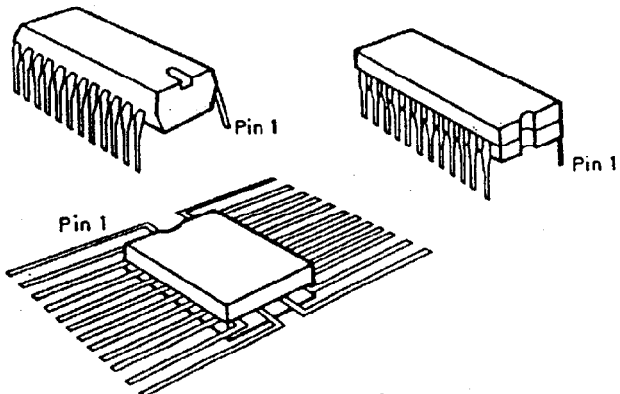


|                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>BRITISH STANDARDS INSTITUTION<br/>2 PARK STREET, LONDON. W1A 2BS</p>                                                                                                                                                                                                                    | <p>BS CECC 90103-178<br/>ISSUE 1<br/>OCTOBER 1982</p> <p>Page 1 of 21 Pages</p>                                                                                                                                                                     |
| <p>SPECIFICATION AVAILABLE FROM:- As shown in PD 9002<br/>AND CECC 00 200 AND</p> <p>TEXAS INSTRUMENTS LIMITED,<br/>MANTON LANE,<br/>BEDFORD, MK41 7PA</p>                                                                                                                                 |                                                                                                                                                                  |
| <p>ELECTRONIC COMPONENTS OF ASSESSED QUALITY</p> <p>DETAIL SPECIFICATION IN ACCORDANCE WITH:-</p> <p>BS CECC 90 000 : 1982<br/>BS CECC 90 100 : 1977</p>                                                                                                                                   | <p>MANUFACTURERS TYPE NUMBER</p> <p>54LS674<br/>64LS674<br/>74LS674<br/>84LS674</p>                                                                                                                                                                 |
| <p>Outline not to scale. Isometric projection<br/>Marking information see Clause 1</p>  <p>IEC 191-2 (Type A510)<br/>Dual-in-line (plastic or ceramic)<br/>Appendix A1.3 Flatpack (metal or ceramic)</p> | <p>SEE PD 9002 AND CECC 00 200<br/>For ordering information<br/>see Clause 1</p> <p>16 BIT SHIFT REGISTERS</p> <p>TYPICAL CONSTRUCTION<br/>SILICON MONOLITHIC<br/>BIPOLAR TTL LOW POWER<br/>SCHOTTKY</p> <p>ASSESSMENT LEVELS R, S, T<br/>AND V</p> |

1. TYPE DESCRIPTION

1.1. Truth table (see Page 2)

REFER TO QUALIFIED PRODUCTS LIST PD 9002 AND/OR CECC 00 200  
FOR DETAILS OF MANUFACTURERS APPROVED TO THIS SPECIFICATION

| INPUTS |     |      |     | SER/<br>Q15 | OPERATION                     |
|--------|-----|------|-----|-------------|-------------------------------|
| CS     | R/W | MODE | CLK |             |                               |
| H      | X   | X    | X   | Z           | Do nothing                    |
| L      | L   | X    | L   | Z           | Shift and write (serial load) |
| L      | H   | L    | L   | Q14n        | Shift and read                |
| L      | H   | H    | L   | P15         | Parallel load                 |

H = high level (steady state)  
L = low level (steady state)  
L = transition from low to high level  
L = transition from high to low level  
X = irrelevant (any input including transitions)  
Z = high impedance, input mode  
Q14n = content of 14th bit of the shift register before the most recent transition of the clock  
Y15n = content of the 15th bit of the storage register before the most recent transition of the clock.  
P15 = level of input P15

The 'LS674 is a 16-bit parallel-in, serial-out shift register. A three-state input/output (SER/Q15) port provides access for entering serial data or reading the shift-register word in a recirculating loop.

