# 74AUP1G3208

## Low-power 3-input OR-AND gate

Rev. 01.00 — 17 January 2006 Preliminary data sheet

## 1. General description

The 74AUP1G3208 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

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.

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.

## 2. Features

- 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-A114-C Class 3A. Exceeds 5000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101-C exceeds 1000 V
- Low static power consumption; $I_{CC}$ = 0.9 µA (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

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## 3. Quick reference data

**Table 1: Quick reference data**

*GND = 0 V; $T_{amb}$ = 25 °C; $t_r = t_f \leq 3$ ns.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | $C_L$ = 5 pF; $R_L$ = 1 MΩ; $V_{CC}$ = 0.8 V | | - | 18.5 | - | ns |
| | | $C_L$ = 5 pF; $R_L$ = 1 MΩ; $V_{CC}$ = 1.1 V to 1.3 V | | 2.2 | 5.4 | 10.6 | ns |
| | | $C_L$ = 5 pF; $R_L$ = 1 MΩ; $V_{CC}$ = 1.4 V to 1.6 V | | 1.9 | 3.8 | 6.4 | ns |
| | | $C_L$ = 5 pF; $R_L$ = 1 MΩ; $V_{CC}$ = 1.65 V to 1.95 V | | 1.5 | 3.1 | 5.1 | ns |
| | | $C_L$ = 5 pF; $R_L$ = 1 MΩ; $V_{CC}$ = 2.3 V to 2.7 V | | 1.3 | 2.4 | 3.7 | ns |
| | | $C_L$ = 5 pF; $R_L$ = 1 MΩ; $V_{CC}$ = 3.0 V to 3.6 V | | 1.2 | 2.2 | 3.2 | ns |
| $C_I$ | input capacitance | | | - | 1.0 | - | pF |
| $C_{PD}$ | power dissipation capacitance | $V_{CC}$ = 1.8 V; f = 1 MHz | [1] [2] | - | 3.2 | - | pF |
| | | $V_{CC}$ = 3.3 V; f = 1 MHz | [1] [2] | - | 4.2 | - | pF |

[1] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ 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:
$f_i$ = input frequency in MHz;
$f_o$ = output frequency in MHz;
$C_L$ = output load capacitance in pF;
$V_{CC}$ = supply voltage in V;
N = number of inputs switching;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

[2] The condition is $V_I$ = GND to $V_{CC}$.

## 4. Ordering information

**Table 2: Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 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 |

## 5. Marking

Table 3: Marking

| Type number | Marking code |
|---|---|
| 74AUP1G3208GW | a2 |
| 74AUP1G3208GM | a2 |
| 74AUP1G3208GF | a2 |

## 6. Functional diagram

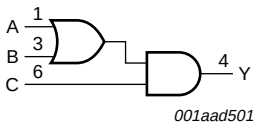



Fig 1. Logic symbol

## 7. Pinning information

### 7.1 Pinning

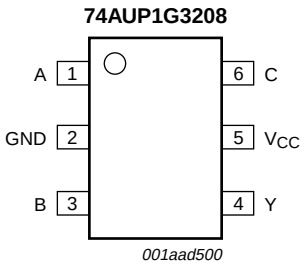



Fig 2. Pin configuration SOT363 (SC-88)

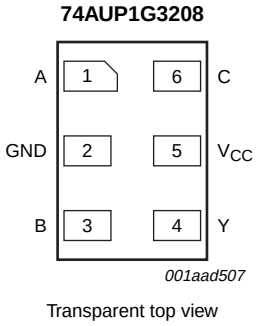



Fig 3. Pin configuration SOT886 (XSON6)

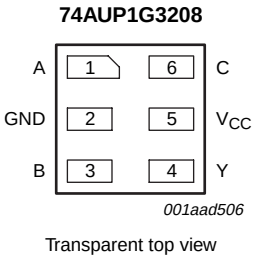



Fig 4. Pin configuration SOT891 (XSON6)

### 7.2 Pin description

**Table 4: 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 |
| $V_{CC}$ | 5 | supply voltage |
| C | 6 | data input C |

## 8. Functional description

### 8.1 Function table

**Table 5: Function table [1]**

| 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.

