



# CD4017 (LX)

## 5-stage Johnson Decade Counter

### Product Specification

#### Specification Revision History:

| Version    | Date    | Description |
|------------|---------|-------------|
| 2021-12-A1 | 2021-12 | New         |
|            |         |             |
|            |         |             |



## 1、General Description

The CD4017 is a 5-stage Johnson decade counter with ten spike-free decoded active HIGH outputs (Q0 to Q9), an active LOW carry output from the most significant flip-flop ( $\overline{Q5-9}$ ), active HIGH and active LOW clock inputs (CP0,  $\overline{CP1}$ ) and an overriding asynchronous master reset input (MR).

The counter is advanced by either a LOW-to-HIGH transition at CP0 while  $\overline{CP1}$  is LOW or a HIGH-to-LOW transition at  $\overline{CP1}$  while CP0 is HIGH.

When cascading counters, the  $\overline{Q5-9}$  output, which is LOW while the counter is in states 5, 6, 7, 8, and 9, can be used to drive the CP0 input of the next counter. A HIGH on MR resets the counter to zero (Q0= $\overline{Q5-9}$ =HIGH; Q1 to Q9=LOW) independent of the clock inputs (CP0,  $\overline{CP1}$ ).

Automatic counter code correction is provided by an internal circuit: following any illegal code the counter returns to a proper counting mode within 11 clock pulses.

It operates over a recommended  $V_{DD}$  power supply range of 3V to 15V referenced to  $V_{SS}$  (usually ground). Unused inputs must be connected to  $V_{DD}$ ,  $V_{SS}$ , or another input.

### Features:

- Wide supply voltage range from 3V to 15V
- Automatic counter correction
- Tolerant of slow clock rise and fall times
- 5V, 10V, and 15V parametric ratings
- Standardized symmetrical output characteristics
- Specified from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Packaging information: DIP16/SOP16/TSSOP16

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

| Type number  | Packaging form | Marking code | Tube quantity  | Boxed tube quantity | Boxed quantity  | Packing box number | Packing quantity  | Notes  |
|--------------|----------------|--------------|----------------|---------------------|-----------------|--------------------|-------------------|--|
| CD4017BE(LX) | DIP16          | CD4017BE     | 25<br>PCS/tube | 40<br>tube/box      | 1000<br>PCS/box | 10<br>box/pack     | 10000<br>PCS/pack | Dimensions of plastic enclosure:<br>19.0mm×6.4mm<br>Pin spacing:<br>2.54mm |

**Reel packing specifications:**

| Type number   | Packaging form | Marking code | Reel quantity    | Boxed reel quantity | Packing quantity  | Notes  |
|---------------|----------------|--------------|------------------|---------------------|-------------------|--|
| CD4017BM(LX)  | SOP16          | CD4017BM     | 4000<br>PCS/reel | 8000<br>PCS/box     | 64000<br>PCS/pack | Dimensions of plastic enclosure:<br>10.0mm×3.9mm<br>Pin spacing:1.27mm |
| CD4017BPW(LX) | TSSOP16        | CD4017       | 5000<br>PCS/reel | 10000<br>PCS/box    | 80000<br>PCS/pack | Dimensions of plastic enclosure:<br>5.0mm×4.4mm<br>Pin spacing:0.65mm  |

