

74LVC1G126

Bus buffer/line driver; 3-state

Rev. 10 — 29 December 2010

Product data sheet

1. General description

The 74LVC1G126 provides one non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input (OE). A LOW-level at pin OE causes the output to assume a high-impedance OFF-state.

The input can be driven from either 3.3 V or 5 V devices. This feature allows the use of this device in a mixed 3.3 V and 5 V environment.

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.

2. Features and benefits

- 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)
- ± 24 mA output drive ($V_{CC} = 3.0$ V)
- ESD protection:
 - ◆ HBM JESD22-A114F exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
- CMOS low power consumption
- Inputs accept voltages up to 5 V
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- 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 | | | Version |
|--------------|-------------------|--------|---|----------|
| | Temperature range | Name | Description | |
| 74LVC1G126GW | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74LVC1G126GV | -40 °C to +125 °C | SC-74A | plastic surface-mounted package; 5 leads | SOT753 |
| 74LVC1G126GM | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| 74LVC1G126GF | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm | SOT891 |
| 74LVC1G126GN | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm | SOT1115 |
| 74LVC1G126GS | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm | SOT1202 |

4. Marking

Table 2. Marking codes

| Type number | Marking ^[1] |
|--------------|------------------------|
| 74LVC1G126GW | VN |
| 74LVC1G126GV | V26 |
| 74LVC1G126GM | VN |
| 74LVC1G126GF | VN |
| 74LVC1G126GN | VN |
| 74LVC1G126GS | VN |

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

5. Functional diagram

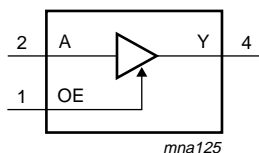


Fig 1. Logic symbol

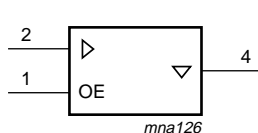


Fig 2. IEC logic symbol

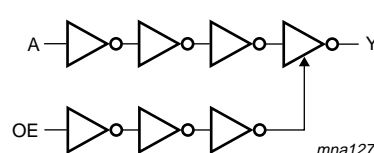
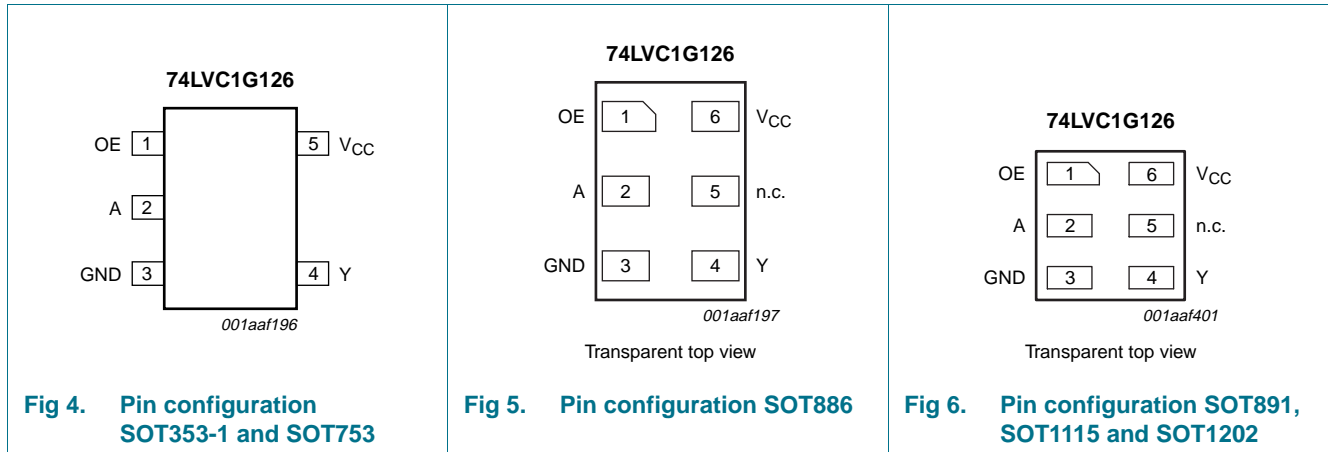


Fig 3. Logic diagram

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

| Symbol | Pin | | Description |
|-----------------|------------------|----------------------------------|---------------------|
| | SOT353-1, SOT753 | SOT886, SOT891, SOT1115, SOT1202 | |
| OE | 1 | 1 | output enable input |
| A | 2 | 2 | data input |
| GND | 3 | 3 | ground (0 V) |
| Y | 4 | 4 | data output |
| n.c. | - | 5 | not connected |
| V _{CC} | 5 | 6 | supply voltage |

7. Functional description

Table 4. Function table^[1]

| Input | | | Output |
|-------|---|---|--------|
| OE | A | Y | |
| H | L | L | |
| H | H | H | |
| L | X | Z | |

[1] H = HIGH voltage level;
 L = LOW voltage level;
 X = don't care;
 Z = high-impedance OFF-state.

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 |
| V_I | input voltage | | [1] -0.5 | +6.5 | V |
| I_{OK} | output clamping current | $V_O > V_{CC}$ or $V_O < 0$ V | - | ± 50 | mA |
| V_O | output voltage | Active mode | [1][2] -0.5 | $V_{CC} + 0.5$ | V |
| | | Power-down mode | [1][2] -0.5 | +6.5 | V |
| I_O | output current | $V_O = 0$ V to V_{CC} | - | ± 50 | mA |
| I_{CC} | supply current | | - | 100 | mA |
| I_{GND} | ground current | | -100 | - | mA |
| P_{tot} | total power dissipation | $T_{amb} = -40$ °C to $+125$ °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.

