SN74LS160 (LX)
Presettable Synchronous BCD Decade Counter; Asynchronous Reset

Product Specification

Specification Revision History:

Version	Date	Description
2021-06-A1	2021-06	New
2023-04-B1	2023-04	Update the template

Contents

1、General Description

The SN74LS160 is a synchronous presettable decade counter with an internal look-ahead carry. Synchronous operation is provided by having all flip-flops clocked simultaneously on the positive-going edge of the clock (CP). The outputs (Q0 to Q3) of the counters may be preset HIGH or LOW. A LOW at the parallel enable input ($\overline{PE}$) disables the counting action and causes the data at the data inputs (D0 to D3) to be loaded into the counter on the positive-going edge of the clock. Preset takes place regardless of the levels at count enable inputs (CEP and CET). A LOW at the master reset input ($\overline{MR}$) sets Q0 to Q3 LOW regardless of the levels at input pins CP, $\overline{PE}$, CET and CEP (thus providing an asynchronous clear function). The look-ahead carry simplifies serial cascading of the counters. Both CEP and CET must be HIGH to count. The CET input is fed forward to enable the terminal count output (TC). The TC output thus enabled will produce a HIGH output pulse of a duration approximately equal to a HIGH output of Q0. This pulse can be used to enable the next cascaded stage. The maximum clock frequency for the cascaded counters is determined by the CP to TC propagation delay and CEP to CP set-up time, according to the following formula:

$f_{max}=1/(t_{P(max)}(CP\ to\ TC)+t_{SU}(CEP\ to\ CP))$

Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

Features:

- Synchronous counting and loading
- 2 count enable inputs for n-bit cascading
- Asynchronous reset
- Positive-edge triggered clock
- Specified from -40℃ to +125℃
- Packaging information: DIP16/SOP16/TSSOP16

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
SN74LS160N (LX)	DIP16	SN74LS160N	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
SN74LS160D(LX)	SOP16	74LS160	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
SN74LS160PW(LX)	TSSOP16	74LS160	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
SN74LS160DR(LX)	SOP16	LS160	2500 PCS/reel	5000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing:1.27mm
SN74LS160PW(LX)	TSSOP16	LS160	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

