

Low power dual CMOS voltage comparator

Features

- Wide single supply range or dual supplies 3 V to 16 V or ±1.5 V to ±8 V
- Very low supply current: 0.1 mA/comparator independent of supply voltage
- Extremely low input bias current: 1 pA typ
- Extremely low input offset currents: 1 pA typ
- Low input offset voltage
- Input common-mode voltage range includes GND
- Low output saturation voltage 150 mV typical
- Output compatible with TTL, MOS and CMOS
- High input impedance: 10¹² Ω typical
- Fast response time: 200 ns typ for TTL level input step

Applications

- Battery powered electronics
- General-purpose portable device
- General-purpose low voltage application

Description

These devices consist of two independent precision voltage comparators, designed to operate with single or dual supplies.

These differential comparators use the STMicroelectronics silicon lin MOS process giving them an excellent consumption-speed ratio.

These devices are ideally suited for low consumption applications.

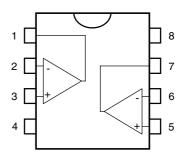


N DIP8 (plastic package)



D SO8 (plastic micropackage)

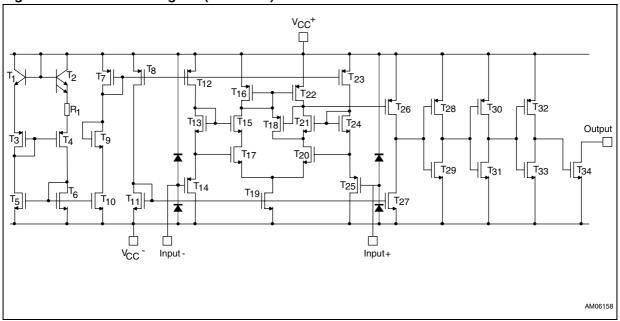
Pin connections (top view)



- 1 Output 1
- 2 Inverting Input 1
- 3 Non-inverting Input 1
- 4 V_{CC}
- 5 Non-inverting Input 2
- 6 Inverting Input 2
- 7 Output 2
- 8 V_{CC}+

1 Application schematic

Figure 1. Schematic diagram (1/2 TS372)



2 Absolute maximum ratings and operating conditions

Table 1. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|-------------------|-------------------------------------------------------|-------------|------|
| V _{CC} + | Supply voltage ^{(1) (2)} | 18 | V |
| V _{id} | Differential input voltage (3) | ±18 | V |
| V _i | Input voltage ⁽⁴⁾ | 18 | V |
| V _o | Output voltage | 18 | V |
| I _o | Output current | 20 | mA |
| I _F | Forward current in ESD protection diodes on input (5) | 50 | mA |
| | Duration of output circuit to GND ⁽⁶⁾ | Infinite | |
| p _d | Power dissipation ⁽⁷⁾ DIP8 SO8 | 1250 710 | mW |
| T _{stg} | Storage temperature range | -65 to +150 | °C |
| Tj | Junction temperature | +150 | °C |

- 1. Maximum power supply voltage when the comparator is not switching.
- 2. All voltage values, except differential voltage, are with respect to network ground terminal.
- 3. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
- 4. The magnitude of the input and the output voltages must never exceed the magnitude of the positive supply voltage.
- 5. Guaranteed by design.
- 6. Short-circuit from outputs to Vcc+ can cause excessive heating and eventual destruction.
- 7. Pd is calculated with T_{amb} = +25°C, T_j = +150°C and R_{thja} = 100°C/W for DIP8 package = 175°C/W for SO-8 package.

