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 be pulsing or to inhibit the outputs. Inputs and outputs are entirely compatible for use with TTL or DTL logic outputs.

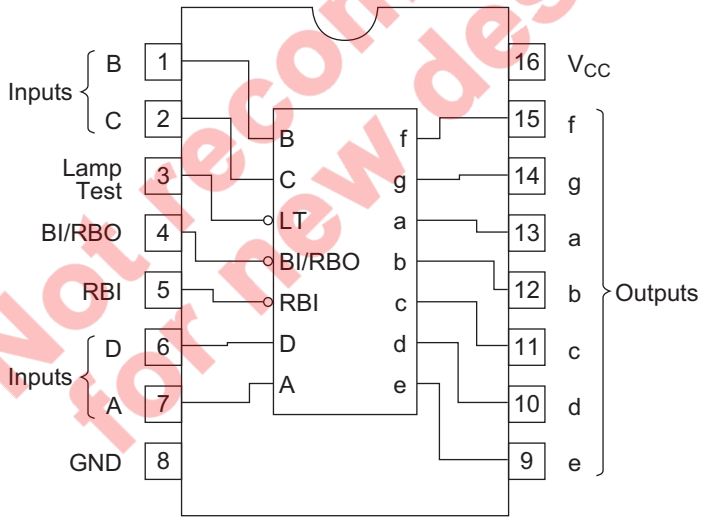
Features

- Ordering Information

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

Not recommend for new design

Pin Arrangement



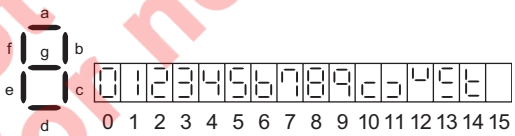
(Top view)

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.



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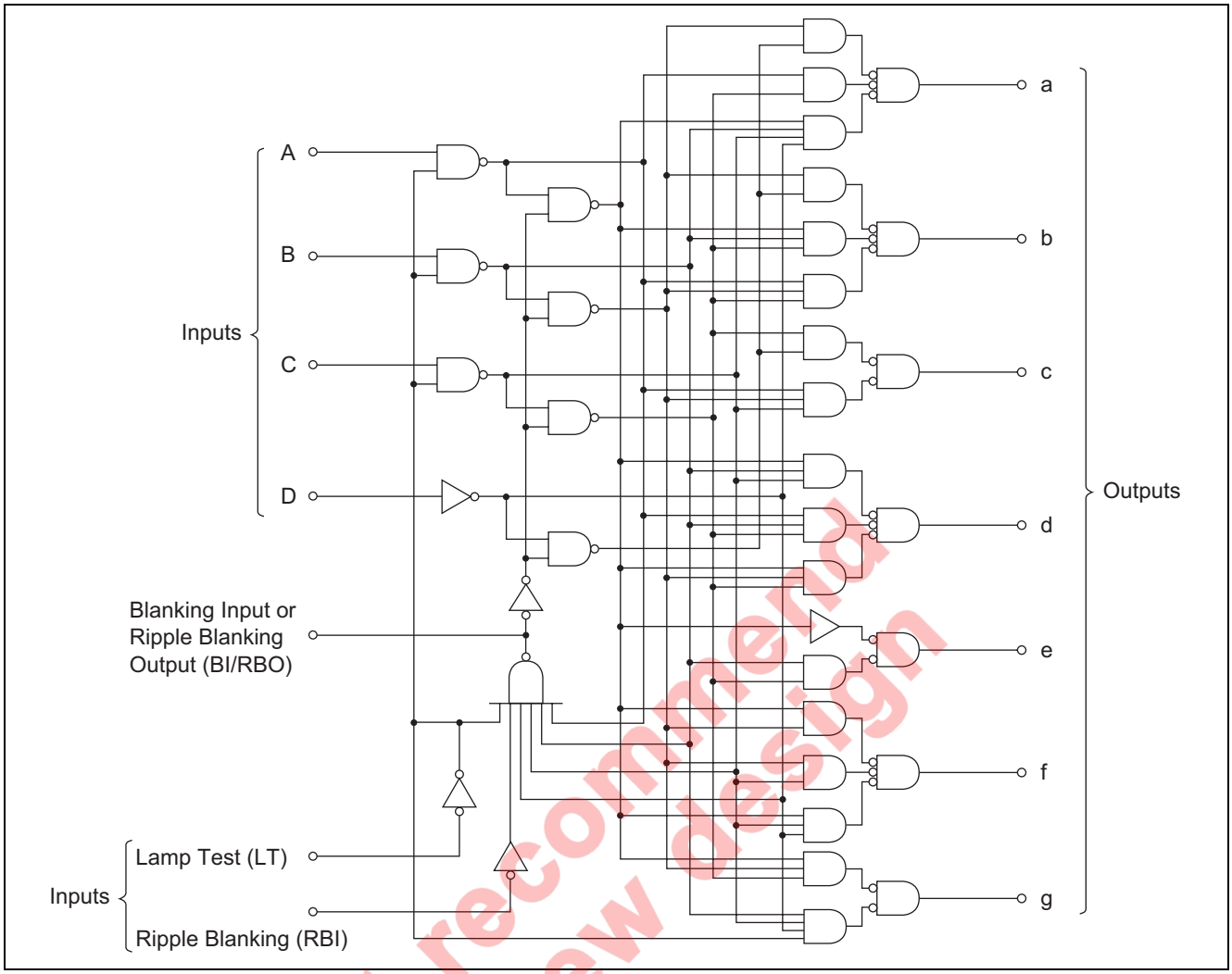
Block Diagram



