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Kind regards,

Team Nexperia

# 74AUP1G38

## Low-power 2-input NAND gate (open drain)

Rev. 7 — 4 April 2016

Product data sheet

### 1. General description

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The 74AUP1G38 provides the single 2-input NAND gate with open-drain output. The output of the device is an open drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions.

Schmitt trigger action at all inputs makes the circuit tolerant to slower input rise and fall times across the entire  $V_{CC}$  range from 0.8 V to 3.6 V.

This device ensures a very low static and dynamic power consumption across the entire  $V_{CC}$  range from 0.8 V to 3.6 V.

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

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- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- Complies with JEDEC standards:
  - ◆ JESD8-12 (0.8 V to 1.3 V)
  - ◆ JESD8-11 (0.9 V to 1.65 V)
  - ◆ JESD8-7 (1.2 V to 1.95 V)
  - ◆ JESD8-5 (1.8 V to 2.7 V)
  - ◆ JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - ◆ HBM JESD22-A114F Class 3A exceeds 5000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 V
- Low static power consumption;  $I_{CC} = 0.9 \mu A$  (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of  $V_{CC}$
- $I_{OFF}$  circuitry provides partial power-down mode operation
- Multiple package options
- Specified from  $-40\text{ }^{\circ}C$  to  $+85\text{ }^{\circ}C$  and  $-40\text{ }^{\circ}C$  to  $+125\text{ }^{\circ}C$



### 3. Ordering information

Table 1. Ordering information

| Type number | Package           |        |                                                                                                                        |          |
|-------------|-------------------|--------|------------------------------------------------------------------------------------------------------------------------|----------|
|             | Temperature range | Name   | Description                                                                                                            | Version  |
| 74AUP1G38GW | −40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm                                                 | SOT353-1 |
| 74AUP1G38GM | −40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm                            | SOT886   |
| 74AUP1G38GF | −40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm                               | SOT891   |
| 74AUP1G38GN | −40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm                                  | SOT1115  |
| 74AUP1G38GS | −40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm                                  | SOT1202  |
| 74AUP1G38GX | −40 °C to +125 °C | X2SON5 | X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.35 mm | SOT1226  |

### 4. Marking

Table 2. Marking

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| 74AUP1G38GW | aB                          |
| 74AUP1G38GM | aB                          |
| 74AUP1G38GF | aB                          |
| 74AUP1G38GN | aB                          |
| 74AUP1G38GS | aB                          |
| 74AUP1G38GX | aB                          |

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

### 5. Functional diagram

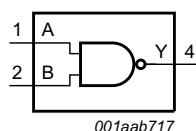


Fig 1. Logic symbol

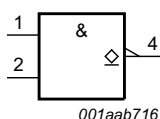


Fig 2. IEC logic symbol

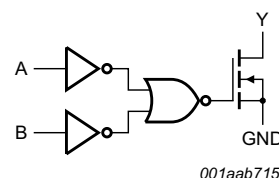


Fig 3. Logic diagram

6. Pinning information

6.1 Pinning

**Fig 4. Pin configuration SOT353-1 (TSSOP5)**

**Fig 5. Pin configuration SOT886 (XSON6)**

**Fig 6. Pin configuration SOT891, SOT1115 and SOT1202 (XSON6)**

**Fig 7. Pin configuration SOT1226 (X2SON5)**

6.2 Pin description

Table 3. Pin description

| Symbol          | Pin               |       | Description    |
|-----------------|-------------------|-------|----------------|
|                 | TSSOP5 and X2SON5 | XSON6 |                |
| A               | 1                 | 1     | data input     |
| B               | 2                 | 2     | data input     |
| GND             | 3                 | 3     | ground (0 V)   |
| Y               | 4                 | 4     | data output    |
| n.c.            | -                 | 5     | not connected  |
| V <sub>CC</sub> | 5                 | 6     | supply voltage |

## 7. Functional description

Table 4. Function table<sup>[1]</sup>

| Input |   | Output |
|-------|---|--------|
| A     | B | Y      |
| L     | L | Z      |
| L     | H | Z      |
| H     | L | Z      |
| H     | H | L      |

- [1] H = HIGH voltage level;  
 L = LOW voltage level;  
 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 | +4.6 | V    |
| $I_{IK}$  | input clamping current  | $V_I < 0$ V                                    | -50  | -    | mA   |
| $V_I$     | input voltage           | <sup>[1]</sup>                                 | -0.5 | +4.6 | V    |
| $I_{OK}$  | output clamping current | $V_O < 0$ V                                    | -50  | -    | mA   |
| $V_O$     | output voltage          | Active mode and Power-down mode <sup>[1]</sup> | -0.5 | +4.6 | V    |
| $I_O$     | output current          | $V_O = 0$ V to $V_{CC}$                        | -    | +20  | mA   |
| $I_{CC}$  | supply current          |                                                | -    | +50  | mA   |
| $I_{GND}$ | ground current          |                                                | -50  | -    | mA   |
| $T_{stg}$ | storage temperature     |                                                | -65  | +150 | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +125 °C <sup>[2]</sup>   | -    | 250  | mW   |

