SN74LS90N

■ Product Introduction

The SN74LS90N is a Decade counters, consisting of 3 JK flip flops and a RS trigger. With 4 input reset enable terminals, multi chip cascade can be easily realized

■ Product Features

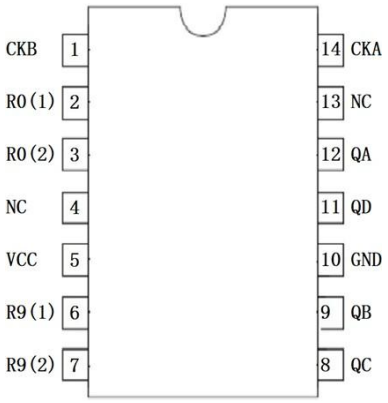
- 10 binary BCD Decade counters, or 5 binary permutation code
- Fully compatible with TTL/DTL input and output logic level
- Package : DIP14, SOP14

■ Product Applications

- Digital count logic driver
- Industrial control applications
- Other application areasBattery-powered equipment

■ Package and Pin Assignment

SOP14 or DIP14.			
Pin NO	Pin Definition	Pin NO	Pin Definition
1	Input CKB	14	Input CKA
2	Input R0(1)	13	NC
3	Input R0(2)	12	Output Q_A
4	NC	11	Output Q_D
5	Supply VCC	10	Supply GND
6	Input R9(1)	9	Output Q_B
7	Input R9(2)	8	Output Q_C

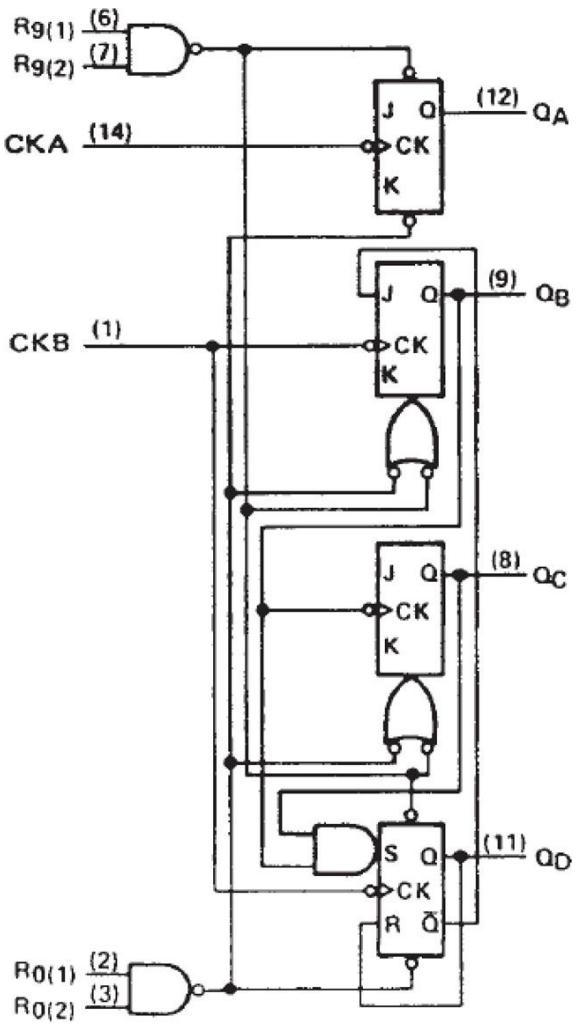


■ Absolute Maximum Ratings

Item	Symbol	Maximum Ratings	Unit
Supply voltage	V_{CC}	7	V
Input voltage	V_I	7	V
Power dissipation	P_D	500	mW
Operating temperature	T_A	0-70	℃
Storage temperature	T_S	-65-150	℃
welding temperature	T_W	260	℃,10s

Note: the limit parameter is the limit value that cannot be exceeded under any condition. Once this limit is exceeded, it may cause physical damage such as deterioration of the product. At the same time, the chip can not be guaranteed to work properly when it is close to the limit parameters.

