



SN74HC166/HCT166 (LX) 8-bit parallel-in/serial out shift register

Product Specification

Specification Revision History:

| Version | Date | Description |
|------------|---------|------------------------|
| 2023-10-A0 | 2023-10 | New |
| 2023-11-A1 | 2023-11 | Parameter modification |
| 2024-04-A2 | 2024-04 | Modify the content |
| | | |



Contents

| | |
|---|-----------|
| 1、 General Description..... | 1 |
| 2、 Block Diagram And Pin Description | 2 |
| 2.1、 Block Diagram | 2 |
| 2.2、 Pin Configurations..... | 2 |
| 2.3、 Pin Description..... | 3 |
| 2.4、 Function Table..... | 3 |
| 3、 Electrical Parameter | 4 |
| 3.1、 Absolute Maximum Ratings..... | 4 |
| 3.2、 Recommended Operating Conditions..... | 4 |
| 3.3、 Electrical Characteristics | 5 |
| 3.3.1、 DC Characteristics 1 | 5 |
| 3.3.2、 DC Characteristics 2..... | 6 |
| 3.3.3、 AC Characteristics 1 | 7 |
| 3.3.4、 AC Characteristics 2..... | 9 |
| 4、 Testing Circuit | 10 |
| 4.1、 AC Testing Circuit | 10 |
| 4.2、 Test Data | 11 |
| 4.3、 AC Testing Waveforms..... | 11 |
| 4.4、 Measurement Points | 12 |
| 5、 Package Information | 13 |
| 5.1、 DIP16 | 13 |
| 5.2、 SOP16..... | 14 |
| 5.3、 TSSOP16..... | 15 |
| 6、 Statements And Notes | 16 |



1、General Description

The SN74HC/HCT166 is an 8-bit serial or parallel-in/serial-out shift register.

Features:

- Supply voltage range:
SN74HC166: 2~6V
SN74HCT166: 4.5~5.5V
- Input levels:
SN74HC166: CMOS level
SN74HCT166: TTL level
- 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 |
|-----------------|----------------|--------------|----------------|---------------------|-----------------|--|
| SN74HC166N(LX) | DIP16 | SN74HC166N | 25 PCS/tube | 40 tube/box | 1000 PCS/box | Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm |
| SN74HCT166N(LX) | DIP16 | SN74HCT166N | 25 PCS/tube | 40 tube/box | 1000 PCS/box | Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm |

Reel packing specifications:

| Part number | Packaging form | Markingcode | Reel quantity | Boxed reel quantity | Notes |
|------------------|----------------|-------------|------------------|---------------------|---|
| SN74HC166DR(LX) | SOP16 | HC166 | 2500 PCS/reel | 5000 PCS/box | Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm |
| SN74HCT166DR(LX) | SOP16 | HCT166 | 2500 PCS/reel | 5000 PCS/box | Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm |
| SN74HC166PW(LX) | TSSOP16 | HC166 | 5000 PCS/reel | 10000 PCS/box | Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm |
| SN74HCT166PW(LX) | TSSOP16 | HCT166 | 5000 PCS/reel | 10000 PCS/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

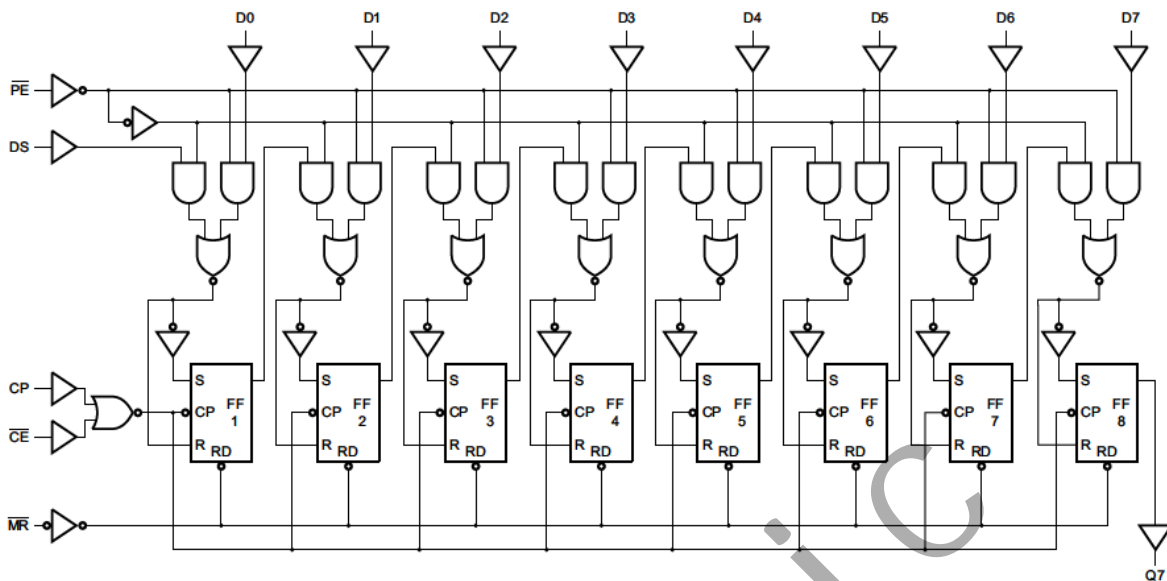
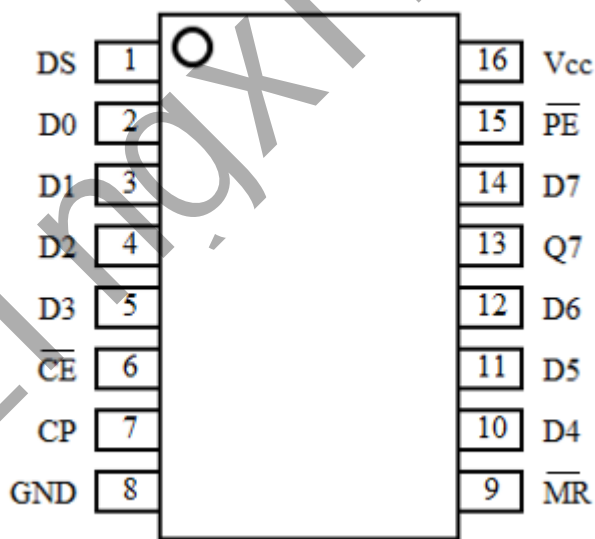