### 8.2 Logic configurations

**Table 6: Function selection table**

| Logic function | Figure |
|---|---|
| 2-input AND | see Figure 5 and 6 |
| 2-input OR | see Figure 7 |
| 3-input gate with the Boolean function: $Y = (A + B) \times C$ | see Figure 8 |

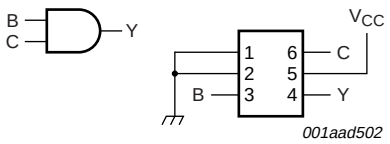



Fig 5. 2-input AND gate

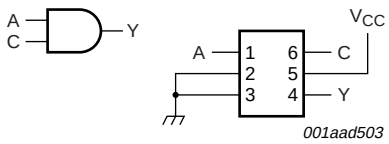



Fig 6. 2-input AND gate

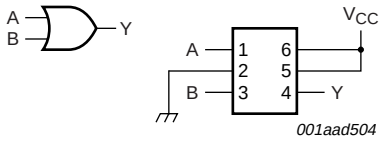



Fig 7. 2-input OR gate

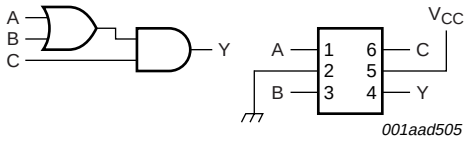



Fig 8. 3-input gate with the Boolean function: Y = (A + B) × C

## 9. Limiting values

**Table 7: 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 $V_{CC}$ | | - | ±20 | mA |
| $I_{CC}$ | quiescent 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 packages: above 45 °C the value of $P_{tot}$ derates linearly with 2.4 mW/K.

## 10. Recommended operating conditions

**Table 8: 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 |

## 11. Static characteristics

**Table 9: Static characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = 25 °C** | | | | | | |
| $V_{IH}$ | HIGH-state input voltage | $V_{CC}$ = 0.8 V | 0.70 × $V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 0.9 V to 1.95 V | 0.65 × $V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.6 | - | - | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 2.0 | - | - | V |
| $V_{IL}$ | LOW-state input voltage | $V_{CC}$ = 0.8 V | - | - | 0.30 × $V_{CC}$ | V |
| | | $V_{CC}$ = 0.9 V to 1.95 V | - | - | 0.35 × $V_{CC}$ | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | - | 0.7 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | - | - | 0.9 | V |
| $V_{OH}$ | HIGH-state output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = –20 µA; $V_{CC}$ = 0.8 V to 3.6 V | $V_{CC}$ – 0.1 | - | - | V |
| | | $I_O$ = –1.1 mA; $V_{CC}$ = 1.1 V | 0.75 × $V_{CC}$ | - | - | V |
| | | $I_O$ = –1.7 mA; $V_{CC}$ = 1.4 V | 1.11 | - | - | V |
| | | $I_O$ = –1.9 mA; $V_{CC}$ = 1.65 V | 1.32 | - | - | V |
| | | $I_O$ = –2.3 mA; $V_{CC}$ = 2.3 V | 2.05 | - | - | V |
| | | $I_O$ = –3.1 mA; $V_{CC}$ = 2.3 V | 1.9 | - | - | V |
| | | $I_O$ = –2.7 mA; $V_{CC}$ = 3.0 V | 2.72 | - | - | V |
| | | $I_O$ = –4.0 mA; $V_{CC}$ = 3.0 V | 2.6 | - | - | V |

