

# 74AUP1G16

Low-power buffer

Rev. 2 — 7 October 2016

Product data sheet

## 1. General description

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The 74AUP1G16 provides a low-power, low-voltage single buffer.

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;  $I_{CC} = 0.9 \mu\text{A}$  (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  $-40 \text{ }^\circ\text{C}$  to  $+85 \text{ }^\circ\text{C}$  and  $-40 \text{ }^\circ\text{C}$  to  $+125 \text{ }^\circ\text{C}$

### 3. Ordering information

Table 1. Ordering information

| Type number | Package           |        |   | Version  |
|-------------|-------------------|--------|---|----------|
|             | Temperature range | Name   | Description   |          |
| 74AUP1G16GW | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm                      | SOT353-1 |
| 74AUP1G16GM | -40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886   |
| 74AUP1G16GF | -40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm    | SOT891   |

### 4. Marking

Table 2. Marking

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| 74AUP1G16GW | 5N                          |
| 74AUP1G16GM | 5N                          |
| 74AUP1G16GF | 5N                          |

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

### 5. Functional diagram

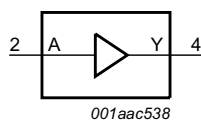


Fig 1. Logic symbol



Fig 2. IEC logic symbol

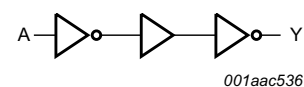


Fig 3. Logic diagram

## 6. Pinning information

### 6.1 Pinning

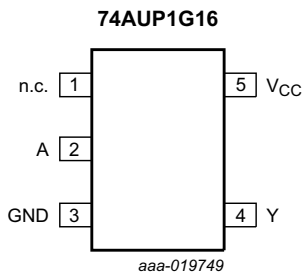


Fig 4. Pin configuration SOT353-1 (TSSOP5)

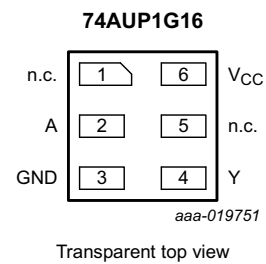


Fig 5. Pin configuration SOT886 and SOT891 (XSON6)

### 6.2 Pin description

Table 3. Pin description

| Symbol          | Pin    |       | Description    |
|-----------------|--------|-------|----------------|
|                 | TSSOP5 | XSON6 |                |
| n.c.            | 1      | 1     | not connected  |
| 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<sup>[1]</sup>

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

[1] H = HIGH voltage level;  
L = LOW voltage level.

## 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           |                                 | -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 | -0.5 | +4.6     | V    |
| $I_O$     | output current          | $V_O = 0$ V to $V_{CC}$         | -    | $\pm 20$ | 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   | -    | 250      | mW   |

[1] The 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 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                     | 0   | $V_{CC}$ | V    |
|                     |                                     | Power-down mode; $V_{CC} = 0$ V | 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 |
|--|--------------------------------------|---|------------------------|-----|------------------------|------|
| <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    |
| 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 <a href="#">[1]</a> | -                      | -   | 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   |

Table 7. Static characteristics ...continued

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

| 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    |
| 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>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   |
|   |                                      | 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 <a href="#">[1]</a> | -                      | -   | 50                     | μA   |

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

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

| Symbol                                     | Parameter                            | Conditions   | Min                    | Typ | Max                    | Unit |
|--|--------------------------------------|--|------------------------|-----|------------------------|------|
| <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>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    |
| 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>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   |
|  |                                      | 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; 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; 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 [Figure 7](#).

