



**THE DATASHEET OF
74LVC1G06GF,132**





74LVC1G06

Inverter with open-drain output

Rev. 16.1 — 3 September 2024

Product data sheet

1. General description

The 74LVC1G06 is a single inverter with open-drain output. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments.

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

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

2. Features and benefits

- Wide supply voltage range from 1.65 V to 5.5 V
- 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)
 - JESD8C (2.7 V to 3.6 V)
 - JESD36 (4.5 V to 5.5 V)
- ± 24 mA output drive ($V_{CC} = 3.0$ V)
- CMOS low power dissipation
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Overvoltage tolerant inputs to 5.5 V
- I_{OFF} circuitry provides partial Power-down mode operation
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Multiple package options
- Specified from -40 °C to $+125$ °C

3. Ordering information

Table 1. Ordering information

| Type number | Package | | | |
|-----------------------------|-------------------|--------|--|---------------------------|
| | Temperature range | Name | Description | Version |
| 74LVC1G06GW | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74LVC1G06GV | -40 °C to +125 °C | SC-74A | plastic surface-mounted package; 5 leads | SOT753 |
| 74LVC1G06GM | -40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |
| 74LVC1G06GN | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm | SOT1115 |
| 74LVC1G06GS | -40 °C to +125 °C | XSON6 | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm | SOT1202 |
| 74LVC1G06GX | -40 °C to +125 °C | X2SON5 | plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.32 mm | SOT1226-3 |
| 74LVC1G06GZ | -40 °C to +125 °C | XSON5 | plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm | SOT8065-1 |

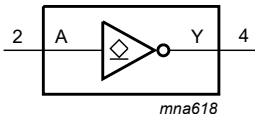

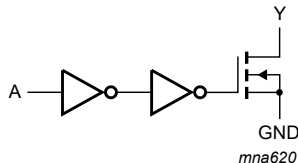
4. Marking

Table 2. Marking codes

| Type number | Marking [1] |
|-------------|-------------|
| 74LVC1G06GW | VR |
| 74LVC1G06GV | V06 |
| 74LVC1G06GM | VR |
| 74LVC1G06GN | VR |
| 74LVC1G06GS | VR |
| 74LVC1G06GX | VR |
| 74LVC1G06GZ | VR |

