

74AUP1G57

Low-power configurable multiple function gate

Rev. 8 — 23 February 2018

Product data sheet

1 General description

The 74AUP1G57 provides configurable multiple functions. The output state is determined by eight patterns of 3-bit input. The user can choose the logic functions AND, OR, NAND, NOR, XNOR, inverter, and buffer. All inputs can be connected to V_{CC} or GND.

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 74AUP1G57 has Schmitt trigger inputs making it capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

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 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 | |
| 74AUP1G57GW | -40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |
| 74AUP1G57GM | -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 |
| 74AUP1G57GF | -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 |
| 74AUP1G57GN | -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 |
| 74AUP1G57GS | -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 |
| 74AUP1G57GX | -40 °C to +125 °C | X2SON6 | plastic thermal extremely thin small outline package; no leads; 6 terminals; body 1 x 0.8 x 0.35 mm | SOT1255 |

4 Marking

Table 2. Marking

| Type number | Marking code ^[1] |
|-------------|-----------------------------|
| 74AUP1G57GW | aC |
| 74AUP1G57GM | aC |
| 74AUP1G57GF | aC |
| 74AUP1G57GN | aC |
| 74AUP1G57GS | aC |
| 74AUP1G57GX | aC |

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

5 Functional diagram



Figure 1. Logic symbol

6 Pinning information

6.1 Pinning

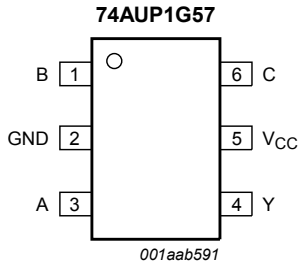


Figure 2. Pin configuration SOT363

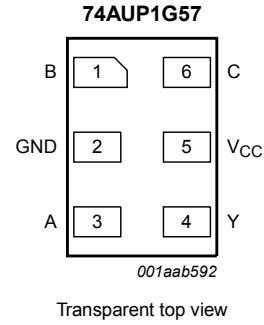


Figure 3. Pin configuration SOT886

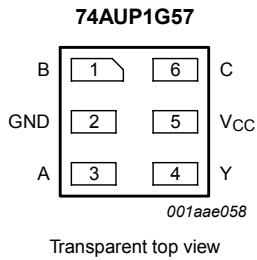


Figure 4. Pin configuration SOT891, SOT1115 and SOT1202

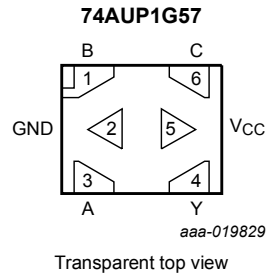


Figure 5. Pin configuration SOT1255 (X2SON6)

6.2 Pin description

Table 3. Pin description

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

7 Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level.

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

7.1 Logic configurations

Table 5. Function selection table

| Logic function | Figure |
|---------------------------------------|---|
| 2-input AND | see Figure 6 |
| 2-input AND with both inputs inverted | see Figure 9 |
| 2-input NAND with inverted input | see Figure 7 and Figure 8 |
| 2-input OR with inverted input | see Figure 7 and Figure 8 |
| 2-input NOR | see Figure 9 |
| 2-input NOR with both inputs inverted | see Figure 6 |
| 2-input XNOR | see Figure 10 |
| Inverter | see Figure 11 |
| Buffer | see Figure 12 |

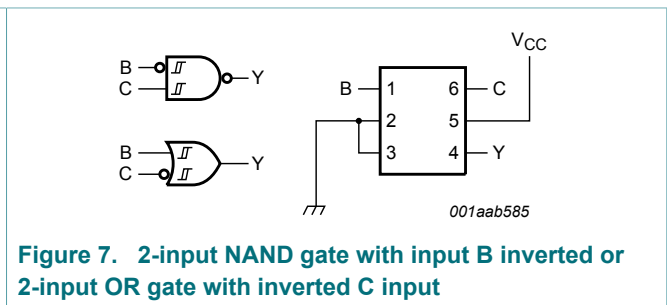
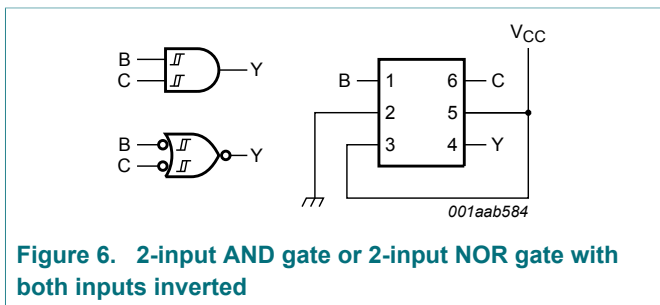




Figure 8. 2-input NAND gate with input C inverted or 2-input OR gate with inverted A input

