

# Low Voltage Dual D-Type Positive Edge-Triggered Flip-Flop with 5 V Tolerant Inputs

## 74LCX74

### General Description

The LCX74 is a dual D-type flip-flop with Asynchronous Clear and Set inputs and complementary (Q,  $\bar{Q}$ ) outputs. Information at the input is transferred to the outputs on the positive edge of the clock pulse. After the Clock Pulse input threshold voltage has been passed, the Data input is locked out and information present will not be transferred to the outputs until the next rising edge of the Clock Pulse input.

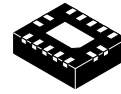
#### Asynchronous Inputs:

- LOW input to  $\bar{S}_D$  (Set) sets Q to HIGH level
- LOW input to  $\bar{C}_D$  (Clear) sets Q to LOW level
- Clear and Set are independent of clock
- Simultaneous LOW on  $\bar{C}_D$  and  $\bar{S}_D$  makes both Q and  $\bar{Q}$  HIGH

### Features

- 5 V Tolerant Inputs
- 1.65 V – 5.5 V  $V_{CC}$  Specifications Provided
- 7.0 ns  $t_{PD}$  Max. ( $V_{CC} = 3.3$  V)
- 10  $\mu$ A  $I_{CC}$  Max.
- Power Down High Impedance Inputs and Outputs
- $\pm 24$  mA Output Drive ( $V_{CC} = 3.0$  V)
- Implements Proprietary Noise/EMI Reduction Circuitry
- Latch-up Performance Exceeds JEDEC 78 Conditions
- ESD Performance:
  - ♦ Human Body Model > 2000 V
- These Devices are Pb-Free, Halide Free and are RoHS Compliant

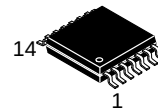
### MARKING DIAGRAMS



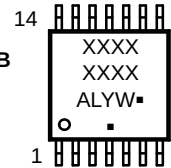
QFN14 3.0x2.5, 0.5P  
CASE 510CB

ZXYKK  
XXXXXX

XXXXXX = Specific Device Code  
Z = Assembly Plant Code  
XY = Date Code (Year & Week)  
KK = Lot Run Traceability Code



TSSOP-14 WB  
DT SUFFIX  
CASE 948G



XXXXXX = Specific Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information on page 9 of this data sheet.

# 74LCX74

## Connection Diagrams

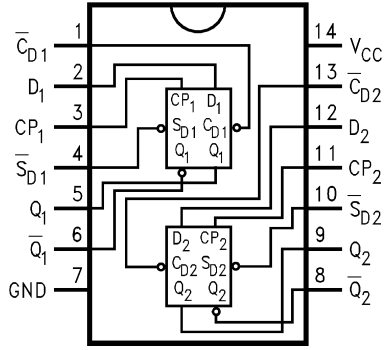


Figure 1. Pin Assignment for TSSOP

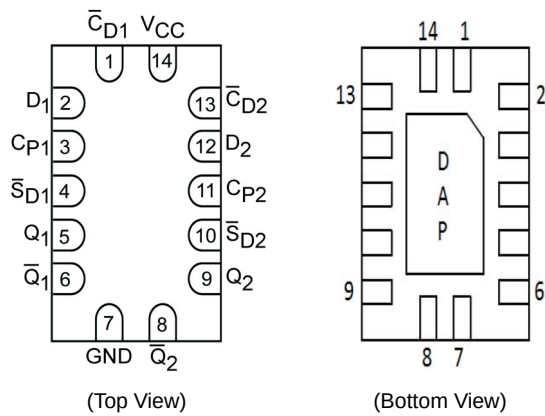


Figure 2. Pin Assignment for DQFN

## PIN DESCRIPTION

| Pin Names                                                         | Description         |
|-------------------------------------------------------------------|---------------------|
| D <sub>1</sub> , D <sub>2</sub>                                   | Data Inputs         |
| CP <sub>1</sub> , CP <sub>2</sub>                                 | Clock Pulse Inputs  |
| C <sub>D1</sub> , C <sub>D2</sub>                                 | Direct Clear Inputs |
| S <sub>D1</sub> , S <sub>D2</sub>                                 | Direct Set Inputs   |
| Q <sub>1</sub> , Q <sub>1</sub> , Q <sub>2</sub> , Q <sub>2</sub> | Outputs             |
| DAP                                                               | No Connect          |

1. DAP (Die Attach Pad)

## Logic Symbols

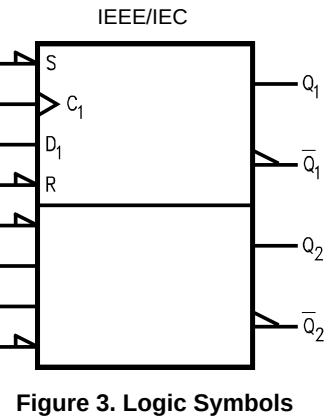
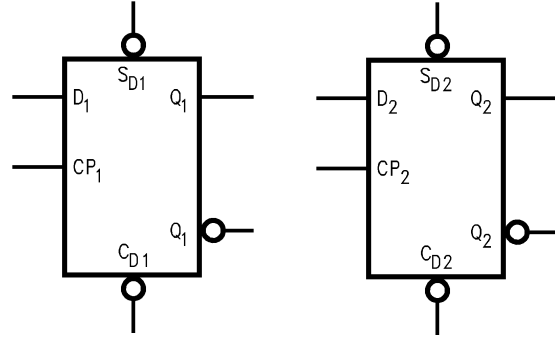


