# CD4067
# 16-channel Analog Multiplexer/Demultiplexer

# Product Specification

**Specification Revision History：**

| Version | Date | Description |
|---|---|---|
| 2019-09-A1 | 2019-09 | New |
| 2023-04-B1 | 2023-04 | Update the template |
| 2023-07-B2 | 2023-07 | Additional package |
| 2024-04-B3 | 2024-04 | Modify the parameters |
| 2024-09-B4 | 2024-09 | Add the SSOP24 (0.635mm) package form |

# Contents

## 1、General Description

The CD4067 is a 16-channel analog multiplexer/demultiplexer with four address inputs (A0 to A3), an active LOW enable input ($\overline{E}$), sixteen independent inputs/outputs (Y0 to Y15) and a common input/output (Z). The device contains sixteen bidirectional analog switches, each with one side connected to an independent input/output (Y0 to Y15) and the other side connected to the common input/output (Z). With $\overline{E}$ LOW, one of the sixteen switches is selected (low-impedance ON-state) by A0 to A3. All unselected switches are in the high-impedance OFF-state. With $\overline{E}$ HIGH all switches are in the high-impedance OFF-state, independent of A0 to A3. The analog inputs/outputs (Y0 to Y15 and Z) can swing between $V_{DD}$ as a positive limit and $V_{SS}$ as a negative limit. $V_{DD}$ to $V_{SS}$ may not exceed 9V.

**Features:**

- Wide supply voltage range from 3V to 9V
- Fully static operation
- 5V and 9V parametric ratings
- Standardized symmetrical output characteristics
- Specified from -40℃ to +125℃
- Packaging information:SOP24/TSSOP24/SSOP24(0.65mm)/SSOP24(0.635mm)

**Ordering Information:**

**Tube packing specifications:**

| Part number | Packaging form | Marking code | Tube quantity | Boxed tube quantity | Boxed quantity | Notes |
|---|---|---|---|---|---|---|
| CD4067SA24.TB | SOP24 | CD4067 | 30 PCS/tube | 80 tube/box | 2400 PCS/box | Dimensions of plastic enclosure: 15.4mm×7.5mm Pin spacing: 1.27mm |
| CD4067TA24.TB | TSSOP24 | CD4067 | 62 PCS/tube | 200 tube/box | 12400 PCS/box | Dimensions of plastic enclosure: 7.8mm×4.4mm Pin spacing: 0.65mm |
| CD4067VA24.TB | SSOP24 | CD4067 | 60 PCS/tube | 100 tube/box | 6000 PCS/box | Dimensions of plastic enclosure: 8.2mm×5.3mm Pin spacing: 0.65mm |
| CD4067VB24.TB | SSOP24 | CD4067 | 50 PCS/tube | 200 tube/box | 10000 PCS/box | Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 0.635mm |

**Reel packing specifications:**

| Part number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|---|---|---|---|---|---|
| CD4067SA24.TR | SOP24 | CD4067 | 1250 PCS/reel | 1250 PCS/box | Dimensions of plastic enclosure: 15.4mm×7.5mm Pin spacing:1.27mm |
| CD4067TA24.TR | TSSOP24 | CD4067 | 4000 PCS/reel | 8000 PCS/box | Dimensions of plastic enclosure: 7.8mm×4.4mm Pin spacing: 0.65mm |
| CD4067VA24.TR | SSOP24 | CD4067 | 2500 PCS/reel | 5000 PCS/box | Dimensions of plastic enclosure: 8.2mm×5.3mm Pin spacing: 0.65mm |
| CD4067VB24.TR | SSOP24 | CD4067 | 4000 PCS/reel | 8000 PCS/box | Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 0.635mm |

