

74LVC1G53

2-channel analog multiplexer/demultiplexer

Rev. 05 — 11 June 2008

Product data sheet

1. General description

The 74LVC1G53 is a low-power, low-voltage, high-speed, Si-gate CMOS device.

The 74LVC1G53 provides one analog multiplexer/demultiplexer with a digital select input (S), two independent inputs/outputs (Y0 and Y1), a common input/output (Z) and an active LOW enable input (\bar{E}). When pin \bar{E} is HIGH, the switch is turned off.

Schmitt-trigger action at the select and enable inputs makes the circuit tolerant of slower input rise and fall times across the entire V_{CC} range from 1.65 V to 5.5 V.

2. Features

- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON resistance:
 - ◆ 7.5 Ω (typical) at $V_{CC} = 2.7$ V
 - ◆ 6.5 Ω (typical) at $V_{CC} = 3.3$ V
 - ◆ 6 Ω (typical) at $V_{CC} = 5$ V
- Switch current capability of 32 mA
- High noise immunity
- CMOS low-power consumption
- TTL interface compatibility at 3.3 V
- Latch-up performance meets requirements of JESD 78 Class I
- ESD protection:
 - ◆ HBM JESD22-A114E exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
 - ◆ CDM JESD22-C101C exceeds 1000 V
- Control inputs accepts voltages up to 5 V
- 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 | | | Version |
|-------------|-------------------|--------|--|----------|
| | Temperature range | Name | Description | |
| 74LVC1G53DP | -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 |
| 74LVC1G53DC | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm | SOT765-1 |
| 74LVC1G53GT | -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 |
| 74LVC1G53GD | -40 °C to +125 °C | XSON8U | plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 × 2 × 0.5 mm | SOT996-2 |
| 74LVC1G53GM | -40 °C to +125 °C | XQFN8U | plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 × 1.6 × 0.5 mm | SOT902-1 |

4. Marking

Table 2. Marking codes

| Type number | Marking code |
|-------------|--------------|
| 74LVC1G53DC | V53 |
| 74LVC1G53DP | V53 |
| 74LVC1G53GT | V53 |
| 74LVC1G53GD | V53 |
| 74LVC1G53GM | V53 |

5. Functional diagram

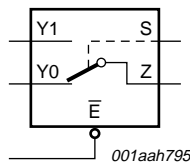


Fig 1. Logic symbol

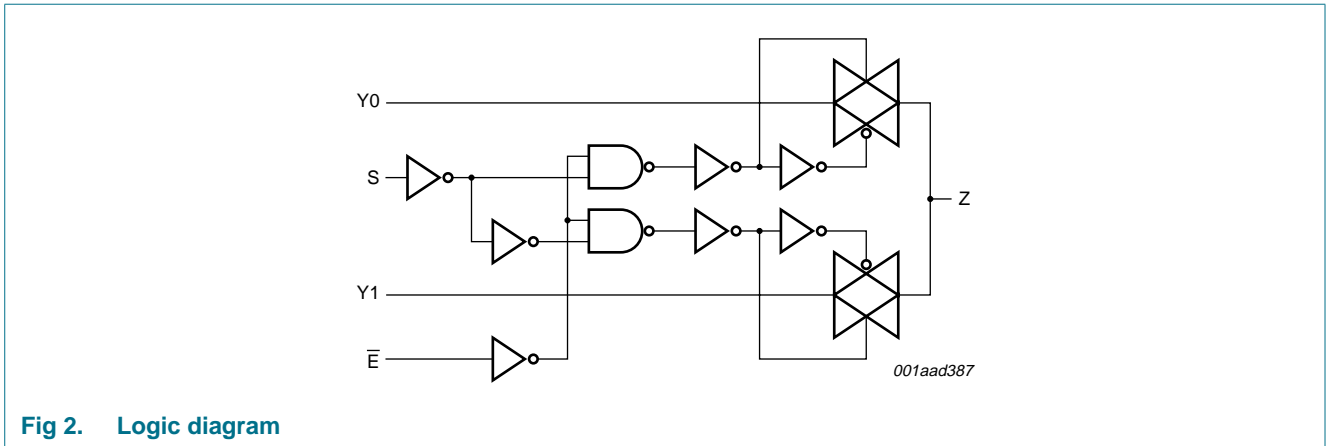


Fig 2. Logic diagram

6. Pinning information

6.1 Pinning

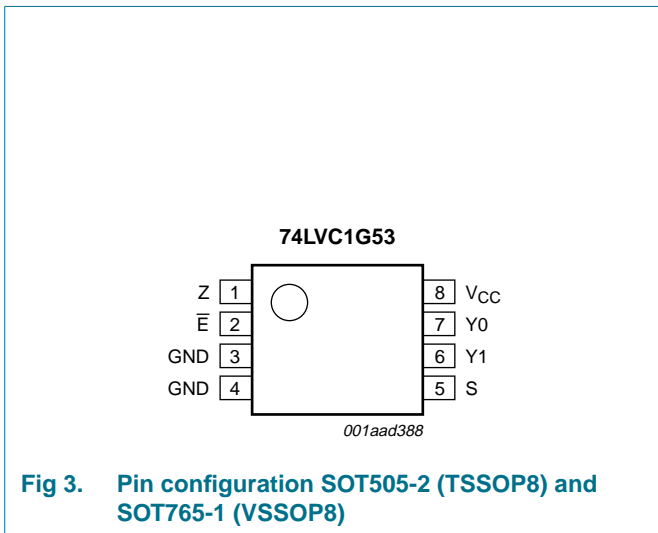


Fig 3. Pin configuration SOT505-2 (TSSOP8) and SOT765-1 (VSSOP8)

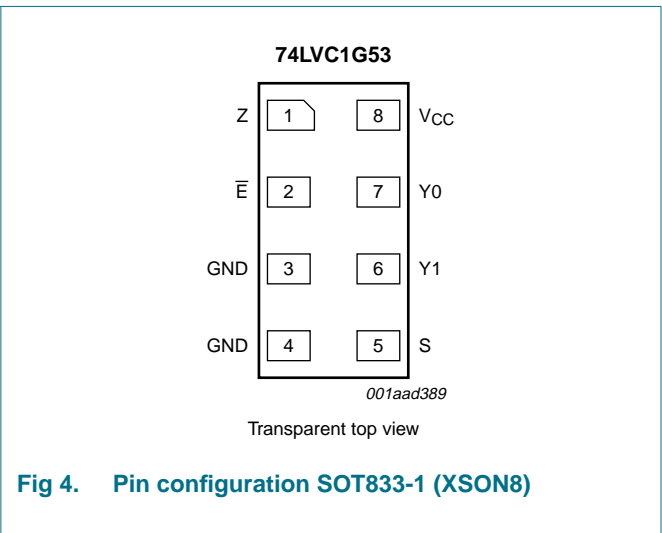


Fig 4. Pin configuration SOT833-1 (XSON8)

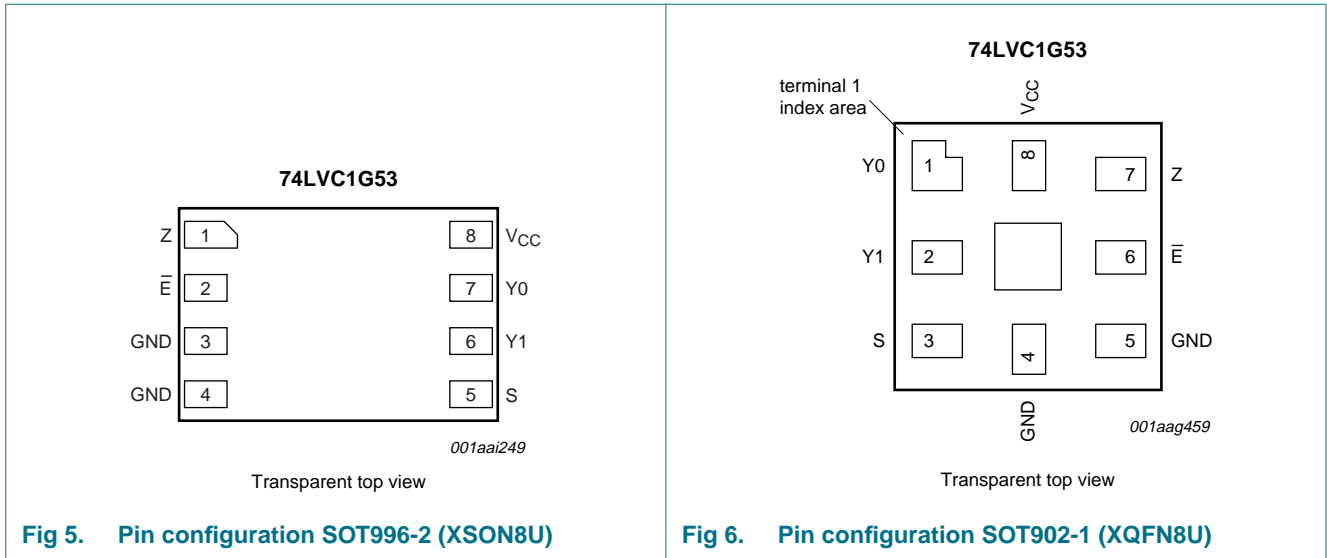


Fig 5. Pin configuration SOT996-2 (XSON8U)

