



钜地半导体  
Tudi Semiconductor

## Product Specification

TUDI-AD8601/AD8602/AD8604

精密、CMOS、单电源、轨到轨 输入/输出、宽带运算放大器

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## 产品特性

低失调电压：500  $\mu$ V(最大值)  
单电源供电：2.7 V至5.5 V  
低电源电流：每个放大器750  $\mu$ A  
宽带宽：8 MHz  
压摆率：5 V/ $\mu$ s  
低失真  
无相位反转  
低输入电流  
单位增益稳定  
通过汽车应用认证

## 应用

电流检测  
条形码扫描器  
PA控制  
电池供电仪器仪表  
多极滤波器  
传感器  
ASIC输入或输出放大器  
音频

## 概述

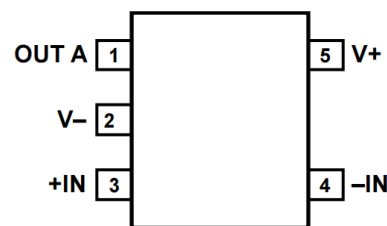
AD8601、AD8602和AD8604分别是单通道、双通道和四通 道、轨到轨输入和输出、单电源放大器，具有极低的失调 电压和宽信号带宽。这些放大器采用新型专利微调技术，无需激光微调便可达到出色的性能。所有器件均可采用3 V 至5 V单电源供电。

低失调、极低的输入偏置电流和高速度特性相结合，使这些放大器适合各种应用。滤波器、积分器、二极管放大器、分流传感器和高阻抗传感器等器件均可受益于这些特性组合。宽带宽和低失真特性则有益于音频和其它交流应 用。对于大部分成本敏感型应用，D级可在较低的价格下 提供一样的交流性能，但直流精度较低。

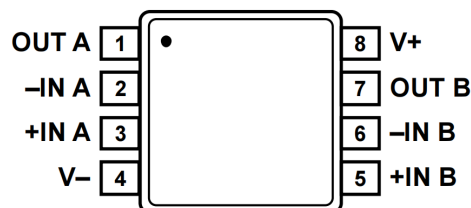
这些放大器的具体应用包括：便携式设备的音频放大、便 携式电话耳机、条形码扫描器、便携式仪器仪表、蜂窝PA 控制以及多极滤波器。

它还具有轨到轨输入与输出摆幅能力，因而设计人员可以 在单电源系统中缓冲CMOS ADC、DAC、ASIC及其它宽输出摆幅器件。

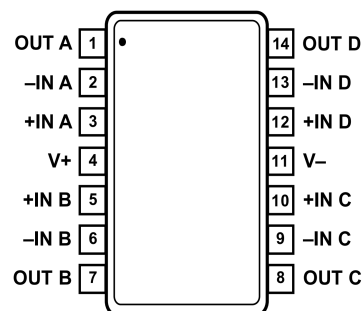
AD8601、AD8602和AD8604的额定温度范围为-40°C至 +125°C扩展工业温度范围。AD8601单通道放大器采用5引 脚小型SOT-23封装。AD8602双通道放大器提供8引脚 MSOP和8引脚窄体SOIC表面贴装两种封装。AD8604四通 道放大器提供14引脚TSSOP、14引脚SOIC和16引脚QSOP三种封装。有关汽车应用产品的信息，请参考“订购指南”。



5引脚SOT-23(RJ后缀)



8引脚MSOP(RM后缀)和8引脚SOIC(R后缀)



14引脚TSSOP(RU后缀)和14引脚SOIC(R后缀)



## 技术规格

### 电气特性

除非另有说明,  $V_S = 3\text{ V}$ ,  $V_{CM} = V_S/2$ ,  $T_A = 25^\circ\text{C}$ 。

表1.

