



# **CD4051**

## **8-channel Analog**

## **Multiplexer/Demultiplexer**

### **Product Specification**

#### **Specification Revision History:**

| <b>Version</b> | <b>Date</b> | <b>Description</b>                                           |
|----------------|-------------|--------------------------------------------------------------|
| 2019-06-A1     | 2019-06     | New                                                          |
| 2021-12-A2     | 2021-12     | Modify Ordering Information                                  |
| 2023-04-B1     | 2023-04     | Update the template                                          |
| 2025-07-B2     | 2025-07     | Add notes to package information; update package information |



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## 1、General Description

The CD4051 is an 8-channel analog multiplexer/demultiplexer with three address inputs (S1 to S3), an active LOW enable input ( $\bar{E}$ ), eight independent inputs/outputs (Y0 to Y7) and a common input/output (Z). The device contains eight bidirectional analog switches, each with one side connected to an independent input/output (Y0 to Y7) and the other side connected to a common input/output (Z). With  $\bar{E}$  LOW, one of the eight switches is selected (low-impedance ON-state) by S1 to S3. With  $\bar{E}$  HIGH, all switches are in the high-impedance OFF-state, independent of S1 to S3. If break before make is needed, then it is necessary to use the enable input.

$V_{DD}$  and  $V_{SS}$  are the supply voltage connections for the digital control inputs (S1 to S3, and  $\bar{E}$ ). The  $V_{DD}$  to  $V_{SS}$  range is 3V to 9V. The analog inputs/outputs (Y0 to Y7, and Z) can swing between  $V_{DD}$  as a positive limit and  $V_{EE}$  as a negative limit.  $V_{DD}-V_{EE}$  may not exceed 9V. Unused inputs must be connected to  $V_{DD}$ ,  $V_{SS}$ , or another input. For operation as a digital multiplexer/demultiplexer,  $V_{EE}$  is connected to  $V_{SS}$  (typically ground).  $V_{EE}$  and  $V_{SS}$  are the supply voltage connections for the switches.

### Features:

- Wide supply voltage range from 3V to 9V
- Fully static operation
- 5V and 9V parametric ratings
- Standardized symmetrical output characteristics
- Specified from -40°C to +125°C
- Packaging information: DIP16/SOP16/TSSOP16

**Ordering Information:****Tube packing specifications:**

| Part number   | Packaging form | Marking code | Tube quantity  | Boxed tube quantity | Boxed quantity   | Notes                                                                      |
|---------------|----------------|--------------|----------------|---------------------|------------------|----------------------------------------------------------------------------|
| CD4051DA16.TB | DIP16          | CD4051       | 25<br>PCS/tube | 40<br>tube/box      | 1000<br>PCS/box  | Dimensions of plastic enclosure:<br>19.0mm×6.4mm<br>Pin spacing:<br>2.54mm |
| CD4051SA16.TB | SOP16          | CD4051       | 50<br>PCS/tube | 200<br>tube/box     | 10000<br>PCS/box | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:<br>1.27mm |
| CD4051TA16.TB | TSSOP16        | CD4051       | 96<br>PCS/tube | 200<br>tube/box     | 19200<br>PCS/box | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:<br>0.65mm  |

**Reel packing specifications:**

| Part number   | Packaging form | Marking code | Reel quantity    | Boxed reel quantity | Notes                                                                  |
|---------------|----------------|--------------|------------------|---------------------|------------------------------------------------------------------------|
| CD4051SA16.TR | SOP16          | CD4051       | 4000<br>PCS/reel | 8000<br>PCS/box     | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:1.27mm |
| CD4051TA16.TR | TSSOP16        | CD4051       | 5000<br>PCS/reel | 10000<br>PCS/box    | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:0.65mm  |

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



## 2、Block Diagram And Pin Description

### 2.1、Block Diagram

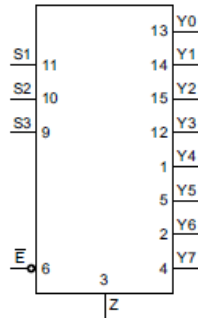


Figure 1. Logic symbol

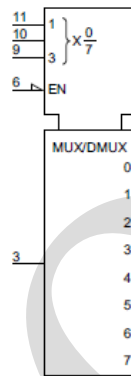


Figure 2. IEC logic symbol

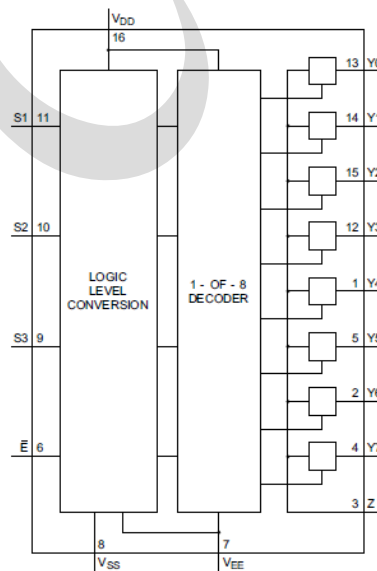


Figure 3. Functional diagram

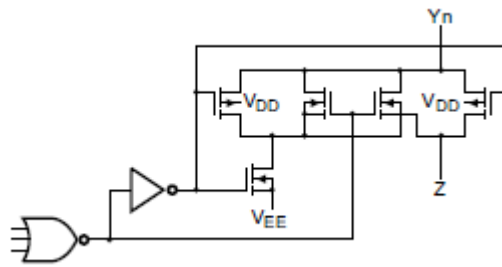


Figure 4. Schematic diagram (one switch)