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

[3] For TSSOP5 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.

9. Recommended operating conditions

Table 6. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------|-------------------------------------|---------------------------------|------|-----|----------|------|
| V_{CC} | supply voltage | | 1.65 | - | 5.5 | V |
| V_I | input voltage | | 0 | - | 5.5 | V |
| V_O | 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 |

10. Static characteristics

Table 7. Static characteristics

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

| Symbol | Parameter | Conditions | Min | Typ ^[1] | Max | Unit |
|---|---------------------------|---|------------------------|--------------------|------------------------|------|
| T_{amb} = -40 °C to +85 °C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 1.65 V to 1.95 V | 0.65 × V _{CC} | - | - | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | - | - | V |
| | | V _{CC} = 2.7 V to 3.6 V | 2.0 | - | - | V |
| | | V _{CC} = 4.5 V to 5.5 V | 0.7 × V _{CC} | - | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 1.65 V to 1.95 V | - | - | 0.35 × V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | - | - | 0.7 | V |
| | | V _{CC} = 2.7 V to 3.6 V | - | - | 0.8 | V |
| | | V _{CC} = 4.5 V to 5.5 V | - | - | 0.3 × V _{CC} | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 1.65 V to 5.5 V; I _O = 100 μA | - | - | 0.1 | V |
| | | V _{CC} = 1.65 V; I _O = 4 mA | - | - | 0.45 | V |
| | | V _{CC} = 2.3 V; I _O = 8 mA | - | - | 0.3 | V |
| | | V _{CC} = 2.7 V; I _O = 12 mA | - | - | 0.4 | V |
| | | V _{CC} = 3.0 V; I _O = 24 mA | - | - | 0.55 | V |
| | | V _{CC} = 4.5 V; I _O = 32 mA | - | - | 0.55 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 1.65 V to 5.5 V; I _O = -100 μA | V _{CC} - 0.1 | - | - | V |
| | | V _{CC} = 1.65 V; I _O = -4 mA | 1.2 | - | - | V |
| | | V _{CC} = 2.3 V; I _O = -8 mA | 1.9 | - | - | V |
| | | V _{CC} = 2.7 V; I _O = -12 mA | 2.2 | - | - | V |
| | | V _{CC} = 3.0 V; I _O = -24 mA | 2.3 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -32 mA | 3.8 | - | - | V |
| I _I | input leakage current | V _{CC} = 0 V to 5.5 V; V _I = 5.5 V or GND | - | ±0.1 | ±5 | μA |
| I _{OZ} | OFF-state output current | V _{CC} = 3.6 V; V _I = V _{IH} or V _{IL} ; V _O = 5.5 V or GND | - | ±0.1 | ±10 | μA |
| I _{OFF} | power-off leakage current | V _{CC} = 0 V; V _I or V _O = 5.5 V | - | ±0.1 | ±10 | μA |
| I _{CC} | supply current | V _I = 5.5 V or GND; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A | - | 0.1 | 10 | μA |
| ΔI _{CC} | additional supply current | per pin; V _{CC} = 2.3 V to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A | - | 5 | 500 | μA |
| C _I | input capacitance | | - | 5 | - | pF |

Table 7. Static characteristics ...continued

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

| Symbol | Parameter | Conditions | Min | Typ ^[1] | Max | Unit |
|--|---------------------------|---|------------------------|--------------------|------------------------|------|
| T_{amb} = -40 °C to +125 °C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 1.65 V to 1.95 V | 0.65 × V _{CC} | - | - | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | - | - | V |
| | | V _{CC} = 2.7 V to 3.6 V | 2.0 | - | - | V |
| | | V _{CC} = 4.5 V to 5.5 V | 0.7 × V _{CC} | - | - | V |
| V _{IL} | LOW-level input voltage | V _{CC} = 1.65 V to 1.95 V | - | - | 0.35 × V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | - | - | 0.7 | V |
| | | V _{CC} = 2.7 V to 3.6 V | - | - | 0.8 | V |
| | | V _{CC} = 4.5 V to 5.5 V | - | - | 0.3 × V _{CC} | V |
| V _{OL} | LOW-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 1.65 V to 5.5 V; I _O = 100 μA | - | - | 0.1 | V |
| | | V _{CC} = 1.65 V; I _O = 4 mA | - | - | 0.70 | V |
| | | V _{CC} = 2.3 V; I _O = 8 mA | - | - | 0.45 | V |
| | | V _{CC} = 2.7 V; I _O = 12 mA | - | - | 0.60 | V |
| | | V _{CC} = 3.0 V; I _O = 24 mA | - | - | 0.80 | V |
| | | V _{CC} = 4.5 V; I _O = 32 mA | - | - | 0.80 | V |
| V _{OH} | HIGH-level output voltage | V _I = V _{IH} or V _{IL} | | | | |
| | | V _{CC} = 1.65 V to 5.5 V; I _O = -100 μA | V _{CC} - 0.1 | - | - | V |
| | | V _{CC} = 1.65 V; I _O = -4 mA | 0.95 | - | - | V |
| | | V _{CC} = 2.3 V; I _O = -8 mA | 1.7 | - | - | V |
| | | V _{CC} = 2.7 V; I _O = -12 mA | 1.9 | - | - | V |
| | | V _{CC} = 3.0 V; I _O = -24 mA | 2.0 | - | - | V |
| | | V _{CC} = 4.5 V; I _O = -32 mA | 3.4 | - | - | V |
| I _I | input leakage current | V _{CC} = 0 V to 5.5 V; V _I = 5.5 V or GND | - | - | ±100 | μA |
| I _{OZ} | OFF-state output current | V _{CC} = 3.6 V; V _I = V _{IH} or V _{IL} ; V _O = 5.5 V or GND | - | - | ±200 | μA |
| I _{OFF} | power-off leakage current | V _{CC} = 0 V; V _I or V _O = 5.5 V | - | - | ±200 | μA |
| I _{CC} | supply current | V _I = 5.5 V or GND; V _{CC} = 1.65 V to 5.5 V; I _O = 0 A | - | - | 200 | μA |
| ΔI _{CC} | additional supply current | per pin; V _{CC} = 2.3 V to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A | - | - | 5000 | μA |