- [1] The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2] For TSSOP5 packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.  
 For XSON6 and X2SON5 packages: 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 | Max  | Unit |
|---------------------|-------------------------------------|---------------------------------|-----|------|------|
| $V_{CC}$            | supply voltage                      |                                 | 0.8 | 3.6  | V    |
| $V_I$               | input voltage                       |                                 | 0   | 3.6  | V    |
| $V_O$               | output voltage                      | Active mode and Power-down mode | 0   | 3.6  | V    |
| $T_{amb}$           | ambient temperature                 |                                 | -40 | +125 | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 0.8$ V to 3.6 V       | 0   | 200  | 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 | Max                    | Unit |
|--------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| T <sub>amb</sub> = 25 °C                         |                                      |                                                                                                                                                 |                        |     |                        |      |
| V <sub>IH</sub>                                  | HIGH-level input voltage             | V <sub>CC</sub> = 0.8 V                                                                                                                         | 0.70 × V <sub>CC</sub> | -   | -                      | V    |
|                                                  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V                                                                                                               | 0.65 × V <sub>CC</sub> | -   | -                      | V    |
|                                                  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                                | 1.6                    | -   | -                      | V    |
|                                                  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                                | 2.0                    | -   | -                      | V    |
| V <sub>IL</sub>                                  | LOW-level input voltage              | V <sub>CC</sub> = 0.8 V                                                                                                                         | -                      | -   | 0.30 × V <sub>CC</sub> | V    |
|                                                  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V                                                                                                               | -                      | -   | 0.35 × V <sub>CC</sub> | V    |
|                                                  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                                | -                      | -   | 0.7                    | V    |
|                                                  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                                | -                      | -   | 0.9                    | V    |
| V <sub>OL</sub>                                  | LOW-level output voltage             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                             |                        |     |                        |      |
|                                                  |                                      | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V                                                                                        | -                      | -   | 0.1                    | V    |
|                                                  |                                      | I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V                                                                                                | -                      | -   | 0.3 × V <sub>CC</sub>  | V    |
|                                                  |                                      | I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V                                                                                                | -                      | -   | 0.31                   | V    |
|                                                  |                                      | I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V                                                                                               | -                      | -   | 0.31                   | V    |
|                                                  |                                      | I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V                                                                                                | -                      | -   | 0.31                   | V    |
|                                                  |                                      | I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V                                                                                                | -                      | -   | 0.44                   | V    |
|                                                  |                                      | I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V                                                                                                | -                      | -   | 0.31                   | V    |
| I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V | -                                    | -                                                                                                                                               | 0.44                   | V   |                        |      |
| I <sub>I</sub>                                   | input leakage current                | V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V                                                                                   | -                      | -   | ±0.1                   | μA   |
| I <sub>OZ</sub>                                  | OFF-state output current             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> (and at least one input LOW); V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V | -                      | -   | ±0.1                   | μA   |
| I <sub>OFF</sub>                                 | power-off leakage current            | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V                                                                          | -                      | -   | ±0.2                   | μA   |
| ΔI <sub>OFF</sub>                                | additional power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V                                                                 | -                      | -   | ±0.2                   | μA   |
| I <sub>CC</sub>                                  | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V                                                | -                      | -   | 0.5                    | μA   |
| ΔI <sub>CC</sub>                                 | additional supply current            | V <sub>I</sub> = V <sub>CC</sub> – 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V                                                         | -                      | -   | 40                     | μA   |
| C <sub>I</sub>                                   | input capacitance                    | V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub>                                                                         | -                      | 0.8 | -                      | pF   |
| C <sub>O</sub>                                   | output capacitance                   | output enabled; V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V                                                                                     | -                      | 1.7 | -                      | pF   |
|                                                  |                                      | output disabled; V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V                                                                                    | -                      | 1.1 | -                      | pF   |
| T <sub>amb</sub> = –40 °C to +85 °C              |                                      |                                                                                                                                                 |                        |     |                        |      |
| V <sub>IH</sub>                                  | HIGH-level input voltage             | V <sub>CC</sub> = 0.8 V                                                                                                                         | 0.70 × V <sub>CC</sub> | -   | -                      | V    |
|                                                  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V                                                                                                               | 0.65 × V <sub>CC</sub> | -   | -                      | V    |
|                                                  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                                | 1.6                    | -   | -                      | V    |
|                                                  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                                | 2.0                    | -   | -                      | V    |

**Table 7.** Static characteristics ...continued

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

| Symbol                                     | Parameter                            | Conditions                                                                                                                                      | Min                    | Typ | Max                    | Unit |
|--------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| V <sub>IL</sub>                            | LOW-level input voltage              | V <sub>CC</sub> = 0.8 V                                                                                                                         | -                      | -   | 0.30 × V <sub>CC</sub> | V    |
|                                            |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V                                                                                                               | -                      | -   | 0.35 × V <sub>CC</sub> | V    |
|                                            |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                                | -                      | -   | 0.7                    | V    |
|                                            |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                                | -                      | -   | 0.9                    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                             |                        |     |                        |      |
|                                            |                                      | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V                                                                                        | -                      | -   | 0.1                    | V    |
|                                            |                                      | I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V                                                                                                | -                      | -   | 0.3 × V <sub>CC</sub>  | V    |
|                                            |                                      | I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V                                                                                                | -                      | -   | 0.37                   | V    |
|                                            |                                      | I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V                                                                                               | -                      | -   | 0.35                   | V    |
|                                            |                                      | I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V                                                                                                | -                      | -   | 0.33                   | V    |
|                                            |                                      | I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V                                                                                                | -                      | -   | 0.45                   | V    |
|                                            |                                      | I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V                                                                                                | -                      | -   | 0.33                   | V    |
|                                            |                                      | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V                                                                                                | -                      | -   | 0.45                   | V    |
| I <sub>I</sub>                             | input leakage current                | V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V                                                                                   | -                      | -   | ±0.5                   | μA   |
| I <sub>OZ</sub>                            | OFF-state output current             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> (and at least one input LOW); V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V | -                      | -   | ±0.5                   | μA   |
| I <sub>OFF</sub>                           | power-off leakage current            | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V                                                                          | -                      | -   | ±0.5                   | μA   |
| ΔI <sub>OFF</sub>                          | additional power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V                                                                 | -                      | -   | ±0.6                   | μA   |
| I <sub>CC</sub>                            | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V                                                | -                      | -   | 0.9                    | μA   |
| ΔI <sub>CC</sub>                           | additional supply current            | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V                                                         | -                      | -   | 50                     | μA   |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                                      |                                                                                                                                                 |                        |     |                        |      |
| V <sub>IH</sub>                            | HIGH-level input voltage             | V <sub>CC</sub> = 0.8 V                                                                                                                         | 0.75 × V <sub>CC</sub> | -   | -                      | V    |
|                                            |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V                                                                                                               | 0.70 × V <sub>CC</sub> | -   | -                      | V    |
|                                            |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                                | 1.6                    | -   | -                      | V    |
|                                            |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                                | 2.0                    | -   | -                      | V    |
| V <sub>IL</sub>                            | LOW-level input voltage              | V <sub>CC</sub> = 0.8 V                                                                                                                         | -                      | -   | 0.25 × V <sub>CC</sub> | V    |
|                                            |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V                                                                                                               | -                      | -   | 0.30 × V <sub>CC</sub> | V    |
|                                            |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V                                                                                                                | -                      | -   | 0.7                    | V    |
|                                            |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V                                                                                                                | -                      | -   | 0.9                    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                             |                        |     |                        |      |
|                                            |                                      | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V                                                                                        | -                      | -   | 0.11                   | V    |
|                                            |                                      | I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V                                                                                                | -                      | -   | 0.33 × V <sub>CC</sub> | V    |
|                                            |                                      | I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V                                                                                                | -                      | -   | 0.41                   | V    |
|                                            |                                      | I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V                                                                                               | -                      | -   | 0.39                   | V    |
|                                            |                                      | I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V                                                                                                | -                      | -   | 0.36                   | V    |
|                                            |                                      | I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V                                                                                                | -                      | -   | 0.50                   | V    |
|                                            |                                      | I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V                                                                                                | -                      | -   | 0.36                   | V    |
|                                            |                                      | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V                                                                                                | -                      | -   | 0.50                   | V    |