| Symbol                       | Parameter         | Conditions  | T <sub>amb</sub> = 25 °C |                    |      | T <sub>amb</sub> = -40 °C to +125 °C |             |     |              | Unit |
|------------------------------|-------------------|---|--------------------------|--------------------|------|--------------------------------------|-------------|-----|--------------|------|
|                              |                   |   | Min                      | Typ <sup>[1]</sup> | Max  | Min                                  | Max (85 °C) | Min | Max (125 °C) |      |
| <b>C<sub>L</sub> = 5 pF</b>  |                   |   |                          |                    |      |                                      |             |     |              |      |
| t <sub>pd</sub>              | propagation delay | A to Y; see <a href="#">Figure 6</a> <sup>[2]</sup> |                          |                    |      |                                      |             |     |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                             | -                        | 15.0               | -    | -                                    | -           | -   | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                    | 2.6                      | 4.7                | 9.2  | 2.0                                  | 10.0        | 2.0 | 11.0         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                    | 2.1                      | 3.4                | 5.7  | 1.6                                  | 6.5         | 1.6 | 7.2          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                  | 1.8                      | 2.9                | 4.5  | 1.4                                  | 5.2         | 1.4 | 5.8          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                    | 1.5                      | 2.3                | 3.5  | 1.2                                  | 4.2         | 1.2 | 4.6          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                    | 1.4                      | 2.1                | 3.2  | 1.0                                  | 3.8         | 1.0 | 4.2          | ns   |
| <b>C<sub>L</sub> = 10 pF</b> |                   |   |                          |                    |      |                                      |             |     |              |      |
| t <sub>pd</sub>              | propagation delay | A to Y; see <a href="#">Figure 6</a> <sup>[2]</sup> |                          |                    |      |                                      |             |     |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                             | -                        | 18.4               | -    | -                                    | -           | -   | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                    | 3.2                      | 5.6                | 10.9 | 2.3                                  | 11.8        | 2.3 | 13.1         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                    | 2.6                      | 4.1                | 6.7  | 1.9                                  | 7.7         | 1.9 | 8.5          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                  | 2.3                      | 3.4                | 5.3  | 1.7                                  | 6.2         | 1.7 | 6.9          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                    | 2.0                      | 2.9                | 4.2  | 1.5                                  | 5.0         | 1.5 | 5.5          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                    | 1.7                      | 2.6                | 3.8  | 1.4                                  | 4.6         | 1.4 | 5.1          | ns   |
| <b>C<sub>L</sub> = 15 pF</b> |                   |   |                          |                    |      |                                      |             |     |              |      |
| t <sub>pd</sub>              | propagation delay | A to Y; see <a href="#">Figure 6</a> <sup>[2]</sup> |                          |                    |      |                                      |             |     |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                             | -                        | 21.9               | -    | -                                    | -           | -   | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                    | 3.6                      | 6.4                | 12.6 | 2.6                                  | 13.8        | 2.6 | 15.2         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                    | 3.0                      | 4.6                | 7.6  | 2.2                                  | 8.9         | 2.2 | 9.8          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                  | 2.6                      | 3.9                | 6.0  | 2.0                                  | 7.2         | 2.0 | 7.9          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                    | 2.3                      | 3.3                | 4.8  | 1.8                                  | 5.7         | 1.8 | 6.3          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                    | 2.1                      | 3.1                | 4.2  | 1.6                                  | 5.0         | 1.6 | 5.5          | ns   |
| <b>C<sub>L</sub> = 30 pF</b> |                   |   |                          |                    |      |                                      |             |     |              |      |
| t <sub>pd</sub>              | propagation delay | A to Y; see <a href="#">Figure 6</a> <sup>[2]</sup> |                          |                    |      |                                      |             |     |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                             | -                        | 32.1               | -    | -                                    | -           | -   | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                    | 4.8                      | 8.7                | 16.3 | 3.6                                  | 18.9        | 3.6 | 20.8         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                    | 4.0                      | 6.2                | 10.3 | 3.4                                  | 12.2        | 3.4 | 13.4         | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                  | 3.6                      | 5.2                | 8.1  | 3.2                                  | 9.8         | 3.2 | 10.8         | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                    | 3.0                      | 4.4                | 6.4  | 2.7                                  | 7.7         | 2.7 | 8.5          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                    | 2.9                      | 4.2                | 5.6  | 2.5                                  | 6.5         | 2.5 | 7.2          | ns   |



