

# 74LVCV2G66

## Overvoltage tolerant bilateral switch

Rev. 3 — 16 June 2010

Product data sheet

### 1. General description

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The 74LVCV2G66 is a low-power, low-voltage, high-speed Si-gate CMOS device.

The 74LVCV2G66 provides two single pole single throw analog or digital switches. Each switch includes an overvoltage tolerant input/output terminal (pin nZ), an output/input terminal (pin nY) and low-power active HIGH enable input (pin nE).

The overvoltage tolerant switch terminals allow the switching of signals in excess of  $V_{CC}$ . The low-power enable input eliminates the necessity of using current limiting resistors in portable applications when using control logic signals much lower than  $V_{CC}$ . These inputs are also overvoltage tolerant.

### 2. Features and benefits

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- Wide supply voltage range from 2.3 V to 5.5 V
- Ultra low-power operation
- Very low ON resistance:
  - ◆ 8.0  $\Omega$  (typical) at  $V_{CC} = 2.7$  V
  - ◆ 7.5  $\Omega$  (typical) at  $V_{CC} = 3.3$  V
  - ◆ 7.3  $\Omega$  (typical) at  $V_{CC} = 5.0$  V.
- 5 V tolerant input for interfacing with 5 V logic
- High noise immunity
- Switch handling capability of 32 mA
- CMOS low-power consumption
- Latch-up performance exceeds 250 mA
- Incorporates overvoltage tolerant analog switch technology
- Switch accepts voltages up to 5.5 V independent of  $V_{CC}$
- Multiple package options
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C



### 3. Ordering information

Table 1. Ordering information

| Type number  | Package           |        |  | Version  |
|--------------|-------------------|--------|--|----------|
|              | Temperature range | Name   | Description  |          |
| 74LVCV2G66DP | -40 °C to +125 °C | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm              | SOT505-2 |
| 74LVCV2G66DC | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm                           | SOT765-1 |
| 74LVCV2G66GD | -40 °C to +125 °C | XSON8U | plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 × 2 × 0.5 mm | SOT996-2 |

### 4. Marking

Table 2. Marking codes

| Type number  | Marking code <sup>[1]</sup> |
|--------------|-----------------------------|
| 74LVCV2G66DP | Y66                         |
| 74LVCV2G66DC | Y66                         |
| 74LVCV2G66GD | Y66                         |

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

### 5. Functional diagram

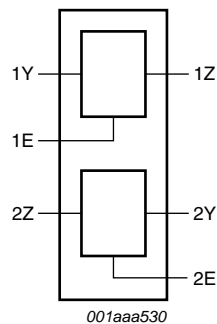


Fig 1. Logic symbol

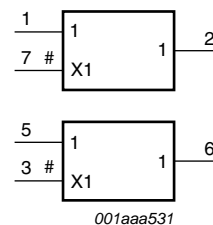


Fig 2. IEC logic symbol

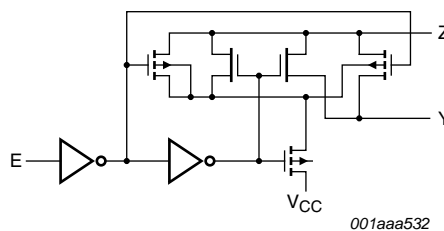
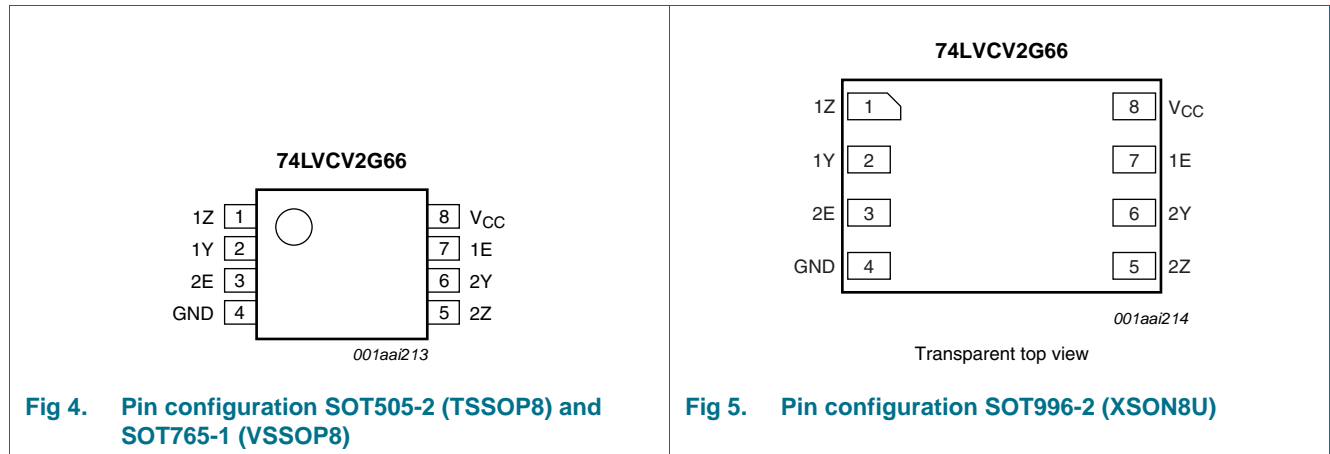


Fig 3. Logic diagram (one switch)

## 6. Pinning information

### 6.1 Pinning



### 6.2 Pin description

Table 3. Pin description

| Symbol          | Pin  | Description   |
|-----------------|------|---|
| 1Y, 2Y          | 2, 6 | independent input or output                         |
| 1Z, 2Z          | 1, 5 | independent input or output (overvoltage tolerance) |
| GND             | 4    | ground (0 V)  |
| 1E, 2E          | 7, 3 | enable input (active HIGH)                          |
| V <sub>CC</sub> | 8    | supply voltage                                      |

## 7. Functional description

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

| Input nE | 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 <sub>CC</sub>  | supply voltage          |   | -0.5     | +6.5 | V    |
| V <sub>I</sub>   | input voltage           |   | [1] -0.5 | +6.5 | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < -0.5 V or V <sub>I</sub> > 6.5 V   | -50      | -    | mA   |
| I <sub>SK</sub>  | switch clamping current | V <sub>I</sub> < -0.5 V or V <sub>I</sub> > 6.5 V   | -        | ±50  | mA   |
| V <sub>SW</sub>  | switch voltage          | enable and disable mode                             | -0.5     | +6.5 | V    |
| I <sub>SW</sub>  | switch current          | V <sub>SW</sub> > -0.5 V or V <sub>SW</sub> < 6.5 V | -        | ±50  | mA   |
| I <sub>CC</sub>  | supply current          |   | -        | 100  | mA   |
| I <sub>GND</sub> | ground current          |   | -100     | -    | 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                | [2] -    | 250  | mW   |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For TSSOP8 package: above 55 °C the value of P<sub>tot</sub> derates linearly with 2.5 mW/K.

