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# XS3A4052

## Low-ohmic dual-pole quad-throw analog switch

Rev. 1 — 11 February 2022 Product data sheet

## 1. General description

The XS3A4052 is a low-ohmic dual-pole quad-throw analog switch (DP4T), suitable for use as an analog or digital multiplexer/demultiplexer. Each switch features four independent inputs/outputs (nY0, nY1, nY2 and nY3) and a common input/output (nZ). A digital enable input ($\overline{E}$) and two digital select inputs (S0 and S1) are common to both switches. When $\overline{E}$ is HIGH, the switches are turned off.

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 XS3A4052 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The XS3A4052 allows signals with amplitude up to $V_{CC}$ to be transmitted from nZ to nYn or from nYn to nZ. Its low ON resistance (0.5 Ω) and flatness (0.13 Ω) ensures minimal attenuation and distortion of transmitted signals.

## 2. Features and benefits

- Wide supply voltage range from 1.4 V to 4.3 V
- Very low ON resistance (peak):
  - 1.6 Ω (typical) at $V_{CC}$ = 1.4 V
  - 1.0 Ω (typical) at $V_{CC}$ = 1.65 V
  - 0.55 Ω (typical) at $V_{CC}$ = 2.3 V
  - 0.50 Ω (typical) at $V_{CC}$ = 2.7 V
  - 0.50 Ω (typical) at $V_{CC}$ = 4.3 V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - HBM ANSI/ESDA/JEDEC JS-001 exceeds 6000 V
  - CDM ANSI/ESDA/JEDEC JS-002 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 JESD78 Class II Level A
- Low-switching threshold levels
- 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

- Appliances
- Communication Systems
- Medical Equipment
- Analog Sensor Monitoring
- Audio Routing/Switching
- Test and Measurement

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## 4. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| XS3A4052PW | -40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |

## 5. Functional diagram

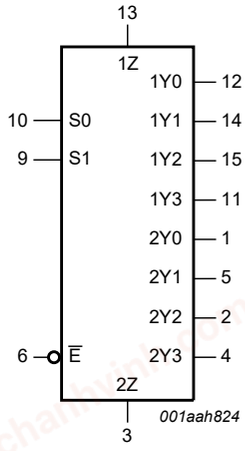



Fig. 1. Logic symbol

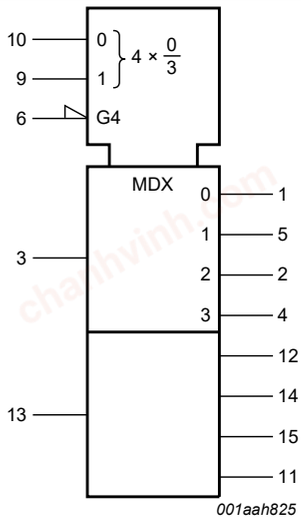



Fig. 2. IEC logic symbol


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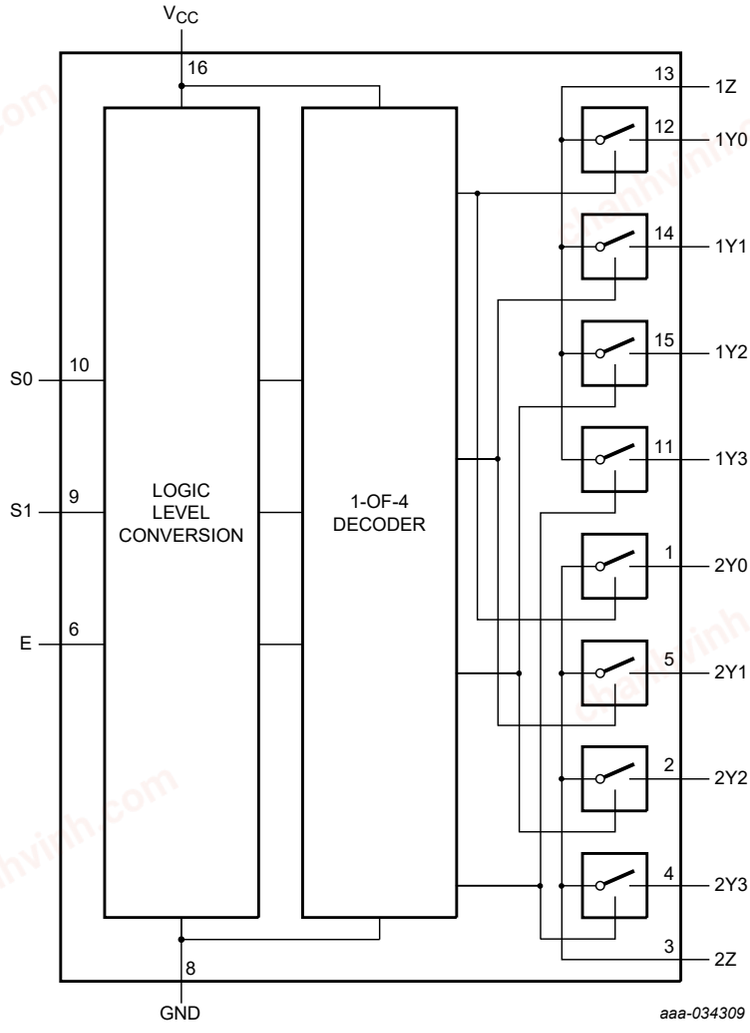



