

# 74AUP2G3404

## Low-power buffer and inverter

Rev. 1 — 22 August 2012

Product data sheet

## 1. General description

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The 74AUP2G3404 is a single buffer and single inverter.

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

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

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

## 2. Features and benefits

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- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- Complies with JEDEC standards:
  - ◆ JESD8-12 (0.8 V to 1.3 V)
  - ◆ JESD8-11 (0.9 V to 1.65 V)
  - ◆ JESD8-7 (1.2 V to 1.95 V)
  - ◆ JESD8-5 (1.8 V to 2.7 V)
  - ◆ JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - ◆ HBM JESD22-A114F Class 3A exceeds 5000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101E exceeds 1000 V
- Low static power consumption;  $I_{CC} = 0.9 \mu A$  (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of  $V_{CC}$
- $I_{OFF}$  circuitry provides partial power-down mode operation
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  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           |       |                                                                                             |         |
|---------------|-------------------|-------|---------------------------------------------------------------------------------------------|---------|
|               | Temperature range | Name  | Description                                                                                 | Version |
| 74AUP2G3404GW | −40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads                                                    | SOT363  |
| 74AUP2G3404GM | −40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886  |
| 74AUP2G3404GF | −40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm    | SOT891  |
| 74AUP2G3404GN | −40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm       | SOT1115 |
| 74AUP2G3404GS | −40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm       | SOT1202 |

4. Marking

Table 2. Marking

| Type number   | Marking code <sup>[1]</sup> |
|---------------|-----------------------------|
| 74AUP2G3404GW | aZ                          |
| 74AUP2G3404GM | aZ                          |
| 74AUP2G3404GF | aZ                          |
| 74AUP2G3404GN | aZ                          |
| 74AUP2G3404GS | aZ                          |

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

5. Functional diagram

aaa-002988

**Fig 1. Logic symbol**

aaa-002989

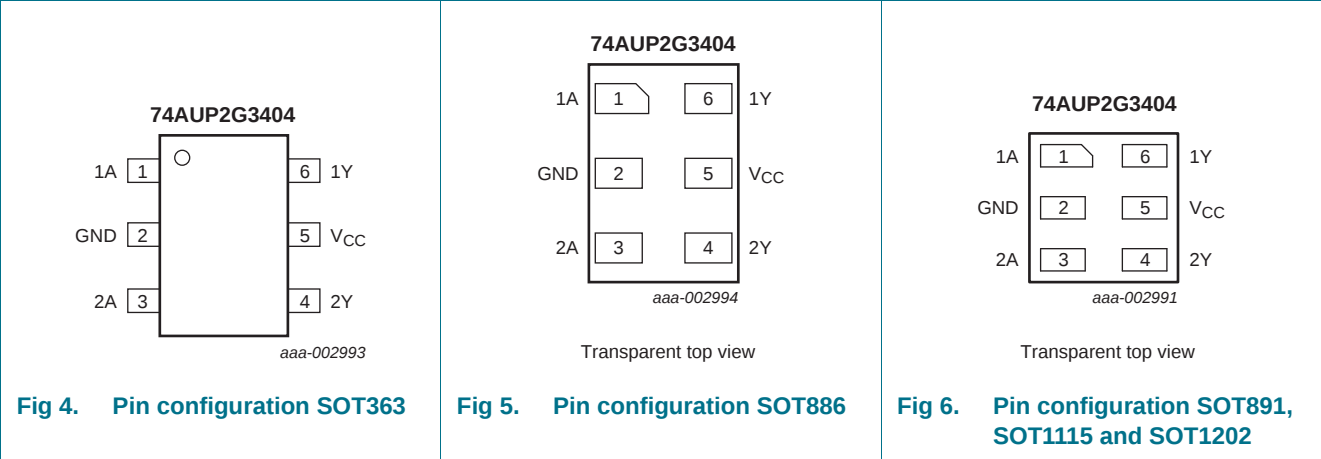
**Fig 2. IEC logic symbol**

aaa-002990

**Fig 3. Logic diagram**

## 6. Pinning information

### 6.1 Pinning



### 6.2 Pin description

Table 3. Pin description

| Symbol          | Pin | Description    |
|-----------------|-----|----------------|
| 1A              | 1   | data input     |
| GND             | 2   | ground (0 V)   |
| 2A              | 3   | data input     |
| 2Y              | 4   | data output    |
| V <sub>CC</sub> | 5   | supply voltage |
| 1Y              | 6   | data output    |

