



灵星芯微 集成电路

CD4585 (LX) 4-bit magnitude comparator

Product Specification

Specification Revision History:

| Version | Date | Description |
|------------|---------|-------------|
| 2023-04-A1 | 2023-04 | New |
| | | |
| | | |



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1、General Description

The CD4585 is a 4-bit magnitude comparator.

Features:

- Supply voltage range: 3V to 15V
- Temperature range: -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 |
|--------------|----------------|--------------|----------------|---------------------|------------------|---|
| CD4585BE(LX) | DIP16 | CD4585BE | 25 PCS/tube | 40 tube/box | 1000 PCS/box | Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm |
| CD4585BM(LX) | SOP16 | CD4585BM | 50 PCS/tube | 200 tube/box | 10000 PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm |
| CD4585PW(LX) | TSSOP16 | CD4585 | 96 PCS/tube | 200 tube/box | 19200 PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm |

Reel packing specifications:

| Part number | Packaging form | Marking code | Reel quantity | Boxed reel quantity | Notes |
|--------------|----------------|--------------|---------------|---------------------|---|
| CD4585BM(LX) | SOP16 | CD4585BM | 2500PCS/reel | 5000PCS/box | Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm |
| CD4585PW(LX) | TSSOP16 | CD4585 | 5000PCS/reel | 10000PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm 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