**Fig. 3. Functional diagram**


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# 6. Pinning information

## 6.1. Pinning

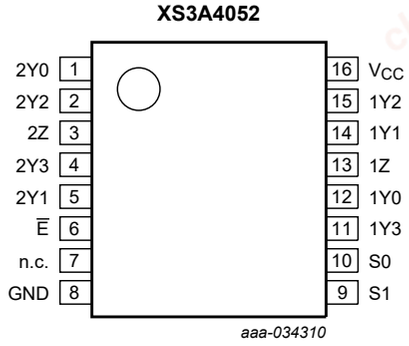



**Fig. 4. Pin configuration SOT403-1 (TSSOP16)**

## 6.2. Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| 2Y0, 2Y1, 2Y2, 2Y3 | 1, 5, 2, 4 | independent input or output |
| 1Z, 2Z | 13, 3 | common output or input |
| $\overline{E}$ | 6 | enable input (active LOW) |
| n.c. | 7 | not connected |
| GND | 8 | ground supply voltage |
| S0, S1 | 10, 9 | select input |
| 1Y0, 1Y1, 1Y2, 1Y3 | 12, 14, 15, 11 | independent input or output |
| $V_{CC}$ | 16 | supply voltage |


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# 7. Functional description

**Table 3. Function table**

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

| Input | | | Channel ON |
|---|---|---|---|
| $\overline{E}$ | S1 | S0 | |
| L | L | L | nY0 to nZ |
| L | L | H | nY1 to nZ |
| L | H | L | nY2 to nZ |
| L | H | H | nY3 to nZ |
| H | X | X | switches off |

# 8. Limiting values

**Table 4. 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 | Sn and $\overline{E}$ inputs [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 [3] | - | 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 SOT403-1 (TSSOP16) package: $P_{tot}$ derates linearly with 8.5 mW/K above 91 °C.


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# 9. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | 1.4 | 4.3 | V |
| $V_I$ | input voltage | Sn and $\overline{E}$ inputs | 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 $\overline{E}$ inputs; $V_{CC}$ = 1.4 V to 4.3 V [2] | - | 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 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 6. Static characteristics**

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

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = −40 °C to +85 °C | | $T_{amb}$ = −40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.4 V to 1.6 V | 0.9 | - | - | 0.9 | - | 0.9 | - | V |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 0.9 | - | - | 0.9 | - | 0.9 | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.1 | - | - | 1.1 | - | 1.1 | - | V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | 1.3 | - | - | 1.3 | - | 1.3 | - | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | 1.4 | - | - | 1.4 | - | 1.4 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 1.4 V to 1.6 V | - | - | 0.3 | - | 0.3 | - | 0.3 | V |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | - | 0.4 | - | 0.4 | - | 0.3 | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | - | 0.4 | - | 0.4 | - | 0.4 | V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | - | 0.6 | - | 0.6 | - | 0.6 | V |
| $I_I$ | input leakage current | Sn and $\overline{E}$ inputs; $V_I$ = GND to 4.3 V; $V_{CC}$ = 1.4 V to 4.3 V | - | - | - | - | ±0.5 | - | ±1 | µA |
| $I_{S(OFF)}$ | OFF-state leakage current | nYn port; see Fig. 5 | | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | - | - | ±5 | - | ±50 | - | ±500 | nA |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | - | ±10 | - | ±50 | - | ±500 | nA |
| $I_{S(ON)}$ | ON-state leakage current | nZ port; see Fig. 6 | | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | - | - | ±15 | - | ±150 | - | ±1500 | nA |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | - | ±20 | - | ±150 | - | ±1500 | nA |
| $I_{CC}$ | supply current | $V_I$ = $V_{CC}$ or GND; $V_{SW}$ = GND or $V_{CC}$ | | | | | | | | |
| | | $V_{CC}$ = 3.6 V | - | - | 100 | - | 690 | - | 6000 | nA |
| | | $V_{CC}$ = 4.3 V | - | - | 150 | - | 800 | - | 7000 | nA |


