

Hex Inverter with Schmitt Trigger Input

74AC14, 74ACT14

General Description

The 74AC14 and 74ACT14 contain six inverter gates each with a Schmitt trigger input. They are capable of transforming slowly changing input signals into sharply defined, jitter–free output signals. In addition, they have a greater noise margin than conventional inverters.

The 74AC14 and 74ACT14 have hysteresis between the positive-going and negative-going input thresholds (typically 1.0 V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

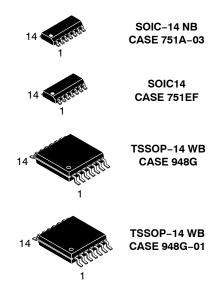
Features

- I_{CC} Reduced by 50%
- Outputs Source/Sink 24 mA
- 74ACT14 has TTL-Compatible Inputs
- These are Pb-Free Devices

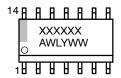
ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|---|-------------------------------------|----------------------------------|------|
| Supply Voltage | V _{CC} | -0.5 to +6.5 | V |
| DC Input Diode Current $V_I = -0.5 \text{ V}$ $V_I = V_{CC} + 1.5 \text{ V}$ | I _{IK} | -20 +20 | mA |
| DC Input Voltage | VI | –0.5 to V _{CC} + 1.5 | V |
| DC Output Diode Current $V_O = -0.5 \text{ V}$ $V_O = V_{CC} + 0.5 \text{ V}$ | I _{OK} | -20 +20 | mA |
| DC Output Voltage | V _O | -0.5 to V _{CC} + 0.5 | V |
| DC Output Source or Sink Current | I _O | ±50 | mA |
| DC V _{CC} or Ground Current per Output Pin | I _{CC} or I _{GND} | ±50 | mA |
| Storage Temperature Range | T _{STG} | -65 to +150 | °C |
| Junction Temperature | TJ | 140 | °C |

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.



MARKING DIAGRAM



XXXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week

MARKING DIAGRAM



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 5 of this data sheet.

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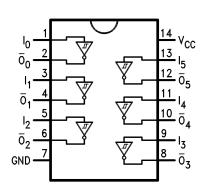


Figure 1. Connection Diagram

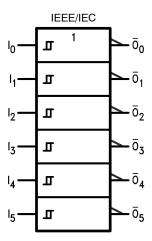


Figure 2. Logic Symbol

PIN DESCRIPTION

| Pin | Description |
|----------------|-------------|
| A _n | Inputs |
| Ōn | Outputs |

FUNCTION TABLE

| Input | Output |
|-------|--------|
| Α | ō |
| L | Н |
| Н | L |

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|-----------------|-----------------------------|------------|-----------------|------|
| V _{CC} | Supply Voltage AC ACT | 2.0 4.5 | 6.0 5.5 | V |
| VI | Input Voltage | 0 | V _{CC} | V |
| Vo | Output Voltage | 0 | V _{CC} | V |
| T _A | Operating Temperature | -40 | +85 | °C |

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.

DC ELECTRICAL CHARACTERISTICS FOR AC

| | | | | T _A = - | +25°C | $T_A = -40^{\circ}C \text{ to } +85^{\circ}C$ | |
|-----------------------------|-------------------------------------|---------------------|--|--------------------|-------|---|------|
| Symbol | Parameter | V _{CC} (V) | Conditions | Тур | G | Guaranteed Limits | Unit |
| V _{OH} | Minimum HIGH Level | 3.0 | I _{OUT} = -50 μA | 2.99 | 2.9 | 2.9 | V |
| | Output Voltage | 4.5 | | 4.49 | 4.4 | 4.4 | |
| | | 5.5 | | 5.49 | 5.4 | 5.4 | |
| | | 3.0 | I _{OH} = 12 mA | - | 2.56 | 2.46 | |
| | | 4.5 | I _{OH} = 24 mA | - | 3.86 | 3.76 | |
| | | 5.5 | I _{OH} = 24 mA (Note 1) | - | 4.86 | 4.76 | |
| V _{OL} | Maximum LOW Level | 3.0 | I _{OUT} = 50 μA | 0.002 | 0.1 | 0.1 | V |
| | Output Voltage | 4.5 | | 0.001 | 0.1 | 0.1 | |
| | | 5.5 | | 0.001 | 0.1 | 0.1 | |
| | | 3.0 | I _{OL} = 12 mA | - | 0.36 | 0.44 | |
| | | 4.5 | I _{OL} = 24 mA | - | 0.36 | 0.44 | |
| | | 5.5 | I _{OL} = 24 mA (Note 1) | - | 0.36 | 0.44 | |
| I _{IN} (Note 3) | Maximum Input Leakage Current | 5.5 | V _I = V _{CC} , GND | - | ±0.1 | ±1.0 | μΑ |
| V _{t+} | Maximum Positive | 3.0 | T _A = Worst Case | - | 2.2 | 2.2 | V |
| | Threshold | 4.5 | | _ | 3.2 | 3.2 | |
| | | 5.5 | | _ | 3.9 | 3.9 | |
| V _{t-} | Minimum Negative | 3.0 | T _A = Worst Case | - | 0.5 | 0.5 | V |
| | Threshold | 4.5 | | - | 0.9 | 0.9 | |
| | | 5.5 | | - | 1.1 | 1.1 | |
| V _{H(MAX)} | Maximum Hysteresis | 3.0 | T _A = Worst Case | - | 1.2 | 1.2 | V |
| | | 4.5 | | _ | 1.4 | 1.4 | |
| | | 5.5 | | - | 1.6 | 1.6 | |
| V _{H(MIN)} | Minimum Hysteresis | 3.0 | T _A = Worst Case | - | 0.3 | 0.3 | V |
| | | 4.5 | | _ | 0.4 | 0.4 | |
| | | 5.5 | | - | 0.5 | 0.5 | |
| I _{OLD} | Minimum Dynamic | 5.5 | V _{OLD} = 1.65 V Max. | - | _ | 75 | mA |
| I _{OHD} | Output Current (Note 2) | 5.5 | V _{OHD} = 3.85 V Min. | - | _ | -75 | mA |
| I _{CC} (Note 3) | Maximum Quiescent Supply Current | 5.5 | $V_{IN} = V_{CC}$ or GND | - | 2.0 | 20.0 | μΑ |