**Table 7.** Static characteristics ...continued

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

| Symbol           | Parameter                            | Conditions                                                                                                                                          | Min | Typ | Max        | Unit          |
|------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------------|---------------|
| $I_I$            | input leakage current                | $V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$                                                                        | -   | -   | $\pm 0.75$ | $\mu\text{A}$ |
| $I_{OZ}$         | OFF-state output current             | $V_I = V_{IH} \text{ or } V_{IL} \text{ (and at least one input LOW)}; V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$ | -   | -   | $\pm 0.75$ | $\mu\text{A}$ |
| $I_{OFF}$        | power-off leakage current            | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$                                                                         | -   | -   | $\pm 0.75$ | $\mu\text{A}$ |
| $\Delta I_{OFF}$ | additional power-off leakage current | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$                                                       | -   | -   | $\pm 0.75$ | $\mu\text{A}$ |
| $I_{CC}$         | supply current                       | $V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$                                                          | -   | -   | 1.4        | $\mu\text{A}$ |
| $\Delta I_{CC}$  | additional supply current            | $V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$                                                                           | -   | -   | 75         | $\mu\text{A}$ |

## 11. Dynamic characteristics

**Table 8.** Dynamic characteristicsVoltages are referenced to GND (ground = 0 V; for test circuit see [Figure 9](#))

| Symbol                 | Parameter         | Conditions                                               | 25 °C |                    |      | −40 °C to +125 °C |             |              | Unit |
|------------------------|-------------------|----------------------------------------------------------|-------|--------------------|------|-------------------|-------------|--------------|------|
|                        |                   |                                                          | Min   | Typ <sup>[1]</sup> | Max  | Min               | Max (85 °C) | Max (125 °C) |      |
| C <sub>L</sub> = 5 pF  |                   |                                                          |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | A or B to Y; see <a href="#">Figure 8</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                  | -     | 13.5               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                         | 1.9   | 4.6                | 10.4 | 1.8               | 11.4        | 12.6         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                         | 1.5   | 3.3                | 6.5  | 1.4               | 7.4         | 8.2          | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                       | 1.2   | 2.9                | 5.1  | 1.1               | 5.9         | 6.5          | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                         | 1.0   | 2.2                | 3.8  | 0.9               | 4.5         | 4.9          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         | 0.9   | 2.3                | 4.0  | 0.8               | 4.5         | 4.9          | ns   |
| C <sub>L</sub> = 10 pF |                   |                                                          |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | A or B to Y; see <a href="#">Figure 8</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                  | -     | 16.3               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                         | 2.3   | 5.6                | 12.3 | 2.1               | 13.7        | 15.1         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                         | 1.8   | 4.1                | 7.6  | 1.7               | 8.8         | 9.7          | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                       | 1.6   | 3.8                | 6.1  | 1.4               | 7.1         | 7.8          | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                         | 1.4   | 2.9                | 4.6  | 1.2               | 5.4         | 5.9          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         | 1.3   | 3.2                | 5.7  | 1.1               | 6.4         | 7.0          | ns   |
| C <sub>L</sub> = 15 pF |                   |                                                          |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | A or B to Y; see <a href="#">Figure 8</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                  | -     | 19.0               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                         | 2.6   | 6.6                | 14.2 | 2.4               | 15.8        | 17.4         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                         | 2.1   | 4.8                | 8.7  | 1.9               | 10.1        | 11.1         | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                       | 1.9   | 4.6                | 7.6  | 1.7               | 8.5         | 9.3          | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                         | 1.6   | 3.6                | 5.6  | 1.5               | 6.3         | 6.9          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                         | 1.6   | 4.1                | 7.5  | 1.4               | 8.3         | 9.1          | ns   |



**Table 8. Dynamic characteristics ...continued**

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

| Symbol                                        | Parameter                     | Conditions                                                                     | 25 °C |                    |      | −40 °C to +125 °C |             |              | Unit |
|-----------------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-------|--------------------|------|-------------------|-------------|--------------|------|
|                                               |                               |                                                                                | Min   | Typ <sup>[1]</sup> | Max  | Min               | Max (85 °C) | Max (125 °C) |      |
| C <sub>L</sub> = 30 pF                        |                               |                                                                                |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>                               | propagation delay             | A or B to Y; see <a href="#">Figure 8</a> <sup>[2]</sup>                       |       |                    |      |                   |             |              |      |
|                                               |                               | V <sub>CC</sub> = 0.8 V                                                        | -     | 27.0               | -    | -                 | -           | -            | ns   |
|                                               |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                                               | 3.6   | 9.5                | 19.5 | 3.2               | 21.8        | 24.0         | ns   |
|                                               |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                                               | 2.9   | 7.0                | 11.5 | 2.6               | 13.6        | 15.0         | ns   |
|                                               |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                             | 2.6   | 7.0                | 12.1 | 2.3               | 13.3        | 14.6         | ns   |
|                                               |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                               | 2.4   | 5.4                | 8.9  | 2.1               | 9.9         | 10.9         | ns   |
|                                               |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                               | 2.3   | 6.5                | 12.7 | 2.1               | 13.9        | 15.3         | ns   |
| C <sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF |                               |                                                                                |       |                    |      |                   |             |              |      |
| C <sub>PD</sub>                               | power dissipation capacitance | f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[3]</sup> |       |                    |      |                   |             |              |      |
|                                               |                               | V <sub>CC</sub> = 0.8 V                                                        | -     | 0.6                | -    | -                 | -           | -            | pF   |
|                                               |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                                               | -     | 0.7                | -    | -                 | -           | -            | pF   |
|                                               |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                                               | -     | 0.8                | -    | -                 | -           | -            | pF   |
|                                               |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                             | -     | 0.9                | -    | -                 | -           | -            | pF   |
|                                               |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                               | -     | 1.1                | -    | -                 | -           | -            | pF   |
|                                               |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                               | -     | 1.4                | -    | -                 | -           | -            | pF   |

[1] All typical values are measured at nominal V<sub>CC</sub>.

