



# CD40174 (LX) Hex D-type flip-flop

## Product Specification

### Specification Revision History:

Version	Date	Description
2023-04-A1	2023-04	New
2024-04-A2	2024-04	Modify the content



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## 1、General Description

The CD40174 is a hex edge-triggered D-type flip-flop.

### Features:

- Supply voltage range:3V to 15V
- Temperature range:-40°C to +125°C
- Packaging information: DIP16/SOP16

### Ordering Information:

#### Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
CD40174BE(LX)	DIP16	CD40174BE	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	Marking code	Reel quantity	Boxed reel quantity	Notes
CD40174BM(LX)	SOP16	CD40174BM	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm

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

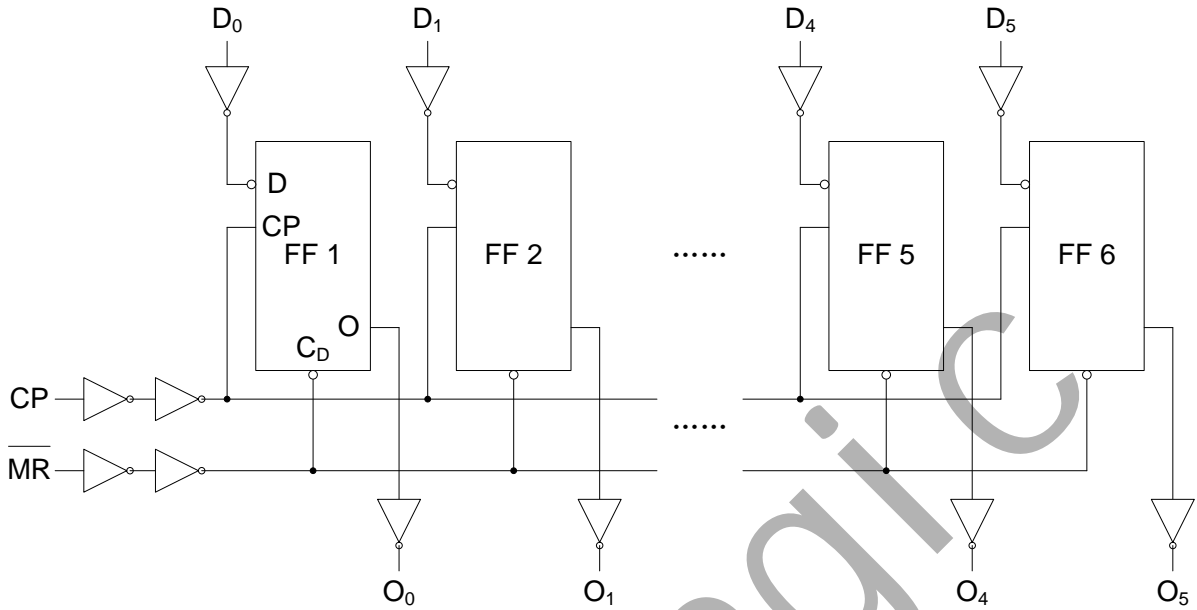


Figure 1. Functional diagram

### 2.2、Pin Configurations

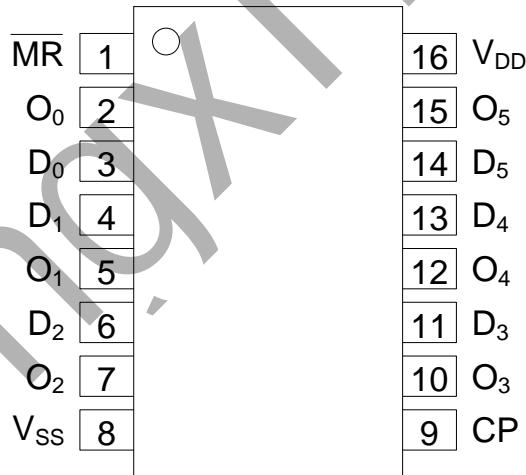


Figure 2. Pin configurations



### 2.3、Pin Description

Pin No.	Pin Name	Description
1	$\overline{MR}$	clock input
2	$O_0$	buffered output
3	$D_0$	data input
4	$D_1$	data input
5	$O_1$	buffered output
6	$D_2$	data input
7	$O_2$	buffered output
8	$V_{SS}$	ground supply voltage
9	CP	clock input
10	$O_3$	buffered output
11	$D_3$	data input
12	$O_4$	buffered output
13	$D_4$	data input
14	$D_5$	data input
15	$O_5$	buffered output
16	$V_{DD}$	supply voltage

### 2.4、Function Table

Input			Output
CP	D	$\overline{MR}$	O
↑	H	H	H
↑	L	H	L
↓	X	H	no change
X	X	L	L

Note: H=HIGH voltage level; L=LOW voltage level. 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	245	°C
			SOP	260	



