

### Features

- Supply Voltage: 3.3V to 36V
- Offset Voltage:  $\pm 100\mu\text{V}$  Maximum
- Differential Input Voltage Range to Supply Rail, can Work as Comparator
- Input Rail to  $-V_s$ , Rail to Rail Output
- Bandwidth: 11MHz
- Slew Rate: 23V/μs
- Excellent EMI Suppress Performance: 45dB at 1GHz

- Quiescent Current: 2.7mA per Amplifier (Typ)
- $-40^\circ\text{C}$  to  $125^\circ\text{C}$  Operation Temperature Range
- Small Package:

GS2261 Available in SOT23-5 Package

GS2262 Available in SOP-8 and MSOP-8 Packages

GS2264 Available in SOP-14 and TSSOP-14 Packages

### General Description

The GS226X series amplifiers are newest high supply voltage amplifiers with low offset, low power and stable high frequency response. Good AC performance with 11MHz bandwidth, 23V/μs slew rate and low distortion while drawing only 2.7mA of quiescent current per amplifier. The input common-mode voltage range extends to  $-V_s$ , and the outputs swing rail-to-rail. The GS226X family can be used as plug-in replacements for many commercially available Op-Amps to reduce power and improve input/output range and performance. The GS2261 single is available in SOT23-5 package. The GS2262 Dual is available in Green SOP-8 and MSOP-8 packages. The GS2264 Quad is available in Green SOP-14 and TSSOP-14 packages.

### Applications

- Instrumentation
- Active Filters, ASIC Input or Output Amplifier
- Sensor Interface
- Motor Control
- Industrial Control

### Pin Configuration

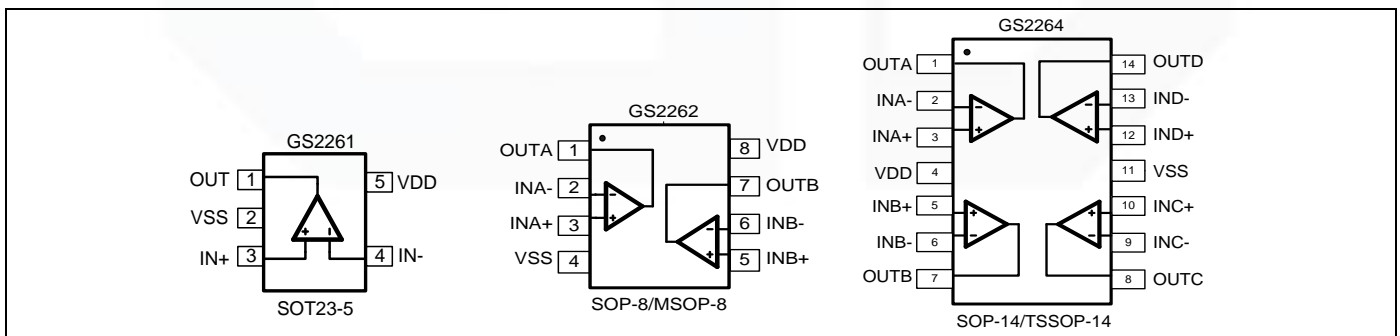


Figure 1. Pin Assignment Diagram

## Absolute Maximum Ratings

| Condition  | Min                   | Max                   |
|--|-----------------------|-----------------------|
| Power Supply Voltage (V <sub>DD</sub> to V <sub>SS</sub> ) | -0.5V                 | +40V                  |
| Analog Input Voltage (IN+ or IN-)                          | V <sub>SS</sub> -0.5V | V <sub>DD</sub> +0.5V |
| PDB Input Voltage  | V <sub>SS</sub> -0.5V | +40V                  |
| Operating Temperature Range                                | -40°C                 | +125°C                |
| Junction Temperature                                       | +160°C                |                       |
| Storage Temperature Range                                  | -55°C                 | +150°C                |
| Lead Temperature (soldering, 10sec)                        | +260°C                |                       |
| Package Thermal Resistance (T <sub>A</sub> =+25°C)         |                       |                       |
| SOP-8, θ <sub>JA</sub>                                     | 125°C/W               |                       |
| MSOP-8, θ <sub>JA</sub>                                    | 216°C/W               |                       |
| SOT23-5, θ <sub>JA</sub>                                   | 190°C/W               |                       |
| SOP-14, θ <sub>JA</sub>                                    | 120°C/W               |                       |
| TSSOP-14, θ <sub>JA</sub>                                  | 180°C/W               |                       |
| ESD Susceptibility   |                       |                       |
| HBM  | 2KV                   |                       |
| MM   | 300V                  |                       |

