

# NX3DV3899

## Dual double-pole double-throw analog switch

Rev. 3.1 — 25 June 2021

Product data sheet

## 1 General description

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The NX3DV3899 is a dual double-pole double-throw analog data-switch suitable for use as an analog or digital multiplexer/demultiplexer. It consists of four switches, each with two independent input/outputs (nY0 and nY1) and a common input/output (nZ). The two digital inputs (1S and 2S) are used to select the switch position. Schmitt trigger action at the select input (nS) makes the circuit tolerant to slower input rise and fall times across the entire  $V_{CC}$  range from 1.4 V to 4.3 V.

A low input voltage threshold allows pin nS to be driven by lower level logic signals without a significant increase in supply current  $I_{CC}$ . This makes it possible for the NX3DV3899 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The NX3DV3899 allows signals with amplitude up to  $V_{CC}$  to be transmitted from nZ to nY0 or nY1; or from nY0 or nY1 to nZ.

## 2 Features and benefits

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- Wide supply voltage range from 1.4 V to 4.3 V
- Very low ON resistance (peak):
  - 7.2  $\Omega$  (typical) at  $V_{CC} = 1.4$  V
  - 5.4  $\Omega$  (typical) at  $V_{CC} = 1.65$  V
  - 2.9  $\Omega$  (typical) at  $V_{CC} = 2.5$  V
  - 2.4  $\Omega$  (typical) at  $V_{CC} = 3.0$  V
  - 2.3  $\Omega$  (typical) at  $V_{CC} = 3.6$  V
  - 2.2  $\Omega$  (typical) at  $V_{CC} = 4.3$  V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - HBM JESD22-A114F Class 2A exceeds 2000 V (all pins)
  - HBM JESD22-A114F Class 3A exceeds 5000 V (I/O pins to GND)
  - MM JESD22-A115-A exceeds 200 V
  - CDM AEC-Q100-011 revision B exceeds 1000 V
- 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)
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C



### 3 Applications

- Data switch
- Cell phone
- PDA
- Portable media player

### 4 Ordering information

Table 1. Ordering information

| Type number | Topside marking | Package  |  |           |
|-------------|-----------------|----------|--|-----------|
|             |                 | Name     | Description  | Version   |
| NX3DV3899HR | x99             | HXQFN16U | plastic thermal enhanced extremely thin quad flat package; no leads; 16 terminals; UTLP based; body 3 x 3 x 0.5 mm | SOT1039-1 |
| NX3DV3899GU | x9              | XQFN16   | plastic, extremely thin quad flat package; no leads; 16 terminals; body 1.80 x 2.60 x 0.50 mm                      | SOT1161-1 |

Table 2. Ordering options

| Type number | Orderable part number | Package  | Packing method                    | Minimum order quantity | Temperature range |
|-------------|-----------------------|----------|-----------------------------------|------------------------|-------------------|
| NX3DV3899HR | NX3DV3899HR,115       | HXQFN16U | REEL 7" Q1 NDP <sup>[1]</sup>     | 1500                   | -40°C to +125°C   |
|             | NX3DV3899HRZ          | HXQFN16U | REEL 7" Q1 NDP SSB <sup>[2]</sup> | 1500                   | -40°C to +125°C   |
| NX3DV3899GU | NX3DV3899GU,115       | XQFN16   | REEL 7" Q1 NDP                    | 4000                   | -40°C to +125°C   |

[1] Will go EOL - migrate to new leadframe NX3DV3899HRZ orderable part number.

[2] This packing method uses a Static Shielding Bag (SSB) solution. Material is to be kept in the sealed bag between uses.

### 5 Functional diagram

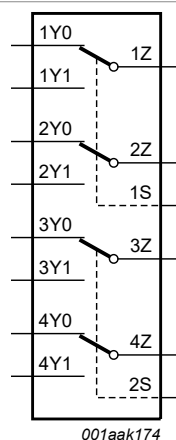


Figure 1. Logic symbol

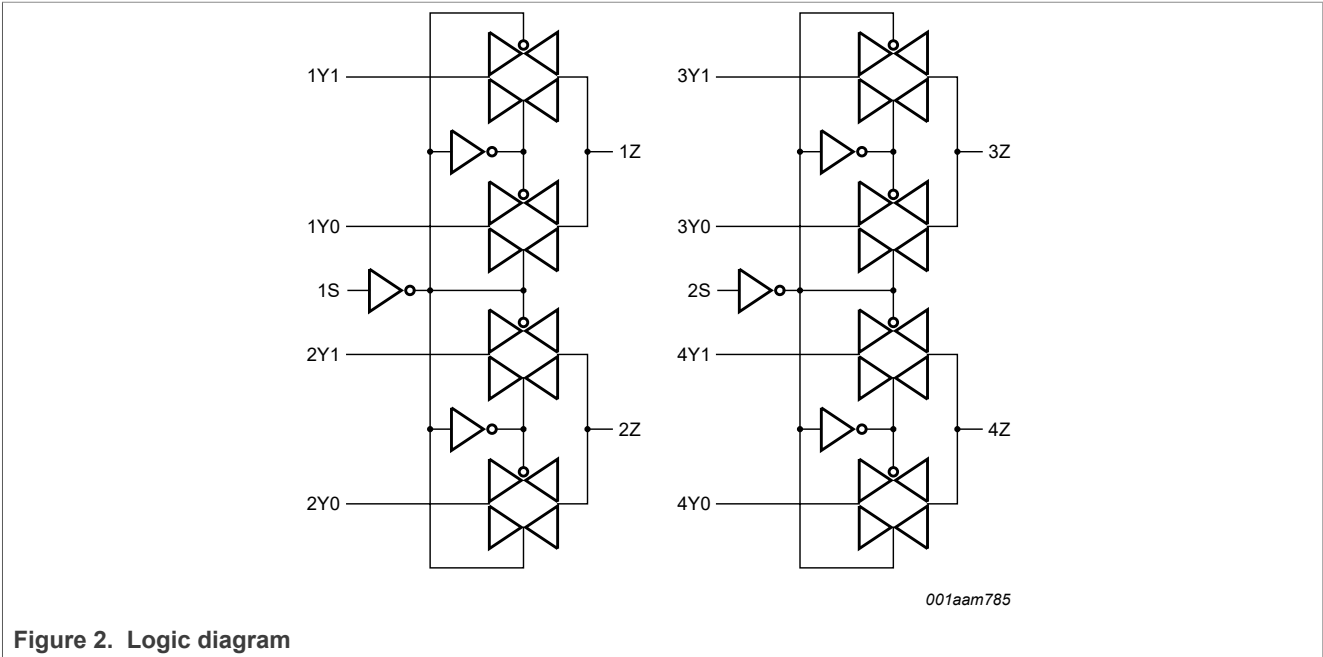


Figure 2. Logic diagram

## 6 Pinning information

### 6.1 Pinning

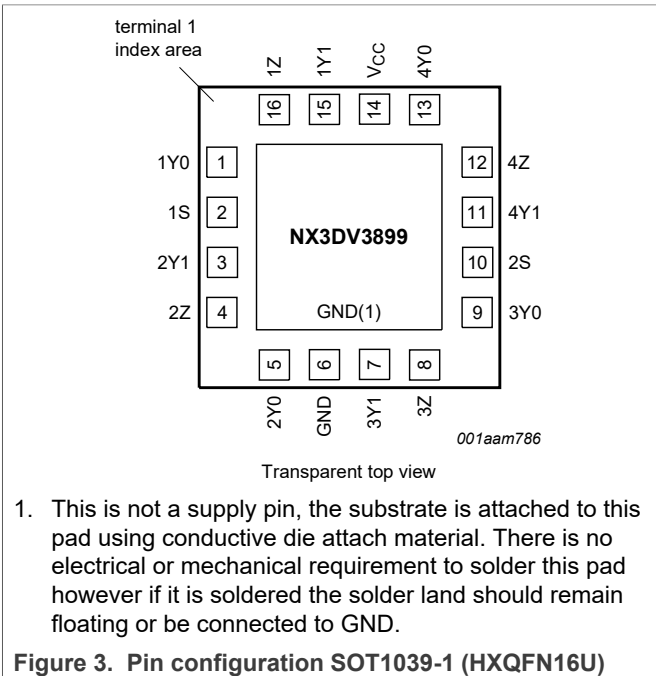


Figure 3. Pin configuration SOT1039-1 (HXQFN16U)

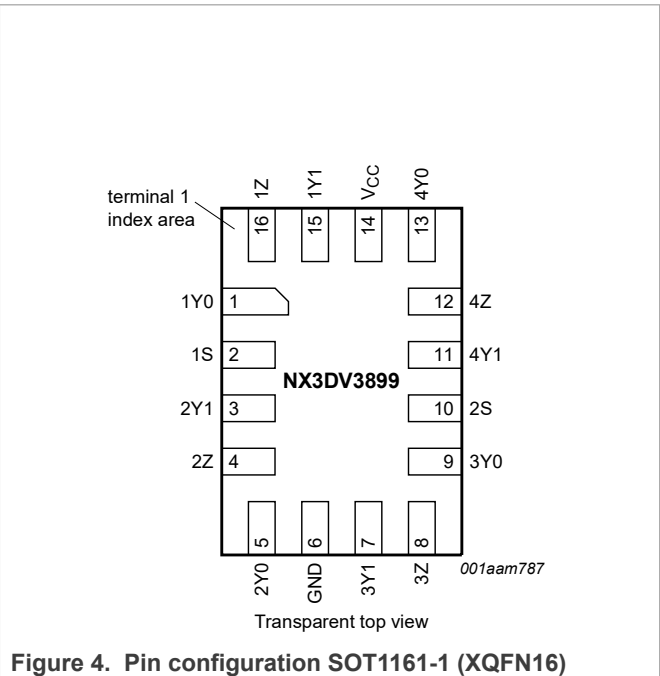


Figure 4. Pin configuration SOT1161-1 (XQFN16)

