

74AUP2G04

Low-power dual inverter

Rev. 01. — 16 January 2006

Preliminary data sheet

1. General description

The 74AUP2G04 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 74AUP2G04 provides two inverting buffers.

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; $I_{CC} = 0.9 \mu\text{A}$ (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. Quick reference data

Table 1: Quick reference data
 $GND = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}; t_r = t_f \leq 3\text{ ns.}$

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|--------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------|--------|------|------|------|----|
| t_{PHL}, t_{PLH} | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | $C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 0.8\text{ V}$ | - | 16.0 | - | ns | |
| | | $C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | 2.4 | 5.0 | 10.3 | ns | |
| | | $C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | 1.8 | 3.6 | 6.4 | ns | |
| | | $C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 1.5 | 2.9 | 5.0 | ns | |
| | | $C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.2 | 2.4 | 3.9 | ns | |
| | | $C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.1 | 2.1 | 3.2 | ns | |
| C_I | input capacitance | | - | 1.0 | - | pF | |
| C_{PD} | power dissipation capacitance | $V_{CC} = 1.8\text{ V}; f_i = 1\text{ MHz}$ | [1][2] | - | 3.2 | - | pF |
| | | $V_{CC} = 3.3\text{ V}; f_i = 1\text{ MHz}$ | [1][2] | - | 4.3 | - | 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 = 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 | | | Version |
|-------------|-------------------|-------|----------------------------------------------------------------------------------------------------------------|---------|
| | Temperature range | Name | Description | |
| 74AUP2G04GW | -40 °C to +125 °C | SC-88 | plastic surface mounted package; 6 leads | SOT363 |
| 74AUP2G04GM | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1.45 \times 0.5\text{ mm}$ | SOT886 |
| 74AUP2G04GF | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1 \times 0.5\text{ mm}$ | SOT891 |

5. Marking

Table 3: Marking

| Type number | Marking code |
|-------------|--------------|
| 74AUP2G04GW | p4 |
| 74AUP2G04GM | p4 |
| 74AUP2G04GF | p4 |

6. Functional diagram

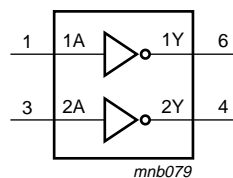


Fig 1. Logic symbol

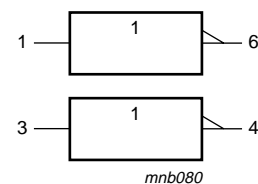


Fig 2. IEC logic symbol

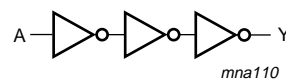


Fig 3. Logic diagram (one gate)

7. Pinning information

7.1 Pinning

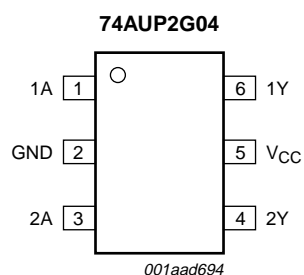


Fig 4. Pin configuration SOT363 (SC-88)

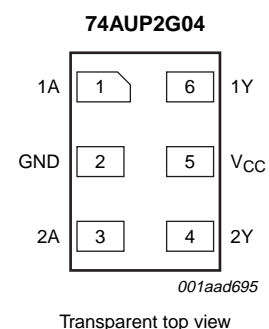
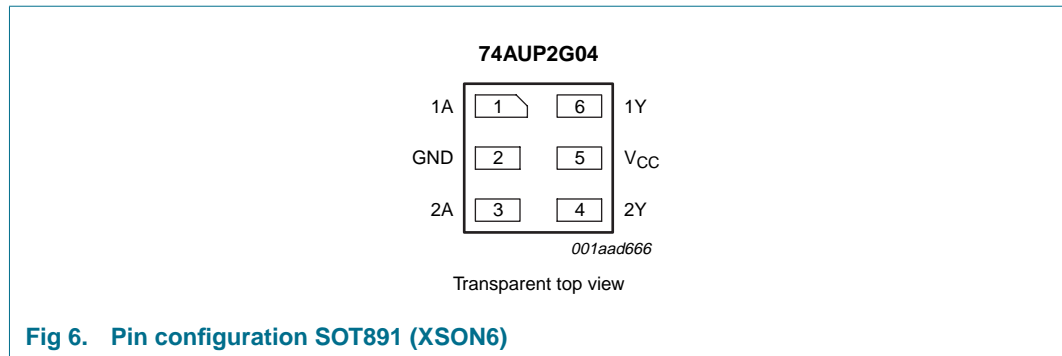