Figure 3. Logic Symbols

## TRUTH TABLE (Each Half)

| Input          |                |    |   | Outputs        |                |
|----------------|----------------|----|---|----------------|----------------|
| S <sub>D</sub> | C <sub>D</sub> | CP | D | Q              | Q              |
| L              | H              | X  | X | H              | L              |
| H              | L              | X  | X | L              | H              |
| L              | L              | X  | X | H              | H              |
| H              | H              | ↗  | H | H              | L              |
| H              | H              | ↘  | L | L              | H              |
| H              | H              | L  | X | Q <sub>0</sub> | Q <sub>0</sub> |

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

↗ = LOW-to-HIGH Clock Transition

Q<sub>0</sub> (Q<sub>0</sub>) = Previous Q (Q) before LOW-to-HIGH Transition of Clock

# 74LCX74

## MAXIMUM RATINGS

| Symbol                | Parameter                                       |                                   | Value                  | Unit |
|-----------------------|-------------------------------------------------|-----------------------------------|------------------------|------|
| $V_{CC}$              | DC Supply Voltage                               |                                   | -0.5 to +6.5           | V    |
| $V_I$                 | DC Input Voltage (Note 2)                       |                                   | -0.5 to +6.5           | V    |
| $V_O$                 | DC Output Voltage (Note 2)                      | Active-Mode (High or Low State)   | -0.5 to $V_{CC} + 0.5$ | V    |
|                       |                                                 | Tri-State Mode                    | -0.5 to +6.5           |      |
|                       |                                                 | Power-Down Mode ( $V_{CC} = 0$ V) | -0.5 to +6.5           |      |
| $I_{IK}$              | DC Input Diode Current $V_I < GND$              |                                   | -50                    | mA   |
| $I_{OK}$              | DC Output Diode Current $V_O < GND$             |                                   | -50                    | mA   |
| $I_O$                 | DC Output Source/Sink Current                   |                                   | $\pm 50$               | mA   |
| $I_{CC}$ or $I_{GND}$ | DC Supply Current per Supply Pin or Ground Pin  |                                   | $\pm 100$              | mA   |
| $T_{STG}$             | Storage Temperature Range                       |                                   | -65 to +150            | °C   |
| $T_L$                 | Lead Temperature, 1 mm from Case for 10 Seconds |                                   | 260                    | °C   |
| $T_J$                 | Junction Temperature under Bias                 |                                   | +150                   | °C   |
| $\theta_{JA}$         | Thermal Resistance (Note 2)                     | QFN14                             | 130                    | °C/W |
|                       |                                                 | TSSOP-14                          | 150                    |      |
| $P_D$                 | Power Dissipation in Still Air at 125°C         | QFN14                             | 962                    | mW   |
|                       |                                                 | TSSOP-14                          | 833                    |      |
| MSL                   | Moisture Sensitivity                            |                                   | Level 1                |      |
| $F_R$                 | Flammability Rating                             | Oxygen Index: 28 to 34            | UL 94 V-0 @ 0.125 in   |      |
| $V_{ESD}$             | ESD Withstand Voltage (Note 4)                  | Human Body Model                  | 2000                   | V    |
|                       |                                                 | Charged Device Model              | N/A                    |      |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

2.  $I_O$  absolute maximum rating must be observed.

3. Measured with minimum pad spacing on an FR4 board, using 76 mm-by-114 mm, 2-ounce copper trace no air flow per JESD51-7.

4. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.

## RECOMMENDED OPERATING CONDITIONS

| Symbol     | Parameter                      |                                                | Min  | Typ      | Max      | Unit |
|------------|--------------------------------|------------------------------------------------|------|----------|----------|------|
| $V_{CC}$   | Supply Voltage                 | Operating                                      | 1.65 | 2.5, 3.3 | 5.5      | V    |
|            |                                | Data Retention Only                            | 1.5  | 2.5, 3.3 | 5.5      |      |
| $V_I$      | Digital Input Voltage          |                                                | 0    | -        | 5.5      | V    |
| $V_O$      | Output Voltage                 | Active Mode (High or Low State)                | 0    | -        | $V_{CC}$ | V    |
|            |                                | Tri-State Mode                                 | 0    | -        | 5.5      |      |
|            |                                | Power Down Mode ( $V_{CC} = 0$ V)              | 0    | -        | 5.5      |      |
| $T_A$      | Operating Free-Air Temperature |                                                | -40  | -        | +125     | °C   |
| $t_r, t_f$ | Input Rise or Fall Rate        | $V_{CC} = 1.65$ V to 1.95 V                    | 0    | -        | 20       | nS/V |
|            |                                | $V_{CC} = 2.3$ V to 2.7 V                      | 0    | -        | 20       |      |
|            |                                | $V_{IN}$ from 0.8 V to 2.0 V, $V_{CC} = 3.0$ V | 0    | -        | 10       |      |
|            |                                | $V_{CC} = 4.5$ V to 5.5 V                      | 0    | -        | 5        |      |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

5. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or  $V_{CC}$ ). Unused outputs must be left open.