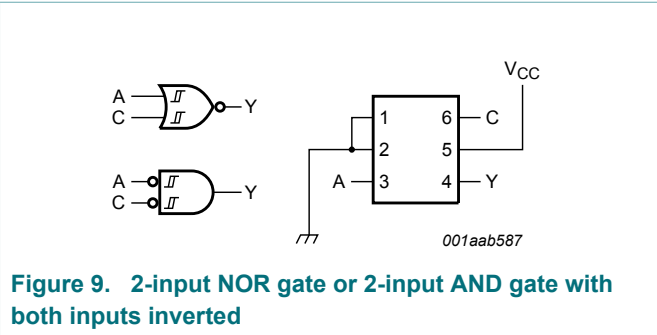


Figure 9. 2-input NOR gate or 2-input AND gate with both inputs inverted

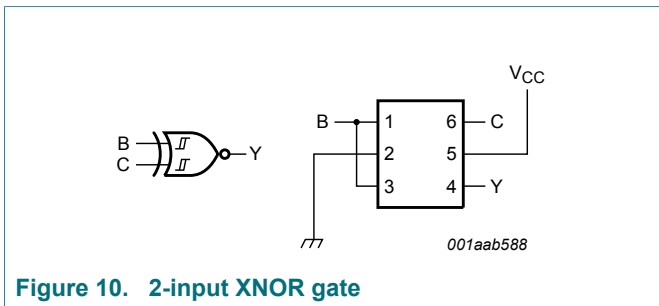


Figure 10. 2-input XNOR gate

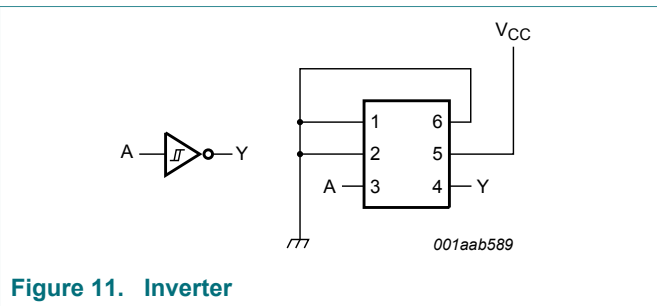


Figure 11. Inverter

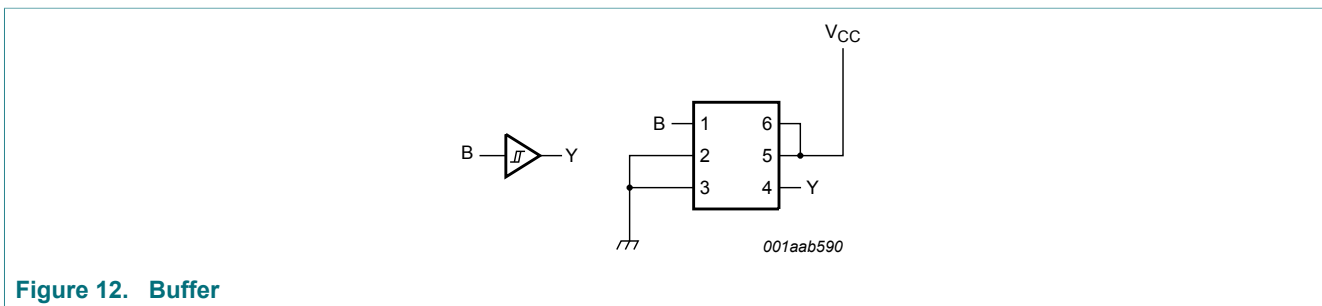


Figure 12. Buffer

8 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 | | -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 | -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 | - | 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 X2SON6 and XSON6 packages: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

9 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 |

10 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 _{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 | 0.75 × V _{CC} | - | - | V |
| | | I _O = -1.7 mA; V _{CC} = 1.4 V | 1.11 | - | - | V |
| | | I _O = -1.9 mA; V _{CC} = 1.65 V | 1.32 | - | - | V |
| | | I _O = -2.3 mA; V _{CC} = 2.3 V | 2.05 | - | - | V |
| | | I _O = -3.1 mA; V _{CC} = 2.3 V | 1.9 | - | - | V |
| | | I _O = -2.7 mA; V _{CC} = 3.0 V | 2.72 | - | - | V |
| | | I _O = -4.0 mA; V _{CC} = 3.0 V | 2.6 | - | - | V |
| 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 |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|---|-----------------------|-----|-----------------------|------|
| 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 |
| 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 |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|---|------------------------|-----|------------------------|------|
| T_{amb} = -40 °C to +125 °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} - 0.11 | - | - | 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 |
| I _O = -4.0 mA; V _{CC} = 3.0 V | 2.30 | - | - | 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 | - | - | 0.11 | V |
| | | I _O = 1.1 mA; V _{CC} = 1.1 V | - | - | 0.33 × V _{CC} | V |
| | | I _O = 1.7 mA; V _{CC} = 1.4 V | - | - | 0.41 | V |
| | | I _O = 1.9 mA; V _{CC} = 1.65 V | - | - | 0.39 | V |
| | | I _O = 2.3 mA; V _{CC} = 2.3 V | - | - | 0.36 | V |
| | | I _O = 3.1 mA; V _{CC} = 2.3 V | - | - | 0.50 | V |
| | | I _O = 2.7 mA; V _{CC} = 3.0 V | - | - | 0.36 | V |
| I _O = 4.0 mA; V _{CC} = 3.0 V | - | - | 0.50 | V | | |
| I _I | input leakage current | V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V | - | - | ±0.75 | μA |
| I _{OFF} | power-off leakage current | V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V | - | - | ±0.75 | μA |
| 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 9. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit, see [Figure 14](#).

