

NX3L4051-Q100

Single low-ohmic 8-channel analog switch

Rev. 1 — 7 August 2012

Product data sheet

1. General description

The NX3L4051-Q100 is a low-ohmic 8-channel analog switch, suitable for use as an analog or digital multiplexer/demultiplexer. The NX3L4051-Q100 has three digital select inputs (S1 to S3), eight independent inputs/outputs (Y0 to Y7) and a common input/output (Z). All eight switches share an enable input (\bar{E}). A HIGH on \bar{E} causes all switches into the high impedance OFF-state, independent of Sn.

Schmitt trigger action at the digital inputs makes the circuit tolerant to slower input rise and fall times. Low threshold digital inputs allows this device to be driven by 1.8 V logic levels in 3.3 V applications without significant increase in supply current I_{CC} . This makes it possible for the NX3L4051-Q100 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The NX3L4051-Q100 allows signals with amplitude up to V_{CC} to be transmitted from Z to Yn or from Yn to Z. The low ON resistance (0.5 Ω) and flatness (0.13 Ω), ensures minimal attenuation and distortion of transmitted signals.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - ◆ Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$
- Wide supply voltage range from 1.4 V to 4.3 V
- Very low ON resistance (peak):
 - ◆ 1.7 Ω (typical) at $V_{CC} = 1.4\text{ V}$
 - ◆ 1.0 Ω (typical) at $V_{CC} = 1.65\text{ V}$
 - ◆ 0.6 Ω (typical) at $V_{CC} = 2.3\text{ V}$
 - ◆ 0.5 Ω (typical) at $V_{CC} = 2.7\text{ V}$
 - ◆ 0.5 Ω (typical) at $V_{CC} = 4.3\text{ V}$
- Break-before-make switching
- High noise immunity
- ESD protection:
 - ◆ MIL-STD-883, method 3015 Class 3A exceeds 7500 V
 - ◆ HBM JESD22-A114F Class 3A exceeds 7500 V
 - ◆ MM JESD22-A115-A exceeds 200 V ($C = 200\text{ pF}$, $R = 0\text{ }\Omega$)
 - ◆ CDM AEC-Q100-011 revision B exceeds 1000 V
 - ◆ IEC61000-4-2 contact discharge exceeds 8000 V for switch ports
- CMOS low-power consumption



- Latch-up performance exceeds 100 mA per JESD 78B Class II Level A
- 1.8 V control logic at $V_{CC} = 3.6$ V
- Control input accepts voltages above supply voltage
- Very low supply current, even when input is below V_{CC}
- High current handling capability (350 mA continuous current under 3.3 V supply)

3. Applications

- Cell phone
- PDA
- Portable media player
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

4. Ordering information

Table 1. Ordering information

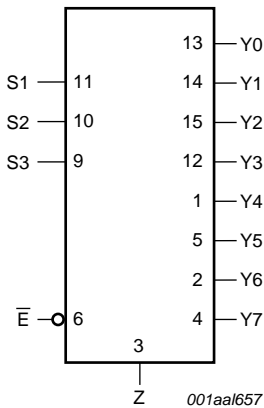
| Type number | Package | | | |
|-----------------|-------------------|---------|--|-----------|
| | Temperature range | Name | Description | Version |
| NX3L4051HR-Q100 | -40 °C to +125 °C | HXQFN16 | plastic thermal enhanced extremely thin quad flat package; no leads; 16 terminals; body 3 × 3 × 0.5 mm | SOT1039-2 |
| NX3L4051PW-Q100 | -40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |

5. Marking

Table 2. Marking codes

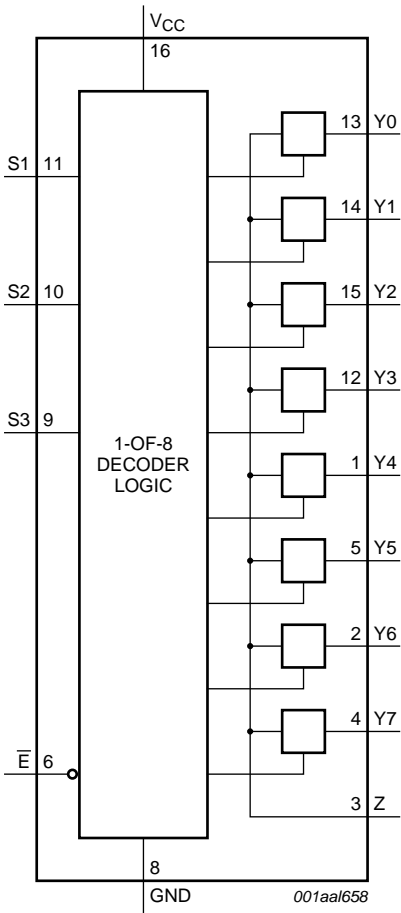
| Type number | Marking code |
|-----------------|--------------|
| NX3L4051HR-Q100 | M41 |
| NX3L4051PW-Q100 | X3L4051 |

6. Functional diagram



Pin numbers are shown for TSSOP16 package only.

Fig 1. Logic symbol



Pin numbers are shown for TSSOP16 package only.

Fig 2. Functional diagram

7. Pinning information

7.1 Pinning

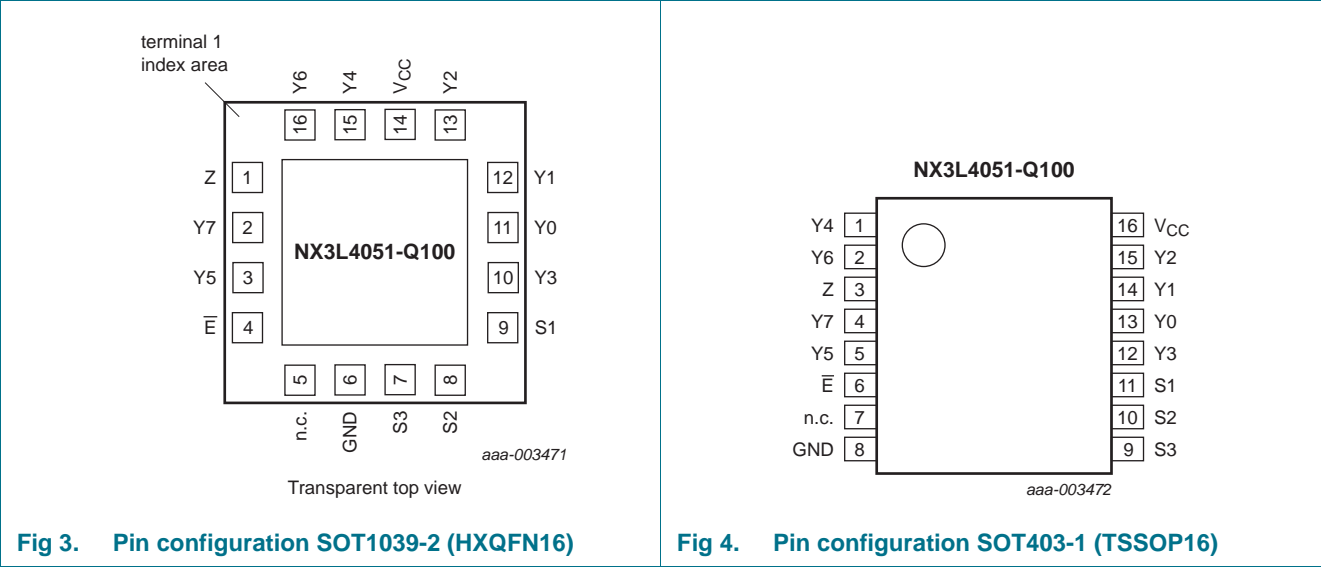


Fig 3. Pin configuration SOT1039-2 (HXQFN16)

