

# 74AUP2G0604

Low-power inverting buffer with open-drain and inverter

Rev. 1 — 23 November 2012

Product data sheet

## 1. General description

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The 74AUP2G0604 is a single inverting buffer with open-drain output and a single inverter. It features two input pins (nA), an output pin (2Y) and an open-drain output pin (1Y).

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;  $I_{CC} = 0.9 \mu\text{A}$  (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   |         |
| 74AUP2G0604GW | -40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads  | SOT363  |
| 74AUP2G0604GM | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886  |
| 74AUP2G0604GF | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm    | SOT891  |
| 74AUP2G0604GN | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm       | SOT1115 |
| 74AUP2G0604GS | -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> |
|---------------|-----------------------------|
| 74AUP2G0604GW | a6                          |
| 74AUP2G0604GM | a6                          |
| 74AUP2G0604GF | a6                          |
| 74AUP2G0604GN | a6                          |
| 74AUP2G0604GS | a6                          |

[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

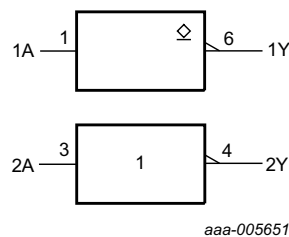


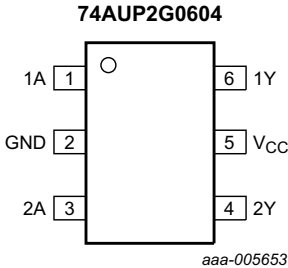
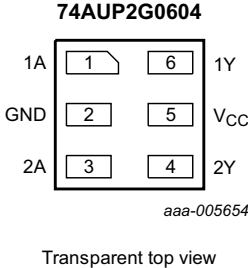
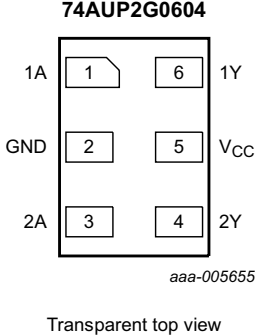
Fig 2. IEC logic symbol



Fig 3. Logic diagram

## 6. Pinning information

### 6.1 Pinning

|   |   |  |
|---|---|--|
|  <p><b>74AUP2G0604</b></p> <p>aaa-005653</p> <p><b>Fig 4. Pin configuration SOT363</b></p> |  <p><b>74AUP2G0604</b></p> <p>aaa-005654</p> <p>Transparent top view</p> <p><b>Fig 5. Pin configuration SOT886</b></p> |  <p><b>74AUP2G0604</b></p> <p>aaa-005655</p> <p>Transparent top view</p> <p><b>Fig 6. Pin configuration SOT891, SOT1115 and SOT1202</b></p> |
|---|---|--|

### 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         | Z         |
| H         | L         |

[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 $V_{CC}$         |          |      |      |
|           |                         | 1Y                              | -        | +20  | mA   |
|           |                         | 2Y                              | -        | ±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            | 2Y; 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             | 1Y, 2Y; 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   |

**Table 8. Static characteristics ...continued**

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

| Symbol                                    | Parameter                            | Conditions   | Min                    | Typ | Max                    | Unit |
|---|--------------------------------------|--|------------------------|-----|------------------------|------|
| C <sub>O</sub>                            | output capacitance                   | V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V  |                        |     |                        |      |
|   |                                      | 1Y output; enabled   | -                      | 1.7 | -                      | pF   |
|   |                                      | 1Y output; disabled  | -                      | 1.1 | -                      | pF   |
|   |                                      | 2Y output  | -                      | 1.7 | -                      | pF   |
| <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            | 2Y; 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             | 1Y, 2Y; 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   |
| I <sub>OFF</sub>                          | power-off leakage current            | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V                           | -                      | -   | ±0.5                   | μA   |
| ΔI <sub>OFF</sub>                         | additional power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V                  | -                      | -   | ±0.6                   | μA   |
| I <sub>CC</sub>                           | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V | -                      | -   | 0.9                    | μA   |
| ΔI <sub>CC</sub>                          | additional supply current            | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V          | -                      | -   | 50                     | μA   |