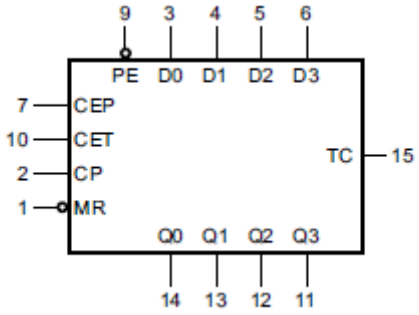


Figure 1. Logic symbol

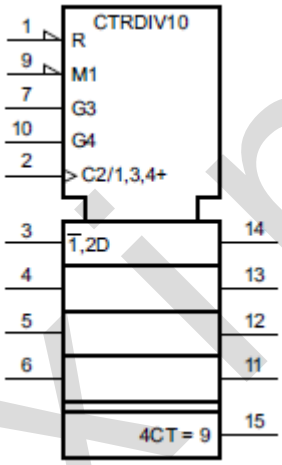


Figure 2. IEC logic symbol

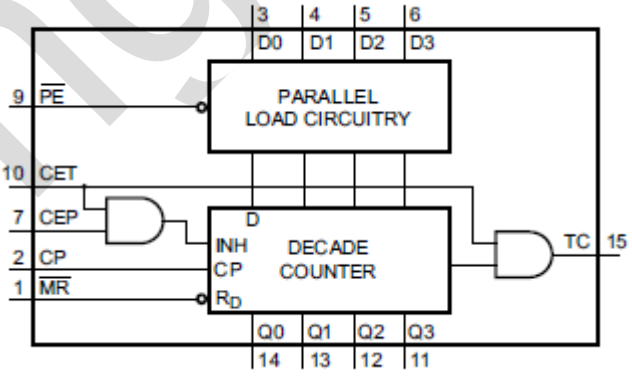


Figure 3. Functional diagram

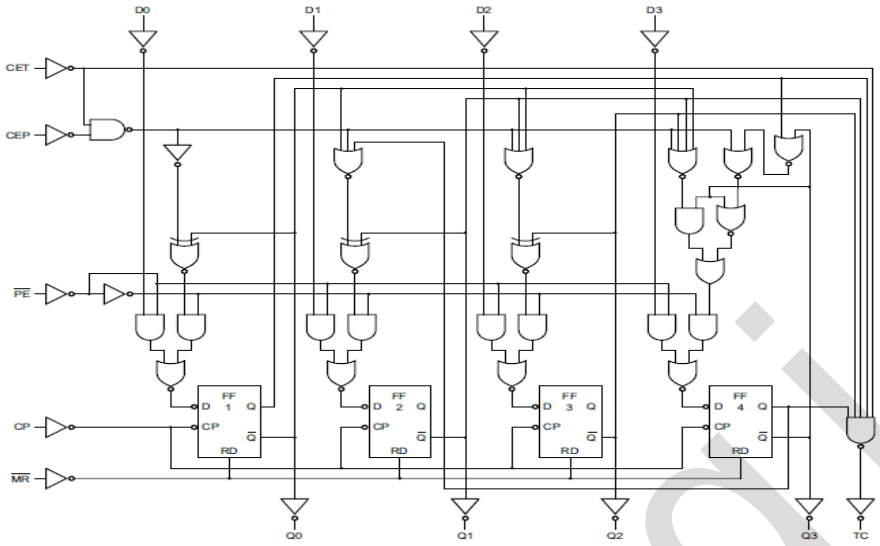


Figure 4. Logic diagram

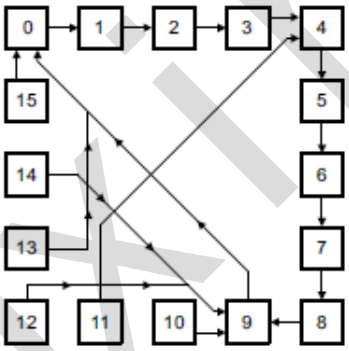


Figure 5. State diagram

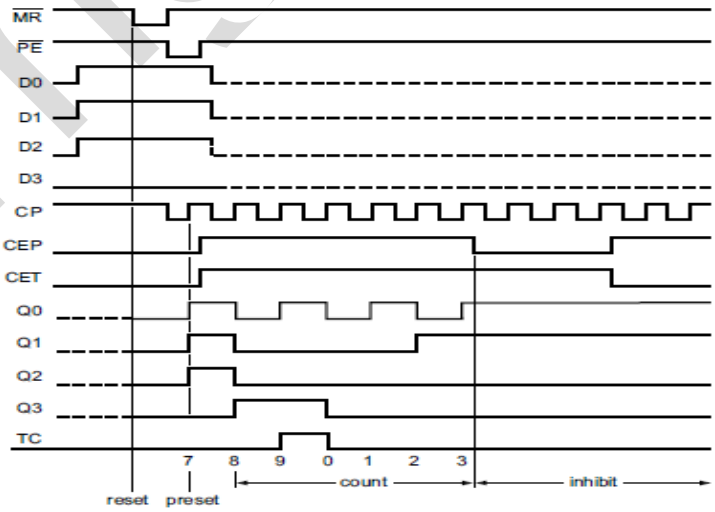
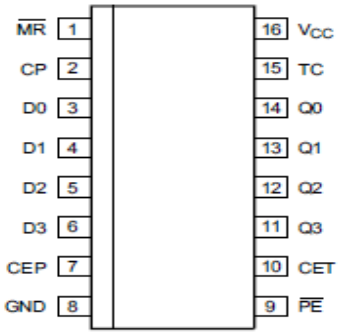


Figure 6. Typical timing sequence

2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	$\overline{MR}$	asynchronous master reset (active LOW)
2	CP	clock input (LOW-to-HIGH, edge triggered)
3	D0	data input
4	D1	data input
5	D2	data input
6	D3	data input
7	CEP	count enable input
8	GND	ground (0V)
9	$\overline{PE}$	parallel enable input (active LOW)
10	CET	count enable carry input
11	Q3	flip-flop output
12	Q2	flip-flop output
13	Q1	flip-flop output
14	Q0	flip-flop output
15	TC	terminal count output
16	V_{CC}	supply voltage

2.4、Function Table

Operating mode	Input						Output	
	$\overline{MR}$	CP	CEP	CET	$\overline{PE}$	Dn	Qn	TC
reset (clear)	L	X	X	X	X	X	L	L
parallel load	H	↑	X	X	l	l	L	L
	H	↑	X	X	l	h	H	[2]
count	H	↑	h	h	h	X	count	[2]
hold (do nothing)	H	X	l	X	h	X	q_n	[2]
	H	X	X	l	h	X	q_n	L

Note:

[1] H=HIGH voltage level; L=LOW voltage level; X=don't care; ↑=LOW-to-HIGH clock transition;
l=LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition;
h=HIGH voltage level one set-up time prior to the LOW-to-HIGH CP transition;
q_n=lower case letters indicate the state of the referenced output one set-up time prior to the LOW-to-HIGH CP transition.

[2] The TC output is HIGH when CET is HIGH and the counter is at terminal count (HLLH).

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	+7.0	V
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
supply current	I_{CC}	-		-	+50	mA
ground current	I_{GND}	-		-50	-	mA
storage temperature	T_{stg}	-		-65	+150	℃
total power dissipation	P_{tot}	-		-	500	mW
soldering temperature	T_L	10s	DIP	245		℃
			SOP/TSSOP	260		

3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
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
input transition rise and fall rate	$\Delta t/\Delta V$	V_{CC}=2.0V	-	-	625	ns/V
		V_{CC}=4.5V	-	1.67	139	ns/V
		V_{CC}=6.0V	-	-	83	ns/V
ambient temperature	T_{amb}	-	-40	-	+125	℃

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

(T_{amb}=25℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	1.2	-	V
		V_{CC}=4.5V		3.15	2.4	-	V
		V_{CC}=6.0V		4.2	3.2	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	0.8	0.5	V
		V_{CC}=4.5V		-	2.1	1.35	V
		V_{CC}=6.0V		-	2.8	1.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=2.0V	1.9	2.0	-	V
			I_O=-20uA; V_{CC}=4.5V	4.4	4.5	-	V
			I_O=-20uA; V_{CC}=6.0V	5.9	6.0	-	V
			I_O=-4.0mA; V_{CC}=4.5V	3.98	4.32	-	V
			I_O=-5.2mA; V_{CC}=6.0V	5.48	5.81	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=2.0V	-	0	0.1	V
			I_O=20uA; V_{CC}=4.5V	-	0	0.1	V
			I_O=20uA; V_{CC}=6.0V	-	0	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	0.15	0.26	V
			I_O=5.2mA; V_{CC}=6.0V	-	0.16	0.26	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	8.0	uA
input capacitance	C_I	-		-	3.5	-	pF

