

74AUP1G04

Low-power inverter

Rev. 9 — 8 June 2018

Product data sheet

1 General description

The 74AUP1G04 provides the single inverting buffer.

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

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

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

2 Features and benefits

- 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: ANSI/ESDA/JEDEC JS-001 Class 3A exceeds 5000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 Class C3 exceeds 1000 V
 - MM: JESD22-A115-A exceeds 200 V
- Low static power consumption; $I_{CC} = 0.9 \mu\text{A}$ (maximum)
- Latch-up performance exceeds 100 mA per JESD 78B 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 | | | |
|--------------|---------------------|--------|--|-----------|
| | Temperature range | Name | Description | Version |
| 74AUP1G04GV | -40 ° C to +125 ° C | SC-74A | plastic surface-mounted package; 5 leads | SOT753 |
| 74AUP1G04GW | -40 ° C to +125 ° C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74AUP1G04GM | -40 ° C to +125 ° C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm | SOT886 |
| 74AUP1G04GF | -40 ° C to +125 ° C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm | SOT891 |
| 74AUP1G04GN | -40 ° C to +125 ° C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm | SOT1115 |
| 74AUP1G04GS | -40 ° C to +125 ° C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 0.35 mm | SOT1202 |
| 74AUP1G04GX | -40 ° C to +125 ° C | X2SON5 | plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.35 mm | SOT1226 |
| 74AUP1G04GX4 | -40 ° C to +125 ° C | X2SON4 | plastic thermal enhanced extremely thin small outline package; no leads; 4 terminals; body 0.6 x 0.6 x 0.32 mm | SOT1269-2 |

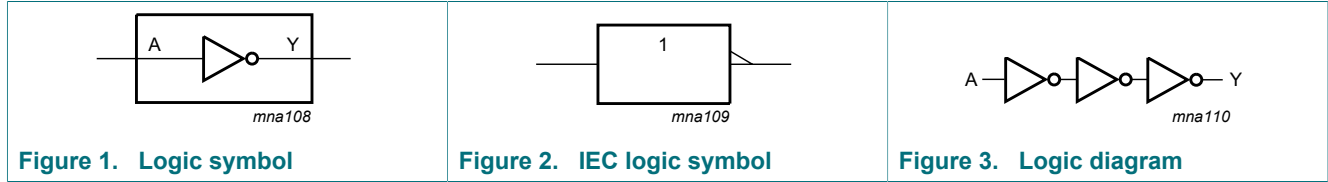
4 Marking

Table 2. Marking

| Type number | Marking code ^[1] |
|--------------|-----------------------------|
| 74AUP1G04GV | p04 |
| 74AUP1G04GW | pC |
| 74AUP1G04GM | pC |
| 74AUP1G04GF | pC |
| 74AUP1G04GN | pC |
| 74AUP1G04GS | pC |
| 74AUP1G04GX | pC |
| 74AUP1G04GX4 | pC |

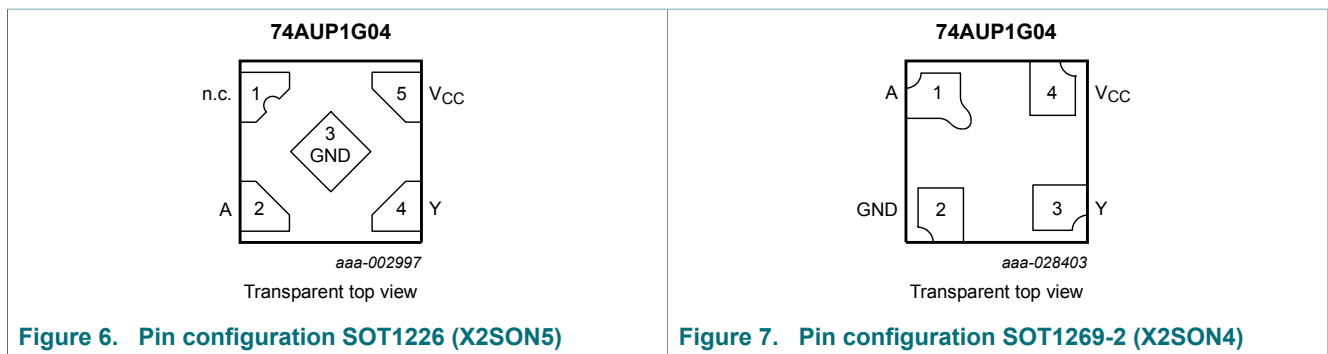
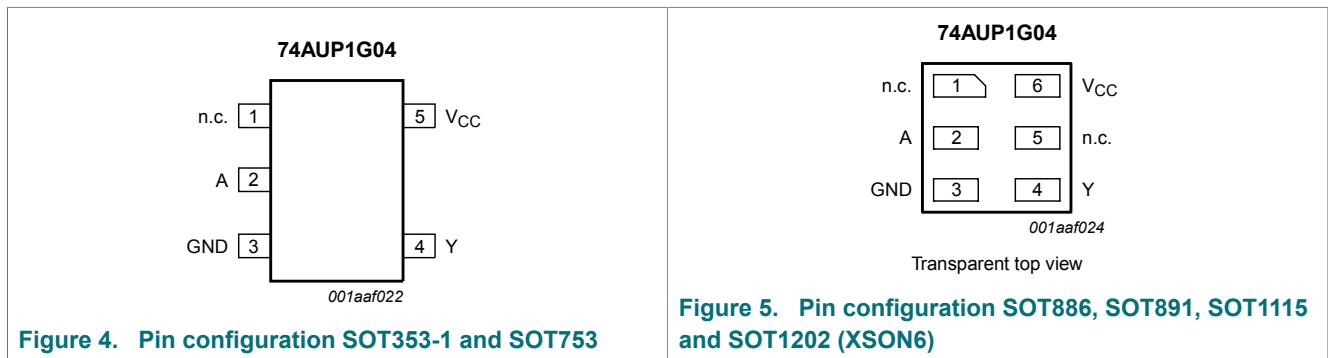
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5 Functional diagram