| 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 | A, B and C to Y; see Figure 13 ^[2] | | | | | | | |
| | | V _{CC} = 0.8 V | - | 22.6 | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 2.8 | 6.5 | 12.6 | 2.5 | 13.0 | 13.2 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.2 | 4.6 | 7.6 | 2.5 | 8.2 | 8.6 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.1 | 3.9 | 6.2 | 2.0 | 6.8 | 7.2 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.0 | 3.1 | 4.5 | 1.8 | 5.1 | 5.3 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 1.8 | 2.8 | 3.9 | 1.5 | 4.1 | 4.3 | ns |
| C_L = 10 pF | | | | | | | | | |
| t _{pd} | propagation delay | A, B and C to Y; see Figure 13 ^[2] | | | | | | | |
| | | V _{CC} = 0.8 V | - | 26.1 | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 3.2 | 7.3 | 14.4 | 2.8 | 14.9 | 15.2 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.6 | 5.2 | 8.7 | 2.8 | 9.3 | 9.8 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.5 | 4.5 | 7.0 | 2.2 | 7.8 | 8.2 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.4 | 3.7 | 5.2 | 2.1 | 5.9 | 6.2 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.3 | 3.4 | 4.6 | 1.9 | 4.9 | 5.1 | ns |
| C_L = 15 pF | | | | | | | | | |
| t _{pd} | propagation delay | A, B and C to Y; see Figure 13 ^[2] | | | | | | | |
| | | V _{CC} = 0.8 V | - | 31.6 | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 3.4 | 8.0 | 15.7 | 3.1 | 16.7 | 17.0 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 2.8 | 5.7 | 9.4 | 3.1 | 10.4 | 10.9 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 2.6 | 4.9 | 7.7 | 2.5 | 8.7 | 9.2 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 2.6 | 4.1 | 5.7 | 2.4 | 6.5 | 6.9 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 2.5 | 3.8 | 5.0 | 2.2 | 5.5 | 5.7 | ns |

| Symbol | Parameter | Conditions | 25 °C | | | -40 °C to +125 °C | | | Unit |
|---|-------------------------------|--|-------|--------------------|------|-------------------|----------------|-----------------|------|
| | | | Min | Typ ^[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| C_L = 30 pF | | | | | | | | | |
| t _{pd} | propagation delay | A, B and C to Y; see Figure 13 ^[2] | | | | | | | |
| | | V _{CC} = 0.8 V | - | 37.8 | - | - | - | - | ns |
| | | V _{CC} = 1.1 V to 1.3 V | 4.6 | 10.4 | 20.9 | 3.9 | 21.8 | 22.3 | ns |
| | | V _{CC} = 1.4 V to 1.6 V | 3.6 | 7.4 | 12.2 | 3.8 | 13.4 | 14.1 | ns |
| | | V _{CC} = 1.65 V to 1.95 V | 3.5 | 6.2 | 9.9 | 3.1 | 11.1 | 11.8 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 3.4 | 5.2 | 7.4 | 3.1 | 8.3 | 8.8 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 3.2 | 4.9 | 6.6 | 2.8 | 7.0 | 7.4 | ns |
| 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 | - | 2.8 | - | - | - | - | 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).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

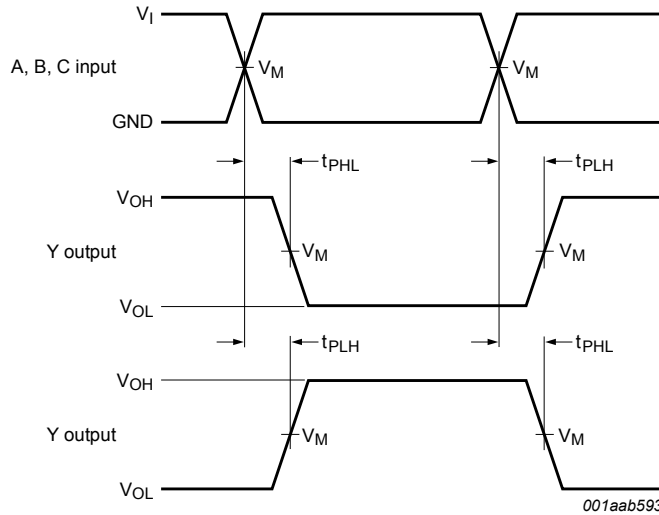
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

Σ(C_L × V_{CC}² × f_o) = sum of the outputs.

