

RD74LVC2G02

Dual 2-Input NOR Gate

REJ03D0748-0100
Rev.1.00
Jul.26.2006

Description

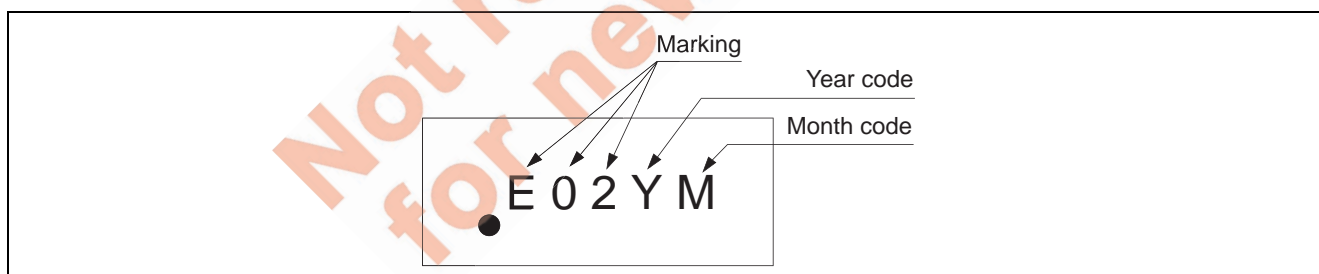
The RD74LVC2G02 has dual 2-input NOR gate in an 8-pin package. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

Features

- The basic gate function is lined up as renesas uni logic series.
- Supply voltage range: 1.65 to 5.5 V
- Operating temperature range: -40 to +85°C
- All inputs: $V_{IH}(\text{Max.}) = 5.5 \text{ V}$ (@ $V_{CC} = 0 \text{ V}$ to 5.5 V)
- All outputs: $V_O(\text{Max.}) = 5.5 \text{ V}$ (@ $V_{CC} = 0 \text{ V}$)
- Output current:
 - $\pm 4 \text{ mA}$ (@ $V_{CC} = 1.65 \text{ V}$)
 - $\pm 8 \text{ mA}$ (@ $V_{CC} = 2.3 \text{ V}$)
 - $\pm 24 \text{ mA}$ (@ $V_{CC} = 3.0 \text{ V}$)
 - $\pm 32 \text{ mA}$ (@ $V_{CC} = 4.5 \text{ V}$)
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
RD74LVC2G02WPE	WCSP-8 pin	SXBG0008LA-A (TBS-8BV)	WP	E (3,000 pcs/reel)

