



# CD4066H

## Quad single-pole single-throw analog switch

### Product Specification

#### Specification Revision History:

| Version    | Date    | Description |
|------------|---------|-------------|
| 2023-08-A1 | 2023-08 | NEW         |
|            |         |             |
|            |         |             |
|            |         |             |



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## 1、General Description

The CD4066H provides four single-pole, single-throw analog switch functions.

It operates over a recommended  $V_{DD}$  power supply range of 3V to 18V referenced to  $V_{SS}$  (usually ground).

Unused inputs must be connected to  $V_{DD}$ ,  $V_{SS}$ , or another input.

### Features:

- Supply voltage range: 3V to 18V
- Temperature range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Packaging information: DIP14/SOP14/TSSOP14

### Ordering Information:

#### Tube packing specifications:

| Part number    | Packaging form | Marking code | Tube quantity | Boxed tube quantity | Boxed quantity | Notes                                                                |
|----------------|----------------|--------------|---------------|---------------------|----------------|----------------------------------------------------------------------|
| CD4066HDA14.TB | DIP14          | CD4066H      | 25 PCS/tube   | 40 tube/box         | 1000 PCS/box   | Dimensions of plastic enclosure: 19.0mm×6.4mm<br>Pin spacing: 2.54mm |
| CD4066HSA14.TB | SOP14          | CD4066H      | 50 PCS/tube   | 200 tube/box        | 10000 PCS/box  | Dimensions of plastic enclosure: 8.7mm×3.9mm<br>Pin spacing: 1.27mm  |
| CD4066HTA14.TB | TSSOP14        | CD4066H      | 96 PCS/tube   | 200 tube/box        | 19200 PCS/box  | Dimensions of plastic enclosure: 5.0mm×4.4mm<br>Pin spacing: 0.65mm  |

#### Reel packing specifications:

| Part number    | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes                                                               |
|----------------|----------------|--------------|---------------|---------------------|---------------------------------------------------------------------|
| CD4066HSA14.TR | SOP14          | CD4066H      | 4000 PCS/reel | 8000 PCS/box        | Dimensions of plastic enclosure: 8.7mm×3.9mm<br>Pin spacing: 1.27mm |
| CD4066HTA14.TR | TSSOP14        | CD4066H      | 5000 PCS/reel | 10000 PCS/box       | Dimensions of plastic enclosure: 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

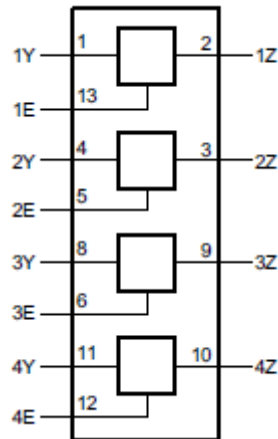
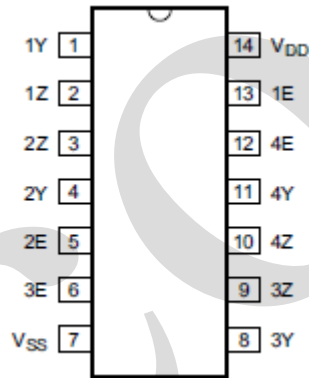


Figure 1. Functional diagram

### 2.2、Pin Configurations





## 2.3、Pin Description

| Pin No. | Pin Name        | Description                  |
|---------|-----------------|------------------------------|
| 1       | Y1              | independent input or output  |
| 2       | Z1              | independent input or output  |
| 3       | Z2              | independent input or output  |
| 4       | Y2              | independent input or output  |
| 5       | E2              | enable input ( active high ) |
| 6       | E3              | enable input ( active high ) |
| 7       | V <sub>SS</sub> | ground (0V)                  |
| 8       | Y3              | independent input or output  |
| 9       | Z3              | enable input ( active high ) |
| 10      | Z4              | enable input ( active high ) |
| 11      | Y4              | independent input or output  |
| 12      | E4              | enable input ( active high ) |
| 13      | E1              | enable input ( active high ) |
| 14      | V <sub>DD</sub> | supply voltage               |

## 2.4、Function Table

| Input | Switch |
|-------|--------|
| nE    |        |
| H     | ON     |
| L     | OFF    |

Note: H=HIGH voltage level; L=LOW voltage level.

## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to V<sub>SS</sub> (ground=0V), unless otherwise specified.)

| Parameter             | Symbol           | Conditions    | Min.      | Max.                 | Unit |
|-----------------------|------------------|---------------|-----------|----------------------|------|
| supply voltage        | V <sub>DD</sub>  | -             | -0.5      | +21                  | V    |
| input voltage         | V <sub>I</sub>   | all inputs    | -0.5      | V <sub>DD</sub> +0.5 | V    |
| DC input current      | I <sub>IK</sub>  | any one input | -         | ±10                  | mA   |
| storage temperature   | T <sub>stg</sub> | -             | -65       | +150                 | °C   |
| soldering temperature | T <sub>L</sub>   | 10s           | DIP       | 245                  | °C   |
|                       |                  |               | SOP/TSSOP | 260                  |      |



## 3.2、Recommended Operating Conditions

| Parameter           | Symbol    | Conditions  | Min. | Typ. | Max. | Unit |
|---------------------|-----------|-------------|------|------|------|------|
| supply voltage      | $V_{DD}$  | -           | 3    | -    | 18   | V    |
| ambient temperature | $T_{amb}$ | in free air | -40  | -    | +125 | °C   |

## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

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

| Parameter                               | Symbol          | $V_{DD}$ | Conditions                               | Min. | Typ. | Max.      | Unit          |
|-----------------------------------------|-----------------|----------|------------------------------------------|------|------|-----------|---------------|
| HIGH-level input voltage                | $V_{IH}$        | 5V       | -                                        | 3.5  | -    | -         | V             |
|                                         |                 | 10V      | -                                        | 7    | -    | -         | V             |
|                                         |                 | 18V      | -                                        | 12.6 | -    | -         | V             |
| LOW-level input voltage                 | $V_{IL}$        | 5V       | -                                        | -    | -    | 1.5       | V             |
|                                         |                 | 10V      | -                                        | -    | -    | 3         | V             |
|                                         |                 | 18V      | -                                        | -    | -    | 5.4       | V             |
| input leakage current                   | $I_I$           | 18V      | $V_I=18\text{V}$ or GND                  | -    | -    | $\pm 1.0$ | $\mu\text{A}$ |
| OFF-state leakage current               | $I_{S(OFF)}$    | 18V      | per channel                              | -    | -    | $\pm 1.0$ | $\mu\text{A}$ |
| supply current                          | $I_{DD}$        | 5V       | $V_I=5\text{V}$ or GND; $I_O=0\text{A}$  | -    | -    | 150       | $\mu\text{A}$ |
|                                         |                 | 10V      | $V_I=10\text{V}$ or GND; $I_O=0\text{A}$ | -    | -    | 300       | $\mu\text{A}$ |
|                                         |                 | 18V      | $V_I=18\text{V}$ or GND; $I_O=0\text{A}$ | -    | -    | 600       | $\mu\text{A}$ |
| ON resistance (peak)                    | $R_{ON(peak)}$  | 5V       | $V_I=0\text{V}\sim V_{DD}$               | -    | 117  | 836       | $\Omega$      |
|                                         |                 | 10V      |                                          | -    | 58   | 178       | $\Omega$      |
|                                         |                 | 15V      |                                          | -    | 41   | 120       | $\Omega$      |
|                                         |                 | 20V      |                                          | -    | 36   | 105       | $\Omega$      |
| ON resistance (rail)                    | $R_{ON(rail)}$  | 5V       | $V_I=0\text{V}$                          | -    | 44   | 130       | $\Omega$      |
|                                         |                 | 10V      |                                          | -    | 29   | 93        | $\Omega$      |
|                                         |                 | 15V      |                                          | -    | 24   | 69        | $\Omega$      |
|                                         |                 | 20V      |                                          | -    | 22   | 63        | $\Omega$      |
|                                         |                 | 5V       | $V_I=V_{DD}$                             | -    | 82   | 249       | $\Omega$      |
|                                         |                 | 10V      |                                          | -    | 51   | 157       | $\Omega$      |
|                                         |                 | 15V      |                                          | -    | 41   | 127       | $\Omega$      |
|                                         |                 | 20V      |                                          | -    | 36   | 112       | $\Omega$      |
| ON resistance Mismatch between channels | $\Delta R_{ON}$ | 5V       | $V_I=0\text{V}\sim V_{DD}$               | -    | 25   | -         | $\Omega$      |
|                                         |                 | 10V      |                                          | -    | 10   | -         | $\Omega$      |
|                                         |                 | 15V      |                                          | -    | 5    | -         | $\Omega$      |
|                                         |                 | 20V      |                                          | -    | 5    | -         | $\Omega$      |

