# 74LVC3GU04

## Triple unbuffered inverter

Rev. 11 — 9 April 2013 Product data sheet

## 1. General description

The 74LVC3GU04 is a triple unbuffered inverter.

Inputs can be driven from either 3.3 V or 5 V devices. These features allow the use of these devices in a mixed 3.3 V and 5 V environment.

## 2. Features and benefits

- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant input/output for interfacing with 5 V logic
- High noise immunity
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- ±24 mA output drive at $V_{CC}$ = 3.0 V
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Multiple package options
- Specified from −40 °C to +85 °C and from −40 °C to +125 °C.

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74LVC3GU04DP | −40 °C to +125 °C | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm | SOT505-2 |
| 74LVC3GU04DC | −40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm | SOT765-1 |
| 74LVC3GU04GT | −40 °C to +125 °C | XSON8 | plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm | SOT833-1 |
| 74LVC3GU04GF | −40 °C to +125 °C | XSON8 | extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm | SOT1089 |
| 74LVC3GU04GD | −40 °C to +125 °C | XSON8 | plastic extremely thin small outline package; no leads; 8 terminals; body 3 × 2 × 0.5 mm | SOT996-2 |

**Table 1. Ordering information** *…continued*

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74LVC3GU04GM | −40 °C to +125 °C | XQFN8 | plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 × 1.6 × 0.5 mm | SOT902-2 |
| 74LVC3GU04GN | −40 °C to +125 °C | XSON8 | extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm | SOT1116 |
| 74LVC3GU04GS | −40 °C to +125 °C | XSON8 | extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm | SOT1203 |

## 4. Marking

**Table 2. Marking codes**

| Type number | Marking code[1] |
|---|---|
| 74LVC3GU04DP | VU04 |
| 74LVC3GU04DC | VU4 |
| 74LVC3GU04GT | VU4 |
| 74LVC3GU04GF | YD |
| 74LVC3GU04GD | VU4 |
| 74LVC3GU04GM | VU4 |
| 74LVC3GU04GN | YD |
| 74LVC3GU04GS | YD |

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

## 5. Functional diagram

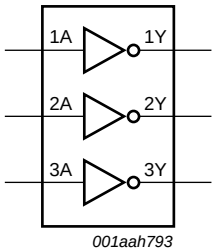



**Fig 1. Logic symbol**

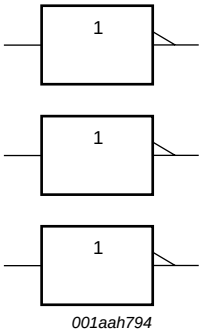



**Fig 2. IEC logic symbol**

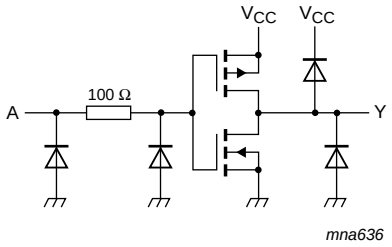



**Fig 3. Logic diagram (one gate)**

# 6. Pinning information

## 6.1 Pinning

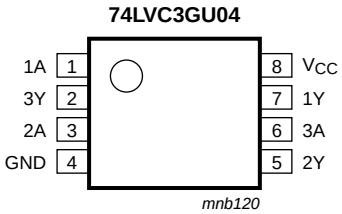
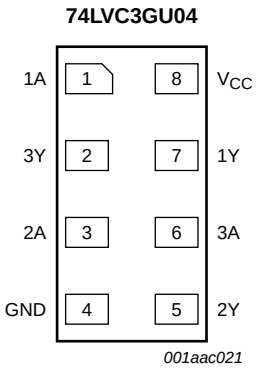
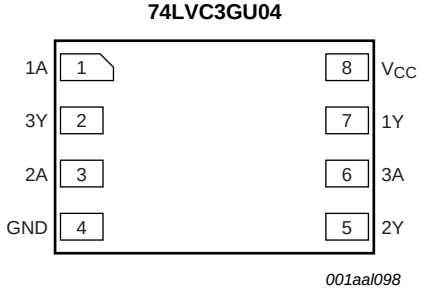



**Fig 4. Pin configuration SOT505-2 and SOT765-1**



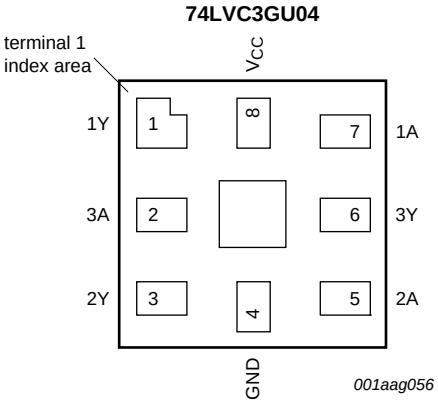

Transparent top view

**Fig 5. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203**




Transparent top view

**Fig 6. Pin configuration SOT996-2**




Transparent top view

**Fig 7. Pin configuration SOT902-2**

### 6.2 Pin description

**Table 3. Pin description**

| Symbol | Pin | | Description |
|---|---|---|---|
| | SOT505-2, SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203 | SOT902-2 | |
| 1A, 2A, 3A | 1, 3, 6 | 7, 5, 2 | data input |
| GND | 4 | 4 | ground (0 V) |
| 1Y, 2Y, 3Y | 7, 5, 2 | 1, 3, 6 | data output |
| $V_{CC}$ | 8 | 8 | supply voltage |

## 7. Functional description

**Table 4. Function table[1]**

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

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

## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | | −0.5 | +6.5 | V |
| $V_I$ | input voltage | | [1] | −0.5 | +6.5 | V |
| $V_O$ | output voltage | Active mode | [1] | −0.5 | $V_{CC}$ + 0.5 | V |
| $I_{IK}$ | input clamping current | $V_I$ < 0 V | | −50 | - | mA |
| $I_{OK}$ | output clamping current | $V_O$ > $V_{CC}$ or $V_O$ < 0 V | | - | ±50 | mA |
| $I_O$ | output current | $V_O$ = 0 V to $V_{CC}$ | | - | ±50 | mA |
| $I_{CC}$ | supply current | | | - | 100 | mA |
| $I_{GND}$ | ground current | | | −100 | - | mA |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = −40 °C to +125 °C | [2] | - | 250 | mW |
| $T_{stg}$ | storage temperature | | | −65 | +150 | °C |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For TSSOP8 packages: above 55 °C the value of $P_{tot}$ derates linearly with 2.5 mW/K.
For VSSOP8 packages: above 110 °C the value of $P_{tot}$ derates linearly with 8.0 mW/K.
For XSON8 and XQFN8 packages: above 118 °C the value of $P_{tot}$ derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6. Operating conditions**