6 Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

| Symbol | Pin | | | Description |
|-----------------|---------------------------|-------|--------|----------------|
| | SC-74A, TSSOP5 and X2SON5 | XSON6 | X2SON4 | |
| n.c. | 1 | 1, 5 | - | not connected |
| A | 2 | 2 | 1 | data input |
| GND | 3 | 3 | 2 | ground (0 V) |
| Y | 4 | 4 | 3 | data output |
| V _{CC} | 5 | 6 | 4 | supply voltage |

7 Functional description

Table 4. Function table ^[1]

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

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

8 Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|-------------------------|--|------|----------------|------|
| V_{CC} | supply voltage | | -0.5 | +4.6 | V |
| I_{IK} | input clamping current | $V_I < 0$ V | -50 | - | mA |
| V_I | input voltage | | -0.5 | +4.6 | V |
| I_{OK} | output clamping current | $V_O < 0$ V | -50 | - | mA |
| V_O | output voltage | active mode | -0.5 | $V_{CC} + 0.5$ | V |
| | | power-down mode | -0.5 | +4.6 | V |
| 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 | | | |
| | | TSSOP5, SC-74A, XSON6 and X2SON5 package | - | 250 | mW |
| | | X2SON4 package | - | 150 | mW |

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

[2] For TSSOP5 and SC-74A packages: above 87.5 ° C the value of P_{tot} derates linearly with 4.0 mW/K.

For XSON6 and X2SON5 packages: above 118 ° C the value of P_{tot} derates linearly with 7.8 mW/K.

[3] For X2SON4 packages: above 57 ° C the value of P_{tot} derates linearly with 1.7 mW/K.

9 Recommended operating conditions

Table 6. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---------------------|-------------------------------------|---------------------------------|-----|----------|------|
| V_{CC} | supply voltage | | 0.8 | 3.6 | V |
| V_I | input voltage | | 0 | 3.6 | V |
| V_O | output voltage | active mode | 0 | V_{CC} | V |
| | | power-down mode; $V_{CC} = 0$ V | 0 | 3.6 | V |
| T_{amb} | ambient temperature | | -40 | +125 | ° C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 0.8$ V to 3.6 V | 0 | 200 | ns/V |

10 Static characteristics

Table 7. Static characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------------|---------------------------|--|----------------|-----|--------------|------|
| $T_{amb} = 25$ ° C | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 0.8$ V | $0.70V_{CC}$ | - | - | V |
| | | $V_{CC} = 0.9$ V to 1.95 V | $0.65V_{CC}$ | - | - | 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-level input voltage | $V_{CC} = 0.8$ V | - | - | $0.30V_{CC}$ | V |
| | | $V_{CC} = 0.9$ V to 1.95 V | - | - | $0.35V_{CC}$ | 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-level output voltage | $V_I = V_{IH}$ or V_{IL} | | | | |
| | | $I_O = -20$ μ A; $V_{CC} = 0.8$ V to 3.6 V | $V_{CC} - 0.1$ | - | - | V |
| | | $I_O = -1.1$ mA; $V_{CC} = 1.1$ V | $0.75V_{CC}$ | - | - | 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 | | |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|---|-----------------------|-----|---------------------|------|
| V _{OL} | LOW-level 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 | - | - | 0.3V _{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 |
| ΔI _{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} | supply current | V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V | - | - | 0.5 | μA |
| ΔI _{CC} | additional supply current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V | - | - | 40 | μA |
| C _I | input capacitance | V _{CC} = 0 V to 3.6 V; V _I = GND or V _{CC} | - | 0.8 | - | pF |
| C _O | output capacitance | V _O = GND; V _{CC} = 0 V | - | 1.7 | - | pF |
| T_{amb} = -40 ° C to +85 ° C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 0.8 V | 0.70V _{CC} | - | - | V |
| | | V _{CC} = 0.9 V to 1.95 V | 0.65V _{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-level input voltage | V _{CC} = 0.8 V | - | - | 0.30V _{CC} | V |
| | | V _{CC} = 0.9 V to 1.95 V | - | - | 0.35V _{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-level 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 | 0.7V _{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 | | |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|---|------------------------|-----|---------------------|------|
| V _{OL} | LOW-level 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 | - | - | 0.3V _{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 |
| ΔI _{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} | supply current | V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V | - | - | 0.9 | μA |
| ΔI _{CC} | additional supply current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V | - | - | 50 | μA |
| T_{amb} = -40 ° C to +125 ° C | | | | | | |
| V _{IH} | HIGH-level input voltage | V _{CC} = 0.8 V | 0.75V _{CC} | - | - | V |
| | | V _{CC} = 0.9 V to 1.95 V | 0.70V _{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-level input voltage | V _{CC} = 0.8 V | - | - | 0.25V _{CC} | V |
| | | V _{CC} = 0.9 V to 1.95 V | - | - | 0.30V _{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-level 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 | 0.6V _{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 | | |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|--------------------------------------|---|------|-----|---------------------|------|
| V _{OL} | LOW-level 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 | - | - | 0.33V _{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 |
| ΔI _{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} | supply current | V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V | - | - | 1.4 | μA |
| ΔI _{CC} | additional supply current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V | - | - | 75 | μA |