[2] t<sub>pd</sub> is the same as t<sub>PZL</sub> and t<sub>PLZ</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N where:

f<sub>i</sub> = input frequency in MHz;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching.

12. Waveforms

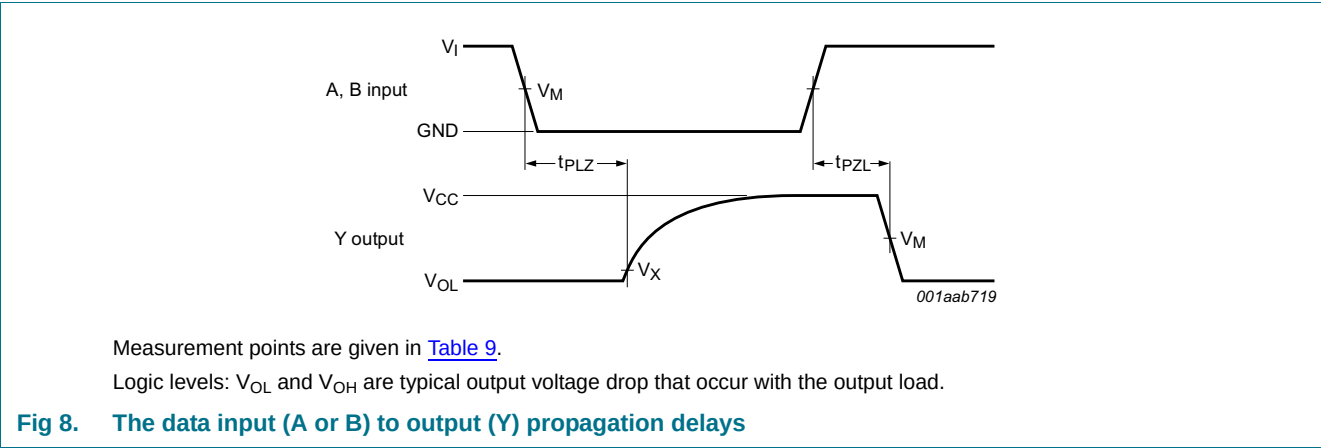


Table 9. Measurement points

| Supply voltage  | Input               | Output              |                          |
|-----------------|---------------------|---------------------|--------------------------|
| $V_{CC}$        | $V_M$               | $V_M$               | $V_X$                    |
| 0.8 V to 1.6 V  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.1\text{ V}$  |
| 1.65 V to 2.7 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15\text{ V}$ |
| 3.0 V to 3.6 V  | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.3\text{ V}$  |

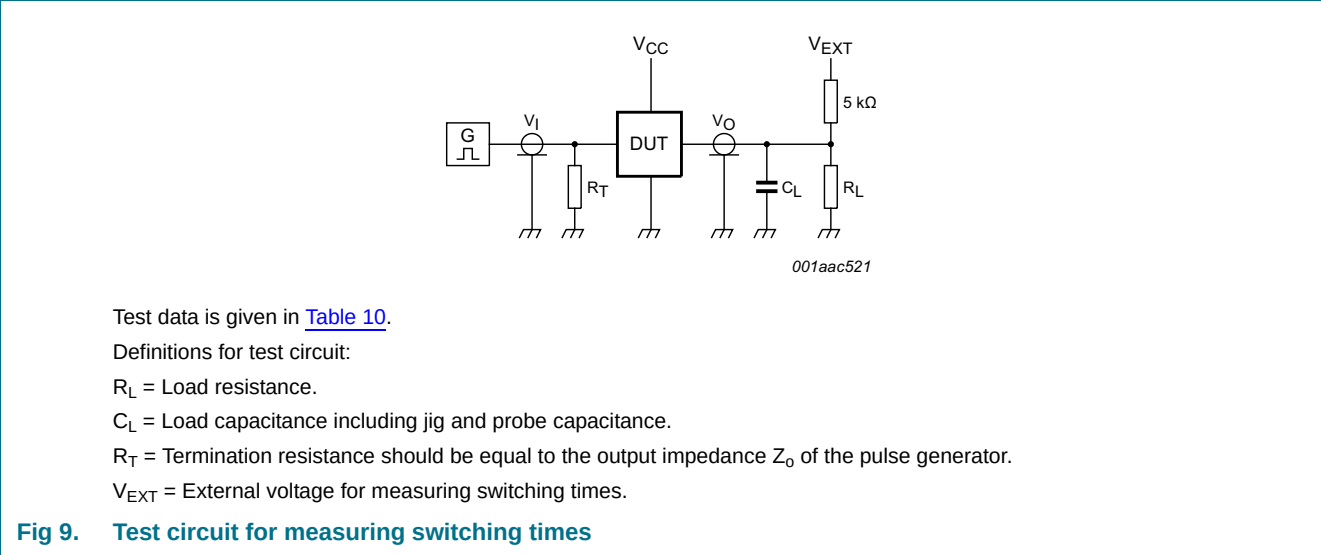


Table 10. Test data

| Supply voltage | Load                         |              | $V_{EXT}$             |                       |                       |
|----------------|------------------------------|--------------|-----------------------|-----------------------|-----------------------|
| $V_{CC}$       | $C_L$                        | $R_L$ [1]    | $t_{PLH}$ , $t_{PHL}$ | $t_{PZH}$ , $t_{PHZ}$ | $t_{PZL}$ , $t_{PLZ}$ |
| 0.8 V to 3.6 V | 5 pF, 10 pF, 15 pF and 30 pF | 5 kΩ or 1 MΩ | open                  | GND                   | $2 \times V_{CC}$     |

[1] For measuring enable and disable times  $R_L = 5\text{ k}\Omega$ , for measuring propagation delays, setup and hold times and pulse width  $R_L = 1\text{ M}\Omega$ .