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

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V). For test circuit see [Figure 9](#).

| 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 to Y; see Figure 7 ^[2] | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 1.0 | 3 | 8.0 | 1.0 | 10.5 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 0.5 | 2.1 | 5.5 | 0.5 | 7 | ns |
| | | V _{CC} = 2.7 V | 0.5 | 2.3 | 5.5 | 0.5 | 7 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 0.5 | 2.0 | 4.5 | 0.5 | 6 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 0.5 | 1.7 | 4.0 | 0.5 | 5.5 | ns |
| t _{en} | enable time | OE to Y; see Figure 8 ^[3] | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 1.0 | 3.2 | 9.4 | 1.0 | 12 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 0.5 | 2.2 | 6.6 | 0.5 | 8.5 | ns |
| | | V _{CC} = 2.7 V | 0.5 | 2.4 | 6.6 | 0.5 | 8.5 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 0.5 | 2.1 | 5.3 | 0.5 | 7 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 0.5 | 1.6 | 5.0 | 0.5 | 6.5 | ns |
| t _{dis} | disable time | OE to Y; see Figure 8 ^[4] | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 1.0 | 4.3 | 9.2 | 1.0 | 12 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 0.5 | 2.7 | 5.5 | 0.5 | 7 | ns |
| | | V _{CC} = 2.7 V | 0.5 | 3.4 | 5.5 | 0.5 | 7 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 0.5 | 3.0 | 5.5 | 0.5 | 7 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 0.5 | 2.2 | 4.2 | 0.5 | 5.5 | ns |
| C _{PD} | power dissipation capacitance | per buffer; V _I = GND to V _{CC} ^[5] | | | | | | |
| | | output enabled | - | 25 | - | - | - | pF |
| | | output disabled | - | 6 | - | - | - | 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.

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

[3] t_{en} is the same as t_{PZH} and t_{PZL}

[4] t_{dis} is the same as t_{PLZ} and t_{PHZ}

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

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

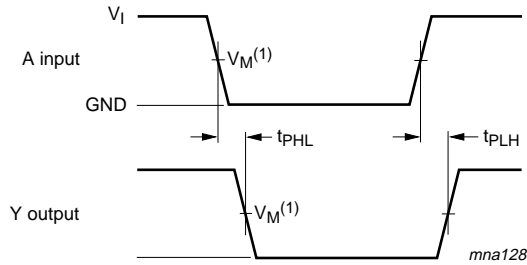
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

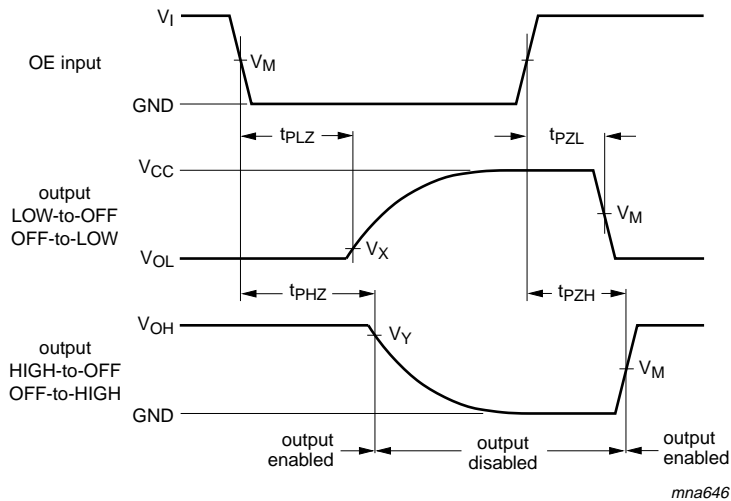
∑(C_L × V_{CC}² × f_o) = sum of outputs.