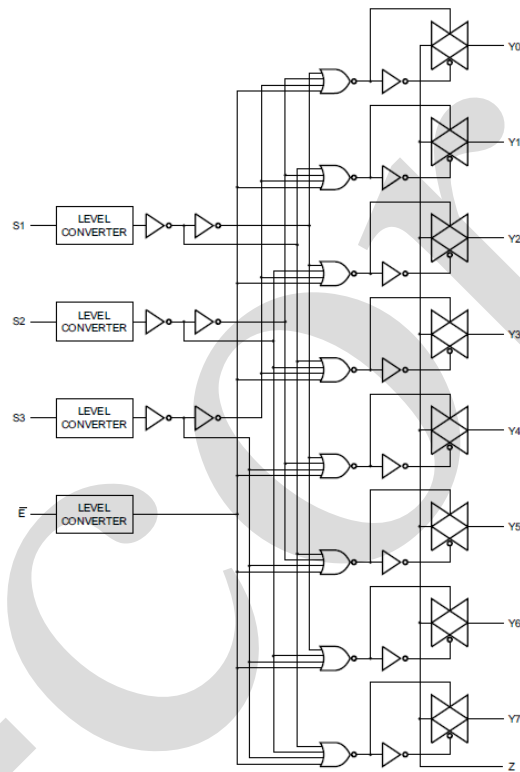
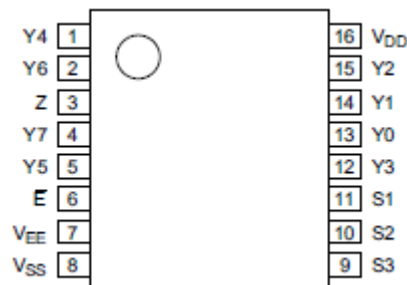


Figure 5. Logic diagram

## 2.2、Pin Configurations





## 2.3、Pin Description

| Pin No. | Pin Name        | Description                 |
|---------|-----------------|-----------------------------|
| 1       | Y4              | independent input or output |
| 2       | Y6              | independent input or output |
| 3       | Z               | common output or input      |
| 4       | Y7              | independent input or output |
| 5       | Y5              | independent input or output |
| 6       | $\bar{E}$       | enable input (active LOW)   |
| 7       | V <sub>EE</sub> | supply voltage              |
| 8       | V <sub>SS</sub> | ground (0V)                 |
| 9       | S3              | select input                |
| 10      | S2              | select input                |
| 11      | S1              | select input                |
| 12      | Y3              | independent input or output |
| 13      | Y0              | independent input or output |
| 14      | Y1              | independent input or output |
| 15      | Y2              | independent input or output |
| 16      | V <sub>DD</sub> | supply voltage              |

## 2.4、Function Table

| Input     |    |    |    | Channel ON   |
|-----------|----|----|----|--------------|
| $\bar{E}$ | S3 | S2 | S1 |              |
| L         | L  | L  | L  | Y0 to Z      |
| L         | L  | L  | H  | Y1 to Z      |
| L         | L  | H  | L  | Y2 to Z      |
| L         | L  | H  | H  | Y3 to Z      |
| L         | H  | L  | L  | Y4 to Z      |
| L         | H  | L  | H  | Y5 to Z      |
| L         | H  | H  | L  | Y6 to Z      |
| L         | H  | H  | H  | Y7 to Z      |
| H         | X  | X  | X  | switches off |

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



## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to  $V_{SS}$  (ground=0V), unless otherwise specified.)

| Parameter               | Symbol    | Conditions                            | Min.      | Max.           | Unit |
|-------------------------|-----------|---------------------------------------|-----------|----------------|------|
| supply voltage          | $V_{DD}$  | -                                     | -0.5      | +12            | V    |
| Power Supply Voltage    | $V_{EE}$  | -                                     | -12       | +0.5           | V    |
| input clamping current  | $I_{IK}$  | $V_I < 0.5V$ or $V_I > V_{DD} + 0.5V$ | -         | $\pm 10$       | mA   |
| switch current          | $I$       | -                                     | -         | $\pm 10$       | mA   |
| input voltage           | $V_I$     | all inputs                            | -0.5      | $V_{DD} + 0.5$ | V    |
| storage temperature     | $T_{stg}$ | -                                     | -65       | +150           | °C   |
| total power dissipation | $P_{tot}$ | -                                     | -         | 500            | mW   |
| device dissipation      | $P$       | per output transistor                 | -         | 100            | mW   |
| Soldering temperature   | $T_L$     | 10s                                   | DIP       | 245            | °C   |
|                         |           |                                       | SOP/TSSOP | 260            | °C   |

### 3.2、Recommended Operating Conditions

( $T_{amb} = 25^\circ\text{C}$ ;  $R_L = 10k\Omega$ ;  $C_L = 50pF$ ;  $\bar{E} = V_{DD}$ ;  $V_{is} = V_{DD} = 5V$ .)

