

# 74LVC1G66-Q100

## Bilateral switch

Rev. 2 — 9 December 2016

Product data sheet

## 1. General description

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The 74LVC1G66-Q100 provides one single pole, single-throw analog switch function. It has two input/output terminals (Y and Z) and an active HIGH enable input pin (E). When E is LOW, the analog switch is turned off.

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

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

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- 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 1.65 V to 5.5 V
- Very low ON resistance:
  - ◆  $7.5\text{ }\Omega$  (typical) at  $V_{CC} = 2.7\text{ V}$
  - ◆  $6.5\text{ }\Omega$  (typical) at  $V_{CC} = 3.3\text{ V}$
  - ◆  $6\text{ }\Omega$  (typical) at  $V_{CC} = 5\text{ V}$
- Switch current capability of 32 mA
- High noise immunity
- CMOS low power consumption
- TTL interface compatibility at 3.3 V
- Latch-up performance meets requirements of JESD78 Class I
- ESD protection:
  - ◆ MIL-STD-883, method 3015 exceeds 2000 V
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V ( $C = 200\text{ pF}$ ,  $R = 0\text{ }\Omega$ )
- Enable input accepts voltages up to 5.5 V
- Multiple package options

3. Ordering information

Table 1. Ordering information

| Type number      | Package           |        |  |          |
|------------------|-------------------|--------|--|----------|
|                  | Temperature range | Name   | Description  | Version  |
| 74LVC1G66GW-Q100 | −40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74LVC1G66GV-Q100 | −40 °C to +125 °C | SC-74A | plastic surface-mounted package; 5 leads                               | SOT753   |

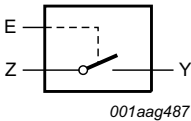
4. Marking

Table 2. Marking

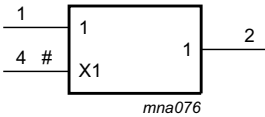
| Type number      | Marking code <sup>[1]</sup> |
|------------------|-----------------------------|
| 74LVC1G66GW-Q100 | VL                          |
| 74LVC1G66GV-Q100 | V66                         |

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

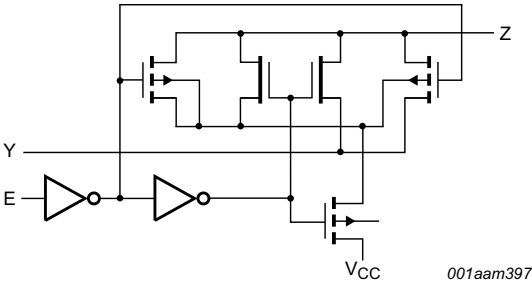
5. Functional diagram



**Fig 1. Logic symbol**



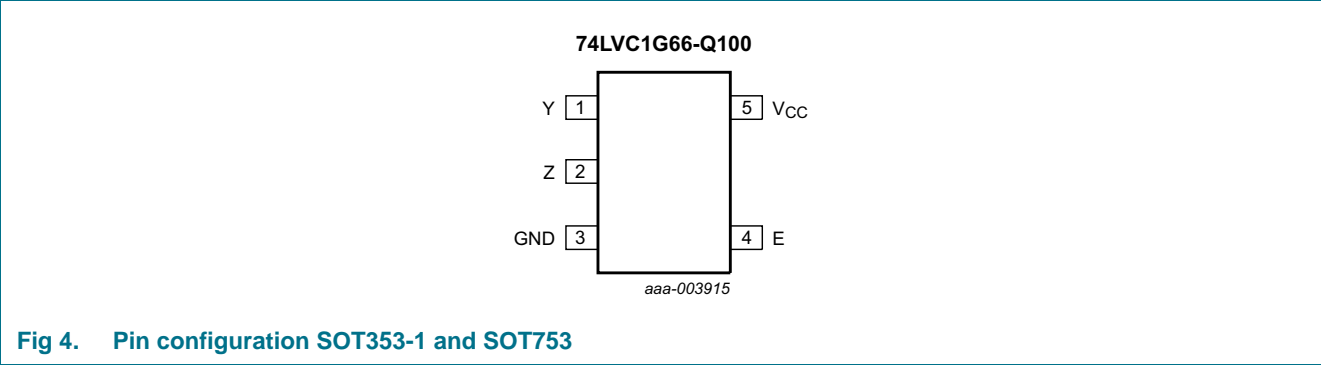
**Fig 2. IEC logic symbol**



**Fig 3. Logic diagram**

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

| Symbol          | Pin | Symbol                      |
|-----------------|-----|-----------------------------|
| Y               | 1   | independent input or output |
| Z               | 2   | independent output or input |
| GND             | 3   | ground (0 V)                |
| E               | 4   | enable input (active HIGH)  |
| V <sub>CC</sub> | 5   | supply voltage              |

7. Functional description

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

| Input E | Switch    |
|---------|-----------|
| L       | OFF-state |
| H       | ON-state  |

[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 |
|-----------|-------------------------|--|------|----------------|------|
| $V_{CC}$  | supply voltage          |  | -0.5 | +6.5           | V    |
| $V_I$     | input voltage           | [1]  | -0.5 | +6.5           | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$       | -50  | -              | mA   |
| $I_{SK}$  | switch clamping current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$       | -    | $\pm 50$       | mA   |
| $V_{SW}$  | switch voltage          | enable and disable mode [2]                                  | -0.5 | $V_{CC} + 0.5$ | V    |
| $I_{SW}$  | switch current          | $V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$ | -    | $\pm 50$       | mA   |
| $I_{CC}$  | supply current          |  | -    | 100            | mA   |
| $I_{GND}$ | ground current          |  | -100 | -              | mA   |
| $T_{stg}$ | storage temperature     |  | -65  | +150           | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [3]            | -    | 250            | mW   |

- [1] The minimum input voltage rating may be exceeded if the input current rating is observed.
- [2] The minimum and maximum switch voltage ratings may be exceeded if the switch clamping current rating is observed.
- [3] For TSSOP5 and SC-74A packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.  
For XSON6 packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

| Symbol              | Parameter                           | Conditions                                     | Min  | Typ | Max      | Unit |
|---------------------|-------------------------------------|--|------|-----|----------|------|
| $V_{CC}$            | supply voltage                      |  | 1.65 | -   | 5.5      | V    |
| $V_I$               | input voltage                       |  | 0    | -   | 5.5      | V    |
| $V_{SW}$            | switch voltage                      | [1]  | 0    | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 |  | -40  | -   | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.65\text{ V}$ to $2.7\text{ V}$ [2] | -    | -   | 20       | ns/V |
|                     |                                     | $V_{CC} = 2.7\text{ V}$ to $5.5\text{ V}$ [2]  | -    | -   | 10       | ns/V |