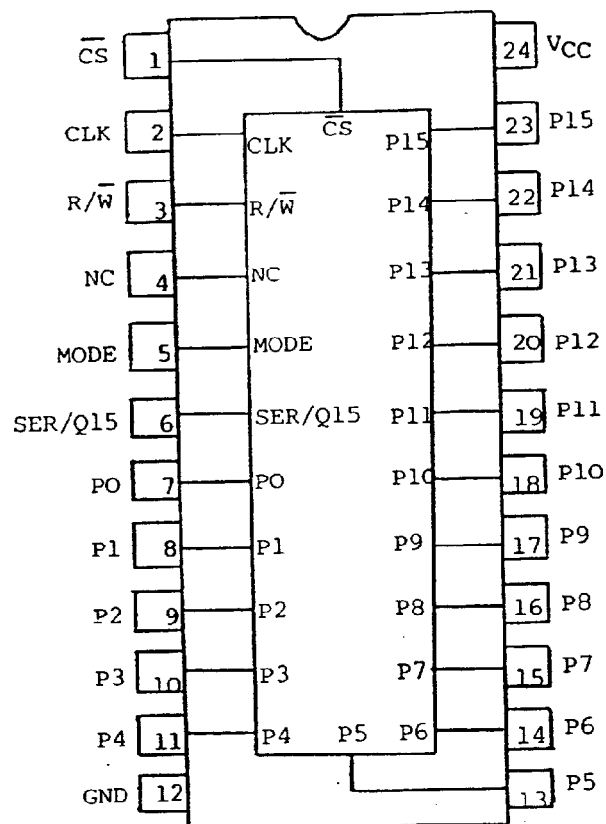
The device has four basic modes of operation:

- 1) Hold (do nothing)
- 2) Write (serially via input/output)
- 3) Read (serially)
- 4) Load (parallel via data inputs)

Low-to-high-level changes at the chip select input should be made only when the clock input is low to prevent false clocking.

## 1.2. Termination Identification, Type Designation and Marking

### 1.2.1. Terminal Identification



### 1.2.2. Type Designation

| TEMPERATURE RANGE | PACKAGE              |                      |                  |
|-------------------|----------------------|----------------------|------------------|
|                   | Ceramic Dual-in-Line | Plastic Dual-in-Line | Ceramic Flatpack |
| 0 + 70            | 74LS674J             | N                    | W                |
| -25 + 85          | 84LS674J             |                      |                  |
| -40 + 85          | 64LS674J             |                      |                  |
| -55 +125          | 54LS674J             |                      |                  |

### 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 procedures and assessment levels as detailed to this CECC specification number.

(For details of screening procedures see Appendix A1).

## 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 |  | -0.5V |
|-----|------------------------|--|-------|

|       |                       |            |       |                |
|-------|-----------------------|------------|-------|----------------|
| 2.2.1 | Maximum input voltage | SER/Q15    | $V_I$ | +5.5V          |
|       |                       | ALL OTHERS | $V_I$ | -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<br>max. +125 | -40<br>+85  | 0<br>+70 | -25<br>+85 |
| 2.4 | Minimum and maximum storage temperatures           | $T_{stg}(^{\circ}C)$ | min. -65<br>max. +150 | (All types) |          |            |

## 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.

## 3.1. (Cont'd)

| 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<br>SER/Q15 | $I_{OLA}$  | 54LS<br>64/74/84LS | -1.0<br>-2.6             | mA     |
| Maximum value of output current for each output of $V_{OH}$ SER/Q15  | $-I_{OHA}$ | 54LS<br>64/74/84LS | 12.0<br>24.0             | mA     |

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 <sub>amb</sub> min. | -55  | -40  | 0    | -25  | °C |
| T <sub>amb</sub> max. | +125 | +85  | +70  | +85  |    |
| V <sub>CC</sub> min.  | 4,5  | 4,75 |      |      | V  |
| V <sub>CC</sub> max.  | 5,5  | 5,25 |      |      |    |