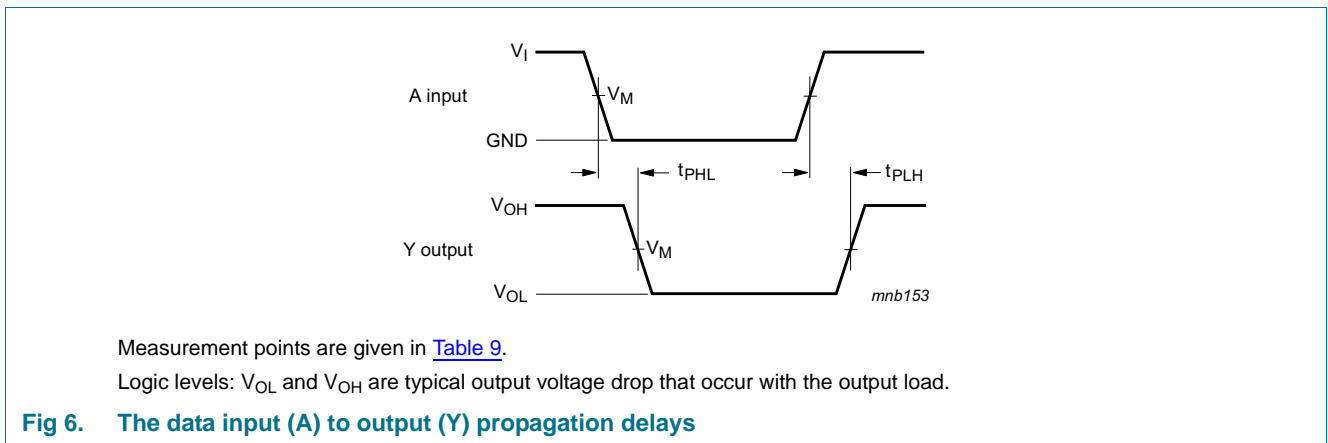
**Table 8. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#).

| Symbol          | Parameter                     | Conditions   | T <sub>amb</sub> = 25 °C |                    |     | T <sub>amb</sub> = -40 °C to +125 °C |             |     |              | Unit |
|-----------------|-------------------------------|--|--------------------------|--------------------|-----|--------------------------------------|-------------|-----|--------------|------|
|                 |                               |  | Min                      | Typ <sup>[1]</sup> | Max | Min                                  | Max (85 °C) | Min | Max (125 °C) |      |
| 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  | -                        | 2.5                | -   | -                                    | -           | -   | -            | pF   |
|                 |                               | V <sub>CC</sub> = 1.1 V to 1.3 V   | -                        | 2.6                | -   | -                                    | -           | -   | -            | pF   |
|                 |                               | V <sub>CC</sub> = 1.4 V to 1.6 V   | -                        | 2.7                | -   | -                                    | -           | -   | -            | pF   |
|                 |                               | V <sub>CC</sub> = 1.65 V to 1.95 V   | -                        | 2.9                | -   | -                                    | -           | -   | -            | pF   |
|                 |                               | V <sub>CC</sub> = 2.3 V to 2.7 V   | -                        | 3.4                | -   | -                                    | -           | -   | -            | pF   |
|                 |                               | V <sub>CC</sub> = 3.0 V to 3.6 V   | -                        | 4.0                | -   | -                                    | -           | -   | -            | pF   |

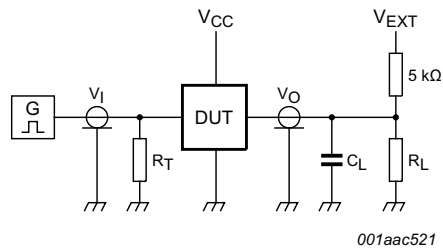
- [1] All typical values are measured at nominal V<sub>CC</sub>.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- [3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  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;  
 Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs.

## 12. Waveforms



**Table 9. Measurement points**

| Supply voltage  | Output                | Input                 |                 |                                 |
|-----------------|-----------------------|-----------------------|-----------------|---------------------------------|
| V <sub>CC</sub> | V <sub>M</sub>        | V <sub>M</sub>        | V <sub>I</sub>  | t <sub>r</sub> = t <sub>f</sub> |
| 0.8 V to 3.6 V  | 0.5 × V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | V <sub>CC</sub> | ≤ 3.0 ns                        |



Test data is given in [Table 10](#).

Definitions for test circuit:

$R_L$  = Load resistance.