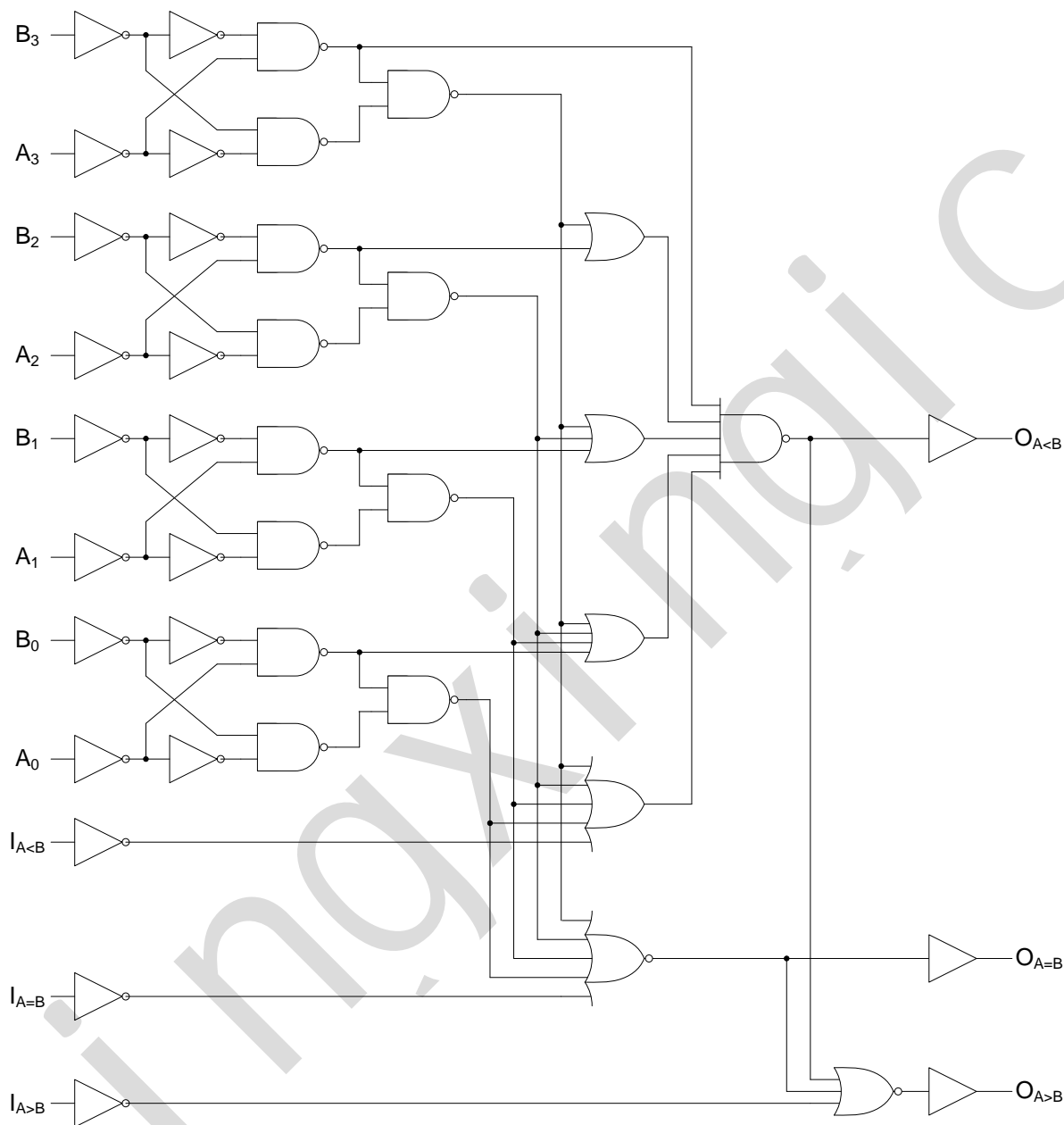


Figure 1. Functional diagram



2.2、Pin Configurations

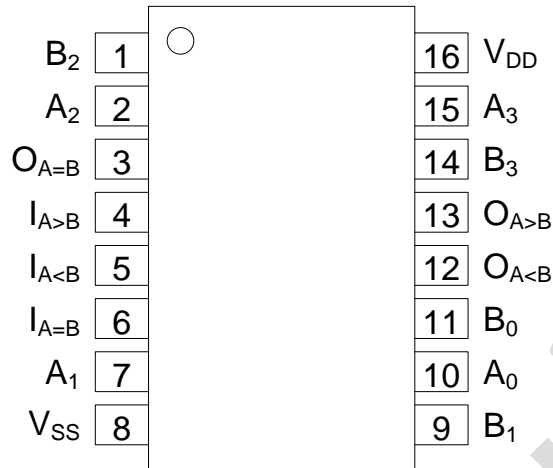


Figure 2. Pin configurations

2.3、Pin Description

| Pin No. | Pin Name | Description |
|---------|---------------------|-------------------------|
| 1 | B ₂ | word B parallel input |
| 2 | A ₂ | word A parallel input |
| 3 | O _{A=B} | A equal to B output |
| 4 | I _{A>B} | expander input |
| 5 | I _{A<B} | expander input |
| 6 | I _{A=B} | expander input |
| 7 | A ₁ | word A parallel input |
| 8 | V _{SS} | ground supply voltage |
| 9 | B ₁ | word B parallel input |
| 10 | A ₀ | word A parallel input |
| 11 | B ₀ | word B parallel input |
| 12 | O _{A<B} | A less than B output |
| 13 | O _{A>B} | A greater than B output |
| 14 | B ₃ | word B parallel input |
| 15 | A ₃ | word A parallel input |
| 16 | V _{DD} | supply voltage |



2.4、Function Table

| COMPARING INPUTS | | | | CASCADING INPUTS | | | OUTPUTS | | |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------|---------------------|------------------|---------------------|---------------------|------------------|
| A ₃ B ₃ | A ₂ B ₂ | A ₁ B ₁ | A ₀ B ₀ | I _{A>B} | I _{A<B} | I _{A=B} | O _{A>B} | O _{A<B} | O _{A=B} |
| A ₃ >B ₃ | X | X | X | H | X | X | H | L | L |
| A ₃ <B ₃ | X | X | X | X | X | X | L | H | L |
| A ₃ =B ₃ | A ₂ >B ₂ | X | X | H | X | X | H | L | L |
| A ₃ =B ₃ | A ₂ <B ₂ | X | X | X | X | X | L | H | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ >B ₁ | X | H | X | X | H | L | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ <B ₁ | X | X | X | X | L | H | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ >B ₀ | H | X | X | H | L | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ <B ₀ | X | X | X | L | H | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ =B ₀ | X | L | H | L | L | H |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ =B ₀ | H | L | L | H | L | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ =B ₀ | X | H | L | L | H | L |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ =B ₀ | X | H | H | L | H | H |
| A ₃ =B ₃ | A ₂ =B ₂ | A ₁ =B ₁ | A ₀ =B ₀ | L | L | L | L | L | L |