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Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7	V
Input voltage	VI_N	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	µA
	$I_{OH\ (BI/RBO)}$	—	—	–50	µA
Output current	$I_{OL\ (a\ to\ g)}$	—	—	6	mA
	$I_{OL\ (BI/RBO)}$	—	—	3.2	mA
Operating temperature	Topr	-20	25	75	°C

Electrical Characteristics

(Ta = –20 to +75 °C)

Item		Symbol	min.	typ.*	max.	Unit	Condition	
Input voltage		V_{IH}	2.0	—	—	V		
		V_{IL}	—	—	0.8	V		
Output voltage	a to g	V_{OH}	2.4	—	—	V	I_{OH} = –100 µA	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V
	BI / RBO		2.4	—	—	V	I_{OH} = –50 µA	
	a to g	V_{OL}	—	—	0.4	V	I_{OL} = 2 mA	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V
			—	—	0.5		I_{OL} = 6 mA	
	BI / RBO		—	—	0.4	V	I_{OL} = 1.6 mA	
			—	—	0.5		I_{OL} = 3.2 mA	
Output current**	a to g	I_O	–1.3	—	—	mA	V_{CC} = 4.75 V, V_O = 0.85 V,	
Input current	except BI / RBO	I_{IH}	—	—	20	µA	V_{CC} = 5.25 V, V_I = 2.7 V	
		I_{IL}	—	—	–0.4	mA	V_{CC} = 5.25 V, V_I = 0.4 V	
	BI / RBO		—	—	–1.2	mA	V_{CC} = 5.25 V, V_I = 0.4 V	
	except BI / RBO	I_I	—	—	0.1	mA	V_{CC} = 5.25 V, V_I = 7 V	
Short-circuit output current	BI / RBO	I_{OS}	–0.3	—	–2	mA	V_{CC} = 5.25 V	
Supply current***		I_{CC}	—	25	38	mA	V_{CC} = 5.25 V	
Input clamp voltage		V_{IK}	—	—	–1.5	V	V_{CC} = 4.75 V, I_{IN} = –18 mA	

