

74AUP2G14

Low-power dual Schmitt trigger inverter

Rev. 4 — 1 December 2011

Product data sheet

1. General description

The 74AUP2G14 provides two inverting buffers with Schmitt trigger action which accept standard input signals. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

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 inputs switch at different points for positive and negative-going signals. The difference between the positive voltage V_{T+} and the negative voltage V_{T-} is defined as the input hysteresis voltage V_H .

2. Features and benefits

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

3. Applications

- Wave and pulse shaper
- Astable multivibrator
- Monostable multivibrator



4. Ordering information

Table 1. Ordering information

| Type number | Package | | | Version |
|-------------|-------------------|-------|---|---------|
| | Temperature range | Name | Description | |
| 74AUP2G14GW | -40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |
| 74AUP2G14GM | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| 74AUP2G14GF | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm | SOT891 |
| 74AUP2G14GN | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm | SOT1115 |
| 74AUP2G14GS | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm | SOT1202 |

5. Marking

Table 2. Marking

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| 74AUP2G14GW | pK |
| 74AUP2G14GM | pK |
| 74AUP2G14GF | pK |
| 74AUP2G14GN | pK |
| 74AUP2G14GS | pK |

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

6. Functional diagram

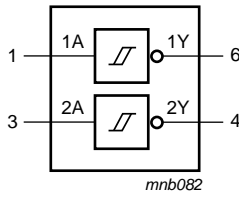


Fig 1. Logic symbol

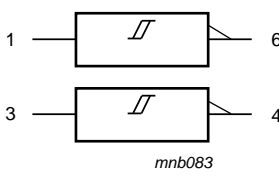


Fig 2. IEC logic symbol

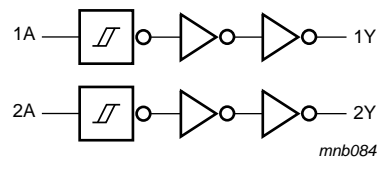


Fig 3. Logic diagram

7. Pinning information

7.1 Pinning

74AUP2G14
001aad704

74AUP2G14
001aad705
Transparent top view

74AUP2G14
001aad663
Transparent top view

Fig 4. Pin configuration SOT363

Fig 5. Pin configuration SOT886

Fig 6. Pin configuration SOT891, SOT1115 and SOT1202

7.2 Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|-----------------|-----|----------------|
| 1A | 1 | data input |
| GND | 2 | ground (0 V) |
| 2A | 3 | data input |
| 2Y | 4 | data output |
| V _{CC} | 5 | supply voltage |
| 1Y | 6 | data output |

8. Functional description

Table 4. Function table^[1]

| Input | Output |
|-------|--------|
| nA | nY |
| L | H |
| H | L |

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

9. 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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SC-88 packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.

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

10. 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 |

11. 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_{OH} | HIGH-level output voltage | $V_I = V_{T+}$ or V_{T-} | | | | |
| | | $I_O = -20$ 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 | $0.75 \times V_{CC}$ | - | - | 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 7. 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-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | 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 |
| 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 _I = GND or V _{CC} ; V _{CC} = 0 V to 3.6 V | - | 1.1 | - | pF |
| C _O | output capacitance | V _O = GND; V _{CC} = 0 V | - | 1.7 | - | pF |
| T_{amb} = -40 °C to +85 °C | | | | | | |
| V _{OH} | HIGH-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | 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 | | |
| V _{OL} | LOW-level output voltage | V _I = V _{T+} or V _{T-} | | | | |
| | | 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 | - | - | 0.37 | 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 |

Table 7. Static characteristics ...continued

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|--------------------------------------|--|---------------------|-----|----------------------|---------|
| 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 |
| I_{CC} | supply current | $V_I = \text{GND}$ or V_{CC} ; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V | - | - | 0.9 | μ A |
| ΔI_{CC} | additional supply current | $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V | - | - | 50 | μ A |
| $T_{amb} = -40$ °C to $+125$ °C | | | | | | |
| V_{OH} | HIGH-level output voltage | $V_I = V_{T+}$ or V_{T-} | | | | |
| | | $I_O = -20$ μ A; $V_{CC} = 0.8$ 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 |
| V_{OL} | LOW-level output voltage | $V_I = V_{T+}$ or V_{T-} | | | | |
| | | $I_O = 20$ μ A; $V_{CC} = 0.8$ V to 3.6 V | - | - | 0.11 | V |
| | | $I_O = 1.1$ mA; $V_{CC} = 1.1$ V | - | - | $0.33 \times V_{CC}$ | 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_I | input leakage current | $V_I = \text{GND}$ to 3.6 V; $V_{CC} = 0$ V to 3.6 V | - | - | ± 0.75 | μ A |
| | | V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V | - | - | ± 0.75 | 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 | - | - | ± 0.75 | μ A |
| I_{CC} | supply current | $V_I = \text{GND}$ or V_{CC} ; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V | - | - | 1.4 | μ A |
| ΔI_{CC} | additional supply current | $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V | - | - | 75 | μ A |

12. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#).