11.1 Waveforms and test circuit



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

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

Figure 13. Input A, B and C to output Y propagation delay times

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 14. 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 k Ω or 1 M Ω | open | GND | 2 x 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, $R_L = 1\text{ M}\Omega$.

11.2 Transfer characteristics

Table 12. Transfer characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 14](#).

| 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 15 and Figure 16 | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | 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_{T-} | negative-going threshold voltage | see Figure 15 and Figure 16 | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | 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_H | hysteresis voltage | ($V_{T+} - V_{T-}$); see Figure 15 , Figure 16 , Figure 17 and Figure 18 | | | | | | | |
| | | $V_{CC} = 0.8\text{ V}$ | 0.07 | - | 0.50 | 0.07 | 0.50 | 0.50 | V |
| | | $V_{CC} = 1.1\text{ V}$ | 0.08 | - | 0.46 | 0.08 | 0.46 | 0.46 | V |
| | | $V_{CC} = 1.4\text{ V}$ | 0.18 | - | 0.56 | 0.18 | 0.56 | 0.56 | V |
| | | $V_{CC} = 1.65\text{ V}$ | 0.27 | - | 0.66 | 0.27 | 0.66 | 0.66 | V |
| | | $V_{CC} = 2.3\text{ V}$ | 0.53 | - | 0.92 | 0.53 | 0.92 | 0.92 | V |
| | $V_{CC} = 3.0\text{ V}$ | 0.79 | - | 1.31 | 0.79 | 1.31 | 1.31 | V | |

11.3 Waveform transfer characteristics

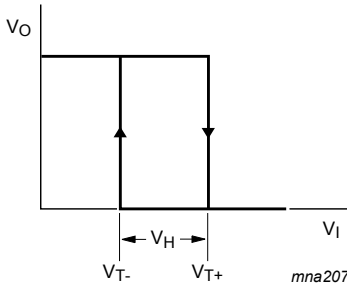
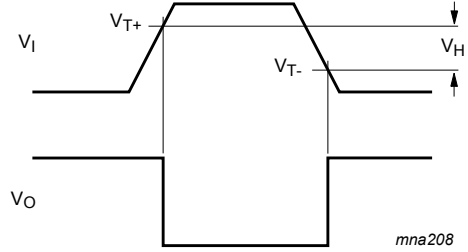


Figure 15. Transfer characteristic



V_{T+} and V_{T-} limits at 70 % and 20 %.