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| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = −40 °C to +85 °C | | $T_{amb}$ = −40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $\Delta I_{CC}$ | 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 | Sn and $\overline{E}$ inputs | - | 1.0 | - | - | - | - | - | pF |
| $C_{S(OFF)}$ | OFF-state capacitance | | - | 35 | - | - | - | - | - | pF |
| $C_{S(ON)}$ | ON-state capacitance | | - | tbd | - | - | - | - | - | pF |

**Table 7. ON resistance**

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

| Symbol | Parameter | Conditions | $T_{amb}$ = -40 °C to +85 °C | | | $T_{amb}$ = -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA; see Fig. 7 | | | | | | |
| | | $V_{CC}$ = 1.4 V | - | 1.6 | 3.7 | - | 4.1 | Ω |
| | | $V_{CC}$ = 1.65 V | - | 1.0 | 1.6 | - | 1.7 | Ω |
| | | $V_{CC}$ = 2.3 V | - | 0.55 | 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 |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA [2] | | | | | | |
| | | $V_{CC}$ = 1.4 V; $V_{SW}$ = 0.4 V | - | 0.07 | 0.3 | - | 0.3 | Ω |
| | | $V_{CC}$ = 1.65 V; $V_{SW}$ = 0.5 V | - | 0.06 | 0.2 | - | 0.3 | Ω |
| | | $V_{CC}$ = 2.3 V; $V_{SW}$ = 0.7 V | - | 0.06 | 0.10 | - | 0.13 | Ω |
| | | $V_{CC}$ = 2.7 V; $V_{SW}$ = 0.8 V | - | 0.06 | 0.10 | - | 0.13 | Ω |
| | | $V_{CC}$ = 4.3 V; $V_{SW}$ = 0.8 V | - | 0.06 | 0.10 | - | 0.13 | Ω |
| $R_{ON(flat)}$ | ON resistance (flatness) | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA [3] | | | | | | |
| | | $V_{CC}$ = 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 |

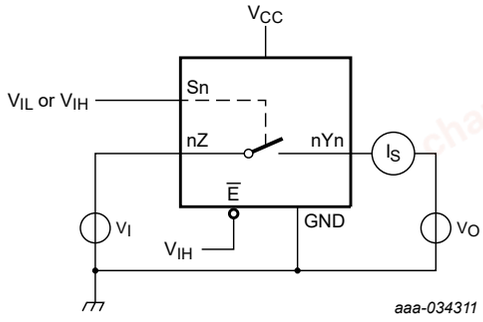
[1] Typical values are measured at $T_{amb}$ = 25 °C.
[2] Measured at identical $V_{CC}$, temperature and input voltage.
[3] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical $V_{CC}$ and temperature.


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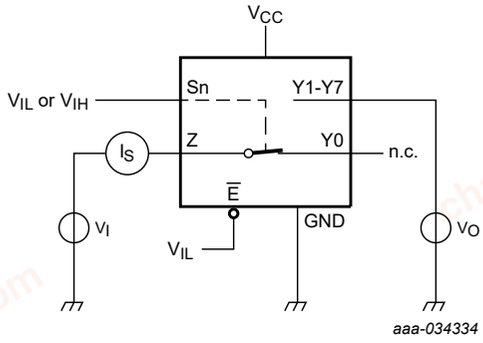


## 10.1. Test circuits and graphs




$V_I$ = 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

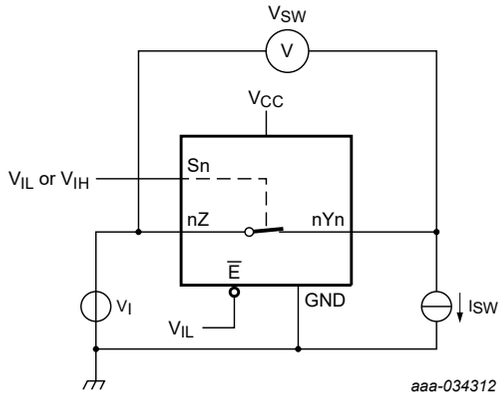
**Fig. 6. Test circuit for measuring ON-state leakage current**