| 参数                  | 符号                       | 条件                                                                                                                                                        | A级   |          |      | D级   |          |      | 单位                           |
|---------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|------|------|----------|------|------------------------------|
|                     |                          |                                                                                                                                                           | 最小值  | 典型值      | 最大值  | 最小值  | 典型值      | 最大值  |                              |
| 输入特性                |                          |                                                                                                                                                           |      |          |      |      |          |      |                              |
| 失调电压(AD8601/AD8602) | $V_{OS}$                 | $0\text{ V} \leq V_{CM} \leq 1.3\text{ V}$<br>$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ | 80   | 500      |      | 1100 | 6000     |      | $\mu\text{V}$                |
|                     |                          |                                                                                                                                                           |      | 700      |      |      | 7000     |      | $\mu\text{V}$                |
|                     |                          |                                                                                                                                                           |      | 1100     |      |      | 7000     |      | $\mu\text{V}$                |
|                     |                          | $0\text{ V} \leq V_{CM} \leq 3\text{ V}^1$<br>$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                         | 350  | 750      |      | 1300 | 6000     |      | $\mu\text{V}$                |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                                                                       |      | 1800     |      |      | 7000     |      | $\mu\text{V}$                |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                                      |      | 2100     |      |      | 7000     |      | $\mu\text{V}$                |
| 失调电压(AD8604)        | $V_{OS}$                 | $V_{CM} = 0\text{ V}$ 至 $1.3\text{ V}$<br>$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$     | 80   | 600      |      | 1100 | 6000     |      | $\mu\text{V}$                |
|                     |                          |                                                                                                                                                           |      | 800      |      |      | 7000     |      | $\mu\text{V}$                |
|                     |                          |                                                                                                                                                           |      | 1600     |      |      | 7000     |      | $\mu\text{V}$                |
|                     |                          | $V_{CM} = 0\text{ V}$ 至 $3.0\text{ V}^1$<br>$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                           | 350  | 800      |      | 1300 | 6000     |      | $\mu\text{V}$                |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                                                                       |      | 2200     |      |      | 7000     |      | $\mu\text{V}$                |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                                      |      | 2400     |      |      | 7000     |      | $\mu\text{V}$                |
| 输入偏置电流              | $I_B$                    | $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                                                                       | 0.2  | 60       |      | 0.2  | 200      |      | $\text{pA}$                  |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                                      | 25   | 100      |      | 25   | 200      |      | $\text{pA}$                  |
| 输入失调电流              | $I_{OS}$                 | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                                      | 150  | 1000     |      | 150  | 1000     |      | $\text{pA}$                  |
|                     |                          |                                                                                                                                                           | 0.1  | 30       |      | 0.1  | 100      |      | $\text{pA}$                  |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                                                                       |      | 50       |      |      | 100      |      | $\text{pA}$                  |
|                     |                          | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                                      |      | 500      |      |      | 500      |      | $\text{pA}$                  |
| 输入电压范围              |                          |                                                                                                                                                           | 0    |          | 3    | 0    |          | 3    | $\text{V}$                   |
| 共模抑制比               | CMRR                     | $V_{CM} = 0\text{ V}$ 至 $3\text{ V}$                                                                                                                      | 68   | 83       |      | 52   | 65       |      | $\text{dB}$                  |
| 大信号电压增益             | $A_{VO}$                 | $V_O = 0.5\text{ V}$ 至 $2.5\text{ V}$ ,<br>$R_L = 2\text{ k}\Omega$ , $V_{CM} = 0\text{ V}$                                                               | 30   | 100      |      | 20   | 60       |      | $\text{V/mV}$                |
| 失调电压漂移              | $\Delta V_{OS}/\Delta T$ |                                                                                                                                                           | 2    |          |      | 2    |          |      | $\mu\text{V}/^\circ\text{C}$ |
| 输出特性                |                          |                                                                                                                                                           |      |          |      |      |          |      |                              |
| 高输出电压               | $V_{OH}$                 | $I_L = 1.0\text{ mA}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                             | 2.92 | 2.95     |      | 2.92 | 2.95     |      | $\text{V}$                   |
|                     |                          |                                                                                                                                                           | 2.88 |          |      | 2.88 |          |      | $\text{V}$                   |
| 低输出电压               | $V_{OL}$                 | $I_L = 1.0\text{ mA}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                             |      | 20       | 35   |      | 20       | 35   | $\text{mV}$                  |
|                     |                          |                                                                                                                                                           |      |          | 50   |      |          | 50   | $\text{mV}$                  |
| 输出电流                | $I_{OUT}$                |                                                                                                                                                           |      | $\pm 30$ |      |      | $\pm 30$ |      | $\text{mA}$                  |
| 闭环输出阻抗              | $Z_{OUT}$                | $f = 1\text{ MHz}$ , $A_V = 1$                                                                                                                            |      | 12       |      |      | 12       |      | $\Omega$                     |
| 电源                  |                          |                                                                                                                                                           |      |          |      |      |          |      |                              |
| 电源抑制比               | PSRR                     | $V_S = 2.7\text{ V}$ 至 $5.5\text{ V}$                                                                                                                     | 67   | 80       |      | 56   | 72       |      | $\text{dB}$                  |
| 每放大器电源电流            | $I_{SY}$                 | $V_O = 0\text{ V}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                |      | 680      | 1000 |      | 680      | 1000 | $\mu\text{A}$                |
|                     |                          |                                                                                                                                                           |      |          | 1300 |      |          | 1300 | $\mu\text{A}$                |
| 动态性能                |                          |                                                                                                                                                           |      |          |      |      |          |      |                              |
| 压摆率                 | SR                       | $R_L = 2\text{ k}\Omega$                                                                                                                                  |      | 5.2      |      |      | 5.2      |      | $\text{V}/\mu\text{s}$       |
| 建立时间                | $t_s$                    | 至0.01%                                                                                                                                                    |      | <0.5     |      |      | <0.5     |      | $\mu\text{s}$                |
| 增益带宽积               | GBP                      |                                                                                                                                                           |      | 8.2      |      |      | 8.2      |      | $\text{MHz}$                 |
| 相位裕量                | $\Phi_o$                 |                                                                                                                                                           |      | 50       |      |      | 50       |      | 度                            |
| 噪声性能                |                          |                                                                                                                                                           |      |          |      |      |          |      |                              |
| 电压噪声密度              | $e_n$                    | $f = 1\text{ kHz}$                                                                                                                                        |      | 33       |      |      | 33       |      | $\text{nV}/\sqrt{\text{Hz}}$ |
|                     |                          | $f = 10\text{ kHz}$                                                                                                                                       |      | 18       |      |      | 18       |      | $\text{nV}/\sqrt{\text{Hz}}$ |
| 电流噪声密度              | $i_n$                    |                                                                                                                                                           |      | 0.05     |      |      | 0.05     |      | $\text{pA}/\sqrt{\text{Hz}}$ |