**3.3.2、DC Characteristics 2**(T<sub>amb</sub>=-40°C to +125°C, voltages are referenced to V<sub>SS</sub> (ground=0V), unless otherwise specified.)

| Parameter                 | Symbol                | V <sub>DD</sub> | Conditions                                     | Min. | Typ. | Max. | Unit |
|---------------------------|-----------------------|-----------------|------------------------------------------------|------|------|------|------|
| HIGH-level input voltage  | V <sub>IH</sub>       | 5V              | -                                              | 3.5  | -    | -    | V    |
|                           |                       | 10V             | -                                              | 7    | -    | -    | V    |
|                           |                       | 18V             | -                                              | 12.6 | -    | -    | V    |
| LOW-level input voltage   | V <sub>IL</sub>       | 5V              | -                                              | -    | -    | 1.5  | V    |
|                           |                       | 10V             | -                                              | -    | -    | 3    | V    |
|                           |                       | 18V             | -                                              | -    | -    | 5.4  | V    |
| input leakage current     | I <sub>I</sub>        | 18V             | V <sub>I</sub> =18V or GND                     | -    | -    | ±1.0 | uA   |
| OFF-state leakage current | I <sub>S(OFF)</sub>   | 18V             | per channel                                    | -    | -    | ±1.0 | uA   |
| supply current            | I <sub>DD</sub>       | 5V              | V <sub>I</sub> =5V or GND; I <sub>O</sub> =0A  | -    | -    | 150  | uA   |
|                           |                       | 10V             | V <sub>I</sub> =10V or GND; I <sub>O</sub> =0A | -    | -    | 300  | uA   |
|                           |                       | 18V             | V <sub>I</sub> =18V or GND; I <sub>O</sub> =0A | -    | -    | 600  | uA   |
| ON resistance (peak)      | R <sub>ON(peak)</sub> | 5V              | V <sub>I</sub> =0V~V <sub>DD</sub>             | -    | -    | 836  | Ω    |
|                           |                       | 10V             |                                                | -    | -    | 178  | Ω    |
|                           |                       | 15V             |                                                | -    | -    | 120  | Ω    |
|                           |                       | 20V             |                                                | -    | -    | 105  | Ω    |
| ON resistance (rail)      | R <sub>ON(rail)</sub> | 5V              | V <sub>I</sub> =0V                             | -    | -    | 130  | Ω    |
|                           |                       | 10V             |                                                | -    | -    | 93   | Ω    |
|                           |                       | 15V             |                                                | -    | -    | 69   | Ω    |
|                           |                       | 20V             |                                                | -    | -    | 63   | Ω    |
|                           |                       | 5V              | V <sub>I</sub> =V <sub>DD</sub>                | -    | -    | 249  | Ω    |
|                           |                       | 10V             |                                                | -    | -    | 157  | Ω    |
|                           |                       | 15V             |                                                | -    | -    | 127  | Ω    |
|                           |                       | 20V             |                                                | -    | -    | 112  | Ω    |