Fig 5. Pin configuration SOT886 (XSON6)



7.2 Pin description

Table 4: Pin description

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

8. Functional description

8.1 Function table

Table 5: Function table [\[1\]](#)

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

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

9. Limiting values

Table 6: Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|--------------------------|---------------------------------|----------|------|------|
| V_{CC} | supply voltage | | -0.5 | +4.6 | V |
| 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 7: Recommended operating conditions

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

11. Static characteristics

Table 8: Static characteristics

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| T_{amb} = 25 °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 |
| 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 |
| 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} | 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 |
| ΔI _{CC} | additional quiescent 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} | - | 1.0 | - | pF |
| C _O | output capacitance | V _O = GND; V _{CC} = 0 V | - | 1.8 | - | pF |

Table 8: Static characteristics ...continued

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| 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 |
| 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 | - | - | 0.37 | 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 _I | input leakage current | V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V | - | - | ±0.5 | μA |
| | | 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} | 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 |
| ΔI _{CC} | additional quiescent supply current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V | - | - | 50 | μA |

Table 8: Static characteristics ...continued

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------|------------------------|-----|------------------------|------|
| T_{amb} = -40 °C to +125 °C | | | | | | |
| V _{IH} | HIGH-state input voltage | V _{CC} = 0.8 V | 0.75 × V _{CC} | - | - | V |
| | | V _{CC} = 0.9 V to 1.95 V | 0.70 × 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 × V _{CC} | V |
| | | V _{CC} = 0.9 V to 1.95 V | - | - | 0.30 × 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 × 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-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 _I | input leakage current | V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V | - | - | ±0.75 | μA |
| | | 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} | 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 |
| ΔI _{CC} | additional quiescent supply current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V | - | - | 75 | μA |

12. Dynamic characteristics

Table 9: Dynamic characteristics

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

| Symbol | Parameter | Conditions | Min | Typ [1] | Max | Unit |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------|-----|---------|------|------|
| $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 5\text{ pF}$ | | | | | | |
| t_{PHL} , t_{PLH} | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 16.0 | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | 2.4 | 5.0 | 10.3 | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | 1.8 | 3.6 | 6.4 | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 1.5 | 2.9 | 5.0 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.2 | 2.4 | 3.9 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.1 | 2.1 | 3.2 | ns |
| $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 10\text{ pF}$ | | | | | | |
| t_{PHL} , t_{PLH} | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 19.8 | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | 2.8 | 5.9 | 12.2 | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | 2.3 | 4.2 | 7.5 | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 2.0 | 3.5 | 5.9 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.7 | 2.9 | 4.6 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.6 | 2.7 | 3.8 | ns |
| $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 15\text{ pF}$ | | | | | | |
| t_{PHL} , t_{PLH} | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 23.3 | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | 3.2 | 6.7 | 13.0 | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | 2.6 | 4.7 | 8.6 | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 2.3 | 4.0 | 6.7 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 2.1 | 3.3 | 5.1 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 2.0 | 3.1 | 4.2 | ns |
| $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 30\text{ pF}$ | | | | | | |
| t_{PHL} , t_{PLH} | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | - | 33.6 | - | ns |
| | | $V_{CC} = 1.1\text{ V to }1.3\text{ V}$ | 4.4 | 8.9 | 16.0 | ns |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | 3.6 | 6.3 | 10.8 | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 3.2 | 5.3 | 9.0 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 2.9 | 4.5 | 6.5 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 2.9 | 4.2 | 5.4 | ns |