11 Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#)

| Symbol | Parameter | Conditions | Min | Typ ^[1] | Max | Unit |
|--|-------------------|---|-----|--------------------|------|------|
| T_{amb} = 25 ° C; C_L = 5 pF | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[2] | | | | |
| | | V _{CC} = 0.8 V | - | 16.0 | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 2.4 | 5.0 | 10.3 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 1.8 | 3.6 | 6.4 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 1.5 | 2.9 | 5.0 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.2 | 2.4 | 3.9 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.1 | 2.1 | 3.2 | ns |
| T_{amb} = 25 ° C; C_L = 10 pF | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[2] | | | | |
| | | V _{CC} = 0.8 V | - | 19.8 | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 2.8 | 5.9 | 12.2 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.3 | 4.2 | 7.5 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.0 | 3.5 | 5.9 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | 2.9 | 4.6 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.6 | 2.7 | 3.8 | ns |

| Symbol | Parameter | Conditions | Min | Typ ^[1] | Max | Unit |
|--|-------------------------------|---|-----|--------------------|------|------|
| T_{amb} = 25 ° C; C_L = 15 pF | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[2] | | | | |
| | | V _{CC} = 0.8 V | - | 23.3 | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 3.2 | 6.7 | 13.0 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.6 | 4.7 | 8.6 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.3 | 4.0 | 6.7 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.1 | 3.3 | 5.1 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.0 | 3.1 | 4.2 | ns |
| T_{amb} = 25 ° C; C_L = 30 pF | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[2] | | | | |
| | | V _{CC} = 0.8 V | - | 33.6 | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 4.4 | 8.9 | 16.0 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 3.6 | 6.3 | 10.8 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 3.2 | 5.3 | 9.0 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.9 | 4.5 | 6.5 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.9 | 4.2 | 5.4 | ns |
| T_{amb} = 25 ° C | | | | | | |
| C _{PD} | power dissipation capacitance | f = 1 MHz; V _I = GND to V _{CC} ^[3] | | | | |
| | | V _{CC} = 0.8 V | - | 2.5 | - | pF |
| | | V _{CC} = 1.1 V to 1.3 V | - | 2.7 | - | pF |
| | | V _{CC} = 1.4 V to 1.6 V | - | 2.8 | - | pF |
| | | V _{CC} = 1.65 V to 1.95 V | - | 3.0 | - | pF |
| | | V _{CC} = 2.3 V to 2.7 V | - | 3.5 | - | pF |
| | | V _{CC} = 3.0 V to 3.6 V | - | 4.0 | - | pF |

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

[2] t_{pd} is the same as t_{PLH} and t_{PHL}.

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

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

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

Table 9. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#)

