HD74LV06A

Hex Inverter Buffers / Drivers with Open Drain Outputs

REJ03D0230–0600
Rev.6.00
Dec 23, 2005

Description

The HD74LV06A has six inverter buffers / drivers with open drain outputs in a 14-pin package.

Low-voltage and high-speed operation is suitable for the battery-powered products (e.g., notebook computers), and the low-power consumption extends the battery life.

Features

- V_{CC} = 2.0 V to 5.5 V operation
- All inputs V_{IH} (Max.) = 5.5 V (@V_{CC} = 0 V to 5.5 V)
- All outputs V_O (Max.) = 5.5 V (@V_{CC} = 0 V)
- All outputs V_O (Max.) = 5.5 V (@V_{CC} = 2.0 V to 5.5 V, Output “Z” state)
- Typical V_{OL} ground bounce < 0.8 V (@V_{CC} = 3.3 V, Ta = 25°C)
- Output current ±8 mA (@V_{CC} = 3.0 V to 3.6 V), ±16 mA (@V_{CC} = 4.5 V to 5.5 V)
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LV06AFPEL	SOP–14 pin (JEITA)	PRSP0014DF-B (FP–14DAV)	FP	EL (2,000 pcs/reel)
HD74LV06ARPEL	SOP–14 pin (JEDEC)	PRSP0014DE-A (FP–14DNV)	RP	EL (2,500 pcs/reel)
HD74LV06ATELL	TSSOP–14 pin	PTSP0014JA-B (TTP–14DV)	T	ELL (2,000 pcs/reel)

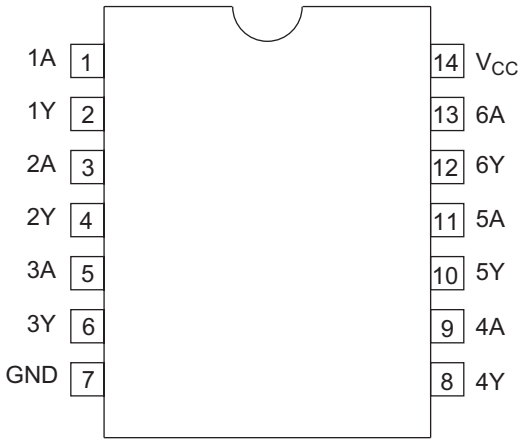
Note: Please consult the sales office for the above package availability.

Function Table

Input A	Output Y
L	Z
H	L

Note: H: High level
L: Low level
Z: High impedance

Pin Arrangement



(Top view)

Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	–0.5 to 7.0	V	
Input voltage range*[1]	V_I	–0.5 to 7.0	V	
Output voltage range*[1, 2]	V_O	–0.5 to V_{CC} + 0.5	V	Output: L
		–0.5 to 7.0		V_{CC}: OFF Output: Z
Input clamp current	I_{IK}	–20	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$
Continuous output current	I_O	±35	mA	V_O = 0 to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±50	mA	
Maximum power dissipation at Ta = 25°C (in still air)*[3]	P_T	785	mW	SOP
		500		TSSOP
Storage temperature	Tstg	–65 to 150	°C	

Notes: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

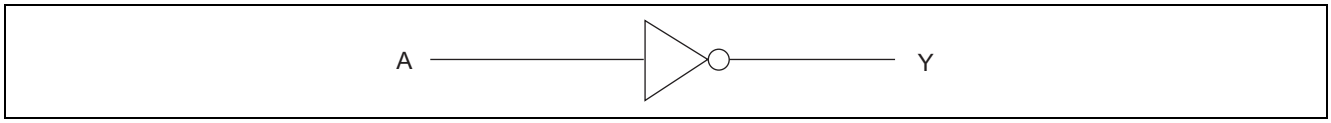
1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. This value is limited to 7.0 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	2.0	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	5.5	V	
Output current	I_{OL}	—	50	µA	V_{CC} = 2.0 V
		—	2	mA	V_{CC} = 2.3 to 2.7 V
		—	8		V_{CC} = 3.0 to 3.6 V
		—	16		V_{CC} = 4.5 to 5.5 V
Input transition rise or fall rate	Δt / Δv	0	200	ns/V	V_{CC} = 2.3 to 2.7 V
		0	100		V_{CC} = 3.0 to 3.6 V
		0	20		V_{CC} = 4.5 to 5.5 V
Operating free-air temperature	Ta	–40	85	°C	

Note: Unused or floating inputs must be held high or low.

