

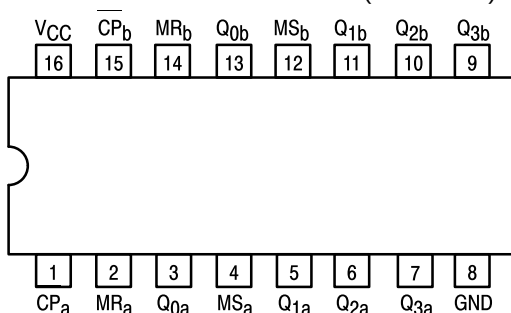


DUAL DECADE COUNTER

The SN54/74LS490 contains a pair of high-speed 4-stage ripple counters. Each half of the SN54/74LS490 has individual Clock, Master Reset and Master Set (Preset 9) inputs. Each section counts in the 8, 4, 2, 1 BCD code.

- Dual Version of SN54/74LS490
- Individual Asynchronous Clear and Preset to 9 for Each Counter
- Count Frequency — Typically 65 MHz
- Input Clamp Diodes Limit High-Speed Termination Effects

CONNECTION DIAGRAM DIP (TOP VIEW)



PIN NAMES

MS Master Set (Set to 9) Input
 MR Master Reset
 CP Clock Input (Active LOW Going Edge)
 Q0–Q3 Counter Outputs (Note b)

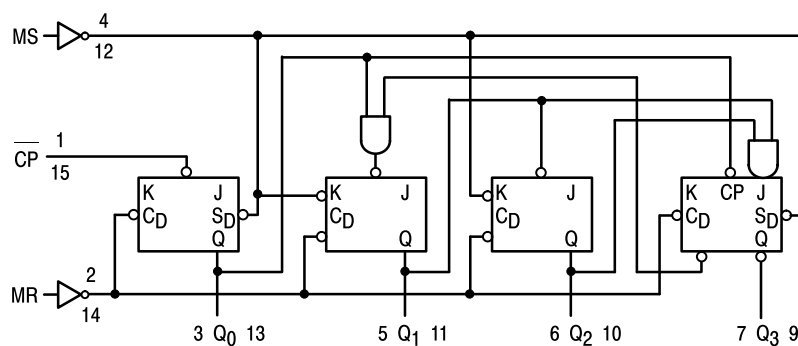
LOADING (Note a)

	HIGH	LOW
MS	0.5 U.L.	0.25 U.L.
MR	0.5 U.L.	0.25 U.L.
CP	1.5 U.L.	1.5 U.L.
Q0–Q3	10 U.L.	5 (2.5) U.L.

NOTES:

- a) 1 TTL Unit Load (U.L.) = 40 μ A HIGH/1.6 mA LOW.
 b) The Output LOW drive factor is 2.5 U.L. for Military (54) and 5 U.L. for Commercial (74) Temperature Ranges.

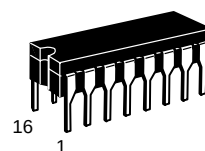
LOGIC DIAGRAM (ONE HALF SHOWN)



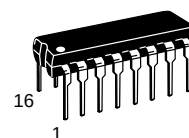
SN54/74LS490

DUAL DECADE COUNTER

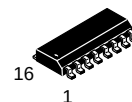
LOW POWER SCHOTTKY



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08



D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

SN54LSXXXJ Ceramic
 SN74LSXXXN Plastic
 SN74LSXXXD SOIC

TRUTH TABLE

COUNT	OUTPUTS			
	Q3	Q2	Q1	Q0
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