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



## 2、Block Diagram And Pin Description

### 2.1、Block Diagram

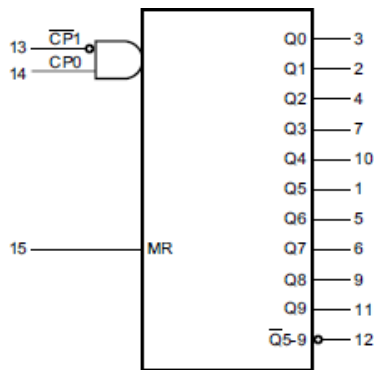


Figure 1. Logic symbol

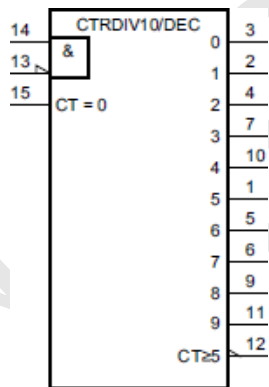


Figure 2. IEE logic symbol

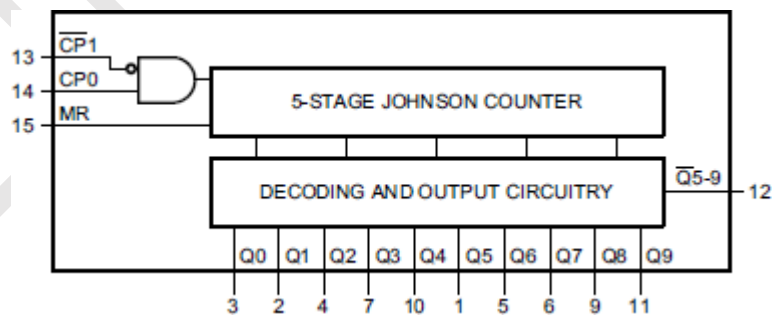


Figure 3. Functional diagram

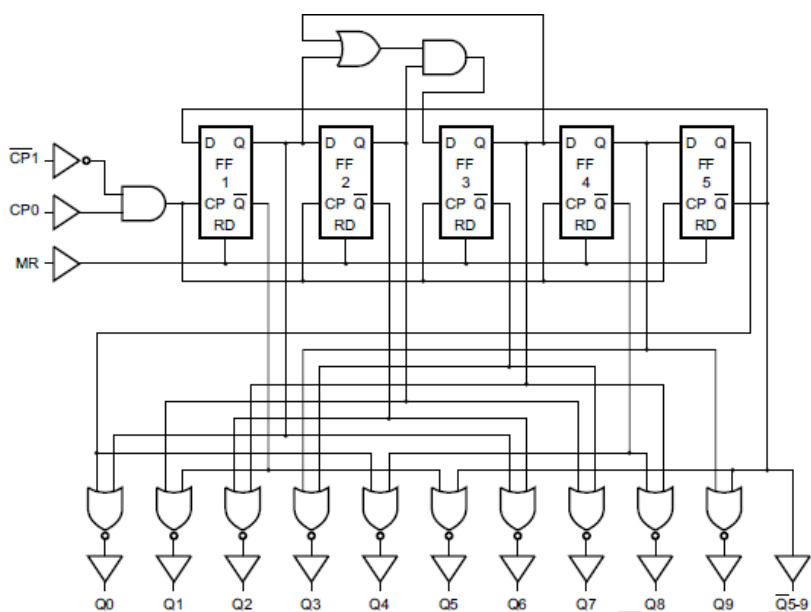


Figure 4. Logic diagram

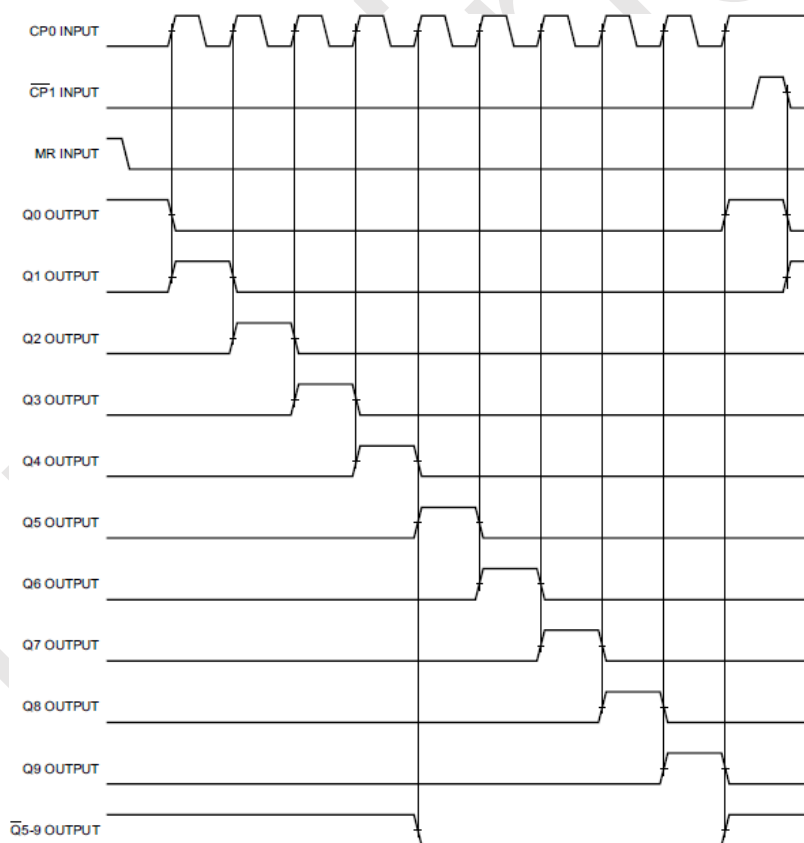
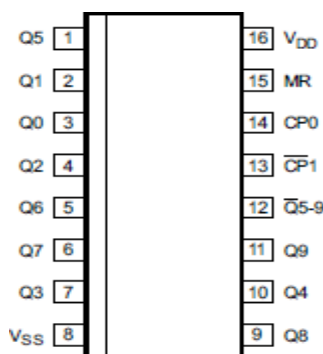