**Table 9: Static characteristics** *…continued*

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{OL}$ | LOW-state output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = 20 µA; $V_{CC}$ = 0.8 V to 3.6 V | - | - | 0.1 | V |
| | | $I_O$ = 1.1 mA; $V_{CC}$ = 1.1 V | - | - | 0.3 × $V_{CC}$ | V |
| | | $I_O$ = 1.7 mA; $V_{CC}$ = 1.4 V | - | - | 0.31 | V |
| | | $I_O$ = 1.9 mA; $V_{CC}$ = 1.65 V | - | - | 0.31 | V |
| | | $I_O$ = 2.3 mA; $V_{CC}$ = 2.3 V | - | - | 0.31 | V |
| | | $I_O$ = 3.1 mA; $V_{CC}$ = 2.3 V | - | - | 0.44 | V |
| | | $I_O$ = 2.7 mA; $V_{CC}$ = 3.0 V | - | - | 0.31 | V |
| | | $I_O$ = 4.0 mA; $V_{CC}$ = 3.0 V | - | - | 0.44 | V |
| $I_I$ | input leakage current | $V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V | - | - | ±0.1 | µA |
| $I_{OFF}$ | power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V | - | - | ±0.2 | µA |
| $\Delta I_{OFF}$ | additional power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V to 0.2 V | - | - | ±0.2 | µA |
| $I_{CC}$ | quiescent supply current | $V_I$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V | - | - | 0.5 | µA |
| $\Delta I_{CC}$ | additional quiescent supply current | $V_I = V_{CC}$ – 0.6 V; $I_O$ = 0 A; $V_{CC}$ = 3.3 V [1] | - | - | 40 | µA |
| $C_I$ | input capacitance | $V_{CC}$ = 0 V to 3.6 V; $V_I$ = GND or $V_{CC}$ | - | 1.0 | - | pF |
| $C_O$ | output capacitance | $V_O$ = GND; $V_{CC}$ = 0 V | - | 1.8 | - | pF |
| **$T_{amb}$ = –40 °C to +85 °C** | | | | | | |
| $V_{IH}$ | HIGH-state input voltage | $V_{CC}$ = 0.8 V | 0.70 × $V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 0.9 V to 1.95 V | 0.65 × $V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.6 | - | - | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 2.0 | - | - | V |
| $V_{IL}$ | LOW-state input voltage | $V_{CC}$ = 0.8 V | - | - | 0.30 × $V_{CC}$ | V |
| | | $V_{CC}$ = 0.9 V to 1.95 V | - | - | 0.35 × $V_{CC}$ | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | - | 0.7 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | - | - | 0.9 | V |
| $V_{OH}$ | HIGH-state output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = –20 µA; $V_{CC}$ = 0.8 V to 3.6 V | $V_{CC}$ – 0.1 | - | - | V |
| | | $I_O$ = –1.1 mA; $V_{CC}$ = 1.1 V | 0.7 × $V_{CC}$ | - | - | V |
| | | $I_O$ = –1.7 mA; $V_{CC}$ = 1.4 V | 1.03 | - | - | V |
| | | $I_O$ = –1.9 mA; $V_{CC}$ = 1.65 V | 1.30 | - | - | V |
| | | $I_O$ = –2.3 mA; $V_{CC}$ = 2.3 V | 1.97 | - | - | V |
| | | $I_O$ = –3.1 mA; $V_{CC}$ = 2.3 V | 1.85 | - | - | V |
| | | $I_O$ = –2.7 mA; $V_{CC}$ = 3.0 V | 2.67 | - | - | V |
| | | $I_O$ = –4.0 mA; $V_{CC}$ = 3.0 V | 2.55 | - | - | V |

