



CD40175

Quad D-type flip-flop

Product Specification

Specification Revision History:

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



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1、General Description

The CD40175 is a quad edge-triggered D-type flip-flop.

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
CD40175DA16.TB	DIP16	CD40175	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
CD40175SA16.TB	SOP16	CD40175	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
CD40175TA16.TB	TSSOP16	CD40175	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
CD40175SA16.TR	SOP16	CD40175	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
CD40175TA16.TR	TSSOP16	CD40175	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.



2.3、Pin Description

Pin No.	Pin Name	Description
1	$\overline{\text{MR}}$	master reset input
2	Q1	buffered output
3	Q1N	complementary buffered output
4	D1	data input
5	D2	data input
6	Q2N	complementary buffered output
7	Q2	buffered output
8	V _{SS}	ground supply voltage
9	CP	clock input
10	Q3	buffered output
11	Q3N	complementary buffered output
12	D3	data input
13	D4	data input
14	Q4N	data input
15	Q4	buffered output
16	V _{DD}	supply voltage

2.4、Function Table

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

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
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/TSSOP	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	-	-	± 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°C to +125°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 <1uA	4.95	-	-	V
		10V	I _O <1uA	9.95	-	-	V
		15V	I _O <1uA	14.95	-	-	V
LOW-level output voltage	V _{OL}	5V	I _O <1uA	-	-	0.05	V
		10V	I _O <1uA	-	-	0.05	V
		15V	I _O <1uA	-	-	0.05	V
HIGH-level output current	I _{OH}	5V	V _O =4.6V	-	-	-0.3	mA
		5V	V _O =2.5V	-	-	-1.15	mA
		10V	V _O =9.5V	-	-	-0.45	mA
		15V	V _O =13.5V	-	-	-1.4	mA
LOW-level output current	I _{OL}	5V	V _O =0.4V	0.29	-	-	mA
		10V	V _O =0.5V	0.38	-	-	mA
		15V	V _O =1.5V	1.2	-	-	mA
input leakage current	I _I	15V	V _I =15V or GND	-	-	±4	uA
supply current	I _{DD}	5V	V _I =5V or GND; I _O =0A	-	-	7.5	uA
		10V	V _I =10V or GND; I _O =0A	-	-	15	uA
		15V	V _I =15V or GND; I _O =0A	-	-	30	uA

3.3.3、AC Characteristics 1(T_{amb}=-40°C to +85°C, V_{SS}=0V, 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	-	70	140	ns
		10V		-	30	65	ns
		15V		-	20	45	ns
MR to Qn HIGH to LOW propagation delay time	t _{PHL}	5V	See Figure 5	-	70	140	ns
		10V		-	30	65	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	60	30	-	ns
		10V		20	10	-	ns
		15V		15	5	-	ns
hold time	t _{hold}	5V		25	-5	-	ns
		10V		10	0	-	ns



		15V		10	0	-	ns
minimum clock pulse width;LOW	t_{WCPL}	5V		90	45	-	ns
		10V		35	15	-	ns
		15V		25	10	-	ns
minimum $\overline{MR}$ pulse width;LOW	t_{WMRL}	5V		80	40	-	ns
		10V		30	15	-	ns
		15V		20	10	-	ns
recovery time for $\overline{MR}$	t_{RMR}	5V		0	-30	-	ns
		10V		0	-20	-	ns
		15V		0	-15	-	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	-	-	168	ns
		10V		-	-	78	ns
		15V		-	-	54	ns
$\overline{MR}$ to Qn HIGH to LOW propagation delay time	t_{PHL}	5V	See Figure 5	-	-	168	ns
		10V		-	-	78	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	72	-	-	ns
		10V		24	-	-	ns
		15V		18	-	-	ns
hold time	t_{hold}	5V		30	-	-	ns
		10V		12	-	-	ns
		15V		12	-	-	ns
minimum clock pulse width; LOW	t_{WCPL}	5V		108	-	-	ns
		10V		42	-	-	ns
		15V		30	-	-	ns
minimum $\overline{MR}$ pulse width; LOW	t_{WMRL}	5V		96	-	-	ns
		10V		36	-	-	ns
		15V		24	-	-	ns
recovery time for $\overline{MR}$	t_{RMR}	5V		0	-	-	ns
		10V		0	-	-	ns
		15V		0	-	-	ns
maximum clock pulse frequency	f_{max}	5V		4	-	-	MHZ
		10V		12	-	-	MHZ
		15V		16	-	-	MHZ



