

# 74AUP1G02

## Low-power 2-input NOR gate

Rev. 11 — 30 August 2024

Product data sheet

## 1. General description

The 74AUP1G02 is a single 2-input NOR gate. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. This device ensures 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 potentially damaging backflow current through the device when it is powered down.

## 2. Features and benefits

- Wide supply voltage range from 0.8 V to 3.6 V
- CMOS low power dissipation
- High noise immunity
- Overvoltage tolerant inputs to 3.6 V
- Low noise overshoot and undershoot < 10 % of  $V_{CC}$
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Low static power consumption;  $I_{CC} = 0.9 \mu\text{A}$  (maximum)
- 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: ANSI/ESDA/JEDEC JS-001 class 3A exceeds 5000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 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                   |
| <a href="#">74AUP1G02GW</a> | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm                                                                         | <a href="#">SOT353-1</a>  |
| <a href="#">74AUP1G02GM</a> | -40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm                                                    | <a href="#">SOT886</a>    |
| <a href="#">74AUP1G02GN</a> | -40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm                                                          | <a href="#">SOT1115</a>   |
| <a href="#">74AUP1G02GS</a> | -40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm                                                          | <a href="#">SOT1202</a>   |
| <a href="#">74AUP1G02GX</a> | -40 °C to +125 °C | X2SON5 | plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.32 mm                                 | <a href="#">SOT1226-3</a> |
| <a href="#">74AUP1G02GZ</a> | -40 °C to +125 °C | X2SON5 | plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm | <a href="#">SOT8065-1</a> |

4. Marking

Table 2. Marking

| Type number | Marking code[1] |
|-------------|-----------------|
| 74AUP1G02GW | pB              |
| 74AUP1G02GM | pB              |
| 74AUP1G02GN | pB              |
| 74AUP1G02GS | pB              |
| 74AUP1G02GX | pB              |
| 74AUP1G02GZ | pB              |

[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

mna103

Fig. 2. IEC logic symbol

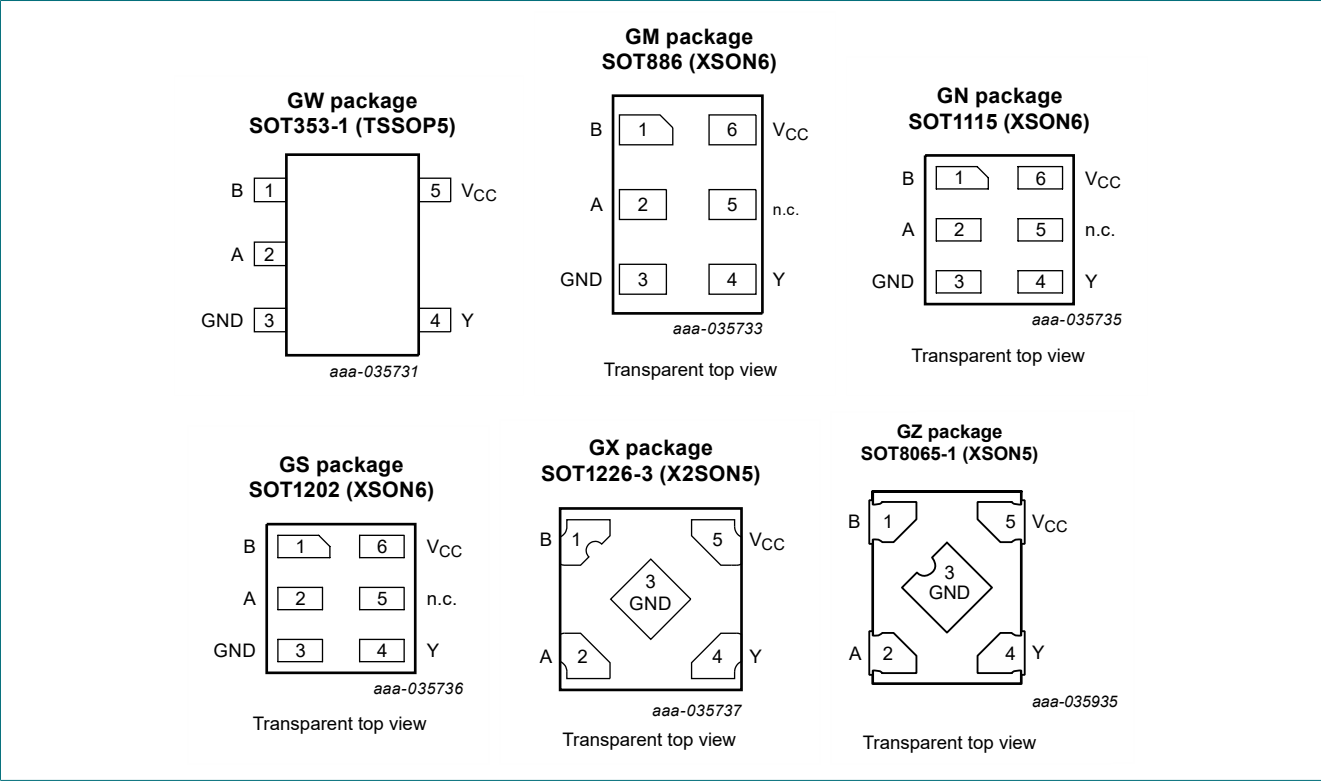
mna104

Fig. 3. Logic diagram

mna105

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

| Symbol          | Pin                      |       | Description    |
|-----------------|--------------------------|-------|----------------|
|                 | TSSOP5, XSON5 and X2SON5 | XSON6 |                |
| B               | 1                        | 1     | data input     |
| A               | 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

H = HIGH voltage level; L = LOW voltage level.