**Table 9: Static characteristics** *…continued*

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

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{OL}$ | LOW-state output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | | |
| | | $I_O$ = 20 µA; $V_{CC}$ = 0.8 V to 3.6 V | | - | - | 0.1 | V |
| | | $I_O$ = 1.1 mA; $V_{CC}$ = 1.1 V | | - | - | $0.3 \times V_{CC}$ | V |
| | | $I_O$ = 1.7 mA; $V_{CC}$ = 1.4 V | | - | - | 0.37 | V |
| | | $I_O$ = 1.9 mA; $V_{CC}$ = 1.65 V | | - | - | 0.35 | V |
| | | $I_O$ = 2.3 mA; $V_{CC}$ = 2.3 V | | - | - | 0.33 | V |
| | | $I_O$ = 3.1 mA; $V_{CC}$ = 2.3 V | | - | - | 0.45 | V |
| | | $I_O$ = 2.7 mA; $V_{CC}$ = 3.0 V | | - | - | 0.33 | V |
| | | $I_O$ = 4.0 mA; $V_{CC}$ = 3.0 V | | - | - | 0.45 | V |
| $I_I$ | input leakage current | $V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V | | - | - | ±0.5 | µA |
| $I_{OFF}$ | power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V | | - | - | ±0.5 | µA |
| $\Delta I_{OFF}$ | additional power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V to 0.2 V | | - | - | ±0.6 | µA |
| $I_{CC}$ | quiescent supply current | $V_I$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V | | - | - | 0.9 | µA |
| $\Delta I_{CC}$ | additional quiescent supply current | $V_I = V_{CC} - 0.6$ V; $I_O$ = 0 A; $V_{CC}$ = 3.3 V | [1] | - | - | 50 | µA |
| **$T_{amb}$ = −40 °C to +125 °C** | | | | | | | |
| $V_{IH}$ | HIGH-state input voltage | $V_{CC}$ = 0.8 V | | $0.75 \times V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 0.9 V to 1.95 V | | $0.70 \times V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | | 1.6 | - | - | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 2.0 | - | - | V |
| $V_{IL}$ | LOW-state input voltage | $V_{CC}$ = 0.8 V | | - | - | $0.25 \times V_{CC}$ | V |
| | | $V_{CC}$ = 0.9 V to 1.95 V | | - | - | $0.30 \times V_{CC}$ | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | | - | - | 0.7 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | - | - | 0.9 | V |
| $V_{OH}$ | HIGH-state output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | | |
| | | $I_O$ = −20 µA; $V_{CC}$ = 0.8 V to 3.6 V | | $V_{CC} - 0.11$ | - | - | V |
| | | $I_O$ = −1.1 mA; $V_{CC}$ = 1.1 V | | $0.6 \times V_{CC}$ | - | - | V |
| | | $I_O$ = −1.7 mA; $V_{CC}$ = 1.4 V | | 0.93 | - | - | V |
| | | $I_O$ = −1.9 mA; $V_{CC}$ = 1.65 V | | 1.17 | - | - | V |
| | | $I_O$ = −2.3 mA; $V_{CC}$ = 2.3 V | | 1.77 | - | - | V |
| | | $I_O$ = −3.1 mA; $V_{CC}$ = 2.3 V | | 1.67 | - | - | V |
| | | $I_O$ = −2.7 mA; $V_{CC}$ = 3.0 V | | 2.40 | - | - | V |
| | | $I_O$ = −4.0 mA; $V_{CC}$ = 3.0 V | | 2.30 | - | - | V |

**Table 9: Static characteristics** *…continued*

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{OL}$ | LOW-state output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = 20 µA; $V_{CC}$ = 0.8 V to 3.6 V | - | - | 0.11 | V |
| | | $I_O$ = 1.1 mA; $V_{CC}$ = 1.1 V | - | - | 0.33 × $V_{CC}$ | V |
| | | $I_O$ = 1.7 mA; $V_{CC}$ = 1.4 V | - | - | 0.41 | V |
| | | $I_O$ = 1.9 mA; $V_{CC}$ = 1.65 V | - | - | 0.39 | V |
| | | $I_O$ = 2.3 mA; $V_{CC}$ = 2.3 V | - | - | 0.36 | V |
| | | $I_O$ = 3.1 mA; $V_{CC}$ = 2.3 V | - | - | 0.50 | V |
| | | $I_O$ = 2.7 mA; $V_{CC}$ = 3.0 V | - | - | 0.36 | V |
| | | $I_O$ = 4.0 mA; $V_{CC}$ = 3.0 V | - | - | 0.50 | V |
| $I_I$ | input leakage current | $V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V | - | - | ±0.75 | µA |
| $I_{OFF}$ | power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V | - | - | ±0.75 | µA |
| $\Delta I_{OFF}$ | additional power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V to 0.2 V | - | - | ±0.75 | µA |
| $I_{CC}$ | quiescent supply current | $V_I$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V | - | - | 1.4 | µA |
| $\Delta I_{CC}$ | additional quiescent supply current | $V_I = V_{CC}$ − 0.6 V; $I_O$ = 0 A; $V_{CC}$ = 3.3 V [1] | - | - | 75 | µA |

[1] One input at $V_{CC}$ − 0.6 V, other input at $V_{CC}$ or GND.

