

## 1. DESCRIPTION

The 74LS76 contain two independent negative-edge-triggered flip-flops.

The J and K inputs must be stable one setup time prior to the high-to-

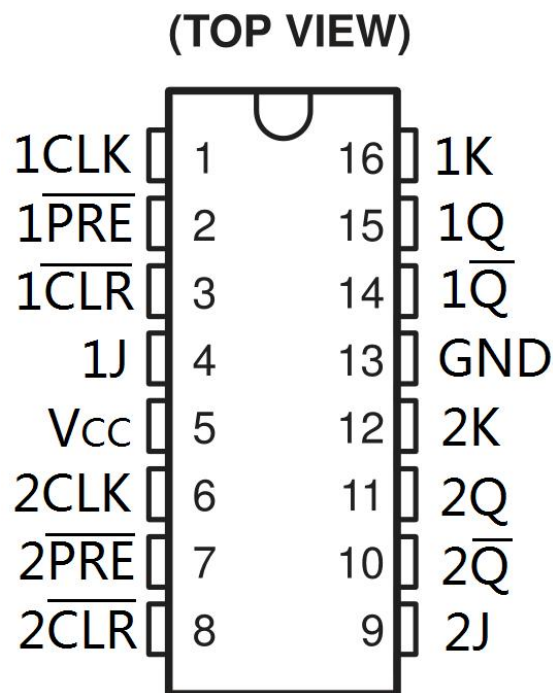
low clock transition for predictable operation. The preset

and clear are asynchronous active low inputs. When low they override the clock and data inputs forcing the outputs to the steady state levels as shown in the function table.