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

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 <sub>CC</sub>  | supply voltage          |                                                          | -0.5 | +4.6 | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < 0 V                                     | -50  | -    | mA   |
| V <sub>I</sub>   | input voltage           | [1]                                                      | -0.5 | +4.6 | V    |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 0 V | -    | ±50  | mA   |
| V <sub>O</sub>   | output voltage          | Active mode and Power-down mode [1]                      | -0.5 | +4.6 | V    |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = 0 V to V <sub>CC</sub>                  | -    | ±20  | mA   |
| I <sub>CC</sub>  | supply current          |                                                          | -    | +50  | mA   |
| I <sub>GND</sub> | ground current          |                                                          | -50  | -    | mA   |
| T <sub>stg</sub> | storage temperature     |                                                          | -65  | +150 | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C [2]                 | -    | 250  | mW   |

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
- [2] For SOT353-1 (TSSOP5) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C.  
For SOT886 (XSON6) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C.  
For SOT1115 (XSON6) package: P<sub>tot</sub> derates linearly with 3.2 mW/K above 71 °C.  
For SOT1202 (XSON6) package: P<sub>tot</sub> derates linearly with 3.3 mW/K above 74 °C.  
For SOT1226-3 (X2SON5) package: P<sub>tot</sub> derates linearly with 3.0 mW/K above 67 °C.  
For SOT8065-1 (XSON5) package: P<sub>tot</sub> derates linearly with 3.2 mW/K above 72 °C.

9. Recommended operating conditions

Table 6. Recommended operating conditions

| Symbol           | Parameter                           | Conditions                             | Min | Max             | Unit |
|------------------|-------------------------------------|----------------------------------------|-----|-----------------|------|
| V <sub>CC</sub>  | supply voltage                      |                                        | 0.8 | 3.6             | V    |
| V <sub>I</sub>   | input voltage                       |                                        | 0   | 3.6             | V    |
| V <sub>O</sub>   | output voltage                      | Active mode                            | 0   | V <sub>CC</sub> | V    |
|                  |                                     | Power-down mode; V <sub>CC</sub> = 0 V | 0   | 3.6             | V    |
| T <sub>amb</sub> | ambient temperature                 |                                        | -40 | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 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 |
|--------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| <b>T<sub>amb</sub> = 25 °C</b> |                                      |                                                                                                  |                        |     |                        |      |
| 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>OH</sub>                | HIGH-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                                        | V <sub>CC</sub> - 0.1  | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V                                                | 0.75 × V <sub>CC</sub> | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V                                                | 1.11                   | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V                                               | 1.32                   | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V                                                | 2.05                   | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V                                                | 1.9                    | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V                                                | 2.72                   | -   | -                      | V    |
|                                |                                      | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V                                                | 2.6                    | -   | -                      | 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>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 [1]      | -                      | -   | 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                   | V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V                                                      | -                      | 1.7 | -                      | pF   |

| Symbol                                     | Parameter                            | Conditions                                                                                       | Min                    | Typ | Max                    | Unit |
|--------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b>  |                                      |                                                                                                  |                        |     |                        |      |
| 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>OH</sub>                            | HIGH-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                                        | V <sub>CC</sub> - 0.1  | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V                                                | 0.7 × V <sub>CC</sub>  | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V                                                | 1.03                   | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V                                               | 1.30                   | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V                                                | 1.97                   | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V                                                | 1.85                   | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V                                                | 2.67                   | -   | -                      | V    |
|                                            |                                      | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V                                                | 2.55                   | -   | -                      | 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>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 [1]      | -                      | -   | 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    |

| Symbol            | Parameter                            | Conditions                                                                                          | Min                    | Typ | Max                    | Unit |
|-------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| V <sub>OH</sub>   | HIGH-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                                           | V <sub>CC</sub> - 0.11 | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V                                                   | 0.6 × V <sub>CC</sub>  | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V                                                   | 0.93                   | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V                                                  | 1.17                   | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V                                                   | 1.77                   | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V                                                   | 1.67                   | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V                                                   | 2.40                   | -   | -                      | V    |
|                   |                                      | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V                                                   | 2.30                   | -   | -                      | 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    |
| 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                                       | -                      | -   | ±0.75                  | 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                              | -                      | -   | ±0.75                  | 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;<br>V <sub>CC</sub> = 0 V to 0.2 V                  | -                      | -   | ±0.75                  | µA   |
| I <sub>CC</sub>   | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 0.8 V to 3.6 V | -                      | -   | 1.4                    | 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 [1]         | -                      | -   | 75                     | µA   |

[1] One input at V<sub>CC</sub> - 0.6 V, other input at V<sub>CC</sub> or GND.

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5.

| Symbol                                          | Parameter         | Conditions                         | Min | Typ [1] | Max  | Unit |
|-------------------------------------------------|-------------------|------------------------------------|-----|---------|------|------|
| T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 5 pF |                   |                                    |     |         |      |      |
| t <sub>pd</sub>                                 | propagation delay | A, B to Y; see Fig. 4 [2]          |     |         |      |      |
|                                                 |                   | V <sub>CC</sub> = 0.8 V            | -   | 17.0    | -    | ns   |
|                                                 |                   | V <sub>CC</sub> = 1.1 V to 1.3 V   | 2.5 | 5.1     | 10.8 | ns   |
|                                                 |                   | V <sub>CC</sub> = 1.4 V to 1.6 V   | 1.6 | 3.7     | 6.7  | ns   |
|                                                 |                   | V <sub>CC</sub> = 1.65 V to 1.95 V | 1.3 | 3.0     | 5.3  | ns   |
|                                                 |                   | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.0 | 2.4     | 3.9  | ns   |
|                                                 |                   | V <sub>CC</sub> = 3.0 V to 3.6 V   | 1.0 | 2.2     | 3.4  | ns   |

