HD74UH02

2-input NOR Gate

REJ03D0200–0500Z
(Previous ADE-205-015C (Z))
Rev.5.00
Jan.30.2004

Description

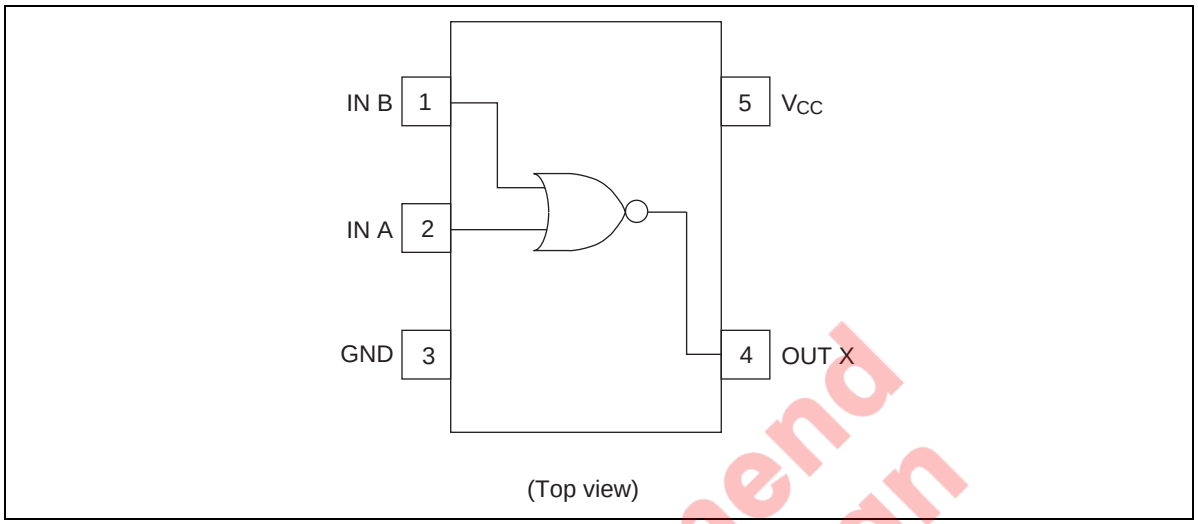
The HD74UH02 is high-speed CMOS two input NOR gate using silicon gate CMOS process. With CMOS low power dissipation, it provides high-speed equivalent to LS-TTL series. The internal circuit of three stages construction with buffer provides wide noise margin and stable output.

Features

- Encapsulated in very small 5pins package of 2.9 × 1.6 × 1.1 mm, the efficiency to mount on substrate is significantly improved.
- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Electrical characteristics equivalent to the HD74HC02
  Supply voltage range: 2 to 6 V
  Operating temperature range: –40 to +85°C
- $| I_{OH} | = I_{OL}$ = 2 mA (min)
- Ordering Information

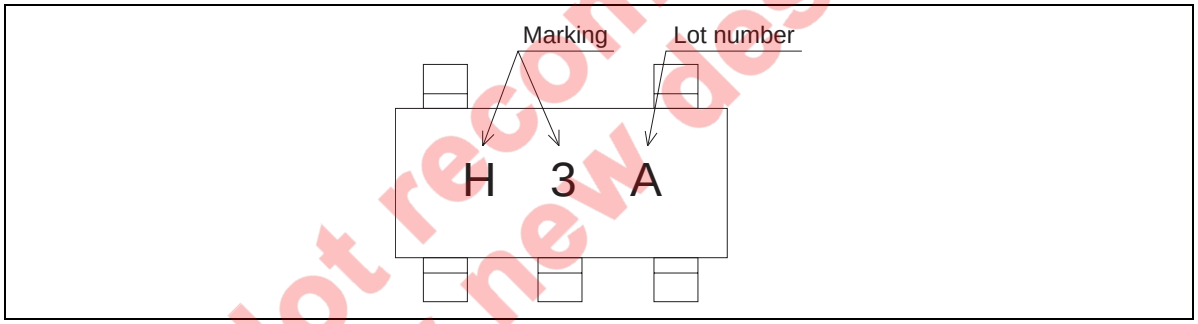
Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74UH02EL	MPAK-5 pin	MPAK-5V	–	EL (3,000 pcs/reel)