Figure 5. Timing diagram



## 2.2、Pin Configurations



## 2.3、Pin Description

| Pin No. | Pin Name        | Description                              |
|---------|-----------------|--|
| 1       | Q5              | decoded output                           |
| 2       | Q1              | decoded output                           |
| 3       | Q0              | decoded output                           |
| 4       | Q2              | decoded output                           |
| 5       | Q6              | decoded output                           |
| 6       | Q7              | decoded output                           |
| 7       | Q3              | decoded output                           |
| 8       | V <sub>SS</sub> | ground (0V)                              |
| 9       | Q8              | decoded output                           |
| 10      | Q4              | decoded output                           |
| 11      | Q9              | decoded output                           |
| 12      | Q5-9            | carry output (active LOW)                |
| 13      | CP1             | clock input (HIGH-to-LOW edge-triggered) |
| 14      | CP0             | clock input (LOW-to-HIGH edge-triggered) |
| 15      | MR              | master reset input                       |
| 16      | V <sub>DD</sub> | supply voltage                           |

## 2.4、Function Table

| Input |     |     | Operation             |
|-------|-----|-----|-----------------------|
| MR    | CP0 | CP1 |                       |
| H     | X   | X   | Q0=Q5-9=H; Q1 to Q9=L |
| L     | H   | ↓   | counter advances      |
| L     | ↑   | L   | counter advances      |
| L     | L   | X   | no change             |
| L     | X   | H   | no change             |
| L     | H   | ↑   | no change             |
| L     | ↓   | L   | no change             |

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

↑=positive-going transition; ↓=negative-going transition.



### 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           |
| DC input current        | $I_{IK}$  | any one input         | -    | $\pm 10$     | mA          |
| input voltage           | $V_I$     | all inputs            | -0.5 | $V_{DD}+0.5$ | V           |
| storage temperature     | $T_{stg}$ | -                     | -65  | +150         | $^{\circ}C$ |
| total power dissipation | $P_{tot}$ | -                     | -    | 500          | mW          |
| device dissipation      | P         | per output transistor | -    | 100          | mW          |
| Soldering temperature   | $T_L$     | 10s                   | DIP  | 245          | $^{\circ}C$ |
|                         |           |                       | SOP  | 250          |             |

Note:

[1] For DIP16 packages: above  $70^{\circ}C$  the value of  $P_{tot}$  derates linearly with 12mW/K.

[2] For SOP16 packages: above  $70^{\circ}C$  the value of  $P_{tot}$  derates linearly with 8mW/K.

[3] For (T)SSOP16 packages: above  $60^{\circ}C$  the value of  $P_{tot}$  derates linearly with 5.5mW/K.

#### 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       | -    | +85  | $^{\circ}C$ |
| clock input frequency    | $f_{CL}$           | $V_{DD}=5V$  | -         | -    | 2.5  | MHz         |
|                          |                    | $V_{DD}=10V$ | -         | -    | 5    | MHz         |
|                          |                    | $V_{DD}=15V$ | -         | -    | 5.5  | MHz         |
| clock pulse width        | $t_w$              | $V_{DD}=5V$  | 200       | -    | -    | ns          |
|                          |                    | $V_{DD}=10V$ | 90        | -    | -    | ns          |
|                          |                    | $V_{DD}=15V$ | 60        | -    | -    | ns          |
| clock rise and fall time | $t_{rCL}, t_{fCL}$ | $V_{DD}=5V$  | unlimited |      |      | -           |
|                          |                    | $V_{DD}=10V$ | unlimited |      |      | -           |
|                          |                    | $V_{DD}=15V$ | unlimited |      |      | -           |
| clock inhibit setup time | $t_s$              | $V_{DD}=5V$  | 230       | -    | -    | ns          |
|                          |                    | $V_{DD}=10V$ | 100       | -    | -    | ns          |
|                          |                    | $V_{DD}=15V$ | 70        | -    | -    | ns          |
| reset pulse width        | $t_{RW}$           | $V_{DD}=5V$  | 260       | -    | -    | ns          |
|                          |                    | $V_{DD}=10V$ | 110       | -    | -    | ns          |
|                          |                    | $V_{DD}=15V$ | 60        | -    | -    | ns          |
| reset removal time       | $t_{rec}$          | $V_{DD}=5V$  | 400       | -    | -    | ns          |
|                          |                    | $V_{DD}=10V$ | 280       | -    | -    | ns          |
|                          |                    | $V_{DD}=15V$ | 150       | -    | -    | ns          |