| Symbol                                           | Parameter                     | Conditions                                             | Min | Typ [1] | Max  | Unit |
|--------------------------------------------------|-------------------------------|--------------------------------------------------------|-----|---------|------|------|
| T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 10 pF |                               |                                                        |     |         |      |      |
| t <sub>pd</sub>                                  | propagation delay             | A, B to Y; see Fig. 4 [2]                              |     |         |      |      |
|                                                  |                               | V <sub>CC</sub> = 0.8 V                                | -   | 20.4    | -    | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                       | 2.4 | 6.0     | 12.8 | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                       | 1.9 | 4.3     | 7.9  | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | 1.6 | 3.6     | 6.2  | ns   |
|                                                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | 1.4 | 3.0     | 4.7  | ns   |
|                                                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | 1.3 | 2.7     | 4.2  | ns   |
| T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 15 pF |                               |                                                        |     |         |      |      |
| t <sub>pd</sub>                                  | propagation delay             | A, B to Y; see Fig. 4 [2]                              |     |         |      |      |
|                                                  |                               | V <sub>CC</sub> = 0.8 V                                | -   | 23.9    | -    | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                       | 3.4 | 6.8     | 14.6 | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                       | 2.3 | 4.8     | 8.9  | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | 1.9 | 4.0     | 7.0  | ns   |
|                                                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | 1.7 | 3.4     | 5.4  | ns   |
|                                                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | 1.6 | 3.2     | 4.8  | ns   |
| T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 30 pF |                               |                                                        |     |         |      |      |
| t <sub>pd</sub>                                  | propagation delay             | A, B to Y; see Fig. 4 [2]                              |     |         |      |      |
|                                                  |                               | V <sub>CC</sub> = 0.8 V                                | -   | 34.2    | -    | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                       | 4.6 | 9.0     | 19.9 | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                       | 3.4 | 6.4     | 11.8 | ns   |
|                                                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | 2.6 | 5.3     | 9.3  | ns   |
|                                                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | 2.4 | 4.5     | 7.1  | ns   |
|                                                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | 2.3 | 4.2     | 6.4  | ns   |
| T <sub>amb</sub> = 25 °C                         |                               |                                                        |     |         |      |      |
| C <sub>PD</sub>                                  | power dissipation capacitance | f = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> [3] |     |         |      |      |
|                                                  |                               | V <sub>CC</sub> = 0.8 V                                | -   | 2.6     | -    | pF   |
|                                                  |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                       | -   | 2.7     | -    | pF   |
|                                                  |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                       | -   | 2.9     | -    | pF   |
|                                                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                     | -   | 3.1     | -    | pF   |
|                                                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                       | -   | 3.5     | -    | pF   |
|                                                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                       | -   | 4.1     | -    | pF   |

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

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

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

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

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

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

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

N = number of inputs switching;

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



Table 9. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5

| Symbol                 | Parameter         | Conditions                                | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|------------------------|-------------------|-------------------------------------------|------------------|------|-------------------|------|------|
|                        |                   |                                           | Min              | Max  | Min               | Max  |      |
| C <sub>L</sub> = 5 pF  |                   |                                           |                  |      |                   |      |      |
| t <sub>pd</sub>        | propagation delay | A, B to Y; see <a href="#">Fig. 4</a> [1] |                  |      |                   |      |      |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V          | 2.1              | 12.1 | 2.1               | 13.4 | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V          | 1.4              | 7.8  | 1.4               | 8.6  | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V        | 1.1              | 6.2  | 1.1               | 6.9  | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V          | 0.9              | 4.6  | 0.9               | 5.1  | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V          | 0.8              | 4.0  | 0.8               | 4.4  | ns   |
| C <sub>L</sub> = 10 pF |                   |                                           |                  |      |                   |      |      |
| t <sub>pd</sub>        | propagation delay | A, B to Y; see <a href="#">Fig. 4</a> [1] |                  |      |                   |      |      |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V          | 2.2              | 14.3 | 2.2               | 15.8 | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V          | 1.7              | 9.2  | 1.7               | 10.2 | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V        | 1.5              | 7.3  | 1.5               | 8.1  | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V          | 1.2              | 5.6  | 1.2               | 6.2  | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V          | 1.2              | 5.0  | 1.2               | 5.5  | ns   |
| C <sub>L</sub> = 15 pF |                   |                                           |                  |      |                   |      |      |
| t <sub>pd</sub>        | propagation delay | A, B to Y; see <a href="#">Fig. 4</a> [1] |                  |      |                   |      |      |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V          | 3.1              | 16.4 | 3.1               | 18.1 | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V          | 2.0              | 10.4 | 2.0               | 11.5 | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V        | 1.7              | 8.3  | 1.7               | 9.2  | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V          | 1.5              | 6.3  | 1.5               | 7.0  | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V          | 1.4              | 5.7  | 1.4               | 6.3  | ns   |
| C <sub>L</sub> = 30 pF |                   |                                           |                  |      |                   |      |      |
| t <sub>pd</sub>        | propagation delay | A, B to Y; see <a href="#">Fig. 4</a> [1] |                  |      |                   |      |      |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V          | 4.1              | 22.4 | 4.1               | 24.7 | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V          | 2.9              | 13.9 | 2.9               | 15.3 | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V        | 2.3              | 11.1 | 2.3               | 12.3 | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V          | 2.1              | 8.5  | 2.1               | 9.4  | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V          | 2.1              | 7.7  | 2.1               | 8.5  | ns   |

