To our customers,

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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HD74LS248

BCD-to-Seven-Segment Decoder / Driver (internal pull-up outputs)

REJ03D0466–0300
Rev.3.00
Jul.15.2005

The HD74LS248 is electrically and functionally identical to the HD74LS48, respectively, and has the same pin assignments as its equivalents. It can be used interchangeably in present or future designs to offer designers a choice between two indicator fonts. The HD74LS48 composes the 6 and the 9 without tails and the HD74LS248 composes the 6 and the 9 with tails. Composition of all other characters, including display patterns for BCD inputs above nine, is identical. The HD74LS248 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 count above 9 are unique symbols to authenticate input conditions. This circuit incorporates automatic leading and / or trailing-edge zero-blanking control (RBI and RBO).

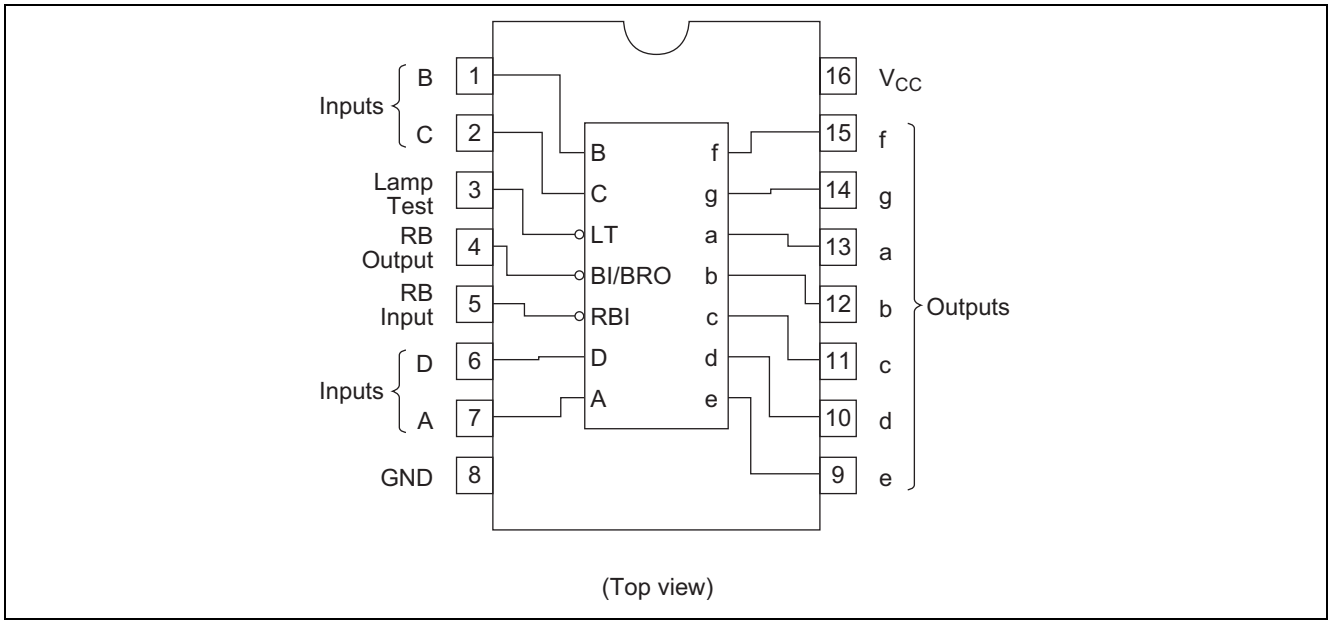
Lamp test (LT) of this type may be performed at any time when the BI / RBO node is at a high level. This type contains an overriding blanking input (BI) which can be used to control the lamp intensity be pulsing or to inhibit the outputs.

Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS248FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)

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	H	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	H	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

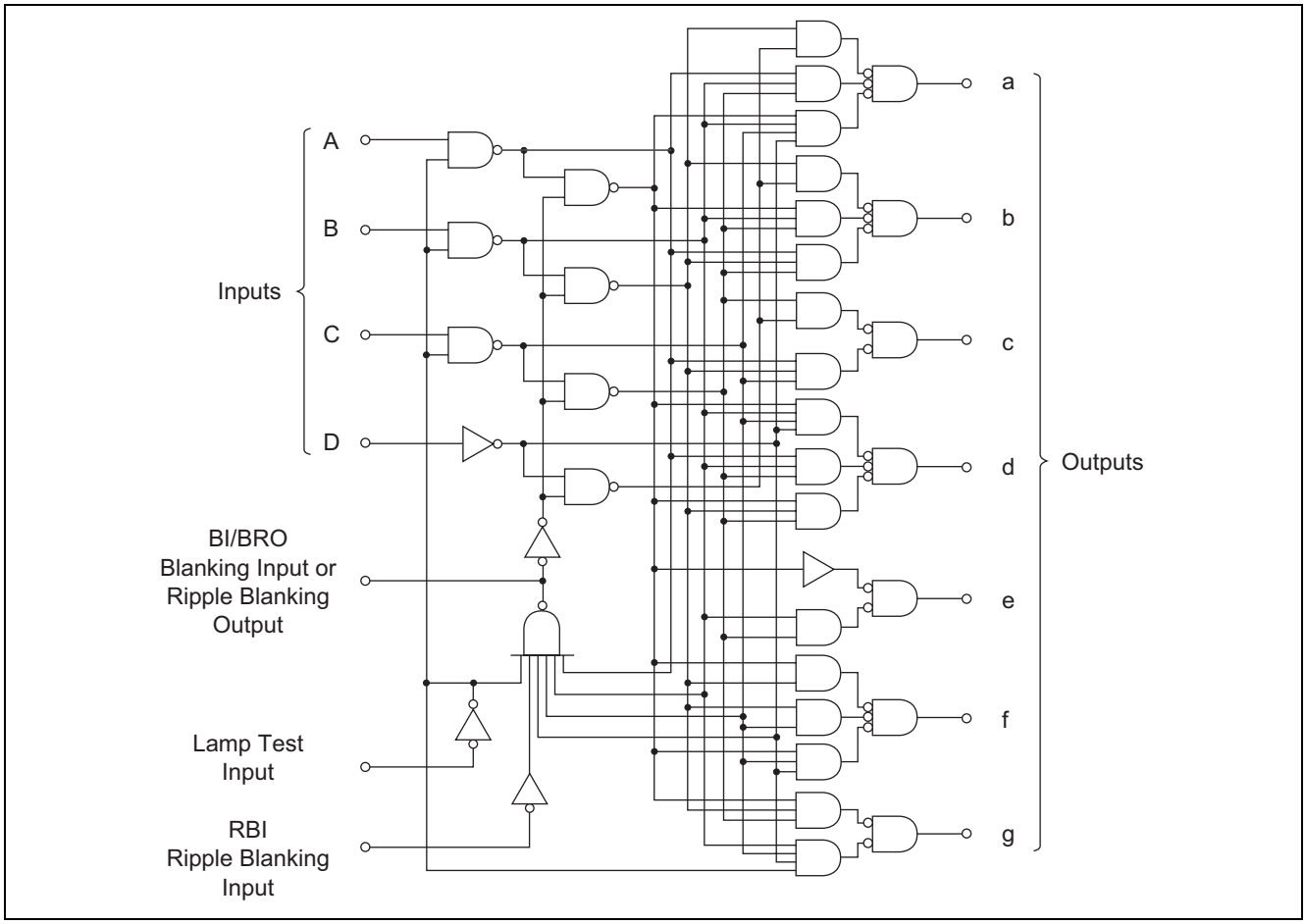
Notes: 1. The blanking input (BI) must be open or held at a high logic level when output functions 0 through 15 are desired. The ripple-blanking input (RBI) must be open or high if blanking of a decimal zero is not desired.