Logic Diagram



DC Electrical Characteristics

Ta = –40 to 85°C

Item	Symbol	V_{CC} (V)*	Min	Typ	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.0	1.5	—	—	V	
		2.3 to 2.7	$V_{CC} \times 0.7$	—	—		
		3.0 to 3.6	$V_{CC} \times 0.7$	—	—		
		4.5 to 5.5	$V_{CC} \times 0.7$	—	—		
	V_{IL}	2.0	—	—	0.5		
		2.3 to 2.7	—	—	$V_{CC} \times 0.3$		
		3.0 to 3.6	—	—	$V_{CC} \times 0.3$		
		4.5 to 5.5	—	—	$V_{CC} \times 0.3$		
Output voltage	V_{OL}	Min to Max	—	—	0.1	V	I_{OL} = 50 µA
		2.3	—	—	0.4		I_{OL} = 2 mA
		3.0	—	—	0.44		I_{OL} = 8 mA
		4.5	—	—	0.55		I_{OL} = 16 mA
Input current	I_{IN}	0 to 5.5	—	—	±1	µA	V_{IN} = 5.5 V or GND
Off state output current	I_{OZ}	Min to Max	—	—	±2.5	µA	V_O = 5.5 V
Quiescent supply current	I_{CC}	5.5	—	—	20	µA	V_{IN} = V_{CC} or GND, I_O = 0
Output leakage current	I_{OFF}	0	—	—	5	µA	V_I or V_O = 0 to 5.5 V
Input capacitance	C_{IN}	3.3	—	2.3	—	pF	V_I = V_{CC} or GND

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

Switching Characteristics

V_{CC} = 2.5 ± 0.2 V

Item	Symbol	Ta = 25°C			Ta = –40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	4.7	10.4	1.0	13.0	ns	C_L = 15 pF	A	Y
		—	9.5	15.2	1.0	18.0		C_L = 50 pF		
	t_{PHL}	—	5.4	10.4	1.0	13.0		C_L = 15 pF		
		—	7.9	15.2	1.0	18.0		C_L = 50 pF		

V_{CC} = 3.3 ± 0.3 V

Item	Symbol	Ta = 25°C			Ta = –40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	4.0	7.1	1.0	8.5	ns	C_L = 15 pF	A	Y
		—	7.3	10.6	1.0	12.0		C_L = 50 pF		
	t_{PHL}	—	4.3	7.1	1.0	8.5		C_L = 15 pF		
		—	5.8	10.6	1.0	12.0		C_L = 50 pF		

V_{CC} = 5.0 ± 0.5 V

Item	Symbol	Ta = 25°C			Ta = –40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max	Min	Max				
Propagation delay time	t_{PLH}	—	3.3	5.5	1.0	6.5	ns	C_L = 15 pF	A	Y
		—	5.6	7.5	1.0	8.5		C_L = 50 pF		
	t_{PHL}	—	3.4	5.5	1.0	6.5		C_L = 15 pF		
		—	4.1	7.5	1.0	8.5		C_L = 50 pF		

Operating Characteristics

C_L = 50 pF

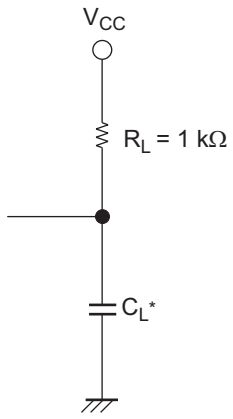
Item	Symbol	V_{CC} (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C_{PD}	3.3	—	9.6	—	pF	f = 10 MHz
		5.0	—	11.4	—		

