



**THE DATASHEET OF  
74LVC1G74GN,115**



# 74LVC1G74

Single D-type flip-flop with set and reset;  
positive edge trigger

Rev. 14 — 27 December 2018

Product data sheet

## 1. General description

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The 74LVC1G74 is a single positive edge triggered D-type flip-flop with individual data (D) inputs, clock (CP) inputs, set ( $\overline{SD}$ ) and reset ( $\overline{RD}$ ) inputs, and complementary Q and  $\overline{Q}$  outputs.

This device is fully specified for partial power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing damaging backflow current through the device when it is powered down.

The set and reset are asynchronous active LOW inputs and operate independently of the clock input. Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The D inputs must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

Schmitt trigger action at all inputs makes the circuit highly tolerant of slower input rise and fall times.

## 2. Features and benefits

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- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant inputs for interfacing with 5 V logic
- High noise immunity
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8-B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- $\pm 24$  mA output drive ( $V_{CC} = 3.0$  V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 V
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C

### 3. Ordering information

Table 1. Ordering information

| Type number | Package           |        |   |          |
|-------------|-------------------|--------|---|----------|
|             | Temperature range | Name   | Description   | Version  |
| 74LVC1G74DP | -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 |
| 74LVC1G74DC | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm                  | SOT765-1 |
| 74LVC1G74GT | -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 |
| 74LVC1G74GF | -40 °C to +125 °C | XSON8  | extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm         | SOT1089  |
| 74LVC1G74GM | -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 |
| 74LVC1G74GN | -40 °C to +125 °C | XSON8  | extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm       | SOT1116  |
| 74LVC1G74GS | -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] |
|-------------|------------------|
| 74LVC1G74DP | V74              |
| 74LVC1G74DC | V74              |
| 74LVC1G74GT | V74              |
| 74LVC1G74GF | Y4               |
| 74LVC1G74GM | V74              |
| 74LVC1G74GN | Y4               |
| 74LVC1G74GS | Y4               |

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

### 5. Functional diagram

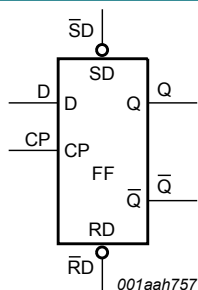


Fig. 1. Logic symbol

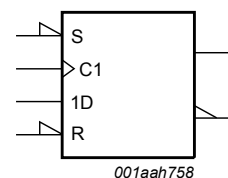


Fig. 2. IEC logic symbol

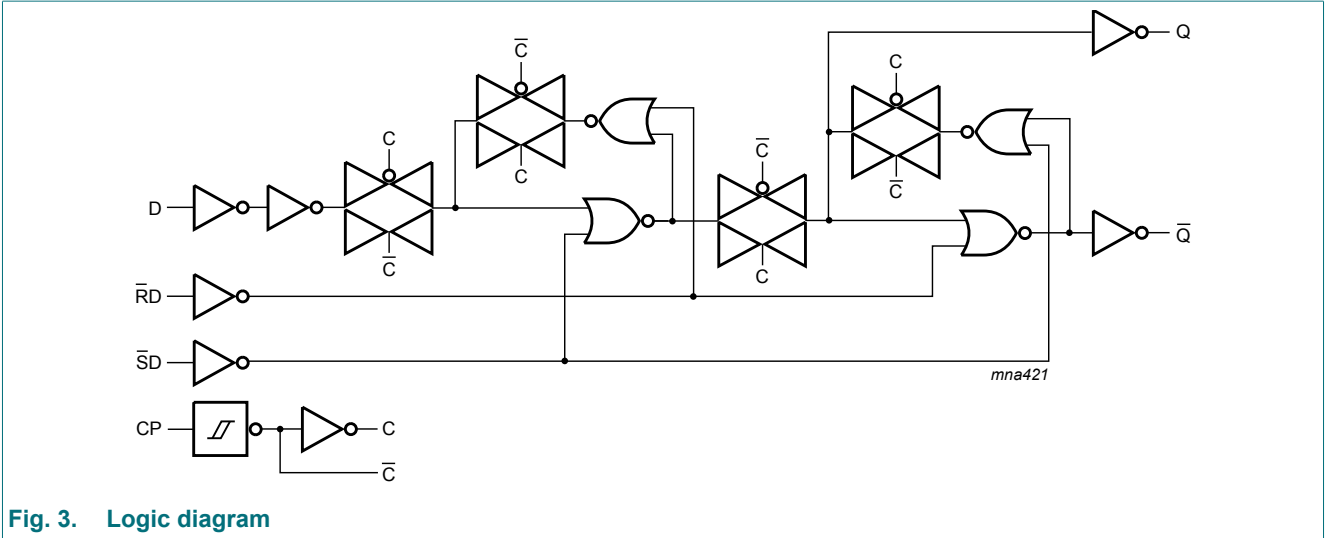


Fig. 3. Logic diagram

## 6. Pinning information

### 6.1. Pinning

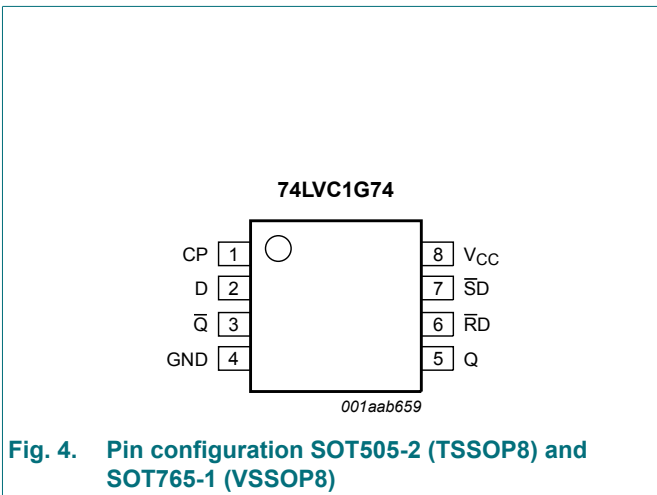


Fig. 4. Pin configuration SOT505-2 (TSSOP8) and SOT765-1 (VSSOP8)

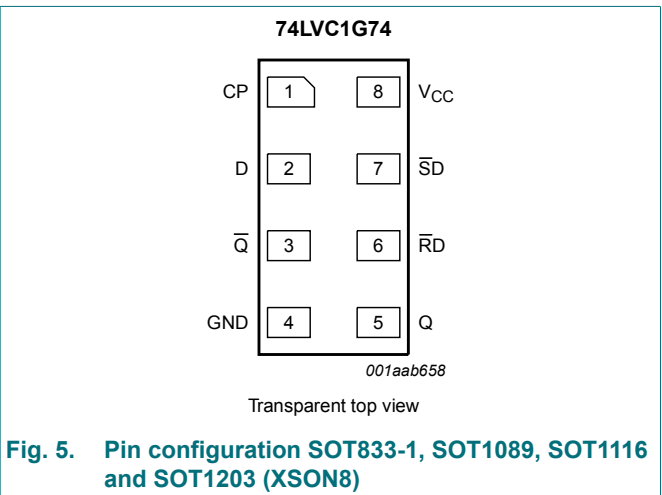


Fig. 5. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203 (XSON8)