# 74LCX74

## DC ELECTRICAL CHARACTERISTICS

| Symbol           | Parameter                             | Conditions                                          | V <sub>CC</sub> (V) | T <sub>A</sub> = -40°C to +85°C |                        | T <sub>A</sub> = -40°C to +125°C |                        | Unit |
|------------------|---------------------------------------|-----------------------------------------------------|---------------------|---------------------------------|------------------------|----------------------------------|------------------------|------|
|                  |                                       |                                                     |                     | Min                             | Max                    | Min                              | Max                    |      |
| V <sub>IH</sub>  | HIGH Level Input Voltage              |                                                     | 1.65 – 1.95         | 0.65 x V <sub>CC</sub>          | –                      | 0.65 x V <sub>CC</sub>           | –                      | V    |
|                  |                                       |                                                     | 2.3 – 2.7           | 1.7                             | –                      | 1.7                              | –                      |      |
|                  |                                       |                                                     | 3.0 – 3.6           | 2.0                             | –                      | 2.0                              | –                      |      |
|                  |                                       |                                                     | 4.5 – 5.5           | 0.70 x V <sub>CC</sub>          | –                      | 0.70 x V <sub>CC</sub>           | –                      |      |
| V <sub>IL</sub>  | LOW Level Input Voltage               |                                                     | 1.65 – 1.95         | –                               | 0.35 x V <sub>CC</sub> | –                                | 0.35 x V <sub>CC</sub> | V    |
|                  |                                       |                                                     | 2.3 – 2.7           | –                               | 0.7                    | –                                | 0.7                    |      |
|                  |                                       |                                                     | 3.0 – 3.6           | –                               | 0.8                    | –                                | 0.8                    |      |
|                  |                                       |                                                     | 4.5 – 5.5           | –                               | 0.30 x V <sub>CC</sub> | –                                | 0.30 x V <sub>CC</sub> |      |
| V <sub>OH</sub>  | High-Level Output Voltage             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> | 1.65 to 5.5         | V <sub>CC</sub> – 0.1           | –                      | V <sub>CC</sub> – 0.1            | –                      | V    |
|                  |                                       | I <sub>OH</sub> = -100 µA                           | 1.65                | 1.29                            | –                      | 1.29                             | –                      |      |
|                  |                                       | I <sub>OH</sub> = -4 mA                             | 2.3                 | 1.8                             | –                      | 1.8                              | –                      |      |
|                  |                                       | I <sub>OH</sub> = -8 mA                             | 2.7                 | 2.2                             | –                      | 2.2                              | –                      |      |
|                  |                                       | I <sub>OH</sub> = -12 mA                            | 3.0                 | 2.4                             | –                      | 2.4                              | –                      |      |
|                  |                                       | I <sub>OH</sub> = -16 mA                            | 3.0                 | 2.2                             | –                      | 2.2                              | –                      |      |
|                  |                                       | I <sub>OH</sub> = -24 mA                            | 4.5                 | 3.7                             | –                      | 3.7                              | –                      |      |
|                  |                                       | I <sub>OH</sub> = -32 mA                            |                     |                                 |                        |                                  |                        |      |
| V <sub>OL</sub>  | Low-Level Output Voltage              | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> | 1.65 to 5.5         | –                               | 0.1                    | –                                | 0.1                    | V    |
|                  |                                       | I <sub>OL</sub> = 100 µA                            | 1.65                | –                               | 0.24                   | –                                | 0.24                   |      |
|                  |                                       | I <sub>OL</sub> = 4 mA                              | 2.3                 | –                               | 0.3                    | –                                | 0.3                    |      |
|                  |                                       | I <sub>OL</sub> = 8 mA                              | 2.7                 | –                               | 0.4                    | –                                | 0.4                    |      |
|                  |                                       | I <sub>OL</sub> = 12 mA                             | 3.0                 | –                               | 0.4                    | –                                | 0.4                    |      |
|                  |                                       | I <sub>OL</sub> = 16 mA                             | 3.0                 | –                               | 0.55                   | –                                | 0.55                   |      |
|                  |                                       | I <sub>OL</sub> = 24 mA                             | 4.5                 | –                               | 0.6                    | –                                | 0.6                    |      |
|                  |                                       | I <sub>OL</sub> = 32 mA                             |                     |                                 |                        |                                  |                        |      |
| I <sub>I</sub>   | Input Leakage Current                 | V <sub>I</sub> = 0 to 5.5 V                         | 3.6                 | –                               | ±5.0                   | –                                | ±5.0                   | µA   |
| I <sub>OFF</sub> | Power Off Leakage Current             | V <sub>I</sub> = 5.5 V or V <sub>O</sub> = 5.5 V    | 0                   | –                               | 10                     | –                                | 10                     | µA   |
| I <sub>CC</sub>  | Quiescent Supply Current              | V <sub>I</sub> = 5.5 V or GND                       | 3.6                 | –                               | 10                     | –                                | 10                     | µA   |
| ΔI <sub>CC</sub> | Increase in I <sub>CC</sub> per Input | V <sub>IH</sub> = V <sub>CC</sub> – 0.6 V           | 2.3 to 3.6          | –                               | 500                    | –                                | 500                    | µA   |

