

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HD74HC620, HD74HC623

Octal Bus Transceivers (with inverted 3-state outputs)

Octal Bus Transceivers (with 3-state outputs)

REJ03D0636-0200
(Previous ADE-205-516)
Rev.2.00
Mar 30, 2006

Description

This octal bus transceiver is designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing.

This device allows data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the enable inputs (GBA and GAB).

The enable inputs can be used to disable the device so that the buses are effectively isolated.

The dual-enable configuration gives these devices the capability to store data by simultaneous enabling of $\overline{\text{GBA}}$ and GAB. Each output reinforces its input in this transceiver configuration. Thus, when both control inputs are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states. The 8-bit codes appearing on the two sets of buses will be identical for the HD74HC623 or complementary for the HD74HC620.

Features

- High Speed Operation: t_{pd} (Bus to Bus) = 12 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 15 LSTTL Loads (Q_A to Q_H outputs)
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μA max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μA max ($T_a = 25^\circ\text{C}$)
- Ordering Information

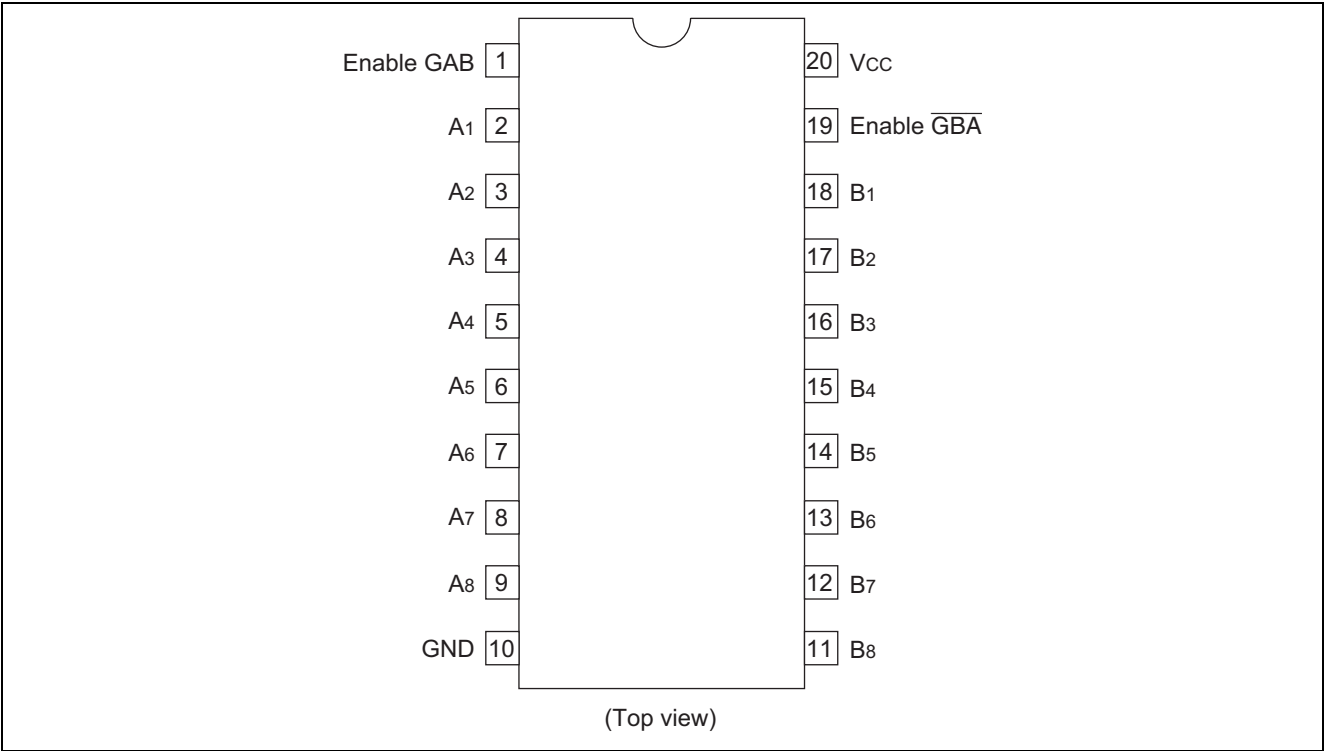
Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC620P	DILP-20 pin	PRDP0020AC-B (DP-20NEV)	P	—
HD74HC620FPEL HD74HC623FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HC620RPEL HD74HC623RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