## 6.2 Pin description

Table 3. Pin description

| Symbol             | Pin          | Description                 |
|--------------------|--------------|-----------------------------|
| 1Y0, 2Y0, 3Y0, 4Y0 | 1, 5, 9, 13  | independent input or output |
| 1S, 2S             | 2, 10        | select input                |
| 1Y1, 2Y1, 3Y1, 4Y1 | 15, 3, 7, 11 | independent input or output |
| 1Z, 2Z, 3Z, 4Z     | 16, 4, 8, 12 | common output or input      |
| GND                | 6            | ground (0 V)                |
| V <sub>CC</sub>    | 14           | supply voltage              |

## 7 Functional description

Table 4. Function table<sup>[1]</sup>

| Input nS | Channel on |
|----------|------------|
| L        | nY0        |
| H        | nY1        |

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

## 8 Limiting values

Table 5. Limiting values

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

| Symbol           | Parameter               | Conditions  | Min                 | Max                   | Unit |
|------------------|-------------------------|---|---------------------|-----------------------|------|
| V <sub>CC</sub>  | supply voltage          |   | -0.5                | +4.6                  | V    |
| V <sub>I</sub>   | input voltage           | select input nS   | <sup>[1]</sup> -0.5 | +4.6                  | V    |
| V <sub>SW</sub>  | switch voltage          |   | <sup>[2]</sup> -0.5 | V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < -0.5 V   | -50                 | -                     | mA   |
| I <sub>SK</sub>  | switch clamping current | V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V   | -                   | ±50                   | mA   |
| I <sub>SW</sub>  | switch current          | V <sub>SW</sub> > -0.5 V or V <sub>SW</sub> < V <sub>CC</sub> + 0.5 V; source or sink current                                   | -                   | ±350                  | mA   |
|                  |                         | V <sub>SW</sub> > -0.5 V or V <sub>SW</sub> < V <sub>CC</sub> + 0.5 V; pulsed at 1 ms duration, < 10 % duty cycle; peak current | -                   | ±500                  | mA   |
| T <sub>stg</sub> | storage temperature     |   | -65                 | +150                  | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C  |                     |                       |      |
|                  |                         | HXQFN16U  | <sup>[3]</sup> -    | 250                   | mW   |
|                  |                         | XQFN16  | <sup>[4]</sup> -    | 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 but may not exceed 4.6 V.

[3] For HXQFN16U package: above 135 °C the value of P<sub>tot</sub> derates linearly with 16.9 mW/K.

[4] For XQFN16 package: above 133 °C the value of P<sub>tot</sub> derates linearly with 14.5 mW/K.

## 9 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                       | select input nS                         | 0                | 4.3      | V    |
| $V_{SW}$            | switch voltage                      |   | <sup>[1]</sup> 0 | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |   | -40              | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.4\text{ V to }4.3\text{ V}$ | <sup>[2]</sup> - | 200      | ns/V |

[1] To avoid sinking GND current from terminal nZ when switch current flows in terminal nYn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal nZ, no GND current will flow from terminal nYn. 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).

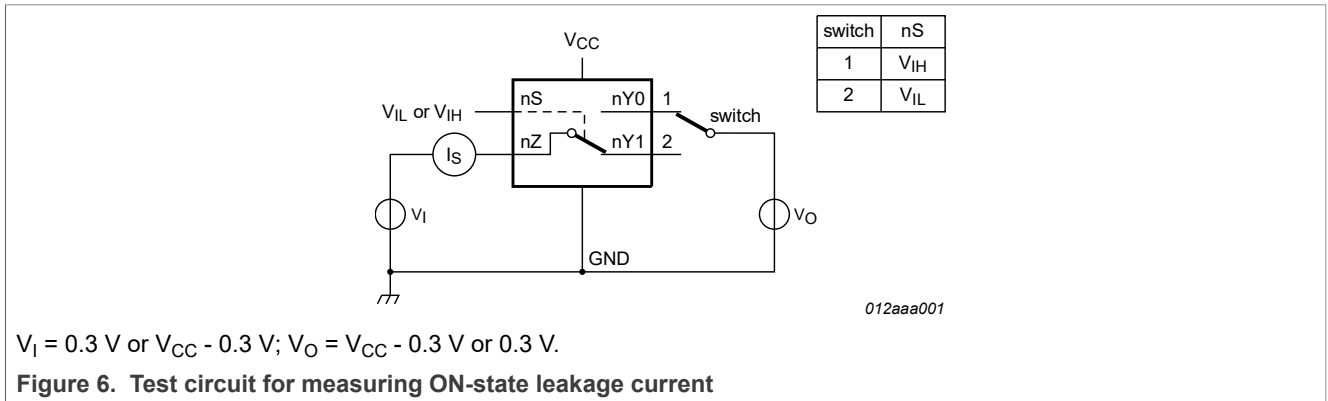
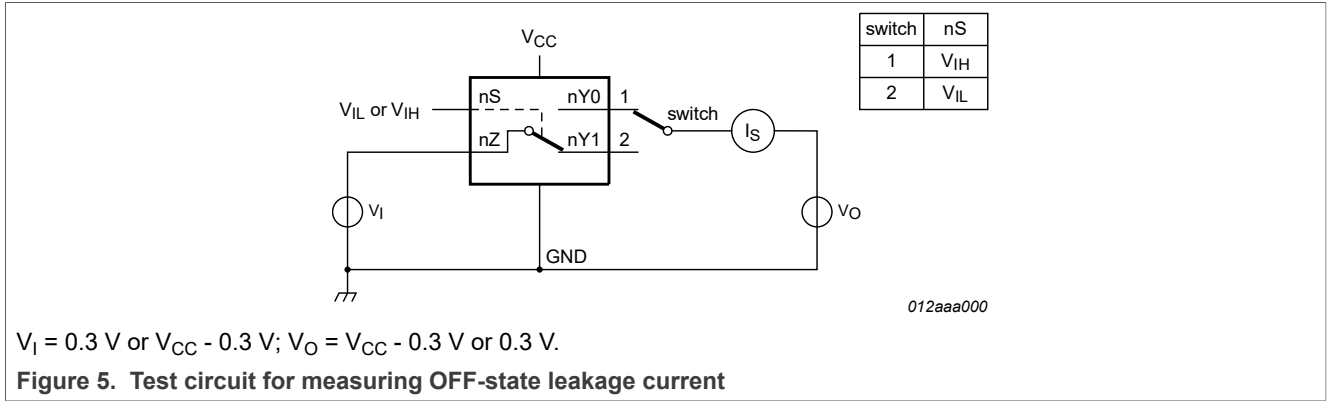
| Symbol       | Parameter                 | Conditions  | $T_{amb} = 25\text{ °C}$ |     |         | $T_{amb} = -40\text{ °C to }+125\text{ °C}$ |             |              | Unit          |
|--------------|---------------------------|---|--------------------------|-----|---------|---|-------------|--------------|---------------|
|              |                           |   | 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     | select input nS; $V_I = \text{GND to }4.3\text{ V}$ ; $V_{CC} = 1.4\text{ V to }4.3\text{ V}$ | -                        | -   | -       | -   | $\pm 0.5$   | $\pm 1$      | $\mu\text{A}$ |
| $I_{S(OFF)}$ | OFF-state leakage current | nY0 and nY1 port; see <a href="#">Figure 5</a>  |                          |     |         |   |             |              |               |
|              |                           | $V_{CC} = 1.4\text{ V to }4.3\text{ V}$   | -                        | -   | $\pm 5$ | -   | $\pm 50$    | $\pm 500$    | nA            |
| $I_{S(ON)}$  | ON-state leakage current  | nZ port; see <a href="#">Figure 6</a>   |                          |     |         |   |             |              |               |
|              |                           | $V_{CC} = 1.4\text{ V to }4.3\text{ V}$   | -                        | -   | $\pm 5$ | -   | $\pm 50$    | $\pm 500$    | 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            |

Table 7. Static characteristics...continued

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

| Symbol              | Parameter                 | Conditions                                      | T <sub>amb</sub> = 25 °C |      |      | T <sub>amb</sub> = -40 °C to +125 °C |             |              | Unit |
|---------------------|---------------------------|---|--------------------------|------|------|--------------------------------------|-------------|--------------|------|
|                     |                           |   | Min                      | Typ  | Max  | Min                                  | Max (85 °C) | Max (125 °C) |      |
|                     |                           | V <sub>CC</sub> = 4.3 V                         | -                        | -    | 150  | -                                    | 800         | 6000         | nA   |
| ΔI <sub>CC</sub>    | additional supply current | V <sub>SW</sub> = GND or V <sub>CC</sub>        |                          |      |      |                                      |             |              |      |
|                     |                           | V <sub>I</sub> = 2.6 V; V <sub>CC</sub> = 4.3 V | -                        | 2.0  | 4.0  | -                                    | 7           | 7            | μA   |
|                     |                           | V <sub>I</sub> = 2.6 V; V <sub>CC</sub> = 3.6 V | -                        | 0.35 | 0.7  | -                                    | 1           | 1            | μA   |
|                     |                           | V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 4.3 V | -                        | 7.0  | 10.0 | -                                    | 15          | 15           | μA   |
|                     |                           | V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 3.6 V | -                        | 2.5  | 4.0  | -                                    | 5           | 5            | μA   |
|                     |                           | V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 2.5 V | -                        | 50   | 200  | -                                    | 300         | 500          | nA   |
| C <sub>I</sub>      | input capacitance         |   | -                        | 1.0  | -    | -                                    | -           | -            | pF   |
| C <sub>S(OFF)</sub> | OFF-state capacitance     |   | -                        | 8    | -    | -                                    | -           | -            | pF   |
| C <sub>S(ON)</sub>  | ON-state capacitance      |   | -                        | 30   | -    | -                                    | -           | -            | pF   |