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +125 °C | | | Unit | |
|------------------------------|-------------------|--|-------|--------------------|------|-------------------|-------------|--------------|------|--|
| | | | Min | Typ ^[1] | Max | Min | Max (85 °C) | Max (125 °C) | | |
| C_L = 5 pF | | | | | | | | | | |
| t _{pd} | propagation delay | nA to nY; see Figure 7 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 19.9 | - | - | - | - | ns | |
| | | V _{CC} = 1.1 V to 1.3 V | 2.7 | 5.9 | 11.0 | 2.4 | 11.1 | 11.2 | ns | |
| | | V _{CC} = 1.4 V to 1.6 V | 2.6 | 4.3 | 6.6 | 2.4 | 7.1 | 7.4 | ns | |
| | | V _{CC} = 1.65 V to 1.95 V | 2.1 | 3.7 | 5.4 | 2.0 | 6.0 | 6.2 | ns | |
| | | V _{CC} = 2.3 V to 2.7 V | 2.0 | 3.0 | 4.1 | 1.7 | 4.5 | 4.7 | ns | |
| | | V _{CC} = 3.0 V to 3.6 V | 1.9 | 2.8 | 3.6 | 1.5 | 3.9 | 4.0 | ns | |
| C_L = 10 pF | | | | | | | | | | |
| t _{pd} | propagation delay | nA to nY; see Figure 7 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 23.4 | - | - | - | - | ns | |
| | | V _{CC} = 1.1 V to 1.3 V | 2.9 | 6.8 | 12.7 | 2.8 | 12.8 | 12.9 | ns | |
| | | V _{CC} = 1.4 V to 1.6 V | 2.8 | 5.0 | 7.7 | 2.6 | 8.2 | 8.6 | ns | |
| | | V _{CC} = 1.65 V to 1.95 V | 2.7 | 4.2 | 6.2 | 2.5 | 6.7 | 7.1 | ns | |
| | | V _{CC} = 2.3 V to 2.7 V | 2.3 | 3.6 | 4.8 | 2.1 | 5.2 | 5.5 | ns | |
| | | V _{CC} = 3.0 V to 3.6 V | 2.1 | 3.3 | 4.3 | 2.0 | 4.5 | 4.7 | ns | |
| C_L = 15 pF | | | | | | | | | | |
| t _{pd} | propagation delay | nA to nY; see Figure 7 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 26.9 | - | - | - | - | ns | |
| | | V _{CC} = 1.1 V to 1.3 V | 3.3 | 7.6 | 14.3 | 3.0 | 14.5 | 14.7 | ns | |
| | | V _{CC} = 1.4 V to 1.6 V | 3.3 | 5.5 | 8.6 | 2.9 | 9.4 | 9.8 | ns | |
| | | V _{CC} = 1.65 V to 1.95 V | 2.8 | 4.7 | 7.0 | 2.8 | 7.7 | 8.1 | ns | |
| | | V _{CC} = 2.3 V to 2.7 V | 2.7 | 4.0 | 5.5 | 2.4 | 5.9 | 6.2 | ns | |
| | | V _{CC} = 3.0 V to 3.6 V | 2.6 | 3.8 | 4.8 | 2.2 | 5.2 | 5.4 | ns | |
| C_L = 30 pF | | | | | | | | | | |
| t _{pd} | propagation delay | nA to nY; see Figure 7 | | | | | | | | |
| | | V _{CC} = 0.8 V | - | 37.3 | - | - | - | - | ns | |
| | | V _{CC} = 1.1 V to 1.3 V | 4.0 | 9.8 | 18.7 | 3.9 | 19.6 | 20.0 | ns | |
| | | V _{CC} = 1.4 V to 1.6 V | 3.7 | 7.1 | 11.2 | 3.8 | 12.3 | 12.9 | ns | |
| | | V _{CC} = 1.65 V to 1.95 V | 3.6 | 6.0 | 9.1 | 3.6 | 10.0 | 10.6 | ns | |
| | | V _{CC} = 2.3 V to 2.7 V | 3.5 | 5.2 | 6.9 | 3.2 | 7.5 | 7.9 | ns | |
| | | V _{CC} = 3.0 V to 3.6 V | 3.3 | 4.8 | 6.1 | 3.1 | 7.1 | 7.4 | ns | |

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

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +125 °C | | | Unit |
|---|-------------------------------|---|-------|--------------------|-----|-------------------|-------------|--------------|------|
| | | | Min | Typ ^[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| C_L = 5 pF, 10 pF, 15 pF and 30 pF | | | | | | | | | |
| C _{PD} | power dissipation capacitance | f _i = 1 MHz; V _I = GND to V _{CC} ^{[3][4]} | | | | | | | |
| | | V _{CC} = 0.8 V | - | 2.6 | - | - | - | - | pF |
| | | V _{CC} = 1.1 V to 1.3 V | - | 2.7 | - | - | - | - | pF |
| | | V _{CC} = 1.4 V to 1.6 V | - | 2.9 | - | - | - | - | pF |
| | | V _{CC} = 1.65 V to 1.95 V | - | 3.1 | - | - | - | - | pF |
| | | V _{CC} = 2.3 V to 2.7 V | - | 3.7 | - | - | - | - | pF |
| | | V _{CC} = 3.0 V to 3.6 V | - | 4.3 | - | - | - | pF | |

- [1] All typical values are measured at nominal V_{CC}.
- [2] t_{pd} is the same as t_{PLH} and t_{PHL}.
- [3] All specified values are the average typical values over all stated loads.
- [4] 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 = load capacitance in pF;
 V_{CC} = supply voltage in V;
 N = number of inputs switching;
 Σ(C_L × V_{CC}² × f_o) = sum of the outputs.

