74LVC1G332

Single 3-input OR gate Rev. 4 — 6 December 2011

Product data sheet

1. **General description**

The 74LVC1G332 provides one 3-input OR function.

Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V applications.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall time.

This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

Features and benefits 2.

- Wide supply voltage range from 1.65 V to 5.5 V
- High noise immunity
- Complies with JEDEC standard:
 - ◆ JESD8-7 (1.65 V to 1.95 V)
 - ◆ JESD8-5 (2.3 V to 2.7 V)
 - ◆ JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
 - ♦ HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
 - CDM JESD22-C101-C exceeds 1000 V
- \pm 24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C



3. Ordering information

Table 1. Ordering information

| Type number | Package | | | | | | | |
|--------------|-------------------|-------|---|---------|--|--|--|--|
| | Temperature range | Name | Description | Version | | | | |
| 74LVC1G332GW | –40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads | SOT363 | | | | |
| 74LVC1G332GV | –40 °C to +125 °C | SC-74 | plastic surface-mounted package (TSOP6); 6 leads | SOT457 | | | | |
| 74LVC1G332GM | –40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 \times 1.45 \times 0.5 mm | SOT886 | | | | |
| 74LVC1G332GF | –40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 \times 1 \times 0.5 mm | SOT891 | | | | |
| 74LVC1G332GN | –40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body $0.9 \times 1.0 \times 0.35$ mm | SOT1115 | | | | |
| 74LVC1G332GS | –40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 \times 1.0 \times 0.35 mm | SOT1202 | | | | |

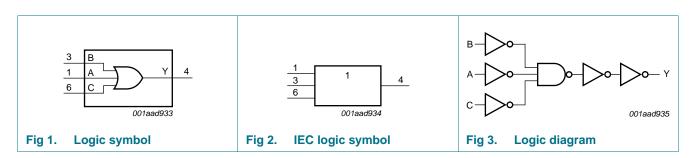
4. Marking

Table 2. Marking

| 3 | | |
|--------------|-----------------------------|--|
| Type number | Marking code ^[1] | |
| 74LVC1G332GW | YG | |
| 74LVC1G332GV | YG | |
| 74LVC1G332GM | YG | |
| 74LVC1G332GF | YG | |
| 74LVC1G332GN | YG | |
| 74LVC1G332GS | YG | |
| | | |

^[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

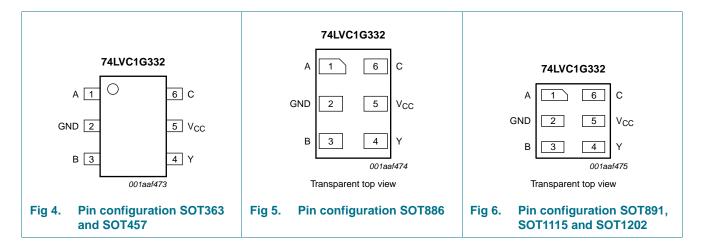
5. Functional diagram



Single 3-input OR gate

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|-----------------|-----|----------------|
| A | 1 | data input |
| GND | 2 | ground (0 V) |
| В | 3 | data input |
| Υ | 4 | data output |
| V _{CC} | 5 | supply voltage |
| С | 6 | data input |

7. Functional description

Table 4. Function table[1]

| Input | Output | | |
|-------|--------|---|---|
| Α | В | С | Υ |
| Н | X | X | Н |
| X | Н | X | Н |
| X | X | Н | Н |
| L | L | L | L |

^[1] H = HIGH voltage level;

L = LOW voltage level;

X = don't care.

