

# 74AUP1G3208

Low-power 3-input OR-AND gate

Rev. 7 — 7 March 2017

Product data sheet

## 1 General description

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The 74AUP1G3208 provides the Boolean function:  $Y = (A + B) \times C$ . The user can choose the logic functions OR, AND and OR-AND. All inputs can be connected to  $V_{CC}$  or GND.

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

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

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

## 2 Features and benefits

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

### 3 Ordering information

Table 1. Ordering information

| Type number   | Package           |        |   | Version |
|---------------|-------------------|--------|---|---------|
|               | Temperature range | Name   | Description   |         |
| 74AUP1G3208GW | -40 °C to +125 °C | SC-88  | plastic surface-mounted package; 6 leads  | SOT363  |
| 74AUP1G3208GM | -40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm         | SOT886  |
| 74AUP1G3208GF | -40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm            | SOT891  |
| 74AUP1G3208GN | -40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm               | SOT1115 |
| 74AUP1G3208GS | -40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm               | SOT1202 |
| 74AUP1G3208GX | -40 °C to +125 °C | X2SON6 | plastic thermal extremely thin small outline package; no leads; 6 terminals; body 1 × 0.8 × 0.35 mm | SOT1255 |

### 4 Marking

Table 2. Marking

| Type number   | Marking code <sup>[1]</sup> |
|---------------|-----------------------------|
| 74AUP1G3208GW | a2                          |
| 74AUP1G3208GM | a2                          |
| 74AUP1G3208GF | a2                          |
| 74AUP1G3208GN | a2                          |
| 74AUP1G3208GS | a2                          |
| 74AUP1G3208GX | a2                          |

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

### 5 Functional diagram

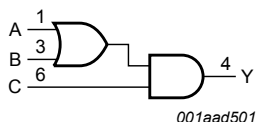


Figure 1. Logic symbol

## 6 Pinning information

### 6.1 Pinning

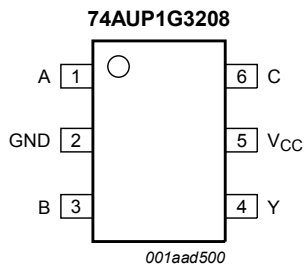


Figure 2. Pin configuration SOT363

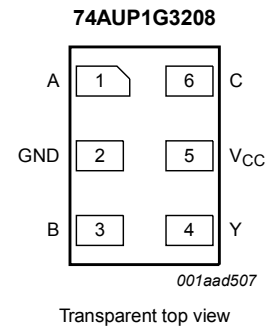


Figure 3. Pin configuration SOT886

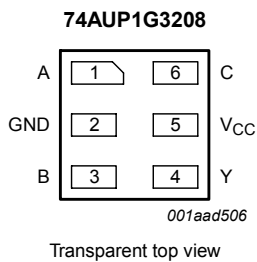


Figure 4. Pin configuration SOT891, SOT1115 and SOT1202

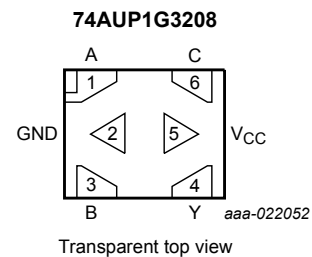


Figure 5. Pin configuration SOT1255 (X2SON6)

### 6.2 Pin description

Table 3. Pin description

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

## 7 Functional description

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

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

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

### 7.1 Logic configurations

Table 5. Function selection table

| Logic function   | Figure  |
|--|---|
| 2-input AND  | see <a href="#">Figure 6</a> and <a href="#">Figure 7</a> |
| 2-input OR   | see <a href="#">Figure 8</a>                              |
| 3-input gate with the Boolean function: $Y = (A + B) \times C$ | see <a href="#">Figure 9</a>                              |

