# 74AUP1T57

## Low-power configurable gate with voltage-level translator

Rev. 5 — 15 August 2012 Product data sheet

## 1. General description

The 74AUP1T57 provides low-power, low-voltage configurable logic gate 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 2.3 V to 3.6 V.

The 74AUP1T57 is designed for logic-level translation applications with input switching levels that accept 1.8 V low-voltage CMOS signals, while operating from either a single 2.5 V or 3.3 V supply voltage.

The wide supply voltage range ensures normal operation as battery voltage drops from 3.6 V to 2.3 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.

Schmitt trigger inputs make the circuit tolerant to slower input rise and fall times across the entire $V_{CC}$ range.

## 2. Features and benefits

- Wide supply voltage range from 2.3 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; $I_{CC}$ = 1.5 μA (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 °C to +85 °C and −40 °C to +125 °C

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## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74AUP1T57GW | –40 °C to +125 °C | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |
| 74AUP1T57GM | –40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| 74AUP1T57GF | –40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm | SOT891 |
| 74AUP1T57GN | –40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm | SOT1115 |
| 74AUP1T57GS | –40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm | SOT1202 |

## 4. Marking

**Table 2. Marking**

| Type number | Marking code[1] |
|---|---|
| 74AUP1T57GW | a7 |
| 74AUP1T57GM | a7 |
| 74AUP1T57GF | a7 |
| 74AUP1T57GN | a7 |
| 74AUP1T57GN | a7 |

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

## 5. Functional diagram

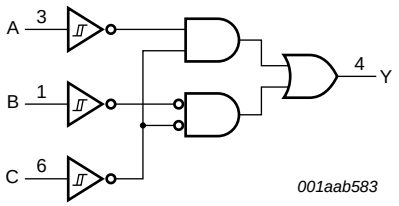



**Fig 1. Logic symbol**

# 6. Pinning information

## 6.1 Pinning

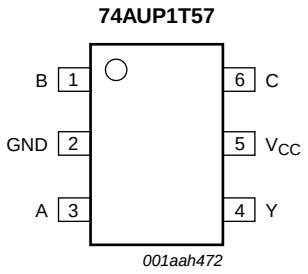



Fig 2. Pin configuration SOT363

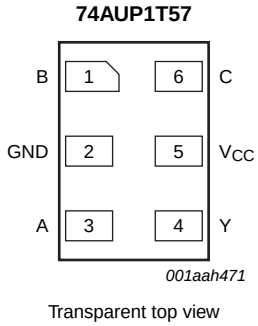



Fig 3. Pin configuration SOT886

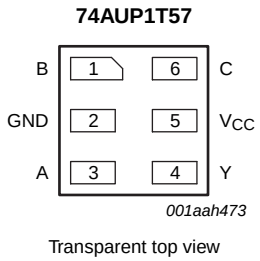



Fig 4. Pin configuration SOT891, SOT1115 and SOT1202

## 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[1]

| 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 |

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

## 7.1 Logic configurations

**Table 5. Function selection table**

| Logic function | Figure |
|---|---|
| 2-input AND | see Figure 5 |
| 2-input AND with both inputs inverted | see Figure 8 |
| 2-input NAND with inverted input | see Figure 6 and 7 |
| 2-input OR with inverted input | see Figure 6 and 7 |
| 2-input NOR | see Figure 8 |
| 2-input NOR with both inputs inverted | see Figure 5 |
| 2-input XNOR | see Figure 9 |
| Inverter | see Figure 10 |
| Buffer | see Figure 11 |