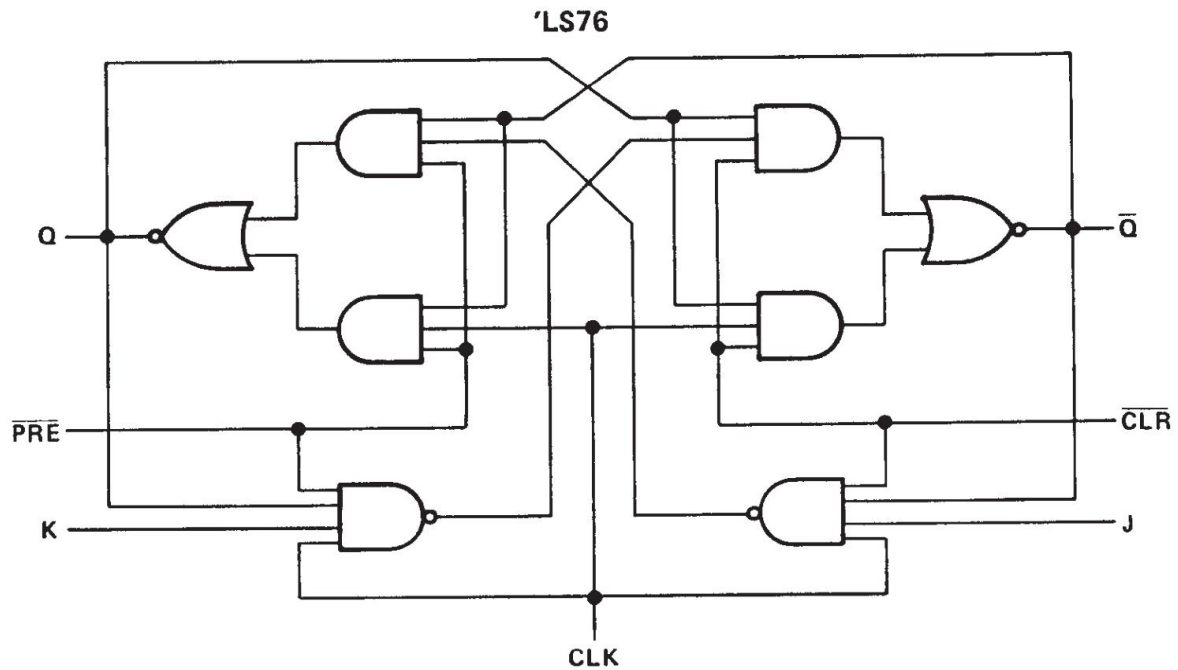
## 2. FEATURES

- Dependable XINLUDA Instruments Quality and Reliability

## 3. PIN CONFIGURATIONS

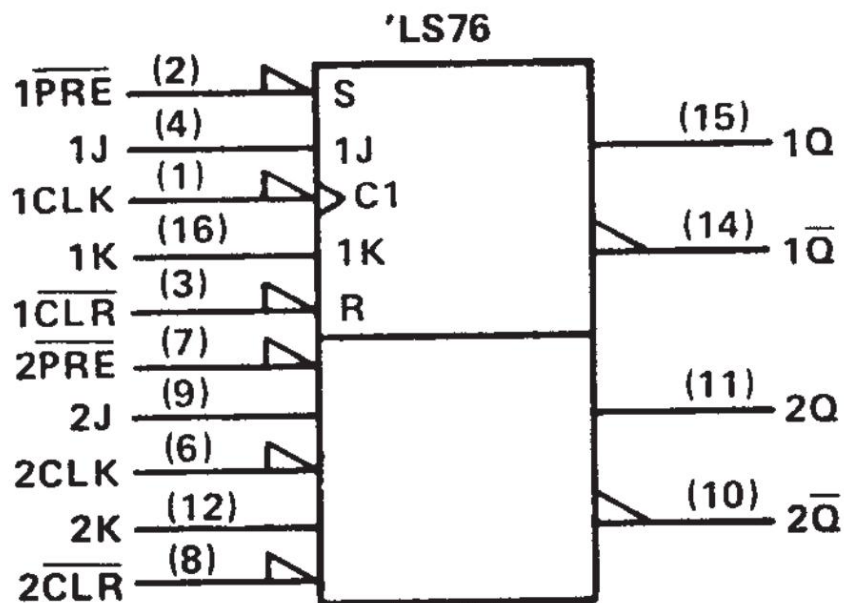


#### 4. LOGIC DIAGRAMS

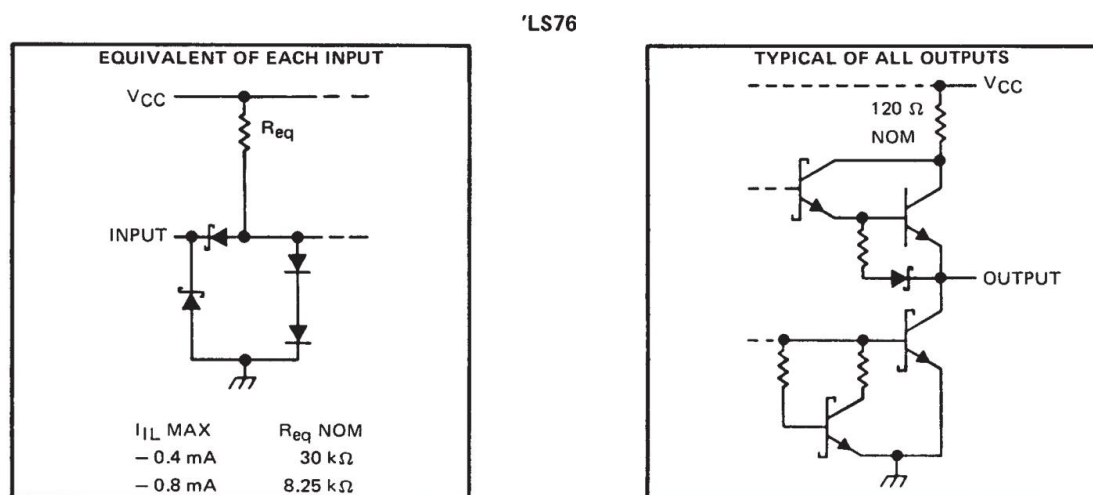


| INPUTS                  |                         |              |   |   | OUTPUTS             |                         |
|-------------------------|-------------------------|--------------|---|---|---------------------|-------------------------|
| $\overline{\text{PRE}}$ | $\overline{\text{CLR}}$ | CLK          | J | K | Q                   | $\overline{\text{Q}}$   |
| L                       | H                       | X            | X | X | H                   | L                       |
| H                       | L                       | X            | X | X | L                   | H                       |
| L                       | L                       | X            | X | X | $\text{H}^\uparrow$ | $\text{H}^\uparrow$     |
| H                       | H                       | $\downarrow$ | L | L | $\text{Q}_0$        | $\text{Q}_0$            |
| H                       | H                       | $\downarrow$ | H | L | H                   | L                       |
| H                       | H                       | $\downarrow$ | L | H | L                   | H                       |
| H                       | H                       | $\downarrow$ | H | H | TOGGLE              |                         |
| H                       | H                       | H            | X | X | $\text{Q}_0$        | $\overline{\text{Q}_0}$ |

## 5. LOGIC SYMBOLS



## 6. SCHEMATICS OF INPUTS AND OUTPUTS



## **7. ABSOLUTE MAXIMUM RATINGS OVER OPERATING FREE-AIR TEMPERATURE RANGE (UNLESS OTHERWISE NOTES)**

|                                                        |                |
|--------------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$ .....                         | 7V             |
| Input voltage, $V_I$ : 74LS76.....                     | 7V             |
| Operating free-air temperature range: DIP package..... | 0°C to 70°C    |
| Storage temperature range, $T_{stg}$ .....             | -65°C to 150°C |