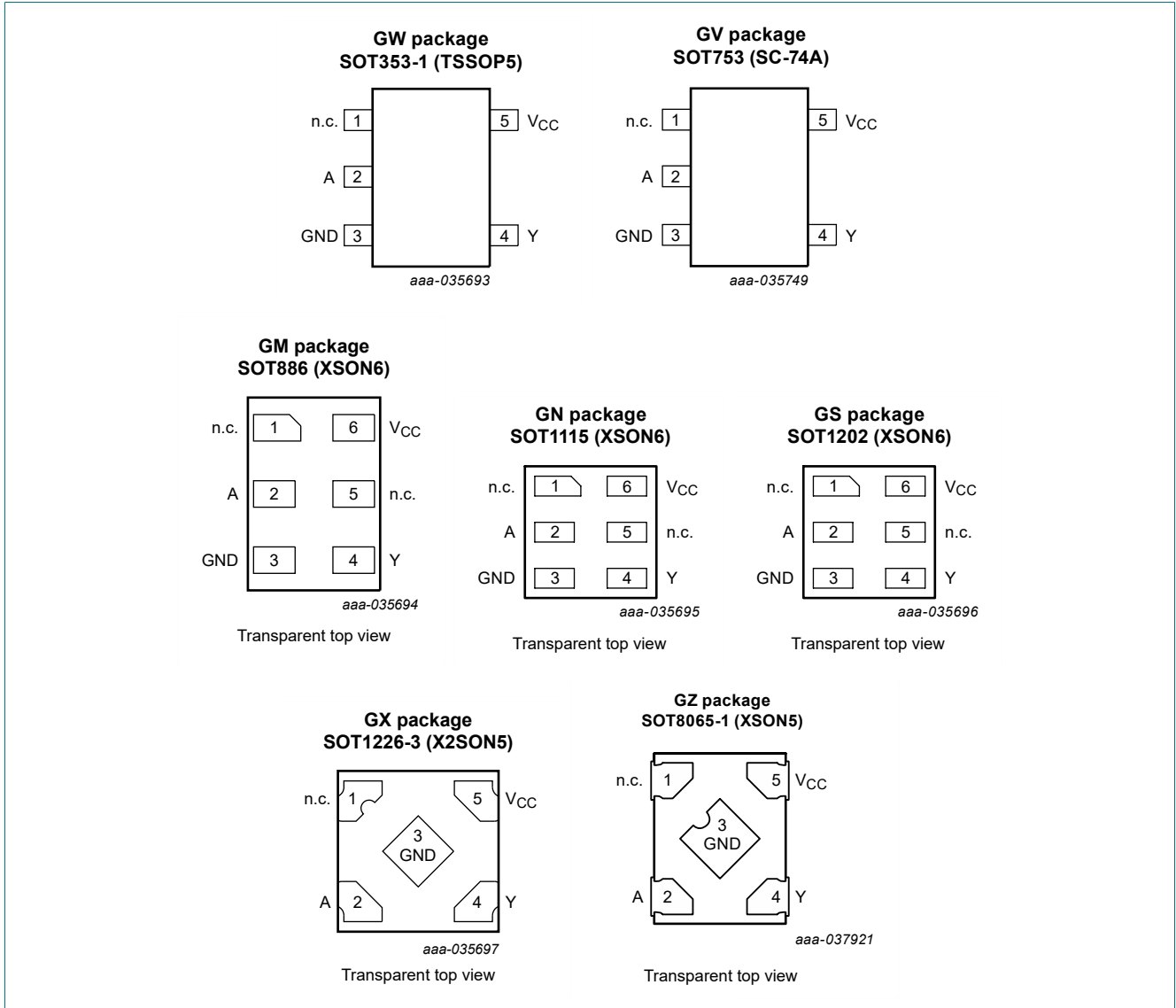
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram

| | | |
|--|--|---|
|  <p>Fig. 1. Logic symbol</p> |  <p>Fig. 2. IEC logic symbol</p> |  <p>Fig. 3. Logic diagram</p> |
|--|--|---|

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

| Symbol | Pin | | Description |
|-----------------|--------------------------|-------|----------------|
| | TSSOP5, XSON5 and X2SON5 | XSON6 | |
| n.c. | 1 | 1 | not connected |
| A | 2 | 2 | data input |
| GND | 3 | 3 | ground (0 V) |
| Y | 4 | 4 | data output |
| n.c. | - | 5 | not connected |
| V _{CC} | 5 | 6 | supply voltage |

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF-state.

| Input | Output |
|-------|--------|
| A | Y |
| L | Z |
| H | L |

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 |
| 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 and Power-down mode | [1] -0.5 | +6.5 | V |
| I _{O(sink/source)} | output sink or source current | V _O = 0 V to V _{CC} | - | ±50 | mA |
| I _{CC} | supply current | | - | +100 | mA |
| I _{GND} | ground current | | -100 | - | 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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT353-1 (TSSOP5) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT753 (SC-74A) package: P_{tot} derates linearly with 3.8 mW/K above 85 °C.

For SOT886 (XSON6) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package: P_{tot} derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT1226-3 (X2SON5) package: P_{tot} derates linearly with 3.0 mW/K above 67 °C.

For SOT8065-1 (XSON5) package: P_{tot} derates linearly with 3.2 mW/K above 72 °C.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