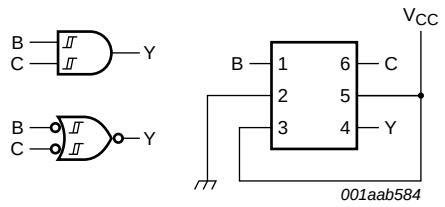



**Fig 5. 2-input AND gate or 2-input NOR gate with both inputs inverted**

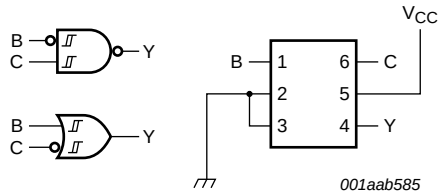



**Fig 6. 2-input NAND gate with input B inverted or 2-input OR gate with inverted C input**

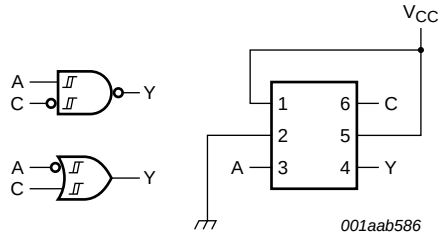



**Fig 7. 2-input NAND gate with input C inverted or 2-input OR gate with inverted A input**

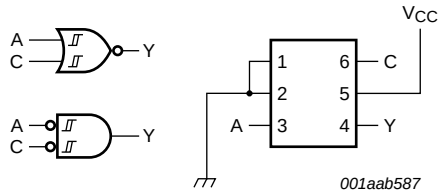



**Fig 8. 2-input NOR gate or 2-input AND gate with both inputs inverted**

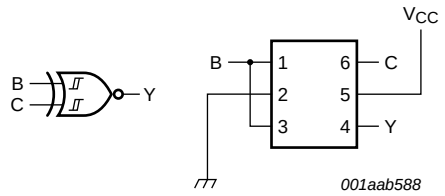



**Fig 9. 2-input XNOR gate**

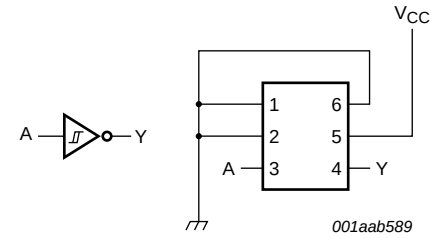



**Fig 10. Inverter**

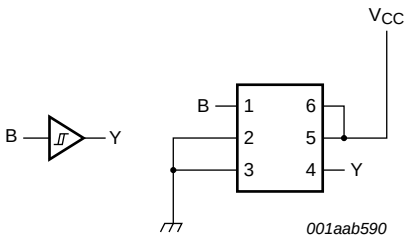



**Fig 11. Buffer**

## 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 | | [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 SC-88 package: 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.

## 9. Recommended operating conditions

**Table 7. Recommended operating conditions**

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | 2.3 | 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** | | | | | | | |
| $V_{T+}$ | positive-going threshold voltage | $V_{CC}$ = 2.3 V to 2.7 V | | 0.60 | - | 1.10 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.75 | - | 1.16 | V |
| $V_{T-}$ | negative-going threshold voltage | $V_{CC}$ = 2.3 V to 2.7 V | | 0.35 | - | 0.60 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.50 | - | 0.85 | V |
| $V_H$ | hysteresis voltage | ($V_H = V_{T+} - V_{T-}$) | | | | | |
| | | $V_{CC}$ = 2.3 V to 2.7 V | | 0.23 | - | 0.60 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.25 | - | 0.56 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | | | | | |
| | | $I_O$ = −20 μA; $V_{CC}$ = 2.3 V to 3.6 V | | $V_{CC}$ − 0.1 | - | - | 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; $V_{CC}$ = 2.3 V to 3.6 V | | - | - | 0.10 | 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 | | - | - | ±0.1 | μA |
| $\Delta I_{OFF}$ | 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; $V_{CC}$ = 2.3 V to 3.6 V | | - | - | 1.2 | μA |
| $\Delta I_{CC}$ | additional supply current | $V_{CC}$ = 2.3 V to 2.7 V; $I_O$ = 0 A | [1] | - | - | - | μA |
| | | $V_{CC}$ = 3.0 V to 3.6 V; $I_O$ = 0 A | [2] | - | - | - | μA |
| $C_I$ | input capacitance | $V_{CC}$ = 0 V to 3.6 V; $V_I$ = GND or $V_{CC}$ | | - | 0.8 | - | pF |
| $C_O$ | output capacitance | $V_O$ = GND; $V_{CC}$ = 0 V | | - | 1.7 | - | pF |
| **$T_{amb}$ = −40 °C to +85 °C** | | | | | | | |
| $V_{T+}$ | positive-going threshold voltage | $V_{CC}$ = 2.3 V to 2.7 V | | 0.60 | - | 1.10 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.75 | - | 1.19 | V |
| $V_{T-}$ | negative-going threshold voltage | $V_{CC}$ = 2.3 V to 2.7 V | | 0.35 | - | 0.60 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.50 | - | 0.85 | V |
| $V_H$ | hysteresis voltage | ($V_H = V_{T+} - V_{T-}$) | | | | | |
| | | $V_{CC}$ = 2.3 V to 2.7 V | | 0.10 | - | 0.60 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.15 | - | 0.56 | V |