10.1 Test circuits



10.2 ON resistance

Table 8. ON resistance

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

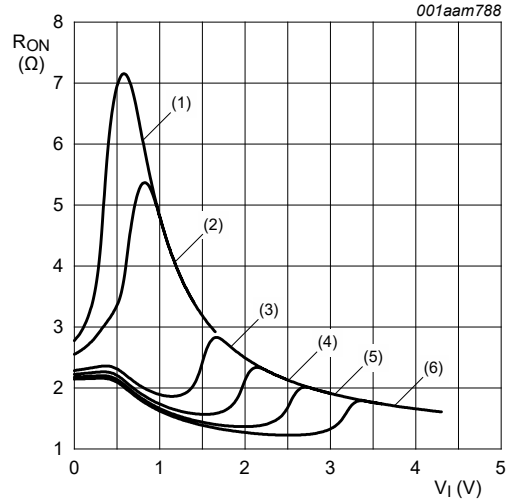
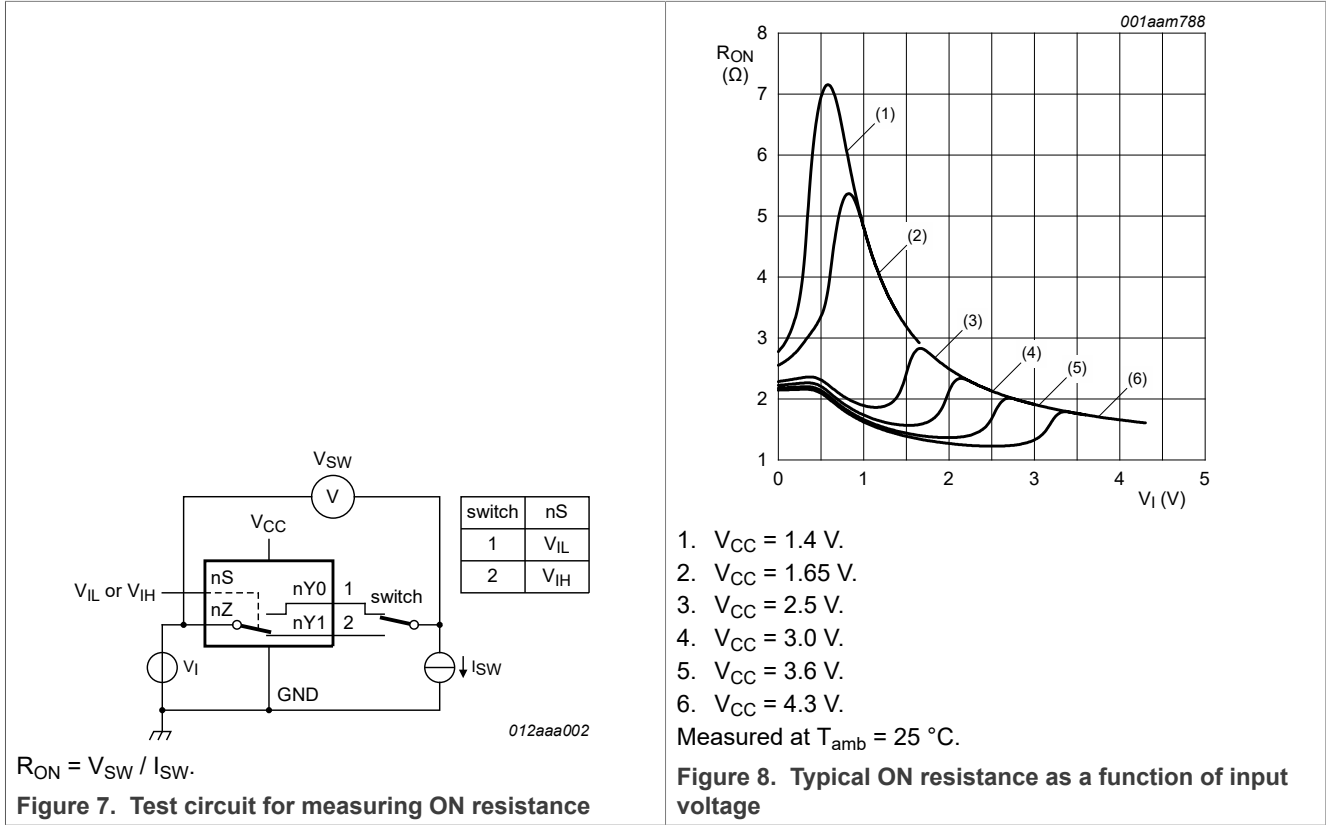
| Symbol                | Parameter                               | Conditions  | T <sub>amb</sub> = -40 °C to +85 °C |                    |     | T <sub>amb</sub> = -40 °C to +125 °C |     | Unit |
|-----------------------|---|---|-------------------------------------|--------------------|-----|--------------------------------------|-----|------|
|                       |   |   | Min                                 | Typ <sup>[1]</sup> | Max | Min                                  | Max |      |
| R <sub>ON(peak)</sub> | ON resistance (peak)                    | V <sub>I</sub> = GND to V <sub>CC</sub> ; I <sub>SW</sub> = 100 mA; see Figure 7  |                                     |                    |     |                                      |     |      |
|                       |   | V <sub>CC</sub> = 1.4 V   | -                                   | 7.2                | 9.3 | -                                    | 10  | Ω    |
|                       |   | V <sub>CC</sub> = 1.65 V  | -                                   | 5.4                | 7.3 | -                                    | 8   | Ω    |
|                       |   | V <sub>CC</sub> = 2.5 V   | -                                   | 2.9                | 3.9 | -                                    | 4.5 | Ω    |
|                       |   | V <sub>CC</sub> = 3.0 V   | -                                   | 2.4                | 3.4 | -                                    | 4.5 | Ω    |
|                       |   | V <sub>CC</sub> = 3.6 V   | -                                   | 2.3                | 3.3 | -                                    | 4.2 | Ω    |
|                       |   | V <sub>CC</sub> = 4.3 V   | -                                   | 2.2                | 3.3 | -                                    | 4.2 | Ω    |
| ΔR <sub>ON</sub>      | ON resistance mismatch between channels | V <sub>I</sub> = GND to V <sub>CC</sub> ; I <sub>SW</sub> = 100 mA <sup>[2]</sup> |                                     |                    |     |                                      |     |      |
|                       |   | V <sub>CC</sub> = 3.0 V   | -                                   | 0.8                | -   | -                                    | -   | Ω    |
|                       |   | V <sub>CC</sub> = 4.3 V   | -                                   | 0.7                | -   | -                                    | -   | Ω    |
| R <sub>ON(flat)</sub> | ON resistance (flatness)                | V <sub>I</sub> = GND to V <sub>CC</sub> ; I <sub>SW</sub> = 100 mA <sup>[3]</sup> |                                     |                    |     |                                      |     |      |
|                       |   | V <sub>CC</sub> = 1.4 V   | -                                   | 4.4                | -   | -                                    | -   | Ω    |
|                       |   | V <sub>CC</sub> = 1.65 V  | -                                   | 2.8                | -   | -                                    | -   | Ω    |
|                       |   | V <sub>CC</sub> = 2.5 V   | -                                   | 1.0                | -   | -                                    | -   | Ω    |
|                       |   | V <sub>CC</sub> = 3.0 V   | -                                   | 0.8                | -   | -                                    | -   | Ω    |
|                       |   | V <sub>CC</sub> = 3.6 V   | -                                   | 0.9                | -   | -                                    | -   | Ω    |
|                       |   | V <sub>CC</sub> = 4.3 V   | -                                   | 1.0                | -   | -                                    | -   | Ω    |

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

[2] Measured at identical V<sub>CC</sub>, temperature and input voltage.

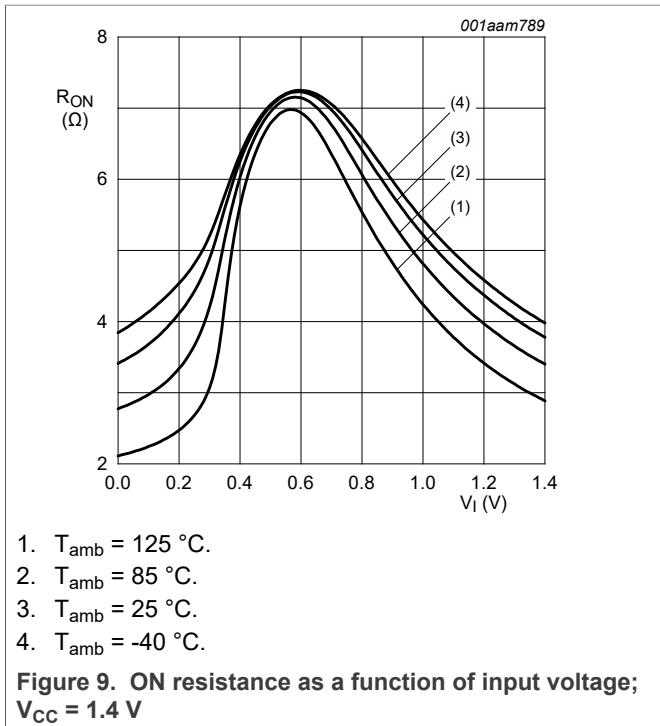
[3] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V<sub>CC</sub> and temperature.