## AC ELECTRICAL CHARACTERISTICS

| Symbol                              | Parameter                                                                                    | Test Condition | V <sub>CC</sub> (V) | T <sub>A</sub> = -40°C to +85°C |      | T <sub>A</sub> = -40°C to +125°C |      | Unit |
|-------------------------------------|----------------------------------------------------------------------------------------------|----------------|---------------------|---------------------------------|------|----------------------------------|------|------|
|                                     |                                                                                              |                |                     | Min                             | Max  | Min                              | Max  |      |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation Delay, CP <sub>n</sub> to (Q <sub>n</sub> or $\bar{Q}_n$ )                       | Waveform 1     | 1.65 to 1.95        | –                               | 12.5 | –                                | 12.5 | ns   |
|                                     |                                                                                              |                | 2.3 to 2.7          | –                               | 8.4  | –                                | 8.4  |      |
|                                     |                                                                                              |                | 2.7                 | –                               | 8.0  | –                                | 8.0  |      |
|                                     |                                                                                              |                | 3.0 to 3.6          | –                               | 7.0  | –                                | 7.0  |      |
|                                     |                                                                                              |                | 4.5 to 5.5          | –                               | 5.0  | –                                | 5.0  |      |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation Delay, (S <sub>Dn</sub> or C <sub>Dn</sub> ) to (Q <sub>n</sub> or $\bar{Q}_n$ ) | Waveform 2     | 1.65 to 1.95        | –                               | 12.5 | –                                | 12.5 | ns   |
|                                     |                                                                                              |                | 2.3 to 2.7          | –                               | 8.4  | –                                | 8.4  |      |
|                                     |                                                                                              |                | 2.7                 | –                               | 8.0  | –                                | 8.0  |      |
|                                     |                                                                                              |                | 3.0 to 3.6          | –                               | 7.0  | –                                | 7.0  |      |
|                                     |                                                                                              |                | 4.5 to 5.5          | –                               | 5.0  | –                                | 5.0  |      |

# 74LCX74

## AC ELECTRICAL CHARACTERISTICS (continued)

| Symbol                                   | Parameter                                               | Test Condition | V <sub>CC</sub> (V) | T <sub>A</sub> = -40°C to +85°C |     | T <sub>A</sub> = -40°C to +125°C |     | Unit |
|------------------------------------------|---------------------------------------------------------|----------------|---------------------|---------------------------------|-----|----------------------------------|-----|------|
|                                          |                                                         |                |                     | Min                             | Max | Min                              | Max |      |
| f <sub>max</sub>                         | Clock Pulse Frequency                                   | Waveform 1     | 1.65 to 1.95        | 90                              | –   | 90                               | –   | MHz  |
|                                          |                                                         |                | 2.3 to 2.7          | 150                             | –   | 150                              | –   |      |
|                                          |                                                         |                | 2.7                 | 150                             | –   | 150                              | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | 150                             | –   | 150                              | –   |      |
|                                          |                                                         |                | 4.5 to 5.5          | 150                             | –   | 150                              | –   |      |
| t <sub>s</sub>                           | Setup Time                                              | Waveform 1     | 1.65 to 1.95        | 4.0                             | –   | 4.0                              | –   | ns   |
|                                          |                                                         |                | 2.3 to 2.7          | 4.0                             | –   | 4.0                              | –   |      |
|                                          |                                                         |                | 2.7                 | 2.5                             | –   | 2.5                              | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | 2.5                             | –   | 2.5                              | –   |      |
|                                          |                                                         |                | 4.5 to 5.5          | 2.5                             | –   | 2.5                              | –   |      |
| t <sub>h</sub>                           | Hold Time                                               | Waveform 1     | 1.65 to 1.95        | 2.0                             | –   | 2.0                              | –   | ns   |
|                                          |                                                         |                | 2.3 to 2.7          | 2.0                             | –   | 2.0                              | –   |      |
|                                          |                                                         |                | 2.7                 | 1.5                             | –   | 1.5                              | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | 1.5                             | –   | 1.5                              | –   |      |
|                                          |                                                         |                | 4.5 to 5.5          | 1.5                             | –   | 1.5                              | –   |      |
| t <sub>w</sub>                           | Pulse Width, CP <sub>n</sub>                            | Waveform 4     | 1.65 to 1.95        | 4.0                             | –   | 4.0                              | –   | ns   |
|                                          |                                                         |                | 2.3 to 2.7          | 4.0                             | –   | 4.0                              | –   |      |
|                                          |                                                         |                | 2.7                 | 3.3                             | –   | 3.3                              | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | 3.3                             | –   | 3.3                              | –   |      |
|                                          |                                                         |                | 4.5 to 5.5          | 3.3                             | –   | 3.3                              | –   |      |
|                                          | Pulse Width, $\overline{S_{Dn}}$ or $\overline{C_{Dn}}$ | Waveform 4     | 1.65 to 1.95        | 4.0                             | –   | 4.0                              | –   | ns   |
|                                          |                                                         |                | 2.3 to 2.7          | 4.0                             | –   | 4.0                              | –   |      |
|                                          |                                                         |                | 2.7                 | 3.6                             | –   | 3.6                              | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | 3.3                             | –   | 3.3                              | –   |      |
|                                          |                                                         |                | 4.5 to 5.5          | 3.3                             | –   | 3.3                              | –   |      |
| t <sub>rec</sub>                         | Recovery Time                                           | Waveform 3     | 1.65 to 1.95        | 4.5                             | –   | 4.5                              | –   | ns   |
|                                          |                                                         |                | 2.3 to 2.7          | 4.5                             | –   | 4.5                              | –   |      |
|                                          |                                                         |                | 2.7                 | 3.0                             | –   | 3.0                              | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | 2.5                             | –   | 2.5                              | –   |      |
|                                          |                                                         |                | 4.5 to 5.5          | 2.5                             | –   | 2.5                              | –   |      |
| t <sub>OSHL</sub> ,<br>t <sub>OSLH</sub> | Output to Output Skew                                   |                | 1.65 to 1.95        | –                               | –   | –                                | –   | ns   |
|                                          |                                                         |                | 2.3 to 2.7          | –                               | –   | –                                | –   |      |
|                                          |                                                         |                | 2.7                 | –                               | –   | –                                | –   |      |
|                                          |                                                         |                | 3.0 to 3.6          | –                               | 1.0 | –                                | 1.0 |      |
|                                          |                                                         |                | 4.5 to 5.5          | –                               | –   | –                                | –   |      |

6. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t<sub>OSHL</sub>) or LOW-to-HIGH (t<sub>OSLH</sub>).