Article Indication



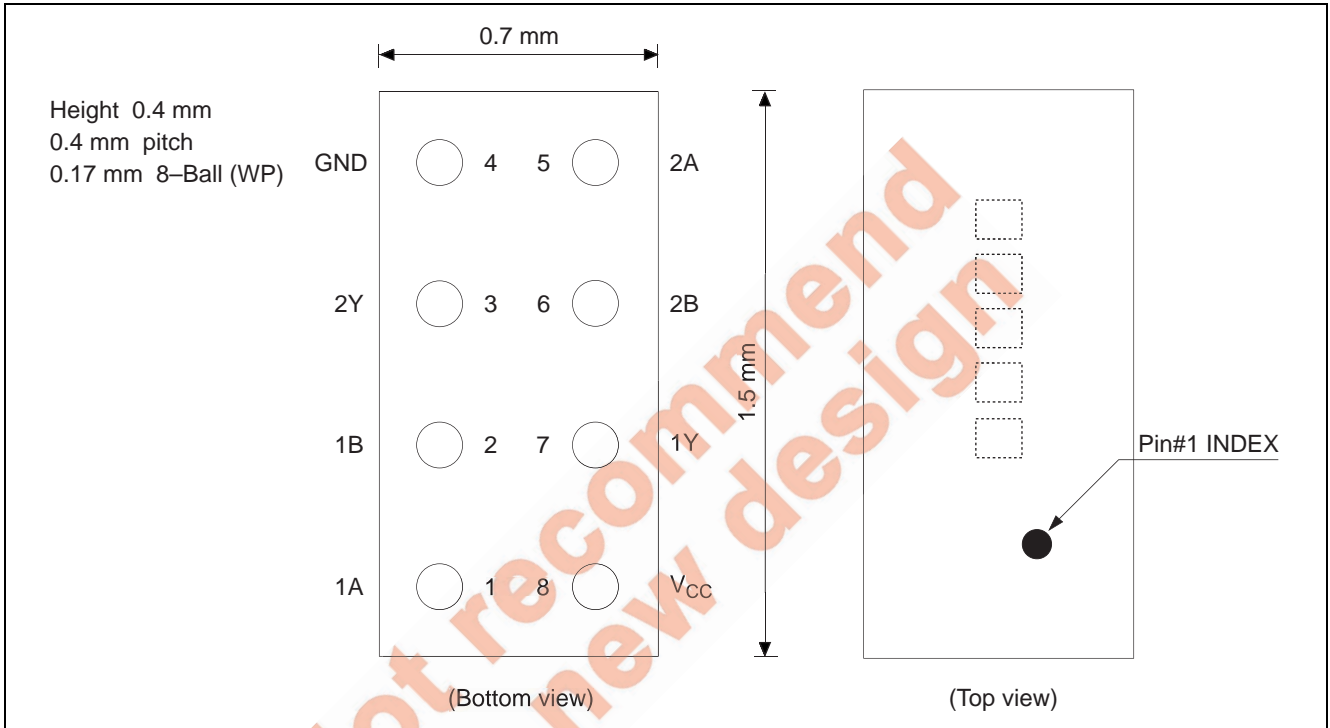
Function Table

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

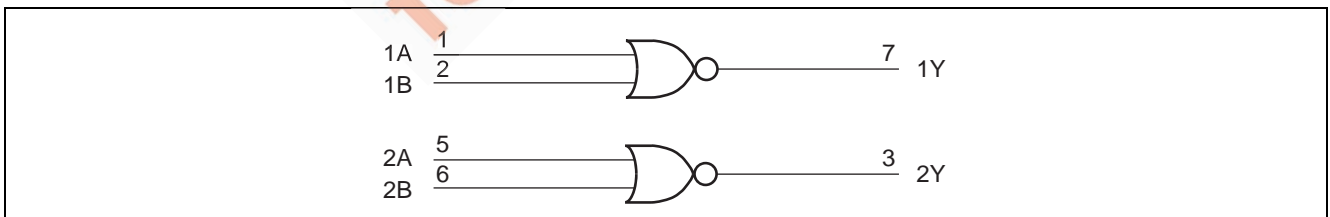
H: High level

L: Low level

Pin Arrangement



Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	V_{CC}	-0.5 to 6.5	V	
Input voltage range ^{*1}	V_I	-0.5 to 6.5	V	
Output voltage range ^{*1, 2}	V_O	-0.5 to $V_{CC} + 0.5$	V	Output : H or L
		-0.5 to 6.5		$V_{CC} : \text{OFF}$
Input clamp current	I_{IK}	-50	mA	$V_I < 0$
Output clamp current	I_{OK}	-50	mA	$V_O < 0$
Continuous output current	I_O	± 50	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	± 100	mA	
Package Thermal impedance	θ_{ja}	140	$^{\circ}\text{C/W}$	WP
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.