10.3 ON resistance test circuit and graphs



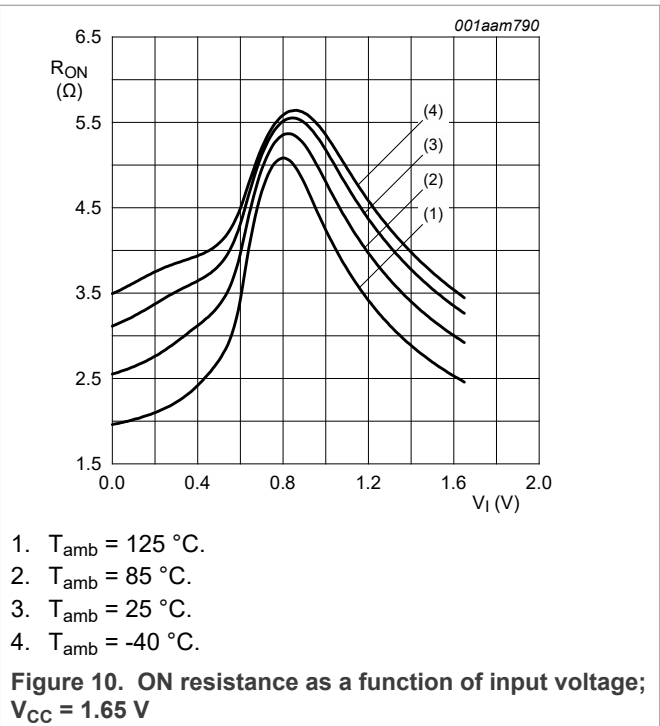
1. V<sub>CC</sub> = 1.4 V.
  2. V<sub>CC</sub> = 1.65 V.
  3. V<sub>CC</sub> = 2.5 V.
  4. V<sub>CC</sub> = 3.0 V.
  5. V<sub>CC</sub> = 3.6 V.
  6. V<sub>CC</sub> = 4.3 V.
- Measured at T<sub>amb</sub> = 25 °C.

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



1. T<sub>amb</sub> = 125 °C.
2. T<sub>amb</sub> = 85 °C.
3. T<sub>amb</sub> = 25 °C.
4. T<sub>amb</sub> = -40 °C.

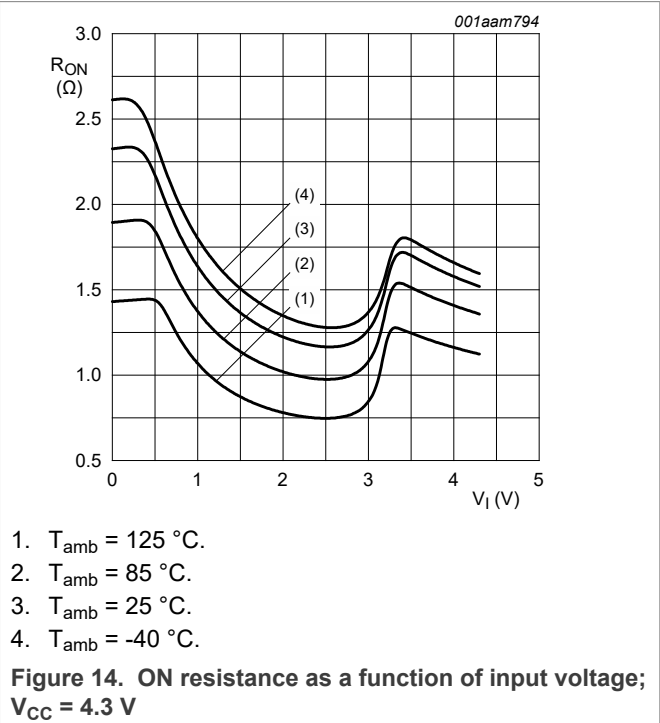
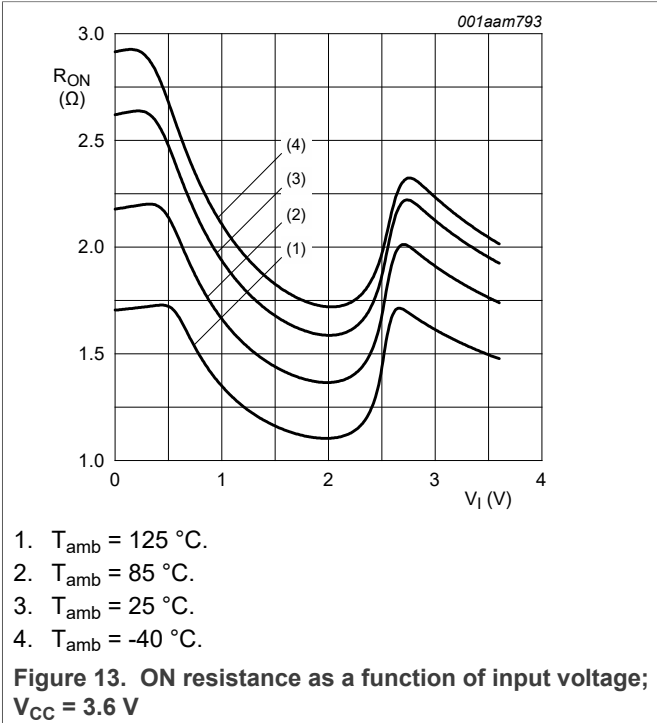
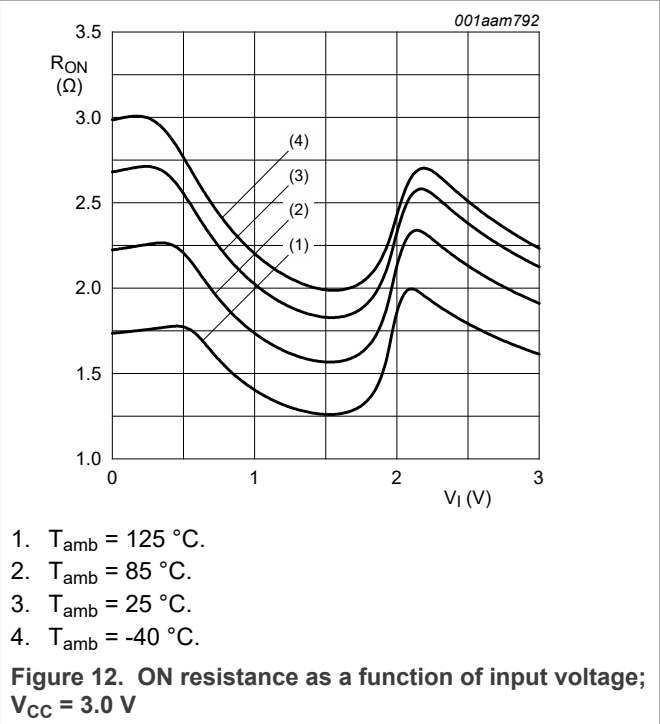
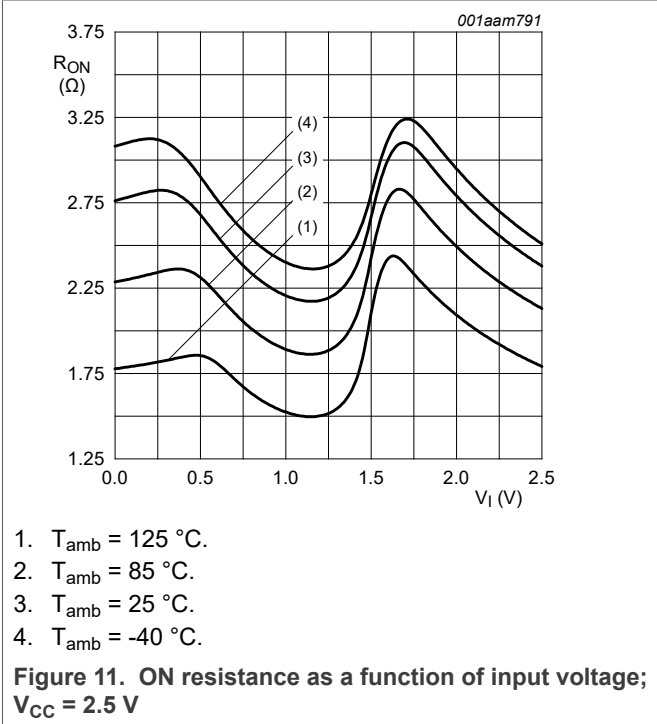
Figure 9. ON resistance as a function of input voltage; V<sub>CC</sub> = 1.4 V



