

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HD74ALVC1G02

## 2-input NOR Gate

REJ03D0106-0600

Rev.6.00

Jun.20.2005

### Description

The HD74ALVC1G02 has two-input NOR gate in a 5 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.

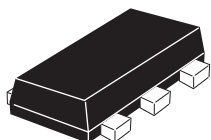
### Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V  
Operating temperature range : -40 to +85°C
- All inputs  $V_{IH}$  (Max.) = 3.6 V (@ $V_{CC}$  = 0 V to 3.6 V)  
All outputs  $V_O$  (Max.) = 3.6 V (@ $V_{CC}$  = 0 V)
- Output current  $\pm 2$  mA (@ $V_{CC}$  = 1.2 V)  
 $\pm 4$  mA (@ $V_{CC}$  = 1.4 V to 1.6 V)  
 $\pm 6$  mA (@ $V_{CC}$  = 1.65 V to 1.95 V)  
 $\pm 18$  mA (@ $V_{CC}$  = 2.3 V to 2.7 V)  
 $\pm 24$  mA (@ $V_{CC}$  = 3.0 V to 3.6 V)
- Ordering Information

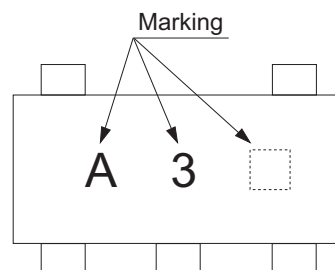
Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74ALVC1G02VSE	VSON-5 pin	PUSN0005KA-A (TNP-5DV)	VS	E (3,000 pcs/reel)

### Outline and Article Indication

- HD74ALVC1G02



VSON-5



□ = Control code

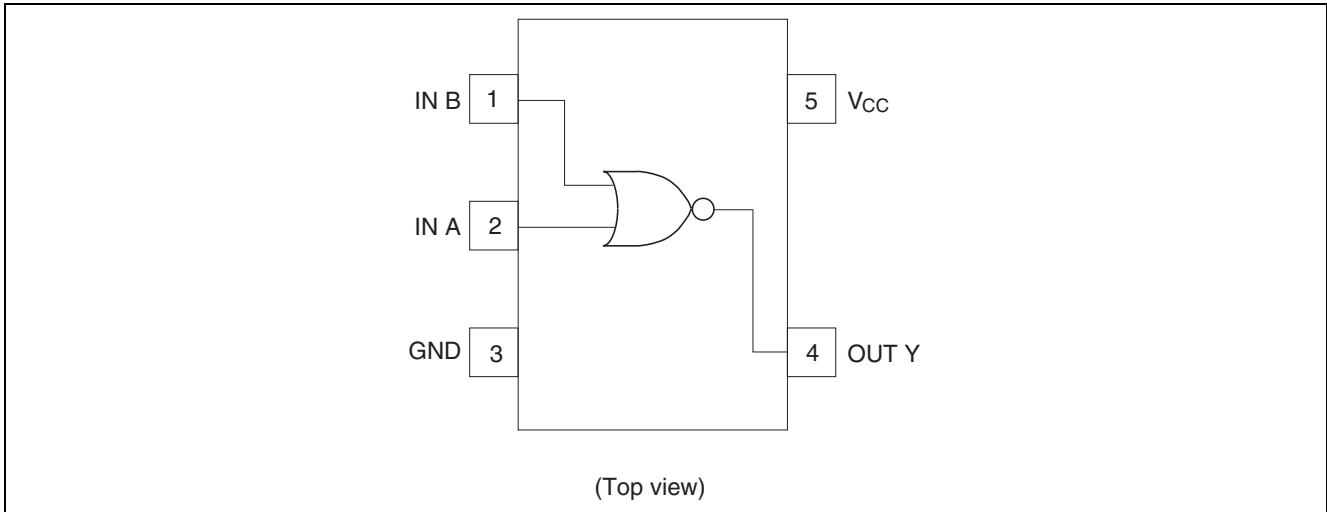
**Function Table**

Inputs		Output
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

H : High level

L : Low level

**Pin Arrangement**



**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	$V_{CC}$	-0.5 to 4.6	V	
Input voltage range *1	$V_I$	-0.5 to 4.6	V	
Output voltage range *1, 2	$V_O$	-0.5 to $V_{CC} + 0.5$	V	Output : H or L
		-0.5 to 4.6		$V_{CC}$ : OFF
Input clamp current	$I_{IK}$	-50	mA	$V_I < 0$
Output clamp current	$I_{OK}$	$\pm 50$	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	$I_O$	$\pm 50$	mA	$V_O = 0$ to $V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 100$	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) *3	$P_T$	200	mW	
Storage temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$	