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

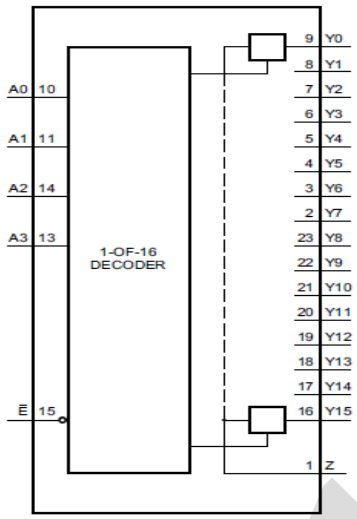



Figure 1. Functional diagram

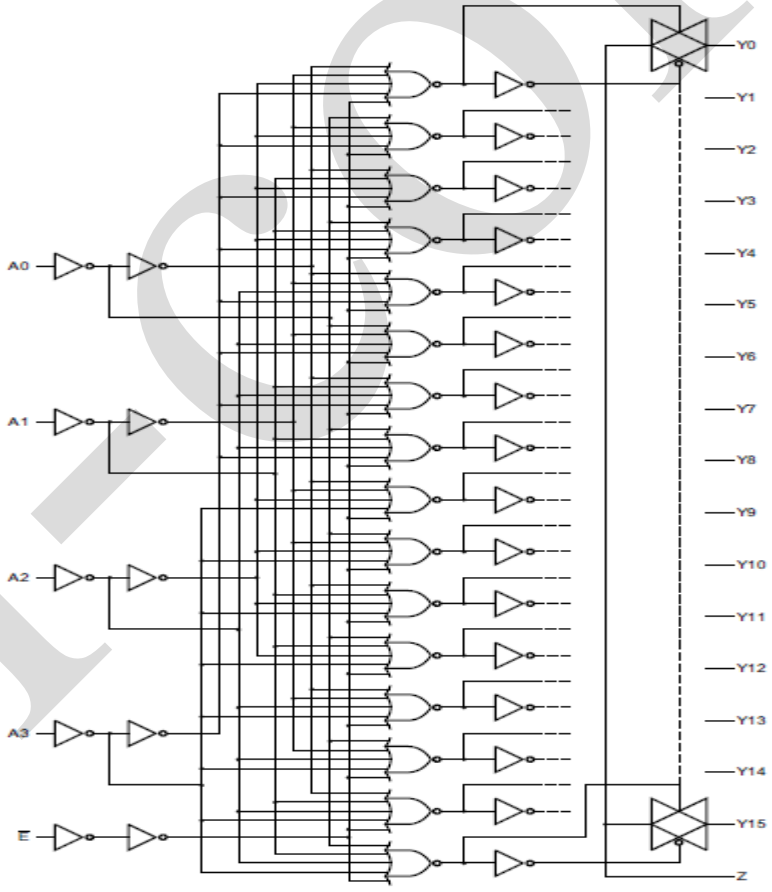



Figure 2. Logic diagram

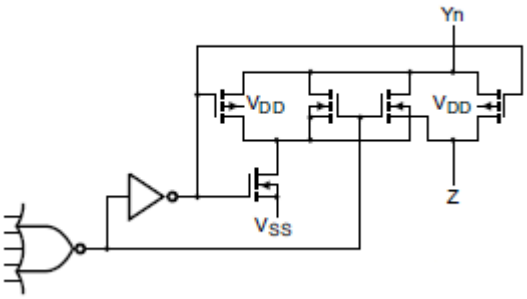
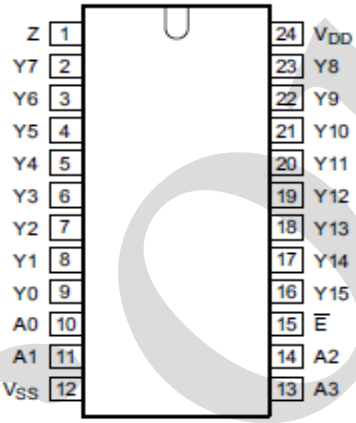



Figure 3. Schematic diagram (one switch)

### 2.2、Pin Configurations




### 2.3、Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | Z | common input/output |
| 2 | Y7 | independent input/output |
| 3 | Y6 | independent input/output |
| 4 | Y5 | independent input/output |
| 5 | Y4 | independent input/output |
| 6 | Y3 | independent input/output |
| 7 | Y2 | independent input/output |
| 8 | Y1 | independent input/output |
| 9 | Y0 | independent input/output |
| 10 | A0 | address input |
| 11 | A1 | address input |
| 12 | $V_{SS}$ | ground (0V) |
| 13 | A3 | address input |
| 14 | A2 | address input |
| 15 | $\overline{E}$ | enable input (active LOW) |
| 16 | Y15 | independent input/output |

| | | |
|---|---|---|
| 17 | Y14 | independent input/output |
| 18 | Y13 | independent input/output |
| 19 | Y12 | independent input/output |
| 20 | Y11 | independent input/output |
| 21 | Y10 | independent input/output |
| 22 | Y9 | independent input/output |
| 23 | Y8 | independent input/output |
| 24 | $V_{DD}$ | supply voltage |

### 2.4、Function Table

| Input | | | | | Channel ON |
|---|---|---|---|---|---|
| $\overline{E}$ | A3 | A2 | A1 | A0 | |
| L | L | L | L | L | Y0=Z |
| L | L | L | L | H | Y1=Z |
| L | L | L | H | L | Y2=Z |
| L | L | L | H | H | Y3=Z |
| L | L | H | L | L | Y4=Z |
| L | L | H | L | H | Y5=Z |
| L | L | H | H | L | Y6=Z |
| L | L | H | H | H | Y7=Z |
| L | H | L | L | L | Y8=Z |
| L | H | L | L | H | Y9=Z |
| L | H | L | H | L | Y10=Z |
| L | H | L | H | H | Y11=Z |
| L | H | H | L | L | Y12=Z |
| L | H | H | L | H | Y13=Z |
| L | H | H | H | L | Y14=Z |
| L | H | H | H | H | Y15=Z |
| H | X | X | X | X | none |

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 |
| input clamping current | $I_{IK}$ | $V_I$<0.5V or $V_I$>$V_{DD}$+0.5V | - | ±20 | mA |
| switch current | I | - | - | ±25 | mA |
| input voltage | $V_I$ | all inputs | -0.5 | $V_{DD}$+0.5 | V |
| storage temperature | $T_{stg}$ | - | -65 | +150 | ℃ |
| total power dissipation | $P_{tot}$ | - | - | 500 | mW |
| device dissipation | P | per output transistor | - | 100 | mW |
| soldering temperature | $T_L$ | 10s | 260 | | ℃ |