- [1] To avoid sinking GND current from terminal Z when switch current flows in terminal Y, 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 Y. 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**

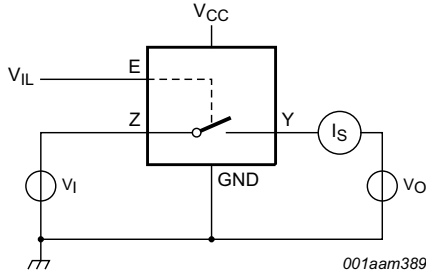
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol              | Parameter                 | Conditions  | –40 °C to +85 °C    |                    |                     | –40 °C to +125 °C   |                     | Unit |
|---------------------|---------------------------|---|---------------------|--------------------|---------------------|---------------------|---------------------|------|
|                     |                           |   | Min                 | Typ <sup>[1]</sup> | Max                 | Min                 | Max                 |      |
| V <sub>IH</sub>     | HIGH-level input voltage  | V <sub>CC</sub> = 1.65 V to 1.95 V  | 0.65V <sub>CC</sub> | -                  | -                   | 0.65V <sub>CC</sub> | -                   | V    |
|                     |                           | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.7                 | -                  | -                   | 1.7                 | -                   | V    |
|                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V  | 2.0                 | -                  | -                   | 2.0                 | -                   | V    |
|                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | 0.7V <sub>CC</sub>  | -                  | -                   | 0.7V <sub>CC</sub>  | -                   | V    |
| V <sub>IL</sub>     | LOW-level input voltage   | V <sub>CC</sub> = 1.65 V to 1.95 V  | -                   | -                  | 0.35V <sub>CC</sub> | -                   | 0.35V <sub>CC</sub> | V    |
|                     |                           | V <sub>CC</sub> = 2.3 V to 2.7 V  | -                   | -                  | 0.7                 | -                   | 0.7                 | V    |
|                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V  | -                   | -                  | 0.8                 | -                   | 0.8                 | V    |
|                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | -                   | -                  | 0.3V <sub>CC</sub>  | -                   | 0.3V <sub>CC</sub>  | V    |
| I <sub>I</sub>      | input leakage current     | pin E; V <sub>I</sub> = 5.5 V or GND;<br>V <sub>CC</sub> = 0 V to 5.5 V <sup>[2]</sup>  | -                   | ±0.1               | ±1                  | -                   | ±1                  | μA   |
| I <sub>S(OFF)</sub> | OFF-state leakage current | V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 5</a> <sup>[2]</sup>  | -                   | ±0.1               | ±0.2                | -                   | ±0.5                | μA   |
| I <sub>S(ON)</sub>  | ON-state leakage current  | V <sub>CC</sub> = 5.5 V; see <a href="#">Figure 6</a> <sup>[2]</sup>  | -                   | ±0.1               | ±1                  | -                   | ±2                  | μA   |
| I <sub>CC</sub>     | supply current            | V <sub>I</sub> = 5.5 V or GND;<br>V <sub>SW</sub> = GND or V <sub>CC</sub> ;<br>V <sub>CC</sub> = 1.65 V to 5.5 V <sup>[2]</sup>      | -                   | 0.1                | 4                   | -                   | 4                   | μA   |
| ΔI <sub>CC</sub>    | additional supply current | pin E; V <sub>I</sub> = V <sub>CC</sub> – 0.6 V;<br>V <sub>SW</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 5.5 V <sup>[2]</sup> | -                   | 5                  | 500                 | -                   | 500                 | μA   |
| C <sub>I</sub>      | input capacitance         |   | -                   | 2.0                | -                   | -                   | -                   | pF   |
| C <sub>S(OFF)</sub> | OFF-state capacitance     |   | -                   | 6.5                | -                   | -                   | -                   | pF   |
| C <sub>S(ON)</sub>  | ON-state capacitance      |   | -                   | 11                 | -                   | -                   | -                   | pF   |

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

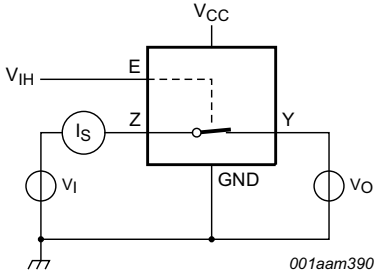
[2] These typical values are measured at V<sub>CC</sub> = 3.3 V.

10.1 Test circuits



$V_I = V_{CC}$  or GND and  $V_O =$  GND or  $V_{CC}$ .

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



$V_I = V_{CC}$  or GND and  $V_O =$  open circuit.

