

# Low Voltage CMOS Hex Schmitt Inverter with 5 V-Tolerant Inputs

## MC74LCX14

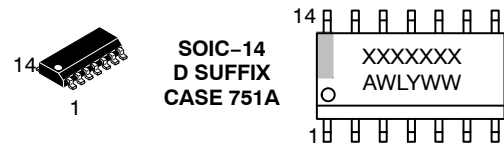
The MC74LCX14 is a high performance hex inverter with Schmitt-Trigger inputs operating from a 1.65 to 5.5 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers, while TTL compatible outputs offer improved switching noise performance. A  $V_I$  specification of 5.5 V allows MC74LCX14 inputs to be safely driven from 5.0 V devices.

Pin configuration and function are the same as the MC74LCX04, but the inputs have hysteresis and, with its Schmitt trigger function, the LCX14 can be used as a line receiver which will receive slow input signals.

### Features

- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation
- 5.0 V Tolerant Inputs – Interface Capability with 5.0 V TTL Logic
- LVTTL Compatible
- LVC MOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current (10  $\mu$ A) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 100 mA
- Current Drive Capability is 24 mA at Source/Sink
- Pin and Function Compatible with Other Standard Logic Families
- ESD Performance: Human Body Model >2000 V
- Chip Complexity: 41 Equivalent Gates
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MARKING DIAGRAMS



XXXXXX = Specific Device Code  
 A = Assembly Location  
 L, WL = Wafer Lot  
 Y, YY = Year  
 W, WW = Work Week  
 G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

MC74LCX14

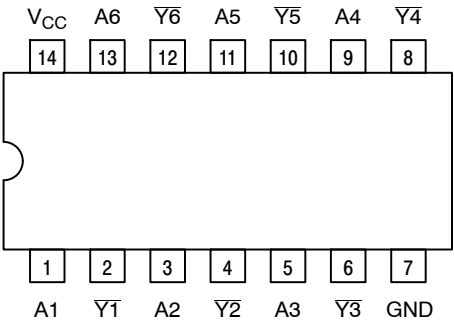


Figure 1. Pinout: 14-Lead (Top View)

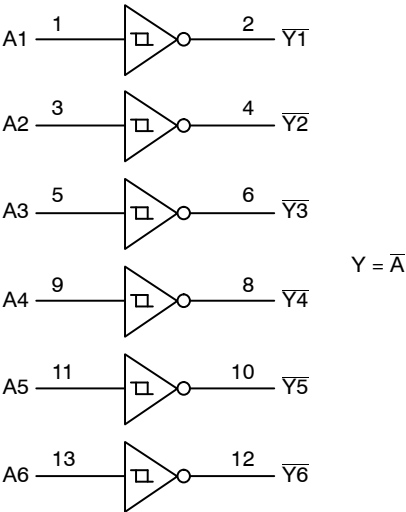


Figure 2. Logic Diagram

PIN NAMES

| Pins             | Function    |
|------------------|-------------|
| A <sub>n</sub>   | Data Inputs |
| $\overline{Y_n}$ | Outputs     |

TRUTH TABLE

| Inputs | Outputs |
|--------|---------|
| A      | Y       |
| L      | H       |
| H      | L       |

