

# DATA SHEET

**74LVT32**

**3.3 V Quad 2-input OR gate**

Product data  
Supersedes data of 1996 Aug 28

2002 Sep 06

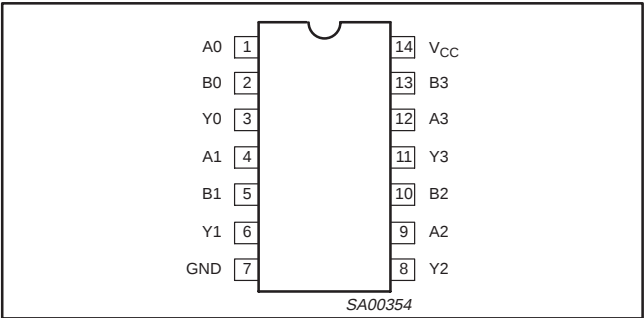
# 3.3 V Quad 2-input OR gate

74LVT32

## QUICK REFERENCE DATA

| SYMBOL                 | PARAMETER                         | CONDITIONS<br>$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;<br>$GND = 0\text{ V}$ | TYPICAL    | UNIT |
|------------------------|-----------------------------------|------------------------------------------------------------------------------|------------|------|
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>An, Bn to Yn | $C_L = 50\text{ pF}$ ;<br>$V_{CC} = 3.3\text{ V}$                            | 2.6<br>3.2 | ns   |
| $C_{IN}$               | Input capacitance                 | $V_I = 0\text{ V}$ or $3.0\text{ V}$                                         | 3          | pF   |
| $I_{CCL}$              | Total supply current              | Outputs Low;<br>$V_{CC} = 3.6\text{ V}$                                      | 1          | mA   |

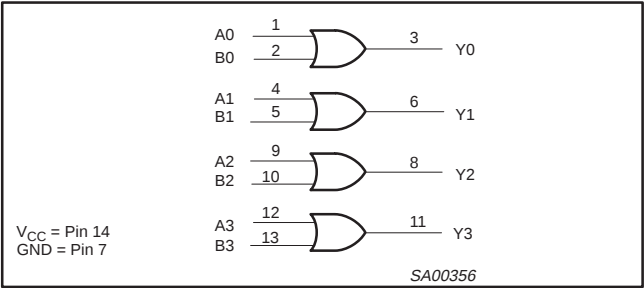
## PIN CONFIGURATION



## PIN DESCRIPTION

| PIN NUMBER                | SYMBOL   | NAME AND FUNCTION       |
|---------------------------|----------|-------------------------|
| 1, 2, 4, 5, 9, 10, 12, 13 | An, Bn   | Data inputs             |
| 3, 6, 8, 11               | Yn       | Data outputs            |
| 7                         | GND      | Ground (0 V)            |
| 14                        | $V_{CC}$ | Positive supply voltage |