## 7. Functional description

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

| Input     | Output    |
|-----------|-----------|
| <b>1A</b> | <b>1Y</b> |
| L         | L         |
| H         | H         |

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

Table 5. Function table<sup>[1]</sup>

| Input     | Output    |
|-----------|-----------|
| <b>2A</b> | <b>2Y</b> |
| L         | H         |
| H         | L         |

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

## 8. Limiting values

**Table 6. 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           |                                 | [1] -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 | [1] -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   | [2] -    | 250      | mW   |

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

[2] For SC-88 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 7. 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 8. 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          | -                      | -   | 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 8.** 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    |
|                                           |                                      | 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;<br>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;<br>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;<br>V <sub>CC</sub> = 3.3 V          | -                      | -   | 50                     | µA   |

**Table 8.** 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    |
|                                            |                                      | 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;<br>V <sub>CC</sub> = 3.3 V          | -                      | -   | 75                     | µA   |

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#).

| Symbol                 | Parameter         | Conditions                                                        | 25 °C |                    |      | −40 °C to +125 °C |             |              | Unit |
|------------------------|-------------------|-------------------------------------------------------------------|-------|--------------------|------|-------------------|-------------|--------------|------|
|                        |                   |                                                                   | Min   | Typ <sup>[1]</sup> | Max  | Min               | Max (85 °C) | Max (125 °C) |      |
| C <sub>L</sub> = 5 pF  |                   |                                                                   |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | 1A to 1Y or 2A to 2Y; see <a href="#">Figure 7</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                           | -     | 16.0               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 2.4   | 5.0                | 10.3 | 2.0               | 11.4        | 12.6         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 1.8   | 3.6                | 6.4  | 1.6               | 7.4         | 8.2          | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 1.5   | 2.9                | 5.0  | 1.4               | 5.9         | 6.5          | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 1.2   | 2.4                | 3.9  | 1.1               | 4.5         | 5.0          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 1.1   | 2.1                | 3.2  | 1.0               | 3.9         | 4.3          | ns   |
| C <sub>L</sub> = 10 pF |                   |                                                                   |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | 1A to 1Y or 2A to 2Y; see <a href="#">Figure 7</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                           | -     | 19.8               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 2.8   | 5.9                | 12.2 | 2.3               | 13.7        | 15.1         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 2.3   | 4.2                | 7.5  | 1.9               | 8.7         | 9.6          | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 2.0   | 3.5                | 5.9  | 1.7               | 7.0         | 7.7          | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 1.7   | 2.9                | 4.6  | 1.5               | 5.4         | 6.0          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 1.6   | 2.7                | 3.8  | 1.4               | 4.5         | 5.1          | ns   |
| C <sub>L</sub> = 15 pF |                   |                                                                   |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | 1A to 1Y or 2A to 2Y; see <a href="#">Figure 7</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                           | -     | 23.3               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 3.2   | 6.7                | 13.0 | 2.6               | 15.8        | 17.4         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 2.6   | 4.7                | 8.6  | 2.2               | 10.0        | 11.0         | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 2.3   | 4.0                | 6.7  | 2.0               | 8.0         | 8.8          | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 2.1   | 3.3                | 5.1  | 1.8               | 6.1         | 6.8          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 2.0   | 3.1                | 4.2  | 1.6               | 5.0         | 5.5          | ns   |
| C <sub>L</sub> = 30 pF |                   |                                                                   |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>        | propagation delay | 1A to 1Y or 2A to 2Y; see <a href="#">Figure 7</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                        |                   | V <sub>CC</sub> = 0.8 V                                           | -     | 33.6               | -    | -                 | -           | -            | ns   |
|                        |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 4.4   | 8.9                | 16.3 | 3.6               | 19.0        | 20.9         | ns   |
|                        |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 3.6   | 6.3                | 10.8 | 3.2               | 12.9        | 14.2         | ns   |
|                        |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 3.2   | 5.3                | 9.0  | 2.9               | 10.5        | 11.6         | ns   |
|                        |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 2.9   | 4.5                | 6.5  | 2.6               | 7.6         | 8.5          | ns   |
|                        |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 2.9   | 4.2                | 5.6  | 2.5               | 6.2         | 7.2          | ns   |