Single 3-input OR gate

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|--|-----------------|----------------|------|
| V_{CC} | supply voltage | | -0.5 | +6.5 | V |
| I _{IK} | input clamping current | V _I < 0 V | -50 | • | mA |
| VI | input voltage | | <u>[1]</u> –0.5 | +6.5 | V |
| I _{OK} | output clamping current | $V_O > V_{CC}$ or $V_O < 0$ V | - | ±50 | mA |
| Vo | output voltage | Active mode | [1][2] -0.5 | $V_{CC} + 0.5$ | V |
| | | Power-down mode | [1][2] -0.5 | +6.5 | V |
| Io | output current | $V_O = 0 V \text{ to } V_{CC}$ | - | ±50 | mA |
| I _{CC} | supply current | | - | 100 | mA |
| I_{GND} | ground current | | -100 | - | mA |
| P _{tot} | total power dissipation | $T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ | [3] _ | 250 | mW |
| T _{stg} | storage temperature | | -65 | +150 | °C |

^[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

9. Recommended operating conditions

Table 6. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|---------------------|-------------------------------------|--|------|-----|----------|------|
| V_{CC} | supply voltage | | 1.65 | - | 5.5 | V |
| VI | input voltage | | 0 | - | 5.5 | V |
| Vo | output voltage | Active mode | 0 | - | V_{CC} | V |
| | | V _{CC} = 0 V; Power-down mode | 0 | - | 5.5 | V |
| T _{amb} | ambient temperature | | -40 | - | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | V _{CC} = 1.65 V to 2.7 V | - | - | 20 | ns/V |
| | | V _{CC} = 2.7 V to 5.5 V | - | - | 10 | ns/V |

^[2] When $V_{CC} = 0 \text{ V}$ (Power-down mode), the output voltage can be 5.5 V in normal operation.

^[3] For SC-88 and SC-74A packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K. For XSON6 package: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

10. Static characteristics

Table 7. Static characteristics

At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | -40 ° | −40 °C to +85 °C | | | -40 °C to +125 °C | |
|----------------------------|---------------------------------|---|-----------------------|------------------|---------------------|-----------------------|---------------------|----|
| | | | Min | Typ[1] | Max | Min | Max | |
| V _{IH} | HIGH-level | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$ | 0.65V _{CC} | - | - | 0.65V _{CC} | - | V |
| | input voltage | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$ | 1.7 | - | - | 1.7 | - | V |
| | | $V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$ | 2.0 | - | - | 2.0 | - | V |
| | | V _{CC} = 4.5 V to 5.5 V | $0.7V_{CC}$ | - | - | $0.7V_{CC}$ | - | V |
| V _{IL} | LOW-level | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$ | - | - | 0.35V _{CC} | - | 0.35V _{CC} | V |
| | input voltage | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$ | - | - | 0.7 | - | 0.7 | V |
| | | V _{CC} = 2.7 V to 3.6 V | - | - | 0.8 | - | 8.0 | V |
| | | V _{CC} = 4.5 V to 5.5 V | - | - | $0.3V_{CC}$ | - | $0.3V_{CC}$ | V |
| V _{OH} HIGH-level | HIGH-level | $V_I = V_{IH}$ or V_{IL} | | | | | | |
| | output voltage | $I_O = -100 \mu A;$ $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$ | V _{CC} - 0.1 | - | - | V _{CC} - 0.1 | - | V |
| | | $I_O = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$ | 1.2 | - | - | 0.95 | - | V |
| | | $I_{O} = -8 \text{ mA}; V_{CC} = 2.3 \text{ V}$ | 1.9 | - | - | 1.7 | - | V |
| | | $I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$ | 2.2 | - | - | 1.9 | - | V |
| | | $I_{O} = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$ | 2.3 | - | - | 2.0 | - | V |
| | | $I_{O} = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$ | 3.8 | - | - | 3.4 | - | V |
| V _{OL} | LOW-level | $V_I = V_{IH}$ or V_{IL} | | | | | | |
| | output voltage | $I_O = 100 \mu A;$ $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}$ | - | - | 0.1 | - | 0.1 | V |
| | | $I_O = 4 \text{ mA}$; $V_{CC} = 1.65 \text{ V}$ | - | - | 0.45 | - | 0.70 | V |
| | | $I_O = 8 \text{ mA}$; $V_{CC} = 2.3 \text{ V}$ | - | - | 0.3 | - | 0.45 | V |
| | | $I_O = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$ | - | - | 0.4 | - | 0.60 | V |
| | | $I_O = 24 \text{ mA}$; $V_{CC} = 3.0 \text{ V}$ | - | - | 0.55 | - | 0.80 | V |
| | | $I_O = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$ | - | - | 0.55 | - | 0.80 | V |
| l _l | input leakage current | $V_{CC} = 0 \text{ V to } 5.5 \text{ V};$ $V_{I} = 5.5 \text{ V or GND}$ | - | ±0.1 | ±5 | - | ±100 | μА |
| OFF | power-off leakage current | $V_{CC} = 0 \text{ V}; V_{I} \text{ or } V_{O} = 5.5 \text{ V}$ | - | ±0.1 | ±10 | - | ±200 | μΑ |
| CC | supply current | $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V};$ $V_{I} = V_{CC} \text{ or GND; } I_{O} = 0 \text{ A}$ | - | 0.1 | 10 | - | 200 | μА |
| ∆I _{CC} | additional supply current | per pin; $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V};$ $V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}$ | - | 5 | 500 | - | 5000 | μА |
| Cı | input capacitance | $V_{CC} = 3.3 \text{ V}; V_I = \text{GND to}$ V_{CC} | - | 3 | - | - | - | pF |