4、Testing Circuit

4.1、AC Testing Circuit

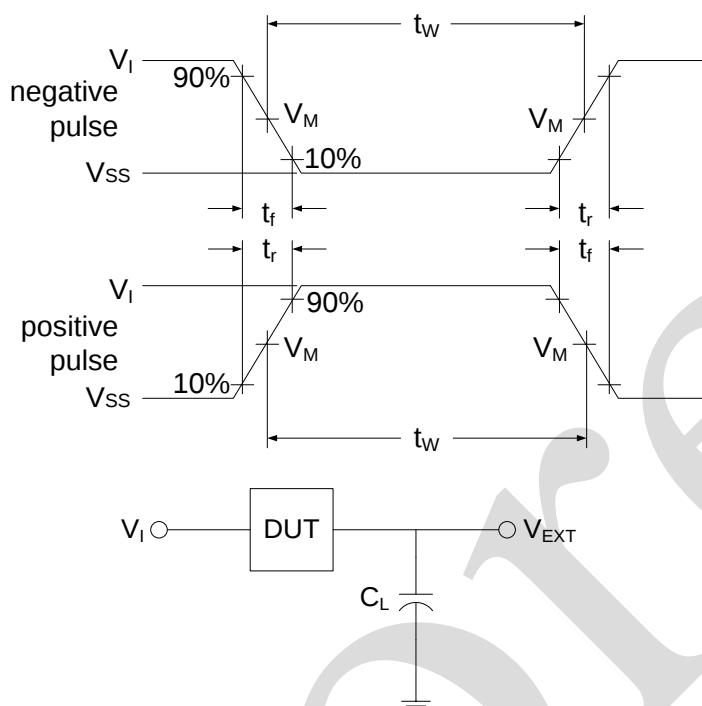


Figure 3. Load circuit

C_L includes probe and jig capacitance.

4.2、Test Data

Supply voltage	Input		Load	V_{EXT}		
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

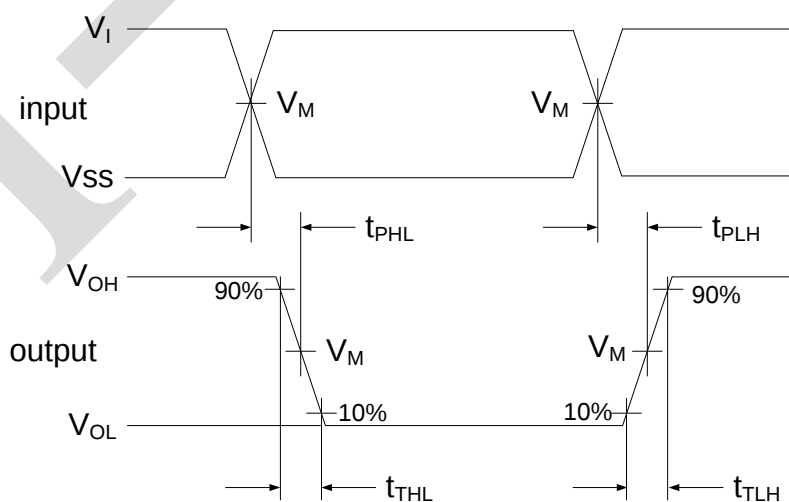


Figure 4. Propagation delay, output transition time

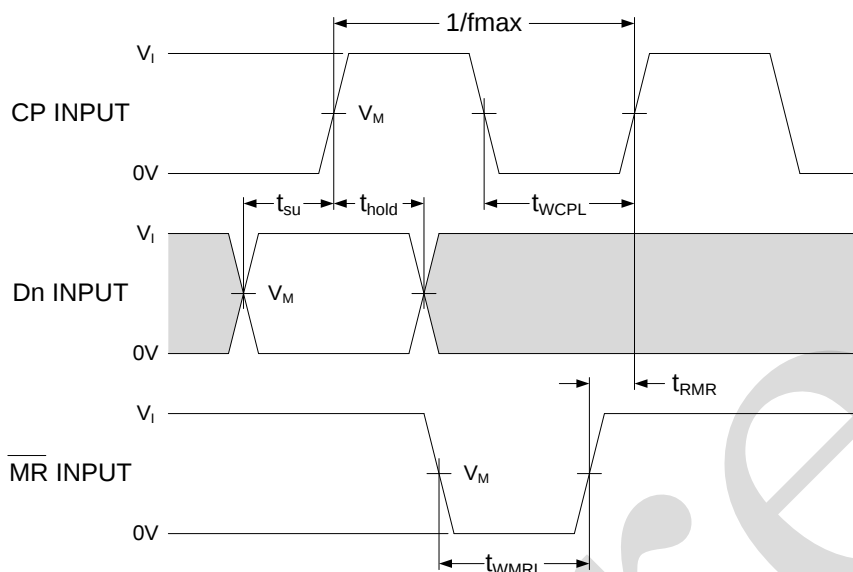


Figure 5. Minimum pulse widths for CP and $\overline{\text{MR}}$, $\overline{\text{MR}}$ to CP recovery time, and set-up and hold time for Dn to CP

