

74AUP1G80

Low-power D-type flip-flop; positive-edge trigger

Rev. 4 — 28 June 2012

Product data sheet

1. General description

The 74AUP1G80 provides the single positive-edge triggered D-type flip-flop. Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The input pin D must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

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 JESD22-A114F exceeds 5000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
 - ◆ CDM JESD22-C101E exceeds 1000 V
- Low static power consumption; $I_{CC} = 0.9 \mu\text{A}$ (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of V_{CC}
- I_{OFF} circuitry provides partial power-down mode operation
- Multiple package options
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$

3. Ordering information

Table 1. Ordering information

| Type number | Package | | | Version |
|-------------|-------------------|--------|--|----------|
| | Temperature range | Name | Description | |
| 74AUP1G80GW | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74AUP1G80GM | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| 74AUP1G80GF | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm | SOT891 |
| 74AUP1G80GN | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm | SOT1115 |
| 74AUP1G80GS | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm | SOT1202 |
| 74AUP1G80GX | -40 °C to +125 °C | X2SON5 | X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.35 mm | SOT1226 |

4. Marking

Table 2. Marking

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| 74AUP1G80GW | pT |
| 74AUP1G80GM | pT |
| 74AUP1G80GF | pT |
| 74AUP1G80GN | pT |
| 74AUP1G80GS | pT |
| 74AUP1G80GX | pT |

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

5. Functional diagram

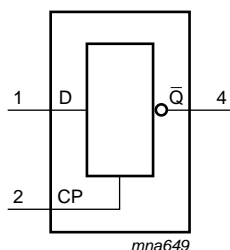


Fig 1. Logic symbol

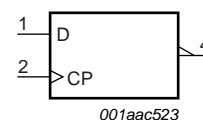
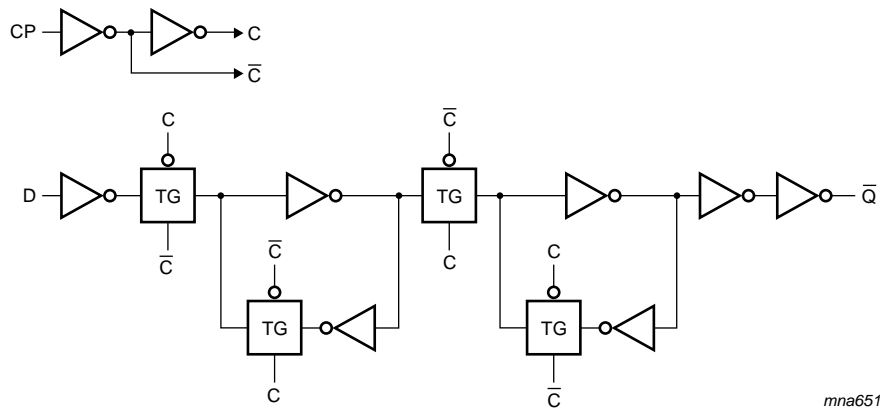


Fig 2. IEC logic symbol

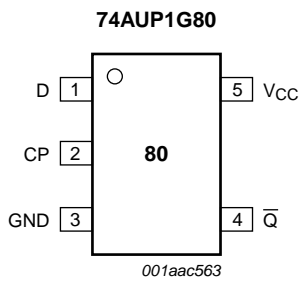


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Fig 3. Logic diagram

6. Pinning information

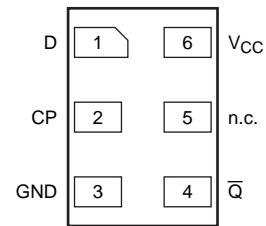
6.1 Pinning



001aac563

Fig 4. Pin configuration SOT353-1

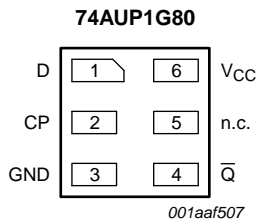
74AUP1G80



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Transparent top view

Fig 5. Pin configuration SOT886

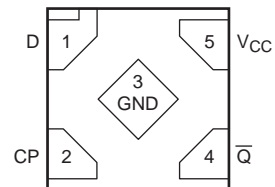


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Transparent top view

Fig 6. Pin configuration SOT891, SOT1115 and SOT1202

74AUP1G80



aaa-003008

Transparent top view

Fig 7. Pin configuration SOT1226 (X2SON5)

6.2 Pin description

Table 3. Pin description

| Symbol | Pin | | Description |
|-----------------|-------------------|-------|-------------------|
| | TSSOP5 and X2SON5 | XSON6 | |
| D | 1 | 1 | data input |
| CP | 2 | 2 | clock pulse input |
| GND | 3 | 3 | ground (0 V) |
| \overline{Q} | 4 | 4 | data output |
| n.c. | - | 5 | not connected |
| V _{CC} | 5 | 6 | supply voltage |

7. Functional description

Table 4. Function table^[1]

| Input | | Output |
|-------|---|----------------|
| CP | D | \overline{Q} |
| ↑ | L | H |
| ↑ | H | L |
| L | X | \overline{q} |

- [1] H = HIGH voltage level;
 L = LOW voltage level;
 ↑ = LOW-to-HIGH CP transition;
 X = don't care;
 \overline{q} = lower case letter indicates the state of referenced input, one set-up time prior to the LOW-to-HIGH CP transition.

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 | | [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} | 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 TSSOP5 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.