For VSSOP8 package: above 110 °C the value of P<sub>tot</sub> derates linearly with 8 mW/K.

For XSON8U package: above 118 °C the value of P<sub>tot</sub> derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6: Recommended operating conditions**

| Symbol           | Parameter                           | Conditions                       | Min   | Typ | Max  | Unit |
|------------------|-------------------------------------|----------------------------------|-------|-----|------|------|
| V <sub>CC</sub>  | supply voltage                      |                                  | 2.3   | -   | 5.5  | V    |
| V <sub>I</sub>   | input voltage                       |                                  | 0     | -   | 5.5  | V    |
| V <sub>SW</sub>  | switch voltage                      | enable and disable mode          | [1] 0 | -   | 5.5  | V    |
| T <sub>amb</sub> | ambient temperature                 |                                  | -40   | -   | +125 | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 2.3 V to 2.7 V | [2] - | -   | 20   | ns/V |
|                  |                                     | V <sub>CC</sub> = 2.7 V to 5.5 V | [2] - | -   | 10   | ns/V |

[1] To avoid sinking GND current from terminal nZ when switch current flows in terminal nY, 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 nY. 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).

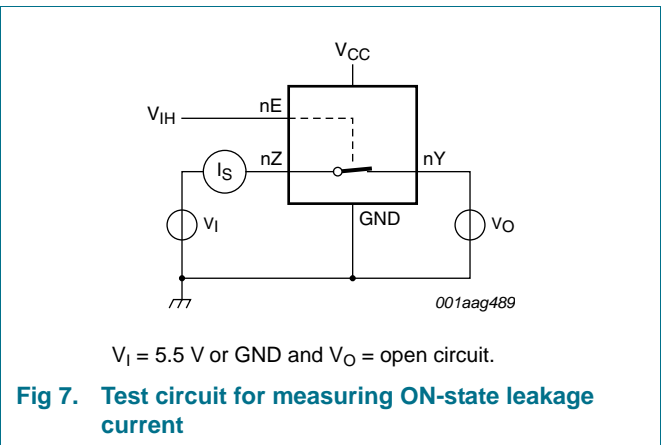
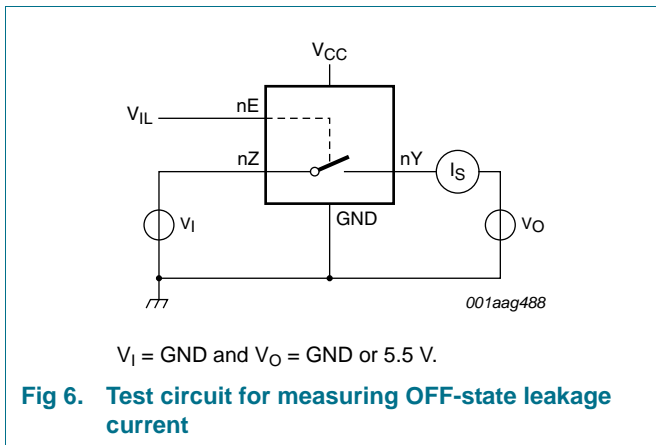
| Symbol              | Parameter                 | Conditions  | -40 °C to +85 °C    |                    |                     | -40 °C to +125 °C   |                     | Unit |    |
|---------------------|---------------------------|---|---------------------|--------------------|---------------------|---------------------|---------------------|------|----|
|                     |                           |   | Min                 | Typ <sup>[1]</sup> | Max                 | Min                 | Max                 |      |    |
| V <sub>IH</sub>     | HIGH-level input voltage  | V <sub>CC</sub> = 2.3 V to 2.7 V  | 0.6V <sub>CC</sub>  | -                  | -                   | 0.6V <sub>CC</sub>  | -                   | V    |    |
|                     |                           | V <sub>CC</sub> = 3.0 V to 3.6 V  | 2.0                 | -                  | -                   | 2.0                 | -                   | V    |    |
|                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | 0.55V <sub>CC</sub> | -                  | -                   | 0.55V <sub>CC</sub> | -                   | V    |    |
| V <sub>IL</sub>     | LOW-level input voltage   | V <sub>CC</sub> = 2.3 V to 2.7 V  | -                   | -                  | 0.1V <sub>CC</sub>  | -                   | 0.1V <sub>CC</sub>  | V    |    |
|                     |                           | V <sub>CC</sub> = 3.0 V to 3.6 V  | -                   | -                  | 0.5                 | -                   | 0.5                 | V    |    |
|                     |                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | -                   | -                  | 0.15V <sub>CC</sub> | -                   | 0.15V <sub>CC</sub> | V    |    |
| I <sub>I</sub>      | input leakage current     | pin nE; V <sub>I</sub> = 5.5 V or GND;<br>V <sub>CC</sub> = 0 V to 5.5 V  | [2]                 | -                  | ±0.1                | ±5                  | -                   | ±5   | μA |
| I <sub>S(OFF)</sub> | OFF-state leakage current | V <sub>CC</sub> = 2.3 V to 5.5 V; see <a href="#">Figure 6</a>  | [2][3]              | -                  | ±0.1                | ±10                 | -                   | ±10  | μA |
| I <sub>S(ON)</sub>  | ON-state leakage current  | V <sub>CC</sub> = 2.3 V to 5.5 V; see <a href="#">Figure 7</a>  | [2][3]              | -                  | ±0.1                | ±10                 | -                   | ±10  | 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> = 2.3 V to 5.5 V                    | [2]                 | -                  | 0.1                 | 10                  | -                   | 40   | μA |
| ΔI <sub>CC</sub>    | additional supply current | pin nE; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V;<br>V <sub>SW</sub> = GND or V <sub>CC</sub> ;<br>V <sub>CC</sub> = 3.0 V to 5.5 V | [2]                 | -                  | 0.1                 | 5                   | -                   | 50   | μA |
| C <sub>I</sub>      | input capacitance         |   | -                   | 2.5                | -                   | -                   | -                   | -    | pF |
| C <sub>S(OFF)</sub> | OFF-state capacitance     |   | -                   | 8.0                | -                   | -                   | -                   | -    | pF |
| C <sub>S(ON)</sub>  | ON-state capacitance      |   | -                   | 16                 | -                   | -                   | -                   | -    | 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.

[3] For overvoltage signals (V<sub>SW</sub> > V<sub>CC</sub>) the condition V<sub>Y</sub> < V<sub>Z</sub> must be observed.