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

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for load circuit see Figure 8.

| Symbol | Parameter | Conditions | | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|----------|-------------------------------|--|-----|------------------|--------|------|-------------------|------|------|
| | | | | Min | Typ[1] | Max | Min | Max | |
| t_{pd} | propagation delay | A, B and C to Y; see Figure 7 | [2] | | | | | | |
| | | $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$ | | 1.5 | 4.7 | 17.2 | 1.5 | 21.5 | ns |
| | | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$ | | 1.0 | 3.0 | 6.2 | 1.0 | 7.8 | ns |
| | | V _{CC} = 2.7 V | | 1.0 | 3.0 | 6.0 | 1.0 | 7.5 | ns |
| | | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$ | | 1.0 | 2.6 | 4.8 | 1.0 | 6.2 | ns |
| | | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$ | | 1.0 | 1.9 | 3.5 | 1.0 | 4.4 | ns |
| C_{PD} | power dissipation capacitance | $V_I = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ | [3] | - | 12 | - | - | - | pF |

^[1] Typical values are measured at $T_{amb} = 25$ °C and $V_{CC} = 1.8$ V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

 f_i = input frequency in MHz;

f_o = output frequency in MHz;

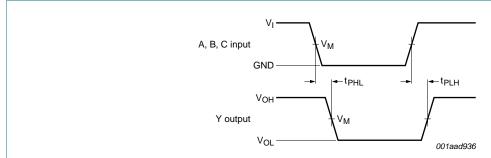
C_L = output load capacitance in pF;

 V_{CC} = supply voltage in V;

N = number of inputs switching;

 $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

12. AC waveforms



Measurement points are given in Table 9.

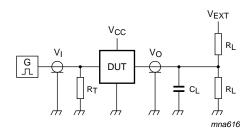
 V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 7. The input A, B and C to output Y propagation delays

^[2] t_{pd} is the same as t_{PLH} and t_{PHL} .

Table 9. Measurement points

| Supply voltage | Input | Output |
|------------------|--------------------|--------------------|
| V _{CC} | V _M | V _M |
| 1.65 V to 1.95 V | 0.5V _{CC} | 0.5V _{CC} |
| 2.3 V to 2.7 V | 0.5V _{CC} | 0.5V _{CC} |
| 2.7 V | 1.5 V | 1.5 V |
| 3.0 V to 3.6 V | 1.5 V | 1.5 V |
| 4.5 V to 5.5 V | 0.5V _{CC} | 0.5V _{CC} |



Test data is given in Table 10.

Definitions for test circuit:

R_L = Load resistance.

 C_L = Load capacitance including jig and probe capacitance.

 R_T = Termination resistance; should be equal to the output impedance Z_o of the pulse generator.

 V_{EXT} = External voltage for measuring switching times.

