

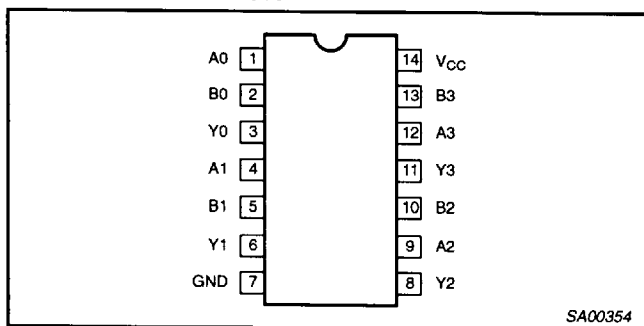
## 3.3V Quad 2-input OR gate

74LVT32

## QUICK REFERENCE DATA

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

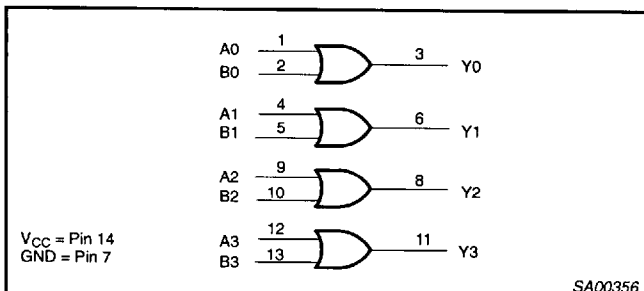
## PIN CONFIGURATION



## 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 (0V)             |
| 14                        | $V_{CC}$ | Positive supply voltage |

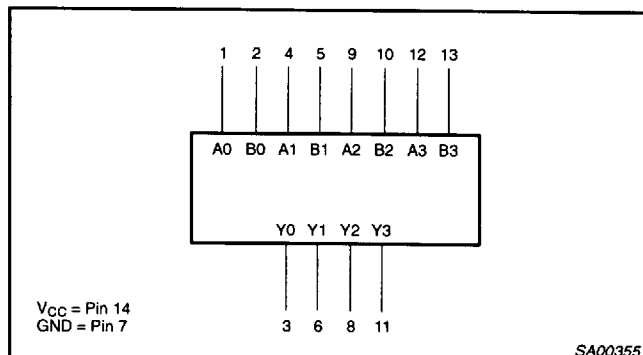
## LOGIC DIAGRAM



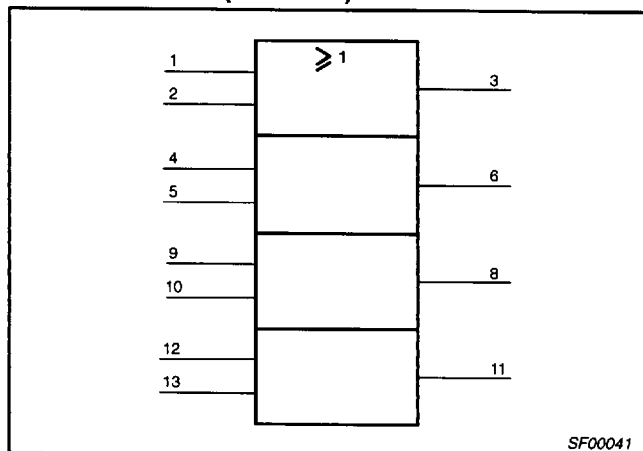
## ORDERING INFORMATION

| PACKAGES             | TEMPERATURE RANGE                              | OUTSIDE NORTH AMERICA | NORTH AMERICA | DWG NUMBER |
|----------------------|------------------------------------------------|-----------------------|---------------|------------|
| 14-Pin Plastic SO    | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74LVT32 D             | 74LVT32 D     | SOT108-1   |
| 14-Pin Plastic SSOP  | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74LVT32 DB            | 74LVT32 DB    | SOT337-1   |
| 14-Pin Plastic TSSOP | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ | 74LVT32 PW            | 74LVT32PW DH  | 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

## 3.3V Quad 2-input OR gate

74LVT32

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:

- 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.
- 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.
- 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   |