3.3.2、DC Characteristics 2

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=2.0V	1.9	-	-	V
			I_O=-20uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-20uA; V_{CC}=6.0V	5.9	-	-	V
			I_O=-4.0mA; V_{CC}=4.5V	3.84	-	-	V
			I_O=-5.2mA; V_{CC}=6.0V	5.34	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=2.0V	-	-	0.1	V
			I_O=20uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=20uA; V_{CC}=6.0V	-	-	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	-	0.33	V
			I_O=5.2mA; V_{CC}=6.0V	-	-	0.33	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	80	uA

3.3.3、DC Characteristics 3

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=2.0V		1.5	-	-	V
		V_{CC}=4.5V		3.15	-	-	V
		V_{CC}=6.0V		4.2	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=2.0V		-	-	0.5	V
		V_{CC}=4.5V		-	-	1.35	V
		V_{CC}=6.0V		-	-	1.8	V
HIGH-level output voltage	V_{OH}	V_I=V_{IH} or V_{IL}	I_O=-20uA; V_{CC}=2.0V	1.9	-	-	V
			I_O=-20uA; V_{CC}=4.5V	4.4	-	-	V
			I_O=-20uA; V_{CC}=6.0V	5.9	-	-	V
			I_O=-4.0mA; V_{CC}=4.5V	3.7	-	-	V
			I_O=-5.2mA; V_{CC}=6.0V	5.2	-	-	V
LOW-level output voltage	V_{OL}	V_I=V_{IH} or V_{IL}	I_O=20uA; V_{CC}=2.0V	-	-	0.1	V
			I_O=20uA; V_{CC}=4.5V	-	-	0.1	V
			I_O=20uA; V_{CC}=6.0V	-	-	0.1	V
			I_O=4.0mA; V_{CC}=4.5V	-	-	0.4	V
			I_O=5.2mA; V_{CC}=6.0V	-	-	0.4	V
input leakage current	I_I	V_I=V_{CC} or GND; V_{CC}=6.0V		-	-	±1.0	uA
supply current	I_{CC}	V_I=V_{CC} or GND; I_O=0A; V_{CC}=6.0V		-	-	160	uA

3.3.4、AC Characteristics 1

(T_{amb}=25℃, GND=0V; t_r=t_f=6ns; C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	CP to Qn; see Figure 8[1]	V_{CC}=2.0V	-	61	185	ns
			V_{CC}=4.5V	-	22	37	ns
			V_{CC}=5.0V; C_L=15pF	-	19	-	ns
			V_{CC}=6.0V	-	18	31	ns
		CP to TC; see Figure 8	V_{CC}=2.0V	-	69	215	ns
			V_{CC}=4.5V	-	25	43	ns
			V_{CC}=5.0V; C_L=15pF	-	21	-	ns
			V_{CC}=6.0V	-	20	31	ns
		CET to TC; see Figure 9	V_{CC}=2.0V	-	47	150	ns
			V_{CC}=4.5V	-	17	30	ns
			V_{CC}=5.0V; C_L=15pF	-	14	-	ns
			V_{CC}=6.0V	-	14	26	ns
High to LOW propagation delay	t_{PHL}	$\overline{MR}$ to Qn; see Figure 10	V_{CC}=2.0V	-	69	210	ns
			V_{CC}=4.5V	-	25	42	ns
			V_{CC}=5.0V; C_L=15pF	-	21	-	ns
			V_{CC}=6.0V	-	20	36	ns
		$\overline{MR}$ to TC; see Figure 10	V_{CC}=2.0V	-	69	220	ns
			V_{CC}=4.5V	-	25	44	ns
			V_{CC}=5.0V; C_L=15pF	-	21	-	ns
			V_{CC}=6.0V	-	20	37	ns
transition time	t_t	see Figure 8 and Figure 9[2]	V_{CC}=2.0V	-	19	75	ns
			V_{CC}=4.5V	-	7	15	ns
			V_{CC}=6.0V	-	6	13	ns
pulse width	t_W	CP HIGH or LOW; see Figure 8	V_{CC}=2.0V	80	22	-	ns
			V_{CC}=4.5V	16	8	-	ns
			V_{CC}=6.0V	14	3	-	ns
		$\overline{MR}$ LOW; see Figure 10	V_{CC}=2.0V	80	28	-	ns
			V_{CC}=4.5V	16	10	-	ns
			V_{CC}=6.0V	14	8	-	ns
recovery time	t_{rec}	$\overline{MR}$ to CP;	V_{CC}=2.0V	100	30	-	ns