# 74LCX74

## DYNAMIC SWITCHING CHARACTERISTICS

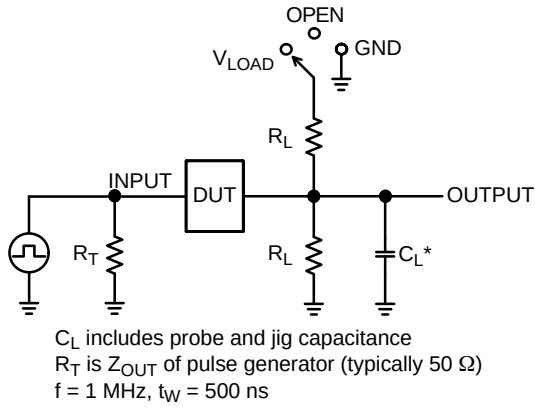
| Symbol           | Parameter                                   | Condition                                                              | V <sub>CC</sub> (V) | T <sub>A</sub> = +25°C | Unit |
|------------------|---------------------------------------------|------------------------------------------------------------------------|---------------------|------------------------|------|
|                  |                                             |                                                                        |                     | Typ                    |      |
| V <sub>OLP</sub> | Quiet Output Dynamic Peak V <sub>OL</sub>   | C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 3.3 V, V <sub>IL</sub> = 0 V | 3.3                 | 0.8                    | V    |
|                  |                                             | C <sub>L</sub> = 30 pF, V <sub>IH</sub> = 2.5 V, V <sub>IL</sub> = 0 V | 2.5                 | 0.6                    |      |
| V <sub>OLV</sub> | Quiet Output Dynamic Valley V <sub>OL</sub> | C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 3.3 V, V <sub>IL</sub> = 0 V | 3.3                 | −0.8                   | V    |
|                  |                                             | C <sub>L</sub> = 30 pF, V <sub>IH</sub> = 2.5 V, V <sub>IL</sub> = 0 V | 2.5                 | −0.6                   |      |

## CAPACITANCE

| Symbol           | Parameter                     | Condition                                                                     | Typ | Unit |
|------------------|-------------------------------|-------------------------------------------------------------------------------|-----|------|
| C <sub>IN</sub>  | Input Capacitance             | V <sub>CC</sub> = Open, V <sub>I</sub> = 0 V or V <sub>CC</sub>               | 7   | pF   |
| C <sub>OUT</sub> | Output Capacitance            | V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>              | 8   | pF   |
| C <sub>PD</sub>  | Power Dissipation Capacitance | V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> , f = 10 MHz | 25  | pF   |

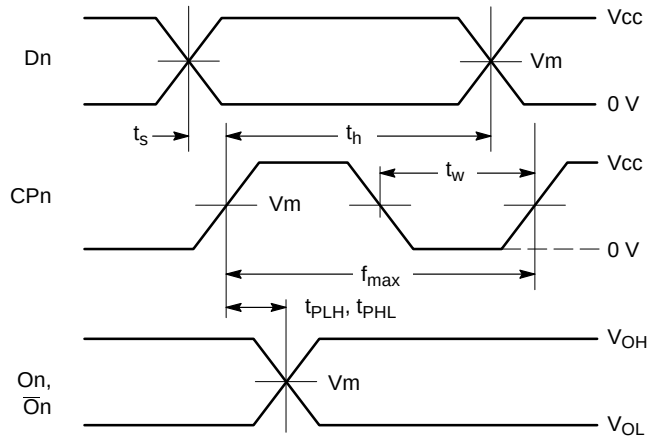
# 74LCX74

## AC Loading and Waveforms (Generic for LCX Family)



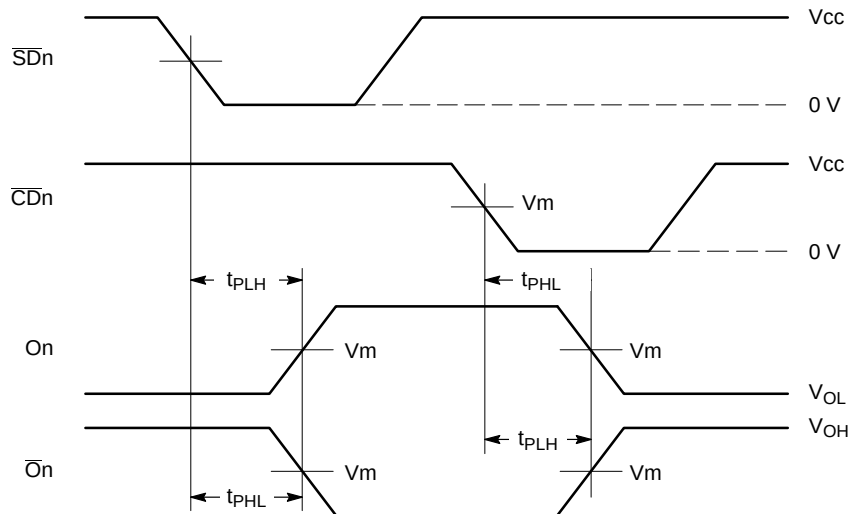
| Test                | Switch Position |
|---------------------|-----------------|
| $t_{PLH} / t_{PHL}$ | Open            |
| $t_{PLZ} / t_{PZL}$ | $V_{LOAD}$      |
| $t_{PHZ} / t_{PZH}$ | GND             |