**Table 8. Static characteristics** *…continued*

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

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | | | | | |
| | | $I_O = -20\ \mu A$; $V_{CC}$ = 2.3 V to 3.6 V | | $V_{CC} - 0.1$ | - | - | 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 $V_{T-}$ | | | | | |
| | | $I_O = 20\ \mu A$; $V_{CC}$ = 2.3 V to 3.6 V | | - | - | 0.1 | 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 |
| $\Delta I_{OFF}$ | additional power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V to 0.2 V | | - | - | ±0.5 | μA |
| $I_{CC}$ | supply current | $V_I$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 2.3 V to 3.6 V | | - | - | 1.5 | μA |
| $\Delta I_{CC}$ | additional supply current | $V_{CC}$ = 2.3 V to 2.7 V; $I_O$ = 0 A | [1] | - | - | 4 | μA |
| | | $V_{CC}$ = 3.0 V to 3.6 V; $I_O$ = 0 A | [2] | - | - | 12 | μA |
| **$T_{amb}$ = –40 °C to +125 °C** | | | | | | | |
| $V_{T+}$ | positive-going threshold voltage | $V_{CC}$ = 2.3 V to 2.7 V | | 0.60 | - | 1.10 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.75 | - | 1.19 | V |
| $V_{T-}$ | negative-going threshold voltage | $V_{CC}$ = 2.3 V to 2.7 V | | 0.33 | - | 0.64 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.46 | - | 0.85 | V |
| $V_H$ | hysteresis voltage | ($V_H = V_{T+} - V_{T-}$) | | | | | |
| | | $V_{CC}$ = 2.3 V to 2.7 V | | 0.10 | - | 0.60 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | | 0.15 | - | 0.56 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | | | | | |
| | | $I_O = -20\ \mu A$; $V_{CC}$ = 2.3 V to 3.6 V | | $V_{CC} - 0.11$ | - | - | 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 $V_{T-}$ | | | | | |
| | | $I_O = 20\ \mu A$; $V_{CC}$ = 2.3 V to 3.6 V | | - | - | 0.11 | 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 |

**Table 8. 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 | | - | - | ±0.75 | μA |
| $\Delta I_{OFF}$ | 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; $V_{CC}$ = 2.3 V to 3.6 V | | - | - | 3.5 | μA |
| $\Delta I_{CC}$ | additional supply current | $V_{CC}$ = 2.3 V to 2.7 V; $I_O$ = 0 A | [1] | - | - | 7 | μA |
| | | $V_{CC}$ = 3.0 V to 3.6 V; $I_O$ = 0 A | [2] | - | - | 22 | μA |

[1] One input at 0.3 V or 1.1 V, other input at $V_{CC}$ or GND.

[2] One input at 0.45 V or 1.2 V, other input at $V_{CC}$ or GND.