2. When a low logic level is applied directly to the blanking input (BI), all segment outputs are off regardless of the level of any other input.

3. When ripple-blanking input (RBI) and inputs A, B, C, and D are a low level with the lamp test input high, all segment outputs go off and the ripple-blanking output (RBO) goes to a low level (response condition).

4. When a blanking input ripple blanking input (BI/RBO) is open or held high and a low is applied to the lamp-test input, all segment outputs are on.

Block Diagram



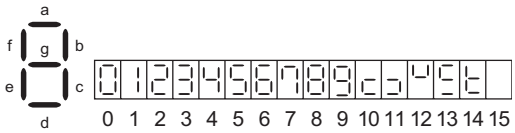
Absolute Maximum Ratings

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
Operating temperature		Topr	–20	25	75	°C
Output current	a to g	I_{OH}	—	—	–100	µA
	BI/RBO		—	—	–50	µA
	a to g	I_{OL}	—	—	6	mA
	BI/RBO		—	—	3.2	mA



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						I_{OH} = –50 µA	
Output current**	a to g	I_O	–1.3	—	—	mA	V_{CC} = 4.75 V, V_O = 0.85 V	
Output voltage	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		I_{OL} = 1.6 mA	
			—	—	0.5		I_{OL} = 3.2 mA	
Input current	Except BI/RBO	I_{IH}	—	—	20	µA	V_{CC} = 5.25 V, V_I = 2.7 V	
	Except BI/RBO	I_{IL}	—	—	–0.4	mA	V_{CC} = 5.25 V, V_I = 0.4 V	
	BI/RBI		—	—	–1.2			
	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 all inputs at 4.5 V.

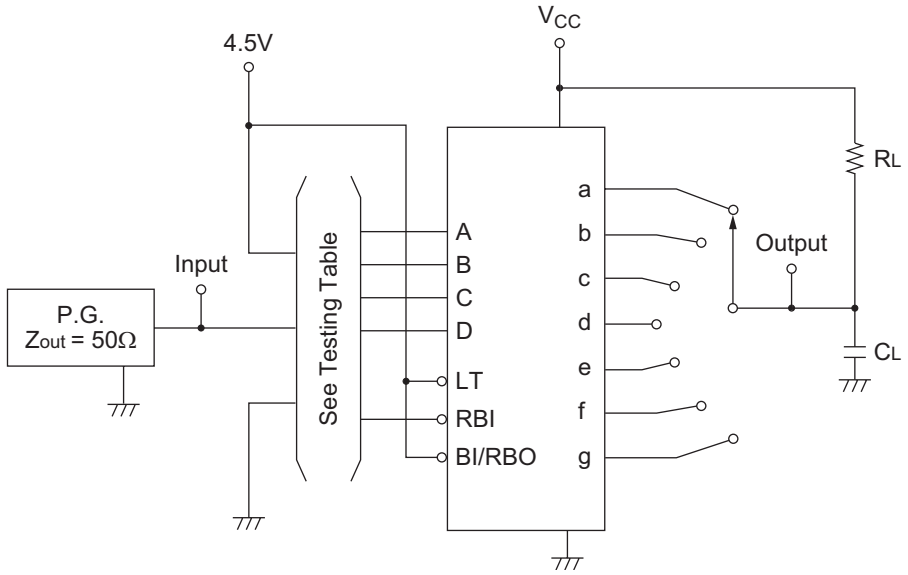
Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