13. Waveforms

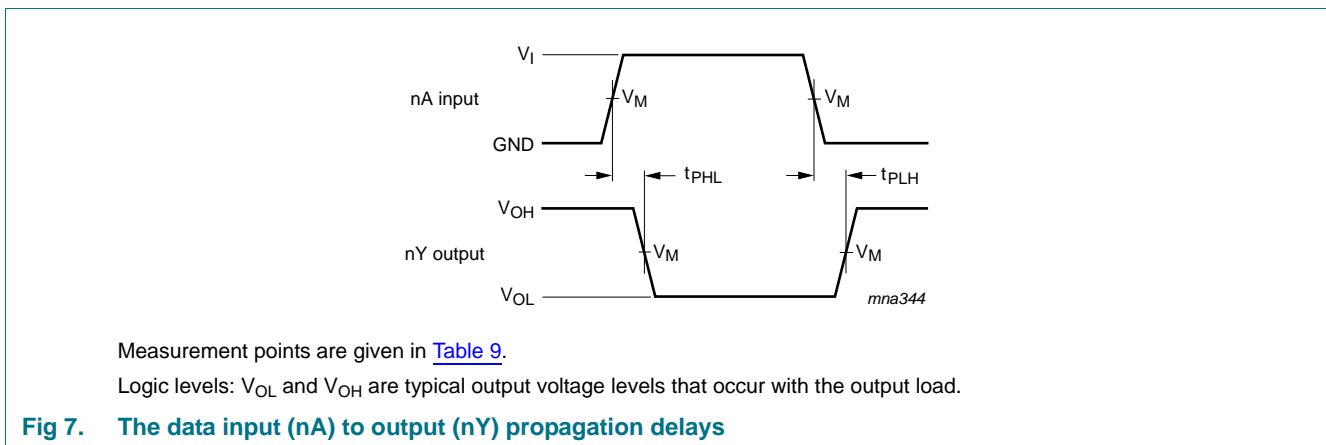
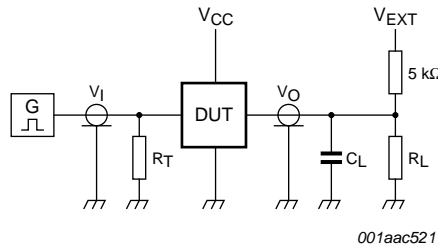


Table 9. Measurement points

| Supply voltage | Output | Input | | t _r = t _f |
|-----------------|-----------------------|-----------------------|-----------------|---------------------------------|
| V _{CC} | V _M | V _M | V _I | |
| 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 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 8. 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, set-up and hold times and pulse width $R_L = 1 \text{ M}\Omega$.

14. Transfer characteristics

Table 11. Transfer characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#).

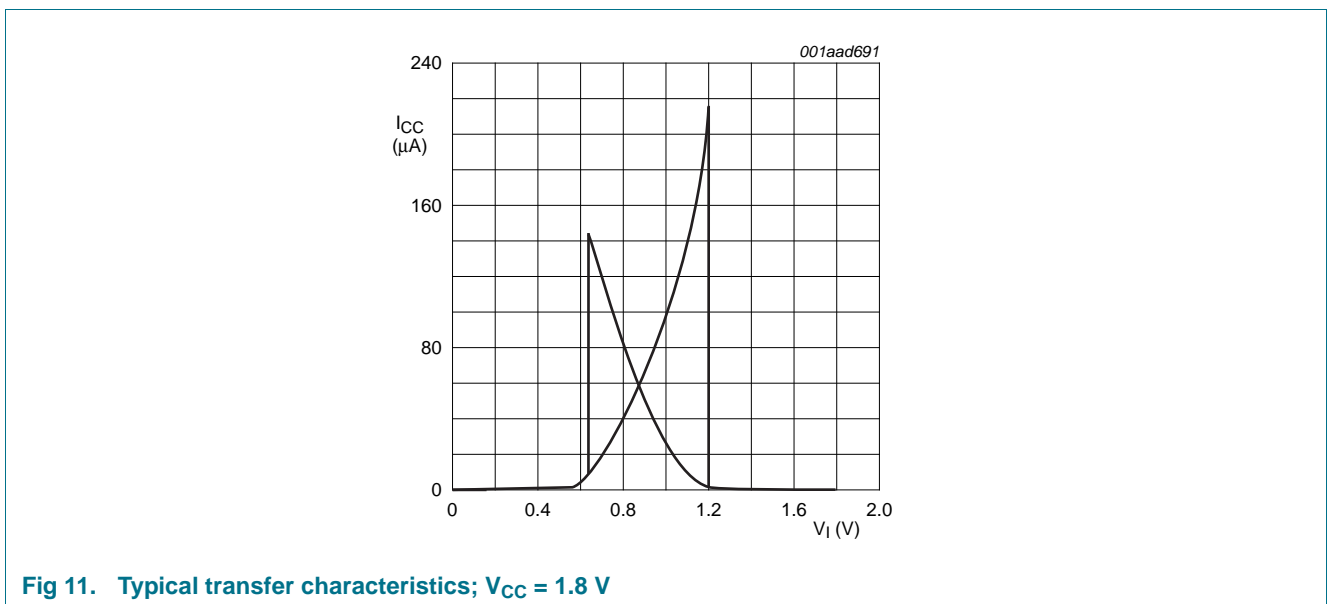
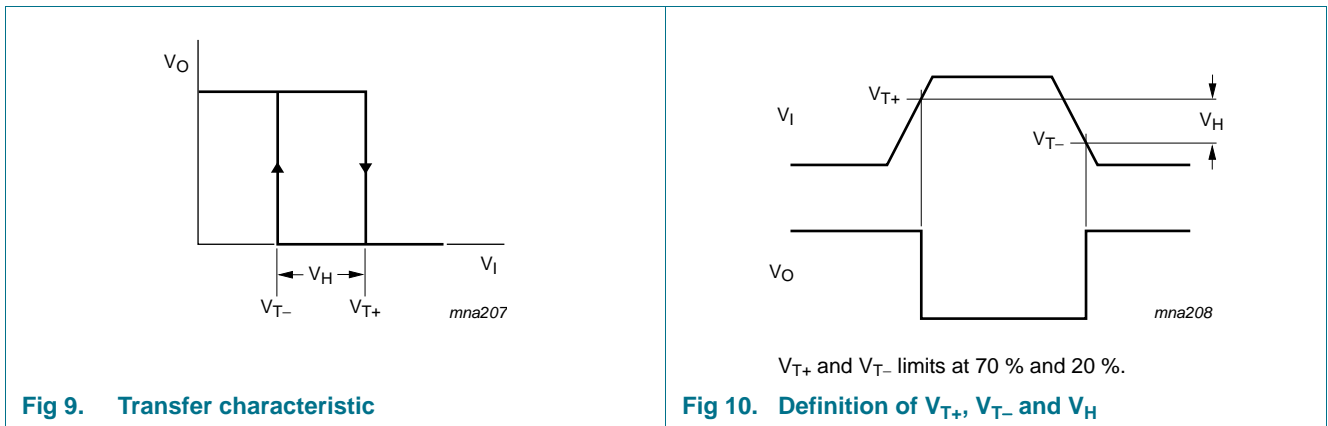
| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +125 °C | | | Unit |
|----------|----------------------------------|--|-------|-----|------|-------------------|-------------|--------------|------|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| V_{T+} | positive-going threshold voltage | see Figure 9 and Figure 10 | | | | | | | |
| | | $V_{CC} = 0.8 \text{ V}$ | 0.30 | - | 0.60 | 0.30 | 0.60 | 0.62 | V |
| | | $V_{CC} = 1.1 \text{ V}$ | 0.53 | - | 0.90 | 0.53 | 0.90 | 0.92 | V |
| | | $V_{CC} = 1.4 \text{ V}$ | 0.74 | - | 1.11 | 0.74 | 1.11 | 1.13 | V |
| | | $V_{CC} = 1.65 \text{ V}$ | 0.91 | - | 1.29 | 0.91 | 1.29 | 1.31 | V |
| | | $V_{CC} = 2.3 \text{ V}$ | 1.37 | - | 1.77 | 1.37 | 1.77 | 1.80 | V |
| | | $V_{CC} = 3.0 \text{ V}$ | 1.88 | - | 2.29 | 1.88 | 2.29 | 2.32 | V |
| V_{T-} | negative-going threshold voltage | see Figure 9 and Figure 10 | | | | | | | |
| | | $V_{CC} = 0.8 \text{ V}$ | 0.10 | - | 0.60 | 0.10 | 0.60 | 0.60 | V |
| | | $V_{CC} = 1.1 \text{ V}$ | 0.26 | - | 0.65 | 0.26 | 0.65 | 0.65 | V |
| | | $V_{CC} = 1.4 \text{ V}$ | 0.39 | - | 0.75 | 0.39 | 0.75 | 0.75 | V |
| | | $V_{CC} = 1.65 \text{ V}$ | 0.47 | - | 0.84 | 0.47 | 0.84 | 0.84 | V |
| | | $V_{CC} = 2.3 \text{ V}$ | 0.69 | - | 1.04 | 0.69 | 1.04 | 1.04 | V |
| | | $V_{CC} = 3.0 \text{ V}$ | 0.88 | - | 1.24 | 0.88 | 1.24 | 1.24 | V |