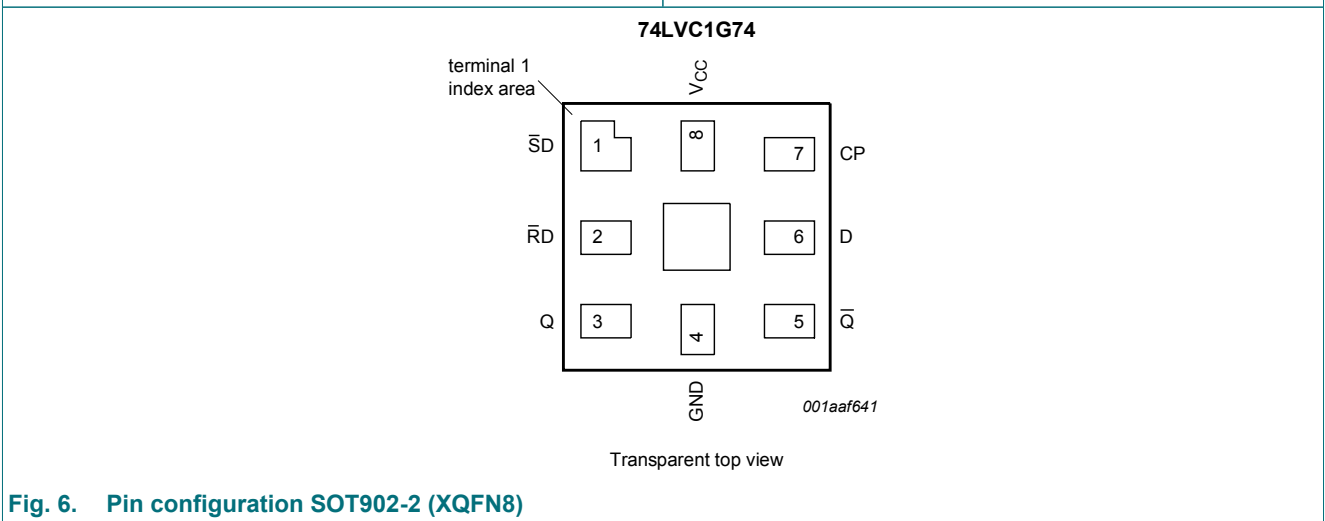


Fig. 6. Pin configuration SOT902-2 (XQFN8)

## 6.2. Pin description

Table 3. Pin description

| Symbol          | Pin  |          | Description                                  |
|-----------------|--|----------|--|
|                 | SOT505-2, SOT765-1, SOT833-1, SOT1089, SOT1116 and SOT1203 | SOT902-2 |  |
| CP              | 1  | 7        | clock input (LOW-to-HIGH, edge-triggered)    |
| D               | 2  | 6        | data input                                   |
| $\bar{Q}$       | 3  | 5        | complement output                            |
| GND             | 4  | 4        | ground (0 V)                                 |
| Q               | 5  | 3        | true output                                  |
| $\bar{RD}$      | 6  | 2        | asynchronous reset-direct input (active LOW) |
| $\bar{SD}$      | 7  | 1        | asynchronous set-direct input (active LOW)   |
| V <sub>CC</sub> | 8  | 8        | supply voltage                               |

## 7. Functional description

Table 4. Function table for asynchronous operation

H = HIGH voltage level; L = LOW voltage level; X = don't care.

| Input      |            |    |   | Output |           |
|------------|------------|----|---|--------|-----------|
| $\bar{SD}$ | $\bar{RD}$ | CP | D | Q      | $\bar{Q}$ |
| L          | H          | X  | X | H      | L         |
| H          | L          | X  | X | L      | H         |
| L          | L          | X  | X | H      | H         |

Table 5. Function table for synchronous operation

H = HIGH voltage level; L = LOW voltage level;  $\uparrow$  = LOW-to-HIGH CP transition;

$Q_{n+1}$  = state after the next LOW-to-HIGH CP transition.

| Input      |            |            |   | Output    |                 |
|------------|------------|------------|---|-----------|-----------------|
| $\bar{SD}$ | $\bar{RD}$ | CP         | D | $Q_{n+1}$ | $\bar{Q}_{n+1}$ |
| H          | H          | $\uparrow$ | L | L         | H               |
| H          | H          | $\uparrow$ | H | H         | L               |

## 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     | +6.5           | V    |
| $I_{IK}$  | input clamping current  | $V_I < 0$ V                     | -50      | -              | mA   |
| $V_I$     | input voltage           |                                 | [1] -0.5 | +6.5           | V    |
| $I_{OK}$  | output clamping current | $V_O > V_{CC}$ or $V_O < 0$ V   | -        | ±50            | mA   |
| $V_O$     | output voltage          | Active mode                     | [1] -0.5 | $V_{CC} + 0.5$ | V    |
|           |                         | Power-down mode; $V_{CC} = 0$ V | [1] -0.5 | +6.5           | V    |
| $I_O$     | 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] -    | 300            | 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 7. 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 8. Static characteristics**

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

| Symbol           | Parameter                 | Conditions  | T <sub>amb</sub> = -40 °C to +85 °C |         |                     | T <sub>amb</sub> = -40 °C to +125 °C |                     | Unit |
|------------------|---------------------------|---|-------------------------------------|---------|---------------------|--------------------------------------|---------------------|------|
|                  |                           |   | Min                                 | Typ [1] | Max                 | Min                                  | Max                 |      |
| V <sub>IH</sub>  | HIGH-level input voltage  | V <sub>CC</sub> = 1.65 V to 1.95 V  | 0.65V <sub>CC</sub>                 | -       | -                   | 0.65V <sub>CC</sub>                  | -                   | V    |
|                  |                           | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.7                                 | -       | -                   | 1.7                                  | -                   | V    |
|                  |                           | V <sub>CC</sub> = 2.7 V to 3.6 V  | 2.0                                 | -       | -                   | 2.0                                  | -                   | V    |
|                  |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | 0.7V <sub>CC</sub>                  | -       | -                   | 0.7V <sub>CC</sub>                   | -                   | V    |
| V <sub>IL</sub>  | LOW-level input voltage   | V <sub>CC</sub> = 1.65 V to 1.95 V  | -                                   | -       | 0.35V <sub>CC</sub> | -                                    | 0.35V <sub>CC</sub> | V    |
|                  |                           | V <sub>CC</sub> = 2.3 V to 2.7 V  | -                                   | -       | 0.7                 | -                                    | 0.7                 | V    |
|                  |                           | V <sub>CC</sub> = 2.7 V to 3.6 V  | -                                   | -       | 0.8                 | -                                    | 0.8                 | V    |
|                  |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | -                                   | -       | 0.3V <sub>CC</sub>  | -                                    | 0.3V <sub>CC</sub>  | V    |
| V <sub>OH</sub>  | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   |                                     |         |                     |                                      |                     |      |
|                  |                           | I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V   | V <sub>CC</sub> - 0.1               | -       | -                   | V <sub>CC</sub> - 0.1                | -                   | V    |
|                  |                           | I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V  | 1.2                                 | 1.54    | -                   | 0.95                                 | -                   | V    |
|                  |                           | I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V   | 1.9                                 | 2.15    | -                   | 1.7                                  | -                   | V    |
|                  |                           | I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V  | 2.2                                 | 2.50    | -                   | 1.9                                  | -                   | V    |
|                  |                           | I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V  | 2.3                                 | 2.62    | -                   | 2.0                                  | -                   | V    |
|                  |                           | I <sub>O</sub> = -32 mA; V <sub>CC</sub> = 4.5 V  | 3.8                                 | 4.11    | -                   | 3.4                                  | -                   | V    |
| V <sub>OL</sub>  | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   |                                     |         |                     |                                      |                     |      |
|                  |                           | I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V  | -                                   | -       | 0.10                | -                                    | 0.10                | V    |
|                  |                           | I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V   | -                                   | 0.07    | 0.45                | -                                    | 0.70                | V    |
|                  |                           | I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V  | -                                   | 0.12    | 0.30                | -                                    | 0.45                | V    |
|                  |                           | I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V   | -                                   | 0.17    | 0.40                | -                                    | 0.60                | V    |
|                  |                           | I <sub>O</sub> = 24 mA; V <sub>CC</sub> = 3.0 V   | -                                   | 0.33    | 0.55                | -                                    | 0.80                | V    |
|                  |                           | I <sub>O</sub> = 32 mA; V <sub>CC</sub> = 4.5 V   | -                                   | 0.39    | 0.55                | -                                    | 0.80                | V    |
| I <sub>I</sub>   | input leakage current     | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 0 V to 5.5 V   | -                                   | ±0.1    | ±1                  | -                                    | ±1                  | μA   |
| I <sub>OFF</sub> | power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 5.5 V; V <sub>CC</sub> = 0 V   | -                                   | ±0.1    | ±2                  | -                                    | ±2                  | μA   |
| I <sub>CC</sub>  | supply current            | V <sub>I</sub> = 5.5 V or GND; V <sub>CC</sub> = 1.65 V to 5.5 V; I <sub>O</sub> = 0 A                    | -                                   | 0.1     | 4                   | -                                    | 4                   | μA   |
| ΔI <sub>CC</sub> | additional supply current | per pin; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 5.5 V | -                                   | 5       | 500                 | -                                    | 500                 | μA   |
| C <sub>I</sub>   | input capacitance         |   | -                                   | 4.0     | -                   | -                                    | -                   | pF   |