**3.3.3、AC Characteristics 3**(T<sub>amb</sub>=-40°C to +85°C, V<sub>SS</sub>=0V, unless otherwise specified.)

| Parameter                                | Symbol           | V <sub>DD</sub> | Conditions                         | Min. | Typ. | Max. | Unit |
|------------------------------------------|------------------|-----------------|------------------------------------|------|------|------|------|
| HIGH to LOW propagation delay time       | t <sub>PHL</sub> | 5V              | nY to nZ; nZ TO nY<br>see Figure 4 | -    | 10   | 20   | ns   |
|                                          |                  | 10V             |                                    | -    | 5    | 10   | ns   |
|                                          |                  | 18V             |                                    | -    | 5    | 10   | ns   |
| LOW to HIGH propagation delay time       | t <sub>PLH</sub> | 5V              | nY to nZ; nZ TO nY<br>see Figure 4 | -    | 10   | 20   | ns   |
|                                          |                  | 10V             |                                    | -    | 5    | 10   | ns   |
|                                          |                  | 18V             |                                    | -    | 5    | 10   | ns   |
| HIGH to OFF-state propagation delay time | t <sub>PHZ</sub> | 5V              | nE to nY; nZ<br>see Figure 5       | -    | 80   | 160  | ns   |
|                                          |                  | 10V             |                                    | -    | 65   | 130  | ns   |
|                                          |                  | 18V             |                                    | -    | 60   | 120  | ns   |
| LOW to OFF-state propagation delay time  | t <sub>PLZ</sub> | 5V              | nE to nY; nZ<br>see Figure 5       | -    | 80   | 160  | ns   |
|                                          |                  | 10V             |                                    | -    | 70   | 140  | ns   |
|                                          |                  | 18V             |                                    | -    | 70   | 140  | ns   |



|                                          |          |     |                                                                               |   |      |    |     |
|------------------------------------------|----------|-----|-------------------------------------------------------------------------------|---|------|----|-----|
| OFF-state to HIGH propagation delay time | tpZH     | 5V  | nE to nY;nZ<br>see Figure 5                                                   | - | 40   | 80 | ns  |
|                                          |          | 10V |                                                                               | - | 20   | 40 | ns  |
|                                          |          | 18V |                                                                               | - | 15   | 30 | ns  |
| OFF-state to LOW propagation delay time  | tpZL     | 5V  | nE to nY;nZ<br>see Figure 5                                                   | - | 45   | 90 | ns  |
|                                          |          | 10V |                                                                               | - | 20   | 40 | ns  |
|                                          |          | 18V |                                                                               | - | 15   | 30 | ns  |
| Total harmonic distortion                | THD      | 5V  | RL=10K,CL=15pF<br>Channel<br>ON;VI=0.55VDD(P-P)<br>fi = 1kHz<br>see Figure 4  | - | 0.25 | -  | %   |
|                                          |          | 10V |                                                                               | - | 0.04 | -  | %   |
|                                          |          | 18V |                                                                               | - | 0.04 | -  | %   |
| Crosstalk voltage(nE to nY to nZ)        | Vct      | 10V | RL=10K,CL=15pF<br>nE = VDD (square-wave)<br>see Figure 5                      | - | 50   | -  | mV  |
| crosstalk                                | Xtalk    | 10V | between switches; fi = 1 MHz; RL = 1 kΩ;<br>VI = 0.5VDD (p-p)<br>see Figure 6 | - | -50  | -  | dB  |
| OFF frequency                            | aiso     | 10V | fi = 1 MHz; RL = 1 kΩ;;<br>CL = 5 pF; VI = 0.5VDD (p-p)<br>see Figure 7       | - | -50  | -  | dB  |
| -3 dB frequency response                 | f (-3dB) | 10V | RL = 1 kΩ; CL = 5 pF;<br>VI = 0.5VDD (p-p)<br>see Figure 8                    | - | 90   | -  | MHZ |

### 3.3.4、AC Characteristics 4

(T<sub>amb</sub>=-40℃ to +125℃, V<sub>SS</sub>=0V, unless otherwise specified.)