10.1 Test circuits



10.2 ON resistance

Table 8. Resistance  $R_{ON}$

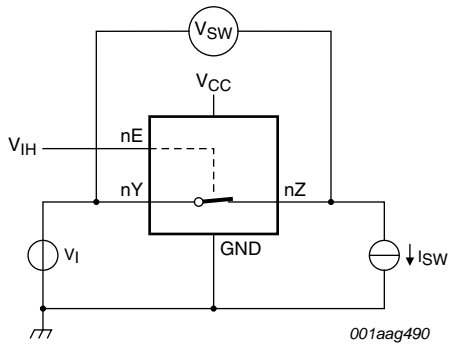
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see [Figure 9](#) and [Figure 10](#).

| Symbol                | Parameter                | Conditions  | -40 °C to +85 °C |                    | -40 °C to +125 °C |     | Unit |          |
|-----------------------|--------------------------|---|------------------|--------------------|-------------------|-----|------|----------|
|                       |                          |   | Min              | Typ <sup>[1]</sup> | Max               | Min |      | Max      |
| $R_{ON(\text{peak})}$ | ON resistance (peak)     | $V_{SW} = \text{GND}$ to $V_{CC}$ ; $V_I = V_{IH}$ ; see <a href="#">Figure 8</a> |                  |                    |                   |     |      |          |
|                       |                          | $I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$             | -                | 13                 | 30                | -   | 30   | $\Omega$ |
|                       |                          | $I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$                               | -                | 10                 | 25                | -   | 25   | $\Omega$ |
|                       |                          | $I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$ to $3.6 \text{ V}$            | -                | 8.3                | 20                | -   | 20   | $\Omega$ |
|                       |                          | $I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$            | -                | 7.4                | 15                | -   | 15   | $\Omega$ |
| $R_{ON(\text{rail})}$ | ON resistance (rail)     | $V_{SW} = \text{GND}$ ; $V_I = V_{IH}$ ; see <a href="#">Figure 8</a>             |                  |                    |                   |     |      |          |
|                       |                          | $I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$             | -                | 8.5                | 20                | -   | 20   | $\Omega$ |
|                       |                          | $I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$                               | -                | 8.0                | 18                | -   | 18   | $\Omega$ |
|                       |                          | $I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$ to $3.6 \text{ V}$            | -                | 7.5                | 15                | -   | 15   | $\Omega$ |
|                       |                          | $I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$            | -                | 7.3                | 10                | -   | 10   | $\Omega$ |
|                       |                          | $V_{SW} = V_{CC}$ ; $V_I = V_{IH}$  |                  |                    |                   |     |      |          |
|                       |                          | $I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.3 \text{ V}$ to $2.7 \text{ V}$             | -                | 8.5                | 20                | -   | 20   | $\Omega$ |
|                       |                          | $I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$                               | -                | 7.2                | 18                | -   | 18   | $\Omega$ |
|                       |                          | $I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3.0 \text{ V}$ to $3.6 \text{ V}$            | -                | 6.5                | 15                | -   | 15   | $\Omega$ |
|                       |                          | $I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 4.5 \text{ V}$ to $5.5 \text{ V}$            | -                | 5.7                | 10                | -   | 10   | $\Omega$ |
| $R_{ON(\text{flat})}$ | ON resistance (flatness) | $V_{SW} = \text{GND}$ to $V_{CC}$ ; $V_I = V_{IH}$ <sup>[2]</sup>                 |                  |                    |                   |     |      |          |
|                       |                          | $I_{SW} = 8 \text{ mA}$ ; $V_{CC} = 2.5 \text{ V}$                                | -                | 17                 | -                 | -   | -    | $\Omega$ |
|                       |                          | $I_{SW} = 12 \text{ mA}$ ; $V_{CC} = 2.7 \text{ V}$                               | -                | 10                 | -                 | -   | -    | $\Omega$ |
|                       |                          | $I_{SW} = 24 \text{ mA}$ ; $V_{CC} = 3.3 \text{ V}$                               | -                | 5                  | -                 | -   | -    | $\Omega$ |
|                       |                          | $I_{SW} = 32 \text{ mA}$ ; $V_{CC} = 5.0 \text{ V}$                               | -                | 3                  | -                 | -   | -    | $\Omega$ |

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

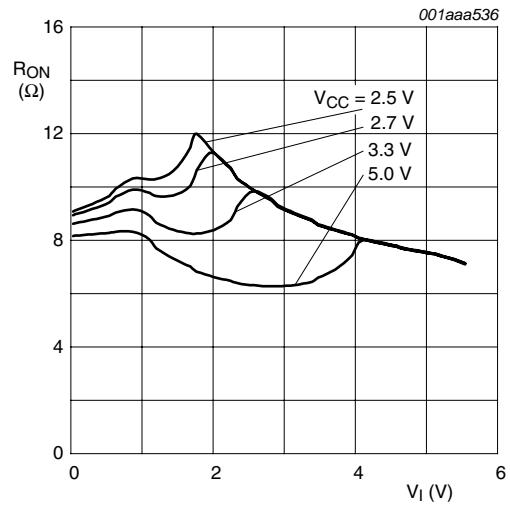
[2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical  $V_{CC}$  and temperature.

10.3 ON resistance test circuit and graphs



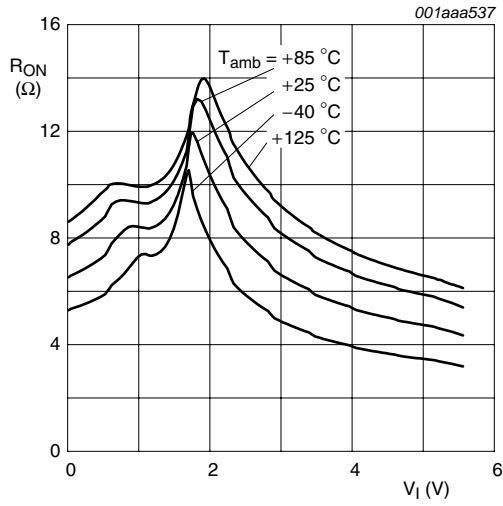
$V_I = \text{GND to } 5.5 \text{ V}; R_{ON} = V_{SW} / I_{SW}$ .

Fig 8. Test circuit for measuring ON resistance

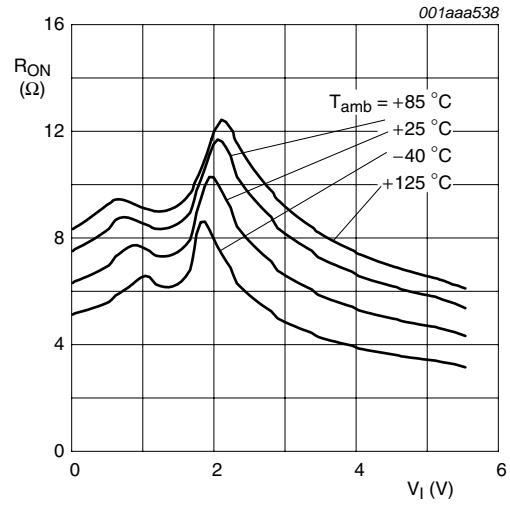


$V_I = \text{GND to } 5.5 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$ .