Figure 1. Logic symbol

2.2、Pin Configurations





2.3、Pin Description

| Pin No. | Pin Name | Description |
|---------|-----------------|--|
| 1 | DS | serial data input |
| 2 | D0 | parallel data input |
| 3 | D1 | parallel data input |
| 4 | D2 | parallel data input |
| 5 | D3 | parallel data input |
| 6 | \overline{CE} | clock enable input (active LOW) |
| 7 | CP | clock input (LOW-to-HIGH edge-triggered) |
| 8 | GND | ground (0V) |
| 9 | \overline{MR} | asynchronous master reset (active LOW) |
| 10 | D4 | parallel data input |
| 11 | D5 | parallel data input |
| 12 | D6 | parallel data input |
| 13 | Q7 | serial output from the last stage |
| 14 | D7 | parallel data input |
| 15 | \overline{PE} | parallel enable input (active LOW) |
| 16 | V _{CC} | supply voltage |

2.4、Function Table

| Operating modes | Inputs | | | | | Qn registers | | Output |
|-------------------|-----------------|-----------------|----|----|----------|--------------|----------|--------|
| | \overline{PE} | \overline{CE} | CP | DS | D0 to D7 | Q0 | Q1 to Q6 | Q7 |
| parallel load | l | l | ↑ | X | l | L | L to L | L |
| | l | l | ↑ | X | h | H | H to H | H |
| serial shift | h | l | ↑ | l | X | L | q0 to q5 | q6 |
| | h | l | ↑ | h | X | H | q0 to q5 | q6 |
| hold "do nothing" | X | H | X | X | X | q0 | q1 to q6 | q7 |

Note:

H = HIGH voltage level;

h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition;

L = LOW voltage level;

l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition;

q = state of the referenced output one set-up time prior to the LOW-to-HIGH clock transition;

X = don't care;

↑ = LOW-to-HIGH clock transition.



3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | Min. | Max. | Unit |
|-------------------------|-----------|--------------------------------------|-----------|----------|-------------|
| supply voltage | V_{CC} | - | -0.5 | +7 | V |
| supply current | I_{CC} | - | - | 50 | mA |
| ground current | I_{GND} | - | -50 | - | mA |
| input clamping current | I_{IK} | $V_I < -0.5V$ or $V_I > V_{CC}+0.5V$ | - | ± 20 | mA |
| output clamping current | I_{OK} | $V_O < -0.5V$ or $V_O > V_{CC}+0.5V$ | - | ± 20 | mA |
| output current | I_O | $-0.5V < V_O < V_{CC}+0.5V$ | - | ± 25 | mA |
| storage temperature | T_{stg} | - | -65 | +150 | $^{\circ}C$ |
| soldering temperature | T_L | 10s | DIP | 245 | $^{\circ}C$ |
| | | | SOP/TSSOP | 260 | |