[1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

11.1. Waveform and test circuit

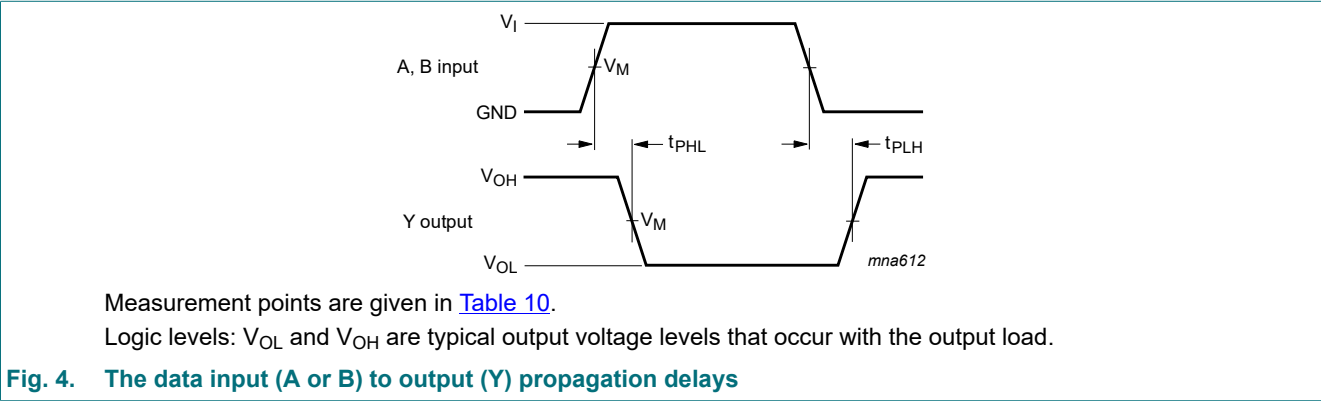


Table 10. Measurement points

| Supply voltage | Output              | Input               |          |                       |
|----------------|---------------------|---------------------|----------|-----------------------|
| $V_{CC}$       | $V_M$               | $V_M$               | $V_I$    | $t_r = t_f$           |
| 0.8 V to 3.6 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0 \text{ ns}$ |

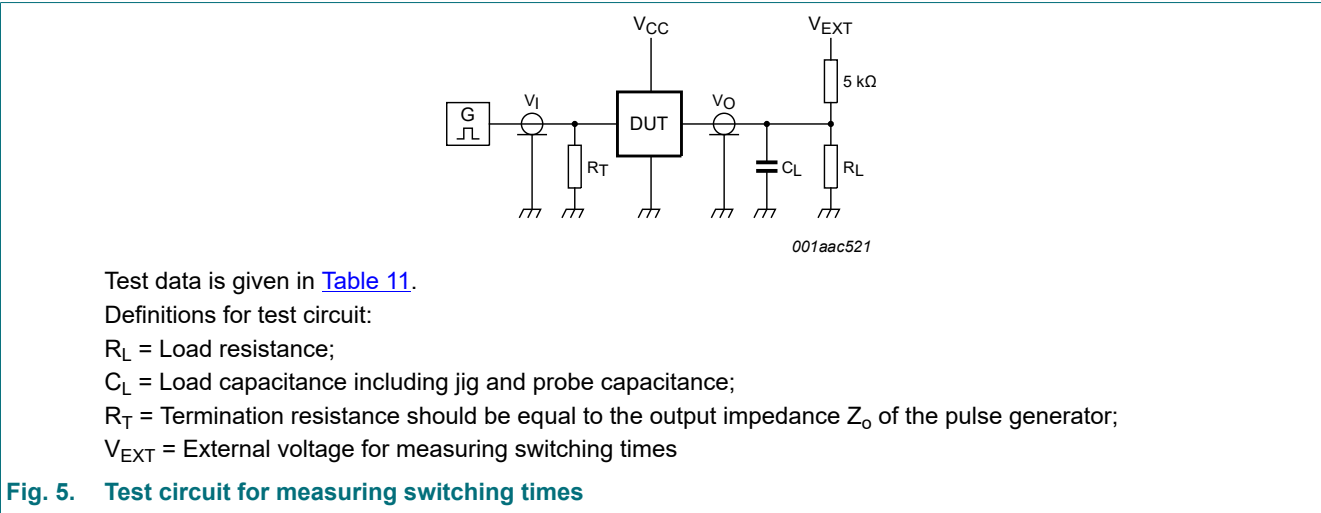


Table 11. Test data

| 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  $R_L = 1 \text{ M}\Omega$ .