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 and Power-down mode | 0 | 3.6 | V |
| T_{amb} | ambient temperature | | -40 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 0.8\text{ V to }3.6\text{ V}$ | 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 |
|--|---------------------------|---|----------------------|-----|----------------------|---------------|
| $T_{amb} = 25\text{ °C}$ | | | | | | |
| 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 | $V_I = V_{IH}$ 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 | $V_I = V_{IH}$ 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 | $V_I = \text{GND to }3.6\text{ V}; V_{CC} = 0\text{ V to }3.6\text{ V}$ | - | - | ± 0.1 | μA |

Table 7. Static characteristics ...continued

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|---|----------------------|-----|----------------------|---------|
| I_{OFF} | power-off leakage current | V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V | - | - | ± 0.2 | μ A |
| 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 | μ A |
| 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 | μ A |
| ΔI_{CC} | additional supply current | $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V | 1 - | - | 40 | μ A |
| C_I | input capacitance | $V_{CC} = 0$ V to 3.6 V; $V_I = GND$ or V_{CC} | - | 1.5 | - | pF |
| C_O | output capacitance | $V_O = GND$; $V_{CC} = 0$ V | - | 3.0 | - | pF |
| $T_{amb} = -40$ °C to $+85$ °C | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 0.8$ V | $0.70 \times V_{CC}$ | - | - | V |
| | | $V_{CC} = 0.9$ V to 1.95 V | $0.65 \times V_{CC}$ | - | - | 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-level input voltage | $V_{CC} = 0.8$ V | - | - | $0.30 \times V_{CC}$ | V |
| | | $V_{CC} = 0.9$ V to 1.95 V | - | - | $0.35 \times V_{CC}$ | 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-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 | $0.7 \times V_{CC}$ | - | - | 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 | | |
| V_{OL} | LOW-level output voltage | $V_I = V_{IH}$ or V_{IL} | | | | |
| | | $I_O = 20$ μ A; $V_{CC} = 0.8$ 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 | μ A |
| I_{OFF} | power-off leakage current | V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V | - | - | ± 0.5 | μ A |
| 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 | μ A |

Table 7. Static characteristics ...continued

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|--|----------------------|-----|----------------------|---------------|
| 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 | μA |
| ΔI_{CC} | additional supply current | $V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$ | [1] | - | 50 | μA |
| $T_{\text{amb}} = -40 \text{ }^\circ\text{C to } +125 \text{ }^\circ\text{C}$ | | | | | | |
| 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 | $V_I = V_{IH} \text{ or } V_{IL}$ | | | | |
| | | $I_O = -20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$ | $V_{CC} - 0.11$ | - | - | 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 | $V_I = V_{IH} \text{ or } V_{IL}$ | | | | |
| | | $I_O = 20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$ | - | - | 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 | $V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$ | - | - | ± 0.75 | μA |
| | | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$ | - | - | ± 0.75 | μA |
| I_{OFF} | power-off leakage current | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$ | - | - | ± 0.75 | μA |
| ΔI_{OFF} | additional power-off leakage current | $V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$ | - | - | ± 0.75 | μA |
| I_{CC} | supply current | $V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$ | - | - | 1.4 | μA |
| ΔI_{CC} | additional supply current | $V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$ | [1] | - | 75 | μA |

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

11. Dynamic characteristics

Table 8. Dynamic characteristics

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

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +125 °C | | | | Unit |
|------------------------------|-------------------|--|-------|--------------------|------|-------------------|-------------|--------------|--------------|------|
| | | | Min | Typ ^[1] | Max | Min (85 °C) | Max (85 °C) | Min (125 °C) | Max (125 °C) | |
| C_L = 5 pF | | | | | | | | | | |
| t _{pd} | propagation delay | CP to \overline{Q} ; see Figure 8 ^[2] | - | 20.9 | - | - | - | - | - | ns |
| | | V _{CC} = 0.8 V | - | 20.9 | - | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 2.9 | 6.0 | 12.9 | 2.6 | 14.3 | 2.6 | 15.7 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 1.9 | 4.2 | 7.6 | 2.0 | 8.9 | 2.0 | 9.8 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 1.7 | 3.4 | 5.9 | 1.6 | 7.0 | 1.6 | 7.7 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.4 | 2.6 | 4.3 | 1.2 | 5.6 | 1.2 | 6.2 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.2 | 2.2 | 3.6 | 1.0 | 4.4 | 1.0 | 4.8 | ns |
| f _{max} | maximum frequency | CP; see Figure 9 | - | 53 | - | - | - | - | - | MHz |
| | | V _{CC} = 0.8 V | - | 53 | - | - | - | - | - | MHz |
| | | V _{CC} = 1.1 V to 1.3 V | - | 203 | - | 170 | - | 170 | - | MHz |
| | | V _{CC} = 1.4 V to 1.6 V | - | 347 | - | 310 | - | 300 | - | MHz |
| | | V _{CC} = 1.65 V to 1.95 V | - | 435 | - | 400 | - | 390 | - | MHz |
| | | V _{CC} = 2.3 V to 2.7 V | - | 550 | - | 490 | - | 480 | - | MHz |
| | | V _{CC} = 3.0 V to 3.6 V | - | 619 | - | 550 | - | 510 | - | MHz |
| C_L = 10 pF | | | | | | | | | | |
| t _{pd} | propagation delay | CP to \overline{Q} ; see Figure 8 ^[2] | - | 24.6 | - | - | - | - | - | ns |
| | | V _{CC} = 0.8 V | - | 24.6 | - | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 3.3 | 6.9 | 14.9 | 3.0 | 16.5 | 3.0 | 18.1 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.6 | 4.8 | 8.8 | 2.3 | 10.3 | 2.3 | 11.3 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.3 | 3.9 | 6.8 | 2.0 | 8.1 | 2.0 | 8.9 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 1.9 | 3.1 | 5.1 | 1.7 | 6.3 | 1.7 | 6.9 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.8 | 2.7 | 4.4 | 1.4 | 4.9 | 1.4 | 5.4 | ns |
| f _{max} | maximum frequency | CP; see Figure 9 | - | 52 | - | - | - | - | - | MHz |
| | | V _{CC} = 0.8 V | - | 52 | - | - | - | - | - | MHz |
| | | V _{CC} = 1.1 V to 1.3 V | - | 192 | - | 150 | - | 150 | - | MHz |
| | | V _{CC} = 1.4 V to 1.6 V | - | 324 | - | 280 | - | 230 | - | MHz |
| | | V _{CC} = 1.65 V to 1.95 V | - | 421 | - | 310 | - | 250 | - | MHz |
| | | V _{CC} = 2.3 V to 2.7 V | - | 486 | - | 370 | - | 360 | - | MHz |
| | | V _{CC} = 3.0 V to 3.6 V | - | 550 | - | 410 | - | 360 | - | MHz |

