

# 74LV4066

## Quad bilateral switches

Rev. 4 — 9 December 2015

Product data sheet

### 1. General description

The 74LV4066 is a low-voltage Si-gate CMOS device that is pin and function compatible with the 74HC4066 and 74HCT4066.

The 74LV4066 has four independent switches. Each switch has two input/output pins (nY, nZ) and an active HIGH enable input pin (nE). When nE is LOW the corresponding analog switch is turned off.

The 74LV4066 has a ON-resistance which is reduced in comparison with the 74HCT4066.

### 2. Features and benefits

- Optimized for low-voltage applications: 1.0 V to 3.6 V
- Typical  $V_{OLP}$  (output ground bounce): < 0.8 V at  $V_{CC} = 3.3$  V and  $T_{amb} = 25$  °C
- Accepts TTL input levels between  $V_{CC} = 2.7$  V and  $V_{CC} = 3.6$  V
- Very low ON-resistance:
  - ◆ 60  $\Omega$  (typical) at  $V_{CC} = 2.0$  V
  - ◆ 35  $\Omega$  (typical) at  $V_{CC} = 3.0$  V
  - ◆ 25  $\Omega$  (typical) at  $V_{CC} = 4.5$  V
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Specified from -40 °C to +80 °C and from -40 °C to +125 °C

### 3. Ordering information

Table 1. Ordering information

| Type number | Package           |         |  |          |
|-------------|-------------------|---------|--|----------|
|             | Temperature range | Name    | Description  | Version  |
| 74LV4066D   | -40 °C to +125 °C | SO14    | plastic small outline package; 14 leads; body width 3.9 mm             | SOT108-1 |
| 74LV4066DB  | -40 °C to +125 °C | SSOP14  | plastic shrink small outline package; 14 leads; body width 5.3 mm      | SOT337-1 |
| 74LV4066PW  | -40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |

### 4. Functional diagram



Fig 1. Logic symbol



Fig 2. IEC logic diagram

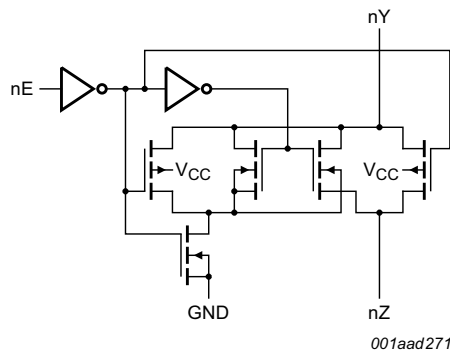


Fig 3. Logic diagram (one switch)

## 5. Pinning information

### 5.1 Pinning

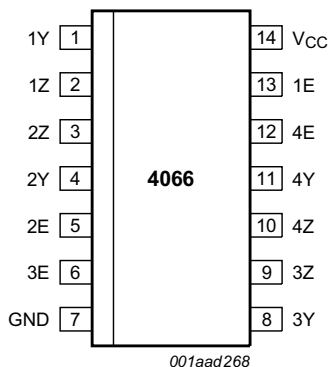


Fig 4. Pin configuration

### 5.2 Pin description

Table 2. Pin description

| Symbol          | Pin          | Description                 |
|-----------------|--------------|-----------------------------|
| 1Y, 2Y, 3Y, 4Y  | 1, 4, 8, 11  | independent input or output |
| 1Z, 2Z, 3Z, 4Z  | 2, 3, 9, 10  | independent output or input |
| GND             | 7            | ground (0 V)                |
| 1E, 2E, 3E, 4E  | 13, 5, 6, 12 | enable input                |
| V <sub>CC</sub> | 14           | supply voltage              |

## 6. Functional description

### 6.1 Function table

Table 3. Function table

| Input nE | Switch |
|----------|--------|
| LOW      | off    |
| HIGH     | on     |

## 7. 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 | +7.0     | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | -    | $\pm 50$ | mA   |
| $I_{SW}$  | switch current          | $V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$ [1] | -    | $\pm 25$ | mA   |
| $T_{stg}$ | storage temperature     |  | -65  | +150     | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$          |      |          |      |
|           |                         | SO14 package [2]                                       | -    | 500      | mW   |
|           |                         | (T)SSOP14 package [3]                                  |      | 400      | mW   |

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

[2] SO14 package:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[3] (T)SSOP14 package:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

| Symbol              | Parameter                           | Conditions                                | Min | Typ | Max      | Unit |
|---------------------|-------------------------------------|---|-----|-----|----------|------|
| $V_{CC}$            | supply voltage                      | [1]                                       | 1.0 | 3.3 | 6        | V    |
| $V_I$               | input voltage                       |   | 0   | -   | $V_{CC}$ | V    |
| $V_O$               | output voltage                      |   | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$           | ambient temperature                 | in free air                               | -40 | -   | +125     | °C   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 1.0\text{ V}$ to $2.0\text{ V}$ | -   | -   | 500      | ns/V |
|                     |                                     | $V_{CC} = 2.0\text{ V}$ to $2.7\text{ V}$ | -   | -   | 200      | ns/V |
|                     |                                     | $V_{CC} = 2.7\text{ V}$ to $3.6\text{ V}$ | -   | -   | 100      | ns/V |
|                     |                                     | $V_{CC} = 3.6\text{ V}$ to $5.5\text{ V}$ | -   | -   | 50       | ns/V |

[1] The static characteristics are guaranteed from  $V_{CC} = 1.2\text{ V}$  to  $V_{CC} = 5.5\text{ V}$ , but LV devices are guaranteed to function down to  $V_{CC} = 1.0\text{ V}$  (with input levels GND or  $V_{CC}$ ).

