

# HD74LS48

## BCD-to-Seven-Segment Decoder / Driver (Internal Pull-up outputs)

REJ03D0411-0300

Rev.3.00

Jul.22.2005

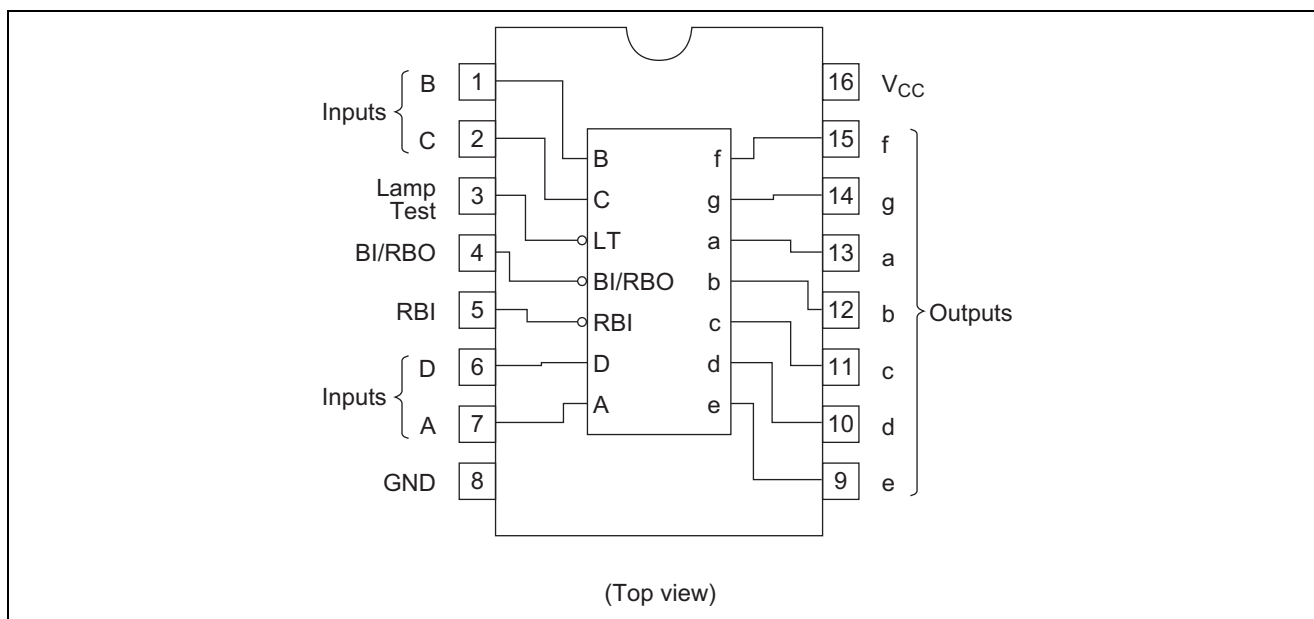
HD74LS48 features active high outputs for driving lamp buffers. This circuit has full ripple blanking input / output controls and a lamp test input. Display patterns for BCD input counts above 9 are unique symbols to authenticate input conditions. This circuit incorporates automatic leading and / or trailing-edge zero-blanking control (RBI and RBO). Lamp test (LT) of these types may be performed at any time when the BI / RBO node is at a high level. It contains an overriding blanking input (BI) which can be used to control the lamp intensity by pulsing or to inhibit the outputs. Inputs and outputs are entirely compatible for use with TTL or DTL logic outputs.

### Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS48P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—