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

Function Table

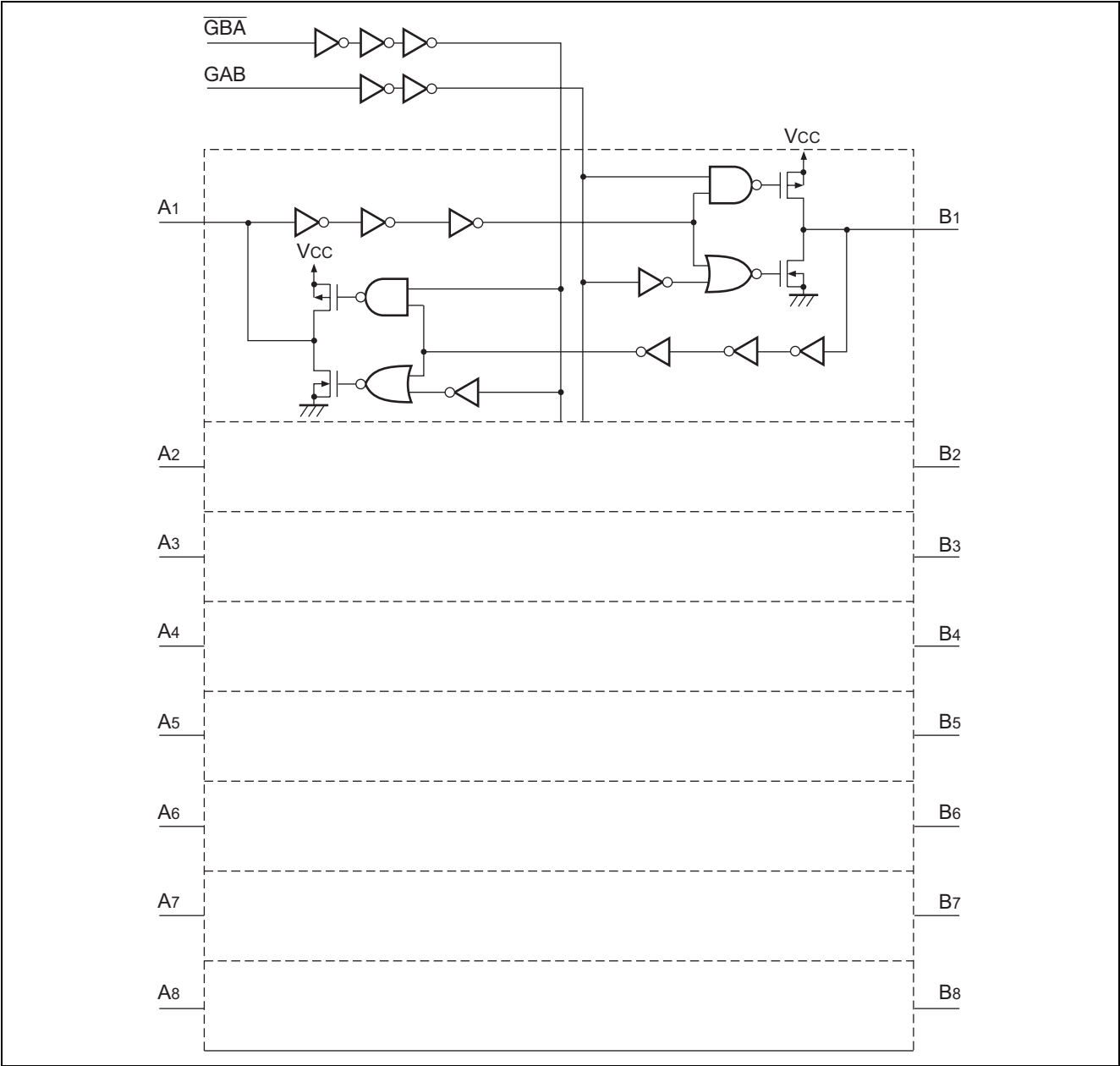
Enable Inputs		Operation	
$\overline{\text{GBA}}$	GAB	HD74HC620	HD74HC623
L	L	$\overline{\text{B}}$ data to A bus	B data to A bus
H	H	$\overline{\text{A}}$ data to B bus	A data to B bus
H	L	Isolation	Isolation
L	H	$\overline{\text{B}}$ data to A bus, $\overline{\text{A}}$ data to B bus	B data to A bus, A data to B bus