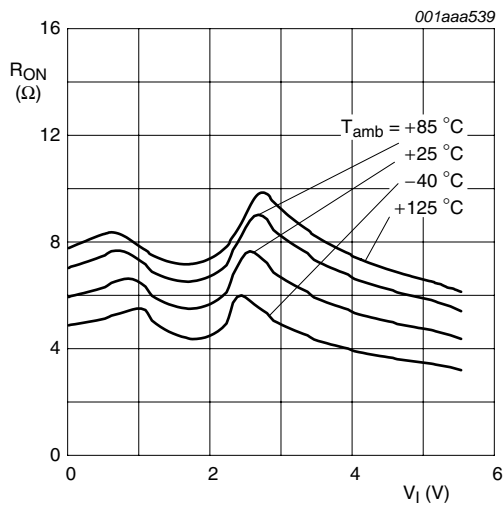
Fig 9. Typical ON resistance as a function of input voltage



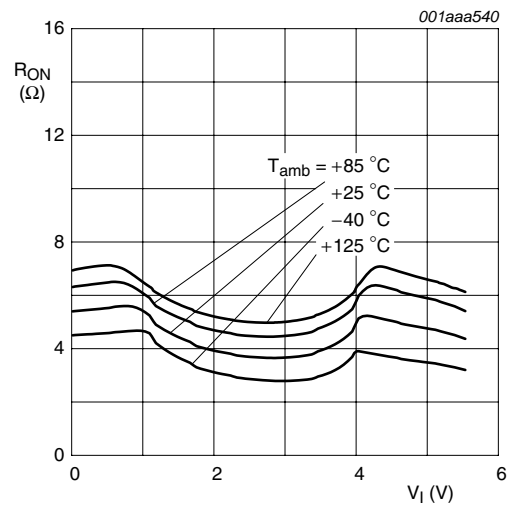
a.  $V_{CC} = 2.5\text{ V}$



b.  $V_{CC} = 2.7\text{ V}$



c.  $V_{CC} = 3.3\text{ V}$



d.  $V_{CC} = 5.0\text{ V}$

Fig 10. ON resistance as a function of input voltage at various supply voltages



## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#).

| Symbol           | Parameter                     | Conditions  | -40 °C to +85 °C |                    |      | -40 °C to +125 °C |      | Unit |
|------------------|-------------------------------|---|------------------|--------------------|------|-------------------|------|------|
|                  |                               |   | Min              | Typ <sup>[1]</sup> | Max  | Min               | Max  |      |
| t <sub>pd</sub>  | propagation delay             | nY to nZ or nZ to nY;<br>see <a href="#">Figure 11</a>                            |                  |                    |      |                   |      |      |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | -                | 0.4                | 1.2  | -                 | 2.0  | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V   | -                | 0.4                | 1.0  | -                 | 1.5  | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | -                | 0.3                | 0.8  | -                 | 1.5  | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  | -                | 0.2                | 0.6  | -                 | 1.0  | ns   |
| t <sub>en</sub>  | enable time                   | nE to nY or nZ;<br>see <a href="#">Figure 12</a>                                  |                  |                    |      |                   |      |      |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.0              | 4.7                | 12   | 1.0               | 15   | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V   | 1.0              | 4.4                | 8.5  | 1.0               | 11   | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | 1.0              | 3.8                | 7.5  | 1.0               | 9.5  | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  | 1.0              | 2.7                | 5.0  | 1.0               | 6.5  | ns   |
| t <sub>dis</sub> | disable time                  | nE to nY or nZ;<br>see <a href="#">Figure 12</a>                                  |                  |                    |      |                   |      |      |
|                  |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.0              | 6.0                | 16   | 1.0               | 20   | ns   |
|                  |                               | V <sub>CC</sub> = 2.7 V   | 1.0              | 7.9                | 15   | 1.0               | 19   | ns   |
|                  |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | 1.0              | 6.5                | 13.5 | 1.0               | 17   | ns   |
|                  |                               | V <sub>CC</sub> = 4.5 V to 5.5 V  | 1.0              | 4.4                | 9.0  | 1.0               | 11.5 | ns   |
| C <sub>PD</sub>  | power dissipation capacitance | C <sub>L</sub> = 50 pF; f <sub>i</sub> = 10 MHz;<br>V <sub>I</sub> = GND to 5.5 V |                  |                    |      |                   |      |      |
|                  |                               | V <sub>CC</sub> = 2.5 V   | -                | 9.7                | -    | -                 | -    | pF   |
|                  |                               | V <sub>CC</sub> = 3.3 V   | -                | 10.3               | -    | -                 | -    | pF   |
|                  |                               | V <sub>CC</sub> = 5.0 V   | -                | 11.3               | -    | -                 | -    | 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).

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

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;

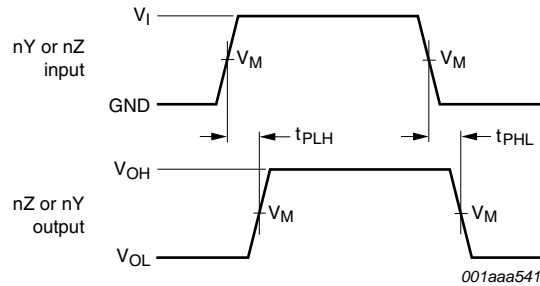
C<sub>S(ON)</sub> = maximum ON-state switch capacitance in pF;

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

N = number of inputs switching;

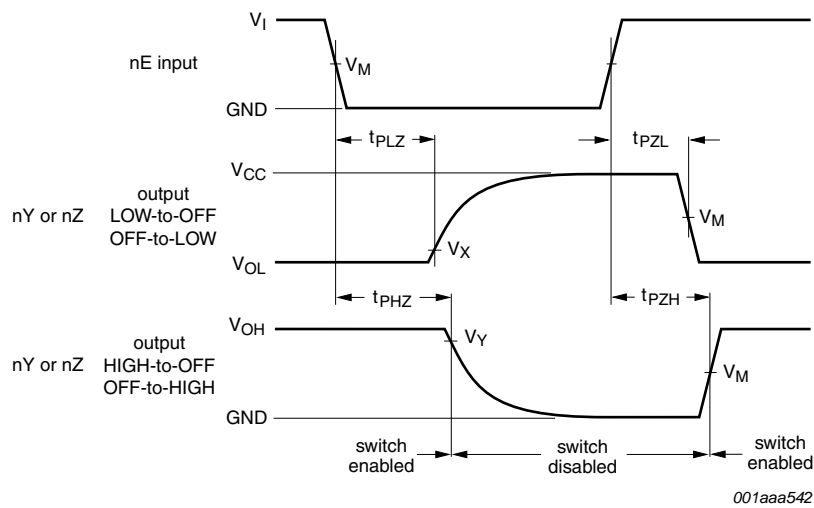
$\sum\{(C_L + C_{S(ON)}) \times V_{CC}^2 \times f_o\}$  = sum of the outputs.