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

10.2 ON resistance

**Table 8. ON resistance**  
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 8](#) to [Figure 13](#).

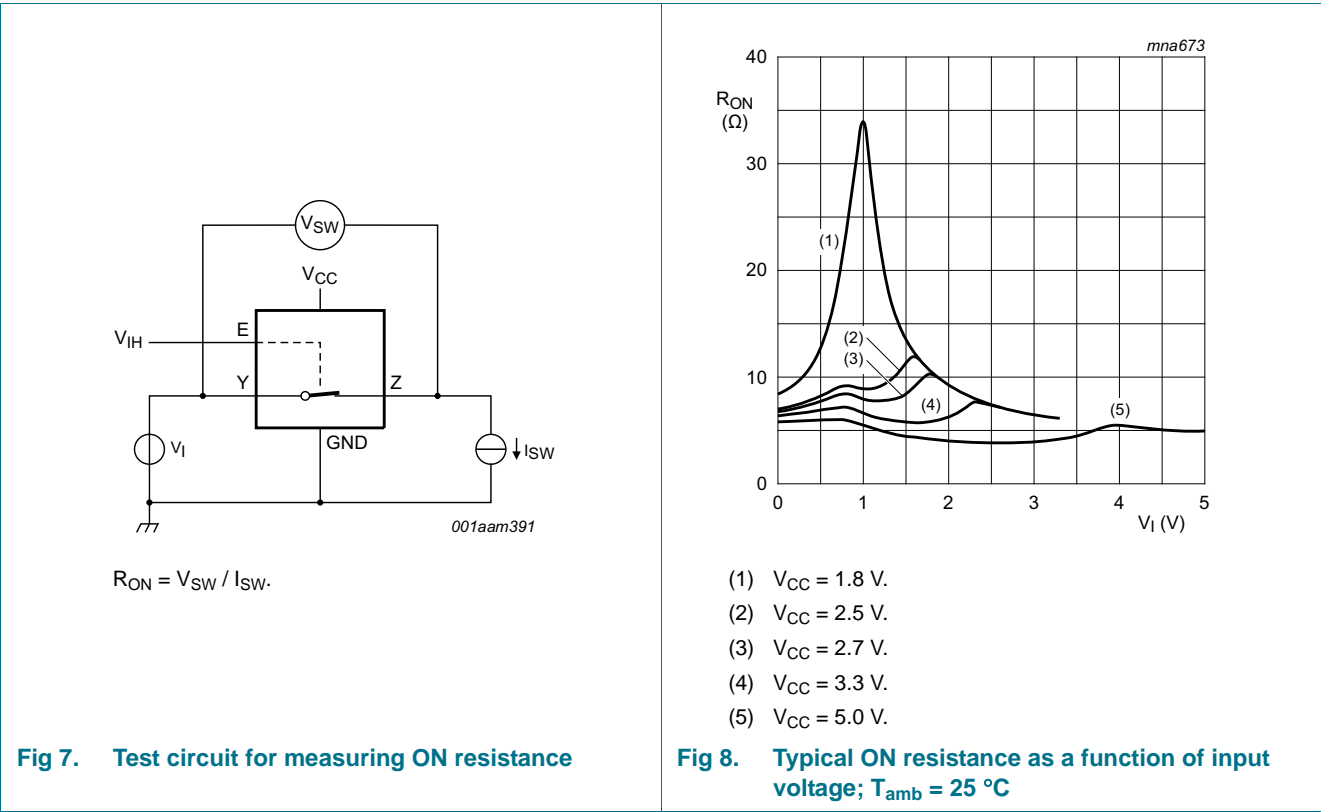
| Symbol    | Parameter            | Conditions   | −40 °C to +85 °C |                    |     | −40 °C to +125 °C |     | Unit |
|-----------|----------------------|--|------------------|--------------------|-----|-------------------|-----|------|
|           |                      |  | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| RON(peak) | ON resistance (peak) | $V_I =$ GND to $V_{CC}$ ; see <a href="#">Figure 7</a> |                  |                    |     |                   |     |      |
|           |                      | $I_{SW} = 4$ mA; $V_{CC} = 1.65$ V to 1.95 V           | -                | 34.0               | 130 | -                 | 195 | Ω    |
|           |                      | $I_{SW} = 8$ mA; $V_{CC} = 2.3$ V to 2.7 V             | -                | 12.0               | 30  | -                 | 45  | Ω    |
|           |                      | $I_{SW} = 12$ mA; $V_{CC} = 2.7$ V                     | -                | 10.4               | 25  | -                 | 38  | Ω    |
|           |                      | $I_{SW} = 24$ mA; $V_{CC} = 3.0$ V to 3.6 V            | -                | 7.8                | 20  | -                 | 30  | Ω    |
|           |                      | $I_{SW} = 32$ mA; $V_{CC} = 4.5$ V to 5.5 V            | -                | 6.2                | 15  | -                 | 23  | Ω    |
| RON(rail) | ON resistance (rail) | $V_I =$ GND; see <a href="#">Figure 7</a>              |                  |                    |     |                   |     |      |
|           |                      | $I_{SW} = 4$ mA; $V_{CC} = 1.65$ V to 1.95 V           | -                | 8.2                | 18  | -                 | 27  | Ω    |
|           |                      | $I_{SW} = 8$ mA; $V_{CC} = 2.3$ V to 2.7 V             | -                | 7.1                | 16  | -                 | 24  | Ω    |
|           |                      | $I_{SW} = 12$ mA; $V_{CC} = 2.7$ V                     | -                | 6.9                | 14  | -                 | 21  | Ω    |
|           |                      | $I_{SW} = 24$ mA; $V_{CC} = 3.0$ V to 3.6 V            | -                | 6.5                | 12  | -                 | 18  | Ω    |
|           |                      | $I_{SW} = 32$ mA; $V_{CC} = 4.5$ V to 5.5 V            | -                | 5.8                | 10  | -                 | 15  | Ω    |
|           |                      | $V_I = V_{CC}$ ; see <a href="#">Figure 7</a>          |                  |                    |     |                   |     |      |
|           |                      | $I_{SW} = 4$ mA; $V_{CC} = 1.65$ V to 1.95 V           | -                | 10.4               | 30  | -                 | 45  | Ω    |
|           |                      | $I_{SW} = 8$ mA; $V_{CC} = 2.3$ V to 2.7 V             | -                | 7.6                | 20  | -                 | 30  | Ω    |
|           |                      | $I_{SW} = 12$ mA; $V_{CC} = 2.7$ V                     | -                | 7.0                | 18  | -                 | 27  | Ω    |
|           |                      | $I_{SW} = 24$ mA; $V_{CC} = 3.0$ V to 3.6 V            | -                | 6.1                | 15  | -                 | 23  | Ω    |
|           |                      | $I_{SW} = 32$ mA; $V_{CC} = 4.5$ V to 5.5 V            | -                | 4.9                | 10  | -                 | 15  | Ω    |

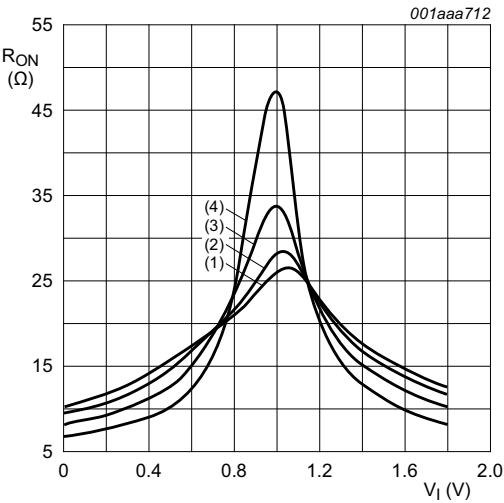
**Table 8. ON resistance ...continued**  
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 8](#) to [Figure 13](#).