12. 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. Input A to output Y propagation delay times

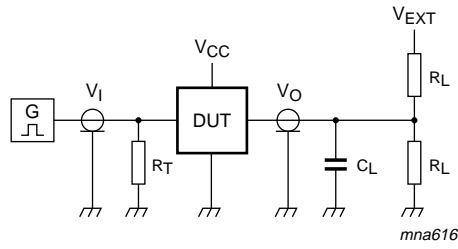


Measurement points are given in [Table 9](#).
 V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 8. 3-state enable and disable times

Table 9. Measurement points

| Supply voltage | Input | Output | | |
|------------------|-------------|-------------|-------------------|-------------------|
| V_{CC} | V_M | V_M | V_X | V_Y |
| 1.65 V to 1.95 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.15 V$ | $V_{OH} - 0.15 V$ |
| 2.3 V to 2.7 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.15 V$ | $V_{OH} - 0.15 V$ |
| 2.7 V | 1.5 V | 1.5 V | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |
| 3.0 V to 3.6 V | 1.5 V | 1.5 V | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |
| 4.5 V to 5.5 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |



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 9. Test circuit for measuring switching times

Table 10. Test data

| Supply voltage | Input | | Load | | V_{EXT} | | |
|------------------|----------|---------------|-------|--------------|--------------------|--------------------|--------------------|
| V_{CC} | V_I | t_r, t_f | C_L | R_L | t_{PLH}, t_{PHL} | t_{PZH}, t_{PHZ} | t_{PZL}, t_{PLZ} |
| 1.65 V to 1.95 V | V_{CC} | ≤ 2.0 ns | 30 pF | 1 k Ω | open | GND | $2V_{CC}$ |
| 2.3 V to 2.7 V | V_{CC} | ≤ 2.0 ns | 30 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | 6 V |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | 6 V |
| 4.5 V to 5.5 V | V_{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |

13. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

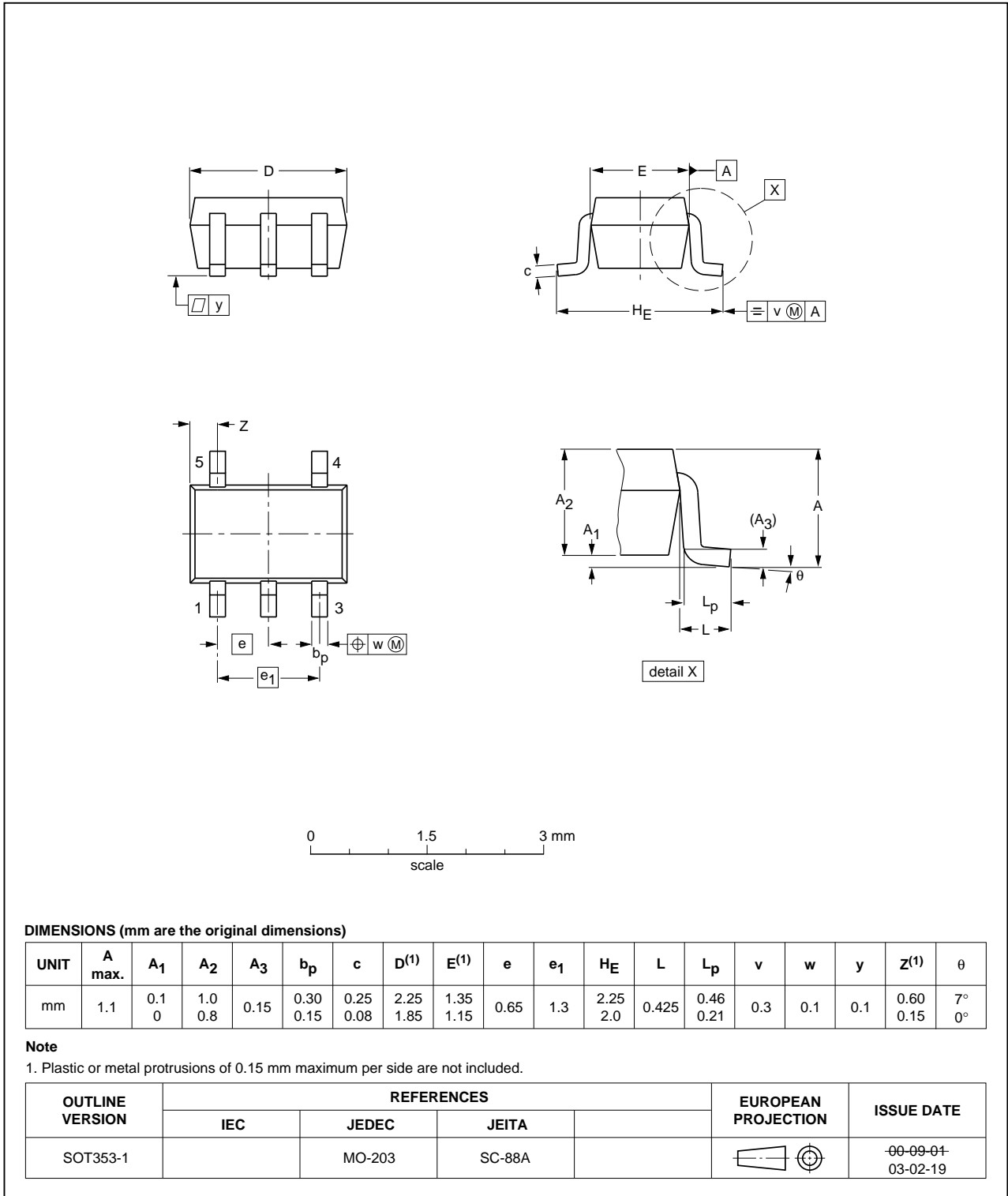


Fig 10. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

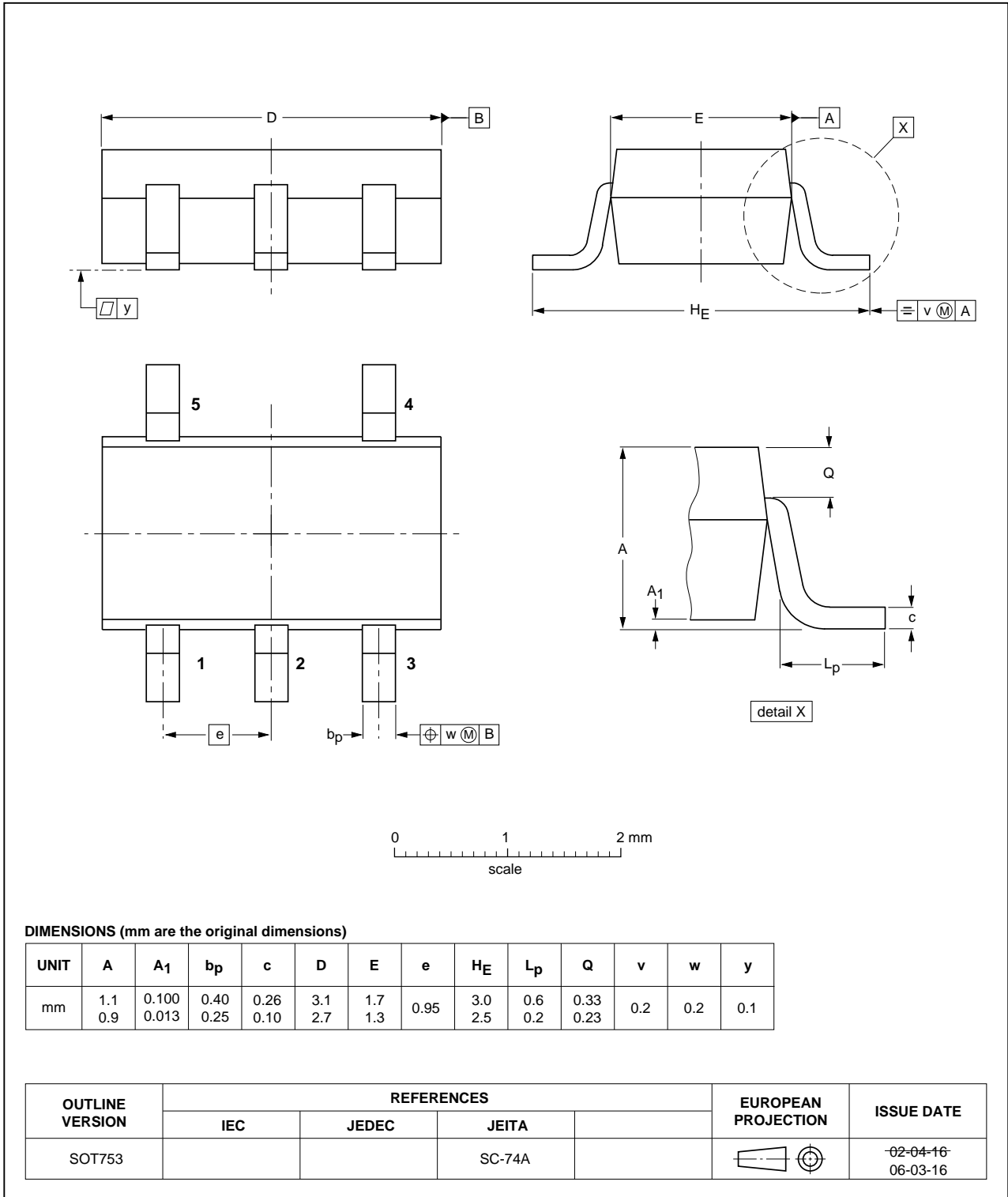


Fig 11. Package outline SOT753 (SC-74A)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886