<sup>1</sup> 若  $V_{CM}$  在1.3 V到1.8 V之间,  $V_{OS}$  可超过额定值。



除非另有说明,  $V_S = 5.0\text{ V}$ ,  $V_{CM} = V_S/2$ ,  $T_A = 25^\circ\text{C}$ 。

表2.

| 参数                  | 符号                       | 条件                                                                                                                                                                  | A级    |       |       | D级    |                              |     | 单位         |
|---------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|------------------------------|-----|------------|
|                     |                          |                                                                                                                                                                     | 最小值   | 典型值   | 最大值   | 最小值   | 典型值                          | 最大值 |            |
| 输入特性                |                          |                                                                                                                                                                     |       |       |       |       |                              |     |            |
| 失调电压(AD8601/AD8602) | $V_{OS}$                 | $0\text{ V} \leq V_{CM} \leq 5\text{ V}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                    | 80    | 500   | 1300  | 6000  | $\mu\text{V}$                |     |            |
| 失调电压(AD8604)        | $V_{OS}$                 | $V_{CM} = 0\text{ V}$ 至 $5\text{ V}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                        | 80    | 600   | 1300  | 7000  | $\mu\text{V}$                |     |            |
| 输入偏置电流              | $I_B$                    | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$<br>$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$                                                         | 0.2   | 60    | 100   | 200   | $\text{pA}$                  |     |            |
| 输入失调电流              | $I_{OS}$                 | $-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$<br>$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ | 0.1   | 30    | 1000  | 1000  | $\text{pA}$                  |     |            |
| 输入电压范围              |                          |                                                                                                                                                                     | 0     |       | 5     | 0     |                              | 5   | $\text{V}$ |
| 共模抑制比               | CMRR                     | $V_{CM} = 0\text{ V}$ 至 $5\text{ V}$                                                                                                                                | 74    | 89    | 56    | 67    | $\text{dB}$                  |     |            |
| 大信号电压增益             | $A_{VO}$                 | $V_O = 0.5\text{ V}$ 至 $4.5\text{ V}$ ,<br>$R_L = 2\text{ k}\Omega$ , $V_{CM} = 0\text{ V}$                                                                         | 30    | 80    | 20    | 60    | $\text{V/mV}$                |     |            |
| 失调电压漂移              | $\Delta V_{OS}/\Delta T$ |                                                                                                                                                                     | 2     |       | 2     |       | $\mu\text{V}/^\circ\text{C}$ |     |            |
| 输出特性                |                          |                                                                                                                                                                     |       |       |       |       |                              |     |            |
| 高输出电压               | $V_{OH}$                 | $I_L = 1.0\text{ mA}$<br>$I_L = 10\text{ mA}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                               | 4.925 | 4.975 | 4.925 | 4.975 | $\text{V}$                   |     |            |
| 低输出电压               | $V_{OL}$                 | $I_L = 1.0\text{ mA}$<br>$I_L = 10\text{ mA}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                               | 4.7   | 4.77  | 4.7   | 4.77  | $\text{V}$                   |     |            |
| 输出电流                | $I_{OUT}$                |                                                                                                                                                                     | 15    | 30    | 15    | 30    | $\text{mA}$                  |     |            |
| 闭环输出阻抗              | $Z_{OUT}$                | $f = 1\text{ MHz}$ , $A_V = 1$                                                                                                                                      | 10    |       | 10    |       | $\Omega$                     |     |            |
| 电源                  |                          |                                                                                                                                                                     |       |       |       |       |                              |     |            |
| 电源抑制比               | PSRR                     | $V_S = 2.7\text{ V}$ 至 $5.5\text{ V}$                                                                                                                               | 67    | 80    | 56    | 72    | $\text{dB}$                  |     |            |
| 每放大器电源电流            | $I_{SY}$                 | $V_O = 0\text{ V}$<br>$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$                                                                                          | 750   | 1200  | 750   | 1200  | $\mu\text{A}$                |     |            |
| 动态性能                |                          |                                                                                                                                                                     |       |       |       |       |                              |     |            |
| 压摆率                 | SR                       | $R_L = 2\text{ k}\Omega$                                                                                                                                            | 6     |       | 6     |       | $\text{V}/\mu\text{s}$       |     |            |
| 建立时间                | $t_s$                    | 至0.01%                                                                                                                                                              | <1.0  |       | <1.0  |       | $\mu\text{s}$                |     |            |
| 全功率带宽               | BWp                      | <1%失真                                                                                                                                                               | 360   |       | 360   |       | $\text{kHz}$                 |     |            |
| 增益带宽积               | GBP                      |                                                                                                                                                                     | 8.4   |       | 8.4   |       | $\text{MHz}$                 |     |            |
| 相位裕量                | $\Phi_o$                 |                                                                                                                                                                     | 55    |       | 55    |       | 度                            |     |            |
| 噪声性能                |                          |                                                                                                                                                                     |       |       |       |       |                              |     |            |
| 电压噪声密度              | $e_n$                    | $f = 1\text{ kHz}$<br>$f = 10\text{ kHz}$                                                                                                                           | 33    |       | 33    |       | $\text{nV}/\sqrt{\text{Hz}}$ |     |            |
| 电流噪声密度              | $i_n$                    | $f = 1\text{ kHz}$                                                                                                                                                  | 18    |       | 18    |       | $\text{nV}/\sqrt{\text{Hz}}$ |     |            |
|                     |                          |                                                                                                                                                                     | 0.05  |       | 0.05  |       | $\text{pA}/\sqrt{\text{Hz}}$ |     |            |



