

## GENERAL DESCRIPTION

These devices consist of two independent, high gain, internally frequency-compensated operational amplifiers designed operate from a single supply over a wide range of voltages. Operation from split supplies also is possible if the difference between the two supplies is 3V to 36V, and  $V_{CC}$  is at least 1.5V more positive than the input common-mode voltage, the low supply-current drain is independent of the magnitude of the power supply voltage.

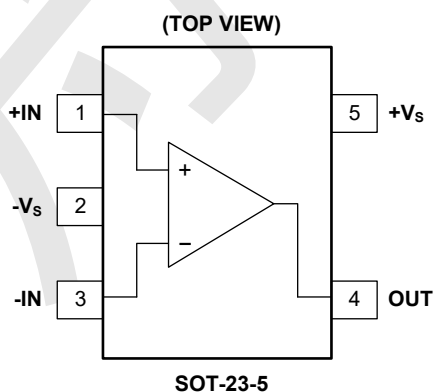
### Features

- One internally compensated OP amps
- Wide power supply range: 3V to 36V
- Large output voltage swing: 0V to  $V_{CC}-1.5V$
- Low input bias current
- Low input offset voltage and offset current
- Internally frequency compensated for unity gain
- Short Circuit Protected Outputs
- Input common-mode voltage range includes ground
- SOT-23-5L package

### Applications

- Multivibrators
- Oscillators
- Switching Telephone
- Portable Systems

### Pin Assignments



### Absolute Maximum Ratings

| Characteristics                             | Symbol           | Rating           | Unit                        |
|---|------------------|------------------|-----------------------------|
| Power Supply Voltage (Single Supply)        | $V_{CC}$         | 40               | V                           |
| Power Supply Voltage (Split Supplies)       | $V_{CC}, V_{SS}$ | $\pm 20$         | V                           |
| Input Differential Voltage Range            | $V_{IDR}$        | $\pm 20$         | V                           |
| Input Common Mode Voltage Range             | $V_{ICR}$        | -0.3 to $V_{CC}$ | V                           |
| Output Short Circuit Duration               | $T_{SC}$         | Continuous       |                             |
| Power Dissipation                           | PD               | 500              | mW                          |
| Storage Temperature Range                   | $T_{ST}$         | -55 to +165      | $^{\circ}\text{C}$          |
| Operating Junction Temperature              | $T_{OPJ}$        | -40 to +125      | $^{\circ}\text{C}$          |
| Junction Temperature Range                  | $T_J$            | 150              | $^{\circ}\text{C}$          |
| Thermal Resistance from Junction to case    | $\theta_{JC}$    | 110              | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance from Junction to ambient | $\theta_{JA}$    | 250              | $^{\circ}\text{C}/\text{W}$ |

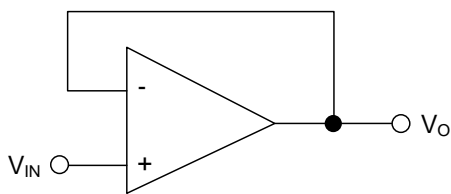
### Electrical Characteristics

( $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ , unless otherwise specified)