12. Package outline

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

SOT353-1

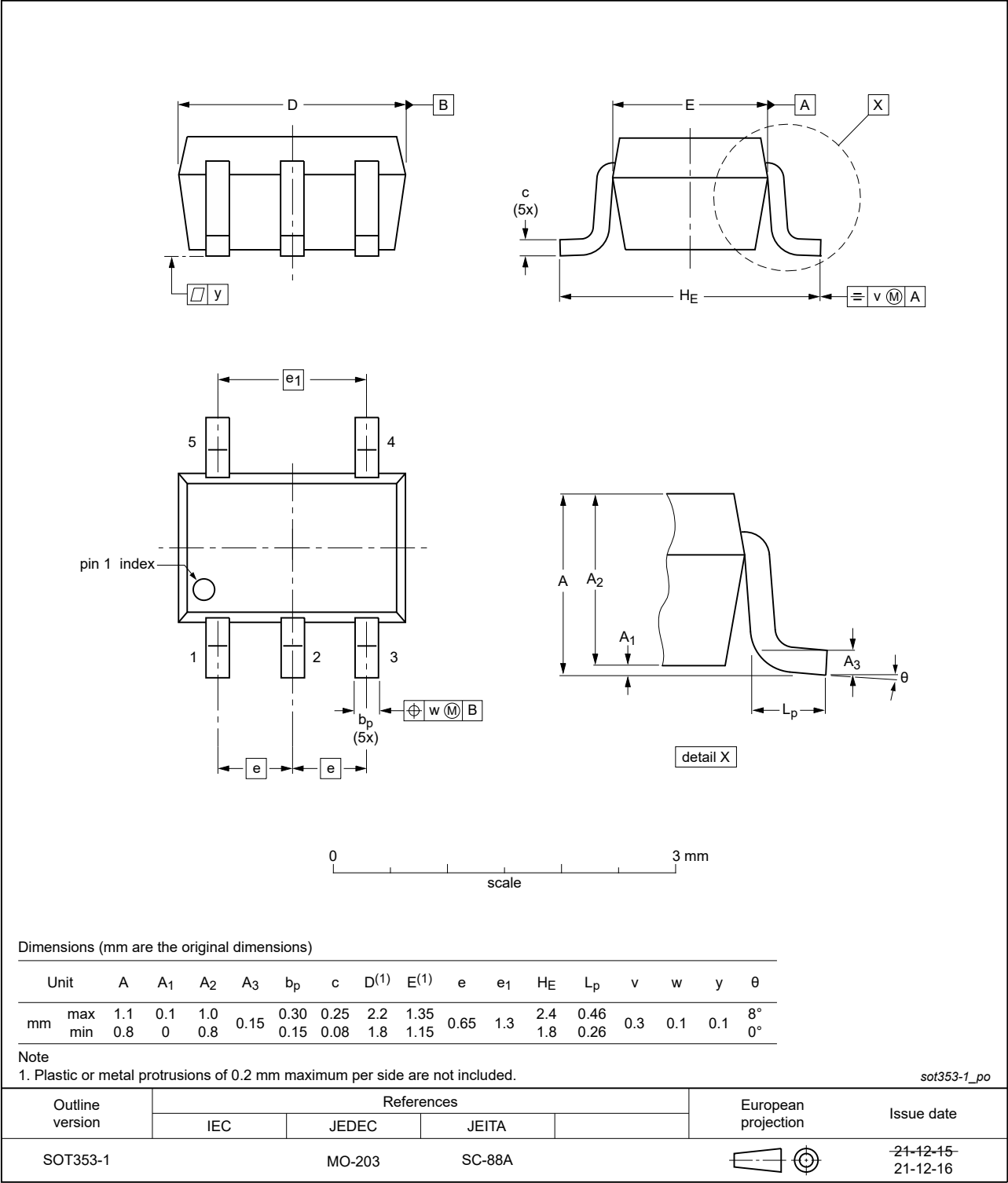


Fig. 6. Package outline SOT353-1 (TSSOP5)

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

SOT886

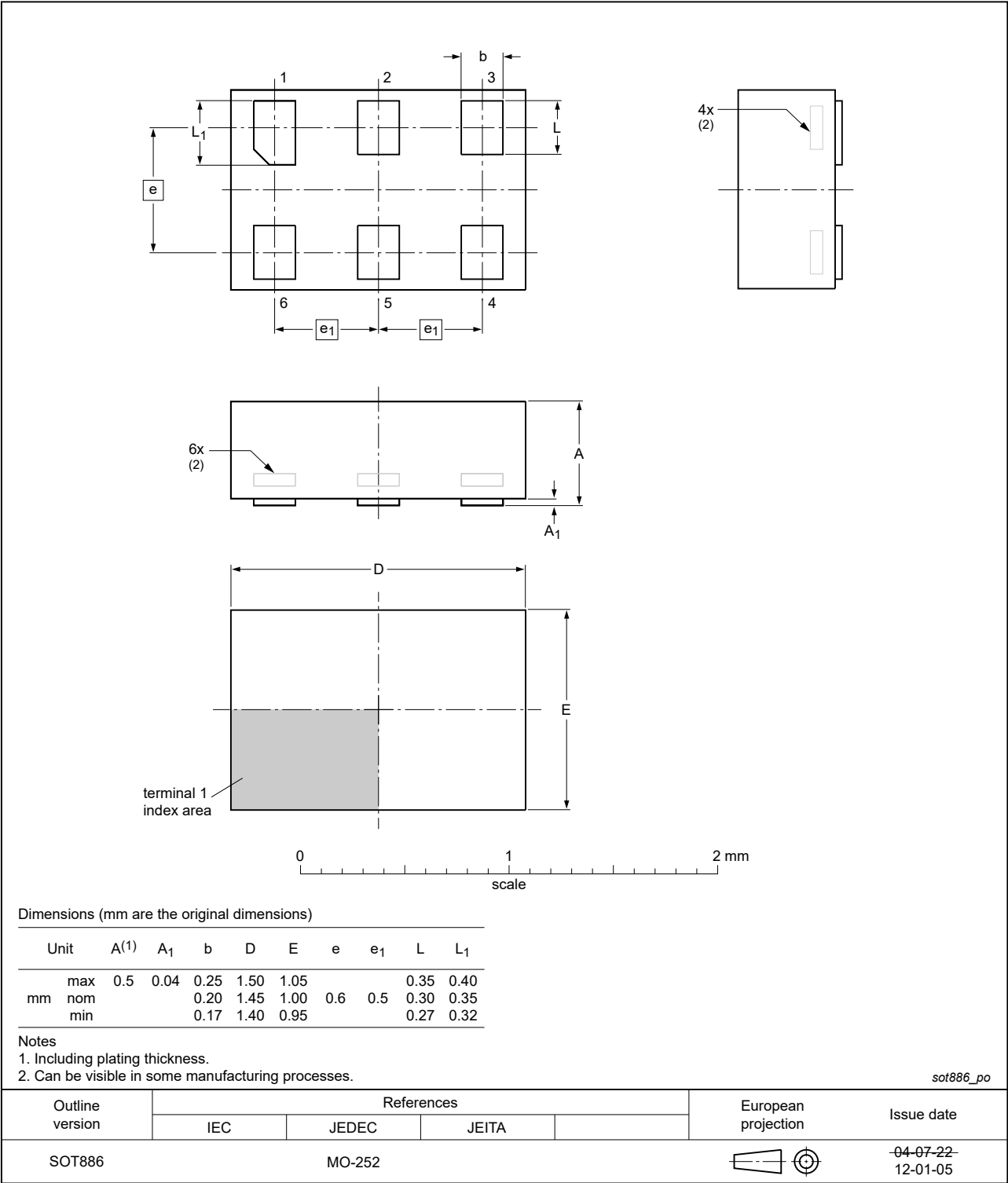


Fig. 7. Package outline SOT886 (XSON6)