Figure 16. Definition of V_{T+} , V_{T-} and V_H

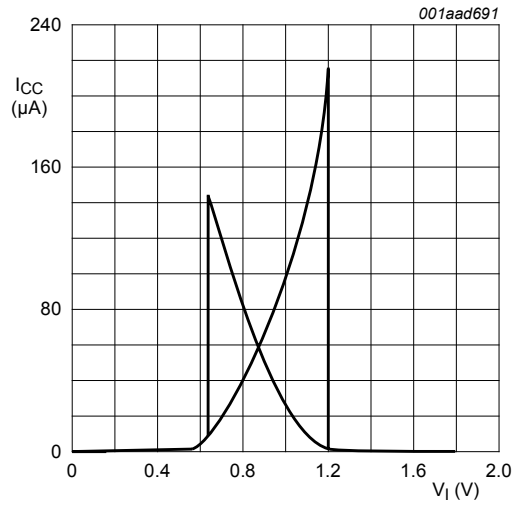


Figure 17. Typical transfer characteristics; $V_{CC} = 1.8\text{ V}$

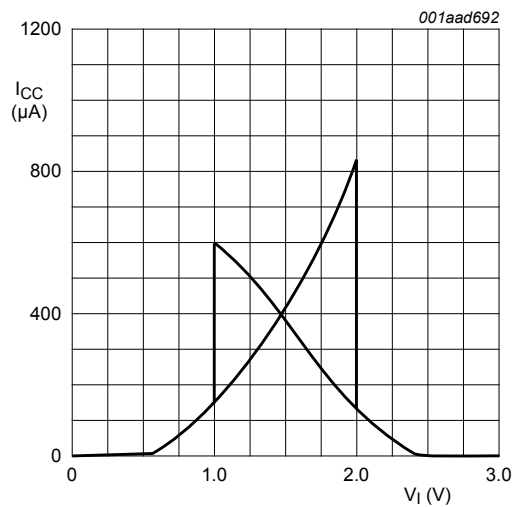