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

Testing Method

Test Circuit

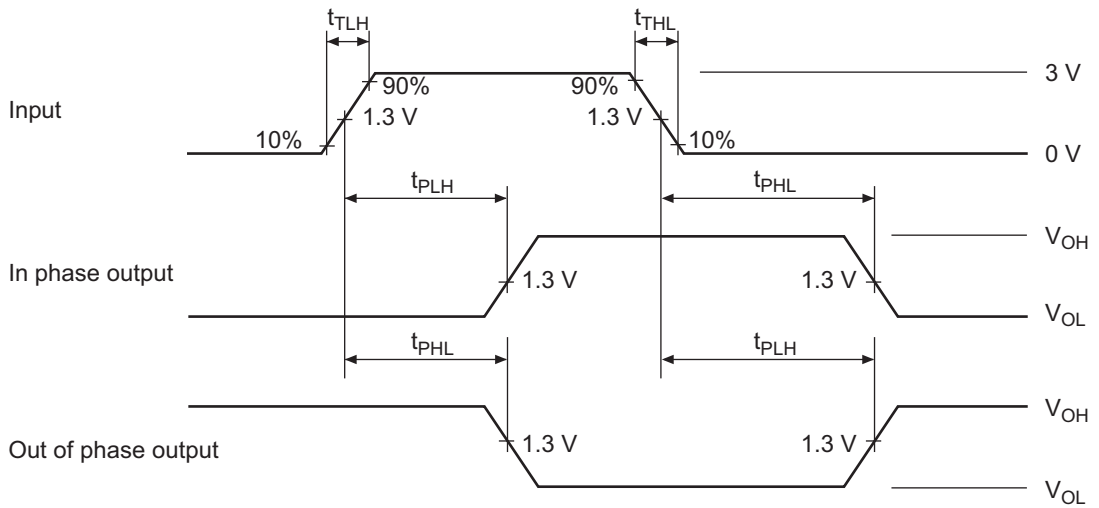


Note: C_L includes probe and jig capacitance.

Testing Table

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

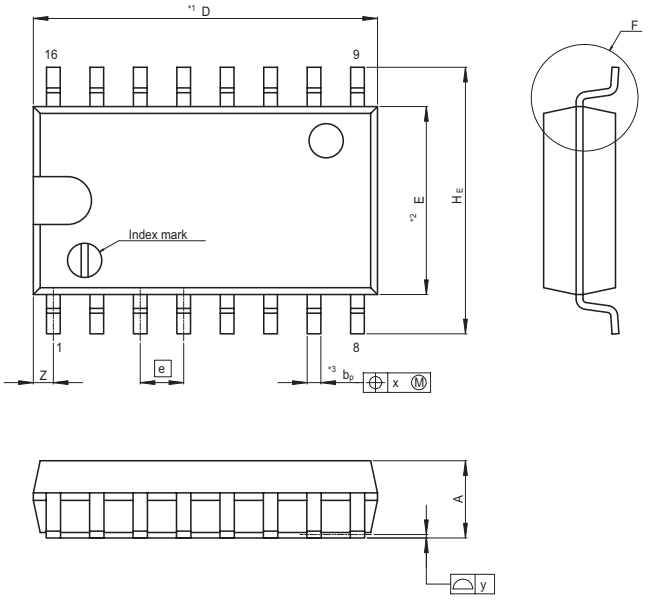
Waveform



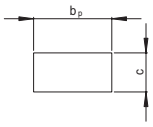
Note: Input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, duty cycle = 50%

Package Dimensions

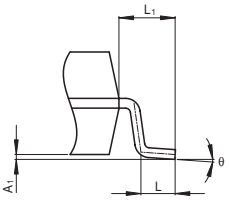
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-5.5x10.06-1.27	PRSP0016DH-B	FP-16DAV	0.24g



NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.



Terminal cross section
(Ni/Pd/Au plating)



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	——	10.06	10.5
E	——	5.50	——
A_2	——	——	——
A_1	0.00	0.10	0.20
A	——	——	2.20
b_p	0.34	0.40	0.46
b_1	——	——	——
c	0.15	0.20	0.25
c_1	——	——	——
θ	0°	——	8°
H_E	7.50	7.80	8.00
e	——	1.27	——
x	——	——	0.12
y	——	——	0.15
Z	——	——	0.80
L	0.50	0.70	0.90
L_1	——	1.15	——

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