## 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	-	-	$\pm 2$	$\mu\text{A}$
supply current	$I_{DD}$	5V	$V_I=5\text{V}$ or GND; $I_O=0\text{A}$	-	-	7.5	$\mu\text{A}$
		10V	$V_I=10\text{V}$ or GND; $I_O=0\text{A}$	-	-	15	$\mu\text{A}$
		15V	$V_I=15\text{V}$ or GND; $I_O=0\text{A}$	-	-	30	$\mu\text{A}$



### 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	-	-	$\pm 4$	$\mu\text{A}$
supply current	$I_{DD}$	5V	$V_I=5\text{V}$ or GND; $I_O=0\text{A}$	-	-	7.5	$\mu\text{A}$
		10V	$V_I=10\text{V}$ or GND; $I_O=0\text{A}$	-	-	15	$\mu\text{A}$
		15V	$V_I=15\text{V}$ or GND; $I_O=0\text{A}$	-	-	30	$\mu\text{A}$



### 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
propagation delay time	$t_{PHL}, t_{PLH}$	5V	CP to Qn See Figure 4	-	75	155	ns
		10V		-	30	65	ns
		15V		-	20	45	ns
$\overline{\text{MR}}$ to Qn HIGH to LOW propagation delay time	$t_{PHL}$	5V	See Figure 5	-	85	175	ns
		10V		-	35	70	ns
		15V		-	25	50	ns
transition time	$t_{THL}, t_{TLH}$	5V	See Figure 4	-	60	120	ns
		10V		-	30	60	ns
		15V		-	20	40	ns
set-up time	$t_{su}$	5V	See Figure 5	20	10	-	ns
		10V		10	5	-	ns
		15V		10	5	-	ns
hold time	$t_{hold}$	5V	See Figure 5	10	0	-	ns
		10V		5	0	-	ns
		15V		5	0	-	ns
Minimum clock pulse width; LOW	$t_{WCPL}$	5V	See Figure 5	70	35	-	ns
		10V		30	15	-	ns
		15V		20	10	-	ns
Minimum $\overline{\text{MR}}$ pulse width; LOW	$t_{WMRL}$	5V	See Figure 5	70	35	-	ns
		10V		35	15	-	ns
		15V		25	10	-	ns
Recovery time for $\overline{\text{MR}}$	$t_{RMR}$	5V	See Figure 5	45	25	-	ns
		10V		20	10	-	ns
		15V		15	5	-	ns
Maximum clock pulse frequency	$f_{max}$	5V	-	5	11	-	MHZ
		10V	-	15	30	-	MHZ
		15V	-	20	45	-	MHZ