| Parameter                                | Symbol           | V <sub>DD</sub> | Conditions                        | Min. | Typ. | Max. | Unit |
|------------------------------------------|------------------|-----------------|-----------------------------------|------|------|------|------|
| HIGH to LOW propagation delay time       | t <sub>PHL</sub> | 5V              | nY to nZ;nZ TO nY<br>see Figure 9 | -    | -    | 24   | ns   |
|                                          |                  | 10V             |                                   | -    | -    | 12   | ns   |
|                                          |                  | 18V             |                                   | -    | -    | 12   | ns   |
| LOW to HIGH propagation delay time       | t <sub>PLH</sub> | 5V              | nY to nZ;nZ TO nY<br>see Figure 9 | -    | -    | 24   | ns   |
|                                          |                  | 10V             |                                   | -    | -    | 12   | ns   |
|                                          |                  | 18V             |                                   | -    | -    | 12   | ns   |
| HIGH to OFF-state propagation delay time | t <sub>PHZ</sub> | 5V              | nE to nY;NZ<br>see Figure 10      | -    | -    | 192  | ns   |
|                                          |                  | 10V             |                                   | -    | -    | 156  | ns   |
|                                          |                  | 18V             |                                   | -    | -    | 144  | ns   |
| LOW to OFF-state propagation delay time  | t <sub>PLZ</sub> | 5V              | nE to nY;nZ<br>see Figure 10      | -    | -    | 192  | ns   |
|                                          |                  | 10V             |                                   | -    | -    | 156  | ns   |
|                                          |                  | 18V             |                                   | -    | -    | 156  | ns   |
| OFF-state to HIGH propagation delay time | t <sub>pZH</sub> | 5V              | nE to nY;nZ<br>see Figure 10      | -    | -    | 96   | ns   |
|                                          |                  | 10V             |                                   | -    | -    | 48   | ns   |
|                                          |                  | 18V             |                                   | -    | -    | 36   | ns   |
| OFF-state to LOW                         | t <sub>pZL</sub> | 5V              | nE to nY;nZ<br>see Figure 10      | -    | -    | 108  | ns   |
|                                          |                  | 10V             |                                   | -    | -    | 48   | ns   |



|                                   |                     |     |                                                                               |   |      |    |     |
|-----------------------------------|---------------------|-----|-------------------------------------------------------------------------------|---|------|----|-----|
| propagation delay time            |                     | 18V |                                                                               | - | -    | 36 | ns  |
| Total harmonic distortion         | THD                 | 5V  | RL=10K,CL=15pF<br>Channel<br>ON;VI=0.55VDD(P-P)<br>fi = 1kHz<br>see Figure 4  | - | 0.25 | -  | %   |
|                                   |                     | 10V |                                                                               | - | 0.04 | -  | %   |
|                                   |                     | 18V |                                                                               | - | 0.04 | -  | %   |
| Crosstalk voltage(nE to nY to nZ) | V <sub>ct</sub>     | 10V | RL=10K,CL=15pF<br>nE = VDD (square-wave)<br>see Figure 5                      | - | 50   | -  | mV  |
| crosstalk                         | Xtalk               | 10V | between switches; fi = 1 MHz; RL = 1 kΩ;<br>VI = 0.5VDD (p-p)<br>see Figure 6 | - | -50  | -  | dB  |
| OFF frequency                     | aiso                | 10V | fi = 1 MHz; RL = 1 kΩ;;<br>CL = 5 pF; VI = 0.5VDD (p-p)<br>see Figure 7       | - | -50  | -  | dB  |
| -3 dB frequency response          | f <sub>(-3dB)</sub> | 10V | RL = 1 kΩ; CL = 5 pF;<br>VI = 0.5VDD (p-p)<br>see Figure 8                    | - | 90   | -  | MHZ |



## 4、Testing Circuit

### 4.1、AC Testing Circuit

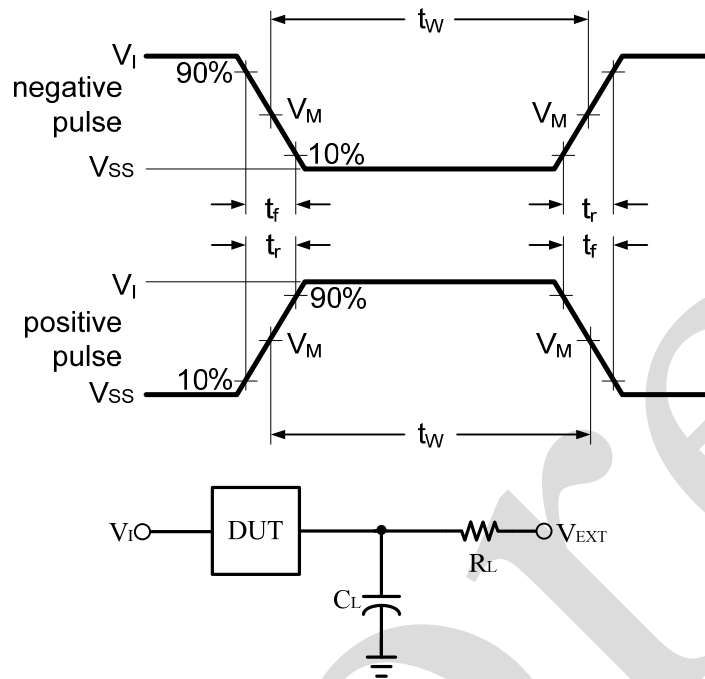


Figure 3. Load circuit

$C_L$  includes probe and jig capacitance.