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 13.*

| Symbol | Parameter | Conditions | | 25 °C | | | –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| **$V_{CC}$ = 2.3 V to 2.7 V; $V_I$ = 1.65 V to 1.95 V** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B, C to Y; see Figure 12 | [2] | | | | | | | |
| | | $C_L$ = 5 pF | | 2.1 | 3.6 | 5.5 | 0.5 | 6.8 | 7.5 | ns |
| | | $C_L$ = 10 pF | | 2.6 | 4.1 | 6.2 | 1.0 | 7.9 | 8.7 | ns |
| | | $C_L$ = 15 pF | | 2.9 | 4.6 | 6.8 | 1.0 | 8.7 | 9.6 | ns |
| | | $C_L$ = 30 pF | | 3.8 | 5.8 | 8.2 | 1.5 | 10.8 | 11.9 | ns |
| **$V_{CC}$ = 2.3 V to 2.7 V; $V_I$ = 2.3 V to 2.7 V** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B, C to Y; see Figure 12 | [2] | | | | | | | |
| | | $C_L$ = 5 pF | | 1.7 | 3.4 | 5.4 | 0.5 | 6.0 | 6.6 | ns |
| | | $C_L$ = 10 pF | | 2.1 | 4.0 | 6.2 | 1.0 | 7.1 | 7.9 | ns |
| | | $C_L$ = 15 pF | | 2.5 | 4.5 | 6.7 | 1.0 | 7.9 | 8.7 | ns |
| | | $C_L$ = 30 pF | | 3.3 | 5.6 | 8.2 | 1.5 | 10.0 | 11.0 | ns |
| **$V_{CC}$ = 2.3 V to 2.7 V; $V_I$ = 3.0 V to 3.6 V** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B, C to Y; see Figure 12 | [2] | | | | | | | |
| | | $C_L$ = 5 pF | | 1.4 | 3.2 | 4.9 | 0.5 | 5.5 | 6.1 | ns |
| | | $C_L$ = 10 pF | | 1.8 | 3.7 | 5.7 | 1.0 | 6.5 | 7.2 | ns |
| | | $C_L$ = 15 pF | | 2.2 | 4.2 | 6.3 | 1.0 | 7.4 | 8.2 | ns |
| | | $C_L$ = 30 pF | | 3.0 | 5.4 | 7.8 | 1.5 | 9.5 | 10.5 | ns |
| **$V_{CC}$ = 3.0 V to 3.6 V; $V_I$ = 1.65 V to 1.95 V** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B, C to Y; see Figure 12 | [2] | | | | | | | |
| | | $C_L$ = 5 pF | | 2.0 | 2.9 | 3.9 | 0.5 | 8.0 | 8.8 | ns |
| | | $C_L$ = 10 pF | | 2.5 | 3.5 | 4.6 | 1.0 | 8.5 | 9.4 | ns |
| | | $C_L$ = 15 pF | | 2.8 | 3.9 | 5.2 | 1.0 | 9.1 | 10.1 | ns |
| | | $C_L$ = 30 pF | | 3.6 | 5.1 | 6.6 | 1.5 | 9.8 | 10.8 | ns |

**Table 9. Dynamic characteristics** *...continued*

*Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 13.*

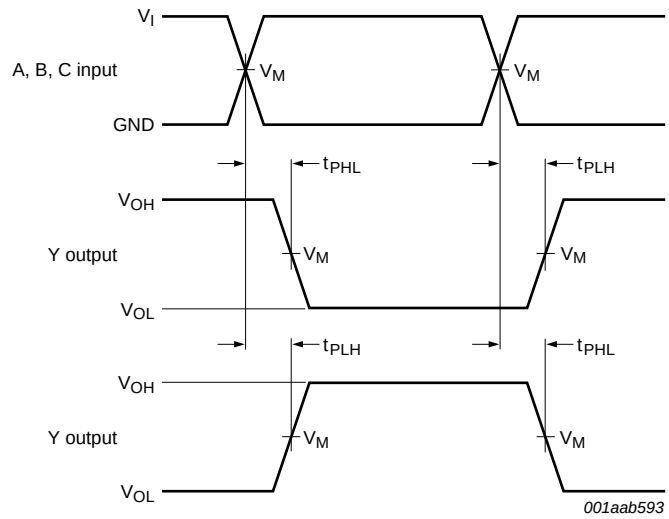
| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| **$V_{CC}$ = 3.0 V to 3.6 V; $V_I$ = 2.3 V to 2.7 V** | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B, C to Y; see Figure 12 [2] | | | | | | | |
| | | $C_L$ = 5 pF | 1.6 | 2.8 | 4.2 | 0.5 | 5.3 | 5.9 | ns |
| | | $C_L$ = 10 pF | 2.0 | 3.4 | 4.9 | 1.0 | 6.1 | 6.8 | ns |
| | | $C_L$ = 15 pF | 2.3 | 3.9 | 5.5 | 1.0 | 6.8 | 7.5 | ns |
| | | $C_L$ = 30 pF | 3.1 | 5.0 | 6.9 | 1.5 | 8.5 | 9.4 | ns |
| **$V_{CC}$ = 3.0 V to 3.6 V; $V_I$ = 3.0 V to 3.6 V** | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B, C to Y; see Figure 12 [2] | | | | | | | |
| | | $C_L$ = 5 pF | 1.3 | 2.8 | 4.2 | 0.5 | 4.7 | 5.2 | ns |
| | | $C_L$ = 10 pF | 1.7 | 3.3 | 4.9 | 1.0 | 5.7 | 6.3 | ns |
| | | $C_L$ = 15 pF | 2.0 | 3.8 | 5.5 | 1.0 | 6.2 | 6.9 | ns |
| | | $C_L$ = 30 pF | 2.8 | 4.9 | 7.0 | 1.5 | 7.8 | 8.6 | ns |
| **$T_{amb}$ = 25 °C** | | | | | | | | | |
| $C_{PD}$ | power dissipation capacitance | $f_i$ = 1 MHz; $V_I$ = GND to $V_{CC}$ [3] | | | | | | | |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 3.6 | - | - | - | - | 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] $C_{PD}$ 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;
$C_L$ = 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