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | 1.65 | 5.5 | V |
| $V_I$ | input voltage | | 0 | 5.5 | V |
| $V_O$ | output voltage | Active mode | 0 | $V_{CC}$ | V |
| | | Power-down mode; $V_{CC}$ = 0 V | 0 | 5.5 | V |
| $T_{amb}$ | ambient temperature | | –40 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC}$ = 1.65 V to 2.7 V | - | 20 | ns/V |
| | | $V_{CC}$ = 2.7 V to 5.5 V | - | 10 | ns/V |

## 10. Static characteristics

**Table 7. Static characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ[1] | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = –40 °C to +85 °C** | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.65 V to 5.5 V | 0.75 × $V_{CC}$ | - | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 1.65 V to 5.5 V | - | - | 0.25 × $V_{CC}$ | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = –100 μA; $V_{CC}$ = 1.65 V to 5.5 V | $V_{CC}$ – 0.1 | - | - | V |
| | | $I_O$ = –4 mA; $V_{CC}$ = 1.65 V | 1.2 | - | - | V |
| | | $I_O$ = –8 mA; $V_{CC}$ = 2.3 V | 1.9 | - | - | V |
| | | $I_O$ = –12 mA; $V_{CC}$ = 2.7 V | 2.2 | - | - | V |
| | | $I_O$ = –24 mA; $V_{CC}$ = 3.0 V | 2.3 | - | - | V |
| | | $I_O$ = –32 mA; $V_{CC}$ = 4.5 V | 3.8 | - | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = 100 μA; $V_{CC}$ = 1.65 V to 5.5 V | - | - | 0.1 | V |
| | | $I_O$ = 4 mA; $V_{CC}$ = 1.65 V | - | - | 0.45 | V |
| | | $I_O$ = 8 mA; $V_{CC}$ = 2.3 V | - | - | 0.3 | V |
| | | $I_O$ = 12 mA; $V_{CC}$ = 2.7 V | - | - | 0.4 | V |
| | | $I_O$ = 24 mA; $V_{CC}$ = 3.0 V | - | - | 0.55 | V |
| | | $I_O$ = 32 mA; $V_{CC}$ = 4.5 V | - | - | 0.55 | V |
| $I_I$ | input leakage current | $V_I$ = 5.5 V or GND; $V_{CC}$ = 0 V to 5.5 V | - | ±0.1 | ±5 | μA |
| $I_{CC}$ | supply current | $V_I$ = 5.5 V or GND; $V_{CC}$ = 1.65 V to 5.5 V; $I_O$ = 0 A | - | 0.1 | 10 | μA |
| $C_I$ | input capacitance | | - | 5 | - | pF |

**Table 7. Static characteristics** *...continued*

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

| Symbol | Parameter | Conditions | Min | Typ[1] | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = –40 °C to +125 °C** | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.65 V to 5.5 V | 0.8 × $V_{CC}$ | - | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 1.65 V to 5.5 V | - | - | 0.2 × $V_{CC}$ | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = –100 μA; $V_{CC}$ = 1.65 V to 5.5 V | $V_{CC}$ – 0.1 | - | - | V |
| | | $I_O$ = –4 mA; $V_{CC}$ = 1.65 V | 0.95 | - | - | V |
| | | $I_O$ = –8 mA; $V_{CC}$ = 2.3 V | 1.7 | - | - | V |
| | | $I_O$ = –12 mA; $V_{CC}$ = 2.7 V | 1.9 | - | - | V |
| | | $I_O$ = –24 mA; $V_{CC}$ = 3.0 V | 2.0 | - | - | V |
| | | $I_O$ = –32 mA; $V_{CC}$ = 4.5 V | 3.4 | - | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | |
| | | $I_O$ = 100 μA; $V_{CC}$ = 1.65 V to 5.5 V | - | - | 0.1 | V |
| | | $I_O$ = 4 mA; $V_{CC}$ = 1.65 V | - | - | 0.70 | V |
| | | $I_O$ = 8 mA; $V_{CC}$ = 2.3 V | - | - | 0.45 | V |
| | | $I_O$ = 12 mA; $V_{CC}$ = 2.7 V | - | - | 0.60 | V |
| | | $I_O$ = 24 mA; $V_{CC}$ = 3.0 V | - | - | 0.80 | V |
| | | $I_O$ = 32 mA; $V_{CC}$ = 4.5 V | - | - | 0.80 | V |
| $I_I$ | input leakage current | $V_I$ = 5.5 V or GND; $V_{CC}$ = 0 V to 5.5 V | - | - | ±20 | μA |
| $I_{CC}$ | supply current | $V_I$ = 5.5 V or GND; $V_{CC}$ = 1.65 V to 5.5 V; $I_O$ = 0 A | - | - | 40 | μA |

[1] All typical values are measured at $T_{amb}$ = 25 °C.