1. T<sub>amb</sub> = 125 °C.
2. T<sub>amb</sub> = 85 °C.
3. T<sub>amb</sub> = 25 °C.
4. T<sub>amb</sub> = -40 °C.

Figure 10. ON resistance as a function of input voltage; V<sub>CC</sub> = 1.65 V





## 11 Dynamic characteristics

Table 9. Dynamic characteristics

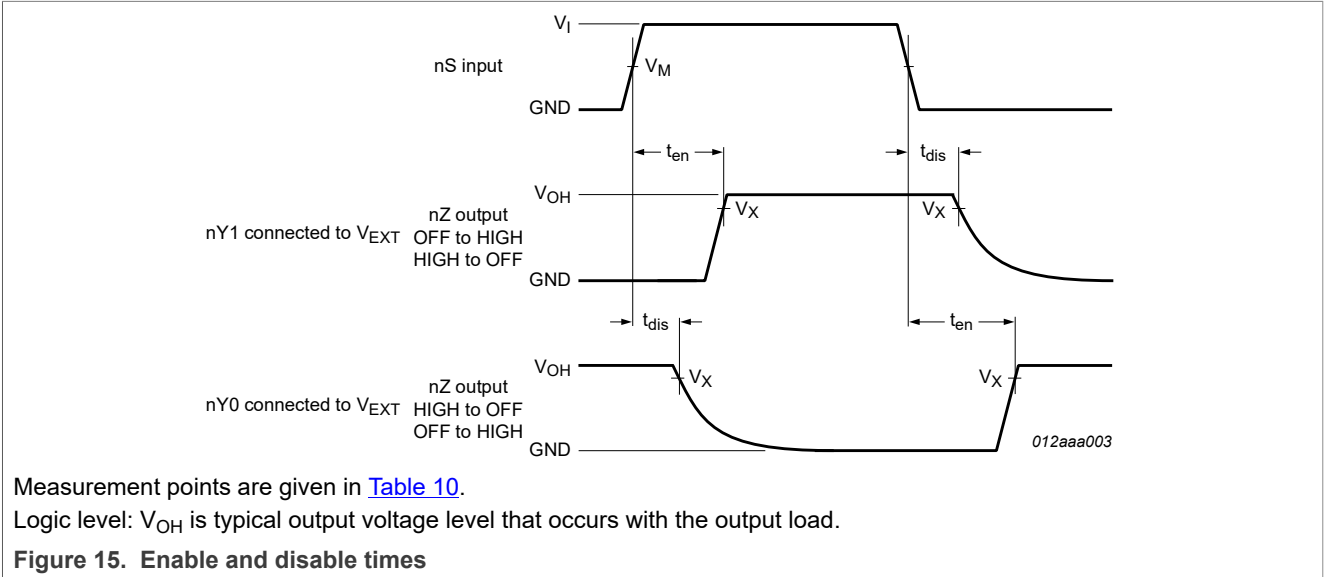
At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 17](#).

| Symbol           | Parameter              | Conditions                                     | T <sub>amb</sub> = 25 °C |                    |     | T <sub>amb</sub> = -40 °C to +125 °C |             |              | Unit |
|------------------|------------------------|--|--------------------------|--------------------|-----|--------------------------------------|-------------|--------------|------|
|                  |                        |  | Min                      | Typ <sup>[1]</sup> | Max | Min                                  | Max (85 °C) | Max (125 °C) |      |
| t <sub>en</sub>  | enable time            | nS to nZ or nYn; see <a href="#">Figure 15</a> |                          |                    |     |                                      |             |              |      |
|                  |                        | V <sub>CC</sub> = 1.4 V to 1.6 V               | -                        | 41                 | 90  | -                                    | 120         | 120          | ns   |
|                  |                        | V <sub>CC</sub> = 1.65 V to 1.95 V             | -                        | 30                 | 70  | -                                    | 80          | 90           | ns   |
|                  |                        | V <sub>CC</sub> = 2.3 V to 2.7 V               | -                        | 20                 | 45  | -                                    | 50          | 55           | ns   |
|                  |                        | V <sub>CC</sub> = 2.7 V to 3.6 V               | -                        | 19                 | 40  | -                                    | 45          | 50           | ns   |
|                  |                        | V <sub>CC</sub> = 3.6 V to 4.3 V               | -                        | 19                 | 40  | -                                    | 45          | 50           | ns   |
| t <sub>dis</sub> | disable time           | nS to nZ or nYn; see <a href="#">Figure 15</a> |                          |                    |     |                                      |             |              |      |
|                  |                        | V <sub>CC</sub> = 1.4 V to 1.6 V               | -                        | 24                 | 70  | -                                    | 80          | 90           | ns   |
|                  |                        | V <sub>CC</sub> = 1.65 V to 1.95 V             | -                        | 15                 | 55  | -                                    | 60          | 65           | ns   |
|                  |                        | V <sub>CC</sub> = 2.3 V to 2.7 V               | -                        | 9                  | 25  | -                                    | 30          | 35           | ns   |
|                  |                        | V <sub>CC</sub> = 2.7 V to 3.6 V               | -                        | 8                  | 20  | -                                    | 25          | 30           | ns   |
|                  |                        | V <sub>CC</sub> = 3.6 V to 4.3 V               | -                        | 8                  | 20  | -                                    | 25          | 30           | ns   |
| t <sub>b-m</sub> | break-before-make time | see <a href="#">Figure 16</a>                  | [2]                      |                    |     |                                      |             |              |      |
|                  |                        | V <sub>CC</sub> = 1.4 V to 1.6 V               | -                        | 20                 | -   | 9                                    | -           | -            | ns   |
|                  |                        | V <sub>CC</sub> = 1.65 V to 1.95 V             | -                        | 17                 | -   | 7                                    | -           | -            | ns   |
|                  |                        | V <sub>CC</sub> = 2.3 V to 2.7 V               | -                        | 13                 | -   | 4                                    | -           | -            | ns   |
|                  |                        | V <sub>CC</sub> = 2.7 V to 3.6 V               | -                        | 11                 | -   | 3                                    | -           | -            | ns   |
|                  |                        | V <sub>CC</sub> = 3.6 V to 4.3 V               | -                        | 11                 | -   | 2                                    | -           | -            | ns   |

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.5 V, 1.8 V, 2.5 V, 3.3 V and 4.3 V respectively.

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

**11.1 Waveform and test circuits**



**Table 10. Measurement points**

| Supply voltage | Input       | Output      |
|----------------|-------------|-------------|
| $V_{CC}$       | $V_M$       | $V_X$       |
| 1.4 V to 4.3 V | $0.5V_{CC}$ | $0.9V_{OH}$ |

