

## LOW POWER QUAD CMOS VOLTAGE COMPARATOR

- WIDE SINGLE SUPPLY RANGE OR DUAL SUPPLIES **3V TO 16V** OR  $\pm 1.5V$  TO  $\pm 8V$
- VERY LOW SUPPLY CURRENT:  
0.1mA/COMP INDEPENDENT OF SUPPLY VOLTAGE
- EXTREMELY LOW INPUT BIAS CURRENT :  
**1pA typ**
- EXTREMELY LOW INPUT OFFSET CURRENTS : **1pA typ**
- LOW INPUT OFFSET VOLTAGE
- INPUT COMMON-MODE VOLTAGE RANGE INCLUDES GND
- LOW OUTPUT SATURATION VOLTAGE  
150mV TYP
- OUTPUT COMPATIBLE WITH TTL, MOS AND CMOS
- HIGH INPUT IMPEDANCE :  $10^{12}\Omega$  typ
- FAST RESPONSE TIME : 200ns TYP FOR TTL LEVEL INPUT STEP

### DESCRIPTION

These devices consist of four 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.

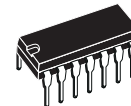
These devices are ideally suited for low consumption applications.

### ORDER CODE

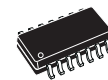
| Part Number | Temperature Range | Package |   |
|-------------|-------------------|---------|---|
|             |                   | N       | D |
| TS374C      | 0°C, +70°C        | •       | • |
| TS374I      | -40°C, +125°C     | •       | • |
| TS374M      | -55°C, +125°C     | •       | • |

N = Dual in Line Package (DIP)

D = Small Outline Package (SO) - also available in Tape & Reel (DT)