13. Package outline

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

SOT353-1

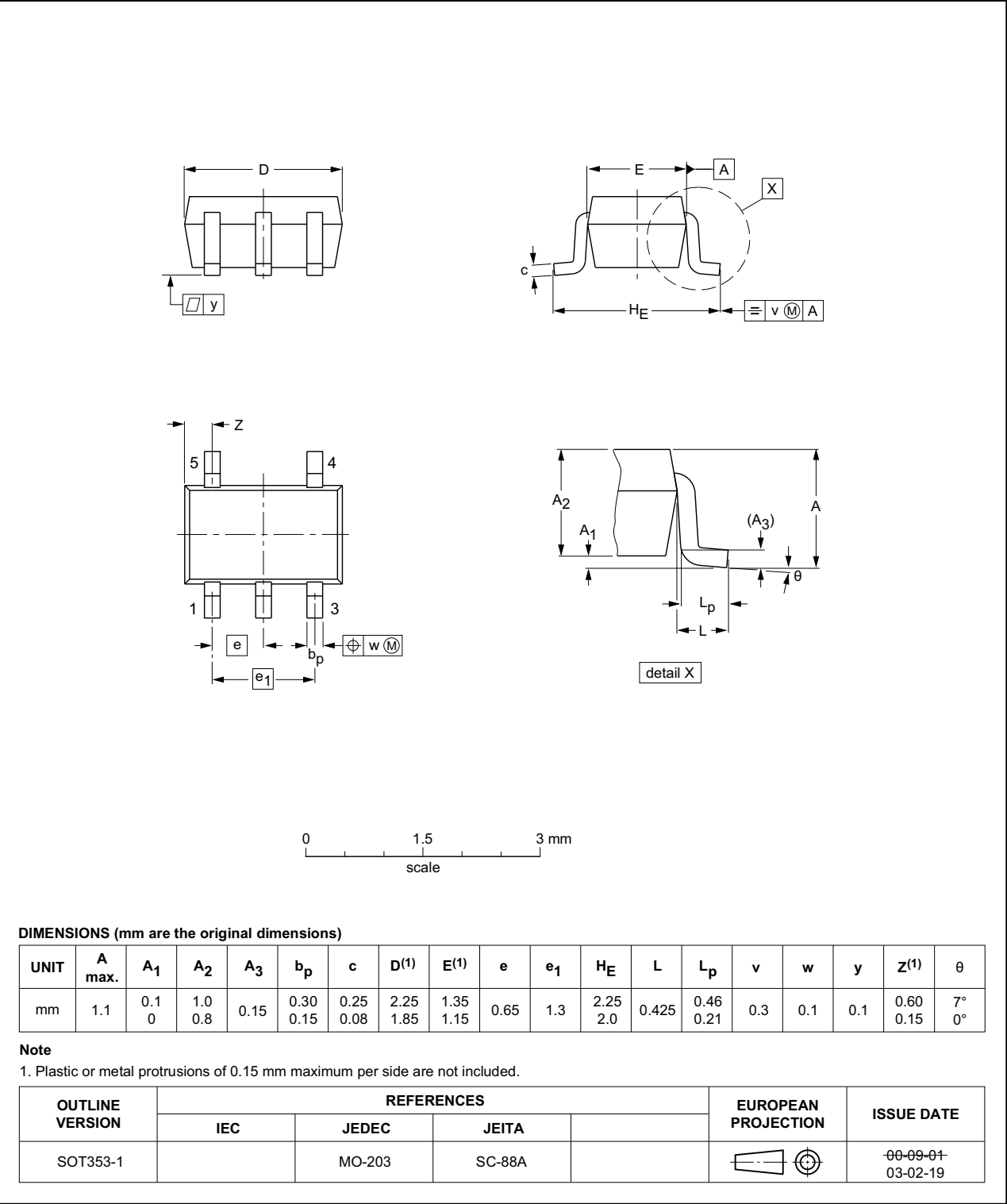


Fig 10. Package outline SOT353-1 (TSSOP5)