- All outputs loaded; thresholds on input associated with output under test.
 Maximum test duration 2.0 ms, one output loaded at a time.
 I_{IN} and I_{CC} at 3.0 V are guaranteed to be less than or equal to the respective limit at 5.5 V V_{CC}.

DC ELECTRICAL CHARACTERISTICS FOR ACT

| | | | | T _A = - | +25°C | T _A = -40°C to +85°C | |
|---------------------|-------------------------------------|---------------------|--|--------------------|-------|---------------------------------|------|
| Symbol | Parameter | V _{CC} (V) | Conditions | Тур | G | uaranteed Limits | Unit |
| V _{IH} | Minimum HIGH Level | 4.5 | V _{OUT} = 0.1 V | 1.5 | 2.0 | 2.0 | V |
| | Input Voltage | 5.5 | or V _{CC} – 0.1 V | 1.5 | 2.0 | 2.0 | |
| V _{IL} | Maximum LOW Level | 4.5 | V _{OUT} = 0.1 V | 1.5 | 0.8 | 0.8 | V |
| | Input Voltage | 5.5 | or V _{CC} – 0.1 V | 1.5 | 0.8 | 0.8 | |
| V _{OH} | Minimum HIGH Level | 4.5 | I _{OUT} = -50 μA | 4.49 | 4.34 | 4.4 | V |
| | Output Voltage | 5.5 | | 5.49 | 5.4 | 5.4 | |
| | | 4.5 | $V_{IN} = V_{IL}$ or V_{IH} , $I_{OH} = -24$ mA | _ | 3.86 | 3.76 | |
| | | 5.5 | $V_{IN} = V_{IL}$ or V_{IH} , $I_{OH} = -24$ mA (Note 4) | _ | 4.86 | 4.76 | |
| V _{OL} | Maximum LOW Level | 4.5 | I _{OUT} = 50 μA | 0.001 | 0.1 | 0.1 | V |
| | Output Voltage | 5.5 | | 0.001 | 0.1 | 0.1 | |
| | | 4.5 | $V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24 \text{ mA}$ | _ | 0.36 | 0.44 | |
| | | 5.5 | $V_{IN} = V_{IL} \text{ or } V_{IH},$ $I_{OL} = 24 \text{ mA (Note 4)}$ | _ | 0.36 | 0.44 | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | $V_I = V_{CC}$, GND | _ | ±0.1 | ±1.0 | μΑ |
| V _{H(MAX)} | Maximum Hysteresis | 4.5 | T _A = Worst Case | _ | 1.4 | 1.4 | V |
| | | 5.5 | | _ | 1.6 | 1.6 | |
| V _{H(MIN)} | Minimum Hysteresis | 4.5 | T _A = Worst Case | - | 0.4 | 0.4 | V |
| | | 5.5 | | _ | 0.5 | 0.5 | |
| V_{t+} | Maximum Positive | 4.5 | T _A = Worst Case | - | 2.0 | 2.0 | V |
| | Threshold | 5.5 | | _ | 2.0 | 2.0 | |
| V_{t-} | Minimum Negative | 4.5 | T _A = Worst Case | _ | 0.8 | 0.8 | V |
| | Threshold | 5.5 | | _ | 0.8 | 0.8 | |
| I _{CCT} | Maximum I _{CC} /Input | 5.5 | V _I = V _{CC} – 2.1 V | 0.6 | - | 1.5 | mA |
| I _{OLD} | Minimum Dynamic | 5.5 | V _{OLD} = 1.65 V Max. | - | - | 75 | mA |
| I _{OHD} | Output Current (Note 5) | 5.5 | V _{OHD} = 3.85 V Min. | - | - | -75 | mA |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | V _{IN} = V _{CC} or GND | - | 2.0 | 20.0 | μΑ |

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.