## 9. Static characteristics

**Table 6. Static characteristics**

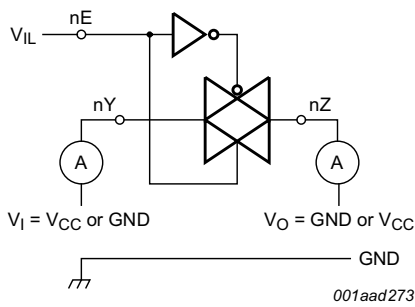
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol  | Parameter                 | Conditions  | Min  | Typ | Max  | Unit          |
|---|---------------------------|---|------|-----|------|---------------|
| <b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b>  |                           |   |      |     |      |               |
| $V_{IH}$  | HIGH-level input voltage  | $V_{CC} = 1.2\text{ V}$   | 0.90 | -   | -    | V             |
|   |                           | $V_{CC} = 2.0\text{ V}$   | 1.40 | -   | -    | V             |
|   |                           | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$   | 2.00 | -   | -    | V             |
|   |                           | $V_{CC} = 4.5\text{ V}$   | 3.15 | -   | -    | V             |
|   |                           | $V_{CC} = 6.0\text{ V}$   | 4.20 | -   | -    | V             |
| $V_{IL}$  | LOW-level input voltage   | $V_{CC} = 1.2\text{ V}$   | -    | -   | 0.30 | V             |
|   |                           | $V_{CC} = 2.0\text{ V}$   | -    | -   | 0.60 | V             |
|   |                           | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$   | -    | -   | 0.80 | V             |
|   |                           | $V_{CC} = 4.5\text{ V}$   | -    | -   | 1.35 | V             |
|   |                           | $V_{CC} = 6.0\text{ V}$   | -    | -   | 1.80 | V             |
| $I_I$   | input leakage current     | $V_I = V_{CC}$ or GND   |      |     |      |               |
|   |                           | $V_{CC} = 3.6\text{ V}$   | -    | -   | 1.0  | $\mu\text{A}$ |
|   |                           | $V_{CC} = 6.0\text{ V}$   | -    | -   | 2.0  | $\mu\text{A}$ |
| $I_{S(OFF)}$  | OFF-state leakage current | $V_I = V_{IH}$ or $V_{IL}$ ; see <a href="#">Figure 5</a>                             |      |     |      |               |
|   |                           | $V_{CC} = 3.6\text{ V}$   | -    | -   | 1.0  | $\mu\text{A}$ |
|   |                           | $V_{CC} = 6.0\text{ V}$   | -    | -   | 2.0  | $\mu\text{A}$ |
| $I_{S(ON)}$   | ON-state leakage current  | $V_I = V_{IH}$ or $V_{IL}$ ; see <a href="#">Figure 6</a>                             |      |     |      |               |
|   |                           | $V_{CC} = 3.6\text{ V}$   | -    | -   | 1.0  | $\mu\text{A}$ |
|   |                           | $V_{CC} = 6.0\text{ V}$   | -    | -   | 2.0  | $\mu\text{A}$ |
| $I_{CC}$  | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0\text{ A}$   |      |     |      |               |
|   |                           | $V_{CC} = 3.6\text{ V}$   | -    | -   | 20   | $\mu\text{A}$ |
|   |                           | $V_{CC} = 6.0\text{ V}$   | -    | -   | 40   | $\mu\text{A}$ |
| $\Delta I_{CC}$   | additional supply current | per input; $V_I = V_{CC} - 0.6\text{ V}$ ;<br>$V_{CC} = 2.7\text{ V to }3.6\text{ V}$ | -    | -   | 500  | $\mu\text{A}$ |
| $C_I$   | input capacitance         |   | -    | 3.5 | -    | pF            |
| <b><math>T_{amb} = -40\text{ °C to }+125\text{ °C}</math></b> |                           |   |      |     |      |               |
| $V_{IH}$  | HIGH-level input voltage  | $V_{CC} = 1.2\text{ V}$   | 0.90 | -   | -    | V             |
|   |                           | $V_{CC} = 2.0\text{ V}$   | 1.40 | -   | -    | V             |
|   |                           | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$   | 2.00 | -   | -    | V             |
|   |                           | $V_{CC} = 4.5\text{ V}$   | 3.15 | -   | -    | V             |
|   |                           | $V_{CC} = 6.0\text{ V}$   | 4.20 | -   | -    | V             |
| $V_{IL}$  | LOW-level input voltage   | $V_{CC} = 1.2\text{ V}$   | -    | -   | 0.30 | V             |
|   |                           | $V_{CC} = 2.0\text{ V}$   | -    | -   | 0.60 | V             |
|   |                           | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$   | -    | -   | 0.80 | V             |
|   |                           | $V_{CC} = 4.5\text{ V}$   | -    | -   | 1.35 | V             |
|   |                           | $V_{CC} = 6.0\text{ V}$   | -    | -   | 1.80 | V             |