Fig 6. Pin configuration SOT902-1 (XQFN8U)

6.2 Pin description

Table 3. Pin description

| Symbol | Pin | | Description |
|-----------------|---|----------|-----------------------------|
| | SOT505-2, SOT765-1, SOT996-2 and SOT833-1 | SOT902-1 | |
| Z | 1 | 7 | common output or input |
| \bar{E} | 2 | 6 | enable input (active LOW) |
| GND | 3 | 5 | ground (0 V) |
| GND | 4 | 4 | ground (0 V) |
| S | 5 | 3 | select input |
| Y1 | 6 | 2 | independent input or output |
| Y0 | 7 | 1 | independent input or output |
| V _{CC} | 8 | 8 | supply voltage |

7. Functional description

Table 4. Function table^[1]

| Input | | Channel on |
|-------|-----------|--------------------|
| S | \bar{E} | |
| L | L | Y0 to Z or Z to Y0 |
| H | L | Y1 to Z or Z to Y1 |
| X | H | Z (switch off) |

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.

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 |
| I_{IK} | input clamping current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | -50 | - | mA |
| I_{SK} | switch clamping current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | - | ± 50 | mA |
| V_{SW} | switch voltage | enable and disable mode | [2] -0.5 | $V_{CC} + 0.5$ | V |
| I_{SW} | switch current | $V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$ | - | ± 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 | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ | [3] - | 250 | mW |

[1] The minimum input voltage rating may be exceeded if the input current rating is observed.

[2] The minimum and maximum switch voltage ratings may be exceeded if the switch clamping current rating is observed.

[3] 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, XSON8U and XQFN8U packages: above 45 °C the value of P_{tot} derates linearly with 2.4 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_{SW} | switch voltage | enable and disable mode | [1] 0 | V_{CC} | V |
| T_{amb} | ambient temperature | | -40 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.65\text{ V}$ to 2.7 V | [2] - | 20 | ns/V |
| | | $V_{CC} = 2.7\text{ V}$ to 5.5 V | [2] - | 10 | ns/V |

[1] To avoid sinking GND current from terminal Z when switch current flows in terminal Yn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no GND current will flow from terminal Yn. In this case, there is no limit for the voltage drop across the switch.

[2] Applies to control signal levels.

10. Static characteristics

Table 7. Static characteristics

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

| Symbol | Parameter | Conditions | T _{amb} = -40 °C to +85 °C | | | T _{amb} = -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 × V _{CC} | - | - | 0.65 × V _{CC} | - | V | |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | - | - | 1.7 | - | V | |
| | | V _{CC} = 3 V to 3.6 V | 2.0 | - | - | 2.0 | - | V | |
| | | V _{CC} = 4.5 V to 5.5 V | 0.7 × V _{CC} | - | - | 0.7 × V _{CC} | - | V | |
| V _{IL} | LOW-level input voltage | V _{CC} = 1.65 V to 1.95 V | - | - | 0.35 × V _{CC} | - | 0.35 × V _{CC} | V | |
| | | V _{CC} = 2.3 V to 2.7 V | - | - | 0.7 | - | 0.7 | V | |
| | | V _{CC} = 3 V to 3.6 V | - | - | 0.8 | - | 0.8 | V | |
| | | V _{CC} = 4.5 V to 5.5 V | - | - | 0.3 × V _{CC} | - | 0.3 × V _{CC} | V | |
| I _I | input leakage current | pin S and pin \bar{E} ; V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V | ^[2] | - | ±0.1 | ±2 | - | ±10 | μA |
| I _{S(OFF)} | OFF-state leakage current | V _I = V _{IH} or V _{IL} ; V _{CC} = 5.5 V; see Figure 7 | ^[2] | - | ±0.1 | ±5 | - | ±20 | μA |
| I _{S(ON)} | ON-state leakage current | V _I = V _{IH} or V _{IL} ; V _{CC} = 5.5 V; see Figure 8 | ^[2] | - | ±0.1 | ±5 | - | ±20 | μA |
| I _{CC} | supply current | V _I = 5.5 V or GND; V _{SW} = GND or V _{CC} ; I _O = 0 A; V _{CC} = 1.65 V to 5.5 V | ^[2] | - | 0.1 | 10 | - | 40 | μA |
| ΔI _{CC} | additional supply current | pin S and pin \bar{E} ; V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{SW} = GND or V _{CC} ; V _{CC} = 5.5 V | ^[2] | - | 5 | 500 | - | 5000 | μA |
| C _I | input capacitance | | - | 2.5 | - | - | - | - | pF |
| C _{S(OFF)} | OFF-state capacitance | | - | 6.0 | - | - | - | - | pF |
| C _{S(ON)} | ON-state capacitance | | - | 18 | - | - | - | - | pF |

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

[2] These typical values are measured at V_{CC} = 3.3 V.