| Symbol | Parameter | Conditions | Min | Typ | 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 | - | 5.5 | 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 | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|----------|--------------------------|---|----------------------|---------|----------------------|----------------------|----------------------|------|
| | | | Min | Typ [1] | Max | Min | Max | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 1.65$ V to 1.95 V | $0.65 \times V_{CC}$ | - | - | $0.65 \times V_{CC}$ | - | V |
| | | $V_{CC} = 2.3$ V to 2.7 V | 1.7 | - | - | 1.7 | - | V |
| | | $V_{CC} = 2.7$ V to 3.6 V | 2.0 | - | - | 2.0 | - | V |
| | | $V_{CC} = 4.5$ V to 5.5 V | $0.7 \times V_{CC}$ | - | - | $0.7 \times V_{CC}$ | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 1.65$ V to 1.95 V | - | - | $0.35 \times V_{CC}$ | - | $0.35 \times V_{CC}$ | V |
| | | $V_{CC} = 2.3$ V to 2.7 V | - | - | 0.7 | - | 0.7 | V |
| | | $V_{CC} = 2.7$ V to 3.6 V | - | - | 0.8 | - | 0.8 | V |
| | | $V_{CC} = 4.5$ V to 5.5 V | - | - | $0.3 \times V_{CC}$ | - | $0.3 \times V_{CC}$ | V |
| V_{OL} | LOW-level output voltage | $V_I = V_{IH}$ or V_{IL} | | | | | | |
| | | $I_O = 100$ μ A; $V_{CC} = 1.65$ V to 5.5 V | - | - | 0.10 | - | 0.10 | V |
| | | $I_O = 4$ mA; $V_{CC} = 1.65$ V | - | - | 0.45 | - | 0.70 | V |
| | | $I_O = 8$ mA; $V_{CC} = 2.3$ V | - | - | 0.30 | - | 0.45 | V |
| | | $I_O = 12$ mA; $V_{CC} = 2.7$ V | - | - | 0.40 | - | 0.60 | V |
| | | $I_O = 24$ mA; $V_{CC} = 3.0$ V | - | - | 0.55 | - | 0.80 | V |
| | | $I_O = 32$ mA; $V_{CC} = 4.5$ V | - | - | 0.55 | - | 0.80 | V |

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|------------------|---------------------------|---|------------------|---------|-----|-------------------|-----|------|
| | | | Min | Typ [1] | Max | Min | Max | |
| I _I | input leakage current | V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | - | ±0.1 | ±1 | - | ±1 | µA |
| I _{OZ} | OFF-state output current | V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 5.5 V | - | ±0.1 | ±2 | - | ±2 | µA |
| I _{OFF} | power-off leakage current | V _I or V _O = 5.5 V; V _{CC} = 0 V | - | ±0.1 | ±2 | - | ±2 | µA |
| I _{CC} | supply current | V _I = 5.5 V or GND; I _O = 0 A; V _{CC} = 1.65 V to 5.5 V | - | 0.1 | 4 | - | 4 | µA |
| ΔI _{CC} | additional supply current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 2.3 V to 5.5 V; per pin | - | 5 | 500 | - | 500 | µA |
| C _I | input capacitance | V _{CC} = 3.3 V; V _I = GND to V _{CC} | - | 5 | - | - | - | pF |

[1] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 5.

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------------|-------------------------------|---|------------------|---------|-----|-------------------|-----|------|
| | | | Min | Typ [1] | Max | Min | Max | |
| t _{pd} | propagation delay | A to Y; see Fig. 4 [2] | | | | | | |
| | | V _{CC} = 1.65 V to 1.95 V | 1.0 | 3 | 6.5 | 1.0 | 8.5 | ns |
| | | V _{CC} = 2.3 V to 2.7 V | 0.5 | 1.9 | 4 | 0.5 | 5.5 | ns |
| | | V _{CC} = 2.7 V | 0.5 | 2.5 | 4.5 | 0.5 | 6 | ns |
| | | V _{CC} = 3.0 V to 3.6 V | 0.5 | 2.3 | 4 | 0.5 | 5.5 | ns |
| | | V _{CC} = 4.5 V to 5.5 V | 0.5 | 1.7 | 3 | 0.5 | 4 | ns |
| C _{PD} | power dissipation capacitance | V _I = GND to V _{CC} ; V _{CC} = 3.3 V [3] | - | 14 | - | - | - | 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_{PLZ} and t_{PZL}.