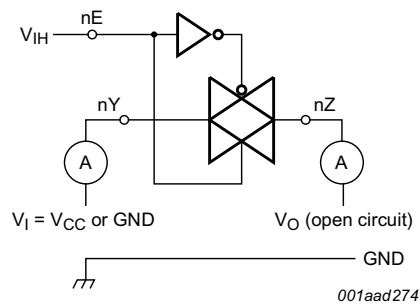
**Table 6. Static characteristics ...continued**

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

| Symbol          | Parameter                 | Conditions  | Min | Typ | Max | Unit    |
|-----------------|---------------------------|---|-----|-----|-----|---------|
| $I_I$           | input leakage current     | $V_I = V_{CC}$ or GND   |     |     |     |         |
|                 |                           | $V_{CC} = 3.6$ V  | -   | -   | 1.0 | $\mu$ A |
|                 |                           | $V_{CC} = 6.0$ V  | -   | -   | 2.0 | $\mu$ A |
| $I_{S(OFF)}$    | OFF-state leakage current | $V_I = V_{IH}$ or $V_{IL}$ ; see <a href="#">Figure 5</a>       |     |     |     |         |
|                 |                           | $V_{CC} = 3.6$ V  | -   | -   | 1.0 | $\mu$ A |
|                 |                           | $V_{CC} = 6.0$ V  | -   | -   | 2.0 | $\mu$ A |
| $I_{S(ON)}$     | ON-state leakage current  | $V_I = V_{IH}$ or $V_{IL}$ ; see <a href="#">Figure 6</a>       |     |     |     |         |
|                 |                           | $V_{CC} = 3.6$ V  | -   | -   | 1.0 | $\mu$ A |
|                 |                           | $V_{CC} = 6.0$ V  | -   | -   | 2.0 | $\mu$ A |
| $I_{CC}$        | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0$ A                              |     |     |     |         |
|                 |                           | $V_{CC} = 3.6$ V  | -   | -   | 40  | $\mu$ A |
|                 |                           | $V_{CC} = 6.0$ V  | -   | -   | 80  | $\mu$ A |
| $\Delta I_{CC}$ | additional supply current | per input; $V_I = V_{CC} - 0.6$ V;<br>$V_{CC} = 2.7$ V to 3.6 V | -   | -   | 850 | $\mu$ A |



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



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

**Table 7. ON-resistance**At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#).

| Symbol  | Parameter                | Conditions  | Min | Typ <sup>[1]</sup> | Max | Unit |  |
|---|--------------------------|---|-----|--------------------|-----|------|--|
| <b>T<sub>amb</sub> = -40 °C to +85 °C; see <a href="#">Figure 8</a></b> |                          |   |     |                    |     |      |  |
| R <sub>ON(peak)</sub>   | ON resistance (peak)     | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                     |     |                    |     |      |  |
|   |                          | V <sub>CC</sub> = 1.2 V <sup>[2]</sup>  | -   | 300                | -   | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.0 V   | -   | 60                 | 130 | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.7 V   | -   | 41                 | 60  | Ω    |  |
|   |                          | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | 37                 | 72  | Ω    |  |
|   |                          | V <sub>CC</sub> = 4.5 V   | -   | 25                 | 52  | Ω    |  |
|   |                          | V <sub>CC</sub> = 6.0 V   | -   | 23                 | 47  | Ω    |  |
| R <sub>ON(rail)</sub>   | ON resistance (rail)     | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>is</sub> = GND             |     |                    |     |      |  |
|   |                          | V <sub>CC</sub> = 1.2 V <sup>[2]</sup>  | -   | 75                 | -   | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.0 V   | -   | 35                 | 98  | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.7 V   | -   | 26                 | 60  | Ω    |  |
|   |                          | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | 24                 | 52  | Ω    |  |
|   |                          | V <sub>CC</sub> = 4.5 V   | -   | 15                 | 40  | Ω    |  |
|   |                          | V <sub>CC</sub> = 6.0 V   | -   | 13                 | 35  | Ω    |  |
|   |                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>is</sub> = V <sub>CC</sub> |     |                    |     |      |  |
|   |                          | V <sub>CC</sub> = 1.2 V <sup>[2]</sup>  | -   | 75                 | -   | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.0 V   | -   | 40                 | 110 | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.7 V   | -   | 35                 | 72  | Ω    |  |
|   |                          | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | 30                 | 65  | Ω    |  |
|   |                          | V <sub>CC</sub> = 4.5 V   | -   | 22                 | 47  | Ω    |  |
|   |                          | V <sub>CC</sub> = 6.0 V   | -   | 20                 | 40  | Ω    |  |
| R <sub>ON(flat)</sub>   | ON resistance (flatness) | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>is</sub> = V <sub>CC</sub> |     |                    |     |      |  |
|   |                          | V <sub>CC</sub> = 2.0 V   | -   | 5                  | -   | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.7 V   | -   | 4                  | -   | Ω    |  |
|   |                          | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | 4                  | -   | Ω    |  |
|   |                          | V <sub>CC</sub> = 4.5 V   | -   | 3                  | -   | Ω    |  |
| V <sub>CC</sub> = 6.0 V   | -                        | 2   | -   | Ω                  |     |      |  |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b>                              |                          |   |     |                    |     |      |  |
| R <sub>ON(peak)</sub>   | ON resistance (peak)     | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                     |     |                    |     |      |  |
|   |                          | V <sub>CC</sub> = 2.0 V   | -   | -                  | 150 | Ω    |  |
|   |                          | V <sub>CC</sub> = 2.7 V   | -   | -                  | 90  | Ω    |  |
|   |                          | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | -                  | 83  | Ω    |  |
|   |                          | V <sub>CC</sub> = 4.5 V   | -   | -                  | 60  | Ω    |  |
| V <sub>CC</sub> = 6.0 V   | -                        | -   | 54  | Ω                  |     |      |  |