# MC74LCX14

## MAXIMUM RATINGS

| Symbol                | Parameter                                                                                                            | Value                                                  | Unit |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------|
| $V_{CC}$              | DC Supply Voltage                                                                                                    | –0.5 to +6.5                                           | V    |
| $V_I$                 | DC Input Voltage (Note 1)                                                                                            | –0.5 to +6.5                                           | V    |
| $V_O$                 | DC Output Voltage (Note 1)<br>Active–Mode (High or Low State)<br>Tri–State Mode<br>Power–Down Mode ( $V_{CC} = 0$ V) | –0.5 to $V_{CC} + 0.5$<br>–0.5 to +6.5<br>–0.5 to +6.5 | V    |
| $I_{IK}$              | DC Input Diode Current<br>$V_I < GND$                                                                                | –50                                                    | mA   |
| $I_{OK}$              | DC Output Diode Current<br>$V_O < GND$                                                                               | –50                                                    | mA   |
| $I_O$                 | DC Output Source/Sink Current                                                                                        | ±50                                                    | mA   |
| $I_{CC}$ or $I_{GND}$ | DC Supply Current per Supply Pin or Ground Pin                                                                       | ±100                                                   | mA   |
| $T_{STG}$             | Storage Temperature Range                                                                                            | –65 to +150                                            | °C   |
| $T_L$                 | Lead Temperature, 1 mm from Case for 10 secs                                                                         | 260                                                    | °C   |
| $T_J$                 | Junction Temperature Under Bias                                                                                      | +150                                                   | °C   |
| $\theta_{JA}$         | Thermal Resistance (Note 1)<br>SOIC–14<br>QFN14<br>TSSOP–14                                                          | 116<br>130<br>150                                      | °C/W |
| $P_D$                 | Power Dissipation in Still Air at 125°C<br>SOIC–14<br>QFN14<br>TSSOP–14                                              | 1077<br>962<br>833                                     | mW   |
| MSL                   | Moisture Sensitivity                                                                                                 | Level 1                                                | –    |
| $F_R$                 | Flammability Rating<br>Oxygen Index: 28 to 34                                                                        | UL 94 V–0 @ 0.125 in                                   | –    |
| $V_{ESD}$             | ESD Withstand Voltage (Note 3)<br>Human Body Model<br>Charged Device Model                                           | 2000<br>N/A                                            | V    |

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.

1.  $I_O$  absolute maximum rating must be observed.
2. Measured with minimum pad spacing on an FR4 board, using 76mm-by-114mm, 2-ounce copper trace no air flow per JESD51–7.
3. 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<br>Operating<br>Data Retention Only                                                       | 1.65<br>1.5 | 3.3         | 5.5                    | V    |
| $V_I$      | Digital Input Voltage                                                                                    | 0           | –           | 5.5                    | V    |
| $V_O$      | Output Voltage<br>Active Mode (High or Low State)<br>Tri–State Mode<br>Power Down Mode ( $V_{CC} = 0$ V) | 0<br>0<br>0 | –<br>–<br>– | $V_{CC}$<br>5.5<br>5.5 | V    |
| $T_A$      | Operating Free–Air Temperature                                                                           | –40         | –           | +125                   | °C   |
| $t_r, t_f$ | Input Transition Rise or Fall Rate                                                                       | 0           | –           | No Limit               | nS/V |

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.

4. 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.