Table 11. Transfer characteristics ...continued

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#).

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +125 °C | | | Unit |
|----------------|---|--------------------------|-------|-----|------|-------------------|-------------|--------------|------|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| V _H | hysteresis voltage (V _{T+} - V _{T-}); see Figure 9 , Figure 10 , Figure 11 and Figure 12 | V _{CC} = 0.8 V | 0.07 | - | 0.50 | 0.07 | 0.50 | 0.50 | V |
| | | V _{CC} = 1.1 V | 0.08 | - | 0.46 | 0.08 | 0.46 | 0.46 | V |
| | | V _{CC} = 1.4 V | 0.18 | - | 0.56 | 0.18 | 0.56 | 0.56 | V |
| | | V _{CC} = 1.65 V | 0.27 | - | 0.66 | 0.27 | 0.66 | 0.66 | V |
| | | V _{CC} = 2.3 V | 0.53 | - | 0.92 | 0.53 | 0.92 | 0.92 | V |
| | | V _{CC} = 3.0 V | 0.79 | - | 1.31 | 0.79 | 1.31 | 1.31 | V |

15. Waveforms transfer characteristics



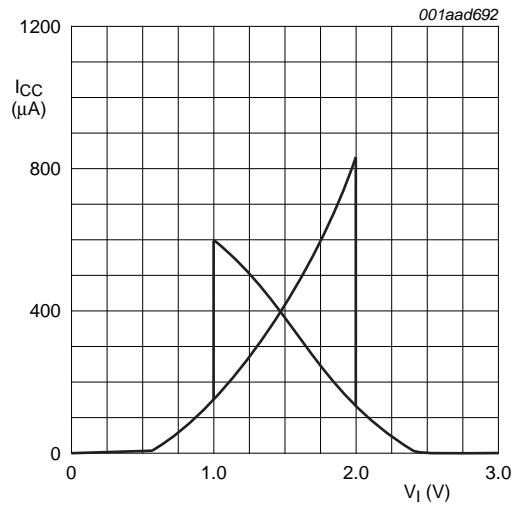


Fig 12. Typical transfer characteristics; $V_{CC} = 3.0\text{ V}$

16. Application information

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$$P_{\text{add}} = f_i \times (t_r \times \Delta I_{\text{CC(AV)}} + t_f \times \Delta I_{\text{CC(AV)}}) \times V_{\text{CC}} \text{ where:}$$

P_{add} = additional power dissipation (μW);

f_i = input frequency (MHz);