11.1 Waveforms and test circuit



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

Fig 11. Input (nY or nZ) to output (nZ or nY) propagation delays

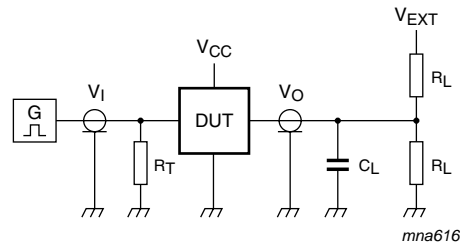


Measurement points are given in [Table 10](#).  
 Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

Fig 12. Enable and disable times

Table 10. Measurement points

| Supply voltage | Input       | Output      |                      |                      |
|----------------|-------------|-------------|----------------------|----------------------|
| $V_{CC}$       | $V_M$       | $V_M$       | $V_X$                | $V_Y$                |
| 2.3 V to 2.7 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.1V_{CC}$ | $V_{OH} - 0.1V_{CC}$ |
| 2.7 V          | 1.5 V       | 1.5 V       | $V_{OL} + 0.3 V$     | $V_{OH} - 0.3 V$     |
| 3.0 V to 3.6 V | 1.5 V       | 1.5 V       | $V_{OL} + 0.3 V$     | $V_{OH} - 0.3 V$     |
| 4.5 V to 5.5 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL} + 0.3 V$     | $V_{OH} - 0.3 V$     |



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

Definitions test circuit:

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

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

$R_L$  = Load resistance.

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

**Fig 13. Load circuit for measuring switching times**

**Table 11. Test data**

| Supply voltage | Input    |               | Load  |              | $V_{EXT}$          |                    |                    |
|----------------|----------|---------------|-------|--------------|--------------------|--------------------|--------------------|
| $V_{CC}$       | $V_I$    | $t_r, t_f$    | $C_L$ | $R_L$        | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 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                | 6.0 V              |
| 3.0 V to 3.6 V | 2.7 V    | $\leq 2.5$ ns | 50 pF | 500 $\Omega$ | open               | GND                | 6.0 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.

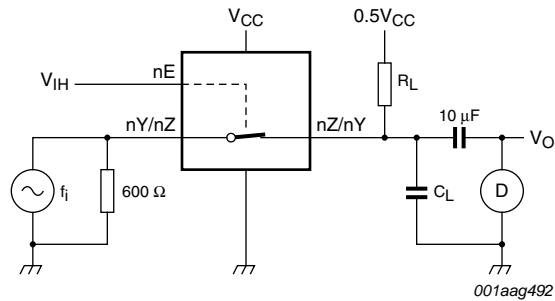
| Symbol | Parameter                 | Conditions  | Min | Typ  | Max | Unit |  |
|--------|---------------------------|---|-----|------|-----|------|--|
| THD    | total harmonic distortion | $f_i = 1$ kHz; $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF;<br>see <a href="#">Figure 14</a>  |     |      |     |      |  |
|        |                           | $V_{CC} = 2.3$ V  | -   | 0.42 | -   | %    |  |
|        |                           | $V_{CC} = 3.0$ V  | -   | 0.36 | -   | %    |  |
|        |                           | $V_{CC} = 4.5$ V  | -   | 0.47 | -   | %    |  |
|        |                           | $f_i = 10$ kHz; $R_L = 10$ k $\Omega$ ; $C_L = 50$ pF;<br>see <a href="#">Figure 14</a> |     |      |     |      |  |
|        |                           | $V_{CC} = 2.3$ V  | -   | 0.11 | -   | %    |  |
|        |                           | $V_{CC} = 3.0$ V  | -   | 0.07 | -   | %    |  |
|        |                           | $V_{CC} = 4.5$ V  | -   | 0.01 | -   | %    |  |

**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 |  |
|--|--------------------------|--|-----------------------|---|-----|------|--|
| $f_{(-3dB)}$   | -3 dB frequency response | $R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ;<br>see <a href="#">Figure 15</a>   |                       |   |     |      |  |
|  |                          | $V_{CC} = 2.3\ \text{V}$   | -                     | 160   | -   | MHz  |  |
|  |                          | $V_{CC} = 3.0\ \text{V}$   | -                     | 200   | -   | MHz  |  |
|  |                          | $V_{CC} = 4.5\ \text{V}$   | -                     | 210   | -   | MHz  |  |
|  |                          | $R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; see <a href="#">Figure 15</a>  |                       |   |     |      |  |
|  |                          | $V_{CC} = 2.3\ \text{V}$   | -                     | 180   | -   | MHz  |  |
|  |                          | $V_{CC} = 3.0\ \text{V}$   | -                     | 180   | -   | MHz  |  |
|  |                          | $V_{CC} = 4.5\ \text{V}$   | -                     | 180   | -   | MHz  |  |
|  |                          | $\alpha_{iso}$   | isolation (OFF-state) | $R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ;<br>see <a href="#">Figure 16</a>  |     |      |  |
| $V_{CC} = 2.3\ \text{V}$   | -                        |  |                       | -65   | -   | dB   |  |
| $V_{CC} = 3.0\ \text{V}$   | -                        |  |                       | -65   | -   | dB   |  |
| $V_{CC} = 4.5\ \text{V}$   | -                        |  |                       | -62   | -   | dB   |  |
| $R_L = 50\ \Omega$ ; $C_L = 5\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ;<br>see <a href="#">Figure 16</a> |                          |  |                       |   |     |      |  |
| $V_{CC} = 2.3\ \text{V}$   | -                        |  |                       | -37   | -   | dB   |  |
| $V_{CC} = 3.0\ \text{V}$   | -                        |  |                       | -36   | -   | dB   |  |
| $V_{CC} = 4.5\ \text{V}$   | -                        |  |                       | -36   | -   | dB   |  |
| $V_{ct}$   | crosstalk voltage        |  |                       | between digital inputs and switch;<br>$R_L = 600\ \Omega$ ; $C_L = 50\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ;<br>$t_r = t_f = 2\ \text{ns}$ ; see <a href="#">Figure 17</a> |     |      |  |
|  |                          | $V_{CC} = 2.3\ \text{V}$   | -                     | 91  | -   | mV   |  |
|  |                          | $V_{CC} = 3.0\ \text{V}$   | -                     | 119   | -   | mV   |  |
|  |                          | $V_{CC} = 4.5\ \text{V}$   | -                     | 205   | -   | mV   |  |
| Xtalk  | crosstalk                | between switches; $R_L = 600\ \Omega$ ;<br>$C_L = 50\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 18</a> |                       |   |     |      |  |
|  |                          | $V_{CC} = 2.3\ \text{V}$   | -                     | -56   | -   | dB   |  |
|  |                          | $V_{CC} = 3.0\ \text{V}$   | -                     | -55   | -   | dB   |  |
|  |                          | $V_{CC} = 4.5\ \text{V}$   | -                     | -55   | -   | dB   |  |
|  |                          | between switches; $R_L = 50\ \Omega$ ;<br>$C_L = 5\ \text{pF}$ ; $f_i = 1\ \text{MHz}$ ; see <a href="#">Figure 18</a>   |                       |   |     |      |  |
|  |                          | $V_{CC} = 2.3\ \text{V}$   | -                     | -29   | -   | dB   |  |
|  |                          | $V_{CC} = 3.0\ \text{V}$   | -                     | -28   | -   | dB   |  |
|  |                          | $V_{CC} = 4.5\ \text{V}$   | -                     | -28   | -   | dB   |  |
|  |                          | $Q_{inj}$  | charge injection      | $C_L = 0.1\ \text{nF}$ ; $V_{gen} = 0\ \text{V}$ ; $R_{gen} = 0\ \Omega$ ;<br>$f_i = 1\ \text{MHz}$ ; $R_L = 1\ \text{M}\Omega$ ; see <a href="#">Figure 19</a>           |     |      |  |
| $V_{CC} = 2.5\ \text{V}$   | -                        |  |                       | < 0.003   | -   | pC   |  |
| $V_{CC} = 3.3\ \text{V}$   | -                        |  |                       | 0.003   | -   | pC   |  |
| $V_{CC} = 4.5\ \text{V}$   | -                        |  |                       | 0.0035  | -   | pC   |  |
| $V_{CC} = 5.5\ \text{V}$   | -                        |  |                       | 0.0035  | -   | pC   |  |