### 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
propagation delay time	$t_{PHL}, t_{PLH}$	5V	CP to Qn See Figure 4	-	-	186	ns
		10V		-	-	78	ns
		15V		-	-	54	ns
$\overline{\text{MR}}$ to Qn HIGH to LOW propagation delay time	$t_{PHL}$	5V	See Figure 5	-	-	210	ns
		10V		-	-	84	ns
		15V		-	-	60	ns
transition time	$t_{THL}, t_{TLH}$	5V	See Figure 4	-	-	144	ns
		10V		-	-	72	ns
		15V		-	-	48	ns
set-up time	$t_{su}$	5V	See Figure 5	24	-	-	ns
		10V		12	-	-	ns
		15V		12	-	-	ns
hold time	$t_{hold}$	5V	See Figure 5	12	-	-	ns
		10V		6	-	-	ns
		15V		6	-	-	ns
Minimum clock pulse width;LOW	$t_{WCPL}$	5V	See Figure 5	84	-	-	ns
		10V		36	-	-	ns
		15V		24	-	-	ns
Minimum $\overline{\text{MR}}$ pulse width;LOW	$t_{WMRL}$	5V	See Figure 5	84	-	-	ns
		10V		45	-	-	ns
		15V		30	-	-	ns
Recovery time for $\overline{\text{MR}}$	$t_{RMR}$	5V	See Figure 5	54	-	-	ns
		10V		24	-	-	ns
		15V		18	-	-	ns
Maximum clock pulse frequency	$f_{max}$	5V	-	4	-	-	MHZ
		10V	-	12	-	-	MHZ
		15V	-	16	-	-	MHZ



### 4、Testing Circuit

#### 4.1、AC Testing Circuit

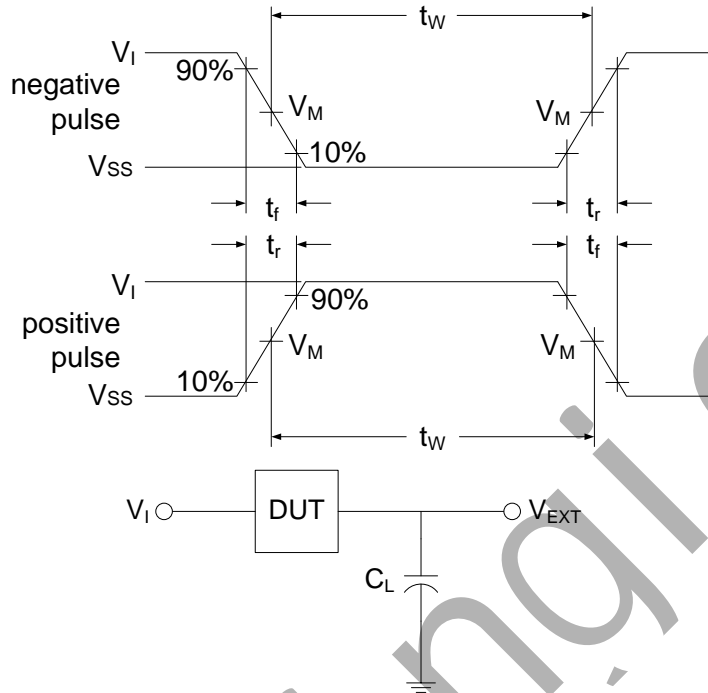


Figure 3. Load circuit

C<sub>L</sub> includes probe and jig capacitance.

#### 4.2、Test Data

Supply voltage	Input		Load	V <sub>EXT</sub>		
V <sub>DD</sub>	V <sub>I</sub>	t <sub>r</sub> = t <sub>f</sub>	C <sub>L</sub>	t <sub>PLH</sub> /t <sub>PHL</sub>	t <sub>PLZ</sub> /t <sub>PZL</sub>	t <sub>PHZ</sub> /t <sub>PZH</sub>
5V to 15V	V <sub>DD</sub>	≤ 20ns	50pF	Open	V <sub>DD</sub>	V <sub>SS</sub>