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

SOT1115

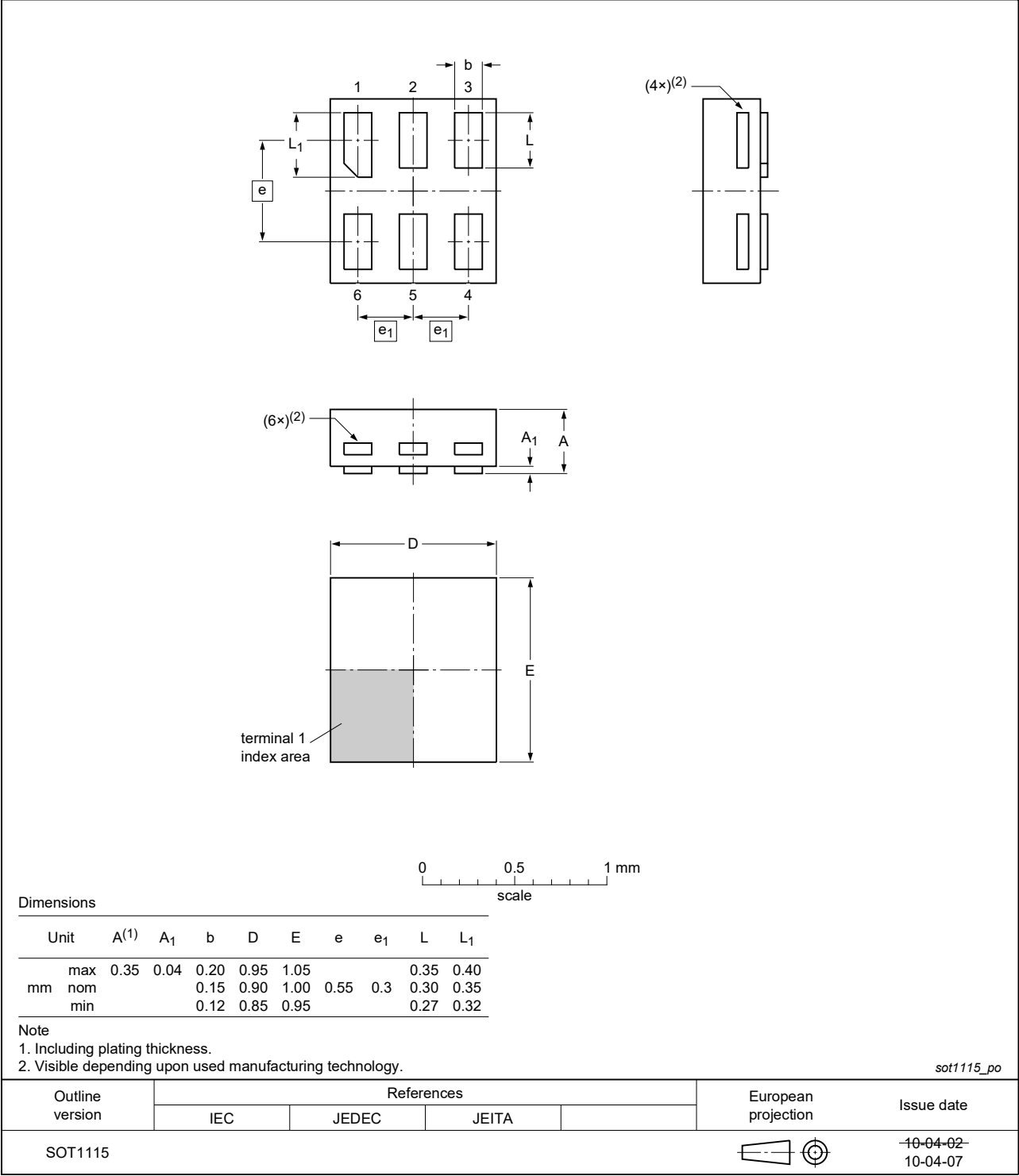


Fig. 8. Package outline SOT1115 (XSON6)

