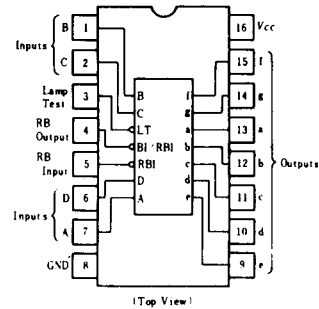


HD74LS249 • BCD-to-Seven-Segment Decoders/Drivers (with open collector outputs)

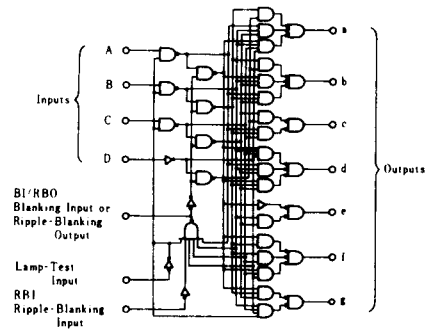
The HD74LS249 is 16-pin versions of the HD74LS49, respectively. Included in the HD74LS249 circuits is the full functional capability for lamp test and ripple blanking, which is not available in the HD74LS circuits. The HD74LS49 composes the $\overline{L}$ and $\overline{E}$ without tails and the HD74LS249 composes the $\overline{L}$ and $\overline{E}$ with tails. Composition of all other characters, including display patterns for BCD inputs above nine, is identical. The HD74LS249 features active-low outputs designed for driving indicators directly. All of the circuits have full ripple-blanking input/output controls and a lamp test input. Segment identification and resultant displays are shown below. Display patterns for BCD input counts above 9 are unique symbols to authenticate input conditions. This circuit incorporates automatic leading and/or trailing-edge zero-blanking control (RBI and RBO).

Lamp test (LT) of this type may be performed at any time when the BI/RBO node is at a high level. This type contains an overriding blanking input (BI) which can be used to control the lamp intensity by pulsing or to inhibit the outputs.

PIN ARRANGEMENT



BLOCK DIAGRAM

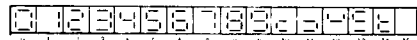


ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7.0	V
Input voltage	V_{IN}	7.0	V
Output current (off-state)	I_{OFF}	1	mA
Operating temperature range	T_{opr}	-20 ~ +75	°C
Storage temperature range	T_{stg}	-65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	Unit
Output voltage	a ~ g	V_{OH}	—	5.5	V
Output current	BI/RBO	I_{OH}	—	-50	μA
	a ~ g	I_{OL}	—	8	mA
	BI/RBO	—	—	3.2	mA



FUNCTION TABLE

Decimal or Function	Inputs						BI/RBO	Outputs							Note
	LT	RBI	D	C	B	A		a	b	c	d	e	f	g	
0	H	H	L	L	L	L	H	H	H	H	H	H	H	L	1
1	H	×	L	L	L	H	H	L	H	H	L	L	L	L	
2	H	×	L	L	H	L	H	H	H	L	H	H	L	H	
3	H	×	L	L	H	H	H	H	H	H	H	L	L	H	
4	H	×	L	H	L	L	H	L	H	H	L	L	H	H	
5	H	×	L	H	L	H	H	H	L	H	H	L	H	H	
6	H	×	L	H	H	L	H	H	H	L	H	H	H	H	
7	H	×	L	H	H	H	H	H	H	H	L	L	L	L	
8	H	×	H	L	L	L	H	H	H	H	H	H	H	H	
9	H	×	H	L	L	H	H	H	H	H	H	L	H	H	
10	H	×	H	L	H	L	H	L	L	L	H	H	L	H	
11	H	×	H	L	H	H	H	L	L	H	H	L	L	H	
12	H	×	H	H	L	L	H	L	H	L	L	L	H	H	
13	H	×	H	H	L	H	H	H	L	L	L	H	L	H	
14	H	×	H	H	H	L	H	L	L	L	H	H	H	H	
15	H	×	H	H	H	H	H	L	L	L	L	L	L	L	
BI	×	×	×	×	×	×	L	L	L	L	L	L	L	L	2
RBI	H	L	L	L	L	L	L	L	L	L	L	L	L	L	3
LT	L	×	×	×	×	×	H	H	H	H	H	H	H	H	4

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

- Notes: 1. The blanking input (BI) must be open or held at a high logic level when output functions 0 through 15 are desired.
 2. When a low logic level is applied directly to blanking input (BI), all segment outputs are low regardless of the level of any other input.

3. When ripple-blanking input (RBI) and inputs A, B, C, and D are at a low level with the lamp-test input high, all segment outputs go low and the ripple-blanking output (RBO) goes to a low level (response condition).
 4. When a blanking input/ripple blanking output (BI/RBO) is open or held high and a low is applied to the lamp-test input, all segment outputs are high.