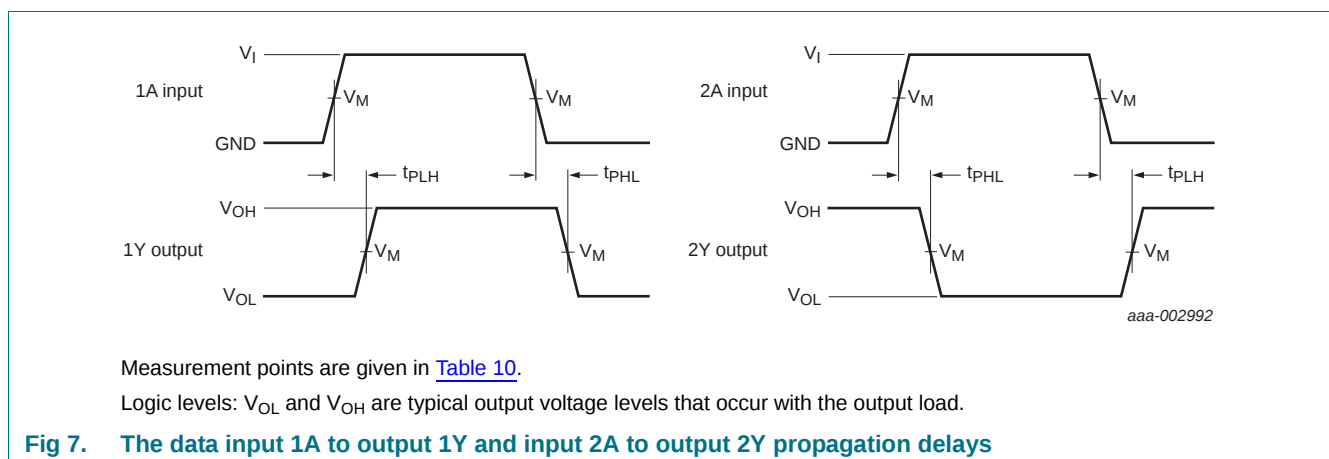
**Table 9. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#).

| Symbol                                        | Parameter                     | Conditions                                                      | 25 °C |                    |     | –40 °C to +125 °C |             |              | Unit |
|-----------------------------------------------|-------------------------------|-----------------------------------------------------------------|-------|--------------------|-----|-------------------|-------------|--------------|------|
|                                               |                               |                                                                 | Min   | Typ <sup>[1]</sup> | Max | Min               | Max (85 °C) | Max (125 °C) |      |
| C <sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF |                               |                                                                 |       |                    |     |                   |             |              |      |
| C <sub>PD</sub>                               | power dissipation capacitance | f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> |       |                    |     |                   |             |              |      |
|                                               |                               | V <sub>CC</sub> = 0.8 V                                         | -     | 2.5                | -   | -                 | -           | -            | 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                                | -     | 2.8                | -   | -                 | -           | -            | pF   |
|                                               |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                              | -     | 3.0                | -   | -                 | -           | -            | 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                                | -     | 4.0                | -   | -                 | -           | -            | pF   |

- [1] All typical values are measured at nominal  $V_{CC}$ .
- [2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
- [3] All specified values are the average typical values over all stated loads.
- [4]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $C_L$  = load capacitance in pF;  
 $V_{CC}$  = supply voltage in V;  
 $N$  = number of inputs switching;  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