Fig 4. Pin configuration SOT403-1 (TSSOP16)

7.2 Pin description

Table 3. Pin description

| Symbol | Pin | | Description |
|--------------------------------|------------------------------|----------------------------|-----------------------------|
| | SOT1039-2 | SOT403-1 | |
| Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7 | 11, 12, 13, 10, 15, 3, 16, 2 | 13, 14, 15, 12, 1, 5, 2, 4 | independent input or output |
| Z | 1 | 3 | independent output or input |
| E | 4 | 6 | enable input (active LOW) |
| n.c. | 5 | 7 | not connected |
| GND | 6 | 8 | ground (0 V) |
| S1, S2, S3 | 9, 8, 7 | 11, 10, 9 | select input |
| VCC | 14 | 16 | supply voltage |

8. Functional description

Table 4. Function table^[1]

| Input | | | | Channel ON |
|----------------|----|----|----|--------------|
| \overline{E} | S3 | S2 | S1 | |
| L | L | L | L | Y0 = Z |
| L | L | L | H | Y1 = Z |
| L | L | H | L | Y2 = Z |
| L | L | H | H | Y3 = Z |
| L | H | L | L | Y4 = Z |
| L | H | L | H | Y5 = Z |
| L | H | H | L | Y6 = Z |
| L | H | H | H | Y7 = Z |
| H | X | X | X | switches off |

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

9. 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 | +4.6 | V |
| V_I | input voltage | S_n and \overline{E} | ^[1] -0.5 | +4.6 | V |
| V_{SW} | switch voltage | | ^[2] -0.5 | $V_{CC} + 0.5$ | V |
| I_{IK} | input clamping current | $V_I < -0.5$ V | -50 | - | mA |
| I_{SK} | switch clamping current | $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V | - | ±50 | mA |
| I_{SW} | switch current | $V_{SW} > -0.5$ V or $V_{SW} < V_{CC} + 0.5$ V; source or sink current | - | ±350 | mA |
| | | $V_{SW} > -0.5$ V or $V_{SW} < V_{CC} + 0.5$ V; pulsed at 1 ms duration, < 10 % duty cycle; peak current | - | ±500 | mA |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| P_{tot} | total power dissipation | $T_{amb} = -40$ °C to +125 °C | | | |
| | | HXQFN16 | ^[3] - | 250 | mW |
| | | TSSOP16 | ^[4] - | 500 | 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 but may not exceed 4.6 V.

[3] For HXQFN16 package: above 135 °C the value of P_{tot} derates linearly with 16.9 mW/K.

[4] For TSSOP16 package: above 60 °C the value of P_{tot} derates linearly with 5.5 mW/K.

10. Recommended operating conditions

Table 6. Recommended operating conditions

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---------------------|-------------------------------------|--|-------|----------|------|
| V_{CC} | supply voltage | | 1.4 | 4.3 | V |
| V_I | input voltage | Sn and \bar{E} | 0 | 4.3 | V |
| V_{SW} | switch voltage | | [1] 0 | V_{CC} | V |
| T_{amb} | ambient temperature | | -40 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | Sn and \bar{E} ; $V_{CC} = 1.4\text{ V to }4.3\text{ V}$ | - | 200 | 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 flows from terminal Yn. In this case, there is no limit for the voltage drop across the switch.

11. Static characteristics

Table 7. Static characteristics

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

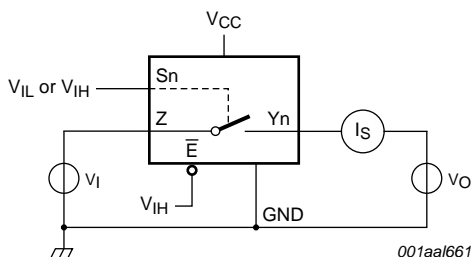
| Symbol | Parameter | Conditions | $T_{amb} = 25\text{ °C}$ | | | $T_{amb} = -40\text{ °C to }+125\text{ °C}$ | | | Unit |
|--------------|---------------------------|---|--------------------------|-----|----------|---|-------------|--------------|---------------|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | 0.9 | - | - | 0.9 | - | - | V |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 0.9 | - | - | 0.9 | - | - | V |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 1.1 | - | - | 1.1 | - | - | V |
| | | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$ | 1.3 | - | - | 1.3 | - | - | V |
| | | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$ | 1.4 | - | - | 1.4 | - | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | - | 0.3 | - | 0.3 | 0.3 | V |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | - | 0.4 | - | 0.4 | 0.3 | V |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | - | 0.4 | - | 0.4 | 0.4 | V |
| | | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$ | - | - | 0.5 | - | 0.5 | 0.5 | V |
| | | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$ | - | - | 0.6 | - | 0.6 | 0.6 | V |
| I_I | input leakage current | Sn and \bar{E} ; $V_I = \text{GND to }4.3\text{ V}$; $V_{CC} = 1.4\text{ V to }4.3\text{ V}$ | - | - | - | - | ± 0.5 | ± 1 | μA |
| $I_{S(OFF)}$ | OFF-state leakage current | Yn ports; see Figure 5 | | | | | | | |
| | | $V_{CC} = 1.4\text{ V to }3.6\text{ V}$ | - | - | ± 5 | - | ± 50 | ± 500 | nA |
| | | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$ | - | - | ± 10 | - | ± 50 | ± 500 | nA |
| $I_{S(ON)}$ | ON-state leakage current | Z port; $V_{CC} = 1.4\text{ V to }3.6\text{ V}$; see Figure 6 | | | | | | | |
| | | $V_{CC} = 1.4\text{ V to }3.6\text{ V}$ | - | - | ± 20 | - | ± 200 | ± 2000 | nA |
| | | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$ | - | - | ± 40 | - | ± 200 | ± 2000 | nA |
| I_{CC} | supply current | $V_I = V_{CC}\text{ or GND}$; $V_{SW} = \text{GND or }V_{CC}$ | | | | | | | |
| | | $V_{CC} = 3.6\text{ V}$ | - | - | 100 | - | 500 | 5000 | nA |
| | | $V_{CC} = 4.3\text{ V}$ | - | - | 150 | - | 800 | 6000 | nA |