| Parameter                                       | Symbol             | Conditions                           | Min. | Typ. | Max.     | Unit |
|-------------------------------------------------|--------------------|--------------------------------------|------|------|----------|------|
| supply voltage                                  | $V_{DD}$           | -                                    | 3    | 5    | 9        | V    |
| ambient temperature                             | $T_{amb}$          | in free air                          | -40  | -    | +125     | °C   |
| supply voltage                                  | $V_{EE}$           | -                                    | -6.0 | -    | 0        | V    |
| supply voltage                                  | $V_{DD} - V_{EE}$  | -                                    | 3.0  | -    | 9.0      | V    |
| input voltage                                   | $V_I$              | -                                    | 0    | -    | $V_{DD}$ | V    |
| Disable output time<br>(High level→turn off)    | $t_{PHZ}$          | $\bar{E}$ to Z or $\bar{E}$ to $Y_n$ | -    | 85   | 170      | ns   |
| Disable output time<br>(Low level→turn off)     | $t_{PLZ}$          | $\bar{E}$ to Z or $\bar{E}$ to $Y_n$ | -    | 115  | 230      | ns   |
| Enable output time<br>(turn off→high/low level) | $t_{PZH}, t_{PZL}$ | -                                    | -    | 40   | 80       | ns   |
| input capacitance                               | $C_I$              | -                                    | -    | -    | 7.5      | pF   |



## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

( $T_{amb}=25^{\circ}\text{C}$ , voltages are referenced to  $V_{SS}$  (ground=0V), unless otherwise specified.)

| Parameter                               | Symbol          | Conditions (V)                                      |                                      | $T_{amb}=25^{\circ}\text{C}$ |      |      | Unit          |
|-----------------------------------------|-----------------|-----------------------------------------------------|--------------------------------------|------------------------------|------|------|---------------|
|                                         |                 |                                                     |                                      | Min.                         | Typ. | Max. |               |
| supply current                          | $I_{DD}$        | $V_I=V_{DD}$ or $V_{SS}$ , $I_O=0\text{A}$          | $V_{DD}=5\text{V}$                   | -                            | -    | 20   | $\mu\text{A}$ |
|                                         |                 |                                                     | $V_{DD}=9\text{V}$                   | -                            | -    | 40   | $\mu\text{A}$ |
| HIGH-level input voltage                | $V_{IH}$        | $ I_O <1\mu\text{A}$                                | $V_{DD}=5\text{V}$                   | 3.5                          | -    | -    | V             |
|                                         |                 |                                                     | $V_{DD}=9\text{V}$                   | 7.0                          | -    | -    | V             |
| LOW-level input voltage                 | $V_{IL}$        | $ I_O <1\mu\text{A}$                                | $V_{DD}=5\text{V}$                   | -                            | -    | 1.5  | V             |
|                                         |                 |                                                     | $V_{DD}=9\text{V}$                   | -                            | -    | 3.0  | V             |
| input leakage current                   | $I_I$           | $V_I=0\text{V}$ or $9\text{V}$ , $V_{DD}=9\text{V}$ |                                      | -                            | -    | 1.0  | $\mu\text{A}$ |
| 3 state output leakage current          | $I_{OZ}$        | $V_{DD}=9\text{V}$                                  | output to $V_{DD}$                   | -                            | -    | 1.6  | $\mu\text{A}$ |
|                                         |                 |                                                     | output to $V_{SS}$                   | -                            | -    | -1.6 | $\mu\text{A}$ |
| ON resistance (rail)                    | $R_{ON}$        | $V_{IS}=0\text{V}$ to $V_{DD}-V_{EE}$               | $V_{DD}-V_{EE}=5\text{V}$            | -                            | 350  | 2500 | $\Omega$      |
|                                         |                 |                                                     | $V_{DD}-V_{EE}=9\text{V}$            | -                            | 80   | 245  | $\Omega$      |
|                                         |                 | $V_{IS}=0\text{V}$                                  | $V_{DD}-V_{EE}=5\text{V}$            | -                            | 115  | 340  | $\Omega$      |
|                                         |                 |                                                     | $V_{DD}-V_{EE}=9\text{V}$            | -                            | 50   | 160  | $\Omega$      |
|                                         |                 | $V_{IS}=V_{DD}-V_{EE}$                              | $V_{DD}-V_{EE}=5\text{V}$            | -                            | 120  | 365  | $\Omega$      |
|                                         |                 |                                                     | $V_{DD}-V_{EE}=9\text{V}$            | -                            | 65   | 200  | $\Omega$      |
| ON resistance mismatch between channels | $\Delta R_{ON}$ | $V_{IS}=0\text{V}$ to $V_{DD}-V_{EE}$               | $V_{DD}-V_{EE}=5\text{V}$            | -                            | 25   | -    | $\Omega$      |
|                                         |                 |                                                     | $V_{DD}-V_{EE}=9\text{V}$            | -                            | 10   | -    | $\Omega$      |
| OFF-state leakage current               | $I_{S(OFF)}$    | $V_{SS}=V_{EE}$ , $V_{DD}-V_{EE}=9\text{V}$         | all channel off;<br>$\bar{E}=V_{DD}$ | -                            | -    | 1.0  | $\mu\text{A}$ |
|                                         |                 |                                                     | any channel;<br>$\bar{E}=V_{SS}$     | -                            | -    | 1.0  | $\mu\text{A}$ |

### 3.3.2、DC Characteristics 2

( $T_{amb}=-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , voltages are referenced to  $V_{SS}$  (ground=0V), unless otherwise specified.)