Table 9: Dynamic characteristics ...continuedVoltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#)

| Symbol | Parameter | Conditions | Min | Typ [1] | Max | Unit |
|--------------------------------|-------------------------------|------------------------------------|---------|---------|-----|------|
| T_{amb} = 25 °C | | | | | | |
| C _{PD} | power dissipation capacitance | f _i = 1 MHz | [2] [3] | | | |
| | | V _{CC} = 0.8 V | - | 2.8 | - | pF |
| | | V _{CC} = 1.1 V to 1.3 V | - | 3.0 | - | 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 | - | 3.7 | - | pF |
| | | V _{CC} = 3.0 V to 3.6 V | - | 4.3 | - | pF |

[1] All typical values are measured at nominal V_{CC}.[2] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).P_D = C_{PD} × V_{CC}² × f_i × N + Σ(C_L × V_{CC}² × 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;

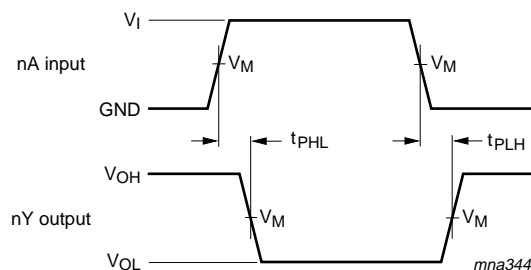
Σ(C_L × V_{CC}² × f_o) = sum of the outputs.[3] The condition is V_I = GND to V_{CC}.**Table 10: Dynamic characteristics**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#)

| 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 nA to nY | see Figure 7 | | | | | |
| | | 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 _{PHL} , t _{PLH} | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | | |
| | | 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 |

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

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit |
|-----------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|------------------|------|-------------------|------|------|
| | | | Min | Max | Min | Max | |
| $C_L = 15 \text{ pF}$ | | | | | | | |
| $t_{\text{PHL}}, t_{\text{PLH}}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | | |
| | | $V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$ | 3.0 | 15.8 | 3.0 | 17.4 | ns |
| | | $V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$ | 2.4 | 10.0 | 2.4 | 11.0 | ns |
| | | $V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$ | 2.1 | 8.0 | 2.1 | 8.8 | ns |
| | | $V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$ | 1.8 | 6.1 | 1.8 | 6.8 | ns |
| | | $V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$ | 1.8 | 5.0 | 1.8 | 5.5 | ns |
| $C_L = 30 \text{ pF}$ | | | | | | | |
| $t_{\text{PHL}}, t_{\text{PLH}}$ | HIGH-to-LOW and LOW-to-HIGH propagation delay nA to nY | see Figure 7 | | | | | |
| | | $V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$ | 4.0 | 19.0 | 4.0 | 20.9 | ns |
| | | $V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$ | 3.2 | 12.9 | 3.2 | 14.2 | ns |
| | | $V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$ | 2.9 | 10.5 | 2.9 | 11.6 | ns |
| | | $V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$ | 2.6 | 7.6 | 2.6 | 8.4 | ns |
| | | $V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$ | 2.6 | 6.2 | 2.6 | 6.9 | ns |

13. Waveforms

Measurement points are given in [Table 11](#).Logic levels: V_{OL} and V_{OH} are typical output voltage drop that occur with the output load.**Fig 7. The data input (nA) to output (nY) propagation delays****Table 11: 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 | $0.5 \times V_{\text{CC}}$ | $0.5 \times V_{\text{CC}}$ | V_{CC} | $\leq 3.0 \text{ ns}$ |