Fig 8. Test circuit for measuring switching times

Table 10. Test data

| Supply voltage | Input | | Load | Load | |
|------------------|-----------------|---------------|-------|-------|-------------------------------------|
| V _{CC} | V _I | $t_r = t_f$ | CL | R_L | t _{PLH} , t _{PHL} |
| 1.65 V to 1.95 V | V _{CC} | \leq 2.0 ns | 30 pF | 1 kΩ | open |
| 2.3 V to 2.7 V | V_{CC} | ≤ 2.0 ns | 30 pF | 500 Ω | open |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 4.5 V to 5.5 V | V_{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | open |

13. Package outline

Plastic surface-mounted package; 6 leads

SOT363

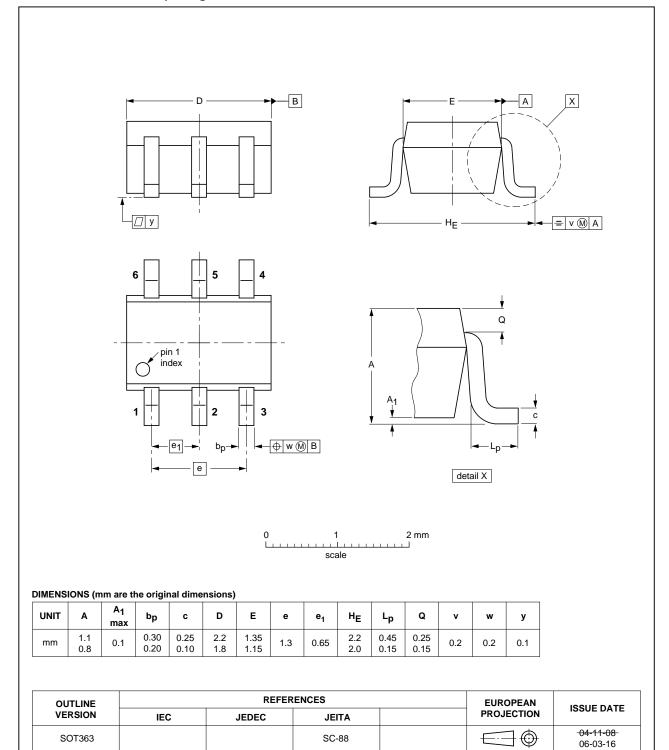


Fig 9. Package outline SOT363 (SC-88)

74LVC1G332

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Plastic surface-mounted package (TSOP6); 6 leads

SOT457

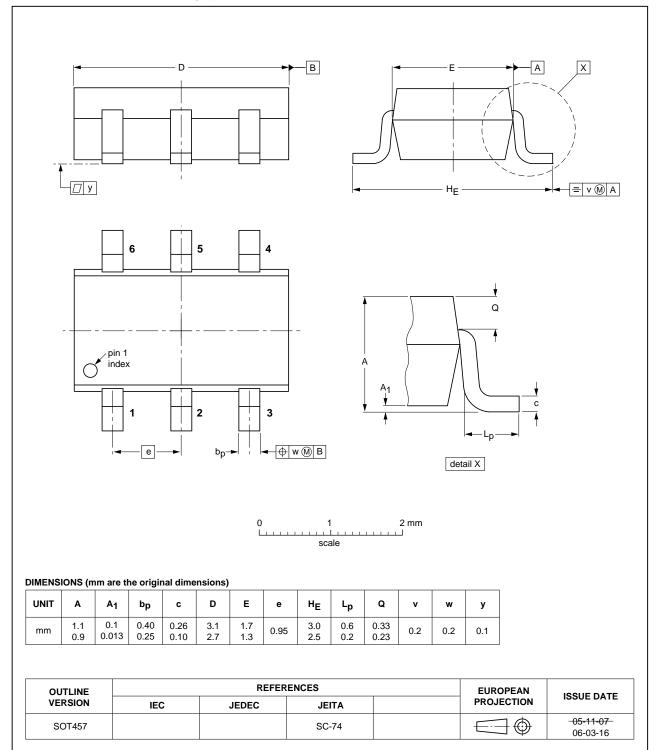


Fig 10. Package outline SOT457 (SC-74)