| Parameter                      | Symbol   | Conditions (V)                                      |                    | $T_{amb}=-40^{\circ}\text{C}$ |      | $T_{amb}=+85^{\circ}\text{C}$ |       | Unit          |
|--------------------------------|----------|-----------------------------------------------------|--------------------|-------------------------------|------|-------------------------------|-------|---------------|
|                                |          |                                                     |                    | Min.                          | Max. | Min.                          | Max.  |               |
| supply current                 | $I_{DD}$ | $V_I=V_{DD}$ or $V_{SS}$ , $I_O=0\text{A}$          | $V_{DD}=5\text{V}$ | -                             | 20   | -                             | 150   | $\mu\text{A}$ |
|                                |          |                                                     | $V_{DD}=9\text{V}$ | -                             | 40   | -                             | 300   | $\mu\text{A}$ |
| HIGH-level input voltage       | $V_{IH}$ | $ I_O <1\mu\text{A}$                                | $V_{DD}=5\text{V}$ | 3.5                           | -    | 3.5                           | -     | V             |
|                                |          |                                                     | $V_{DD}=9\text{V}$ | 7.0                           | -    | 7.0                           | -     | V             |
| LOW-level input voltage        | $V_{IL}$ | $ I_O <1\mu\text{A}$                                | $V_{DD}=5\text{V}$ | -                             | 1.5  | -                             | 1.5   | V             |
|                                |          |                                                     | $V_{DD}=9\text{V}$ | -                             | 3.0  | -                             | 3.0   | V             |
| input leakage current          | $I_I$    | $V_I=0\text{V}$ or $9\text{V}$ , $V_{DD}=9\text{V}$ |                    | -                             | 1.0  | -                             | 1.0   | $\mu\text{A}$ |
| 3 state output leakage current | $I_{OZ}$ | $V_{DD}=9\text{V}$                                  | output to $V_{DD}$ | -                             | 1.6  | -                             | 12.0  | $\mu\text{A}$ |
|                                |          |                                                     | output to $V_{SS}$ | -                             | -1.6 | -                             | -12.0 | $\mu\text{A}$ |



### 3.3.3、DC Characteristics 3

( $T_{amb}=-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to  $V_{SS}$  (ground=0V), unless otherwise specified.)

| Parameter                      | Symbol   | Conditions (V)                                      | $T_{amb}=-40^{\circ}\text{C}$ |      | $T_{amb}=+125^{\circ}\text{C}$ |      | Unit                |
|--------------------------------|----------|-----------------------------------------------------|-------------------------------|------|--------------------------------|------|---------------------|
|                                |          |                                                     | Min.                          | Max. | Min.                           | Max. |                     |
| supply current                 | $I_{DD}$ | $V_I=V_{DD}$ or $V_{SS}$ , $I_O=0\text{A}$          | $V_{DD}=5\text{V}$            | -    | 20                             | -    | 150 $\mu\text{A}$   |
|                                |          |                                                     | $V_{DD}=9\text{V}$            | -    | 40                             | -    | 300 $\mu\text{A}$   |
| HIGH-level input voltage       | $V_{IH}$ | $ I_O <1\mu\text{A}$                                | $V_{DD}=5\text{V}$            | 3.5  | -                              | 3.5  | V                   |
|                                |          |                                                     | $V_{DD}=9\text{V}$            | 7.0  | -                              | 7.0  | V                   |
| LOW-level input voltage        | $V_{IL}$ | $ I_O <1\mu\text{A}$                                | $V_{DD}=5\text{V}$            | -    | 1.5                            | -    | 1.5 V               |
|                                |          |                                                     | $V_{DD}=9\text{V}$            | -    | 3.0                            | -    | 3.0 V               |
| input leakage current          | $I_I$    | $V_I=0\text{V}$ or $9\text{V}$ , $V_{DD}=9\text{V}$ | -                             | 1.0  | -                              | 1.0  | $\mu\text{A}$       |
| 3 state output leakage current | $I_{OZ}$ | $V_{DD}=9\text{V}$                                  | output to $V_{DD}$            | -    | 1.6                            | -    | 12.0 $\mu\text{A}$  |
|                                |          |                                                     | output to $V_{SS}$            | -    | -1.6                           | -    | -12.0 $\mu\text{A}$ |

### 3.3.4、AC Characteristics 1

( $T_{amb}=25^{\circ}\text{C}$ ,  $V_{EE}=V_{SS}=0\text{V}$ ,  $t_r, t_f\leq 20\text{ns}$ ,  $C_L=50\text{pF}$ ,  $R_L=10\text{k}\Omega$ , unless otherwise specified.)

| Parameter                           | Symbol    | Conditions                       | Min.               | Typ. | Max. | Unit   |
|-------------------------------------|-----------|----------------------------------|--------------------|------|------|--------|
| HIGH to LOW propagation delay time  | $t_{PHL}$ | Yn to Z; Z to Yn; see Figure 7   | $V_{DD}=5\text{V}$ | -    | 15   | 30 ns  |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 5    | 10 ns  |
|                                     |           | Sn to Yn, Z; see Figure 8        | $V_{DD}=5\text{V}$ | -    | 150  | 300 ns |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 60   | 120 ns |
| LOW to HIGH propagation delay       | $t_{PLH}$ | Yn to Z; Z to Yn; see Figure 7   | $V_{DD}=5\text{V}$ | -    | 15   | 30 ns  |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 5    | 10 ns  |
|                                     |           | Sn to Yn, Z; see Figure 8        | $V_{DD}=5\text{V}$ | -    | 150  | 300 ns |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 65   | 130 ns |
| HIGH to OFF-state propagation delay | $t_{PHZ}$ | $\bar{E}$ to Yn, Z; see Figure 9 | $V_{DD}=5\text{V}$ | -    | 120  | 240 ns |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 90   | 180 ns |
| LOW to OFF-state propagation delay  | $t_{PLZ}$ | $\bar{E}$ to Yn, Z; see Figure 9 | $V_{DD}=5\text{V}$ | -    | 145  | 290 ns |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 120  | 240 ns |
| OFF-state to HIGH propagation delay | $t_{PZH}$ | $\bar{E}$ to Yn, Z; see Figure 9 | $V_{DD}=5\text{V}$ | -    | 140  | 280 ns |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 55   | 110 ns |
| OFF-state to LOW propagation delay  | $t_{PZL}$ | $\bar{E}$ to Yn, Z; see Figure 9 | $V_{DD}=5\text{V}$ | -    | 140  | 280 ns |
|                                     |           |                                  | $V_{DD}=9\text{V}$ | -    | 55   | 110 ns |