Note:

H=HIGH state (the more positive voltage);

L=LOW voltage level (the less positive voltage);

X=state is immaterial.

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 | +18 | V |
| input voltage | V _I | all inputs | -0.5 | V _{DD} +0.5 | V |
| DC input current | I _{IK} | any one input | - | ±10 | mA |
| storage temperature | T _{stg} | - | -65 | +150 | °C |
| soldering temperature | T _L | 10s | DIP | | °C |
| | | | SOP/TSSOP | | |

3.2、Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|------------------|-------------|------|------|------|------|
| supply voltage | V _{DD} | - | 3 | - | 15 | 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 |
| | | 15V | - | 11 | - | - | V |
| LOW-level input voltage | V_{IL} | 5V | - | - | - | 1.5 | V |
| | | 10V | - | - | - | 3 | V |
| | | 15V | - | - | - | 4 | V |
| HIGH-level output voltage | V_{OH} | 5V | $ I_O < 1\mu\text{A}$ | 4.95 | - | - | V |
| | | 10V | $ I_O < 1\mu\text{A}$ | 9.95 | - | - | V |
| | | 15V | $ I_O < 1\mu\text{A}$ | 14.95 | - | - | V |
| LOW-level output voltage | V_{OL} | 5V | $ I_O < 1\mu\text{A}$ | - | - | 0.05 | V |
| | | 10V | $ I_O < 1\mu\text{A}$ | - | - | 0.05 | V |
| | | 15V | $ I_O < 1\mu\text{A}$ | - | - | 0.05 | V |
| HIGH-level output current | I_{OH} | 5V | $V_O = 4.6\text{V}$ | - | - | -0.34 | mA |
| | | 5V | $V_O = 2.5\text{V}$ | - | - | -1.3 | mA |
| | | 10V | $V_O = 9.5\text{V}$ | - | - | -0.55 | mA |
| | | 15V | $V_O = 13.5\text{V}$ | - | - | -1.65 | mA |
| LOW-level output current | I_{OL} | 5V | $V_O = 0.4\text{V}$ | 0.34 | - | - | mA |
| | | 10V | $V_O = 0.5\text{V}$ | 0.46 | - | - | mA |
| | | 15V | $V_O = 1.5\text{V}$ | 1.4 | - | - | mA |
| input leakage current | I_I | 15V | $V_I = 15\text{V}$ or GND | - | - | ± 2 | μA |
| supply current | I_{DD} | 5V | $V_I = 5\text{V}$ or GND; $I_O = 0\text{A}$ | - | - | 7.5 | μA |
| | | 10V | $V_I = 10\text{V}$ or GND; $I_O = 0\text{A}$ | - | - | 15 | μA |
| | | 15V | $V_I = 15\text{V}$ or GND; $I_O = 0\text{A}$ | - | - | 30 | μA |