Table 8. Dynamic characteristics ...continuedVoltages are referenced to GND (ground = 0 V; for test circuit see [Figure 10](#))

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +125 °C | | | | Unit |
|---|-------------------|--|-------|--------------------|------|-------------------|----------------|-----------------|-----------------|------|
| | | | Min | Typ ^[1] | Max | Min (85 °C) | Max (85 °C) | Min (125 °C) | Max (125 °C) | |
| C_L = 15 pF | | | | | | | | | | |
| t _{pd} | propagation delay | CP to \overline{Q} ; see Figure 8 ^[2] | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 28.2 | - | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 3.0 | 7.6 | 16.7 | 3.4 | 18.6 | 3.4 | 20.5 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 3.0 | 5.3 | 9.8 | 2.6 | 11.5 | 2.6 | 12.7 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.6 | 4.4 | 7.6 | 2.3 | 9.1 | 2.3 | 10.0 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.2 | 3.5 | 5.7 | 2.0 | 6.9 | 2.0 | 7.6 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.9 | 3.1 | 5.0 | 1.8 | 5.5 | 1.8 | 6.1 | ns |
| f _{max} | maximum frequency | CP; see Figure 9 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 50 | - | - | - | - | - | MHz |
| | | V _{CC} = 1.1 V to 1.3 V | - | 181 | - | 120 | - | 120 | - | MHz |
| | | V _{CC} = 1.4 V to 1.6 V | - | 301 | - | 190 | - | 160 | - | MHz |
| | | V _{CC} = 1.65 V to 1.95 V | - | 407 | - | 240 | - | 190 | - | MHz |
| | | V _{CC} = 2.3 V to 2.7 V | - | 422 | - | 300 | - | 270 | - | MHz |
| | | V _{CC} = 3.0 V to 3.6 V | - | 481 | - | 320 | - | 300 | - | MHz |
| C_L = 30 pF | | | | | | | | | | |
| t _{pd} | propagation delay | CP to \overline{Q} ; see Figure 8 ^[2] | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 38.8 | - | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 4.9 | 9.8 | 20.7 | 4.4 | 24.7 | 4.4 | 27.2 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 4.0 | 6.8 | 12.7 | 3.5 | 15.0 | 3.5 | 16.5 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 3.5 | 5.6 | 9.9 | 2.2 | 11.9 | 2.2 | 13.0 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 3.1 | 4.5 | 7.5 | 2.8 | 9.3 | 2.8 | 10.2 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.9 | 4.1 | 6.4 | 2.7 | 7.5 | 2.7 | 8.3 | ns |
| f _{max} | maximum frequency | CP; see Figure 9 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 28 | - | - | - | - | - | MHz |
| | | V _{CC} = 1.1 V to 1.3 V | - | 128 | - | 70 | - | 70 | - | MHz |
| | | V _{CC} = 1.4 V to 1.6 V | - | 206 | - | 120 | - | 110 | - | MHz |
| | | V _{CC} = 1.65 V to 1.95 V | - | 262 | - | 150 | - | 120 | - | MHz |
| | | V _{CC} = 2.3 V to 2.7 V | - | 269 | - | 190 | - | 170 | - | MHz |
| | | V _{CC} = 3.0 V to 3.6 V | - | 309 | - | 200 | - | 190 | - | MHz |
| C_L = 5 pF, 10 pF, 15 pF and 30 pF | | | | | | | | | | |
| t _{su(H)} | set-up time HIGH | D to CP; see Figure 9 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 2.5 | - | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | - | 0.5 | - | 2.2 | - | 2.2 | - | ns |
| | | V _{CC} = 1.4 V to 1.6 V | - | 0.3 | - | 1.1 | - | 1.1 | - | ns |
| | | V _{CC} = 1.65 V to 1.95 V | - | 0.3 | - | 0.8 | - | 0.8 | - | ns |
| | | V _{CC} = 2.3 V to 2.7 V | - | 0.2 | - | 0.6 | - | 0.6 | - | ns |
| | | V _{CC} = 3.0 V to 3.6 V | - | 0.2 | - | 0.4 | - | 0.4 | - | ns |

Table 8. Dynamic characteristics ...continuedVoltages are referenced to GND (ground = 0 V; for test circuit see [Figure 10](#))