■ Block Diagram



Reset enable input logic table：

RESET INPUTS				OUTPUT			
$R_{0(1)}$	$R_{0(2)}$	$R_{9(1)}$	$R_{9(2)}$	Q_D	Q_C	Q_B	Q_A
H	H	L	X	L	L	L	L
H	H	X	L	L	L	L	L
X	X	H	H	H	L	L	H
X	L	X	L	COUNT			
L	X	L	X	COUNT			
L	X	X	L	COUNT			
X	L	L	X	COUNT			

H; high level, L; low level, X; irrelevant

Clock CKA/CKB rising edge effective

■ Function Table

BCD code : QA connected to CKB

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H

Quinary: QD connected to CKA

COUNT	OUTPUT			
	Q_A	Q_D	Q_C	Q_B
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	H	L	L	L
6	H	L	L	H
7	H	L	H	L
8	H	L	H	H
9	H	H	L	L

Recommended Operating Conditions

Item	Symbol	Min	Tpy	Max	Unit
Supply voltage	V_{CC}	4.75	5	5.25	V
Output current	I_{OH}	—	—	-400	uA
	I_{OL}	—	—	8	mA
Operating temperature	T_A	0	—	60	℃

Electrical Characteristics

(T_A=25℃, Unless specified)

Item		Symbol	Min	Tpy	Max	Unit	Conditions	
Input voltage		V_{IH}	2	—	—	V		
		V_{IL}	—	—	0.7	V		
Output voltage		V_{OH}	2.7	3.5	—	V	I_{OH}=-400uA	VCC=4.75V,V_{IH}=2V, V_{IL}=0.7V
		V_{OL}	—	0.25	0.4	V	I_{OL}=4mA	
			—	0.35	0.5		I_{OL}=8mA	
Input current	Reset	I_{IH}	—	0.01	20	uA	VCC=5.25V, V_I=2.7V	
	CKA		—	0.01	40			
	CKB		—	0.01	80			
Input current	Reset	I_{IL}	—	0.25	-0.4	mA	VCC=5.25V, V_I=0.4V	
	CKA		—	0.55	-2.4			
	CKB		—	1.0	-3.2			
Input current	Reset	I_I	—	0.1	100	uA	VCC=5.25V, V_I=7V	
	CKA		—	0.1	200	uA	VCC=5.25V, V_I=5.5V	
	CKB		—	0.1	400			
Short-circuit output current *		I_{OS}	-20		-100	mA	VCC=5.25V	
Supply current **		I_{CC}	—	8	15	mA	VCC=5.25V	
Input clamp voltage		V_{IK}	—	0.9	-1.5	V	VCC=4.75V, I_I =–18mA	

Notes: *: only one output port is short circuited each time, and the short circuit time is not more than one second.

**: When ICC is measured, all outputs are open, one R0 input is 4.5V and the other input is GND.

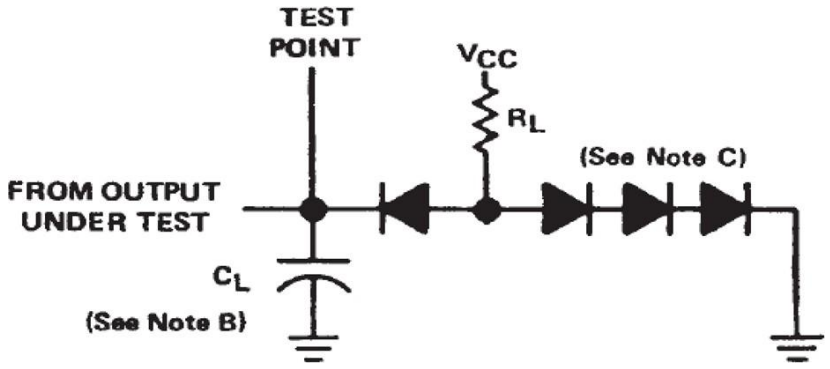
Switching Characteristics

(T_A=25℃, Unless specified)