Figure 18. Typical transfer characteristics; $V_{CC} = 3.0\text{ V}$

12 Package outline

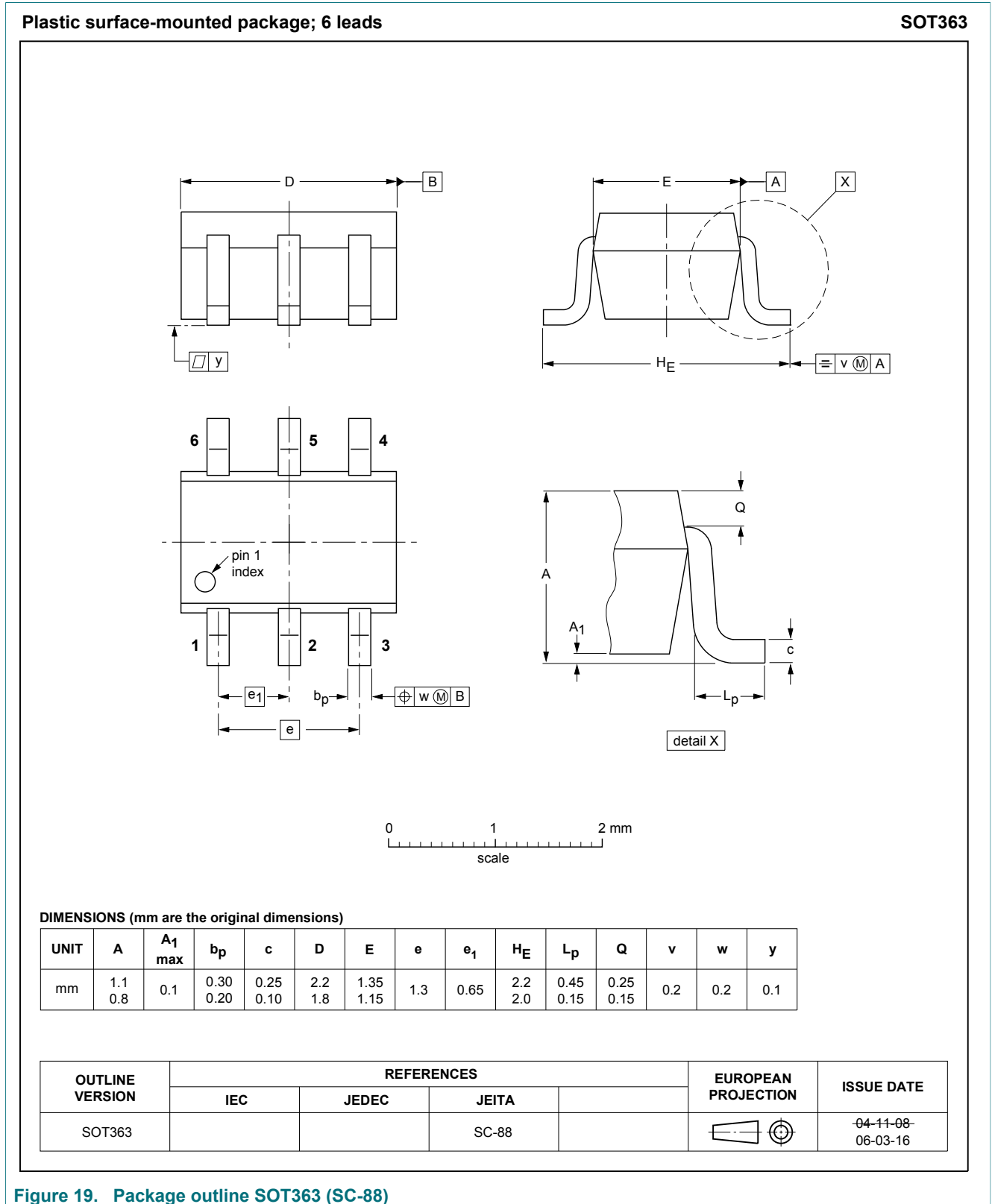
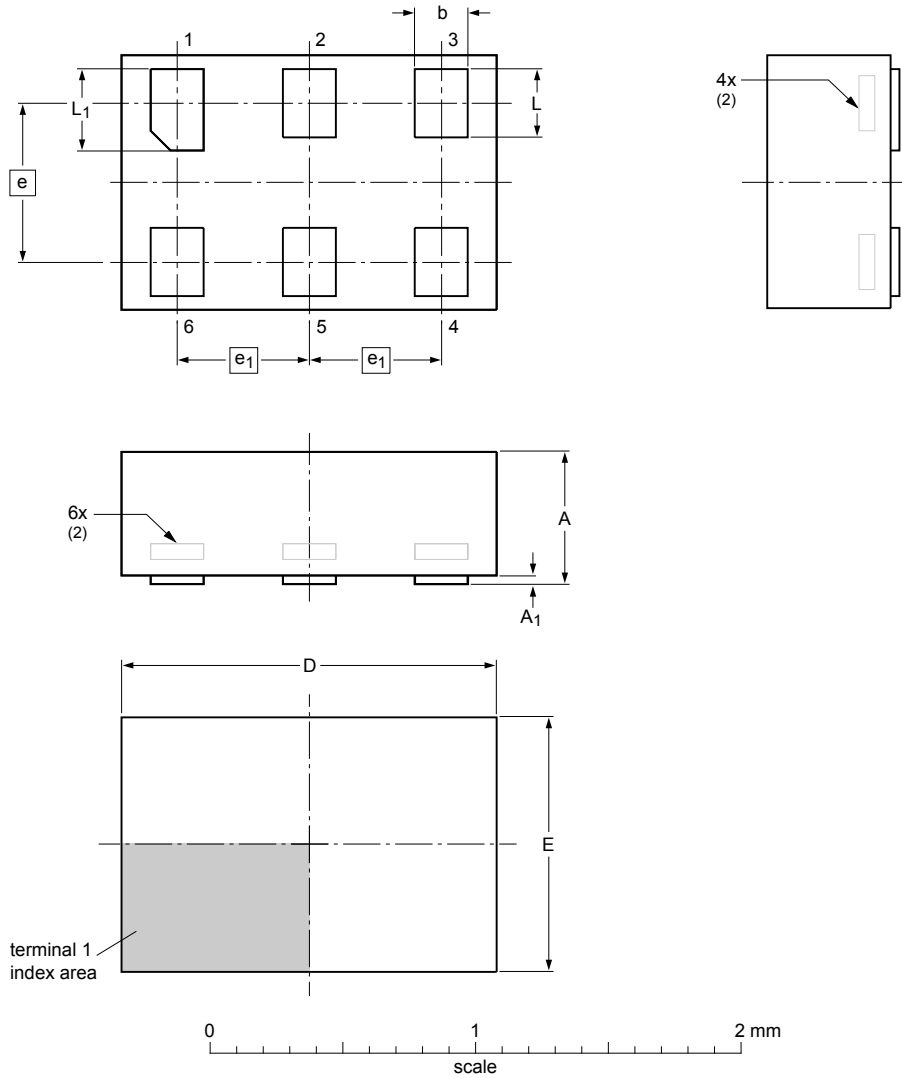


