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April 1st, 2010
Renesas Electronics Corporation

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RD74LVC1G97

Configurable Multiple-Function Gate

REJ03D0729-0100
Rev.1.00
Jul 26, 2006

Description

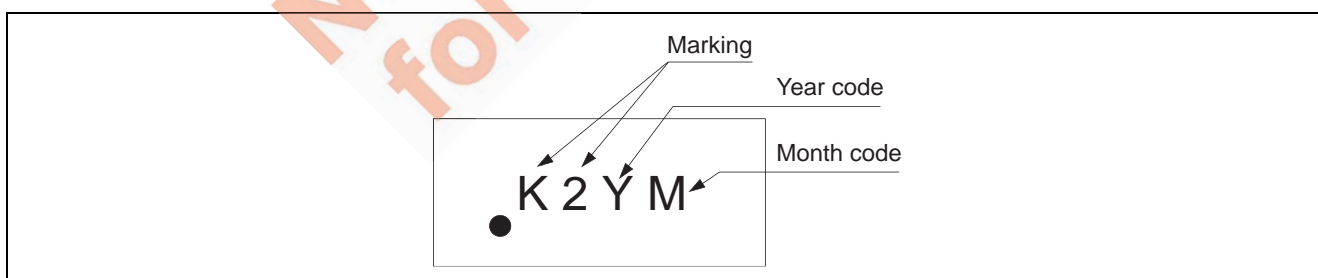
The RD74LVC1G97 has configurable multiple-function gate in a 6-pin package. The Output state is determined by eight patterns of 3-bit input. The user can choose the logic functions AND, NAND, OR, NOR, INVERTER, Non-Invert Buffer, Data Selector. Low voltage and high-speed operation is suitable for the 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} (Max.) = 5.5 V (@ V_{CC} = 0 V to 5.5 V)
- All outputs V_O (Max.) = 5.5 V (@ V_{CC} = 0 V)
- Output current:
 - ±4 mA (@ V_{CC} = 1.65 V)
 - ±8 mA (@ V_{CC} = 2.3 V)
 - ±24 mA (@ V_{CC} = 3.0 V)
 - ±32 mA (@ V_{CC} = 4.5 V)
- All the logical input has hysteresis voltage for the slow transition.
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
RD74LVC1G97WPE	WCSP-6 pin	SXBG0006LA-A (TBS-6BV)	WP	E (3,000 pcs/reel)