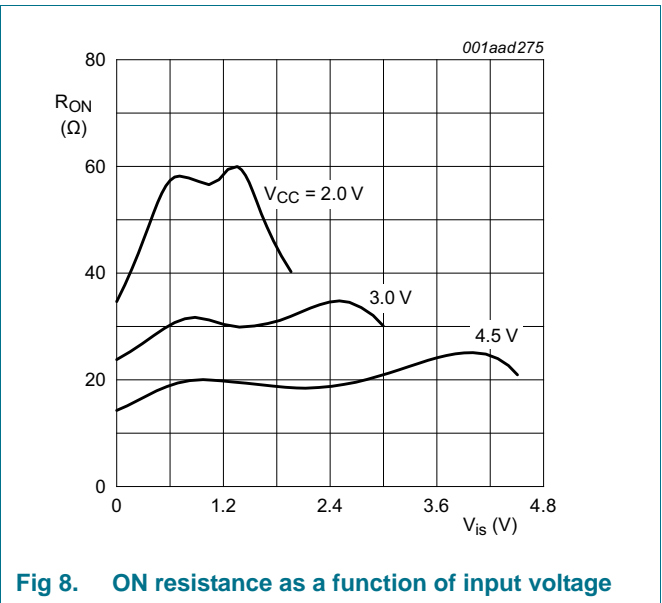
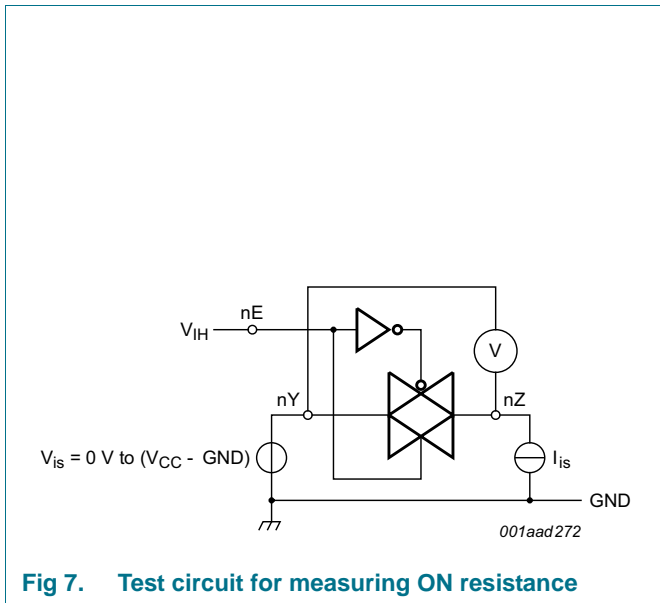
**Table 7. ON-resistance ...continued**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#).

| Symbol                | Parameter            | Conditions  | Min | Typ <sup>[1]</sup> | Max | Unit |  |
|-----------------------|----------------------|---|-----|--------------------|-----|------|--|
| R <sub>ON(rail)</sub> | ON resistance (rail) | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>is</sub> = GND             |     |                    |     |      |  |
|                       |                      | V <sub>CC</sub> = 2.0 V   | -   | -                  | 115 | Ω    |  |
|                       |                      | V <sub>CC</sub> = 2.7 V   | -   | -                  | 68  | Ω    |  |
|                       |                      | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | -                  | 60  | Ω    |  |
|                       |                      | V <sub>CC</sub> = 4.5 V   | -   | -                  | 45  | Ω    |  |
|                       |                      | V <sub>CC</sub> = 6.0 V   | -   | -                  | 40  | Ω    |  |
|                       |                      | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>is</sub> = V <sub>CC</sub> |     |                    |     |      |  |
|                       |                      | V <sub>CC</sub> = 2.0 V   | -   | -                  | 130 | Ω    |  |
|                       |                      | V <sub>CC</sub> = 2.7 V   | -   | -                  | 85  | Ω    |  |
|                       |                      | V <sub>CC</sub> = 3.0 V to 3.6 V  | -   | -                  | 75  | Ω    |  |
|                       |                      | V <sub>CC</sub> = 4.5 V   | -   | -                  | 55  | Ω    |  |
|                       |                      | V <sub>CC</sub> = 6.0 V   | -   | -                  | 47  | Ω    |  |

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

[2] At supply voltage approaching 1.2 V, the analog switch ON-resistance becomes extremely non-linear. Therefore it is recommended that these devices be used to transmit digital signals only, when using these supply voltages.





