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April 1st, 2010
Renesas Electronics Corporation

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Not recommended
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HD74LVC2244A

Octal Buffers / Line Drivers with 3–state Outputs

REJ03D0376–0300
 (Previous ADE-205-234A (Z))
 Rev.3.00
 Aug. 20, 2004

Description

The HD74LVC2244A has eight line drivers with three state outputs in a 20 pin package. This device is a noninverting buffer and has two active low enables ($\overline{1G}$ and $2\overline{G}$). Each enable independently controls four buffers.

All outputs, which are designed to sink up to 12mA, include equivalent 26 Ω resistors to reduce overshoot and undershoot.

Low voltage and high-speed operation is suitable at battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

Features

- $V_{CC} = 1.65$ to 5.5 V
- All inputs V_{IH} (Max) = 5.5 V (@ $V_{CC} = 0$ to 5.5 V)
- All outputs V_O (Max) = 5.5 V (@ $V_{CC} = 0$ V or output off state)
- Typical V_{OL} ground bounce < 0.8 V (@ $V_{CC} = 3.3$ V, $T_a = 25^\circ\text{C}$)
- Typical V_{OH} undershoot > 2.0 V (@ $V_{CC} = 3.3$ V, $T_a = 25^\circ\text{C}$)
- High output current $\pm 12\text{mA}$ (@ $V_{CC} = 3.0$ to 5.5 V)
- All outputs have equivalent 26 Ω series resistors, so no external resistors are required
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVC2244AFPEL	SOP–20 pin (JEITA)	FP–20DAV	FP	EL (2,000 pcs/reel)
HD74LVC2244ATELL	TSSOP–20 pin	TTP–20DAV	T	ELL (2,000 pcs/reel)