| Symbol                | Parameter                | Conditions   | −40 °C to +85 °C |                    |     | −40 °C to +125 °C |     | Unit |
|-----------------------|--------------------------|--|------------------|--------------------|-----|-------------------|-----|------|
|                       |                          |  | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| R <sub>ON(flat)</sub> | ON resistance (flatness) | V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[2]</sup>     |                  |                    |     |                   |     |      |
|                       |                          | I <sub>SW</sub> = 4 mA; V <sub>CC</sub> = 1.65 V to 1.95 V | -                | 26.0               | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 8 mA; V <sub>CC</sub> = 2.3 V to 2.7 V   | -                | 5.0                | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 12 mA; V <sub>CC</sub> = 2.7 V           | -                | 3.5                | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 24 mA; V <sub>CC</sub> = 3.0 V to 3.6 V  | -                | 2.0                | -   | -                 | -   | Ω    |
|                       |                          | I <sub>SW</sub> = 32 mA; V <sub>CC</sub> = 4.5 V to 5.5 V  | -                | 1.5                | -   | -                 | -   | Ω    |

- [1] Typical values are measured at T<sub>amb</sub> = 25 °C and nominal V<sub>CC</sub>.
- [2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V<sub>CC</sub> and temperature.

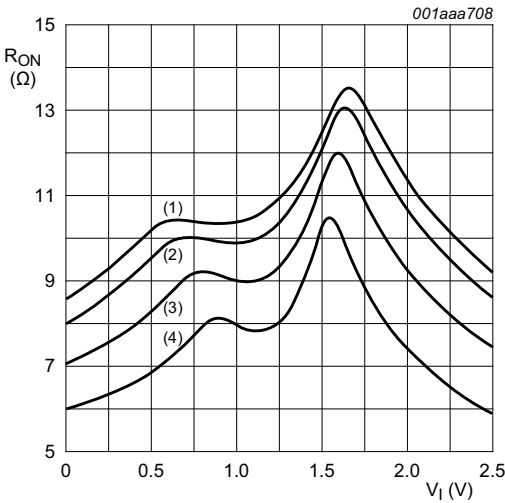
10.3 ON resistance test circuit and graphs





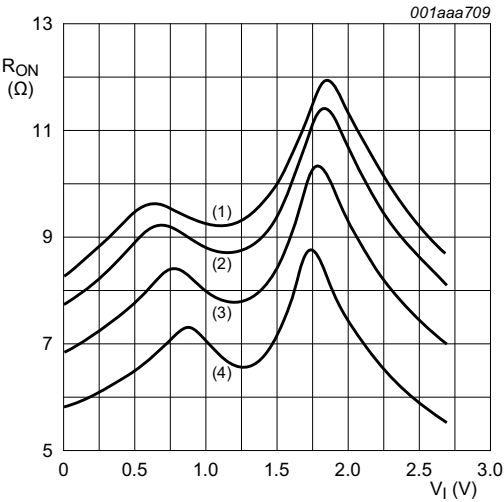
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 9. ON resistance as a function of input voltage;  
 $V_{CC} = 1.8\text{ V}$



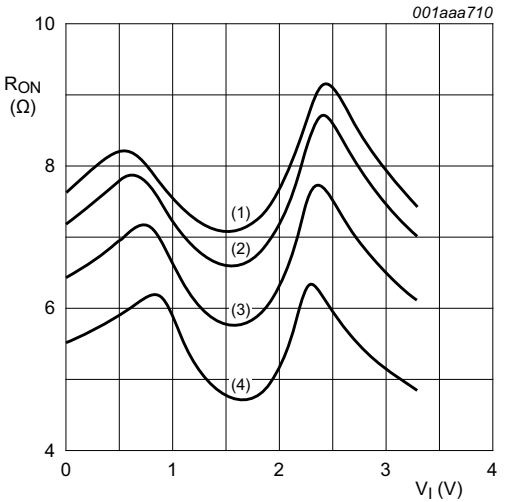
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 10. 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)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

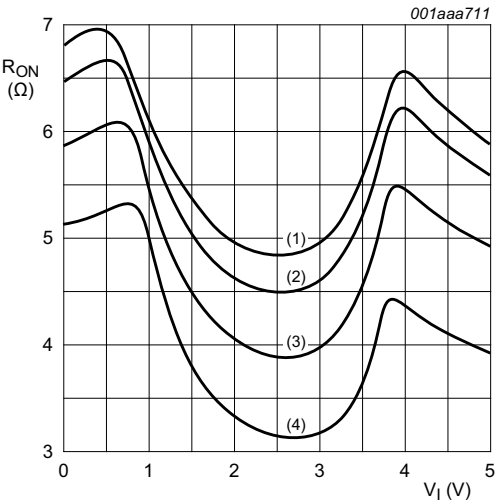
Fig 11. ON resistance as a function of input voltage;  
 $V_{CC} = 2.7\text{ V}$



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

Fig 12. ON resistance as a function of input voltage;  
 $V_{CC} = 3.3\text{ V}$





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

Fig 13. ON resistance as a function of input voltage;  $V_{CC} = 5.0\text{ V}$

11. Dynamic characteristics

Table 9. Dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

| Symbol   | Parameter         | Conditions  | −40 °C to +85 °C |                    |     | −40 °C to +125 °C |      | Unit |
|----------|-------------------|---|------------------|--------------------|-----|-------------------|------|------|
|          |                   |   | Min              | Typ <sup>[1]</sup> | Max | Min               | Max  |      |
| $t_{pd}$ | propagation delay | Y to Z or Z to Y; see <a href="#">Figure 14</a> <sup>[2][3]</sup> |                  |                    |     |                   |      |      |
|          |                   | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$                         | -                | 0.8                | 2.0 | -                 | 3.0  | ns   |
|          |                   | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$                           | -                | 0.4                | 1.2 | -                 | 2.0  | ns   |
|          |                   | $V_{CC} = 2.7\text{ V}$   | -                | 0.4                | 1.0 | -                 | 1.5  | ns   |
|          |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$                           | -                | 0.3                | 0.8 | -                 | 1.5  | ns   |
|          |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$                           | -                | 0.2                | 0.6 | -                 | 1.0  | ns   |
| $t_{en}$ | enable time       | E to Y or Z; see <a href="#">Figure 15</a> <sup>[4]</sup>         |                  |                    |     |                   |      |      |
|          |                   | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$                         | 1.0              | 5.3                | 12  | 1.0               | 15.5 | ns   |
|          |                   | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$                           | 1.0              | 3.0                | 6.5 | 1.0               | 8.5  | ns   |
|          |                   | $V_{CC} = 2.7\text{ V}$   | 1.0              | 2.6                | 6.0 | 1.0               | 8.0  | ns   |
|          |                   | $V_{CC} = 3.0\text{ V to }3.6\text{ V}$                           | 1.0              | 2.5                | 5.0 | 1.0               | 6.5  | ns   |
|          |                   | $V_{CC} = 4.5\text{ V to }5.5\text{ V}$                           | 1.0              | 1.9                | 4.2 | 1.0               | 5.5  | ns   |