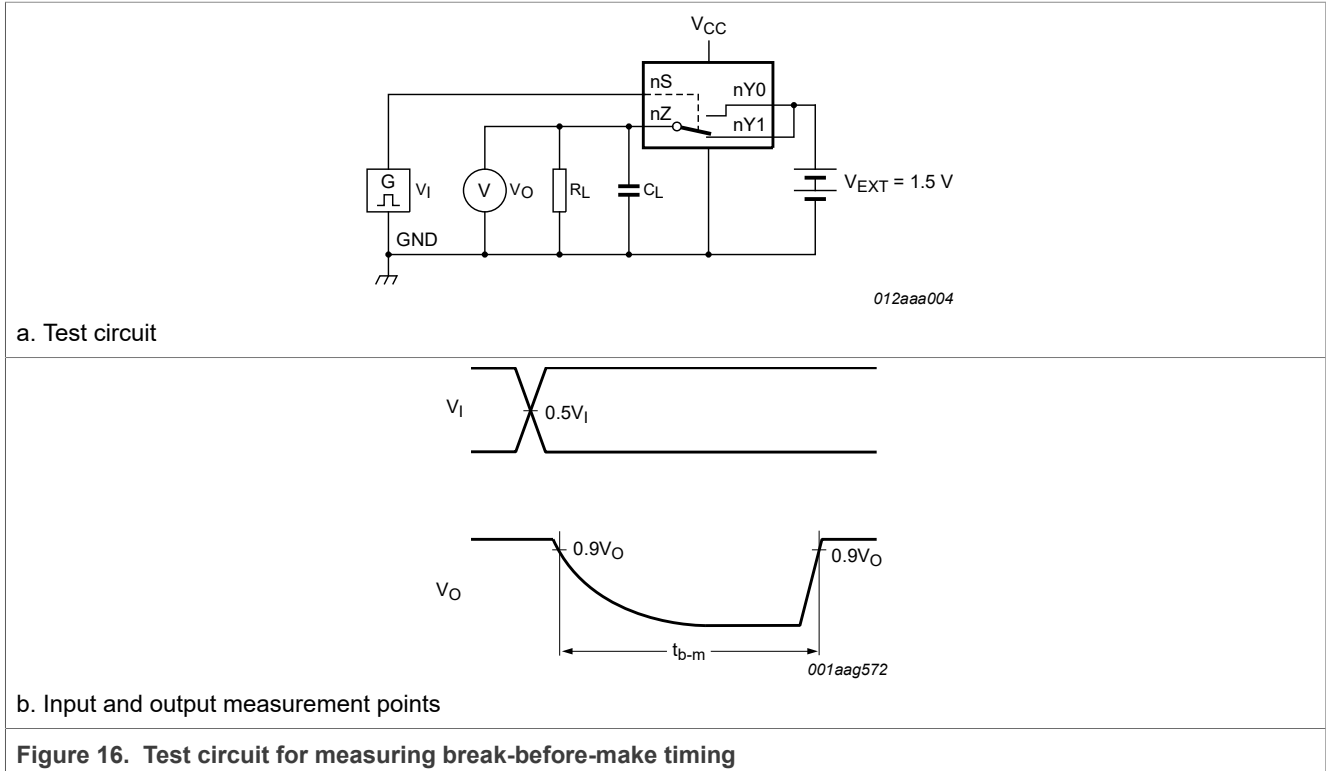


Figure 16. Test circuit for measuring break-before-make timing

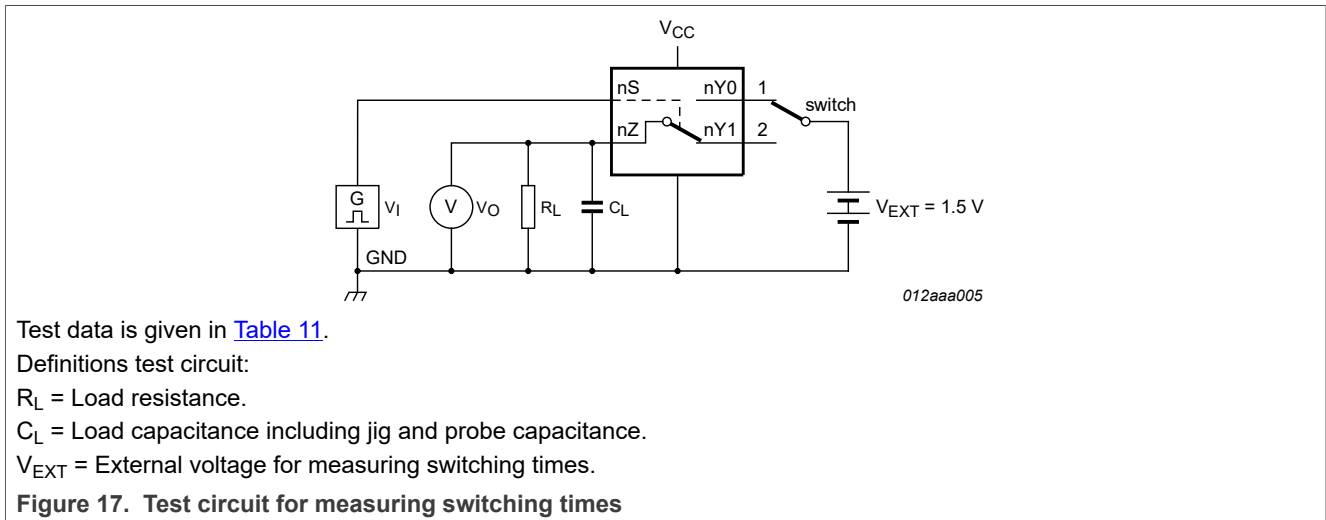


Table 11. Test data

| Supply voltage | Input    |               | Load  |             |
|----------------|----------|---------------|-------|-------------|
| $V_{CC}$       | $V_I$    | $t_r, t_f$    | $C_L$ | $R_L$       |
| 1.4 V to 4.3 V | $V_{CC}$ | $\leq 2.5$ ns | 35 pF | 50 $\Omega$ |

11.2 Additional dynamic characteristics

Table 12. Additional dynamic characteristics

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

| Symbol         | Parameter                 | Conditions  | Min | Typ | Max  | Unit |     |
|----------------|---------------------------|---|-----|-----|------|------|-----|
| THD            | total harmonic distortion | $f_i = 20$ Hz to 20 kHz; $R_L = 600$ $\Omega$ ; see <a href="#">Figure 18</a>   | [1] |     |      |      |     |
|                |                           | $V_{CC} = 1.4$ V; $V_I = 1$ V (p-p)   |     | -   | 0.05 | -    | %   |
|                |                           | $V_{CC} = 1.65$ V; $V_I = 1.2$ V (p-p)  |     | -   | 0.02 | -    | %   |
|                |                           | $V_{CC} = 2.3$ V; $V_I = 1.5$ V (p-p)   |     | -   | 0.01 | -    | %   |
|                |                           | $V_{CC} = 2.7$ V; $V_I = 2$ V (p-p)   |     | -   | 0.01 | -    | %   |
|                |                           | $V_{CC} = 3.6$ V; $V_I = 2$ V (p-p)   |     | -   | 0.01 | -    | %   |
|                |                           | $V_{CC} = 4.3$ V; $V_I = 2$ V (p-p)   |     | -   | 0.01 | -    | %   |
| $f_{(-3dB)}$   | -3 dB frequency response  | $R_L = 50$ $\Omega$ ; see <a href="#">Figure 19</a>   | [1] |     |      |      |     |
|                |                           | $V_{CC} = 1.4$ V to 4.3 V   |     | -   | 200  | -    | MHz |
| $\alpha_{iso}$ | isolation (OFF-state)     | $f_i = 1$ MHz; $R_L = 50$ $\Omega$ ; see <a href="#">Figure 20</a>  | [1] |     |      |      |     |
|                |                           | $V_{CC} = 1.4$ V to 4.3 V   |     | -   | -70  | -    | dB  |
| $V_{ct}$       | crosstalk voltage         | between digital inputs and switch; $f_i = 1$ MHz; $C_L = 50$ pF; $R_L = 50$ $\Omega$ ; see <a href="#">Figure 21</a>          |     |     |      |      |     |
|                |                           | $V_{CC} = 1.4$ V to 3.6 V   |     | -   | 210  | -    | V   |
|                |                           | $V_{CC} = 3.6$ V to 4.3 V   |     | -   | 300  | -    | V   |
| Xtalk          | crosstalk                 | between switches; $f_i = 1$ MHz; $R_L = 50$ $\Omega$ ; see <a href="#">Figure 22</a>  | [1] |     |      |      |     |
|                |                           | $V_{CC} = 1.4$ V to 4.3 V   |     | -   | -90  | -    | dB  |
| $Q_{inj}$      | charge injection          | $f_i = 1$ MHz; $C_L = 0.1$ nF; $R_L = 1$ M $\Omega$ ; $V_{gen} = 0$ V; $R_{gen} = 0$ $\Omega$ ; see <a href="#">Figure 23</a> |     |     |      |      |     |
|                |                           | $V_{CC} = 1.4$ V  |     | -   | 0.5  | -    | pC  |
|                |                           | $V_{CC} = 1.65$ V   |     | -   | 0.7  | -    | pC  |
|                |                           | $V_{CC} = 2.5$ V  |     | -   | 1.6  | -    | pC  |
|                |                           | $V_{CC} = 3.0$ V  |     | -   | 2.1  | -    | pC  |
|                |                           | $V_{CC} = 3.6$ V  |     | -   | 2.9  | -    | pC  |
|                |                           | $V_{CC} = 4.3$ V  |     | -   | 4.0  | -    | pC  |

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

11.3 Test circuits

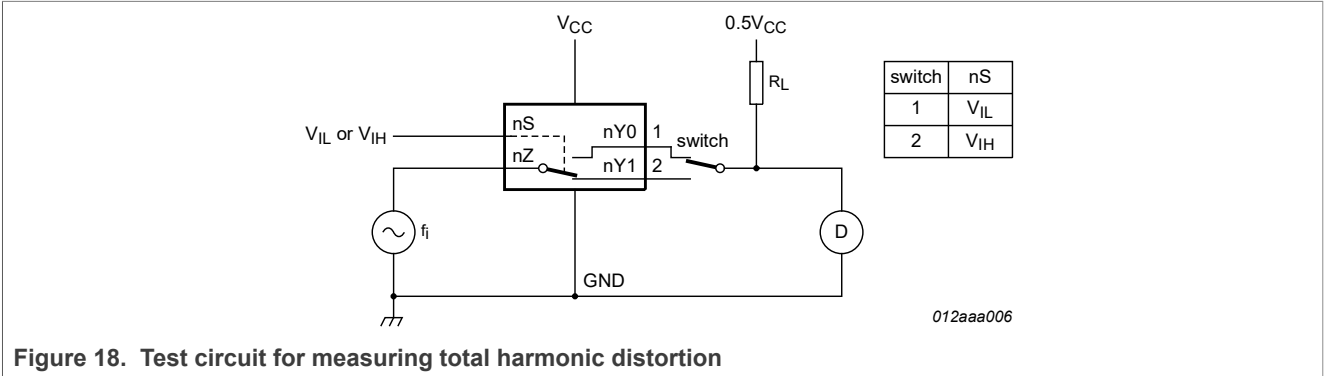
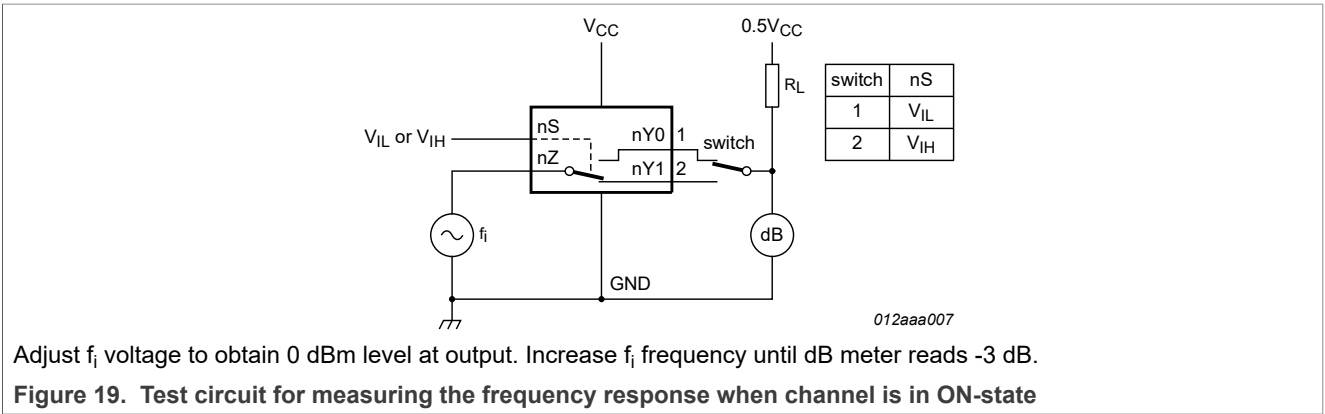
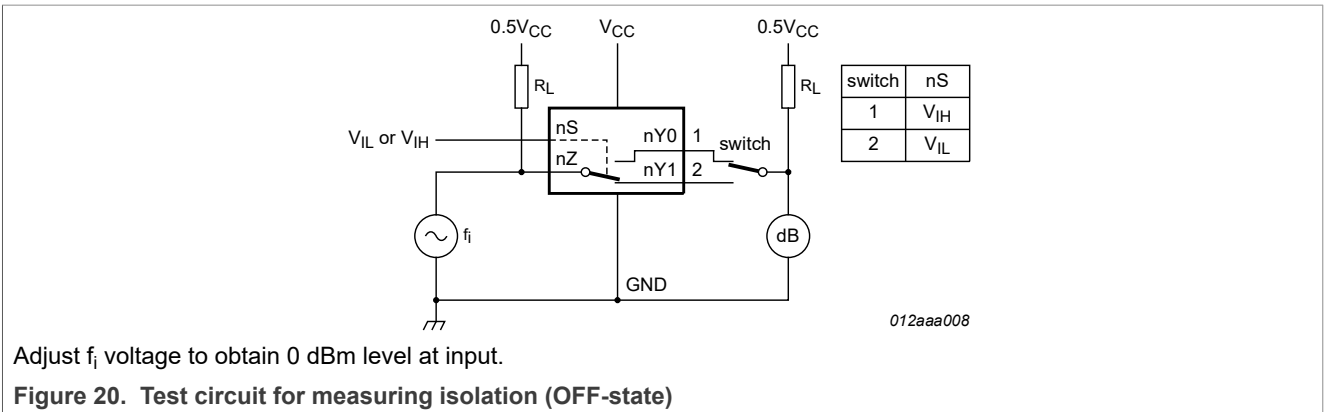