### 3.2、Recommended Operating Conditions

($T_{amb}$=25℃, voltages are referenced to $V_{SS}$ (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage | $V_{DD}$ | - | 3 | 5 | 9 | V |
| ambient temperature | $T_{amb}$ | in free air | -40 | - | +125 | ℃ |
| input voltage | $V_I$ | - | 0 | - | $V_{DD}$ | V |
| multiplexer switch input current capability | - | - | - | - | 25 | mA |
| output load resistance | - | - | 100 | - | - | Ω |

### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

($T_{amb}$=25℃, voltages are referenced to $V_{SS}$ (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions (V) | | $T_{amb}$=25℃ | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| LOW-level input voltage | $V_{IL}$ | $\|I_O\|$<1uA | $V_{DD}$=5V, $V_O$=0.5V or 4.5V | - | - | 1.5 | V |
| | | | $V_{DD}$=9V, $V_O$=1.0V or 9V | - | - | 3 | V |
| HIGH-level input voltage | $V_{IH}$ | $\|I_O\|$<1uA | $V_{DD}$=5V, $V_O$=0.5V or 4.5V | 3.5 | - | - | V |
| | | | $V_{DD}$=9V, $V_O$=1.0V or 9V | 7 | - | - | V |
| input leakage current | $I_I$ | $V_I$=0V or 9V, $V_{DD}$=9V | | - | - | ±1 | uA |
| OFF-state leakage current | $I_{S(OFF)}$ | $V_{SS}$=0V; $V_{DD}$=9V | | - | - | ±100 | nA |
| supply current | $I_{DD}$ | all valid input combinations; $I_O$=0A | $V_{DD}$=5V | - | - | 5 | uA |
| | | | $V_{DD}$=9V | - | - | 10 | uA |
| input capacitance | $C_I$ | any address or inhibit input | | - | 5 | 7.5 | pF |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ON resistance | $R_{ON}$ | $V_{SS}\leq V_{is}\leq V_{DD}$ | $V_{DD}$=5V | - | 470 | 1050 | Ω |
| | | | $V_{DD}$=9V | - | 180 | 400 | Ω |
| change in on-state resistance between channels | $\Delta R_{ON}$ | - | $V_{DD}$=5V | - | 15 | - | Ω |
| | | | $V_{DD}$=9V | - | 10 | - | Ω |

### 3.3.2、DC Characteristics 2

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

| Parameter | Symbol | Conditions (V) | | $T_{amb}$=-40℃ | | $T_{amb}$=+85℃ | | $T_{amb}$=+125℃ | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Max. | Min. | Max. | Min. | Max. | |
| LOW-level input voltage | $V_{IL}$ | $\|I_O\|$<1uA | $V_{DD}$=5V, $V_O$=0.5V or 4.5V | - | 1.5 | - | 1.5 | - | 1.5 | V |
| | | | $V_{DD}$=9V, $V_O$=1.0V or 9V | - | 3 | - | 3 | - | 3 | V |
| HIGH-level input voltage | $V_{IH}$ | $\|I_O\|$<1uA | $V_{DD}$=5V, $V_O$=0.5V or 4.5V | 3.5 | - | 3.5 | - | 3.5 | - | V |
| | | | $V_{DD}$=9V, $V_O$=1.0V or 9V | 7 | - | 7 | - | 7 | - | V |
| input leakage current | $I_I$ | $V_I$=0V or 9V, $V_{DD}$=9V | | - | ±1 | - | ±1 | - | ±1 | uA |
| OFF-state leakage current | $I_{S(OFF)}$ | $V_{SS}$=0V; $V_{DD}$=9V | | - | ±100 | - | ±1000 | - | ±1000 | nA |
| supply current | $I_{DD}$ | all valid input combinations; $I_O$=0A | $V_{DD}$=5V | - | 5 | - | 150 | - | 150 | uA |
| | | | $V_{DD}$=9V | - | 10 | - | 300 | - | 300 | uA |
| ON resistance | $R_{ON}$ | $V_{SS}\leq V_{is}\leq V_{DD}$ | $V_{DD}$=5V | - | 850 | - | 1200 | - | 1300 | Ω |
| | | | $V_{DD}$=9V | - | 330 | - | 520 | - | 550 | Ω |