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V). For test circuit see Figure 9.*

| Symbol | Parameter | Conditions | –40 °C to +85 °C | | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $t_{pd}$ | propagation delay | nA to nY; see Figure 8 [2] | | | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 0.5 | 2.3 | 5.0 | 0.5 | 6.3 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 0.3 | 1.8 | 4.0 | 0.3 | 4.0 | ns |
| | | $V_{CC}$ = 2.7 V | 0.3 | 2.6 | 4.5 | 0.3 | 5.6 | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 0.3 | 2.3 | 3.7 | 0.3 | 4.5 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.3 | 1.7 | 3.0 | 0.3 | 3.8 | ns |

**Table 8. Dynamic characteristics** *...continued*

*Voltages are referenced to GND (ground = 0 V). For test circuit see Figure 9.*

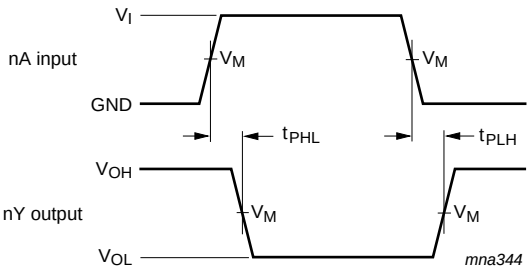
| Symbol | Parameter | Conditions | –40 °C to +85 °C | | | –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $C_{PD}$ | power dissipation capacitance | $V_I$ = GND to $V_{CC}$; $V_{CC}$ = 3.3 V [3] | - | 7 | - | - | - | pF |

[1] Typical values are measured at $T_{amb}$ = 25 °C and $V_{CC}$ = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[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 outputs.

## 12. Waveforms



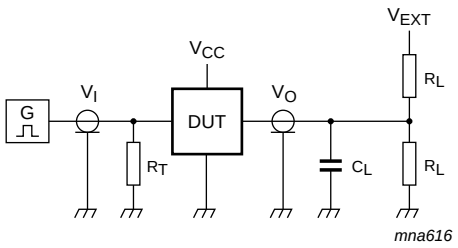

Measurement points are given in Table 9.

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

**Fig 8. The input (nA) to output (nY) propagation delays**

**Table 9. Measurement points**

| Supply voltage | Input | Output |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ |
| 1.65 V to 1.95 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |
| 2.3 V to 2.7 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |
| 2.7 V | 1.5 V | 1.5 V |
| 3.0 V to 3.6 V | 1.5 V | 1.5 V |
| 4.5 V to 5.5 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |




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.

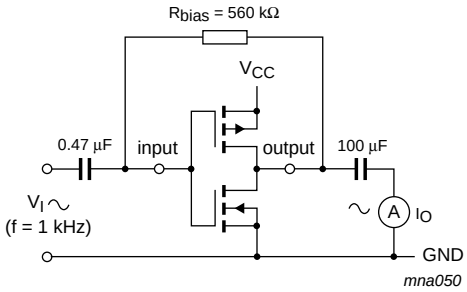
$V_{EXT}$ = External voltage for measuring switching times.

**Fig 9. Test circuit for measuring switching times**

**Table 10. Test data**

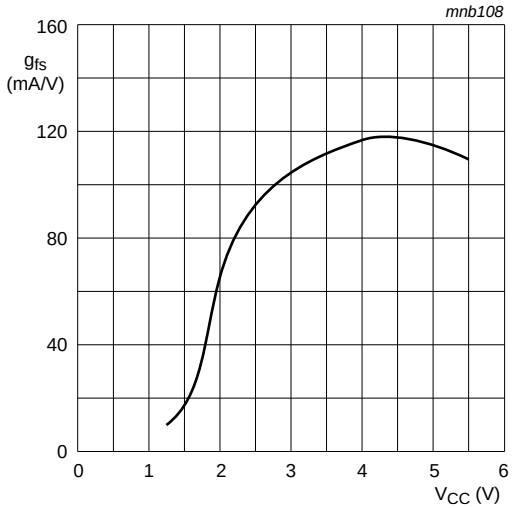
| Supply voltage | Input | | Load | | $V_{EXT}$ |
|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r = t_f$ | $C_L$ | $R_L$ | $t_{PLH}$, $t_{PHL}$ |
| 1.65 V to 1.95 V | $V_{CC}$ | ≤ 2.0 ns | 30 pF | 1 kΩ | open |
| 2.3 V to 2.7 V | $V_{CC}$ | ≤ 2.0 ns | 30 pF | 500 Ω | open |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | open |
| 4.5 V to 5.5 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 500 Ω | open |

## 13. Additional characteristics




$$g_{fs} = \frac{\Delta I_O}{\Delta V_I}$$

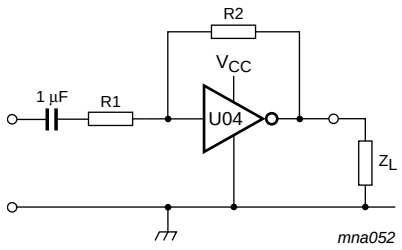
**Fig 10. Test set-up for measuring forward transconductance**




$T_{amb}$ = 25 °C.

**Fig 11. Typical forward transconductance as a function of supply voltage**

## 14. Application information




$Z_L$ > 10 kΩ

R1 ≥ 3 kΩ

R2 ≤ 1 MΩ

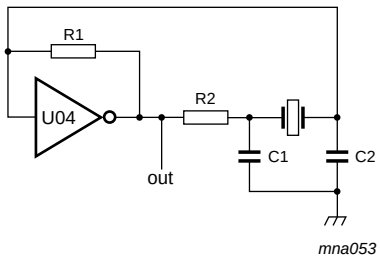
Open loop gain: $G_{ol}$ = 20

Voltage gain: $G_v = -\dfrac{G_{ol}}{1 + \dfrac{R1}{R2}(1 + G_{ol})}$

$V_{o(p\text{-}p)} = V_{CC} - 1.5$ V centered at $0.5 \times V_{CC}$

Unity gain bandwidth product is 5 MHz.