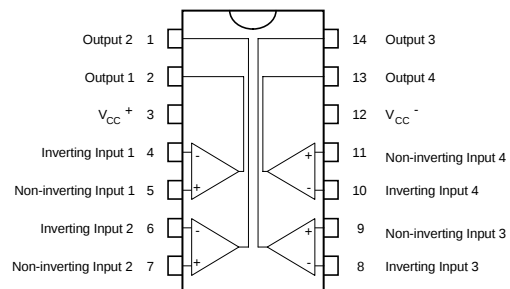


**N  
DIP14**  
(Plastic Package)

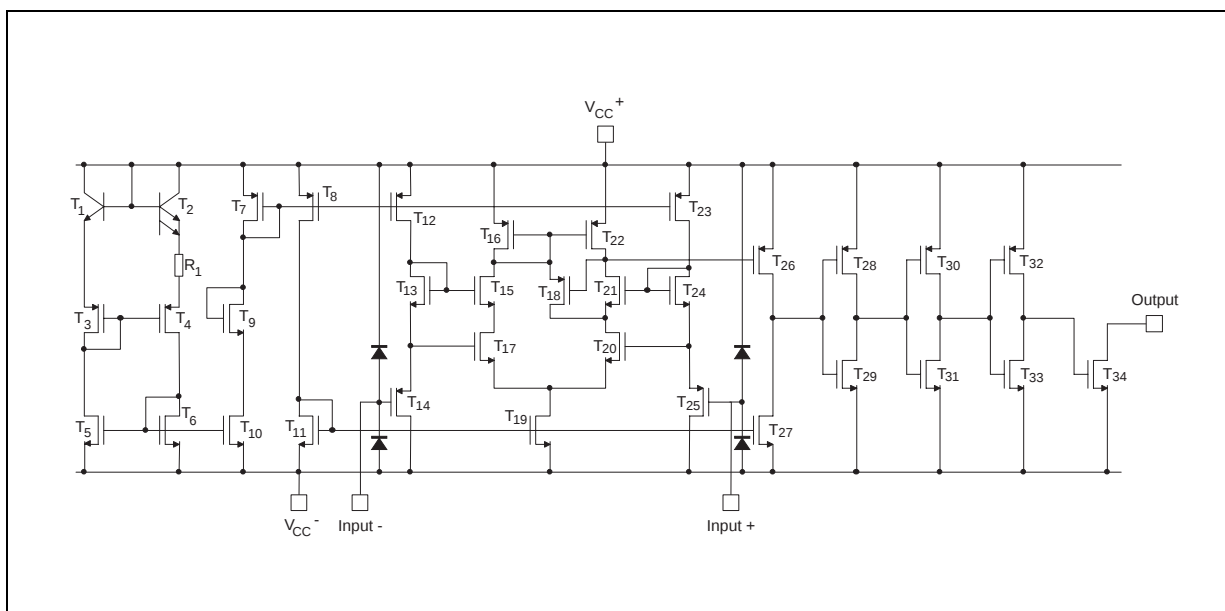


**D  
SO14**  
(Plastic Micropackage)

### PIN CONNECTIONS (top view)



## SCHEMATIC DIAGRAM (for 1/4 TS374)



## ABSOLUTE MAXIMUM RATINGS

| Symbol       | Parameter                                                       | Value       | Unit |
|--------------|-----------------------------------------------------------------|-------------|------|
| $V_{CC}^{+}$ | Supply Voltage <sup>1)</sup>                                    | 18          | V    |
| $V_{id}$     | Differential Input Voltage <sup>2)</sup>                        | $\pm 18$    | V    |
| $V_i$        | Input Voltage <sup>3)</sup>                                     | 18          | V    |
| $V_o$        | Output Voltage                                                  | 18          | V    |
| $I_o$        | Output Current                                                  | 20          | mA   |
| $I_F$        | Forward Current in ESD Protection Diodes on Input <sup>4)</sup> | 50          | mA   |
|              | Duration of Output-Circuit to GND <sup>5)</sup>                 | Infinite    |      |
| $P_d$        | Power Dissipation <sup>6)</sup><br>DIP14<br>SO14                | 1500<br>830 | mW   |
| $T_{stg}$    | Storage Temperature Range                                       | -65 to +150 | °C   |
| $T_j$        | Junction Temperature                                            | +150        | °C   |

1. All voltage values, except differential voltage, are with respect to network ground terminal.
2. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.
3. The magnitude of the input and the output voltages must never exceed the magnitude of the positive supply voltage.
4. Guaranteed by design.
5. Short circuit from outputs to  $V_{CC}^{+}$  can cause excessive heating and eventual destruction.
6.  $P_d$  is calculated with  $T_{amb} = +25^{\circ}\text{C}$ ,  $T_j = +150^{\circ}\text{C}$  and  $R_{thja} = 80^{\circ}\text{C/W}$  for DIP14 package  
 $= 150^{\circ}\text{C/W}$  for SO14 package

## OPERATING CONDITIONS

| Symbol       | Parameter                                                          | Value                                  | Unit |
|--------------|--------------------------------------------------------------------|----------------------------------------|------|
| $V_{CC}^{+}$ | Supply Voltage                                                     | 3 to 16                                | V    |
| $V_{icm}$    | Common Mode Input Voltage Range                                    | 0 to $V_{CC}^{+} - 1.5$                | V    |
| $T_{oper}$   | Operating Free-Air Temperature range<br>TS374C<br>TS374I<br>TS374M | 0 to +70<br>-40 to +125<br>-55 to +125 | °C   |

**ELECTRICAL CHARACTERISTICS**
 $V_{CC}^+ = 5V$ ,  $V_{CC}^- = 0V$ ,  $T_{amb} = 25^\circ C$  (unless otherwise specified)

| Symbol    | Parameter                                                                                                                                         | Min.        | Typ. | Max.                                                    | Unit          |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------|---------------------------------------------------------|---------------|
| $V_{io}$  | Input Offset Voltage ( $V_{ic} = V_{icm \text{ min.}}$ ) <sup>1)</sup><br>$T_{amb} = 25^\circ C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$         |             | 2    | 10<br>12                                                | mV            |
| $I_{io}$  | Input Offset Current <sup>2)</sup><br>$T_{amb} = 25^\circ C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$<br>TS374C<br>TS374I/TS374M                  |             | 1    | 100<br>200                                              | pA            |
| $I_{ib}$  | Input Offset Current - see note 2<br>$T_{amb} = 25^\circ C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$<br>TS374C<br>TS374I/TS374M                   |             | 1    | 150<br>300                                              | pA            |
| $V_{icm}$ | Input Common Mode Voltage Range<br>$T_{amb} = 25^\circ C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$<br>TS374C<br>TS374I/TS374M                     | 0<br>0<br>0 |      | $V_{CC}^+ - 2$<br>$V_{CC}^+ - 2.25$<br>$V_{CC}^+ - 2.5$ | V             |
| $I_{OH}$  | High Level Output Current ( $V_{id} = 1V$ )<br>$T_{amb} = 25^\circ C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$<br>$V_{OH} = 5V$<br>$V_{OH} = 15V$ |             | 0.1  | 1                                                       | nA<br>$\mu A$ |
| $V_{OL}$  | Low Level Output Voltage ( $V_{id} = -1$ , $I_{OL} = 4mA$ )<br>$T_{amb} = 25^\circ C$<br>$T_{min.} \leq T_{amb} \leq T_{max.}$                    |             | 100  | 400<br>700                                              | mV            |
| $I_{OL}$  | Low Level Output Current ( $V_{id} = -1$ , $V_{OL} = 1.5V$ )                                                                                      | 6           | 45   |                                                         | mA            |
| $I_{CC}$  | Supply Current (each comparator) ( $V_{id} = 1V$ , no load)                                                                                       |             | 150  | 250                                                     | $\mu A$       |