| Symbol | Parameter | Conditions | -40 ° C to +85 ° C | | -40 ° C to +125 ° C | | Unit |
|------------------------------|-------------------|---|--------------------|------|---------------------|------|------|
| | | | Min | Max | Min | Max | |
| C_L = 5 pF | | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[1] | | | | | |
| | | V _{CC} = 1.1 V to 1.3 V | 2.1 | 11.4 | 2.1 | 12.6 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 1.6 | 7.4 | 1.6 | 8.2 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 1.4 | 5.9 | 1.4 | 6.5 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.1 | 4.5 | 1.1 | 5.0 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.0 | 3.9 | 1.0 | 4.3 | ns |
| C_L = 10 pF | | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[1] | | | | | |
| | | V _{CC} = 1.1 V to 1.3 V | 2.6 | 13.7 | 2.6 | 15.1 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.1 | 8.7 | 2.1 | 9.6 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 1.8 | 7.0 | 1.8 | 7.7 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.5 | 5.4 | 1.5 | 6.0 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.4 | 4.5 | 1.4 | 5.0 | ns |
| C_L = 15 pF | | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[1] | | | | | |
| | | V _{CC} = 1.1 V to 1.3 V | 3.0 | 15.8 | 3.0 | 17.4 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.4 | 10.0 | 2.4 | 11.0 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.1 | 8.0 | 2.1 | 8.8 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.8 | 6.1 | 1.8 | 6.8 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.8 | 5.0 | 1.8 | 5.5 | ns |
| C_L = 30 pF | | | | | | | |
| t _{pd} | propagation delay | A to Y; see Figure 8 ^[1] | | | | | |
| | | V _{CC} = 1.1 V to 1.3 V | 4.0 | 19.0 | 4.0 | 20.9 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 3.2 | 12.9 | 3.2 | 14.2 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.9 | 10.5 | 2.9 | 11.6 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.6 | 7.6 | 2.6 | 8.4 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.6 | 6.2 | 2.6 | 6.9 | ns |

[1] t_{pd} is the same as t_{pLH} and t_{pHL}.

11.1 Waveform and test circuit



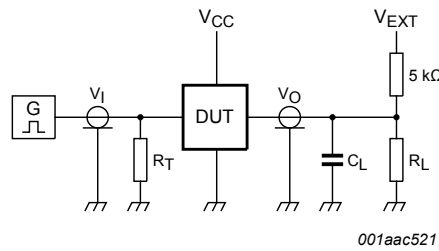
Measurement points are given in [Table 10](#).

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 8. The data input (A) to output (Y) propagation delays

Table 10. Measurement points

| Supply voltage | Output | Input | | |
|----------------|---------------------|---------------------|----------|---------------|
| V_{CC} | V_M | V_M | V_I | $t_r = t_f$ |
| 0.8 V to 3.6 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | V_{CC} | ≤ 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 9. 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 $R_L = 5$ kΩ, for measuring propagation delays, setup and hold times and pulse width $R_L = 1$ MΩ.

12 Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | e ₁ | H _E | L | L _p | v | w | y | Z ⁽¹⁾ | θ |
|------|--------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|----------------|-------|----------------|-----|-----|-----|------------------|----------|
| mm | 1.1 | 0.1 0 | 1.0 0.8 | 0.15 | 0.30 0.15 | 0.25 0.08 | 2.25 1.85 | 1.35 1.15 | 0.65 | 1.3 | 2.25 2.0 | 0.425 | 0.46 0.21 | 0.3 | 0.1 | 0.1 | 0.60 0.15 | 7° 0° |

Note

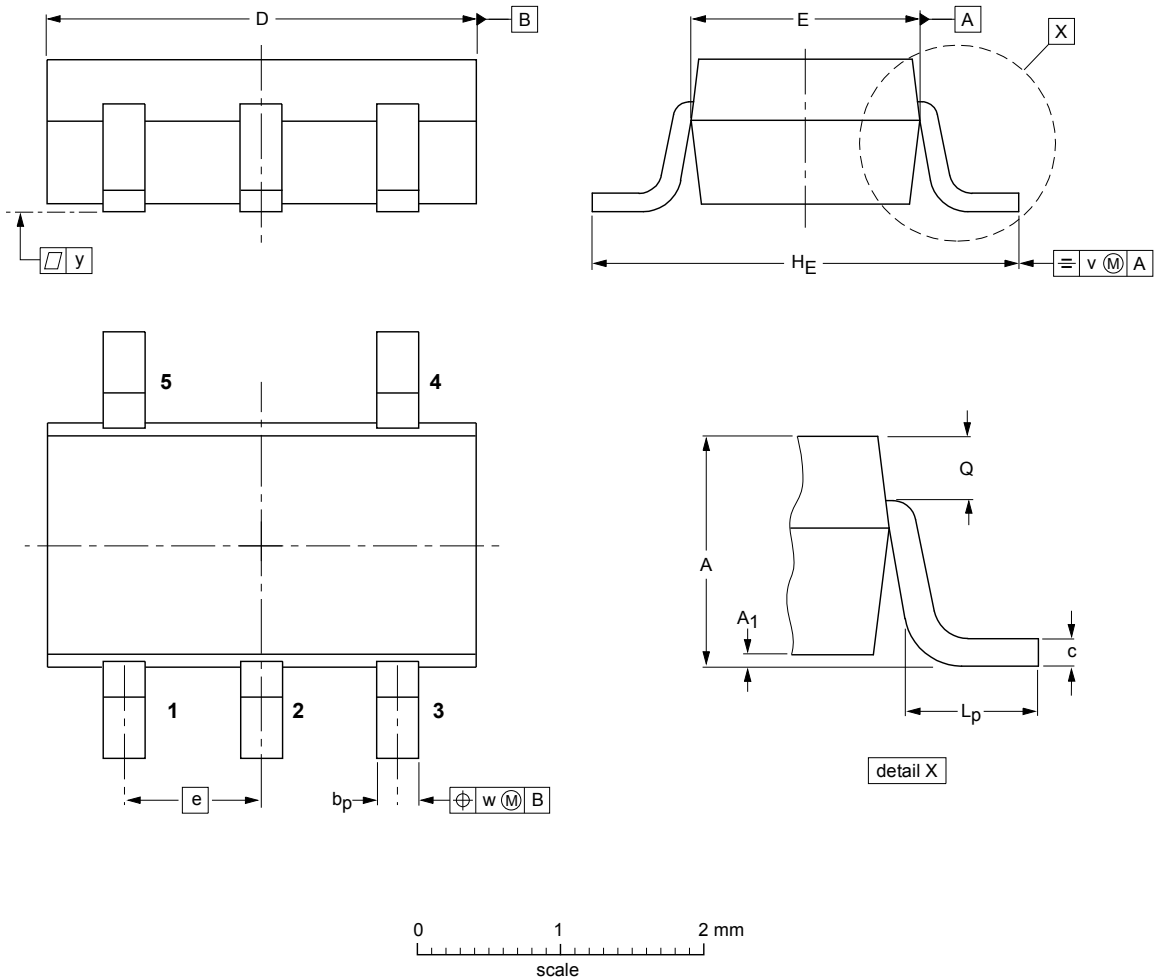
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|--------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT353-1 | | MO-203 | SC-88A | | 00-09-01 03-02-19 |