3.2、Recommended Operating Conditions

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------|------------|------|------|----------|-------------|
| SN74HC166 | | | | | | |
| supply voltage | V_{CC} | - | 2.0 | 5.0 | 6.0 | V |
| input voltage | V_I | - | 0 | - | V_{CC} | V |
| output voltage | V_O | - | 0 | - | V_{CC} | V |
| ambient temperature | T_{amb} | - | -40 | - | +125 | $^{\circ}C$ |
| SN74HCT166 | | | | | | |
| supply voltage | V_{CC} | - | 4.5 | 5.0 | 5.5 | V |
| input voltage | V_I | - | 0 | - | V_{CC} | V |
| output voltage | V_O | - | 0 | - | V_{CC} | V |
| ambient temperature | T_{amb} | - | -40 | - | +125 | $^{\circ}C$ |



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 GND (ground=0V), unless otherwise specified.)

| Parameter | Symbol | V _{CC} | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|------------------|-----------------|---|------|------|------|------|
| SN74HC166 | | | | | | | |
| HIGH-level input voltage | V _{IH} | 2.0V | - | 1.5 | 1.2 | - | V |
| | | 4.5V | - | 3.15 | 2.4 | - | V |
| | | 6.0V | - | 4.2 | 3.2 | - | V |
| LOW-level input voltage | V _{IL} | 2.0V | - | - | 0.8 | 0.5 | V |
| | | 4.5V | - | - | 2.1 | 1.35 | V |
| | | 6.0V | - | - | 2.8 | 1.8 | V |
| HIGH-level output voltage | V _{OH} | 2.0V | I _O = -20uA | 1.9 | 2.0 | - | V |
| | | 4.5V | I _O = -20uA | 4.4 | 4.5 | - | V |
| | | 6.0V | I _O = -20uA | 5.9 | 6.0 | - | V |
| | | 4.5V | I _O = -4.0mA | 3.84 | 4.32 | - | V |
| | | 6.0V | I _O = -5.2mA | 5.34 | 5.81 | - | V |
| LOW-level output voltage | V _{OL} | 2.0V | I _O = 20uA | - | 0 | 0.1 | V |
| | | 4.5V | I _O = 20uA | - | 0 | 0.1 | V |
| | | 6.0V | I _O = 20uA | - | 0 | 0.1 | V |
| | | 4.5V | I _O = 4.0mA | - | 0.15 | 0.33 | V |
| | | 6.0V | I _O = 5.2mA | - | 0.16 | 0.33 | V |
| input leakage current | I _I | 6.0V | V _I = V _{CC} or GND | - | - | ±1 | uA |
| supply current | I _{CC} | 6.0V | V _I = V _{CC} or GND; I _O = 0A | - | - | 80 | uA |
| SN74HCT166 | | | | | | | |
| HIGH-level input voltage | V _{IH} | 4.5~5.5V | - | 2.0 | 1.6 | - | V |
| LOW-level input voltage | V _{IL} | 4.5~5.5V | - | - | 1.2 | 0.8 | V |
| HIGH-level output voltage | V _{OH} | 4.5V | I _O = -20uA | 4.4 | 4.5 | - | V |
| | | | I _O = -4.0mA | 3.84 | 4.32 | - | V |
| LOW-level output voltage | V _{OL} | 4.5V | I _O = 20uA | - | 0 | 0.1 | V |
| | | | I _O = 5.2mA | - | 0.16 | 0.33 | V |
| input leakage current | I _I | 5.5V | V _I = V _{CC} or GND | - | - | ±1 | uA |
| supply current | I _{CC} | 4.5V | V _I = V _{CC} or GND; I _O = 0A | - | - | 80 | uA |
| additional supply current | ΔI _{CC} | 4.5~5.5V | One input at V _I = V _{CC} - 2.1V; Other inputs at V _{CC} or GND; I _O = 0A | - | - | 135 | uA |