Table 7. Static characteristics ...continued

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

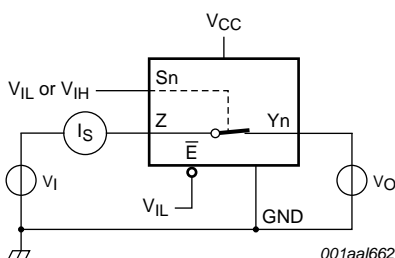
| Symbol | Parameter | Conditions | T _{amb} = 25 °C | | | T _{amb} = -40 °C to +125 °C | | | Unit |
|---------------------|---------------------------|---|--------------------------|------|------|--------------------------------------|-------------|--------------|------|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| ΔI _{CC} | additional supply current | V _{SW} = GND or V _{CC} | | | | | | | |
| | | V _I = 2.6 V; V _{CC} = 4.3 V | - | 2.0 | 4.0 | - | 7 | 7 | μA |
| | | V _I = 2.6 V; V _{CC} = 3.6 V | - | 0.35 | 0.7 | - | 1 | 1 | μA |
| | | V _I = 1.8 V; V _{CC} = 4.3 V | - | 7.0 | 10.0 | - | 15 | 15 | μA |
| | | V _I = 1.8 V; V _{CC} = 3.6 V | - | 2.5 | 4.0 | - | 5 | 5 | μA |
| | | V _I = 1.8 V; V _{CC} = 2.5 V | - | 50 | 200 | - | 300 | 500 | nA |
| C _I | input capacitance | S _n and \bar{E} | - | 1.0 | - | - | - | - | pF |
| C _{S(OFF)} | OFF-state capacitance | | - | 35 | - | - | - | - | pF |
| C _{S(ON)} | ON-state capacitance | | - | 350 | - | - | - | - | pF |

11.1 Test circuits



V_I = 0.3 V or V_{CC} - 0.3 V; V_O = V_{CC} - 0.3 V or 0.3 V.

Fig 5. Test circuit for measuring OFF-state leakage current



V_I = 0.3 V or V_{CC} - 0.3 V; V_O = V_{CC} - 0.3 V or 0.3 V.

Fig 6. Test circuit for measuring ON-state leakage current

11.2 ON resistance

Table 8. ON resistance^[1]

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for graphs see [Figure 8](#) to [Figure 14](#).

| Symbol | Parameter | Conditions | T _{amb} = –40 °C to +85 °C | | | T _{amb} = –40 °C to +125 °C | | Unit |
|-----------------------|---|---|-------------------------------------|--------------------|------|--------------------------------------|------|------|
| | | | Min | Typ ^[2] | Max | Min | Max | |
| R _{ON(peak)} | ON resistance (peak) | V _I = GND to V _{CC} ; I _{SW} = 100 mA; see Figure 7 | | | | | | |
| | | V _{CC} = 1.4 V | - | 1.7 | 3.7 | - | 4.1 | Ω |
| | | V _{CC} = 1.65 V | - | 1.0 | 1.6 | - | 1.7 | Ω |
| | | V _{CC} = 2.3 V | - | 0.6 | 0.8 | - | 0.9 | Ω |
| | | V _{CC} = 2.7 V | - | 0.5 | 0.75 | - | 0.9 | Ω |
| | | V _{CC} = 4.3 V | - | 0.5 | 0.75 | - | 0.9 | Ω |
| ΔR _{ON} | ON resistance mismatch between channels | V _I = GND to V _{CC} ; I _{SW} = 100 mA [3] | | | | | | |
| | | V _{CC} = 1.4 V; V _{SW} = 0.4 V | - | 0.18 | 0.30 | - | 0.30 | Ω |
| | | V _{CC} = 1.65 V; V _{SW} = 0.5 V | - | 0.18 | 0.20 | - | 0.30 | Ω |
| | | V _{CC} = 2.3 V; V _{SW} = 0.7 V | - | 0.07 | 0.10 | - | 0.13 | Ω |
| | | V _{CC} = 2.7 V; V _{SW} = 0.8 V | - | 0.07 | 0.10 | - | 0.13 | Ω |
| | | V _{CC} = 4.3 V; V _{SW} = 0.8 V | - | 0.07 | 0.10 | - | 0.13 | Ω |
| R _{ON(flat)} | ON resistance (flatness) | V _I = GND to V _{CC} ; I _{SW} = 100 mA [4] | | | | | | |
| | | V _{CC} = 1.4 V | - | 1.0 | 3.3 | - | 3.6 | Ω |
| | | V _{CC} = 1.65 V | - | 0.5 | 1.2 | - | 1.3 | Ω |
| | | V _{CC} = 2.3 V | - | 0.15 | 0.3 | - | 0.35 | Ω |
| | | V _{CC} = 2.7 V | - | 0.13 | 0.3 | - | 0.35 | Ω |
| | | V _{CC} = 4.3 V | - | 0.2 | 0.4 | - | 0.45 | Ω |

[1] For NX3L4051PW-Q100 (TSSOP16 package), all ON resistance values are up to 0.05 Ω higher.

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

[3] Measured at identical V_{CC}, temperature and input voltage.

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

11.3 ON resistance test circuit and graphs

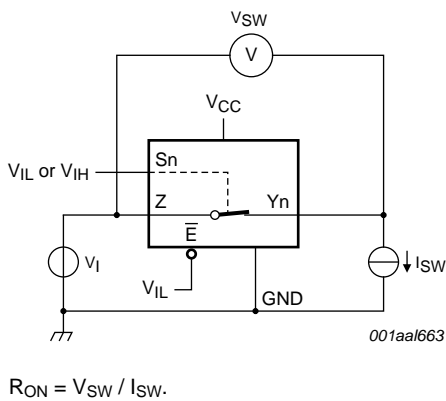
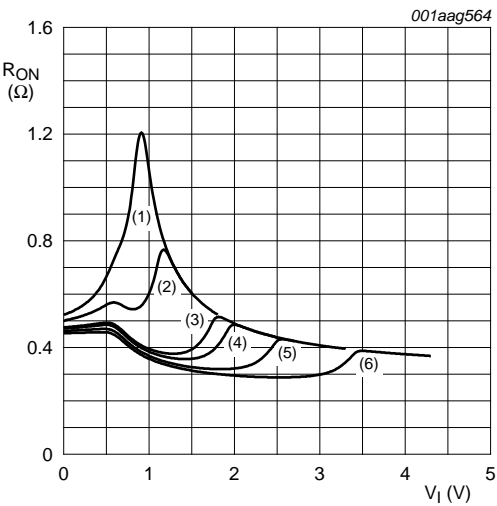
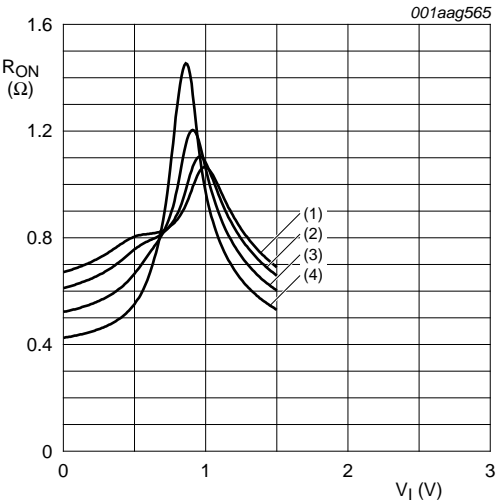