Figure 10. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753



DIMENSIONS (mm are the original dimensions)

| UNIT | A | A ₁ | b _p | c | D | E | e | H _E | L _p | Q | v | w | y |
|------|------------|----------------|----------------|--------------|------------|------------|------|----------------|----------------|--------------|-----|-----|-----|
| mm | 1.1 0.9 | 0.100 0.013 | 0.40 0.25 | 0.26 0.10 | 3.1 2.7 | 1.7 1.3 | 0.95 | 3.0 2.5 | 0.6 0.2 | 0.33 0.23 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|--------|--|---------------------|-----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT753 | | | SC-74A | | | -02-04-16 06-03-16 |

Figure 11. Package outline SOT753 (SC-74A)

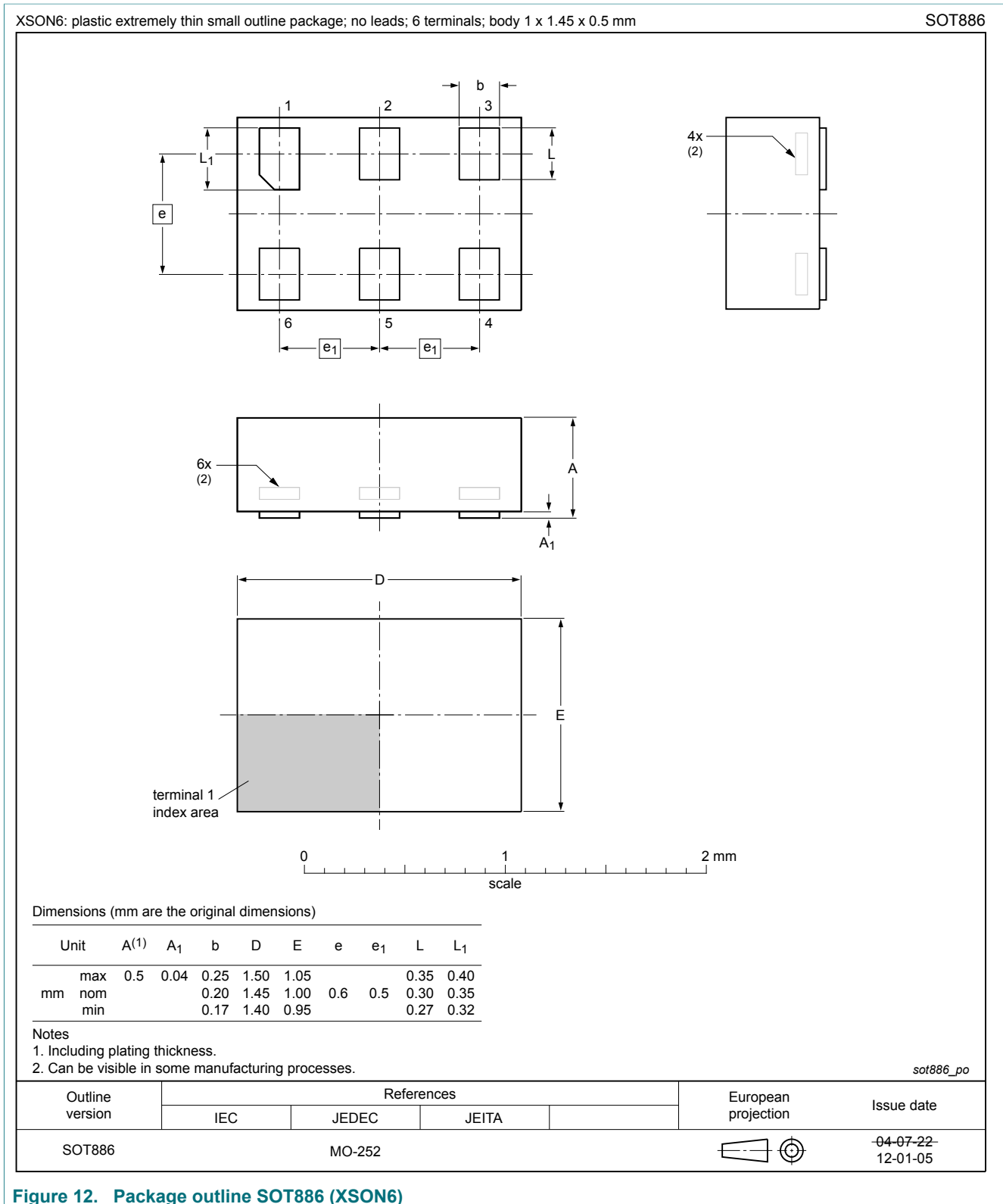


Figure 12. Package outline SOT886 (XSON6)

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 0.12 | 1.05 0.95 | 1.05 0.95 | 0.55 | 0.35 | 0.35 0.27 | 0.40 0.32 |