10.1 Test circuits

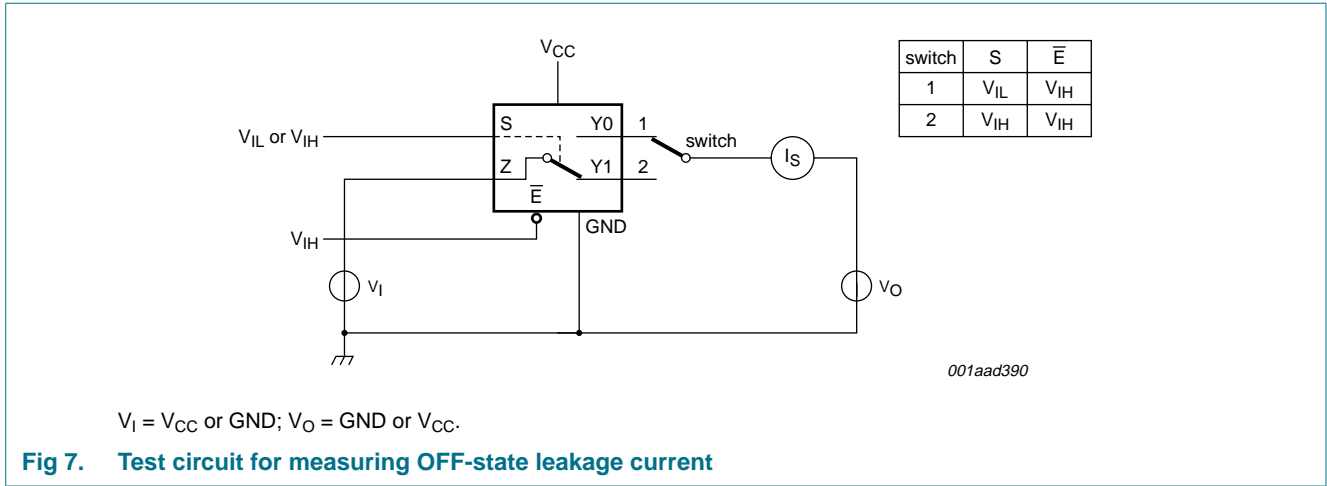


Fig 7. Test circuit for measuring OFF-state leakage current

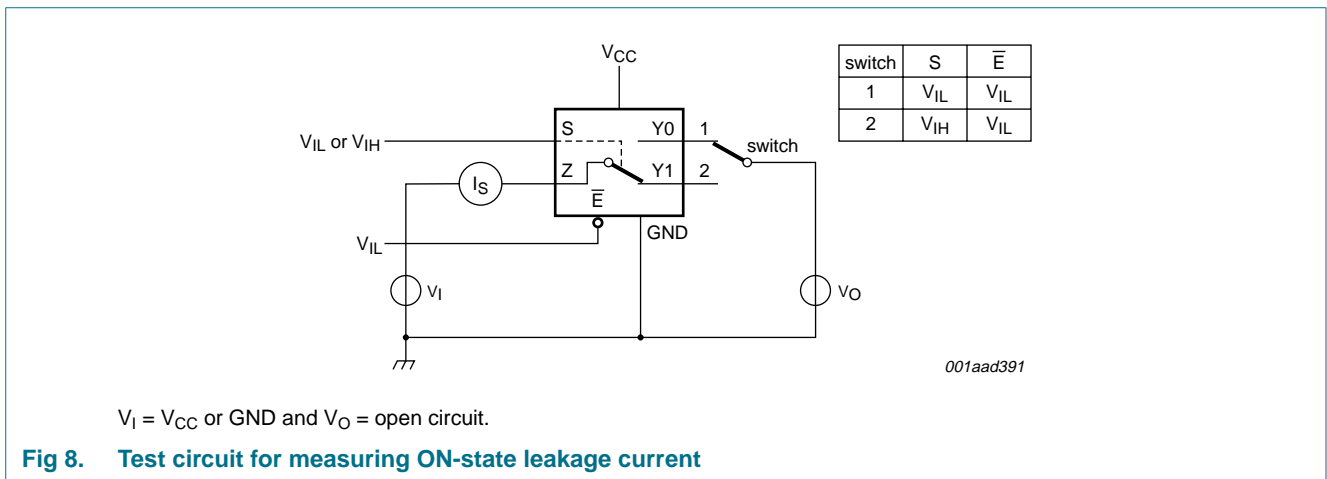


Fig 8. Test circuit for measuring ON-state leakage current

10.2 ON resistance

Table 8. ON resistance

At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see Figure 10 to Figure 15.

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | -40 °C to +125 °C | | Unit | |
|----------------|----------------------|---|------------------|--------------------|-------------------|-----|------|----------|
| | | | Min | Typ ^[1] | Max | Min | | Max |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_I =$ GND to V_{CC} ; see Figure 9 | | | | | | |
| | | $I_{SW} = 4$ mA; $V_{CC} = 1.65$ V to 1.95 V | - | 34.0 | 130 | - | 195 | Ω |
| | | $I_{SW} = 8$ mA; $V_{CC} = 2.3$ V to 2.7 V | - | 12.0 | 30 | - | 45 | Ω |
| | | $I_{SW} = 12$ mA; $V_{CC} = 2.7$ V | - | 10.4 | 25 | - | 38 | Ω |
| | | $I_{SW} = 24$ mA; $V_{CC} = 3$ V to 3.6 V | - | 7.8 | 20 | - | 30 | Ω |
| | | $I_{SW} = 32$ mA; $V_{CC} = 4.5$ V to 5.5 V | - | 6.2 | 15 | - | 23 | Ω |

Table 8. ON resistance ...continued

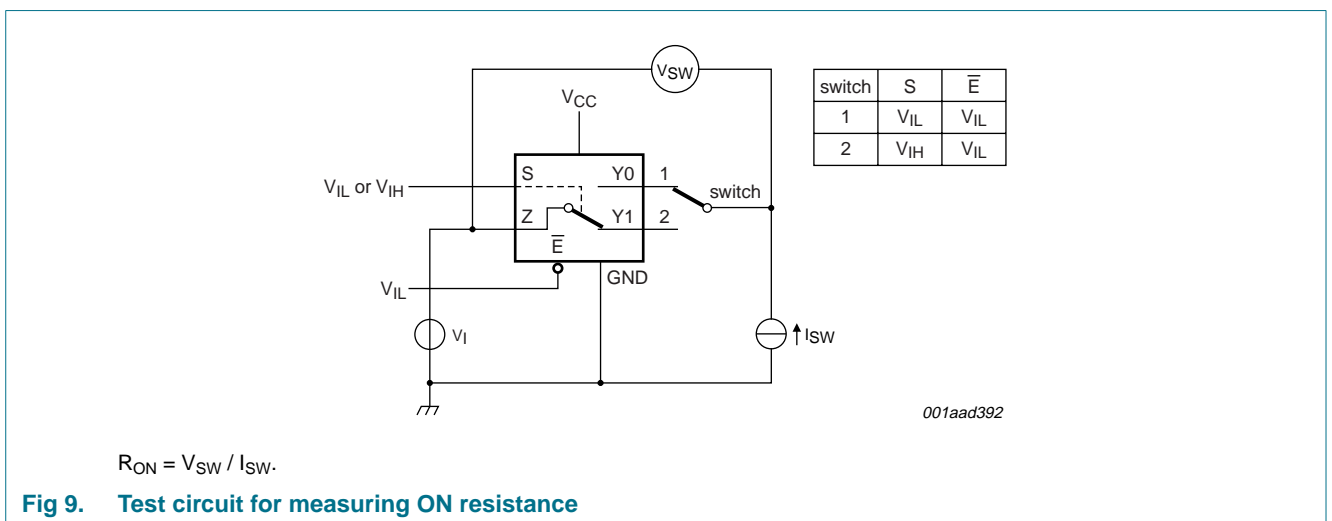
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 10](#) to [Figure 15](#).

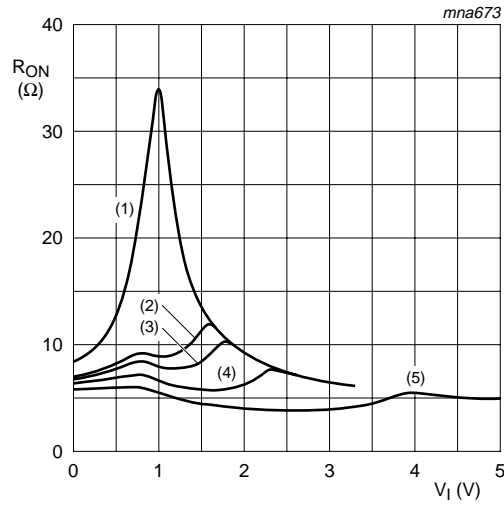
| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------------------|--------------------------|---|------------------|--------------------|-----|-------------------|-----|------|
| | | | Min | Typ ^[1] | Max | Min | Max | |
| R _{ON(rail)} | ON resistance (rail) | V _I = GND; see Figure 9 | | | | | | |
| | | I _{SW} = 4 mA; V _{CC} = 1.65 V to 1.95 V | - | 8.2 | 18 | - | 27 | Ω |
| | | I _{SW} = 8 mA; V _{CC} = 2.3 V to 2.7 V | - | 7.1 | 16 | - | 24 | Ω |
| | | I _{SW} = 12 mA; V _{CC} = 2.7 V | - | 6.9 | 14 | - | 21 | Ω |
| | | I _{SW} = 24 mA; V _{CC} = 3 V to 3.6 V | - | 6.5 | 12 | - | 18 | Ω |
| | | I _{SW} = 32 mA; V _{CC} = 4.5 V to 5.5 V | - | 5.8 | 10 | - | 15 | Ω |
| | | V _I = V _{CC} ; see Figure 9 | | | | | | |
| | | I _{SW} = 4 mA; V _{CC} = 1.65 V to 1.95 V | - | 10.4 | 30 | - | 45 | Ω |
| | | I _{SW} = 8 mA; V _{CC} = 2.3 V to 2.7 V | - | 7.6 | 20 | - | 30 | Ω |
| | | I _{SW} = 12 mA; V _{CC} = 2.7 V | - | 7.0 | 18 | - | 27 | Ω |
| R _{ON(flat)} | ON resistance (flatness) | V _I = GND to V _{CC} ^[2] | | | | | | |
| | | I _{SW} = 4 mA; V _{CC} = 1.65 V to 1.95 V | - | 26.0 | - | - | - | Ω |
| | | I _{SW} = 8 mA; V _{CC} = 2.3 V to 2.7 V | - | 5.0 | - | - | - | Ω |
| | | I _{SW} = 12 mA; V _{CC} = 2.7 V | - | 3.5 | - | - | - | Ω |
| | | I _{SW} = 24 mA; V _{CC} = 3 V to 3.6 V | - | 2.0 | - | - | - | Ω |
| | | I _{SW} = 32 mA; V _{CC} = 4.5 V to 5.5 V | - | 1.5 | - | - | - | Ω |

[1] Typical values are measured at T_{amb} = 25 °C and nominal V_{CC}.

[2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V_{CC} and temperature.