## 12. Dynamic characteristics

**Table 10: Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 10*

| Symbol | Parameter | Conditions | Min | Typ [1] | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = 25 °C; $C_L$ = 5 pF** | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | |
| | | $V_{CC}$ = 0.8 V | - | 18.5 | - | ns |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 2.2 | 5.4 | 10.6 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 1.9 | 3.8 | 6.4 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 1.5 | 3.1 | 5.1 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.3 | 2.4 | 3.7 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 1.2 | 2.2 | 3.2 | ns |
| **$T_{amb}$ = 25 °C; $C_L$ = 10 pF** | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | |
| | | $V_{CC}$ = 0.8 V | - | 22.1 | - | ns |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 2.6 | 6.3 | 12.4 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 2.3 | 4.4 | 7.4 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 2.0 | 3.6 | 5.9 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.7 | 3.0 | 4.4 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 1.6 | 2.7 | 3.9 | ns |
| **$T_{amb}$ = 25 °C; $C_L$ = 15 pF** | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | |
| | | $V_{CC}$ = 0.8 V | - | 25.6 | - | ns |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 3.0 | 7.1 | 14.1 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 2.6 | 5.0 | 8.4 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 2.2 | 4.1 | 6.7 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 2.0 | 3.4 | 5.0 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 1.9 | 3.2 | 4.5 | ns |
| **$T_{amb}$ = 25 °C; $C_L$ = 30 pF** | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | |
| | | $V_{CC}$ = 0.8 V | - | 34.1 | - | ns |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 3.9 | 9.3 | 18.9 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 3.4 | 6.5 | 11.0 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 3.0 | 5.4 | 8.9 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 2.8 | 4.5 | 6.5 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 2.6 | 4.3 | 5.8 | ns |

**Table 10: Dynamic characteristics** *...continued*

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 10*

| Symbol | Parameter | Conditions | | Min | Typ [1] | Max | Unit |
|---|---|---|---|---|---|---|---|
| **$T_{amb}$ = 25 °C** | | | | | | | |
| $C_{PD}$ | power dissipation capacitance | f = 1 MHz | [2] [3] | | | | |
| | | $V_{CC}$ = 0.8 V | | - | 3.1 | - | pF |
| | | $V_{CC}$ = 1.1 V to 1.3 V | | - | 3.1 | - | pF |
| | | $V_{CC}$ = 1.4 V to 1.6 V | | - | 3.1 | - | pF |
| | | $V_{CC}$ = 1.65 V to 1.95 V | | - | 3.2 | - | pF |
| | | $V_{CC}$ = 2.3 V to 2.7 V | | - | 3.6 | - | pF |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | - | 4.2 | - | pF |

[1] All typical values are measured at nominal $V_{CC}$.

[2] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ 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:
$f_i$ = input frequency in MHz;
$f_o$ = output frequency in MHz;
$C_L$ = output load capacitance in pF;
$V_{CC}$ = supply voltage in V;
N = number of inputs switching;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

[3] The condition is $V_I$ = GND to $V_{CC}$.

**Table 11: Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 10*

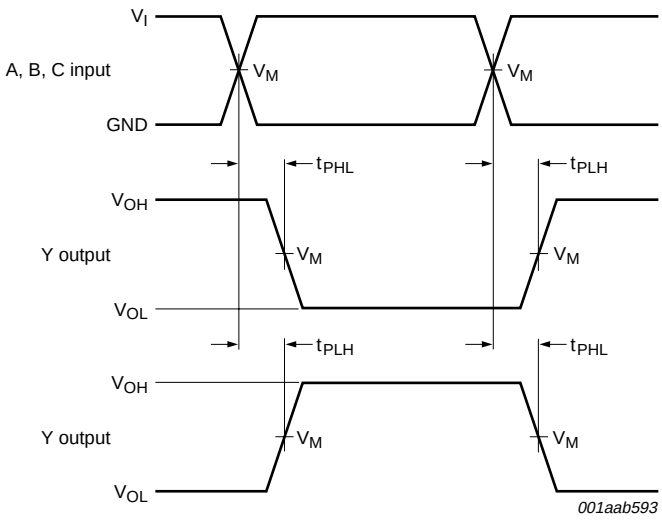
| Symbol | Parameter | Conditions | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | |
| **$C_L$ = 5 pF** | | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | | |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 2.2 | 10.9 | 2.2 | 11.1 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 1.8 | 6.9 | 1.8 | 7.2 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 1.4 | 5.6 | 1.4 | 5.9 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.2 | 4.1 | 1.2 | 4.4 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 1.1 | 3.4 | 1.1 | 3.6 | ns |
| **$C_L$ = 10 pF** | | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | | |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 2.5 | 12.8 | 2.5 | 13.1 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 2.1 | 8.0 | 2.1 | 8.4 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 1.8 | 6.4 | 1.8 | 6.8 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.6 | 4.8 | 1.6 | 5.1 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 1.4 | 4.2 | 1.4 | 4.4 | ns |