[1] All typical values are measured at T<sub>amb</sub> = 25 °C.

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 9.

| Symbol                           | Parameter         | Conditions                                  | T <sub>amb</sub> = -40 °C to +85 °C |         |      | T <sub>amb</sub> = -40 °C to +125 °C |      | Unit |
|----------------------------------|-------------------|---|-------------------------------------|---------|------|--------------------------------------|------|------|
|                                  |                   |   | Min                                 | Typ [1] | Max  | Min                                  | Max  |      |
| t <sub>pd</sub>                  | propagation delay | CP to Q, $\bar{Q}$ ; see Fig. 7 [2]         |                                     |         |      |                                      |      |      |
|                                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V          | 1.5                                 | 6.0     | 13.4 | 1.5                                  | 13.4 | ns   |
|                                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V            | 1.0                                 | 3.5     | 7.1  | 1.0                                  | 7.1  | ns   |
|                                  |                   | V <sub>CC</sub> = 2.7 V                     | 1.0                                 | 3.5     | 7.1  | 1.0                                  | 7.1  | ns   |
|                                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1.0                                 | 3.5     | 5.9  | 1.0                                  | 5.9  | ns   |
|                                  |                   | V <sub>CC</sub> = 4.5 V to 5.5 V            | 1.0                                 | 2.5     | 4.1  | 1.0                                  | 4.1  | ns   |
|                                  |                   | $\bar{S}D$ to Q, $\bar{Q}$ ; see Fig. 8 [2] |                                     |         |      |                                      |      |      |
|                                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V          | 1.5                                 | 6.0     | 12.9 | 1.5                                  | 12.9 | ns   |
|                                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V            | 1.0                                 | 3.5     | 7.0  | 1.0                                  | 7.0  | ns   |
|                                  |                   | V <sub>CC</sub> = 2.7 V                     | 1.0                                 | 3.5     | 7.0  | 1.0                                  | 7.0  | ns   |
|                                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V            | 1.0                                 | 3.0     | 5.9  | 1.0                                  | 5.9  | ns   |
|                                  |                   | V <sub>CC</sub> = 4.5 V to 5.5 V            | 1.0                                 | 2.5     | 4.1  | 1.0                                  | 4.1  | ns   |
|                                  |                   | $\bar{R}D$ to Q, $\bar{Q}$ ; see Fig. 8 [2] |                                     |         |      |                                      |      |      |
|                                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V          | 1.5                                 | 5.0     | 12.9 | 1.5                                  | 12.9 | ns   |
|                                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V            | 1.0                                 | 3.5     | 7.0  | 1.0                                  | 7.0  | ns   |
|                                  |                   | V <sub>CC</sub> = 2.7 V                     | 1.0                                 | 3.5     | 7.0  | 1.0                                  | 7.0  | ns   |
| V <sub>CC</sub> = 3.0 V to 3.6 V | 1.0               | 3.0   | 5.9                                 | 1.0     | 5.9  | ns                                   |      |      |
| V <sub>CC</sub> = 4.5 V to 5.5 V | 1.0               | 2.5   | 4.1                                 | 1.0     | 4.1  | ns                                   |      |      |
| t <sub>w</sub>                   | pulse width       | CP HIGH or LOW; see Fig. 7                  |                                     |         |      |                                      |      |      |
|                                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V          | 6.2                                 | -       | -    | 6.2                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V            | 2.7                                 | -       | -    | 2.7                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 2.7 V                     | 2.7                                 | -       | -    | 2.7                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V            | 2.7                                 | 1.3     | -    | 2.7                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 4.5 V to 5.5 V            | 2.0                                 | -       | -    | 2.0                                  | -    | ns   |
|                                  |                   | $\bar{S}D$ and $\bar{R}D$ LOW; see Fig. 8   |                                     |         |      |                                      |      |      |
|                                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V          | 6.2                                 | -       | -    | 6.2                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V            | 2.7                                 | -       | -    | 2.7                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 2.7 V                     | 2.7                                 | -       | -    | 2.7                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V            | 2.7                                 | 1.6     | -    | 2.7                                  | -    | ns   |
| V <sub>CC</sub> = 4.5 V to 5.5 V | 2.0               | -   | -                                   | 2.0     | -    | ns                                   |      |      |
| t <sub>rec</sub>                 | recovery time     | $\bar{S}D$ or $\bar{R}D$ ; see Fig. 8       |                                     |         |      |                                      |      |      |
|                                  |                   | V <sub>CC</sub> = 1.65 V to 1.95 V          | 1.9                                 | -       | -    | 1.9                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 2.3 V to 2.7 V            | 1.4                                 | -       | -    | 1.4                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 2.7 V                     | 1.3                                 | -       | -    | 1.3                                  | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 3.0 V to 3.6 V            | +1.2                                | -3.0    | -    | +1.2                                 | -    | ns   |
|                                  |                   | V <sub>CC</sub> = 4.5 V to 5.5 V            | 1.0                                 | -       | -    | 1.0                                  | -    | ns   |

## Single D-type flip-flop with set and reset; positive edge trigger

| Symbol           | Parameter                     | Conditions  | T <sub>amb</sub> = -40 °C to +85 °C |         |     | T <sub>amb</sub> = -40 °C to +125 °C |     | Unit |
|------------------|-------------------------------|---|-------------------------------------|---------|-----|--------------------------------------|-----|------|
|                  |                               |   | Min                                 | Typ [1] | Max | Min                                  | Max |      |
| t <sub>su</sub>  | set-up time                   | D to CP; see Fig. 7   |                                     |         |     |                                      |     |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                    | 2.9                                 | -       | -   | 2.9                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                      | 1.7                                 | -       | -   | 1.7                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V   | 1.7                                 | -       | -   | 1.7                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                      | 1.3                                 | 0.5     | -   | 1.3                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                      | 1.1                                 | -       | -   | 1.1                                  | -   | ns   |
| t <sub>h</sub>   | hold time                     | D to CP; see Fig. 7   |                                     |         |     |                                      |     |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                    | 1.5                                 | -       | -   | 1.5                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                      | 1.0                                 | -       | -   | 1.0                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V   | 1.0                                 | -       | -   | 1.0                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                      | 1.0                                 | 0.6     | -   | 1.0                                  | -   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                      | 1.0                                 | -       | -   | 1.0                                  | -   | ns   |
| f <sub>max</sub> | maximum frequency             | CP; see Fig. 7  |                                     |         |     |                                      |     |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                    | 80                                  | -       | -   | 80                                   | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                      | 175                                 | -       | -   | 175                                  | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 2.7 V   | 175                                 | -       | -   | 175                                  | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                      | 175                                 | 280     | -   | 175                                  | -   | MHz  |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V                                      | 200                                 | -       | -   | 200                                  | -   | MHz  |
| C <sub>PD</sub>  | power dissipation capacitance | V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V [3] | -                                   | 15      | -   | -                                    | -   | pF   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