Pin Arrangement

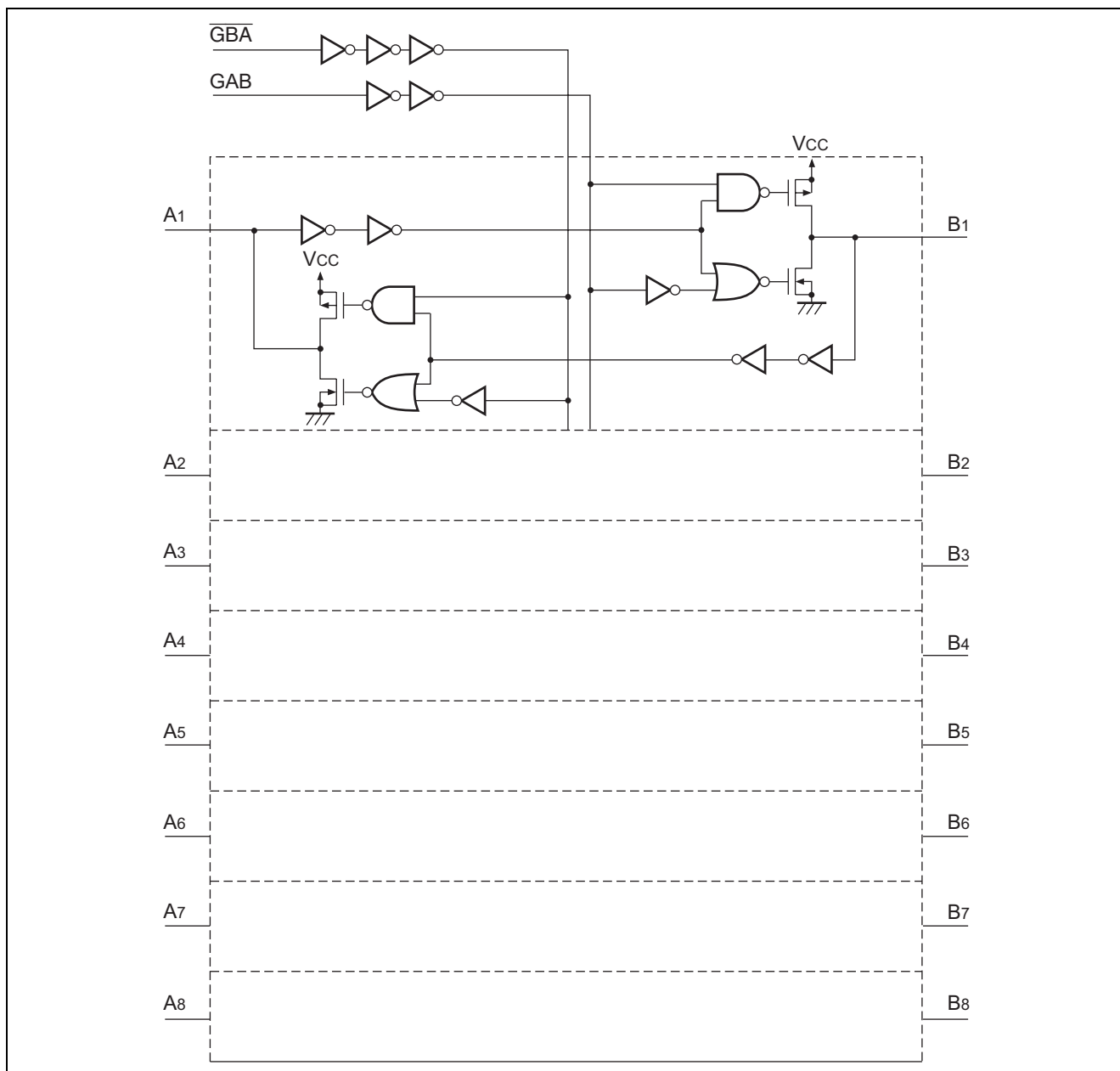


Logic Diagram

HD74HC620



HD74HC623



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage range	V_{CC}	-0.5 to 7.0	V
Input / Output voltage	V_{IN}, V_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input / Output diode current	I_{IK}, I_{OK}	± 20	mA
Output current	I_{OUT}	± 35	mA
V_{CC} , GND current	I_{CC} or I_{GND}	± 75	mA
Power dissipation	P_T	500	mW
Storage temperature	T_{stg}	-65 to +150	°C