<sup>†</sup> Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## 8. RECOMMENDED OPERATING CONDITIONS

|                    |                                |                                                        | 74LS76 |     |      | UNIT |
|--------------------|--------------------------------|--------------------------------------------------------|--------|-----|------|------|
|                    |                                |                                                        | MIN    | NOM | MAX  |      |
| V <sub>CC</sub>    | Supply voltage                 |                                                        | 4.75   | 5   | 5.25 | V    |
| V <sub>IH</sub>    | High-level input voltage       |                                                        | 2      |     |      | V    |
| V <sub>IL</sub>    | Low-level input voltage        |                                                        |        |     | 0.8  | V    |
| I <sub>OH</sub>    | High-level output current      |                                                        |        |     | -0.4 | mA   |
| I <sub>OL</sub>    | Low-level output current       |                                                        |        |     | 8    | mA   |
| f <sub>clock</sub> | Clock frequency                |                                                        | 0      |     | 30   | MHz  |
| t <sub>w</sub>     | Pulse duration                 | CLK high                                               | 20     |     |      | ns   |
|                    |                                | $\overline{\text{PRE}}$ or $\overline{\text{CLR}}$ low | 25     |     |      | ns   |
| t <sub>su</sub>    | Setup time before CLK↓         | data high or low                                       | 20     |     |      | ns   |
|                    |                                | $\overline{\text{CLR}}$ inactive                       | 20     |     |      | ns   |
|                    |                                | $\overline{\text{PRE}}$ inactive                       | 25     |     |      | ns   |
| t <sub>h</sub>     | Hold time before after CLK↓    |                                                        | 0      |     |      | ns   |
| T <sub>A</sub>     | Operating free-air temperature |                                                        | 0      |     | 70   | °C   |

## 9. ELECTRICAL CHARACTERISTICS OVER RECOMMENDED OPERATING FREE-AIR RANGE (UNLESS OTHERWISE NOTED)

| PARAMETER       |                                                    | TEST CONDITIONS <sup>†</sup>                                                                                | 74LS76 |                  |      | UNIT |
|-----------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------|------------------|------|------|
|                 |                                                    |                                                                                                             | MIN    | TYP <sup>‡</sup> | MAX  |      |
| V <sub>IK</sub> |                                                    | V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA                                                              |        |                  | -1.5 | V    |
| V <sub>OH</sub> |                                                    | V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, V <sub>IH</sub> = 2 V, I <sub>OH</sub> = -0.4 mA            | 2.7    | 3.4              |      | V    |
| V <sub>OL</sub> |                                                    | V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL</sub> MAX, I <sub>OL</sub> = 4 mA | 0.25   | 0.4              |      | V    |
|                 |                                                    | I <sub>OL</sub> = 8 mA                                                                                      | 0.35   | 0.5              |      |      |
| I <sub>I</sub>  | J or K                                             | V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V                                                                 |        |                  | 0.1  | mA   |
|                 | $\overline{\text{CLR}}$ or $\overline{\text{PRE}}$ |                                                                                                             |        |                  | 0.3  |      |
|                 | CLK                                                |                                                                                                             |        |                  | 0.4  |      |
| I <sub>IH</sub> | J or K                                             | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V                                                               |        |                  | 20   | μA   |
|                 | $\overline{\text{CLR}}$ or $\overline{\text{PRE}}$ |                                                                                                             |        |                  | 60   |      |
|                 | CLK                                                |                                                                                                             |        |                  | 80   |      |
| I <sub>IL</sub> | J or K                                             | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V                                                               |        |                  | -0.4 | mA   |
|                 | All other                                          |                                                                                                             |        |                  | -0.8 |      |
| I <sub>OS</sub> |                                                    | V <sub>CC</sub> = MAX                                                                                       | -20    |                  | -100 | mA   |
| I <sub>CC</sub> |                                                    | V <sub>CC</sub> = MAX                                                                                       |        | 4                | 6    | mA   |

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

<sup>‡</sup> All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

<sup>§</sup> Not more than one output should be shorted at a time.

## 10. SWITCHING CHARACTERISTICS, $V_{CC} = 5\text{ V}$ , $T_A = 25^\circ\text{C}$

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER†       | FROM<br>(INPUT)                                              | TO<br>(OUTPUT)             | TEST CONDITIONS                              | MIN | TYP | MAX | UNIT |
|------------------|--------------------------------------------------------------|----------------------------|----------------------------------------------|-----|-----|-----|------|
| f <sub>MAX</sub> |                                                              |                            | C <sub>L</sub> = 15 pF,R <sub>L</sub> = 2 kΩ | 30  | 45  |     | MHz  |
| t <sub>PLH</sub> | $\overline{\text{PRE}},\overline{\text{CLR}},\text{ or CLK}$ | Q or $\overline{\text{Q}}$ |                                              |     | 15  | 20  | ns   |
| t <sub>PHL</sub> |                                                              |                            |                                              |     | 15  | 20  | ns   |

†  $t_{\text{PLH}}$  = propagation delay time, low-to-high-level output

$t_{\text{PHL}}$  = propagation delay time, high-to-low-level output

## 11. ORDERING INFORMATION

Ordering Information

| Part Number | Device Marking | Package Type | Body size (mm) | Temperature (°C) | MSL  | Transport Media | Package Quantity |
|-------------|----------------|--------------|----------------|------------------|------|-----------------|------------------|
| XD74LS76    | XD74LS76       | DIP16        | 19.05 * 6.35   | -0 to 70         | MSL3 | Tube 25         | 1000             |

## 12. DIMENSIONAL DRAWINGS