Table 2. Operating conditions

| Symbol | Parameter | Value | Unit |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------|
| V _{CC} + | Supply voltage | 3 to 16 | V |
| Vicm | Input common-mode voltage range ⁽¹⁾ $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max} TS372C$ $TS372I/TS372M$ | V _{CC} ⁺ -2 V _{CC} ⁺ -2.25 V _{CC} ⁺ -2.5 | V |
| T _{oper} | Operating free-air temperature range TS372C TS372I TS372M | 0 to +70 -40 to +125 -55 to +125 | °C |

1. And input voltages < = 12 V.



Electrical characteristics TS372

3 Electrical characteristics

Table 3. Electrical characteristics at V_{CC} + = 5 V, V_{CC} - = 0 V, Tamb = 25°C (unless otherwise specified)

| Symbol | Parameter | Min. | Тур. | Max. | Unit |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------------|----------|
| V _{io} | Input offset voltage ($V_{ic} = V_{icm \ min}$) (1) $T_{amb} = 25$ °C $T_{min} \le T_{amb} \le T_{max}$ | | 2 | 10 12 | mV |
| I _{io} | Input offset current $^{(2)}$ $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max} TS372C$ $TS372I/TS372M$ | | 1 | 100 200 | pA |
| I _{ib} | Input offset current $^{(2)}$ $T_{amb} = 25^{\circ}C$ $T_{min} \le T_{amb} \le T_{max}$ TS372C TS372I/TS372M | | 1 | 150 300 | pA |
| Гон | High level output current ($V_{id} = 1 \text{ V}$) $T_{amb} = 25^{\circ}\text{C V}_{OH} = 5 \text{ V}$ $T_{min} \le T_{amb} \le T_{max} V_{OH} = 15 \text{ V}$ | | 0.1 | 1 | nA μA |
| V _{OL} | Low level output voltage (V_{id} = -1, I_{OL} = 4 mA) T_{amb} = 25°C $T_{min} \le T_{amb} \le T_{max}$ | | 100 | 400 700 | mV |
| I _{OL} | Low level output current (V _{id} = -1, V _{OL} = 1.5 V) | 6 | 45 | | mA |
| I _{CC} | Supply current (each comparator) (V _{id} = 1 V, no load) | | 150 | 375 | μΑ |

^{1.} The specified offset voltage is the maximum value required to drive the output down to 400 mV or up to 4 V with $R_L = 100 \text{ k}\Omega$ to V_{cc} +

Table 4. Switching characteristics (V_{CC} + = 5 V, Tamb = 25°C)

| Symbol | Parameter | Min. | Тур. | Max. | Unit |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------|------|------|
| T | Response time $(R_L = 5.1 \text{ k}\Omega \text{ connected to 5 V, } C_L = 15 \text{ pF}^{(1)}$ 100mV input step with 5mV overdrive TTL level input step | | 600 200 | | ns |

The specified response time is the internal between the input signal and the instant when the output signal crosses 1.4 V.

Note: If one of the two channels is not used, it must be configured with a differential input voltage greater than 100 mV to avoid switching.

^{2.} Maximum values including unavoidable inaccuracies of the industrial test.