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

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

11.1. Waveforms and test circuit

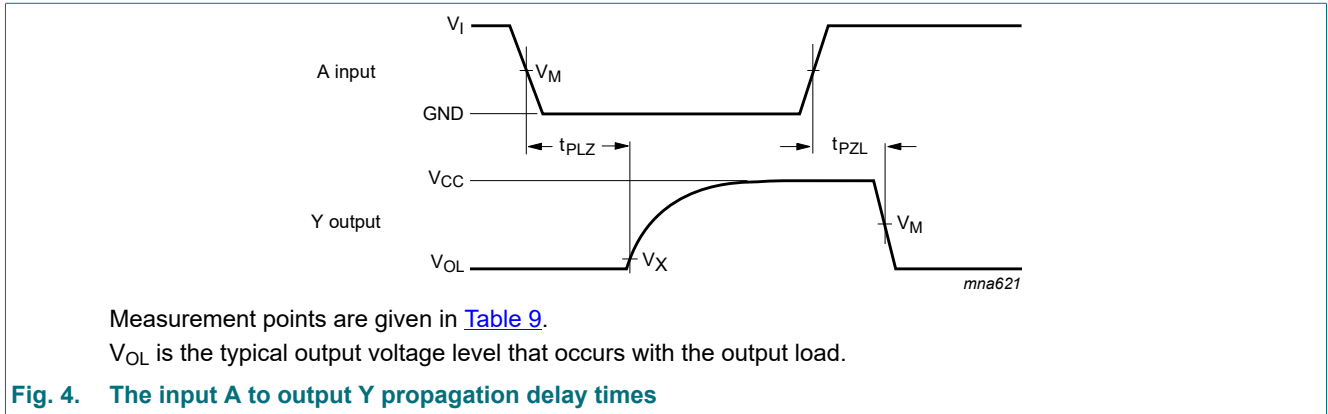


Table 9. Measurement points

| Supply voltage | Input | Output | |
|------------------|---------------------|---------------------|---------------------------|
| V_{CC} | V_M | V_M | V_X |
| 1.65 V to 1.95 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15 \text{ V}$ |
| 2.3 V to 2.7 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15 \text{ V}$ |
| 2.7 V | 1.5 V | 1.5 V | $V_{OL} + 0.3 \text{ V}$ |
| 3.0 V to 3.6 V | 1.5 V | 1.5 V | $V_{OL} + 0.3 \text{ V}$ |
| 4.5 V to 5.5 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.3 \text{ V}$ |