**Note:** Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

## Package/Ordering Information

| Model  | Channel | Order Number | Package Description | Package Option     | Marking Information |
|--------|---------|--------------|---------------------|--------------------|---------------------|
| GS2261 | Single  | GS2261-TR    | SOT23-5             | Tape and Reel,3000 | GS2261              |
| GS2262 | Dual    | GS2262-SR    | SOP-8               | Tape and Reel,4000 | GS2262              |
|        |         | GS2262-MR    | MSOP-8              | Tape and Reel,3000 | GS2262              |
| GS2264 | Quad    | GS2264-TR    | TSSOP-14            | Tape and Reel,3000 | GS2264              |
|        |         | GS2264-SR    | SOP-14              | Tape and Reel,2500 | GS2264              |

## Electrical Characteristics

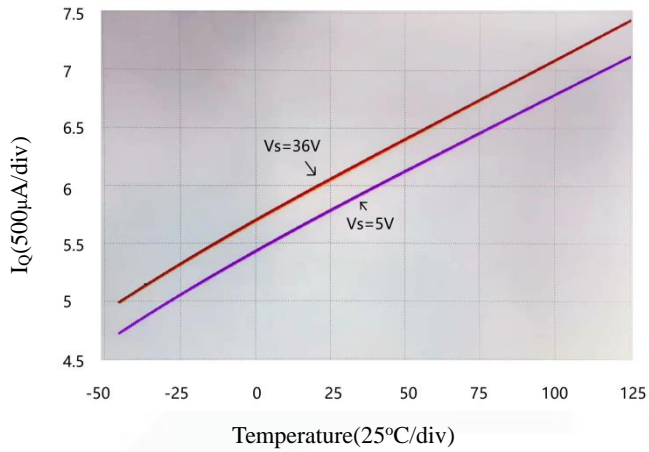
(All test condition is  $V_S = 30V$ ,  $T_A = 25^\circ C$ ,  $R_L = \infty$ , unless otherwise noted.)

| Parammeter                     | Symbol               | Conditions  | TYP                         |       |      |                   |
|--------------------------------|----------------------|---|-----------------------------|-------|------|-------------------|
| INPUT CHARACTERISTICS          |                      |   | TYP                         | MIN   | MAX  | UNIT              |
| Input Offset Voltage           | V <sub>OS</sub>      | V <sub>CM</sub> = V <sub>S</sub> /2                                       | 1.4                         | -100  | 100  | μV                |
| Input Bias Current             | I <sub>B</sub>       |   | 100                         |       |      | pA                |
| Input Offset Current           | I <sub>OS</sub>      |   | 25                          |       |      | pA                |
| Common-Mode Voltage Range      | V <sub>CM</sub>      | V <sub>S</sub> =30V   | 0 to (V <sub>S</sub> -1.5V) |       |      | V                 |
| Common-Mode Rejection Ratio    | CMRR                 | V <sub>S</sub> = 30V, V <sub>CM</sub> = 0V to 28.5V                       | 120                         | 100   |      | dB                |
| Open-Loop Voltage Gain         | A <sub>OL</sub>      | V <sub>S</sub> =30V, R <sub>L</sub> = 10kΩ, V <sub>CM</sub> = 0V to 28.5V | 130                         | 100   |      | dB                |
| Input Offset Voltage Drift     | ΔV <sub>OS</sub> /ΔT |   | 2.0                         |       |      | μV/°C             |
| OUTPUT CHARACTERISTICS         |                      |   |                             |       |      |                   |
| Output Voltage Swing from Rail | V <sub>OH</sub>      | V <sub>S</sub> =30V, R <sub>L</sub> = 10kΩ                                | 29.85                       | 29.65 |      | V                 |
|                                | V <sub>OL</sub>      |   | 100                         |       | 300  | mV                |
|                                | V <sub>OH</sub>      | V <sub>S</sub> =30V, R <sub>L</sub> = 2kΩ                                 | 29.25                       | 28.0  |      | V                 |
|                                | V <sub>OL</sub>      |   | 500                         |       | 1500 | mV                |
| Output Current                 | I <sub>SOURCE</sub>  | V <sub>S</sub> =30V   | 39                          |       |      | mA                |
|                                | I <sub>SINK</sub>    |   | 35                          |       |      |                   |
| POWER SUPPLY                   |                      |   |                             |       |      |                   |
| Operating Voltage Range        |                      |   | 3.3                         |       |      | V                 |
|                                |                      |   | 36                          |       |      | V                 |
| Power Supply Rejection Ratio   | PSRR                 | V <sub>S</sub> = +3.3V to +30V, V <sub>CM</sub> = +0.5V                   | 120                         | 100   |      | dB                |
| Quiescent Current / Amplifier  | I <sub>Q</sub>       |   | 2.7                         |       |      | mA                |
| DYNAMIC PERFORMANCE            |                      |   |                             |       |      |                   |
| Gain-Bandwidth Product         | GBP                  |   | 11                          |       |      | MHz               |
| Slew Rate                      | SR                   | G = +1, 5V Output Step  | 23                          |       |      | V/μs              |
| NOISE PERFORMANCE              |                      |   |                             |       |      |                   |
| Input Voltage Noise            | e <sub>n</sub> p-p   | f = 0.1Hz to 10Hz   | 3.0                         |       |      | μV <sub>RMS</sub> |
| Input Voltage Noise            | e <sub>n</sub>       | f = 1kHz  | 34                          |       |      | nV/√Hz            |
|                                |                      | f = 10kHz   | 13                          |       |      |                   |