### 3.3.3、AC Characteristics 1

($T_{amb}$=25℃, voltages are referenced to $V_{SS}$ (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| HIGH to LOW propagation delay time | $t_{PHL}$ | Yn, Z to Z, Yn; see Figure 5 | $V_{DD}$=5V | - | 30 | 60 | ns |
| | | | $V_{DD}$=9V | - | 15 | 30 | ns |
| LOW to HIGH propagation delay | $t_{PLH}$ | Yn, Z to Z, Yn; see Figure 5 | $V_{DD}$=5V | - | 30 | 60 | ns |
| | | | $V_{DD}$=9V | - | 15 | 30 | ns |
| HIGH to LOW propagation delay time | $t_{PHL}$ | An to Z, Yn; see Figure 6 | $V_{DD}$=5V | - | 190 | 380 | ns |
| | | | $V_{DD}$=9V | - | 70 | 140 | ns |
| LOW to HIGH propagation delay | $t_{PLH}$ | An to Z, Yn; see Figure 6 | $V_{DD}$=5V | - | 175 | 350 | ns |
| | | | $V_{DD}$=9V | - | 70 | 140 | ns |
| HIGH to OFF-state propagation delay | $t_{PHZ}$ | $\overline{E}$ to Yn, Z; see Figure 7 | $V_{DD}$=5V | - | 325 | 650 | ns |
| | | | $V_{DD}$=9V | - | 135 | 270 | ns |
| LOW to OFF-state propagation delay | $t_{PLZ}$ | $\overline{E}$ to Yn, Z; see Figure 7 | $V_{DD}$=5V | - | 325 | 650 | ns |
| | | | $V_{DD}$=9V | - | 135 | 270 | ns |
| OFF-state to HIGH propagation delay | $t_{PZH}$ | $\overline{E}$ to Yn, Z; see Figure 7 | $V_{DD}$=5V | - | 220 | 440 | ns |
| | | | $V_{DD}$=9V | - | 90 | 180 | ns |
| OFF-state to LOW propagation delay | $t_{PZL}$ | $\overline{E}$ to Yn, Z; see Figure 7 | $V_{DD}$=5V | - | 220 | 440 | ns |
| | | | $V_{DD}$=9V | - | 90 | 180 | ns |

### 3.3.4、AC Characteristics 2

($T_{amb}$=25℃, voltages are referenced to $V_{SS}$ (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| -3dB frequency response | $f_{(-3dB)}$ | $V_{is}$=5V; $V_{DD}$=9V; $R_L$=1kΩ; see Figure 9 | $V_{os}$ at Z | - | 14 | - | MHz |
| | | | $V_{os}$ at any channel | - | 60 | - | MHz |
| total harmonic distortion | THD | $f_{is}$=1kHz sine wave; see Figure 8 | $V_{is}$=2V; $V_{DD}$=5V; $R_L$=10kΩ | - | 0.3 | - | % |
| | | | $V_{is}$=3V; $V_{DD}$=9V; $R_L$=10kΩ | - | 0.2 | - | % |
| -40dB feed through frequency | $f_{(-40dB)}$ | $V_{is}$=5V; $V_{DD}$=9V; $R_L$=1kΩ; all channel off | $V_{os}$ at Z | - | 20 | - | MHz |
| | | | $V_{os}$ at any channel | - | 8 | - | MHz |
| crosstalk | $X_{talk}$ | $V_{is}$=5V; $V_{DD}$=9V; $R_L$=1kΩ; frequency at -40dB; between any 2 channels; see Figure 11 | | - | 1 | - | MHz |
| crosstalk voltage | $V_{ct}$ | $V_{DD}$=9V; $R_L$=10kΩ; $V_C$=$V_{DD}$-$V_{SS}$ (square wave); see Figure 10 | | - | 75 | - | mV |

Note:

[1] 20log ($V_{os}/V_{is}$) =-3dB.

[2] 20log ($V_{os}/V_{is}$) =-40dB.

[3] Peak-to-peak voltage symmetrical about ($V_{DD}$-$V_{SS}$)/2.

## 4、Testing Circuit

### 4.1、AC Testing Circuit 1

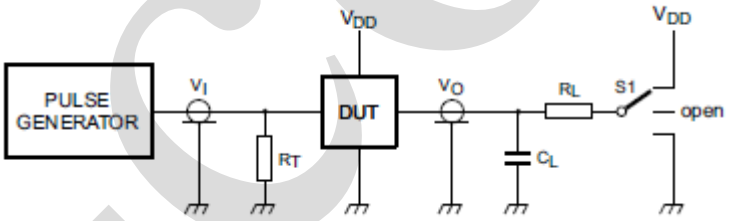



Figure 4. Test circuit for switching times

Definitions for test circuit:

$C_L$=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.

S1=Test selection switch.