3.3.2、DC Characteristics 2

($T_{amb}=-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, 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 |
| | | 15V | - | 11 | - | - | V |
| LOW-level input voltage | V_{IL} | 5V | - | - | - | 1.5 | V |
| | | 10V | - | - | - | 3 | V |
| | | 15V | - | - | - | 4 | V |
| HIGH-level output voltage | V_{OH} | 5V | $ I_O <1\mu\text{A}$ | 4.95 | - | - | V |
| | | 10V | $ I_O <1\mu\text{A}$ | 9.95 | - | - | V |
| | | 15V | $ I_O <1\mu\text{A}$ | 14.95 | - | - | V |
| LOW-level output voltage | V_{OL} | 5V | $ I_O <1\mu\text{A}$ | - | - | 0.05 | V |
| | | 10V | $ I_O <1\mu\text{A}$ | - | - | 0.05 | V |
| | | 15V | $ I_O <1\mu\text{A}$ | - | - | 0.05 | V |
| HIGH-level output current | I_{OH} | 5V | $V_O=4.6\text{V}$ | - | - | -0.3 | mA |
| | | 5V | $V_O=2.5\text{V}$ | - | - | -1.15 | mA |
| | | 10V | $V_O=9.5\text{V}$ | - | - | -0.45 | mA |
| | | 15V | $V_O=13.5\text{V}$ | - | - | -1.4 | mA |
| LOW-level output current | I_{OL} | 5V | $V_O=0.4\text{V}$ | 0.29 | - | - | mA |
| | | 10V | $V_O=0.5\text{V}$ | 0.38 | - | - | mA |
| | | 15V | $V_O=1.5\text{V}$ | 1.2 | - | - | mA |
| input leakage current | I_I | 15V | $V_I=15\text{V}$ or GND | - | - | ± 4 | μA |
| supply current | I_{DD} | 5V | $V_I=5\text{V}$ or GND; $I_O=0\text{A}$ | - | - | 7.5 | μA |
| | | 10V | $V_I=10\text{V}$ or GND; $I_O=0\text{A}$ | - | - | 15 | μA |
| | | 15V | $V_I=15\text{V}$ or GND; $I_O=0\text{A}$ | - | - | 30 | μA |

3.3.3、AC Characteristics 1

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

| Parameter | Symbol | V_{DD} | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|--------------------|----------|-------------------|------|------|------|------|
| HIGH to LOW propagation delay time | t_{PHL} | 5V | An Bn to On | - | 160 | 320 | ns |
| | | 10V | $C_L=50\text{pF}$ | - | 65 | 130 | ns |
| | | 15V | see Figure 4 | - | 45 | 90 | ns |
| | | 5V | In to On | - | 110 | 220 | ns |
| | | 10V | $C_L=50\text{pF}$ | - | 45 | 90 | ns |
| | | 15V | see Figure 4 | - | 30 | 60 | ns |
| LOW to HIGH propagation delay time | t_{PLH} | 5V | An Bn to On | - | 150 | 300 | ns |
| | | 10V | $C_L=50\text{pF}$ | - | 60 | 120 | ns |
| | | 15V | see Figure 4 | - | 45 | 90 | ns |
| | | 5V | In to On | - | 120 | 240 | ns |
| | | 10V | $C_L=50\text{pF}$ | - | 50 | 100 | ns |
| | | 15V | see Figure 4 | - | 35 | 70 | ns |
| transition time | t_{THL}, t_{TLH} | 5V | see Figure 4 | - | 60 | 120 | ns |
| | | 10V | see Figure 4 | - | 30 | 60 | ns |



| | | | | | | | |
|--|--|-----|--|---|----|----|----|
| | | 15V | | - | 20 | 40 | ns |
|--|--|-----|--|---|----|----|----|