$C_L$  = Load capacitance including jig and probe capacitance.

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

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

**Fig 7. Test circuit for measuring switching times**

**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 k $\Omega$ or 1 M $\Omega$ | 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

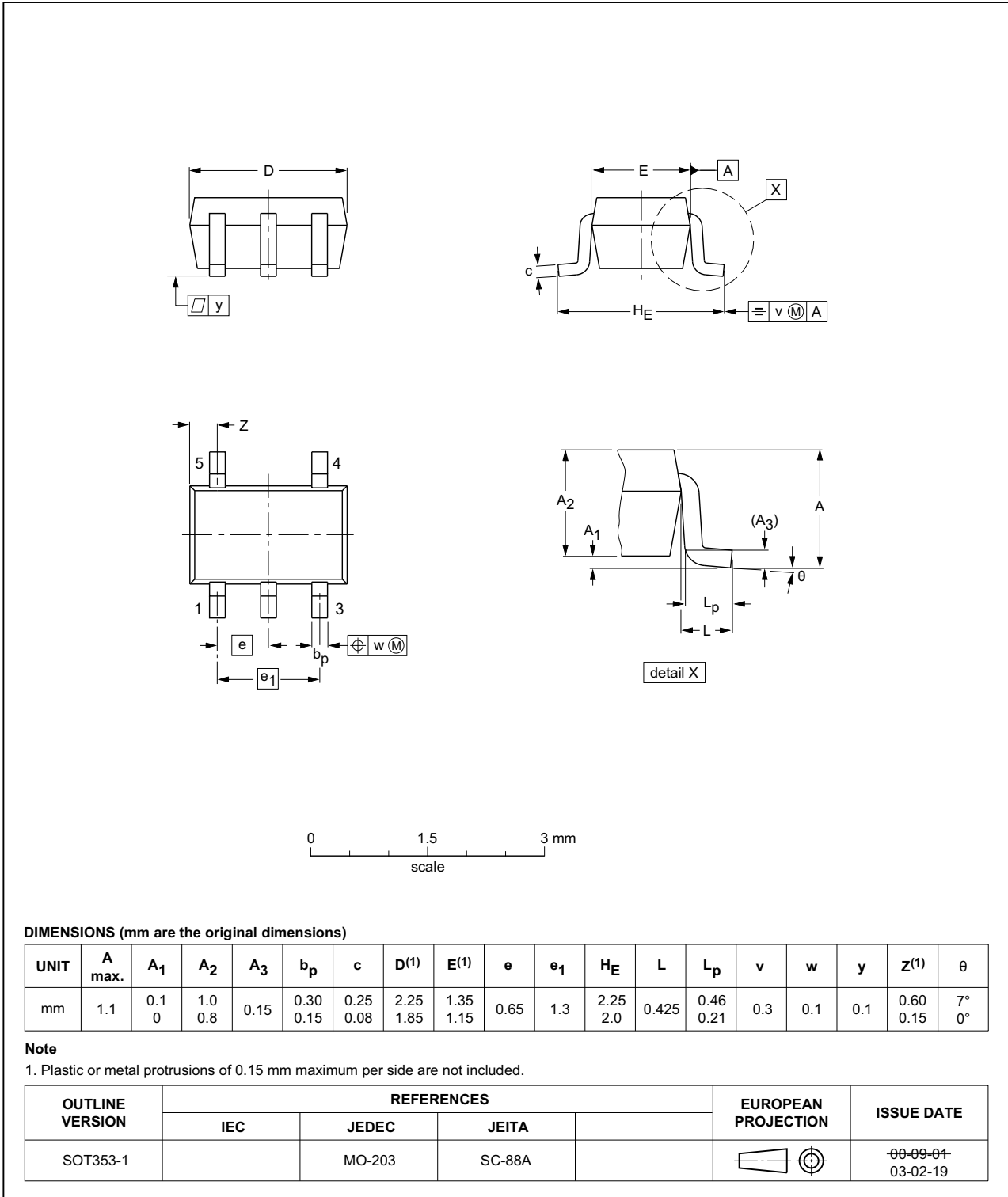


Fig 8. Package outline SOT353-1 (TSSOP5)