# MC74LCX14

## 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>T+</sub>  | Positive-Input Threshold Voltage      |                                                                                                                                                                                                                                                        | 1.65                                                   | –                                                                | 1.4                                             | –                                                                | 1.4                                             | V    |
|                  |                                       |                                                                                                                                                                                                                                                        | 2.5                                                    | 0.9                                                              | 1.7                                             | 0.9                                                              | 1.7                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 3.0                                                    | 1.2                                                              | 2.2                                             | 1.2                                                              | 2.2                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 4.5                                                    | –                                                                | 3.1                                             | –                                                                | 3.1                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 5.5                                                    | –                                                                | 3.6                                             | –                                                                | 3.6                                             |      |
| V <sub>T–</sub>  | Negative-Input Threshold Voltage      |                                                                                                                                                                                                                                                        | 1.65                                                   | 0.2                                                              | –                                               | 0.2                                                              | –                                               | V    |
|                  |                                       |                                                                                                                                                                                                                                                        | 2.5                                                    | 0.4                                                              | 1.1                                             | 0.4                                                              | 1.1                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 3.0                                                    | 0.6                                                              | 1.5                                             | 0.6                                                              | 1.5                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 4.5                                                    | 1                                                                | –                                               | 1                                                                | –                                               |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 5.5                                                    | 1.2                                                              | –                                               | 1.2                                                              | –                                               |      |
| V <sub>H</sub>   | Hysteresis Voltage                    |                                                                                                                                                                                                                                                        | 1.65                                                   | 0.1                                                              | 0.9                                             | 0.1                                                              | 0.9                                             | V    |
|                  |                                       |                                                                                                                                                                                                                                                        | 2.5                                                    | 0.3                                                              | 1.0                                             | 0.3                                                              | 1.0                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 3.0                                                    | 0.4                                                              | 1.2                                             | 0.4                                                              | 1.2                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 4.5                                                    | 0.6                                                              | 1.5                                             | 0.6                                                              | 1.5                                             |      |
|                  |                                       |                                                                                                                                                                                                                                                        | 5.5                                                    | 0.7                                                              | 1.7                                             | 0.7                                                              | 1.7                                             |      |
| V <sub>OH</sub>  | High-Level Output Voltage             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>OH</sub> = –100 μA<br>I <sub>OH</sub> = –4 mA<br>I <sub>OH</sub> = –8 mA<br>I <sub>OH</sub> = –12 mA<br>I <sub>OH</sub> = –16 mA<br>I <sub>OH</sub> = –24 mA<br>I <sub>OH</sub> = –32 mA | 1.65 to 5.5<br>1.65<br>2.3<br>2.7<br>3.0<br>3.0<br>4.5 | V <sub>CC</sub> – 0.1<br>1.29<br>1.8<br>2.2<br>2.4<br>2.2<br>3.7 | –<br>–<br>–<br>–<br>–<br>–<br>–                 | V <sub>CC</sub> – 0.1<br>1.29<br>1.8<br>2.2<br>2.4<br>2.2<br>3.7 | –<br>–<br>–<br>–<br>–<br>–<br>–                 | V    |
| V <sub>OL</sub>  | Low-Level Output Voltage              | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>OL</sub> = 100 μA<br>I <sub>OL</sub> = 4 mA<br>I <sub>OL</sub> = 8 mA<br>I <sub>OL</sub> = 12 mA<br>I <sub>OL</sub> = 16 mA<br>I <sub>OL</sub> = 24 mA<br>I <sub>OL</sub> = 32 mA        | 1.65 to 5.5<br>1.65<br>2.3<br>2.7<br>3.0<br>3.0<br>4.5 | –<br>–<br>–<br>–<br>–<br>–<br>–                                  | 0.1<br>0.24<br>0.3<br>0.4<br>0.4<br>0.55<br>0.6 | –<br>–<br>–<br>–<br>–<br>–<br>–                                  | 0.1<br>0.24<br>0.3<br>0.4<br>0.4<br>0.55<br>0.6 | V    |
| 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<br>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   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# MC74LCX14

## 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> ,<br>t <sub>PHL</sub>   | Propagation Delay, Input to Output | See Figures 3 and 4 | 1.65 to 1.95        | –                               | 15.7 | –                                | 15.7 | ns   |
|                                          |                                    |                     | 2.3 to 2.7          | 1.5                             | 7.8  | 1.5                              | 7.8  |      |
|                                          |                                    |                     | 2.7                 | 1.5                             | 7.5  | 1.5                              | 7.5  |      |
|                                          |                                    |                     | 3.0 to 3.6          | 1.5                             | 6.5  | 1.5                              | 6.5  |      |
|                                          |                                    |                     | 4.5 to 5.5          | –                               | 5.6  | –                                | 5.6  |      |
| t <sub>OSSL</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          | –                               | –    | –                                | –    |      |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## DYNAMIC SWITCHING CHARACTERISTICS