Note

1. Can be visible in some manufacturing processes.

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

Figure 13. 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 ⁽¹⁾ | A ₁ | b | D | E | e | e ₁ | L | L ₁ |
|------|------------------|----------------|------|------|------|-----|----------------|------|----------------|
| 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.

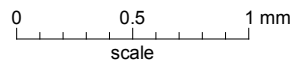
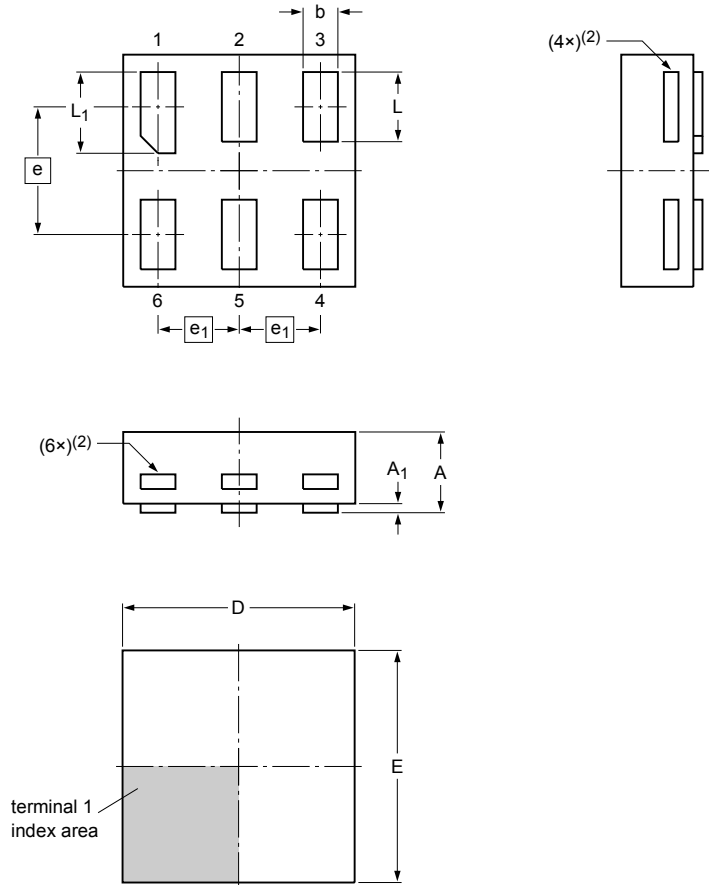
sot1115_po

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

Figure 14. 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 ⁽¹⁾ | A ₁ | b | D | E | e | e ₁ | L | L ₁ |
|------|------------------|----------------|------|------|------|------|----------------|------|----------------|
| 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.