3.3.2、DC Characteristics 2

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

| Parameter | Symbol | V _{CC} | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|------------------|-----------------|--|------|------|------|------|
| SN74HC166 | | | | | | | |
| HIGH-level input voltage | V _{IH} | 2.0V | - | 1.5 | - | - | V |
| | | 4.5V | - | 3.15 | - | - | V |
| | | 6.0V | - | 4.2 | - | - | V |
| LOW-level input voltage | V _{IL} | 2.0V | - | - | - | 0.5 | V |
| | | 4.5V | - | - | - | 1.35 | V |
| | | 6.0V | - | - | - | 1.8 | V |
| HIGH-level output voltage | V _{OH} | 2.0V | I _O =-20uA | 1.9 | - | - | V |
| | | 4.5V | I _O =-20uA | 4.4 | - | - | V |
| | | 6.0V | I _O =-20uA | 5.9 | - | - | V |
| | | 4.5V | I _O =-4.0mA | 3.7 | - | - | V |
| | | 6.0V | I _O =-5.2mA | 5.2 | - | - | V |
| LOW-level output voltage | V _{OL} | 2.0V | I _O =20uA | - | - | 0.1 | V |
| | | 4.5V | I _O =20uA | - | - | 0.1 | V |
| | | 6.0V | I _O =20uA | - | - | 0.1 | V |
| | | 4.5V | I _O =4.0mA | - | - | 0.4 | V |
| | | 6.0V | I _O =5.2mA | - | - | 0.4 | V |
| input leakage current | I _I | 6.0V | V _I =V _{CC} or GND | - | - | ±1 | uA |
| supply current | I _{CC} | 6.0V | V _I =V _{CC} or GND; I _O =0A | - | - | 160 | uA |
| SN74HCT166 | | | | | | | |
| HIGH-level input voltage | V _{IH} | 4.5~5.5V | - | 2.0 | - | - | V |
| LOW-level input voltage | V _{IL} | 4.5~5.5V | - | - | - | 0.8 | V |
| HIGH-level output voltage | V _{OH} | 4.5V | I _O =-20uA | 4.4 | - | - | V |
| | | | I _O =-4.0mA | 3.7 | - | - | V |
| LOW-level output voltage | V _{OL} | 4.5V | I _O =20uA | - | - | 0.1 | V |
| | | | I _O =5.2mA | - | - | 0.4 | V |
| input leakage current | I _I | 5.5V | V _I =V _{CC} or GND | - | - | ±1 | uA |
| supply current | I _{CC} | 4.5V | V _I =V _{CC} or GND; I _O =0A | - | - | 160 | uA |
| additional supply current | ΔI _{CC} | 4.5~5.5V | One input at V _I =V _{CC} -2.1V; Other inputs at V _{CC} or GND; I _O =0A | - | - | 147 | uA |



3.3.3、AC Characteristics 1

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

| Parameter | Symbol | V _{CC} | Conditions | Min. | Typ. | Max. | Unit | |
|--|--------------------|-----------------|-------------------|--------------|------|------|------|-----|
| SN74HC166 | | | | | | | | |
| CP to Q7 propagation delay | t_{PLH}, t_{PHL} | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | - | 50 | 190 | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | - | 18 | 38 | ns |
| | | 5.0V | $C_L=15\text{pF}$ | | - | 15 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | - | 14 | 33 | ns |
| $\overline{\text{MR}}$ to Q7 propagation delay | t_{PLH}, t_{PHL} | 2.0V | $C_L=50\text{pF}$ | see Figure 5 | - | 47 | 200 | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | - | 17 | 40 | ns |
| | | 5.0V | $C_L=15\text{pF}$ | | - | 14 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | - | 14 | 34 | ns |
| transition time | t_{THL}, t_{TLH} | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | - | 19 | 95 | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | - | 7 | 19 | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | - | 6 | 16 | ns |
| CP input HIGH or LOW pulse width | t_w | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | 100 | 17 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 20 | 6 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 17 | 5 | - | ns |
| $\overline{\text{MR}}$ input LOW pulse width | t_w | 2.0V | $C_L=50\text{pF}$ | see Figure 5 | 125 | 25 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 25 | 9 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 21 | 7 | - | ns |
| $\overline{\text{MR}}$ to CP recovery time | t_{rec} | 2.0V | $C_L=50\text{pF}$ | see Figure 5 | 0 | -19 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 0 | -7 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 0 | -6 | - | ns |
| Dn, $\overline{\text{CE}}$ to CP set_up time | t_{su} | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 100 | 14 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 20 | 5 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 17 | 4 | - | ns |
| $\overline{\text{PE}}$ to CP set_up time | t_{su} | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 125 | 33 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 25 | 12 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 21 | 10 | - | ns |
| Dn, $\overline{\text{CE}}$ to CP hold time | t_h | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 2 | -8 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 2 | -3 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 2 | -2 | - | ns |
| $\overline{\text{PE}}$ to CP hold time | t_h | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 0 | -28 | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 0 | -10 | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 0 | -8 | - | ns |
| maximum frequency | f_{max} | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | 4.8 | 19 | - | MHZ |
| | | 4.5V | $C_L=50\text{pF}$ | | 24 | 57 | - | MHZ |
| | | 5.0V | $C_L=15\text{pF}$ | | - | 63 | - | MHZ |
| | | 6.0V | $C_L=50\text{pF}$ | | 28 | 68 | - | MHZ |