11.3 Test circuits



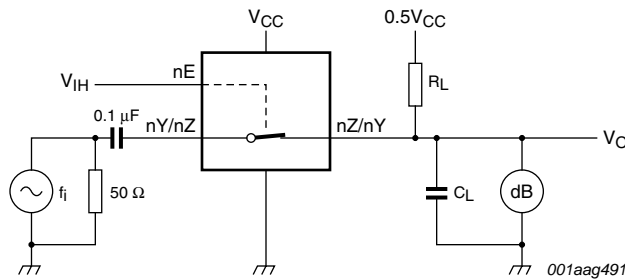
**Test conditions:**

$V_{CC} = 2.3\text{ V}; V_i = 2\text{ V (p-p)}$ .

$V_{CC} = 3\text{ V}; V_i = 2.5\text{ V (p-p)}$ .

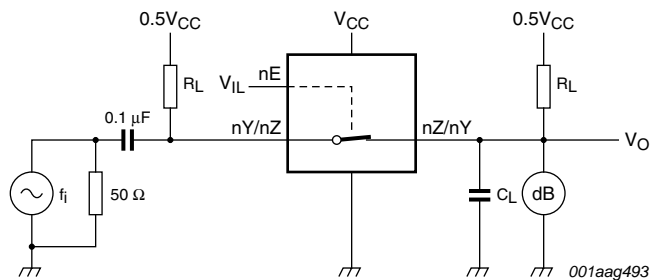
$V_{CC} = 4.5\text{ V}; V_i = 4\text{ V (p-p)}$ .

**Fig 14. 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 15. 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 16. Test circuit for measuring isolation (OFF-state)**

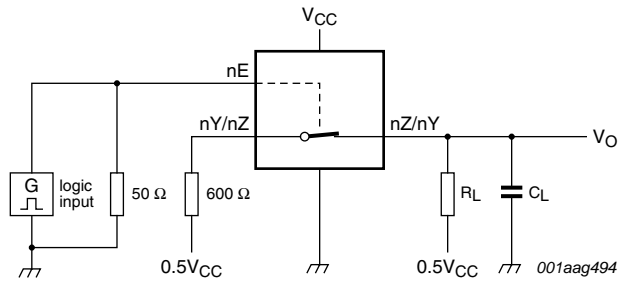
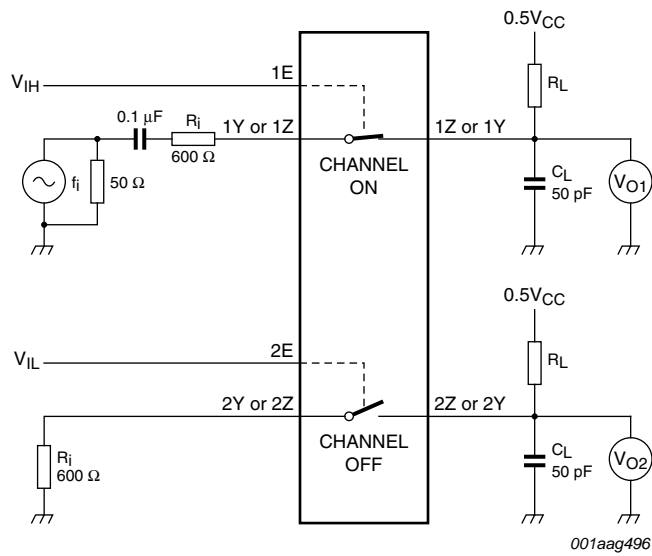
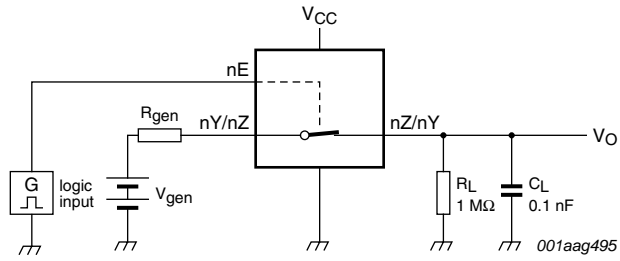


Fig 17. Test circuit for measuring crosstalk voltage (between digital inputs and switch)

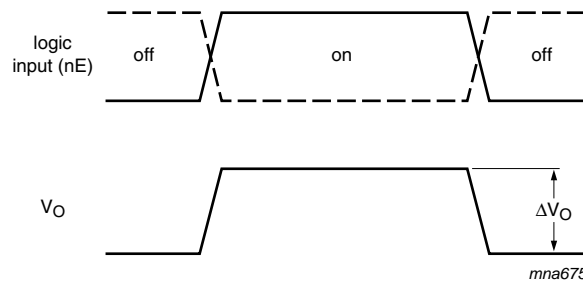


$$20 \log_{10} (V_{O2} / V_{O1}) \text{ or } 20 \log_{10} (V_{O1} / V_{O2}).$$

Fig 18. Test circuit for measuring crosstalk between switches



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 19. Test circuit for measuring charge injection**

## 12. Application information

Use the 74LVCV2G66 to reduce component count and footprint in low-power portable applications.

Typical '66' devices do not have low-power enable inputs causing a high  $\Delta I_{CC}$ . To reduce power consumption in portable (battery) applications, a current limiting resistor is used. (see [Figure 20a](#)). The low-power enable inputs of the 74LVCV2G66 have much lower  $\Delta I_{CC}$ , eliminating the necessity of the current limiting resistor (see [Figure 20b](#)).