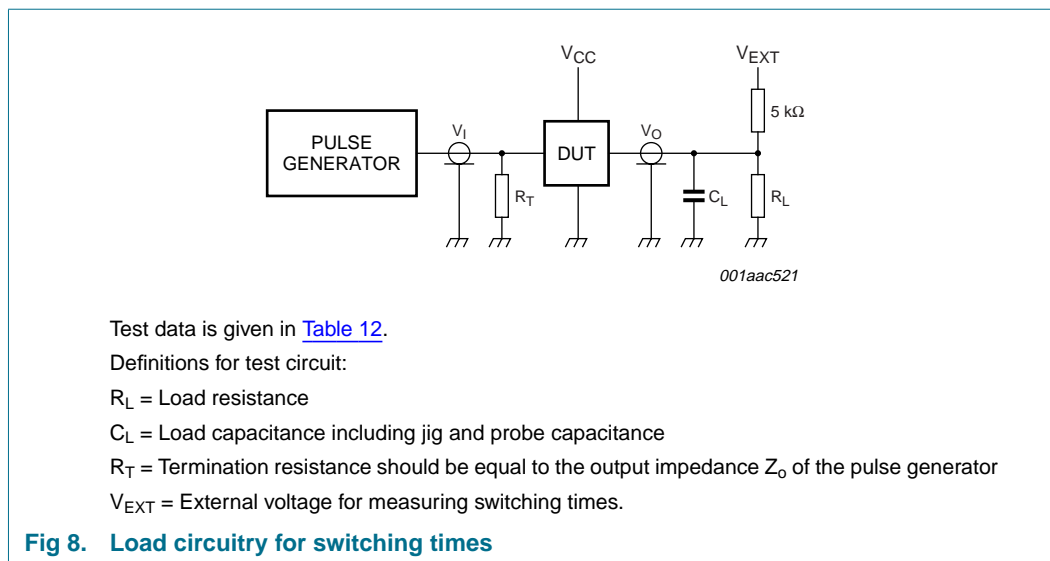


Fig 8. Load circuitry for switching times

Table 12: 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 $R_L = 1 \text{ M}\Omega$