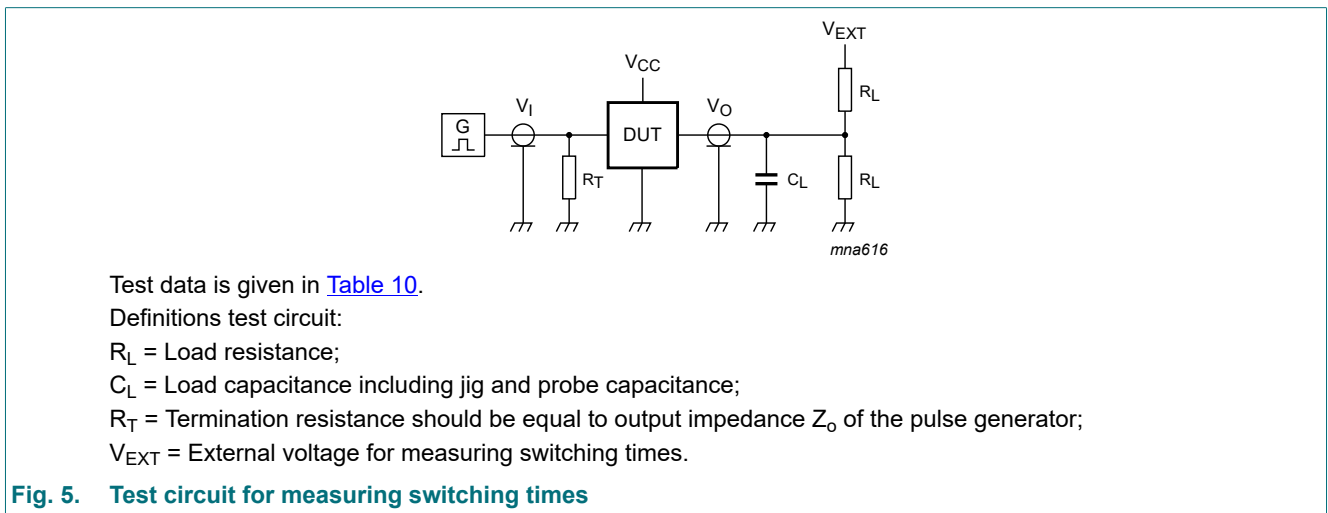


Table 10. Test data

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

12. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1



Fig. 6. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

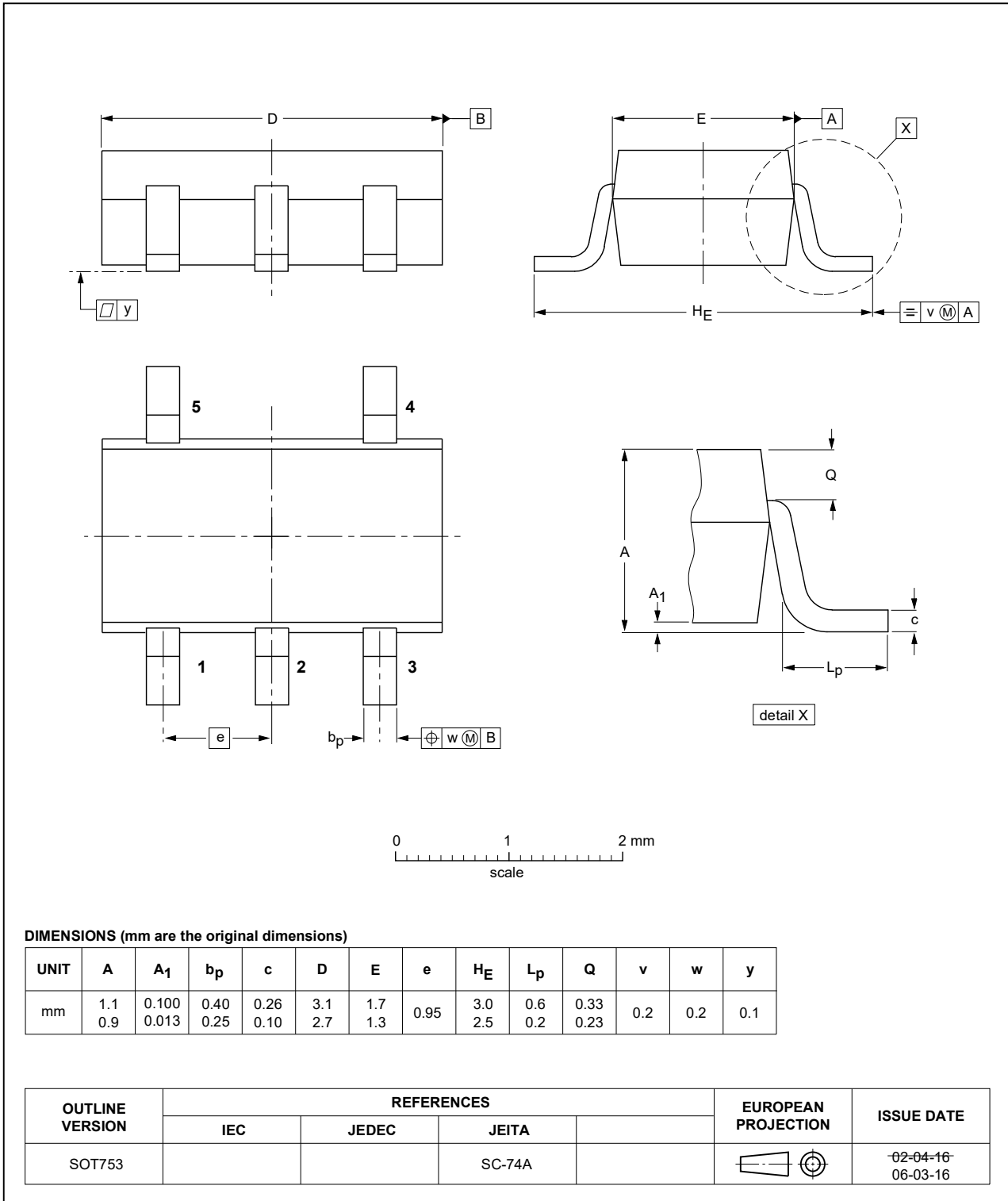


Fig. 7. Package outline SOT753 (SC-74A)

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

SOT886



Fig. 8. Package outline SOT886 (XSON6)

XSON6: extremely thin small outline package; no leads;
6 terminals; body 0.9 x 1.0 x 0.35 mm

SOT1115



Fig. 9. 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



Fig. 10. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.32 mm

SOT1226-3



Fig. 11. Package outline SOT1226-3 (X2SON5)

XSON5: Plastic thermal enhanced extremely thin small outline package with side-wettable flanks (SWF); no leads; 5 terminals; body 1.1 × 0.85 × 0.5 mm