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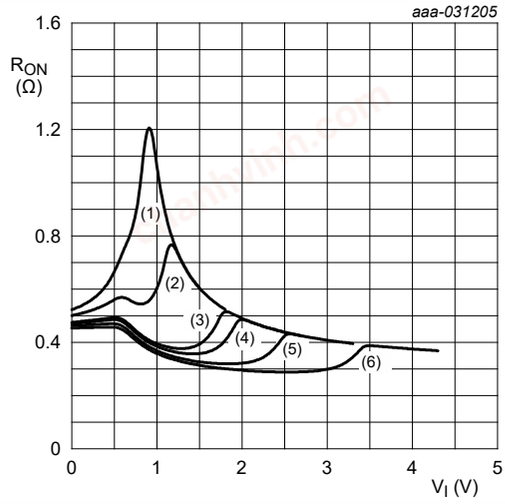
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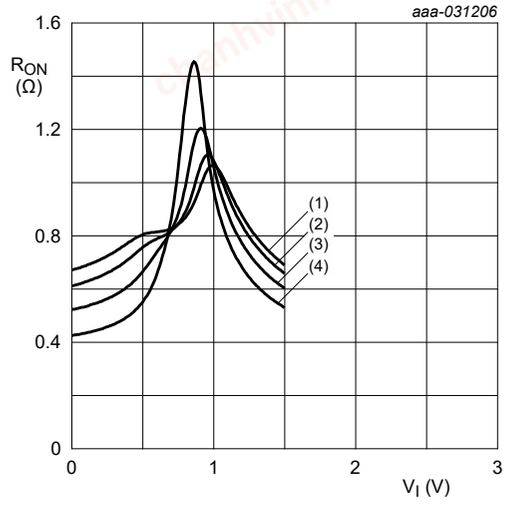

$R_{ON} = V_{SW} / I_{SW}$

**Fig. 7. Test circuit for measuring ON resistance**



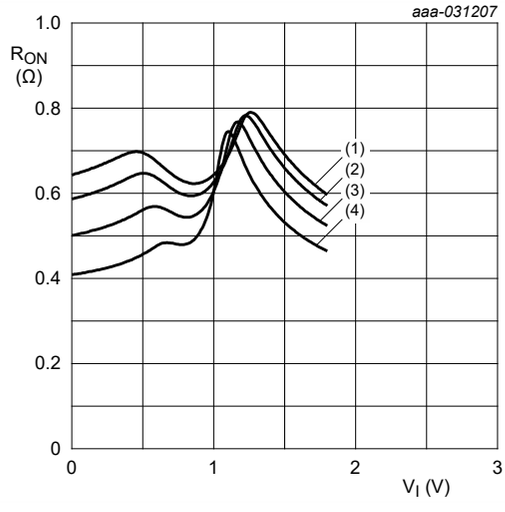

(1) $V_{CC}$ = 1.5 V
(2) $V_{CC}$ = 1.8 V
(3) $V_{CC}$ = 2.5 V
(4) $V_{CC}$ = 2.7 V
(5) $V_{CC}$ = 3.3 V
(6) $V_{CC}$ = 4.3 V
Measured at $T_{amb}$ = 25 °C

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




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

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




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

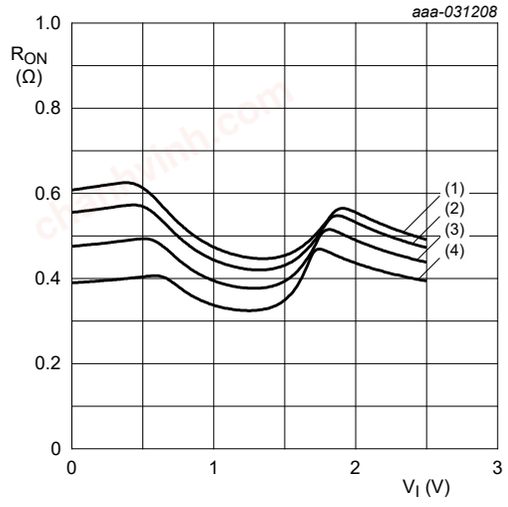
**Fig. 10. ON resistance as a function of input voltage; $V_{CC}$ = 1.8 V**


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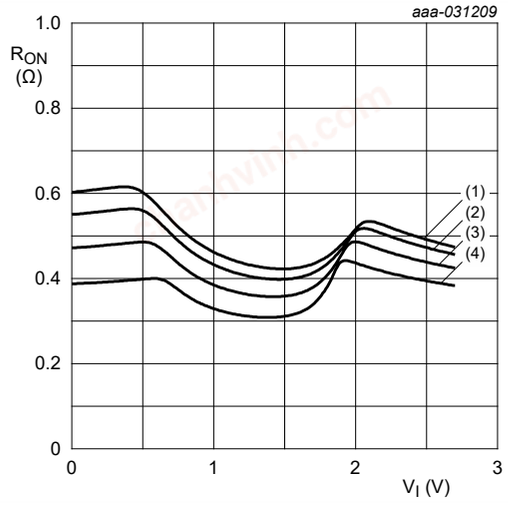
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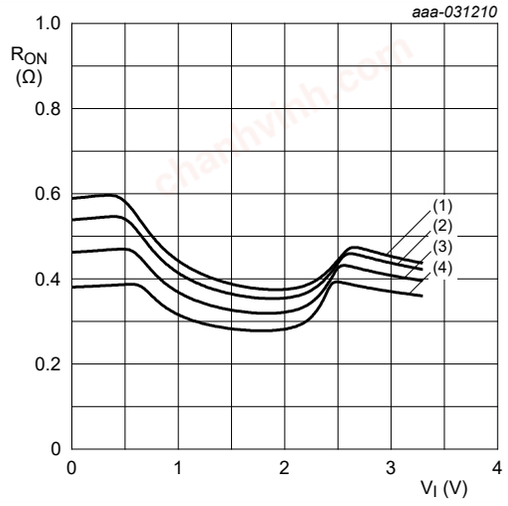