### 3.3、Electrical Characteristics

#### 3.3.1、DC Characteristics 1

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

| Parameter                 | Symbol   | Conditions (V) |          |          | $T_{amb}=25^{\circ}\text{C}$ |               |           | Unit |
|---------------------------|----------|----------------|----------|----------|------------------------------|---------------|-----------|------|
|                           |          | $V_O$          | $V_{IN}$ | $V_{DD}$ | Min.                         | Typ.          | Max.      |      |
| supply current            | $I_{DD}$ | -              | 0, 5     | 5        | -                            | 0.04          | 5         | uA   |
|                           |          | -              | 0, 10    | 10       | -                            | 0.04          | 10        | uA   |
|                           |          | -              | 0, 15    | 15       | -                            | 0.04          | 20        | uA   |
| LOW-level output current  | $I_{OL}$ | 0.4            | 0, 5     | 5        | 0.51                         | 1             | -         | mA   |
|                           |          | 0.5            | 0, 10    | 10       | 1.3                          | 2.6           | -         | mA   |
|                           |          | 1.5            | 0, 15    | 15       | 3.4                          | 6.8           | -         | mA   |
| HIGH-level output current | $I_{OH}$ | 4.6            | 0, 5     | 5        | -0.51                        | -1            | -         | mA   |
|                           |          | 2.5            | 0, 5     | 5        | -1.6                         | -3.2          | -         | mA   |
|                           |          | 9.5            | 0, 10    | 10       | -1.3                         | -2.6          | -         | mA   |
|                           |          | 13.5           | 0, 15    | 15       | -3.4                         | -6.8          | -         | mA   |
| LOW-level output voltage  | $V_{OL}$ | -              | 0, 5     | 5        | -                            | 0             | 0.05      | V    |
|                           |          | -              | 0, 10    | 10       | -                            | 0             | 0.05      | V    |
|                           |          | -              | 0, 15    | 15       | -                            | 0             | 0.05      | V    |
| HIGH-level output voltage | $V_{OH}$ | -              | 0, 5     | 5        | 4.95                         | 5             | -         | V    |
|                           |          | -              | 0, 10    | 10       | 9.95                         | 10            | -         | V    |
|                           |          | -              | 0, 15    | 15       | 14.95                        | 15            | -         | V    |
| LOW-level input voltage   | $V_{IL}$ | 0.5, 4.5       | -        | 5        | -                            | -             | 1.5       | V    |
|                           |          | 1, 9           | -        | 10       | -                            | -             | 3         | V    |
|                           |          | 1.5, 13.5      | -        | 15       | -                            | -             | 4         | V    |
| HIGH-level input voltage  | $V_{IH}$ | 0.5, 4.5       | -        | 5        | 3.5                          | -             | -         | V    |
|                           |          | 1, 9           | -        | 10       | 7                            | -             | -         | V    |
|                           |          | 1.5, 13.5      | -        | 15       | 11                           | -             | -         | V    |
| input leakage current     | $I_I$    | -              | 0, 15    | 15       | -                            | $\pm 10^{-5}$ | $\pm 0.1$ | uA   |

#### 3.3.2、DC Characteristics 2

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

| Parameter                 | Symbol   | Conditions (V) |          |          | $T_{amb}=-40^{\circ}\text{C}$ |      | $T_{amb}=+85^{\circ}\text{C}$ |      | Unit |
|---------------------------|----------|----------------|----------|----------|-------------------------------|------|-------------------------------|------|------|
|                           |          | $V_O$          | $V_{IN}$ | $V_{DD}$ | Min.                          | Max. | Min.                          | Max. |      |
| supply current            | $I_{DD}$ | -              | 0, 5     | 5        | -                             | 5    | -                             | 150  | uA   |
|                           |          | -              | 0, 10    | 10       | -                             | 10   | -                             | 300  | uA   |
|                           |          | -              | 0, 15    | 15       | -                             | 20   | -                             | 600  | uA   |
| LOW-level output current  | $I_{OL}$ | 0.4            | 0, 5     | 5        | 0.61                          | -    | 0.42                          | -    | mA   |
|                           |          | 0.5            | 0, 10    | 10       | 1.5                           | -    | 1.1                           | -    | mA   |
|                           |          | 1.5            | 0, 15    | 15       | 4                             | -    | 2.8                           | -    | mA   |
| HIGH-level output current | $I_{OH}$ | 4.6            | 0, 5     | 5        | -0.61                         | -    | -0.42                         | -    | mA   |
|                           |          | 2.5            | 0, 5     | 5        | -1.8                          | -    | -1.3                          | -    | mA   |
|                           |          | 9.5            | 0, 10    | 10       | -1.5                          | -    | -1.1                          | -    | mA   |
|                           |          | 13.5           | 0, 15    | 15       | -4                            | -    | -2.8                          | -    | mA   |
| LOW-level output voltage  | $V_{OL}$ | -              | 0, 5     | 5        | -                             | 0.05 | -                             | 0.05 | V    |
|                           |          | -              | 0, 10    | 10       | -                             | 0.05 | -                             | 0.05 | V    |