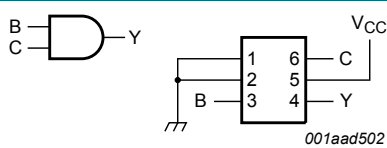


Figure 6. 2-input AND gate

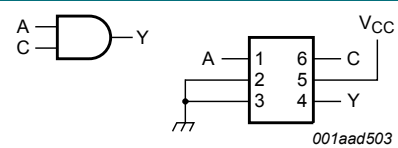


Figure 7. 2-input AND gate

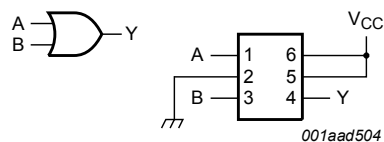


Figure 8. 2-input OR gate

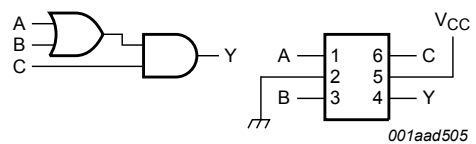


Figure 9. 3-input gate with the Boolean function:  $Y = (A + B) \times C$

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

[1] The minimum 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 and X2SON6 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       | -   | 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          |
|--|--------------------------------------|---|----------------------|-----|----------------------|---------------|
| $T_{amb} = 25\text{ }^{\circ}\text{C}$ |                                      |   |                      |     |                      |               |
| $V_{IH}$                               | HIGH-level input voltage             | $V_{CC} = 0.8\text{ V}$   | $0.70 \times V_{CC}$ | -   | -                    | V             |
|  |                                      | $V_{CC} = 0.9\text{ V to }1.95\text{ V}$  | $0.65 \times V_{CC}$ | -   | -                    | V             |
|  |                                      | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$   | 1.6                  | -   | -                    | V             |
|  |                                      | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$   | 2.0                  | -   | -                    | V             |
| $V_{IL}$                               | LOW-level input voltage              | $V_{CC} = 0.8\text{ V}$   | -                    | -   | $0.30 \times V_{CC}$ | V             |
|  |                                      | $V_{CC} = 0.9\text{ V to }1.95\text{ V}$  | -                    | -   | $0.35 \times V_{CC}$ | V             |
|  |                                      | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$   | -                    | -   | 0.7                  | V             |
|  |                                      | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$   | -                    | -   | 0.9                  | V             |
| $V_{OH}$                               | HIGH-level output voltage            | $V_I = V_{IH}\text{ or }V_{IL}$   |                      |     |                      |               |
|  |                                      | $I_O = -20\text{ }\mu\text{A}; V_{CC} = 0.8\text{ V to }3.6\text{ V}$                 | $V_{CC} - 0.1$       | -   | -                    | V             |
|  |                                      | $I_O = -1.1\text{ mA}; V_{CC} = 1.1\text{ V}$   | $0.75 \times V_{CC}$ | -   | -                    | V             |
|  |                                      | $I_O = -1.7\text{ mA}; V_{CC} = 1.4\text{ V}$   | 1.11                 | -   | -                    | V             |
|  |                                      | $I_O = -1.9\text{ mA}; V_{CC} = 1.65\text{ V}$  | 1.32                 | -   | -                    | V             |
|  |                                      | $I_O = -2.3\text{ mA}; V_{CC} = 2.3\text{ V}$   | 2.05                 | -   | -                    | V             |
|  |                                      | $I_O = -3.1\text{ mA}; V_{CC} = 2.3\text{ V}$   | 1.9                  | -   | -                    | V             |
|  |                                      | $I_O = -2.7\text{ mA}; V_{CC} = 3.0\text{ V}$   | 2.72                 | -   | -                    | V             |
| $V_{OL}$                               | LOW-level output voltage             | $V_I = V_{IH}\text{ or }V_{IL}$   |                      |     |                      |               |
|  |                                      | $I_O = 20\text{ }\mu\text{A}; V_{CC} = 0.8\text{ V to }3.6\text{ V}$                  | -                    | -   | 0.1                  | V             |
|  |                                      | $I_O = 1.1\text{ mA}; V_{CC} = 1.1\text{ V}$  | -                    | -   | $0.3 \times V_{CC}$  | V             |
|  |                                      | $I_O = 1.7\text{ mA}; V_{CC} = 1.4\text{ V}$  | -                    | -   | 0.31                 | V             |
|  |                                      | $I_O = 1.9\text{ mA}; V_{CC} = 1.65\text{ V}$   | -                    | -   | 0.31                 | V             |
|  |                                      | $I_O = 2.3\text{ mA}; V_{CC} = 2.3\text{ V}$  | -                    | -   | 0.31                 | V             |
|  |                                      | $I_O = 3.1\text{ mA}; V_{CC} = 2.3\text{ V}$  | -                    | -   | 0.44                 | V             |
|  |                                      | $I_O = 2.7\text{ mA}; V_{CC} = 3.0\text{ V}$  | -                    | -   | 0.31                 | V             |
| $I_I$                                  | input leakage current                | $V_I = \text{GND to }3.6\text{ V}; V_{CC} = 0\text{ V to }3.6\text{ V}$               | -                    | -   | $\pm 0.1$            | $\mu\text{A}$ |
|  |                                      | $V_I\text{ or }V_O = 0\text{ V to }3.6\text{ V}; V_{CC} = 0\text{ V}$                 | -                    | -   | $\pm 0.2$            | $\mu\text{A}$ |
| $I_{OFF}$                              | power-off leakage current            | $V_I\text{ or }V_O = 0\text{ V to }3.6\text{ V}; V_{CC} = 0\text{ V}$                 | -                    | -   | $\pm 0.2$            | $\mu\text{A}$ |
| $\Delta I_{OFF}$                       | additional power-off leakage current | $V_I\text{ or }V_O = 0\text{ V to }3.6\text{ V}; V_{CC} = 0\text{ V to }0.2\text{ V}$ | -                    | -   | $\pm 0.2$            | $\mu\text{A}$ |
| $I_{CC}$                               | supply current                       | $V_I = \text{GND or }V_{CC}; I_O = 0\text{ A}; V_{CC} = 0.8\text{ V to }3.6\text{ V}$ | -                    | -   | 0.5                  | $\mu\text{A}$ |