Fig 7. Test circuit for measuring ON resistance



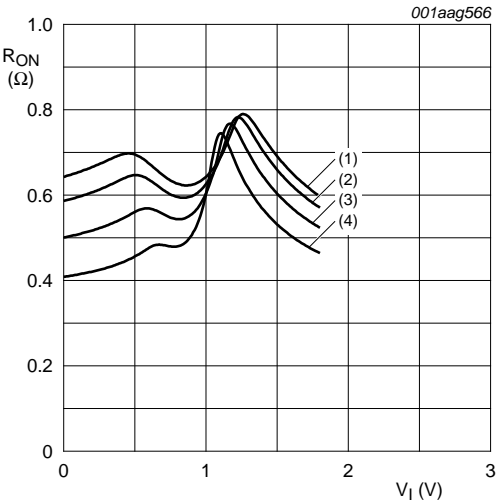
- (1) $V_{CC} = 1.5\text{ V}$.
 - (2) $V_{CC} = 1.8\text{ V}$.
 - (3) $V_{CC} = 2.5\text{ V}$.
 - (4) $V_{CC} = 2.7\text{ V}$.
 - (5) $V_{CC} = 3.3\text{ V}$.
 - (6) $V_{CC} = 4.3\text{ V}$.
- Measured at $T_{amb} = 25\text{ }^{\circ}\text{C}$.

Fig 8. Typical ON resistance as a function of input voltage



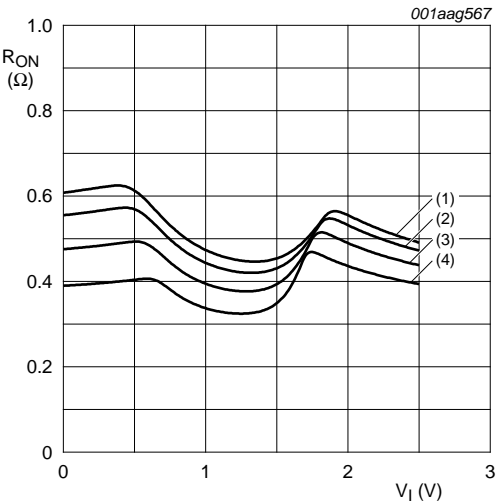
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 9. ON resistance as a function of input voltage;
 $V_{CC} = 1.5\text{ V}$



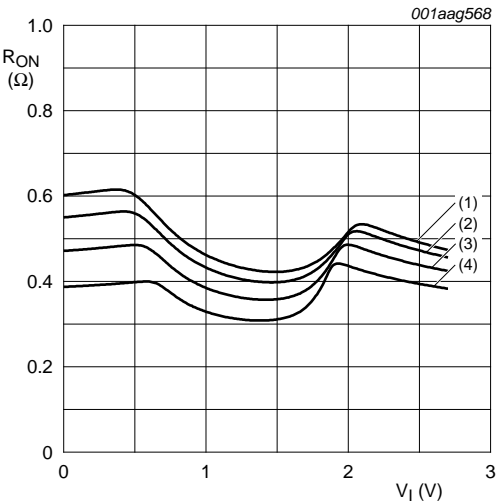
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 10. ON resistance as a function of input voltage;
 $V_{CC} = 1.8\text{ V}$



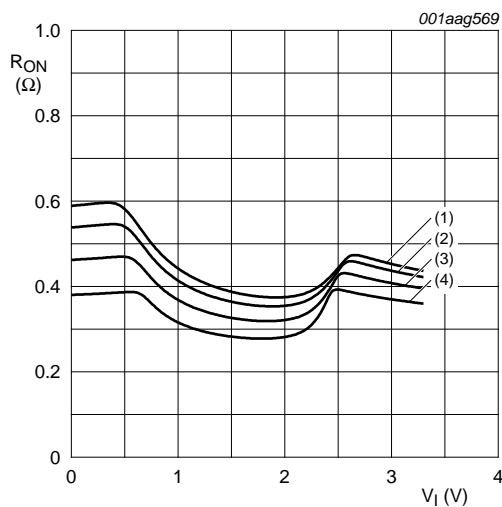
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 11. ON resistance as a function of input voltage;
 $V_{CC} = 2.5\text{ V}$



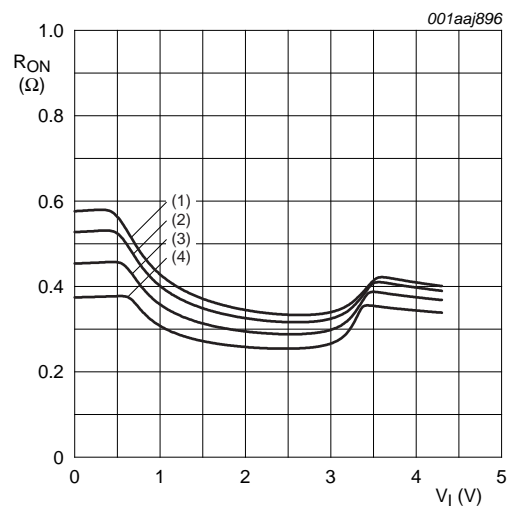
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4) $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 12. ON resistance as a function of input voltage;
 $V_{CC} = 2.7\text{ V}$



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

Fig 13. ON resistance as a function of input voltage;
 $V_{CC} = 3.3\text{ V}$



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

Fig 14. ON resistance as a function of input voltage;
 $V_{CC} = 4.3\text{ V}$

12. Dynamic characteristics

Table 9. Dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see [Figure 17](#).