(1) $T_{amb}$ = 125 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = -40 °C

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



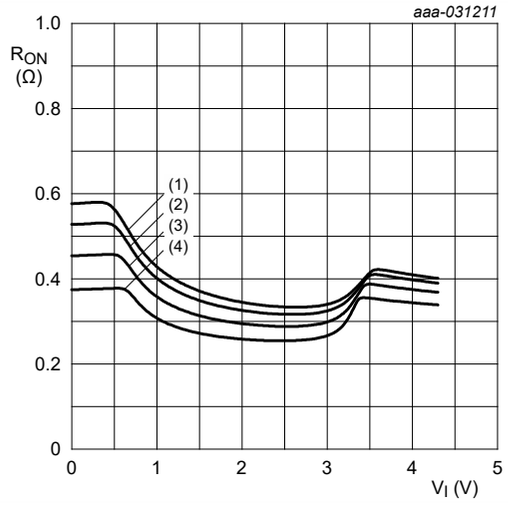

(1) $T_{amb}$ = 125 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = -40 °C

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




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

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




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

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


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# 11. Dynamic characteristics

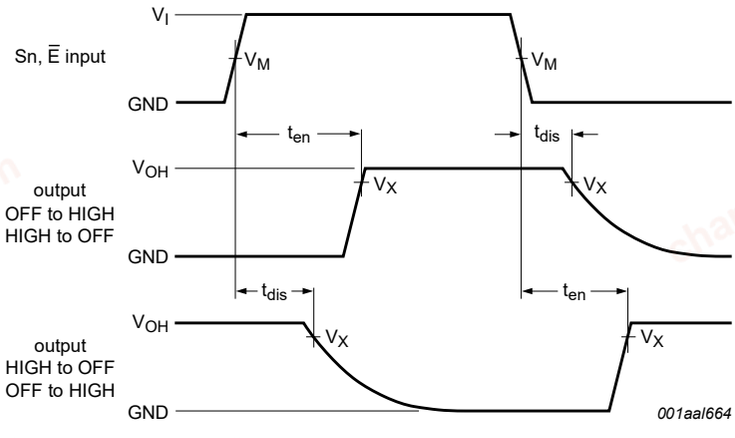
**Table 8. Dynamic characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 17.*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = −40 °C to +85 °C | | $T_{amb}$ = −40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | Min | Max | |
| $t_{en}$ | enable time | $\overline{E}$, Sn to nZ or nYn; see Fig. 15 | | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 50 | 110 | - | 120 | - | 120 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | 36 | 70 | - | 80 | - | 90 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 24 | 45 | - | 50 | - | 55 | ns |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | 22 | 40 | - | 45 | - | 50 | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 22 | 40 | - | 45 | - | 50 | ns |
| $t_{dis}$ | disable time | $\overline{E}$, Sn to nZ or nYn; see Fig. 15 | | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 32 | 90 | - | 90 | - | 90 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | 20 | 55 | - | 60 | - | 65 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 12 | 25 | - | 30 | - | 35 | ns |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | 10 | 20 | - | 25 | - | 30 | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 10 | 20 | - | 25 | - | 30 | ns |
| $t_{b-m}$ | break-before-make time | see Fig. 16 [2] | | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 19 | - | 9 | - | 9 | - | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | 17 | - | 7 | - | 7 | - | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 13 | - | 4 | - | 4 | - | ns |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | 10 | - | 3 | - | 3 | - | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 10 | - | 2 | - | 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.

## 11.1. Waveforms and test circuit




Measurement points are given in Table 9.

Logic level: $V_{OH}$ is typical output voltage level that occurs with the output load.

**Fig. 15. Enable and disable times**


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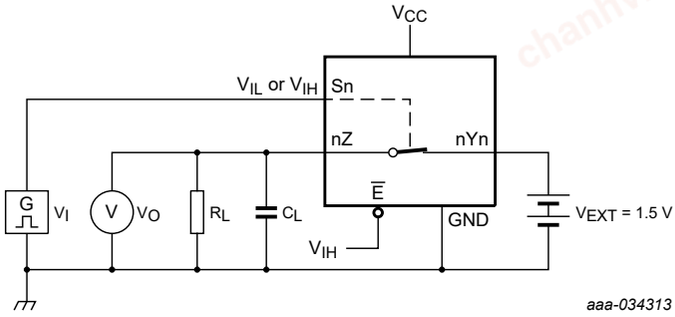
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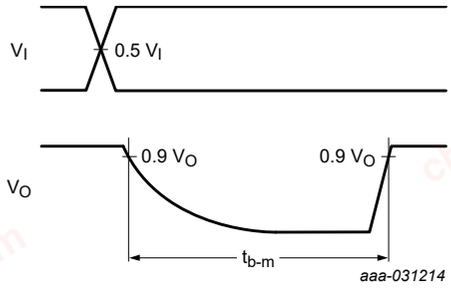