**Table 9. Dynamic characteristics ...continued**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 16](#).

| Symbol           | Parameter                     | Conditions  | –40 °C to +85 °C |                    |     | –40 °C to +125 °C |     | Unit |
|------------------|-------------------------------|---|------------------|--------------------|-----|-------------------|-----|------|
|                  |                               |   | Min              | Typ <sup>[1]</sup> | Max | Min               | Max |      |
| t <sub>dis</sub> | disable time                  | E to Y or Z; see <a href="#">Figure 15</a> <sup>[5]</sup>   |                  |                    |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 1.65 V to 1.95 V  | 1.0              | 4.2                | 10  | 1.0               | 13  | ns   |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.0              | 2.4                | 6.9 | 1.0               | 9.0 | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V   | 1.0              | 3.6                | 7.5 | 1.0               | 9.5 | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | 1.0              | 3.4                | 6.5 | 1.0               | 8.5 | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  | 1.0              | 2.5                | 5.0 | 1.0               | 6.5 | ns   |
| C <sub>PD</sub>  | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 10 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[6]</sup> |                  |                    |     |                   |     |      |
|                  |                               | V <sub>CC</sub> = 2.5 V   | -                | 9.8                | -   | -                 | -   | pF   |
|                  |                               | V <sub>CC</sub> = 3.3 V   | -                | 12.0               | -   | -                 | -   | pF   |
|                  |                               | V <sub>CC</sub> = 5.0 V   | -                | 17.3               | -   | -                 | -   | pF   |

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

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

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

[4] t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.

[5] t<sub>dis</sub> is the same as t<sub>PLZ</sub> and t<sub>PHZ</sub>.

[6] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

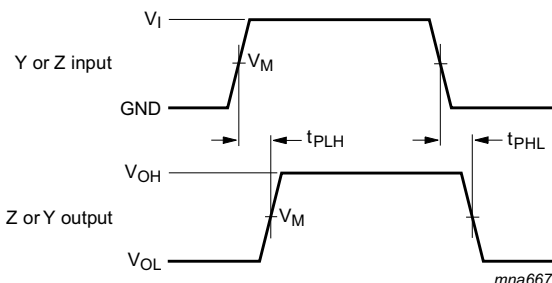
C<sub>S(ON)</sub> = maximum ON-state switch capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

$\sum \{(C_L + C_{S(ON)}) \times V_{CC}^2 \times f_o\}$  = sum of the outputs.

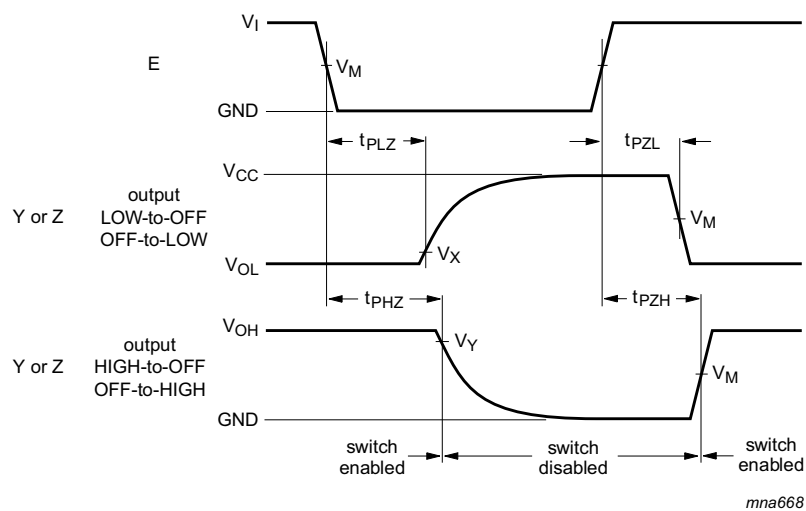
## 11.1 Waveforms and test circuit



Measurement points are given in [Table 10](#).

Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig 14. Input (Y or Z) to output (Z or Y) propagation delays**

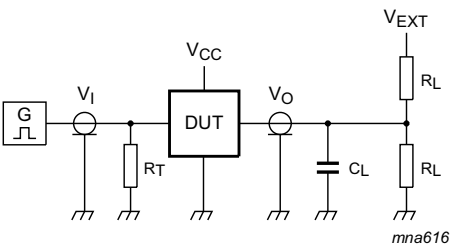


Measurement points are given in [Table 10](#).  
Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Fig 15. Enable and disable times

Table 10. Measurement points

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



Test data is given in [Table 11](#).  
Definitions for test circuit:  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.  
 $C_L$  = Load capacitance including jig and probe capacitance.  
 $R_L$  = Load resistance.  
 $V_{EXT}$  = External voltage for measuring switching times.