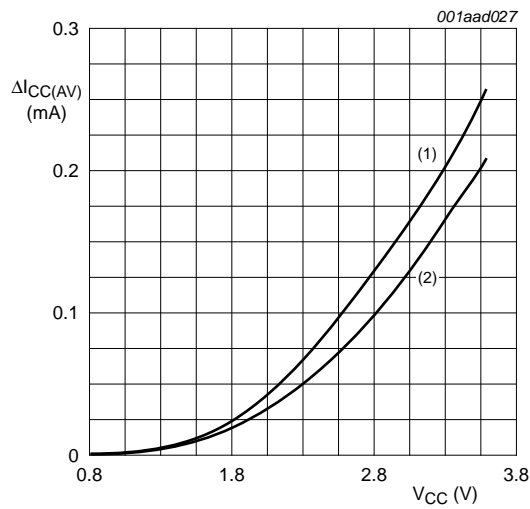
t_r = rise time (ns); 10 % to 90 %;

t_f = fall time (ns); 90 % to 10 %;

$\Delta I_{\text{CC(AV)}}$ = average additional supply current (μA).

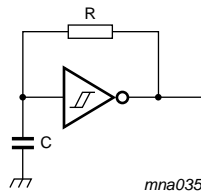
Average $\Delta I_{\text{CC(AV)}}$ differs with positive or negative input transitions, as shown in [Figure 13](#).

An example of a relaxation circuit using the 74AUP2G14 is shown in [Figure 14](#).



- (1) Positive-going edge.
- (2) Negative-going edge.

Fig 13. Average I_{CC} as a function of V_{CC}



$$f = \frac{1}{T} \approx \frac{1}{a \times RC}$$

Average values for variable a are given in [Table 12](#).

Fig 14. Relaxation oscillator

Table 12. Variable values

| Supply voltage | Variable a |
|----------------|------------|
| 1.1 V | 1.28 |
| 1.5 V | 1.22 |
| 1.8 V | 1.24 |
| 2.8 V | 1.34 |
| 3.3 V | 1.45 |

17. Package outline

Plastic surface-mounted package; 6 leads

SOT363

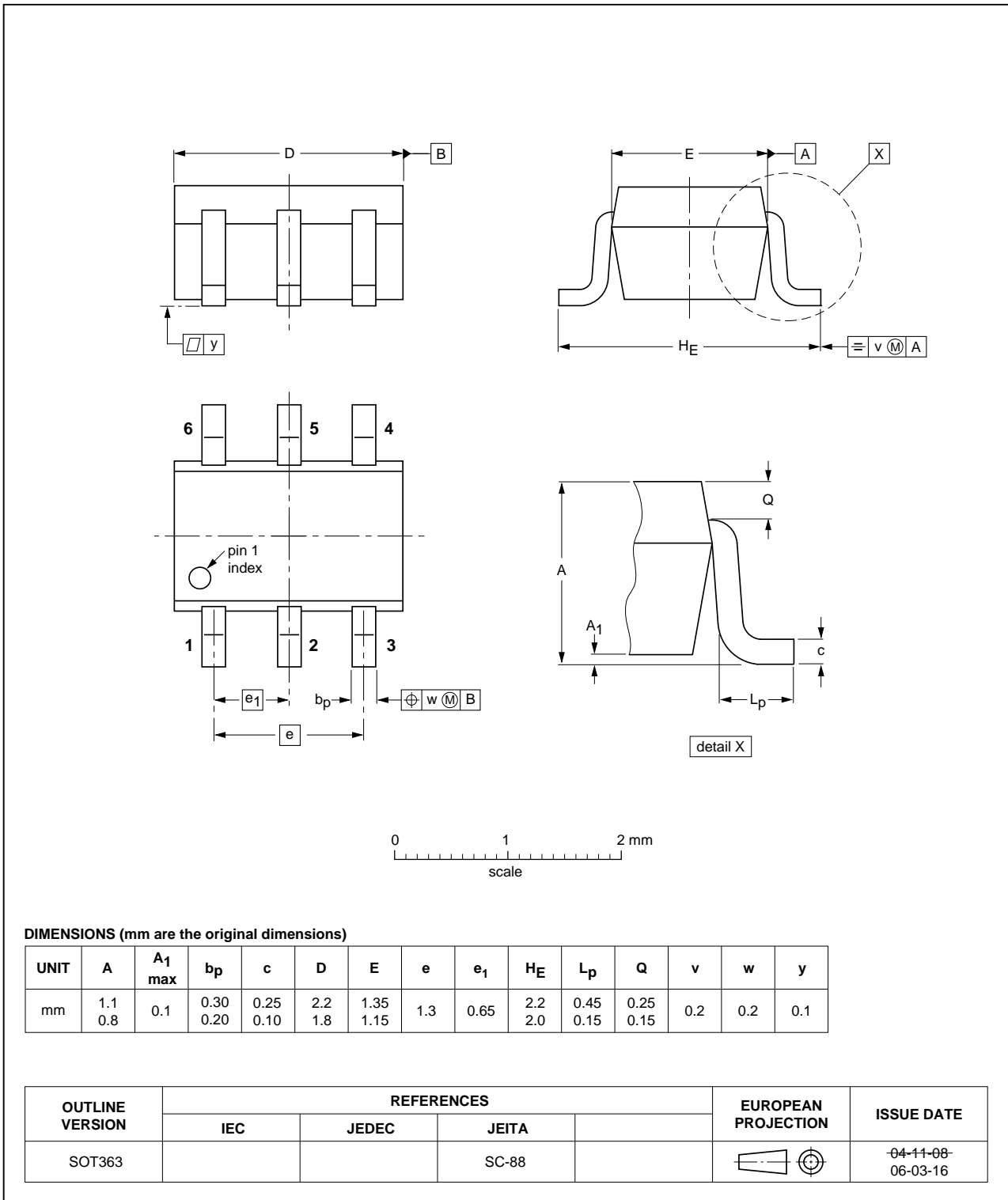


Fig 15. Package outline SOT363 (SC-88)