| Symbol   | Parameter   | Conditions   | Min                  | Typ  | Max                  | Unit          |
|--|---|--|----------------------|------|----------------------|---------------|
| $\Delta I_{CC}$  | additional supply current                         | $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$ ; $V_{CC} = 3.3 \text{ V}$ <sup>[1]</sup>   | -                    | -    | 40                   | $\mu\text{A}$ |
| $C_I$  | input capacitance                                 | $V_{CC} = 0 \text{ V to } 3.6 \text{ V}$ ; $V_I = \text{GND or } V_{CC}$                         | -                    | 0.8  | -                    | $\text{pF}$   |
| $C_O$  | output capacitance                                | $V_O = \text{GND}$ ; $V_{CC} = 0 \text{ V}$  | -                    | 1.7  | -                    | $\text{pF}$   |
| $T_{\text{amb}} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}$ |   |  |                      |      |                      |               |
| $V_{IH}$   | HIGH-level input voltage                          | $V_{CC} = 0.8 \text{ V}$   | $0.70 \times V_{CC}$ | -    | -                    | $\text{V}$    |
|  |   | $V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$  | $0.65 \times V_{CC}$ | -    | -                    | $\text{V}$    |
|  |   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$   | 1.6                  | -    | -                    | $\text{V}$    |
|  |   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$   | 2.0                  | -    | -                    | $\text{V}$    |
| $V_{IL}$   | LOW-level input voltage                           | $V_{CC} = 0.8 \text{ V}$   | -                    | -    | $0.30 \times V_{CC}$ | $\text{V}$    |
|  |   | $V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$  | -                    | -    | $0.35 \times V_{CC}$ | $\text{V}$    |
|  |   | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$   | -                    | -    | 0.7                  | $\text{V}$    |
|  |   | $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$   | -                    | -    | 0.9                  | $\text{V}$    |
| $V_{OH}$   | HIGH-level output voltage                         | $V_I = V_{IH} \text{ or } V_{IL}$  |                      |      |                      |               |
|  |   | $I_O = -20 \mu\text{A}$ ; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$                             | $V_{CC} - 0.1$       | -    | -                    | $\text{V}$    |
|  |   | $I_O = -1.1 \text{ mA}$ ; $V_{CC} = 1.1 \text{ V}$   | $0.7 \times V_{CC}$  | -    | -                    | $\text{V}$    |
|  |   | $I_O = -1.7 \text{ mA}$ ; $V_{CC} = 1.4 \text{ V}$   | 1.03                 | -    | -                    | $\text{V}$    |
|  |   | $I_O = -1.9 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$  | 1.30                 | -    | -                    | $\text{V}$    |
|  |   | $I_O = -2.3 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$   | 1.97                 | -    | -                    | $\text{V}$    |
|  |   | $I_O = -3.1 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$   | 1.85                 | -    | -                    | $\text{V}$    |
|  |   | $I_O = -2.7 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$   | 2.67                 | -    | -                    | $\text{V}$    |
| $V_{OL}$   | LOW-level output voltage                          | $V_I = V_{IH} \text{ or } V_{IL}$  |                      |      |                      |               |
|  |   | $I_O = 20 \mu\text{A}$ ; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$                              | -                    | -    | 0.1                  | $\text{V}$    |
|  |   | $I_O = 1.1 \text{ mA}$ ; $V_{CC} = 1.1 \text{ V}$  | -                    | -    | $0.3 \times V_{CC}$  | $\text{V}$    |
|  |   | $I_O = 1.7 \text{ mA}$ ; $V_{CC} = 1.4 \text{ V}$  | -                    | -    | 0.37                 | $\text{V}$    |
|  |   | $I_O = 1.9 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$   | -                    | -    | 0.35                 | $\text{V}$    |
|  |   | $I_O = 2.3 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$  | -                    | -    | 0.33                 | $\text{V}$    |
|  |   | $I_O = 3.1 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$  | -                    | -    | 0.45                 | $\text{V}$    |
|  |   | $I_O = 2.7 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$  | -                    | -    | 0.33                 | $\text{V}$    |
|  | $I_O = 4.0 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$ | -  | -                    | 0.45 | $\text{V}$           |               |
| $I_I$  | input leakage current                             | $V_I = \text{GND to } 3.6 \text{ V}$ ; $V_{CC} = 0 \text{ V to } 3.6 \text{ V}$                  | -                    | -    | $\pm 0.5$            | $\mu\text{A}$ |
| $I_{\text{OFF}}$   | power-off leakage current                         | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}$ ; $V_{CC} = 0 \text{ V}$                   | -                    | -    | $\pm 0.5$            | $\mu\text{A}$ |
| $\Delta I_{\text{OFF}}$  | additional power-off leakage current              | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}$ ; $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$ | -                    | -    | $\pm 0.6$            | $\mu\text{A}$ |
| $I_{CC}$   | supply current                                    | $V_I = \text{GND or } V_{CC}$ ; $I_O = 0 \text{ A}$ ; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$ | -                    | -    | 0.9                  | $\mu\text{A}$ |

| Symbol   | Parameter                            | Conditions  | Min                  | Typ | Max                  | Unit          |
|--|--------------------------------------|---|----------------------|-----|----------------------|---------------|
| $\Delta I_{CC}$  | additional supply current            | $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 3.3 \text{ V}$                    | -                    | -   | 50                   | $\mu\text{A}$ |
| $T_{\text{amb}} = -40 \text{ }^\circ\text{C}$ to $+125 \text{ }^\circ\text{C}$ |                                      |   |                      |     |                      |               |
| $V_{IH}$   | HIGH-level input voltage             | $V_{CC} = 0.8 \text{ V}$  | $0.75 \times V_{CC}$ | -   | -                    | V             |
|  |                                      | $V_{CC} = 0.9 \text{ V}$ to $1.95 \text{ V}$  | $0.70 \times V_{CC}$ | -   | -                    | V             |
|  |                                      | $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$   | 1.6                  | -   | -                    | V             |
|  |                                      | $V_{CC} = 3.0 \text{ V}$ to $3.6 \text{ V}$   | 2.0                  | -   | -                    | V             |
| $V_{IL}$   | LOW-level input voltage              | $V_{CC} = 0.8 \text{ V}$  | -                    | -   | $0.25 \times V_{CC}$ | V             |
|  |                                      | $V_{CC} = 0.9 \text{ V}$ to $1.95 \text{ V}$  | -                    | -   | $0.30 \times V_{CC}$ | V             |
|  |                                      | $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$   | -                    | -   | 0.7                  | V             |
|  |                                      | $V_{CC} = 3.0 \text{ V}$ to $3.6 \text{ V}$   | -                    | -   | 0.9                  | V             |
| $V_{OH}$   | HIGH-level output voltage            | $V_I = V_{IH}$ or $V_{IL}$  |                      |     |                      |               |
|  |                                      | $I_O = -20 \mu\text{A}$ ; $V_{CC} = 0.8 \text{ V}$ to $3.6 \text{ V}$                                 | $V_{CC} - 0.11$      | -   | -                    | V             |
|  |                                      | $I_O = -1.1 \text{ mA}$ ; $V_{CC} = 1.1 \text{ V}$  | $0.6 \times V_{CC}$  | -   | -                    | V             |
|  |                                      | $I_O = -1.7 \text{ mA}$ ; $V_{CC} = 1.4 \text{ V}$  | 0.93                 | -   | -                    | V             |
|  |                                      | $I_O = -1.9 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$   | 1.17                 | -   | -                    | V             |
|  |                                      | $I_O = -2.3 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$  | 1.77                 | -   | -                    | V             |
|  |                                      | $I_O = -3.1 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$  | 1.67                 | -   | -                    | V             |
|  |                                      | $I_O = -2.7 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$  | 2.40                 | -   | -                    | V             |
| $V_{OL}$   | LOW-level output voltage             | $V_I = V_{IH}$ or $V_{IL}$  |                      |     |                      |               |
|  |                                      | $I_O = 20 \mu\text{A}$ ; $V_{CC} = 0.8 \text{ V}$ to $3.6 \text{ V}$                                  | -                    | -   | 0.11                 | V             |
|  |                                      | $I_O = 1.1 \text{ mA}$ ; $V_{CC} = 1.1 \text{ V}$   | -                    | -   | $0.33 \times V_{CC}$ | V             |
|  |                                      | $I_O = 1.7 \text{ mA}$ ; $V_{CC} = 1.4 \text{ V}$   | -                    | -   | 0.41                 | V             |
|  |                                      | $I_O = 1.9 \text{ mA}$ ; $V_{CC} = 1.65 \text{ V}$  | -                    | -   | 0.39                 | V             |
|  |                                      | $I_O = 2.3 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$   | -                    | -   | 0.36                 | V             |
|  |                                      | $I_O = 3.1 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$   | -                    | -   | 0.50                 | V             |
|  |                                      | $I_O = 2.7 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$   | -                    | -   | 0.36                 | V             |
| $I_I$  | input leakage current                | $V_I = \text{GND}$ to $3.6 \text{ V}$ ; $V_{CC} = 0 \text{ V}$ to $3.6 \text{ V}$                     | -                    | -   | $\pm 0.75$           | $\mu\text{A}$ |
|  |                                      | $V_I$ or $V_O = 0 \text{ V}$ to $3.6 \text{ V}$ ; $V_{CC} = 0 \text{ V}$                              | -                    | -   | $\pm 0.75$           | $\mu\text{A}$ |
| $\Delta I_{OFF}$   | additional power-off leakage current | $V_I$ or $V_O = 0 \text{ V}$ to $3.6 \text{ V}$ ;<br>$V_{CC} = 0 \text{ V}$ to $0.2 \text{ V}$        | -                    | -   | $\pm 0.75$           | $\mu\text{A}$ |
| $I_{CC}$   | supply current                       | $V_I = \text{GND}$ or $V_{CC}$ ; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 0.8 \text{ V}$ to $3.6 \text{ V}$ | -                    | -   | 1.4                  | $\mu\text{A}$ |
| $\Delta I_{CC}$  | additional supply current            | $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$ ;<br>$V_{CC} = 3.3 \text{ V}$                    | -                    | -   | 75                   | $\mu\text{A}$ |