**4.2、AC Testing Waveforms**

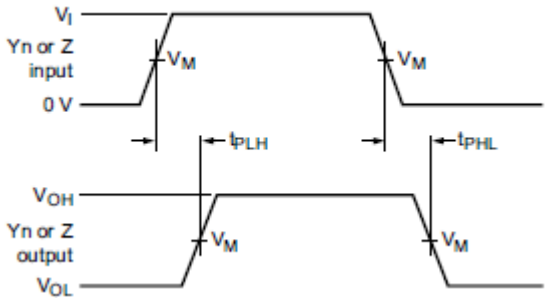



Figure 5. Yn, Z to Z, Yn propagation delays

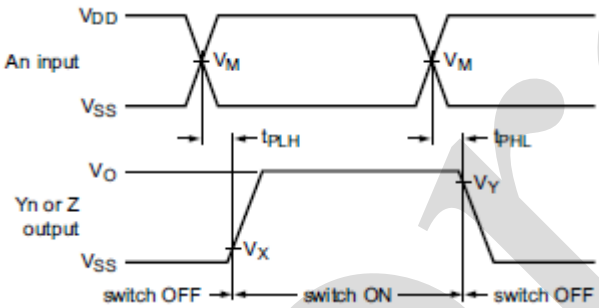



Figure 6. An to Yn, Z propagation delays

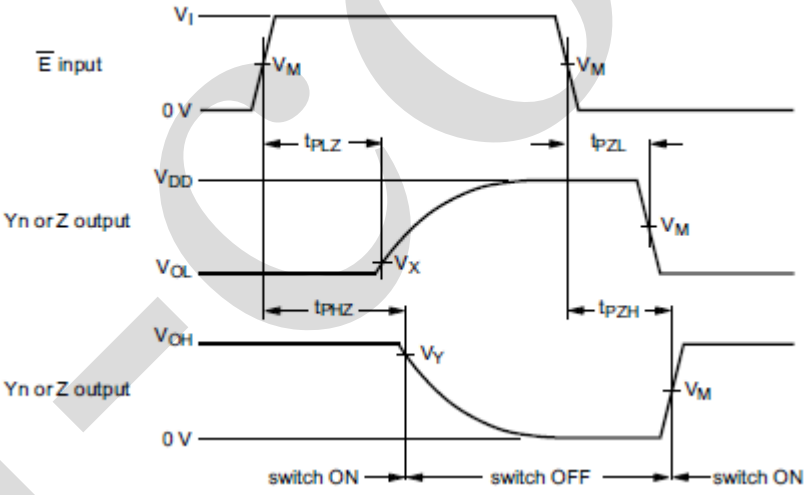



Figure 7. Enable and disable times

**4.3、AC Testing Circuit 2**

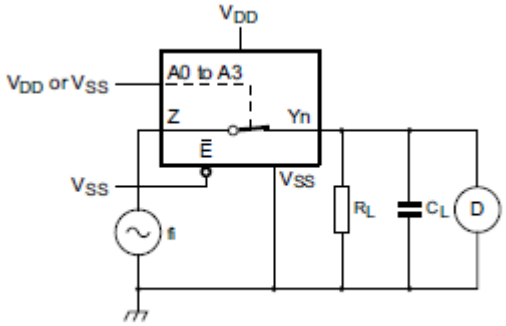



Figure 8. Test circuit for measuring total harmonic distortion

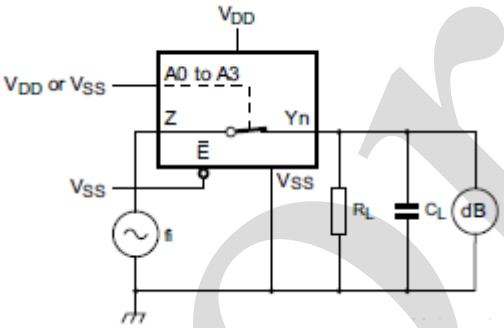



Figure 9. Test circuit for measuring frequency response

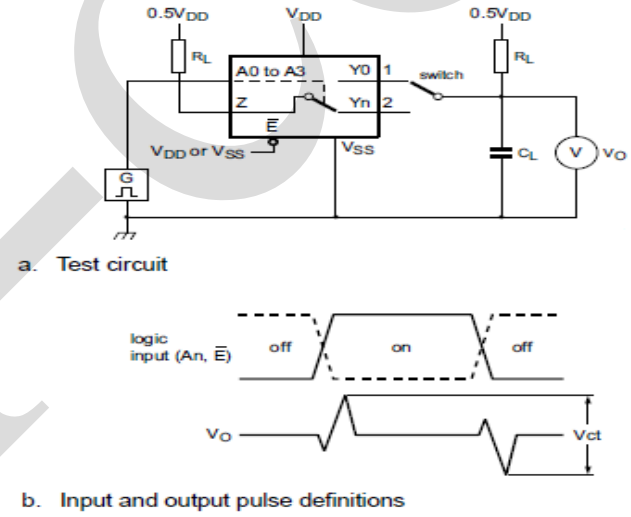



Figure 10. Test circuit for measuring crosstalk voltage between digital inputs and switch