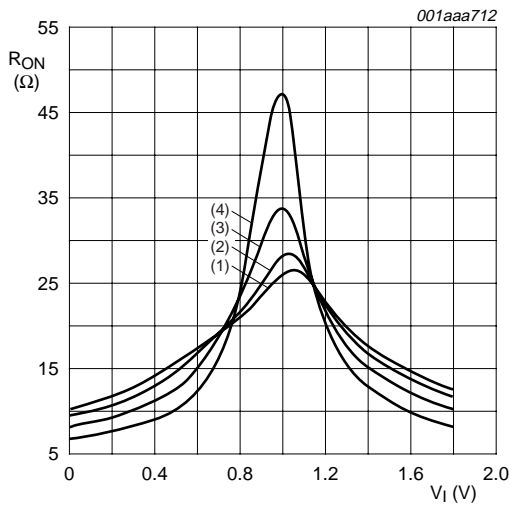
10.3 ON resistance test circuit and graphs





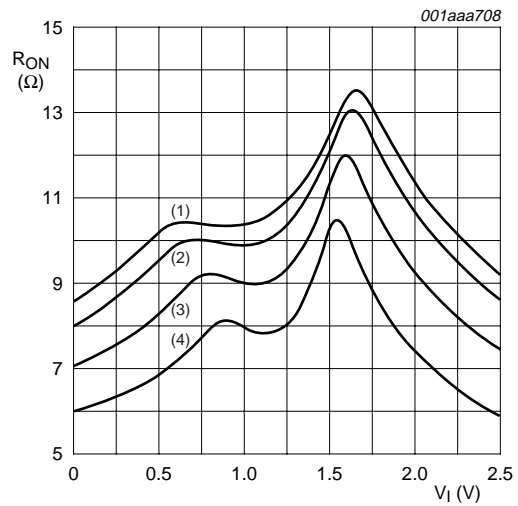
- (1) $V_{CC} = 1.8\text{ V}$.
- (2) $V_{CC} = 2.5\text{ V}$.
- (3) $V_{CC} = 2.7\text{ V}$.
- (4) $V_{CC} = 3.3\text{ V}$.
- (5) $V_{CC} = 5.0\text{ V}$.

Fig 10. Typical ON resistance as a function of input voltage; $T_{amb} = 25\text{ }^{\circ}\text{C}$



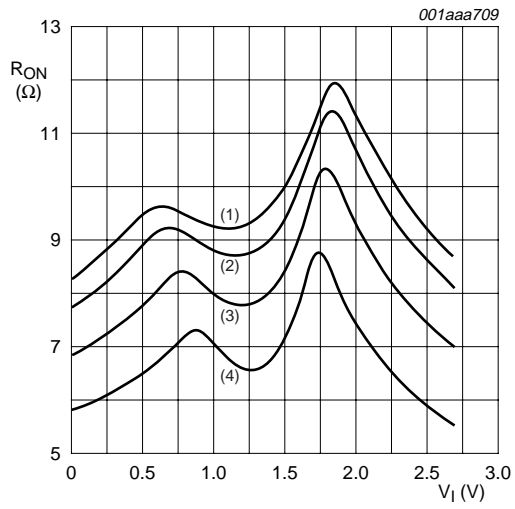
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}$.
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}$.
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}$.
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}$.

Fig 11. ON resistance as a function of input voltage; $V_{CC} = 1.8\text{ V}$



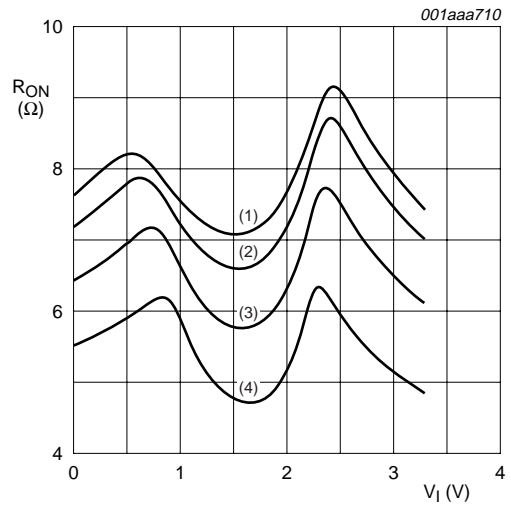
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}$.
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}$.
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}$.
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}$.

Fig 12. ON resistance as a function of input voltage; $V_{CC} = 2.5\text{ V}$



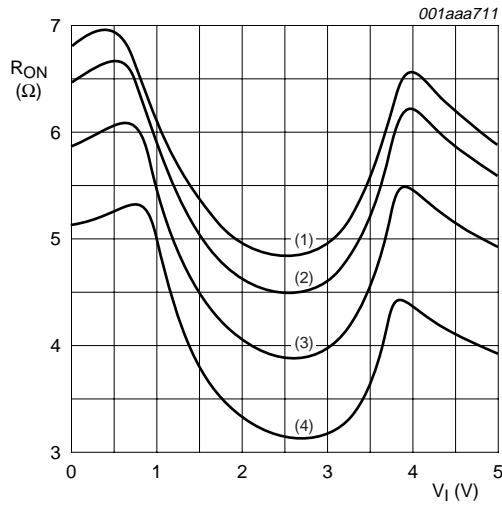
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 13. ON resistance as a function of input voltage; $V_{CC} = 2.7\text{ V}$



- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 14. ON resistance as a function of input voltage; $V_{CC} = 3.3\text{ V}$



- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 15. ON resistance as a function of input voltage; $V_{CC} = 5.0\text{ V}$

11. Dynamic characteristics

Table 9. Dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see [Figure 18](#).

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|-----------|-------------------|---|------------------|--------------------|------|-------------------|------|------|
| | | | Min | Typ ^[1] | Max | Min | Max | |
| t_{pd} | propagation delay | Z to Yn or Yn to Z; see Figure 16 ^{[2][3]} | | | | | | |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | - | 2 | - | 2.5 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | - | 1.2 | - | 1.5 | ns |
| | | $V_{CC} = 2.7\text{ V}$ | - | - | 1.0 | - | 1.25 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | - | - | 0.8 | - | 1.0 | ns |
| | | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | - | - | 0.6 | - | 0.8 | ns |
| t_{en} | enable time | S to Z or Yn; see Figure 17 ^[4] | | | | | | |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 2.6 | 6.7 | 10.3 | 2.6 | 12.9 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.9 | 4.1 | 6.4 | 1.9 | 8.0 | ns |
| | | $V_{CC} = 2.7\text{ V}$ | 1.9 | 4.0 | 5.5 | 1.8 | 7.0 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.8 | 3.4 | 5.0 | 1.8 | 6.3 | ns |
| | | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | 1.3 | 2.6 | 3.8 | 1.3 | 4.8 | ns |
| | | \bar{E} to Z or Yn; see Figure 17 ^[4] | | | | | | |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 1.9 | 4.0 | 7.3 | 1.9 | 9.2 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.4 | 2.5 | 4.4 | 1.4 | 5.5 | ns |
| | | $V_{CC} = 2.7\text{ V}$ | 1.1 | 2.6 | 3.9 | 1.1 | 4.9 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.2 | 2.2 | 3.8 | 1.2 | 4.8 | ns |
| | | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | 1.0 | 1.7 | 2.6 | 1.0 | 3.3 | ns |
| t_{dis} | disable time | S to Z or Yn; see Figure 17 ^[5] | | | | | | |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 2.1 | 6.8 | 10.0 | 2.1 | 12.5 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.4 | 3.7 | 6.1 | 1.4 | 7.7 | ns |
| | | $V_{CC} = 2.7\text{ V}$ | 1.4 | 4.9 | 6.2 | 1.4 | 7.8 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 1.1 | 4.0 | 5.4 | 1.1 | 6.8 | ns |
| | | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | 1.0 | 2.9 | 3.8 | 1.0 | 4.8 | ns |
| | | \bar{E} to Z or Yn; see Figure 17 ^[5] | | | | | | |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 2.3 | 5.6 | 8.6 | 2.3 | 11.0 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.2 | 3.2 | 4.8 | 1.2 | 6.0 | ns |
| | | $V_{CC} = 2.7\text{ V}$ | 1.4 | 4.0 | 5.2 | 1.4 | 6.5 | ns |
| | | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$ | 2.0 | 3.7 | 5.0 | 2.0 | 6.3 | ns |
| | | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | 1.3 | 2.9 | 3.8 | 1.3 | 4.8 | ns |

[1] Typical values are measured at $T_{amb} = 25\text{ °C}$ and nominal V_{CC} .