## 绝对最大额定值

表3.

| 参数              | 额定值                |
|-----------------|--------------------|
| 电源电压            | 6 V                |
| 输入电压            | GND至V <sub>S</sub> |
| 差分输入电压          | ±6 V               |
| 存储温度范围          | −65°C至+150°C       |
| 工作温度范围          | −40°C至+125°C       |
| 结温范围            | −65°C至+150°C       |
| 引脚温度范围(焊接, 60秒) | 300°C              |
| ESD             | 2 kV HBM           |

注意, 超出上述绝对最大额定值可能会导致器件永久性损坏。这只是额定最值, 不表示在这些条件下或者在任何其它超出本技术规范操作章节中所示规格的条件下, 器件能够正常工作。长期在绝对最大额定值条件下工作会影响器件的可靠性。

## 热阻

$\theta_{JA}$  针对最差条件, 即利用标准4层板, 将器件焊接在电路板上以实现表贴封装。

表4. 热阻

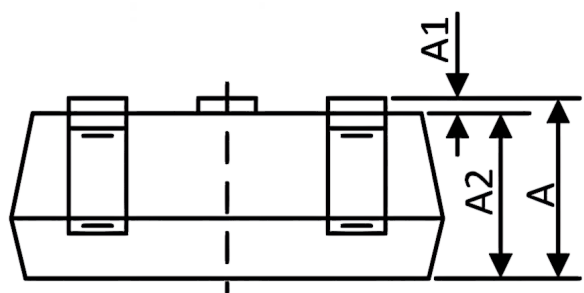
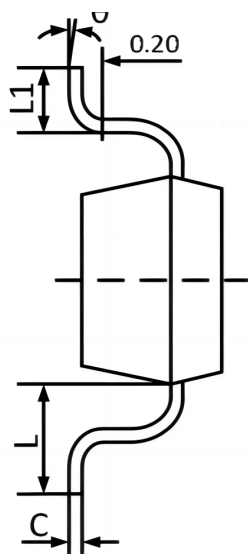
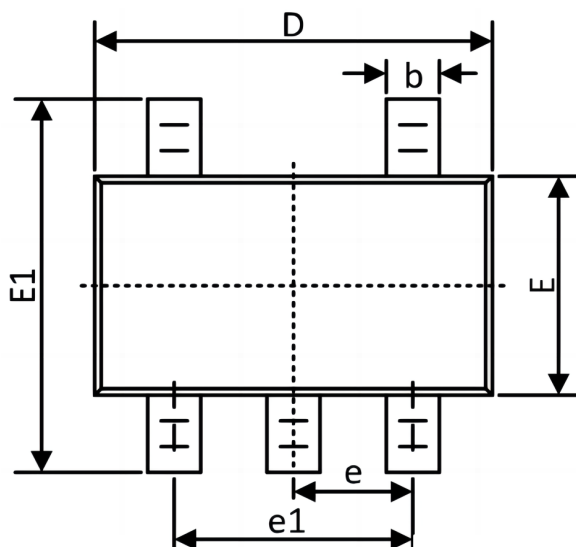
| 封装类型           | $\theta_{JA}$ | $\theta_{JC}$ | 单位   |
|----------------|---------------|---------------|------|
| 5引脚 SOT-23(RJ) | 190           | 92            | °C/W |
| 8引脚 SOIC(R)    | 120           | 45            | °C/W |
| 8引脚 MSOP(RM)   | 142           | 45            | °C/W |
| 14引脚 SOIC(R)   | 115           | 36            | °C/W |
| 14引脚 TSSOP(RU) | 112           | 35            | °C/W |
| 16引脚 QSOP(RQ)  | 115           | 36            | °C/W |



## Order information

| Order Number         | Package | Package Quantity | Marking<br>On The park |
|----------------------|---------|------------------|------------------------|
| AD8601ARTZ-REEL-TUDI | SOT23   | Tape,Reel,3000   | AD8601ARTZ-REEL        |
| AD8602ARMZ-REEL-TUDI | MSOP8   | Tape,Reel,2500   | AD8602ARMZ-REEL        |
| AD8602ARZ-REEL-TUDI  | SOP8    | Tape,Reel,2500   | AD8602ARZ-REEL         |
| AD8602DRMZ-REEL-TUDI | MSOP8   | Tape,Reel,2500   | AD8602DRMZ-REEL        |
| AD8602DRZ-REEL-TUDI  | SOP8    | Tape,Reel,2500   | AD8602DRZ-REEL         |
| AD8604ARUZ-REEL-TUDI | TSSOP14 | Tape,Reel,2500   | AD8604ARUZ-REEL        |
| AD8604ARZ-REEL-TUDI  | SOP14   | Tape,Reel,2500   | AD8604ARZ-REEL         |
| AD8604DRUZ-REEL-TUDI | TSSOP14 | Tape,Reel,2500   | AD8604DRUZ-REEL        |

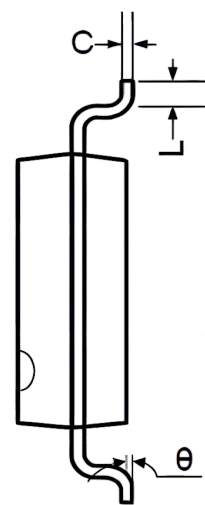
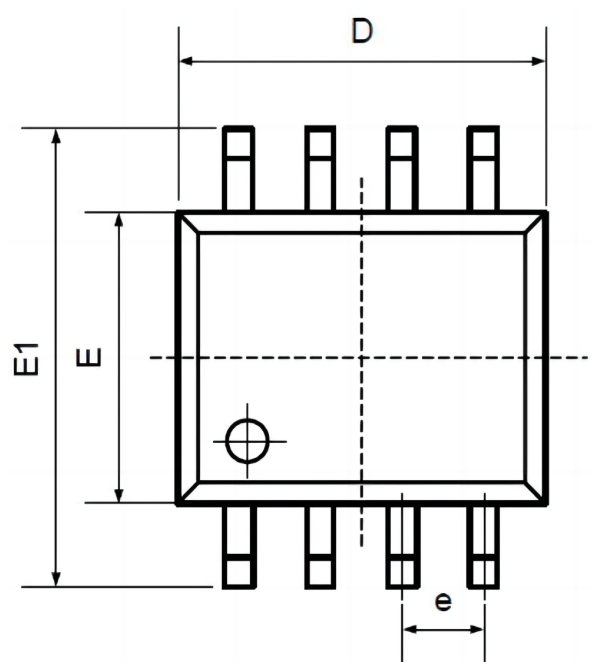
## Package SOT23-5