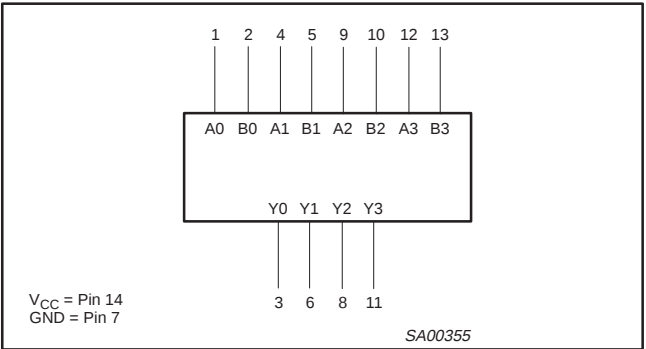
## LOGIC DIAGRAM



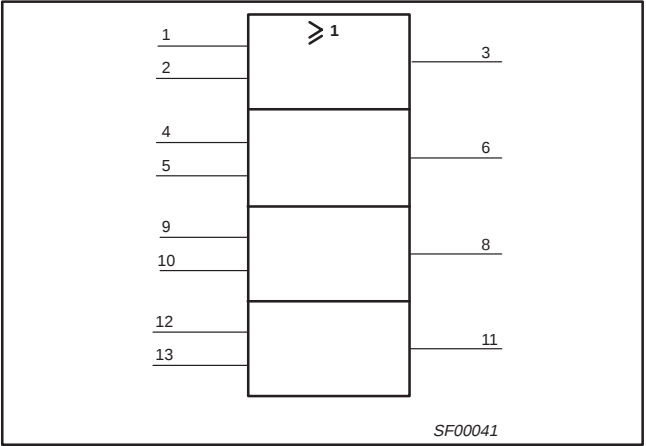
## ORDERING INFORMATION

| PACKAGES             | TEMPERATURE RANGE | OUTSIDE NORTH AMERICA | NORTH AMERICA | DWG NUMBER |
|----------------------|-------------------|-----------------------|---------------|------------|
| 14-Pin Plastic SO    | -40 °C to +85 °C  | 74LVT32D              | 74LVT32D      | SOT108-1   |
| 14-Pin Plastic SSOP  | -40 °C to +85 °C  | 74LVT32DB             | 74LVT32DB     | SOT337-1   |
| 14-Pin Plastic TSSOP | -40 °C to +85 °C  | 74LVT32PW             | 74LVT32PWDH   | SOT402-1   |

## LOGIC SYMBOL



## LOGIC SYMBOL (IEEE/IEC)



## FUNCTION TABLE

| INPUTS |     | OUTPUT |
|--------|-----|--------|
| Dna    | Dnb | Qn     |
| L      | L   | L      |
| L      | H   | H      |
| H      | L   | H      |
| H      | H   | H      |

### NOTES:

H = High voltage level  
L = Low voltage level

## 3.3 V Quad 2-input OR gate

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**ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>**

| SYMBOL    | PARAMETER                      | CONDITIONS                  | RATING       | UNIT |
|-----------|--------------------------------|-----------------------------|--------------|------|
| $V_{CC}$  | DC supply voltage              |                             | −0.5 to +4.6 | V    |
| $I_{IK}$  | DC input diode current         | $V_I < 0$                   | −50          | mA   |
| $V_I$     | DC input voltage <sup>3</sup>  |                             | −0.5 to +7.0 | V    |
| $I_{OK}$  | DC output diode current        | $V_O < 0$                   | −50          | mA   |
| $V_{OUT}$ | DC output voltage <sup>3</sup> | Output in Off or High state | −0.5 to +7.0 | V    |
| $I_{OUT}$ | DC output current              | Output in High state        | −32          | mA   |
|           |                                | Output in Low state         | 64           |      |
| $T_{stg}$ | Storage temperature range      |                             | −65 to 150   | °C   |

**NOTES:**

1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

**RECOMMENDED OPERATING CONDITIONS**

| SYMBOL              | PARAMETER                                           | LIMITS |     | UNIT |
|---------------------|-----------------------------------------------------|--------|-----|------|
|                     |                                                     | MIN    | MAX |      |
| $V_{CC}$            | DC supply voltage                                   | 2.7    | 3.6 | V    |
| $V_I$               | Input voltage                                       | 0      | 5.5 | V    |
| $V_{IH}$            | High-level input voltage                            | 2.0    |     | V    |
| $V_{IL}$            | Low-level Input voltage                             |        | 0.8 | V    |
| $I_{OH}$            | High-level output current                           |        | −20 | mA   |
| $I_{OL}$            | Low-level output current                            |        | 32  | mA   |
| $\Delta t/\Delta v$ | Input transition rise or fall rate; Outputs enabled |        | 10  | ns/V |
| $T_{amb}$           | Operating free-air temperature range                | −40    | +85 | °C   |

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## DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