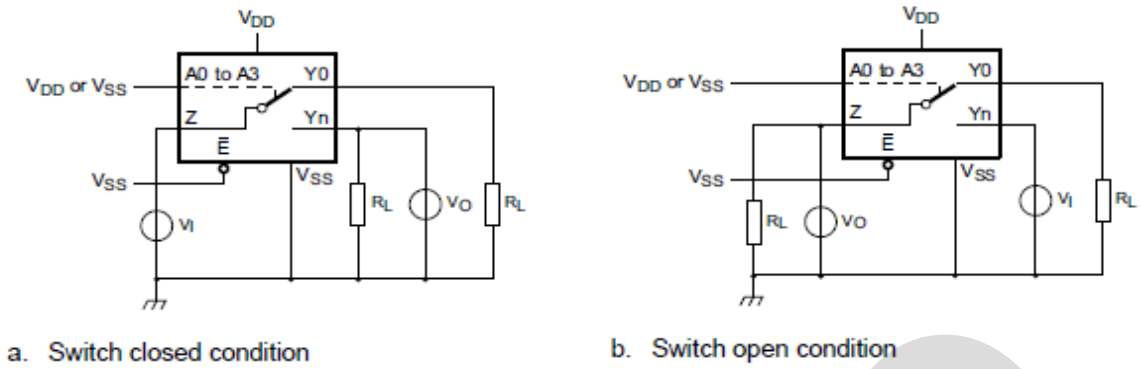



Figure 11. Test circuit for measuring crosstalk between switches

### 4.4、Measurement Points

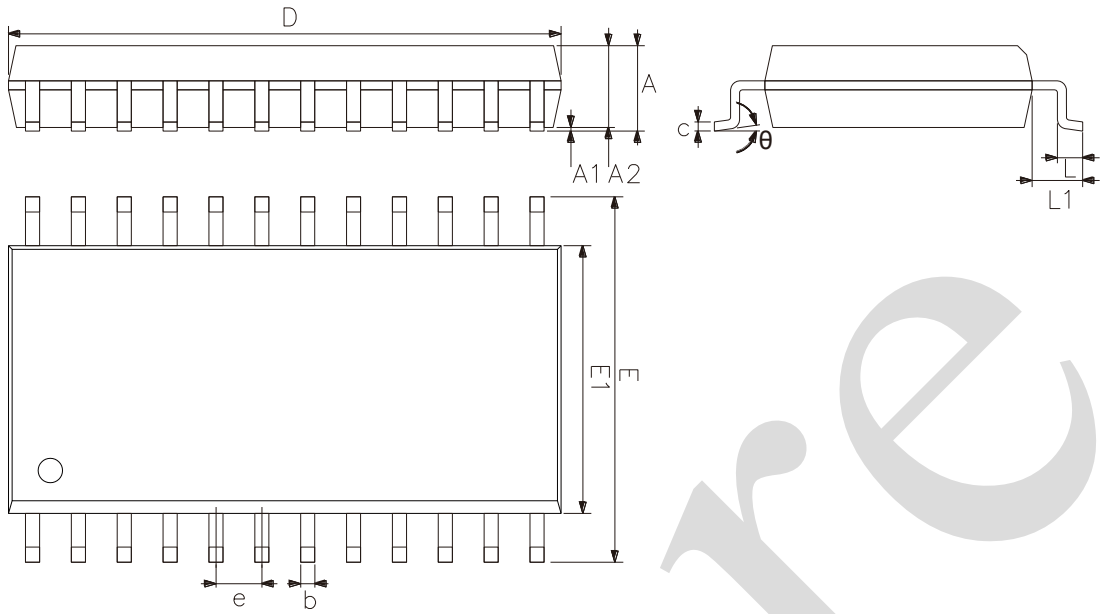
| Supply voltage | Input | Output |
|---|---|---|
| $V_{DD}$ | $V_M$ | $V_M$ |
| 3V to 9V | $0.5\times V_{DD}$ | $0.5\times V_{DD}$ |

### 4.5、Test Data

| Test | Input | | Load | | S1 position |
|---|---|---|---|---|---|
| | $V_M$ | $t_r$, $t_f$ | $C_L$ | $R_L$ | |
| $t_{PHL}$ | $0.5\times V_{DD}$ | ≤ 20ns | 50pF | 10kΩ | $V_{DD}$ or $V_{SS}$ |
| $t_{PLH}$ | $0.5\times V_{DD}$ | ≤ 20ns | 50pF | 10kΩ | $V_{SS}$ |
| $t_{PZH}$, $t_{PHZ}$ | $0.5\times V_{DD}$ | ≤ 20ns | 50pF | 10kΩ | $V_{SS}$ |
| $t_{PZL}$, $t_{PLZ}$ | $0.5\times V_{DD}$ | ≤ 20ns | 50pF | 10kΩ | $V_{DD}$ |
| other | $0.5\times V_{DD}$ | ≤ 20ns | 50pF | 10kΩ | $V_{SS}$ |