Fig 16. Test circuit for measuring switching times

Table 11. Test data

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

11.2 Additional dynamic characteristics

Table 12. Additional dynamic characteristics

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

| Symbol | Parameter                 | Conditions   | Min | Typ   | Max | Unit |
|--------|---------------------------|--|-----|-------|-----|------|
| THD    | total harmonic distortion | $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 1$ kHz; see <a href="#">Figure 17</a>  |     |       |     |      |
|        |                           | $V_{CC} = 1.65$ V  | -   | 0.032 | -   | %    |
|        |                           | $V_{CC} = 2.3$ V   | -   | 0.008 | -   | %    |
|        |                           | $V_{CC} = 3.0$ V   | -   | 0.006 | -   | %    |
|        |                           | $V_{CC} = 4.5$ V   | -   | 0.001 | -   | %    |
|        |                           | $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF; $f_i = 10$ kHz; see <a href="#">Figure 17</a> |     |       |     |      |
|        |                           | $V_{CC} = 1.65$ V  | -   | 0.068 | -   | %    |
|        |                           | $V_{CC} = 2.3$ V   | -   | 0.009 | -   | %    |
|        |                           | $V_{CC} = 3.0$ V   | -   | 0.008 | -   | %    |
|        |                           | $V_{CC} = 4.5$ V   | -   | 0.006 | -   | %    |

**Table 12. Additional dynamic characteristics ...continued**

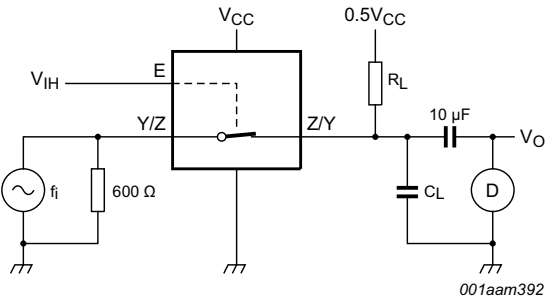
At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

| Symbol              | Parameter                | Conditions  | Min | Typ   | Max | Unit |
|---------------------|--------------------------|---|-----|-------|-----|------|
| $f_{(-3\text{dB})}$ | -3 dB frequency response | $R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ;<br>see <a href="#">Figure 18</a>   |     |       |     |      |
|                     |                          | $V_{CC} = 1.65\text{ V}$  | -   | 135   | -   | MHz  |
|                     |                          | $V_{CC} = 2.3\text{ V}$   | -   | 145   | -   | MHz  |
|                     |                          | $V_{CC} = 3.0\text{ V}$   | -   | 150   | -   | MHz  |
|                     |                          | $V_{CC} = 4.5\text{ V}$   | -   | 155   | -   | MHz  |
|                     |                          | $R_L = 50\text{ }\Omega$ ; $C_L = 5\text{ pF}$ ; see <a href="#">Figure 18</a>  |     |       |     |      |
|                     |                          | $V_{CC} = 1.65\text{ V}$  | -   | > 500 | -   | MHz  |
|                     |                          | $V_{CC} = 2.3\text{ V}$   | -   | > 500 | -   | MHz  |
|                     |                          | $V_{CC} = 3.0\text{ V}$   | -   | > 500 | -   | MHz  |
|                     |                          | $V_{CC} = 4.5\text{ V}$   | -   | > 500 | -   | MHz  |
|                     |                          | $R_L = 50\text{ }\Omega$ ; $C_L = 10\text{ pF}$ ; see <a href="#">Figure 18</a>   |     |       |     |      |
|                     |                          | $V_{CC} = 1.65\text{ V}$  | -   | 200   | -   | MHz  |
|                     |                          | $V_{CC} = 2.3\text{ V}$   | -   | 350   | -   | MHz  |
|                     |                          | $V_{CC} = 3.0\text{ V}$   | -   | 410   | -   | MHz  |
|                     |                          | $V_{CC} = 4.5\text{ V}$   | -   | 440   | -   | MHz  |
| $\alpha_{iso}$      | isolation (OFF-state)    | $R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ;<br>see <a href="#">Figure 19</a>  |     |       |     |      |
|                     |                          | $V_{CC} = 1.65\text{ V}$  | -   | -46   | -   | dB   |
|                     |                          | $V_{CC} = 2.3\text{ V}$   | -   | -46   | -   | dB   |
|                     |                          | $V_{CC} = 3.0\text{ V}$   | -   | -46   | -   | dB   |
|                     |                          | $V_{CC} = 4.5\text{ V}$   | -   | -46   | -   | dB   |
|                     |                          | $R_L = 50\text{ }\Omega$ ; $C_L = 5\text{ pF}$ ; $f_i = 1\text{ MHz}$ ;<br>see <a href="#">Figure 19</a>  |     |       |     |      |
|                     |                          | $V_{CC} = 1.65\text{ V}$  | -   | -37   | -   | dB   |
|                     |                          | $V_{CC} = 2.3\text{ V}$   | -   | -37   | -   | dB   |
|                     |                          | $V_{CC} = 3.0\text{ V}$   | -   | -37   | -   | dB   |
|                     |                          | $V_{CC} = 4.5\text{ V}$   | -   | -37   | -   | dB   |
| $V_{ct}$            | crosstalk voltage        | between digital input and switch;<br>$R_L = 600\text{ }\Omega$ ; $C_L = 50\text{ pF}$ ; $f_i = 1\text{ MHz}$ ;<br>$t_r = t_f = 2\text{ ns}$ ; see <a href="#">Figure 20</a> |     |       |     |      |
|                     |                          | $V_{CC} = 1.65\text{ V}$  | -   | 69    | -   | mV   |
|                     |                          | $V_{CC} = 2.3\text{ V}$   | -   | 87    | -   | mV   |
|                     |                          | $V_{CC} = 3.0\text{ V}$   | -   | 156   | -   | mV   |
|                     |                          | $V_{CC} = 4.5\text{ V}$   | -   | 302   | -   | mV   |

Table 12. Additional dynamic characteristics ...continued  
At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

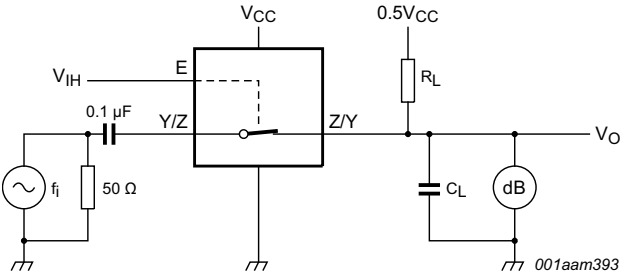
| Symbol    | Parameter        | Conditions  | Min | Typ | Max | Unit |
|-----------|------------------|---|-----|-----|-----|------|
| $Q_{inj}$ | charge injection | $C_L = 0.1\text{ nF}$ ; $V_{gen} = 0\text{ V}$ ; $R_{gen} = 0\text{ }\Omega$ ;<br>$f_i = 1\text{ MHz}$ ; $R_L = 1\text{ M}\Omega$ ; see <a href="#">Figure 21</a> |     |     |     |      |
|           |                  | $V_{CC} = 1.8\text{ V}$   | -   | 3.3 | -   | pC   |
|           |                  | $V_{CC} = 2.5\text{ V}$   | -   | 4.1 | -   | pC   |
|           |                  | $V_{CC} = 3.3\text{ V}$   | -   | 5.0 | -   | pC   |
|           |                  | $V_{CC} = 4.5\text{ V}$   | -   | 6.4 | -   | pC   |
|           |                  | $V_{CC} = 5.5\text{ V}$   | -   | 7.5 | -   | pC   |