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

SOT886

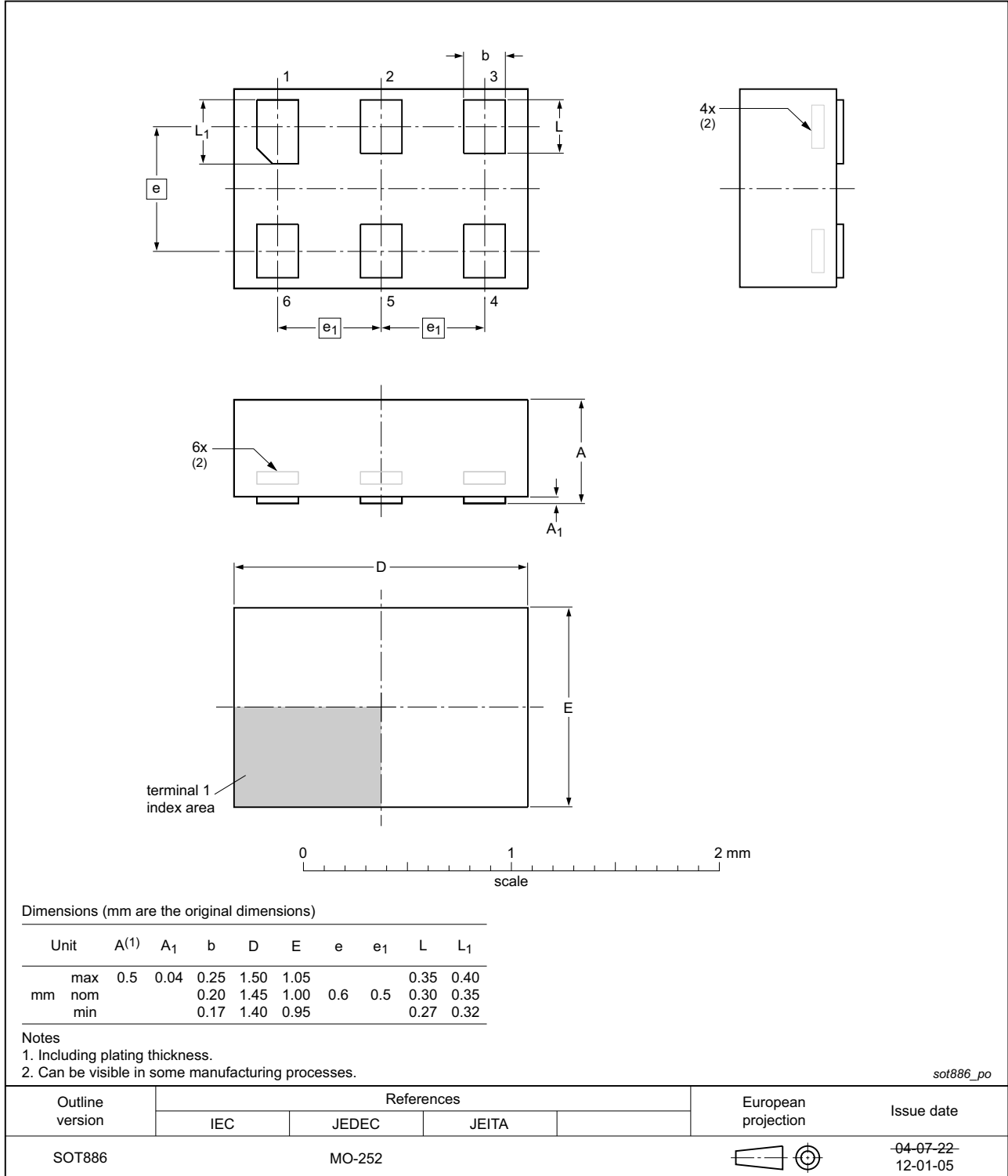


Fig 9. Package outline SOT886 (XSON6)