**Table 9. Measurement points**

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

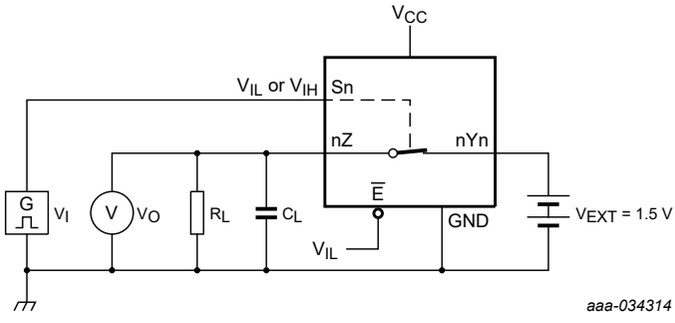



a. Test circuit




b. Input and output measurement points

**Fig. 16. Test circuit for measuring break-before-make times**




Test data is given in Table 10.

Definitions test circuit:

$R_L$ = Load resistance.

$C_L$ = Load capacitance including jig and probe capacitance.

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

**Fig. 17. Test circuit for measuring switching times**

**Table 10. 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 |


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## 11.2. Additional dynamic characteristics

**Table 11. 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.*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| THD | total harmonic distortion | $f_i$ = 20 Hz to 20 kHz; $R_L$ = 32 Ω; see Fig. 18 [1] | | | | |
| | | $V_{CC}$ = 1.4 V; $V_I$ = 1 V (p-p) | - | 0.17 | - | % |
| | | $V_{CC}$ = 1.65 V; $V_I$ = 1.2 V (p-p) | - | 0.10 | - | % |
| | | $V_{CC}$ = 2.3 V; $V_I$ = 1.5 V (p-p) | - | 0.05 | - | % |
| | | $V_{CC}$ = 2.7 V; $V_I$ = 2 V (p-p) | - | 0.04 | - | % |
| | | $V_{CC}$ = 4.3 V; $V_I$ = 2 V (p-p) | - | 0.01 | - | % |
| $f_{(-3dB)}$ | -3 dB frequency response | $R_L$ = 50 Ω; see Fig. 19 [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | - | 25 | - | MHz |
| $\alpha_{iso}$ | isolation (OFF-state) | $f_i$ = 100 kHz; $R_L$ = 50 Ω; see Fig. 20 [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | - | -90 | - | dB |
| $V_{ct}$ | crosstalk voltage | between digital inputs and switch; $f_i$ = 1 MHz; $C_L$ = 50 pF; $R_L$ = 50 Ω; see Fig. 21 [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | - | 0.2 | - | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 0.4 | - | V |
| Xtalk | crosstalk | between switches; $f_i$ = 100 kHz; $R_L$ = 50 Ω; see Fig. 22 [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 MΩ; $V_{gen}$ = 0 V; $R_{gen}$ = 0 Ω; see Fig. 23 [1] | | | | |
| | | $V_{CC}$ = 1.5 V | - | 3 | - | pC |
| | | $V_{CC}$ = 1.8 V | - | 4 | - | pC |
| | | $V_{CC}$ = 2.5 V | - | 6 | - | pC |
| | | $V_{CC}$ = 3.3 V | - | 9 | - | pC |
| | | $V_{CC}$ = 4.3 V | - | 15 | - | pC |

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


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## 11.3. Additional test circuits

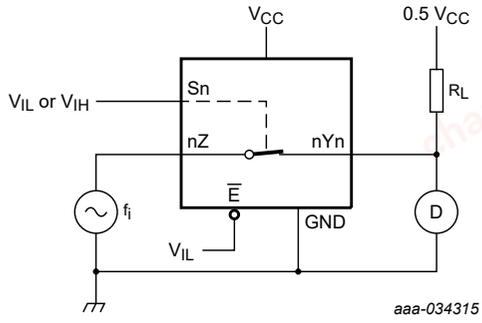
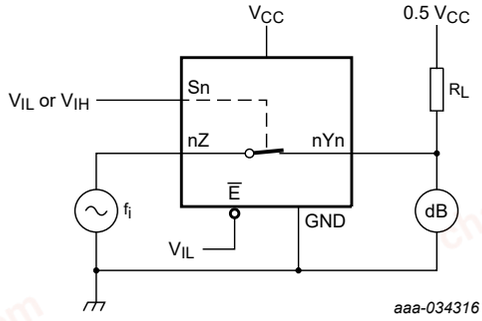
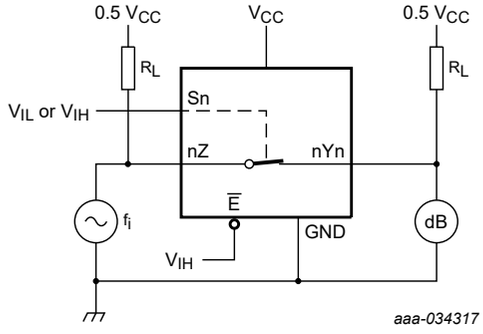