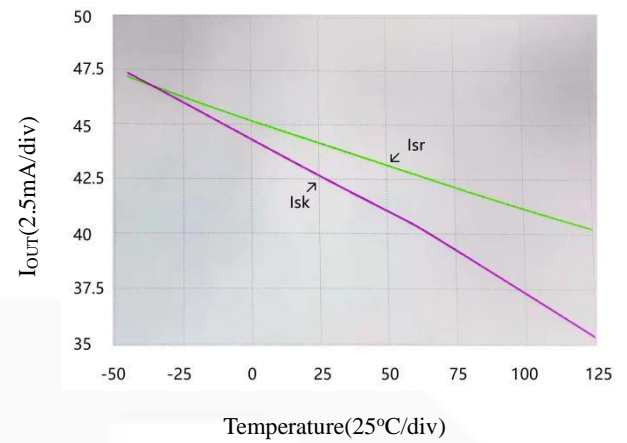
## Typical Performance Characteristics

$T_A = +25^\circ\text{C}$ ,  $V_S = +30\text{V}$ , and  $R_L = \infty$  connected to  $V_S/2$ , unless otherwise specified.

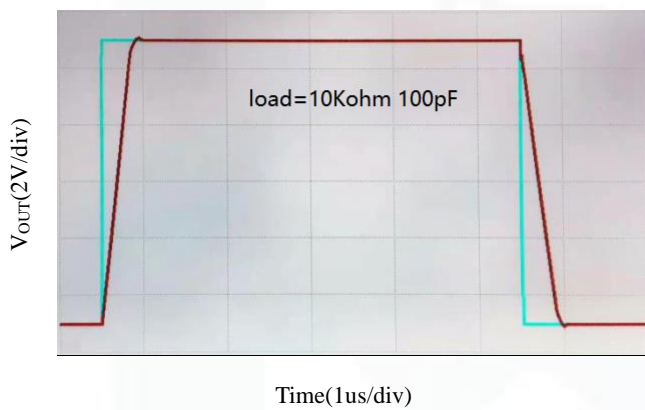
Supply Current(GS2262) vs. Temperature



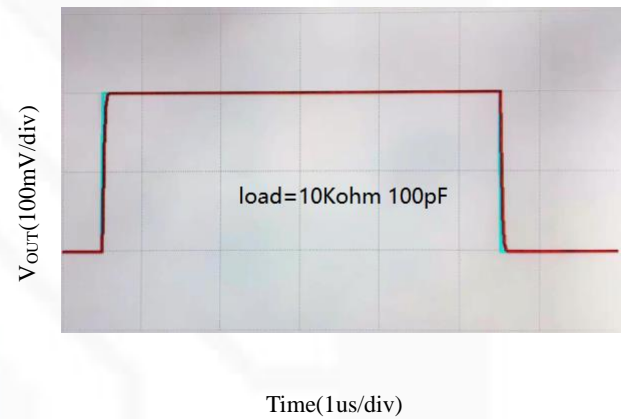
Output Short-Circuit Current vs. Temperature