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 4.6 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	$V_{CC}$	1.2	3.6	V	
Input voltage range	$V_I$	0	3.6	V	
Output voltage range	$V_O$	0	$V_{CC}$	V	
Output current	$I_{OH}$	—	-2	mA	$V_{CC} = 1.2\text{ V}$
		—	-4		$V_{CC} = 1.4\text{ V}$
		—	-6		$V_{CC} = 1.65\text{ V}$
		—	-18		$V_{CC} = 2.3\text{ V}$
		—	-24		$V_{CC} = 3.0\text{ V}$
	$I_{OL}$	—	2		$V_{CC} = 1.2\text{ V}$
		—	4		$V_{CC} = 1.4\text{ V}$
		—	6		$V_{CC} = 1.65\text{ V}$
		—	18		$V_{CC} = 2.3\text{ V}$
		—	24		$V_{CC} = 3.0\text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.2\text{ to }2.7\text{ V}$
		0	10		$V_{CC} = 3.3\pm 0.3\text{ V}$
Operating free-air temperature	$T_a$	-40	85	°C	

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

### Electrical Characteristics

$T_a = -40\text{ to }85^\circ\text{C}$

Item	Symbol	$V_{CC}$ (V) *	Min	Typ	Max	Unit	Test condition
Input voltage	$V_{IH}$	1.2	$V_{CC}\times 0.75$	—	—	V	
		1.4 to 1.6	$V_{CC}\times 0.7$	—	—		
		1.65 to 1.95	$V_{CC}\times 0.7$	—	—		
		2.3 to 2.7	1.7	—	—		
		3.0 to 3.6	2.0	—	—		
	$V_{IL}$	1.2	—	—	$V_{CC}\times 0.25$		
		1.4 to 1.6	—	—	$V_{CC}\times 0.3$		
		1.65 to 1.95	—	—	$V_{CC}\times 0.3$		
		2.3 to 2.7	—	—	0.7		
		3.0 to 3.6	—	—	0.8		
Output voltage	$V_{OH}$	Min to Max	$V_{CC}-0.2$	—	—	V	$I_{OH} = -100\ \mu\text{A}$
		1.2	0.9	—	—		$I_{OH} = -2\ \text{mA}$
		1.4	1.1	—	—		$I_{OH} = -4\ \text{mA}$
		1.65	1.2	—	—		$I_{OH} = -6\ \text{mA}$
		2.3	1.7	—	—		$I_{OH} = -18\ \text{mA}$
		3.0	2.2	—	—		$I_{OH} = -24\ \text{mA}$
	$V_{OL}$	Min to Max	—	—	0.2		$I_{OL} = 100\ \mu\text{A}$
		1.2	—	—	0.3		$I_{OL} = 2\ \text{mA}$
		1.4	—	—	0.3		$I_{OL} = 4\ \text{mA}$
		1.65	—	—	0.3		$I_{OL} = 6\ \text{mA}$
		2.3	—	—	0.55		$I_{OL} = 18\ \text{mA}$
		3.0	—	—	0.55		$I_{OL} = 24\ \text{mA}$
Input current	$I_{IN}$	3.6	—	—	$\pm 5$	$\mu\text{A}$	$V_{IN} = 3.6\text{ V or GND}$
Quiescent supply current	$I_{CC}$	3.6	—	—	10	$\mu\text{A}$	$V_{IN} = V_{CC}\text{ or GND, } I_O = 0$
Output leakage current	$I_{OFF}$	0	—	—	5	$\mu\text{A}$	$V_I\text{ or }V_O = 0\text{ to }3.6\text{ V}$
Input capacitance	$C_{IN}$	3.3	—	4.5	—	pF	$V_{IN} = V_{CC}\text{ or GND}$

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

### Switching Characteristics

$V_{CC} = 1.2\text{ V}$

Item	Symbol	Ta = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>PLH</sub>	—	7.5	—	ns	C <sub>L</sub> = 15 pF	A or B	Y
	t <sub>PHL</sub>							

$V_{CC} = 1.5 \pm 0.1\text{ V}$

Item	Symbol	Ta = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>PLH</sub>	2.0	—	7.0	ns	C <sub>L</sub> = 15 pF	A or B	Y
	t <sub>PHL</sub>							

$V_{CC} = 1.8 \pm 0.15\text{ V}$

Item	Symbol	Ta = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>PLH</sub>	1.5	—	5.0	ns	C <sub>L</sub> = 30 pF	A or B	Y
	t <sub>PHL</sub>							