SN54/74LS490

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V _{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T _A	Operating Ambient Temperature Range	54 74	− 55 0	25 25	125 70	°C
I _{OH}	Output Current — High	54, 74			−0.4	mA
I _{OL}	Output Current — Low	54 74			4.0 8.0	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits			Unit	Test Conditions
			Min	Typ	Max		
V _{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V _{IL}	Input LOW Voltage	54			0.7	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.8		
V _{IK}	Input Clamp Diode Voltage			−0.65	−1.5	V	V _{CC} = MIN, I _{IN} = −18 mA
V _{OH}	Output HIGH Voltage	54	2.5	3.5		V	V _{CC} = MIN, I _{OH} = MAX, V _{IN} = V _{IH} or V _{IL} per Truth Table
		74	2.7	3.5		V	
V _{OL}	Output LOW Voltage	54, 74		0.25	0.4	V	I _{OL} = 4.0 mA
		74		0.35	0.5	V	I _{OL} = 8.0 mA
I _{IH}	Input HIGH Current				20	μA	V _{CC} = MAX, V _{IN} = 2.7 V
					0.1	mA	V _{CC} = MAX, V _{IN} = 7.0 V
I _{IL}	Input LOW Current	MS, MR			−0.4	mA	V _{CC} = MAX, V _{IN} = 0.4 V
		Clock			−1.6		
I _{OS}	Short Circuit Current (Note 1)		−20		−100	mA	V _{CC} = MAX
I _{CC}	Power Supply Current				26	mA	V _{CC} = MAX

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

AC SET-UP REQUIREMENTS (T_A = 25°C, V_{CC} = 5.0 V)

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
t _W	Any Pulse Width	20			ns	V _{CC} = 5.0 V
t _S	MR or MS to Setup Time	25			ns	

SN54/74LS490

AC CHARACTERISTICS (T_A = 25°C)

Symbol	Parameter	Limits			Unit	Test Conditions	
		Min	Typ	Max			
f _{MAX}	Maximum Clock Frequency	25	35		MHz	Figure 1	V _{CC} = 5.0 V, C _L = 15 pF
t _{PLH} t _{PHL}	Propagation Delay, $\overline{\text{CP}}$ to Q ₀		12 13	20 20	ns	Figure 1	
t _{PLH} t _{PHL}	Propagation Delay, $\overline{\text{CP}}$ to Q ₁ or Q ₃		24 26	39 39	ns	Figure 3	
t _{PLH} t _{PHL}	Propagation Delay, $\overline{\text{CP}}$ to Q ₂		32 36	54 54	ns	Figure 2	
t _{PHL}	Propagation Delay, MR to Output		24	39	ns	Figure 2	
t _{PLH} t _{PHL}	Propagation Delay, MS to Output		24 20	39 36	ns	Figure 2	

AC WAVEFORMS

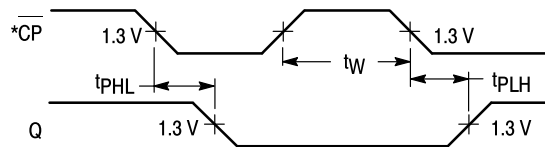


Figure 1

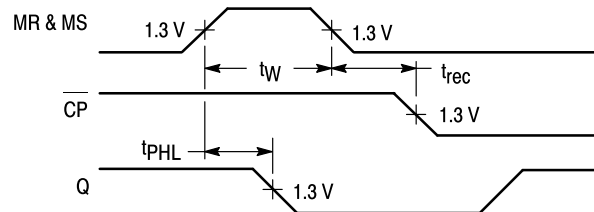


Figure 2

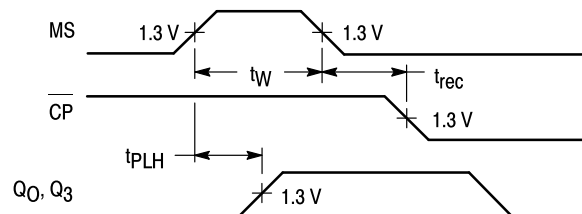
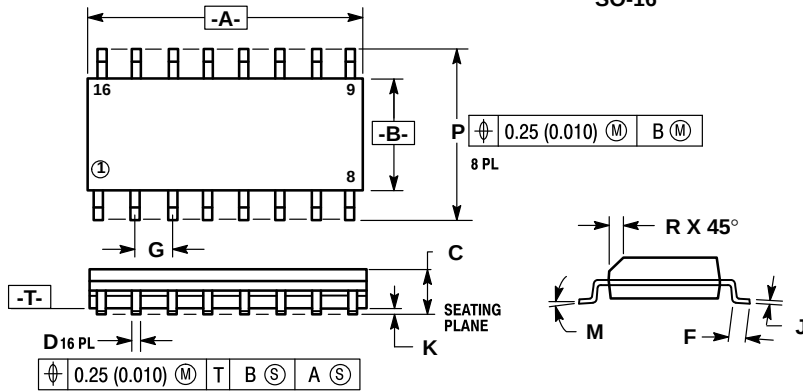


Figure 3

*The number of Clock Pulses required between the t_{PHL} and t_{PLH} measurements can be determined from the Truth Table.