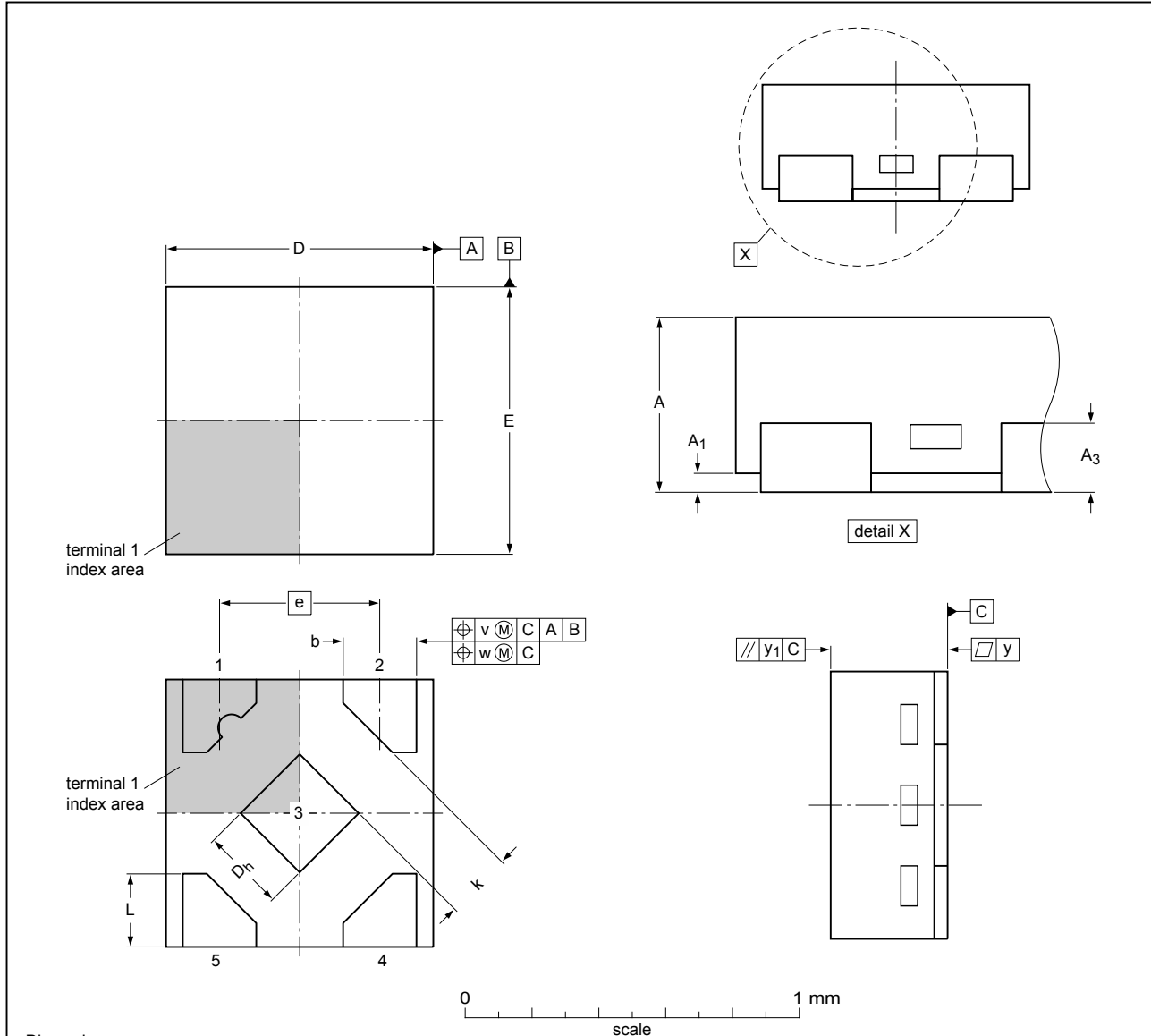
sot1202_po

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

Figure 15. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;
5 terminals; body 0.8 x 0.8 x 0.35 mm

SOT1226



Dimensions

| Unit | A ⁽¹⁾ | A ₁ | A ₃ | D | D _h | E | b | e | k | L | v | w | y | y ₁ |
|--------|------------------|----------------|----------------|------|----------------|------|------|------|------|------|-----|------|------|----------------|
| max | 0.35 | 0.04 | 0.128 | 0.85 | 0.30 | 0.85 | 0.27 | | | 0.27 | | | | |
| mm nom | | | | 0.80 | 0.25 | 0.80 | 0.22 | 0.48 | | 0.22 | 0.1 | 0.05 | 0.05 | 0.05 |
| min | | | 0.040 | 0.75 | 0.20 | 0.75 | 0.17 | | 0.20 | 0.17 | | | | |

Note

1. Dimension A is including plating thickness.
2. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

sot1226_po

| Outline version | References | | | | European projection | Issue date |
|-----------------|------------|-------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT1226 | | | | | | 12-04-10 12-04-25 |

Figure 16. Package outline SOT1226 (X2SON5)

X2SON4: plastic thermal enhanced extremely thin small outline package; no leads;
4 terminals; body 0.6 x 0.6 x 0.32 mm