#### 4.3、AC Testing Waveforms

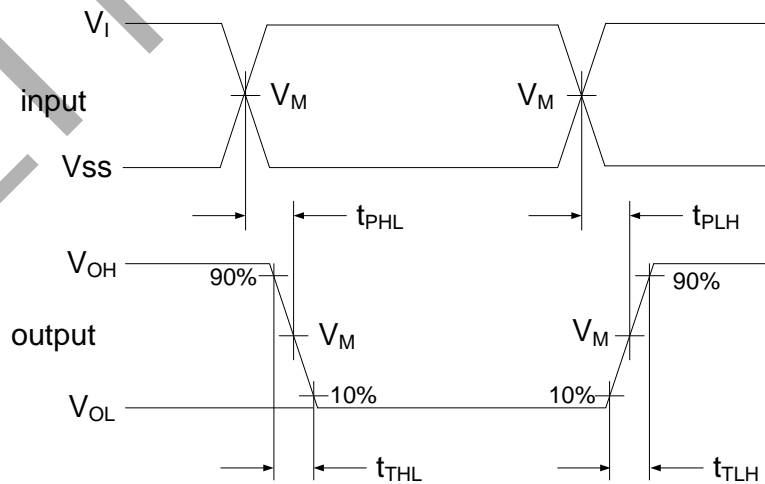


Figure 4. Propagation delay, output transition time

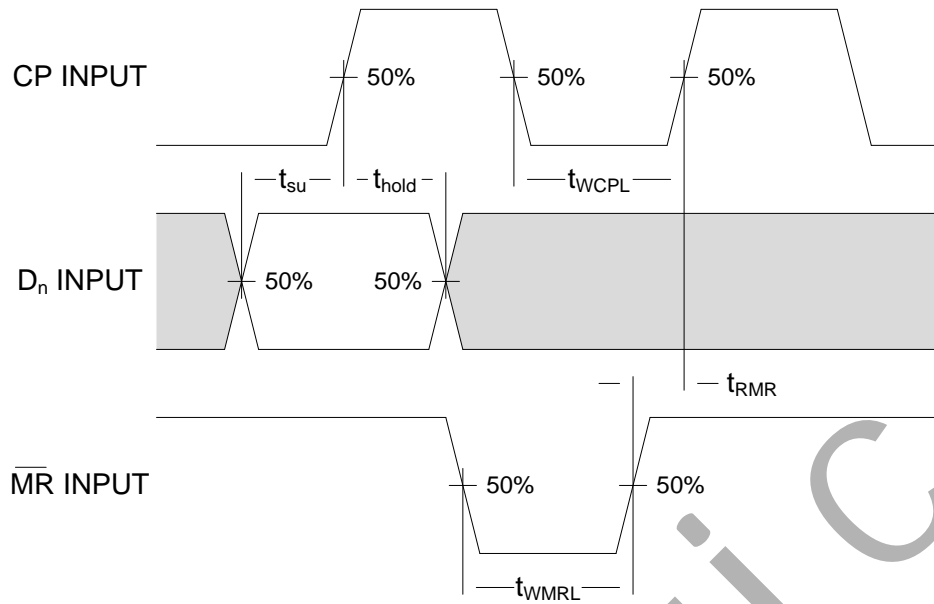


Figure 5. Waveforms showing minimum pulse widths for CP and MR, MR to CP recovery time, and set-up time and hold time for Dn to CP. Set-up and hold times are shown as positive values but may be specified as negative values.