Note: 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.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	2 to 6	V	
Input / Output voltage	V_{IN}, V_{OUT}	0 to V_{CC}	V	
Operating temperature	T_a	-40 to 85	°C	
Input rise / fall time ^{*1}	t_r, t_f	0 to 1000	ns	$V_{CC} = 2.0\text{ V}$
		0 to 500		$V_{CC} = 4.5\text{ V}$
		0 to 400		$V_{CC} = 6.0\text{ V}$

Note: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

Electrical Characteristics

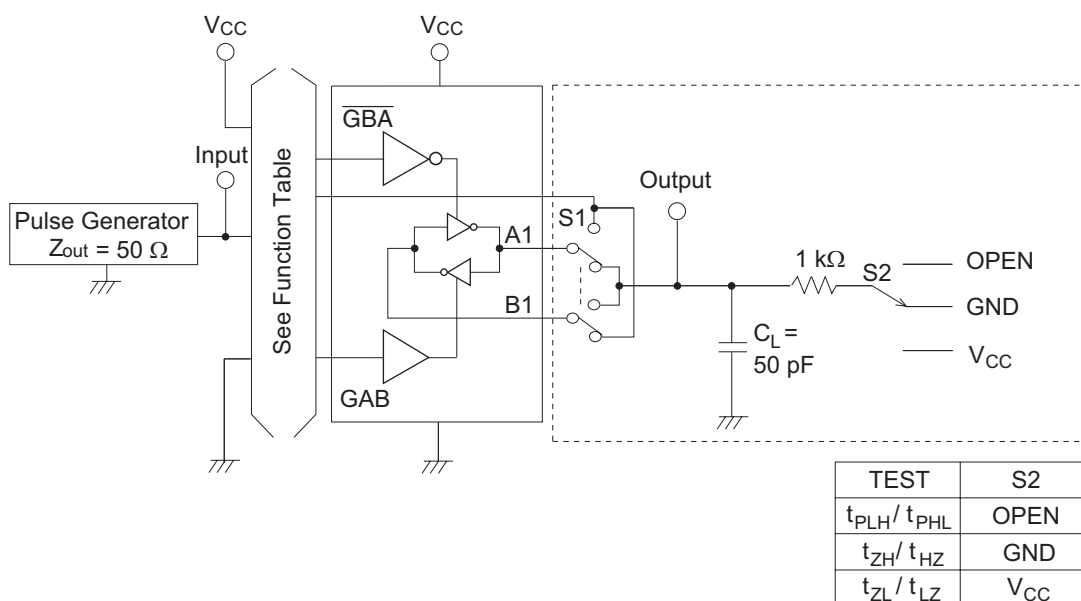
Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V_{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$
		4.5	4.4	4.5	—	4.4	—			$I_{OH} = -6\text{ mA}$
		6.0	5.9	6.0	—	5.9	—			$I_{OH} = -7.8\text{ mA}$
		4.5	4.18	—	—	4.13	—			
		6.0	5.68	—	—	5.63	—			
	V_{OL}	2.0	—	0.0	0.1	—	0.1	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20\text{ }\mu\text{A}$
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			$I_{OL} = 6\text{ mA}$
		6.0	—	—	0.26	—	0.33			$I_{OL} = 7.8\text{ mA}$
Off-state output current	I_{OZ}	6.0	—	—	± 0.5	—	± 5.0	μA	$V_{in} = V_{IH} \text{ or } V_{IL}, V_{out} = V_{CC} \text{ or GND}$	
Input current	I_{in}	6.0	—	—	± 0.1	—	± 1.0	μA	$V_{in} = V_{CC} \text{ or GND}$	
Quiescent supply current	I_{CC}	6.0	—	—	4.0	—	40	μA	$V_{in} = V_{CC} \text{ or GND}, I_{out} = 0\text{ }\mu\text{A}$	