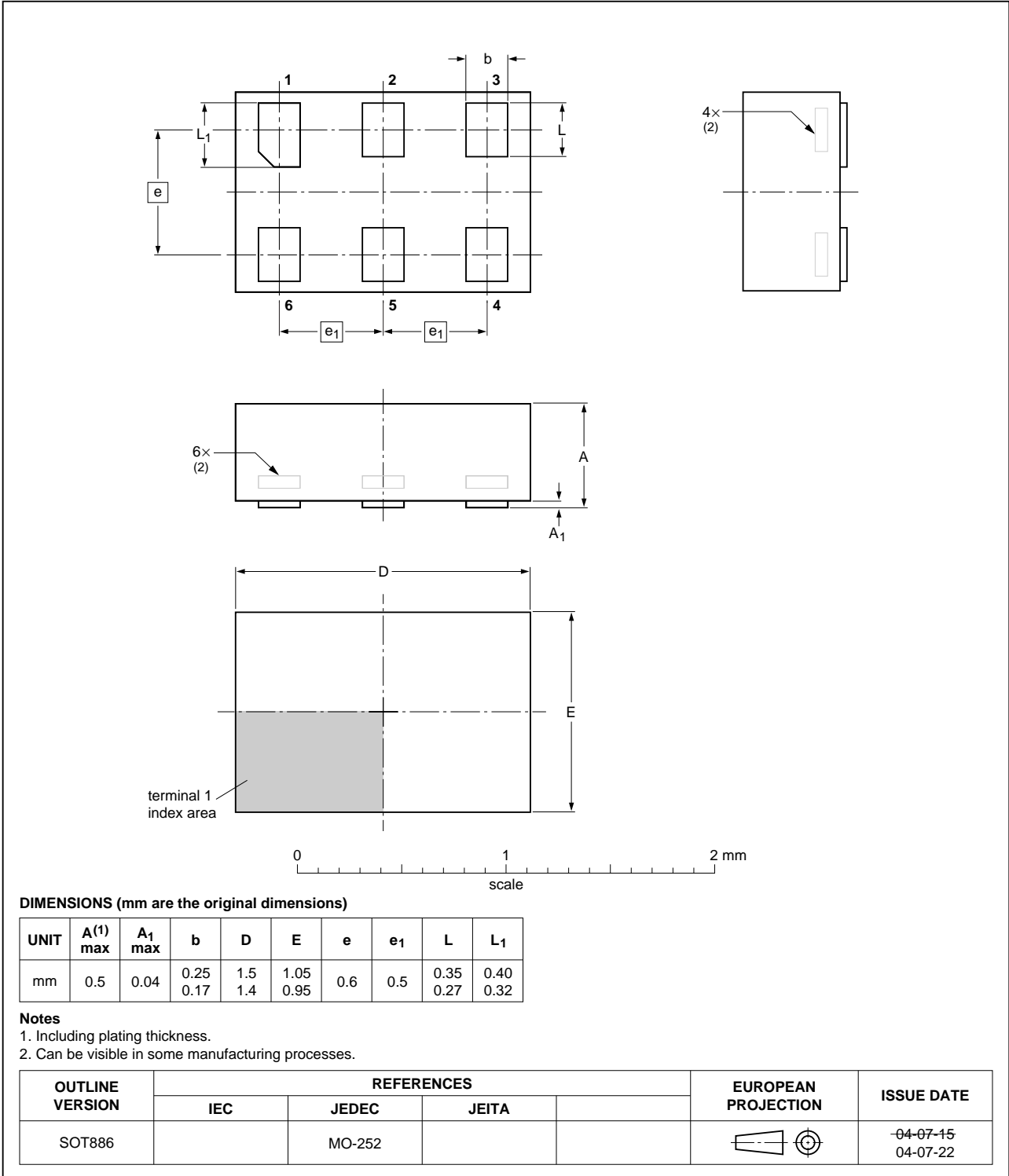


Fig 12. Package outline SOT886 (XSON6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm

SOT891

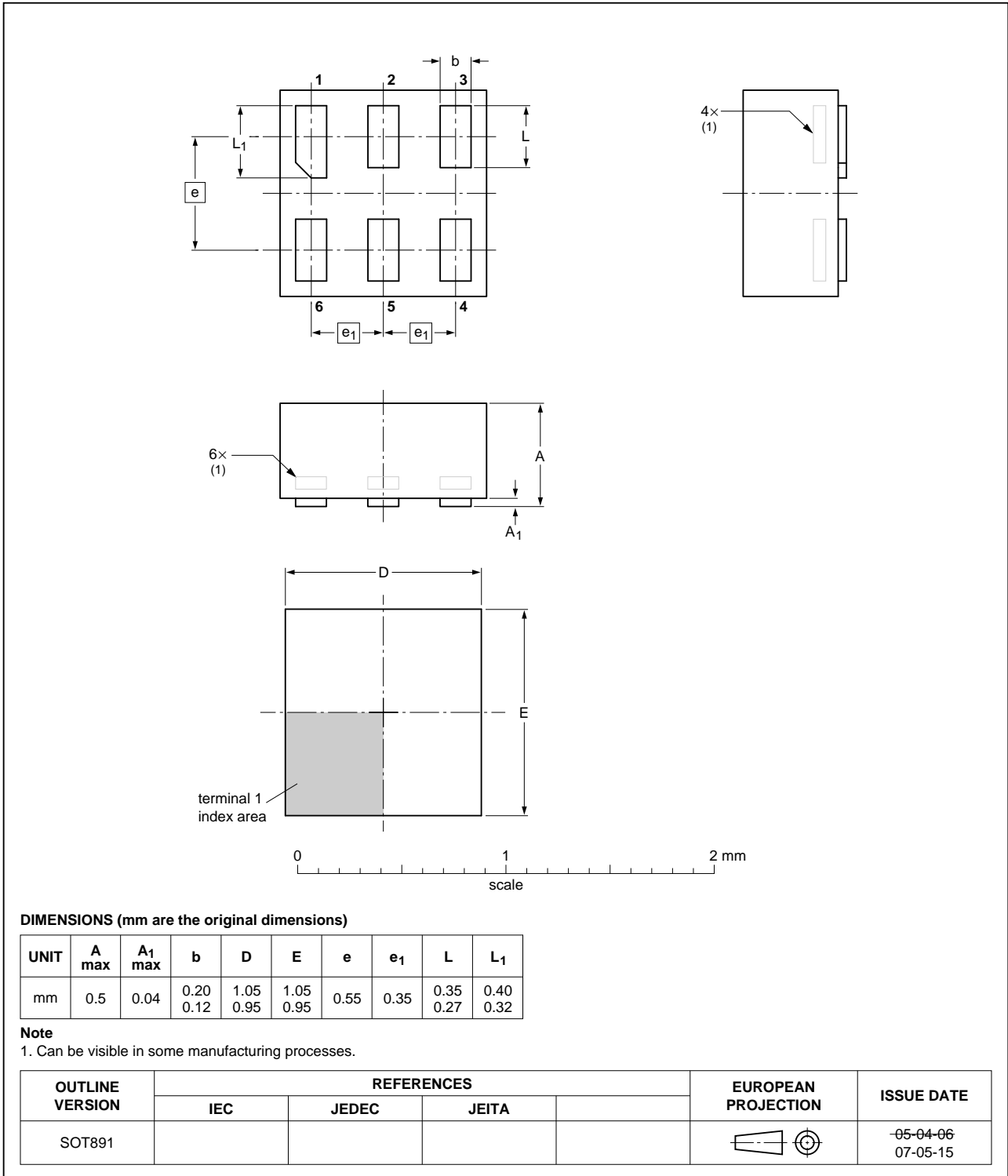


Fig 13. Package outline SOT891 (XSON6)

**XSON6: extremely thin small outline package; no leads;
6 terminals; body 0.9 x 1.0 x 0.35 mm**

SOT1115

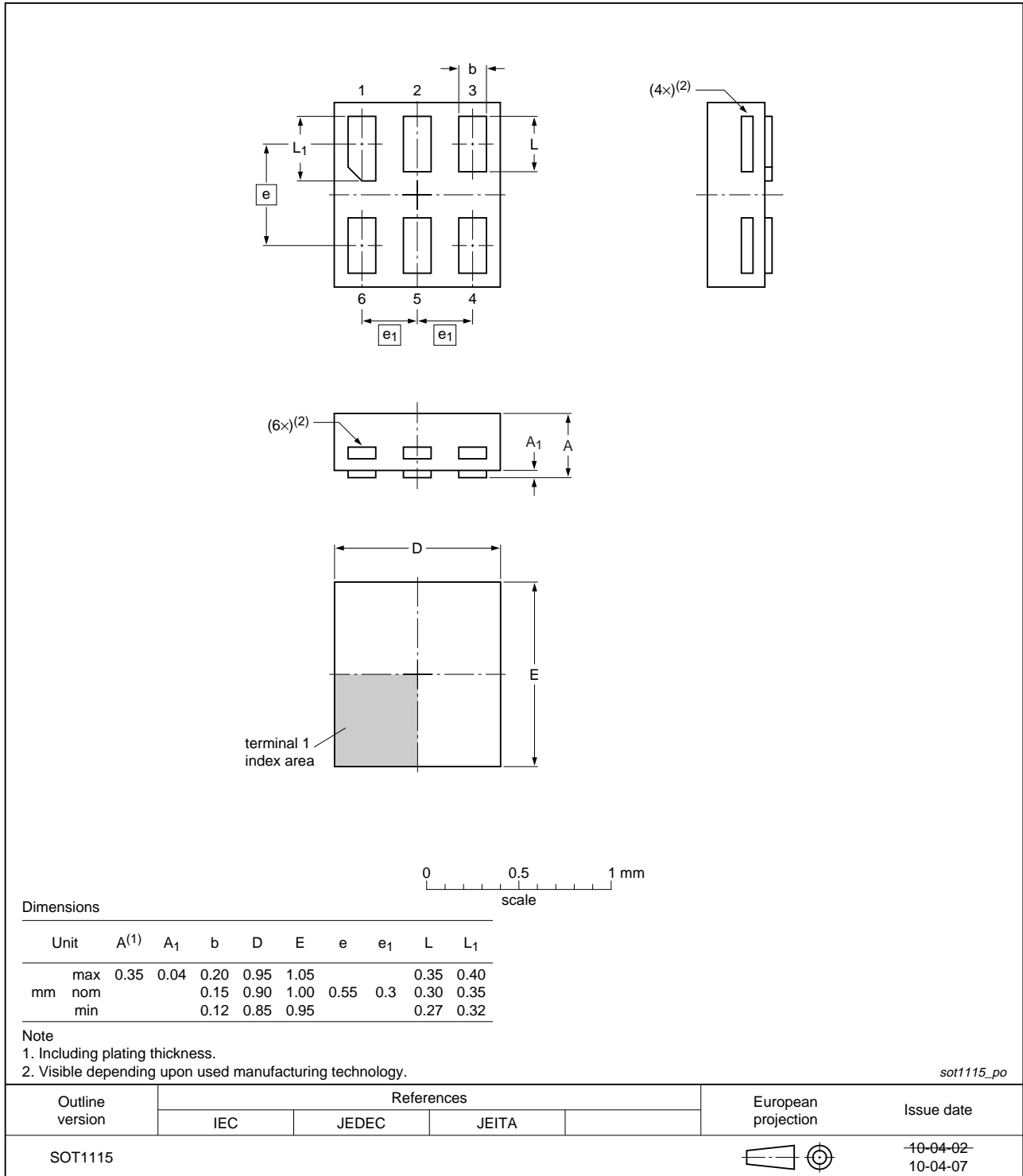


Fig 14. Package outline SOT1115 (XSON6)

XSON6: extremely thin small outline package; no leads;
6 terminals; body 1.0 x 1.0 x 0.35 mm