Large Signal Pulse Response

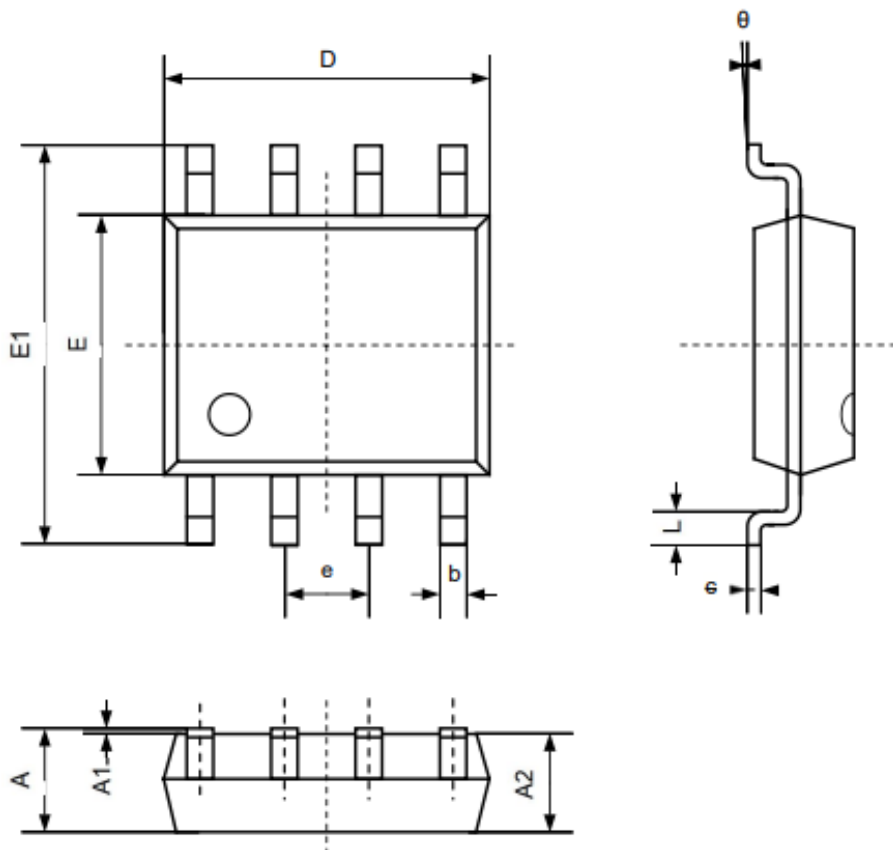


Small Signal Pulse Response

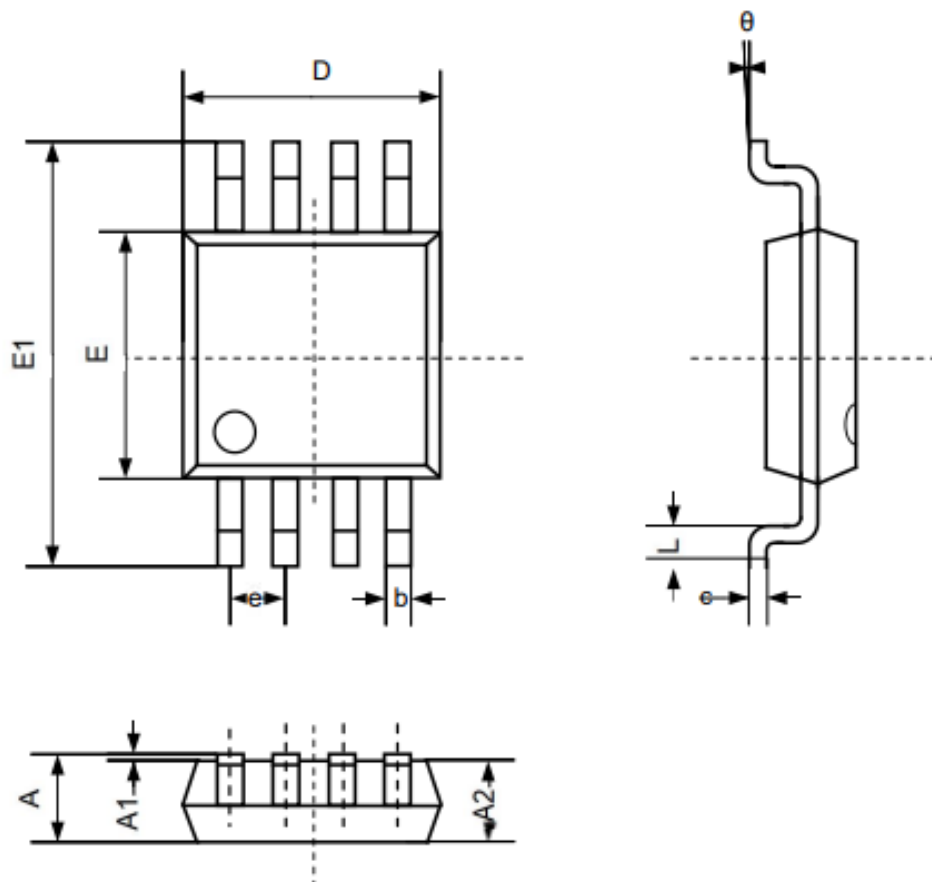


## Package Information

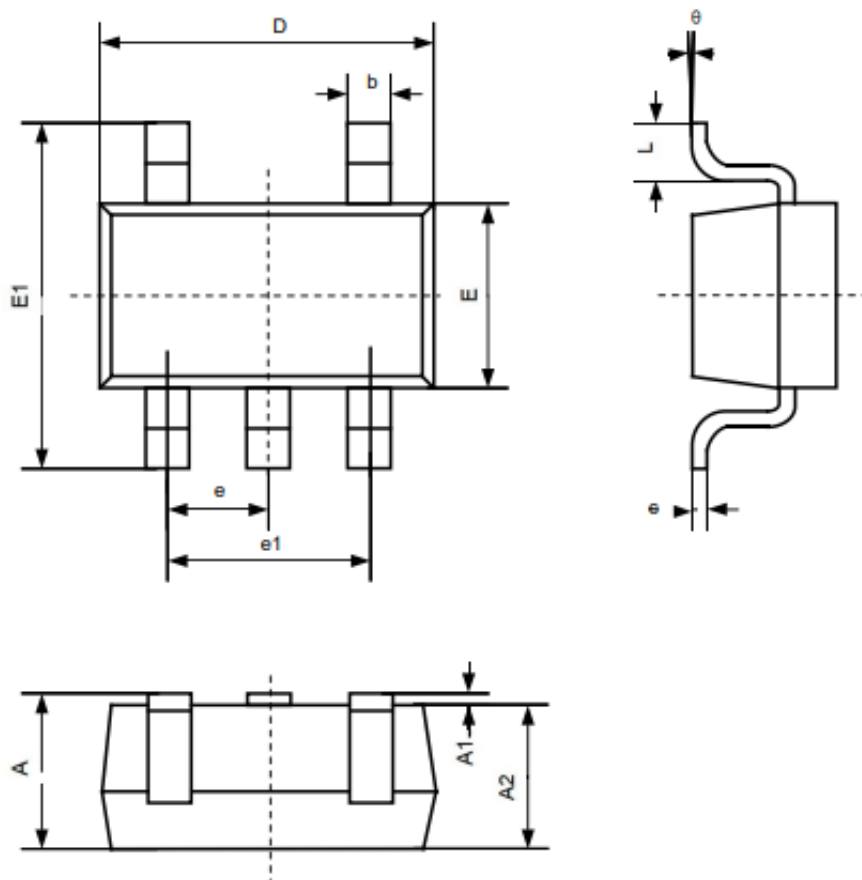
### SOP-8



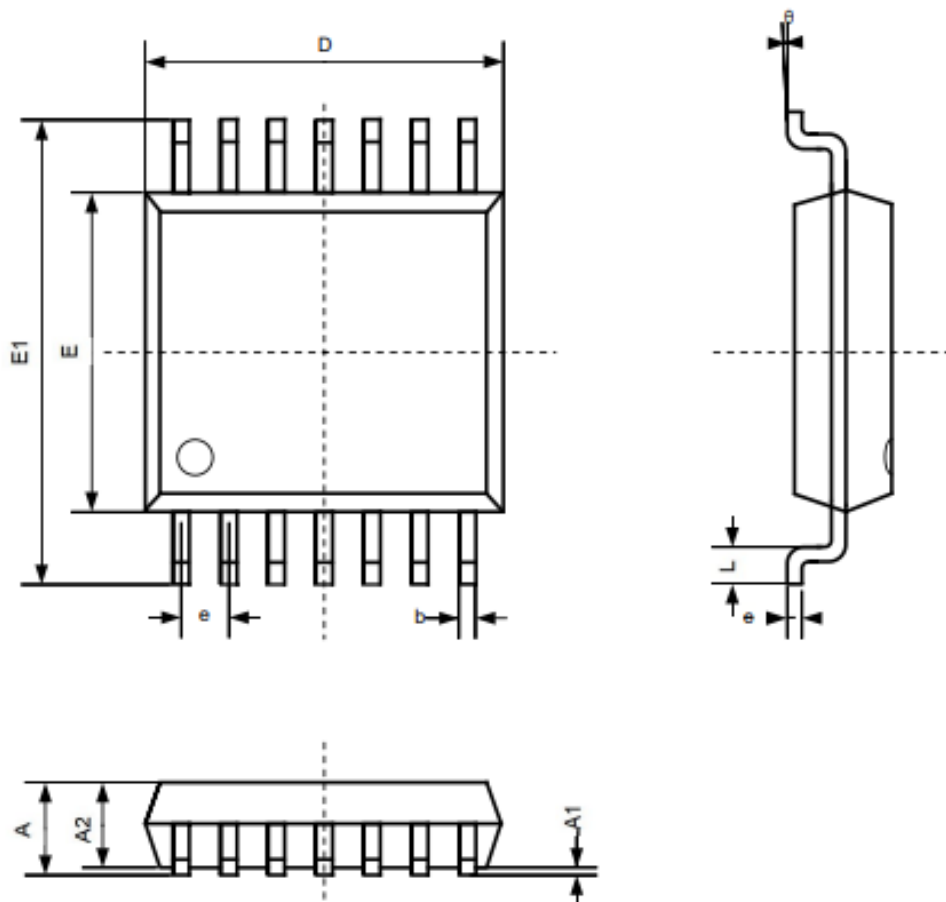
| Symbol | Dimensions in Millimeters |       | Dimensions in Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270 BSC                 |       | 0.050 BSC            |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

**MSOP-8**


| Symbol | Dimensions in Millimeters |       | Dimensions in Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.820                     | 1.100 | 0.032                | 0.043 |
| A1     | 0.020                     | 0.150 | 0.001                | 0.006 |
| A2     | 0.750                     | 0.950 | 0.030                | 0.037 |
| b      | 0.250                     | 0.380 | 0.010                | 0.015 |
| c      | 0.090                     | 0.230 | 0.004                | 0.009 |
| D      | 2.900                     | 3.100 | 0.114                | 0.122 |
| E      | 2.900                     | 3.100 | 0.114                | 0.122 |
| E1     | 4.750                     | 5.050 | 0.187                | 0.199 |
| e      | 0.650 BSC                 |       | 0.026 BSC            |       |
| L      | 0.400                     | 0.800 | 0.016                | 0.031 |
| θ      | 0°                        | 6°    | 0°                   | 6°    |