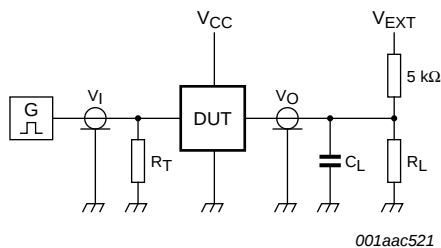
## 12. Waveforms



**Fig 7. The data input 1A to output 1Y and input 2A to output 2Y propagation delays**

**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 | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0 \text{ ns}$ |



Test data is given in [Table 11](#).  
Definitions for test circuit:  
 $R_L$  = Load resistance.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_T$  = Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator.  
 $V_{EXT}$  = External voltage for measuring switching times.

Fig 8. Test circuit for measuring switching times

Table 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, set-up and hold times, and pulse width,  $R_L = 1\text{ M}\Omega$ .

13. Package outline

Plastic surface-mounted package; 6 leadsSOT363

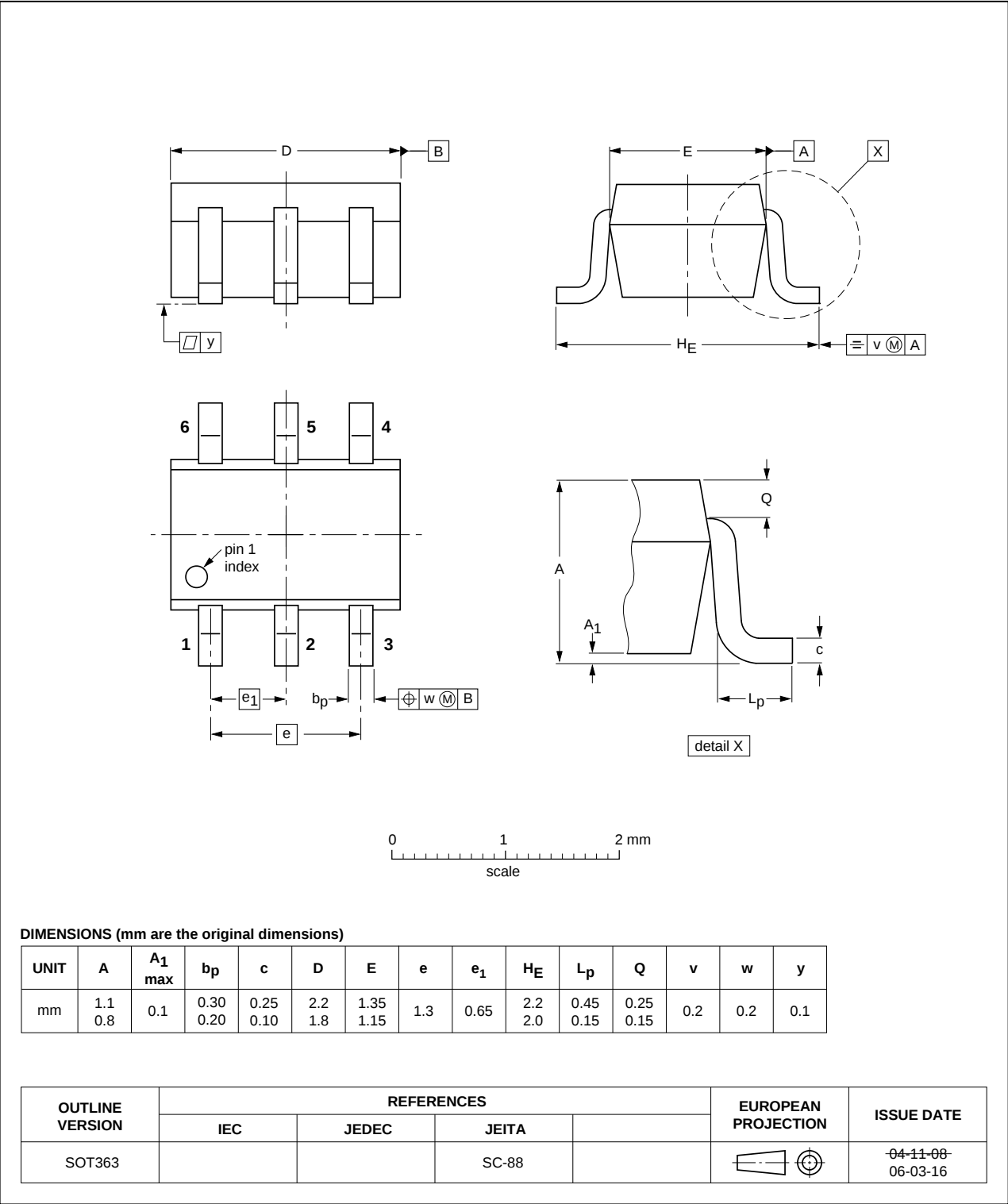


Fig 9. Package outline SOT363 (SC-88)