SOT8065-1

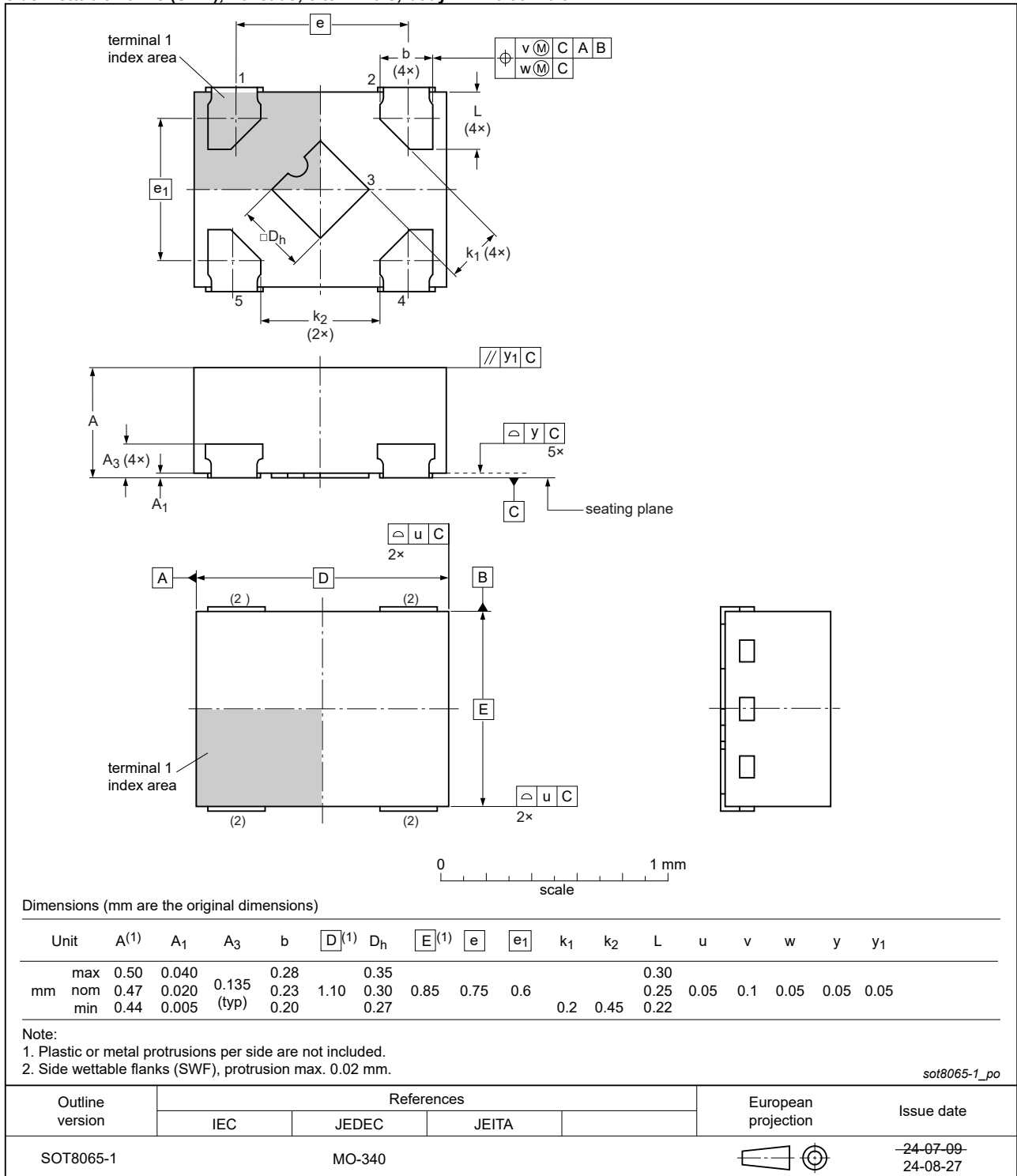


Fig. 12. Package outline SOT8065-1 (XSON5)

13. Abbreviations

Table 11. Abbreviations

| Acronym | Description |
|---------|---|
| ANSI | American National Standards Institute |
| CMOS | Complementary Metal-Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| ESDA | ElectroStatic Discharge Association |
| HBM | Human Body Model |
| JEDEC | Joint Electron Device Engineering Council |
| TTL | Transistor-Transistor Logic |

14. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|------------------|--|--------------------|---------------|----------------|
| 74LVC1G06 v.16.1 | 20240903 | Product data sheet | - | 74LVC1G06 v.16 |
| Modifications: | <ul style="list-style-type: none"> Fig. 12: Added JEDEC reference MO-340 to SOT8065-1 package outline drawing. | | | |
| 74LVC1G06 v.16 | 20240711 | Product data sheet | - | 74LVC1G06 v.15 |
| Modifications: | <ul style="list-style-type: none"> Type number 74LVC1G06GZ (SOT8065-1/XSON5) added. | | | |
| 74LVC1G06 v.15 | 20230804 | Product data sheet | - | 74LVC1G06 v.14 |
| Modifications: | <ul style="list-style-type: none"> Section 2: ESD specification updated according to the latest JEDEC standard. | | | |
| 74LVC1G06 v.14 | 20220210 | Product data sheet | - | 74LVC1G06 v.13 |
| Modifications: | <ul style="list-style-type: none"> Fig. 6: Package outline drawing for SOT353-1 (TSSOP5) has changed. | | | |
| 74LVC1G06 v.13 | 20210924 | Product data sheet | - | 74LVC1G06 v.12 |