|                           |          |           |       |    |       |           |       |         |         |
|---------------------------|----------|-----------|-------|----|-------|-----------|-------|---------|---------|
|                           |          | -         | 0, 15 | 15 | -     | 0.05      | -     | 0.05    | V       |
| HIGH-level output voltage | $V_{OH}$ | -         | 0, 5  | 5  | 4.95  | -         | 4.95  | -       | V       |
|                           |          | -         | 0, 10 | 10 | 9.95  | -         | 9.95  | -       | V       |
|                           |          | -         | 0, 15 | 15 | 14.95 | -         | 14.95 | -       | V       |
| LOW-level input voltage   | $V_{IL}$ | 0.5, 4.5  | -     | 5  | -     | 1.5       | -     | 1.5     | V       |
|                           |          | 1, 9      | -     | 10 | -     | 3         | -     | 3       | V       |
|                           |          | 1.5, 13.5 | -     | 15 | -     | 4         | -     | 4       | V       |
| HIGH-level input voltage  | $V_{IH}$ | 0.5, 4.5  | -     | 5  | 3.5   | -         | 3.5   | -       | V       |
|                           |          | 1, 9      | -     | 10 | 7     | -         | 7     | -       | V       |
|                           |          | 1.5, 13.5 | -     | 15 | 11    | -         | 11    | -       | V       |
| input leakage current     | $I_I$    | -         | 0, 15 | 15 | -     | $\pm 0.1$ | -     | $\pm 1$ | $\mu A$ |

### 3.3.3、AC Characteristics

( $T_{amb}=25^{\circ}C$ ,  $V_{SS}=0V$ ,  $t_r, t_f=20ns$ ,  $C_L=50pF$ ,  $R_L=200k\Omega$ , unless otherwise specified.)

| Parameter                | Symbol             | Conditions                            | Min.         | Typ.      | Max. | Unit |     |
|--------------------------|--------------------|---------------------------------------|--------------|-----------|------|------|-----|
| propagation delay time   | $t_{PHL}, t_{PLH}$ | CP0, CP1 to Q0 to Q9;<br>see Figure 7 | $V_{DD}=5V$  | -         | 325  | 650  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 135  | 270  | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 85   | 170  | ns  |
|                          |                    | CP0, CP1 to Q5-9;<br>see Figure 7     | $V_{DD}=5V$  | -         | 300  | 600  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 125  | 250  | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 80   | 160  | ns  |
|                          |                    | MR to Q0 to Q9;<br>see Figure 7       | $V_{DD}=5V$  | -         | 265  | 530  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 115  | 230  | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 85   | 170  | ns  |
| transition time          | $t_t$              | see Figure 7                          | $V_{DD}=5V$  | -         | 100  | 200  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 50   | 100  | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 40   | 80   | ns  |
| pulse width              | $t_w$              | see Figure 8                          | $V_{DD}=5V$  | -         | 100  | 200  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 45   | 90   | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 30   | 60   | ns  |
| clock rise and fall time | $t_{rCL}, t_{fCL}$ | -                                     | $V_{DD}=5V$  | unlimited |      |      | -   |
|                          |                    |                                       | $V_{DD}=10V$ | unlimited |      |      | -   |
|                          |                    |                                       | $V_{DD}=15V$ | unlimited |      |      | -   |
| maximum clock frequency  | $f_{CL}$           | see Figure 8                          | $V_{DD}=5V$  | 2.5       | 5    | -    | MHz |
|                          |                    |                                       | $V_{DD}=10V$ | 5         | 10   | -    | MHz |
|                          |                    |                                       | $V_{DD}=15V$ | 5.5       | 11   | -    | MHz |
| setup time               | $t_s$              | CP0 to CP1;<br>see Figure 9           | $V_{DD}=5V$  | -         | 115  | 230  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 50   | 100  | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 35   | 70   | ns  |
| reset removal time       | $t_{rec}$          | MR input;<br>see Figure 8             | $V_{DD}=5V$  | -         | 200  | 400  | ns  |
|                          |                    |                                       | $V_{DD}=10V$ | -         | 140  | 280  | ns  |
|                          |                    |                                       | $V_{DD}=15V$ | -         | 75   | 150  | ns  |
| input capacitance        | $C_I$              | any input                             | -            | 5         | -    | pF   |     |

Note:  $t_t$  is the same as  $t_{TLH}$  and  $t_{THL}$ .