3.3.4、AC Characteristics 2

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

| Parameter | Symbol | V_{DD} | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|--------------------|----------|--|------|------|------|------|
| HIGH to LOW propagation delay time | t_{PHL} | 5V | An Bn to On $C_L=50\text{pF}$ see Figure 4 | - | - | 384 | ns |
| | | 10V | | - | - | 156 | ns |
| | | 15V | | - | - | 108 | ns |
| | | 5V | In to On $C_L=50\text{pF}$ see Figure 4 | - | - | 264 | ns |
| | | 10V | | - | - | 108 | ns |
| | | 15V | | - | - | 60 | ns |
| LOW to HIGH propagation delay time | t_{PLH} | 5V | An Bn to On $C_L=50\text{pF}$ see Figure 4 | - | - | 300 | ns |
| | | 10V | | - | - | 120 | ns |
| | | 15V | | - | - | 108 | ns |
| | | 5V | In to On $C_L=50\text{pF}$ see Figure 4 | - | - | 288 | ns |
| | | 10V | | - | - | 120 | ns |
| | | 15V | | - | - | 84 | ns |
| transition time | t_{THL}, t_{TLH} | 5V | see Figure 4 | - | - | 144 | ns |
| | | 10V | | - | - | 72 | ns |
| | | 15V | | - | - | 48 | ns |

4、Testing Circuit

4.1、AC Testing Circuit

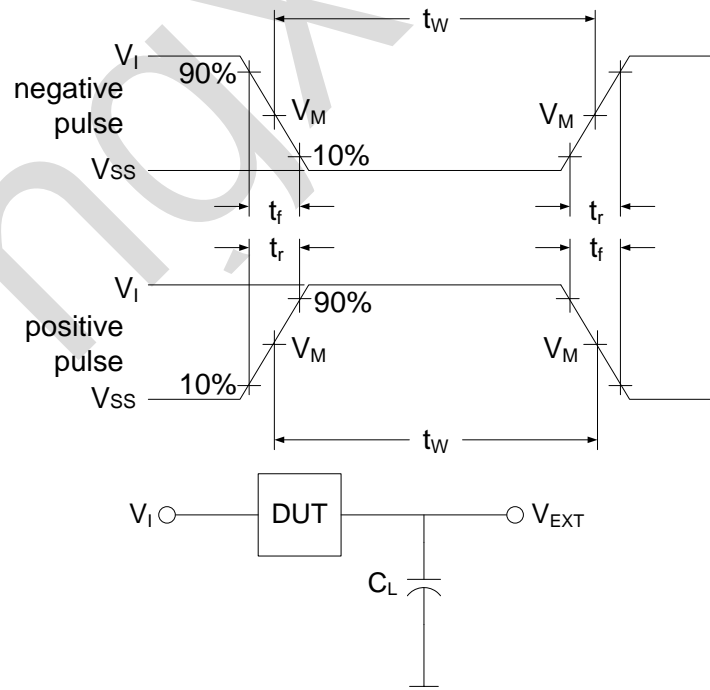


Figure 3. Load circuit

C_L includes probe and jig capacitance.



4.2、Test Data

| Supply voltage | Input | | Load | VEXT | | |
|----------------|----------|--------------------|-------|-------------------|-------------------|-------------------|
| V_{DD} | V_I | $t_r = t_f$ | C_L | t_{PLH}/t_{PHL} | t_{PLZ}/t_{PZL} | t_{PHZ}/t_{PZH} |
| 5V to 15V | V_{DD} | $\leq 20\text{ns}$ | 50pF | Open | V_{DD} | V_{SS} |