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +125 °C | | | | Unit |
|-------------|-------------------------------------|--|-------|--------------------|-----|-------------------|-------------|--------------|--------------|------|
| | | | Min | Typ ^[1] | Max | Min (85 °C) | Max (85 °C) | Min (125 °C) | Max (125 °C) | |
| $t_{su(L)}$ | set-up time LOW | D to CP; see Figure 9 | | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 1.7 | - | - | - | - | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | - | 0.3 | - | 2.0 | - | 2.0 | - | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | 0.2 | - | 1.3 | - | 1.3 | - | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | 0.2 | - | 1.1 | - | 1.1 | - | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | 0.3 | - | 0.8 | - | 0.8 | - | ns |
| t_h | hold time | D to CP; see Figure 9 | | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | -2.1 | - | - | - | - | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | - | -0.4 | - | 0.2 | - | 0.2 | - | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | -0.3 | - | 0.1 | - | 0.1 | - | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | -0.2 | - | 0 | - | 0 | - | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | -0.2 | - | 0 | - | 0 | - | ns |
| t_w | pulse width | CP HIGH or LOW; see Figure 9 | | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 5.2 | - | - | - | - | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | - | 1.0 | - | 3.0 | - | 3.0 | - | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | 0.8 | - | 2.0 | - | 2.0 | - | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | 0.6 | - | 2.0 | - | 2.0 | - | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | 0.5 | - | 2.0 | - | 2.0 | - | ns |
| C_{PD} | power dissipation capacitance | $f_i = 1\text{ MHz}$; $V_I = \text{GND to }V_{CC}$ | | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 1.8 | - | - | - | - | - | pF |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | - | 1.8 | - | - | - | - | - | pF |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | 1.9 | - | - | - | - | - | pF |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | 2.0 | - | - | - | - | - | pF |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | 2.4 | - | - | - | - | - | pF |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | - | 2.9 | - | - | - | - | 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).

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

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.

12. Waveforms

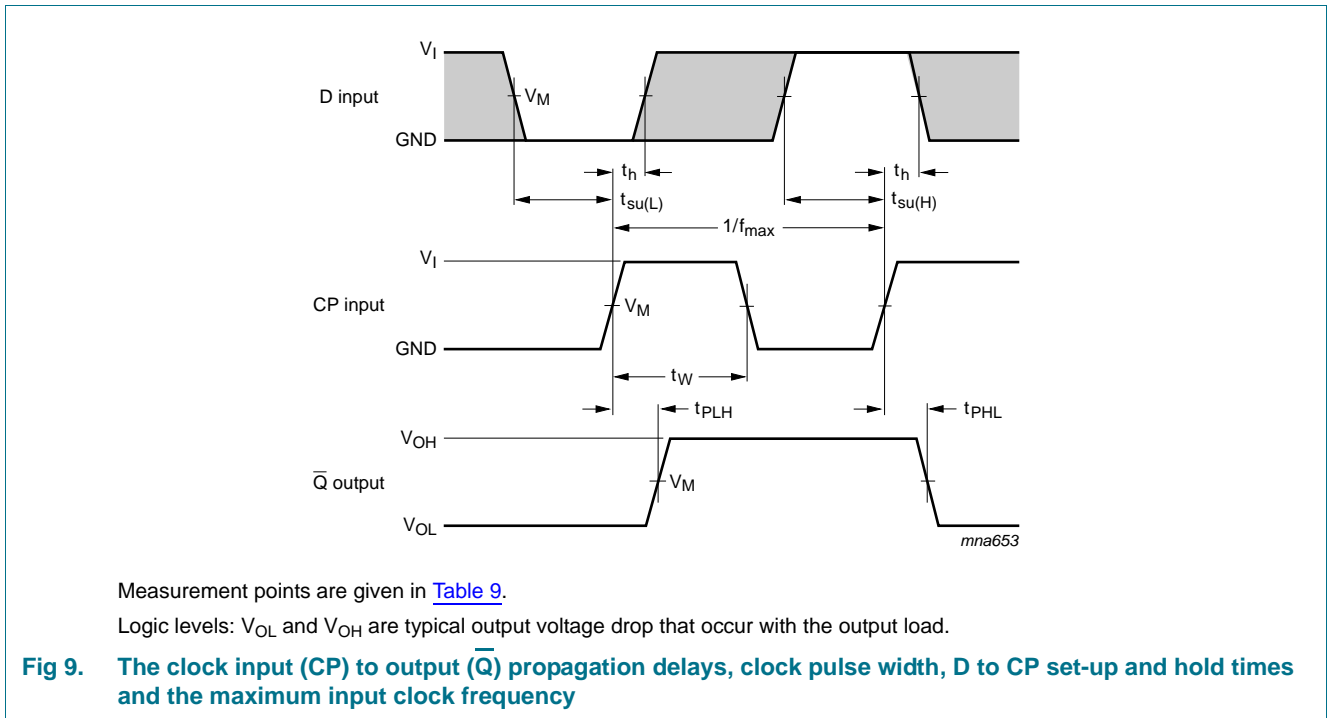
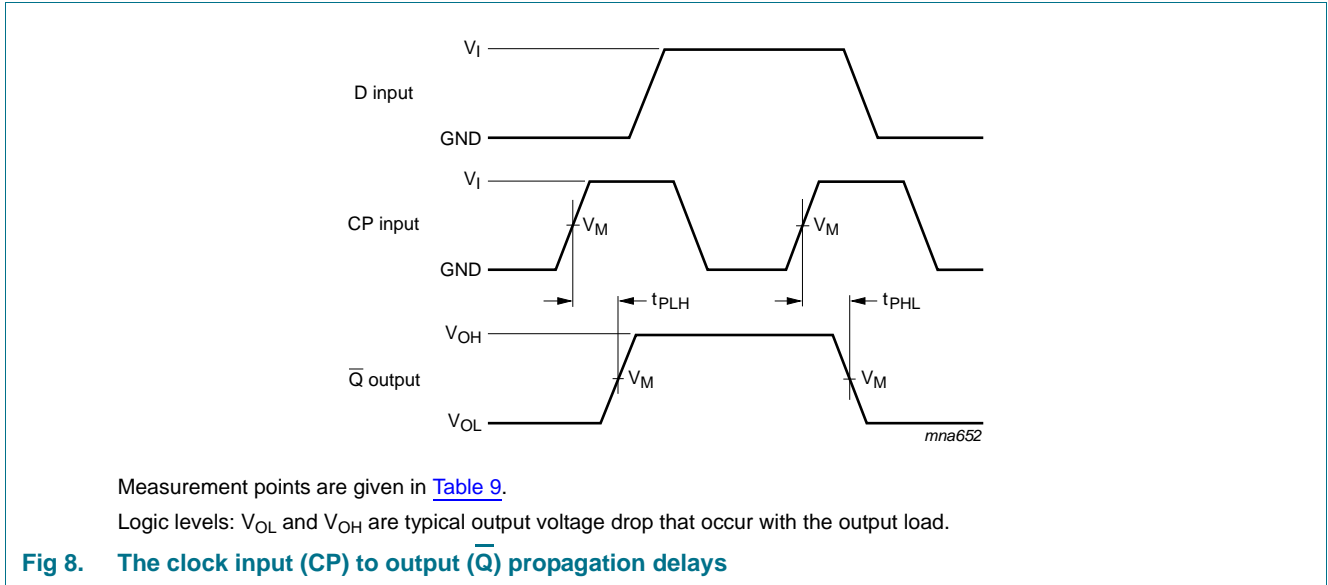
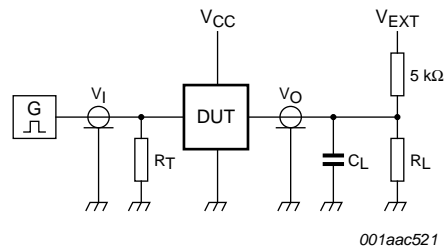


