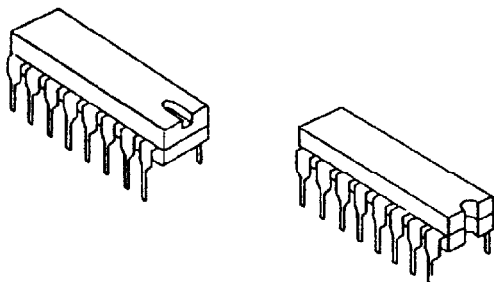


BRITISH STANDARDS INSTITUTION 2 PARK STREET, LONDON. W1A 2BS		BS CECC 90103-180 ISSUE 1 SEPTEMBER 1982	
SPECIFICATION AVAILABLE FROM:- As shown in PD 9002 AND CECC 00 200 AND TEXAS INSTRUMENTS LIMITED, MANTON LANE, BEDFORD, MK41 7PA		 Page 1 of 19 Pages	
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH:- BS CECC 90 000 : 1982 BS CECC 90 100 : 1977			
Outline not to scale. Isometric projection Marking information see Clause 1 		MANUFACTURERS TYPE NUMBER 54LS490 64LS490 74LS490 84LS490 SEE PD 9002 AND CECC 00 200 For ordering information see Clause 1	
		DUAL 4-BIT DECADE COUNTERS WITH SET-TO-9 AND CLEAR INPUTS	
		TYPICAL CONSTRUCTION SILICON MONOLITHIC BIPOLAR LOW-POWER SCHOTTKY TTL	
For detail dimensions: BS 3934 S0-87C		ASSESSMENT LEVELS R, S, T AND V	

1. TYPE DESCRIPTION

1.1. Truth table (see Page 2)

REFER TO QUALIFIED PRODUCTS LIST PD 9002 AND/OR CECC 00 200
 FOR DETAILS OF MANUFACTURERS APPROVED TO THIS SPECIFICATION

1.1. Truth Table (cont'd)

BCD COUNT SEQUENCE
(EACH COUNTER)

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

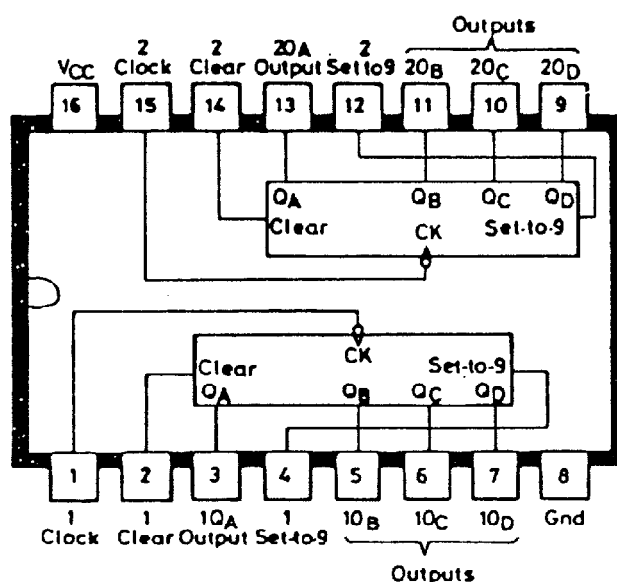
CLEAR/SET-TO-9
(EACH COUNTER)

INPUTS		OUTPUTS			
CLEAR	SET-TO-9	Q _A	Q _B	Q _C	Q _D
H	L	L	L	L	L
L	H	H	L	L	H
L	L	COUNT INDETERMINATE			
H	H				

H = HIGH state
L = LOW state

1.2. Terminal Identification, Type Designation and Marking

1.2.1. Terminal Identification



Dual decade counter

1.2.2 Type designation

TEMPERATURE RANGE	PACKAGE		
	Ceramic Dual-in-Line	Plastic Dual-in-Line	Ceramic Flatpack
0 + 70	74LS490J	N	W
-25 + 85	84LS490J		
-40 + 85	64LS490J		
-55 +125	54LS490J		

1.2.3 Marking

Each integrated circuit shall bear the following markings:

- (1) Terminal identification
- (2) Type designation
- (3) Date code
- (4) Factory identification code (unless derived from trademark)
- (5) Manufacturers trade name or mark
- (6) Mark of conformity (unless a certificate of conformity is used)

1.3 Ordering information

Orders for these integrated circuits shall contain the following minimum information:

Manufacturers integrated circuit type designation screening procedures and assessment levels as detailed to this CECC specification number.