SOT1269-2

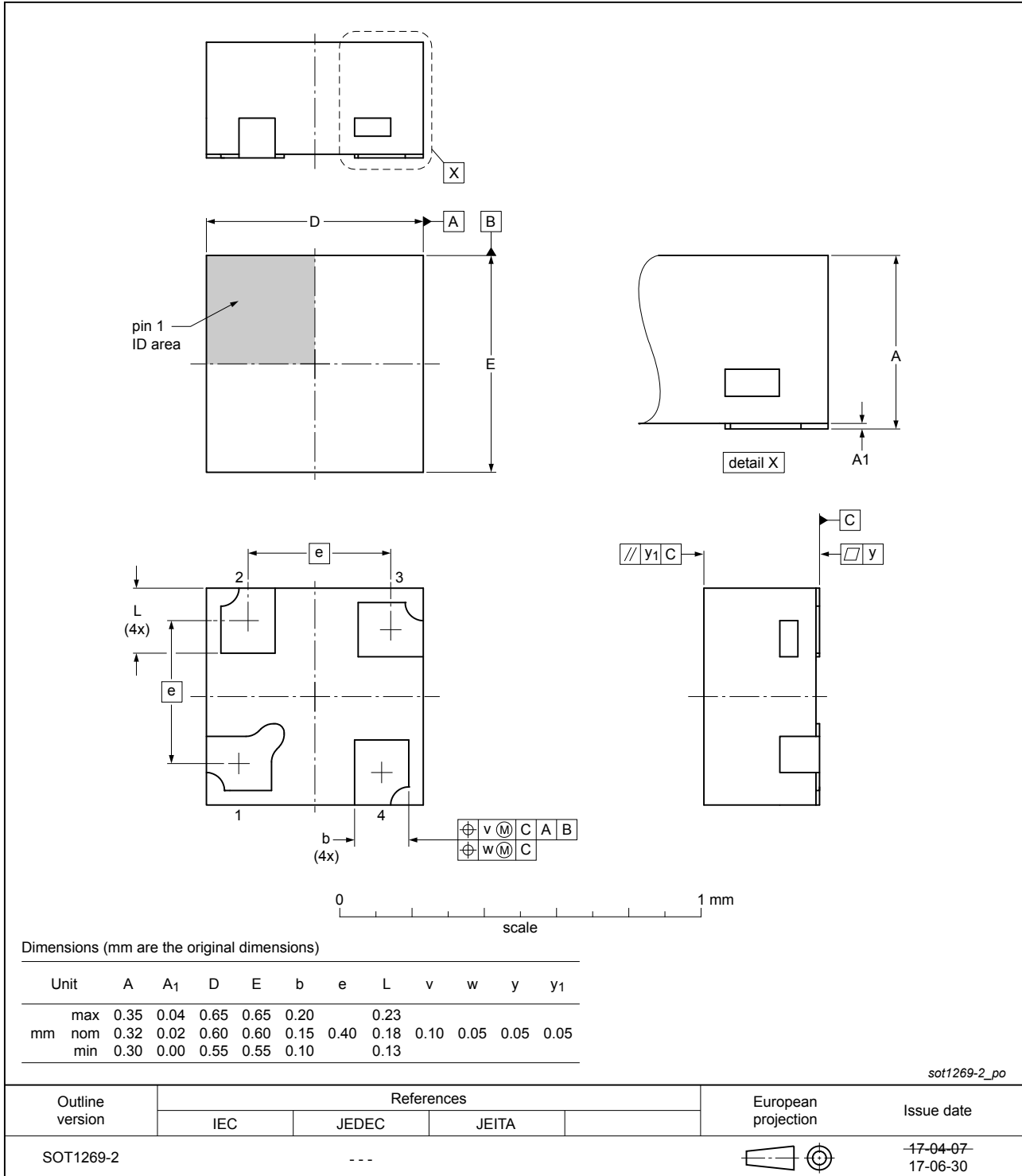


Figure 17. Package outline SOT1269-2 (X2SON4)

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 |
|----------------|---|--------------------|---------------|---------------|
| 74AUP1G04 v.9 | 20180608 | Product data sheet | - | 74AUP1G04 v.8 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74AUP1G04GX4 (SOT1269-2/X2SON4) | | | |
| 74AUP1G04 v.8 | 20171107 | Product data sheet | - | 74AUP1G04 v.7 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. | | | |
| 74AUP1G04 v.7 | 20120627 | Product data sheet | - | 74AUP1G04 v.6 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74AUP1G04GX (SOT1226) | | | |
| 74AUP1G04 v.6 | 20120214 | Product data sheet | - | 74AUP1G04 v.5 |
| Modifications: | <ul style="list-style-type: none"> Package outline drawing of SOT886 (Figure 12) modified. | | | |
| 74AUP1G04 v.5 | 20111205 | Product data sheet | - | 74AUP1G04 v.4 |
| Modifications: | <ul style="list-style-type: none"> Legal pages updated. | | | |
| 74AUP1G04 v.4 | 20100630 | Product data sheet | - | 74AUP1G04 v.3 |
| 74AUP1G04 v.3 | 20091105 | Product data sheet | - | 74AUP1G04 v.2 |
| 74AUP1G04 v.2 | 20060628 | Product data sheet | - | 74AUP1G04 v.1 |
| 74AUP1G04 v.1 | 20050718 | Product data sheet | - | - |

15 Legal information

15.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
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| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
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[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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