3.2.2

| CHARACTERISTICS                                                                                                                        | CONDITIONS                                                                                                                                   | V <sub>CC</sub> (V)  | SYMBOL                                                                                                                                               | MIN.                                           | MAX.                                                          | UNIT                                                |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------|
| Total supply current per package                                                                                                       | V <sub>IL</sub> = 0V <sup>(1)</sup><br>V <sub>IH</sub> = 4.5V                                                                                | V <sub>CC</sub> max. | I <sub>CC</sub>                                                                                                                                      | -                                              | 40.0                                                          | mA                                                  |
| High level input current                                                                                                               | SER/Q15 V <sub>I</sub> = 5.5V<br>OTHERS V <sub>I</sub> = 7.0V<br><br>SER/Q15 V <sub>I</sub> = 2.7V<br>OTHERS                                 | V <sub>CC</sub> max. | I <sub>IH</sub> (1)<br>I <sub>IH</sub> (2)<br>I <sub>IH</sub> (2)                                                                                    | -<br>-<br>-                                    | 0.1<br>40.0<br>20.0                                           | mA<br>μA<br>μA                                      |
| Low level input current                                                                                                                | V <sub>IL</sub> = 0.4V                                                                                                                       | V <sub>CC</sub> max. | -I <sub>IL</sub>                                                                                                                                     | -                                              | 0.4                                                           | mA                                                  |
| Input clamping voltage                                                                                                                 | -I <sub>IC</sub> = 18.0 mA                                                                                                                   | V <sub>CC</sub> min. | -V <sub>ICA</sub>                                                                                                                                    | -                                              | 1.5                                                           | V                                                   |
| Output voltage<br>SER/Q15 54LS<br>SER/Q15 64/74/84LS<br>SER/Q15 All Types<br>SER/Q15 64/74/84LS                                        | I <sub>OH</sub> = max.<br>I <sub>OH</sub> = max.<br>I <sub>OL</sub> (1) = 12 mA <sup>(2)</sup><br>I <sub>OL</sub> (2) = 24 mA <sup>(3)</sup> | V <sub>CC</sub> min. | V <sub>OH</sub><br>V <sub>OH</sub><br>V <sub>OL</sub> (1)<br>V <sub>OL</sub> (2)                                                                     | 2.4<br>2.4<br>-<br>-                           | -<br>-<br>0.4<br>0.5                                          | V<br>V<br>V<br>V                                    |
| Output short circuit current<br><br>SER/Q15                                                                                            | V <sub>O</sub> = 0V <sup>(4)</sup><br>V <sub>IL</sub> = 0V                                                                                   | V <sub>CC</sub> max. | -I <sub>OS</sub>                                                                                                                                     | 30.0                                           | 130.0                                                         | mA                                                  |
| Propagation times<br>All Types<br><br>Frequency of operation<br>CLK SER/Q15<br>CLK SER/Q15<br><br>CS,R/W SER/Q15<br><br>CS,R/W SER/Q15 | T <sub>amb</sub> = 25°C*<br>test conditions as<br>in Subgroup A5                                                                             | 5.0V                 | <br><br><br>f <sub>max</sub><br>t <sub>PLH</sub><br>t <sub>PHL</sub><br>t <sub>PZH</sub><br>t <sub>PZL</sub><br>t <sub>PHZ</sub><br>t <sub>PLZ</sub> | <br><br><br>20.0<br>-<br>-<br>-<br>-<br>-<br>- | <br><br><br>-<br>33.0<br>40.0<br>45.0<br>45.0<br>40.0<br>40.0 | <br><br><br>MHz<br>ns<br>ns<br>ns<br>ns<br>ns<br>ns |

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

(4) Only one output at a time, duration  $t < 1 \text{ sec.}$

\* See 3.2.1. of this specification

3.2.2. (Cont'd)

| CHARACTERISTICS      | CONDITIONS | $V_{CC}(V)$ | SYMBOL          | MIN. | MAX. | UNIT |
|----------------------|------------|-------------|-----------------|------|------|------|
| Set-up Time          |            |             |                 |      |      |      |
| SER/Q15              |            |             | $t_{p\_set-up}$ | 20.0 | -    | ns   |
| MODE                 |            |             | $t_{p\_set-up}$ | 35.0 | -    | ns   |
| R/W, $\overline{CS}$ |            |             | $t_{p\_set-up}$ | 35.0 | -    | ns   |
| PO thru P15          |            |             | $t_{p\_set-up}$ | 20.0 | -    | ns   |
| Hold time            |            |             |                 |      |      |      |
| SER/Q15              |            |             | $t_{p\_hold}$   | 0    | -    | ns   |
| MODE                 |            |             | $t_{p\_hold}$   | 0    | -    | ns   |
| PO thru P15          |            |             | $t_{p\_hold}$   | 0    | -    | ns   |