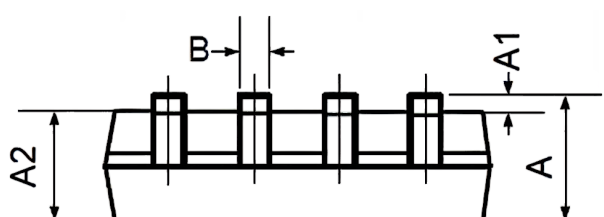
| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|--------|------------------------------|-------|-------------------------|-------|
|        | MIN                          | MAX   | MIN                     | MAX   |
| A      | 1.050                        | 1.250 | 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                        | 0.400 | 0.012                   | 0.016 |
| 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      | 0.950TYP                     |       | 0.037TYP                |       |
| e1     | 1.800                        | 2.000 | 0.071                   | 0.079 |
| L      | 0.700REF                     |       | 0.028REF                |       |
| L1     | 0.300                        | 0.600 | 0.012                   | 0.024 |
| θ      | 0°                           | 8°    | 0°                      | 8°    |



## Package SOP8

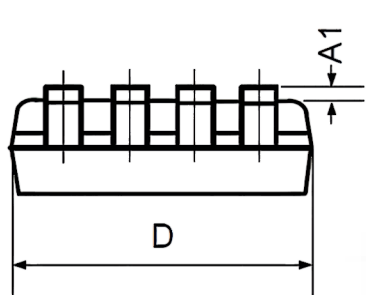
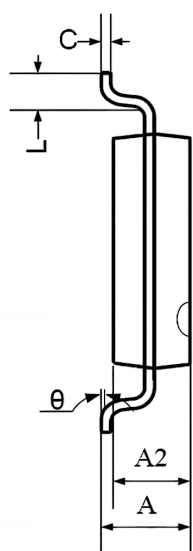
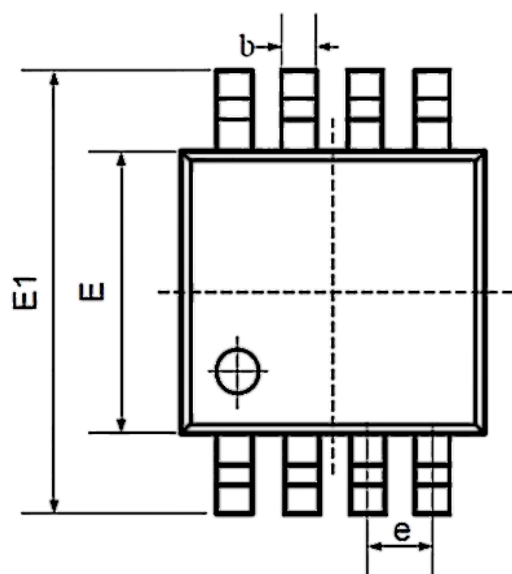


| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|--------|------------------------------|-------|-------------------------|-------|
|        | Min                          | Max   | Min                     | Max   |
| A      | 1.350                        | 1.750 | 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      | 0.190                        | 0.250 | 0.007                   | 0.010 |
| D      | 4.780                        | 5.000 | 0.188                   | 0.197 |
| E      | 3.800                        | 4.000 | 0.150                   | 0.157 |
| E1     | 5.800                        | 6.300 | 0.228                   | 0.248 |
| e      | 1.270TYP                     |       | 0.050TYP                |       |
| L      | 0.400                        | 1.270 | 0.016                   | 0.050 |
| θ      | 0°                           | 8°    | 0°                      | 8°    |