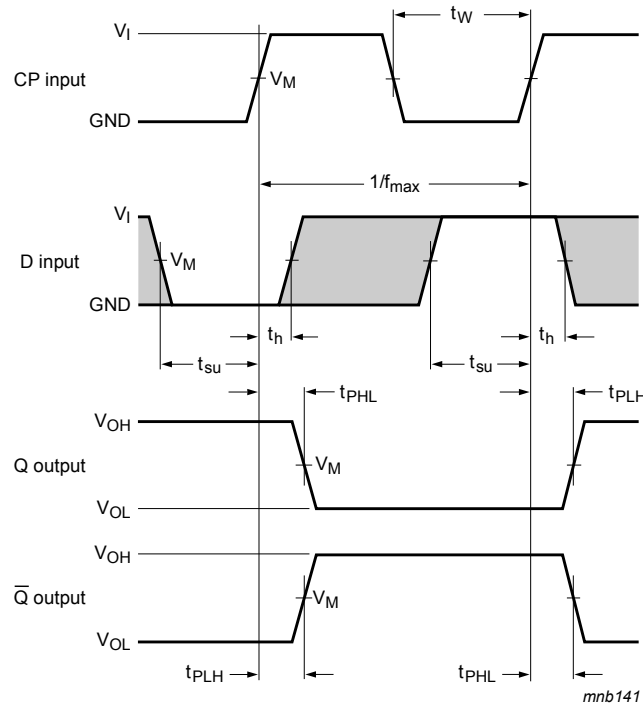
C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of outputs.

11.1. Waveforms and test circuit



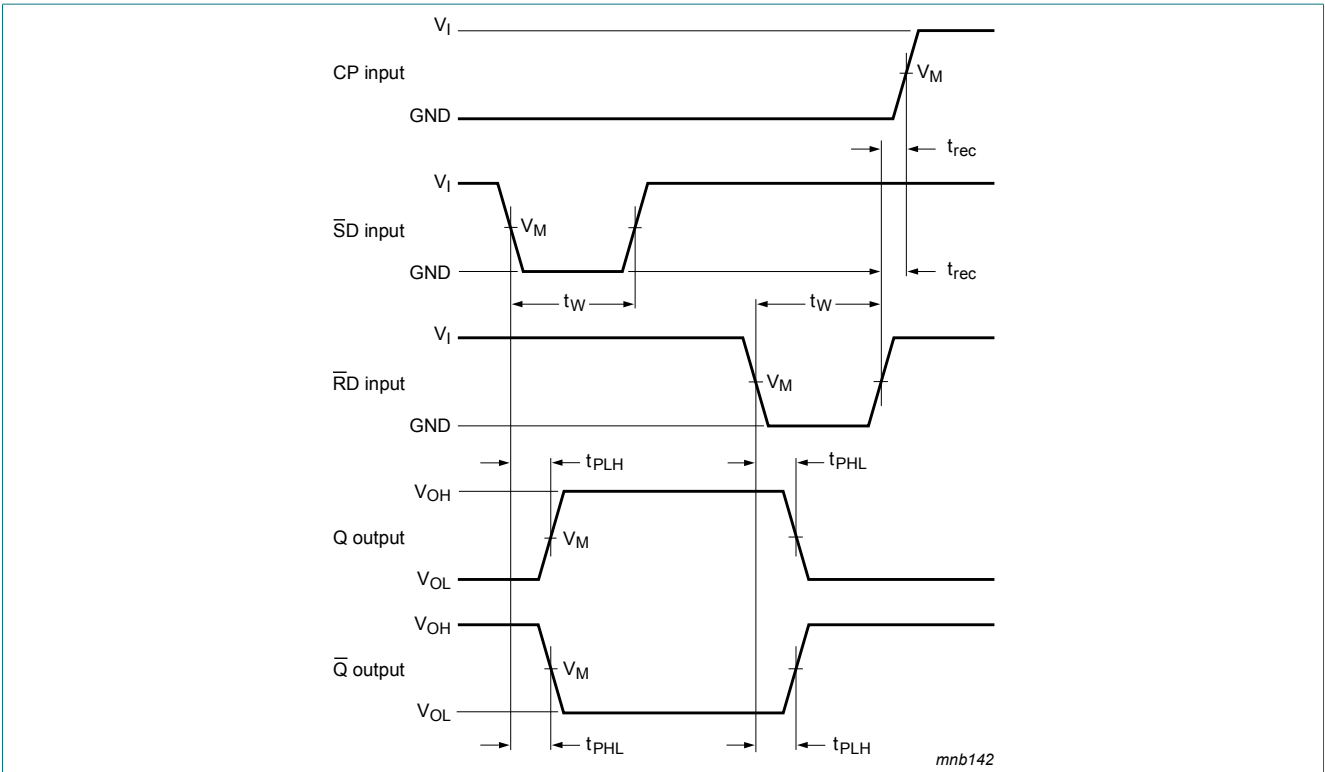
Measurement points are given in [Table 10](#).

The shaded areas indicate when the input is permitted to change for predictable output performance.

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

**Fig. 7. The clock input (CP) to output (Q,  $\bar{Q}$ ) propagation delays and pulse width, D to CP set-up, CP to D hold times and the maximum frequency**

Single D-type flip-flop with set and reset; positive edge trigger



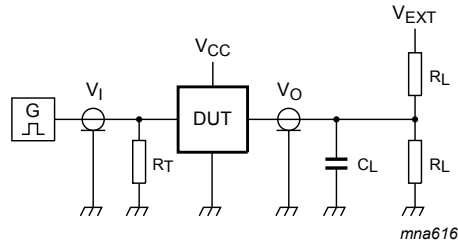
Measurement points are given in [Table 10](#).  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig. 8. The set ( $\bar{SD}$ ) and reset ( $\bar{RD}$ ) input to output (Q,  $\bar{Q}$ ) propagation delays, pulse widths and the  $\bar{RD}$  to CP recovery time**

**Table 10. Measurement points**

| Supply voltage   | Input               | Output              |
|------------------|---------------------|---------------------|
| $V_{CC}$         | $V_M$               | $V_M$               |
| 1.65 V to 1.95 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| 2.3 V to 2.7 V   | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| 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   | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |

## Single D-type flip-flop with set and reset; positive edge trigger



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. 9. Test circuit for measuring switching times**

**Table 11. Test data**

| Supply voltage   | Input    |               | Load  |              | $V_{EXT}$          |                    |                    |
|------------------|----------|---------------|-------|--------------|--------------------|--------------------|--------------------|
| $V_{CC}$         | $V_I$    | $t_r, t_f$    | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 1.65 V to 1.95 V | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 1 k $\Omega$ | open               | GND                | $2 \times V_{CC}$  |
| 2.3 V to 2.7 V   | $V_{CC}$ | $\leq 2.0$ ns | 30 pF | 500 $\Omega$ | open               | GND                | $2 \times V_{CC}$  |
| 2.7 V            | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | 6 V                |
| 3.0 V to 3.6 V   | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | 6 V                |
| 4.5 V to 5.5 V   | $V_{CC}$ | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | $2 \times V_{CC}$  |