- The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- This value is limited to 5.5 V maximum.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	1.65	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	V_{CC}	V	
Output current	I_{OL}	—	4	mA	$V_{CC} = 1.65 \text{ V}$
		—	8		$V_{CC} = 2.3 \text{ V}$
		—	16		$V_{CC} = 3.0 \text{ V}$
		—	24		$V_{CC} = 4.5 \text{ V}$
		—	32		$V_{CC} = 4.5 \text{ V}$
	I_{OH}	—	-4		$V_{CC} = 1.65 \text{ V}$
		—	-8		$V_{CC} = 2.3 \text{ V}$
		—	-16		$V_{CC} = 3.0 \text{ V}$
		—	-24		$V_{CC} = 4.5 \text{ V}$
		—	-32		$V_{CC} = 4.5 \text{ V}$
Input transition rise or fall rate	$\Delta t / \Delta v$	0	20	ns / V	$V_{CC} = 1.65$ to 1.95 V , 2.3 to 2.7 V
		0	10		$V_{CC} = 3.0$ to 3.6 V
		0	5		$V_{CC} = 4.5$ to 5.5 V
Operating free-air temperature	T_a	-40	85	$^{\circ}\text{C}$	

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

Electrical Characteristics

Ta = -40 to 85°C

Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test condition			
Input voltage	V _{IH}	1.65 to 1.95	V _{CC} ×0.65	—	—	V				
		2.3 to 2.7	1.7	—	—					
		3.0 to 3.6	2.0	—	—					
		4.5 to 5.5	V _{CC} ×0.7	—	—					
	V _{IL}	1.65 to 1.95	—	—	V _{CC} ×0.35					
		2.3 to 2.7	—	—	0.7					
		3.0 to 3.6	—	—	0.8					
		4.5 to 5.5	—	—	V _{CC} ×0.3					
Output voltage	V _{OH}	Min to Max	V _{CC} -0.1	—	—	V	I _{OH} = -100 μA			
		1.65	1.2	—	—		I _{OH} = -4 mA			
		2.3	1.9	—	—		I _{OH} = -8 mA			
		3.0	2.4	—	—		I _{OH} = -16 mA			
			2.3	—	—		I _{OH} = -24 mA			
		4.5	3.8	—	—		I _{OH} = -32 mA			
	V _{OL}	Min to Max	—	—	0.1		I _{OL} = 100 μA			
		1.65	—	—	0.45		I _{OL} = 4 mA			
		2.3	—	—	0.3		I _{OL} = 8 mA			
		3.0	—	—	0.4		I _{OL} = 16 mA			
			—	—	0.55		I _{OL} = 24 mA			
		4.5	—	—	0.55		I _{OL} = 32 mA			
		Input current	I _{IN}	0 to 5.5	—		—	±5	μA	V _{IN} = 5.5 V or GND
		Quiescent supply current	I _{CC}	1.65 to 5.5	—		—	10	μA	V _{IN} = V _{CC} or GND, I _O = 0
ΔI _{CC}	3 to 5.5		—	—	500	One input at V _{CC} -0.6 V, Other input at V _{CC} or GND				
Output leakage current	I _{OFF}	0	—	—	±10	μA	V _{IN} or V _O = 0 to 5.5 V			
Input capacitance	C _{IN}	3.3	—	4	—	pF	V _{IN} = V _{CC} or GND			

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

Switching Characteristics

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

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t_{PLH} t_{PHL}	2.8	8.0	ns	$C_L = 30 \text{ pF}$, $R_L = 1.0 \text{ k}\Omega$	A, B	Y

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

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t_{PLH} t_{PHL}	1.2	5.5	ns	$C_L = 30 \text{ pF}$, $R_L = 500 \Omega$	A, B	Y

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

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t_{PLH} t_{PHL}	1.0	4.5	ns	$C_L = 50 \text{ pF}$, $R_L = 500 \Omega$	A, B	Y