(For details of screening procedures see Appendix A1.1)

2. Limiting conditions of use (not for inspection purposes)

2.1	Maximum continuous supply voltage	V_{CC}	-0,5V +7,0V
2.2	Maximum input voltages		
2.2.1	Maximum input voltage	V_I	-0,5V +7,0V +5,5V +5,5V
2.2.2	Maximum input voltage between multiple emitter transistor inputs	V_{II}	

2.3	Minimum and maximum operating ambient temperatures	$T_{amb}(^{\circ}C)$	min. -55 max. +125	-40 +85	0 +70	-25 +85
2.4	Minimum and maximum storage temperatures	$T_{stg}(^{\circ}C)$	min. -65 max. +150	(All types)		

3. Recommended operating conditions and associated characteristics (not for inspection purposes)

3.1 Recommended operating conditions.

These apply over the operating ambient temperature range unless otherwise stated.

Description	Symbol	Type	Value	Unit
Positive supply voltage range	V_{CC}	54LS 64/74/84LS	4,5 - 5,5 4,75 - 5,25	V V
Minimum value of High level input voltage	V_{IHB}	All types	2,0	V
Maximum value of High level input voltage	V_{IHA}	All types	5,5	V
Minimum value of Low level input voltage	V_{ILB}	All types	-0,3	V
Maximum value of Low level input voltage	V_{ILA}	54LS 64/74/84LS	0,7 0,8	V V
Maximum value of Low level output current for each output	I_{OLA}	54LS 64/74/84LS	4,0 8,0	mA mA
Maximum value of output current for each output at V_{OH}	I_{OHA}	All types	-400,0	μA
D.C. noise margin at Low level ($V_{ILA} - V_{OLA}$) at High level ($V_{OHB} - V_{IHB}$)	V_{NL} V_{NH}	All types 54LS 64/74/84LS	0,3 0,5 0,7	V V V

3.2 Associated characteristics

3.2.1 Minimum and maximum values are given for the worst case operation over the ambient temperature range, except for those conditions marked with an asterisk (*)

	54LS	64LS	74LS	84LS	
T _{amb} min.	-55	-40	0	-25	°C
T _{amb} max.	+125	+85	+70	+85	
V _{CC} min.	4,5	4,75			V
V _{CC} max.	5,5	5,25			

3.2.2

Characteristics	Conditions	$V_{CC}(V)$	Symbol	Min.	Max.	Unit
Total supply current per package	Outputs open circuit Clear inputs 4,5V then grounded. Other inputs grounded.	$V_{CC} \text{ max.}$	I_{CC}	-	26,0	mA
High level input current Clear and Set to 9 Clock Input	$V_{IN(1)} = 7,0V \text{ (1)}$ Other inputs = 0V	$V_{CC} \text{ max.}$	$I_{IH(1)}$	-	0,1	mA
	$V_{IN(1)} = 5,5V$		$I_{IH(1)}$	-	0,2	mA
	$V_{IN(2)} = 2,7V \text{ (1)}$ Other inputs = 0V		$I_{IH(2)}$	-	20,0	μA
			$I_{IH(2)}$	-	100,0	μA
Low level input current	$V_{IN} = 0,4V \text{ (1)}$ Other inputs = 4,5V	$V_{CC} \text{ max.}$	$-I_{IL}$	-	0,4	mA
			$-I_{IL}$	-	1,6	mA

(1) To each input in turn

3.2.2 (contd)

Characteristics	Conditions	$V_{CC}(V)$	Symbol	Min.	Max.	Unit
Input clamping voltage	$-I_{IC} = 18,0mA$	V_{CC} min.	$-V_{ICA}$	-	1,5	V
Output voltage 54LS	$I_{OH} = -400,0\mu A$	V_{CC} min.	V_{OH}	2,5	-	V
64/74/84LS	$I_{OH} = -400,0\mu A$		V_{OH}	2,7	-	V
All types	$I_{OL(1)} = 4,0mA$ (2)		$V_{OL(1)}$	-	0,4	V
64/74/84LS	$I_{OL(2)} = 8,0mA$ (3)		$V_{OL(2)}$	-	0,5	V
Output short circuit current	$V_{IN} = V_{ILA}^*$ or V_{IHB}^* as appropriate† $V_O = 0V$ or $4,5V$ (4)	V_{CC} max.	$-I_{OS}$	20,0	100,0	mA
Propagation times All types	$T_{amb} = 25^{\circ}C^*$ test conditions as in Sub-group A5	5,0V				
From To			t_{PHL}			
Clock Q_A				-	20,0	ns
'Clock Q_C				-	54,0	ns
Clock Q_B, Q_D				-	39,0	ns
Clear Any				-	39,0	ns
Set to 9 Q_B, Q_C				-	36,0	ns
			t_{PLH}			
Clock Q_A				-	20,0	ns
Clock Q_C				-	54,0	ns
Clock Q_B, Q_D				-	39,0	ns
Set to 9 Q_A, Q_D				-	39,0	ns
Maximum clock frequency			f_{clock}	25,0	-	MHz
Duration of input pulse Any Input			t_p	20,0	-	ns

(2) Fan out = 10, (3) Fan out = 20,

(4) Only one output at a time, duration $t \leq 1$ sec

*See 3.2.1 of this specification

†Refer to truth table