| SN74HCT166 | | | | | | | | |
|----------------------------------|--------------------|------|-------------------|--------------|----|-----|----|-----|
| CP to Q7 propagation delay | | 4.5V | $C_L=50\text{pF}$ | see Figure 4 | - | 23 | 50 | ns |
| | | 5.0V | $C_L=15\text{pF}$ | | - | 20 | - | ns |
| MR to Q7 propagation delay | t_{PLH}, t_{PHL} | 4.5V | $C_L=50\text{pF}$ | see Figure 5 | - | 22 | 50 | ns |
| | | 5.0V | $C_L=15\text{pF}$ | | - | 19 | - | ns |
| transition time | t_{THL}, t_{TLH} | 4.5V | $C_L=50\text{pF}$ | see Figure 4 | - | 7 | 19 | ns |
| CP input HIGH or LOW pulse width | tw | 4.5V | $C_L=50\text{pF}$ | see Figure 4 | 25 | 9 | - | ns |
| MR input LOW pulse width | | 4.5V | $C_L=50\text{pF}$ | see Figure 5 | 31 | 11 | - | ns |
| MR to CP recovery time | trec | 4.5V | $C_L=50\text{pF}$ | see Figure 5 | 0 | -7 | - | ns |
| Dn, CE to CP set_up time | tsu | 4.5V | $C_L=50\text{pF}$ | see Figure 6 | 20 | 8 | - | ns |
| PE to CP set_up time | | 4.5V | $C_L=50\text{pF}$ | | 38 | 15 | - | ns |
| Dn, CE to CP hold time | th | 4.5V | $C_L=50\text{pF}$ | see Figure 6 | 0 | -3 | - | ns |
| PE to CP hold time | | 4.5V | $C_L=50\text{pF}$ | | 0 | -13 | - | ns |
| maximum frequency | fmax | 4.5V | $C_L=50\text{pF}$ | see Figure 4 | 20 | 45 | - | MHZ |
| | | 5.0V | $C_L=15\text{pF}$ | | - | 50 | - | MHZ |



3.3.4、AC Characteristics 2

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

| Parameter | Symbol | V _{CC} | Conditions | Min. | Typ. | Max. | Unit | |
|----------------------------------|--------------------|-----------------|-------------------|--------------|------|------|------|-----|
| SN74HC166 | | | | | | | | |
| CP to Q7 propagation delay | t_{PLH}, t_{PHL} | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | - | - | 225 | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | - | - | 45 | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | - | - | 38 | ns |
| MR to Q7 propagation delay | t_{PLH}, t_{PHL} | 2.0V | $C_L=50\text{pF}$ | see Figure 5 | - | - | 240 | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | - | - | 48 | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | - | - | 41 | ns |
| transition time | t_{THL}, t_{TLH} | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | - | - | 110 | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | - | - | 22 | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | - | - | 19 | ns |
| CP input HIGH or LOW pulse width | tw | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | 120 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 24 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 20 | - | - | ns |
| MR input LOW pulse width | tw | 2.0V | $C_L=50\text{pF}$ | see Figure 5 | 150 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 30 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 26 | - | - | ns |
| MR to CP recovery time | trec | 2.0V | $C_L=50\text{pF}$ | see Figure 5 | 0 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 0 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 0 | - | - | ns |
| Dn, CE to CP set_up time | tsu | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 120 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 24 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 20 | - | - | ns |
| PE to CP set_up time | tsu | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 150 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 30 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 26 | - | - | ns |
| Dn, CE to CP hold time | th | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 2 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 2 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 2 | - | - | ns |
| PE to CP hold time | th | 2.0V | $C_L=50\text{pF}$ | see Figure 6 | 0 | - | - | ns |
| | | 4.5V | $C_L=50\text{pF}$ | | 0 | - | - | ns |
| | | 6.0V | $C_L=50\text{pF}$ | | 0 | - | - | ns |
| maximum frequency | fmax | 2.0V | $C_L=50\text{pF}$ | see Figure 4 | 4 | - | - | MHZ |
| | | 4.5V | $C_L=50\text{pF}$ | | 20 | - | - | MHZ |
| | | 6.0V | $C_L=50\text{pF}$ | | 24 | - | - | MHZ |



| SN74HCT166 | | | | | | | | |
|----------------------------------|--------------------|------|------------|--------------|----|---|----|-----|
| CP to Q7 propagation delay | t_{PLH}, t_{PHL} | 4.5V | $C_L=50pF$ | see Figure 4 | - | - | 60 | ns |
| MR to Q7 propagation delay | | 4.5V | $C_L=50pF$ | see Figure 5 | - | - | 60 | ns |
| transition time | t_{THL}, t_{TLH} | 4.5V | $C_L=50pF$ | see Figure 4 | - | - | 22 | ns |
| CP input HIGH or LOW pulse width | tw | 4.5V | $C_L=50pF$ | see Figure 4 | 30 | - | - | ns |
| MR input LOW pulse width | | 4.5V | $C_L=50pF$ | see Figure 5 | 38 | - | - | ns |
| MR to CP recovery time | trec | 4.5V | $C_L=50pF$ | see Figure 5 | 0 | - | - | ns |
| Dn, CE to CP set_up time | tsu | 4.5V | $C_L=50pF$ | see Figure 6 | 24 | - | - | ns |
| PE to CP set_up time | | 4.5V | $C_L=50pF$ | | 45 | - | - | ns |
| Dn, CE to CP hold time | th | 4.5V | $C_L=50pF$ | see Figure 6 | 0 | - | - | ns |
| PE to CP hold time | | 4.5V | $C_L=50pF$ | | 0 | - | - | ns |
| maximum frequency | fmax | 4.5V | $C_L=50pF$ | see Figure 4 | 17 | - | - | MHZ |