## 3.3V Quad 2-input OR gate

74LVT32

## DC ELECTRICAL CHARACTERISTICS

Over recommended operating conditions

Voltages are referenced to GND (ground = 0V)

| 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> = 2.7V; I <sub>IK</sub> = -18mA                                                          |                       |                  | -1.2 | V    |
| V <sub>OH</sub>  | High-level output voltage                            | V <sub>CC</sub> = 2.7 to 3.6V; I <sub>OH</sub> = -100μA                                                  | V <sub>CC</sub> -0.2  |                  |      | V    |
|                  |                                                      | V <sub>CC</sub> = 2.7V; I <sub>OH</sub> = -6mA                                                           | 2.4                   |                  |      |      |
|                  |                                                      | V <sub>CC</sub> = 3.0V; I <sub>OH</sub> = -20mA                                                          | 2.0                   |                  |      |      |
| V <sub>OL</sub>  | Low-level output voltage                             | V <sub>CC</sub> = 2.7V; I <sub>OL</sub> = 100μA                                                          |                       |                  | 0.2  | V    |
|                  |                                                      | V <sub>CC</sub> = 2.7V; I <sub>OL</sub> = 24mA                                                           |                       |                  | 0.5  |      |
|                  |                                                      | V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 32mA                                                           |                       |                  | 0.5  |      |
| I <sub>I</sub>   | Input leakage current                                | V <sub>CC</sub> = 0 or 3.6V; V <sub>I</sub> = 5.5V                                                       |                       |                  | 10   | μA   |
|                  |                                                      | V <sub>CC</sub> = 3.6V; V <sub>I</sub> = V <sub>CC</sub> or GND                                          |                       |                  | ±1   |      |
| I <sub>OFF</sub> | Output off current                                   | V <sub>CC</sub> = 0V; V <sub>I</sub> or V <sub>O</sub> = 0 to 4.5V                                       |                       |                  | ±100 | μA   |
| I <sub>CCH</sub> | Quiescent supply current                             | V <sub>CC</sub> = 3.6V; 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> = 3.6V; 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> = 3V to 3.6V; One input at V <sub>CC</sub> -0.6V, Other inputs at V <sub>CC</sub> or GND |                       |                  | 0.2  | μA   |
| C <sub>I</sub>   | Input capacitance                                    | V <sub>I</sub> = 3V or 0                                                                                 |                       | 3                |      | pF   |

## NOTES:

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

## AC CHARACTERISTICS

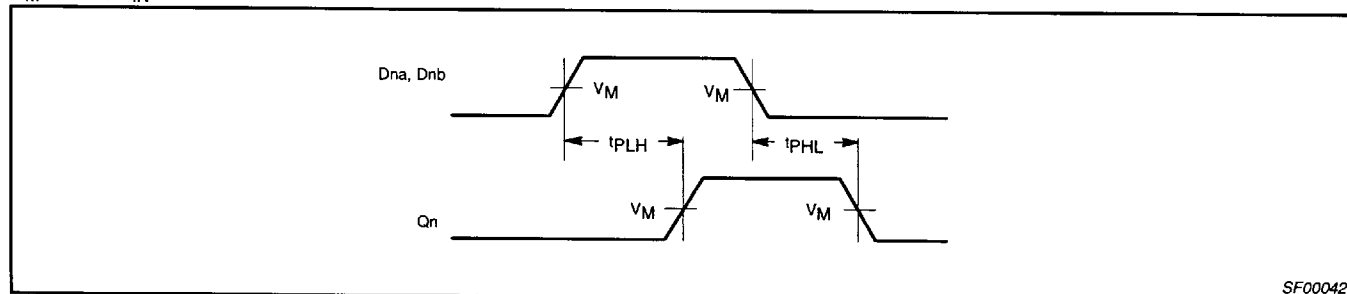
GND = 0V;  $t_R = t_F = 2.5ns$ ;  $C_L = 50pF$ ,  $R_L = 500\Omega$ ;  $T_{amb} = -40^\circ C$  to  $+85^\circ C$ .

| SYMBOL                 | PARAMETER                         | WAVEFORM | LIMITS                   |                  |            |                 | UNIT |
|------------------------|-----------------------------------|----------|--------------------------|------------------|------------|-----------------|------|
|                        |                                   |          | $V_{CC} = 3.3V \pm 0.3V$ |                  |            | $V_{CC} = 2.7V$ |      |
|                        |                                   |          | 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  $V_{CC} = 3.3V$  and  $T_{amb} = 25^\circ C$ .