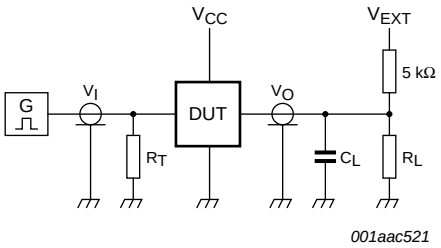

Measurement points are given in Table 10.

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

**Fig 12. Input A, B and C to output Y propagation delay times**

**Table 10. Measurement points**

| Supply voltage | Output | Input | | |
|---|---|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ | $V_I$ | $t_r = t_f$ |
| 2.3 V to 3.6 V | $0.5 \times V_{CC}$ | $0.5 \times V_I$ | 1.65 V to 3.6 V | ≤ 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.

**Fig 13. Test circuit for measuring switching times**

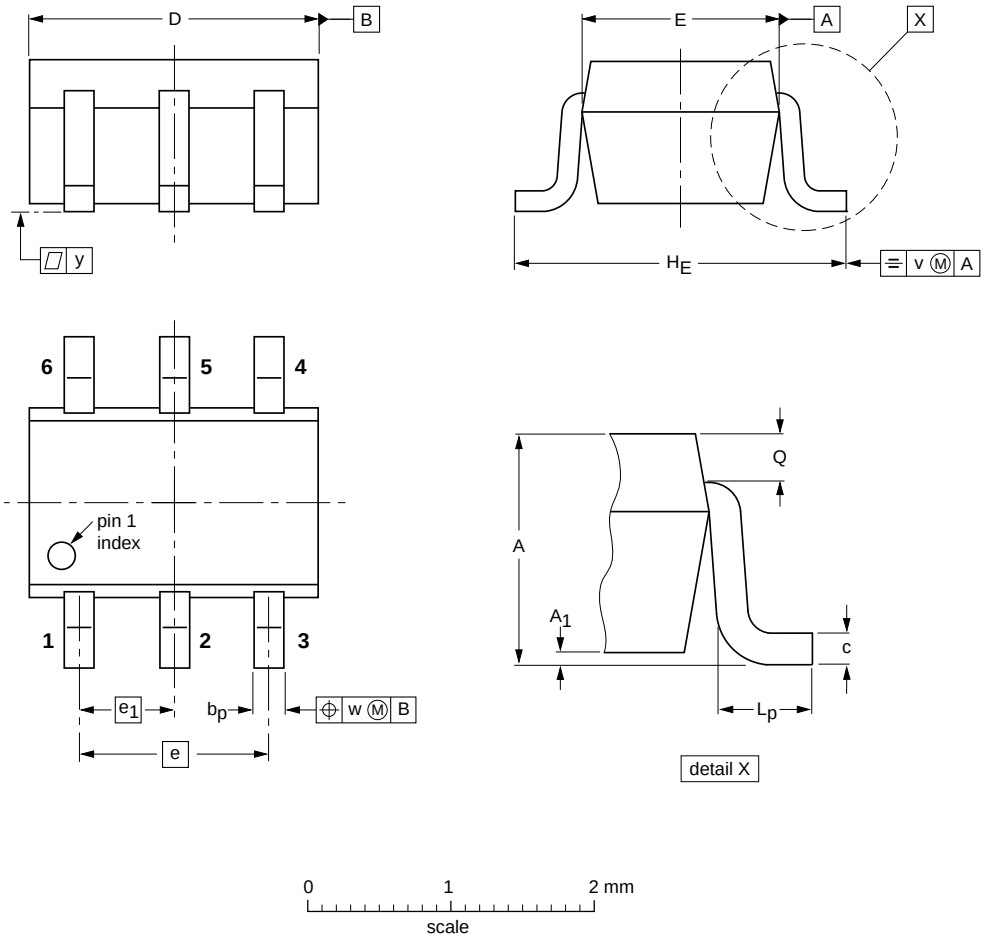