## 4、Testing Circuit

### 4.1、AC Testing Circuit

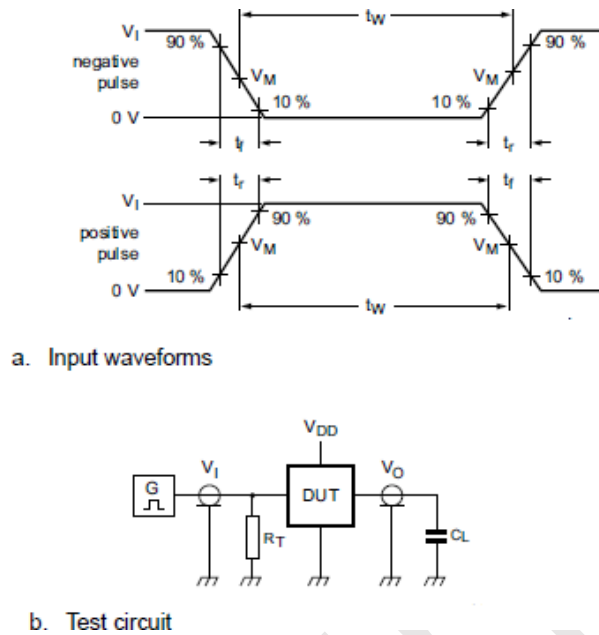


Figure 6. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test.

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

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

### 4.2、AC Testing Waveforms

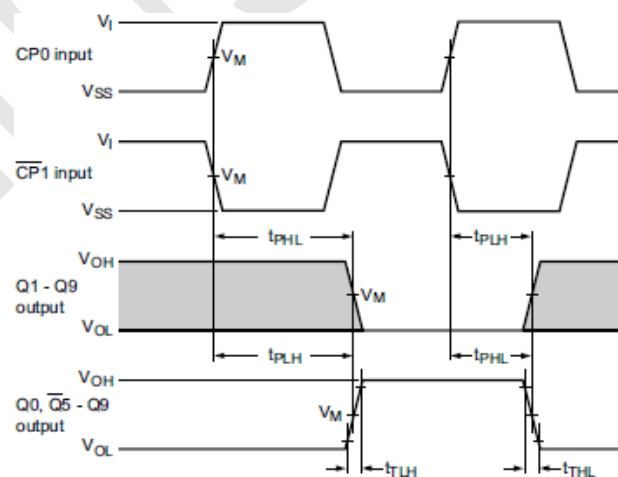


Figure 7. Waveforms showing the propagation delays for CP0, CP1 to Qn, Q5-9 outputs and the output transition times

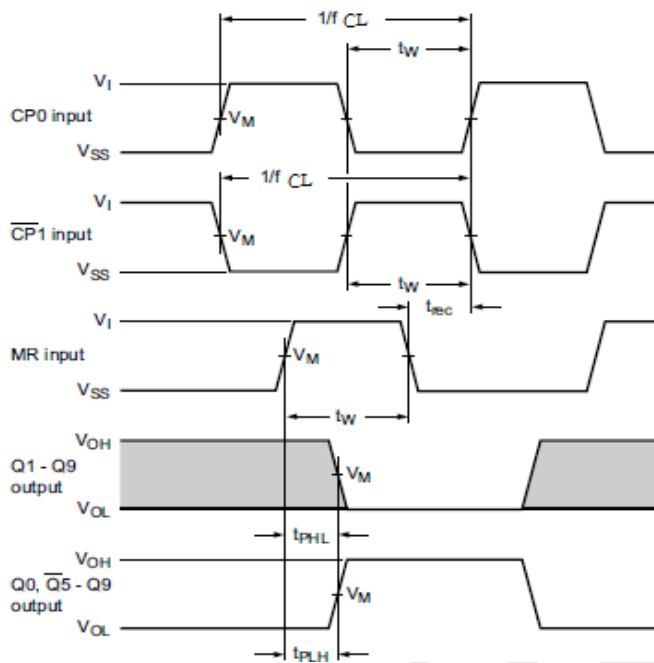


Figure 8. Waveforms showing the minimum pulse width for CP0, CP1 and MR input; the maximum frequency for CP0 and CP1 input; the recovery time for MR and the MR input to Qn and Q5-9 output propagation delay