		see Figure 10	V_{CC}=4.5V	20	11	-	ns
			V_{CC}=6.0V	17	9	-	ns
set-up time	t_{su}	Dn to CP; see Figure 11	V_{CC}=2.0V	80	22	-	ns
			V_{CC}=4.5V	16	8	-	ns
			V_{CC}=6.0V	14	6	-	ns
		$\overline{PE}$ to CP; see Figure 11	V_{CC}=2.0V	135	41	-	ns
			V_{CC}=4.5V	27	15	-	ns
			V_{CC}=6.0V	23	12	-	ns
		CEP, CET to CP; see Figure 12	V_{CC}=2.0V	200	63	-	ns
			V_{CC}=4.5V	40	23	-	ns
			V_{CC}=6.0V	34	18	-	ns
hold time	t_h	Dn to CP; see Figure 11	V_{CC}=2.0V	0	-17	-	ns
			V_{CC}=4.5V	0	-6	-	ns
			V_{CC}=6.0V	0	-5	-	ns
		$\overline{PE}$ to CP; see Figure 11	V_{CC}=2.0V	0	-41	-	ns
			V_{CC}=4.5V	0	-15	-	ns
			V_{CC}=6.0V	0	-12	-	ns
		CEP, CET to CP; see Figure 12	V_{CC}=2.0V	0	-58	-	ns
			V_{CC}=4.5V	0	-21	-	ns
			V_{CC}=6.0V	0	-17	-	ns
maximum frequency	f_{max}	CP; see Figure 8	V_{CC}=2.0V	6	18	-	MHz
			V_{CC}=4.5V	30	55	-	MHz
			V_{CC}=5.0V; C_L=15pF	-	61	-	MHz
			V_{CC}=6.0V	35	66	-	MHz
power dissipation capacitance	C_{PD}	f_i=1MHz; V_I=GND to V_{CC} [3]		-	39	-	pF

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] t_t is the same as t_{THL} and t_{TLH}.

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i\times N+\sum(C_L\times V_{CC}^2\times f_o)$ where:

f_i=input frequency in MHz;

f_o=output frequency in MHz;

C_L=output load capacitance in pF;

V_{CC}=supply voltage in V;

N=number of inputs switching;

$\sum(C_L\times V_{CC}^2\times f_o)$=sum of outputs.

3.3.5、AC Characteristics 2

(T_{amb}=-40℃ to +85℃, GND=0V; $t_r=t_f$=6ns; C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	CP to Qn; see Figure 8[1]	V_{CC}=2.0V	-	-	230	ns
			V_{CC}=4.5V	-	-	46	ns
			V_{CC}=6.0V	-	-	39	ns
		CP to TC; see Figure 8	V_{CC}=2.0V	-	-	270	ns
			V_{CC}=4.5V	-	-	54	ns
			V_{CC}=6.0V	-	-	46	ns
		CET to TC; see Figure 9	V_{CC}=2.0V	-	-	190	ns
			V_{CC}=4.5V	-	-	38	ns
			V_{CC}=6.0V	-	-	33	ns
High to LOW propagation delay	t_{PHL}	$\overline{MR}$ to Qn; see Figure 10	V_{CC}=2.0V	-	-	265	ns
			V_{CC}=4.5V	-	-	53	ns
			V_{CC}=6.0V	-	-	45	ns
		$\overline{MR}$ to TC; see Figure 10	V_{CC}=2.0V	-	-	275	ns
			V_{CC}=4.5V	-	-	55	ns
			V_{CC}=6.0V	-	-	47	ns
transition time	t_t	see Figure 8 and Figure 9[2]	V_{CC}=2.0V	-	-	95	ns
			V_{CC}=4.5V	-	-	19	ns
			V_{CC}=6.0V	-	-	16	ns
pulse width	t_W	CP HIGH or LOW; see Figure 8	V_{CC}=2.0V	100	-	-	ns
			V_{CC}=4.5V	20	-	-	ns

			V_{CC}=6.0V	17	-	-	ns
		$\overline{MR}$ LOW; see Figure 10	V_{CC}=2.0V	100	-	-	ns
			V_{CC}=4.5V	20	-	-	ns
			V_{CC}=6.0V	17	-	-	ns
recovery time	t_{rec}	$\overline{MR}$ to CP; see Figure 10	V_{CC}=2.0V	125	-	-	ns
			V_{CC}=4.5V	25	-	-	ns
			V_{CC}=6.0V	21	-	-	ns
set-up time	t_{su}	Dn to CP; see Figure 11	V_{CC}=2.0V	100	-	-	ns
			V_{CC}=4.5V	20	-	-	ns
			V_{CC}=6.0V	17	-	-	ns
		$\overline{PE}$ to CP; see Figure 11	V_{CC}=2.0V	170	-	-	ns
			V_{CC}=4.5V	34	-	-	ns
			V_{CC}=6.0V	29	-	-	ns
		CEP, CET to CP; see Figure 12	V_{CC}=2.0V	250	-	-	ns
			V_{CC}=4.5V	50	-	-	ns
			V_{CC}=6.0V	43	-	-	ns
hold time	t_h	Dn to CP; see Figure 11	V_{CC}=2.0V	0	-	-	ns
			V_{CC}=4.5V	0	-	-	ns
			V_{CC}=6.0V	0	-	-	ns
		$\overline{PE}$ to CP; see Figure 11	V_{CC}=2.0V	0	-	-	ns
			V_{CC}=4.5V	0	-	-	ns
			V_{CC}=6.0V	0	-	-	ns
		CEP, CET to CP; see Figure 12	V_{CC}=2.0V	0	-	-	ns
			V_{CC}=4.5V	0	-	-	ns
			V_{CC}=6.0V	0	-	-	ns
maximum frequency	f_{max}	CP; see Figure 8	V_{CC}=2.0V	4.8	-	-	MHz
			V_{CC}=4.5V	24	-	-	MHz
			V_{CC}=6.0V	28	-	-	MHz

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] t_t is the same as t_{THL} and t_{TLH}.