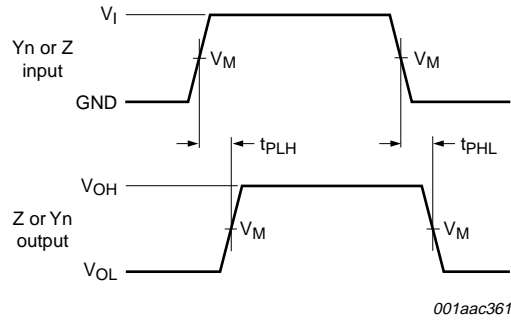
[2] t_{pd} is the same as t_{PLH} and t_{PHL} .

[3] Propagation delay is the calculated RC time constant of the typical ON resistance of the switch and the specified capacitance when driven by an ideal voltage source (zero output impedance).

[4] t_{en} is the same as t_{PZH} and t_{PZL} .

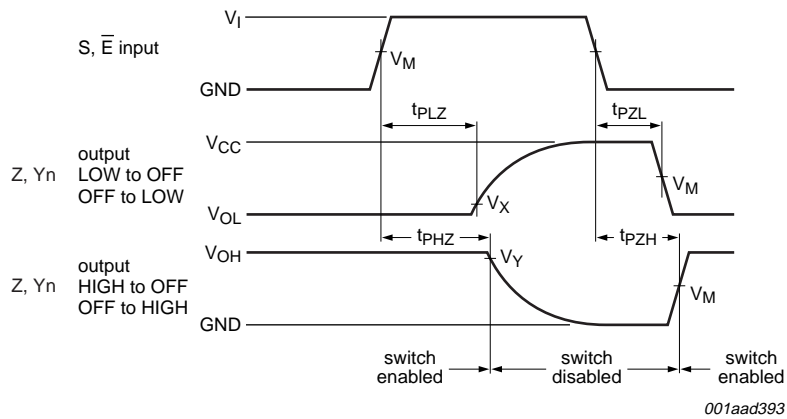
[5] t_{dis} is the same as t_{PLZ} and t_{PHZ} .

11.1 Waveforms and test circuits



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

Fig 16. Input (Yn or Z) to output (Z or Yn) propagation delays

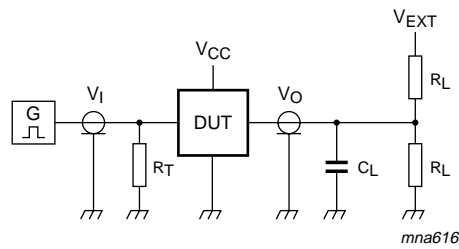


Measurement points are given in [Table 10](#).
 Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig 17. Enable and disable times

Table 10. Measurement points

| Supply voltage | Input | Output | | |
|-----------------|-------------|-------------|-------------------|-------------------|
| V_{CC} | V_M | V_M | V_X | V_Y |
| 1.65 V to 2.7 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.15 V$ | $V_{OH} - 0.15 V$ |
| 2.7 V to 5.5 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3 V$ | $V_{OH} - 0.3 V$ |



Test data is given in [Table 11](#).

Definitions test circuit:

R_T = Termination resistance (should be equal to output impedance Z_o of the pulse generator).

C_L = Load capacitance (including jig and probe capacitance).

R_L = Load resistance.

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

Fig 18. Load circuit for 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} | ≤ 2.0 ns | 30 pF | 1 k Ω | open | GND | $2V_{CC}$ |
| 2.3 V to 2.7 V | V_{CC} | ≤ 2.0 ns | 30 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 2.7 V | V_{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 3 V to 3.6 V | V_{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 4.5 V to 5.5 V | V_{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |

11.2 Additional dynamic characteristics

Table 12. Additional dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); $T_{amb} = 25^\circ C$.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------|---------------------------|---|-----|-------|-----|------|
| THD | total harmonic distortion | $f_i = 600$ Hz to 20 kHz; $R_L = 600$ Ω ; $C_L = 50$ pF; $V_I = 0.5$ V (p-p); see Figure 19 | | | | |
| | | $V_{CC} = 1.65$ V | - | 0.260 | - | % |
| | | $V_{CC} = 2.3$ V | - | 0.078 | - | % |
| | | $V_{CC} = 3.0$ V | - | 0.078 | - | % |
| | | $V_{CC} = 4.5$ V | - | 0.078 | - | % |
| $f_{(-3dB)}$ | -3 dB frequency response | $R_L = 50$ Ω ; $C_L = 5$ pF; see Figure 20 | | | | |
| | | $V_{CC} = 1.65$ V | - | 200 | - | MHz |
| | | $V_{CC} = 2.3$ V | - | 300 | - | MHz |
| | | $V_{CC} = 3.0$ V | - | 300 | - | MHz |
| | | $V_{CC} = 4.5$ V | - | 300 | - | MHz |

Table 12. Additional dynamic characteristics ...continued

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); $T_{amb} = 25^\circ C$.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|-----------------------|--|-----|-----|-----|------|
| α_{iso} | isolation (OFF-state) | $R_L = 50 \Omega$; $C_L = 5 \text{ pF}$; $f_i = 10 \text{ MHz}$; see Figure 21 | | | | |
| | | $V_{CC} = 1.65 \text{ V}$ | - | -42 | - | dB |
| | | $V_{CC} = 2.3 \text{ V}$ | - | -42 | - | dB |
| | | $V_{CC} = 3.0 \text{ V}$ | - | -40 | - | dB |
| | | $V_{CC} = 4.5 \text{ V}$ | - | -40 | - | dB |
| Q_{inj} | charge injection | $C_L = 0.1 \text{ nF}$; $V_{gen} = 0 \text{ V}$; $R_{gen} = 0 \Omega$; $f_i = 1 \text{ MHz}$; $R_L = 1 \text{ M}\Omega$; see Figure 22 | | | | |
| | | $V_{CC} = 1.8 \text{ V}$ | - | 3.3 | - | pC |
| | | $V_{CC} = 2.5 \text{ V}$ | - | 4.1 | - | pC |
| | | $V_{CC} = 3.3 \text{ V}$ | - | 5.0 | - | pC |
| | | $V_{CC} = 4.5 \text{ V}$ | - | 6.4 | - | pC |
| | | $V_{CC} = 5.5 \text{ V}$ | - | 7.5 | - | pC |