Noise Characteristics

C_L = 50 pF

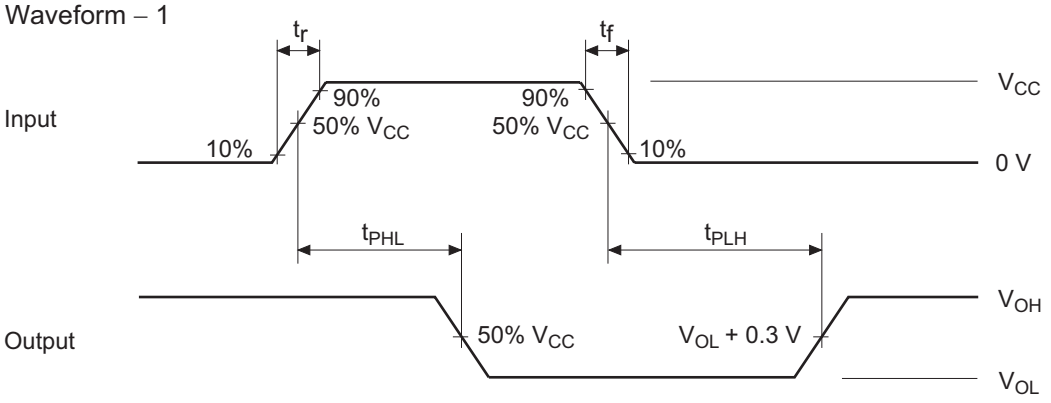
Item	Symbol	V_{CC} (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Quiet output, maximum dynamic V_{OL}	$V_{OL (P)}$	3.3	—	0.3	0.8	V	
Quiet output, minimum dynamic V_{OL}	$V_{OL (V)}$	3.3	—	–0.1	–0.8	V	
High-level dynamic input voltage	$V_{IH (D)}$	3.3	2.31	—	—	V	
Low-level dynamic input voltage	$V_{IL (D)}$	3.3	—	—	0.99	V	

Test Circuit



Note: C_L includes the probe and jig capacitance.

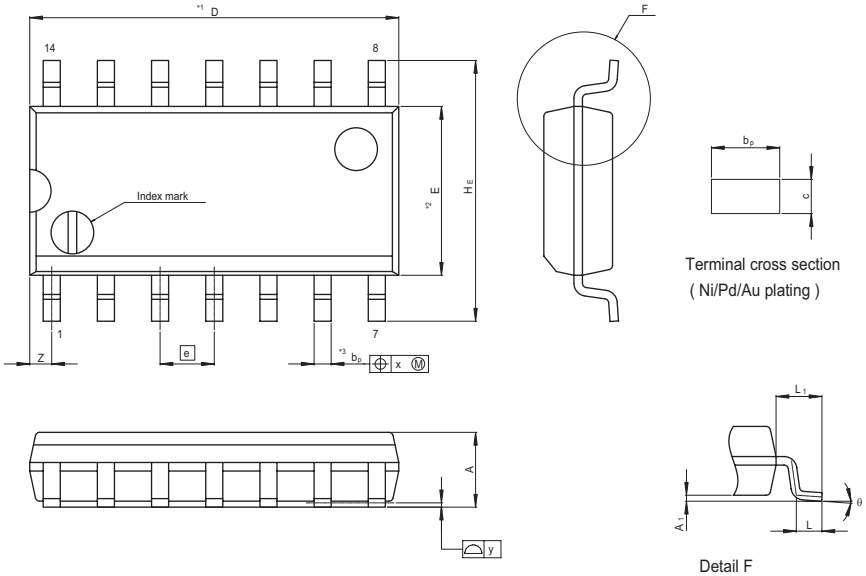
• Waveform – 1



Notes: 1. Input waveform: PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 3 ns, t_f ≤ 3 ns
2. The output are measured one at a time with one transition per measurement.