**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            | 2Y; 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             | 1Y, 2Y; 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   |
| 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; 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          | -                      | -   | 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) |      |
| <b>C<sub>L</sub> = 5 pF</b>  |                   |   |       |                    |      |                   |             |              |      |
| 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   | -     | 14.4               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 2.3   | 4.7                | 10.3 | 2.0               | 11.4        | 12.6         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 1.8   | 3.4                | 6.4  | 1.5               | 7.4         | 8.2          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 1.5   | 2.9                | 5.0  | 1.2               | 5.9         | 6.5          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 1.2   | 2.3                | 3.9  | 1.0               | 4.5         | 5.0          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 1.1   | 2.2                | 3.3  | 0.8               | 3.9         | 4.3          | ns   |
| <b>C<sub>L</sub> = 10 pF</b> |                   |   |       |                    |      |                   |             |              |      |
| 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   | -     | 17.7               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 2.7   | 5.7                | 12.2 | 2.5               | 13.7        | 15.1         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 2.2   | 4.1                | 7.5  | 2.0               | 8.7         | 9.6          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 1.9   | 3.6                | 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  | 1.4               | 5.4         | 6.0          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 1.6   | 3.0                | 4.6  | 1.2               | 4.9         | 5.4          | ns   |
| <b>C<sub>L</sub> = 15 pF</b> |                   |   |       |                    |      |                   |             |              |      |
| 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   | -     | 21.1               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 3.2   | 6.6                | 13.0 | 2.9               | 15.8        | 17.4         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 2.6   | 4.7                | 8.6  | 2.3               | 10.0        | 11.0         | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 2.3   | 4.3                | 6.7  | 2.1               | 8.0         | 8.8          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 2.1   | 3.4                | 5.1  | 1.7               | 6.1         | 6.8          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 2.0   | 3.6                | 6.0  | 1.5               | 6.5         | 7.2          | ns   |
| <b>C<sub>L</sub> = 30 pF</b> |                   |   |       |                    |      |                   |             |              |      |
| 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   | -     | 30.7               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                                  | 4.4   | 9.1                | 16.5 | 3.9               | 19.3        | 21.3         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                                  | 3.6   | 6.6                | 10.8 | 3.2               | 12.9        | 14.2         | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                                | 3.2   | 6.1                | 10.7 | 2.9               | 11.0        | 12.1         | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                                  | 2.9   | 4.9                | 7.2  | 2.6               | 7.8         | 8.6          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                                  | 2.9   | 5.4                | 10.5 | 2.5               | 10.8        | 11.9         | ns   |



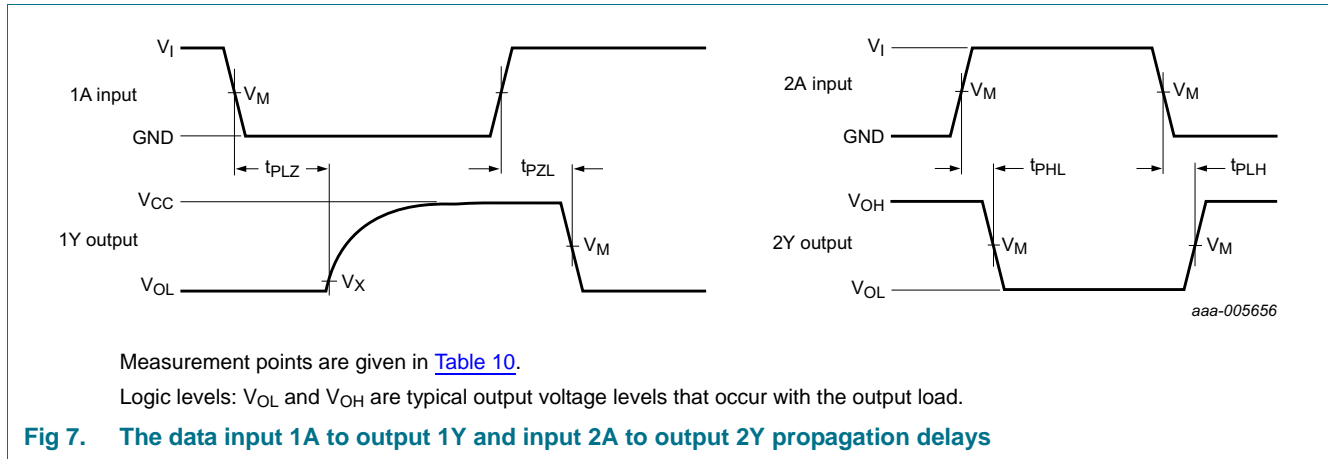
**Table 9. Dynamic characteristics ...continued**