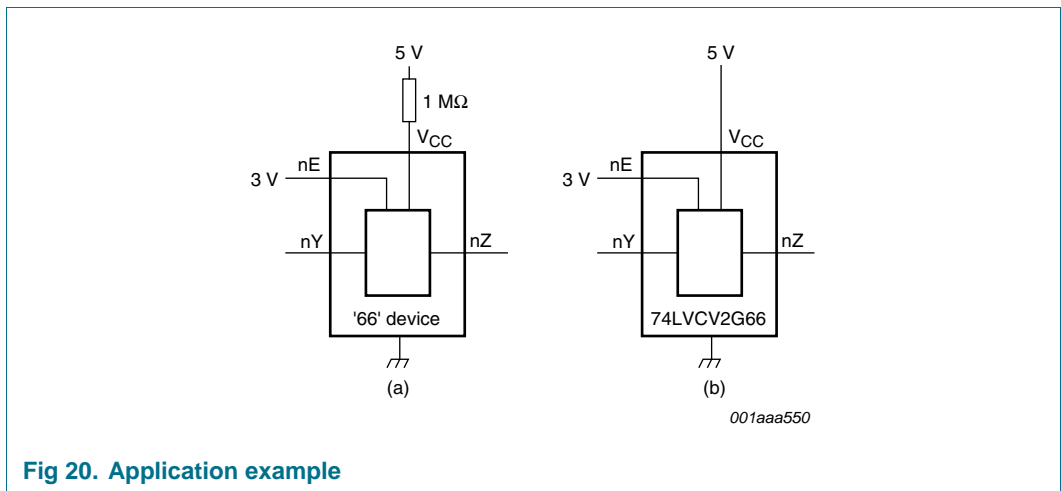


Fig 20. Application example



### 13. Package outline

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

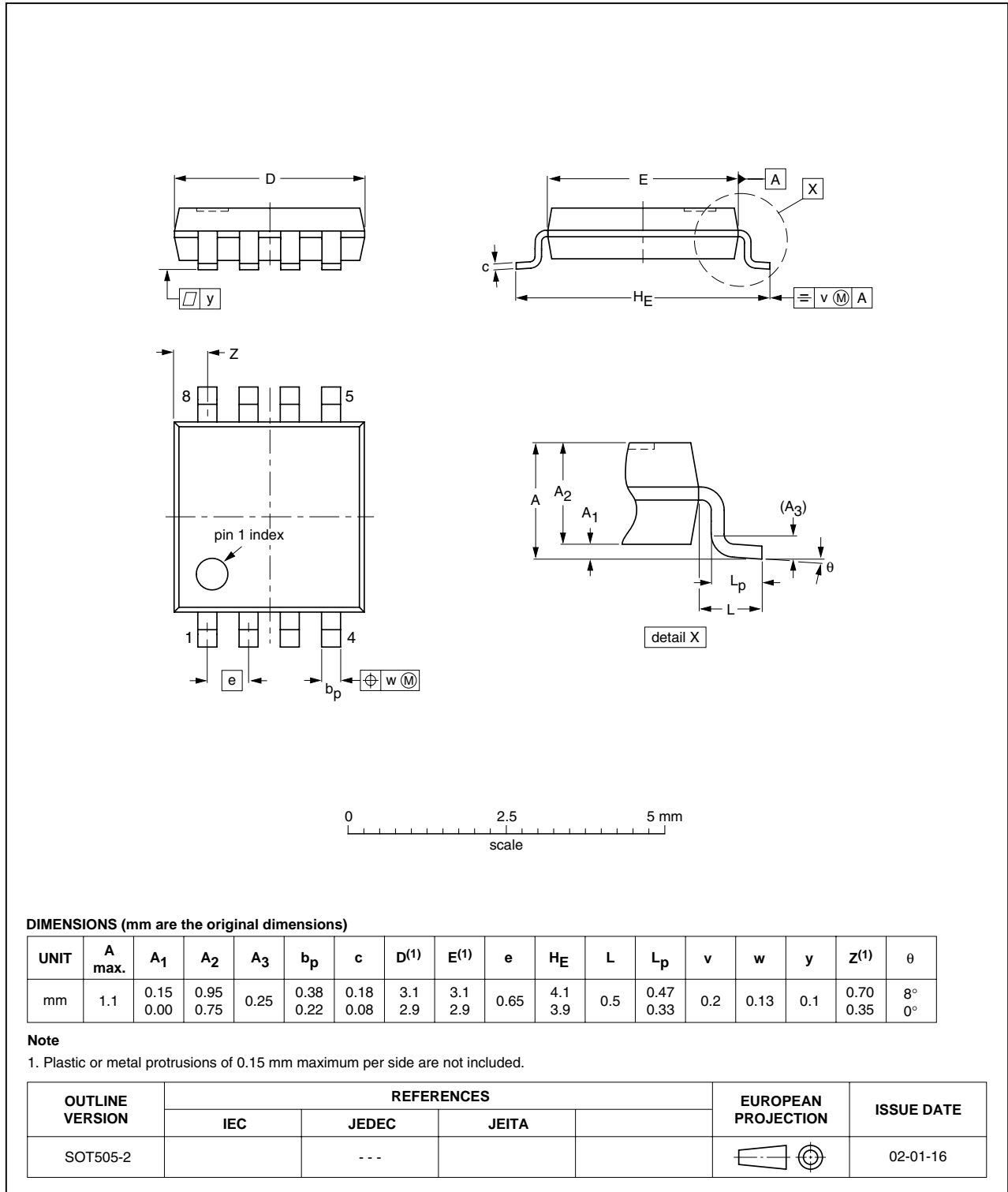


Fig 21. Package outline SOT505-2 (TSSOP8)