## 12. Package outline

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

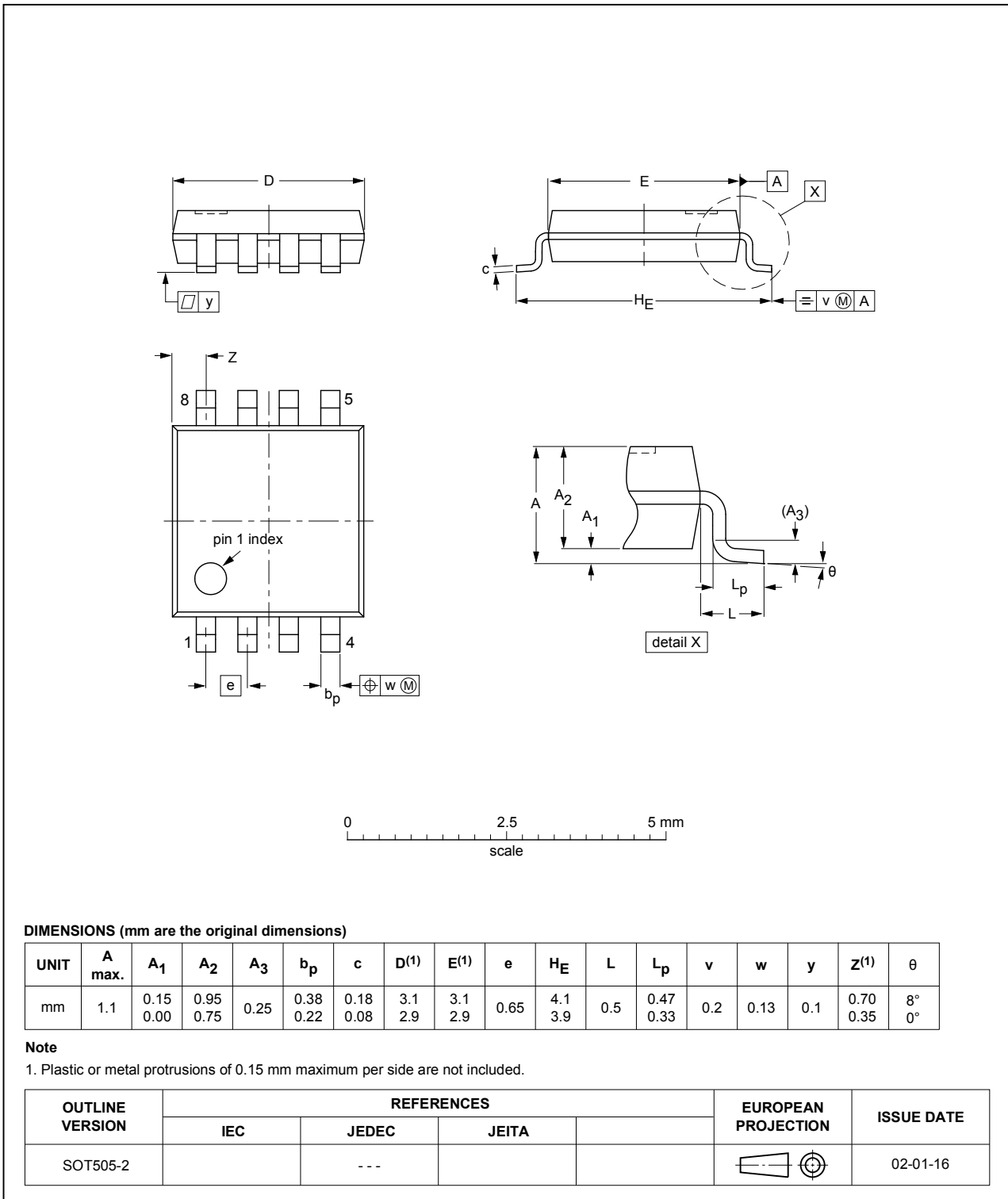


Fig. 10. Package outline SOT505-2 (TSSOP8)