11.3 Test circuits

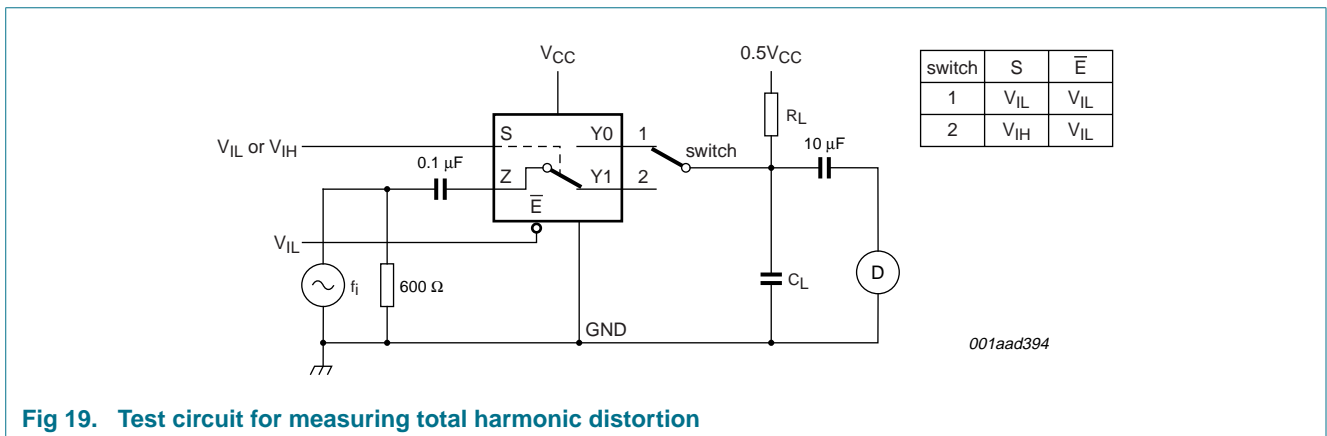


Fig 19. Test circuit for measuring total harmonic distortion

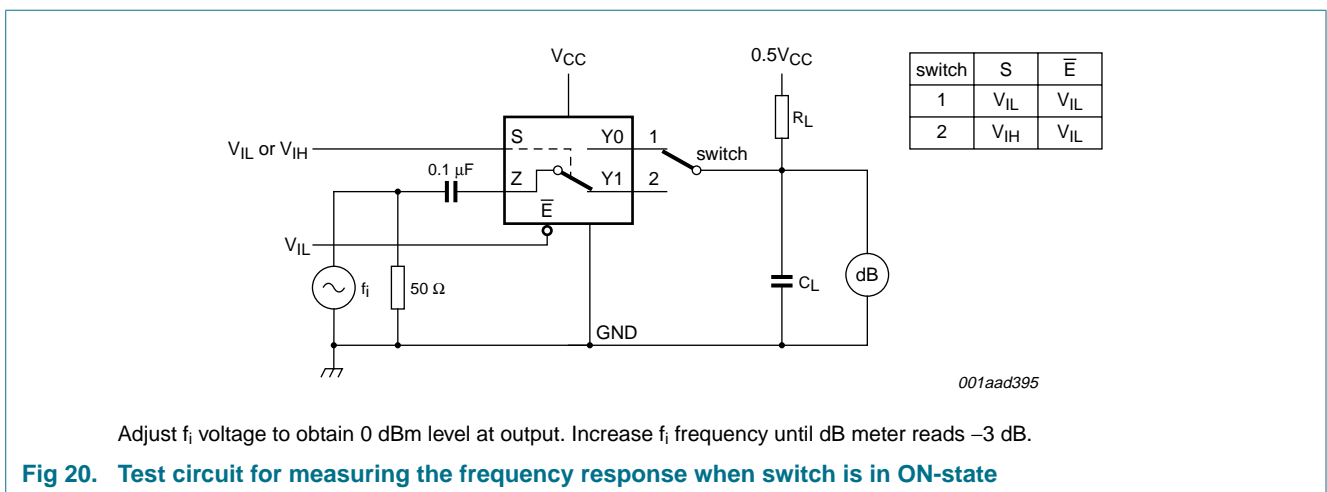
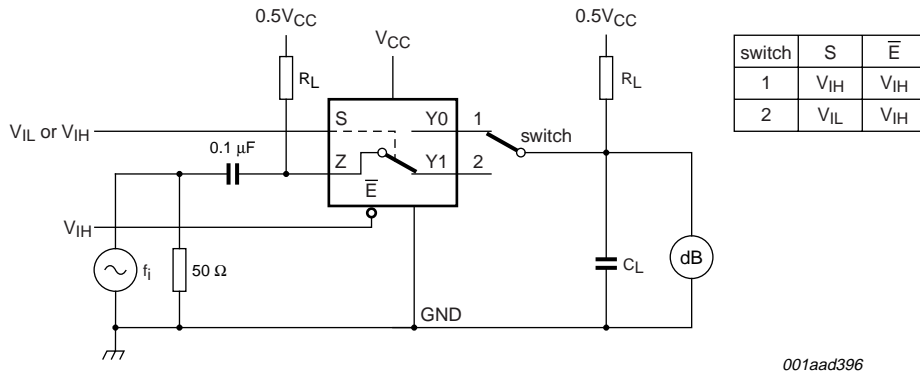
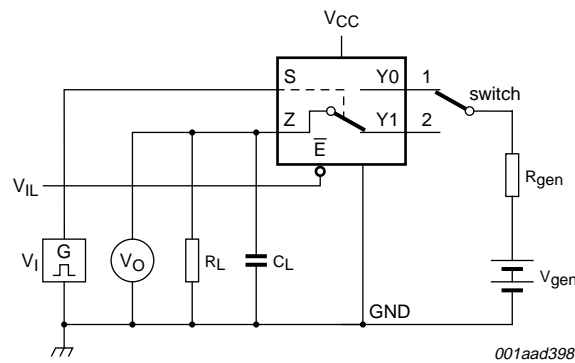


Fig 20. Test circuit for measuring the frequency response when switch is in ON-state

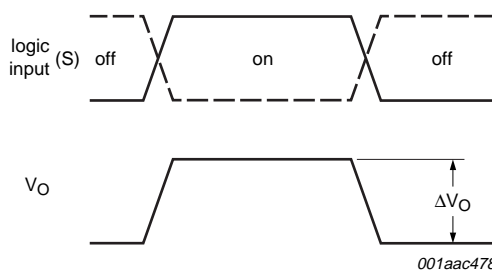


Adjust f_i voltage to obtain 0 dBm level at input.

Fig 21. Test circuit for measuring isolation (OFF-state)



a. Test circuit



b. Input and output pulse definitions

- $Q_{inj} = \Delta V_O \times C_L$.
- ΔV_O = output voltage variation.
- R_{gen} = generator resistance.
- V_{gen} = generator voltage.

Fig 22. Test circuit for measuring charge injection

12. Package outline

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

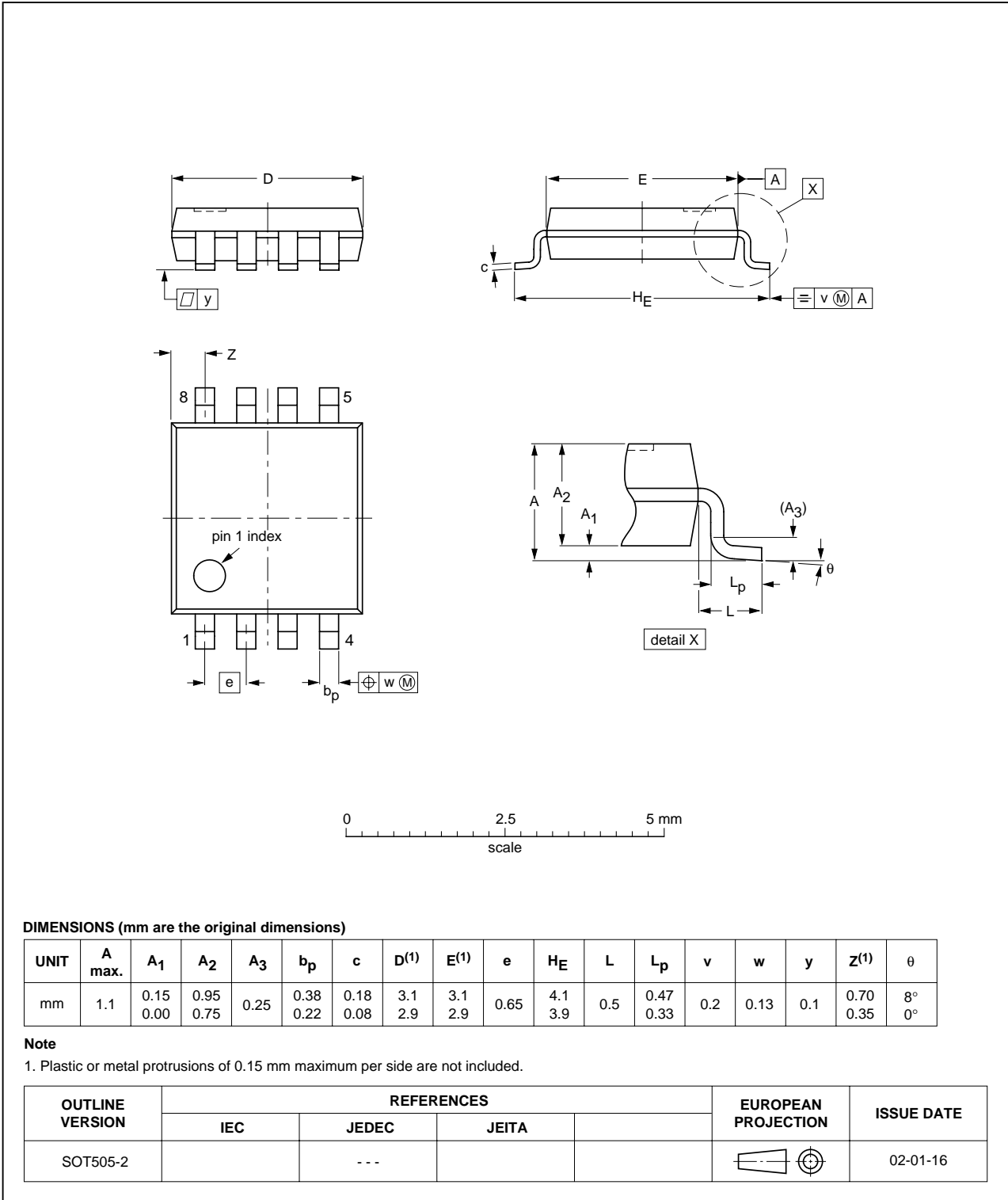


Fig 23. Package outline SOT505-2 (TSSOP8)