**Fig. 18. Test circuit for measuring total harmonic distortion**




Adjust $f_i$ voltage to obtain 0 dBm level at output. Increase $f_i$ frequency until dB meter reads -3 dB.
$R_S = R_L = 50\ \Omega$ (standard 50 Ω system).

**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.

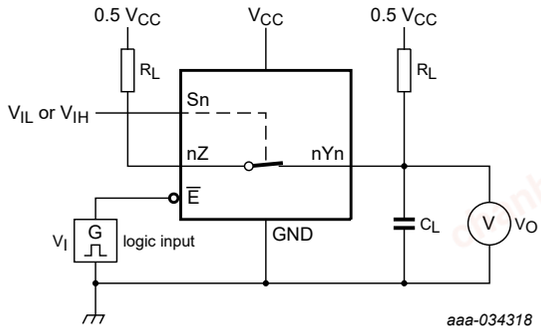
**Fig. 20. Test circuit for measuring isolation (OFF-state)**


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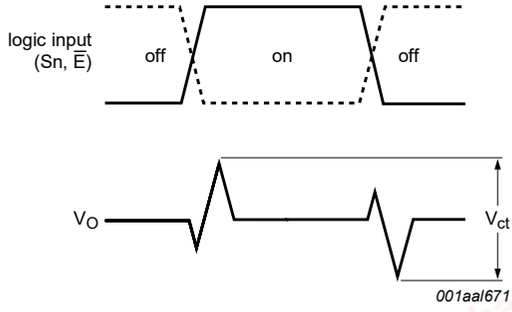
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a. Test circuit




b. Input and output pulse definitions

**Fig. 21. Test circuit for measuring crosstalk voltage between digital input and switch**

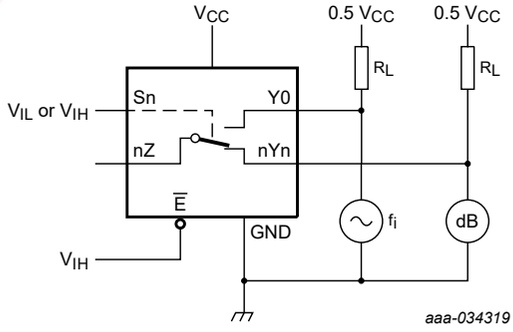


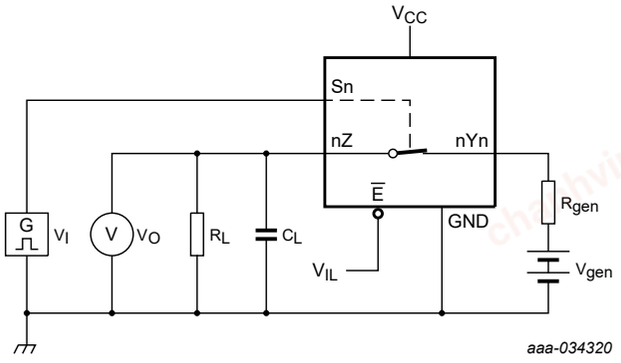

**Fig. 22. Test circuit for measuring crosstalk between switches**


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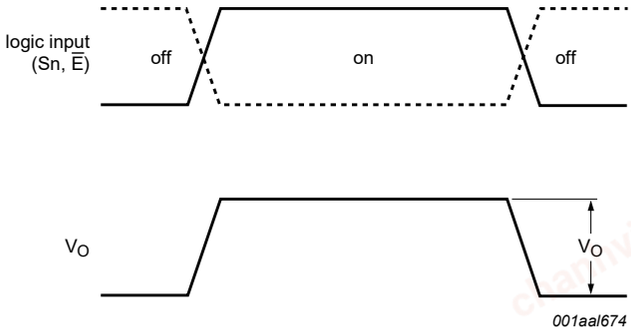
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a. Test circuit