4.3、AC Testing Waveforms

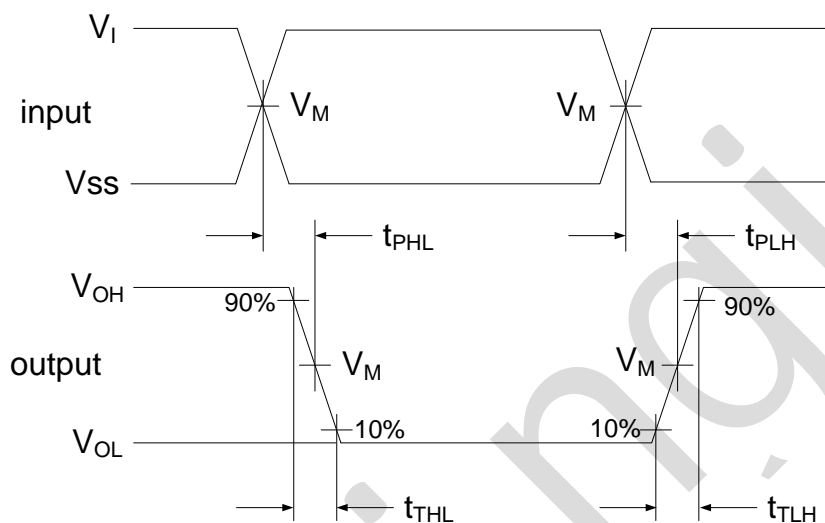


Figure 4. Propagation delay, output transition time

4.4、Measurement Points

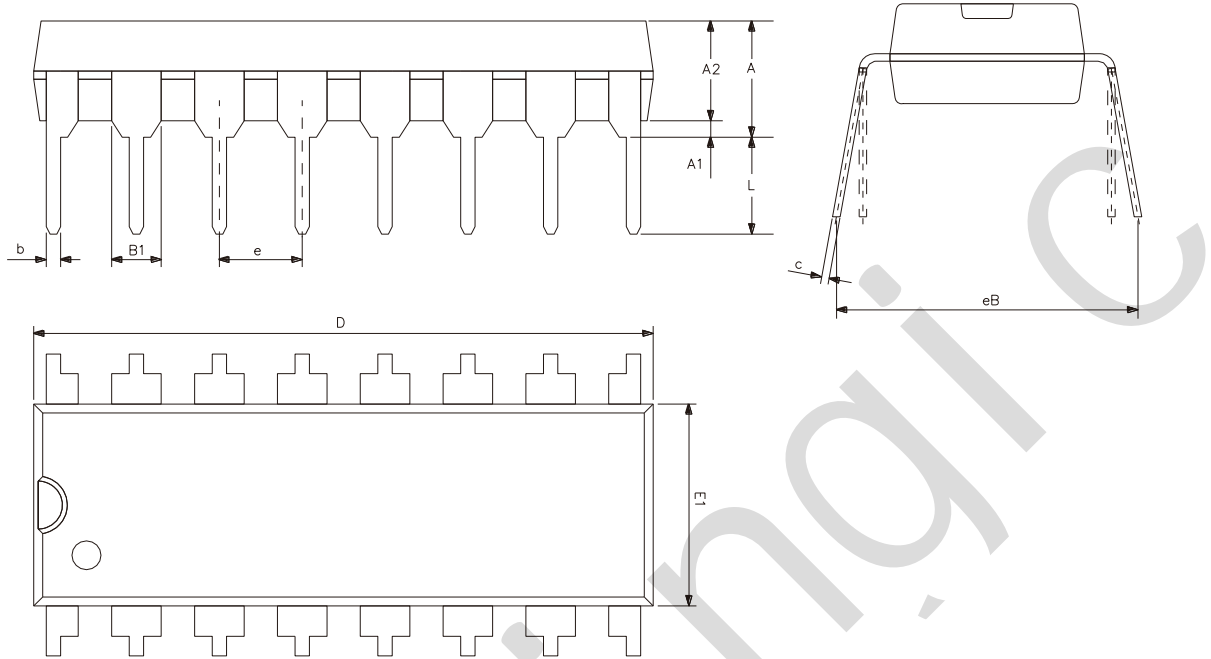
| Supply voltage | Input | | Output | |
|----------------|---------------------|---------------------|---------------------|---------------------|
| V_{DD} | V_M | V_M | V_X | V_Y |
| 5V to 15V | $0.5 \times V_{DD}$ | $0.5 \times V_{DD}$ | $0.1 \times V_{DD}$ | $0.9 \times V_{DD}$ |