Figure 4. Test Circuit



WAVEFORM 1 – PROPAGATION DELAYS, SETUP AND HOLD TIMES

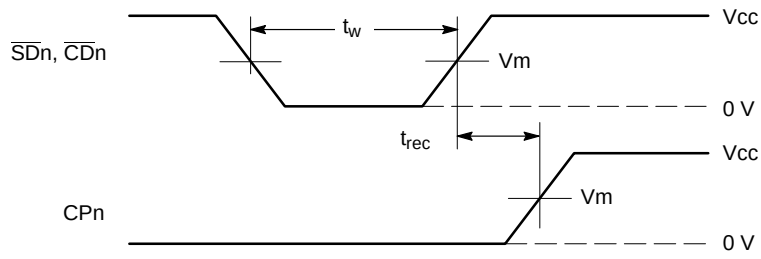
$t_R = t_F = 2.5$  ns, 10% to 90%;  $f = 1$  MHz;  $t_W = 500$  ns



WAVEFORM 2 – PROPAGATION DELAYS

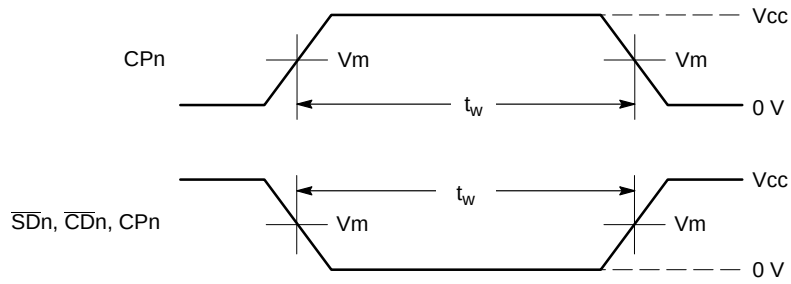
$t_R = t_F = 2.5$  ns, 10% to 90%;  $f = 1$  MHz;  $t_W = 500$  ns

## 74LCX74



**WAVEFORM 3 – RECOVERY TIME**

$t_R = t_F = 2.5$  ns from 10% to 90%;  $f = 1$  MHz;  $t_w = 500$  ns



**WAVEFORM 4 – PULSE WIDTH**

$t_R = t_F = 2.5$  ns (or fast as required) from 10% to 90%;  
Output requirements:  $V_{OL} \leq 0.8$  V,  $V_{OH} \geq 2.0$  V

| $V_{CC}$ , V | $R_L$ , $\Omega$ | $C_L$ , pF | $V_{LOAD}$        | $V_m$ , V    | $V_Y$ , V |
|--------------|------------------|------------|-------------------|--------------|-----------|
| 1.65 to 1.95 | 500              | 30         | $2 \times V_{CC}$ | $V_{CC} / 2$ | 0.15      |
| 2.3 to 2.7   | 500              | 30         | $2 \times V_{CC}$ | $V_{CC} / 2$ | 0.15      |
| 2.7          | 500              | 50         | 6 V               | 1.5          | 0.3       |
| 3.0 to 3.6   | 500              | 50         | 6 V               | 1.5          | 0.3       |
| 4.5 to 5.5   | 500              | 50         | $2 \times V_{CC}$ | $V_{CC} / 2$ | 0.3       |

