| Common-Mode Voltage Range          | V <sub>CM</sub>    | V <sub>S</sub> =5.5V                                     | -0.2 | --   | 5.7 | V      |
| Common-Mode Rejection Ratio        | CMRR               | V <sub>S</sub> = 5.5V, V <sub>CM</sub> =-0.2V to 4V      | 70   | --   | --  | dB     |
|                                    |                    | V <sub>S</sub> = 5.5V, V <sub>CM</sub> =-0.2V to 5.7V    | 65   | --   | --  | dB     |
| OUTPUT                             |                    |                                                          |      |      |     |        |
| Open-Loop Voltage Gain             | A <sub>OL</sub>    | R <sub>L</sub> =2KΩ, V <sub>O</sub> =0.15V to 4.85V      | 86   | --   | --  | dB     |
|                                    |                    | R <sub>L</sub> =10KΩ, V <sub>O</sub> =0.05V to 4.95V     | 96   | --   | --  | dB     |
| Output Swing From Rail             |                    | R <sub>L</sub> =2KΩ                                      | --   | 50   | --  | mV     |
|                                    |                    | R <sub>L</sub> =10KΩ                                     | --   | 10   | --  | mV     |
| Output Current Source              | I <sub>OUT</sub>   |                                                          | --   | 140  | --  | mA     |
| FREQUENCY RESPONSE                 |                    |                                                          |      |      |     |        |
| Slew Rate                          | SR                 |                                                          | --   | 8.5  | --  | V/μs   |
| Gain-Bandwidth Product             | GBP                |                                                          | --   | 10   | --  | MHz    |
| Phase Margin                       | PM                 |                                                          | --   | 62   | --  | °      |
| Setting Time,0.1%                  | ts                 |                                                          | --   | 0.5  | --  | μs     |
| Overload Recovery Time             |                    | V <sub>IN</sub> ·Gain≥V <sub>S</sub>                     | --   | 3.2  | --  | μs     |
| NOISE                              |                    |                                                          |      |      |     |        |
| Input Voltage Noise Density        | en                 | f = 1KHz                                                 | --   | 9.5  | --  | nV/√Hz |
|                                    |                    | f = 10KHz                                                | --   | 6.5  | --  | nV/√Hz |

**Package informantion (Unit: mm)**

SOT353 (Unit: mm)



**Mounting Pad Layout (Unit: mm)**