| Modifications: | <ul style="list-style-type: none"> Section 1 and Section 2 updated. SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package. Type number 74LVC1G06GF (SOT891) removed. Table 5: Derating values for P_{tot} total power dissipation updated. | | | |
| 74LVC1G06 v.12 | 20180522 | Product data sheet | - | 74LVC1G06 v.11 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. | | | |
| 74LVC1G06 v.11 | 20161128 | Product data sheet | - | 74LVC1G06 v.10 |
| Modifications: | <ul style="list-style-type: none"> Table 7: The maximum limits for leakage current and supply current have changed. Table 7: OFF-state output current parameter added. | | | |
| 74LVC1G06 v.10 | 20120629 | Product data sheet | - | 74LVC1G06 v.9 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74LVC1G06GX (SOT1226) Package outline drawing of SOT886 (Fig. 8) modified. | | | |
| 74LVC1G06 v.9 | 20111207 | Product data sheet | - | 74LVC1G06 v.8 |
| Modifications: | <ul style="list-style-type: none"> Legal pages updated. | | | |
| 74LVC1G06 v.8 | 20101026 | Product data sheet | - | 74LVC1G06 v.7 |
| 74LVC1G06 v.7 | 20070712 | Product data sheet | - | 74LVC1G06 v.6 |

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. |
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| Product [short] data sheet | Production | This document contains the product specification. |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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