| Symbol | Parameter | Conditions | $T_{amb} = 25\text{ °C}$ | | | $T_{amb} = -40\text{ °C to }+125\text{ °C}$ | | | Unit |
|-----------|--------------|---|--------------------------|--------------------|-----|---|-------------|--------------|------|
| | | | Min | Typ ^[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| t_{en} | enable time | \bar{E} , Sn to Z or Yn; see Figure 15 | | | | | | | |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | 45 | 100 | - | 120 | 125 | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | 32 | 75 | - | 85 | 95 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | 21 | 50 | - | 55 | 60 | ns |
| | | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$ | - | 19 | 45 | - | 45 | 50 | ns |
| | | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$ | - | 19 | 45 | - | 45 | 50 | ns |
| t_{dis} | disable time | \bar{E} , Sn to Z or Yn; see Figure 15 | | | | | | | |
| | | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$ | - | 25 | 80 | - | 90 | 105 | ns |
| | | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | - | 15 | 65 | - | 70 | 75 | ns |
| | | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | - | 9 | 30 | - | 35 | 40 | ns |
| | | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$ | - | 8 | 25 | - | 30 | 35 | ns |
| | | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$ | - | 8 | 25 | - | 30 | 35 | ns |

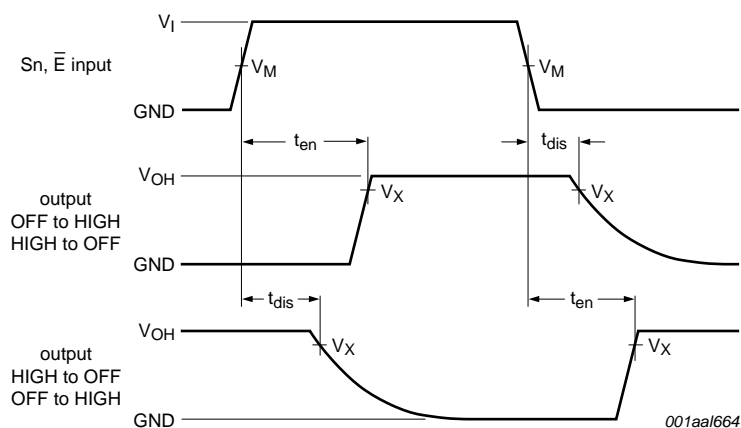
Table 9. Dynamic characteristics ...continuedAt recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see [Figure 17](#).

| Symbol | Parameter | Conditions | T _{amb} = 25 °C | | | T _{amb} = -40 °C to +125 °C | | | Unit |
|------------------|------------------------|--|--------------------------|--------------------|-----|--------------------------------------|-------------|--------------|------|
| | | | Min | Typ ^[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| t _{b-m} | break-before-make time | see Figure 16 ^[2] | | | | | | | |
| | | V _{CC} = 1.4 V to 1.6 V | - | 19 | - | 9 | - | - | ns |
| | | V _{CC} = 1.65 V to 1.95 V | - | 17 | - | 7 | - | - | ns |
| | | V _{CC} = 2.3 V to 2.7 V | - | 12 | - | 4 | - | - | ns |
| | | V _{CC} = 2.7 V to 3.6 V | - | 10 | - | 3 | - | - | ns |
| | | V _{CC} = 3.6 V to 4.3 V | - | 9 | - | 2 | - | - | ns |

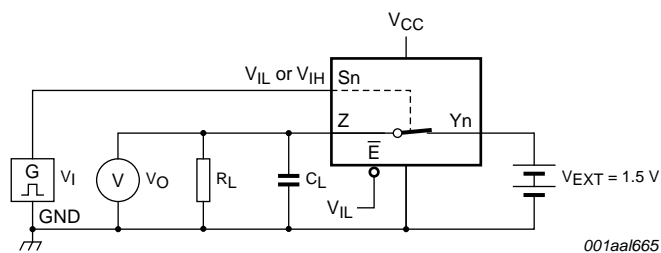
[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 1.5 V, 1.8 V, 2.5 V, 3.3 V and 4.3 V respectively.

[2] Break-before-make guaranteed by design.

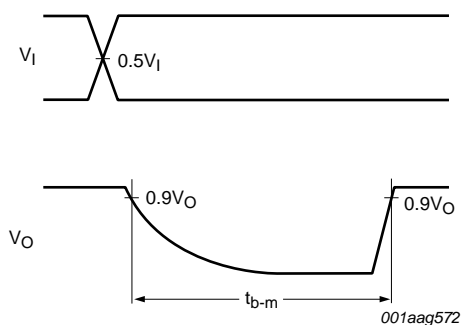
12.1 Waveform and test circuits

Measurement points are given in [Table 10](#).Logic level: V_{OH} is typical output voltage level that occurs with the output load.**Fig 15. Enable and disable times****Table 10. Measurement points**

| Supply voltage | Input | Output |
|-----------------|--------------------|--------------------|
| V _{CC} | V _M | V _X |
| 1.4 V to 4.3 V | 0.5V _{CC} | 0.9V _{OH} |

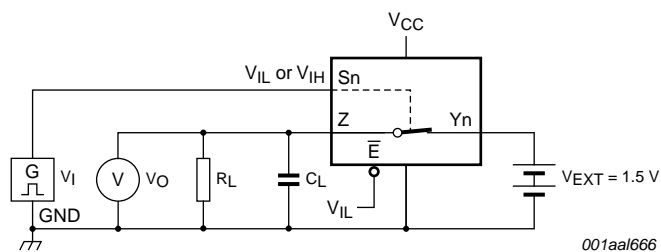


a. Test circuit



b. Input and output measurement points

Fig 16. Test circuit for measuring break-before-make timing



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

Definitions test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

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

V_I may be connected to S_n or \bar{E} .

Fig 17. Test circuit for measuring switching times

Table 11. Test data

| Supply voltage | Input | | Load | |
|-----------------|-----------------|---------------------------------|----------------|----------------|
| V _{CC} | V _I | t _r , t _f | C _L | R _L |
| 1.4 V to 4.3 V | V _{CC} | ≤ 2.5 ns | 35 pF | 50 Ω |