74LVC1G332

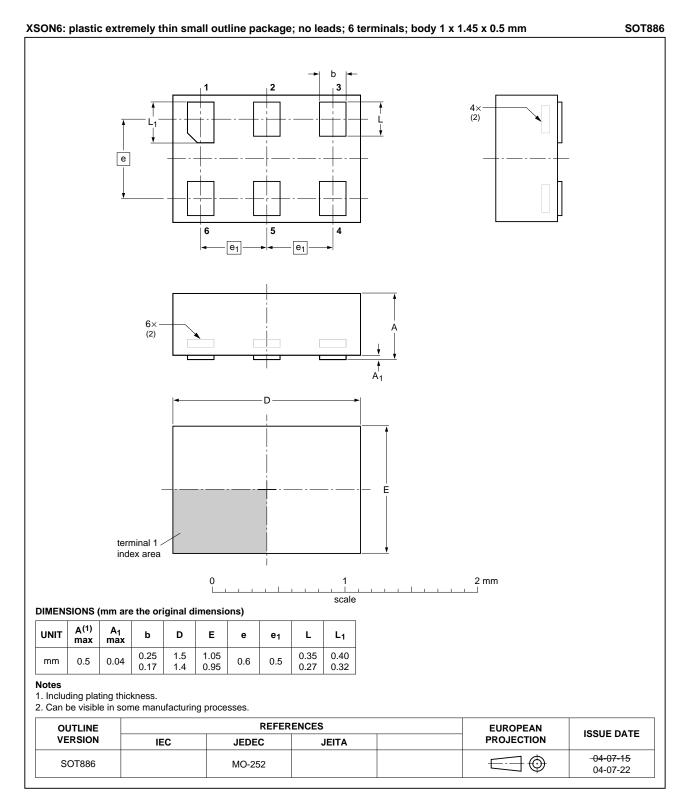


Fig 11. Package outline SOT886 (XSON6)

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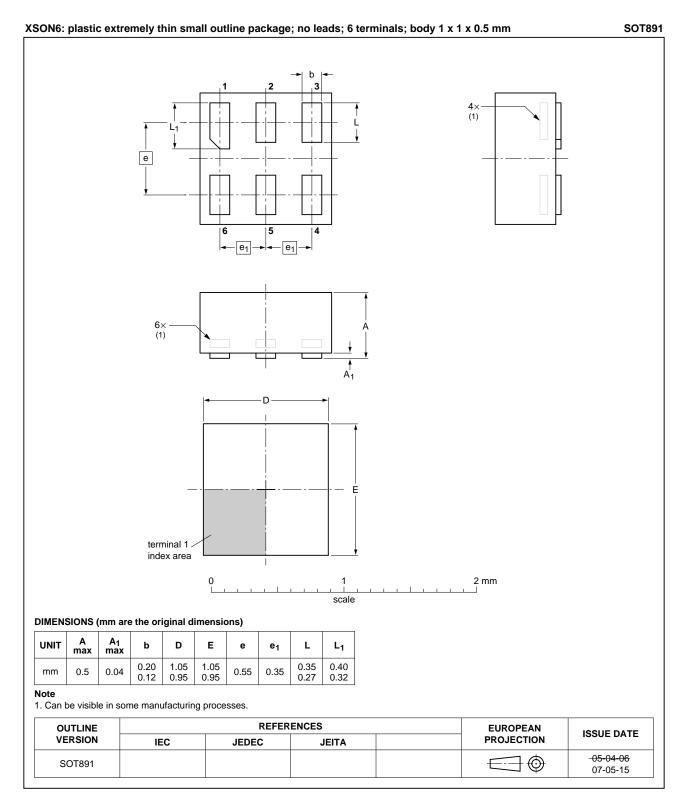


Fig 12. Package outline SOT891 (XSON6)