| SYMBOL           | PARAMETER                                            | TEST CONDITIONS                                                                                                | LIMITS                |                  |      | UNIT |
|------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------|------------------|------|------|
|                  |                                                      |                                                                                                                | Temp = -40°C to +85°C |                  |      |      |
|                  |                                                      |                                                                                                                | MIN                   | TYP <sup>1</sup> | MAX  |      |
| V <sub>IK</sub>  | Input clamp voltage                                  | V <sub>CC</sub> = 2.7 V; I <sub>IK</sub> = −18 mA                                                              |                       |                  | −1.2 | V    |
| V <sub>OH</sub>  | High-level output voltage                            | V <sub>CC</sub> = 2.7 to 3.6 V; I <sub>OH</sub> = −100 μA                                                      | V <sub>CC</sub> −0.2  |                  |      | V    |
|                  |                                                      | V <sub>CC</sub> = 2.7 V; I <sub>OH</sub> = −6 mA                                                               | 2.4                   |                  |      |      |
|                  |                                                      | V <sub>CC</sub> = 3.0 V; I <sub>OH</sub> = −20 mA                                                              | 2.0                   |                  |      |      |
| V <sub>OL</sub>  | Low-level output voltage                             | V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 100 μA                                                              |                       |                  | 0.2  | V    |
|                  |                                                      | V <sub>CC</sub> = 2.7 V; I <sub>OL</sub> = 24 mA                                                               |                       |                  | 0.5  |      |
|                  |                                                      | V <sub>CC</sub> = 3.0 V; I <sub>OL</sub> = 32 mA                                                               |                       |                  | 0.5  |      |
| I <sub>I</sub>   | Input leakage current                                | V <sub>CC</sub> = 0 or 3.6 V; V <sub>I</sub> = 5.5 V                                                           |                       |                  | 10   | μA   |
|                  |                                                      | V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND                                               |                       |                  | ±1   |      |
| I <sub>OFF</sub> | Output off current                                   | V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 0 to 4.5 V                                           |                       |                  | ±100 | μA   |
| I <sub>CCH</sub> | Quiescent supply current                             | V <sub>CC</sub> = 3.6 V;<br>Outputs High, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0         |                       |                  | 0.02 | mA   |
| I <sub>CCL</sub> |                                                      | V <sub>CC</sub> = 3.6 V;<br>Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0          |                       | 1                | 2    |      |
| ΔI <sub>CC</sub> | Additional supply current per input pin <sup>2</sup> | V <sub>CC</sub> = 3 V to 3.6 V; One input at V <sub>CC</sub> −0.6 V,<br>Other inputs at V <sub>CC</sub> or GND |                       |                  | 0.2  | μA   |
| C <sub>I</sub>   | Input capacitance                                    | V <sub>I</sub> = 3 V or 0                                                                                      |                       | 3                |      | pF   |

## NOTES:

1. All typical values are at  $V_{CC} = 3.3 \text{ V}$  and  $T_{amb} = 25^\circ\text{C}$ .
2. This is the increase in supply current for each input at the specified voltage level other than  $V_{CC}$  or GND.

## AC CHARACTERISTICS

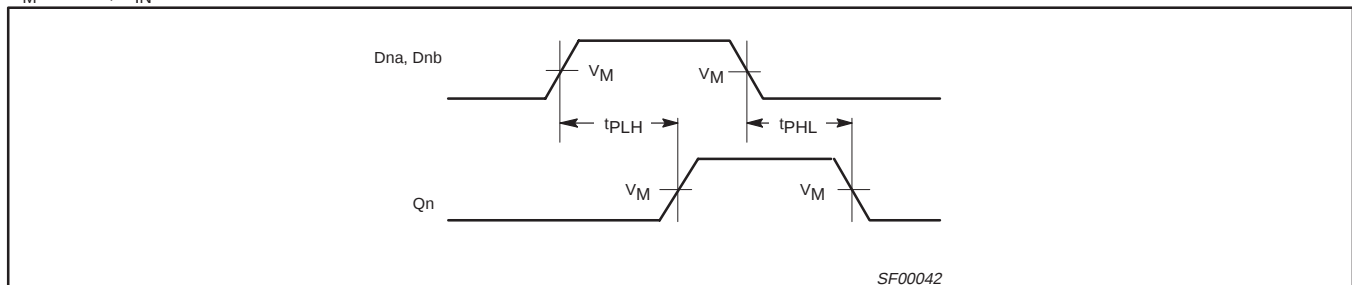
 $\text{GND} = 0 \text{ V}$ ;  $t_R = t_F = 2.5 \text{ ns}$ ;  $C_L = 50 \text{ pF}$ ,  $R_L = 500 \Omega$ ;  $T_{amb} = -40^\circ\text{C to } +85^\circ\text{C}$ .