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

SOT886

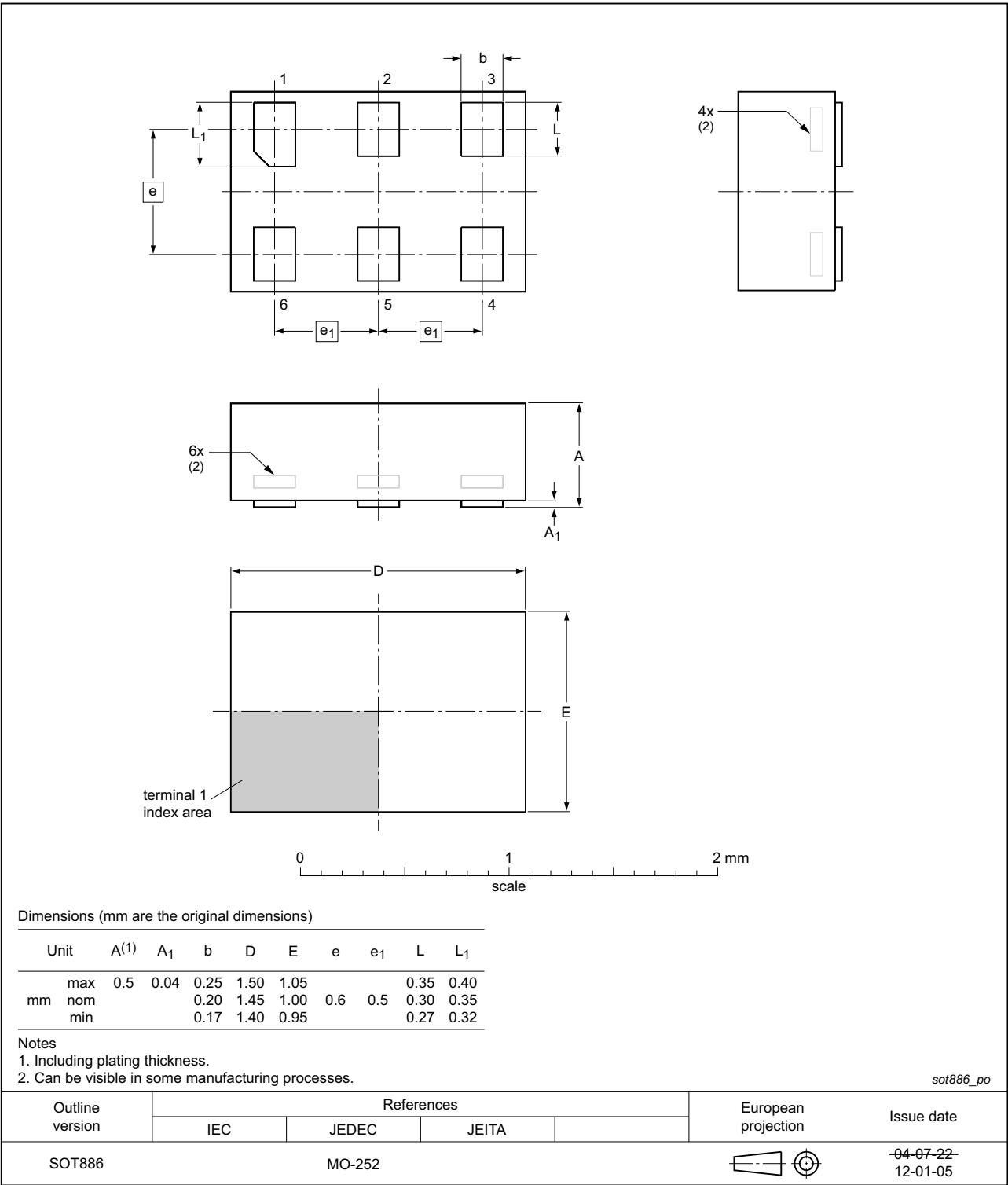


Fig 11. Package outline SOT886 (XSON6)

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

SOT891

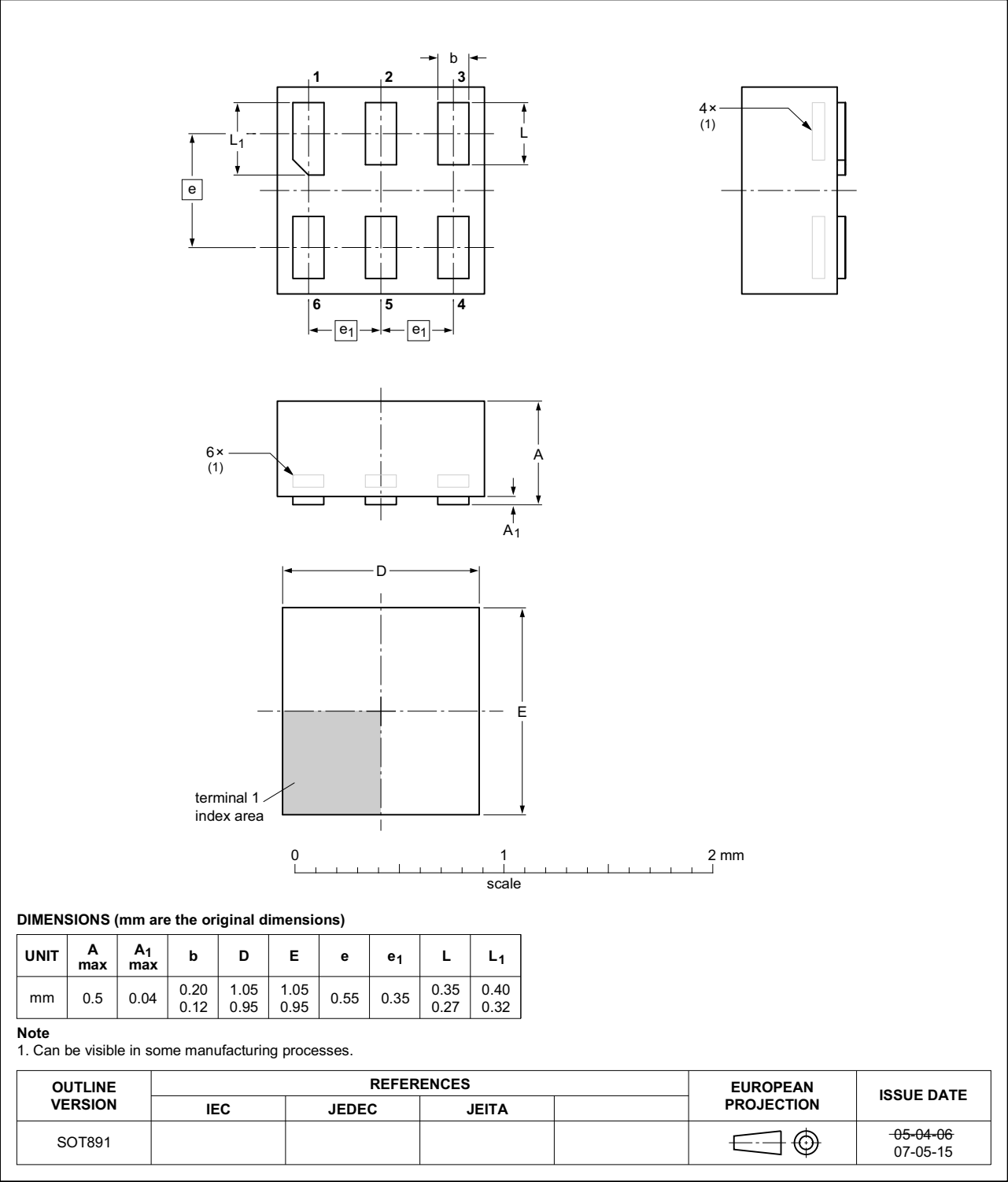


Fig 12. Package outline SOT891 (XSON6)