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

SOT886

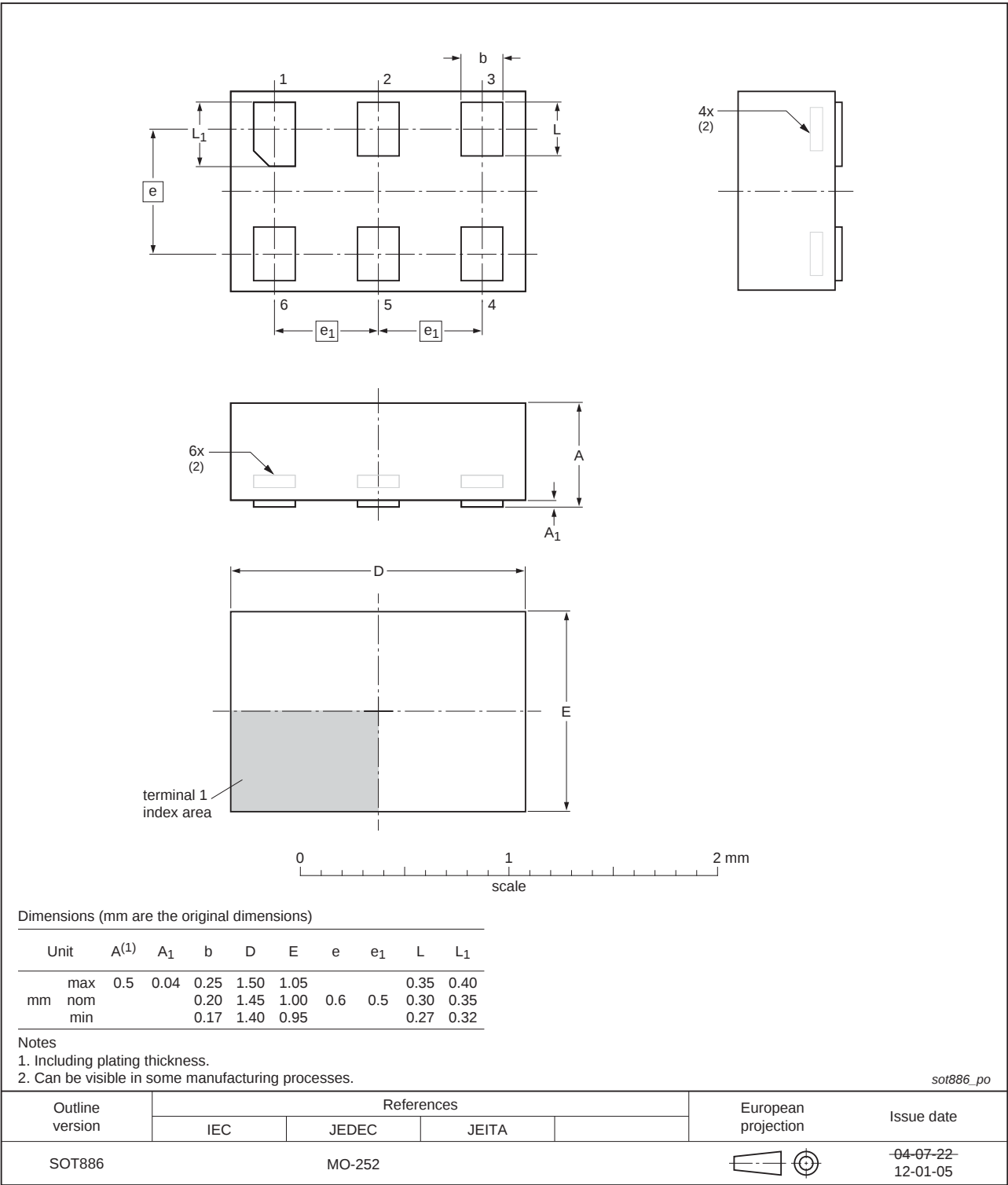