**Fig 12. Linear amplifier application**




C1 = 47 pF

C2 = 22 pF

R1 = 1 MΩ to 10 MΩ

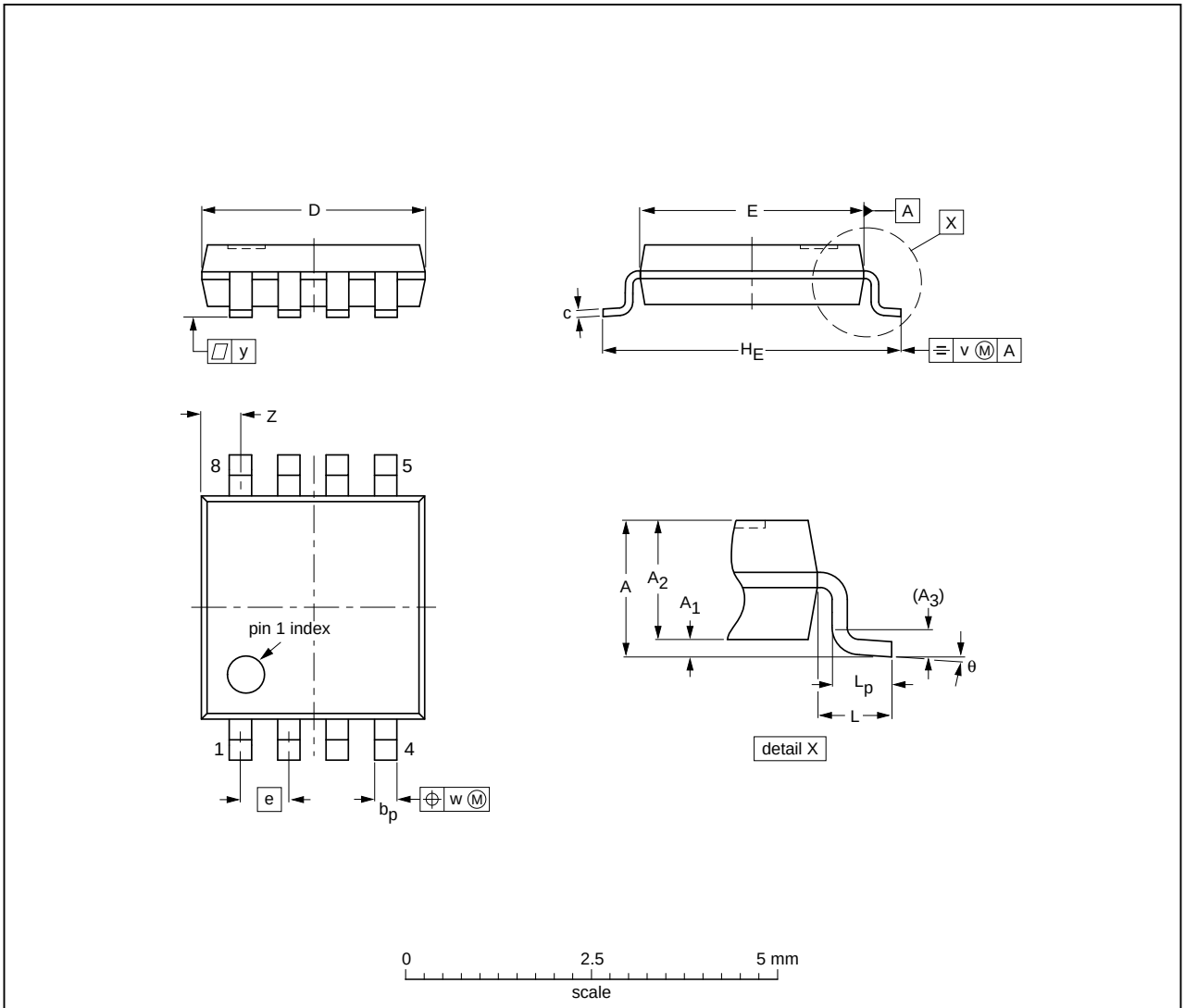
R2 optimum value depends on the frequency and required stability against changes in $V_{CC}$ or average minimum $I_{CC}$ ($I_{CC}$ = 2 mA at $V_{CC}$ = 3.3 V and f = 10 MHz).

**Fig 13. Crystal oscillator application**

**Remark:** All values given are typical values unless otherwise specified.

## 15. Package outline

**TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2**




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

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $H_E$ | L | $L_p$ | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.15<br>0.00 | 0.95<br>0.75 | 0.25 | 0.38<br>0.22 | 0.18<br>0.08 | 3.1<br>2.9 | 3.1<br>2.9 | 0.65 | 4.1<br>3.9 | 0.5 | 0.47<br>0.33 | 0.2 | 0.13 | 0.1 | 0.70<br>0.35 | 8°<br>0° |

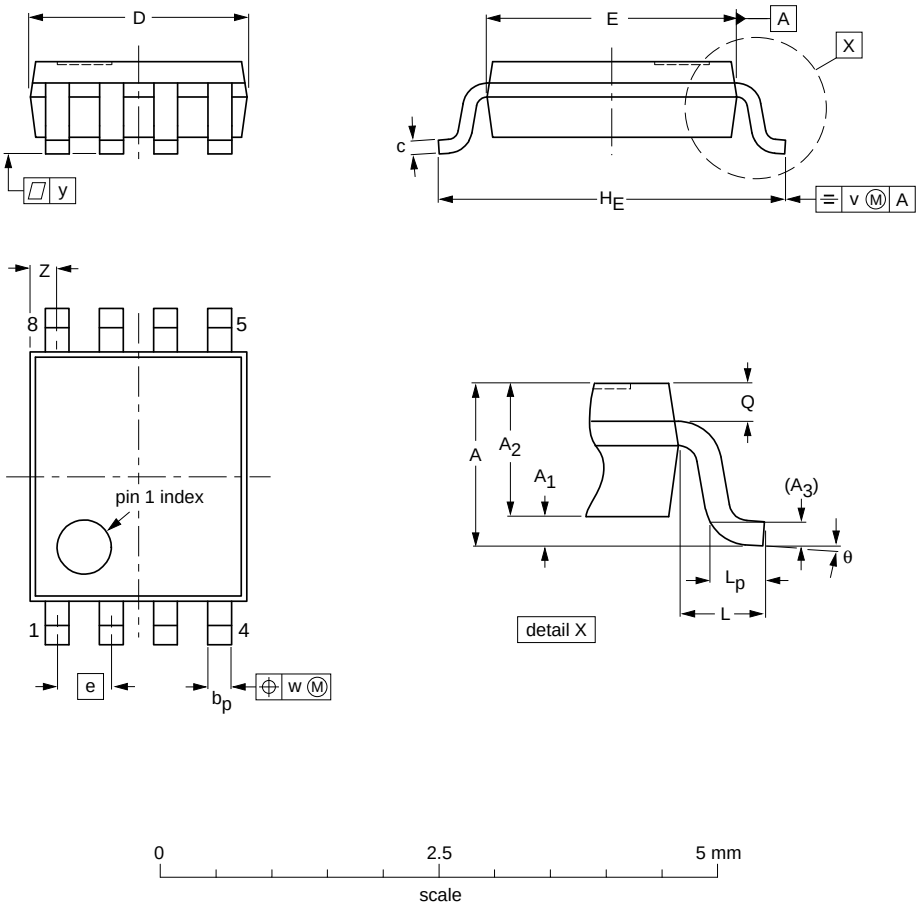
**Note**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT505-2 | | - - - | | | | 02-01-16 |