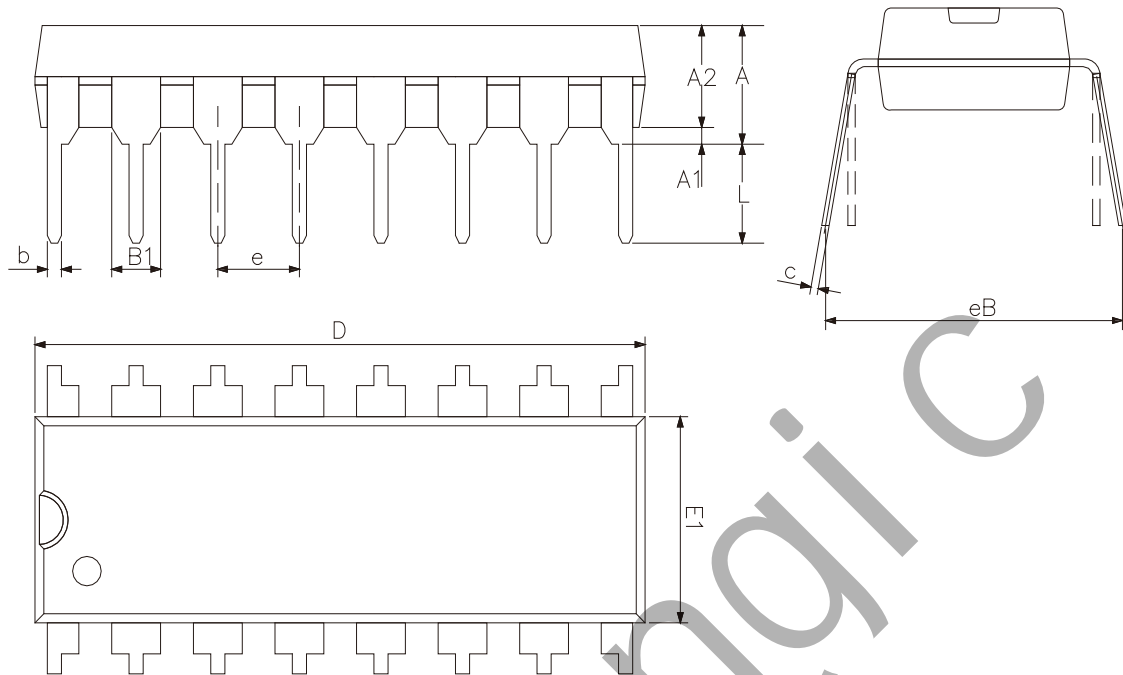
#### 4.4、Measurement Points

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



## 5、Package Information

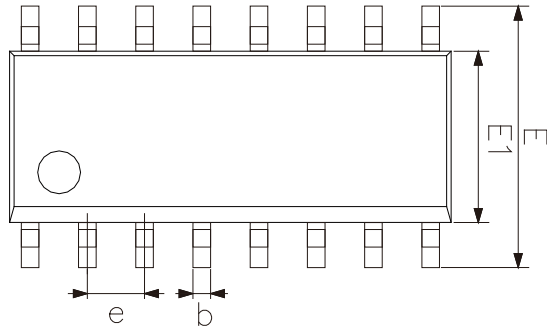
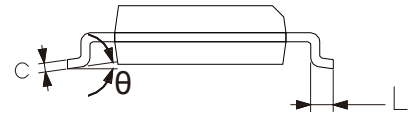
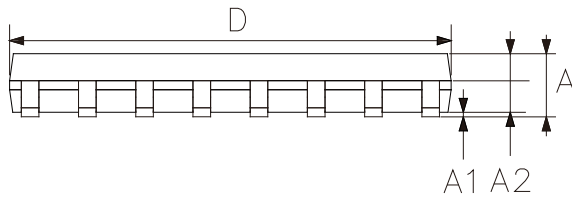
### 5.1、DIP16



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	Dimensions In Millimeters	
Symbol	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°



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## 6、Statements And Notes

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

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[SN74LVC2G14DC\(LX\)](#) [74VHCT574AFT](#) [TC4013BF\(EL,N,F\)](#) [74VHCT9541AFT](#) [74LCX374FT\(AJ\)](#) [TC7WZ74FK,LXGJ\(CT](#)  
[74LCX374FT](#) [74VHC174FT\(TB,BJ\)](#) [TC7WH74FK,LJ](#) [SN74HC374PW\(LX\)](#) [SN74LVC1G17DC\(LX\)](#) [SN74HC174DR\(LX\)](#)  
[SN74HC112N\(LX\)](#) [SN74HC74DR\(LX\)](#) [CD40174BE\(LX\)](#) [CD40175BE\(LX\)](#) [SN74LS374N](#) [SN74HC173N](#) [SN74HC107DR\(LX\)](#)  
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