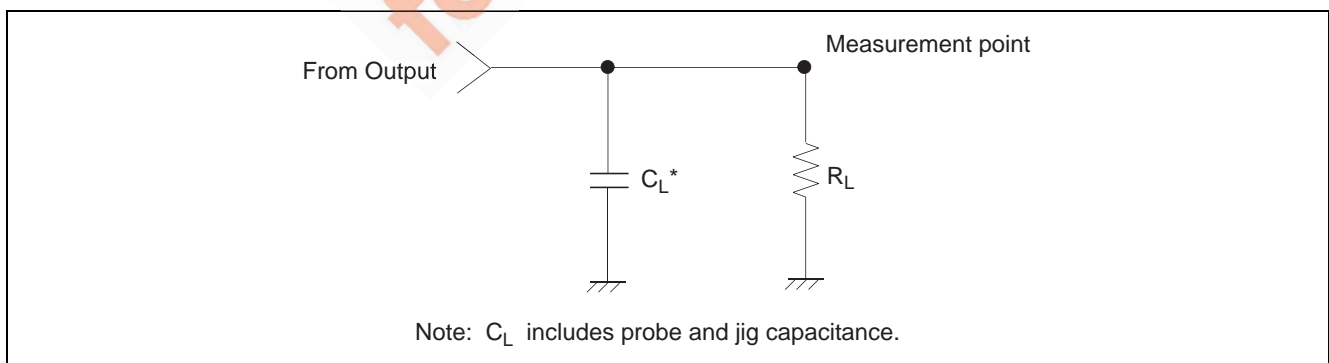
$V_{CC} = 5.0 \pm 0.5 \text{ V}$

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t_{PLH} t_{PHL}	1.0	4.0	ns	$C_L = 50 \text{ pF}$, $R_L = 500 \Omega$	A, B	Y

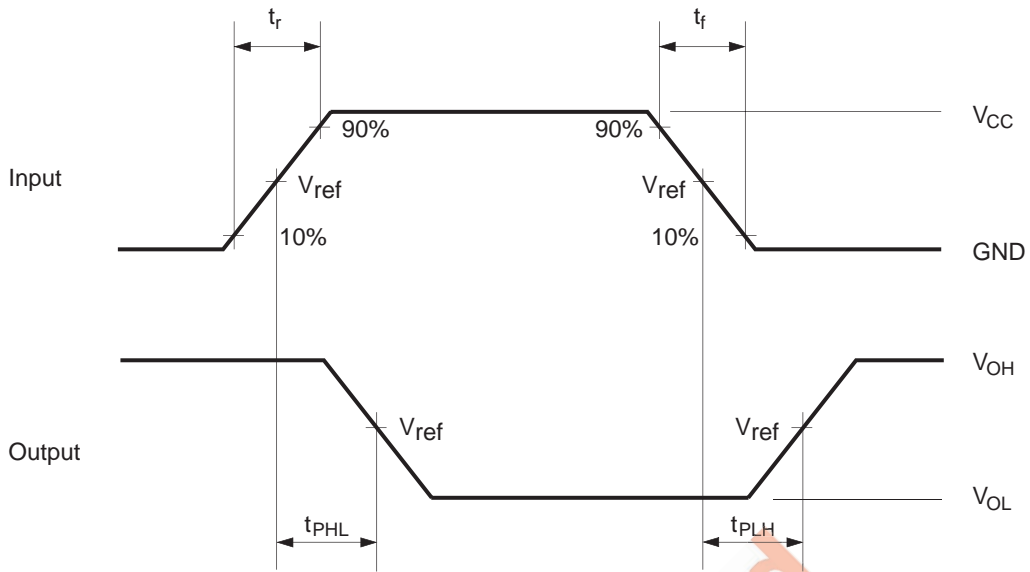
Operating Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C _{PD}	1.8	—	19	—	pF	f = 10 MHz
		2.5	—	19	—		
		3.3	—	20	—		
		5.0	—	22	—		