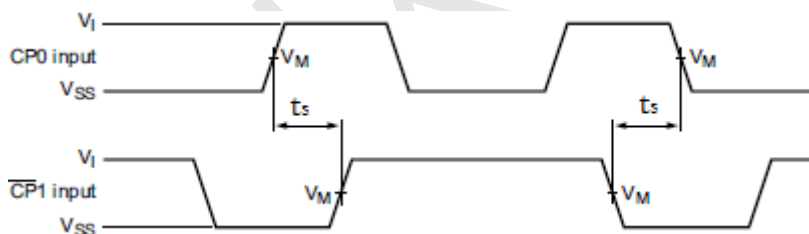


Figure 9. Waveforms showing hold times for CP0 to CP1 and CP1 to CP0

### 4.3 Measurement Points

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

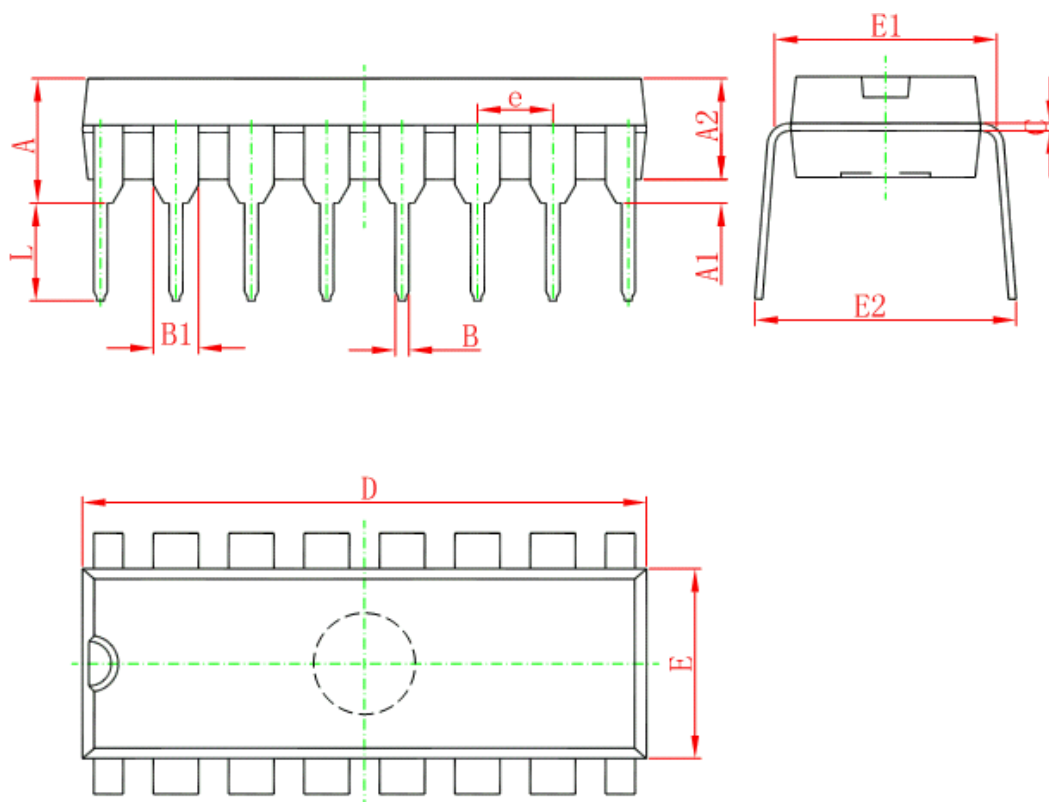
### 4.4 Test Data

| Supply voltage | Input                |             | Load  |
|----------------|----------------------|-------------|-------|
| $V_{DD}$       | $V_I$                | $t_r, t_f$  | $C_L$ |
| 5V to 15V      | $V_{SS}$ or $V_{DD}$ | $\leq 20ns$ | 50pF  |