**Table 11. Test data**

| Supply voltage | Load | | $V_{EXT}$ | | |
|---|---|---|---|---|---|
| $V_{CC}$ | $C_L$ | $R_L$[1] | $t_{PLH}$, $t_{PHL}$ | $t_{PZH}$, $t_{PHZ}$ | $t_{PZL}$, $t_{PLZ}$ |
| 2.3 V to 3.6 V | 5 pF, 10 pF, 15 pF and 30 pF | 5 kΩ or 1 MΩ | open | GND | $2 \times V_{CC}$ |

[1] For measuring enable and disable times $R_L$ = 5 kΩ, for measuring propagation delays, setup and hold times and pulse width $R_L$ = 1 MΩ.

## 13. Package outline

**Plastic surface-mounted package; 6 leads** **SOT363**



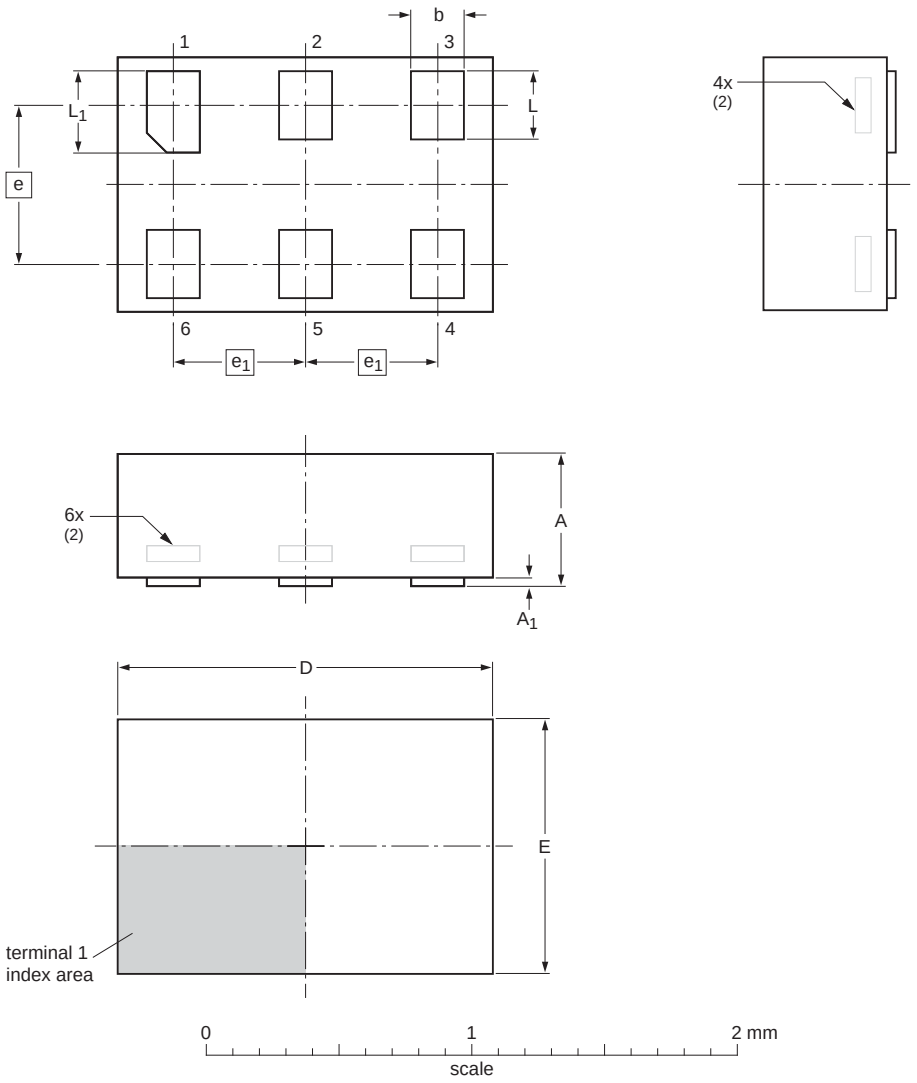

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT363 | | | SC-88 | | | ~~04-11-08~~<br>06-03-16 |