## 10. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

| Symbol                                     | Parameter                     | Conditions  | Min | Typ <sup>[1]</sup> | Max | Unit |
|--|-------------------------------|---|-----|--------------------|-----|------|
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b>  |                               |   |     |                    |     |      |
| t <sub>pd</sub>                            | propagation delay             | V <sub>is</sub> to V <sub>os</sub> ; see <a href="#">Figure 9</a> <sup>[2]</sup>  |     |                    |     |      |
|  |                               | V <sub>CC</sub> = 1.2 V   | -   | 8                  | -   | ns   |
|  |                               | V <sub>CC</sub> = 2.0 V   | -   | 5                  | 26  | ns   |
|  |                               | V <sub>CC</sub> = 2.7 V to 3.6 V  | -   | 3                  | 15  | ns   |
|  |                               | V <sub>CC</sub> = 4.5 V   | -   | 2                  | 13  | ns   |
|  |                               | V <sub>CC</sub> = 6.0 V   | -   | 2                  | 10  | ns   |
| t <sub>on</sub>                            | turn-on time                  | nE to V <sub>os</sub> ; see <a href="#">Figure 9</a> <sup>[3]</sup>   |     |                    |     |      |
|  |                               | V <sub>CC</sub> = 1.2 V   | -   | 40                 | -   | ns   |
|  |                               | V <sub>CC</sub> = 2.0 V   | -   | 22                 | 43  | ns   |
|  |                               | V <sub>CC</sub> = 2.7 V to 3.6 V  | -   | 12                 | 25  | ns   |
|  |                               | V <sub>CC</sub> = 3.3 V; C <sub>L</sub> = 15 pF   | -   | 10                 | -   | ns   |
|  |                               | V <sub>CC</sub> = 4.5 V   | -   | 10                 | 21  | ns   |
| t <sub>off</sub>                           | turn-off time                 | nE to V <sub>os</sub> ; see <a href="#">Figure 9</a> <sup>[4]</sup>   |     |                    |     |      |
|  |                               | V <sub>CC</sub> = 1.2 V   | -   | 50                 | -   | ns   |
|  |                               | V <sub>CC</sub> = 2.0 V   | -   | 27                 | 65  | ns   |
|  |                               | V <sub>CC</sub> = 2.7 V to 3.6 V  | -   | 15                 | 38  | ns   |
|  |                               | V <sub>CC</sub> = 3.3 V; C <sub>L</sub> = 15 pF   | -   | 13                 | -   | ns   |
|  |                               | V <sub>CC</sub> = 4.5 V   | -   | 13                 | 32  | ns   |
| C <sub>PD</sub>                            | power dissipation capacitance | per switch; V <sub>CC</sub> = 3.3 V;<br>V <sub>I</sub> = GND to V <sub>CC</sub> ; C <sub>L</sub> = 15 pF <sup>[5]</sup> | -   | 11                 | -   | pF   |
|  |                               |   |     |                    |     |      |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                               |   |     |                    |     |      |
| t <sub>pd</sub>                            | propagation delay             | V <sub>is</sub> to V <sub>os</sub> ; see <a href="#">Figure 9</a> <sup>[2]</sup>  |     |                    |     |      |
|  |                               | V <sub>CC</sub> = 2.0 V   | -   | -                  | 31  | ns   |
|  |                               | V <sub>CC</sub> = 2.7 V to 3.6 V  | -   | -                  | 18  | ns   |
|  |                               | V <sub>CC</sub> = 4.5 V   | -   | -                  | 15  | ns   |
|  |                               | V <sub>CC</sub> = 6.0 V   | -   | -                  | 12  | ns   |
| t <sub>on</sub>                            | turn-on time                  | nE to V <sub>os</sub> ; see <a href="#">Figure 9</a> <sup>[3]</sup>   |     |                    |     |      |
|  |                               | V <sub>CC</sub> = 2.0 V   | -   | -                  | 51  | ns   |
|  |                               | V <sub>CC</sub> = 2.7 V to 3.6 V  | -   | -                  | 30  | ns   |
|  |                               | V <sub>CC</sub> = 4.5 V   | -   | -                  | 26  | ns   |
|  |                               | V <sub>CC</sub> = 6.0 V   | -   | -                  | 20  | ns   |

**Table 8. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

| Symbol           | Parameter     | Conditions  | Min | Typ <sup>[1]</sup> | Max | Unit |
|------------------|---------------|---|-----|--------------------|-----|------|
| t <sub>off</sub> | turn-off time | nE to V <sub>os</sub> ; see <a href="#">Figure 9</a> <sup>[4]</sup> |     |                    |     |      |
|                  |               | V <sub>CC</sub> = 2.0 V   | -   | -                  | 81  | ns   |
|                  |               | V <sub>CC</sub> = 2.7 V to 3.6 V                                    | -   | -                  | 47  | ns   |
|                  |               | V <sub>CC</sub> = 4.5 V   | -   | -                  | 40  | ns   |
|                  |               | V <sub>CC</sub> = 6.0 V   | -   | -                  | 34  | ns   |

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

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

[3] t<sub>on</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.

[4] t<sub>off</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.