Table 9. Measurement points

| 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 10](#).

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. Test circuit for measuring switching times

Table 10. 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 $R_L = 1 \text{ M}\Omega$.

13. Package outline

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

SOT353-1

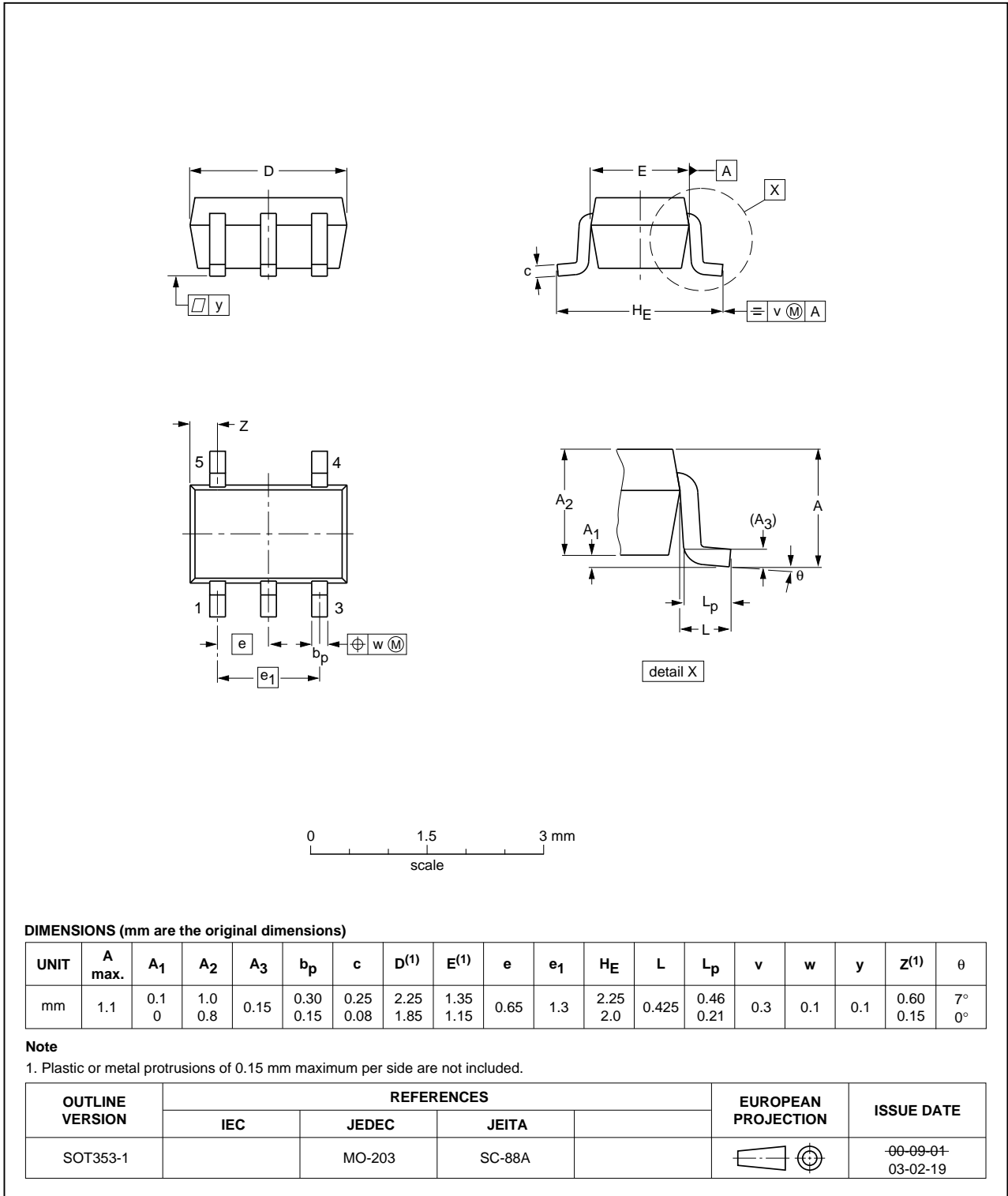


Fig 11. Package outline SOT353-1 (TSSOP5)