[1] One input at  $V_{CC} - 0.6 \text{ V}$ , other inputs at  $V_{CC}$  or GND.



## 11 Dynamic characteristics

**Table 9. Dynamic characteristics**

 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

| 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 | A, B or C to Y; see <a href="#">Figure 10</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                                      | -     | 18.5               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                             | 2.2   | 5.4                | 10.6 | 2.2               | 10.9        | 11.1         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                             | 1.9   | 3.8                | 6.4  | 1.8               | 6.9         | 7.2          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                           | 1.5   | 3.1                | 5.1  | 1.4               | 5.6         | 5.9          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                             | 1.3   | 2.4                | 3.7  | 1.2               | 4.1         | 4.4          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                             | 1.2   | 2.2                | 3.2  | 1.1               | 3.4         | 3.6          | ns   |
| <b>C<sub>L</sub> = 10 pF</b> |                   |  |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>              | propagation delay | A, B or C to Y; see <a href="#">Figure 10</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                                      | -     | 22.1               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                             | 2.6   | 6.3                | 12.4 | 2.5               | 12.8        | 13.1         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                             | 2.3   | 4.4                | 7.4  | 2.1               | 8.0         | 8.4          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                           | 2.0   | 3.6                | 5.9  | 1.8               | 6.4         | 6.8          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                             | 1.7   | 3.0                | 4.4  | 1.6               | 4.8         | 5.1          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                             | 1.6   | 2.7                | 3.9  | 1.4               | 4.2         | 4.4          | ns   |
| <b>C<sub>L</sub> = 15 pF</b> |                   |  |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>              | propagation delay | A, B or C to Y; see <a href="#">Figure 10</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                                      | -     | 25.6               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                             | 3.0   | 7.1                | 14.1 | 2.8               | 14.6        | 14.9         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                             | 2.6   | 5.0                | 8.4  | 2.4               | 9.1         | 9.5          | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                           | 2.2   | 4.1                | 6.7  | 2.1               | 7.4         | 7.8          | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                             | 2.0   | 3.4                | 5.0  | 1.9               | 5.5         | 5.9          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                             | 1.9   | 3.2                | 4.5  | 1.7               | 4.8         | 5.0          | ns   |
| <b>C<sub>L</sub> = 30 pF</b> |                   |  |       |                    |      |                   |             |              |      |
| t <sub>pd</sub>              | propagation delay | A, B or C to Y; see <a href="#">Figure 10</a> <sup>[2]</sup> |       |                    |      |                   |             |              |      |
|                              |                   | V <sub>CC</sub> = 0.8 V                                      | -     | 34.1               | -    | -                 | -           | -            | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V                             | 3.9   | 9.3                | 18.9 | 3.7               | 19.7        | 20.1         | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V                             | 3.4   | 6.5                | 11.0 | 3.2               | 12.1        | 12.7         | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V                           | 3.0   | 5.4                | 8.9  | 2.9               | 9.7         | 10.3         | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V                             | 2.8   | 4.5                | 6.5  | 2.6               | 7.1         | 7.5          | ns   |
|                              |                   | V <sub>CC</sub> = 3.0 V to 3.6 V                             | 2.6   | 4.3                | 5.8  | 2.4               | 6.4         | 6.7          | ns   |

| 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> <sup>[3]</sup> |       |                    |     |                   |             |              |      |
|   |                               | V <sub>CC</sub> = 0.8 V  | -     | 2.6                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V   | -     | 2.7                | -   | -                 | -           | -            | pF   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V   | -     | 2.8                | -   | -                 | -           | -            | 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>.