Article Indication

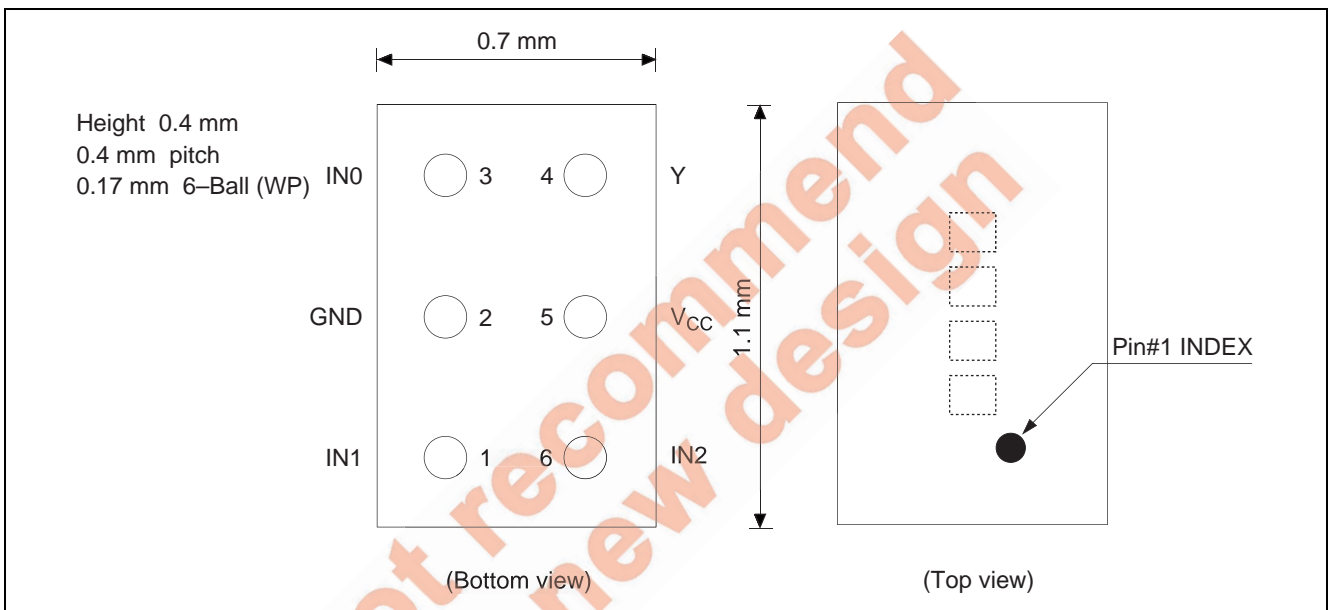


Function Table

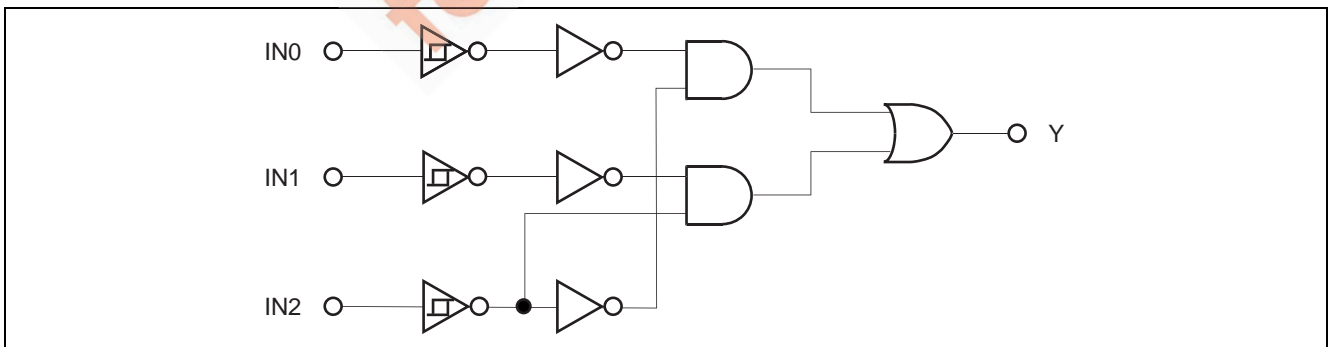
Inputs			Output
IN2	IN1	IN0	Y
L	L	L	L
L	L	H	L
L	H	L	H
L	H	H	H
H	L	L	L
H	L	H	H
H	H	L	L
H	H	H	H

H: High level
L: Low level

Pin Arrangement



Logic Diagram



Function Selection Table

Logic Function	Figure No.
2 to 1 data Selector	1
2-inputs AND	2
2-inputs OR with one input inverted	3
2-inputs NAND with one input inverted	3
2-inputs AND with one input inverted	4
2-inputs NOR with one input inverted	4
2-inputs OR	5
Inverter	6
Non-Inverter Buffer	7