4、Testing Circuit

4.1、AC Testing Circuit

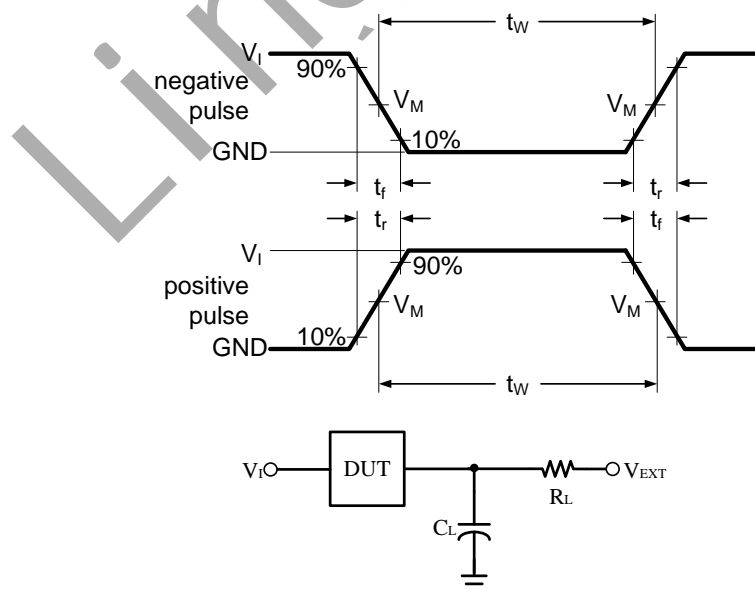


Figure 3. Test circuit for measuring switching times

C_L includes probe and jig capacitance.



4.2、Test Data

| Type | Input | | Load | | V _{EXT} | | |
|------------|-----------------|---------------------------------|----------------|----------------|------------------------------------|------------------------------------|------------------------------------|
| | V _I | t _r = t _f | C _L | R _L | t _{PLH} /t _{PHL} | t _{PLZ} /t _{PZL} | t _{PHZ} /t _{PZH} |
| SN74HC166 | V _{CC} | 3.0ns | 15pF, 50pF | 1KΩ | Open | V _{CC} | GND |
| SN74HCT166 | 3.0V | 3.0ns | 15pF, 50pF | 1KΩ | Open | V _{CC} | GND |

4.3、AC Testing Waveforms

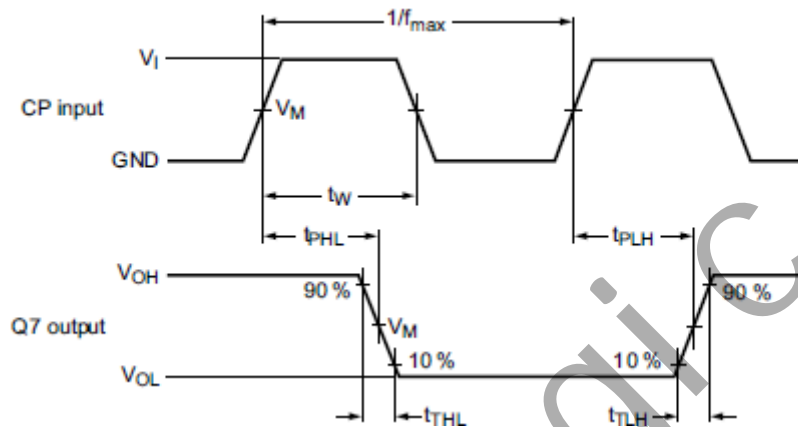


Figure 4. Clock (CP) to output (Q7) propagation delays, pulse width, output transition times and maximum Frequency