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

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma[(C_L + C_S) \times V_{CC}^2 \times f_o] \text{ where:}$$

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;

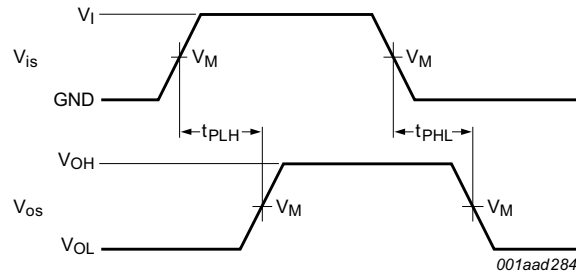
C<sub>S</sub> = maximum switch capacitance in pF;

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

N = number of inputs switching;

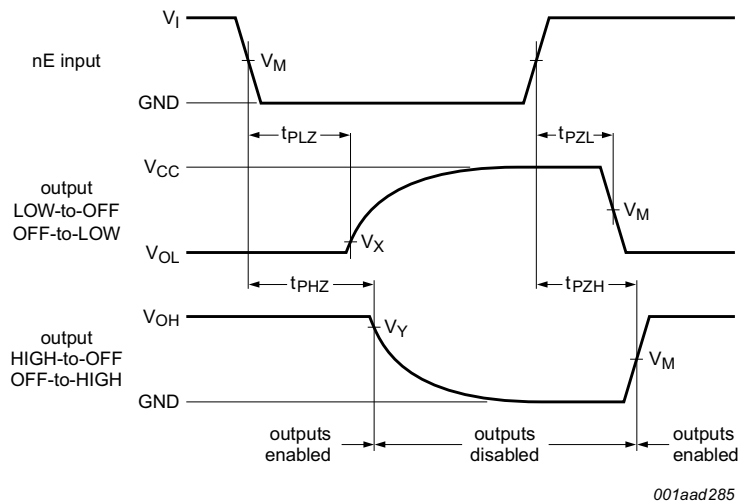
Σ[(C<sub>L</sub> + C<sub>S</sub>) × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>] = sum of the outputs.

11. Waveforms



Measurement points are given in [Table 9](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

**Fig 9. Input to output propagation delays**

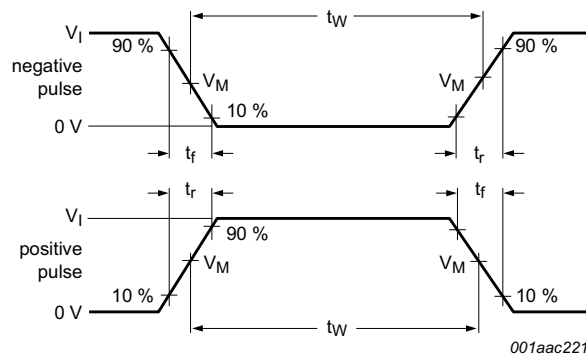


Measurement points are given in [Table 9](#).  
 $V_{OL}$  and  $V_{OH}$  are typical voltage output levels that occur with the output load.

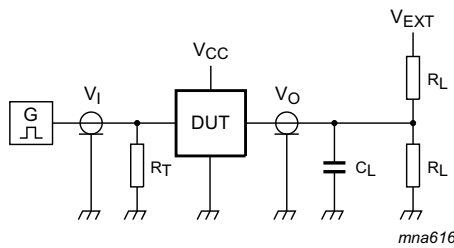
**Fig 10. Turn-on and turn-off times for the inputs to the output**

**Table 9. Measurement points**

| Supply voltage      | Input               | Output              |                 |                          |
|---------------------|---------------------|---------------------|-----------------|--------------------------|
|                     |                     | $V_M$               | $V_X$           | $V_Y$                    |
| $\geq 2.7\text{ V}$ | 1.5 V               | 1.5 V               | $V_{OL} + 0.3$  | $V_{OH} - 0.3\text{ V}$  |
| $< 2.7\text{ V}$    | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{OL} + 0.15$ | $V_{OH} - 0.15\text{ V}$ |



a. Input pulse definition



Test data is given in [Table 10](#).

Definitions test circuit:

$R_L$  = Load resistance.

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

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

$V_{EXT}$  = Test voltage for switching times.

b. Test circuit

**Fig 11. Test circuit for measuring switching times**

**Table 10. Test data**

| Supply voltage | Input    |               | Load  |              | $V_{EXT}$          |                    |                    |
|----------------|----------|---------------|-------|--------------|--------------------|--------------------|--------------------|
| $V_{CC}$       | $V_I$    | $t_r, t_f$    | $C_L$ | $R_L$ [1]    | $t_{PHZ}, t_{PZH}$ | $t_{PLZ}, t_{PZL}$ | $t_{PLH}, t_{PHL}$ |
| < 2.7 V        | $V_{CC}$ | $\leq 2.5$ ns | 50 pF | 1 k $\Omega$ | GND                | $2 \times V_{CC}$  | open               |
| 2.7 V to 3.6 V | 2.7 V    | $\leq 2.5$ ns | 50 pF | 1 k $\Omega$ | GND                | $2 \times V_{CC}$  | open               |
| $\geq 4.5$ V   | $V_{CC}$ | $\leq 2.5$ ns | 50 pF | 1 k $\Omega$ | GND                | $2 \times V_{CC}$  | open               |

[1]  $R_L = \infty \Omega$  for measuring the propagation delays  $t_{PLH}$  and  $t_{PHL}$ .