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

SOT1202

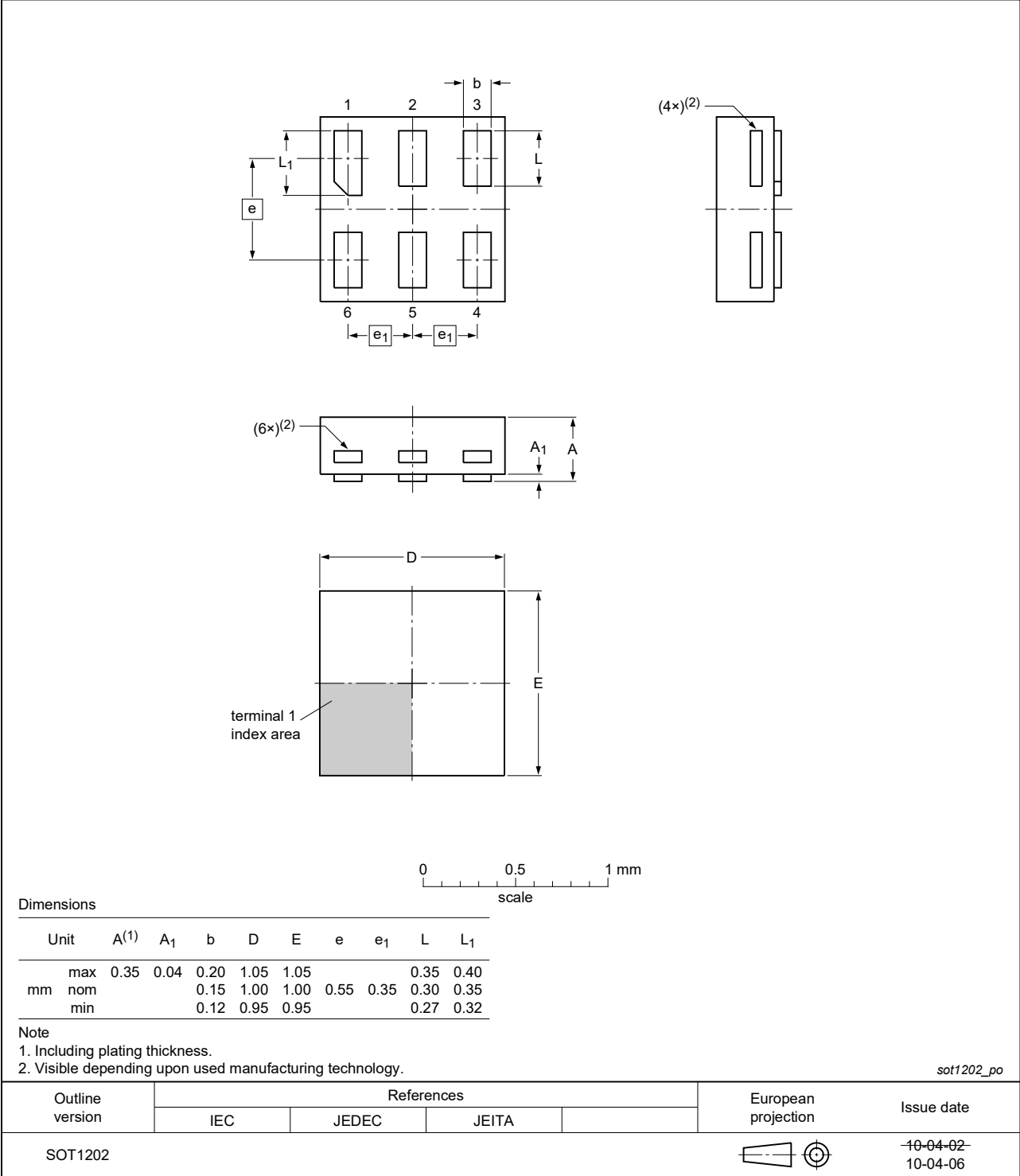


Fig. 9. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;  
5 terminals; body 0.8 x 0.8 x 0.32 mm

SOT1226-3

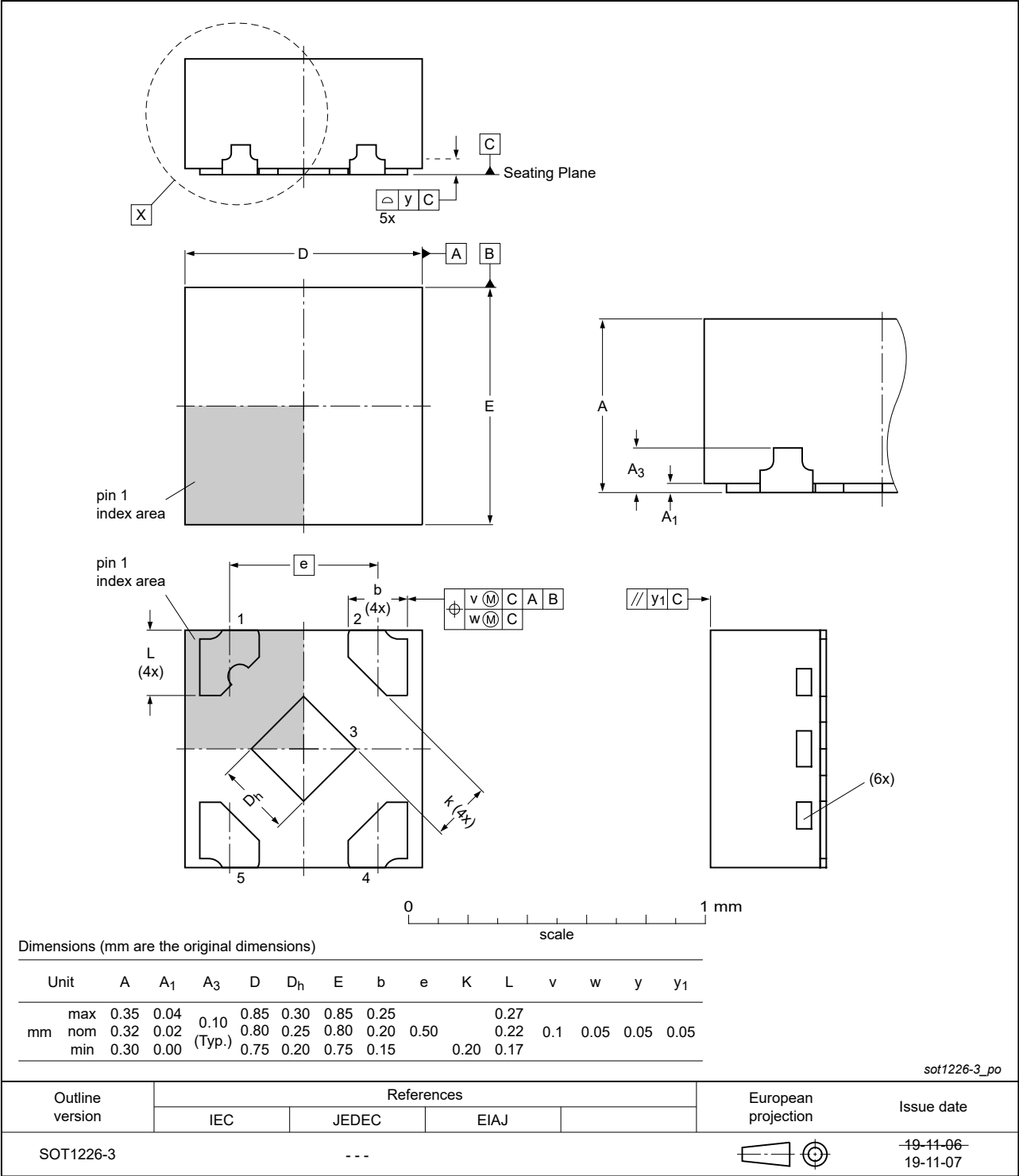


Fig. 10. Package outline SOT1226-3 (X2SON5)