14. Package outline

Plastic surface mounted package; 6 leads

SOT363

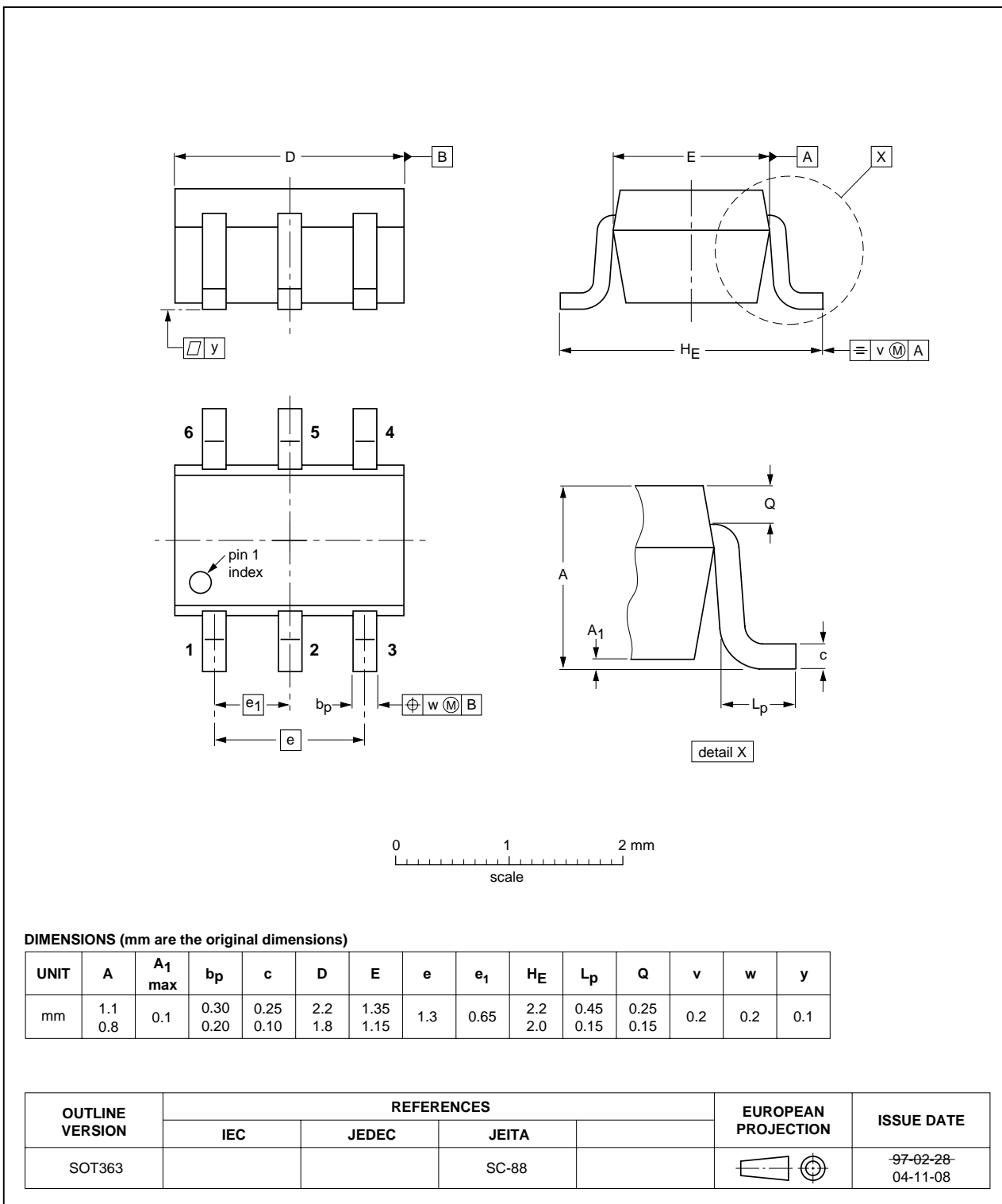


Fig 9. Package outline SOT363 (SC-88)