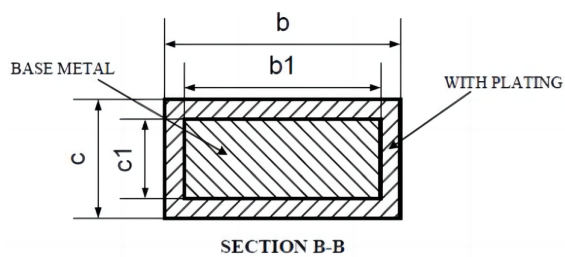
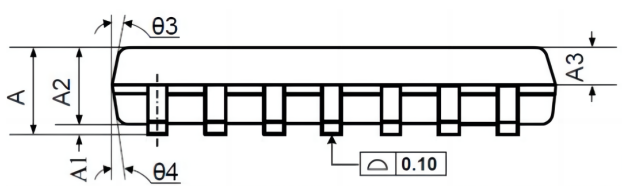
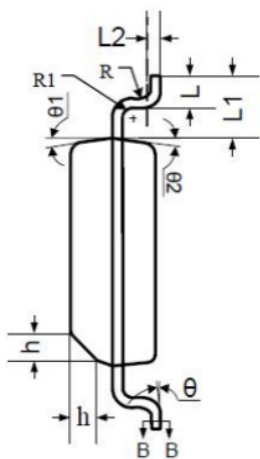
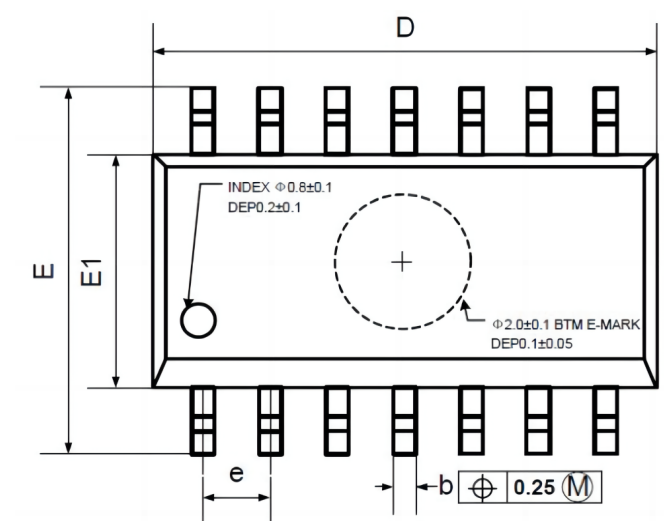


## Package MSOP8



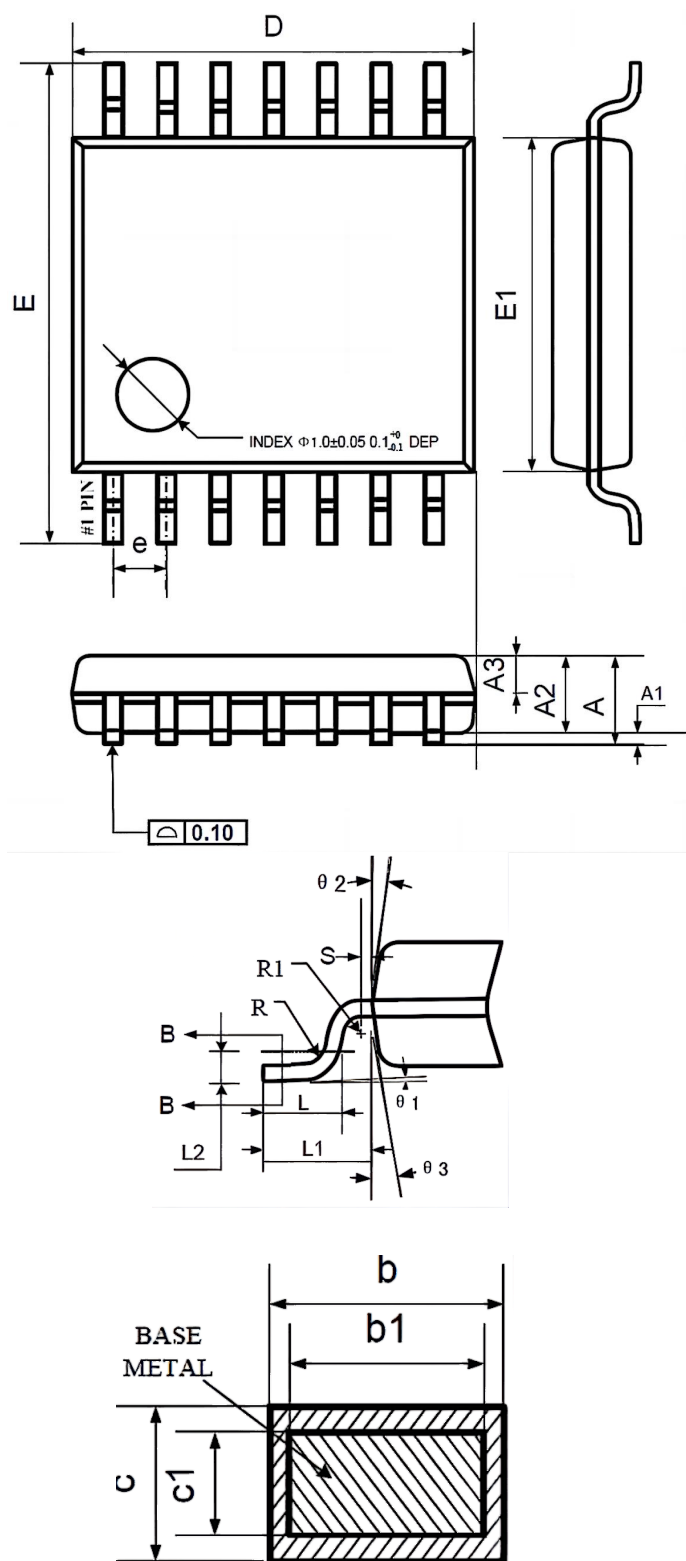
| Symbol | Dimensions<br>In Millimeters |       | Dimensions<br>In Inches |       |
|--------|------------------------------|-------|-------------------------|-------|
|        | Min                          | Max   | Min                     | Max   |
| A      | 0.800                        | 1.200 | 0.031                   | 0.047 |
| A1     | 0.000                        | 0.200 | 0.000                   | 0.008 |
| A2     | 0.760                        | 0.970 | 0.030                   | 0.038 |
| b      | 0.30 TYP                     |       | 0.012 TYP               |       |
| C      | 0.15 TYP                     |       | 0.006 TYP               |       |
| D      | 2.900                        | 3.100 | 0.114                   | 0.122 |
| e      | 0.65 TYP                     |       | 0.026 TYP               |       |
| E      | 2.900                        | 3.100 | 0.114                   | 0.122 |
| E1     | 4.700                        | 5.100 | 0.185                   | 0.201 |
| L      | 0.410                        | 0.650 | 0.016                   | 0.026 |
| θ      | 0°                           | 6°    | 0°                      | 6°    |