**Fig 14. 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 | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 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 |

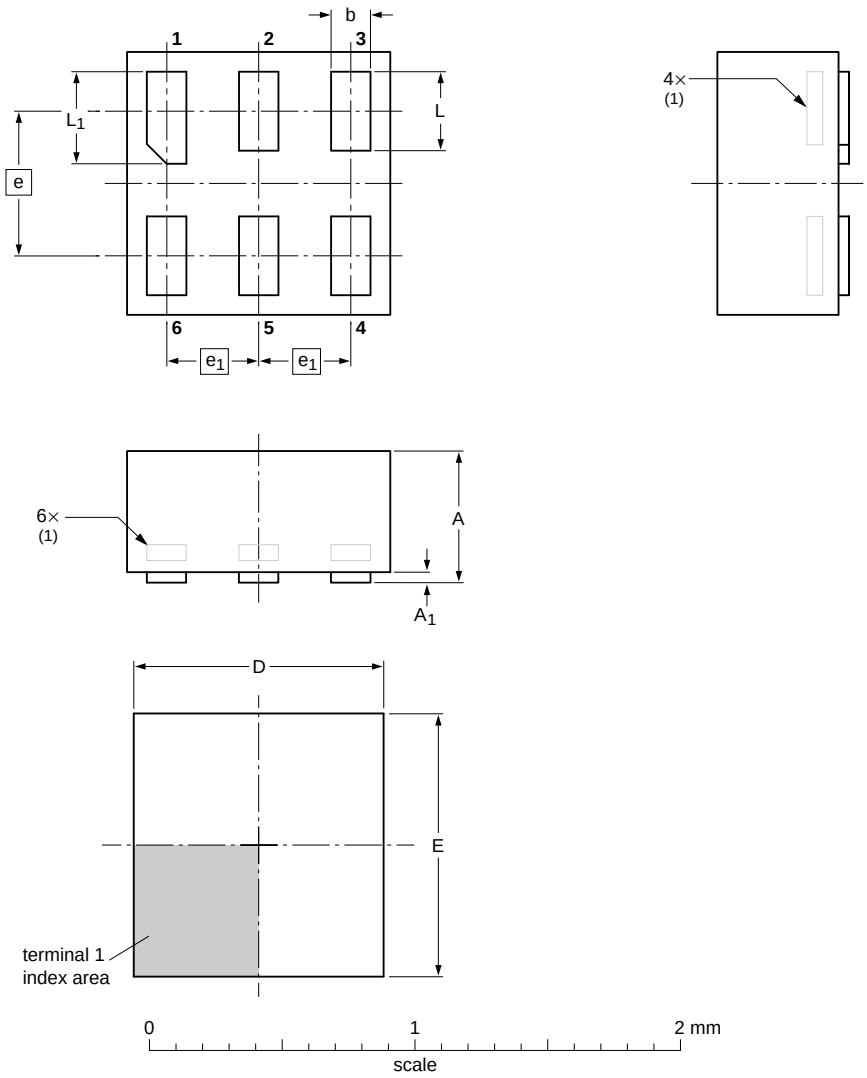
Notes
1. Including plating thickness.
2. Can be visible in some manufacturing processes.

sot886_po

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

**Fig 15. 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<br>0.12 | 1.05<br>0.95 | 1.05<br>0.95 | 0.55 | 0.35 | 0.35<br>0.27 | 0.40<br>0.32 |