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

SOT1115

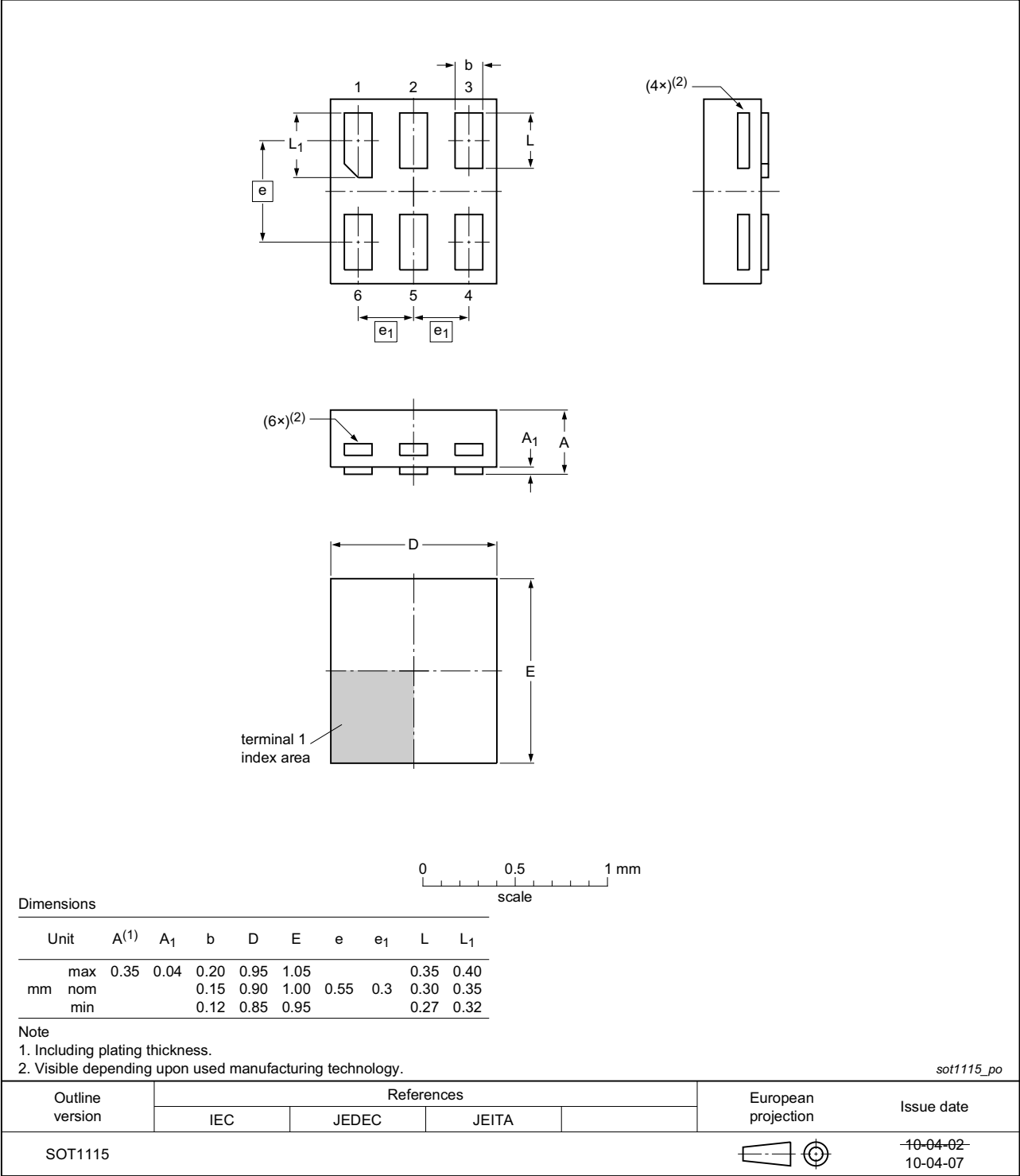


Fig 13. Package outline SOT1115 (XSON6)

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

SOT1202

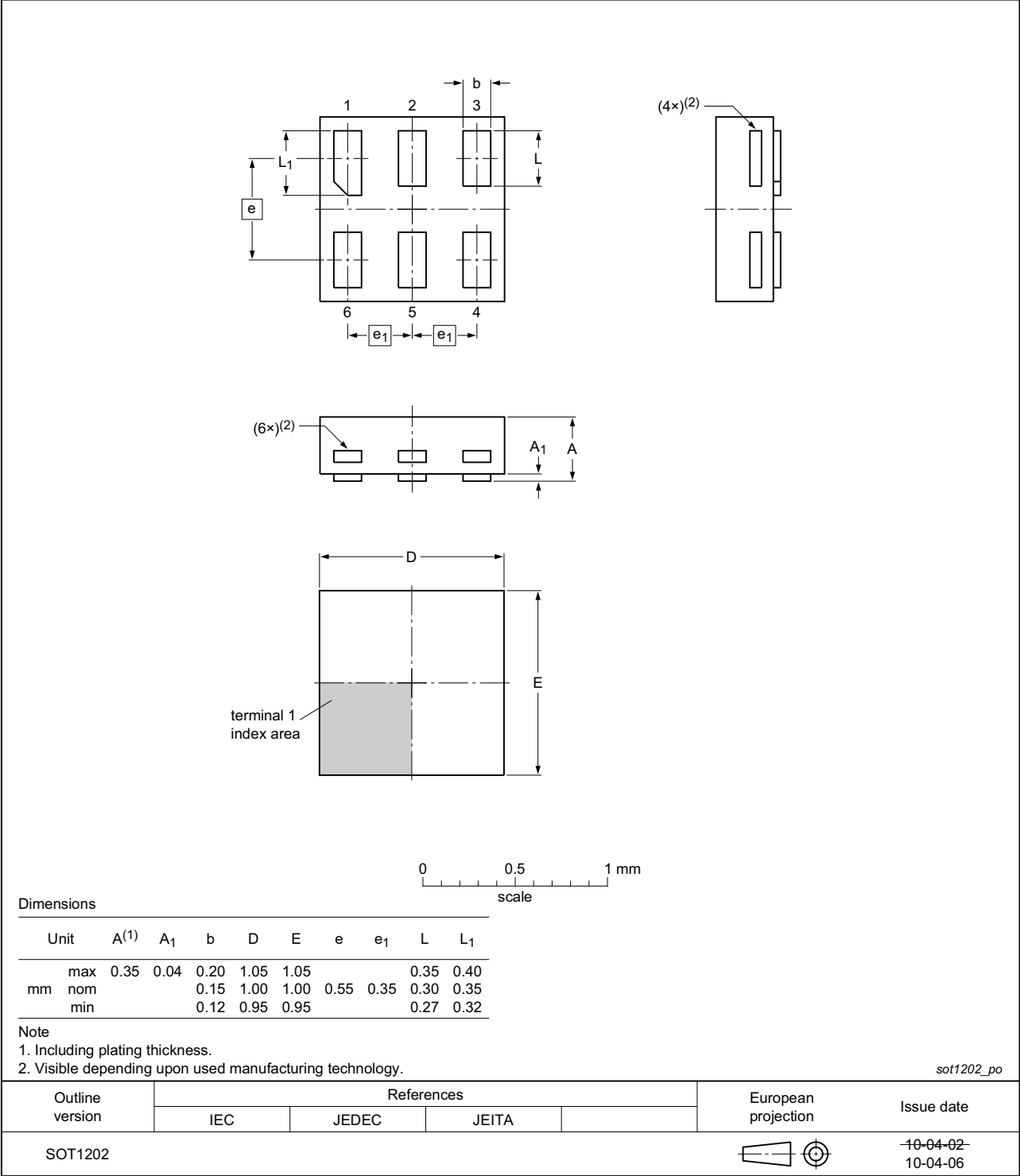


Fig 14. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;  
5 terminals; body 0.8 x 0.8 x 0.35 mm