3.3.6、AC Characteristics 3

(T_{amb}=-40℃ to +125℃, GND=0V; t_r=t_f=6ns; C_L=50pF, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay	t_{pd}	CP to Qn; see Figure 8[1]	V_{CC}=2.0V	-	-	280	ns
			V_{CC}=4.5V	-	-	56	ns
			V_{CC}=6.0V	-	-	48	ns
		CP to TC; see Figure 8	V_{CC}=2.0V	-	-	325	ns
			V_{CC}=4.5V	-	-	65	ns
			V_{CC}=6.0V	-	-	55	ns
		CET to TC; see Figure 9	V_{CC}=2.0V	-	-	225	ns
			V_{CC}=4.5V	-	-	45	ns
			V_{CC}=6.0V	-	-	38	ns
High to LOW propagation delay	t_{PHL}	$\overline{MR}$ to Qn; see Figure 10	V_{CC}=2.0V	-	-	315	ns
			V_{CC}=4.5V	-	-	63	ns
			V_{CC}=6.0V	-	-	54	ns
		$\overline{MR}$ to TC; see Figure 10	V_{CC}=2.0V	-	-	330	ns
			V_{CC}=4.5V	-	-	66	ns
			V_{CC}=6.0V	-	-	56	ns
transition time	t_t	see Figure 8 and Figure 9[2]	V_{CC}=2.0V	-	-	110	ns
			V_{CC}=4.5V	-	-	22	ns
			V_{CC}=6.0V	-	-	19	ns
pulse width	t_W	CP HIGH or LOW; see Figure 8	V_{CC}=2.0V	120	-	-	ns
			V_{CC}=4.5V	24	-	-	ns
			V_{CC}=6.0V	20	-	-	ns
		$\overline{MR}$ LOW; see Figure 10	V_{CC}=2.0V	120	-	-	ns
			V_{CC}=4.5V	24	-	-	ns
			V_{CC}=6.0V	20	-	-	ns
recovery time	t_{rec}	$\overline{MR}$ to CP; see Figure 10	V_{CC}=2.0V	150	-	-	ns
			V_{CC}=4.5V	30	-	-	ns
			V_{CC}=6.0V	26	-	-	ns
set-up time	t_{su}	Dn to CP; see Figure 11	V_{CC}=2.0V	120	-	-	ns
			V_{CC}=4.5V	24	-	-	ns
			V_{CC}=6.0V	20	-	-	ns
		$\overline{PE}$ to CP; see Figure 11	V_{CC}=2.0V	205	-	-	ns
			V_{CC}=4.5V	41	-	-	ns

			V_{CC}=6.0V	35	-	-	ns
		CEP, CET to CP; see Figure 12	V_{CC}=2.0V	300	-	-	ns
			V_{CC}=4.5V	60	-	-	ns
			V_{CC}=6.0V	51	-	-	ns
hold time	t_h	Dn to CP; see Figure 11	V_{CC}=2.0V	0	-	-	ns
			V_{CC}=4.5V	0	-	-	ns
			V_{CC}=6.0V	0	-	-	ns
		$\overline{PE}$ to CP; see Figure 11	V_{CC}=2.0V	0	-	-	ns
			V_{CC}=4.5V	0	-	-	ns
			V_{CC}=6.0V	0	-	-	ns
		CEP, CET to CP; see Figure 12	V_{CC}=2.0V	0	-	-	ns
			V_{CC}=4.5V	0	-	-	ns
			V_{CC}=6.0V	0	-	-	ns
maximum frequency	f_{max}	CP; see Figure 8	V_{CC}=2.0V	4.0	-	-	MHz
			V_{CC}=4.5V	20	-	-	MHz
			V_{CC}=6.0V	24	-	-	MHz

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] t_t is the same as t_{THL} and t_{TLH}.

4、Testing Circuit

4.1、AC Testing Circuit

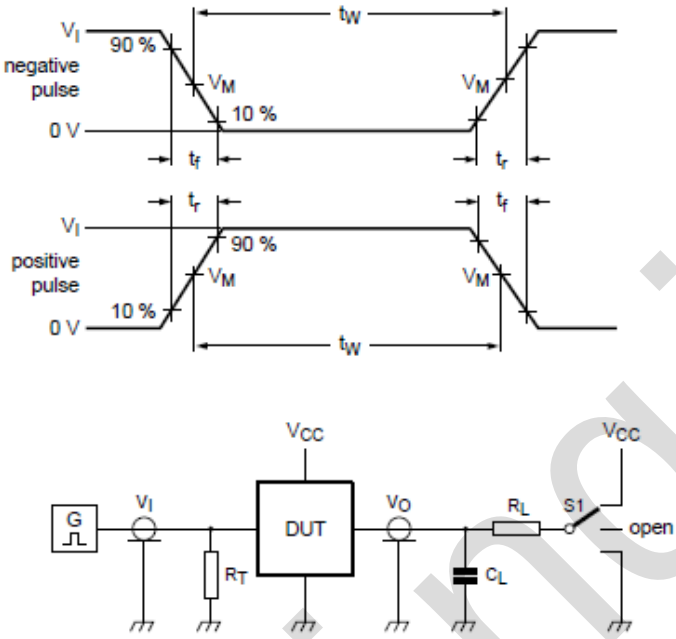


Figure 7. Test circuit for measuring switching times

Definitions for test circuit:

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.