| Symbol           | Characteristic                      | Condition                                                                                                                                                                                          | T <sub>A</sub> = +25°C |              |     | Unit |
|------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------|-----|------|
|                  |                                     |                                                                                                                                                                                                    | Min                    | Typ          | Max |      |
| V <sub>OLP</sub> | Dynamic LOW Peak Voltage (Note 5)   | V <sub>CC</sub> = 3.3 V, C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 3.3 V, V <sub>IL</sub> = 0 V<br>V <sub>CC</sub> = 2.5 V, C <sub>L</sub> = 30 pF, V <sub>IH</sub> = 2.5 V, V <sub>IL</sub> = 0 V |                        | 0.8<br>0.6   |     | V    |
| V <sub>OLV</sub> | Dynamic LOW Valley Voltage (Note 5) | V <sub>CC</sub> = 3.3 V, C <sub>L</sub> = 50 pF, V <sub>IH</sub> = 3.3 V, V <sub>IL</sub> = 0 V<br>V <sub>CC</sub> = 2.5 V, C <sub>L</sub> = 30 pF, V <sub>IH</sub> = 2.5 V, V <sub>IL</sub> = 0 V |                        | –0.8<br>–0.6 |     | V    |

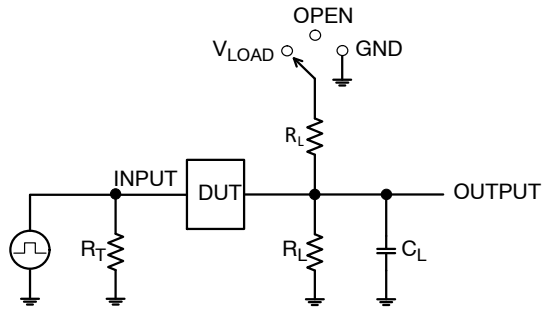
5. Number of outputs defined as “n”. Measured with “n–1” outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

## CAPACITIVE CHARACTERISTICS

| Symbol           | Parameter                              | Test Condition                                                           | Typical (T <sub>A</sub> = 25°C) | Unit |
|------------------|----------------------------------------|--------------------------------------------------------------------------|---------------------------------|------|
| C <sub>IN</sub>  | Input Capacitance                      | V <sub>CC</sub> = 3.3 V, 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 (Note 6) | 10 MHz, V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> | 25                              | pF   |

6. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the dynamic operating current consumption without load. Average operating current can be obtained by the equation  $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$ . C<sub>PD</sub> is used to determine the no-load dynamic power consumption:  $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$ .