Pin Arrangement



(Top view)

Article Indication



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	–0.5 to +7.0	V
Input voltage	V_{IN}	–0.5 to V_{CC} +0.5	V
Output voltage	V_{OUT}	–0.5 to V_{CC} +0.5	V
Input diode current	I_{IK}	±20	mA
Output diode current	I_{OK}	±20	mA
Output current	I_{OUT}	±25	mA
V_{CC}/GND current	I_{CC}, I_{GND}	±25	mA
Power dissipation	P_T	200	mW
Storage temperature	Tstg	–65 to +150	°C

Recommended Operating Conditions

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	2 to 6	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	Topr	–40 to +85	°C
Input rise/fall time	t_r, t_f	0 to 1000 (V_{CC} = 2.0 V)	ns
		0 to 500 (V_{CC} = 4.5 V)	
		0 to 400 (V_{CC} = 6.0 V)	

Electrical Characteristics

		V_{CC}	Ta = 25°C			Ta = –40 to 85°C				
Item	Symbol	(V)	Min	Typ	Max	Min	Max	Unit	Test Conditions	
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V_{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	V_{IN} = V_{IL}	I_{OH} = –20 µA
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	4.31	—	4.13	—			I_{OH} = –2 mA
		6.0	5.68	5.80	—	5.63	—			I_{OH} = –2.6 mA
	V_{OL}	2.0	—	0.0	0.1	—	0.1	V	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 µA
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	0.17	0.26	—	0.33			I_{OL} = 2 mA
		6.0	—	0.18	0.26	—	0.33			I_{OL} = 2.6 mA
Input current	I_{IN}	6.0	—	—	±0.1	—	±1.0	µA	V_{IN} = V_{CC} or GND	
Operating current	I_{CC}	6.0	—	—	1.0	—	10.0		V_{IN} = V_{CC} or GND	

Switching Characteristics

(C_L = 15 pF, $t_r = t_f$ = 6 ns, V_{CC} = 5 V)

Item	Symbol	Ta = 25°C Min	Typ	Max	Unit	Test Conditions
Output rise/fall time	t_{TLH} t_{THL}	—	5	10	ns	See Test circuit
Propagation delay time	t_{PLH} t_{PHL}	—	7	15	ns	See Test circuit

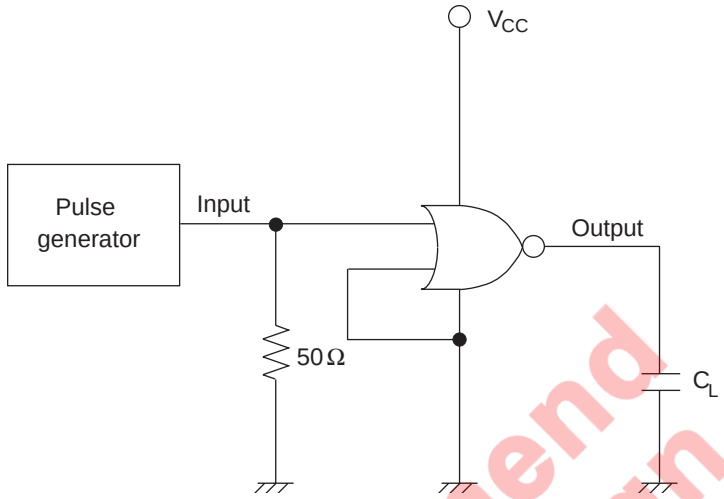
(C_L = 50 pF, $t_r = t_f$ = 6 ns)

Item	Symbol	V_{CC} (V)	Ta = 25°C Min	Typ	Max	Ta = –40 to 85°C Min	Max	Unit	Test Conditions
Output rise/fall time	t_{TLH} t_{THL}	2.0	—	50	125	—	155	ns	See Test circuit
		4.5	—	14	25	—	31		
		6.0	—	12	21	—	26		
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	48	100	—	125	ns	See Test circuit
		4.5	—	12	20	—	25		
		6.0	—	9	17	—	21		
Input capacitance	C_{IN}	—	—	5	10	—	10	pF	
Equivalent capacitance	C_{PD}	—	—	10	—	—	—		

Note: C_{PD} is equivalent capacitance inside of the IC calculated from the operating current without load (see test circuit). The average operating current without load is calculated according to the expression below.