$V_{CC} = 2.5 \pm 0.2\text{ V}$

Item	Symbol	Ta = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>PLH</sub>	1.0	—	3.7	ns	C <sub>L</sub> = 30 pF	A or B	Y
	t <sub>PHL</sub>							

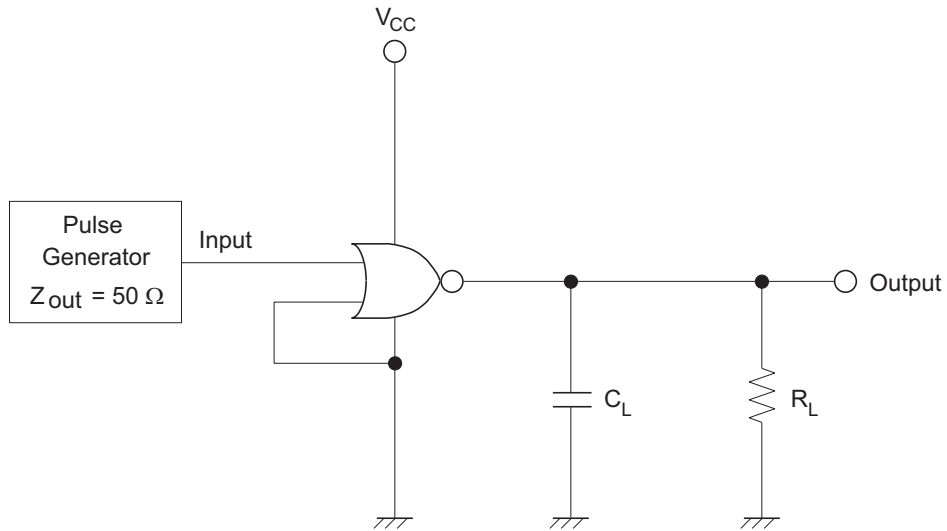
$V_{CC} = 3.3 \pm 0.3\text{ V}$

Item	Symbol	Ta = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>PLH</sub>	1.0	—	2.8	ns	C <sub>L</sub> = 30 pF	A or B	Y
	t <sub>PHL</sub>							

### Operating Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C <sub>PD</sub>	1.5	—	10.5	—	pF	f = 10 MHz
		1.8	—	10.5	—		
		2.5	—	10.5	—		
		3.3	—	11.5	—		

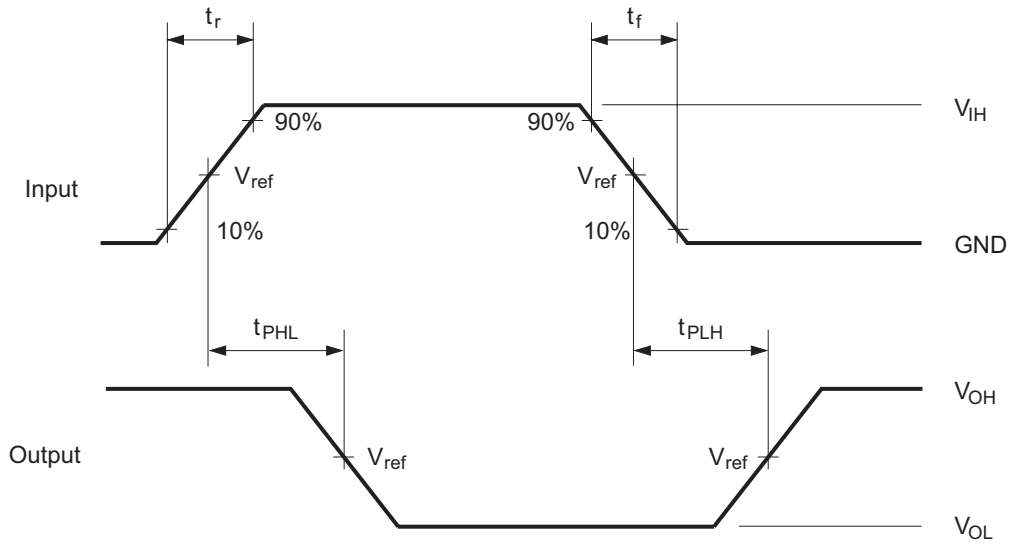
Test Circuit



Symbol	$V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V}$	$V_{CC} = 1.8 \pm 0.15\text{ V}$	$V_{CC} = 2.5 \pm 0.2\text{ V},$ $3.3 \pm 0.3\text{ V}$
$R_L$	2.0 kΩ	1.0 kΩ	500 Ω
$C_L$	15 pF	30 pF	30 pF

Note:  $C_L$  includes probe and jig capacitance.