**Fig 14. Package outline SOT505-2 (TSSOP8)**

**VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm** **SOT765-1**




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

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(2)}$ | e | $H_E$ | L | $L_p$ | Q | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 0.15<br>0.00 | 0.85<br>0.60 | 0.12 | 0.27<br>0.17 | 0.23<br>0.08 | 2.1<br>1.9 | 2.4<br>2.2 | 0.5 | 3.2<br>3.0 | 0.4 | 0.40<br>0.15 | 0.21<br>0.19 | 0.2 | 0.13 | 0.1 | 0.4<br>0.1 | 8°<br>0° |

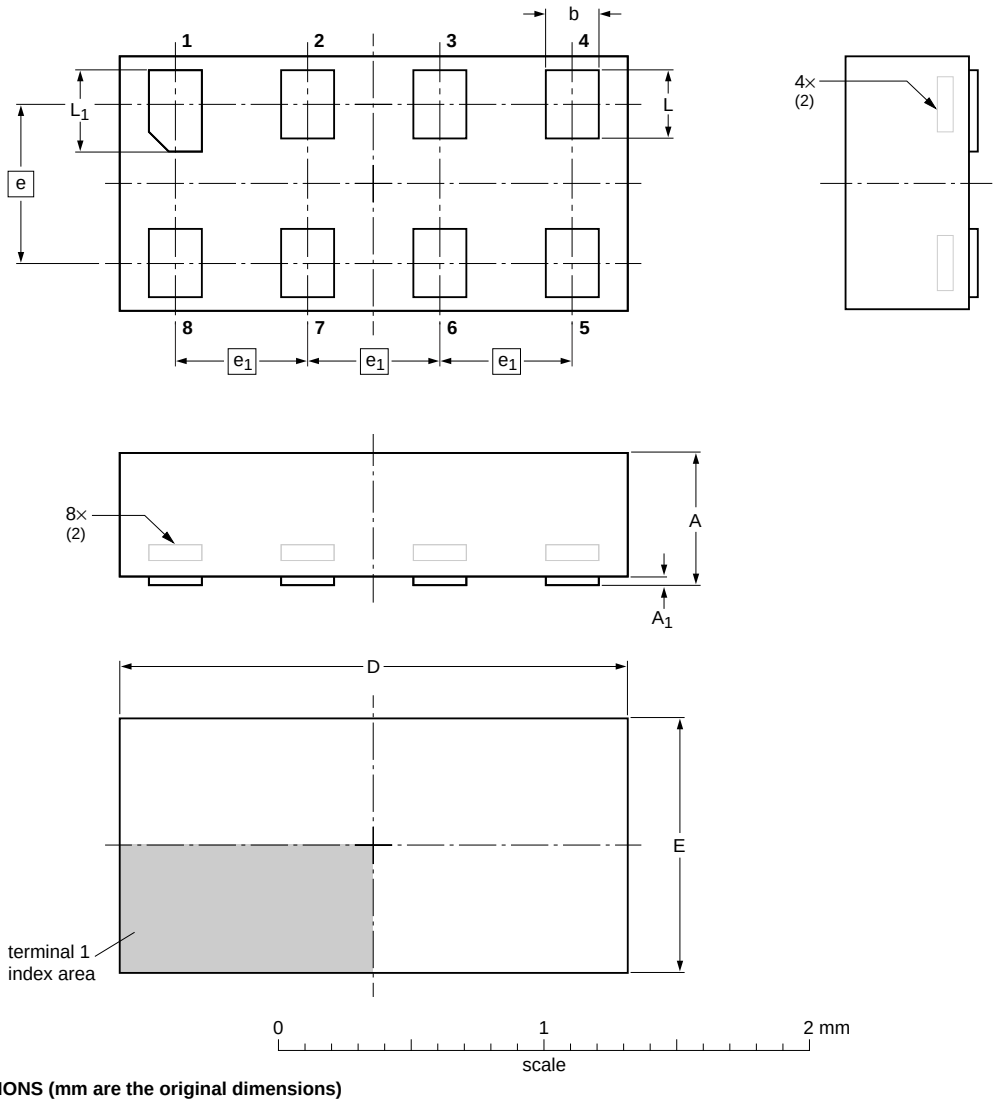
**Notes**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT765-1 | | MO-187 | | | | 02-06-07 |

**Fig 15. Package outline SOT765-1 (VSSOP8)**

**XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm** **SOT833-1**




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

| UNIT | A(1) max | A1 max | b | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.04 | 0.25<br>0.17 | 2.0<br>1.9 | 1.05<br>0.95 | 0.6 | 0.5 | 0.35<br>0.27 | 0.40<br>0.32 |