| SYMBOL                 | PARAMETER                         | WAVEFORM | LIMITS                                     |                  |            |                          | UNIT |
|------------------------|-----------------------------------|----------|--------------------------------------------|------------------|------------|--------------------------|------|
|                        |                                   |          | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ |                  |            | $V_{CC} = 2.7 \text{ V}$ |      |
|                        |                                   |          | MIN                                        | TYP <sup>1</sup> | MAX        | MAX                      |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>An, Bn to Yn | 1        | 1.0<br>1.0                                 | 2.6<br>3.2       | 3.8<br>4.6 | 4.5<br>4.9               | ns   |

## NOTE:

1. All typical values are at  $V_{CC} = 3.3 \text{ V}$  and  $T_{amb} = 25^\circ\text{C}$ .

## AC WAVEFORMS

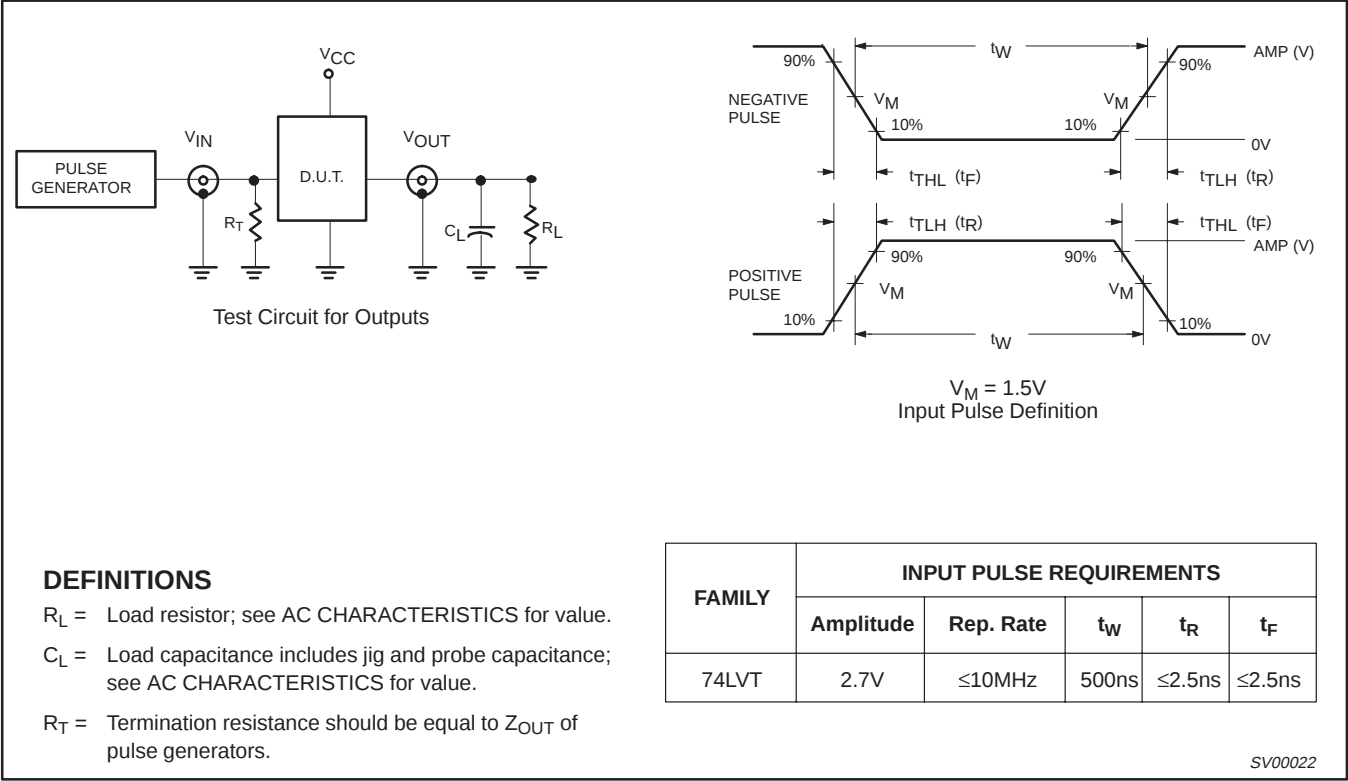
 $V_M = 1.5 \text{ V}$ ,  $V_{IN} = \text{GND to } 2.7 \text{ V}$ 