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

SOT886



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

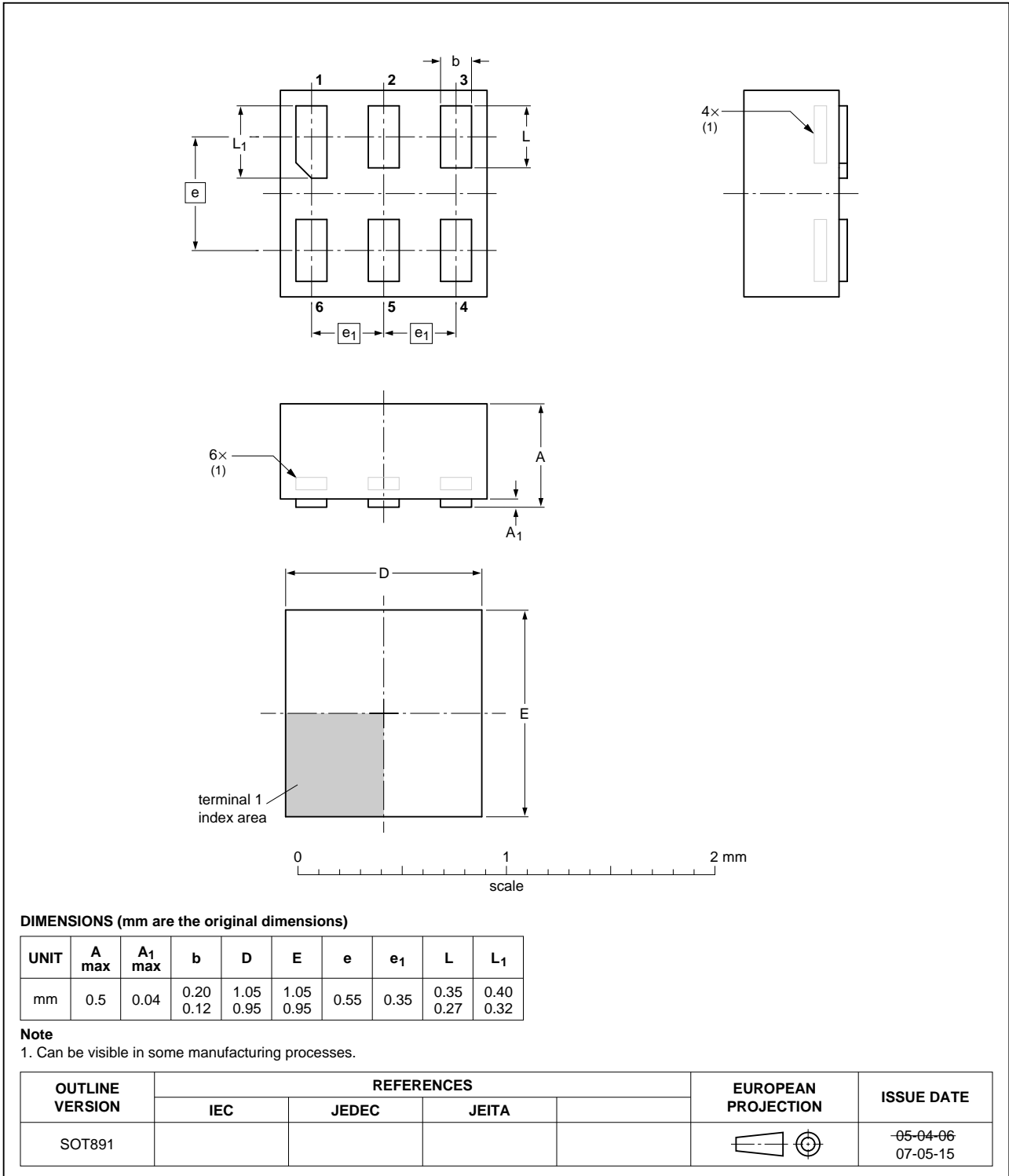


Fig 13. Package outline SOT891 (XSON6)