Figure 18. Test circuit for measuring total harmonic distortion



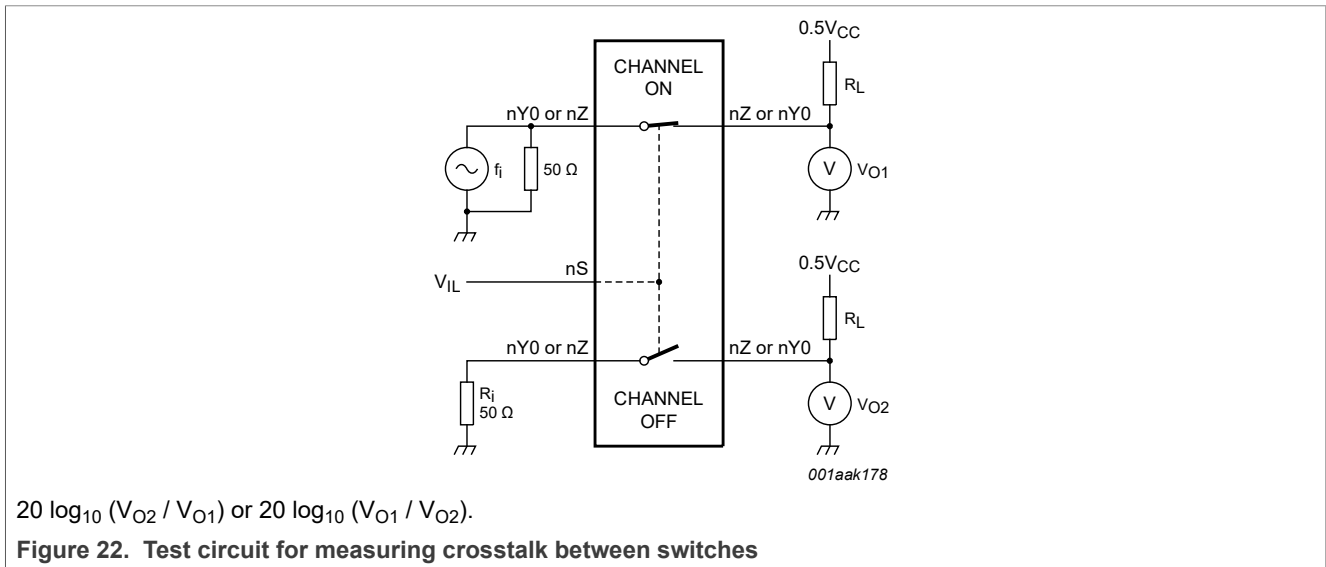
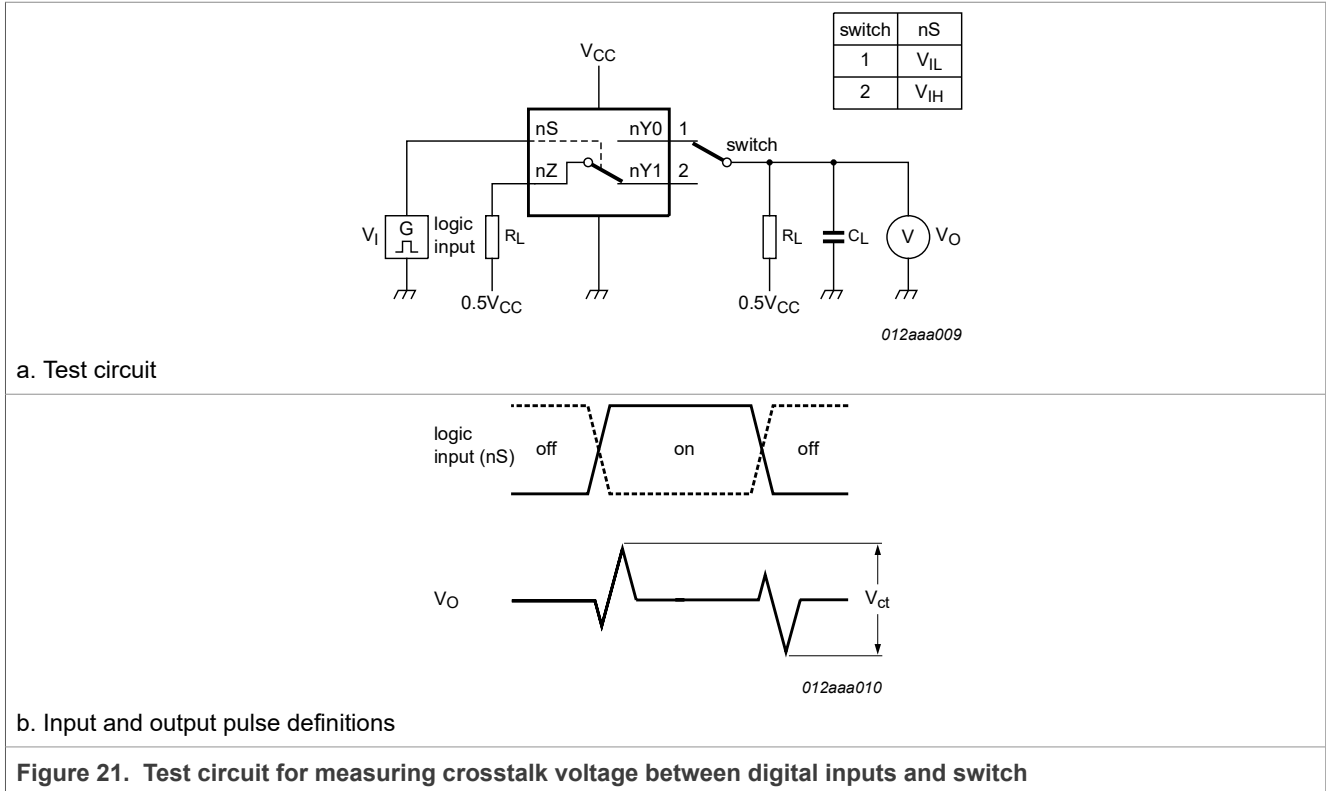
Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads -3 dB.

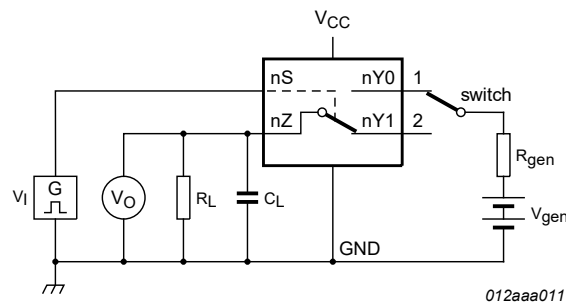
Figure 19. Test circuit for measuring the frequency response when channel is in ON-state



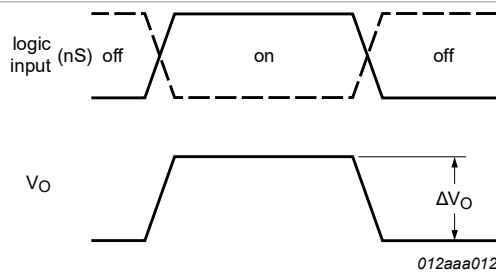
Adjust  $f_i$  voltage to obtain 0 dBm level at input.

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





a. Test circuit



b. Input and output pulse definitions

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

$\Delta V_O$  = output voltage variation.