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

Function Table

Inputs

\overline{G}	A	Output Y
H	X	Z
L	H	H
L	L	L

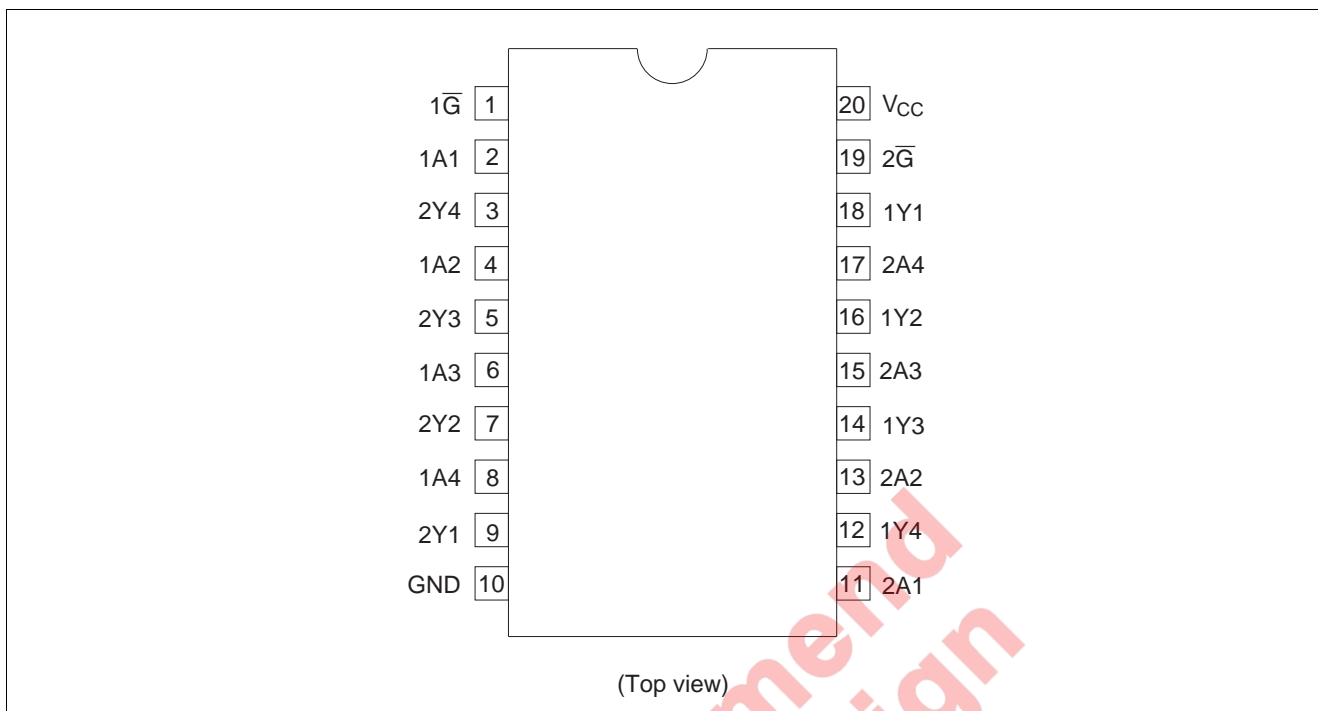
H: High level

L: Low level

X: Immaterial

Z: High impedance

Pin Arrangement



Absolute Maximum Ratings

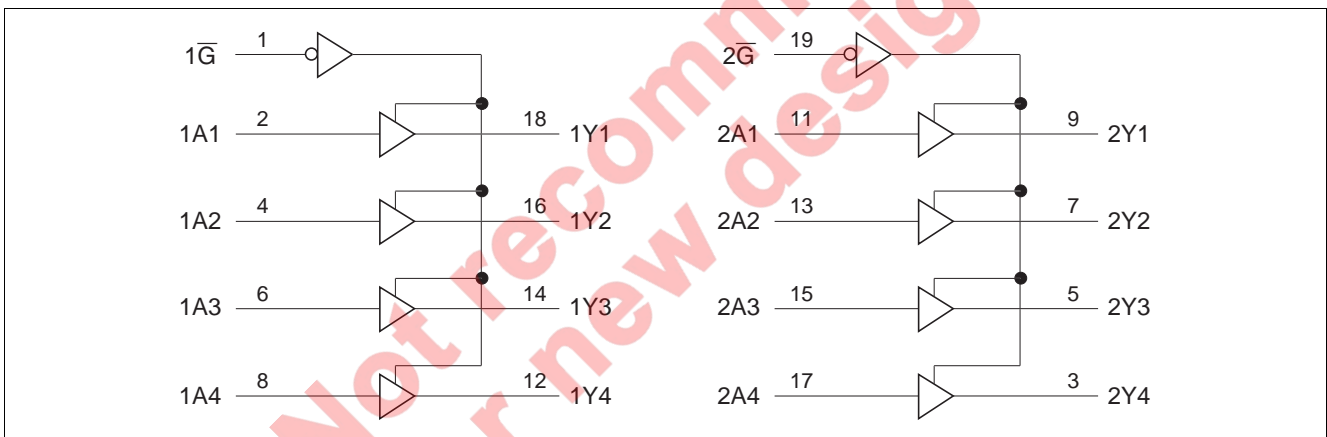
Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V _{CC}	-0.5 to 7.0	V	
Input voltage	V _I	-0.5 to 7.0	V	
Output voltage	V _O	-0.5 to 7.0	V	Output "Z" or V _{CC} : OFF
		-0.5 to V _{CC} +0.5		Output "H" or "L"
Input diode current	I _{IK}	-50	mA	V _I < 0
Output diode current	I _{OK}	-50	mA	V _O < 0
Output current	I _O	±50	mA	
V _{CC} , GND current	I _{CC} or I _{GND}	±100	mA	
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}	1.65 to 5.5	V	At operation
		1.5 to 5.5		Data retention only
Input voltage	V_I	0 to 5.5	V	
Output voltage	V_O	0 to 5.5	V	Output "Z" or V_{CC} : OFF
		0 to V_{CC}		Output "H" or "L"
Output current	I_{OH}	-2	mA	$V_{CC} = 1.65\text{ V}$
		-4		$V_{CC} = 2.3\text{ V}$
		-8		$V_{CC} = 2.7\text{ V}$
		-12		$V_{CC} = 3.0\text{ to }5.5\text{ V}$
	I_{OL}	2	mA	$V_{CC} = 1.65\text{ V}$
		4		$V_{CC} = 2.3\text{ V}$
		8		$V_{CC} = 2.7\text{ V}$
		12		$V_{CC} = 3.0\text{ to }5.5\text{ V}$
Input rise / fall time	t_r, t_f	0 to 6	ns / V	
Operating temperature	T_a	-40 to +85	°C	

Logic Diagram



Electrical Characteristics

(Ta = -40 to 85°C)

Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test Conditions
Input voltage	V _{IH}	1.65 to 1.95	V _{CC} ×0.65	—	—	V	
		2.3 to 2.7	1.7	—	—		
		2.7 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	V	
		2.3 to 2.7	—	—	0.7		
		2.7 to 3.6	—	—	0.8		
		4.5 to 5.5	—	—	V _{CC} ×0.3		
Output voltage	V _{OH}	1.65 to 5.5	V _{CC} -0.2	—	—	V	I _{OH} = -100 μA
		1.65	1.2	—	—		I _{OH} = -2 mA
		2.3	1.7	—	—		I _{OH} = -4 mA
		2.7	2.2	—	—		
		3.0	2.4	—	—		I _{OH} = -6 mA
		2.7	2.0	—	—		I _{OH} = -8 mA
		3.0	2.0	—	—		I _{OH} = -12 mA
		4.5	3.6	—	—		
	V _{OL}	1.65 to 5.5	—	—	0.2	V	I _{OL} = 100 μA
		1.65	—	—	0.45		I _{OL} = 2 mA
		2.3	—	—	0.7		I _{OL} = 4 mA
		2.7	—	—	0.4		
		3.0	—	—	0.55		I _{OL} = 6 mA
		2.7	—	—	0.6		I _{OL} = 8 mA
3.0	—	—	0.8	I _{OL} = 12 mA			
4.5	—	—	0.8				
Input current	I _{IN}	0 to 5.5	—	—	±5	μA	V _{IN} = 0 to 5.5 V
Off state output current	I _{OZ}	1.65 to 5.5	—	—	±5	μA	V _{OUT} = 0 to 5.5 V
Output leak current	I _{OFF}	0	—	—	±5	μA	V _{IN} or V _O = 5.5 V
Quiescent supply current	I _{CC}	1.65 to 3.6	—	—	10	μA	V _{IN} = 3.6 to 5.5 V ^{*1} , I _O = 0
		1.65 to 5.5	—	—	10		V _{IN} = V _{CC} or GND
	ΔI _{CC}	2.7 to 3.6	—	—	500	μA	V _{IN} = one input at (V _{CC} -0.6)V, other inputs at V _{CC} or GND
Input capacitance	C _{IN}	3.3	—	3.4	—	pF	V _{IN} = V _{CC} or GND
Output capacitance	C _O	3.3	—	9.0	—	pF	V _{OUT} = V _{CC} or GND

Note: 1. This applies in the disabled state only.

Switching Characteristics

(Ta = -40 to 85°C)

Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	FROM (Input)	TO (Output)
Propagation delay time	t _{PLH}	1.8±0.15	—	—	10.5	ns	A	Y
		2.5±0.2	—	—	7.0			
	2.7	—	—	6.4				
	3.3±0.3	1.5	—	5.5				
	5.0±0.5	—	—	4.1				
Output enable time	t _{ZH}	1.8±0.15	—	—	13.0	ns	\bar{G}	Y
		2.5±0.2	—	—	9.0			
	2.7	—	—	8.1				
	3.3±0.3	1.0	—	7.1				
	5.0±0.5	—	—	5.6				
Output disable time	t _{HZ}	1.8±0.15	—	—	10.0	ns	\bar{G}	Y
		2.5±0.2	—	—	8.0			
	2.7	—	—	7.3				
	3.3±0.3	1.5	—	6.8				
	5.0±0.5	—	—	5.7				
Between output pin skew ^{*1}	t _{OSLH}	1.8±0.15	—	—	2.0	ns		
		2.5±0.2	—	—	2.0			
	2.7	—	—	1.5				
	3.3±0.3	—	—	1.0				
	5.0±0.5	—	—	1.0				