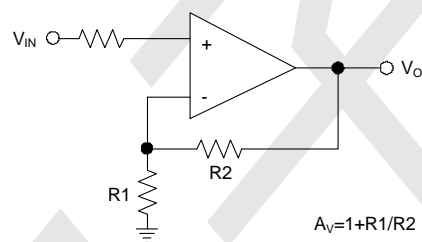
| Characteristics  | Symbol          | Conditions (Note1)                                     | Min               | Typ | Max  | Units            |
|--|-----------------|--|-------------------|-----|------|------------------|
| Input offset voltage(Note2)                                      | $V_{IO}$        | $V_{CC}=5V$ to Max, $V_{IC}=V_{ICR}$ min, $V_O=1.4V$   | 1                 | 5   | 11   | mV               |
| Average temperature coefficient of input offset voltage          | $\alpha V_{IO}$ |  | -                 | 7   | -    | $\mu V/^\circ C$ |
| Input offset current   | $I_{IO}$        | $V_O=1.4V$   | -                 | 2   | 50   | nA               |
| Average temperature coefficient of input offset current          | $\alpha I_{IO}$ |  | -                 | 10  | -    | $\mu A/^\circ C$ |
| Input bias current   | $I_{IB}$        | $I_{IN+}$ or $I_{IN-}$                                 | -                 | -20 | -250 | nA               |
| Common-mode input voltage range                                  | $V_{ICR}$       | $V_{CC}=5V$ to Max                                     | 0 to $V_{CC}-1.5$ | -   | -    | V                |
| High-level output voltage  | $V_{OH}$        | $V_{CC}=\text{Max}$ , $R_L=2K\Omega$                   | 26                | -   | -    | V                |
|  |                 | $V_{CC}=\text{Max}$ , $R_L \geq 10K\Omega$             | 27                | 28  | -    |                  |
| Low-level output voltage   | $V_{OL}$        | $R_L \geq 10K\Omega$                                   | -                 | 5   | 20   | mV               |
| Large-signal differential voltage amplification                  | $A_{VD}$        | $V_{CC}=15V$ , $V_O=1V$ to $11V$ , $R_L \geq 2K\Omega$ | 25                | 100 | -    | V/mV             |
| Common-mode rejection ratio                                      | CMRR            | $V_{CC}=5V$ to Max, $V_{IC}=V_{ICR}$ min.              | 65                | 80  | -    | dB               |
| Supply voltage rejection ratio ( $\Delta V_{CC}/\Delta V_{IO}$ ) | $K_{SVR}$       | $V_{CC}=5V$ to Max                                     | 65                | 100 | -    | dB               |
| Crosstalk attenuation  | $V_{OUT}$       | $F=1KHz$ to $20KHz$                                    | -                 | 120 | -    | dB               |
| Output current   | $I_O$           | $V_{CC}=15V$ , $V_{ID}=1V$ , $V_O=0V$                  | -20               | -30 | -    | mA               |
|  |                 | $V_{CC}=15V$ , $V_{ID}=-1V$ , $V_O=2V$                 | 10                | 20  | -    |                  |
|  |                 | $V_{ID}=-1V$ , $V_O=200mV$                             | 12                | 30  | -    | $\mu A$          |
| Short-circuit output current                                     | $I_{OS}$        | $V_{CC}=15V$ , $V_O=0V$                                | -                 | 40  | -    | mA               |
| Supply current   | $I_{CC}$        | $V_O=2.5V$ , No Load                                   | -                 | 0.7 | 1.2  | mA               |
|  |                 | $V_{CC}=\text{Max}$ , $V_O=0.5V_{CC}$ , No Load        | -                 | 1   | 2    |                  |