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5、Package Information

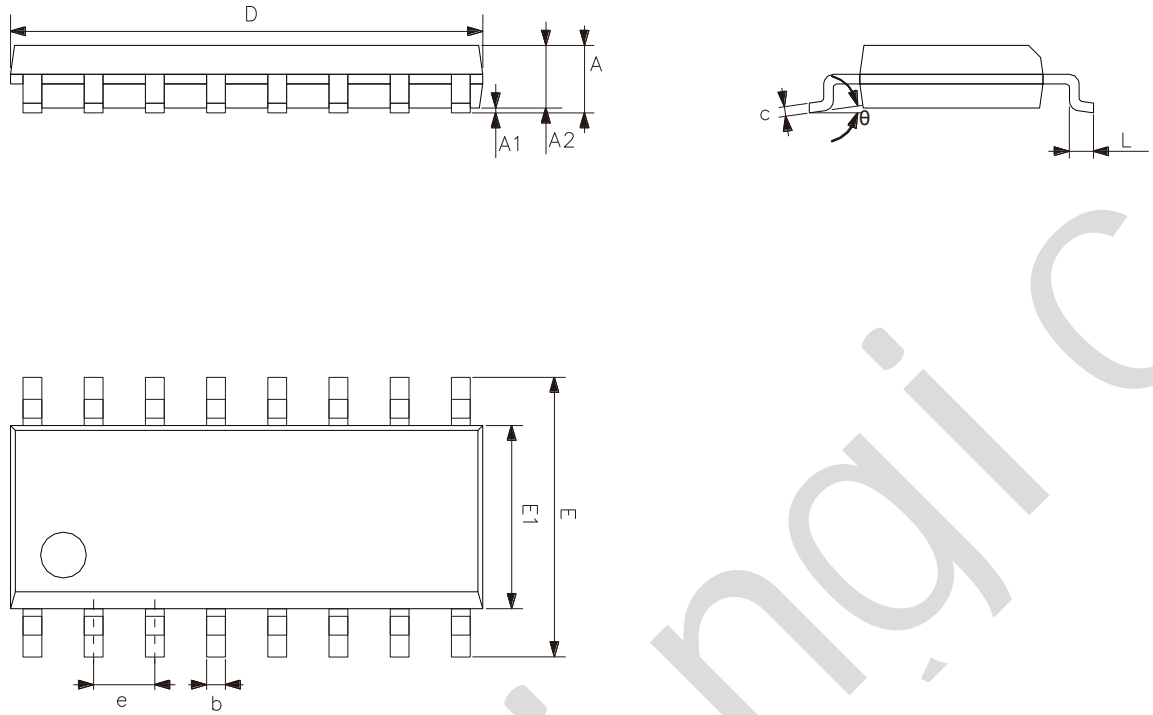
5.1、DIP16



| Symbol | Dimensions (mm) | |
|--------|-----------------|-------|
| | Min. | Max. |
| A2 | 3.20 | 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 |



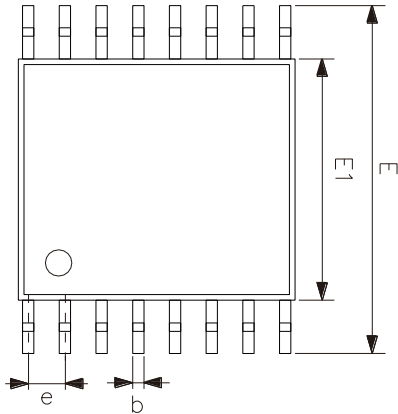
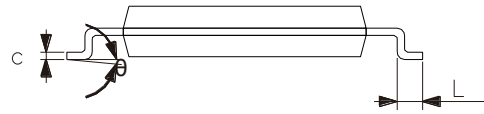
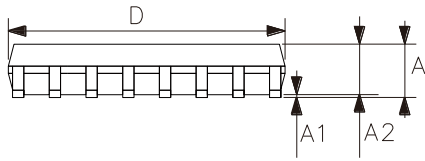
5.2、SOP16



| Symbol | Dimensions (mm) | |
|----------|-----------------|-------|
| | 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 |
| θ | 0° | 8° |



5.3、TSSOP16



| 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 |
| 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. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements. | | | | | | | | | |

6.2、 Notes

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