**Table 11: Dynamic characteristics** *…continued*

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 10*

| Symbol | Parameter | Conditions | –40 °C to +85 °C | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | |
| **$C_L$ = 15 pF** | | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | | |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 2.8 | 14.6 | 2.8 | 14.9 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 2.4 | 9.1 | 2.4 | 9.5 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 2.1 | 7.4 | 2.1 | 7.8 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.9 | 5.5 | 1.9 | 5.9 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 1.7 | 4.8 | 1.7 | 5.0 | ns |
| **$C_L$ = 30 pF** | | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay A, B or C to Y | see Figure 9 | | | | | |
| | | $V_{CC}$ = 1.1 V to 1.3 V | 3.7 | 19.7 | 3.7 | 20.1 | ns |
| | | $V_{CC}$ = 1.4 V to 1.6 V | 3.2 | 12.1 | 3.2 | 12.7 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 2.9 | 9.7 | 2.9 | 10.3 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 2.6 | 7.1 | 2.6 | 7.5 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 2.4 | 6.4 | 2.4 | 6.7 | ns |

## 13. Waveforms



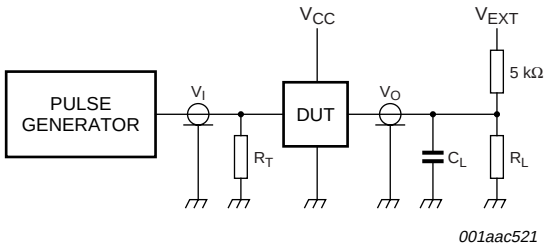

Measurement points are given in Table 12.

$V_{OL}$ and $V_{OH}$ are typical output voltage drop that occur with the output load.

**Fig 9. Input A, B and C to output Y propagation delay times.**

**Table 12: 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 × $V_{CC}$ | 0.5 × $V_{CC}$ | $V_{CC}$ | ≤ 3.0 ns |




Test data is given in Table 13.

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 10. Load circuitry for switching times**