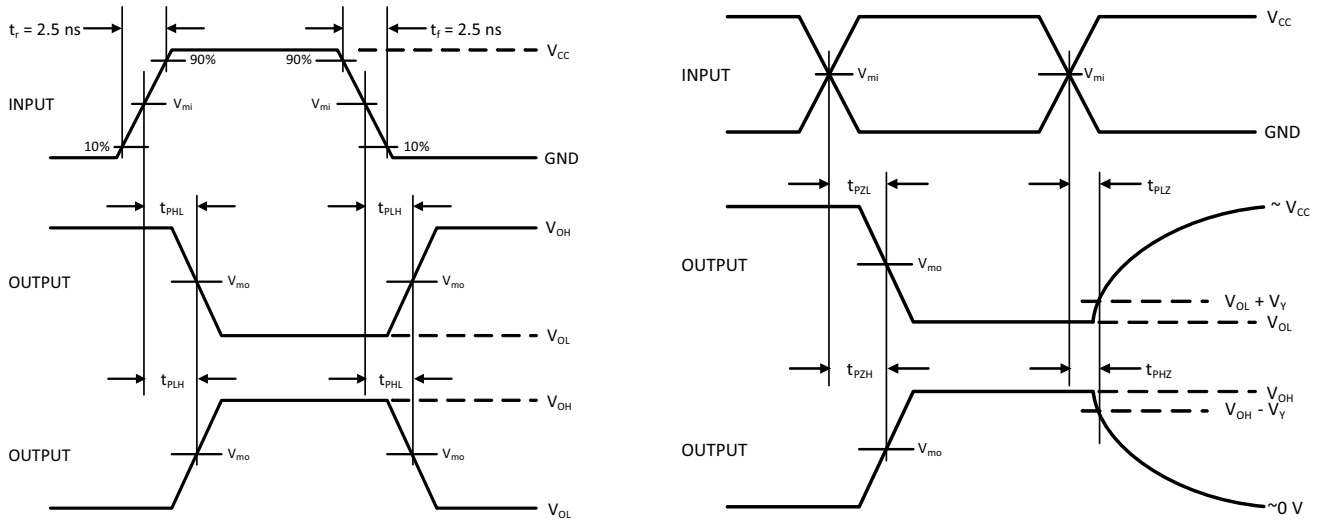
## MC74LCX14



$C_L$  includes probe and jig capacitance  
 $R_T$  is  $Z_{OUT}$  of pulse generator (typically 50  $\Omega$ )  
 $f = 1$  MHz

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

Figure 3. Test Circuit



| $V_{CC}$ , 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 4. Switching Waveforms

# MC74LCX14

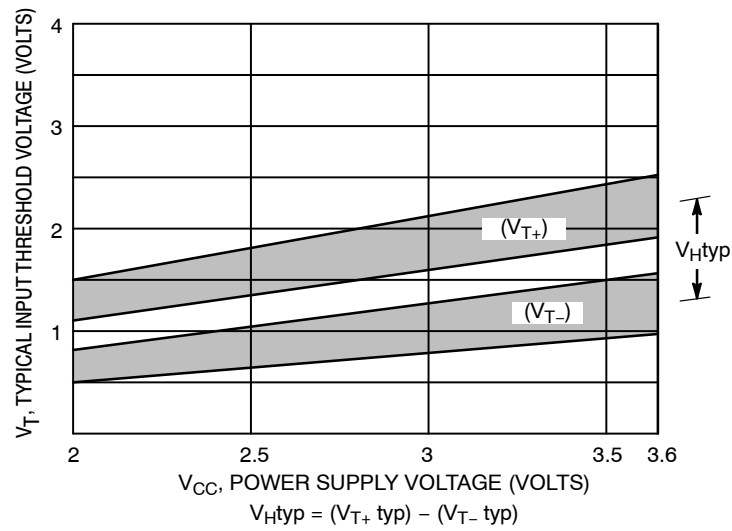
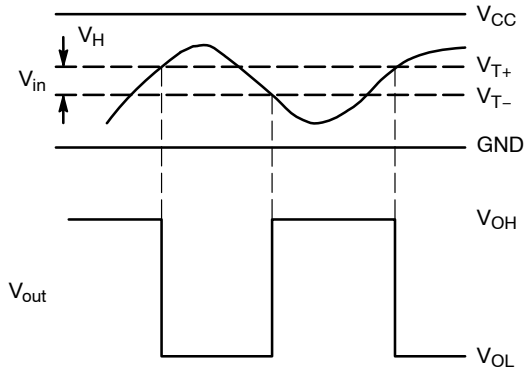


Figure 5. Typical Input Threshold,  $V_{T+}$ ,  $V_{T-}$  versus Power Supply Voltage