XSON5: Plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm

SOT8065-1

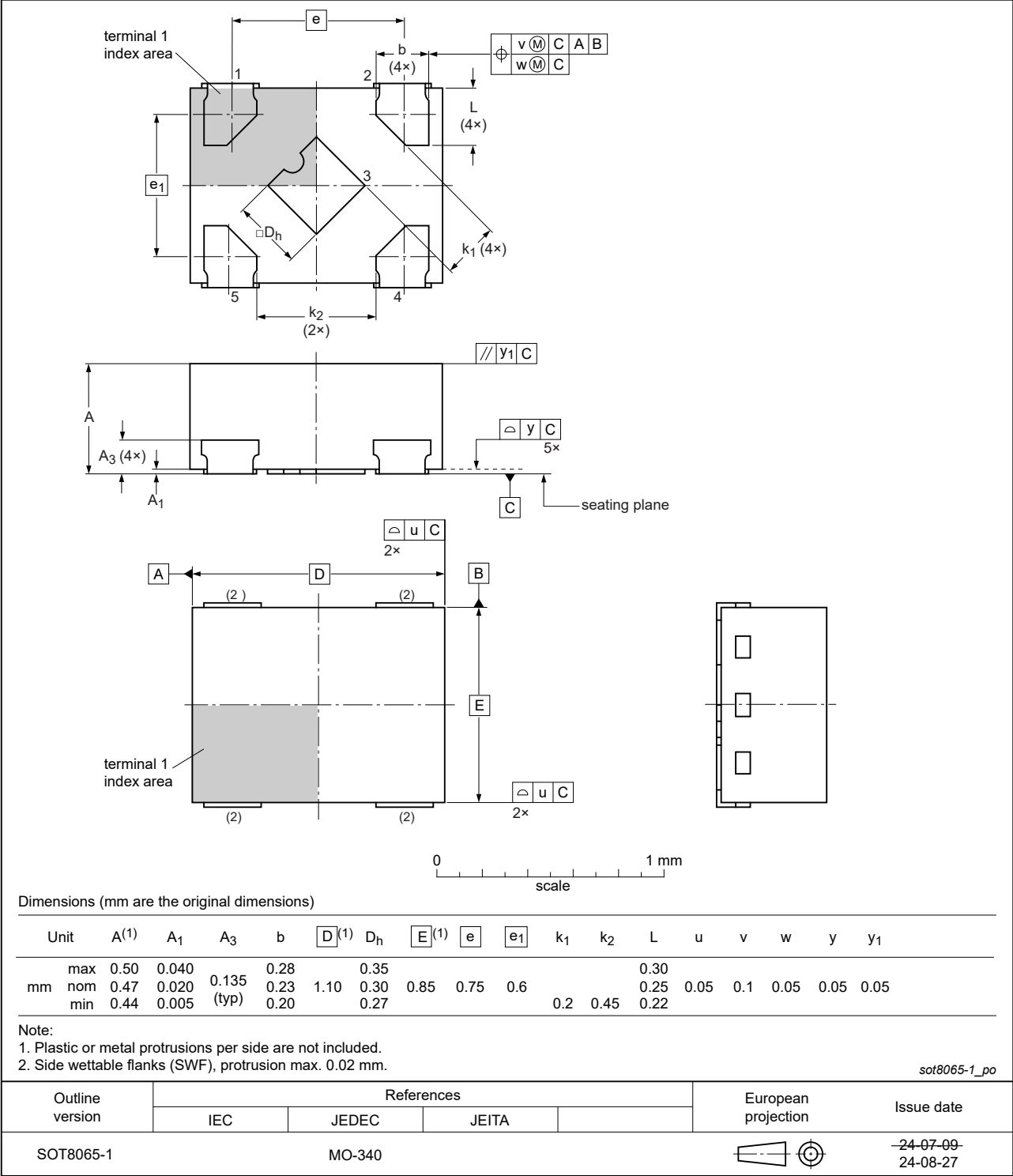


Fig. 11. Package outline SOT8065-1 (XSON5)



13. Abbreviations

Table 12. Abbreviations

| Acronym | Description                               |
|---------|-------------------------------------------|
| ANSI    | American National Standards Institute     |
| CDM     | Charged Device Model                      |
| CMOS    | Complementary Metal Oxide Semiconductor   |
| DUT     | Device Under Test                         |
| ESD     | ElectroStatic Discharge                   |
| ESDA    | ElectroStatic Discharge Association       |
| HBM     | Human Body Model                          |
| JEDEC   | Joint Electron Device Engineering Council |

14. Revision history

Table 13. Revision history

| Document ID      | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Data sheet status  | Change notice | Supersedes       |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|------------------|
| 74AUP1G02 v.11   | 20240830                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.10.1 |
| Modifications:   | • Type number 74AUP1G02GZ (SOT8065-1/XSON5) added.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |               |                  |
| 74AUP1G02 v.10.1 | 20230711                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.9    |
| Modifications:   | • <a href="#">Section 2</a> : ESD specification updated according to the latest JEDEC standard.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |               |                  |
| 74AUP1G02 v.9    | 20220113                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.8    |
| Modifications:   | • <a href="#">Fig. 6</a> : Package outline drawing for SOT353-1 (TSSOP5) has changed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |               |                  |
| 74AUP1G02 v.8    | 20210803                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.7    |
| Modifications:   | • The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.<br>• Legal texts have been adapted to the new company name where appropriate.<br>• Type number 74AUP1G02GF (SOT891/XSON6) removed.<br>• SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package.<br>• <a href="#">Section 1</a> and <a href="#">Section 2</a> updated.<br>• IEC logic symbol <a href="#">Fig. 2</a> modified.<br>• <a href="#">Table 5</a> : Derating values for P <sub>tot</sub> total power dissipation have been updated. |                    |               |                  |
| 74AUP1G02 v.7    | 20150121                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.6    |
| Modifications:   | • X2SON5 added to pin description table ( <a href="#">Table 3</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |               |                  |
| 74AUP1G02 v.6    | 20120627                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.5    |
| Modifications:   | • Added type number 74AUP1G02GX (SOT1226).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |               |                  |
| 74AUP1G02 v.5    | 20120216                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.4    |
| Modifications:   | • Logic diagram ( <a href="#">Fig. 3</a> ) modified.<br>• Package outline drawing of SOT886 ( <a href="#">Fig. 7</a> ) modified.                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |               |                  |
| 74AUP1G02 v.4    | 20111115                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.3    |
| Modifications:   | • Legal pages updated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |               |                  |
| 74AUP1G02 v.3    | 20101012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.2    |
| 74AUP1G02 v.2    | 20060628                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | 74AUP1G02 v.1    |
| 74AUP1G02 v.1    | 20050718                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Product data sheet | -             | -                |

## 15. Legal information

### 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".
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