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

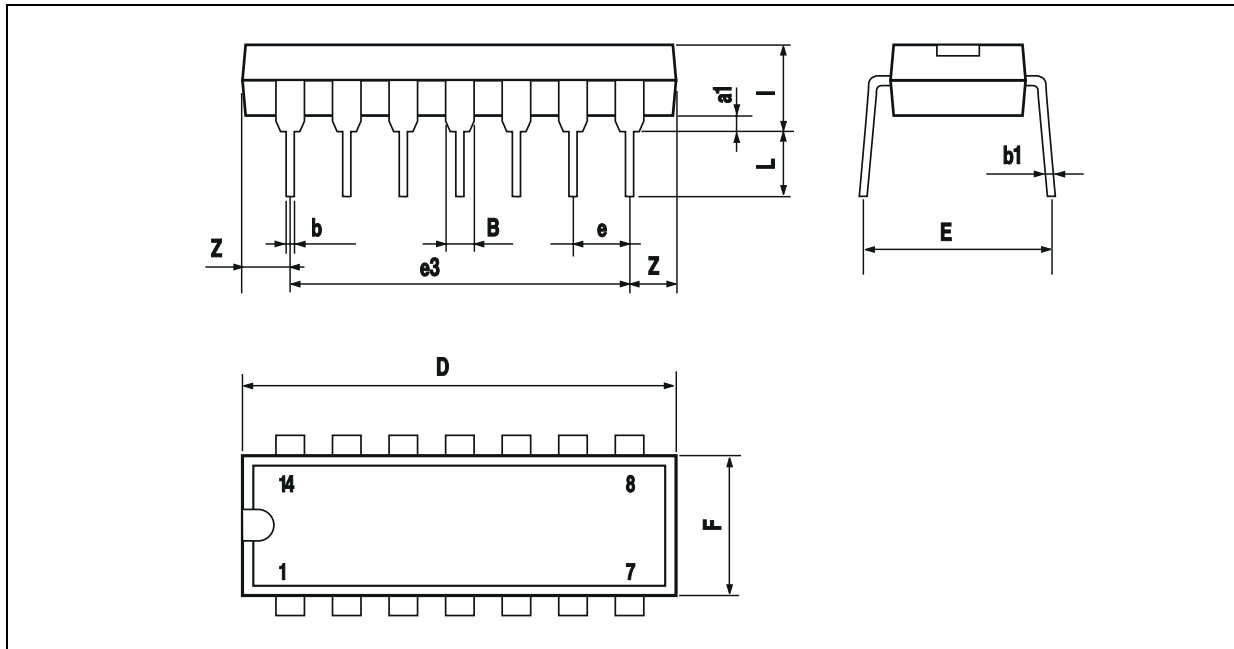
2. Maximum values including unavoidable inaccuracies of the industrial test.