**Figure 5. Waveforms**



# 74LCX74

## Schematic Diagram (Generic for LCX Family)

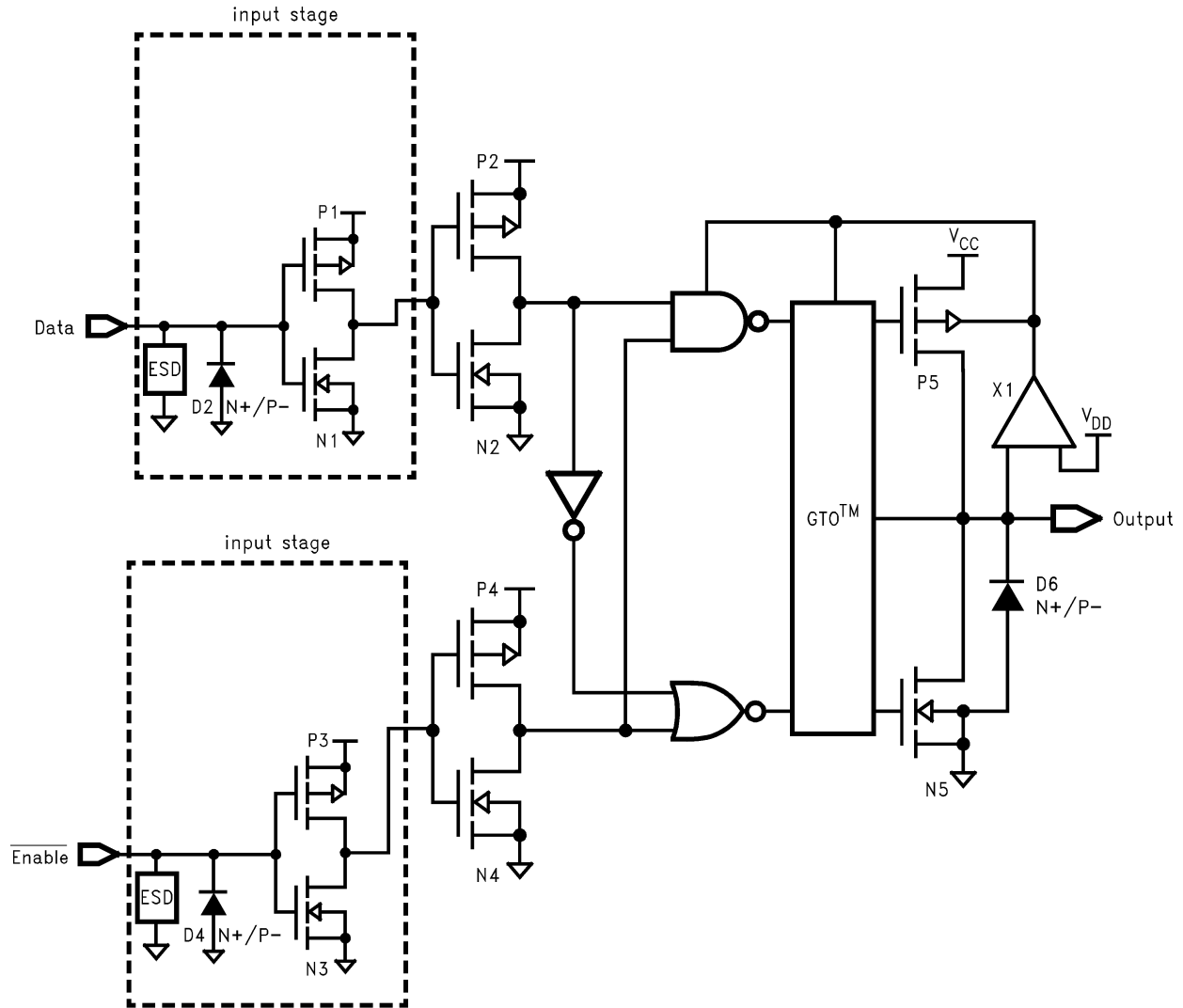


Figure 6. Schematic Diagram

## ORDERING INFORMATION

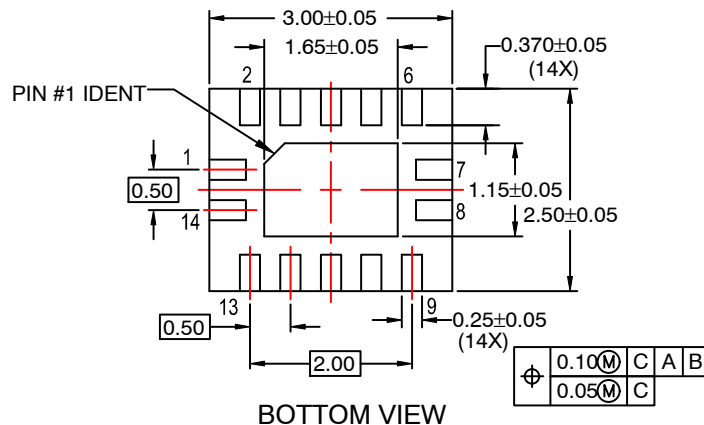
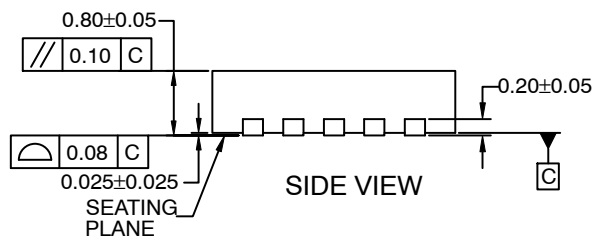
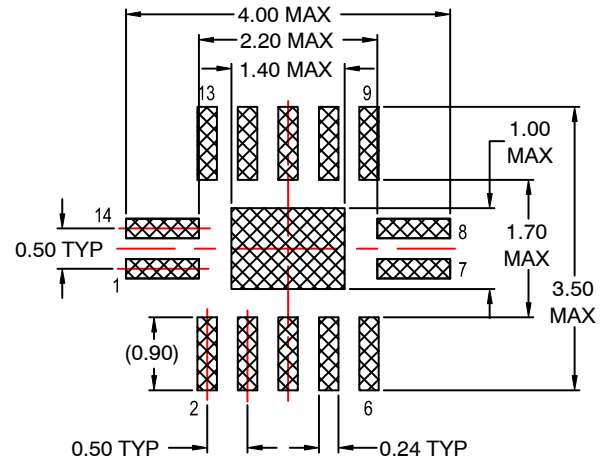
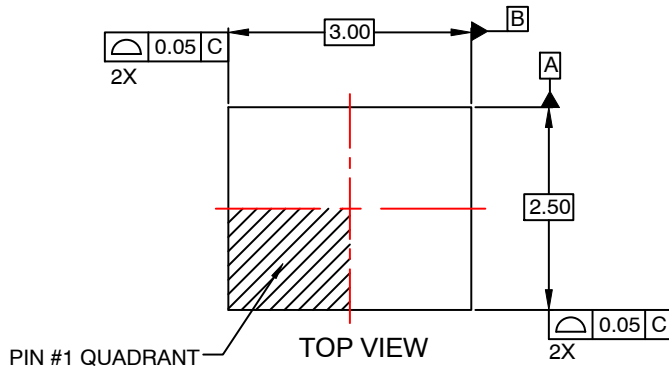
| Device      | Marking   | Package                            | Shipping <sup>†</sup>    |
|-------------|-----------|------------------------------------|--------------------------|
| 74LCX74MTCX | LCX<br>74 | TSSOP-14<br>(Pb-Free, Halide Free) | 2500 Units / Tape & Reel |
| 74LCX74BQX  | LCX74     | QFN14<br>(Pb-Free, Halide Free)    | 3000 Units / Tape & Reel |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*-Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