**Not recommend
for new design**

Logic Configurations

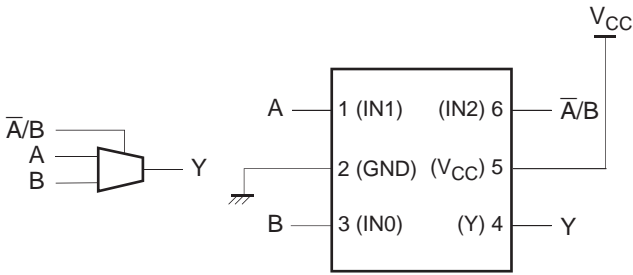


Figure 1 2 to 1 Data Selector

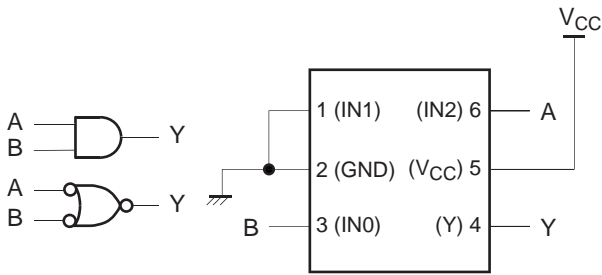


Figure 2 2-inputs AND Gate

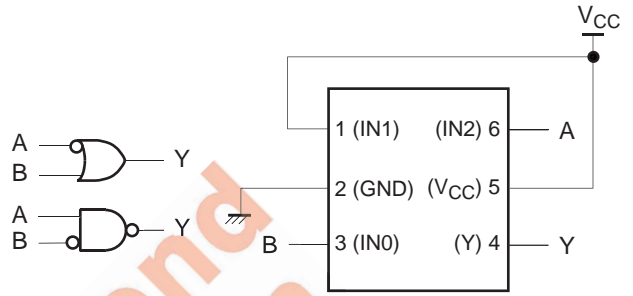


Figure 3 2-inputs OR Gate with A input inverted

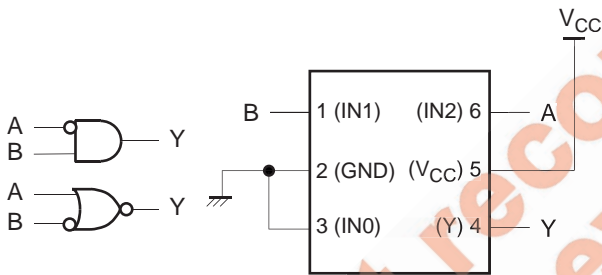


Figure 4 2-inputs AND Gate with A input inverted

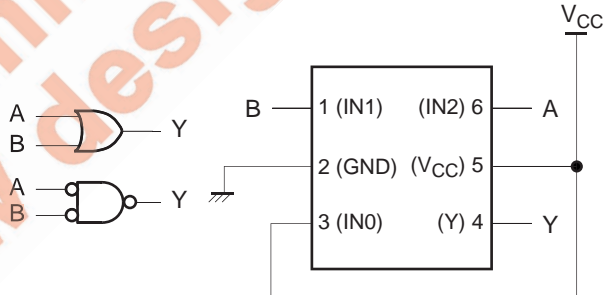


Figure 5 2-inputs OR Gate

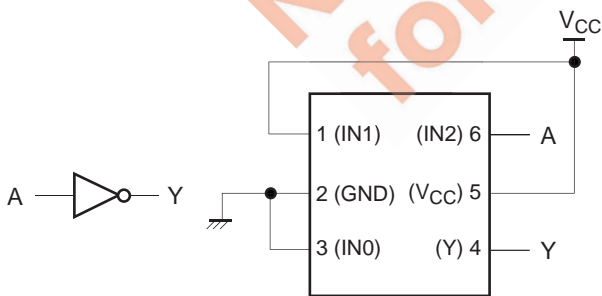


Figure 6 Inverter

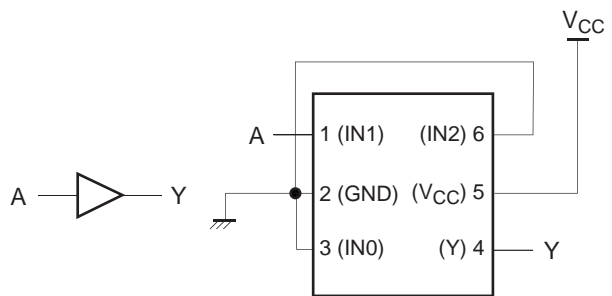


Figure 7 Non-Invert Buffer

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} : 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}	123	$^{\circ}\text{C}/\text{W}$	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		$V_{CC} = 4.5\text{ V}$
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
Threshold voltage	V _T ⁺	1.8	0.8	—	1.4	V	
		2.5	1.2	—	1.7		
		3.3	1.6	—	2.3		
		5.0	2.3	—	3.0		
	V _T ⁻	1.8	0.4	—	0.7		
		2.5	0.6	—	1.0		
		3.3	0.9	—	1.4		
		5.0	1.5	—	2.0		
	ΔV _T	1.8	0.4	—	0.7		
		2.5	0.4	—	0.8		
		3.3	0.4	—	0.9		
		5.0	0.4	—	1.0		
Output voltage	V _{OH}	1.65 to 5.5	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}	1.65 to 5.5	—	—	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}	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	—	3.5	—	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}	3.2	14.4	ns	C _L = 30 pF, R _L = 1.0 kΩ	IN	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}	2.0	8.3	ns	C _L = 30 pF, R _L = 500 Ω	IN	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}	1.5	6.3	ns	C _L = 50 pF, R _L = 500 Ω	IN	Y