### Pin Arrangement

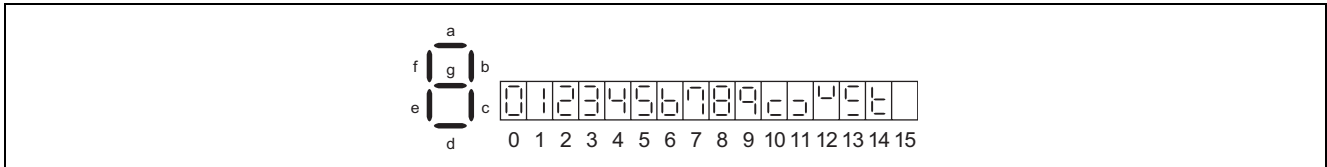


Function Table

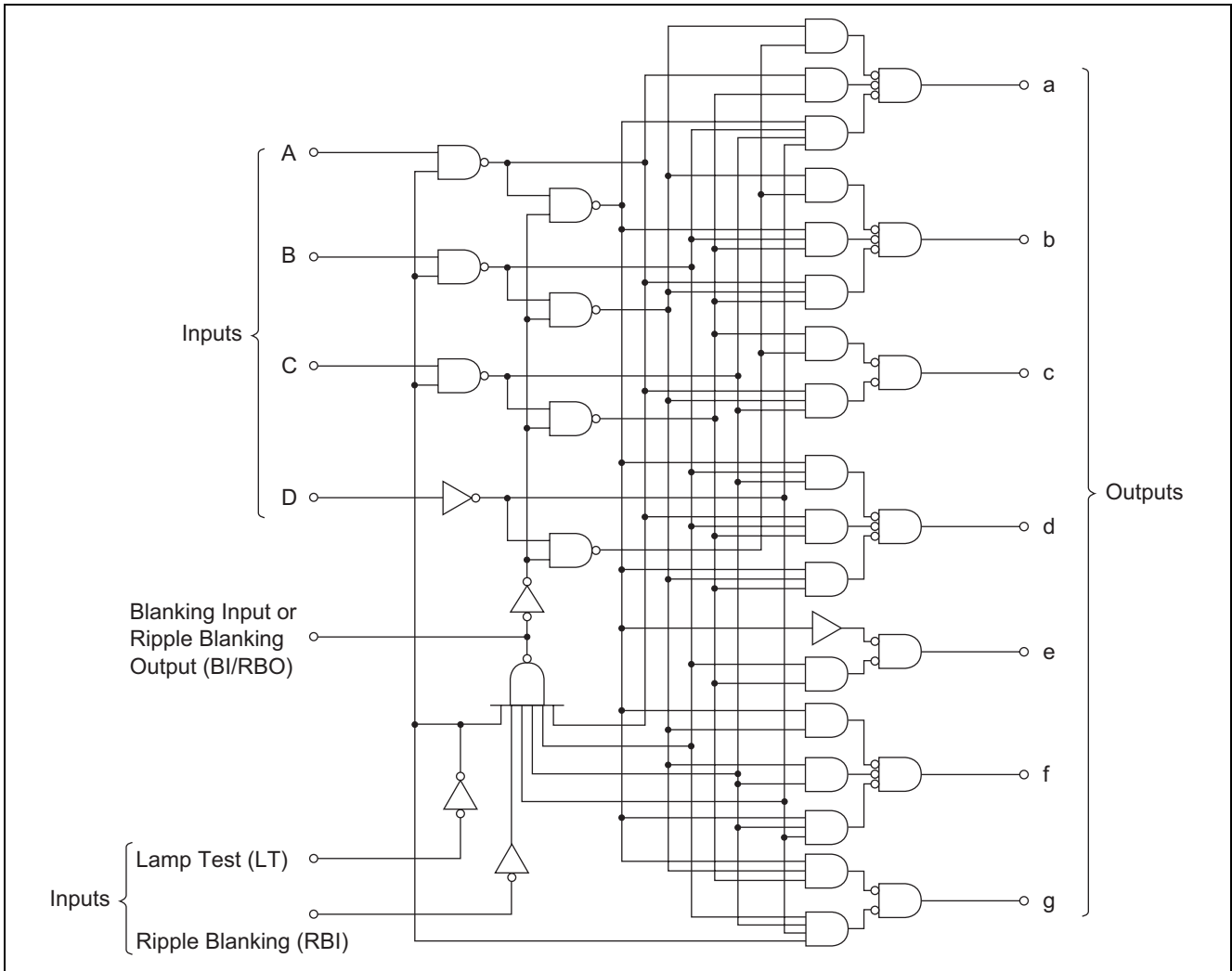
Decimal or Function	Inputs						BI / RBO	Outputs							Note
	LT	RBI	D	C	B	A		a	b	c	d	e	f	g	
0	H	H	L	L	L	L	H	H	H	H	H	H	H	L	1
1	H	X	L	L	L	H	H	L	H	H	L	L	L	L	
2	H	X	L	L	H	L	H	H	H	L	H	H	L	H	
3	H	X	L	L	H	H	H	H	H	H	H	L	L	H	
4	H	X	L	H	L	L	H	L	H	H	L	L	H	H	
5	H	X	L	H	L	H	H	H	L	H	H	L	H	H	
6	H	X	L	H	H	L	H	L	L	H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