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

Item	Symbol	Test Conditions	min	typ*	max	Unit
Input voltage	V_{IH}		2.0	—	—	V
	V_{IL}		—	—	0.8	V
Output voltage	BI/RBO	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $I_{OH}=-50\mu\text{A}$	2.4	—	—	V
Output current	a~g	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$, $V_{OH}=5.5\text{V}$	—	—	250	μA
Output voltage	BI/RBO	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$	$I_{OL}=1.6\text{mA}$	—	0.4	V
			$I_{OL}=3.2\text{mA}$	—	0.5	
	a~g	$V_{CC}=4.75\text{V}$, $V_{IH}=2\text{V}$, $V_{IL}=0.8\text{V}$	$I_{OL}=4\text{mA}$	—	0.4	
			$I_{OL}=8\text{mA}$	—	0.5	
Input current	except BI/RBO	$V_{CC}=5.25\text{V}$, $V_I=2.7\text{V}$	—	—	20	μA
	except BI/RBO	$V_{CC}=5.25\text{V}$, $V_I=0.4\text{V}$	—	—	-0.4	mA
	BI/RBO		—	—	-1.2	
	except BI/RBO	$V_{CC}=5.25\text{V}$, $V_I=7\text{V}$	—	—	0.1	mA
Short-circuit output current	BI/RBO	$V_{CC}=5.25\text{V}$	-0.3	—	-2	mA
Supply current**	I_{CC}	$V_{CC}=5.25\text{V}$	—	8	15	mA
Input clamp voltage	V_{IK}	$V_{CC}=4.75\text{V}$, $I_{IN}=-18\text{mA}$	—	—	-1.5	V

* $V_{CC}=5\text{V}$, $T_a=25^\circ\text{C}$

** I_{CC} is measured with all outputs open and all inputs at 4.5V.



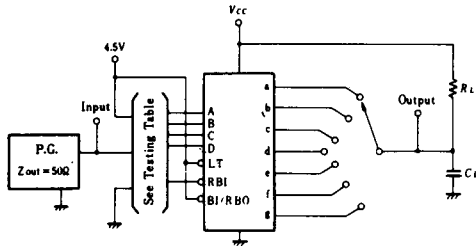
HD74LS249

■ SWITCHING CHARACTERISTICS ($V_{CC}=5V$, $T_a=25^\circ C$)

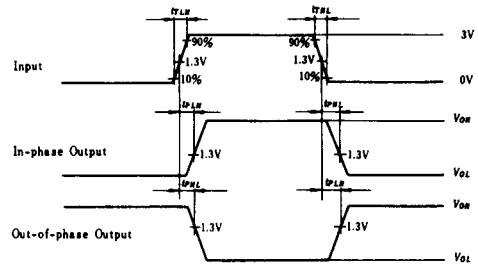
Item	Symbol	Input	Test Conditions	min	typ	max	Unit
Propagation delay time	t_{PLH}	A	$C_L=15pF$	—	—	100	ns
	t_{PHL}		$R_L=2k\Omega$	—	—	100	
	t_{PLH}	RBI	$C_L=15pF$	—	—	100	ns
	t_{PHL}		$R_L=6k\Omega$	—	—	100	

■ TESTING METHOD

1) Test Circuit



Waveform



2) Testing Table

Item	Inputs					Outputs						
	RBI	D	C	B	A	a	b	c	d	e	f	g
t_{PLH}	4.5V	GND	GND	GND	IN	OUT	—	—	OUT	OUT	OUT	—
t_{PHL}	4.5V	GND	GND	4.5V	IN	—	—	OUT	—	OUT	—	—
	4.5V	GND	4.5V	4.5V	IN	—	OUT	—	OUT	OUT	OUT	OUT
	IN	GND	GND	GND	GND	OUT	OUT	OUT	OUT	OUT	OUT	—

- Notes) 1. Input pulse: $t_{PLH} \leq 15ns$, $t_{PHL} \leq 6ns$, $PRR=1MHz$, duty cycle=50%.
2. C_L includes probe and jig capacitance.

PACKAGING INFORMATION

T-90-20

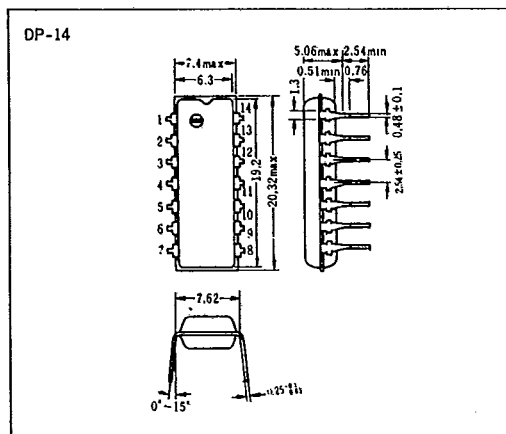
Factory orders for circuits described in this databook should include a three-part type number as explained in the following example.