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

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

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

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

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

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

N = number of inputs switching;

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

11.1 Waveforms and test circuit

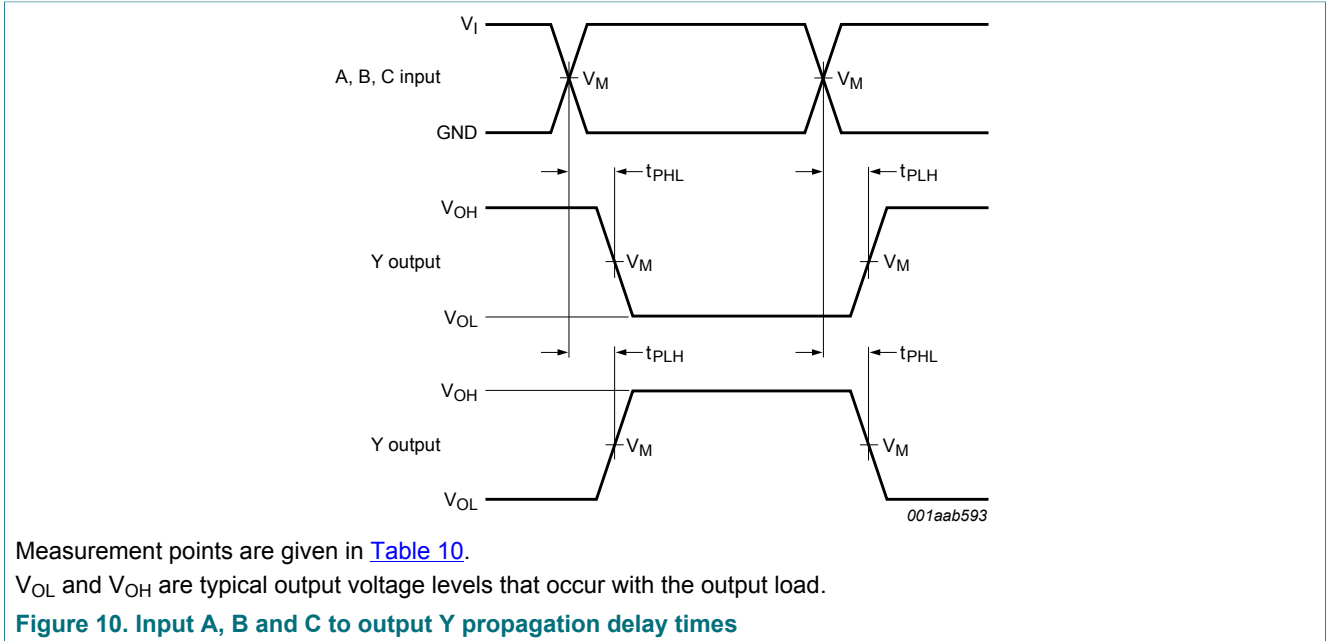
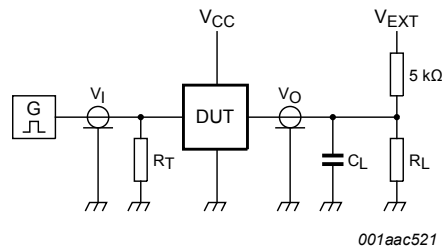


Table 10. Measurement points

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

**Figure 11. 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, setup and hold times and pulse width  $R_L = 1 \text{ M}\Omega$ .