Waveform 1. Propagation delay for inverting outputs

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TEST CIRCUIT AND WAVEFORMS

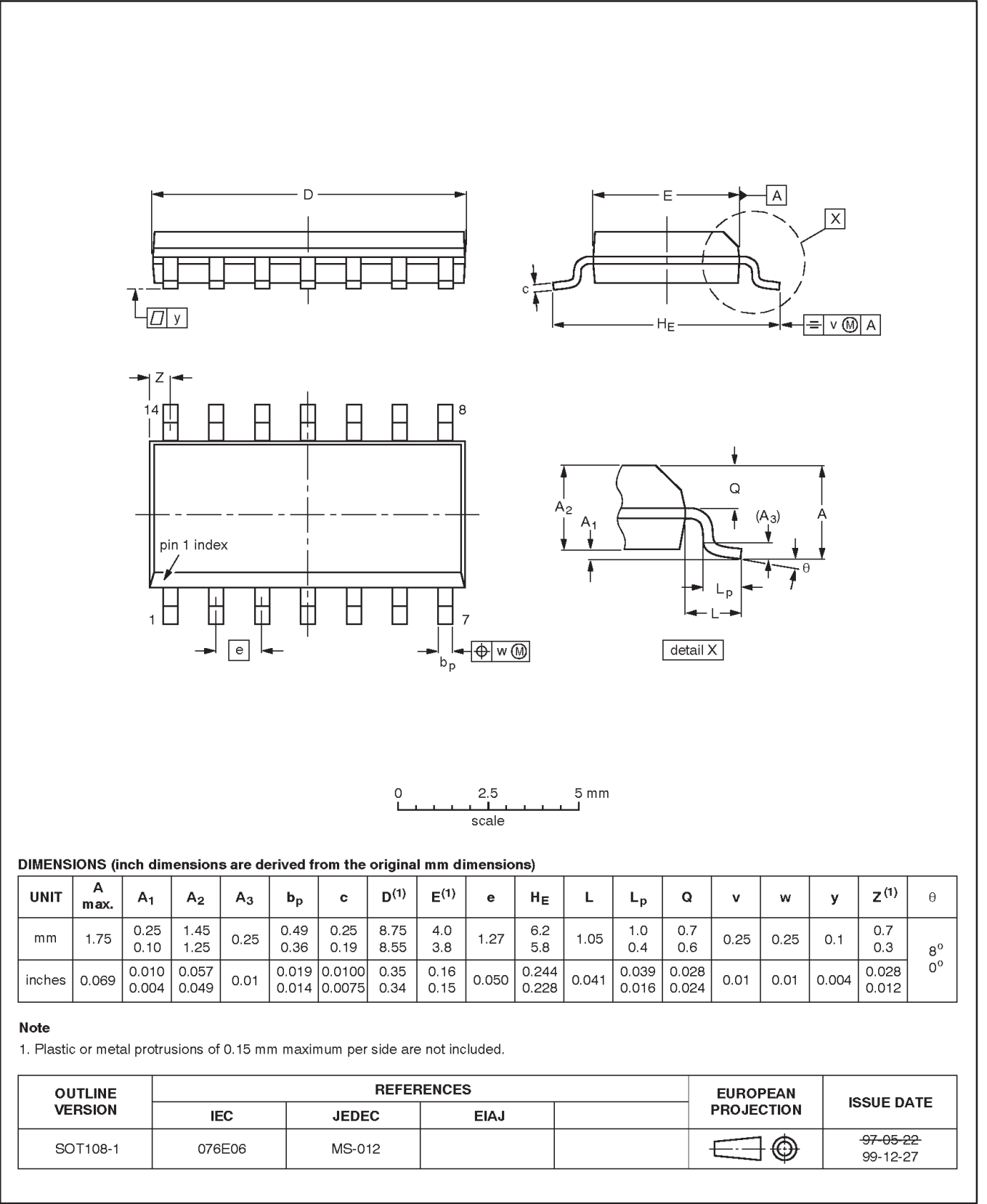


3.3 V Quad 2-input OR gate

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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