Switching Characteristics ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } +85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t_{PLH}	2.0	—	—	100	—	125	ns	
	t_{PHL}	4.5	—	12	20	—	25		
		6.0	—	—	17	—	21		
Output enable time	t_{ZH}	2.0	—	—	150	—	190	ns	
	t_{ZL}	4.5	—	12	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{HZ}	2.0	—	—	150	—	190	ns	
	t_{LZ}	4.5	—	16	30	—	38		
		6.0	—	—	26	—	33		
Output rise/fall time	t_{TLH}	2.0	—	—	60	—	75	ns	
	t_{THL}	4.5	—	4	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	C_{in}	—	—	5	10	—	10	pF	

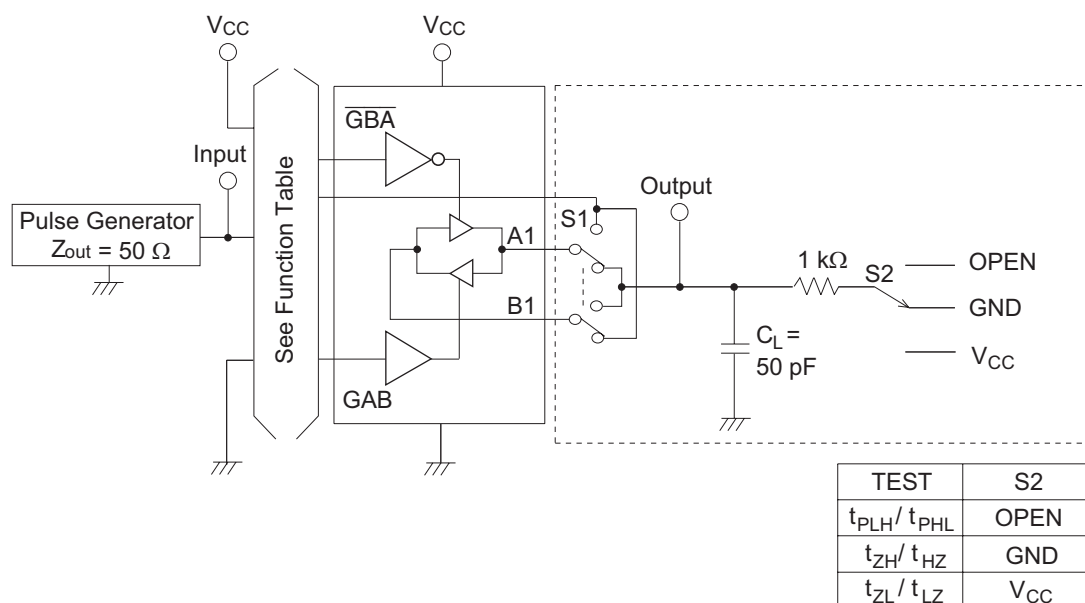
Test Circuit

HD74HC620



- Notes : 1. C_L includes probe and jig capacitance.
 2. A2–B2, A3–B3, A4–B4, A5–B5, A6–B6, A7–B7, A8–B8 are identical to above load circuit.
 3. S1 is a input / output switch.

HD74HC623

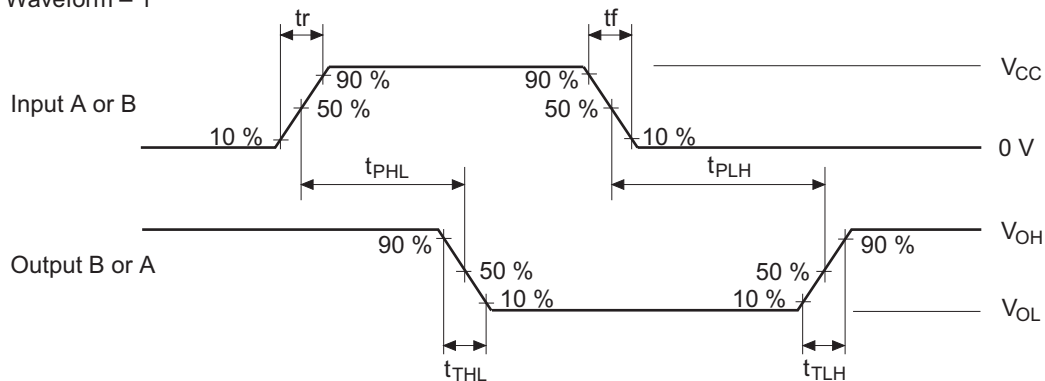


- Notes :
1. C_L includes probe and jig capacitance.
 2. A2–B2, A3–B3, A4–B4, A5–B5, A6–B6, A7–B7, A8–B8 are identical to above load circuit.
 3. S1 is a input / output switch.