12 Package outline

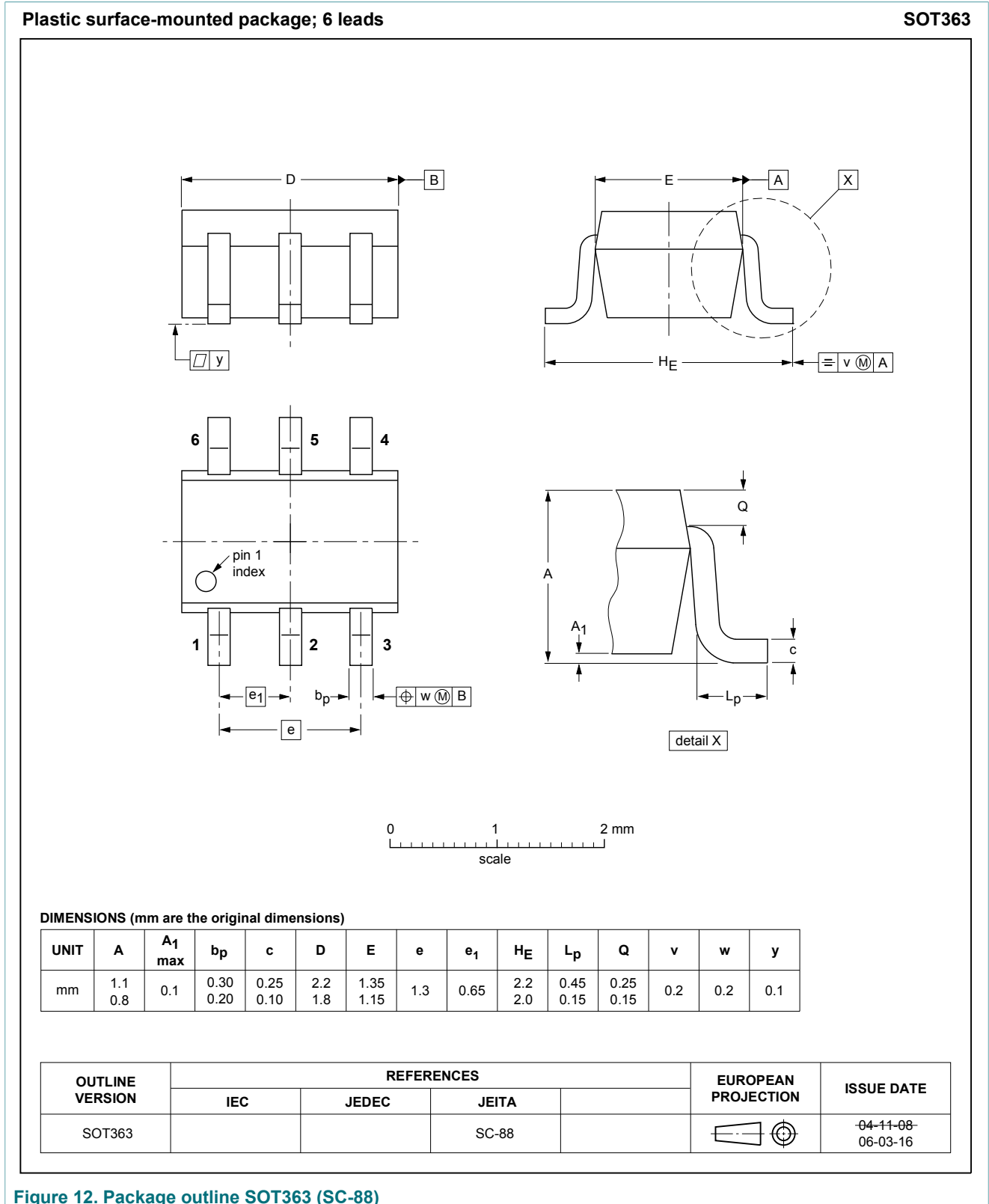
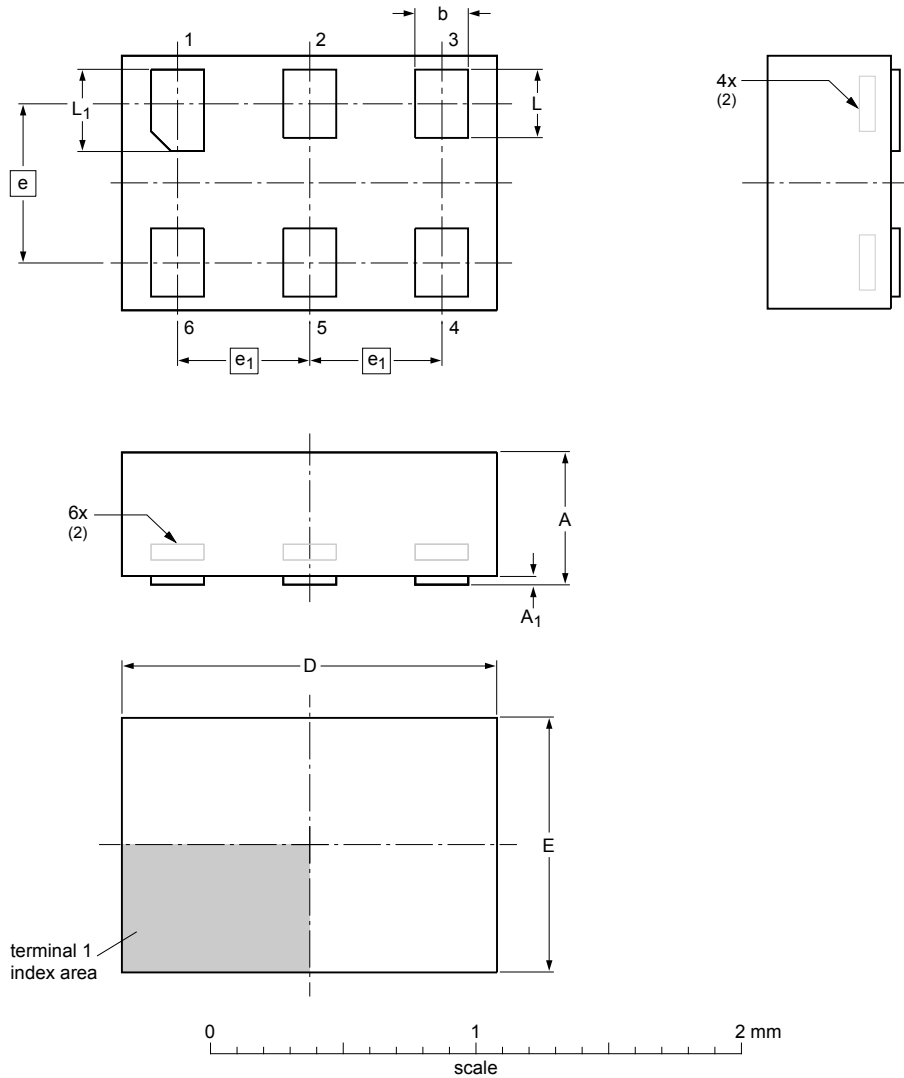


Figure 12. Package outline SOT363 (SC-88)

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

SOT886



Dimensions (mm are the original dimensions)

| Unit   | A <sup>(1)</sup> | A <sub>1</sub> | b    | D    | E    | e   | e <sub>1</sub> | L    | L <sub>1</sub> |
|--------|------------------|----------------|------|------|------|-----|----------------|------|----------------|
| max    | 0.5              | 0.04           | 0.25 | 1.50 | 1.05 |     |                | 0.35 | 0.40           |
| mm nom |                  |                | 0.20 | 1.45 | 1.00 | 0.6 | 0.5            | 0.30 | 0.35           |
| min    |                  |                | 0.17 | 1.40 | 0.95 |     |                | 0.27 | 0.32           |

Notes

- Including plating thickness.
- Can be visible in some manufacturing processes.