**APPLICATION CIRCUIT**

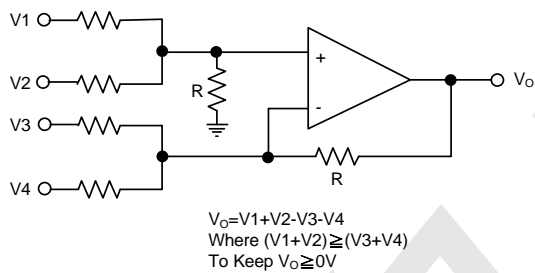
**Voltage Follower**



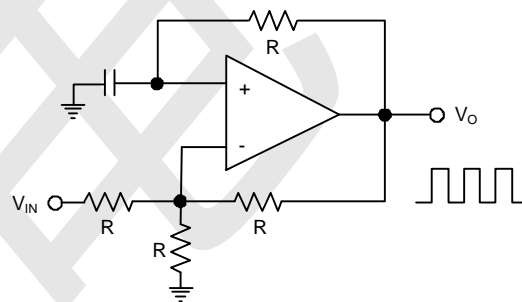
**Non Inverting DC Amplifier**



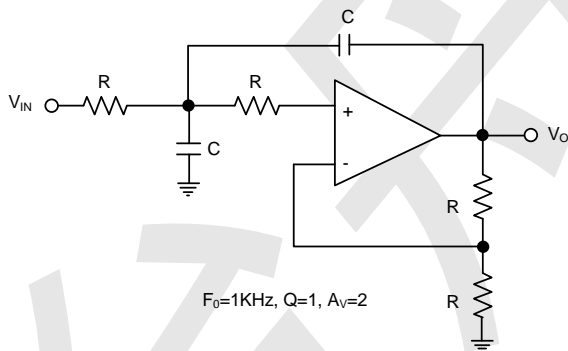
**DC Summing Amplifier**



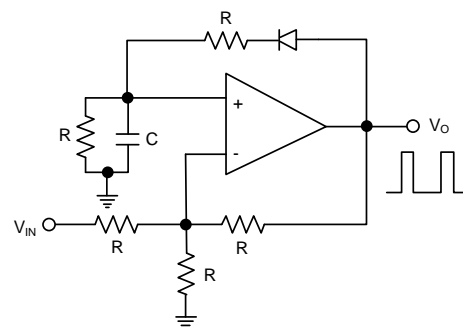
**Square-wave Oscillator**



**DC Coupled Low-Pass RC Active Filter**

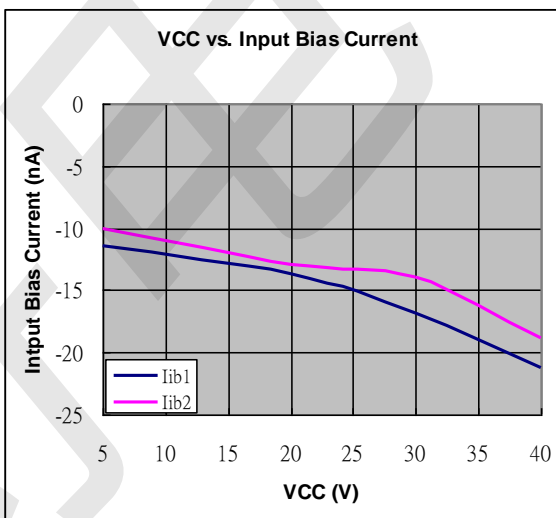
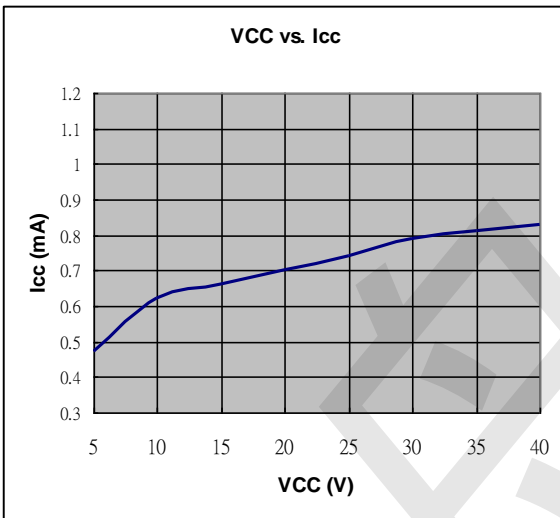
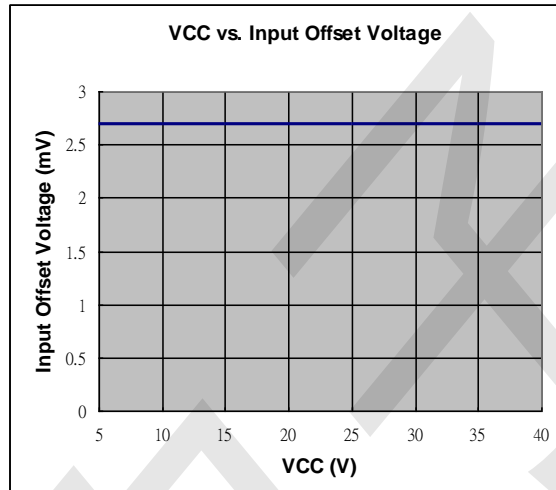
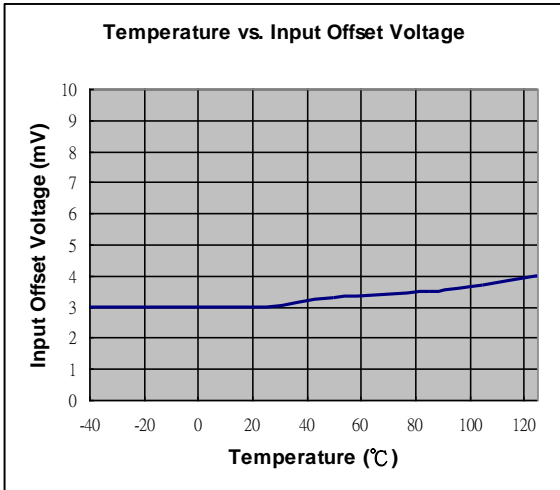