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

SOT1115

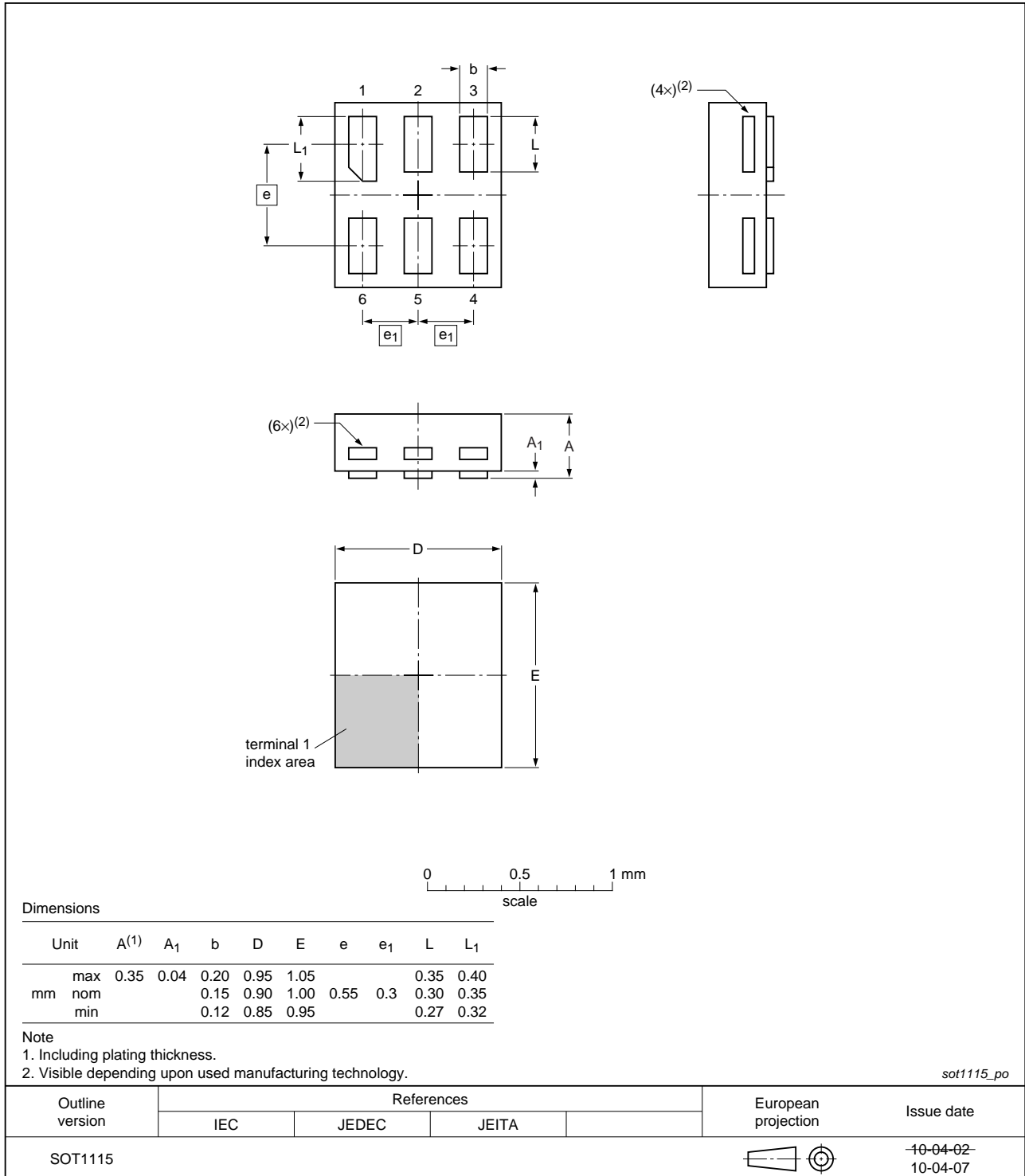


Fig 14. Package outline SOT1115 (XSON6)