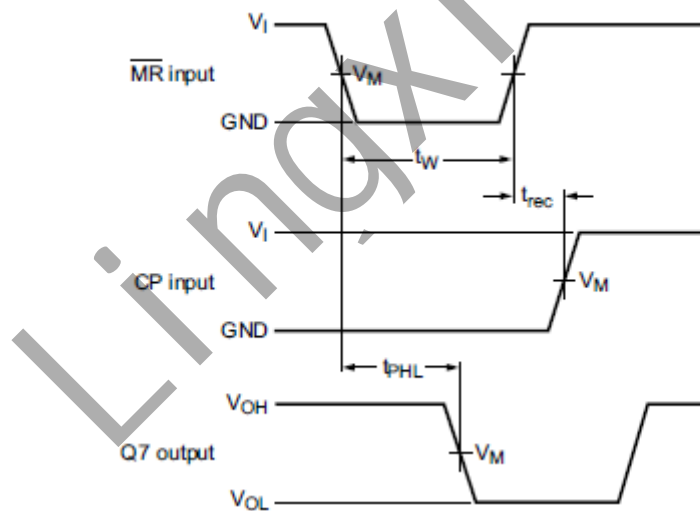


Figure 5. Master reset (\bar{MR}) pulse width, \bar{MR} to output (Q7) propagation delay and \bar{MR} to clock (CP) recovery time