Package Dimensions

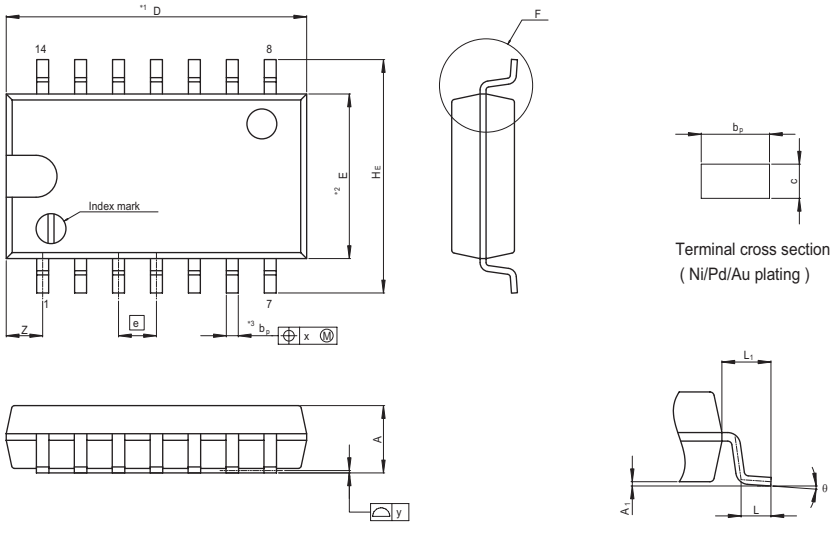
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-3.95x8.65-1.27	PRSP0014DE-A	FP-14DNV	0.13g



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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	8.65	9.05
E	—	3.95	—
A_2	—	—	—
A_1	0.10	0.14	0.25
A	—	—	1.75
b_p	0.34	0.40	0.46
b_1	—	—	—
c	0.15	0.20	0.25
c_1	—	—	—
θ	0°	—	8°
H_E	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L_1	—	1.08	—

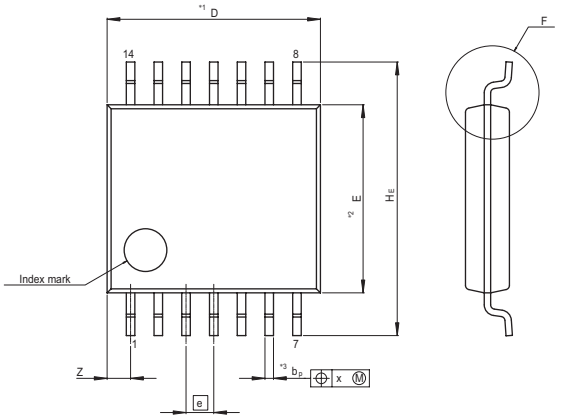
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-5.5x10.06-1.27	PRSP0014DF-B	FP-14DAV	0.23g

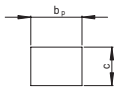


NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.

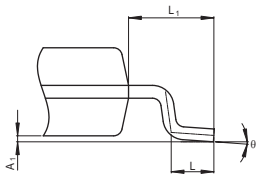
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A_2	—	—	—
A_1	0.00	0.10	0.20
A	—	—	2.20
b_p	0.34	0.40	0.46
b_1	—	—	—
c	0.15	0.20	0.25
c_1	—	—	—
θ	0°	—	8°
H_E	7.50	7.80	8.00
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	1.42
L	0.50	0.70	0.90
L_1	—	1.15	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-TSSOP14-4.4x5-0.65	PTSP0014JA-B	TTP-14DV	0.05g





Terminal cross section
(Ni/Pd/Au plating)



Detail F

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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	5.00	5.30
E	—	4.40	—
A_2	—	—	—
A_1	0.03	0.07	0.10
A	—	—	1.10
b_p	0.15	0.20	0.25
b_1	—	—	—
c	0.10	0.15	0.20
c_1	—	—	—
θ	0°	—	8°
H_E	6.20	6.40	6.60
e	—	0.65	—
x	—	—	0.13
y	—	—	0.10
Z	—	—	0.83
L	0.4	0.5	0.6
L_1	—	1.0	—

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

RENESAS SALES OFFICES

http://www.renesas.com

Refer to "**http://www.renesas.com/en/network**" for the latest and detailed information.

Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 205, AZIA Center, No.133 Yincheng Rd (n), Pudong District, Shanghai 200120, China
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
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

Colophon .5.0