12.2 Additional dynamic characteristics

Table 12. Additional dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); $V_I = \text{GND}$ or V_{CC} (unless otherwise specified); $t_r = t_f \leq 2.5 \text{ ns}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|---------------------------|---|-----|------|-----|------|
| THD | total harmonic distortion | $f_i = 20 \text{ Hz to } 20 \text{ kHz}$; $R_L = 32 \text{ } \Omega$; see Figure 18 | [1] | | | |
| | | $V_{CC} = 1.4 \text{ V}$; $V_I = 1 \text{ V (p-p)}$ | - | 0.15 | - | % |
| | | $V_{CC} = 1.65 \text{ V}$; $V_I = 1.2 \text{ V (p-p)}$ | - | 0.10 | - | % |
| | | $V_{CC} = 2.3 \text{ V}$; $V_I = 1.5 \text{ V (p-p)}$ | - | 0.02 | - | % |
| | | $V_{CC} = 2.7 \text{ V}$; $V_I = 2 \text{ V (p-p)}$ | - | 0.02 | - | % |
| $f_{(-3\text{dB})}$ | –3 dB frequency response | $R_L = 50 \text{ } \Omega$; see Figure 19 | [1] | | | |
| | | $V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$ | - | 15 | - | MHz |
| α_{iso} | isolation (OFF-state) | $f_i = 100 \text{ kHz}$; $R_L = 50 \text{ } \Omega$; see Figure 20 | [1] | | | |
| | | $V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$ | - | –90 | - | dB |
| V_{ct} | crosstalk voltage | between digital inputs and switch; $f_i = 1 \text{ MHz}$; $C_L = 50 \text{ pF}$; $R_L = 50 \text{ } \Omega$; see Figure 21 | | | | |
| | | $V_{CC} = 1.4 \text{ V to } 3.6 \text{ V}$ | - | 0.2 | - | V |
| | | $V_{CC} = 3.6 \text{ V to } 4.3 \text{ V}$ | - | 0.3 | - | V |
| Xtalk | crosstalk | between switches; $f_i = 100 \text{ kHz}$; $R_L = 50 \text{ } \Omega$; see Figure 22 | [1] | | | |
| | | $V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$ | - | –90 | - | dB |
| Q_{inj} | charge injection | $f_i = 1 \text{ MHz}$; $C_L = 0.1 \text{ nF}$; $R_L = 1 \text{ M}\Omega$; $V_{\text{gen}} = 0 \text{ V}$; $R_{\text{gen}} = 0 \text{ } \Omega$; see Figure 23 | | | | |
| | | $V_{CC} = 1.5 \text{ V}$ | - | 3 | - | pC |
| | | $V_{CC} = 1.8 \text{ V}$ | - | 4 | - | pC |
| | | $V_{CC} = 2.5 \text{ V}$ | - | 6 | - | pC |
| | | $V_{CC} = 3.3 \text{ V}$ | - | 9 | - | pC |
| | | $V_{CC} = 4.3 \text{ V}$ | - | 15 | - | pC |

[1] f_i is biased at $0.5V_{CC}$.

12.3 Test circuits

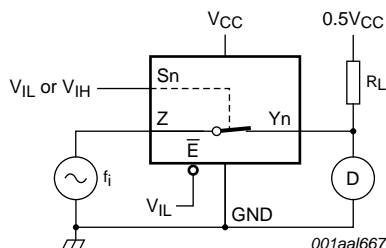
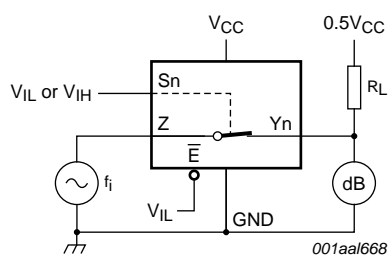
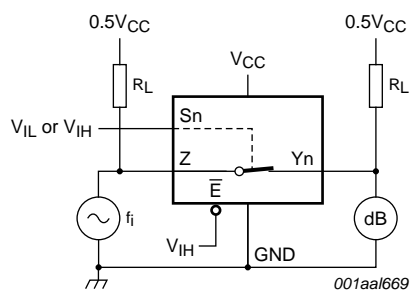


Fig 18. Test circuit for measuring total harmonic distortion



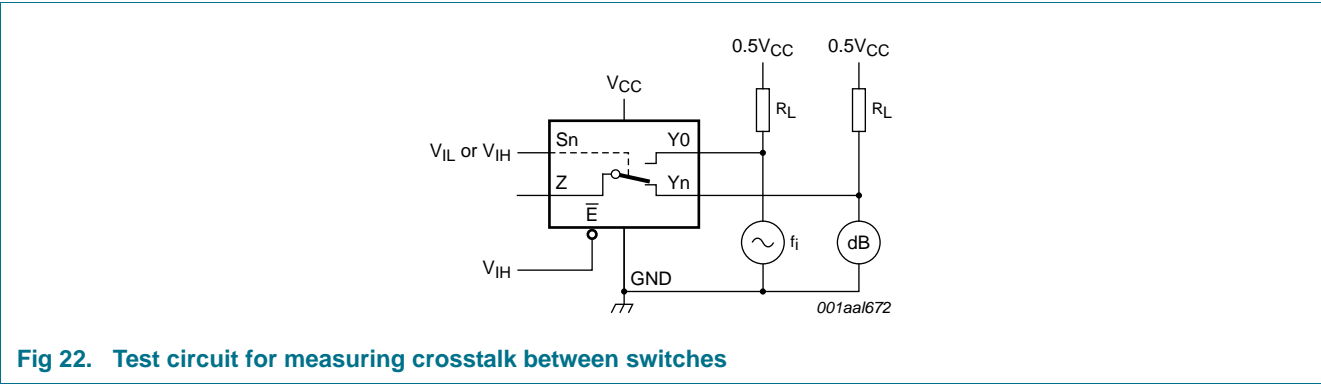
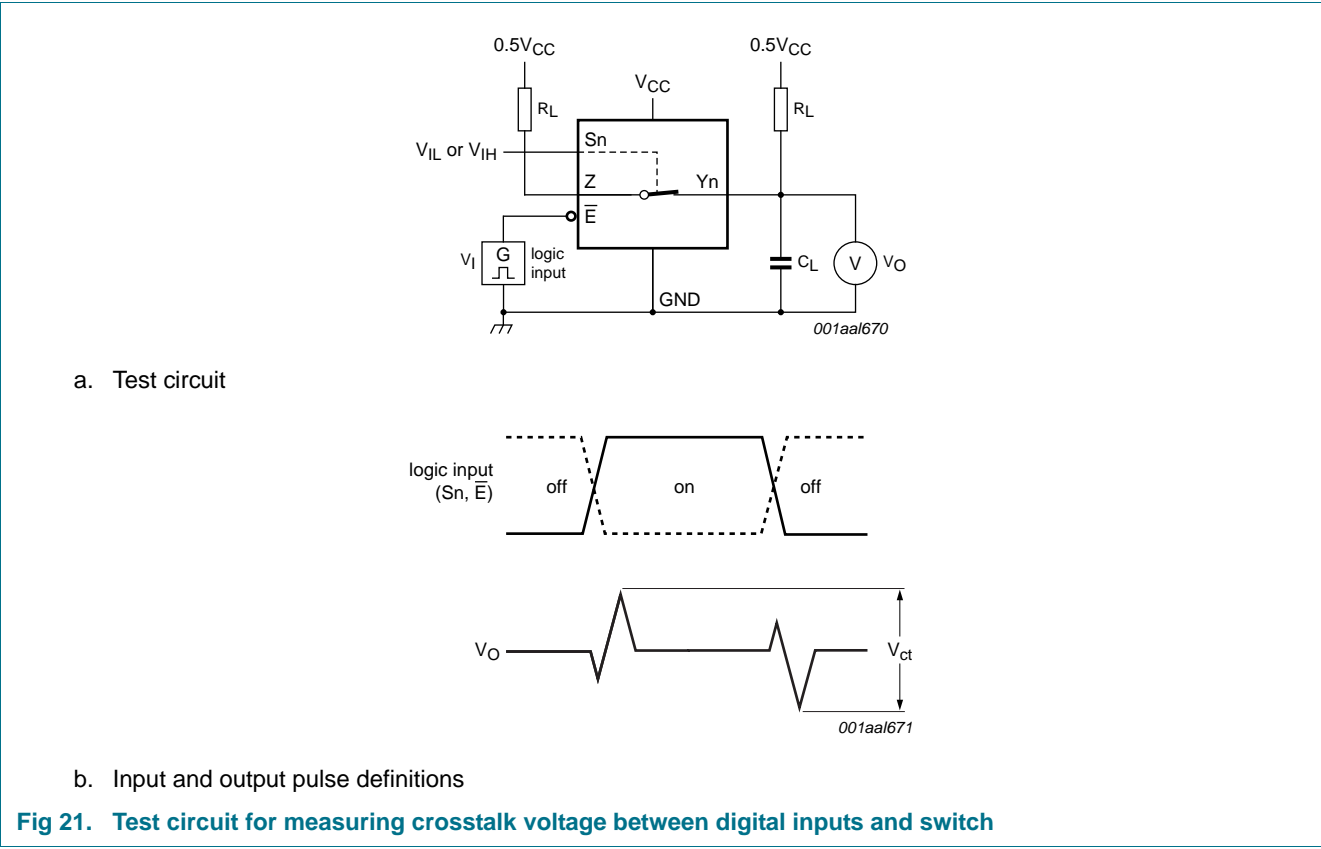
Adjust f_i voltage to obtain 0 dBm level at output. Increase f_i frequency until dB meter reads -3 dB.