Block Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	$V_{CC}$	7	V
Input voltage	$V_{IN}$	7	V
Power dissipation	$P_T$	400	mW
Storage temperature	Tstg	-65 to +150	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	$V_{CC}$	4.75	5.00	5.25	V
Output current	$I_{OH}$ (a to g)	—	—	-100	$\mu A$
	$I_{OH}$ (BI/RBO)	—	—	-50	$\mu A$
Output current	$I_{OL}$ (a to g)	—	—	6	mA
	$I_{OL}$ (BI/RBO)	—	—	3.2	mA
Operating temperature	$T_{opr}$	-20	25	75	°C

## Electrical Characteristics

(Ta = -20 to +75 °C)

Item	Symbol	min.	typ.*	max.	Unit	Condition	
Input voltage	V <sub>IH</sub>	2.0	—	—	V		
	V <sub>IL</sub>	—	—	0.8	V		
Output voltage	a to g	V <sub>OH</sub>	2.4	—	—	V	V <sub>CC</sub> = 4.75 V, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V
	BI / RBO		2.4	—	—	V	
	a to g	V <sub>OL</sub>	—	—	0.4	V	
	BI / RBO		—	—	0.5	V	
			—	—	0.4	V	
			—	—	0.5	V	
Output current**	a to g	I <sub>O</sub>	-1.3	—	—	mA	V <sub>CC</sub> = 4.75 V, V <sub>O</sub> = 0.85 V,
Input current	except BI / RBO	I <sub>IH</sub>	—	—	20	μA	V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 2.7 V
			—	—	-0.4	mA	V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 0.4 V
	BI / RBO	I <sub>IL</sub>	—	—	-1.2	mA	V <sub>CC</sub> = 5.25 V, V <sub>I</sub> = 0.4 V
	except BI / RBO		I <sub>I</sub>	—	—	0.1	mA
Short-circuit output current	BI / RBO	I <sub>OS</sub>	-0.3	—	-2	mA	V <sub>CC</sub> = 5.25 V
Supply current***		I <sub>CC</sub>	—	25	38	mA	V <sub>CC</sub> = 5.25 V
Input clamp voltage		V <sub>IK</sub>	—	—	-1.5	V	V <sub>CC</sub> = 4.75 V, I <sub>IN</sub> = -18 mA

Notes: \* V<sub>CC</sub> = 5 V, Ta = 25°C\*\* Input condition as for V<sub>OH</sub>\*\*\* I<sub>CC</sub> is measured with all outputs open and inputs at 4.5 V.