## AC WAVEFORMS

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

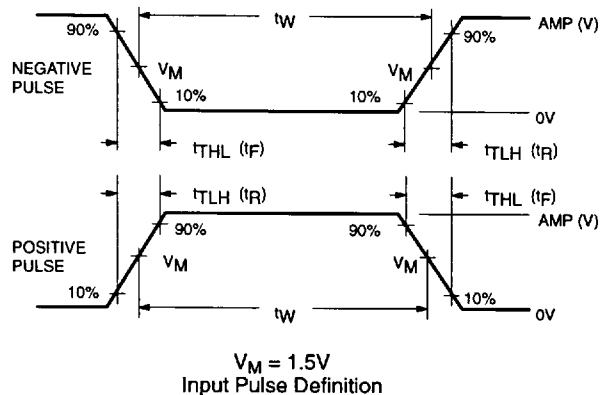
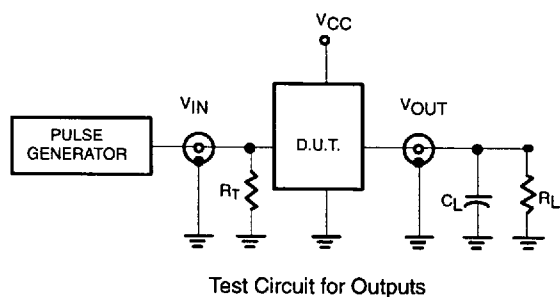
SF00042

Waveform 1. Propagation delay for inverting outputs

## 3.3V Quad 2-input OR gate

74LVT32

## TEST CIRCUIT AND WAVEFORMS



## DEFINITIONS

$R_L$  = Load resistor; see AC CHARACTERISTICS for value.

$C_L$  = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

$R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.

| FAMILY | INPUT PULSE REQUIREMENTS |                     |       |                     |                     |
|--------|--------------------------|---------------------|-------|---------------------|---------------------|
|        | Amplitude                | Rep. Rate           | $t_W$ | $t_R$               | $t_F$               |
| 74LVT  | 2.7V                     | $\leq 10\text{MHz}$ | 500ns | $\leq 2.5\text{ns}$ | $\leq 2.5\text{ns}$ |