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

SOT886

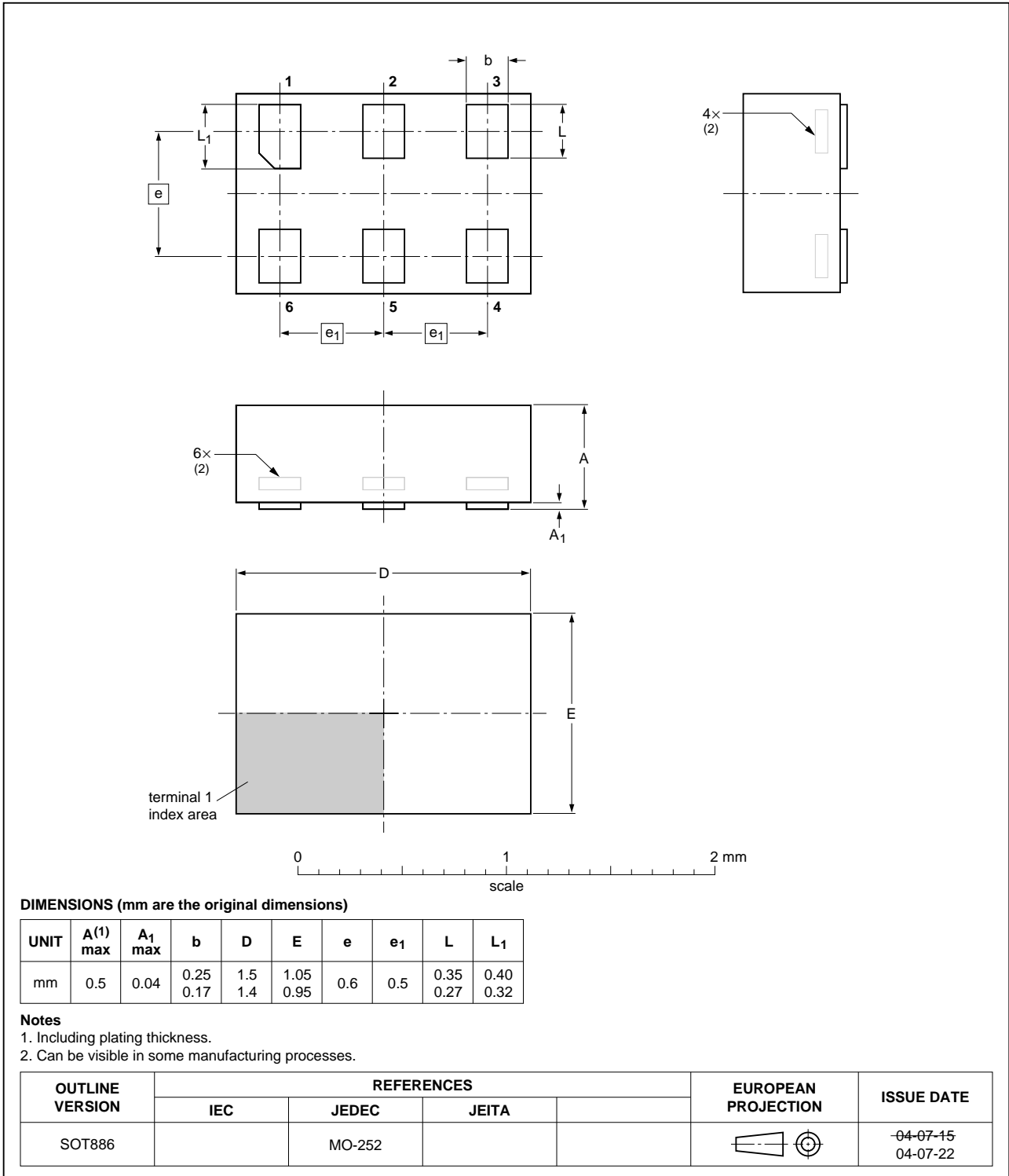


Fig 16. Package outline SOT886 (XSON6)