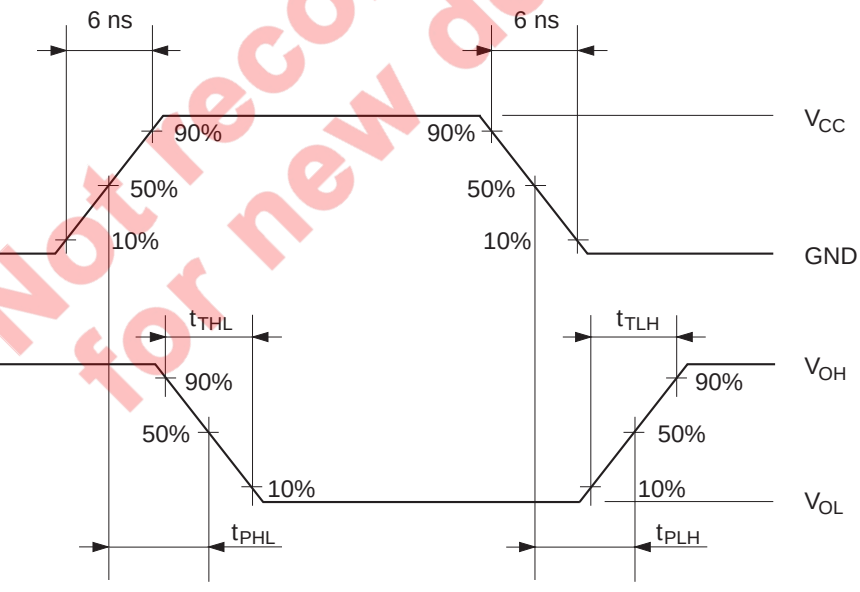
$I_{CC}(opr) = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}$

Test Circuit



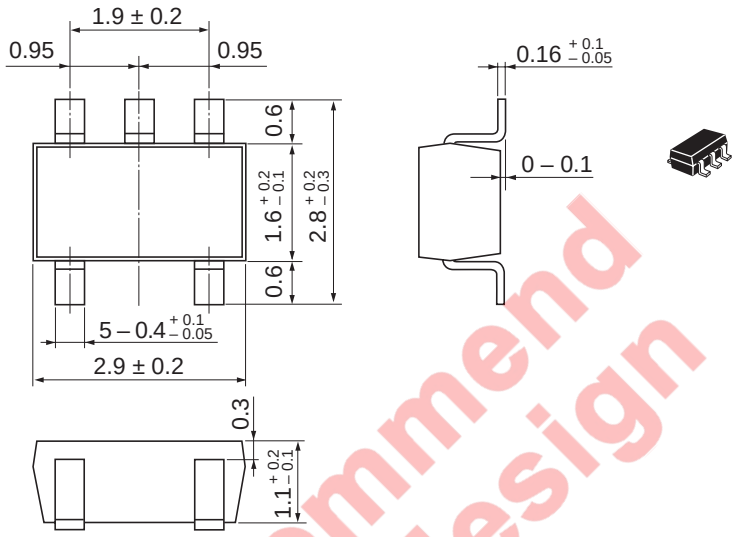
Note: Operating current test time, output is open.

Waveforms



Package Dimensions

Unit: mm



Package Code	MPAK–5V
JEDEC	—
JEITA	—
Mass (reference value)	0.015 g

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

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, United Kingdom
Tel: <44> (1628) 585 100, Fax: <44> (1628) 585 900

Renesas Technology Europe GmbH
Dornacher Str. 3, D-85622 Feldkirchen, Germany
Tel: <49> (89) 380 70 0, Fax: <49> (89) 929 30 11

Renesas Technology Hong Kong Ltd.
7/F., North Tower, World Finance Centre, Harbour City, Canton Road, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2375-6836

Renesas Technology Taiwan Co., Ltd.
FL 10, #99, Fu-Hsing N. Rd., Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.
26/F., Ruijin Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.
1, Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Colophon .1.0