R_L=Load resistance.

S1=Test selection switch

4.2、AC Testing Waveforms

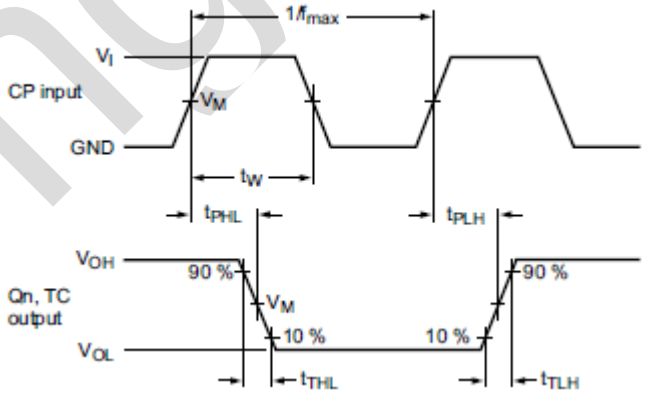


Figure 8. The clock (CP) to outputs (Qn, TC) propagation delays, pulse width, output transition times and maximum frequency

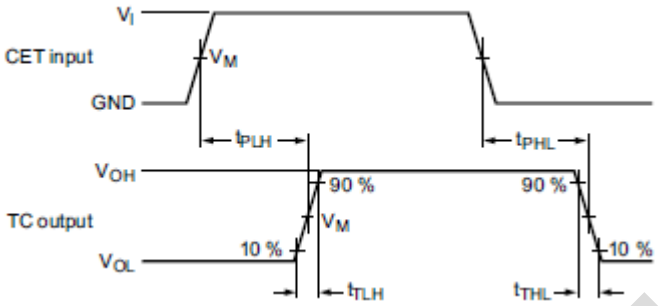


Figure 9. The count enable carry input (CET) to terminal count output (TC) propagation delays and output transition times

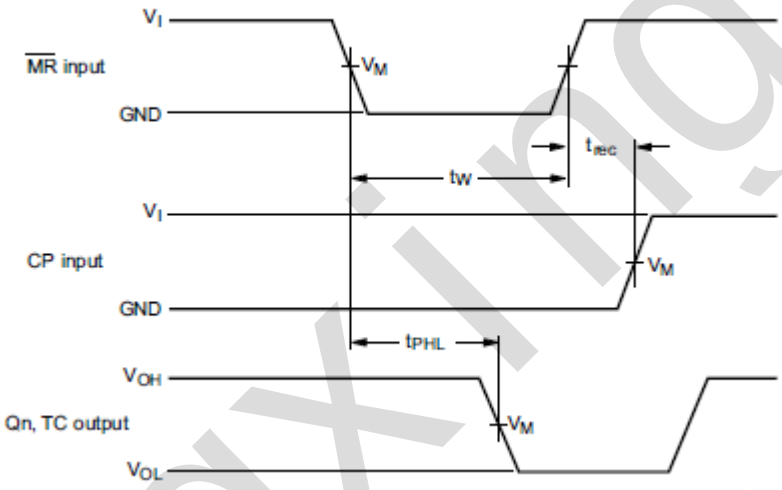


Figure 10. The master reset ($\overline{MR}$) pulse width, master reset to output (Qn, TC) propagation delays, and the master reset to clock (CP) recovery times

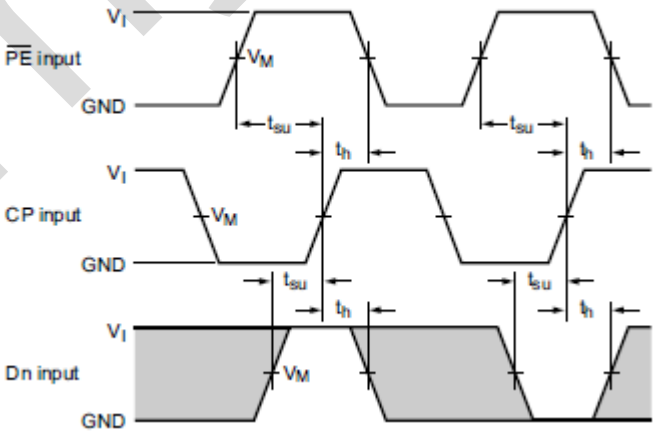


Figure 11. The data input (Dn) and parallel enable input ($\overline{PE}$) set-up and hold times

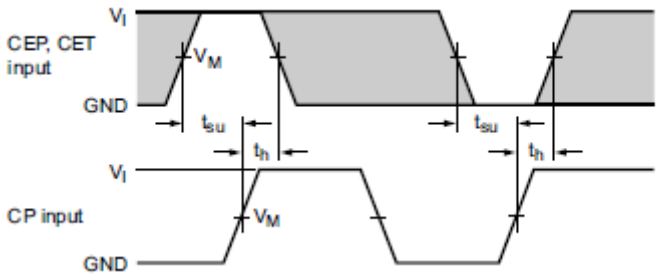


Figure 12. The count enable input (CEP) and count enable carry input (CET) set-up and hold times