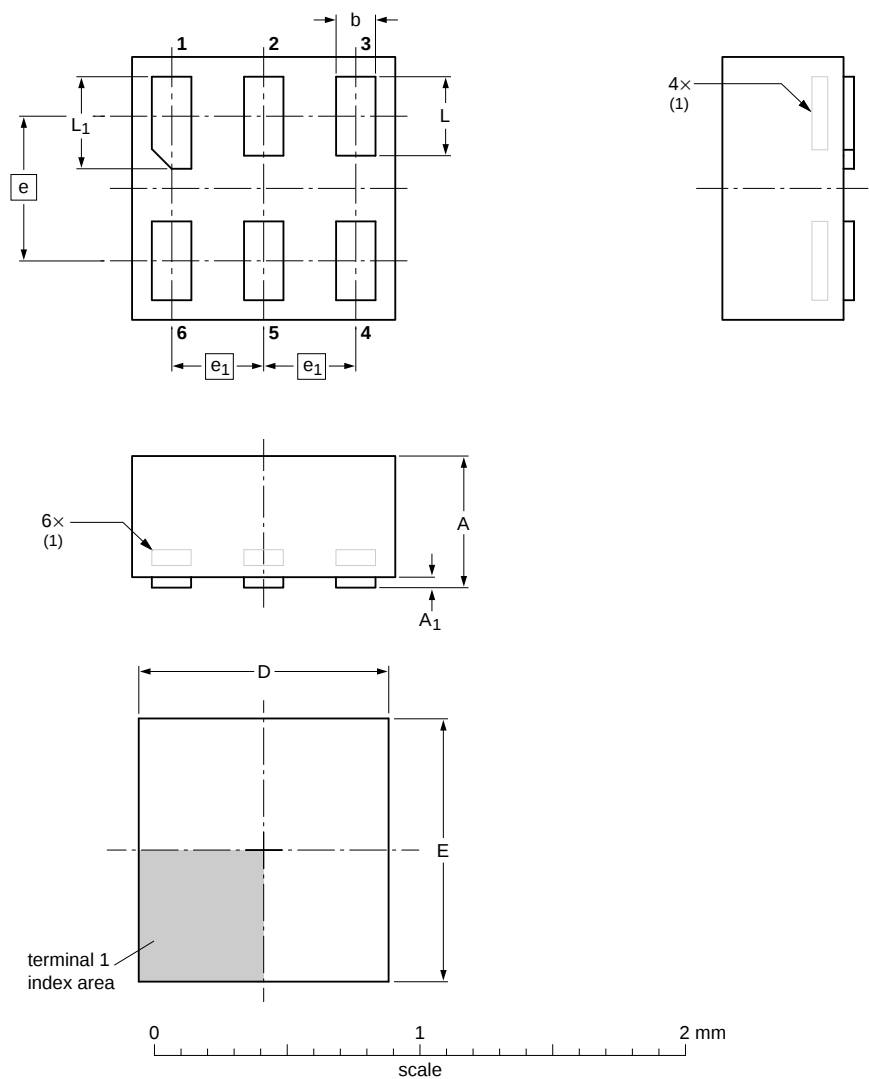


Fig 10. Package outline SOT886 (XSON6)