11.3 Test circuits



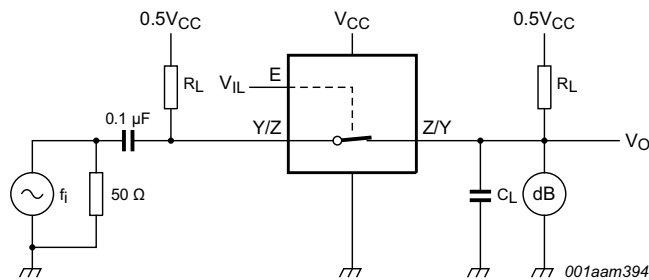
**Test conditions:**  
 $V_{CC} = 1.65\text{ V}$ :  $V_i = 1.4\text{ V}$  (p-p).  
 $V_{CC} = 2.3\text{ V}$ :  $V_i = 2\text{ V}$  (p-p).  
 $V_{CC} = 3\text{ V}$ :  $V_i = 2.5\text{ V}$  (p-p).  
 $V_{CC} = 4.5\text{ V}$ :  $V_i = 4\text{ V}$  (p-p).

Fig 17. Test circuit for measuring total harmonic distortion



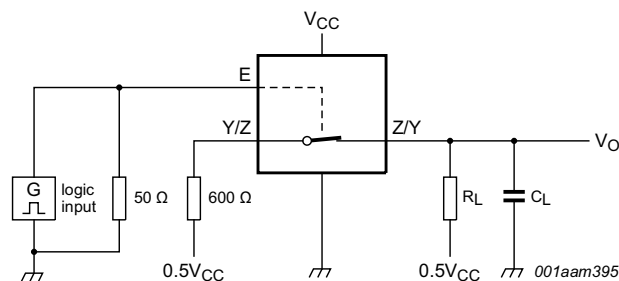
Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads -3 dB.

Fig 18. Test circuit for measuring the frequency response when switch is in ON-state

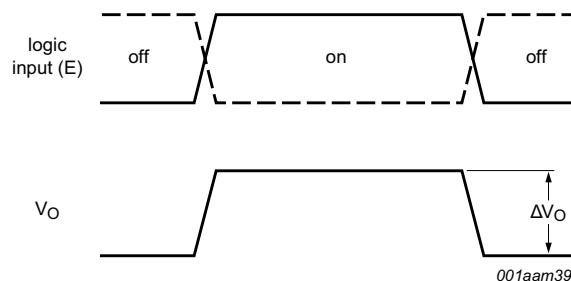
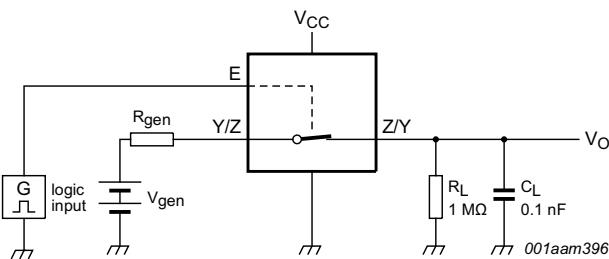


Adjust  $f_i$  voltage to obtain 0 dBm level at input.

**Fig 19. Test circuit for measuring isolation (OFF-state)**



**Fig 20. Test circuit for measuring crosstalk between digital input and switch**



$$Q_{inj} = \Delta V_O \times C_L$$

$\Delta V_O$  = output voltage variation.

$R_{gen}$  = generator resistance.

$V_{gen}$  = generator voltage.