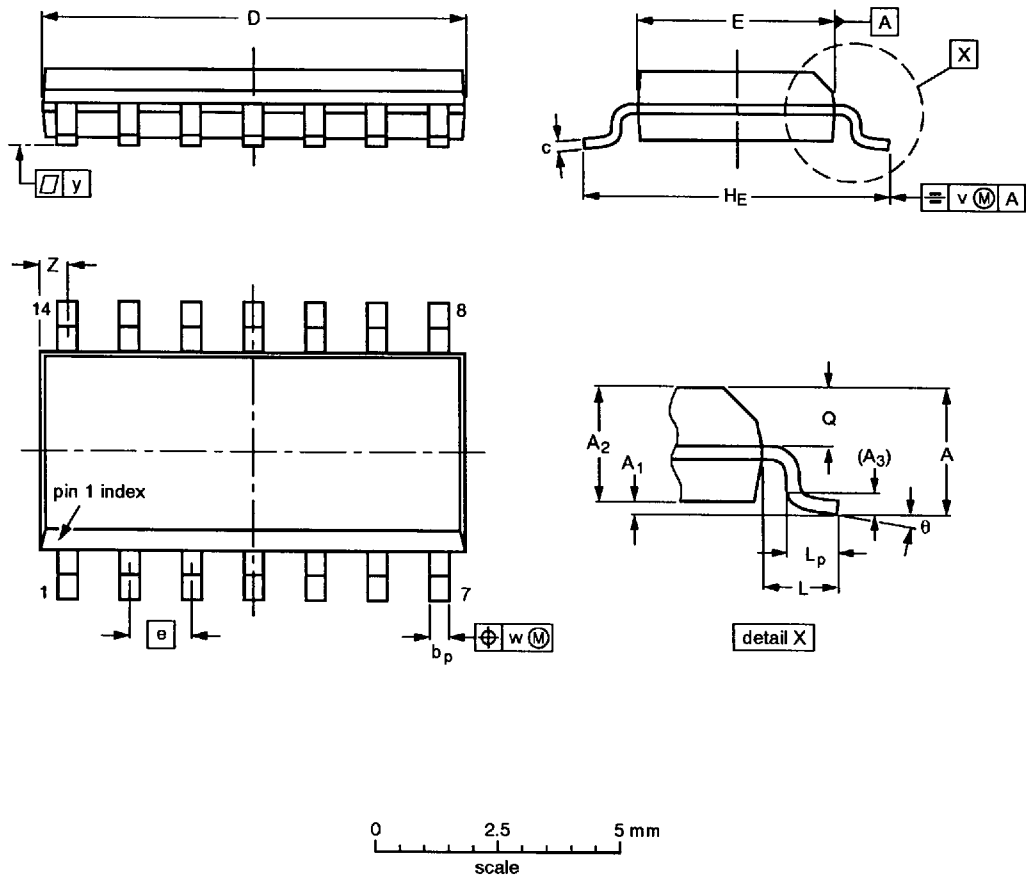
SV00022

3.3V Quad 2-input OR gate

74LVT32

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

SOT108-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT   | A<br>max. | A <sub>1</sub>   | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c                | D <sup>(1)</sup> | E <sup>(1)</sup> | e     | H <sub>E</sub> | L     | L <sub>p</sub> | Q              | v    | w    | y     | Z <sup>(1)</sup> | θ        |
|--------|-----------|------------------|----------------|----------------|----------------|------------------|------------------|------------------|-------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm     | 1.75      | 0.25<br>0.10     | 1.45<br>1.25   | 0.25           | 0.49<br>0.36   | 0.25<br>0.19     | 8.75<br>8.55     | 4.0<br>3.8       | 1.27  | 6.2<br>5.8     | 1.05  | 1.0<br>0.4     | 0.7<br>0.6     | 0.25 | 0.25 | 0.1   | 0.7<br>0.3       | 8°<br>0° |
| inches | 0.069     | 0.0098<br>0.0039 | 0.057<br>0.049 | 0.01           | 0.019<br>0.014 | 0.0098<br>0.0075 | 0.35<br>0.34     | 0.16<br>0.15     | 0.050 | 0.24<br>0.23   | 0.041 | 0.039<br>0.016 | 0.028<br>0.024 | 0.01 | 0.01 | 0.004 | 0.028<br>0.012   |          |

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

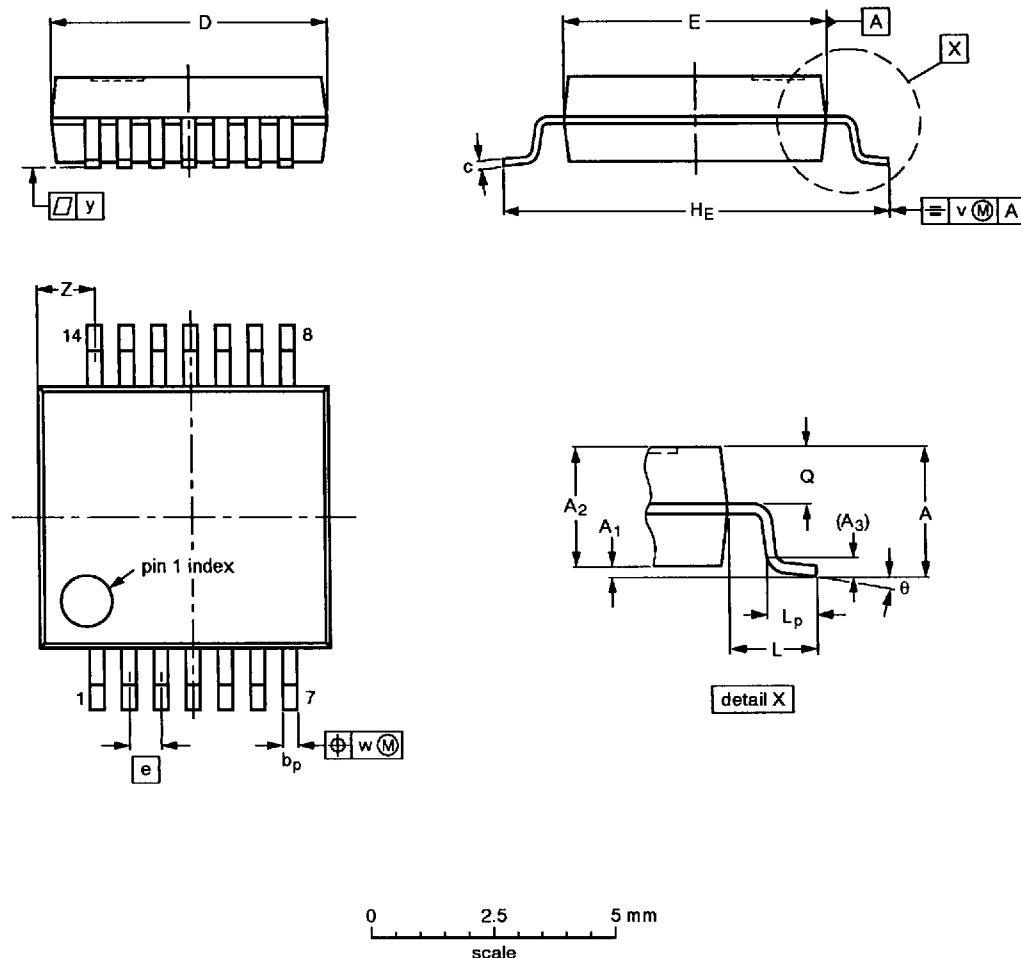
| OUTLINE<br>VERSION | REFERENCES |          |      |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE           |
|--------------------|------------|----------|------|--|---------------------------------------------------------------------------------------|----------------------|
|                    | IEC        | JEDEC    | EIAJ |  |                                                                                       |                      |
| SOT108-1           | 076E06S    | MS-012AB |      |  |  | 91-08-13<br>95-01-23 |