(a) A Schmitt-Trigger Squares Up Inputs With Slow Rise and Fall Times



(b) A Schmitt-Trigger Offers Maximum Noise Immunity

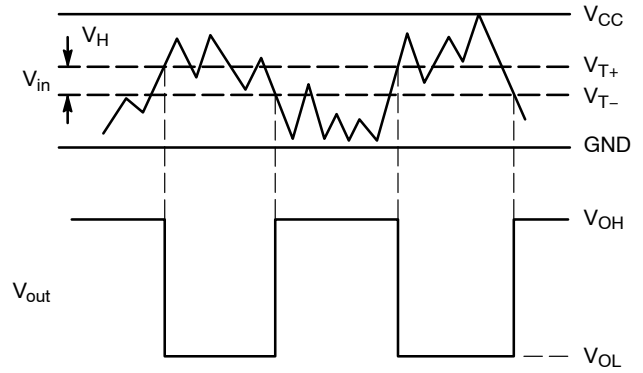


Figure 6. Typical Schmitt-Trigger Applications

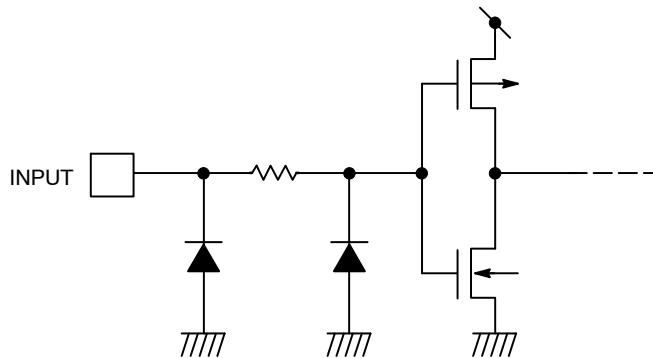


Figure 7. Input Equivalent Circuit

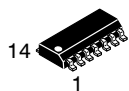
## MC74LCX14

### ORDERING INFORMATION

| Device         | Marking   | Package  | Shipping <sup>†</sup> |
|----------------|-----------|----------|-----------------------|
| MC74LCX14DG    | LCX14G    | SOIC-14  | 55 Units / Rail       |
| MC74LCX14DR2G  | LCX14G    | SOIC-14  | 2500 / Tape & Reel    |
| MC74LCX14DTG   | LCX<br>14 | TSSOP-14 | 96 Units / Rail       |
| MC74LCX14DTR2G | LCX<br>14 | TSSOP-14 | 2500 / 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.

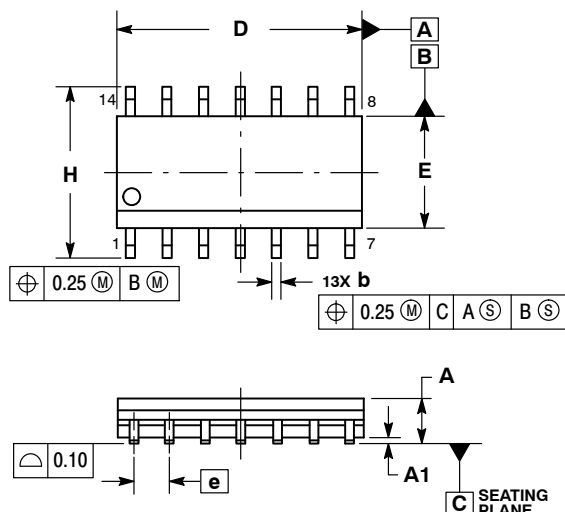
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-14 NB  
CASE 751A-03  
ISSUE L