## 3.3.5、AC Characteristics 2

( $T_{amb}=25^{\circ}\text{C}$ ,  $V_{EE}=V_{SS}=0\text{V}$ ,  $V_I=0.5V_{DD}$  (p-p), unless otherwise specified.)

| Parameter                                          | Symbol           | Conditions                                                                                                  |                     | Min. | Typ. | Max. | Unit |
|----------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------|---------------------|------|------|------|------|
| Square wave distortion                             | d <sub>sin</sub> | see Figure 10;<br>R <sub>L</sub> =10kΩ; C <sub>L</sub> =15pF;<br>channel ON; f <sub>i</sub> =1kHz           | V <sub>DD</sub> =5V | 0.25 | -    | -    | %    |
|                                                    |                  |                                                                                                             | V <sub>DD</sub> =9V | 0.04 | -    | -    | %    |
| any two channel crosstalk                          | f <sub>ct</sub>  | V <sub>DD</sub> =9V, see note2                                                                              |                     | 1    | -    | -    | MHz  |
| crosstalk voltage<br>( $\bar{E}$ to Sn or Yn to Z) | V <sub>ct</sub>  | see Figure 11; R <sub>L</sub> =10kΩ; C <sub>L</sub> =15pF;<br>$\bar{E}$ or Sn=V <sub>DD</sub> (square-wave) |                     | 50   | -    | -    | mV   |
| OFF frequency                                      | f <sub>OFF</sub> | V <sub>DD</sub> =9V, see note3                                                                              |                     | 1    | -    | -    | MHz  |
| conduction frequency                               | f <sub>ON</sub>  | V <sub>DD</sub> =5V, see note4                                                                              |                     | 13   | -    | -    | MHz  |
|                                                    |                  | V <sub>DD</sub> =9V, see note4                                                                              |                     | 40   | -    | -    | MHz  |

Note:

[1]  $f_i$  is biased at  $0.5V_{DD}$ ;  $V_I=0.5V_{DD}$  (p-p).

[2]  $R_L=1\text{k}\Omega$ ;  $20\log V_{os}/V_{is}=-50\text{dB}$ , see Figure 12.

[3]  $R_L=1\text{k}\Omega$ ;  $C_L=5\text{pF}$ , channel off,  $20\log V_{os}/V_{is}=-50\text{dB}$ , see Figure 10.

[4]  $R_L=1\text{k}\Omega$ ;  $C_L=5\text{pF}$ , channel on,  $20\log V_{os}/V_{is}=-3\text{dB}$ , see Figure 10.

## 4、Testing Circuit

### 4.1、AC Testing Circuit 1

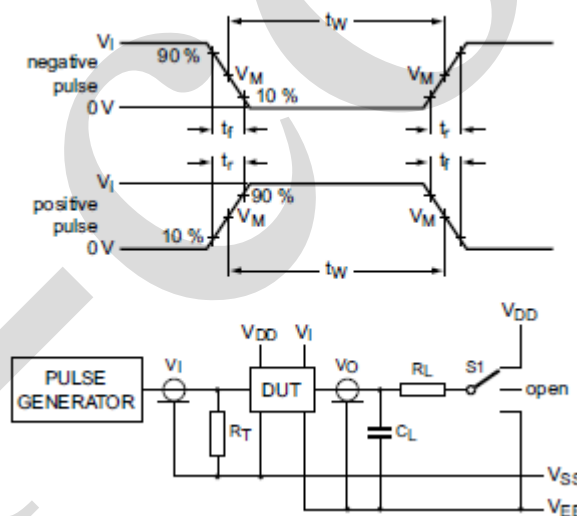


Figure 6. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test.

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

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

$R_L$ =Load resistance.