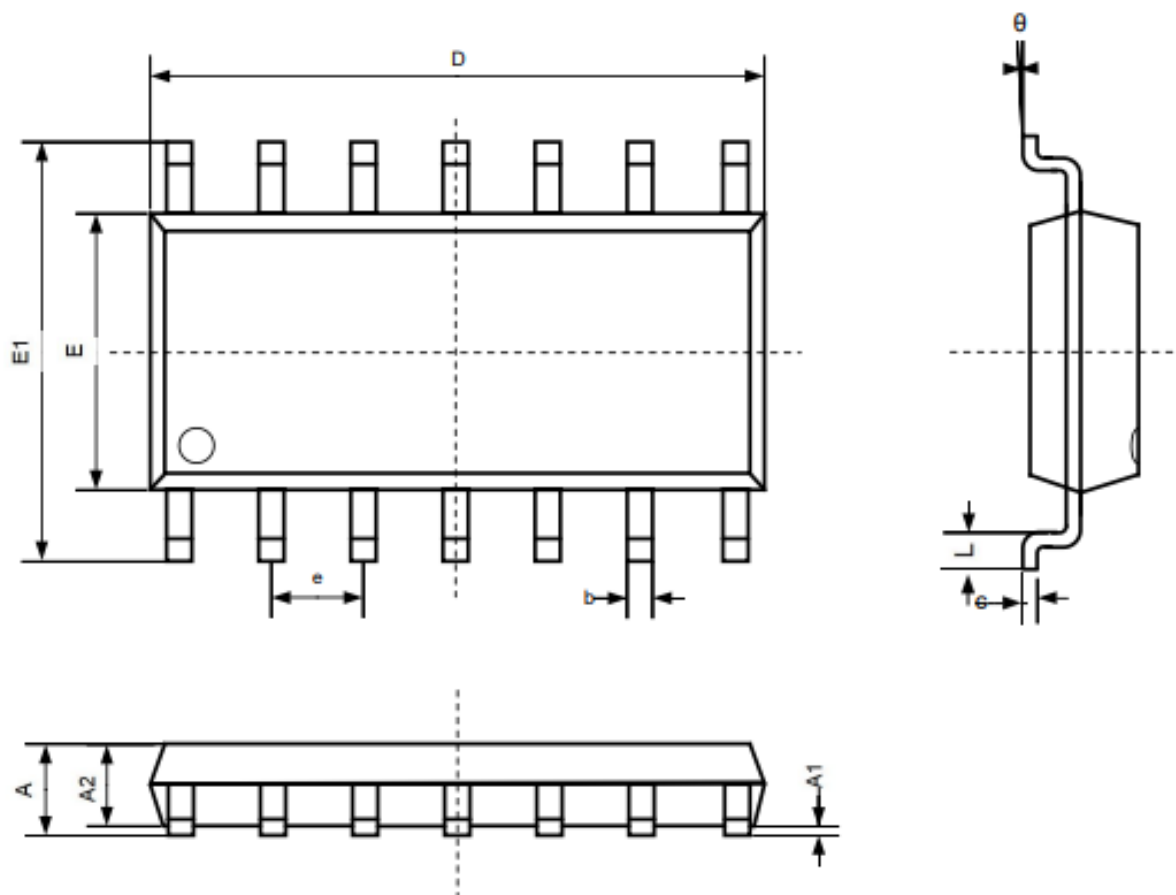
**SOT23-5**


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

**TSSOP-14**


| Symbol | Dimensions in Millimeters |       | Dimensions in Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      |                           | 1.200 |                      | 0.047 |
| A1     | 0.050                     | 0.150 | 0.002                | 0.006 |
| A2     | 0.800                     | 1.000 | 0.031                | 0.039 |
| b      | 0.190                     | 0.300 | 0.007                | 0.012 |
| c      | 0.090                     | 0.200 | 0.004                | 0.008 |
| D      | 4.900                     | 5.100 | 0.193                | 0.201 |
| E      | 4.300                     | 4.500 | 0.169                | 0.177 |
| E1     | 6.250                     | 6.550 | 0.246                | 0.258 |
| e      | 0.650 BSC                 |       | 0.026 BSC            |       |
| L      | 0.500                     | 0.700 | 0.020                | 0.028 |
| θ      | 1°                        | 7°    | 1°                   | 7°    |



**SOP-14**


| Symbol    | Dimensions in Millimeters |       | Dimensions in Inches |       |
|-----------|---------------------------|-------|----------------------|-------|
|           | Min                       | Max   | Min                  | Max   |
| <b>A</b>  | 1.350                     | 1.750 | 0.053                | 0.069 |
| <b>A1</b> | 0.100                     | 0.250 | 0.004                | 0.010 |
| <b>A2</b> | 1.250                     | 1.650 | 0.049                | 0.065 |
| <b>b</b>  | 0.360                     | 0.490 | 0.014                | 0.019 |
| <b>c</b>  | 0.130                     | 0.250 | 0.005                | 0.010 |
| <b>D</b>  | 8.530                     | 8.730 | 0.336                | 0.344 |
| <b>E</b>  | 3.800                     | 4.000 | 0.150                | 0.157 |
| <b>E1</b> | 5.800                     | 6.200 | 0.228                | 0.244 |
| <b>e</b>  | 1.270 BSC                 |       | 0.050 BSC            |       |
| <b>L</b>  | 0.450                     | 0.800 | 0.018                | 0.032 |
| <b>θ</b>  | 0°                        | 8°    | 0°                   | 8°    |