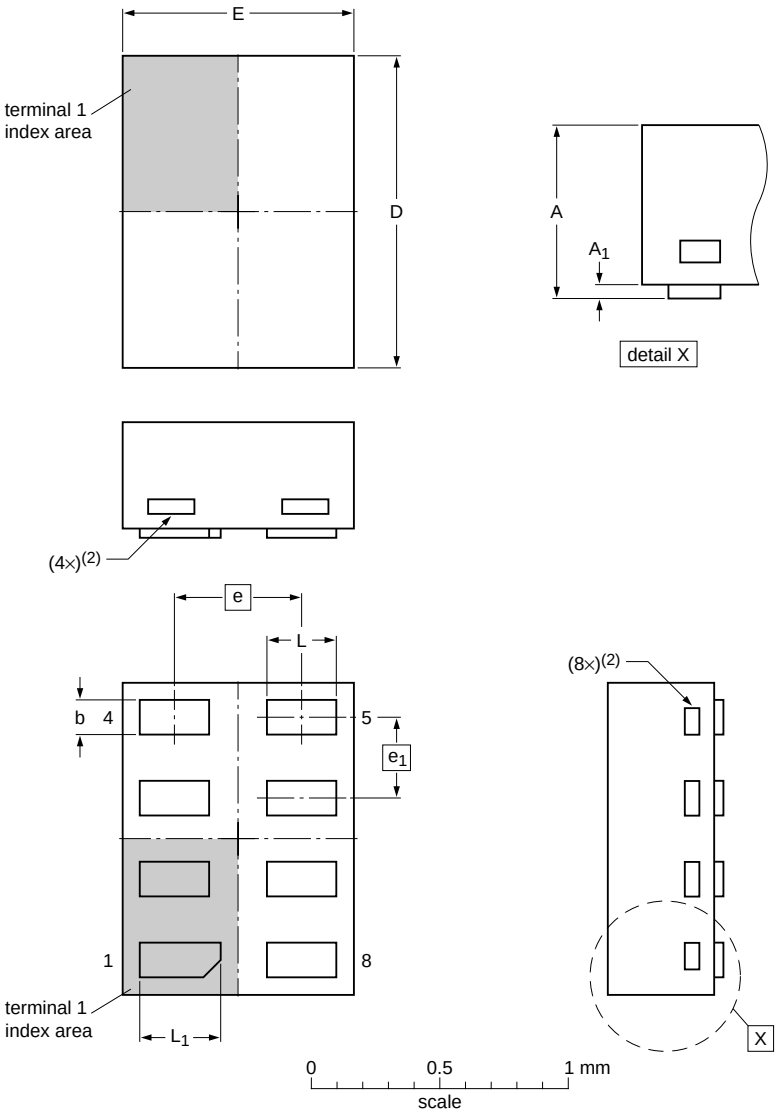
**Notes**

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

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT833-1 | - - - | MO-252 | - - - | | | ~~07-11-14~~<br>07-12-07 |

**Fig 16. Package outline SOT833-1 (XSON8)**

**XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1 x 0.5 mm** **SOT1089**




Dimensions

| Unit | | $A^{(1)}$ | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.5 | 0.04 | 0.20 | 1.40 | 1.05 | | | 0.35 | 0.40 |
| | nom | | | 0.15 | 1.35 | 1.00 | 0.55 | 0.35 | 0.30 | 0.35 |
| | min | | | 0.12 | 1.30 | 0.95 | | | 0.27 | 0.32 |

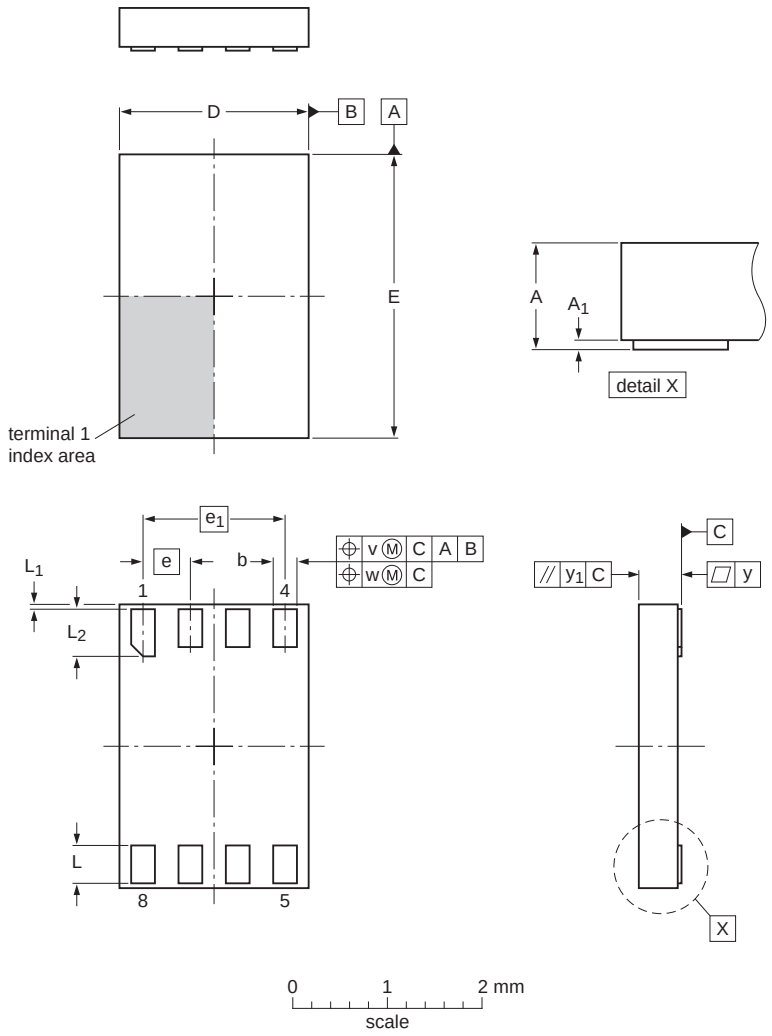
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

*sot1089_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1089 | | MO-252 | | | | ~~10-04-09~~ 10-04-12 |

**Fig 17. Package outline SOT1089 (XSON8)**

**XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 3 x 2 x 0.5 mm** **SOT996-2**




Dimensions (mm are the original dimensions)