## 5、Package Information

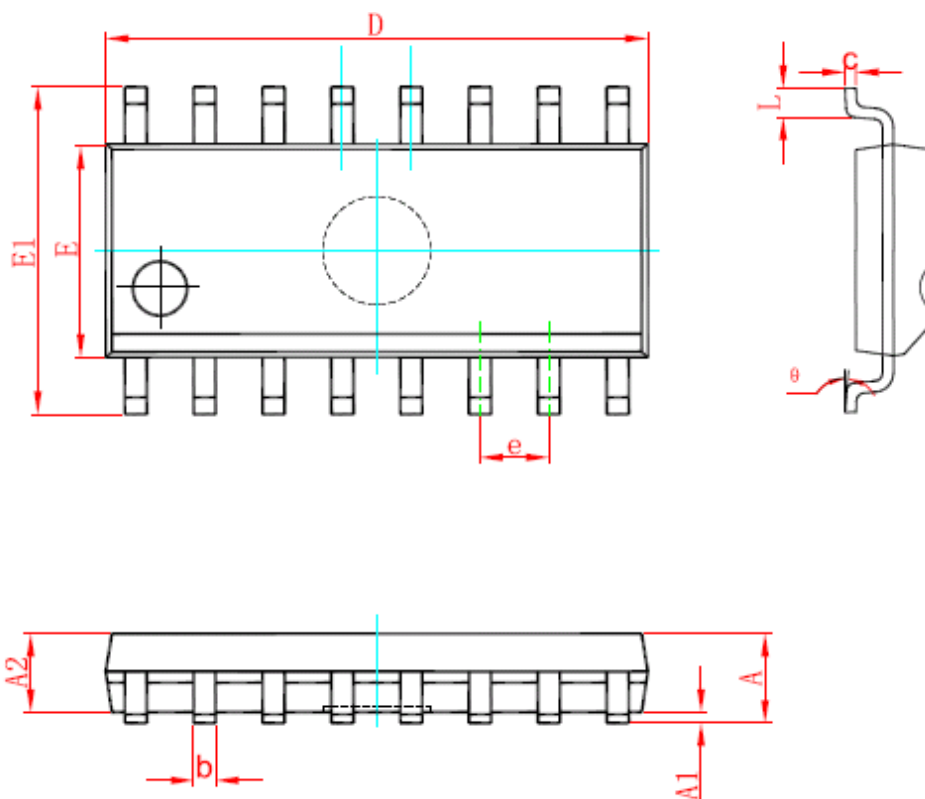
### 5.1、DIP16



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 3.710                     | 4.310  | 0.146                | 0.170 |
| A1     | 0.510                     |        | 0.020                |       |
| A2     | 3.200                     | 3.600  | 0.126                | 0.142 |
| B      | 0.380                     | 0.570  | 0.015                | 0.022 |
| B1     | 1.524 (BSC)               |        | 0.060 (BSC)          |       |
| C      | 0.204                     | 0.360  | 0.008                | 0.014 |
| D      | 18.800                    | 19.200 | 0.740                | 0.756 |
| E      | 6.200                     | 6.600  | 0.244                | 0.260 |
| E1     | 7.320                     | 7.920  | 0.288                | 0.312 |
| e      | 2.540 (BSC)               |        | 0.100 (BSC)          |       |
| L      | 3.000                     | 3.600  | 0.118                | 0.142 |
| E2     | 8.400                     | 9.000  | 0.331                | 0.354 |



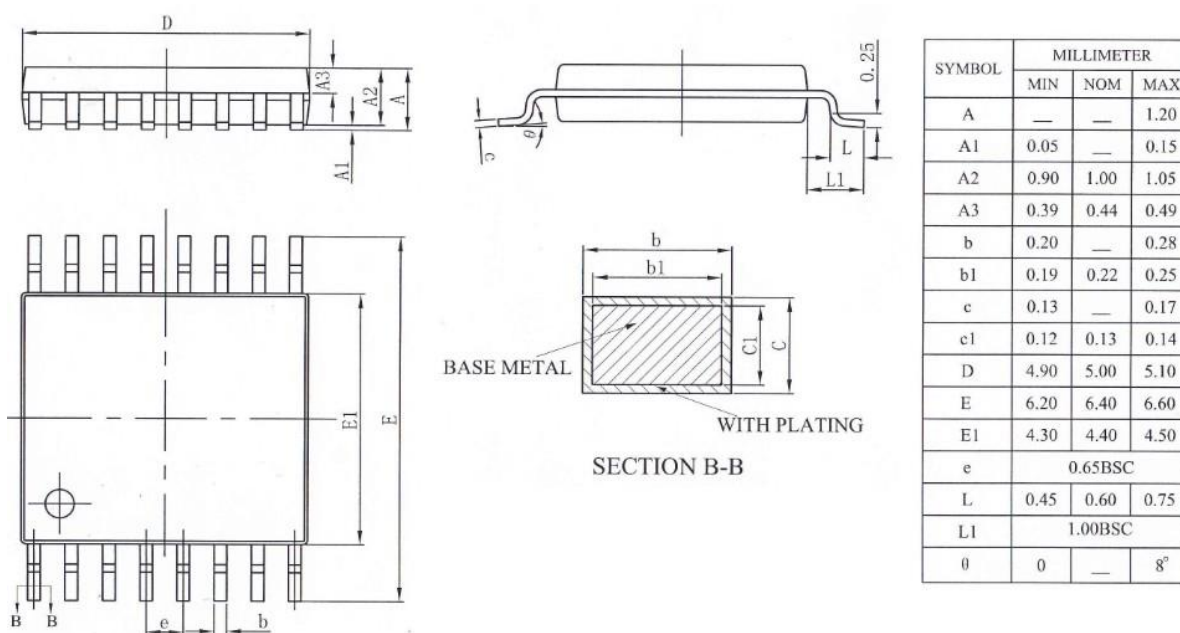
5.2、SOP16



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 1.350                     | 1.750  | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250  | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550  | 0.053                | 0.061 |
| b      | 0.330                     | 0.510  | 0.013                | 0.020 |
| c      | 0.170                     | 0.250  | 0.007                | 0.010 |
| D      | 9.800                     | 10.200 | 0.386                | 0.402 |
| E      | 3.800                     | 4.000  | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200  | 0.228                | 0.244 |
| e      | 1.270 (BSC)               |        | 0.050 (BSC)          |       |
| L      | 0.400                     | 1.270  | 0.016                | 0.050 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |



5.3、TSSOP16



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、Notion

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.