Notes: * V_{CC} = 5 V, Ta = 25°C

** Input condition as for V_{OH}

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

Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

Item	Symbol	Input	min.	typ.	max.	Unit	Condition
Turn-on time	t_{PHL}	A	—	—	100	ns	C_L = 15 pF, R_L = 4 kΩ
	t_{PLH}		—	—	100		
Turn-off time	t_{PHL}	RBI	—	—	100	ns	C_L = 15 pF, R_L = 6 kΩ
	t_{PLH}		—	—	100		

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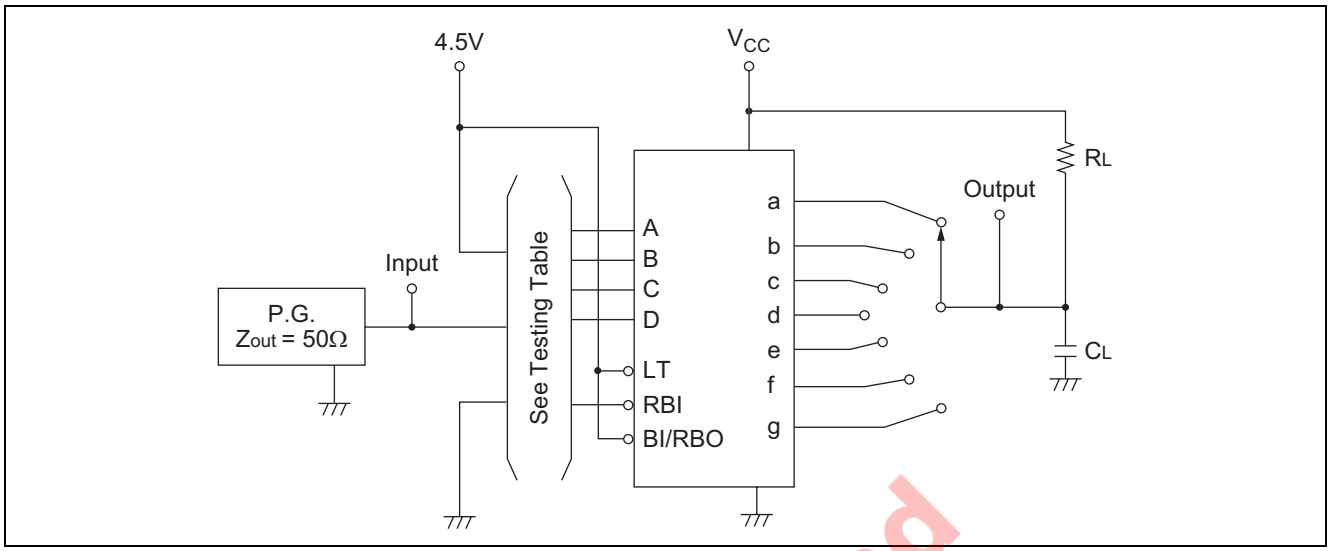
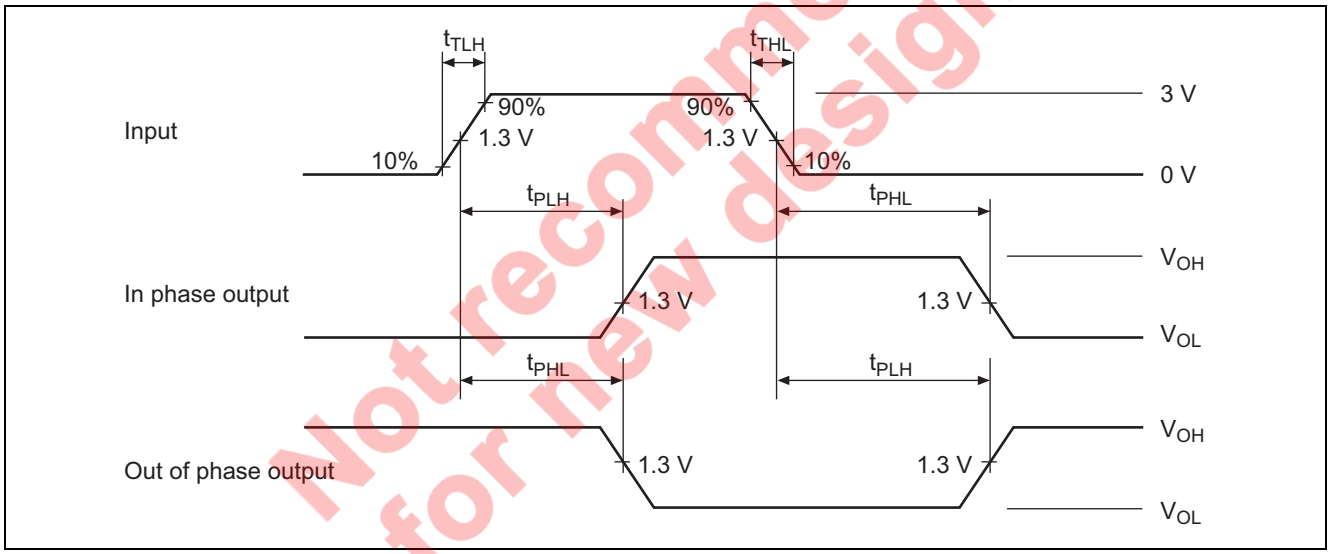
Testing Method