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

SOT765-1

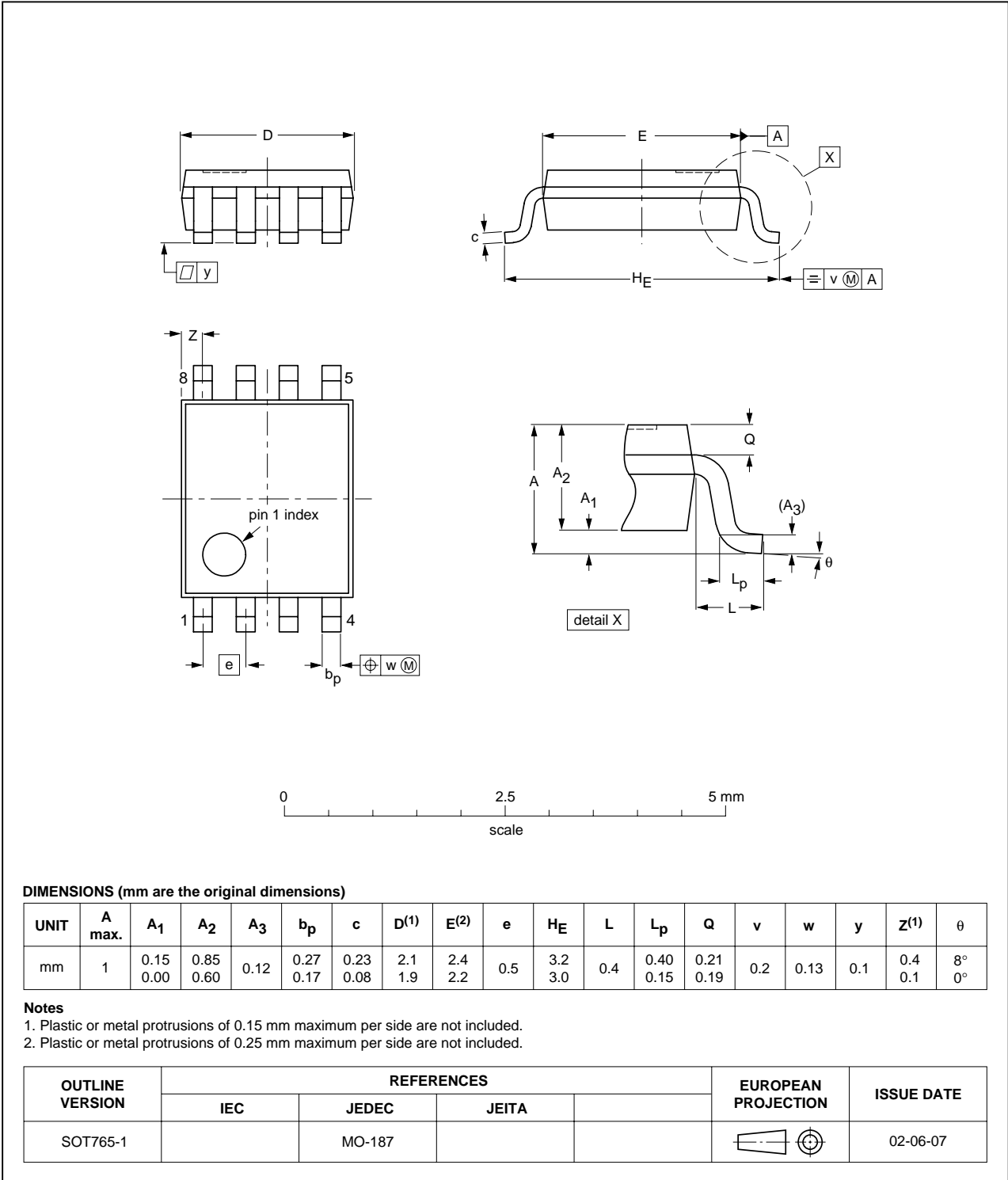


Fig 24. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

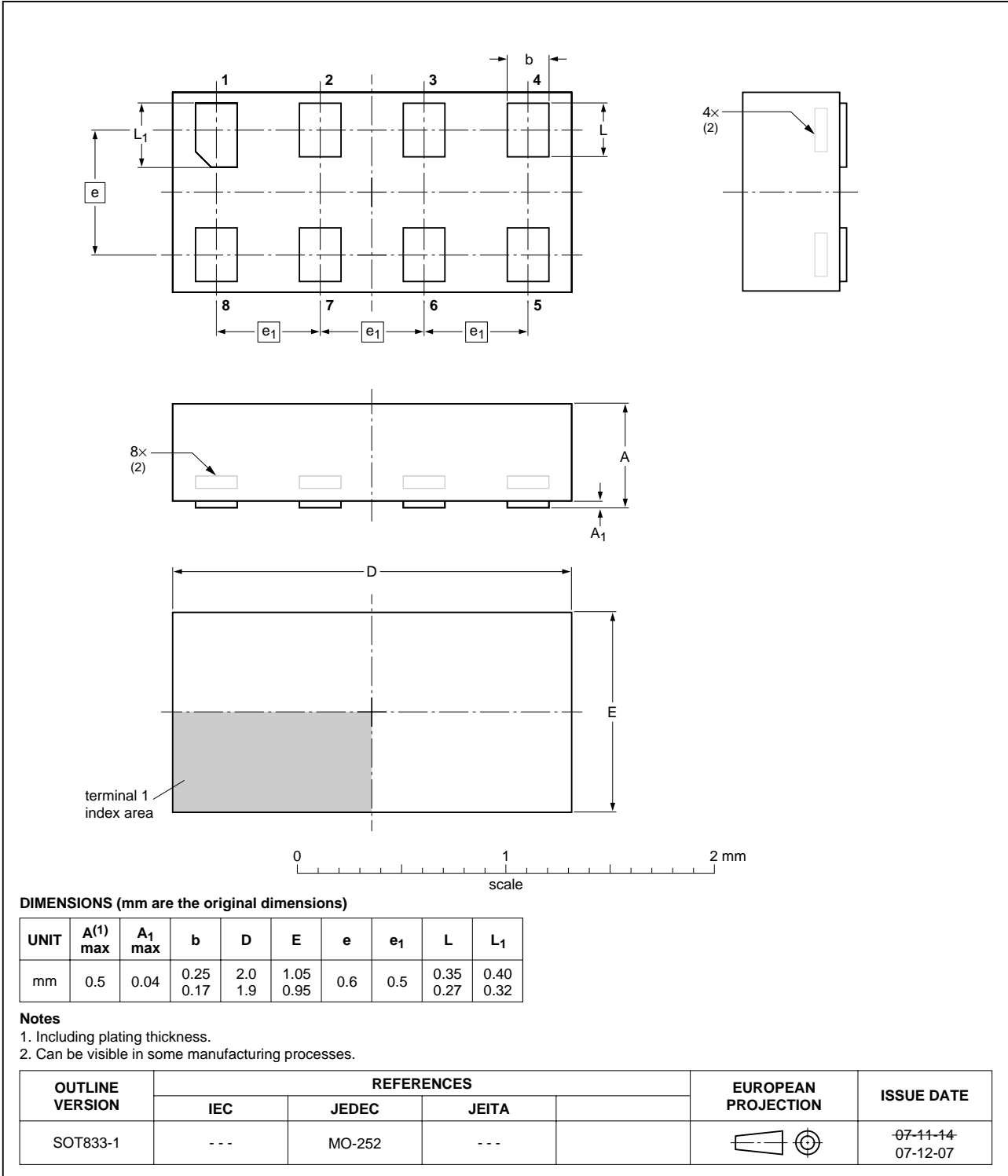


Fig 25. Package outline SOT833-1 (XSON8)

XSON8U: plastic extremely thin small outline package; no leads;
8 terminals; UTLP based; body 3 x 2 x 0.5 mm