## Package SOP14



| Symbol | Dimensions<br>In Millimeters |      |      |
|--------|------------------------------|------|------|
|        | MIN                          | NOM  | MAX  |
| A      | 1.35                         | 1.60 | 1.75 |
| A1     | 0.10                         | 0.15 | 0.25 |
| A2     | 1.25                         | 1.45 | 1.65 |
| A3     | 0.55                         | 0.65 | 0.75 |
| b      | 0.36                         |      | 0.49 |
| b1     | 0.35                         | 0.40 | 0.45 |
| C      | 0.16                         |      | 0.25 |
| c1     | 0.15                         | 0.20 | 0.25 |
| D      | 8.53                         | 8.63 | 8.73 |
| E      | 5.80                         | 6.00 | 6.20 |
| E1     | 3.80                         | 3.90 | 4.00 |
| e      | 1.27 BSC                     |      |      |
| L      | 0.45                         | 0.60 | 0.80 |
| L1     | 1.04 REF                     |      |      |
| L2     | 0.25 BSC                     |      |      |
| R      | 0.07                         |      |      |
| R1     | 0.07                         |      |      |
| h      | 0.30                         | 0.40 | 0.50 |
| θ      | 0°                           |      | 8°   |
| θ1     | 6°                           | 8°   | 10°  |
| θ2     | 6°                           | 8°   | 10°  |
| θ3     | 5°                           | 7°   | 9°   |
| θ4     | 5°                           | 7°   | 9°   |

## Package TSSOP14



| Symbol     | Dimensions<br>In Millimeters |      |      |
|------------|------------------------------|------|------|
|            | MIN                          | NOM  | MAX  |
| A          | —                            | —    | 1.20 |
| A1         | 0.05                         | —    | 0.15 |
| A2         | 0.90                         | 1.00 | 1.05 |
| A3         | 0.34                         | 0.44 | 0.54 |
| b          | 0.20                         | —    | 0.28 |
| b1         | 0.20                         | 0.22 | 0.24 |
| C          | 0.10                         | —    | 0.19 |
| c1         | 0.10                         | 0.13 | 0.15 |
| D          | 4.86                         | 4.96 | 5.06 |
| E          | 6.20                         | 6.40 | 6.60 |
| E1         | 4.30                         | 4.40 | 4.50 |
| e          | 0.65 BSC                     |      |      |
| L          | 0.45                         | 0.60 | 0.75 |
| L1         | 1.00 REF                     |      |      |
| L2         | 0.25 BSC                     |      |      |
| R          | 0.09                         | —    | —    |
| R1         | 0.09                         | —    | —    |
| S          | 0.20                         | —    | —    |
| $\theta 1$ | 0°                           | —    | 8°   |
| $\theta 2$ | 10°                          | 12°  | 14°  |
| $\theta 3$ | 10°                          | 12°  | 14°  |



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