4. All outputs loaded; thresholds on input associated with output under test.

^{5.} Maximum test duration 2.0 ms, one output loaded at a time.

AC ELECTRICAL CHARACTERISTICS FOR AC

| | | | T _A = +25°C, C _L = 50 pF | | T _A = -40°C to +8 | | | |
|------------------|-------------------|------------------------------|--|-----|------------------------------|-----|------|------|
| Symbol | Parameter | V _{CC} (V) (Note 6) | Min | Тур | Max | Min | Max | Unit |
| t _{PLH} | Propagation Delay | 3.3 | 1.5 | 9.5 | 13.5 | 1.5 | 15.0 | ns |
| | | 5.0 | 1.5 | 7.0 | 10.0 | 1.5 | 11.0 | |
| t _{PHL} | Propagation Delay | 3.3 | 1.5 | 7.5 | 11.5 | 1.5 | 13.0 | ns |
| | | 5.0 | 1.5 | 6.0 | 8.5 | 1.5 | 9.5 | |

^{6.} Voltage range 3.3 is 3.3 V + 0.3 V. Voltage range 5.0 is 5.0 V + 0.5 V.

AC ELECTRICAL CHARACTERISTICS FOR ACT

| | | | T _A = +25°C, C _L = 50 pF | | $T_A = -40^{\circ}C \text{ to } +85^{\circ}C, C_L = 50 \text{ pF}$ | | | |
|------------------|-------------------|-----------------------------------|--|-----|--|-----|------|------|
| Symbol | Parameter | V_{CC}(V) (Note 7) | Min | Тур | Max | Min | Max | Unit |
| t _{PLH} | Propagation Delay | 5.0 | 3.0 | 8.0 | 10.0 | 3.0 | 11.0 | ns |
| t _{PLH} | Propagation Delay | 5.0 | 3.0 | 8.0 | 10.0 | 3.0 | 11.0 | ns |

^{7.} Voltage range 5.0 is 5.0 V + 0.5 V.

CAPACITANCE

| Symbol | Parameter | Conditions | Тур | Unit |
|-----------------|--|-------------------------|------------|------|
| C _{IN} | Input Capacitance | V _{CC} = OPEN | 4.5 | pF |
| C _{PD} | Power Dissipation Capacitance AC ACT | V _{CC} = 5.0 V | 25.0 80 | pF |

ORDERING INFORMATION

| Order Number | Marking | Package | Shipping [†] |
|--------------|-----------|----------|-----------------------|
| 74AC14SC | AC14 | SOIC-14 | 55 Units / Rail |
| 74AC14SCX | AC14 | SOIC-14 | 2500 / Tape & Reel |
| 74AC14MTCX | AC 14 | TSSOP-14 | 2500 / Tape & Reel |
| 74ACT14MTC | ACT 14 | TSSOP-14 | 96 Units / Rail |
| 74ACT14MTCX | ACT 14 | TSSOP-14 | 2500 / Tape & Reel |
| 74ACT14SCX | ACT14 | SOIC-14 | 2500 / Tape & Reel |

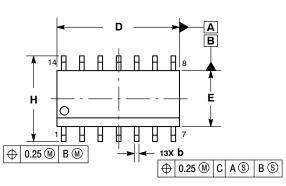
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



△ 0.10

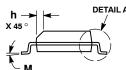
SOIC-14 NB CASE 751A-03 ISSUE L

DATE 03 FEB 2016





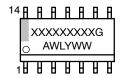




- NOTES:
 1. DIMENSIONING AND TOLERANCING PER
 - ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
 - DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT
 - MAXIMUM MATERIAL CONDITION.
 DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
- 5.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

| | MILLIN | IETERS | INCHES | | |
|-----|--------|--------|-----------|-------|--|
| DIM | MIN | MAX | MIN | MAX | |
| Α | 1.35 | 1.75 | 0.054 | 0.068 | |
| A1 | 0.10 | 0.25 | 0.004 | 0.010 | |
| АЗ | 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 | |
| Е | 3.80 | 4.00 | 0.150 | 0.157 | |
| е | 1.27 | BSC | 0.050 BSC | | |
| Н | 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 ° | |

GENERIC MARKING DIAGRAM*



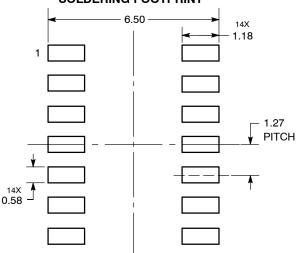
XXXXX = Specific Device Code Α = Assembly Location

WL = Wafer Lot Υ = Year = Work Week

WW = 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.