Test Circuit



Waveform



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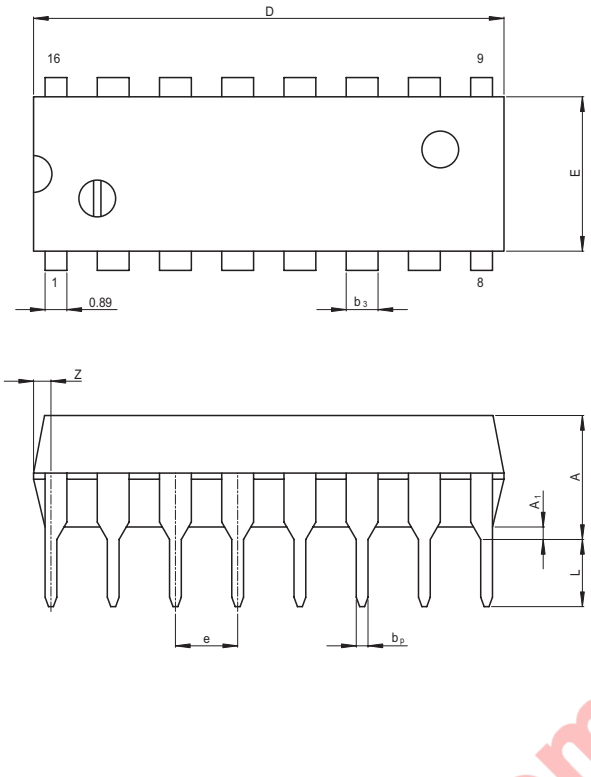
Testing Table

Item	Inputs					Outputs						
	RBI	D	C	B	A	a	b	c	d	e	f	g
t_{PLH} t_{PHL}	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

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP16-6.3x19.2-2.54	PRDP0016AE-B	DP-16FV	1.05g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	——	7.62	——
D	——	19.2	20.32
E	——	6.3	7.4
A	——	——	5.06
A_1	0.51	——	——
b_p	0.40	0.48	0.56
b_3	——	1.30	——
c	0.19	0.25	0.31
θ	0°	——	15°
e	2.29	2.54	2.79
Z	——	——	1.12
L	2.54	——	——

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Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China
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Renesas Technology Singapore Pte. Ltd.
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Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> 2-796-3115, Fax: <82> 2-796-2145

Renesas Technology Malaysia Sdn. Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510

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