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

SOT891

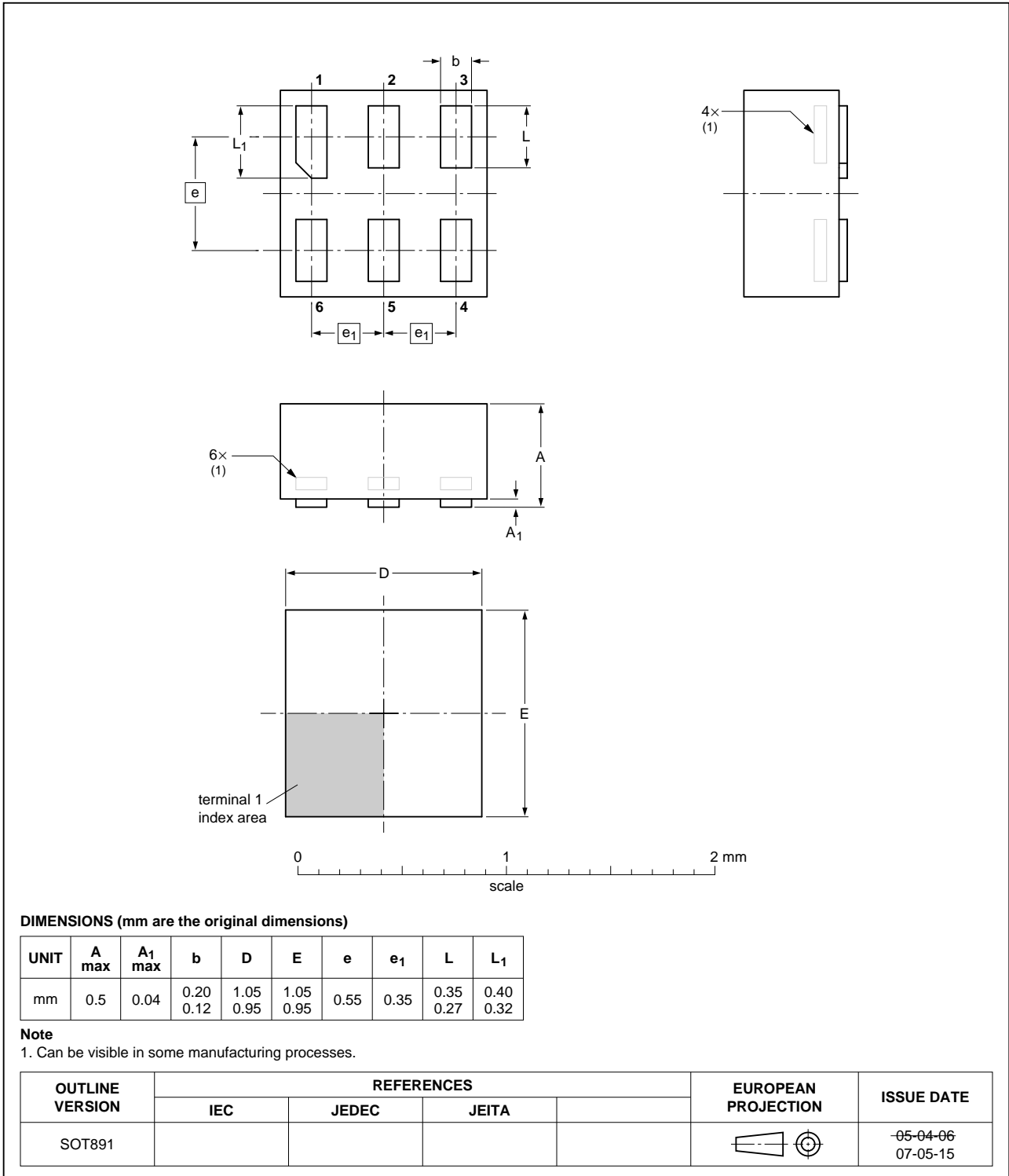


Fig 17. Package outline SOT891 (XSON6)