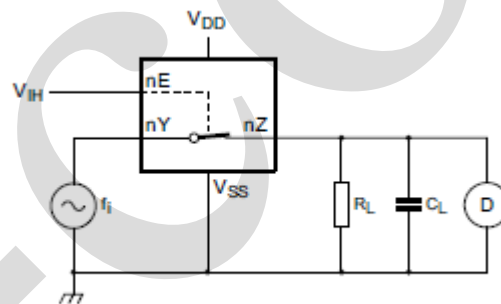
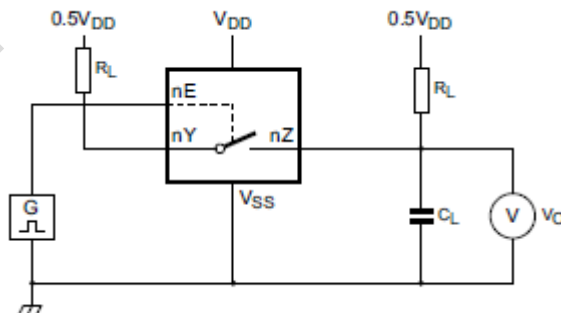


Figure 4. Test circuit for measuring total harmonic distortion



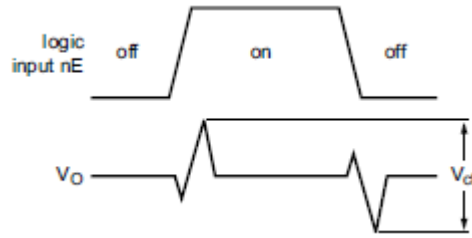


Figure 5. Test circuit for measuring crosstalk voltage between digital input and switch

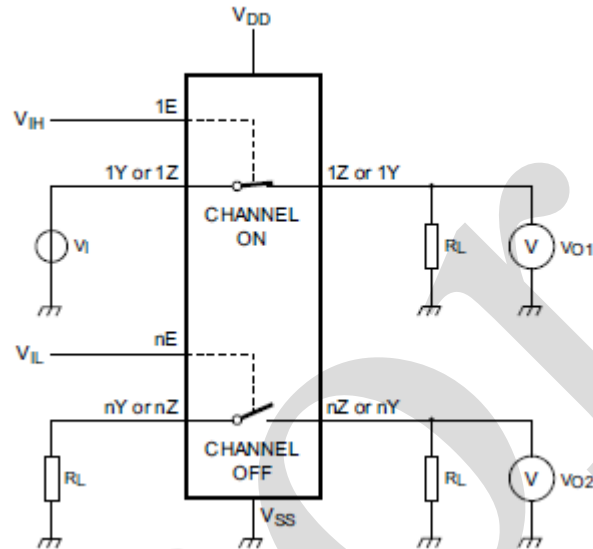


Figure 6. Test circuit for measuring crosstalk between switches

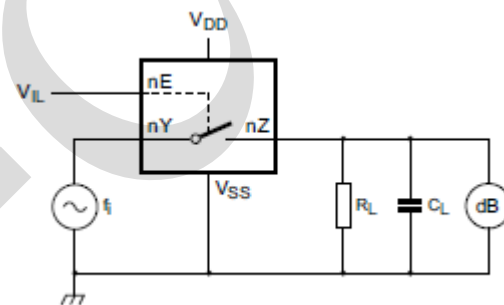
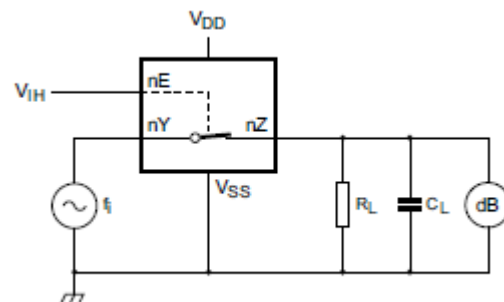
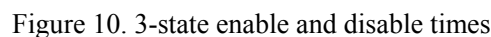