**SWITCHING CHARACTERISTICS** ( $V_{CC}^+ = 5V$ ,  $T_{amb} = 25^\circ C$ )

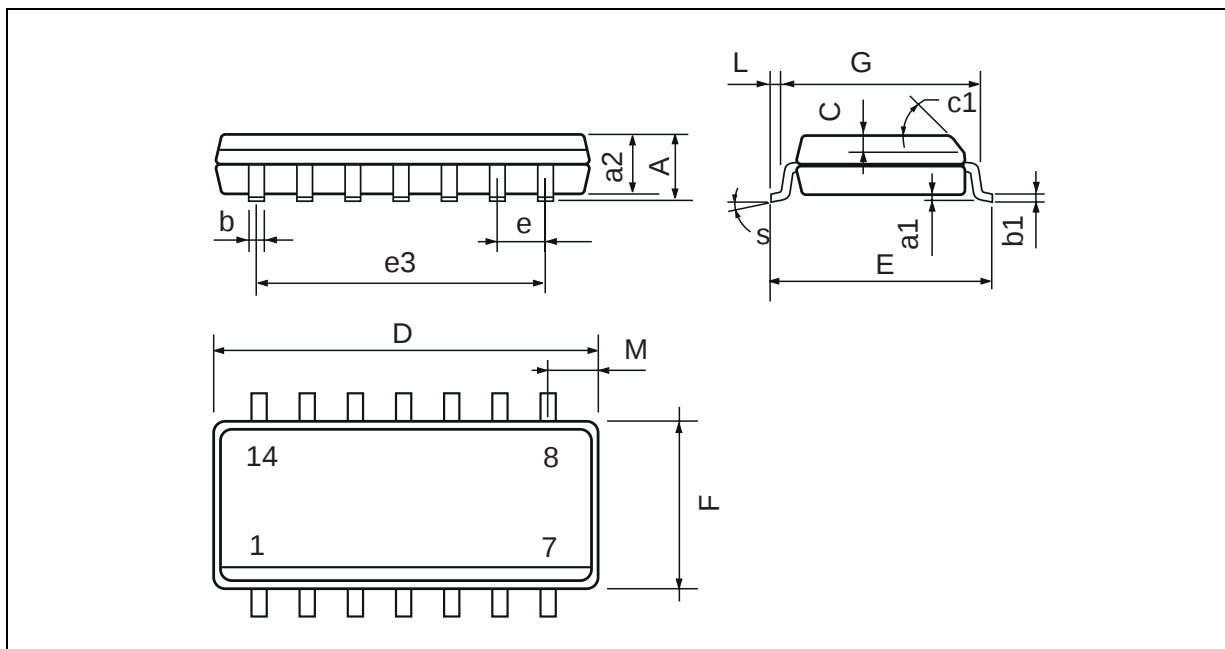
| Symbol   | Parameter                                                                                                                                       | Min. | Typ.       | Max. | Unit |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------|------|------------|------|------|
| $t_{re}$ | Response Time ( $R_L = 5.1k\Omega$ connected to 5V, $C_L = 15pF$ ) <sup>1)</sup><br>100mV input step with 5mV overdrive<br>TTL level input step |      | 600<br>200 |      | ns   |

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

**PACKAGE MECHANICAL DATA**  
14 PINS - PLASTIC DIP



| Dimensions | Millimeters |       |      | Inches |       |       |
|------------|-------------|-------|------|--------|-------|-------|
|            | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| a1         | 0.51        |       |      | 0.020  |       |       |
| B          | 1.39        |       | 1.65 | 0.055  |       | 0.065 |
| b          |             | 0.5   |      |        | 0.020 |       |
| b1         |             | 0.25  |      |        | 0.010 |       |
| D          |             |       | 20   |        |       | 0.787 |
| E          |             | 8.5   |      |        | 0.335 |       |
| e          |             | 2.54  |      |        | 0.100 |       |
| e3         |             | 15.24 |      |        | 0.600 |       |
| F          |             |       | 7.1  |        |       | 0.280 |
| i          |             |       | 5.1  |        |       | 0.201 |
| L          |             | 3.3   |      |        | 0.130 |       |
| Z          | 1.27        |       | 2.54 | 0.050  |       | 0.100 |

**PACKAGE MECHANICAL DATA****14 PINS - PLASTIC MICROPACKAGE (SO)**

| Dimensions | Millimeters |      |      | Inches |       |       |
|------------|-------------|------|------|--------|-------|-------|
|            | Min.        | Typ. | Max. | Min.   | Typ.  | Max.  |
| A          |             |      | 1.75 |        |       | 0.069 |
| a1         | 0.1         |      | 0.2  | 0.004  |       | 0.008 |
| a2         |             |      | 1.6  |        |       | 0.063 |
| b          | 0.35        |      | 0.46 | 0.014  |       | 0.018 |
| b1         | 0.19        |      | 0.25 | 0.007  |       | 0.010 |
| C          |             | 0.5  |      |        | 0.020 |       |
| c1         | 45° (typ.)  |      |      |        |       |       |
| D (1)      | 8.55        |      | 8.75 | 0.336  |       | 0.344 |
| E          | 5.8         |      | 6.2  | 0.228  |       | 0.244 |
| e          |             | 1.27 |      |        | 0.050 |       |
| e3         |             | 7.62 |      |        | 0.300 |       |
| F (1)      | 3.8         |      | 4.0  | 0.150  |       | 0.157 |
| G          | 4.6         |      | 5.3  | 0.181  |       | 0.208 |
| L          | 0.5         |      | 1.27 | 0.020  |       | 0.050 |
| M          |             |      | 0.68 |        |       | 0.027 |
| S          | 8° (max.)   |      |      |        |       |       |

Note: (1) D and F do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (0.006 in.) ONLY FOR DATA BOOK.  
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