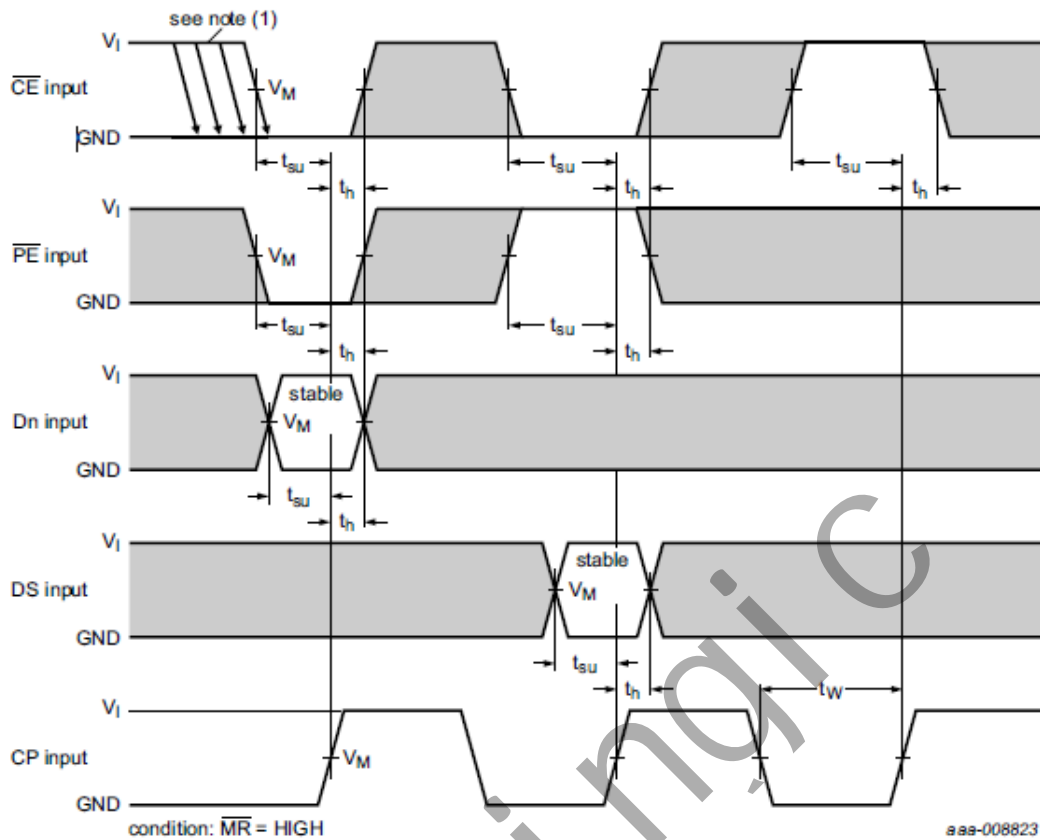


Figure 6. Set-up and hold times

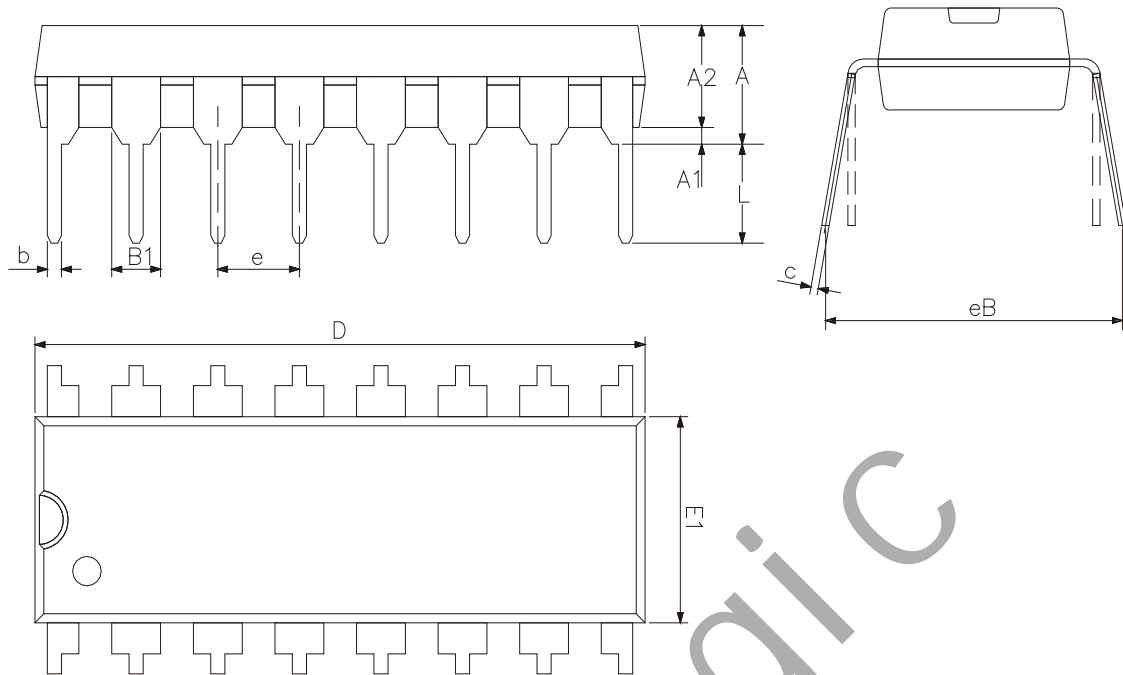
4.4. Measurement Points

| Type | Input | Output |
|------------|---------------------|---------------------|
| | V_M | V_M |
| SN74HC166 | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ |
| SN74HCT166 | 1.3V | 1.3V |



5、Package Information

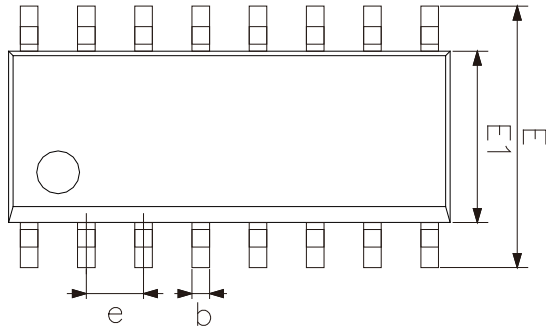
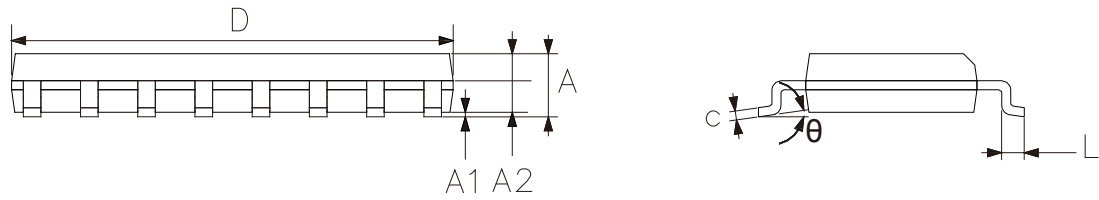
5.1、DIP16



| 2023/12/A | Dimensions In Millimeters | |
|-----------|---------------------------|-------|
| Symbol | Min | Max |
| A2 | 3.20 | 3.60 |
| A1 | 0.51 | — |
| A | 3.60 | 5.33 |
| L | 3.00 | — |
| 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 |



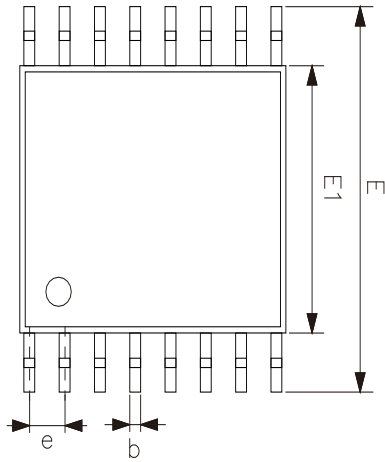
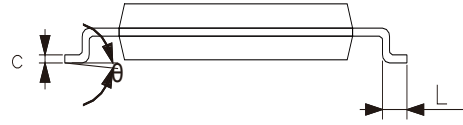
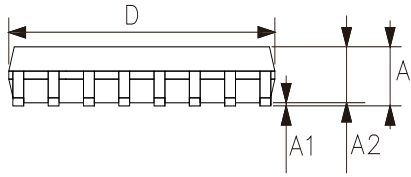
5.2、SOP16



| 2023/12/A Symbol | Dimensions In Millimeters | |
|---------------------|---------------------------|-------|
| | 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



| 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° |



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6、Statements And Notes

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