Figure 19. Package outline SOT363 (SC-88)

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

SOT886



Dimensions (mm are the original dimensions)

| Unit | A ⁽¹⁾ | A ₁ | b | D | E | e | e ₁ | L | L ₁ |
|------|------------------|----------------|------|------|------|-----|----------------|------|----------------|
| max | 0.5 | 0.04 | 0.25 | 1.50 | 1.05 | | | 0.35 | 0.40 |
| nom | | | 0.20 | 1.45 | 1.00 | 0.6 | 0.5 | 0.30 | 0.35 |
| min | | | 0.17 | 1.40 | 0.95 | | | 0.27 | 0.32 |

Notes

- Including plating thickness.
- Can be visible in some manufacturing processes.

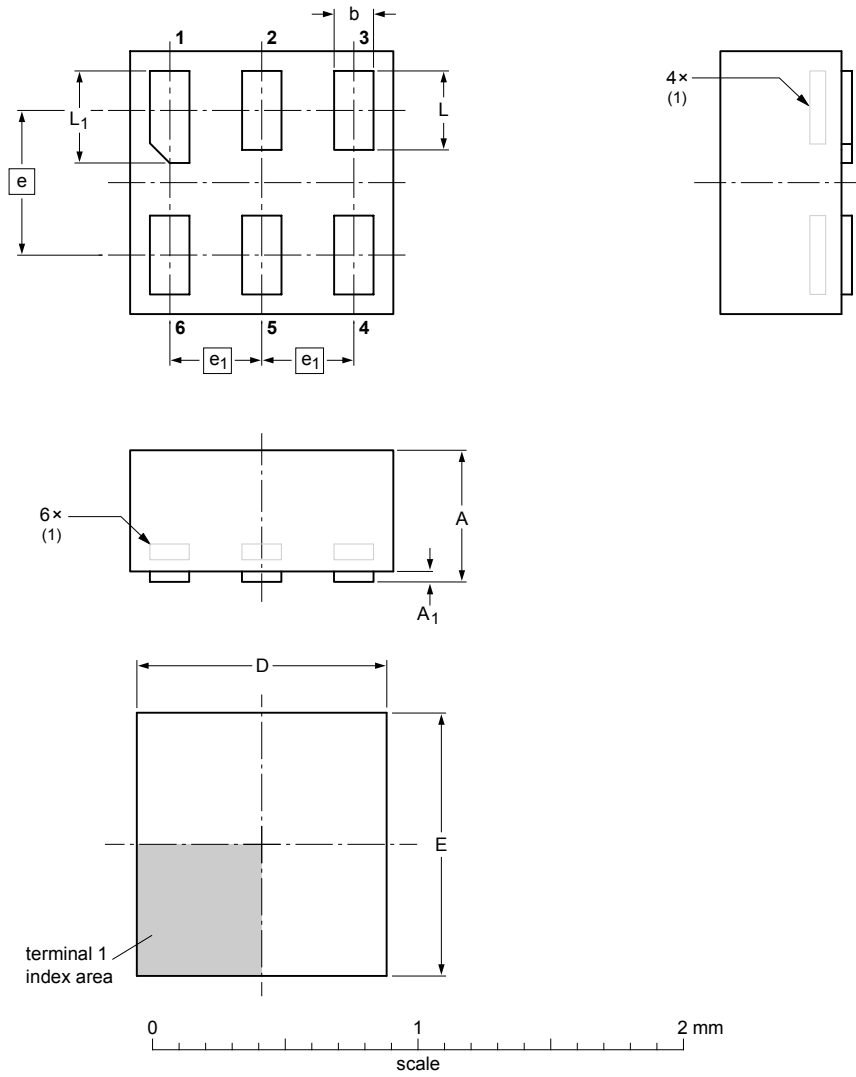
sot886_po

| Outline version | References | | | European projection | Issue date |
|-----------------|------------|--------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOT886 | | MO-252 | | | 04-07-22 12-01-05 |

Figure 20. 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

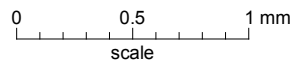
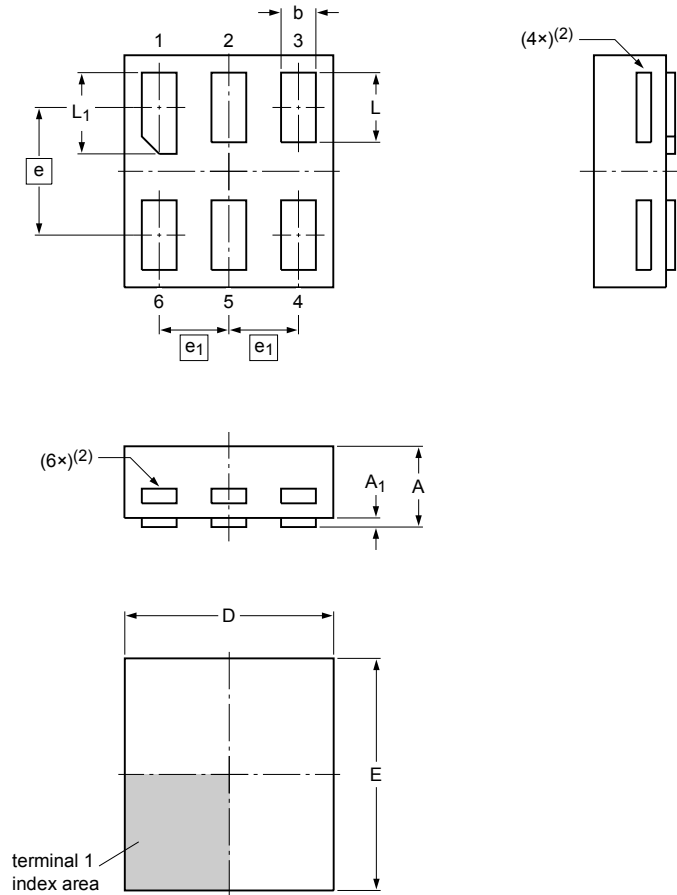
1. Can be visible in some manufacturing processes.

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

Figure 21. 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.

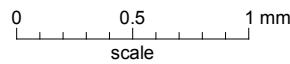
sot1115_po

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

Figure 22. 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 |
|------|------------------|----------------|------|------|------|------|----------------|------|----------------|
| mm | 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

- 1. Including plating thickness.
- 2. 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 23. Package outline SOT1202 (XSON6)

X2SON6: plastic thermal enhanced extremely thin small outline package; no leads;
6 terminals; body 1.0 x 0.8 x 0.35 mm