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

SOT765-1

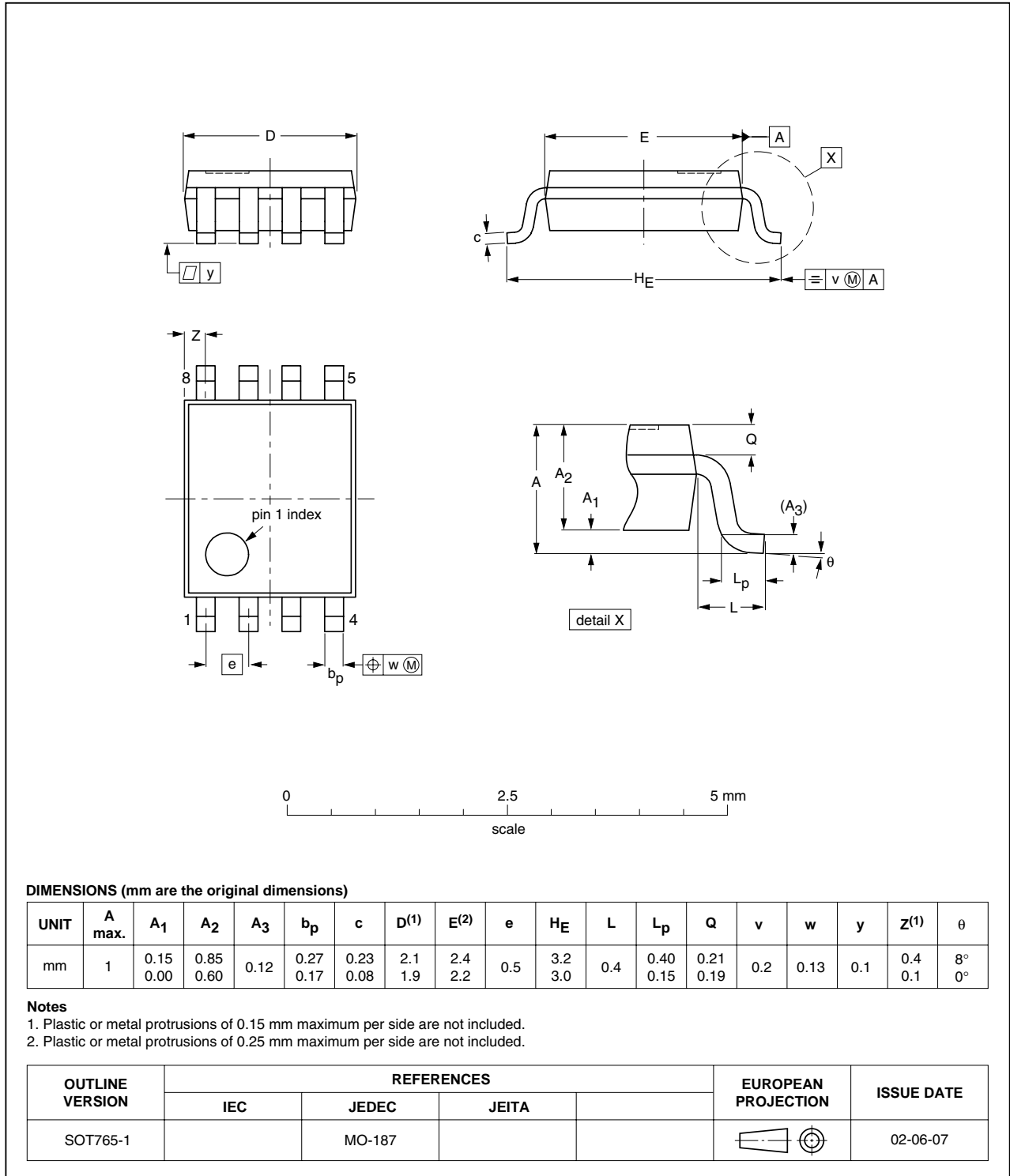


Fig 22. Package outline SOT765-1 (VSSOP8)

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

SOT996-2

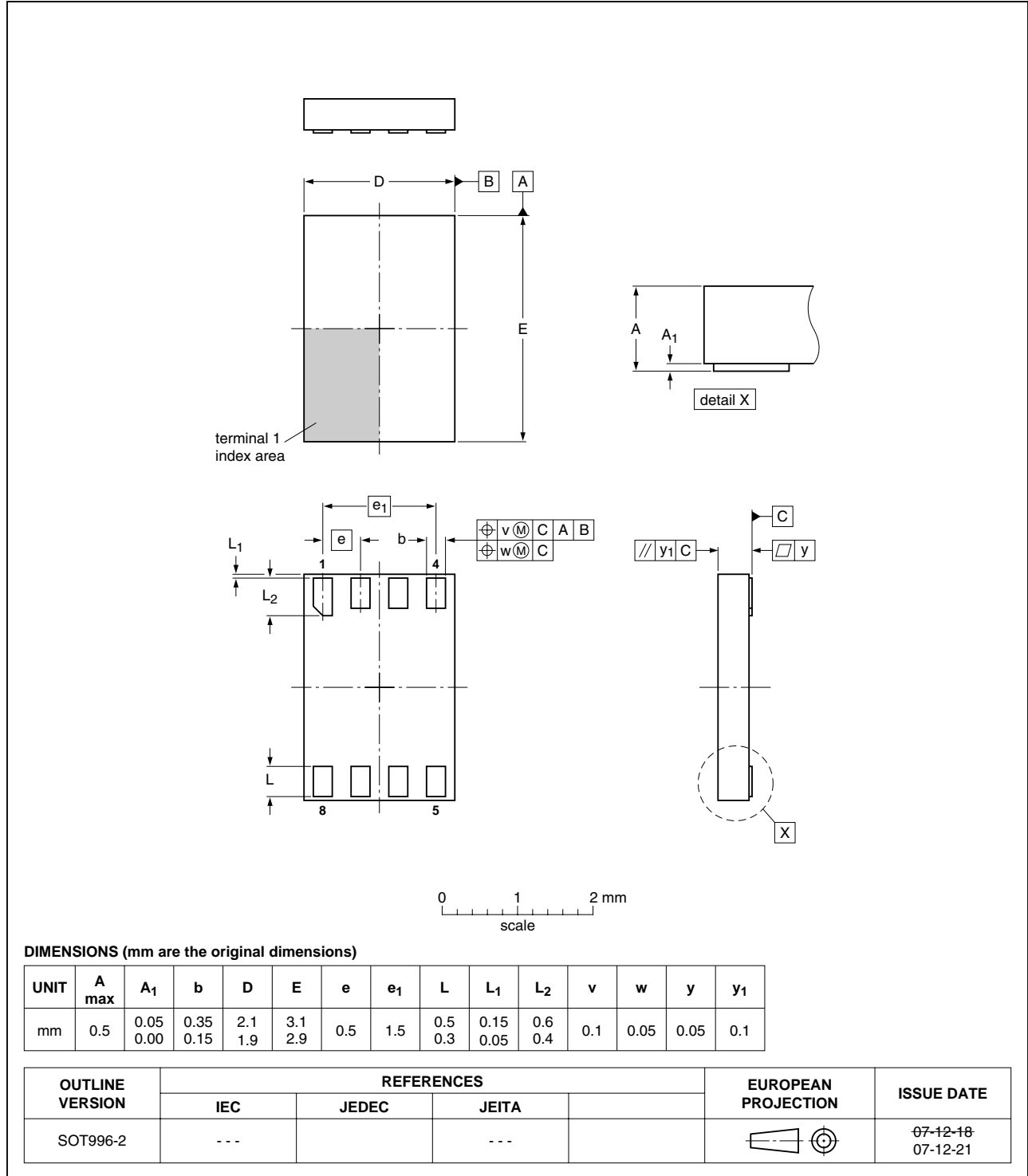


Fig 23. Package outline SOT996-2 (XSON8U)

## 14. Abbreviations

Table 13. Abbreviations

| Acronym | Description                             |
|---------|---|
| CMOS    | Complementary Metal-Oxide Semiconductor |
| DUT     | Device Under Test                       |

## 15. Revision history

Table 14: Revision history

| Document ID    | Release date  | Data sheet status  | Change notice | Supersedes   |
|----------------|---|--------------------|---------------|--------------|
| 74LVCV2G66 v.3 | 20100616  | Product data sheet | -             | 74LVCV2G66_2 |
| Modifications: | <ul style="list-style-type: none"> <li>• Conditions for <math>I_{CC}</math> and <math>\Delta I_{CC}</math> corrected.</li> </ul>  |                    |               |              |
| 74LVCV2G66_2   | 20080703  | Product data sheet | -             | 74LVCV2G66_1 |
| Modifications: | <ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• Added type number 74LVCV2G66GD (XSON8U package).</li> </ul> |                    |               |              |
| 74LVCV2G66_1   | 20040402  | Product data sheet | -             | -            |

## 16. Legal information

### 16.1 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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