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

SOT886

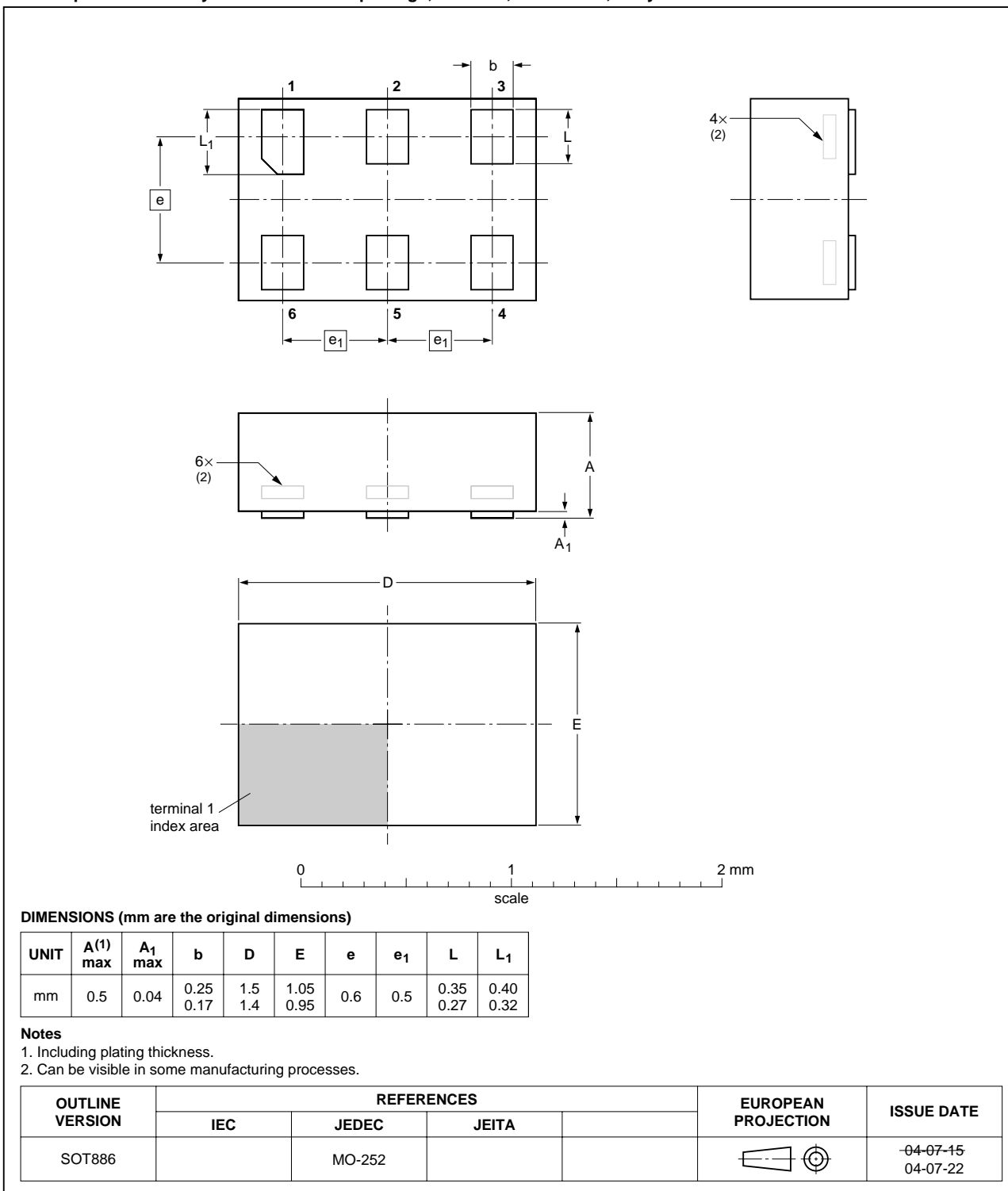


Fig 10. Package outline SOT886 (XSON6)