4.3、Measurement Points

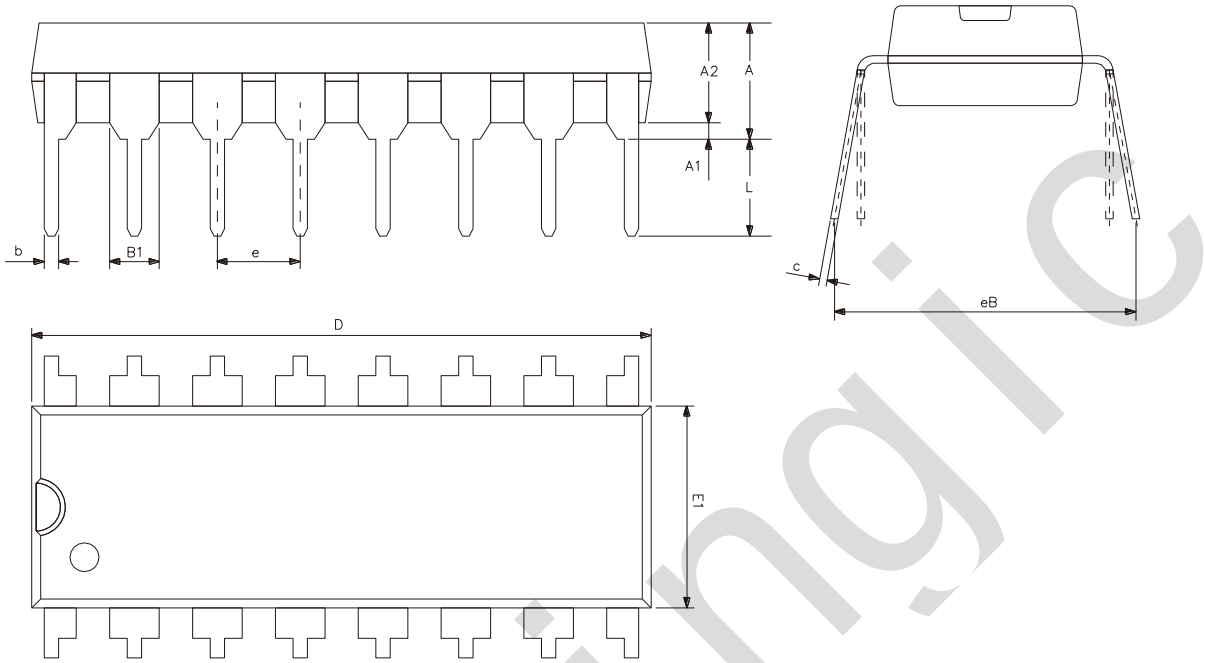
Input		Output
V_I	**V_M**	**V_M**
GND to V_{CC}	$0.5\times V_{CC}$	$0.5\times V_{CC}$

4.4、Test Data

Input		Load		S1 position
V_I	**t_r , t_f**	**C_L**	**R_L**	**t_{PHL}, t_{PLH}**
V_{CC}	6ns	15pF, 50pF	1kΩ	open