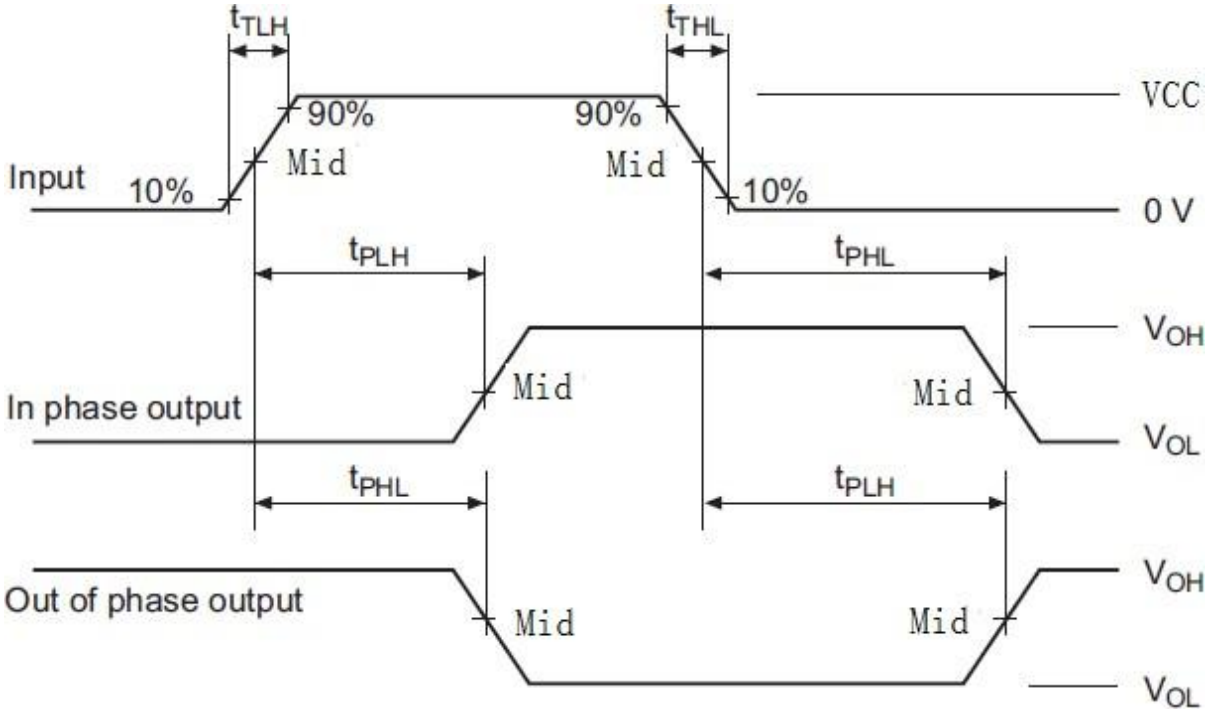
Item	Symbol	Input	Output	Min	Tpy	Max	Unit	Conditions
Propagation delay time	t_{PLH}	CKA	QA	—	28	—	ns	V_{CC}=5V C_L=16pF R_L=2K
	t_{PHL}			—	30	—	ns	
	t_{PLH}	CKA	QD	—	50	—	ns	
	t_{PHL}			—	60	—	ns	
	t_{PLH}	CKB	QB-QD	—	28	—	ns	
	t_{PHL}			—	32	—	ns	

■ Testing Method

1、Test Circuit



2、Waveform



Notes:

A. Input: port input level(CKA, CKB), f=500kHz, D=50%, tTLH=tTHL or less 20ns;

B. the CL capacitor is an external patch capacitor (0603), which is connected to the output pin and the capacitor is near the chip GND.