Waveforms

HD74HC620

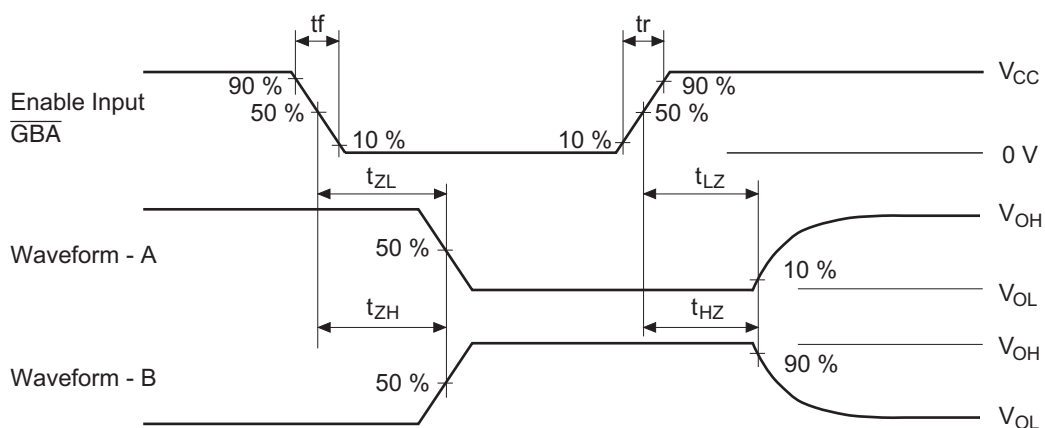
- Waveform – 1



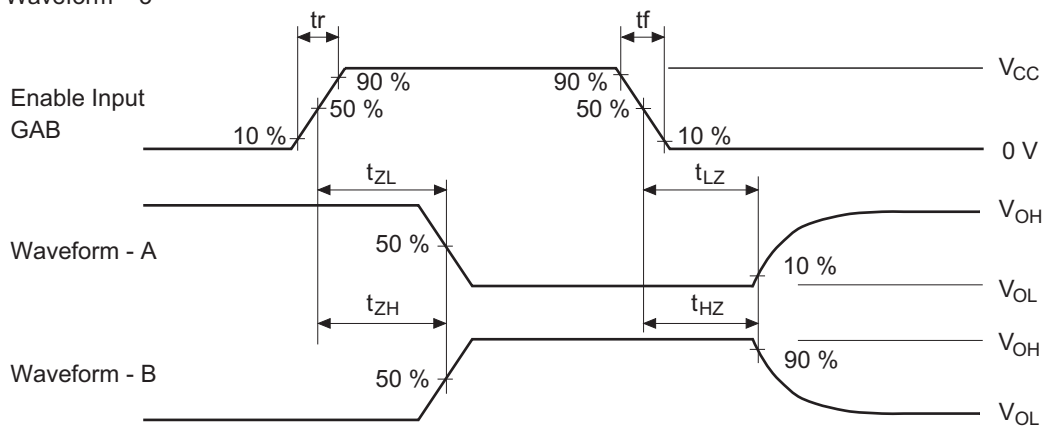
- Notes :
1. Input waveform : PRR $\leq$ 1 MHz, duty cycle 50%, $t_r \leq 6$ ns, $t_f \leq 6$ ns
 2. The output are measured one at a time with one transition per measurement.