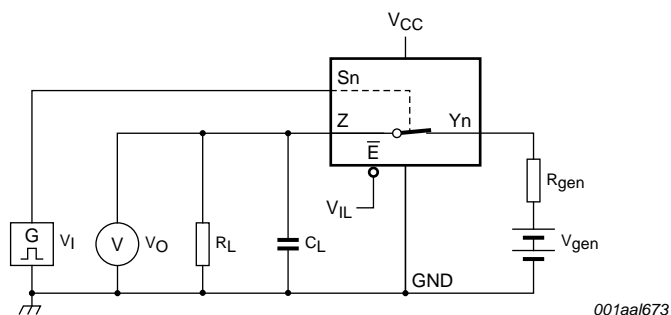
Fig 19. Test circuit for measuring the frequency response when channel is in ON-state



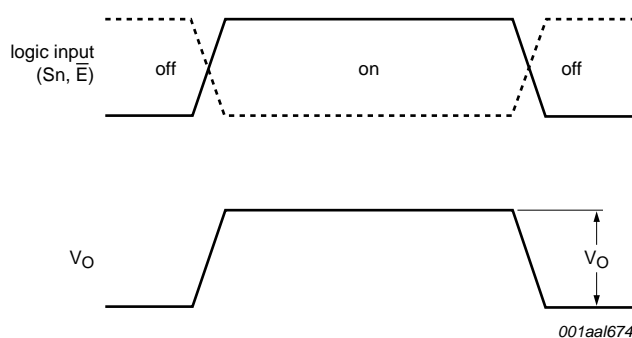
Adjust f_i voltage to obtain 0 dBm level at input.

Fig 20. Test circuit for measuring isolation (OFF-state)





a. Test circuit



b. Input and output pulse definitions

Definition: $Q_{inj} = \Delta V_O \times C_L$.

 ΔV_O = output voltage variation.

R_{gen} = generator resistance.

V_{gen} = generator voltage.

V_I may be connected to S_n or \bar{E} .

Fig 23. Test circuit for measuring charge injection

13. Package outline

HXQFN16: plastic thermal enhanced extremely thin quad flat package; no leads;