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

SOT891



DIMENSIONS (mm are the original dimensions)

| UNIT | A <sub>max</sub> | A <sub>1max</sub> | b            | D            | E            | e    | e <sub>1</sub> | L            | L <sub>1</sub> |
|------|------------------|-------------------|--------------|--------------|--------------|------|----------------|--------------|----------------|
| mm   | 0.5              | 0.04              | 0.20<br>0.12 | 1.05<br>0.95 | 1.05<br>0.95 | 0.55 | 0.35           | 0.35<br>0.27 | 0.40<br>0.32   |

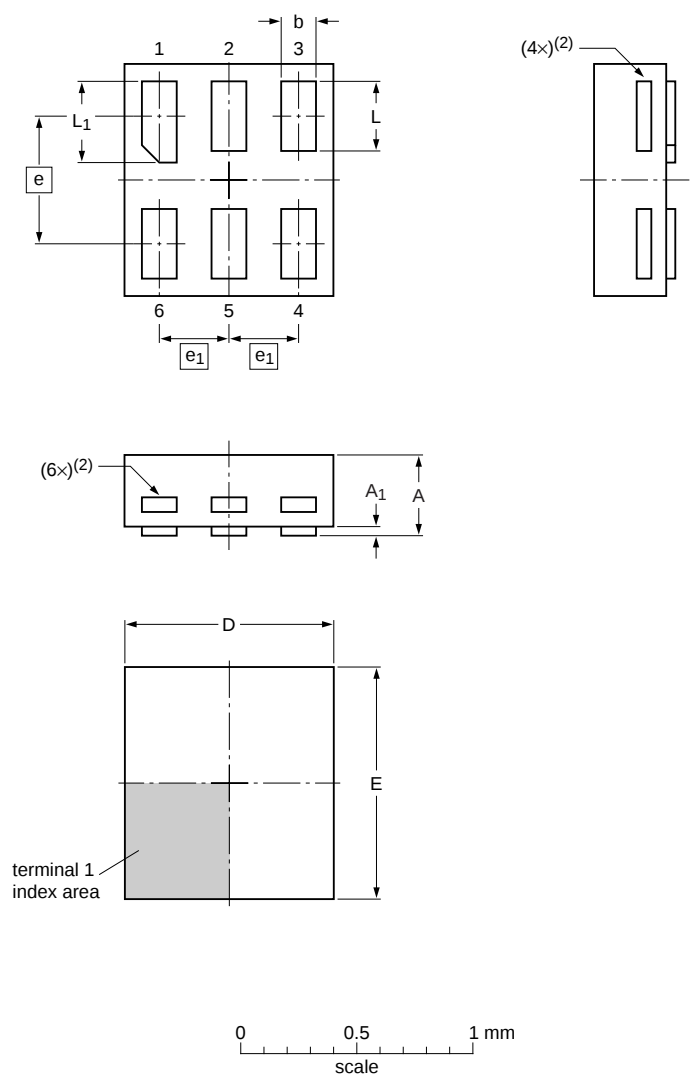
Note  
1. Can be visible in some manufacturing processes.

| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|-------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC | JEITA |  |                        |                      |
| SOT891             |            |       |       |  |                        | 05-04-06<br>07-05-15 |

Fig 11. Package outline SOT891 (XSON6)

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

SOT1115



Dimensions

| Unit | A <sup>(1)</sup> | A <sub>1</sub> | b    | D    | E    | e    | e <sub>1</sub> | L    | L <sub>1</sub> |
|------|------------------|----------------|------|------|------|------|----------------|------|----------------|
| mm   | max              | 0.35           | 0.04 | 0.20 | 0.95 | 1.05 |                | 0.35 | 0.40           |
|      | nom              |                |      | 0.15 | 0.90 | 1.00 | 0.55           | 0.30 | 0.35           |
|      | min              |                |      | 0.12 | 0.85 | 0.95 |                | 0.27 | 0.32           |

Note

- 1. Including plating thickness.
- 2. Visible depending upon used manufacturing technology.