## 4.2、AC Testing Waveforms

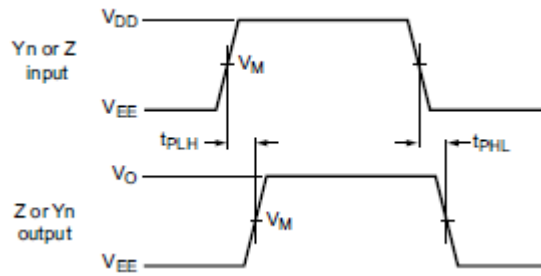


Figure 7. Yn, Z to Z, Yn propagation delays

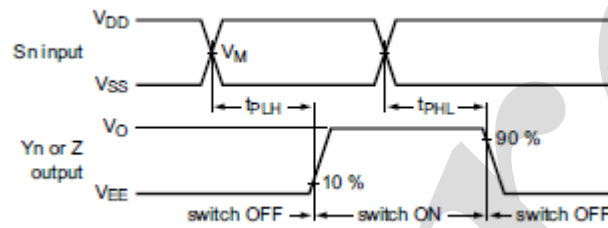


Figure 8. Sn to Yn, Z propagation delays

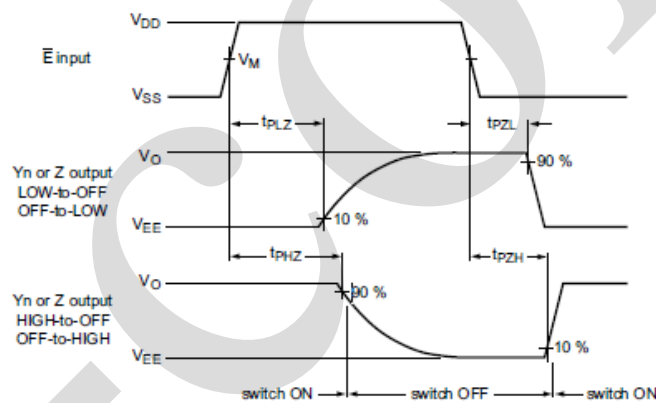


Figure 9. Enable and disable times

## 4.3、AC Testing Circuit 2

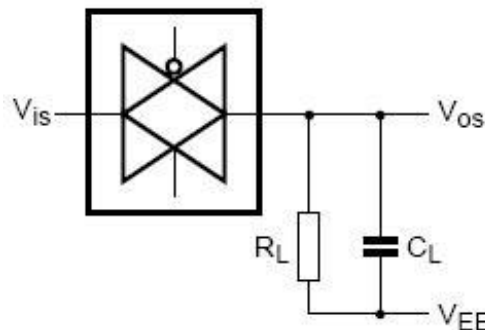


Figure 10. Square wave distortion degree of cut-off frequency and conduction frequency test pattern

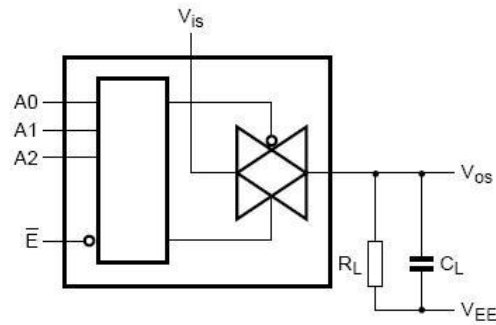


Figure 11. Crosstalk logical input/output test

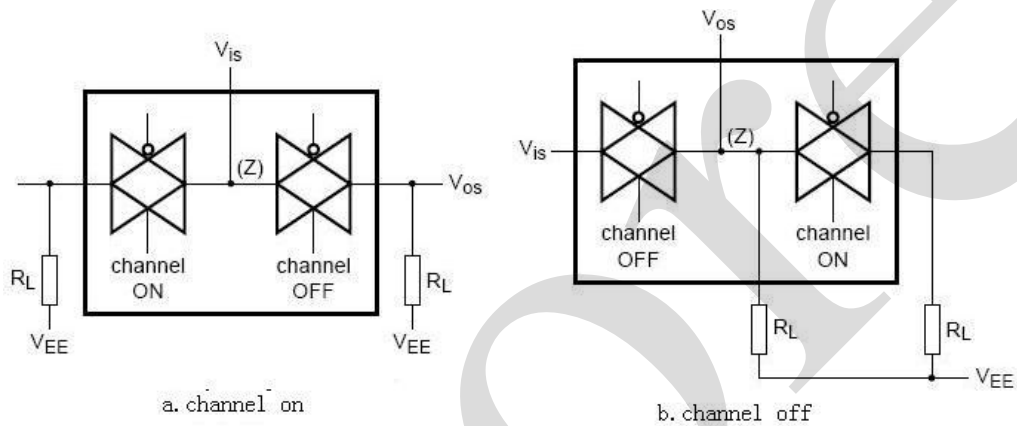


Figure 12. Inter channel Crosstalk

#### 4.4、Measurement Points

| Supply voltage | Input               | Output              |
|----------------|---------------------|---------------------|
| $V_{DD}$       | $V_M$               | $V_M$               |
| 3V to 9V       | $0.5 \times V_{DD}$ | $0.5 \times V_{DD}$ |