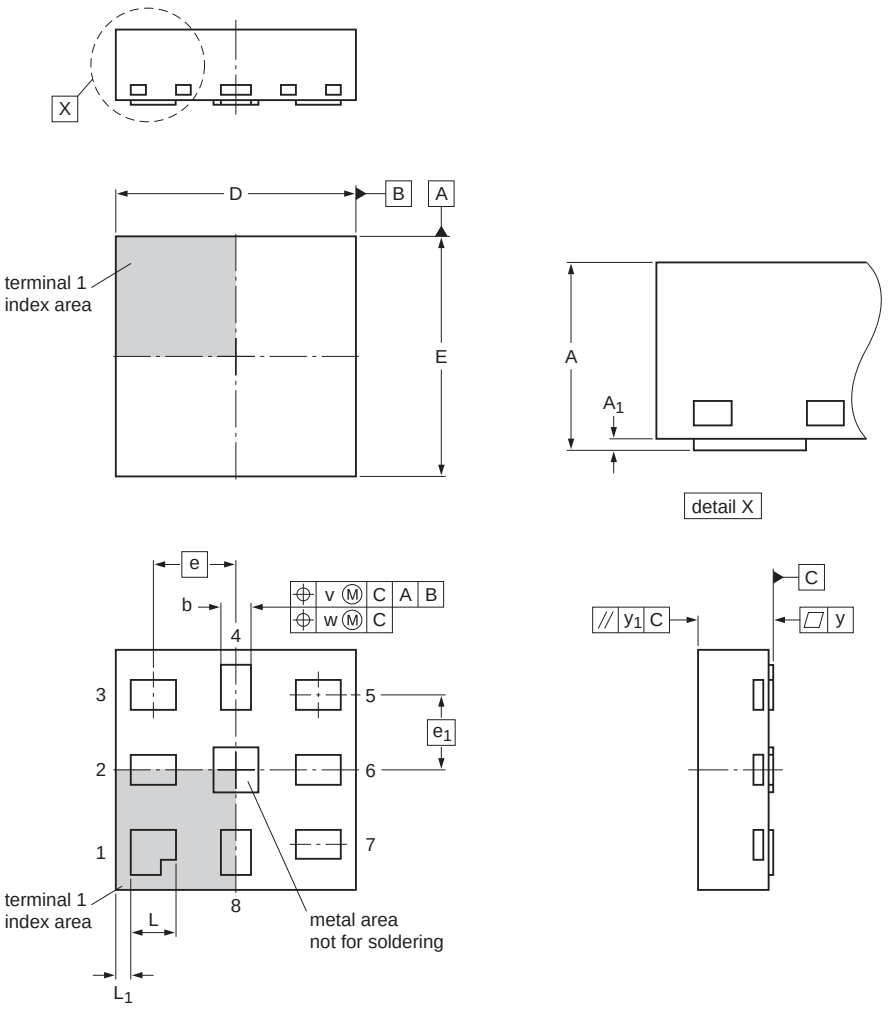
| Unit[1] | | A | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ | $L_2$ | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | max | | 0.05 | 0.35 | 2.1 | 3.1 | | | 0.5 | 0.15 | 0.6 | | | | |
| mm | nom | 0.5 | | | | | 0.5 | 1.5 | | | | 0.1 | 0.05 | 0.05 | 0.1 |
| | min | | 0.00 | 0.15 | 1.9 | 2.9 | | | 0.3 | 0.05 | 0.4 | | | | |

*sot996-2_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT996-2 | | | | | | ~~07-12-21~~ 12-11-20 |

**Fig 18. Package outline SOT996-2 (XSON8)**

**XQFN8: plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 x 1.6 x 0.5 mm** **SOT902-2**




Dimensions

| Unit(1) | | A | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.5 | 0.05 | 0.25 | 1.65 | 1.65 | | | 0.35 | 0.15 | | | | |
| | nom | | | 0.20 | 1.60 | 1.60 | 0.55 | 0.5 | 0.30 | 0.10 | 0.1 | 0.05 | 0.05 | 0.05 |
| | min | | 0.00 | 0.15 | 1.55 | 1.55 | | | 0.25 | 0.05 | | | | |

Note

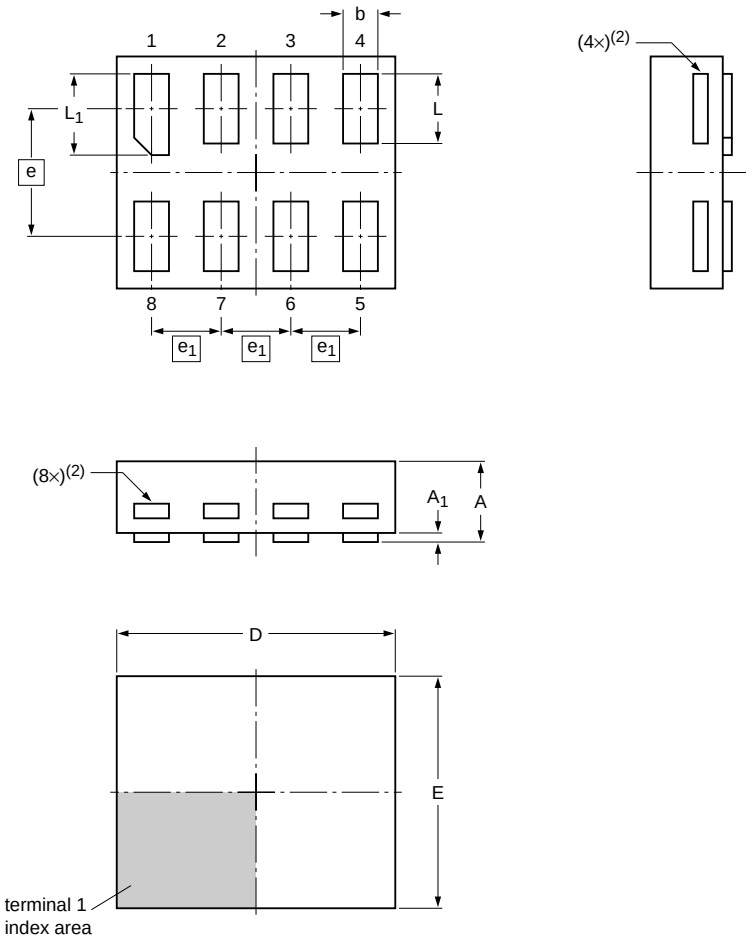
1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

*sot902-2_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT902-2 | - - - | MO-255 | - - - | | | ~~10-11-02~~ 11-03-31 |