SOT1226

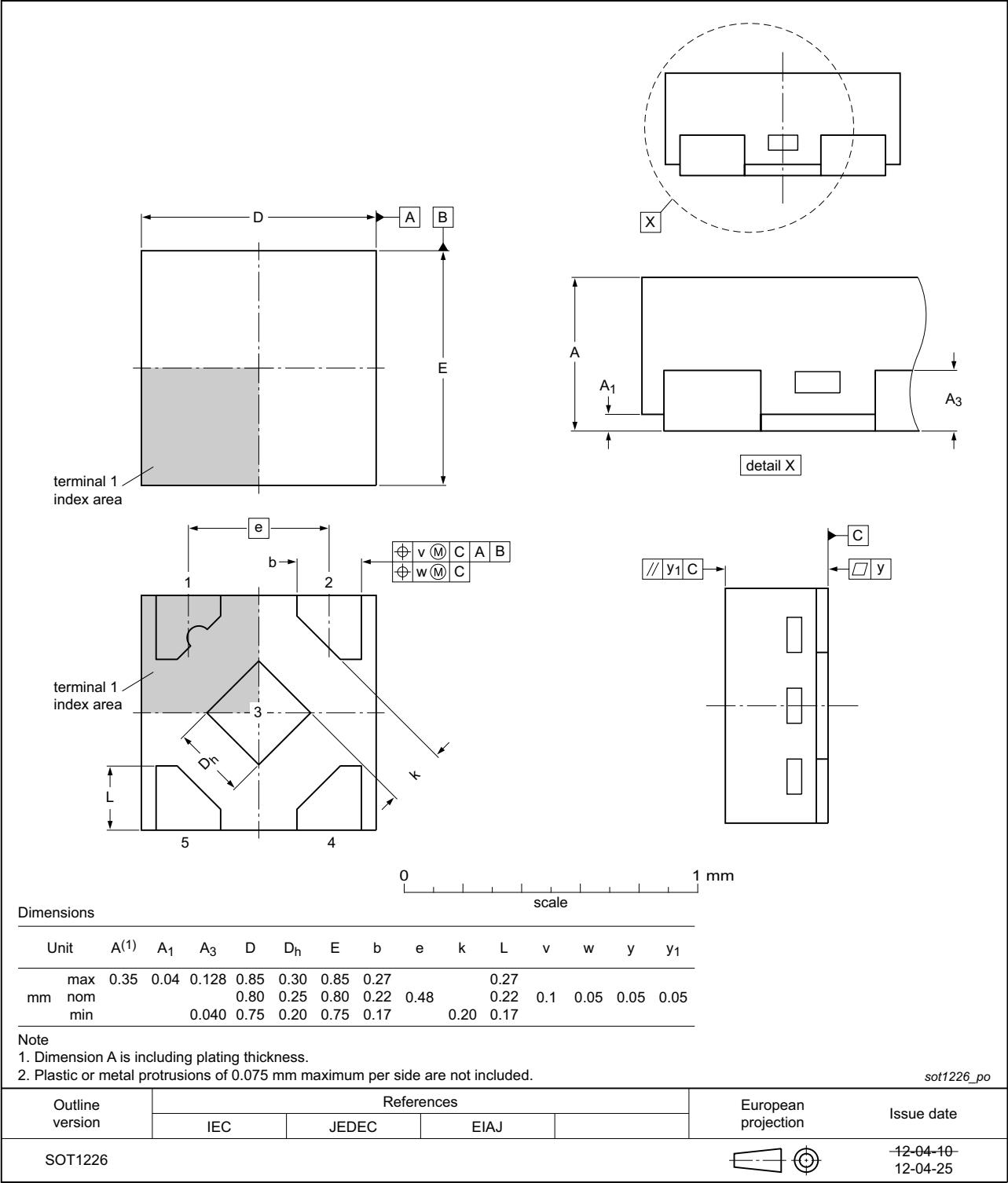


Fig 15. Package outline SOT1226 (X2SON5)



## 14. Abbreviations

Table 11. Abbreviations

| Acronym | Description             |
|---------|-------------------------|
| CDM     | Charged Device Model    |
| DUT     | Device Under Test       |
| ESD     | ElectroStatic Discharge |
| HBM     | Human Body Model        |
| MM      | Machine Model           |

## 15. Revision history

Table 12. Revision history

| Document ID    | Release date                                                                                                             | Data sheet status  | Change notice | Supersedes    |
|----------------|--------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|---------------|
| 74AUP1G38 v.7  | 20160404                                                                                                                 | Product data sheet | -             | 74AUP1G38 v.6 |
| Modifications: | • <a href="#">Figure 7</a> : Typo corrected in pin naming (pins A and B swapped)                                         |                    |               |               |
| 74AUP1G38 v.6  | 20120628                                                                                                                 | Product data sheet | -             | 74AUP1G38 v.5 |
| Modifications: | • Added type number 74AUP1G38GX (SOT1226)<br>• Package outline drawing of SOT886 ( <a href="#">Figure 11</a> ) modified. |                    |               |               |
| 74AUP1G38 v.5  | 20111129                                                                                                                 | Product data sheet | -             | 74AUP1G38 v.4 |
| Modifications: | • Legal pages updated.                                                                                                   |                    |               |               |
| 74AUP1G38 v.4  | 20101007                                                                                                                 | Product data sheet | -             | 74AUP1G38 v.3 |
| 74AUP1G38 v.3  | 20090622                                                                                                                 | Product data sheet | -             | 74AUP1G38 v.2 |
| 74AUP1G38 v.2  | 20070614                                                                                                                 | Product data sheet | -             | 74AUP1G38 v.1 |
| 74AUP1G38 v.1  | 20061020                                                                                                                 | Product data sheet | -             | -             |

## 16. Legal information

### 16.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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".

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