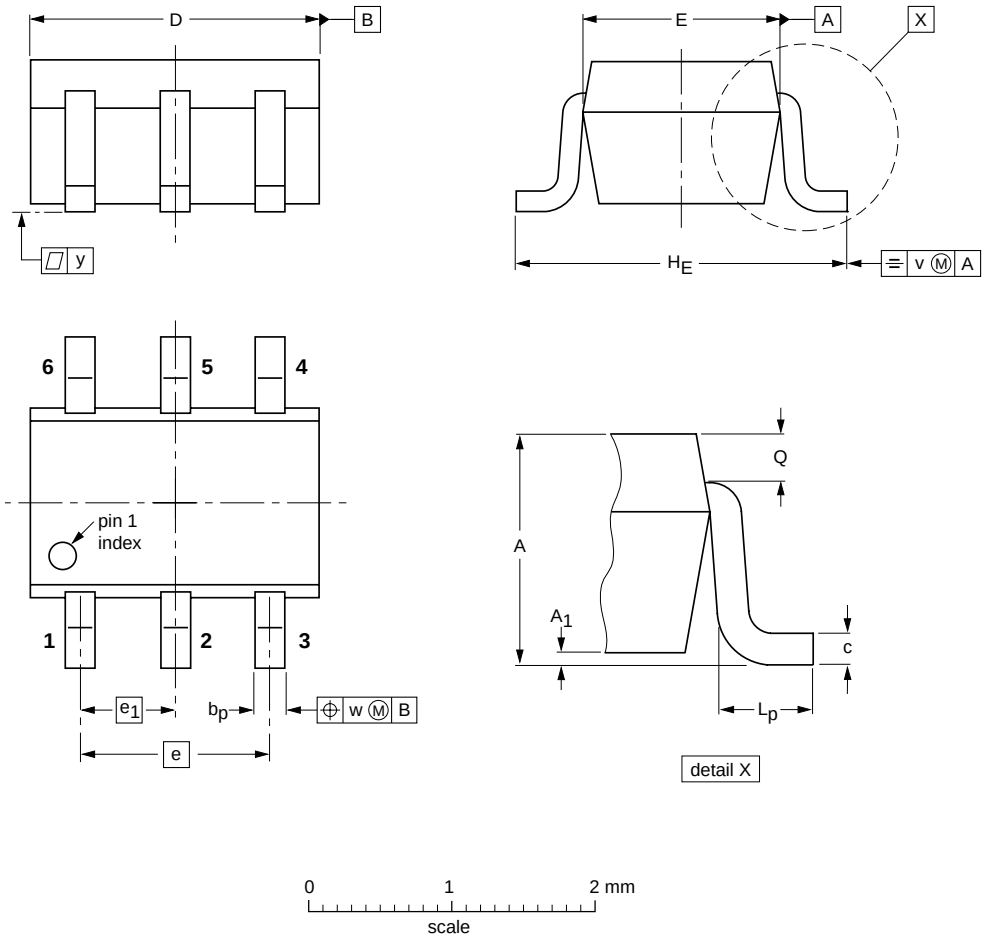
**Table 13: Test data**

| 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 kΩ, for measuring propagation delays, setup and hold times and pulse width $R_L$ = 1 MΩ.

## 14. Package outline

**Plastic surface mounted package; 6 leads** **SOT363**



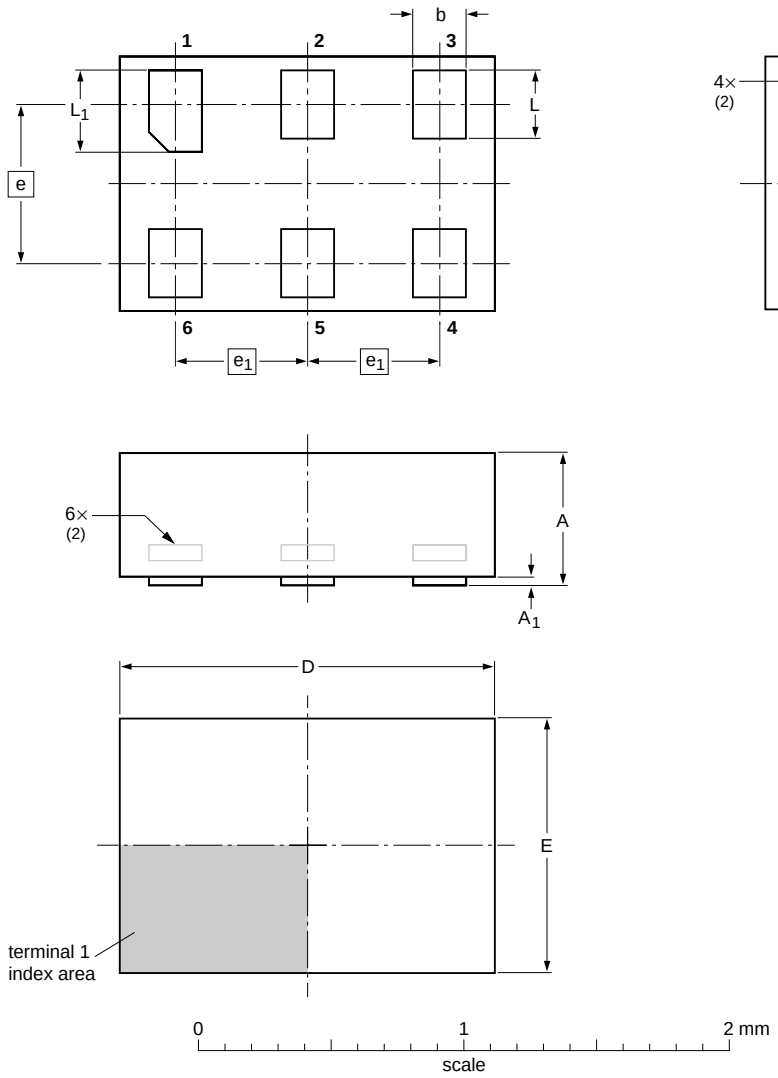

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT363 | | | SC-88 | | | ~~97-02-28~~<br>04-11-08 |