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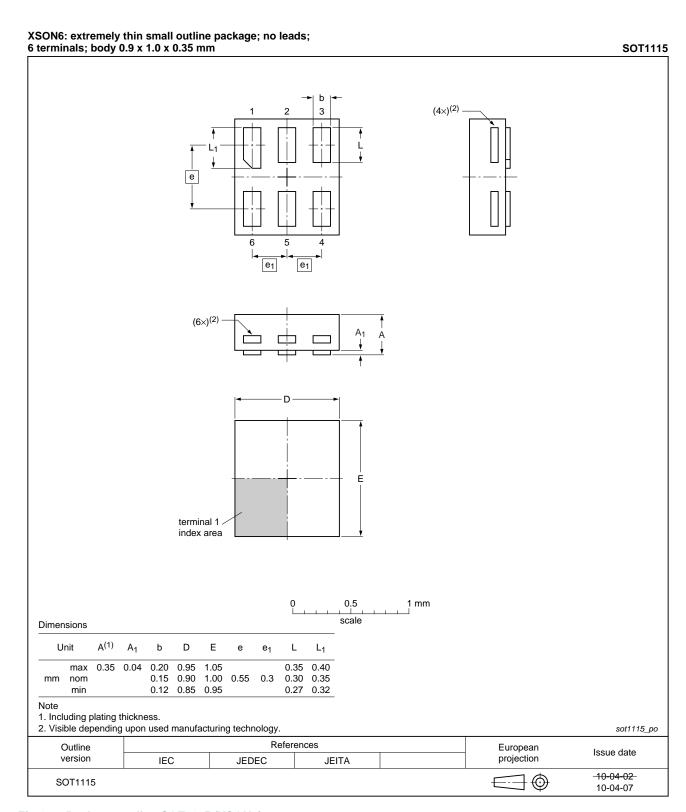


Fig 13. Package outline SOT1115 (XSON6)

74LVC1G332

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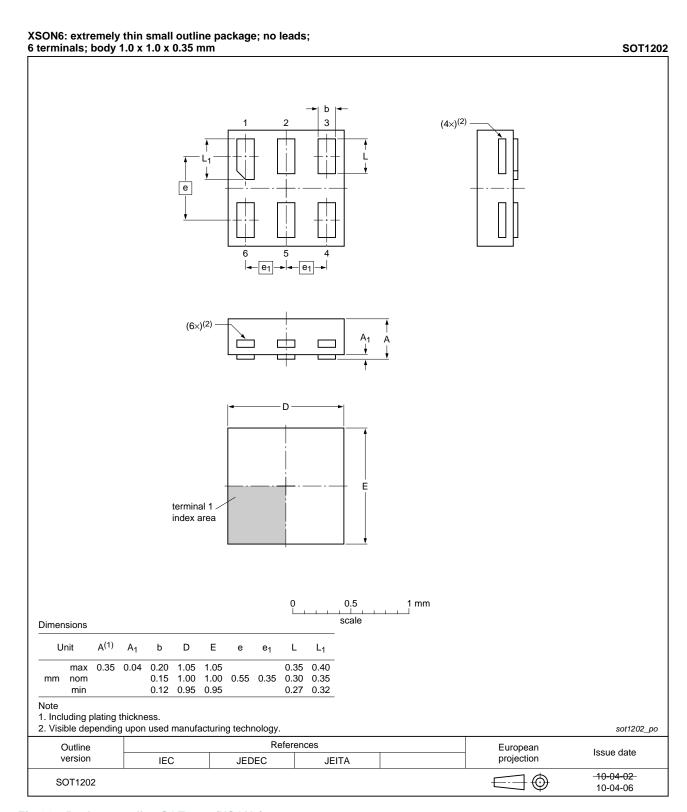


Fig 14. Package outline SOT1202 (XSON6)

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14. Abbreviations

Table 11. Abbreviations

| Acronym | Description |
|---------|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| НВМ | Human Body Model |
| MM | Machine Model |
| TTL | Transistor-Transistor Logic |

15. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---------------------------------|--------------------|---------------|----------------|
| 74LVC1G332 v.4 | 20111206 | Product data sheet | - | 74LVC1G332 v.3 |
| Modifications: | Legal pages | updated. | | |
| 74LVC1G332 v.3 | 20101026 | Product data sheet | - | 74LVC1G332 v.2 |
| 74LVC1G332 v.2 | 20070719 | Product data sheet | - | 74LVC1G332 v.1 |
| 74LVC1G332 v.1 | 20061011 | Product data sheet | - | - |

16. Legal information

16.1 Data sheet status

| Document status[1][2] | Product status[3] | Definition |
|--------------------------------|-------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions"
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18. Contents

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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.