**Pulse Generator**



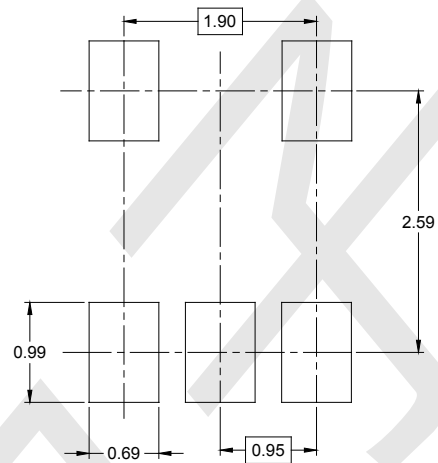
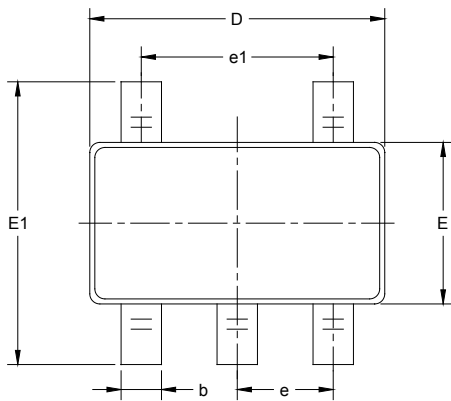


### Typical Performance Characteristics

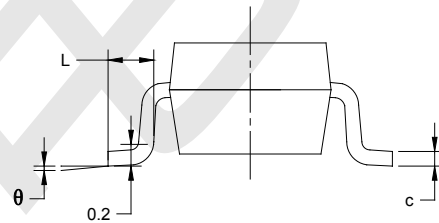
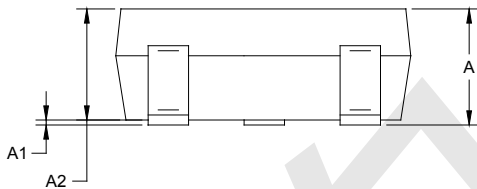


**Package Information**

**SOT-23-5**



RECOMMENDED LAND PATTERN (Unit: mm)



| Symbol   | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|----------|------------------------------|-------|-------------------------|-------|
|          | MIN                          | MAX   | MIN                     | MAX   |
| A        | 1.050                        | 1.250 | 0.041                   | 0.049 |
| A1       | 0.000                        | 0.100 | 0.000                   | 0.004 |
| A2       | 1.050                        | 1.150 | 0.041                   | 0.045 |
| b        | 0.300                        | 0.500 | 0.012                   | 0.020 |
| c        | 0.100                        | 0.200 | 0.004                   | 0.008 |
| D        | 2.820                        | 3.020 | 0.111                   | 0.119 |
| E        | 1.500                        | 1.700 | 0.059                   | 0.067 |
| E1       | 2.650                        | 2.950 | 0.104                   | 0.116 |
| e        | 0.950 BSC                    |       | 0.037 BSC               |       |
| e1       | 1.900 BSC                    |       | 0.075 BSC               |       |
| L        | 0.300                        | 0.600 | 0.012                   | 0.024 |
| $\theta$ | 0°                           | 8°    | 0°                      | 8°    |

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