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

SOT1115

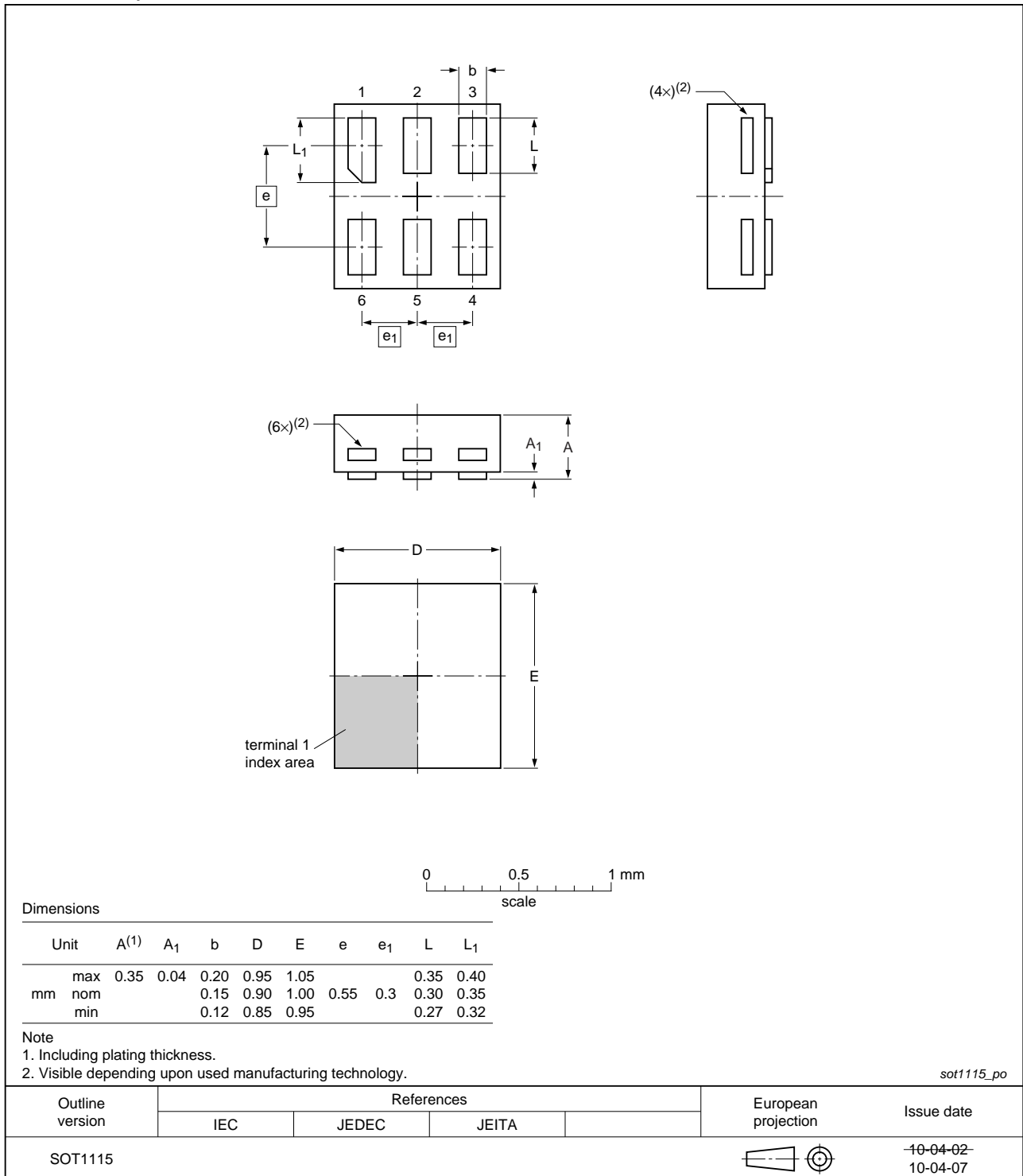


Fig 18. Package outline SOT1115 (XSON6)

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

SOT1202

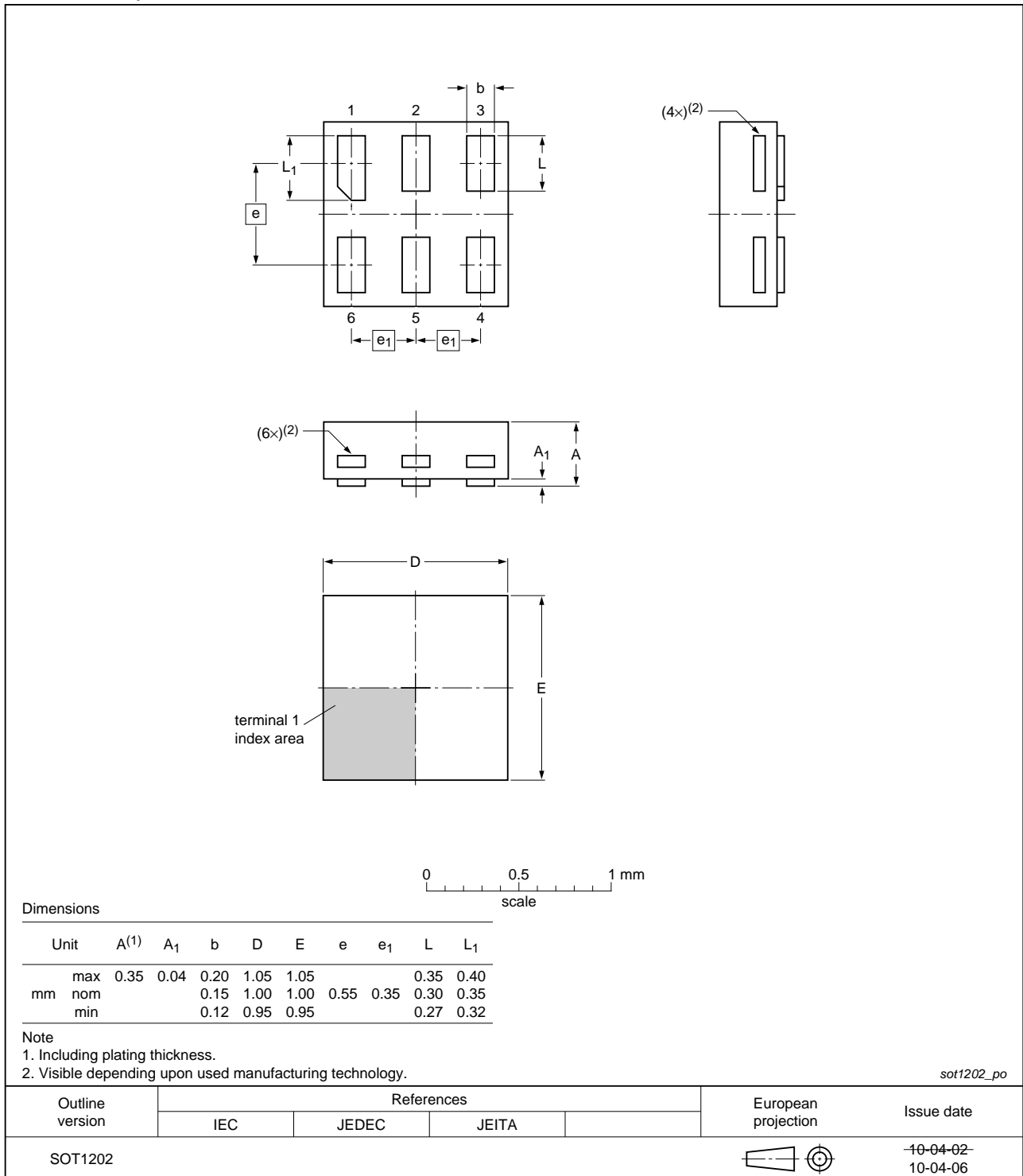


Fig 19. Package outline SOT1202 (XSON6)

18. Abbreviations

Table 13. Abbreviations

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

19. Revision history

Table 14. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|--------------------|---------------|---------------|
| 74AUP2G14 v.4 | 20111201 | Product data sheet | - | 74AUP2G14 v.3 |
| Modifications: | <ul style="list-style-type: none">• Legal pages updated. | | | |
| 74AUP2G14 v.3 | 20100722 | Product data sheet | - | 74AUP2G14 v.2 |
| 74AUP2G14 v.2 | 20090703 | Product data sheet | - | 74AUP2G14 v.1 |
| 74AUP2G14 v.1 | 20061219 | Product data sheet | - | - |

20. Legal information

20.1 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".

[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.nxp.com>.

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