## 12. Additional dynamic characteristics

**Table 11. Additional dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $V_{is}$  is the input voltage at pin nY or nZ, whichever is assigned as an input;  $V_{os}$  is the output voltage at pin nY or nZ, whichever is assigned as an output.

| Symbol                          | Parameter   | Conditions  | Min | Typ  | Max | Unit |
|---------------------------------|---|---|-----|------|-----|------|
| $d_{sin}$                       | sine-wave distortion  | $R_L = 10\text{ k}\Omega$ ; $f = 1\text{ kHz}$ ; $C_L = 50\text{ pF}$ ;<br>see <a href="#">Figure 12</a>                                |     |      |     |      |
|                                 |   | $V_{CC} = 3.0\text{ V}$ ; $V_{is} = 2.75\text{ V (p-p)}$  | -   | 0.04 | -   | %    |
|                                 |   | $V_{CC} = 6.0\text{ V}$ ; $V_{is} = 5.50\text{ V (p-p)}$  | -   | 0.02 | -   | %    |
|                                 |   | $R_L = 10\text{ k}\Omega$ ; $f = 10\text{ kHz}$ ; $C_L = 50\text{ pF}$ ;<br>see <a href="#">Figure 12</a>                               |     |      |     |      |
|                                 |   | $V_{CC} = 3.0\text{ V}$ ; $V_{is} = 2.75\text{ V (p-p)}$  | -   | 0.12 | -   | %    |
|                                 |   | $V_{CC} = 6.0\text{ V}$ ; $V_{is} = 5.50\text{ V (p-p)}$  | -   | 0.06 | -   | %    |
| $\alpha_{OFF(\text{feedthru})}$ | switch OFF-state signal feed-through attenuation                          | $R_L = 600\text{ k}\Omega$ ; $f = 1\text{ MHz}$ ; $C_L = 50\text{ pF}$ ;<br>see <a href="#">Figure 13</a> and <a href="#">Figure 14</a> | [1] |      |     |      |
|                                 |   | $V_{CC} = 3.0\text{ V}$   | -   | -50  | -   | dB   |
|                                 |   | $V_{CC} = 6.0\text{ V}$   | -   | -50  | -   | dB   |
| $\alpha_{ct(S)}$                | crosstalk between switches  | $R_L = 600\text{ k}\Omega$ ; $f = 1\text{ MHz}$ ; $C_L = 50\text{ pF}$ ;<br>see <a href="#">Figure 15</a>                               | [1] |      |     |      |
|                                 |   | $V_{CC} = 3.0\text{ V}$   | -   | -60  | -   | dB   |
|                                 |   | $V_{CC} = 6.0\text{ V}$   | -   | -60  | -   | dB   |
| $V_{ct(pp)}$                    | crosstalk voltage between enable input to any switch (peak-to-peak value) | $R_L = 600\text{ k}\Omega$ ; $f = 1\text{ MHz}$ ; $C_L = 50\text{ pF}$ ;<br>see <a href="#">Figure 16</a> and <a href="#">Figure 17</a> | [2] |      |     |      |
|                                 |   | $V_{CC} = 3.0\text{ V}$   | -   | 110  | -   | mV   |
|                                 |   | $V_{CC} = 6.0\text{ V}$   | -   | 220  | -   | mV   |
| $f_{max}$                       | minimum frequency response (-3 dB)  | $R_L = 50\text{ k}\Omega$ ; $C_L = 50\text{ pF}$ ; see <a href="#">Figure 18</a> and <a href="#">Figure 19</a>                          | [3] |      |     |      |
|                                 |   | $V_{CC} = 3.0\text{ V}$   | -   | 180  | -   | MHz  |
|                                 |   | $V_{CC} = 6.0\text{ V}$   | -   | 200  | -   | MHz  |
| $C_S$                           | maximum switch capacitance  |   | -   | 8    | -   | pF   |

[1] Adjust input voltage  $V_{is}$  is 0 dBm level (0 dBm = 1 mW into 600  $\Omega$ ).

[2] Pin nE: square wave between  $V_{CC}$  and GND,  $t_r = t_f = 6\text{ ns}$ .

[3] Adjust input voltage  $V_{is}$  is 0 dBm level at  $V_{os}$  for 1 MHz (0 dBm = 1 mW into 50  $\Omega$ ).

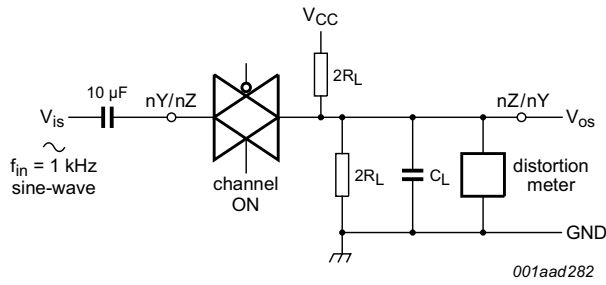


Fig 12. Test circuit for measuring sine-wave distortion

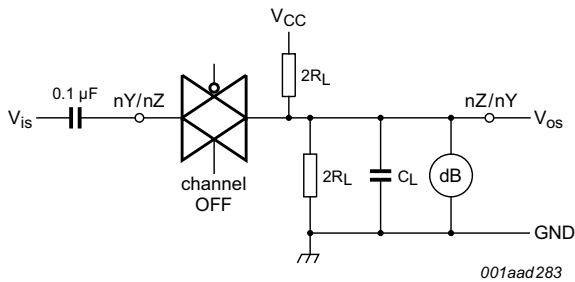
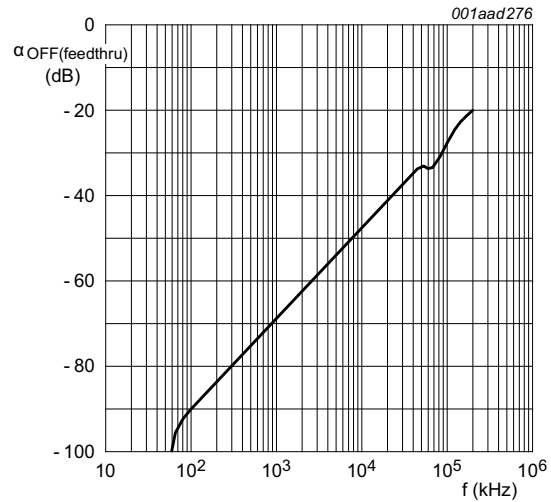
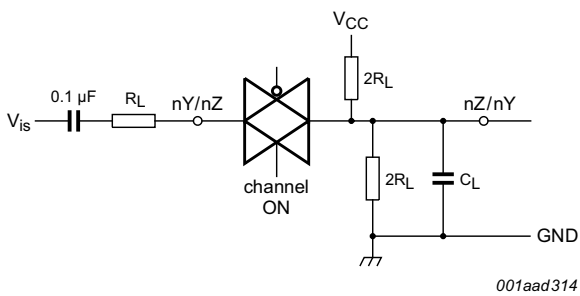