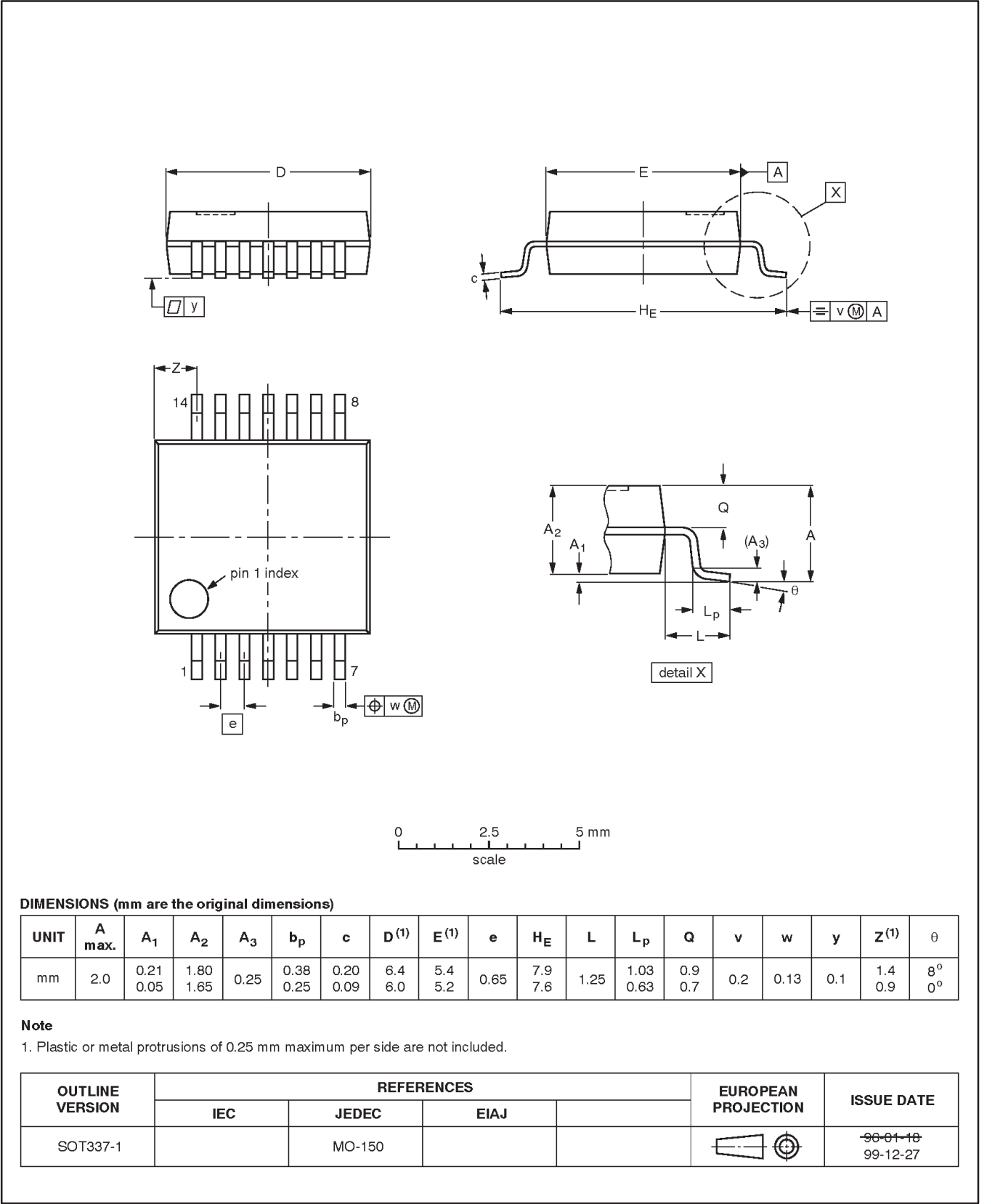


3.3 V Quad 2-input OR gate

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SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1