SOT996-2

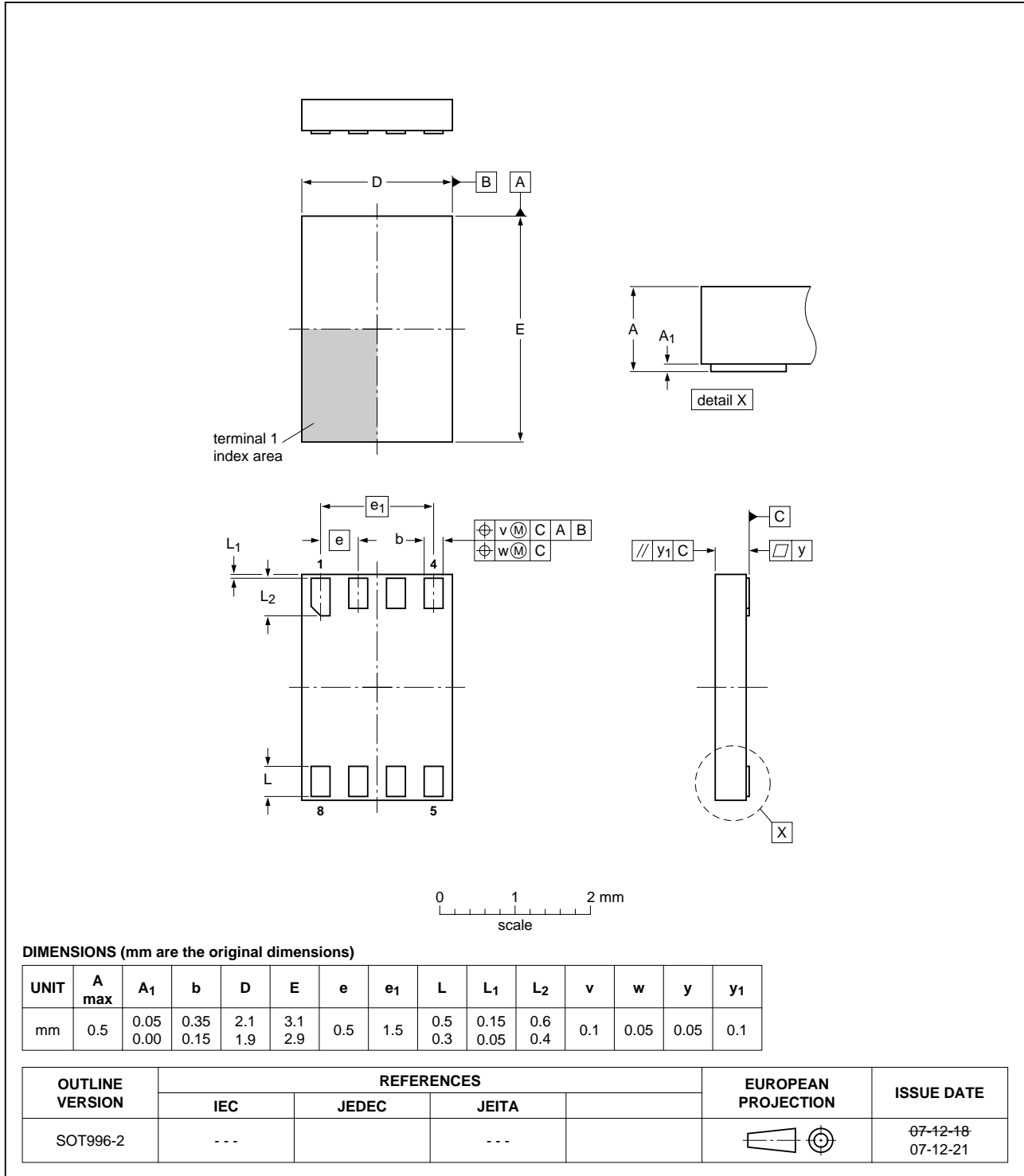


Fig 26. Package outline SOT996-2 (XSON8U)

XQFN8U: plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 x 1.6 x 0.5 mm

SOT902-1

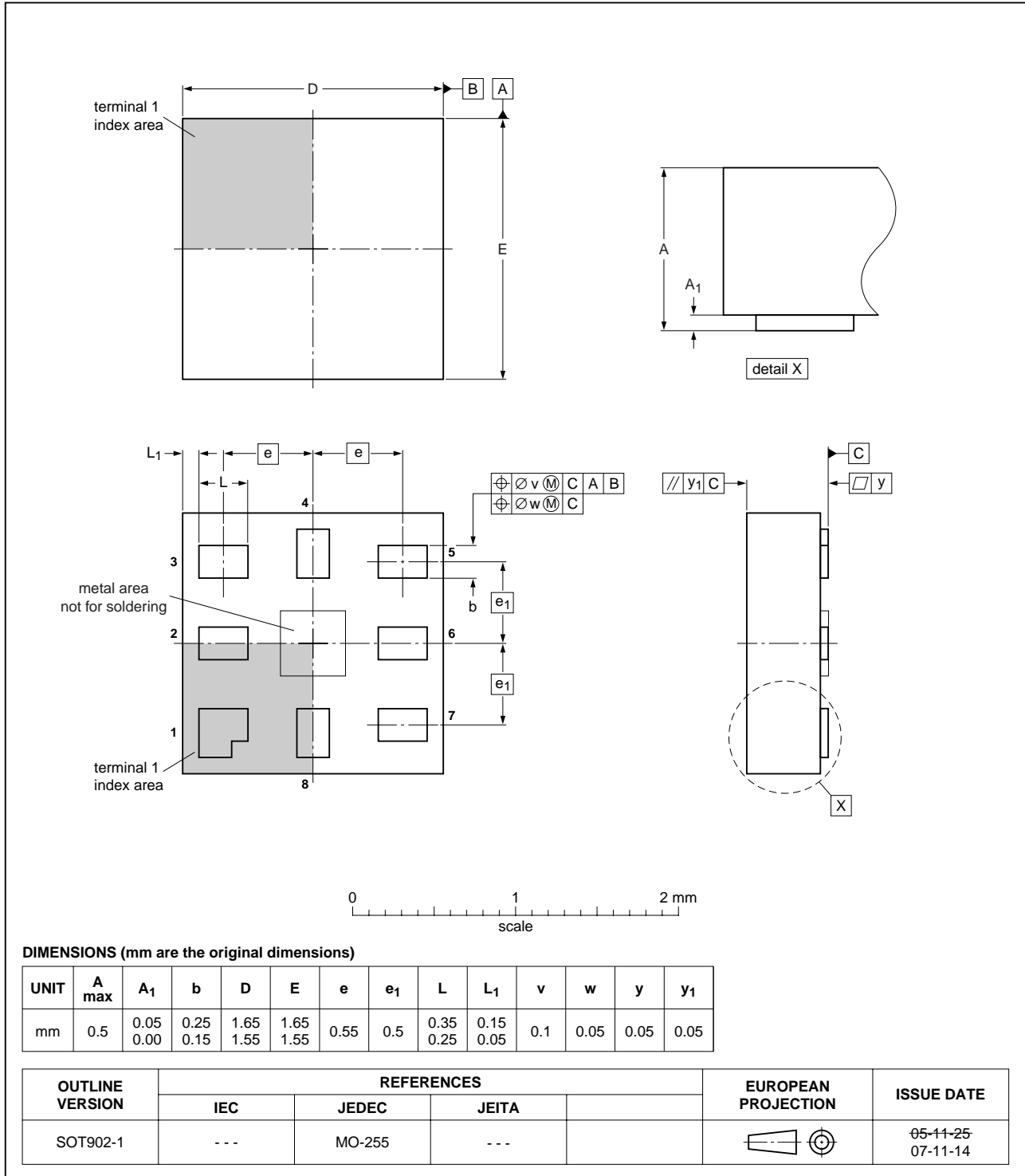


Fig 27. Package outline SOT902-1 (XQFN8U)

13. Abbreviations

Table 13. Abbreviations

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

14. Revision history

Table 14. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|--------------------|---------------|-------------|
| 74LVC1G53_5 | 20080611 | Product data sheet | - | 74LVC1G53_4 |
| Modifications: | <ul style="list-style-type: none"> Added type number 74LVC1G53GD (XSON8U / SOT996-2 package) | | | |
| 74LVC1G53_4 | 20080303 | Product data sheet | - | 74LVC1G53_3 |
| 74LVC1G53_3 | 20070829 | Product data sheet | - | 74LVC1G53_2 |
| 74LVC1G53_2 | 20060410 | Product data sheet | - | 74LVC1G53_1 |
| 74LVC1G53_1 | 20060110 | Product data sheet | - | - |

15. Legal information

15.1 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>.

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