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) |      |
| <b>C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF</b> |                               |   |       |                    |     |                   |             |              |      |
| C <sub>PD</sub>                                     | power dissipation capacitance | 1A to 1Y; f <sub>i</sub> =1 MHz; V <sub>i</sub> = GND to V <sub>CC</sub> <a href="#">[3][4]</a> |       |                    |     |                   |             |              |      |
|   |                               | V <sub>CC</sub> = 0.8 V   | -     | 0.5                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V  | -     | 0.6                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V  | -     | 0.7                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V  | -     | 0.7                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | -     | 1.0                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | -     | 1.2                | -   | -                 | -           | -            | pF   |
|   |                               | 2A to 2Y; f <sub>i</sub> =1 MHz; V <sub>i</sub> = GND to V <sub>CC</sub> <a href="#">[3][5]</a> |       |                    |     |                   |             |              |      |
|   |                               | 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   |

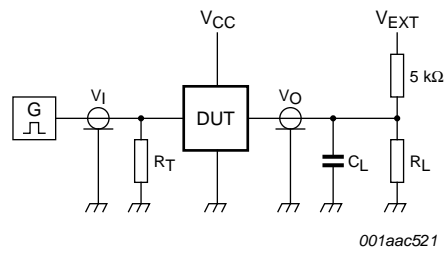
- [1] All typical values are measured at nominal V<sub>CC</sub>.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub> (2A to 2Y) and t<sub>PLZ</sub> and t<sub>PZL</sub> (1A to 1Y).
- [3] All specified values are the average typical values over all stated loads.
- [4] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N$  where:  
 f<sub>i</sub> = input frequency in MHz;  
 C<sub>L</sub> = load capacitance in pF;  
 N = number of inputs switching;
- [5] 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> = load capacitance in pF;  
 V<sub>CC</sub> = supply voltage in V;  
 N = number of inputs switching;  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