16 terminals; body 3 x 3 x 0.5 mm

SOT1039-2

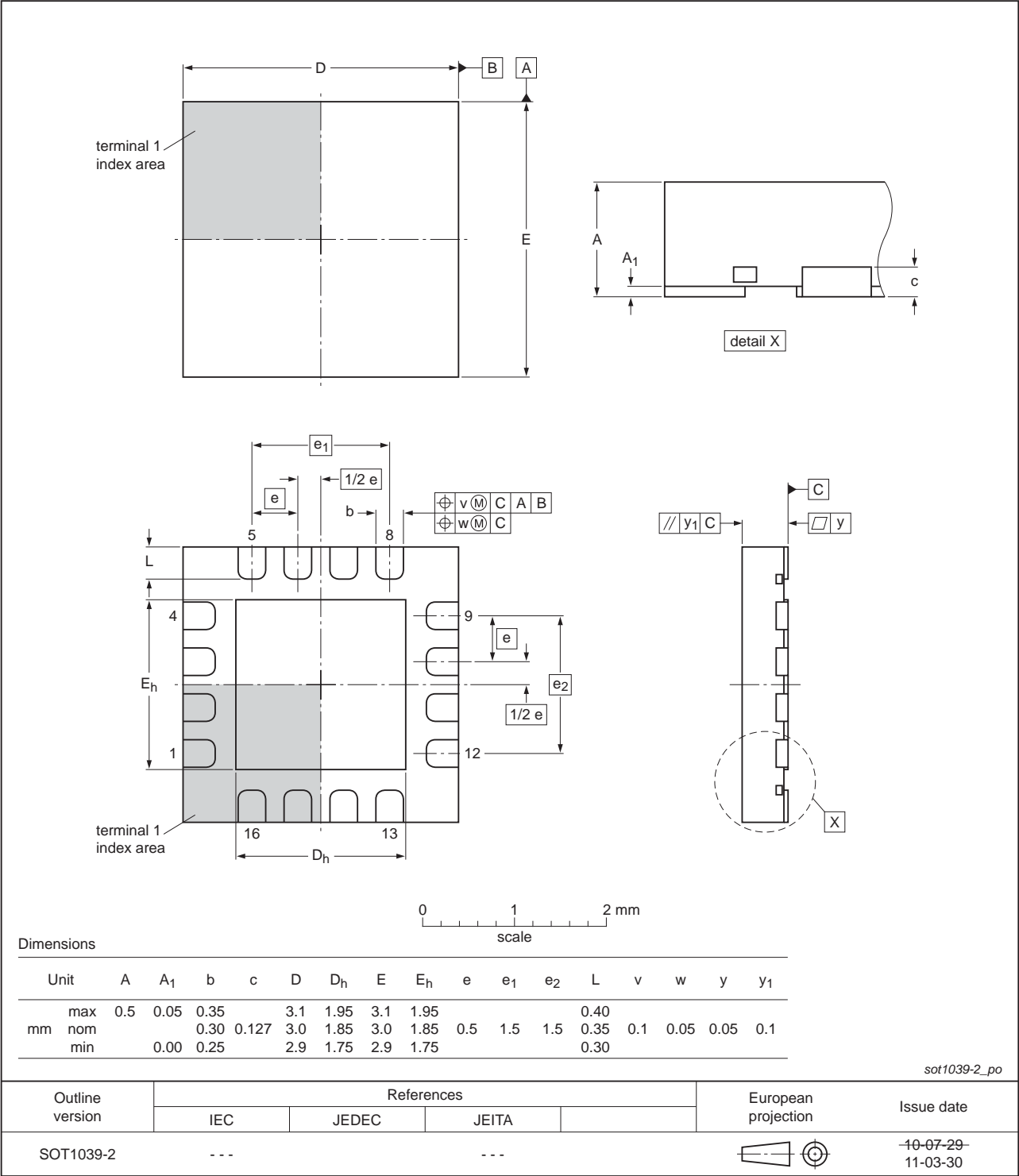


Fig 24. Package outline SOT1039-2 (HXQFN16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

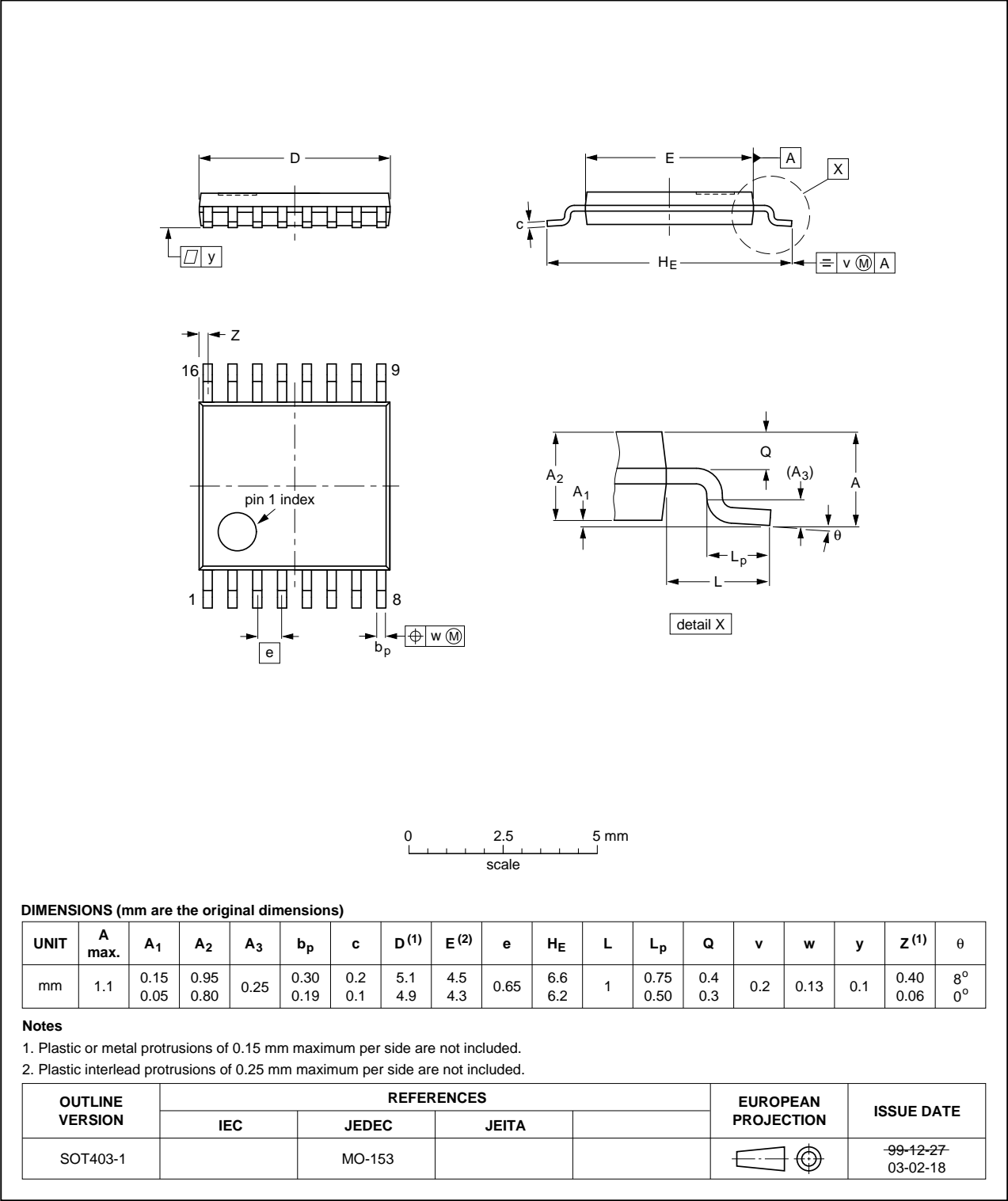


Fig 25. Package outline SOT403-1 (TSSOP16)

14. Abbreviations

Table 13. Abbreviations

| Acronym | Description |
|---------|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal-Oxide Semiconductor |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| MM | Machine Model |
| PDA | Personal Digital Assistant |
| MIL | Military |

15. Revision history

Table 14. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| NX3L4051_Q100 v.1 | 20120807 | Product data sheet | - | - |

16. Legal information

16.1 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".

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18. Contents

| | | |
|-----------|---|-----------|
| 1 | General description | 1 |
| 2 | Features and benefits | 1 |
| 3 | Applications | 2 |
| 4 | Ordering information | 2 |
| 5 | Marking | 2 |
| 6 | Functional diagram | 3 |
| 7 | Pinning information | 4 |
| 7.1 | Pinning | 4 |
| 7.2 | Pin description | 4 |
| 8 | Functional description | 5 |
| 9 | Limiting values | 5 |
| 10 | Recommended operating conditions | 6 |
| 11 | Static characteristics | 6 |
| 11.1 | Test circuits | 7 |
| 11.2 | ON resistance | 8 |
| 11.3 | ON resistance test circuit and graphs | 9 |
| 12 | Dynamic characteristics | 11 |
| 12.1 | Waveform and test circuits | 12 |
| 12.2 | Additional dynamic characteristics | 14 |
| 12.3 | Test circuits | 14 |
| 13 | Package outline | 18 |
| 14 | Abbreviations | 20 |
| 15 | Revision history | 20 |
| 16 | Legal information | 21 |
| 16.1 | Data sheet status | 21 |
| 16.2 | Definitions | 21 |
| 16.3 | Disclaimers | 21 |
| 16.4 | Trademarks | 22 |
| 17 | Contact information | 22 |
| 18 | Contents | 23 |

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