SOT1202

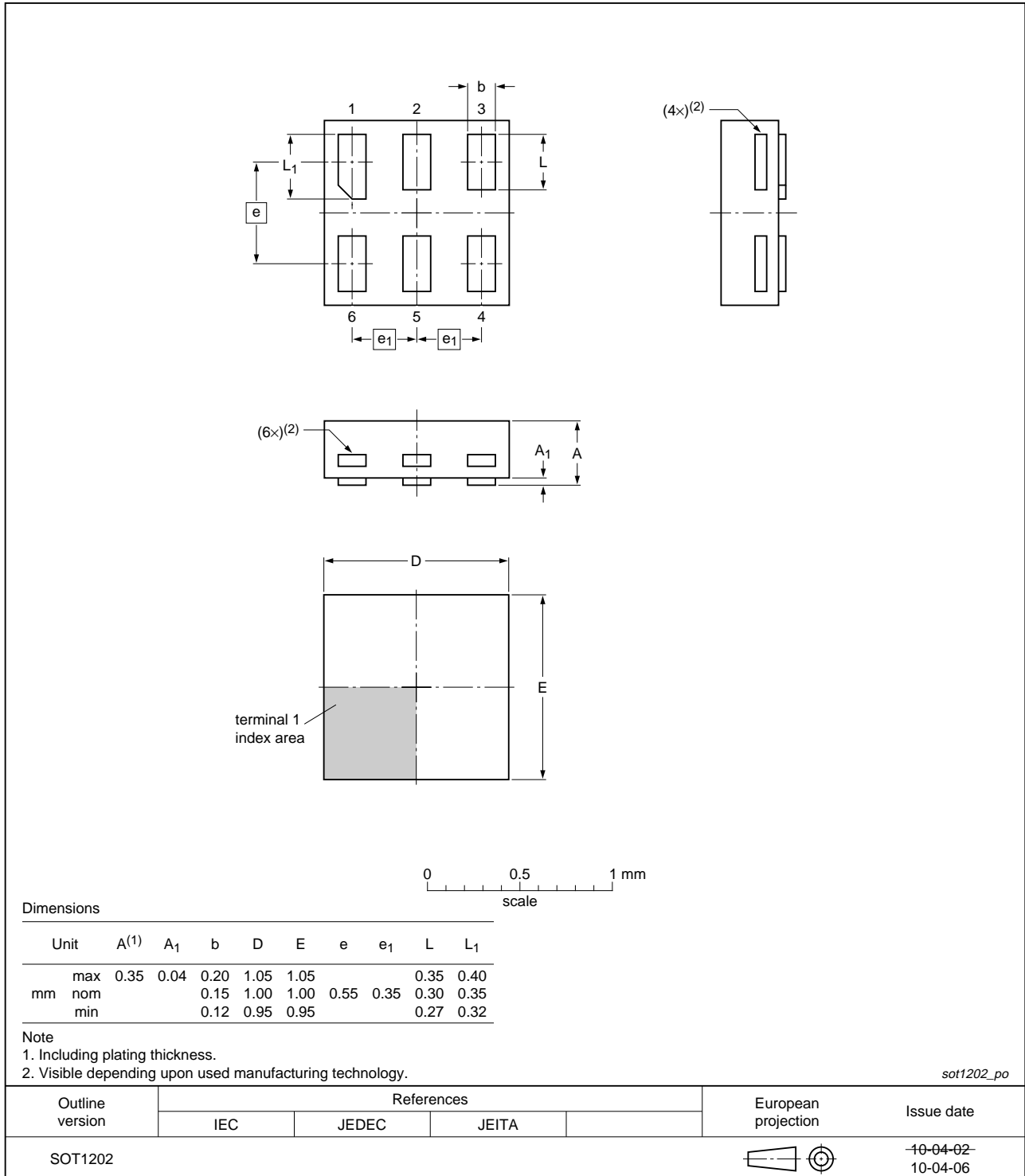


Fig 15. Package outline SOT1202 (XSON6)

14. Abbreviations

Table 11. Abbreviations

| Acronym | Description |
|---------|---|
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | 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 |
|-----------------|--|---------------------------|---------------|----------------|
| 74LVC1G126 v.10 | 20101229 | Product data sheet | - | 74LVC1G126 v.9 |
| Modifications: | <ul style="list-style-type: none"> Minimum limit V_{OH} at a supply voltage of 3.0 V changed from 2.7 V to 2.3 V. | | | |
| 74LVC1G126 v.9 | 20100825 | Product data sheet | - | 74LVC1G126 v.8 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74LVC1G126GN (SOT1115/XSON6 package). Added type number 74LVC1G126GS (SOT1202/XSON6 package). | | | |
| 74LVC1G126 v.8 | 20090409 | Product data sheet | - | 74LVC1G126 v.7 |
| 74LVC1G126 v.7 | 20070830 | Product data sheet | - | 74LVC1G126 v.6 |
| 74LVC1G126 v.6 | 20061009 | Product data sheet | - | 74LVC1G126 v.5 |
| 74LVC1G126 v.5 | 20040921 | Product specification | - | 74LVC1G126 v.4 |
| 74LVC1G126 v.4 | 20021002 | Product specification | - | 74LVC1G126 v.3 |
| 74LVC1G126 v.3 | 20020528 | Product specification | - | 74LVC1G126 v.2 |
| 74LVC1G126 v.2 | 20010406 | Preliminary specification | - | 74LVC1G126 v.1 |
| 74LVC1G126 v.1 | 20001222 | Preliminary specification | - | - |

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. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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