b. Input and output pulse definitions

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

**Fig. 23. Test circuit for measuring charge injection**


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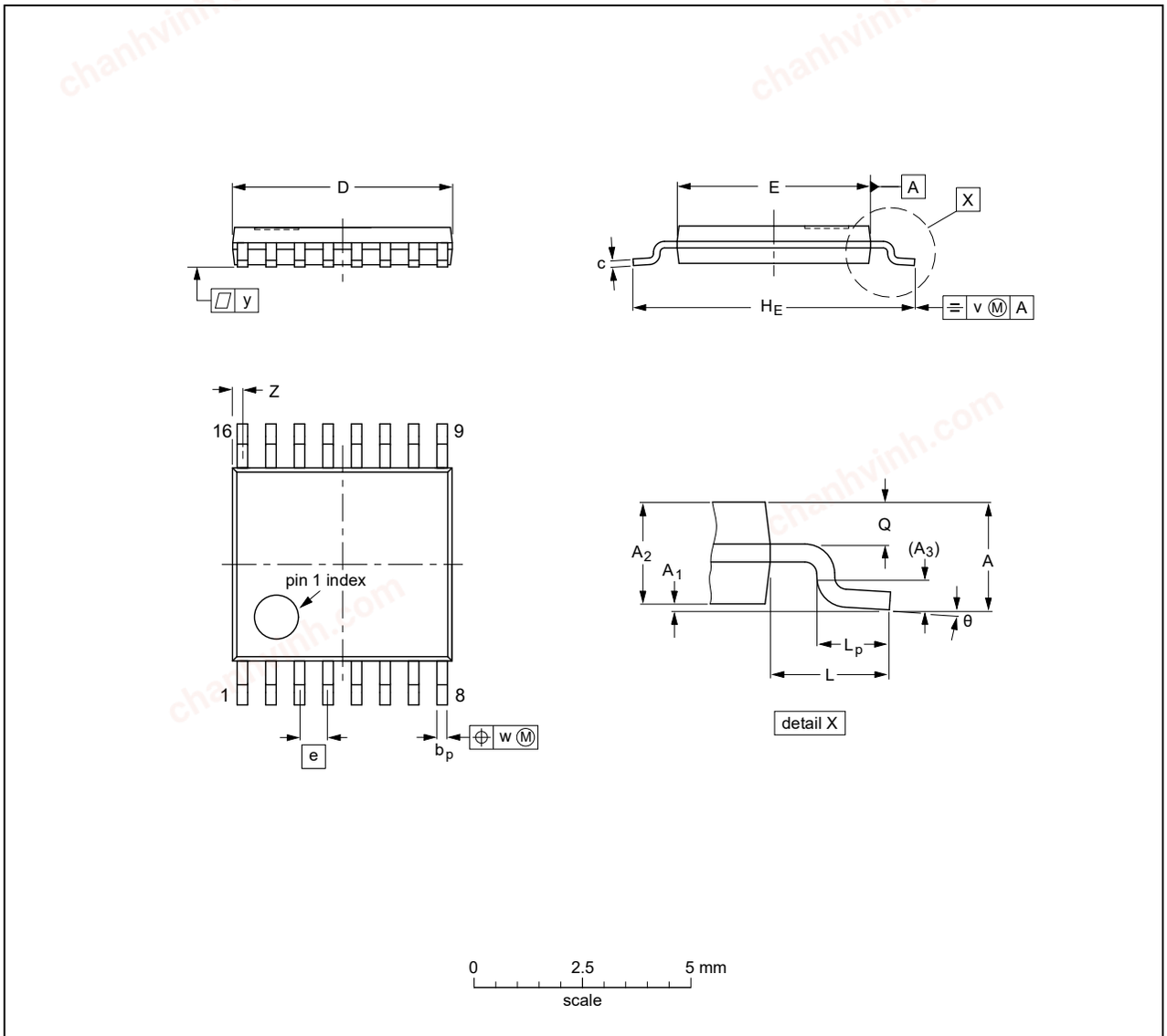
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## 12. Package outline

**TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm** **SOT403-1**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | D (1) | E (2) | e | $H_E$ | L | $L_p$ | Q | v | w | y | Z (1) | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.15<br>0.05 | 0.95<br>0.80 | 0.25 | 0.30<br>0.19 | 0.2<br>0.1 | 5.1<br>4.9 | 4.5<br>4.3 | 0.65 | 6.6<br>6.2 | 1 | 0.75<br>0.50 | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.40<br>0.06 | 8°<br>0° |

**Notes**

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT403-1 | | MO-153 | | | | ~~99-12-27~~<br>03-02-18 |

**Fig. 24. Package outline SOT403-1 (TSSOP16)**


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# 13. Abbreviations

**Table 12. Abbreviations**

| Acronym | Description |
|---|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal-Oxide Semiconductor |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |

# 14. Revision history

**Table 13. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| XS3A4052 v.1 | 20220211 | Product data sheet | - | - |


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| 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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