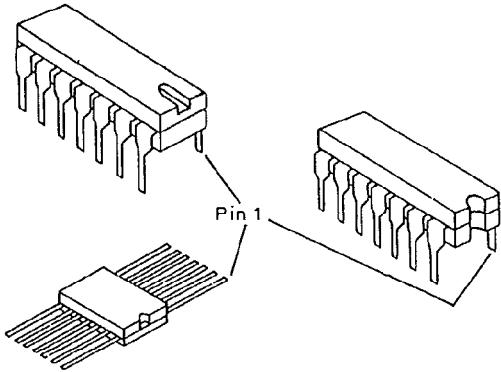




|                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BRITISH STANDARDS INSTITUTION</b><br>2 PARK STREET, LONDON. W1A 2BS                                                                                                                                                                                                                                           | BS CECC 90103 - 022<br><br>ISSUE 1<br><br>DECEMBER 1981<br><br>Page 1 of 16 pages                                                                                                                                                                         |
| Specification available from:- AS SHOWN IN PD 9002 AND CECC 00 200 AND                                                                                                                                                                                                                                           |                                                                                                                                                                        |
| <b>ELECTRONIC COMPONENTS OF ASSESSED QUALITY</b><br>DETAIL SPECIFICATION IN ACCORDANCE WITH:<br><br>BS CECC 90 000 : 1976<br>BS CECC 90 100 : 1977                                                                                                                                                               | <b>MANUFACTURERS TYPE NUMBER</b><br><br>54LS32<br>64LS32<br>74LS32<br>84LS32                                                                                                                                                                              |
| Outline not to scale: Isometric projection<br>Marking information see clause 1<br><br><br><br>Refer to IEC 191-1-50a (type A50B)<br>Dual-in-Line (plastic or ceramic)<br>refer to Appendix A1.3<br>Flatpack (metal or ceramic) | SEE PD 9002 AND CECC 00 200<br>For ordering information see clause 1<br><br><b>QUAD 2-INPUT POSITIVE-OR GATES</b><br><br>TYPICAL CONSTRUCTION<br>SILICON MONOLITHIC<br>BIPOLAR TTL-LOW-POWER<br>SCHOTTKY<br><br><b>ASSESSMENT LEVELS</b><br>R, S, T AND V |

1. Type description

1.1 Truth table

| INPUTS |   | OUTPUT |
|--------|---|--------|
| A      | B | Y      |
| L      | L | L      |
| L      | H | H      |
| H      | L | H      |
| H      | H | H      |

H = High level  
 L = Low level

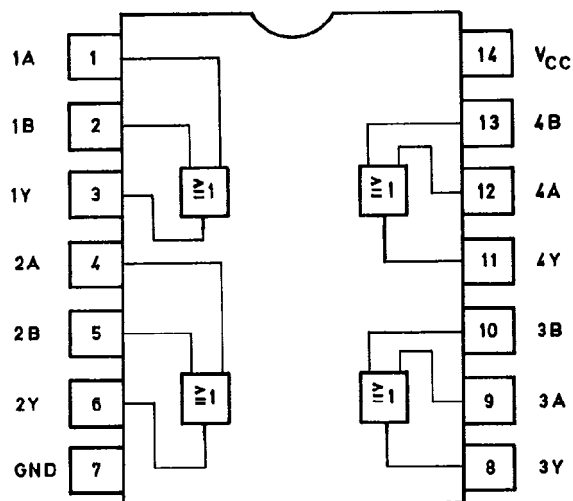
1.1.1 Boolean equation

$$Y = A + B$$

Refer to Qualified Products List PD 9002 and/or CECC 00 200 for details of manufacturers approved to this specification

## 1.2 Terminal identification, type designation and marking

### 1.2.1 Terminal identification



Four 2-input positive-Or gates

### 1.2.2 Type designation

| TEMPERATURE<br>RANGE | PACKAGE                 |                         |                     |
|----------------------|-------------------------|-------------------------|---------------------|
|                      | Ceramic<br>Dual-in-Line | Plastic<br>Dual-in-Line | Ceramic<br>Flatpack |
| 0 + 70               | 74LS32J                 | N                       | W                   |
| -25 + 85             | 84LS32J                 |                         |                     |
| -40 + 85             | 64LS32J                 |                         |                     |
| -55 +125             | 54LS32J                 |                         |                     |

### 1.2.3 Marking

Each integrated circuit shall bear the following markings:

- (1) Terminal identification
- (2) Type designation
- (3) Date code
- (4) Factory identification code (unless derived from trademark)
- (5) Manufacturers trade name or mark
- (6) Mark of conformity (unless a certificate of conformity is used)

### 1.3 Ordering information

Orders for these integrated circuits shall contain the following minimum information:

Manufacturers integrated circuit type designation, screening procedure and assessment levels as detailed to this CECC specification number.

(For details of screening procedure see Appendix A1.1).