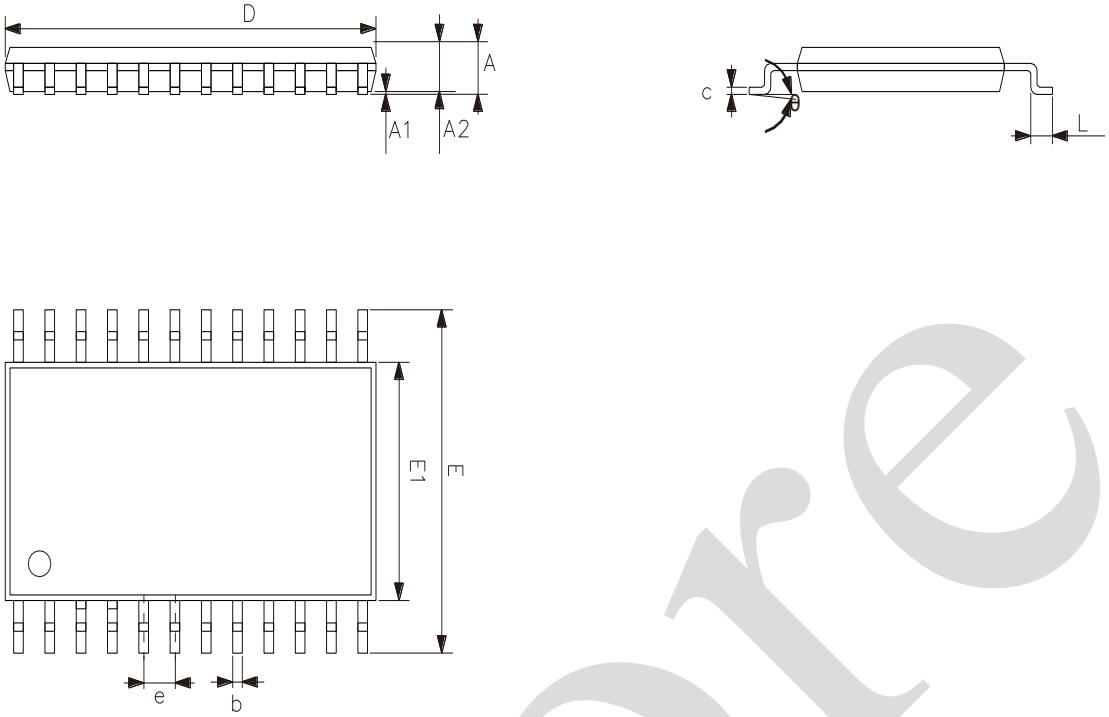
## 5、Package Information

### 5.1、SOP24



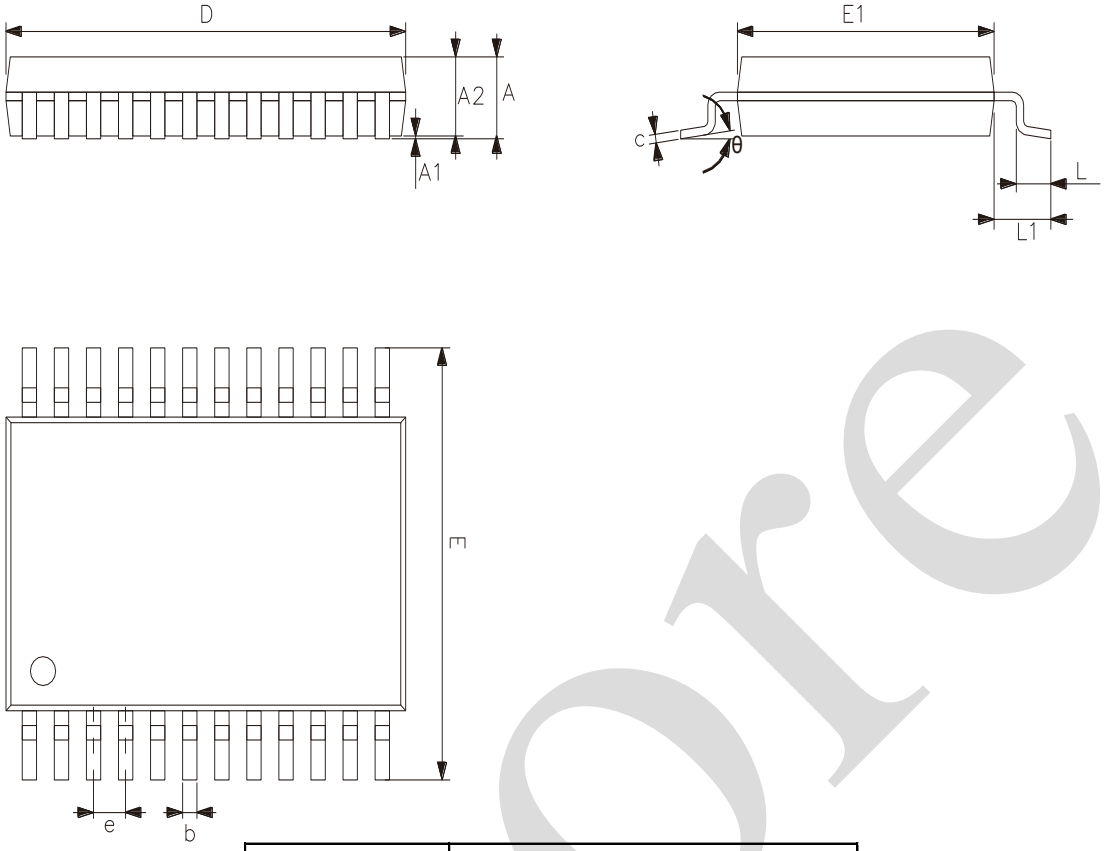

| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min.** | **Max.** |
| A | 2.35 | 2.65 |
| A1 | 0.10 | 0.30 |
| A2 | 2.13 | 2.44 |
| b | 0.39 | 0.47 |
| c | 0.25 | 0.30 |
| D | 15.19 | 15.55 |
| E | 10.10 | 10.57 |
| E1 | 7.40 | 7.62 |
| e | 1.27 | |
| L | 0.41 | 1.00 |
| L1 | 1.30 | 1.50 |
| θ | 0° | 8° |