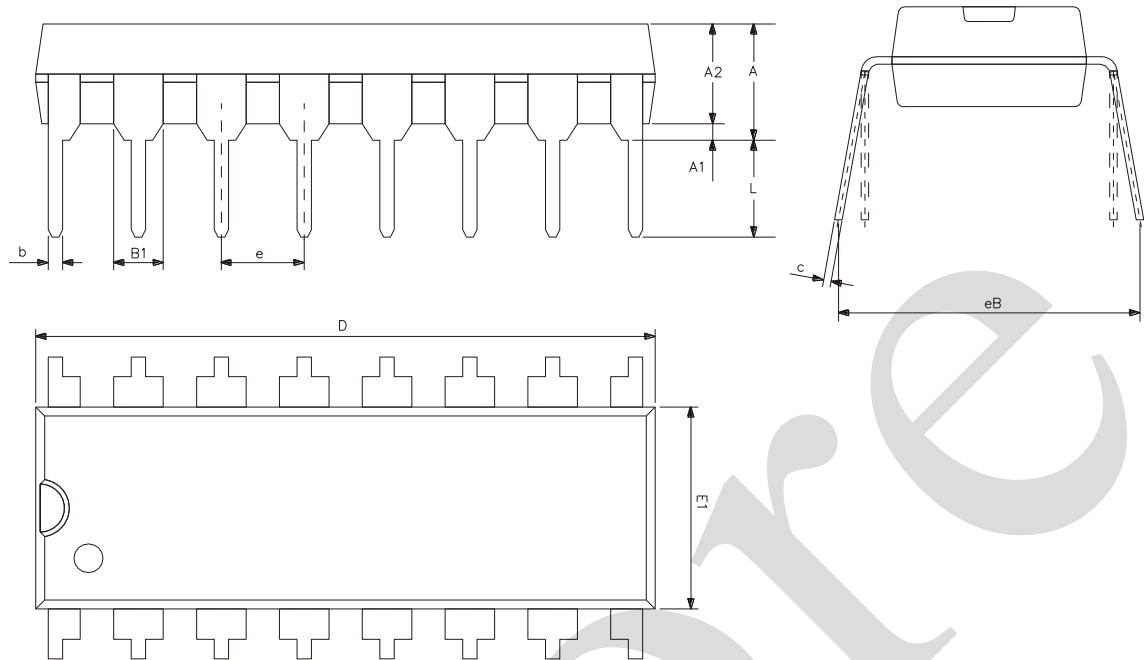
4.4、Measurement Points

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

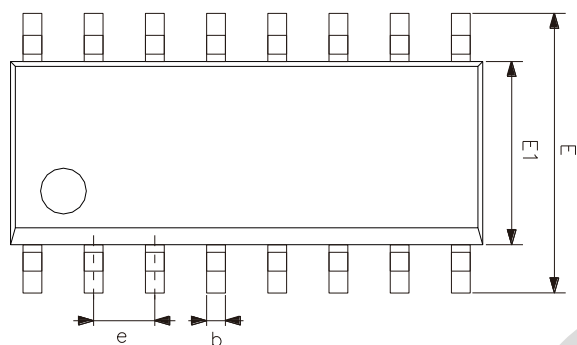
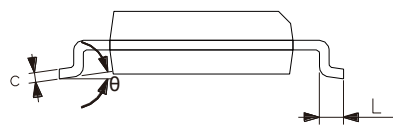
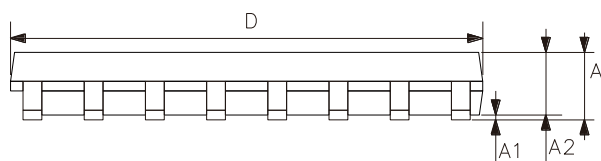
5.1、DIP16



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



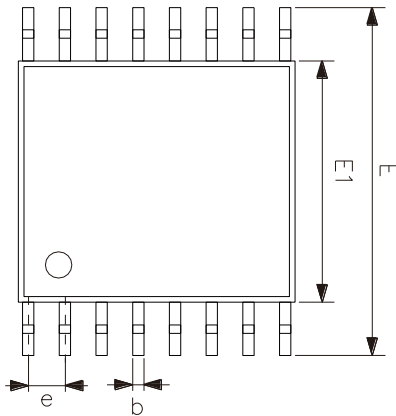
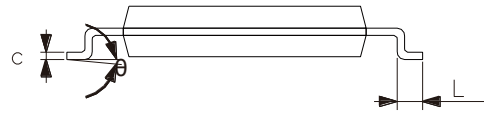
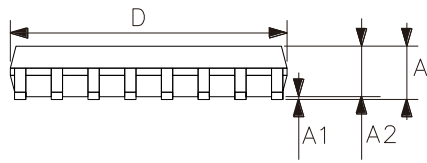
5.2、SOP16



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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