Single D-type flip-flop with set and reset; positive edge trigger

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

SOT765-1

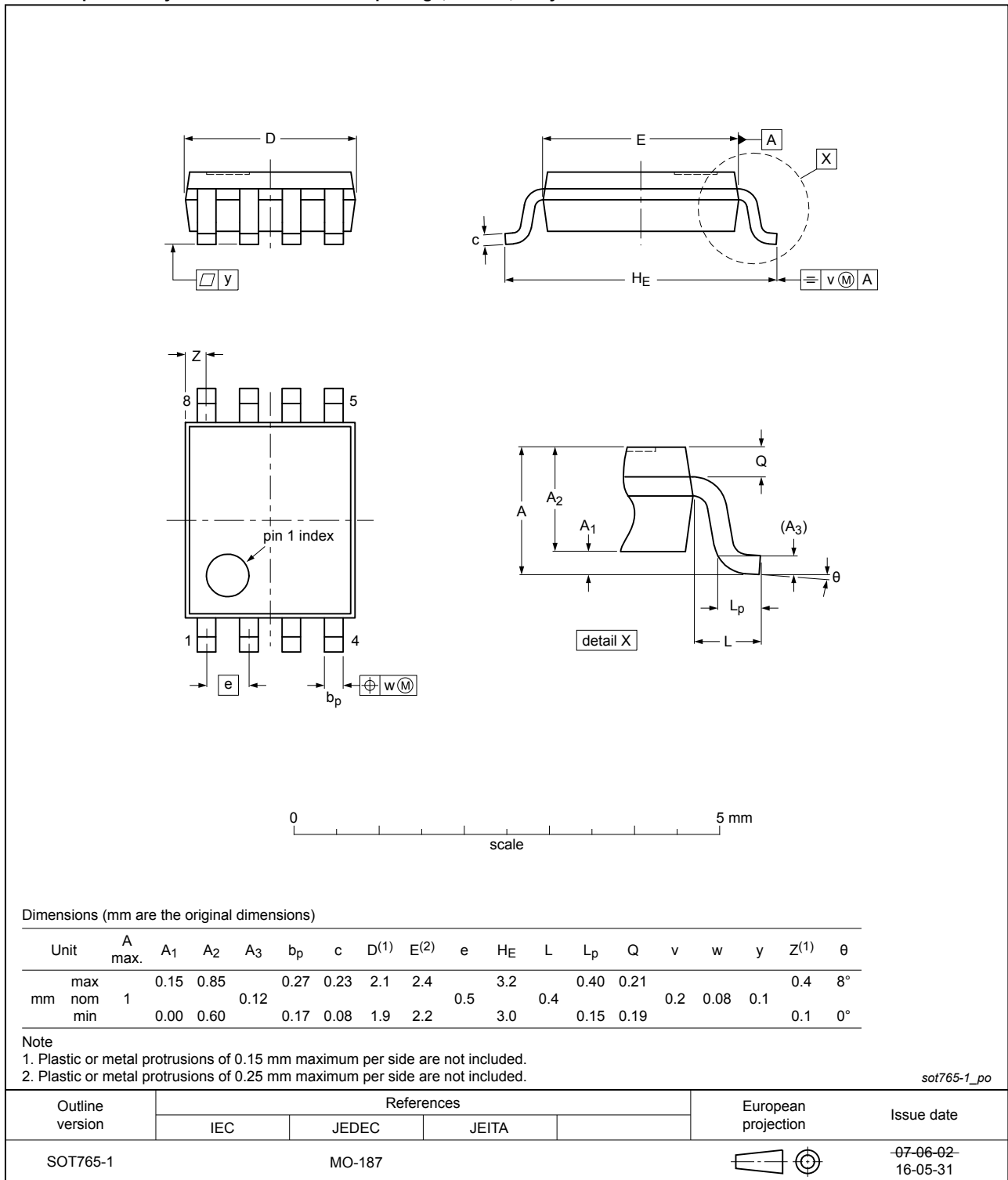


Fig. 11. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

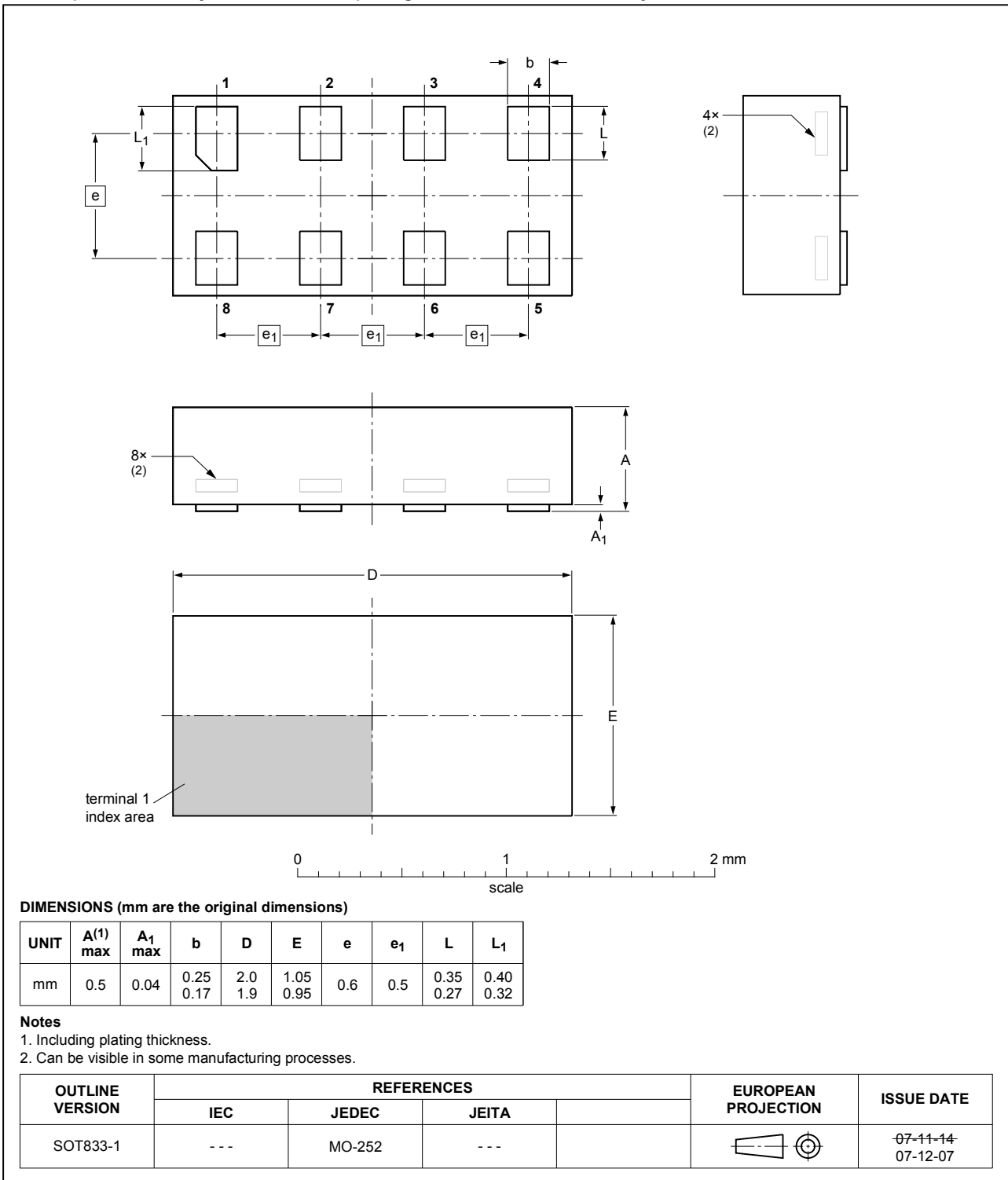


Fig. 12. Package outline SOT833-1 (XSON8)

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

SOT1089

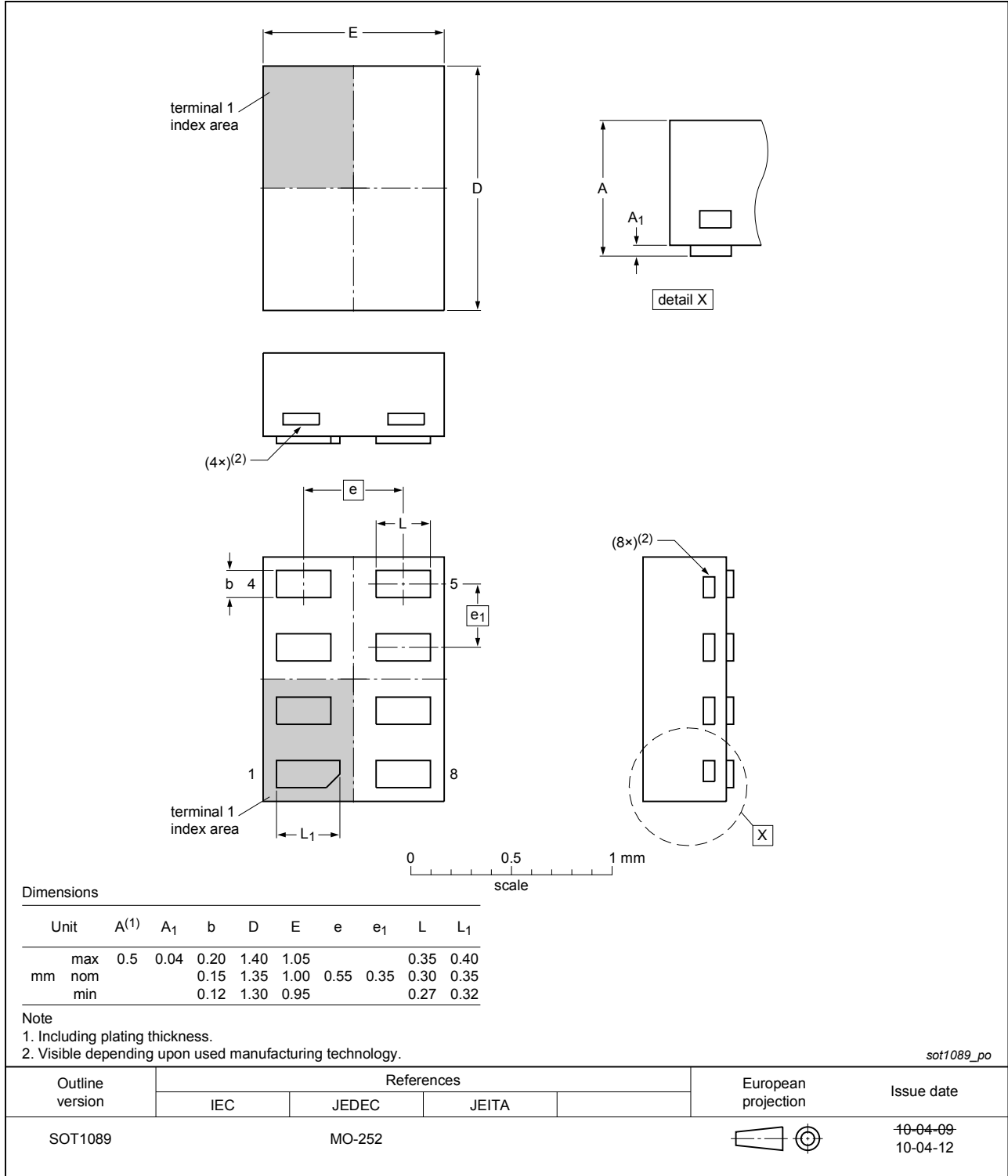


Fig. 13. Package outline SOT1089 (XSON8)