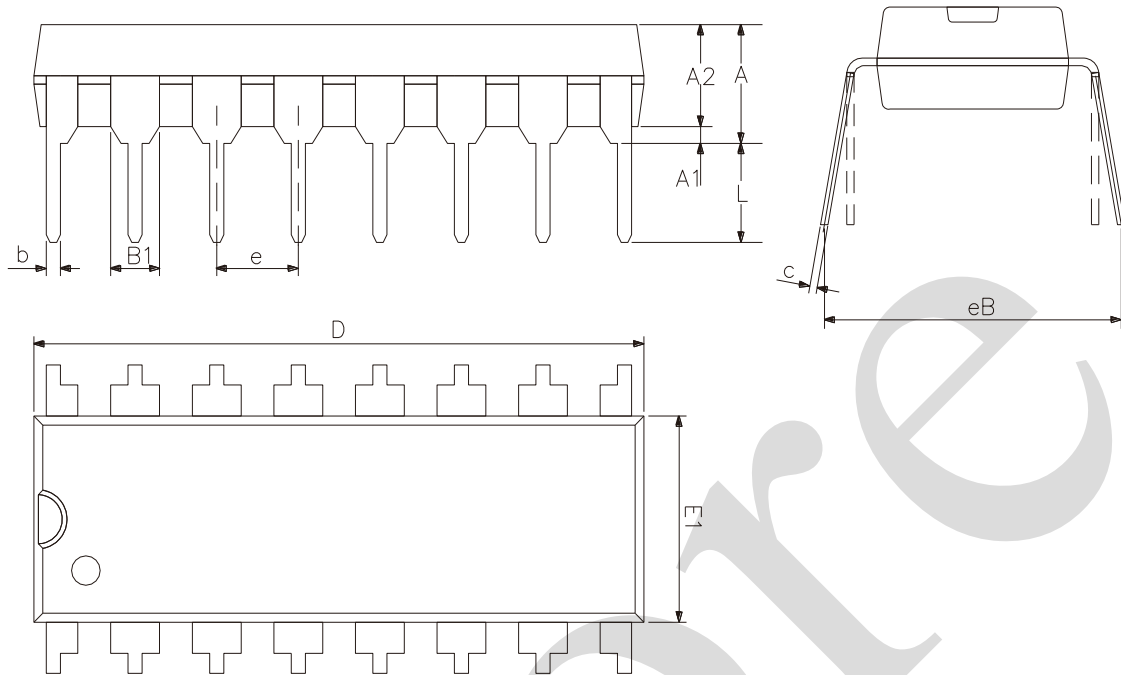
#### 4.5、Test Data

| Test               | Input    |            | Load  |              | Switch   |
|--------------------|----------|------------|-------|--------------|----------|
|                    | $V_{is}$ | $t_r, t_f$ | $C_L$ | $R_L$        |          |
| $t_{PHL}$          | $V_{EE}$ | 20ns       | 50pF  | 10k $\Omega$ | $V_{DD}$ |
| $t_{PLH}$          | $V_{DD}$ | 20ns       | 50pF  | 10k $\Omega$ | $V_{EE}$ |
| $t_{PZH}, t_{PHZ}$ | $V_{DD}$ | 20ns       | 50pF  | 10k $\Omega$ | $V_{EE}$ |
| $t_{PZL}, t_{PLZ}$ | $V_{EE}$ | 20ns       | 50pF  | 10k $\Omega$ | $V_{DD}$ |
| others             | pulse    | 20ns       | 50pF  | 10k $\Omega$ | open     |



## 5、Package Information

### 5.1、DIP16

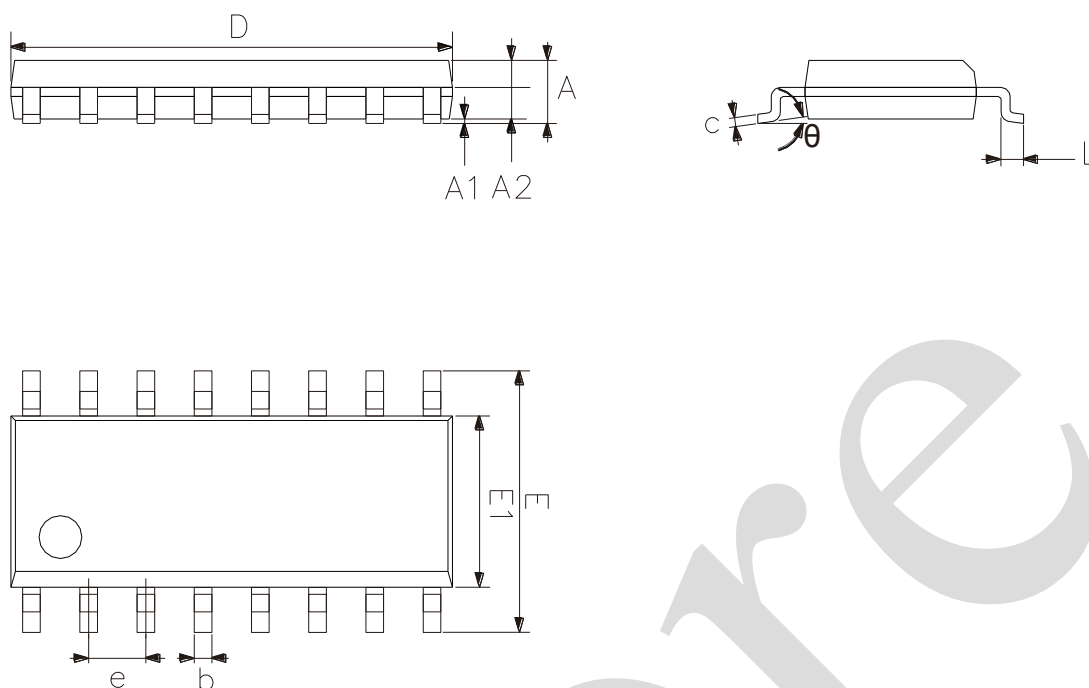


| 2023/12/A | Dimensions In Millimeters |       |
|-----------|---------------------------|-------|
| Symbol    | Min                       | Max   |
| A2        | 3.00                      | 3.60  |
| A1        | 0.51                      | —     |
| A         | 3.60                      | 5.33  |
| L         | 3.00                      | 3.60  |
| b         | 0.36                      | 0.56  |
| B1        | 1.52                      |       |
| D         | 18.80                     | 19.94 |
| E1        | 6.20                      | 6.60  |
| e         | 2.54                      |       |
| c         | 0.20                      | 0.36  |
| eB        | 7.62                      | 9.30  |

Note: The package dimensions do not include flash and burrs, and the dimensions of flash and burrs shall not exceed 0.15mm.