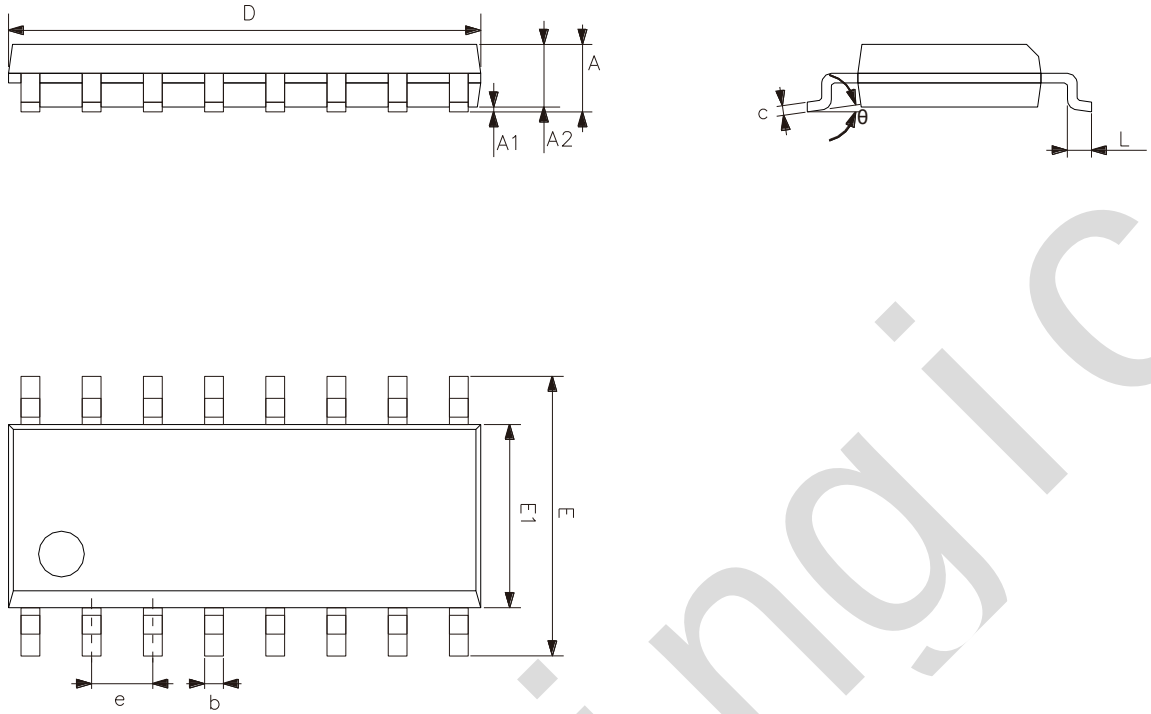
5、Package Information

5.1、DIP16



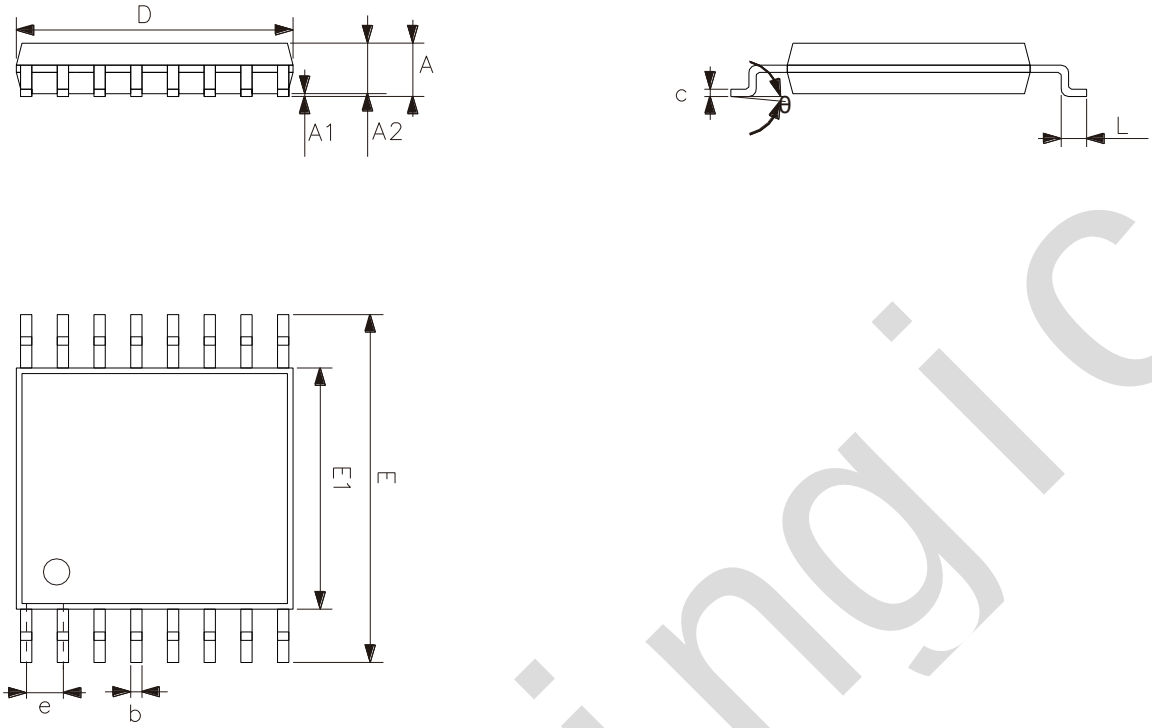
Symbol	Dimensions (mm)	
	Min.	Max.
A2	3.20	3.60
A1	0.51	-
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30

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

We Recommend you to read this chapter carefully before using this product.

The information in this chapter is provided for reference only and lingxing disclaims any express or implied warranties, including but not limited to applicability, special application or non-infringement of third party rights.

This product is not suitable for critical equipment such as life-saving, life-sustaining or safety equipment. It is also not suitable for applications that may result in personal injury, death, or serious property or environmental damage due to product malfunction or failure. Lingxing will not be liable for any damages incurred by the customers at their own risk for such applications.

The customer is responsible for conducting all necessary tests lingxing's application to avoid failure in the application or the application of the customer' s third party users. Lingxing does not accept any liability.

The Company reserves the right to change or improve the information published in this chapter at any time. The information in this chapter are subject to change without notice. We recommend the customer to consult our sales staff before purchasing.

Please obtain related materials form lingxing's regular channels and we are not responsible for its content if it is provided by sources other than our company.

In case of any conflict between the Chinese and English version, the version is subject to the Chinese one.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Counter ICs ***category:***

Click to view products by lingxingic ***manufacturer:***

Other Similar products are found below :

CD4018BE CD4033BE CD4060BE CD4040BE NLV14040BDR2G RFDIP1607ALM9T21 RFDIP1606L708D1T RFTIP2510T12A8Q1C 74HC161DT CD4028BM/TR CD4060DM/TR CD4022BE CD4060DMT/TR CD4020BE CD4060BMT/TR 74HC192M/TR CD4020BMT/TR CD4017CMT/TR 74HC193M/TR CD4017CM/TR AiP74HC193SA16.TB CD4518BM/TR CD4060TA16.TB CD4060DE CD4017CN CD4017BMT/TR U74HC4060G-S16-R CD4017SA.TB XD74LS160 CD4017BM-MS CD4022BM/TR CD4022BMT/TR CD4028BDRG CD4060BDRG CD4017DA.TB CD4520BDRG CD4520BM(LX) CD4518BM(LX) SN74HC393DR(LX) SN74HC393N(LX) CD4060BM(LX) CD4060BE(LX) CD4518BE(LX) CD4520BE(LX) SN74HC192N(XBLW) CD4040BM(LX) CD4026BM(LX) CD40103BDR(LX) SN74LS192DR(LX) SN74HC161DR (LX)