## 2. Limiting conditions of use (not for inspection purposes)

|       |                                                                  |                      |      |      |             |      |      |                |
|-------|------------------------------------------------------------------|----------------------|------|------|-------------|------|------|----------------|
| 2.1   | Maximum continuous supply voltage                                | $V_{CC}$             |      |      |             |      |      | -0,5V<br>+7,0V |
| 2.2   | Maximum input voltages                                           |                      |      |      |             |      |      |                |
| 2.2.1 | Maximum input voltage                                            | $V_I$                |      |      |             |      |      | -0,5V<br>+7,0V |
| 2.2.2 | Maximum input voltage between multiple emitter transistor inputs | $V_{II}$             |      |      |             |      |      | +5,5V          |
|       |                                                                  |                      |      | 54LS | 64LS        | 74LS | 84LS |                |
| 2.3   | Minimum and maximum operating ambient temperatures               | $T_{amb}(^{\circ}C)$ | min. | -55  | -40         | 0    | -25  |                |
|       |                                                                  |                      | max. | +125 | +85         | +70  | +85  |                |
| 2.4   | Minimum and maximum storage temperatures                         | $T_{stg}(^{\circ}C)$ | min. | -65  | (All types) |      |      |                |
|       |                                                                  |                      | max. | +150 |             |      |      |                |

## 3. Recommended operating conditions and associated characteristics (not for inspection purposes)

### 3.1 Recommended operating conditions.

These apply over the operating ambient temperature range unless otherwise stated.

| Description                                                 | Symbol    | Type               | Value                    | Unit     |
|-------------------------------------------------------------|-----------|--------------------|--------------------------|----------|
| Positive supply voltage range                               | $V_{CC}$  | 54LS<br>64/74/84LS | 4,5 - 5,5<br>4,75 - 5,25 | V<br>V   |
| Minimum value of High level input voltage                   | $V_{IHB}$ | All types          | 2,0                      | V        |
| Maximum value of High level input voltage                   | $V_{IHA}$ | All types          | 5,5                      | V        |
| Minimum value of Low level input voltage                    | $V_{ILB}$ | All types          | -0,3                     | V        |
| Maximum value of Low level input voltage                    | $V_{ILA}$ | 54LS<br>64/74/84LS | 0,7<br>0,8               | V<br>V   |
| Maximum value of Low level output current for each output   | $I_{OL}$  | 54LS<br>64/74/84LS | 4,0<br>8,0               | mA<br>mA |
| Maximum value of output current for each output at $V_{OH}$ | $I_{OH}$  | All types          | -400,0                   | $\mu A$  |

### 3.2 Associated characteristics

3.2.1 Minimum and maximum values are given for the worst case operation over the ambient temperature range, except for those conditions marked with an asterisk (\*)

|                | 54LS | 64LS | 74LS | 84LS |    |
|----------------|------|------|------|------|----|
| $T_{amb}$ min. | -55  | -40  | 0    | -25  | °C |
| $T_{amb}$ max. | +125 | +85  | +70  | +85  |    |
| $V_{CC}$ min.  | 4,5  | 4,75 |      |      | V  |
| $V_{CC}$ max.  | 5,5  | 5,25 |      |      |    |

#### 3.2.2

| Characteristics                             | Conditions                                                                | $V_{CC}(\text{V})$ | Symbol      | Min. | Max.  | Unit          |
|---------------------------------------------|---------------------------------------------------------------------------|--------------------|-------------|------|-------|---------------|
| Total supply current with High level output | $V_{IL} = 0\text{V}$ (1)                                                  | $V_{CC}$ max.      | $I_{CCH}$   | -    | 6,2   | mA            |
| Total supply current with Low level output  | $V_{IH} = 4,5\text{V}$                                                    | $V_{CC}$ max.      | $I_{CCL}$   | -    | 9,8   | mA            |
| High level input current                    | $V_{IH(1)} = 7,0\text{V}$                                                 | $V_{CC}$ max.      | $I_{IH(1)}$ | -    | 100,0 | $\mu\text{A}$ |
|                                             | $V_{IH(2)} = 2,7\text{V}$                                                 | $V_{CC}$ max.      | $I_{IH(2)}$ | -    | 20,0  | $\mu\text{A}$ |
| Low level input current                     | $V_{IL} = 0,4\text{V}$                                                    | $V_{CC}$ max.      | $-I_{IL}$   | -    | 0,4   | mA            |
| Input clamping voltage                      | $-I_{IC} = 18,0\text{mA}$                                                 | $V_{CC}$ min.      | $-V_{ICA}$  | -    | 1,5   | V             |
| Output voltage                              | 54LS<br>$I_{OH} = -400,0\mu\text{A}$                                      | $V_{CC}$ min.      | $V_{OH}$    | 2,5  | -     | V             |
|                                             | 64/74/84LS<br>$I_{OH} = -400,0\mu\text{A}$                                |                    | $V_{OH}$    | 2,7  | -     | V             |
|                                             | All types<br>$I_{OL(1)} = 4,0\text{mA}$ (2)                               |                    | $V_{OL(1)}$ | -    | 0,4   | V             |
|                                             | 64/74/84LS<br>$I_{OL(2)} = 8,0\text{mA}$ (3)                              |                    | $V_{OL(2)}$ | -    | 0,5   | V             |
| Output short circuit current                | $V_O = 0\text{V}$ or $4,5\text{V}$ (4)<br>$V_{IL} = 0\text{V}$            | $V_{CC}$ max.      | $-I_{OS}$   | 15,0 | 130,0 | mA            |
| Propagation time                            | $T_{amb} = 25^{\circ}\text{C}$ *<br>test conditions<br>as in Sub-group A5 | 5,0V               | $t_{PLH}$   | -    | 22,0  | ns            |
|                                             |                                                                           |                    | $t_{PHL}$   | -    | 22,0  | ns            |