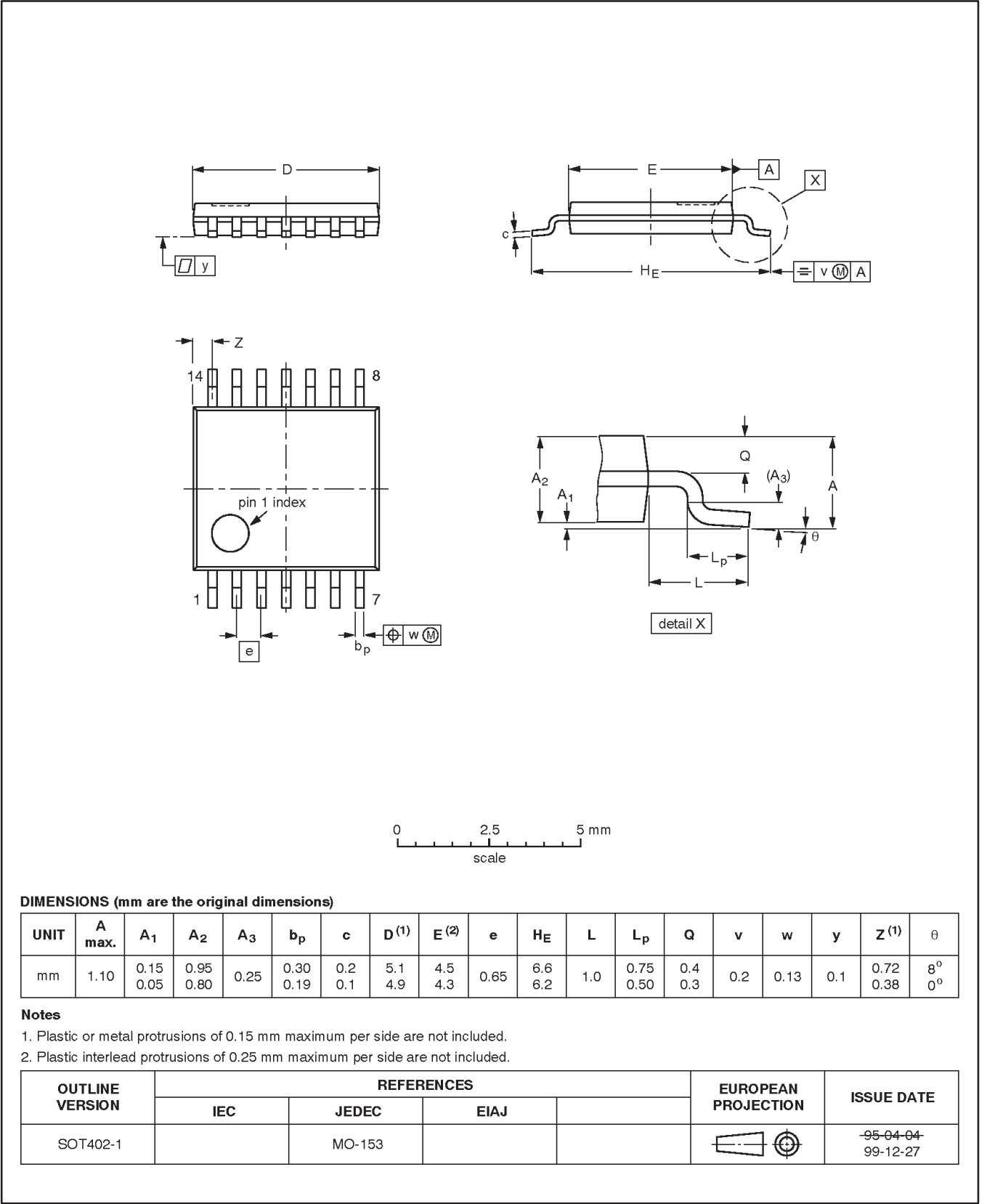


3.3 V Quad 2-input OR gate

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TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1



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**REVISION HISTORY**

| Rev | Date        | Description                                                                                                                                                                                                                    |
|-----|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| _2  | 2002 Sep 06 | Product data (9397 750 10298); supersedes Product specification 74LVT32 of 1996 Aug 28.<br>Modifications:<br>There are no changes to any data. Document re-issued to improve quality of package outline drawings display only. |
| —   | 1996 Aug 28 | Product specification; initial version.<br>Engineering Change Notice: 853-1873 17244 (date: 1996 Aug 28).                                                                                                                      |

## 3.3 V Quad 2-input OR gate

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## Data sheet status

| Data sheet status <sup>[1]</sup> | Product status <sup>[2]</sup> | Definitions                                                                                                                                                                                                                                                                                                            |
|----------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective data                   | Development                   | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.                                                                                                                            |
| Preliminary data                 | Qualification                 | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.                                     |
| Product data                     | Production                    | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A. |

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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