## 12. Waveforms



**Table 10. Measurement points**

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



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 leads

SOT363

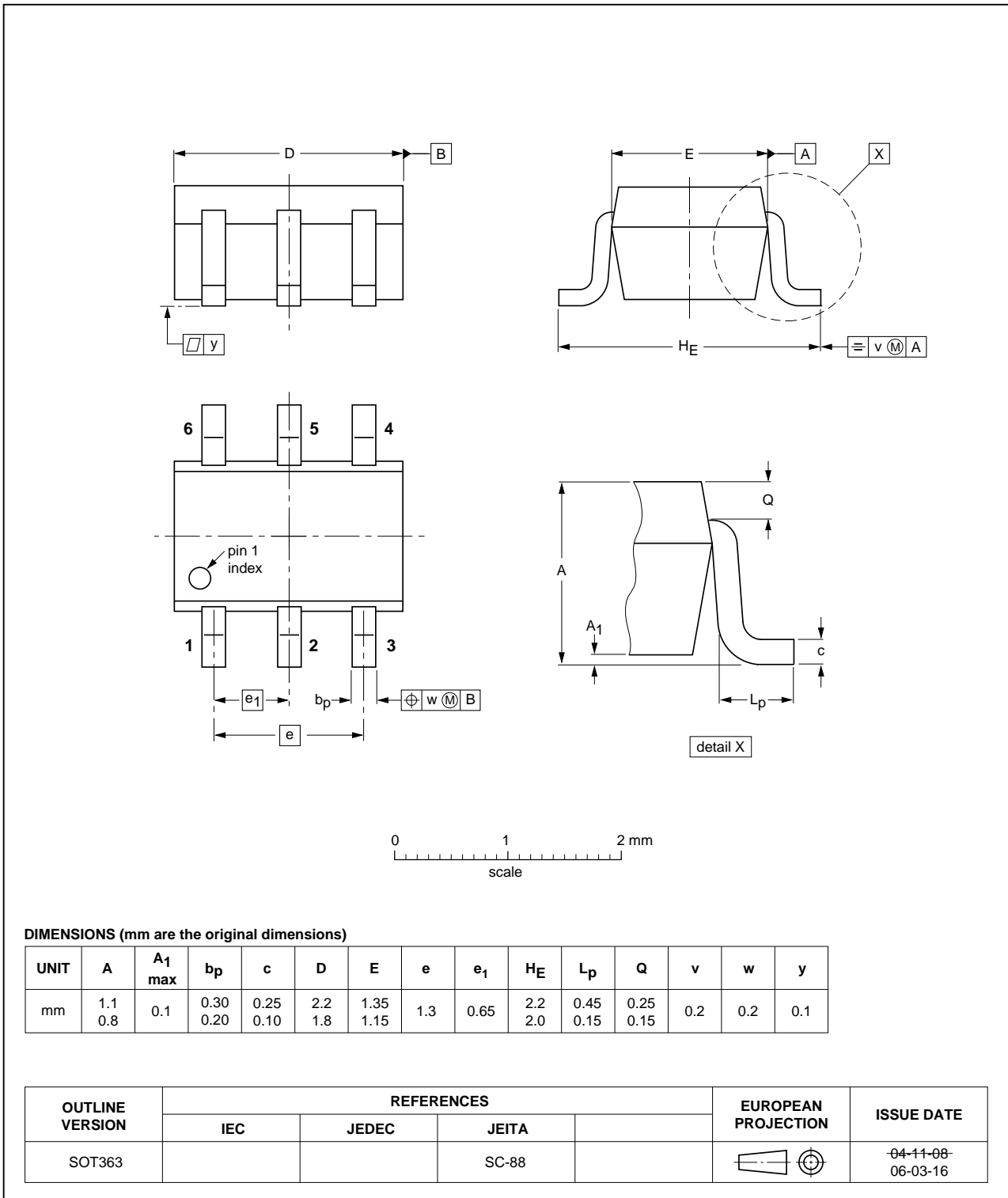


Fig 9. Package outline SOT363 (SC-88)

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

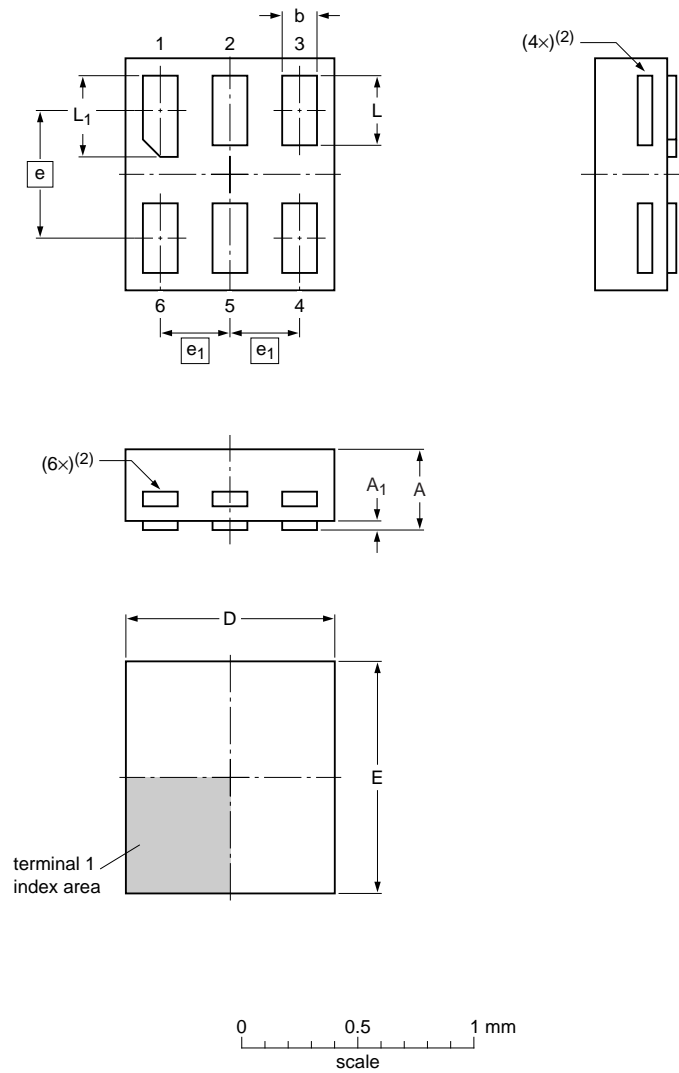
SOT891



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 | 0.3 | 0.30           | 0.35 |                |
|      | min 0.12         |                | 0.85 | 0.95 |      |     |                | 0.27 | 0.32           |

Note

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

sot1115\_po

| Outline version | References |       |       | European projection | Issue date           |
|-----------------|------------|-------|-------|---------------------|----------------------|
|                 | IEC        | JEDEC | JEITA |                     |                      |
| SOT1115         |            |       |       |                     | 10-04-02<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



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 |
|-----------------|--------------|--------------------|---------------|------------|
| 74AUP2G0604 v.1 | 20121123     | 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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