Figure 7 . Test circuit for measuring isolation (OFF-state)



## 4.2、 Test Data

### 4.3、 AC Testing Waveforms



#### 4.4、 Measurement Points

VER: 2023-08-A1



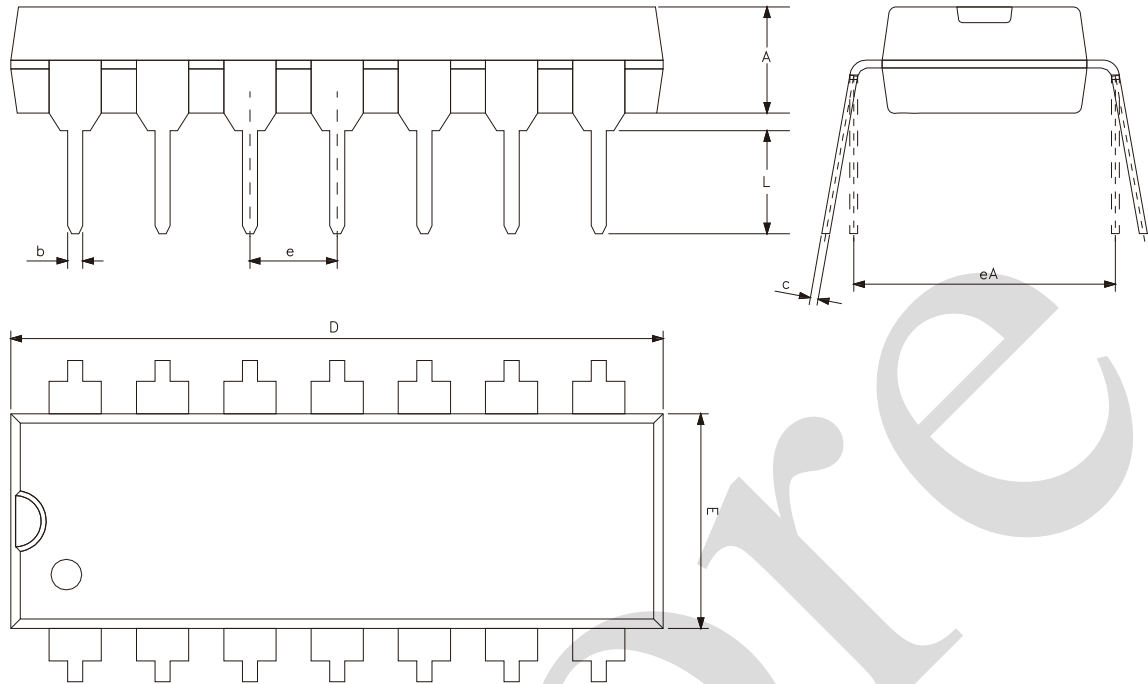
| $V_{DD}$  | $V_M$               | $V_M$               |
|-----------|---------------------|---------------------|
| 5V to 18V | $0.5 \times V_{DD}$ | $0.5 \times V_{DD}$ |