**Fig 11. 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(1) max | A1 max | b | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.04 | 0.25<br>0.17 | 1.5<br>1.4 | 1.05<br>0.95 | 0.6 | 0.5 | 0.35<br>0.27 | 0.40<br>0.32 |

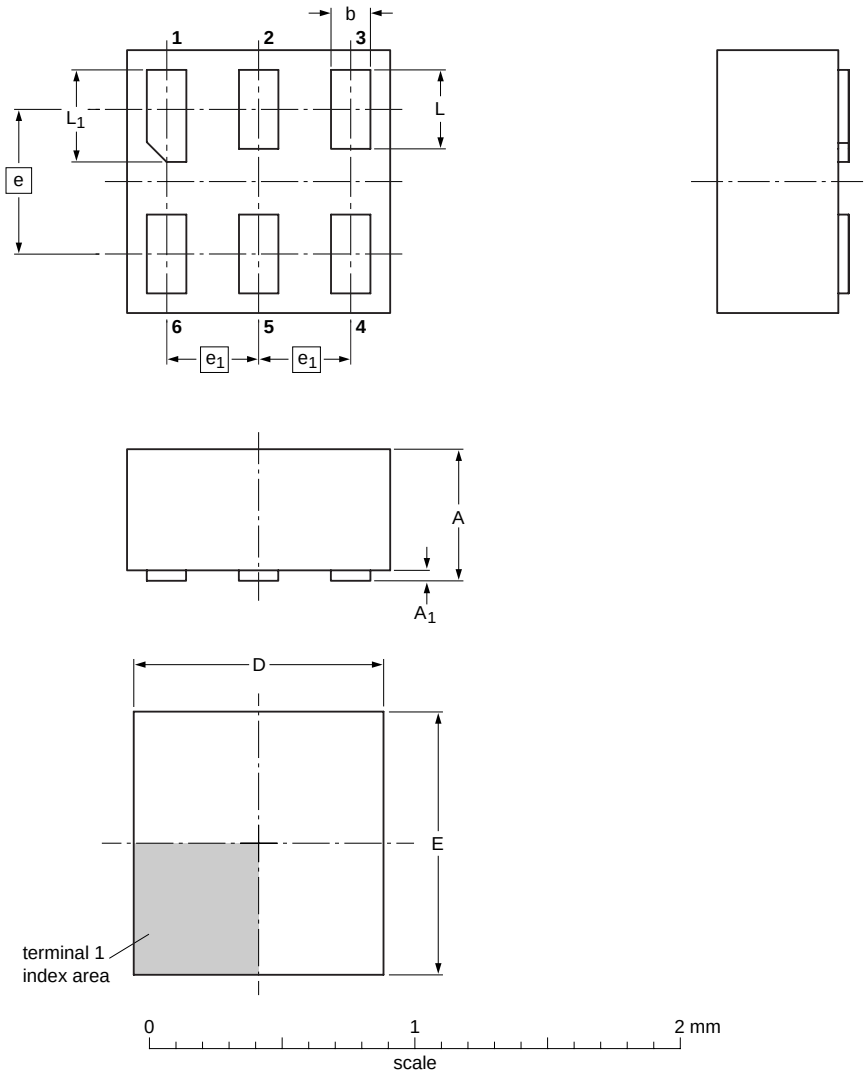
**Notes**

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT886 | | MO-252 | | | | ~~04-07-15~~<br>04-07-22 |

**Fig 12. 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 max | $A_1$ max | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|
| 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 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT891 | | | | | | ~~05-03-11~~<br>05-04-06 |

**Fig 13. Package outline SOT891 (XSON6)**

## 15. Abbreviations

**Table 14: Abbreviations**

| Acronym | Description |
|---|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| MM | Machine Model |
| TTL | Transistor Transistor Logic |

## 16. Revision history

**Table 15: Revision history**

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|---|---|---|---|---|---|
| 74AUP1G3208_1 | <tbd> | Preliminary data sheet | - | - | - |

## 17. Data sheet status

| Level | Data sheet status [1] | Product status [2] [3] | Definition |
|---|---|---|---|
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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## 22. Contents





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