**QFN14 3.0x2.5, 0.5P**  
CASE 510CB  
ISSUE O

DATE 31 AUG 2016

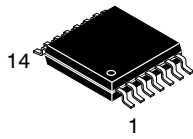


**NOTES:**

- A. CONFORMS TO JEDEC REGISTRATION MO-241, VARIATION AA
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

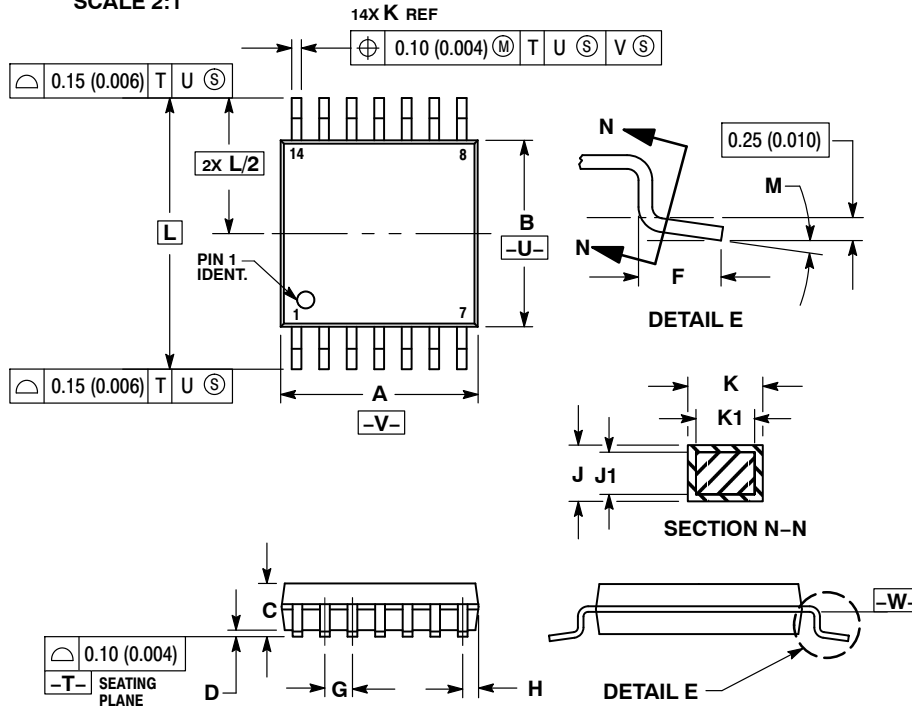
|                         |                            |                                                                                                                                                                                     |
|-------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>QFN14 3.0X2.5, 0.5P</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

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**TSSOP-14 WB**  
**CASE 948G**  
**ISSUE C**

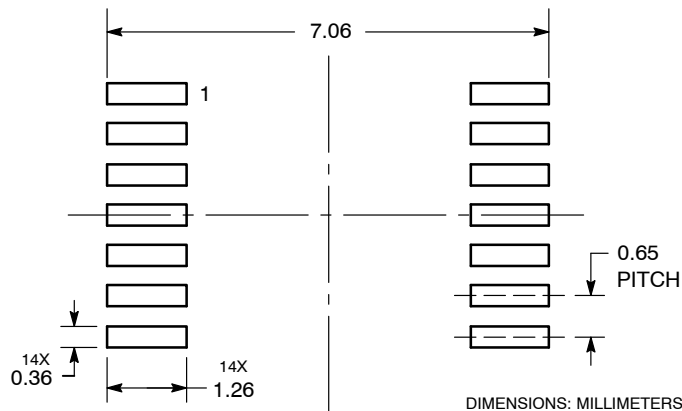
DATE 17 FEB 2016

SCALE 2:1

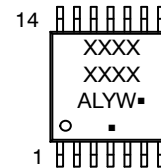

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 4.90        | 5.10 | 0.193     | 0.200 |
| B   | 4.30        | 4.50 | 0.169     | 0.177 |
| C   | ---         | 1.20 | ---       | 0.047 |
| D   | 0.05        | 0.15 | 0.002     | 0.006 |
| F   | 0.50        | 0.75 | 0.020     | 0.030 |
| G   | 0.65 BSC    |      | 0.026 BSC |       |
| H   | 0.50        | 0.60 | 0.020     | 0.024 |
| J   | 0.09        | 0.20 | 0.004     | 0.008 |
| J1  | 0.09        | 0.16 | 0.004     | 0.006 |
| K   | 0.19        | 0.30 | 0.007     | 0.012 |
| K1  | 0.19        | 0.25 | 0.007     | 0.010 |
| L   | 6.40 BSC    |      | 0.252 BSC |       |
| M   | 0°          | 8°   | 0°        | 8°    |

**RECOMMENDED  
SOLDERING FOOTPRINT\***


\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**GENERIC  
MARKING DIAGRAM\***


A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

**DOCUMENT NUMBER:** 98ASH70246A

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**DESCRIPTION:** TSSOP-14 WB

**PAGE 1 OF 1**

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