HD74HC623

• Waveform – 2

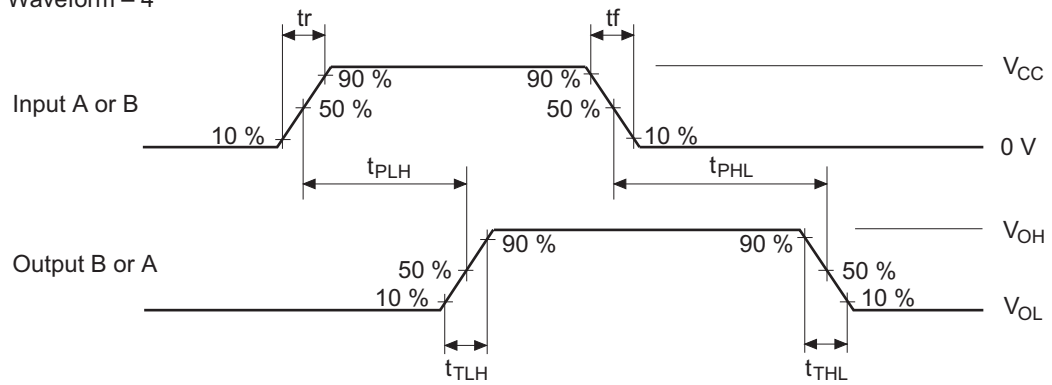


• Waveform – 3



- Notes :
1. Input waveform : $\text{PRR} \leq 1 \text{ MHz}$, duty cycle 50%, $t_r \leq 6 \text{ ns}$, $t_f \leq 6 \text{ ns}$
 2. Waveform - A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform - B is for an output with internal conditions such that the output is high except when disabled by the output control.
 4. The output are measured one at a time with one transition per measurement.

• Waveform – 4



- Notes : 1. Input waveform : PRR $\leq$ 1 MHz, duty cycle 50%, $t_r \leq 6$ ns, $t_f \leq 6$ 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-DIP20-6.3x24.5-2.54	PRDP0020AC-B	DP-20NEV	1.26g

Reference Symbol	Min	Nom	Max
e ₁	—	7.62	—
D	—	24.50	25.40
E	—	6.30	7.00
A	—	—	5.08
A ₁	0.51	—	—
b _p	0.40	0.48	0.56
b ₃	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	1.27
L	2.54	—	—

(Ni/Pd/Au plating)

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-5.5x12.6-1.27	PRSP0020DD-B	FP-20DAV	0.31g

NOTE:
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2. DIMENSION**3"DOES NOT
INCLUDE TRIM OFFSET.

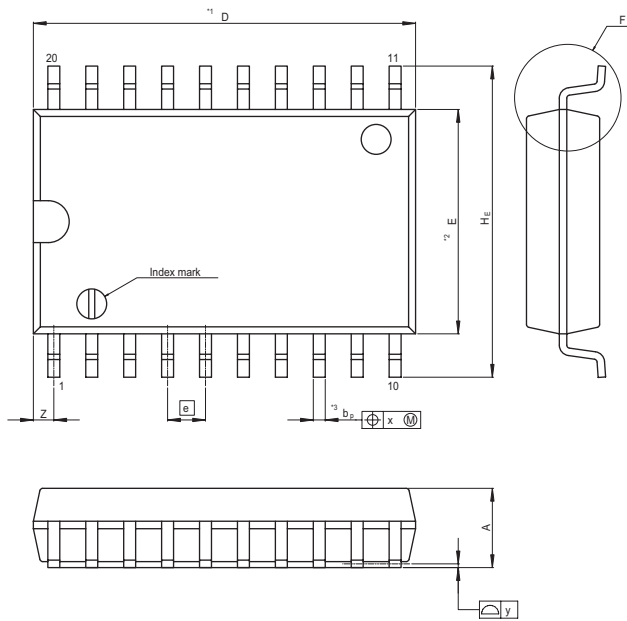
Terminal cross section
(Ni/Pd/Au plating)

Detail F

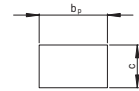
Reference Symbol	Min	Nom	Max
D	—	12.60	13.0
E	—	5.50	—
A ₂	—	—	—
A ₁	0.00	0.10	0.20
A	—	—	2.20
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	7.50	7.80	8.00
ⓐ	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.80
L	0.50	0.70	0.90
L ₁	—	1.15	—

HD74HC620, HD74HC623

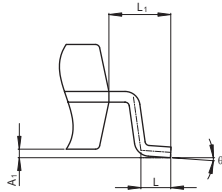
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-7.5x12.8-1.27	PRSP0020DC-A	FP-20DBV	0.52g



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



Terminal cross section
(Ni/Pd/Au plating)



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	12.80	13.2
E	—	7.50	—
A ₂	—	—	—
A ₁	0.10	0.20	0.30
A	—	—	2.65
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.20	0.25	0.30
c ₁	—	—	—
θ	0°	—	8°
H _E	10.00	10.40	10.65
@	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.935
L	0.40	0.70	1.27
L ₁	—	1.45	—

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