TS372 Package information

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Package information TS372

4.1 DIP8 package information

Figure 2. DIP8 package mechanical drawing

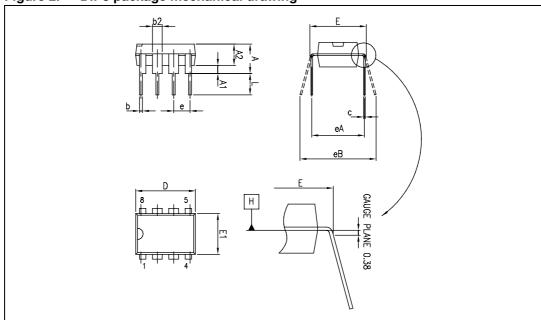


Table 5. DIP8 package mechanical data

| | Dimensions | | | | | |
|------|------------|-------------|-------|-------|--------|-------|
| Ref. | | Millimeters | | | Inches | |
| | Min. | Тур. | Max. | Min. | Тур. | Max. |
| Α | | | 5.33 | | | 0.210 |
| A1 | 0.38 | | | 0.015 | | |
| A2 | 2.92 | 3.30 | 4.95 | 0.115 | 0.130 | 0.195 |
| b | 0.36 | 0.46 | 0.56 | 0.014 | 0.018 | 0.022 |
| b2 | 1.14 | 1.52 | 1.78 | 0.045 | 0.060 | 0.070 |
| С | 0.20 | 0.25 | 0.36 | 0.008 | 0.010 | 0.014 |
| D | 9.02 | 9.27 | 10.16 | 0.355 | 0.365 | 0.400 |
| E | 7.62 | 7.87 | 8.26 | 0.300 | 0.310 | 0.325 |
| E1 | 6.10 | 6.35 | 7.11 | 0.240 | 0.250 | 0.280 |
| е | | 2.54 | | | 0.100 | |
| eA | | 7.62 | | | 0.300 | |
| eB | | | 10.92 | | | 0.430 |
| L | 2.92 | 3.30 | 3.81 | 0.115 | 0.130 | 0.150 |

TS372 Package information

4.2 SO-8 package information

Figure 3. SO-8 package mechanical drawing

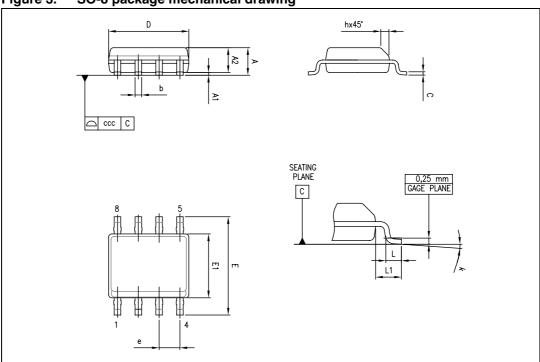


Table 6. SO-8 package mechanical data

| | Dimensions | | | | | |
|------|------------|-------------|------|-------|--------|-------|
| Ref. | | Millimeters | | | Inches | |
| | Min. | Тур. | Max. | Min. | Тур. | Max. |
| Α | | | 1.75 | | | 0.069 |
| A1 | 0.10 | | 0.25 | 0.004 | | 0.010 |
| A2 | 1.25 | | | 0.049 | | |
| b | 0.28 | | 0.48 | 0.011 | | 0.019 |
| С | 0.17 | | 0.23 | 0.007 | | 0.010 |
| D | 4.80 | 4.90 | 5.00 | 0.189 | 0.193 | 0.197 |
| E | 5.80 | 6.00 | 6.20 | 0.228 | 0.236 | 0.244 |
| E1 | 3.80 | 3.90 | 4.00 | 0.150 | 0.154 | 0.157 |
| е | | 1.27 | | | 0.050 | |
| h | 0.25 | | 0.50 | 0.010 | | 0.020 |
| L | 0.40 | | 1.27 | 0.016 | | 0.050 |
| L1 | | 1.04 | | | 0.040 | |
| k | 0 | | 8° | 1° | | 8° |
| CCC | | | 0.10 | | | 0.004 |

Ordering information TS372

5 Ordering information

Table 7. Order codes

| Part number | Temperature range | Package | Packing | Marking |
|-------------|-------------------|---------|-------------|---------|
| TS372CD | 0°C, +70°C | SO-8 | Tube | |
| TS372CDT | 0°C, +70°C | SO-8 | Tape & reel | |
| TS372CN | 0°C, +70°C | DIP8 | | |
| TS372ID | -40°C, +125°C | SO-8 | Tube | |
| TS372IDT | -40°C, +125°C | SO-8 | Tape & reel | |
| TS372IN | -40°C, +125°C | DIP8 | | |

TS372 Revision history

6 Revision history

Table 8. Document revision history

| Date | Revision | Changes |
|-------------|----------|--------------------------------------------------------------------------------------|
| 01-Feb-2002 | 1 | Initial release. |
| 28-Apr-2011 | 2 | Document reformatted. Modified <i>Table 2</i> , <i>Table 3</i> and <i>Table 7</i> . |

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10/10 Doc ID 4068 Rev 2