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

SOT891

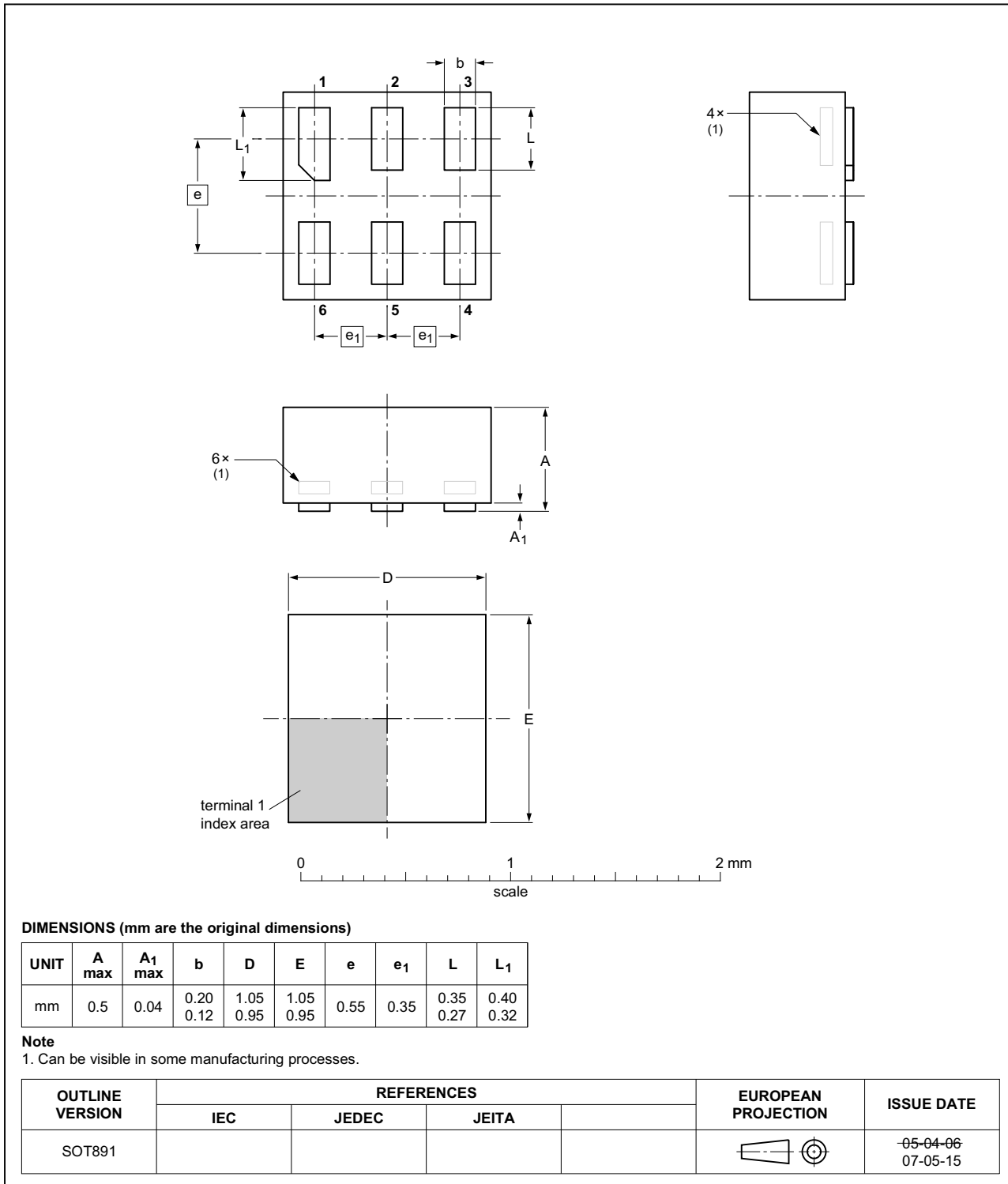


Fig 10. Package outline SOT891 (XSON6)

## 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    |
|----------------|--|--------------------|---------------|---------------|
| 74AUP1G16 v.2  | 20161007   | Product data sheet | -             | 74AUP1G16 v.1 |
| Modifications: | • Type numbers 74AUP1G16GN, 74AUP1G16GS and 74AUP1G16GX removed. |                    |               |               |
| 74AUP1G16 v.1  | 20151104   | 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".

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

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