C. All diode models are 1S2074 (H).

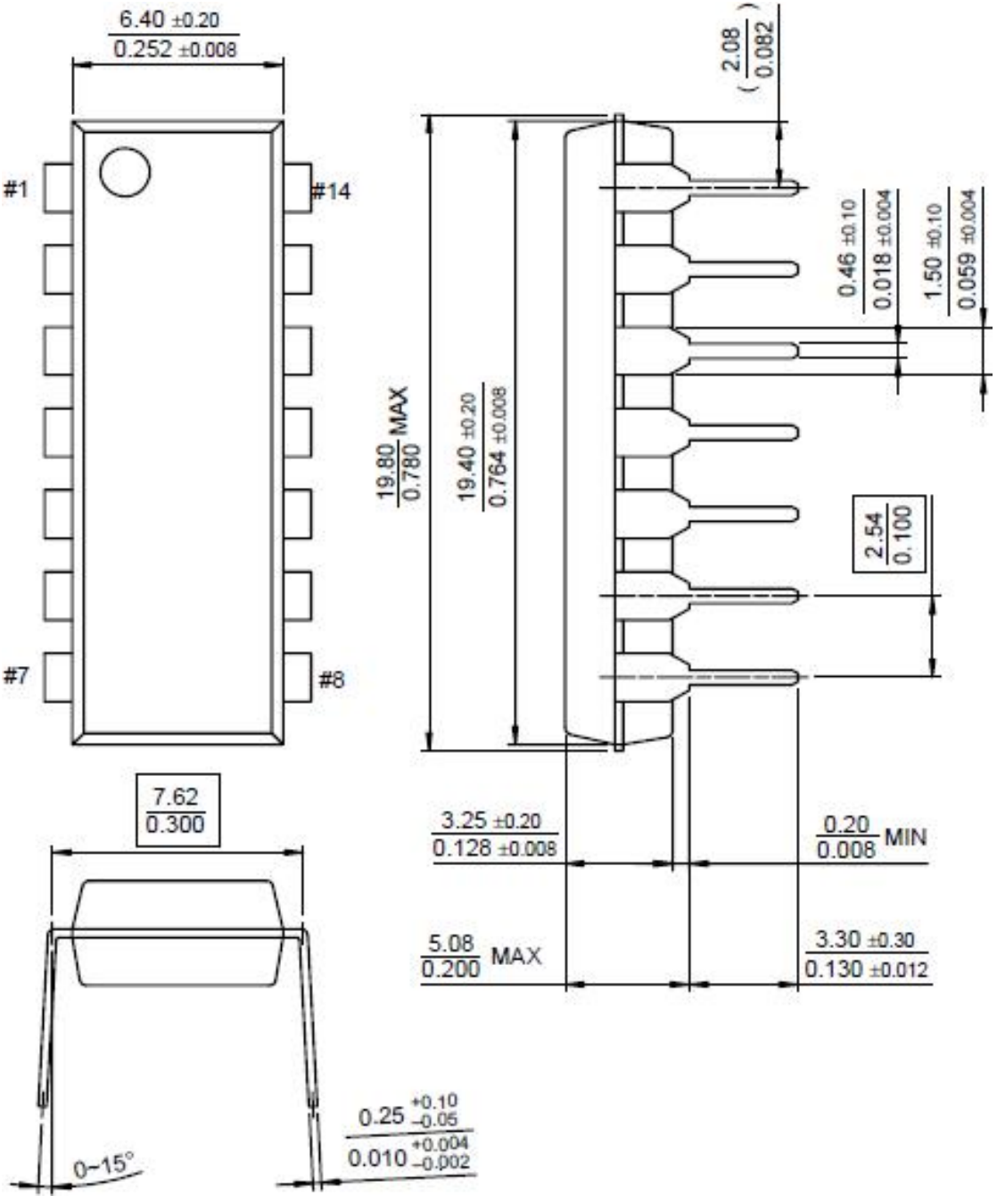
D. Output: QA toQD output test port (Out of Phase Output, In Phase Output)