sot1115\_po

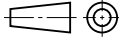
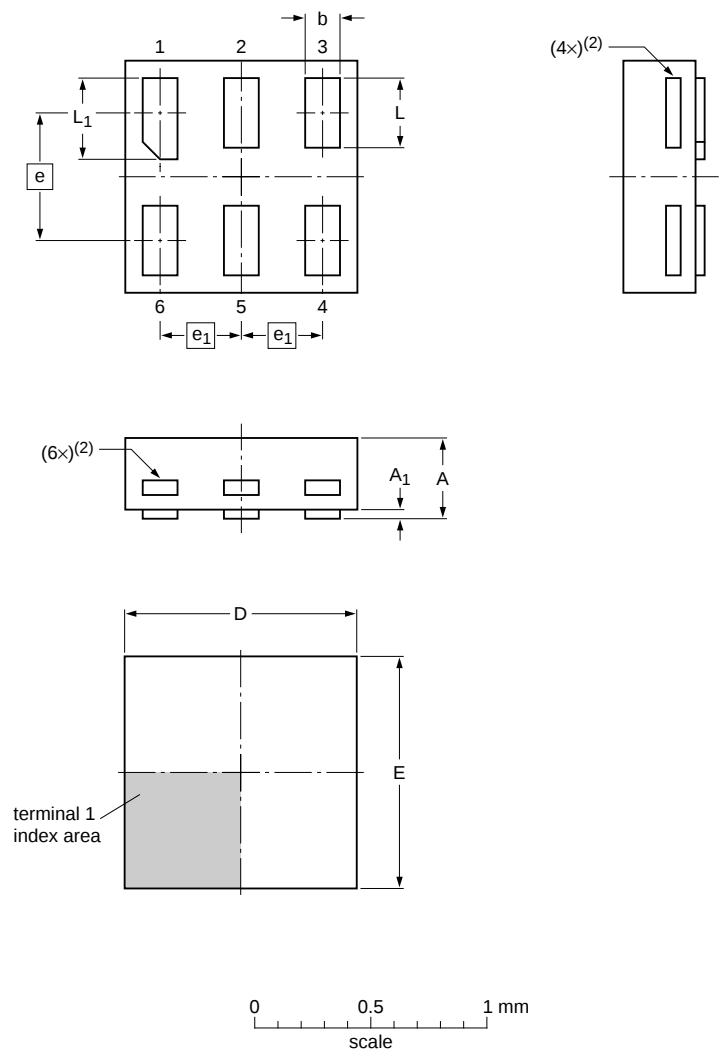
| Outline version | References |       |       |  | European projection                                                                   | Issue date                      |
|-----------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|---------------------------------|
|                 | IEC        | JEDEC | JEITA |  |                                                                                       |                                 |
| SOT1115         |            |       |       |  |  | <del>10-04-02</del><br>10-04-07 |

Fig 12. 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



Dimensions

| Unit | A <sup>(1)</sup> | A <sub>1</sub> | b    | D    | E    | e    | e <sub>1</sub> | L    | L <sub>1</sub> |
|------|------------------|----------------|------|------|------|------|----------------|------|----------------|
| mm   | max              | 0.35           | 0.04 | 0.20 | 1.05 | 1.05 |                | 0.35 | 0.40           |
|      | nom              |                |      | 0.15 | 1.00 | 1.00 | 0.55           | 0.30 | 0.35           |
|      | min              |                |      | 0.12 | 0.95 | 0.95 |                | 0.27 | 0.32           |

Note

- 1. Including plating thickness.
- 2. Visible depending upon used manufacturing technology.

sot1202\_po

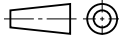
| Outline version | References |       |       |  | European projection                                                                   | Issue date                      |
|-----------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|---------------------------------|
|                 | IEC        | JEDEC | JEITA |  |                                                                                       |                                 |
| SOT1202         |            |       |       |  |  | <del>10-04-02</del><br>10-04-06 |

Fig 13. Package outline SOT1202 (XSON6)

## 14. Abbreviations

Table 12. 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 13. Revision history

| Document ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| 74AUP2G3404 v.1 | 20120822     | Product data sheet | -             | -          |

## 16. Legal information

### 16.1 Data sheet status

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

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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