DATE 03 FEB 2016

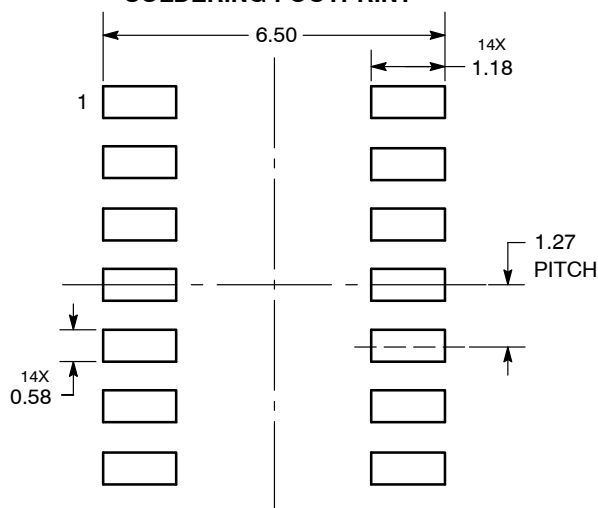


## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 1.35        | 1.75 | 0.054     | 0.068 |
| A1  | 0.10        | 0.25 | 0.004     | 0.010 |
| A3  | 0.19        | 0.25 | 0.008     | 0.010 |
| b   | 0.35        | 0.49 | 0.014     | 0.019 |
| D   | 8.55        | 8.75 | 0.337     | 0.344 |
| E   | 3.80        | 4.00 | 0.150     | 0.157 |
| e   | 1.27 BSC    |      | 0.050 BSC |       |
| H   | 5.80        | 6.20 | 0.228     | 0.244 |
| h   | 0.25        | 0.50 | 0.010     | 0.019 |
| L   | 0.40        | 1.25 | 0.016     | 0.049 |
| M   | 0°          | 7°   | 0°        | 7°    |

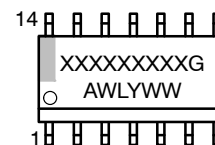
## SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

## GENERIC MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

\*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.

STYLES ON PAGE 2

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42565B | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | SOIC-14 NB  | PAGE 1 OF 2                                                                                                                                                                         |

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

SOIC-14  
CASE 751A-03  
ISSUE L

DATE 03 FEB 2016

STYLE 1:  
PIN 1. COMMON CATHODE  
2. ANODE/CATHODE  
3. ANODE/CATHODE  
4. NO CONNECTION  
5. ANODE/CATHODE  
6. NO CONNECTION  
7. ANODE/CATHODE  
8. ANODE/CATHODE  
9. ANODE/CATHODE  
10. NO CONNECTION  
11. ANODE/CATHODE  
12. ANODE/CATHODE  
13. NO CONNECTION  
14. COMMON ANODE

STYLE 2:  
CANCELLED

STYLE 3:  
PIN 1. NO CONNECTION  
2. ANODE  
3. ANODE  
4. NO CONNECTION  
5. ANODE  
6. NO CONNECTION  
7. ANODE  
8. ANODE  
9. ANODE  
10. NO CONNECTION  
11. ANODE  
12. ANODE  
13. NO CONNECTION  
14. COMMON CATHODE

STYLE 4:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. CATHODE  
4. NO CONNECTION  
5. CATHODE  
6. NO CONNECTION  
7. CATHODE  
8. CATHODE  
9. CATHODE  
10. NO CONNECTION  
11. CATHODE  
12. CATHODE  
13. NO CONNECTION  
14. COMMON ANODE

STYLE 5:  
PIN 1. COMMON CATHODE  
2. ANODE/CATHODE  
3. ANODE/CATHODE  
4. ANODE/CATHODE  
5. ANODE/CATHODE  
6. NO CONNECTION  
7. COMMON ANODE  
8. COMMON CATHODE  
9. ANODE/CATHODE  
10. ANODE/CATHODE  
11. ANODE/CATHODE  
12. ANODE/CATHODE  
13. NO CONNECTION  
14. COMMON ANODE

STYLE 6:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE  
4. CATHODE  
5. CATHODE  
6. CATHODE  
7. CATHODE  
8. ANODE  
9. ANODE  
10. ANODE  
11. ANODE  
12. ANODE  
13. ANODE  
14. ANODE

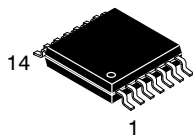
STYLE 7:  
PIN 1. ANODE/CATHODE  
2. COMMON ANODE  
3. COMMON CATHODE  
4. ANODE/CATHODE  
5. ANODE/CATHODE  
6. ANODE/CATHODE  
7. ANODE/CATHODE  
8. ANODE/CATHODE  
9. ANODE/CATHODE  
10. ANODE/CATHODE  
11. COMMON CATHODE  
12. COMMON ANODE  
13. ANODE/CATHODE  
14. ANODE/CATHODE

STYLE 8:  
PIN 1. COMMON CATHODE  
2. ANODE/CATHODE  
3. ANODE/CATHODE  
4. NO CONNECTION  
5. ANODE/CATHODE  
6. ANODE/CATHODE  
7. COMMON ANODE  
8. COMMON ANODE  
9. ANODE/CATHODE  
10. ANODE/CATHODE  
11. NO CONNECTION  
12. ANODE/CATHODE  
13. ANODE/CATHODE  
14. COMMON CATHODE