E. When measuring any input terminal, the other input terminals are connected with 4.5V voltage

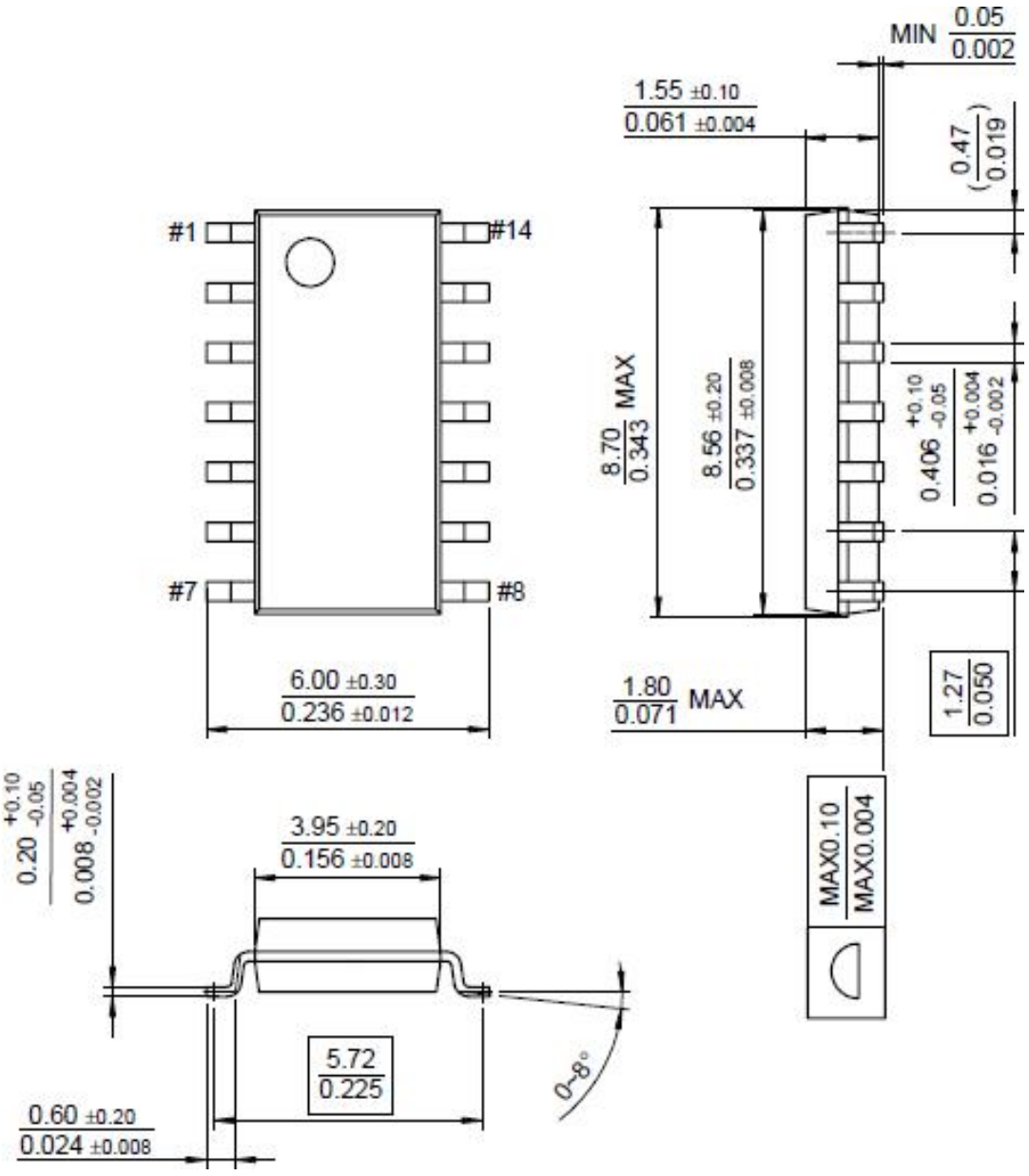
■ Package Dimensions

Unit : mm /inch

DIP14



SOP14


MIN 0.05 / 0.002
1.55 ±0.10 / 0.061 ±0.004
0.47 / 0.019
#1
#14
#7
#8
8.70 MAX / 0.343
8.56 ±0.20 / 0.337 ±0.008
0.406 +0.10 -0.05 / 0.016 +0.004 -0.002
6.00 ±0.30 / 0.236 ±0.012
1.80 / 0.071 MAX
1.27 / 0.050
0.20 +0.10 -0.05 / 0.008 +0.004 -0.002
3.95 ±0.20 / 0.156 ±0.008
MAX0.10 / MAX0.004
5.72 / 0.225
0~8°
0.60 ±0.20 / 0.024 ±0.008