Test Circuit



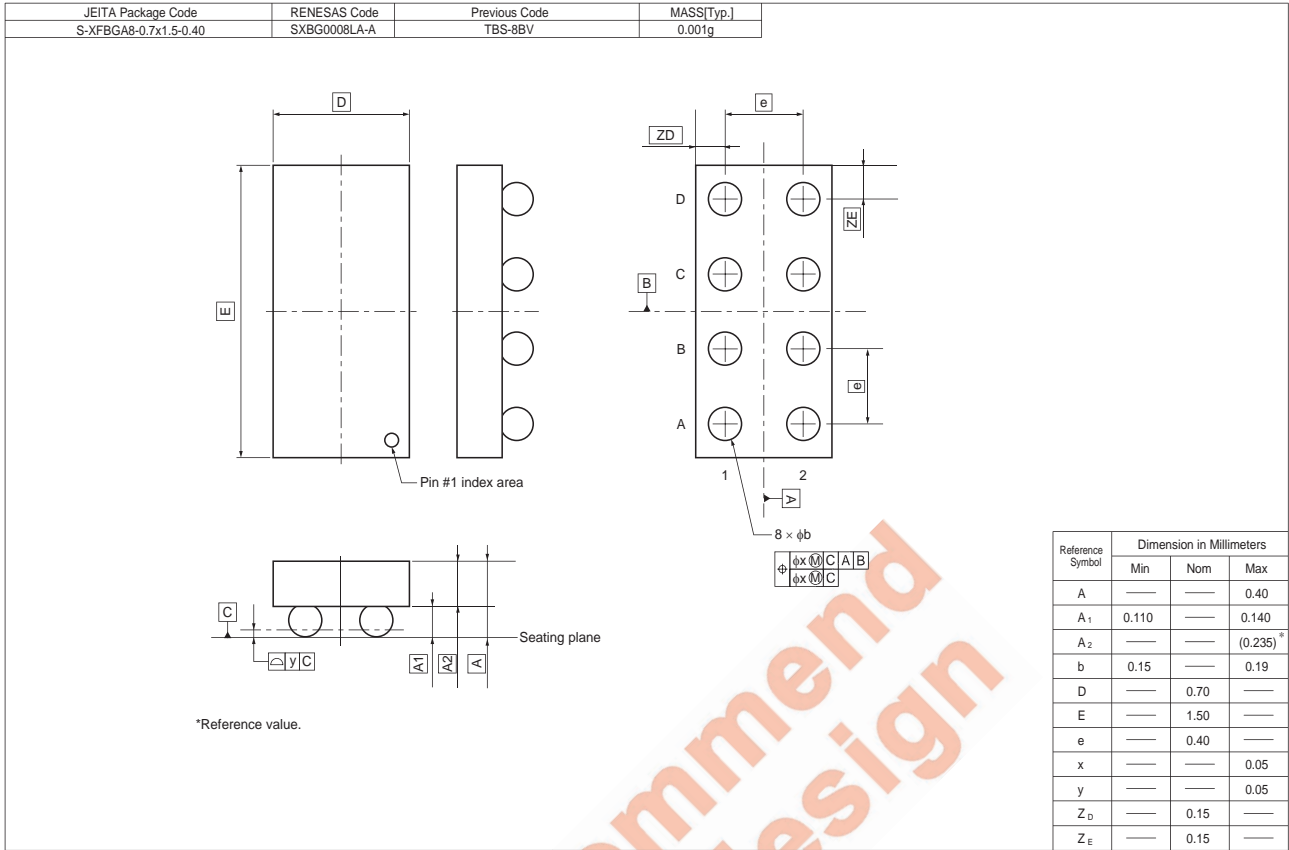
• Waveforms



V_{CC} (V)	Inputs		V_{ref}	C_L	R_L
	V_I	t_r / t_f			
1.8 ± 0.15	V_{CC}	≤ 2 ns	$V_{CC} / 2$	30 pF	1.0 k Ω
2.5 ± 0.2	V_{CC}	≤ 2 ns	$V_{CC} / 2$	30 pF	500 Ω
3.3 ± 0.3	3 V	≤ 2.5 ns	1.5 V	50 pF	500 Ω
5.0 ± 0.5	V_{CC}	≤ 2.5 ns	$V_{CC} / 2$	50 pF	500 Ω

- Notes: 1. Input waveform: PRR \leq 10 MHz, $Z_o = 50 \Omega$.
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions



Not recommend for new design

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