Single D-type flip-flop with set and reset; positive edge trigger

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

SOT902-2

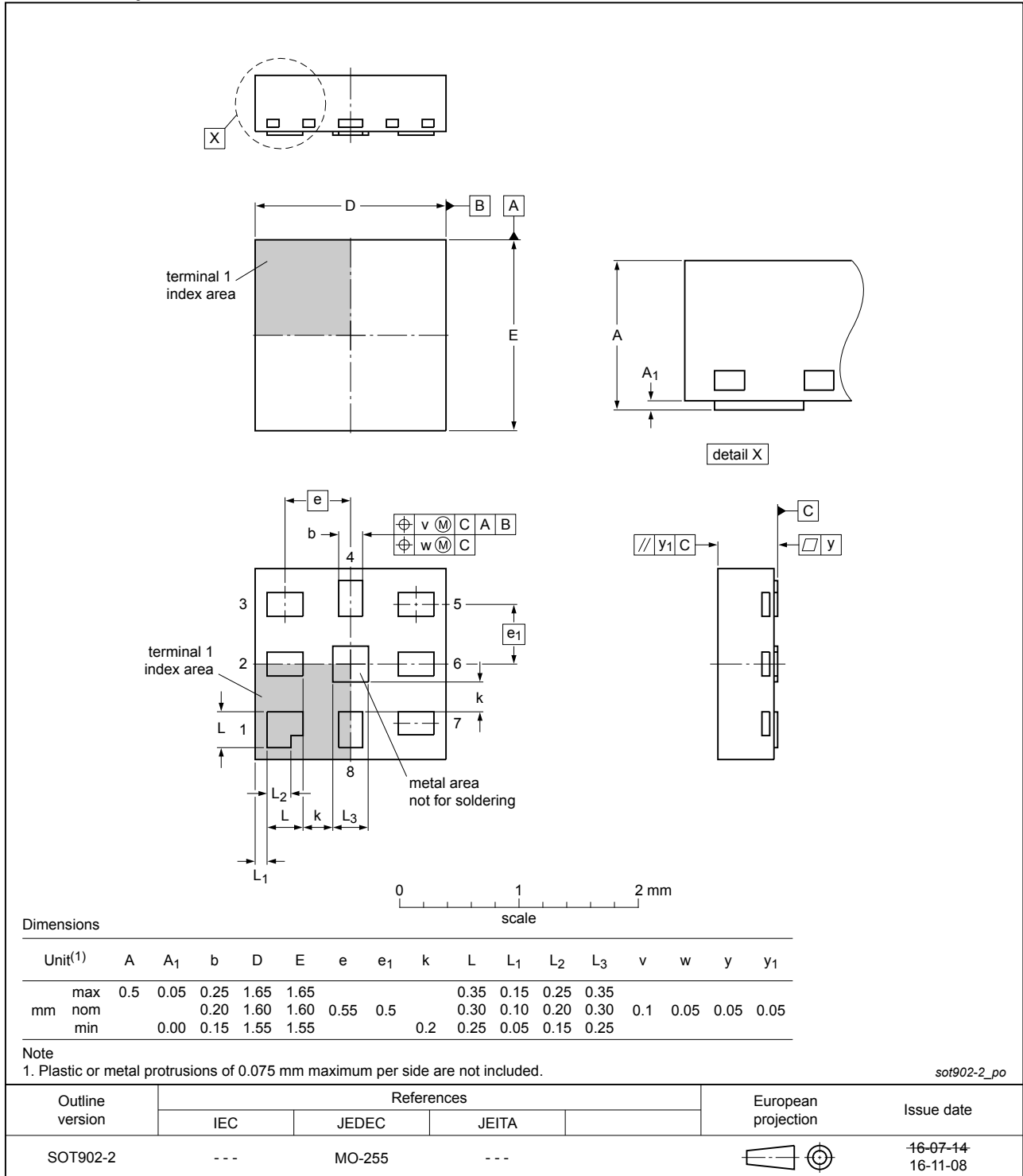


Fig. 14. Package outline SOT902-2 (XQFN8)

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

SOT1116

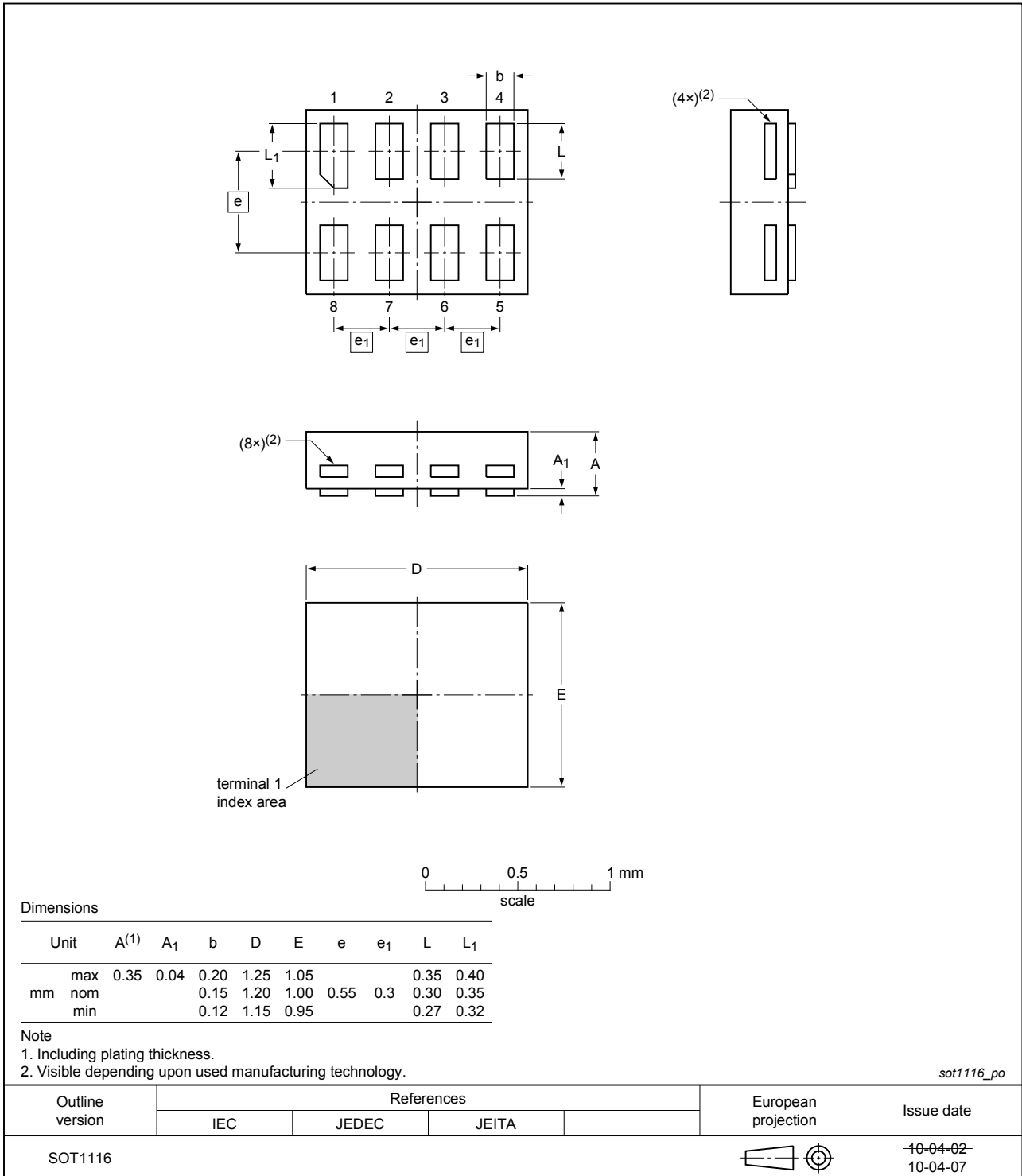


Fig. 15. Package outline SOT1116 (XSON8)