## 5.2、SOP16

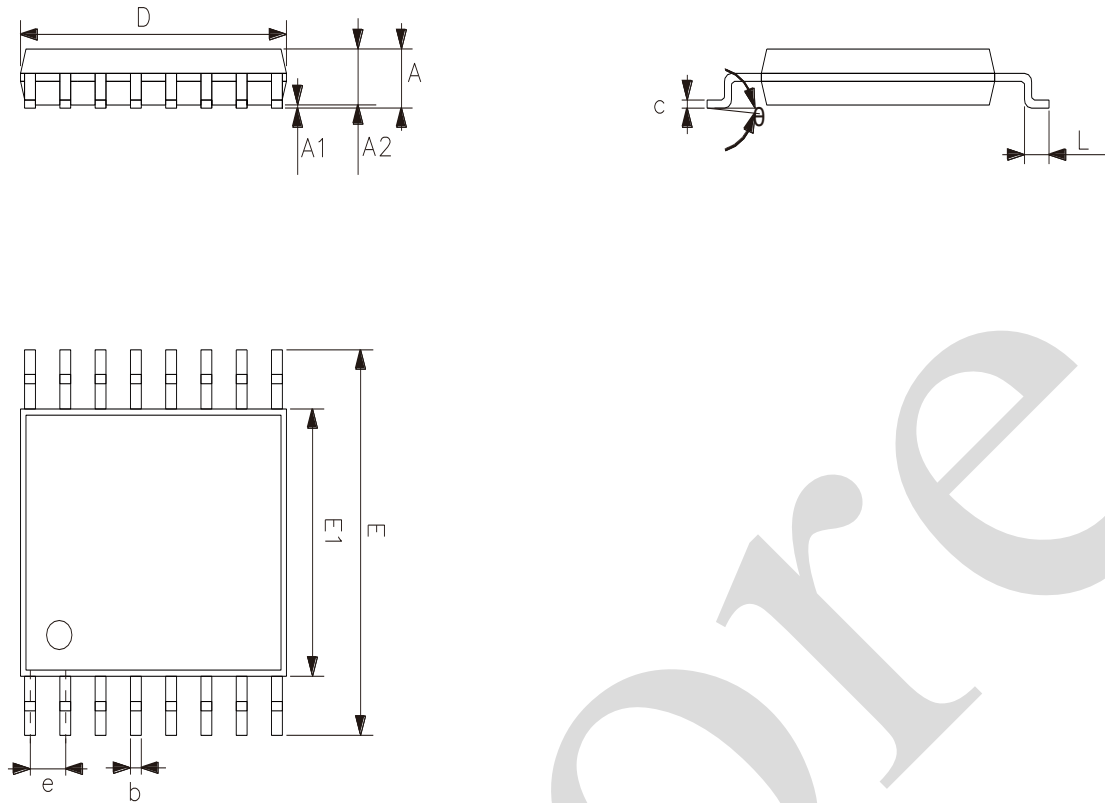


| 2023/12/A | Dimensions In Millimeters |       |
|-----------|---------------------------|-------|
| Symbol    | Min.                      | Max.  |
| A         | 1.35                      | 1.80  |
| A1        | 0.10                      | 0.25  |
| A2        | 1.25                      | 1.55  |
| b         | 0.33                      | 0.51  |
| c         | 0.19                      | 0.25  |
| D         | 9.50                      | 10.10 |
| E         | 5.80                      | 6.30  |
| E1        | 3.70                      | 4.10  |
| e         | 1.27                      |       |
| L         | 0.35                      | 0.89  |
| $\theta$  | 0°                        | 8°    |

Note: The package dimensions do not include flash and burrs, and the dimensions of flash and burrs shall not exceed 0.15mm.



## 5.3、TSSOP16



| 2023/12/A | Dimensions In Millimeters |      |
|-----------|---------------------------|------|
| Symbol    | Min                       | Max  |
| A         | —                         | 1.20 |
| A1        | 0.05                      | 0.15 |
| A2        | 0.80                      | 1.05 |
| b         | 0.19                      | 0.30 |
| c         | 0.09                      | 0.20 |
| D         | 4.90                      | 5.10 |
| E1        | 4.30                      | 4.50 |
| E         | 6.20                      | 6.60 |
| e         | 0.65                      |      |
| L         | 0.45                      | 0.75 |
| θ         | 0°                        | 8°   |

Note: The package dimensions do not include flash and burrs, and the dimensions of flash and burrs shall not exceed 0.15mm.



## 6、Statements And Notes

### 6.1、The name and content of Hazardous substances or Elements in the product

| Part name               | Hazardous substances or Elements                                                                                                                                                                                                                                                 |                               |                               |                               |                          |                                |                   |                       |                           |                      |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------|--------------------------------|-------------------|-----------------------|---------------------------|----------------------|
|                         | Lead and lead compounds                                                                                                                                                                                                                                                          | Mercury and mercury compounds | Cadmium and cadmium compounds | Hexavalent chromium compounds | Polybrominated biphenyls | Polybrominated biphenyl ethers | Dibutyl phthalate | Butylbenzyl phthalate | Di-2-ethylhexyl phthalate | Diisobutyl phthalate |
| Lead frame              | ○                                                                                                                                                                                                                                                                                | ○                             | ○                             | ○                             | ○                        | ○                              | ○                 | ○                     | ○                         | ○                    |
| Plastic resin           | ○                                                                                                                                                                                                                                                                                | ○                             | ○                             | ○                             | ○                        | ○                              | ○                 | ○                     | ○                         | ○                    |
| Chip                    | ○                                                                                                                                                                                                                                                                                | ○                             | ○                             | ○                             | ○                        | ○                              | ○                 | ○                     | ○                         | ○                    |
| The lead                | ○                                                                                                                                                                                                                                                                                | ○                             | ○                             | ○                             | ○                        | ○                              | ○                 | ○                     | ○                         | ○                    |
| Plastic sheet installed | ○                                                                                                                                                                                                                                                                                | ○                             | ○                             | ○                             | ○                        | ○                              | ○                 | ○                     | ○                         | ○                    |
| explanation             | <p>○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard.</p> <p>×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.</p> |                               |                               |                               |                          |                                |                   |                       |                           |                      |

### 6.2、Notes

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