**Fig 19. Package outline SOT902-2 (XQFN8)**

**XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.2 x 1.0 x 0.35 mm** **SOT1116**




Dimensions

| Unit | | $A^{(1)}$ | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.35 | 0.04 | 0.20 | 1.25 | 1.05 | | | 0.35 | 0.40 |
| | nom | | | 0.15 | 1.20 | 1.00 | 0.55 | 0.3 | 0.30 | 0.35 |
| | min | | | 0.12 | 1.15 | 0.95 | | | 0.27 | 0.32 |

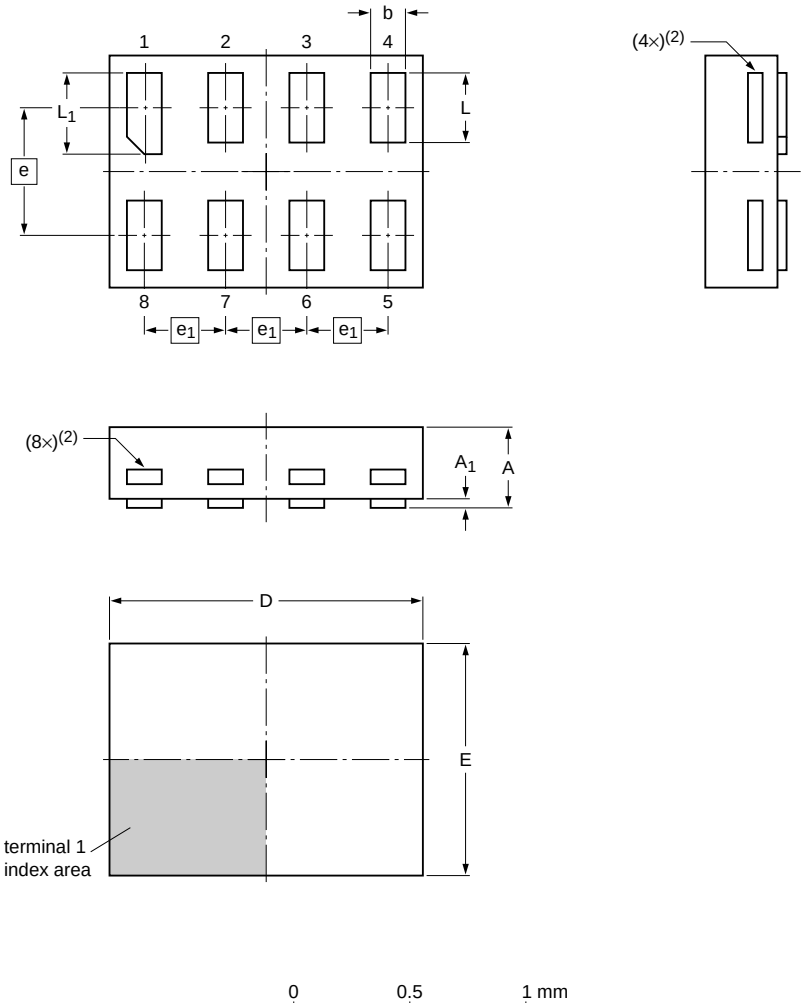
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

*sot1116_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1116 | | | | | | ~~10-04-02~~ 10-04-07 |

**Fig 20. Package outline SOT1116 (XSON8)**

**XSON8: extremely thin small outline package; no leads; 8 terminals; body 1.35 x 1.0 x 0.35 mm** **SOT1203**




Dimensions

| Unit | | $A^{(1)}$ | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.35 | 0.04 | 0.20 | 1.40 | 1.05 | | | 0.35 | 0.40 |
| | nom | | | 0.15 | 1.35 | 1.00 | 0.55 | 0.35 | 0.30 | 0.35 |
| | min | | | 0.12 | 1.30 | 0.95 | | | 0.27 | 0.32 |

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

*sot1203_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1203 | | | | | | ~~10-04-02~~ 10-04-06 |

**Fig 21. Package outline SOT1203 (XSON8)**

## 16. Abbreviations

**Table 11. Abbreviations**

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

## 17. Revision history

**Table 12. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74LVC3GU04 v.11 | 20130409 | Product data sheet | - | 74LVC3GU04 v.10 |
| Modifications: | • For type number 74LVC3GU04GD XSON8U has changed to XSON8. | | | |
| 74LVC3GU04 v.10 | 20120706 | Product data sheet | - | 74LVC3GU04 v.9 |
| Modifications: | • For type number 74LVC3GU04GM the SOT code has changed to SOT902-2. | | | |
| 74LVC3GU04 v.9 | 20111123 | Product data sheet | - | 74LVC3GU04 v.8 |
| Modifications: | • Legal pages updated. | | | |
| 74LVC3GU04 v.8 | 20101110 | Product data sheet | - | 74LVC3GU04 v.7 |
| 74LVC3GU04 v.7 | 20091111 | Product data sheet | - | 74LVC3GU04 v.6 |
| 74LVC3GU04 v.6 | 20080304 | Product data sheet | - | 74LVC3GU04 v.5 |
| 74LVC3GU04 v.5 | 20071005 | Product data sheet | - | 74LVC3GU04 v.4 |
| 74LVC3GU04 v.4 | 20070315 | Product data sheet | - | 74LVC3GU04 v.3 |
| 74LVC3GU04 v.3 | 20050201 | Product data sheet | - | 74LVC3GU04 v.2 |
| 74LVC3GU04 v.2 | 20041027 | Product data sheet | - | 74LVC3GU04 v.1 |
| 74LVC3GU04 v.1 | 20040512 | Product data sheet | - | - |

# 18. Legal information

## 18.1 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.

## 18.2 Definitions

**Draft —** The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet —** A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification —** The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

## 18.3 Disclaimers

**Limited warranty and liability —** Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

**Right to make changes —** NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use —** NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications —** Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Limiting values —** Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale —** NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

**No offer to sell or license —** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control —** This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Non-automotive qualified products —** Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

### 18.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 19. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

## 20. Contents





For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

**Date of release: 9 April 2013**
**Document identifier: 74LVC3GU04**