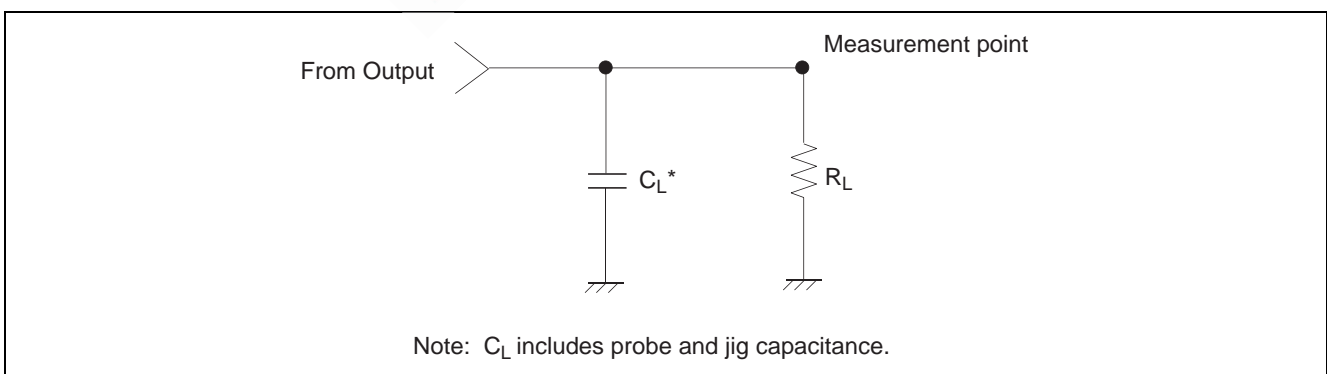
$V_{CC} = 5.0 \pm 0.5 \text{ V}$

Item	Symbol	Ta = -40 to 85°C		Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Max				
Propagation delay time	t _{PLH} t _{PHL}	1.1	5.1	ns	C _L = 50 pF, R _L = 500 Ω	IN	Y

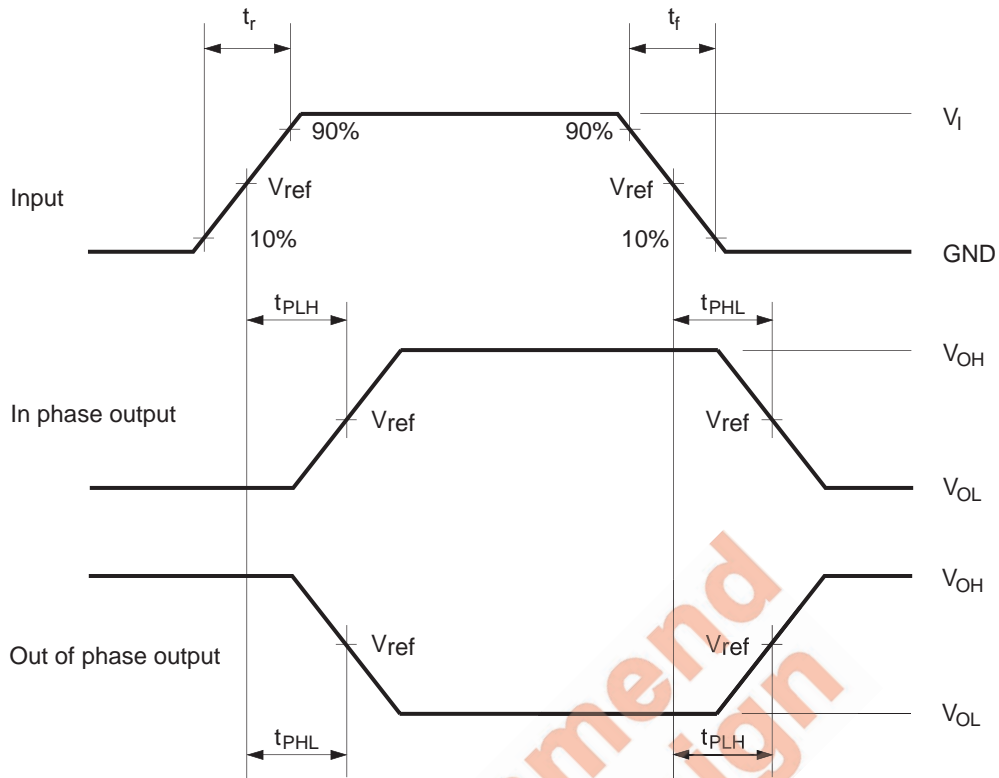
Operating Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Unit	Test Conditions
			Min	Typ	Max		
Power dissipation capacitance	C _{PD}	1.8	—	22	—	pF	f = 10 MHz
		2.5	—	23	—		
		3.3	—	23	—		
		5.0	—	26	—		