**Fig 21. Test circuit for measuring charge injection**

12. Package outline

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

SOT353-1

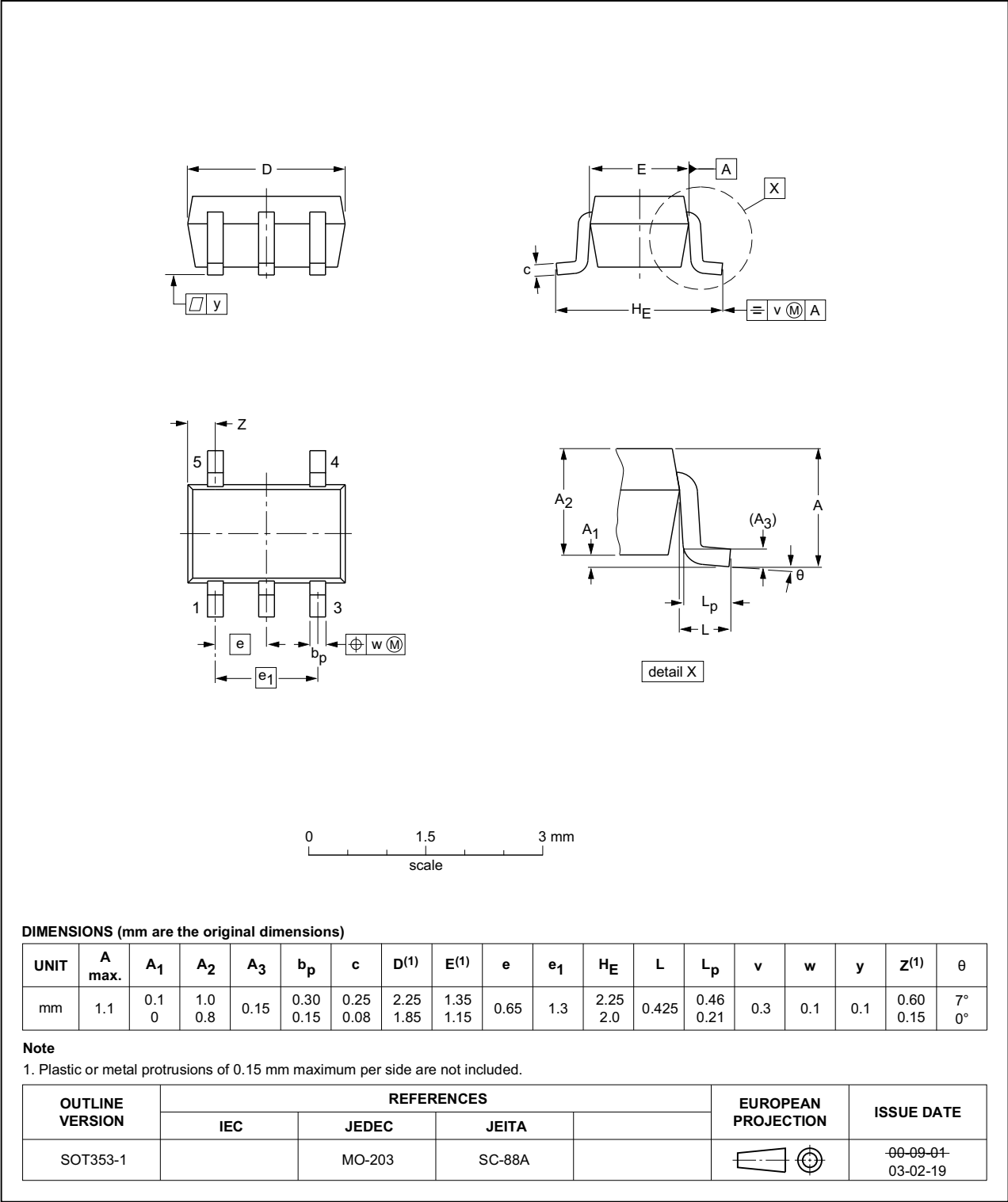


Fig 22. Package outline SOT353-1 (TSSOP5)



Plastic surface-mounted package; 5 leads

SOT753

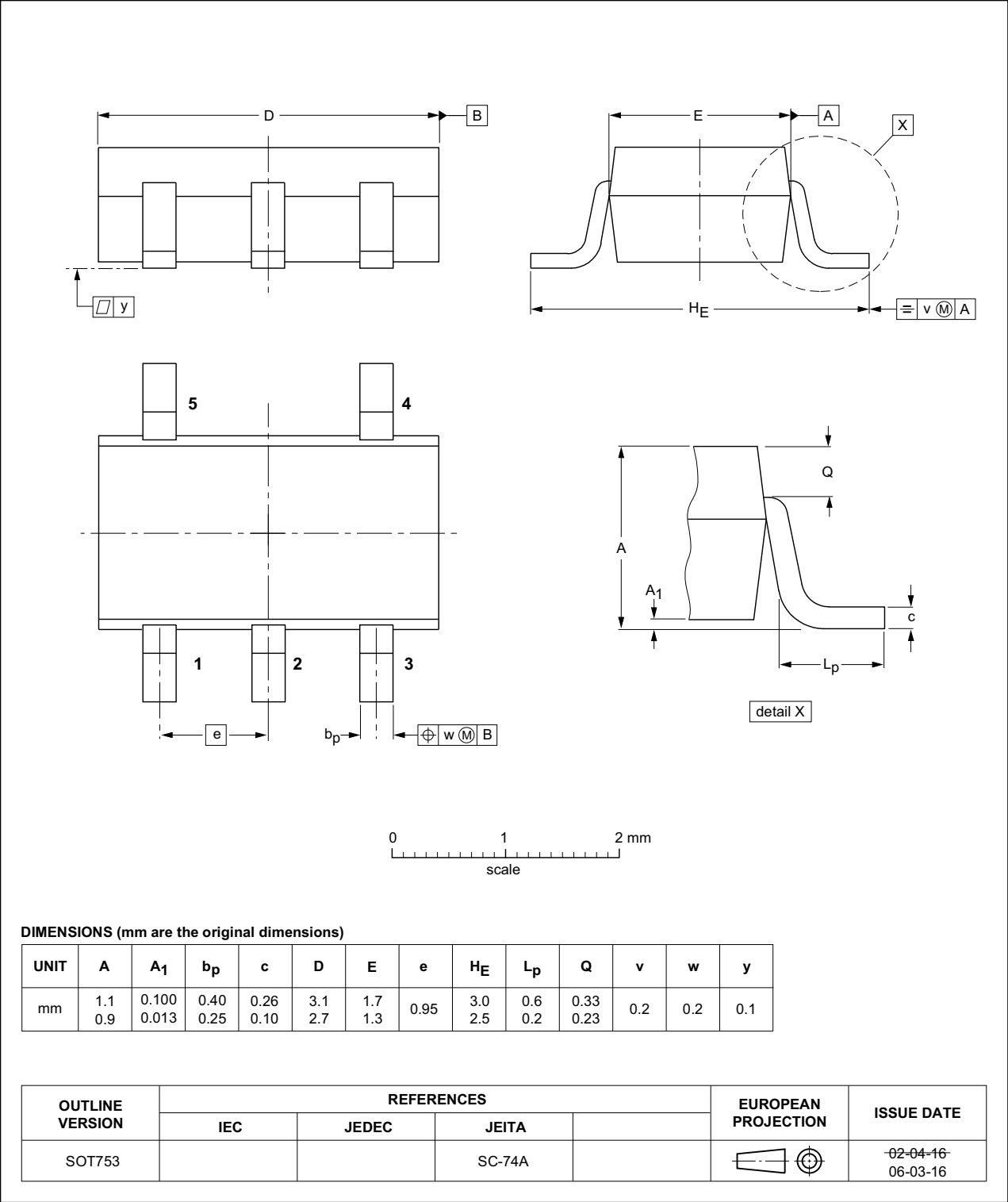


Fig 23. Package outline SOT753 (SC-74A)

## 13. Abbreviations

Table 13. Abbreviations

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

## 14. Revision history

Table 14. Revision history

| Document ID        | Release date   | Data sheet status  | Change notice | Supersedes         |
|--------------------|--|--------------------|---------------|--------------------|
| 74LVC1G66_Q100 v.2 | 20161209   | Product data sheet | -             | 74LVC1G66_Q100 v.1 |
| Modifications:     | <ul style="list-style-type: none"><li><a href="#">Table 7</a>: The maximum limits for leakage current and supply current have changed.</li></ul> |                    |               |                    |
| 74LVC1G66_Q100 v.1 | 20120801   | Product data sheet | -             | -                  |

## 15. Legal information

### 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)