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

C SEATING PLANE

STYLES ON PAGE 2

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

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DATE 03 FEB 2016

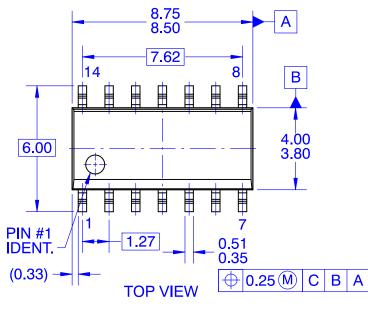
| STYLE 1: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. NO CONNECTION 7. ANODE/CATHODE 8. ANODE/CATHODE 9. ANODE/CATHODE 10. NO CONNECTION 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE | STYLE 2: CANCELLED | STYLE 3: PIN 1. NO CONNECTION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

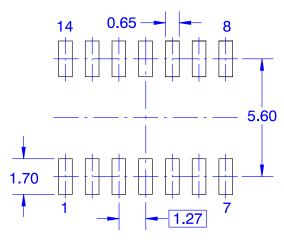
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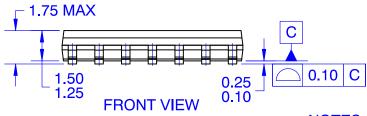
SOIC14 CASE 751EF ISSUE O

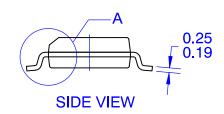
DATE 30 SEP 2016





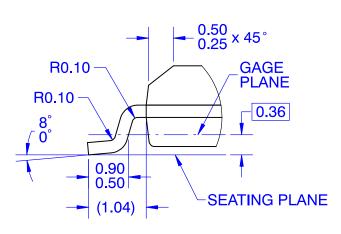
LAND PATTERN RECOMMENDATION





NOTES:

- A. CONFORMS TO JEDEC MS-012, VARIATION AB, ISSUE C
 B. ALL DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS
- LAND PATTERN STANDARD: SOIC127P600X145-14M
- E. CONFORMS TO ASME Y14.5M, 2009

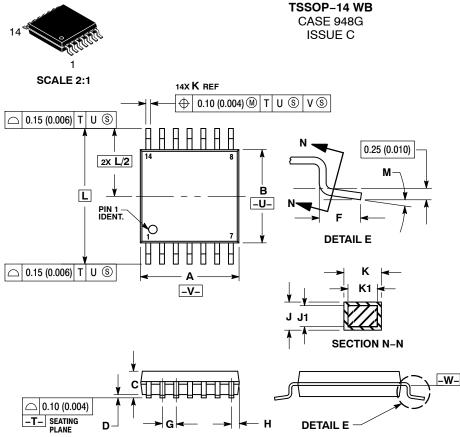


DETAIL A SCALE 16:1

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DATE 17 FEB 2016

- NOTES.

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 2. CONTROLLING DIMENSION: MILLIMETER.

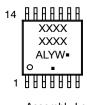
 3. DIMENSION A DOES NOT INCLUDE MOLD
- FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
 DIMENSION B DOES NOT INCLUDE
- INTERLEAD FLASH OR PROTRUSION.
 INTERLEAD FLASH OR PROTRUSION SHALL
- INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER 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 DEFERENCE ONLY
- REFERENCE ONLY.
 DIMENSION A AND B ARE TO BE
- DETERMINED AT DATUM PLANE -W-.

| | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| DIM | MIN | MAX | MIN | MAX |
| Α | 4.90 | 5.10 | 0.193 | 0.200 |
| В | 4.30 | 4.50 | 0.169 | 0.177 |
| С | | 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 | |
| Н | 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 | |
| М | o° | 8 ° | 0 ° | 8 ° |

GENERIC MARKING DIAGRAM*



= Assembly Location

= Wafer Lot Υ = 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.

| so | OLDERING FOOT | PRINT |
|--|---------------|-------------|
| ~ | 7.06 — | - |
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| —————————————————————————————————————— | | |
| | | 0.65 |
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| 0.36 T | 14X | |

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| DESCRIPTION: | TSSOP-14 WB | • | PAGE 1 OF 1 |

DIMENSIONS: MILLIMETERS

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