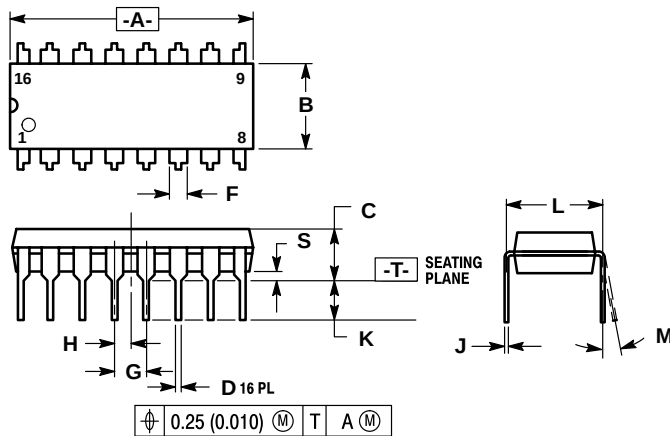
Case 751B-03 D Suffix
16-Pin Plastic
SO-16



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. 751B-01 IS OBSOLETE, NEW STANDARD 751B-03.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

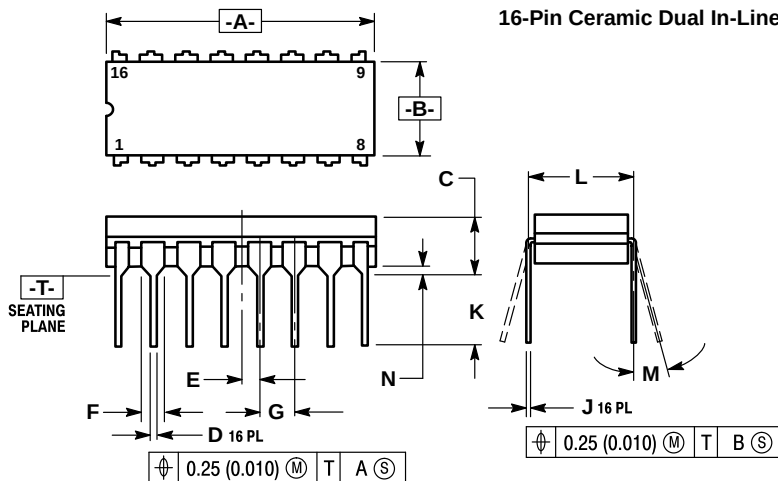
Case 648-08 N Suffix
16-Pin Plastic



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
 4. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
 5. ROUNDED CORNERS OPTIONAL.
 6. 648-01 THRU -07 OBSOLETE, NEW STANDARD 648-08.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	19.55	0.740	0.770
B	6.35	6.85	0.250	0.270
C	3.69	4.44	0.145	0.175
D	0.39	0.53	0.015	0.021
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.27 BSC		0.050 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.30	0.110	0.130
L	7.50	7.74	0.295	0.305
M	0°	10°	0°	10°
S	0.51	1.01	0.020	0.040

Case 620-09 J Suffix
16-Pin Ceramic Dual In-Line



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
 4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
 5. 620-01 THRU -08 OBSOLETE, NEW STANDARD 620-09.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.55	0.750	0.770
B	6.10	7.36	0.240	0.290
C	—	4.19	—	0.165
D	0.39	0.53	0.015	0.021
E	1.27 BSC		0.050 BSC	
F	1.40	1.77	0.055	0.070
G	2.54 BSC		0.100 BSC	
J	0.23	0.27	0.009	0.011
K	—	5.08	—	0.200
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.39	0.88	0.015	0.035

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