HD 74LS00 P

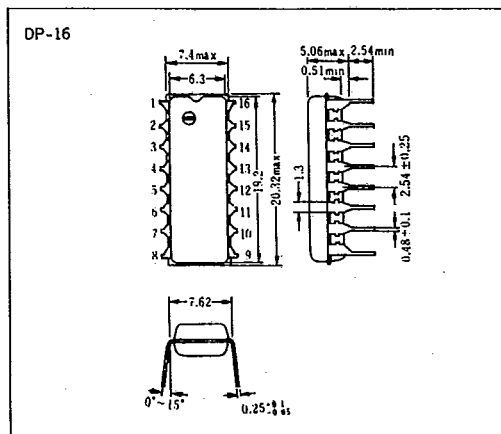
Package ; Plastic DIP ; letters P
Cerdip ; non-letters
Circuit description
Prefix : HD ; Hitachi Digital IC

■ Plastic DIP

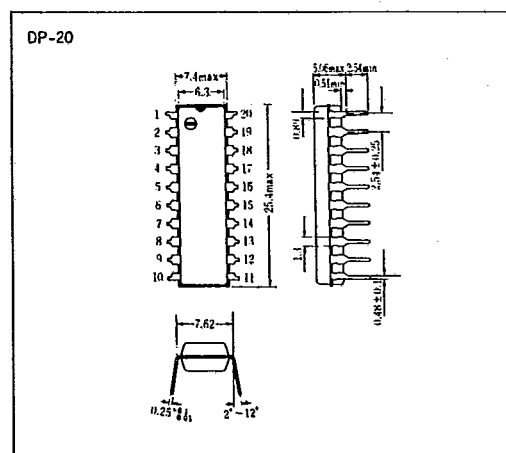
● 14 Pin



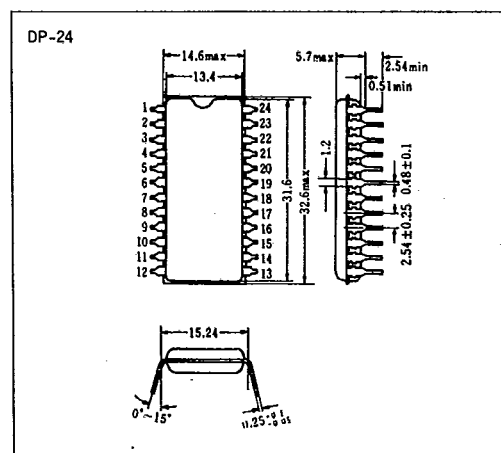
● 16 Pin



● 20 Pin



● 24 Pin



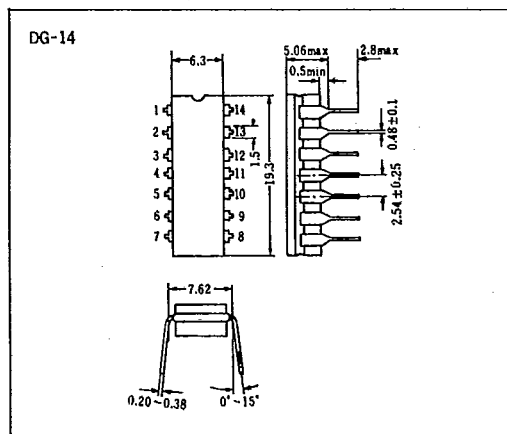
Hitachi America Ltd. • 2210 O'Toole Ave. • San Jose, CA 95131 • (408) 435-8300

T-90-20

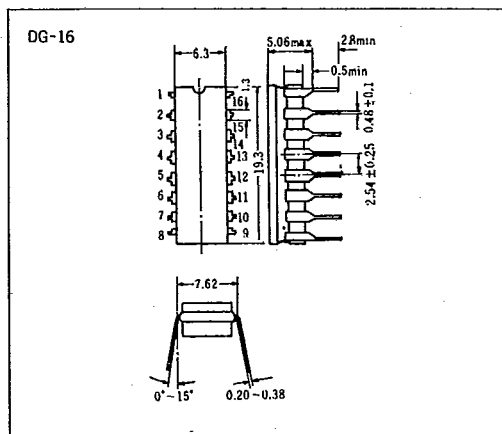
PACKAGING INFORMATION

■Cerdip

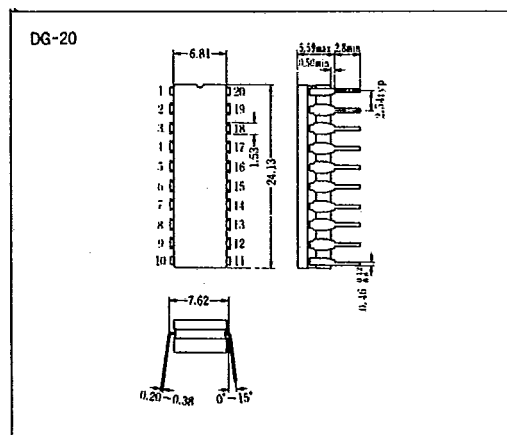
●14 Pin



●16 Pin



●20 Pin



●24 Pin