Waveforms

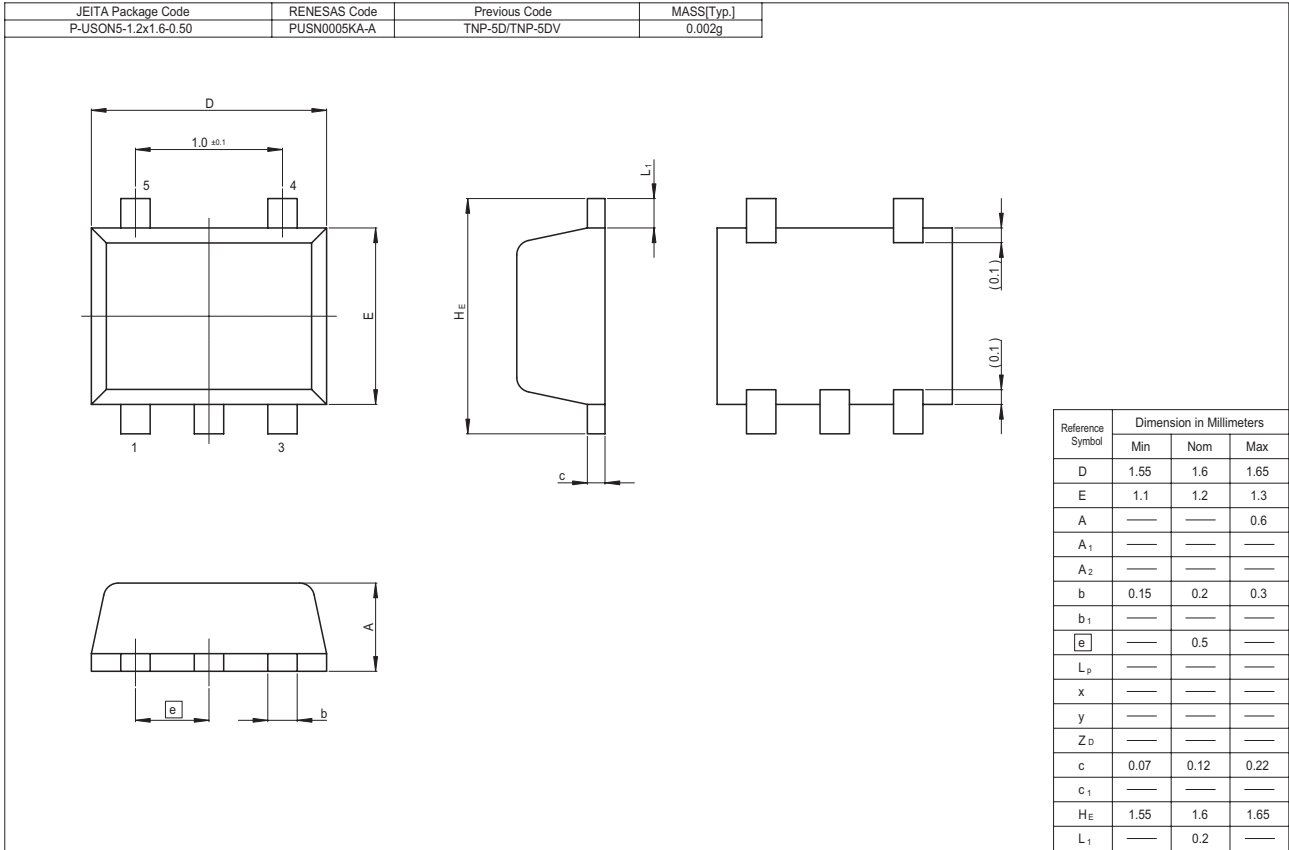


Symbol	$V_{CC} = 1.2\text{ V},$ $1.5 \pm 0.1\text{ V},$ $1.8 \pm 0.15\text{ V}$	$V_{CC} = 2.5 \pm 0.2\text{ V}$	$V_{CC} = 3.3 \pm 0.3\text{ V}$
$t_r / t_f$	2.0 ns	2.5 ns	2.5 ns
$V_{IH}$	$V_{CC}$	$V_{CC}$	2.7 V
$V_{ref}$	50%	50%	1.5 V

Note: Input waveform : PRR = 10 MHz, duty cycle 50%



Package Dimensions



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