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

SOT1202

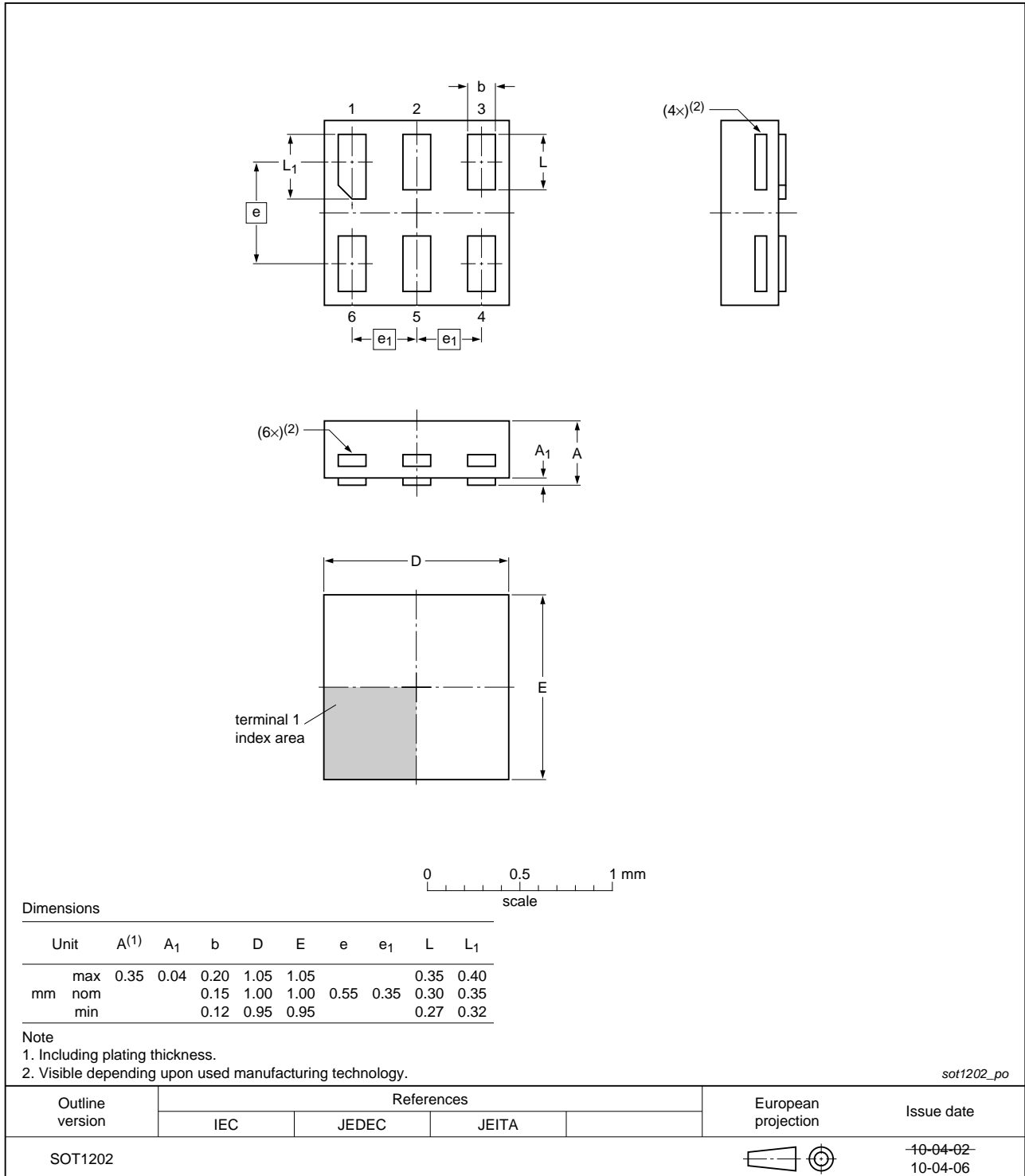


Fig 15. Package outline SOT1202 (XSON6)

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

SOT1226

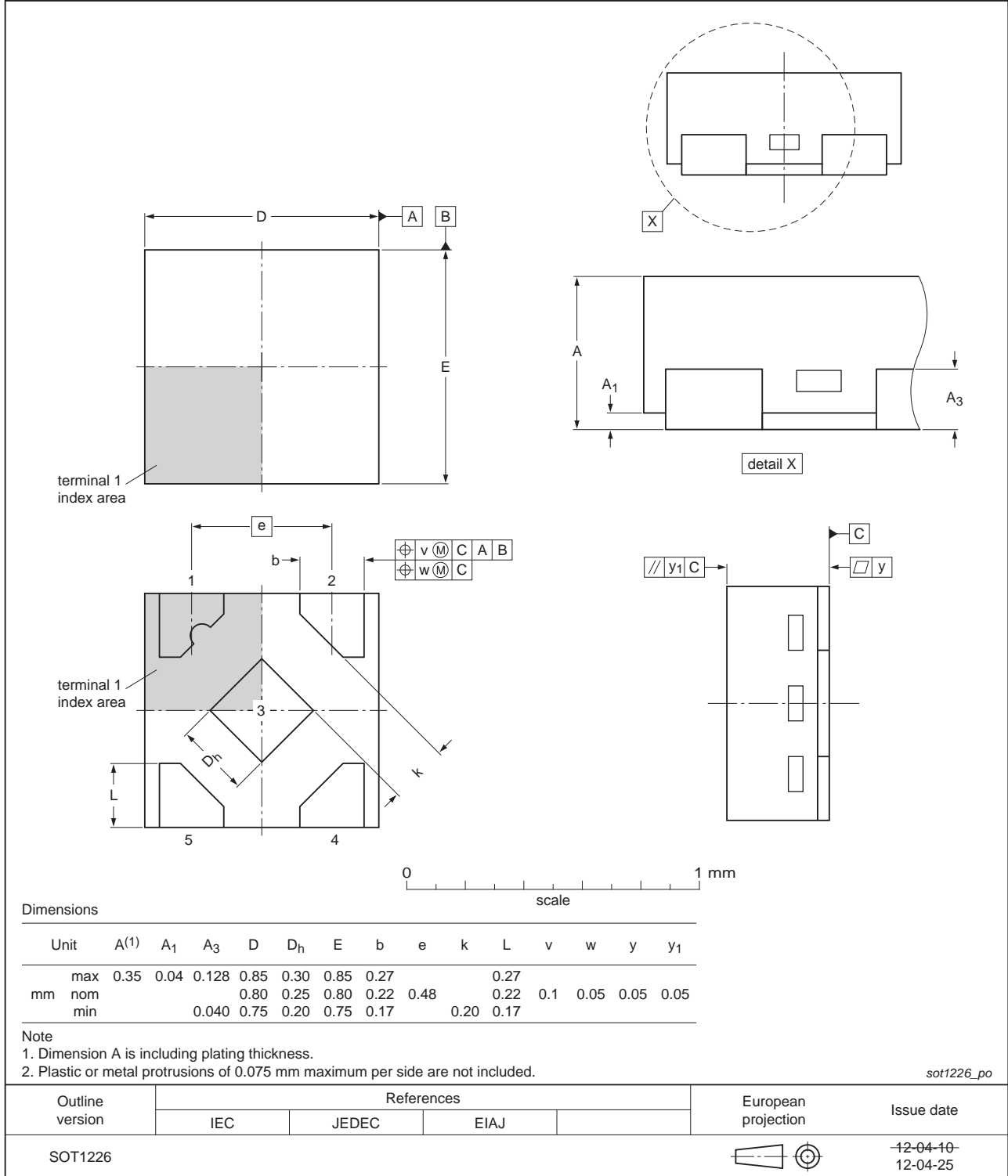


Fig 16. Package outline SOT1226 (X2SON5)

14. Abbreviations

Table 11. Abbreviations

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

15. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|--------------------|---------------|---------------|
| 74AUP1G80 v.4 | 20120628 | Product data sheet | - | 74AUP1G80 v.3 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74AUP1G80GX (SOT1226) Package outline drawing of SOT886 (Figure 11) modified. | | | |
| 74AUP1G80 v.3 | 20111129 | Product data sheet | - | 74AUP1G80 v.2 |
| Modifications: | <ul style="list-style-type: none"> Legal pages updated. | | | |
| 74AUP1G80 v.2 | 20100915 | Product data sheet | - | 74AUP1G80 v.1 |
| 74AUP1G80 v.1 | 20061020 | Product data sheet | - | - |

16. Legal information

16.1 Data sheet status

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

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

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

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- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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