i-core



## 5、Package Information

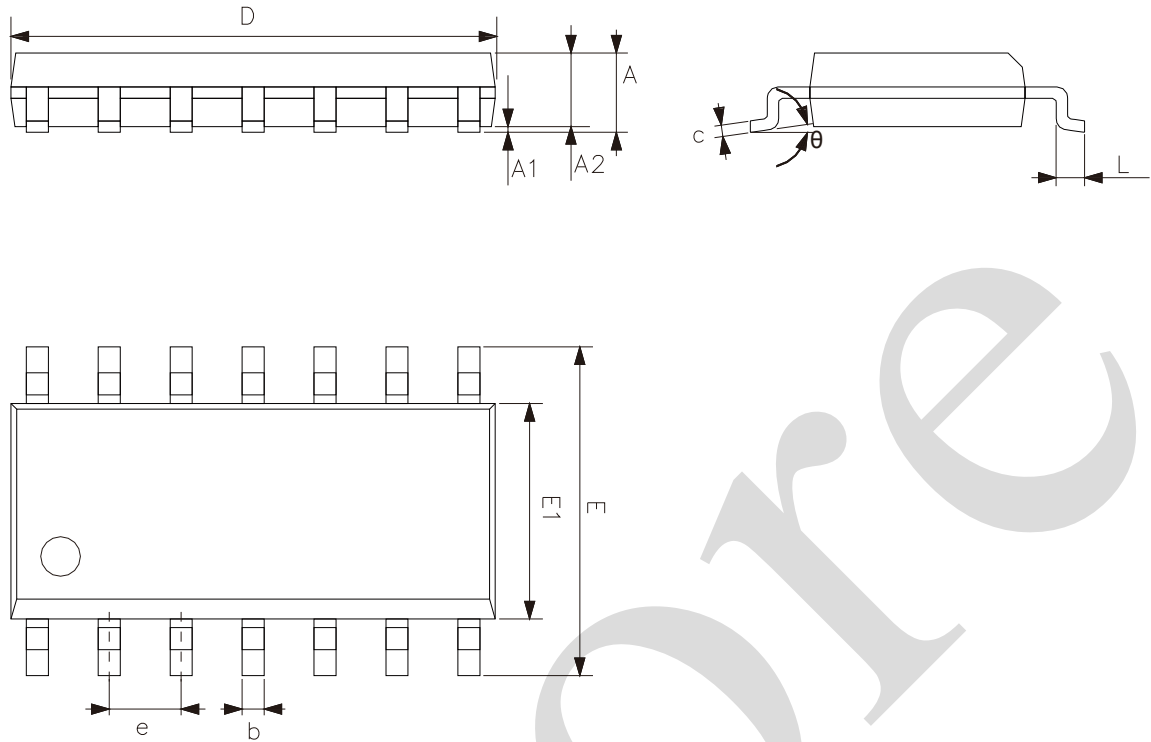
### 5.1、DIP14



| Symbol | Dimensions (mm) |       |
|--------|-----------------|-------|
|        | Min.            | Max.  |
| A      | 3.05            | 3.60  |
| b      | 0.33            | 0.56  |
| c      | 0.20            | 0.36  |
| D      | 18.80           | 19.40 |
| E      | 6.20            | 6.60  |
| e      | 2.54            |       |
| eA     | 7.62            | 10.90 |
| L      | 2.92            | -     |



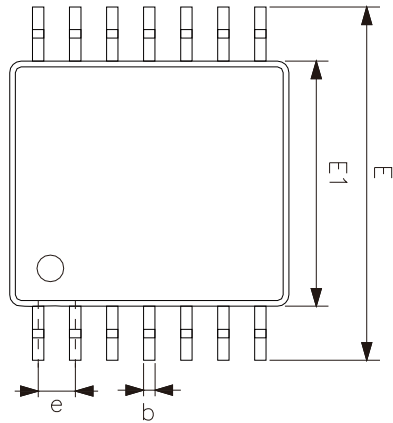
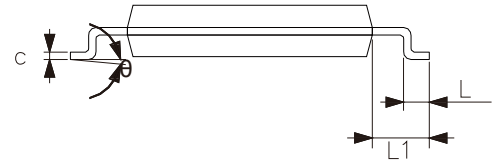
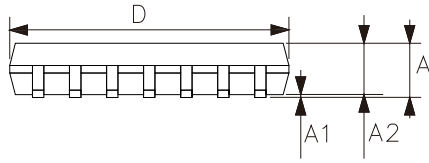
## 5.2、SOP14



| Symbol | Dimensions (mm) |      |
|--------|-----------------|------|
|        | Min.            | Max. |
| A      | 1.50            | 1.75 |
| A1     | 0.05            | 0.25 |
| A2     | 1.30            | -    |
| b      | 0.33            | 0.50 |
| c      | 0.19            | 0.25 |
| D      | 8.43            | 8.76 |
| E      | 5.80            | 6.25 |
| E1     | 3.75            | 4.00 |
| e      | 1.27            |      |
| L      | 0.40            | 0.89 |
| θ      | 0°              | 8°   |



## 5.3、TSSOP14



| Symbol   | Dimensions (mm) |      |
|----------|-----------------|------|
|          | 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 |
| L1       | 1.00            |      |
| $\theta$ | 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             | <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

Recommended carefully reading this information before the use of this product;

The information in this document are subject to change without notice;

This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.