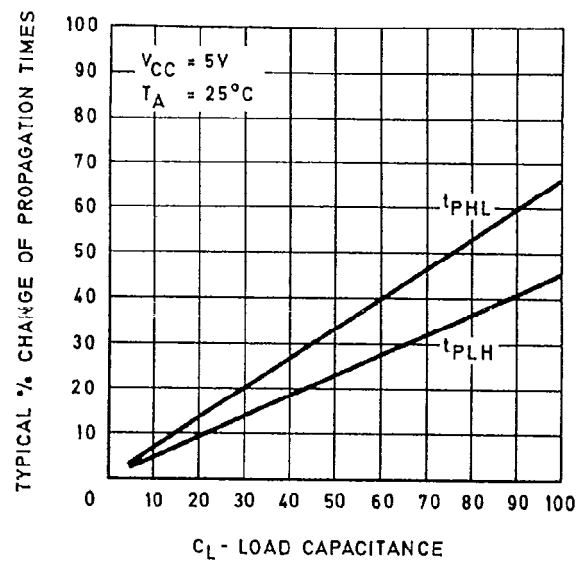
(1) To all inputs, (2) Fan out = 10, (3) Fan out = 20,

(4) Only one output at a time, duration,  $t \leq 1$  sec

\* See 3.2.1 of this specification

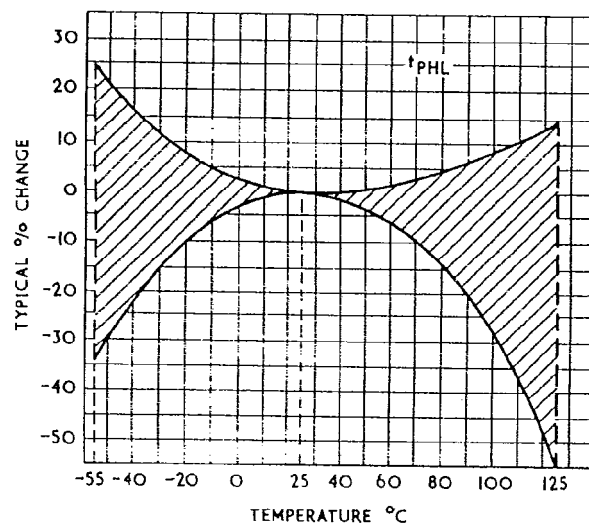
### 3.3 Supplementary information

#### 3.3.1 Change of typical propagation time with output loading

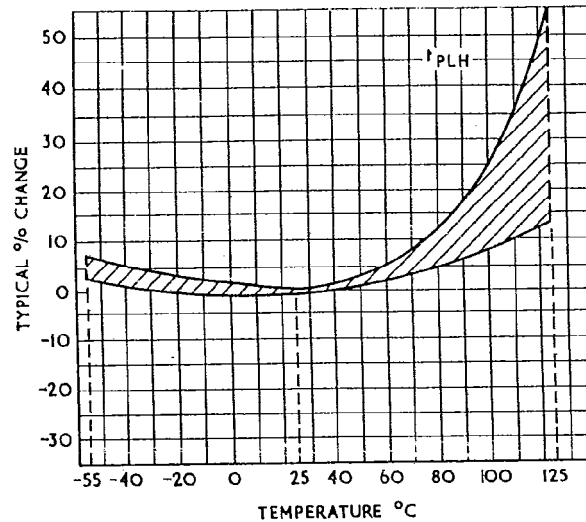


Propagation time Vs. load capacitance

#### 3.3.2 Variation of propagation time with temperature



### 3.3.2 Variation of propagation time with temperature (contd)



### 3.3.3 D.C. noise margin

$$\text{Low level } V_{ILA} - V_{OLA} = V_{NL}$$

$$\text{High level } V_{OHB} - V_{IHB} = V_{NH}$$

### 3.4 Typical values\* ( $V_{CC} = 5.0V$ , $T_{amb} = 25^{\circ}C$ )

Typical supply current of the device (50% duty cycle)

$$\text{LS32 } I_{CC} = 4.0mA$$

Typical propagation time:

$$\text{LS32 } t_{ptyp} = \frac{t_{PLH} + t_{PHL}}{2} = 14.0ns$$

\*See 3.2 of this specification

## 4. Inspection Requirements

All tests shall be performed at  $T_{amb} = 25^{\circ}C \pm 5^{\circ}C$  unless otherwise stated.

The clause numbers refer to the sectional specification CECC 90100, if not otherwise stated.

The tests in the tables shall be applied to each gate of multiple gate devices.