Fig 13. Test circuit for measuring switch OFF-state signal feed-through

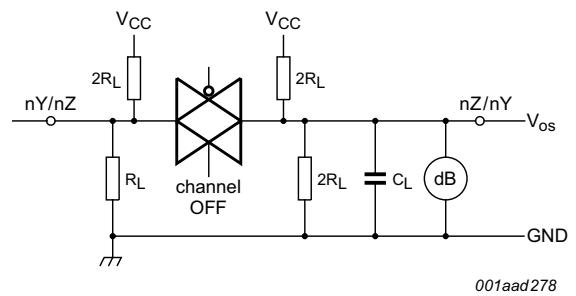


$V_{CC} = 3.0 \text{ V}$ ;  $GND = 0 \text{ V}$ ;  $R_L = 50 \text{ } \Omega$ ;  $R_{SOURCE} = 1 \text{ k}\Omega$ .

Fig 14. Switch OFF-state signal feed-through as a function of frequency



a. Channel on condition

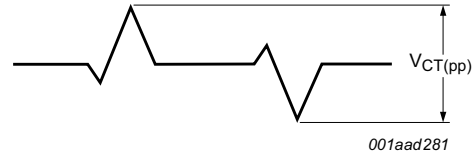


b. Channel off condition

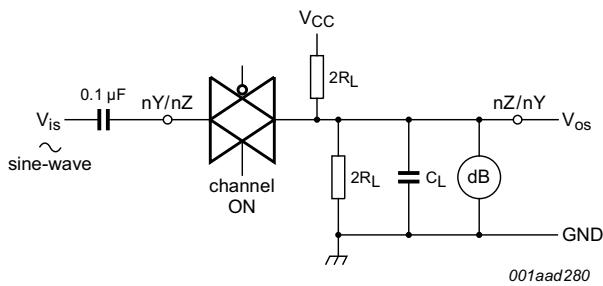
Fig 15. Test circuit for measuring crosstalk between switches



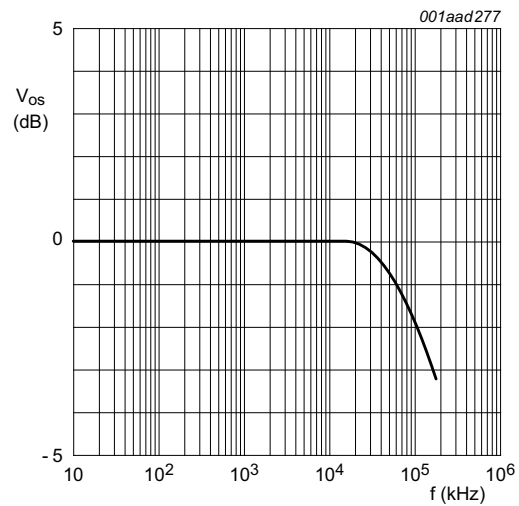
**Fig 16. Test circuit for measuring crosstalk between enable and any switch**



**Fig 17. Crosstalk definition (oscilloscope output)**



**Fig 18. Test circuit for measuring minimum frequency response**



$V_{CC} = 3.0 \text{ V}; GND = 0 \text{ V}; R_L = 50 \text{ } \Omega; R_{SOURCE} = 1 \text{ k}\Omega.$

**Fig 19. Frequency response**

### 13. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



Fig 20. Package outline SOT108-1 (SO14)



SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1



Fig 21. Package outline SOT337-1 (SSOP14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1



Fig 22. Package outline SOT402-1 (TSSOP14)

## 14. Abbreviations

Table 12. Abbreviations

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

## 15. Revision history

Table 13. Revision history

| Document ID    | Release date   | Data sheet status     | Change notice | Supersedes     |
|----------------|--|-----------------------|---------------|----------------|
| 74LV4066 v.4   | 20151209   | Product data sheet    | -             | 74LV4066 v.3   |
| Modifications: | <ul style="list-style-type: none"> <li>Type number 74LV4066N (SOT27-1) removed.</li> </ul>   |                       |               | Modifications: |
| 74LV4066 v.3   | 20050704   | Product data sheet    | -             | 74LV4066 v.2   |
| Modifications: | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.</li> <li><a href="#">Table 1</a>: corrected package names.</li> </ul> |                       |               |                |
| 74LV4066 v.2   | 19980623   | Product specification | -             | -              |

## 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".

[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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- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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