$R_{gen}$  = generator resistance.

$V_{gen}$  = generator voltage.

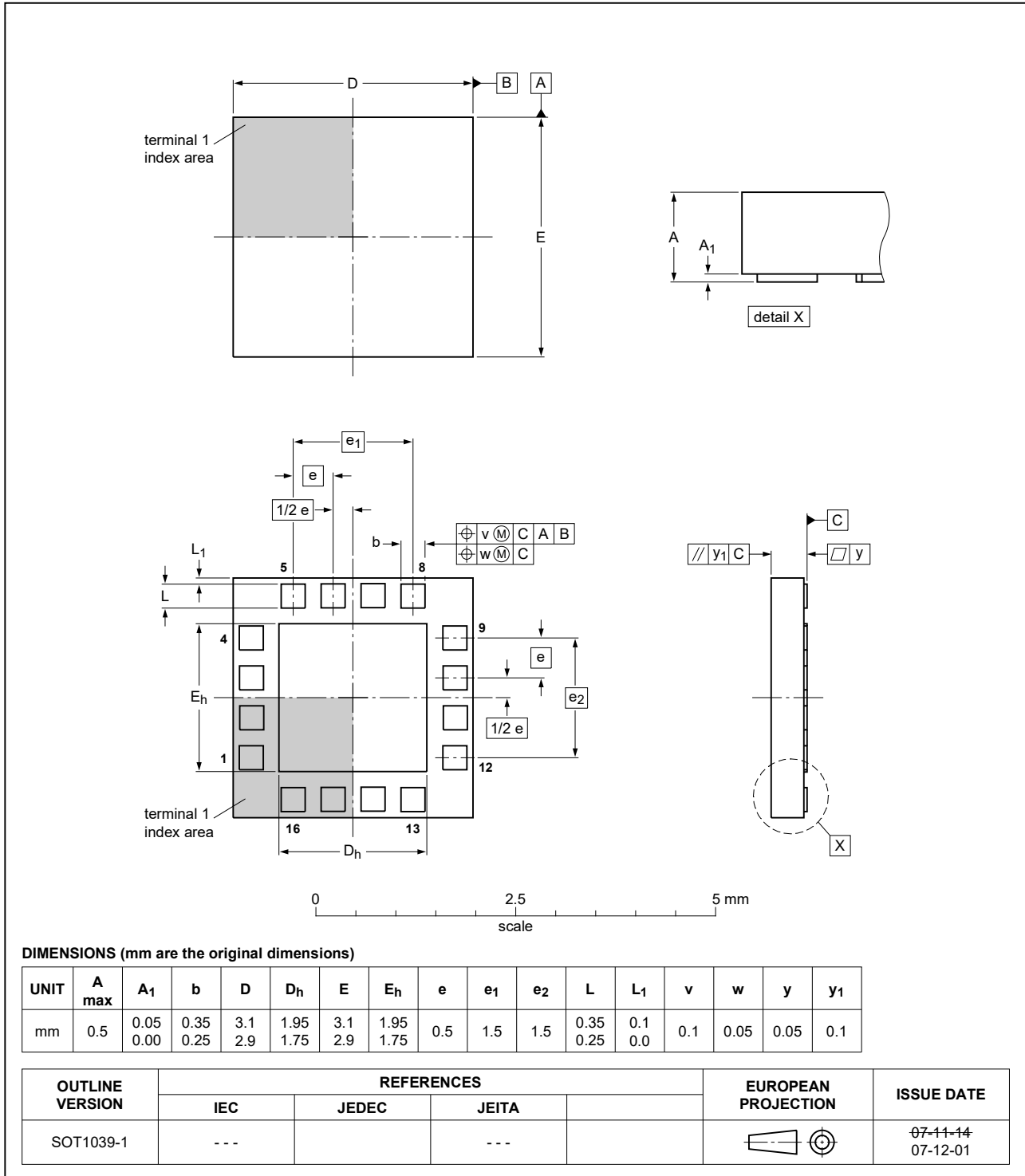
Figure 23. Test circuit for measuring charge injection



**12 Package outline**

**HXQFN16U: plastic thermal enhanced extremely thin quad flat package; no leads;  
16 terminals; UTLP based; body 3 x 3 x 0.5 mm**

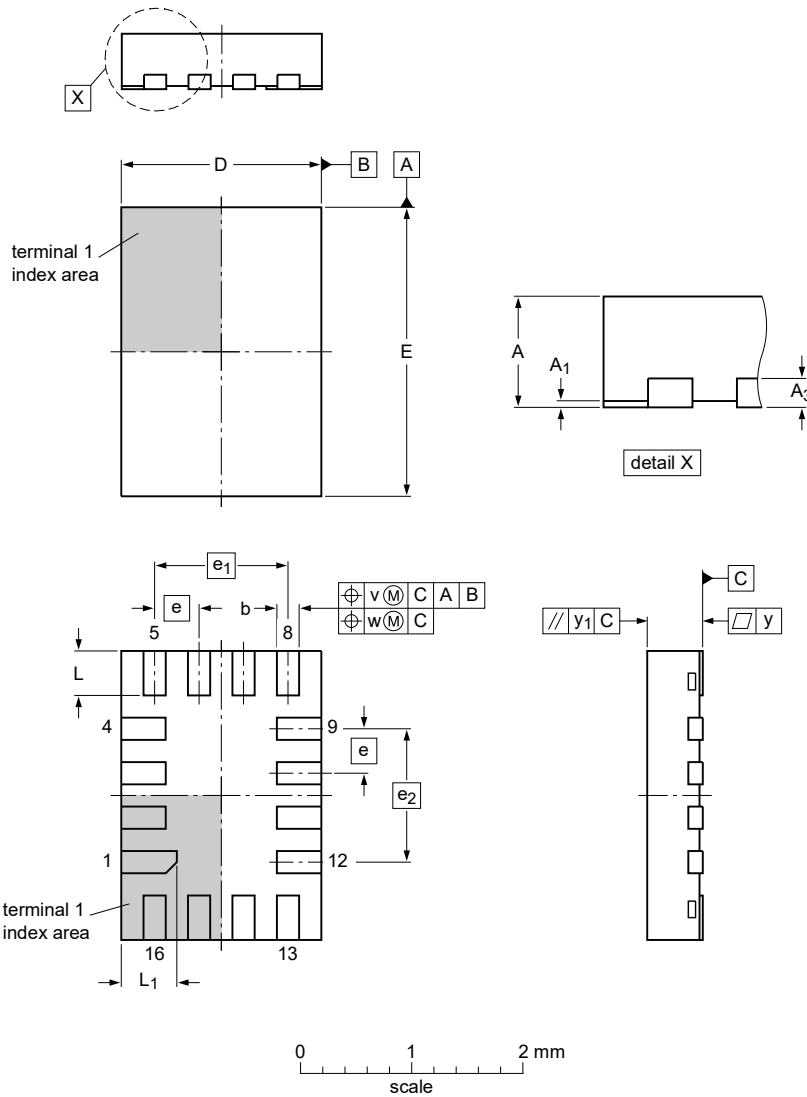
**SOT1039-1**



**Figure 24. Package outline SOT1039-1 (HXQFN16U)**

**XQFN16: plastic, extremely thin quad flat package; no leads;**  
**16 terminals; body 1.80 x 2.60 x 0.50 mm**

SOT1161-1



Dimensions

| Unit <sup>(1)</sup> | A   | A <sub>1</sub> | A <sub>3</sub> | b    | D   | E   | e   | e <sub>1</sub> | e <sub>2</sub> | L    | L <sub>1</sub> | v   | w    | y    | y <sub>1</sub> |
|---------------------|-----|----------------|----------------|------|-----|-----|-----|----------------|----------------|------|----------------|-----|------|------|----------------|
| max                 | 0.5 | 0.05           |                | 0.25 | 1.9 | 2.7 |     |                |                | 0.45 | 0.55           |     |      |      |                |
| mm nom              |     |                | 0.127          | 0.20 | 1.8 | 2.6 | 0.4 | 1.2            | 1.2            | 0.40 | 0.50           | 0.1 | 0.05 | 0.05 | 0.05           |
| min                 |     | 0.00           |                | 0.15 | 1.7 | 2.5 |     |                |                | 0.35 | 0.45           |     |      |      |                |

Note

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

sot1161-1\_po

| Outline version | References |       |       |  | European projection | Issue date            |
|-----------------|------------|-------|-------|--|---------------------|-----------------------|
|                 | IEC        | JEDEC | JEITA |  |                     |                       |
| SOT1161-1       | ---        | ---   | ---   |  |                     | 09-12-28-<br>09-12-29 |

Figure 25. Package outline SOT1161-1 (XQFN16)

## 13 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              |

## 14 Revision history

Table 14. Revision history

| Document ID     | Release date   | Data sheet status  | Change notice | Supersedes    |
|-----------------|--|--------------------|---------------|---------------|
| NX3DV3899 v.3.1 | 20210625   | Product data sheet | -             | NX3DV3899 v.3 |
| Modifications:  | <ul style="list-style-type: none"> <li>Updated <a href="#">Section 4</a>.</li> </ul> |                    |               |               |
| NX3DV3899 v.3   | 20111109   | Product data sheet | -             | NX3DV3899 v.2 |
| NX3DV3899 v.2   | 20101123   | Product data sheet | -             | NX3DV3899 v.1 |
| NX3DV3899 v.1   | 20101021   | Product data sheet | -             | -             |

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### 15.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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