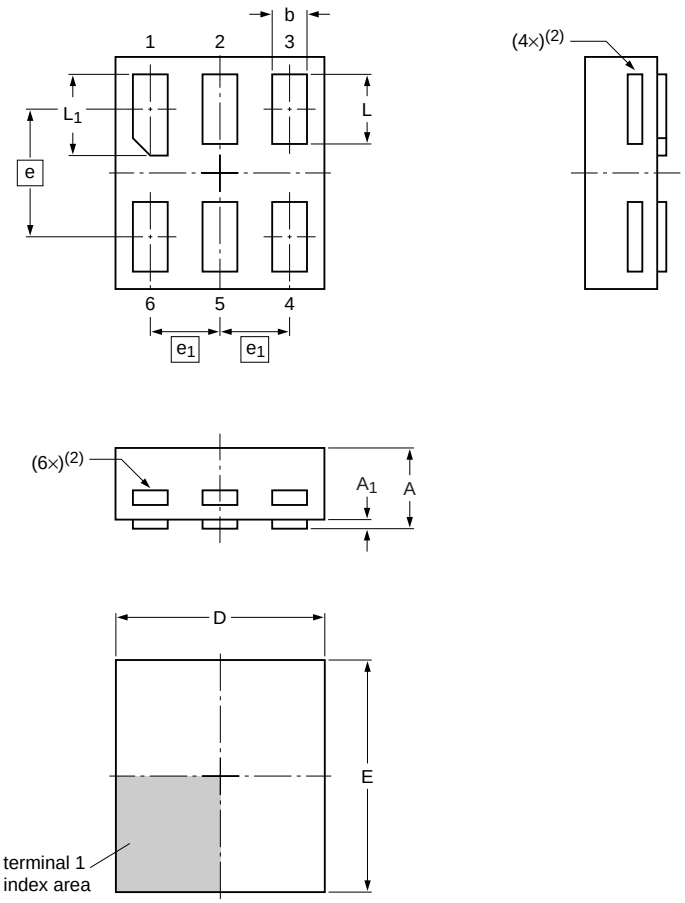
**Note**

1. Can be visible in some manufacturing processes.

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

**Fig 16. 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 |

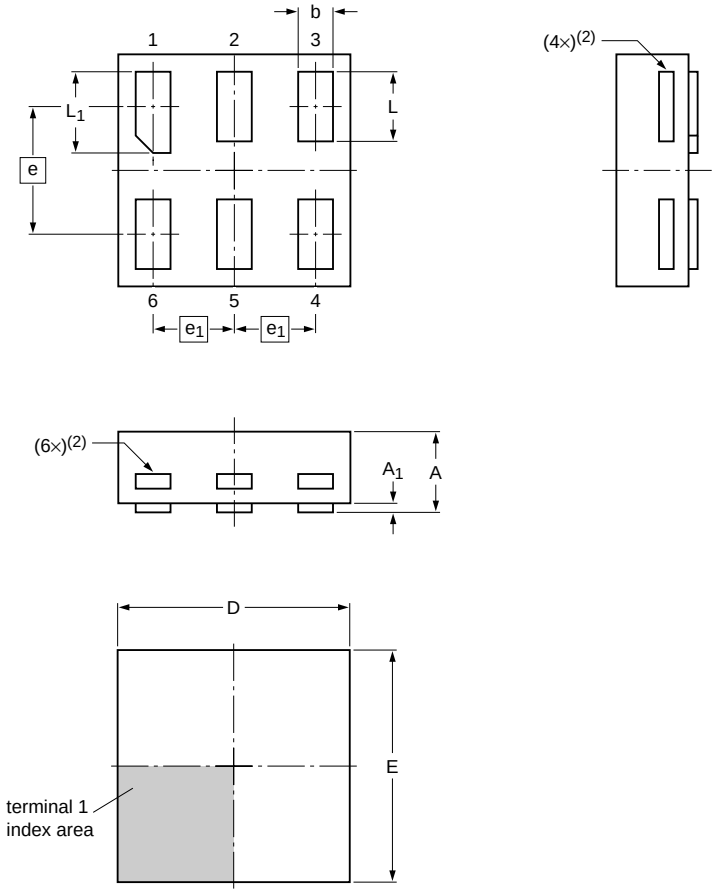
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

*sot1115_po*

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

**Fig 17. 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) | A1 | b | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 |

**Fig 18. Package outline SOT1202 (XSON6)**

## 14. Abbreviations

**Table 12. 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 |

## 15. Revision history

**Table 13. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74AUP1T57 v.5 | 20120815 | Product data sheet | - | 74AUP1T57 v.4 |
| Modifications: | • Package outline drawing of SOT886 (Figure 15) modified. | | | |
| 74AUP1T57 v.4 | 20111201 | Product data sheet | - | 74AUP1T57 v.3 |
| 74AUP1T57 v.3 | 20100721 | Product data sheet | - | 74AUP1T57 v.2 |
| 74AUP1T57 v.2 | 20090803 | Product data sheet | - | 74AUP1T57 v.1 |
| 74AUP1T57 v.1 | 20080103 | Product data sheet | - | - |

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| 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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# 18. Contents





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**Date of release: 15 August 2012**