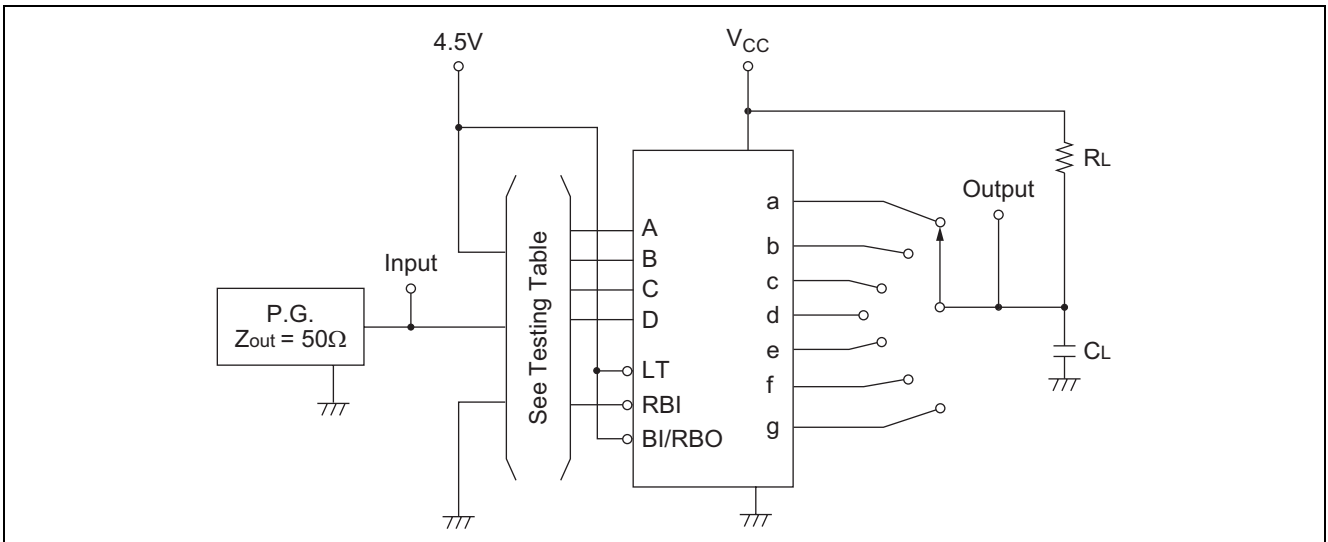
## Switching Characteristics

(V<sub>CC</sub> = 5 V, Ta = 25°C)

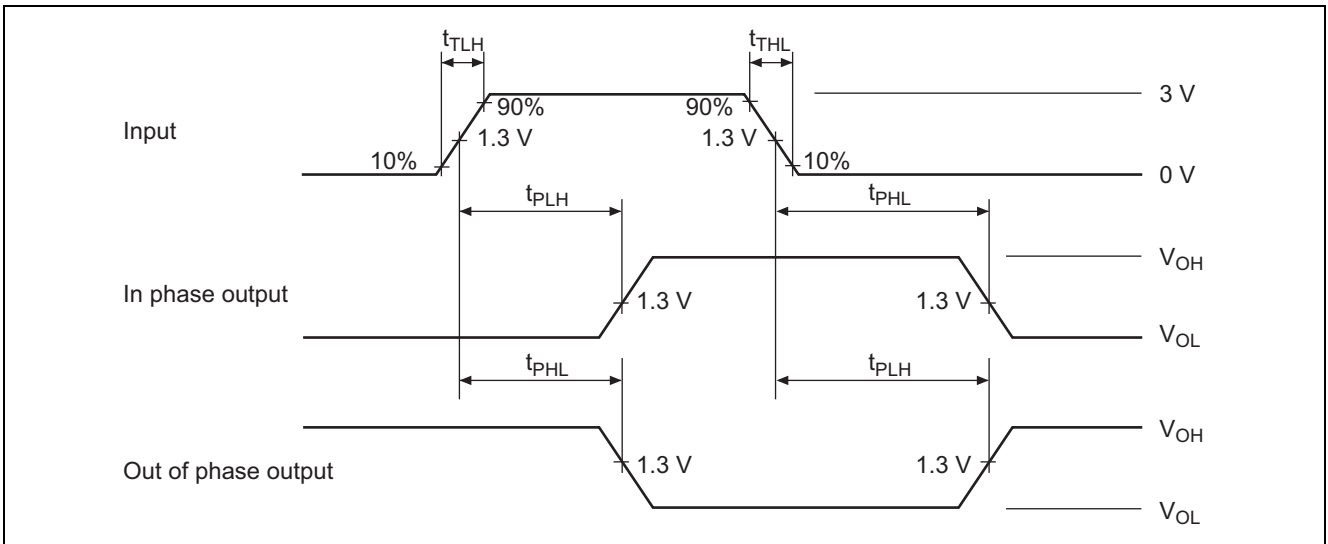
Item	Symbol	Input	min.	typ.	max.	Unit	Condition
Turn-on time	t <sub>PHL</sub>	A	—	—	100	ns	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 4 kΩ
	t <sub>PLH</sub>		—	—	100		
Turn-off time	t <sub>PHL</sub>	RBI	—	—	100	ns	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 6 kΩ
	t <sub>PLH</sub>		—	—	100		