SOT1255

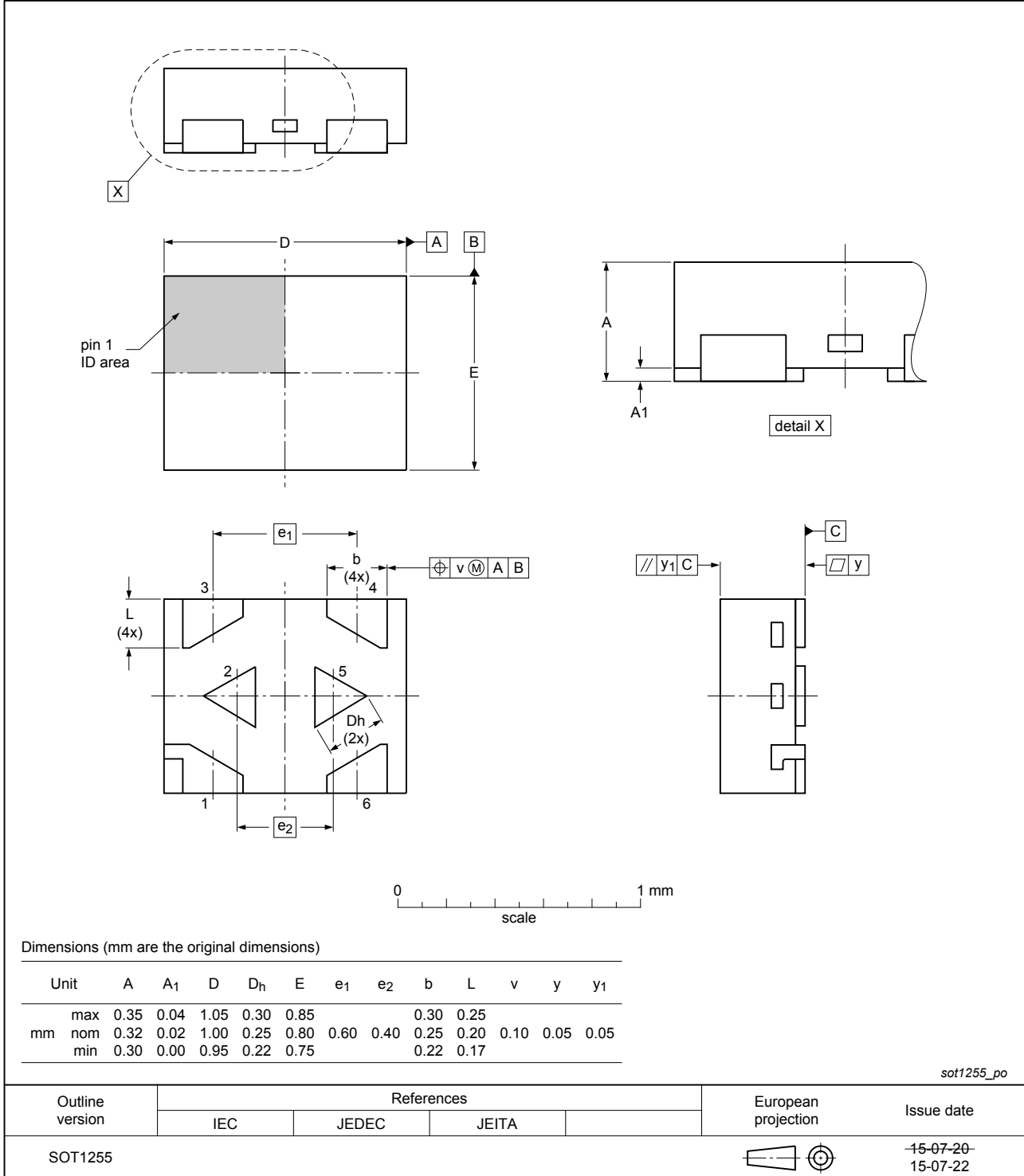


Figure 24. Package outline SOT1255 (X2SON6)

13 Abbreviations

Table 13. 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 14. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|--------------------|---------------|---------------|
| 74AUP1G57 v.8 | 20180223 | Product data sheet | - | 74AUP1G57 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. | | | |
| 74AUP1G57 v.7 | 20150916 | Product data sheet | - | 74AUP1G57 v.6 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74AUP1G57GX (SOT1255/X2SON6). | | | |
| 74AUP1G57 v.6 | 20120815 | Product data sheet | - | 74AUP1G57 v.5 |
| Modifications: | <ul style="list-style-type: none"> Package outline drawing of SOT886 (Figure 20) modified. | | | |
| 74AUP1G57 v.5 | 20111125 | Product data sheet | - | 74AUP1G57 v.4 |
| 74AUP1G57 v.4 | 20100720 | Product data sheet | - | 74AUP1G57 v.3 |
| 74AUP1G57 v.3 | 20090622 | Product data sheet | - | 74AUP1G57 v.2 |
| 74AUP1G57 v.2 | 20090323 | Product data sheet | - | 74AUP1G57 v.1 |
| 74AUP1G57 v.1 | 20061123 | 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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[2] The term 'short data sheet' is explained in section "Definitions".

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Date of release: 23 February 2018
Document identifier: 74AUP1G57

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