**5.2、TSSOP24**



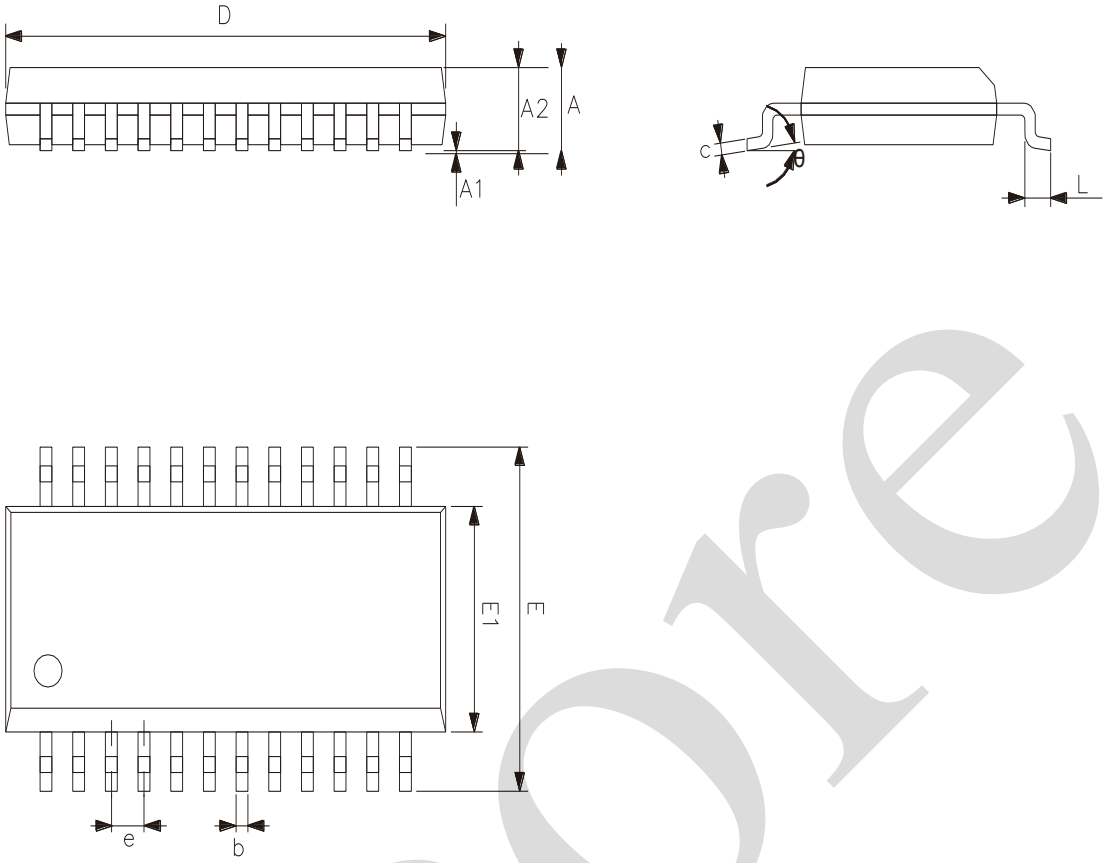

| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min** | **Max** |
| A | — | 1.20 |
| A1 | 0.05 | 0.15 |
| A2 | 0.80 | 1.05 |
| b | 0.19 | 0.30 |
| c | 0.09 | 0.20 |
| D | 7.70 | 7.90 |
| E | 6.20 | 6.60 |
| E1 | 4.30 | 4.50 |
| e | 0.65 | |
| L | 0.45 | 0.75 |
| θ | 0° | 8° |

**5.3、SSOP24 (0.65mm)**




| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min** | **Max** |
| A | 1.60 | 2.00 |
| A1 | 0.05 | 0.25 |
| A2 | 1.40 | 1.85 |
| b | 0.28 | 0.37 |
| c | 0.15 | 0.20 |
| D | 8.00 | 8.40 |
| E | 7.60 | 8.00 |
| E1 | 5.10 | 5.50 |
| e | 0.65 | |
| L | 0.55 | 1.10 |
| L1 | 1.15 | 1.35 |
| θ | 0° | 8° |

**5.4、SSOP24 (0.635mm)**




| 2023/12/A | Dimensions In Millimeters | |
|---|---|---|
| **Symbol** | **Min** | **Max** |
| A | 1.35 | 1.75 |
| A1 | 0.10 | 0.25 |
| A2 | 1.30 | 1.55 |
| b | 0.23 | 0.47 |
| c | 0.19 | 0.26 |
| D | 8.45 | 8.85 |
| E | 5.80 | 6.20 |
| E1 | 3.70 | 4.10 |
| e | 0.635 | |
| L | 0.40 | 0.80 |
| θ | 0° | 8° |

## 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 | ○：Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard.<br>×：Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements. | | | | | | | | | |

### 6.2、Notes

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