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

SOT1203

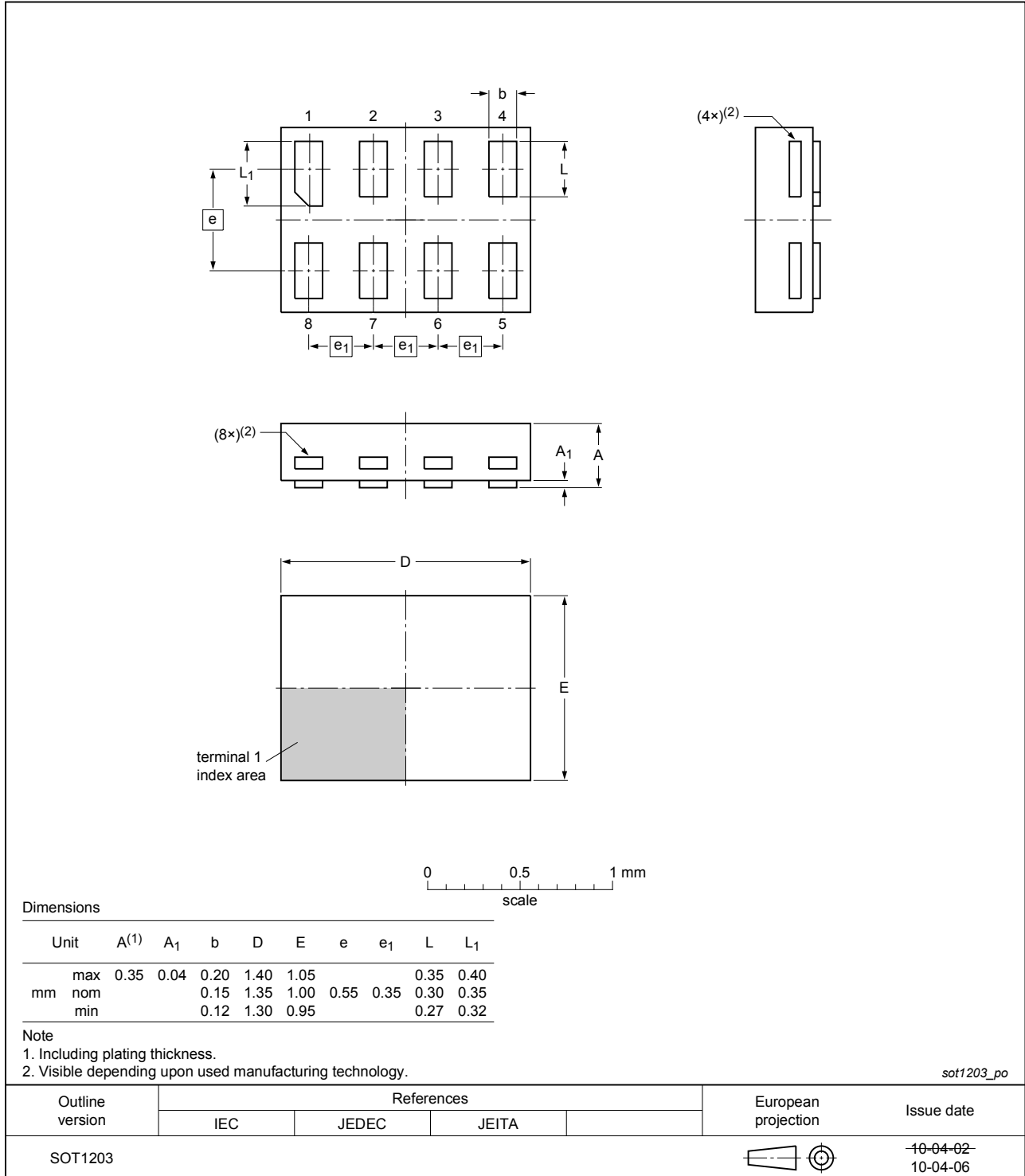


Fig. 16. Package outline SOT1203 (XSON8)

## 13. Abbreviations

Table 12. Abbreviations

| Acronym | Description                             |
|---------|---|
| CMOS    | Complementary Metal-Oxide Semiconductor |
| DUT     | Device Under Test                       |
| ESD     | ElectroStatic Discharge                 |
| HBM     | Human Body Model                        |
| MM      | Machine Model                           |
| TTL     | Transistor-Transistor Logic             |

## 14. Revision history

Table 13. Revision history

| Document ID    | Release date   | Data sheet status     | Change notice | Supersedes     |
|----------------|--|-----------------------|---------------|----------------|
| 74LVC1G74 v.14 | 20181227   | Product data sheet    | -             | 74LVC1G74 v.13 |
| Modifications: | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type number 74LVC1G74GD (SOT996-2) removed.</li> </ul> |                       |               |                |
| 74LVC1G74 v.13 | 20161205   | Product data sheet    | -             | 74LVC1G74 v.12 |
| Modifications: | <ul style="list-style-type: none"> <li><a href="#">Table 8</a>: The maximum limits for leakage current and supply current have changed.</li> </ul>   |                       |               |                |
| 74LVC1G74 v.12 | 20130402   | Product data sheet    | -             | 74LVC1G74 v.11 |
| Modifications: | <ul style="list-style-type: none"> <li>For type number 74LVC1G74GD XSON8U has changed to XSON8.</li> </ul>   |                       |               |                |
| 74LVC1G74 v.11 | 20120604   | Product data sheet    | -             | 74LVC1G74 v.10 |
| Modifications: | <ul style="list-style-type: none"> <li>For type number 74LVC1G74GM the SOT code has changed to SOT902-2.</li> </ul>  |                       |               |                |
| 74LVC1G74 v.10 | 20111202   | Product data sheet    | -             | 74LVC1G74 v.9  |
| Modifications: | <ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>   |                       |               |                |
| 74LVC1G74 v.9  | 20100805   | Product data sheet    | -             | 74LVC1G74 v.8  |
| 74LVC1G74 v.8  | 20091203   | Product data sheet    | -             | 74LVC1G74 v.7  |
| 74LVC1G74 v.7  | 20080626   | Product data sheet    | -             | 74LVC1G74 v.6  |
| 74LVC1G74 v.6  | 20080219   | Product data sheet    | -             | 74LVC1G74 v.5  |
| 74LVC1G74 v.5  | 20070809   | Product data sheet    | -             | 74LVC1G74 v.4  |
| 74LVC1G74 v.4  | 20061207   | Product data sheet    | -             | 74LVC1G74 v.3  |
| 74LVC1G74 v.3  | 20050201   | Product specification | -             | 74LVC1G74 v.2  |
| 74LVC1G74 v.2  | 20040909   | Product specification | -             | 74LVC1G74 v.1  |
| 74LVC1G74 v.1  | 20040202   | Product specification | -             | -              |

## 15. Legal information

### 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 <https://www.nexperia.com>.

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