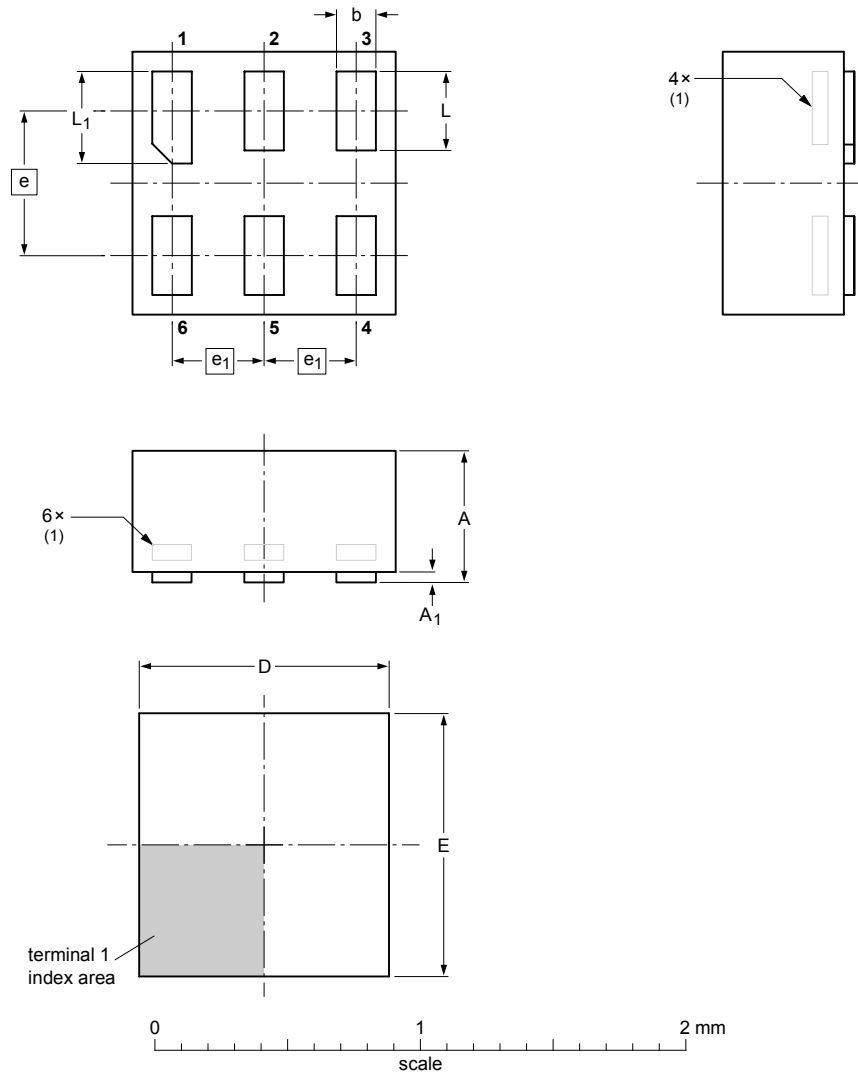
sot886\_po

| Outline version | References |        |       | European projection | Issue date                      |
|-----------------|------------|--------|-------|---------------------|---------------------------------|
|                 | IEC        | JEDEC  | JEITA |                     |                                 |
| SOT886          |            | MO-252 |       |                     | <del>04-07-22</del><br>12-01-05 |

Figure 13. 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<br>max | A <sub>1</sub><br>max | 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**

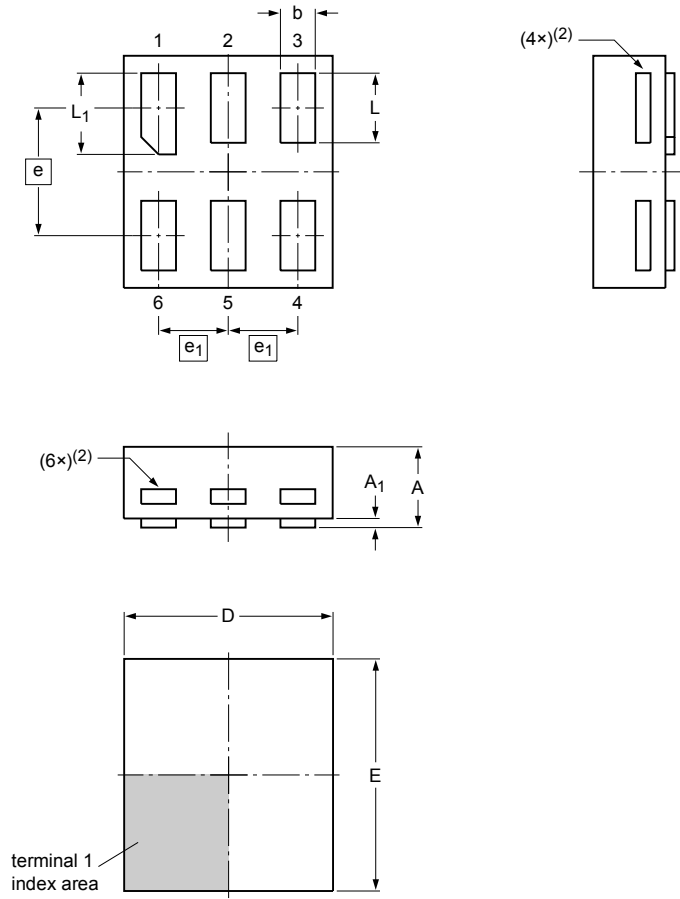
1. Can be visible in some manufacturing processes.

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

Figure 14. 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

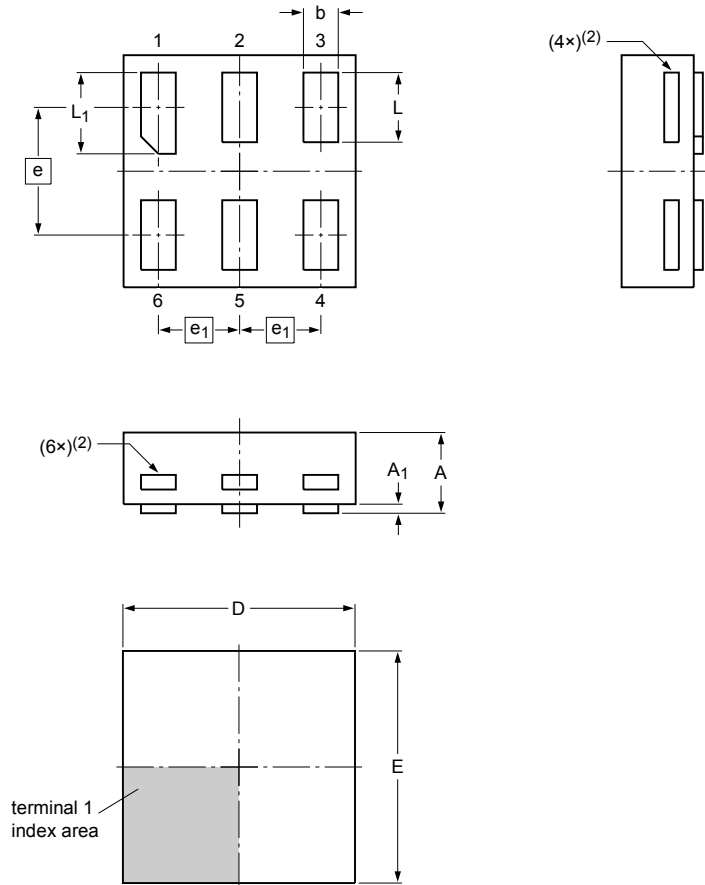
| Outline version | References |       |       |  | European projection | Issue date             |
|-----------------|------------|-------|-------|--|---------------------|------------------------|
|                 | IEC        | JEDEC | JEITA |  |                     |                        |
| SOT1115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