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

SOT891

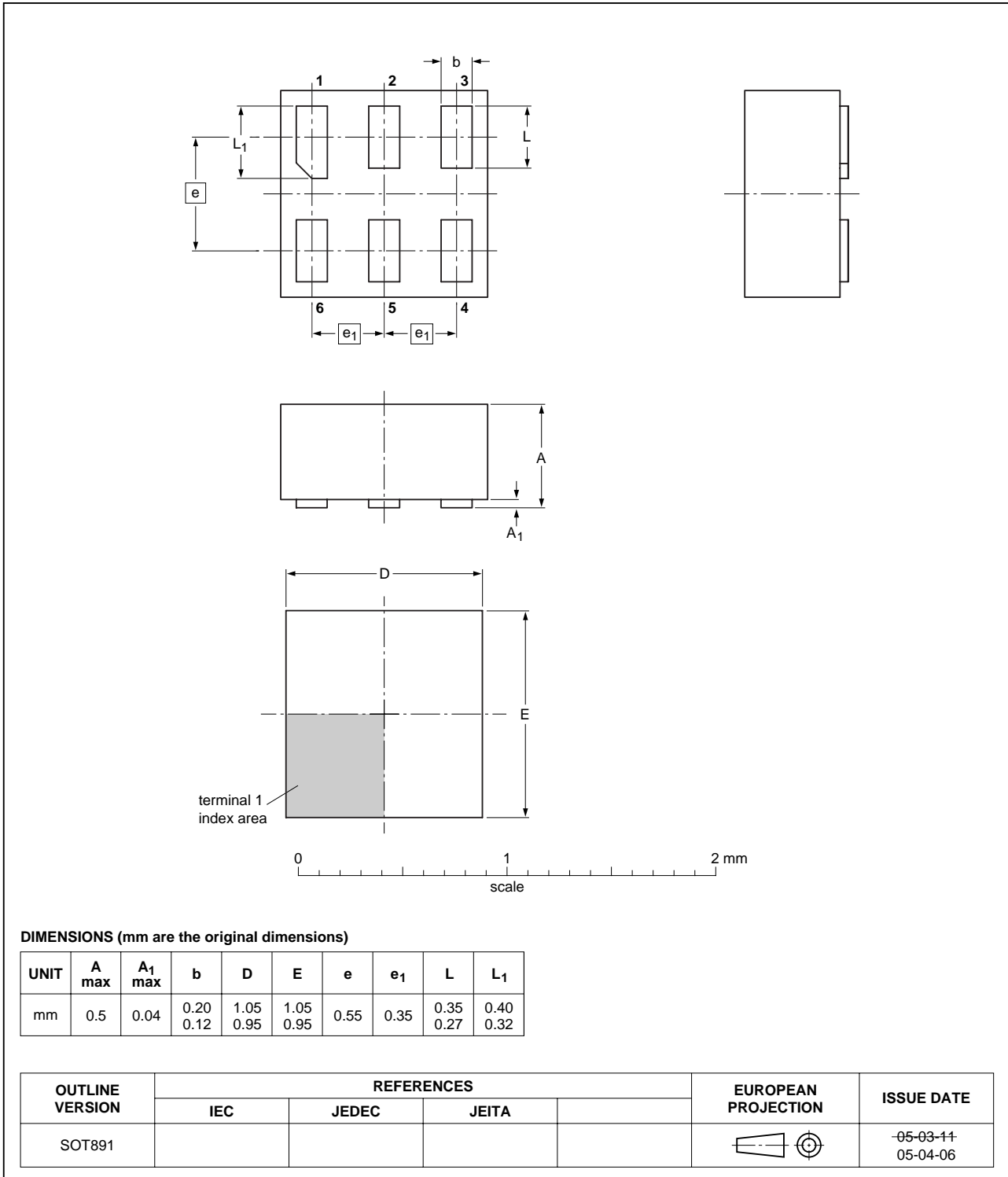


Fig 11. Package outline SOT891 (XSON6)

15. Abbreviations

Table 13: 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 14: Revision history

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|-------------|--------------|--------------------|---------------|-------------|------------|
| 74AUP2G04_1 | <td> | Product data sheet | - | - | - |

17. Data sheet status

| Level | Data sheet status ^[1] | Product status ^{[2] [3]} | Definition |
|-------|----------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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22. Contents

| | | |
|-----|--------------------------------------------|----|
| 1 | General description | 1 |
| 2 | Features | 1 |
| 3 | Quick reference data | 2 |
| 4 | Ordering information | 2 |
| 5 | Marking | 3 |
| 6 | Functional diagram | 3 |
| 7 | Pinning information | 3 |
| 7.1 | Pinning | 3 |
| 7.2 | Pin description | 4 |
| 8 | Functional description | 4 |
| 8.1 | Function table | 4 |
| 9 | Limiting values | 5 |
| 10 | Recommended operating conditions | 5 |
| 11 | Static characteristics | 6 |
| 12 | Dynamic characteristics | 9 |
| 13 | Waveforms | 11 |
| 14 | Package outline | 13 |
| 15 | Abbreviations | 16 |
| 16 | Revision history | 16 |
| 17 | Data sheet status | 17 |
| 18 | Definitions | 17 |
| 19 | Disclaimers | 17 |
| 20 | Trademarks | 17 |
| 21 | Contact information | 17 |



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