## 3.3V Quad 2-input OR gate

74LVT32

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

SOT337-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c            | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L    | L <sub>p</sub> | Q          | v   | w    | y   | Z <sup>(1)</sup> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|------|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 2.0       | 0.21<br>0.05   | 1.80<br>1.65   | 0.25           | 0.38<br>0.25   | 0.20<br>0.09 | 6.4<br>6.0       | 5.4<br>5.2       | 0.65 | 7.9<br>7.6     | 1.25 | 1.03<br>0.63   | 0.9<br>0.7 | 0.2 | 0.13 | 0.1 | 1.4<br>0.9       | 8°<br>0° |

## Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

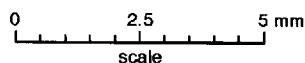
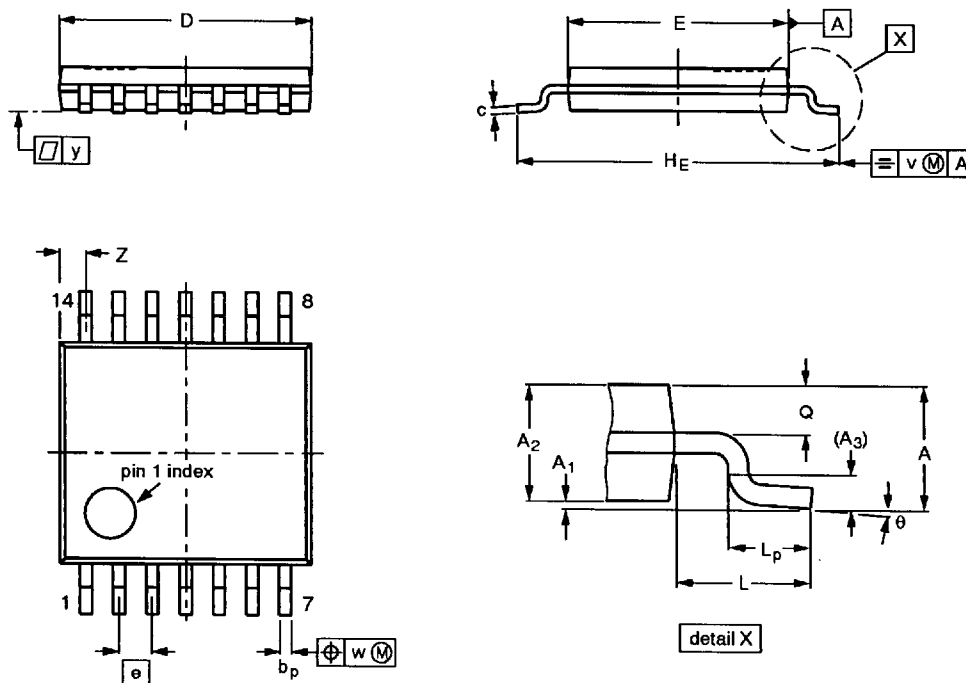
| OUTLINE<br>VERSION | REFERENCES |          |      |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE                      |
|--------------------|------------|----------|------|--|---------------------------------------------------------------------------------------|---------------------------------|
|                    | IEC        | JEDEC    | EIAJ |  |                                                                                       |                                 |
| SOT337-1           |            | MO-150AB |      |  |  | <del>95-02-04</del><br>96-01-18 |

## 3.3V Quad 2-input OR gate

74LVT32

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

SOT402-1



## DIMENSIONS (mm are the original dimensions)

| UNIT | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c          | D <sup>(1)</sup> | E <sup>(2)</sup> | e    | H <sub>E</sub> | L   | L <sub>p</sub> | Q          | v   | w    | y   | Z <sup>(1)</sup> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|------------|------------------|------------------|------|----------------|-----|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 1.10      | 0.15<br>0.05   | 0.95<br>0.80   | 0.25           | 0.30<br>0.19   | 0.2<br>0.1 | 5.1<br>4.9       | 4.5<br>4.3       | 0.65 | 6.6<br>6.2     | 1.0 | 0.75<br>0.50   | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.72<br>0.38     | 8°<br>0° |

## Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE<br>VERSION | REFERENCES |        |      |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|--------|------|--|------------------------|----------------------|
|                    | IEC        | JEDEC  | EIAJ |  |                        |                      |
| SOT402-1           |            | MO-153 |      |  |                        | 94-07-12<br>95-04-04 |