## Testing Method

### Test Circuit



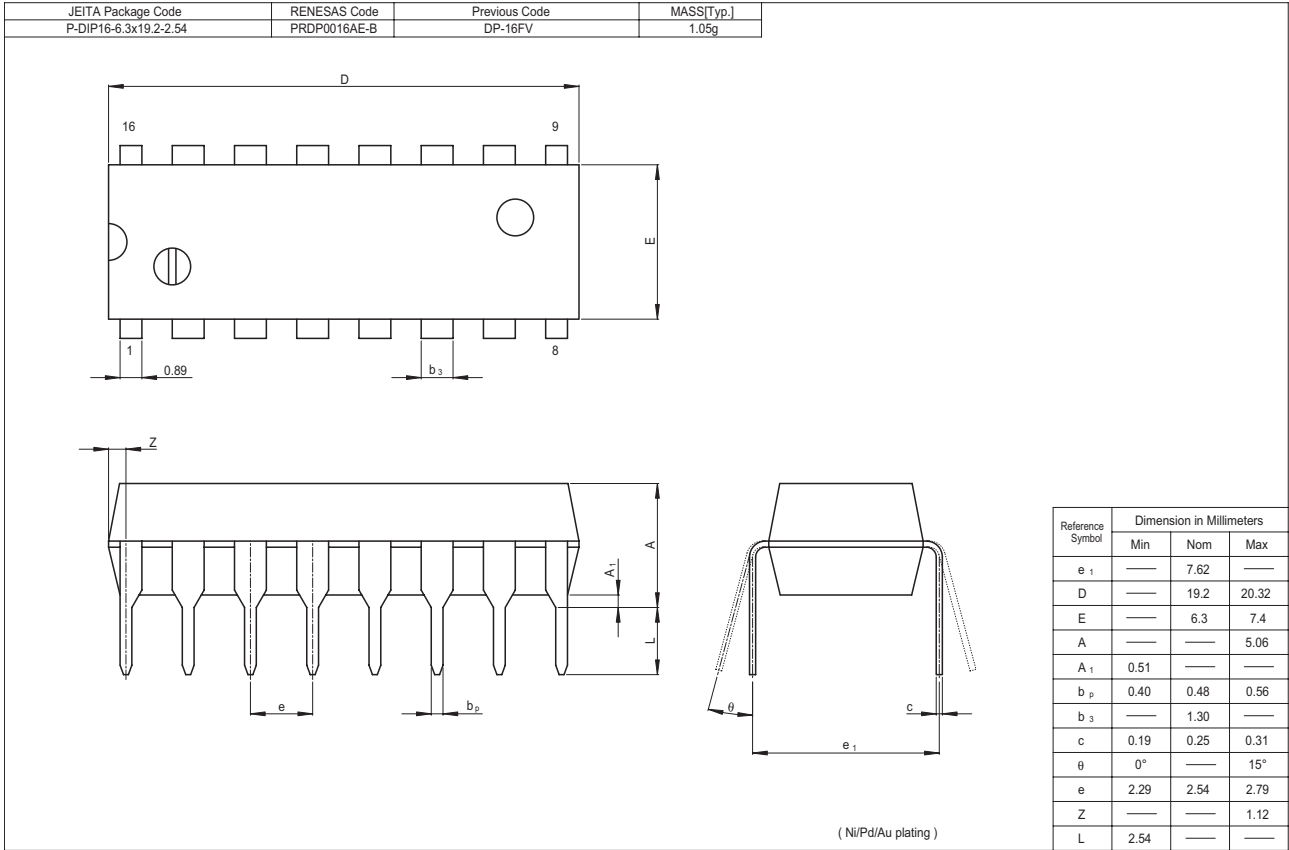
### Waveform



### Testing Table

Item	Inputs					Outputs						
	RBI	D	C	B	A	a	b	c	d	e	f	g
t <sub>PLH</sub> t <sub>PHL</sub>	4.5 V	GND	GND	GND	IN	OUT	—	—	OUT	OUT	OUT	—
	4.5 V	GND	GND	4.5 V	IN	—	—	OUT	—	OUT	—	—
	4.5 V	GND	4.5 V	4.5 V	IN	OUT	OUT	—	OUT	OUT	OUT	OUT
	IN	GND	GND	GND	GND	OUT	OUT	OUT	OUT	OUT	OUT	—

Package Dimensions



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