Figure 15. 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> |
|------|------------------|----------------|------|------|------|------|----------------|------|----------------|
| max  | 0.35             | 0.04           | 0.20 | 1.05 | 1.05 |      |                | 0.35 | 0.40           |
| nom  |                  |                | 0.15 | 1.00 | 1.00 | 0.55 | 0.35           | 0.30 | 0.35           |
| min  |                  |                | 0.12 | 0.95 | 0.95 |      |                | 0.27 | 0.32           |

Note

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

sot1202\_po

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

Figure 16. Package outline SOT1202 (XSON6)

**X2SON6: plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 x 0.8 x 0.35 mm**

**SOT1255**

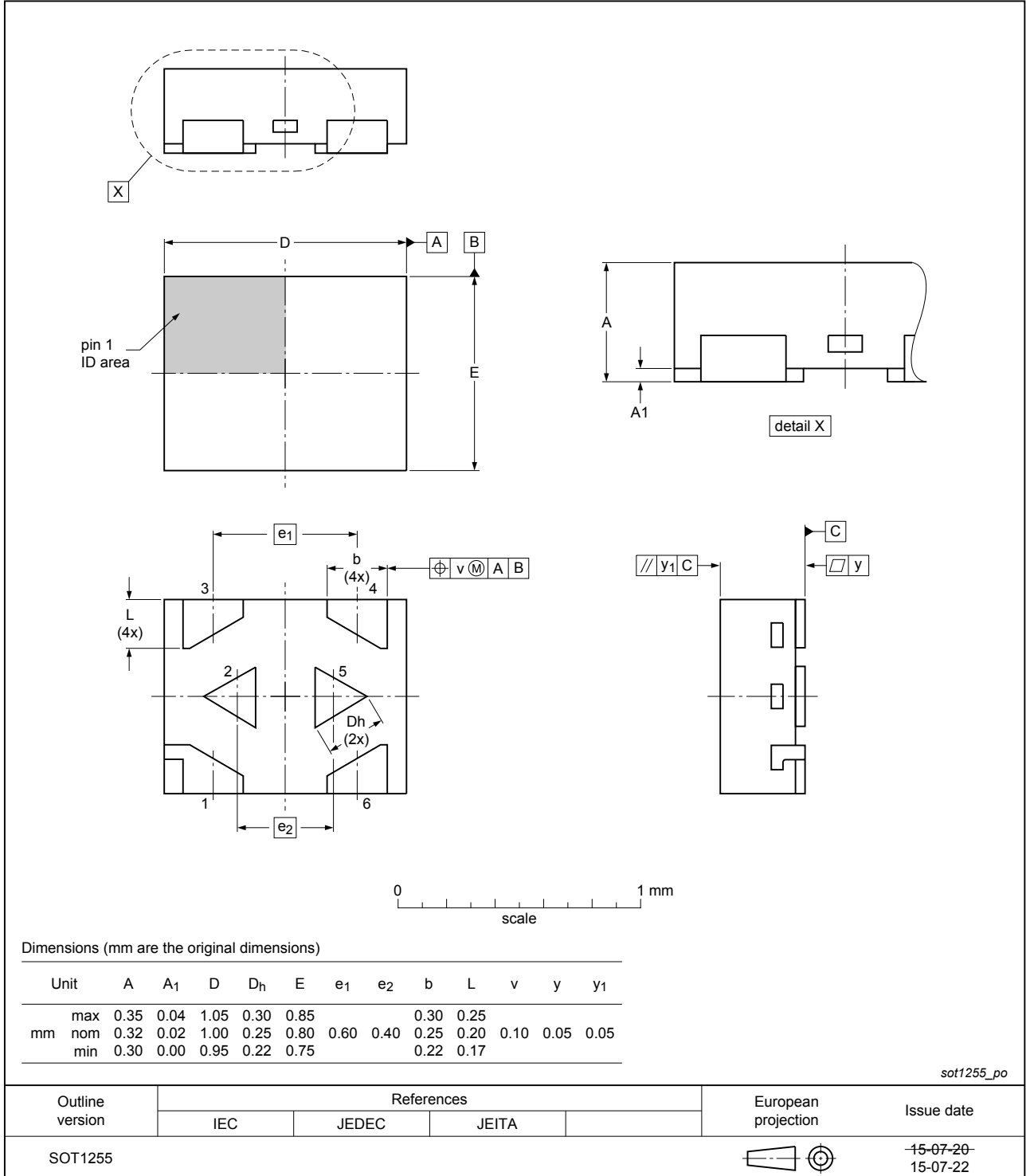


Figure 17. Package outline SOT1255 (X2SON6)

## 13 Abbreviations

Table 12. Abbreviations

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

## 14 Revision history

Table 13. Revision history

| Document ID     | Release date  | Data sheet status  | Change notice | Supersedes      |
|-----------------|---|--------------------|---------------|-----------------|
| 74AUP1G3208 v.7 | 20170307  | Product data sheet | -             | 74AUP1G3208 v.6 |
| Modifications:  | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul> |                    |               |                 |
| 74AUP1G3208 v.6 | 20160309  | Product data sheet | -             | 74AUP1G3208 v.5 |
| Modifications:  | <ul style="list-style-type: none"> <li>Added type number 74AUP1G3208GX (SOT1255/X2SON6)</li> </ul>  |                    |               |                 |
| 74AUP1G3208 v.5 | 20120622  | Product data sheet | -             | 74AUP1G3208 v.4 |
| Modifications:  | <ul style="list-style-type: none"> <li>Package outline drawing of SOT886 (<a href="#">Figure 13</a>) modified.</li> </ul>   |                    |               |                 |
| 74AUP1G3208 v.4 | 20111123  | Product data sheet | -             | 74AUP1G3208 v.3 |
| Modifications:  | <ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>  |                    |               |                 |
| 74AUP1G3208 v.3 | 20101011  | Product data sheet | -             | 74AUP1G3208 v.2 |
| 74AUP1G3208 v.2 | 20090703  | Product data sheet | -             | 74AUP1G3208 v.1 |
| 74AUP1G3208 v.1 | 20061129  | Product data sheet | -             | -               |

## 15 Legal information

### 15.1 Data sheet status

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

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

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

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

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For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.