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42565B | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | SOIC-14 NB  | PAGE 2 OF 2                                                                                                                                                                         |

**onsemi** and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

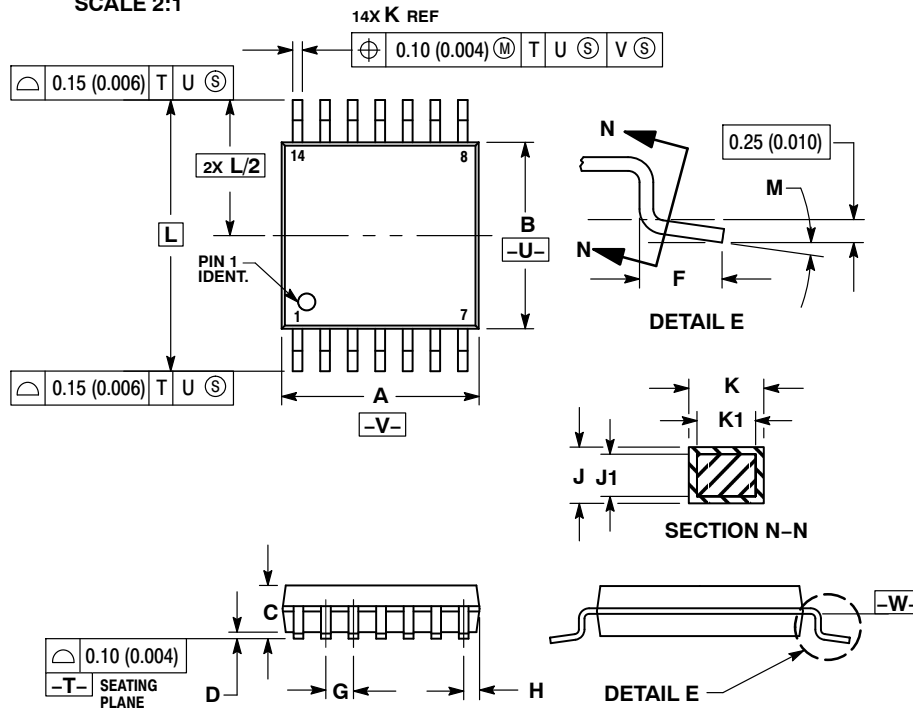
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



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

DATE 17 FEB 2016

SCALE 2:1

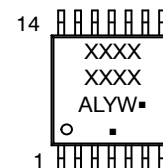


## NOTES:

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°    |

## GENERIC MARKING DIAGRAM\*

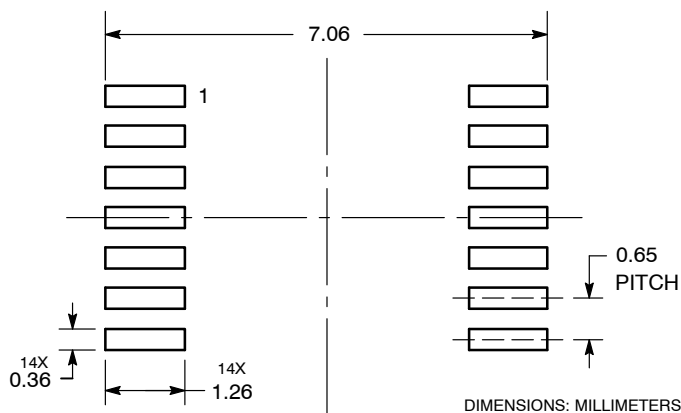


- A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(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.

## SOLDERING FOOTPRINT



DOCUMENT NUMBER: 98ASH70246A

Electronic versions are uncontrolled except when accessed directly from the Document Repository.  
Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.

DESCRIPTION: TSSOP-14 WB

PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)