Test Circuit



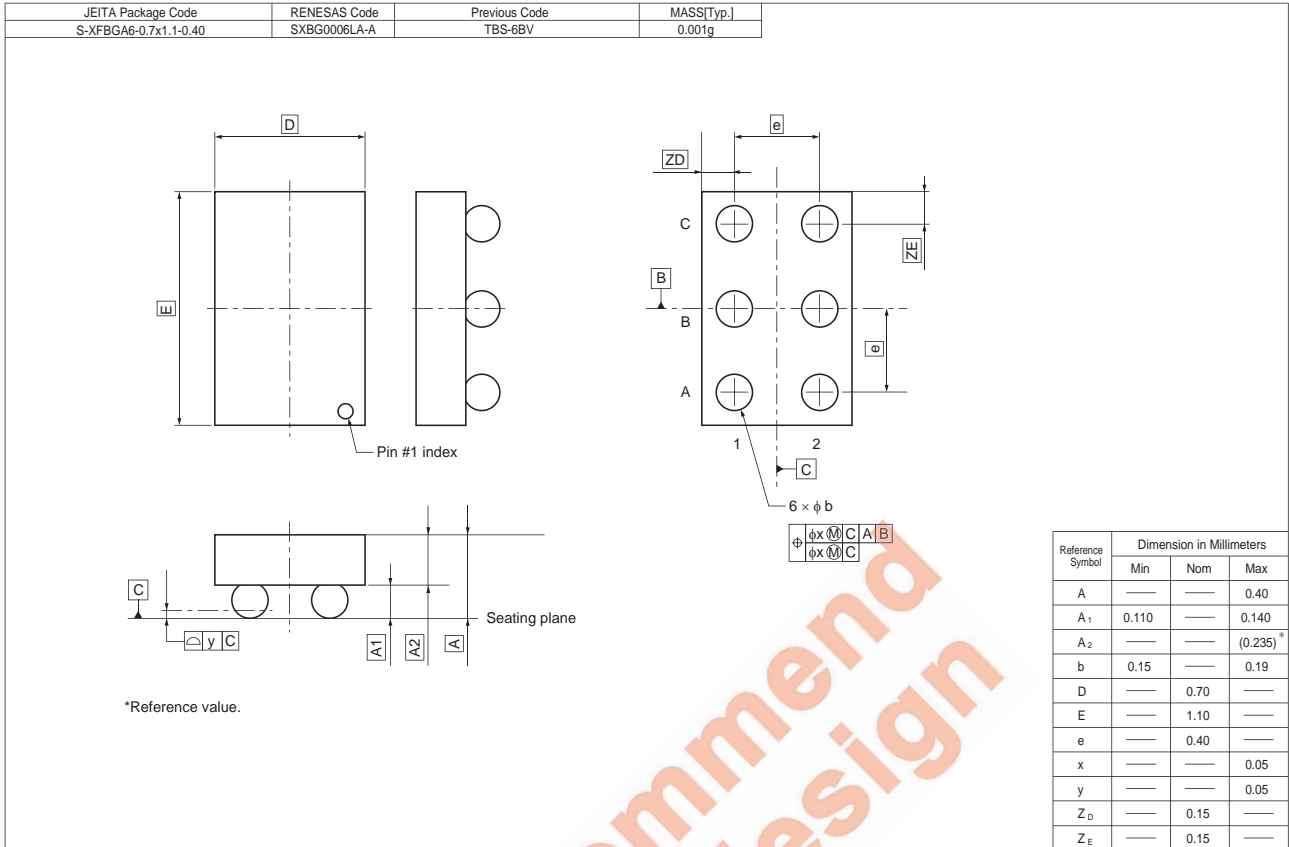
• Waveforms



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 recommended for new design

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