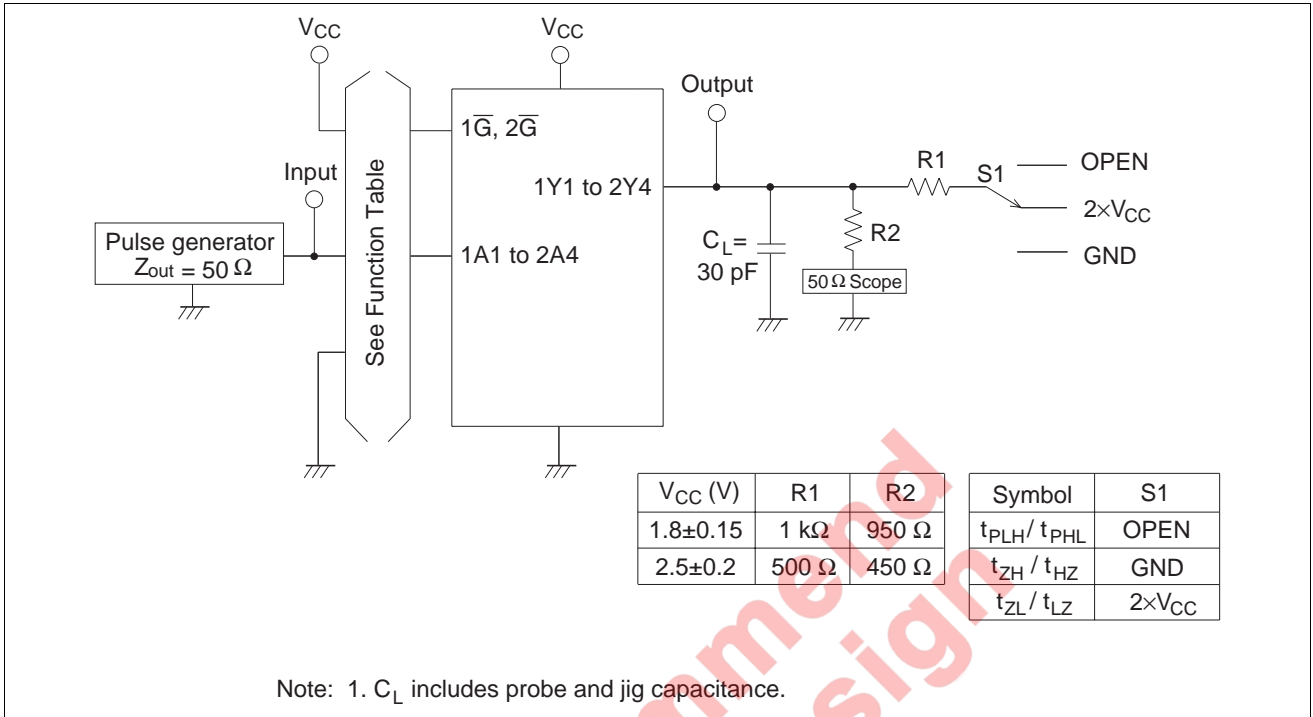
Note: 1. This parameter is characterized but not tested.

$$t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSHL} = |t_{PHLm} - t_{PHLn}|$$

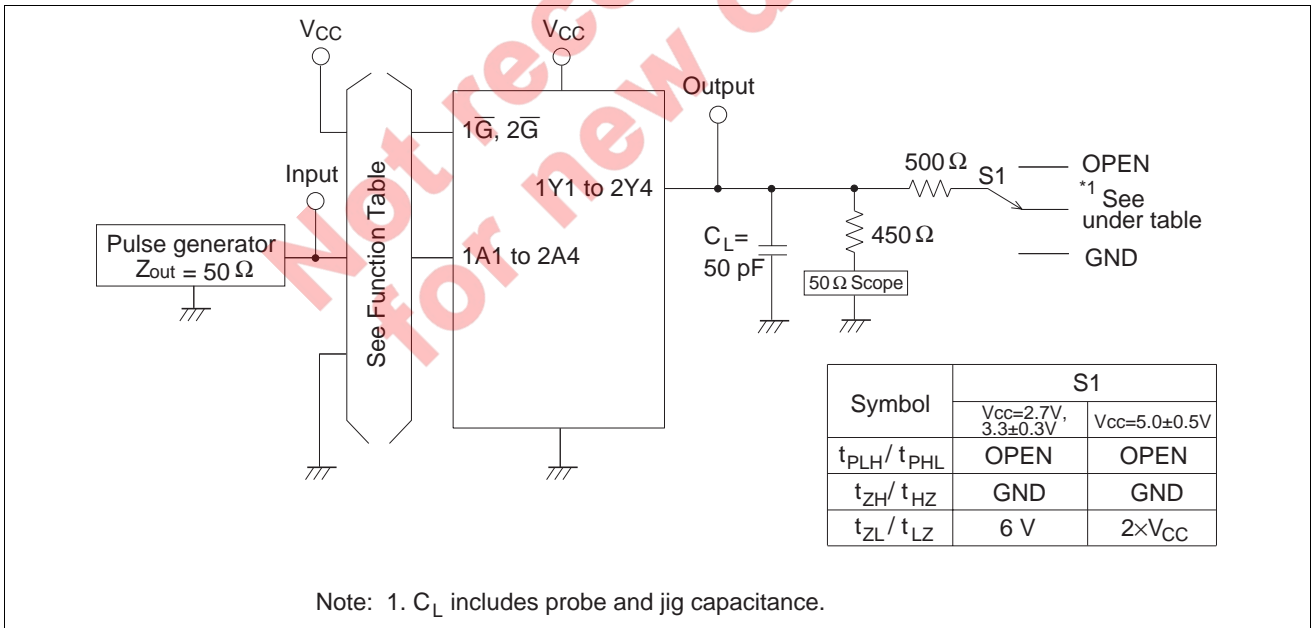
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Test Circuit

($V_{CC} = 1.8 \pm 0.15 \text{ V}$, $V_{CC} = 2.5 \pm 0.2 \text{ V}$)



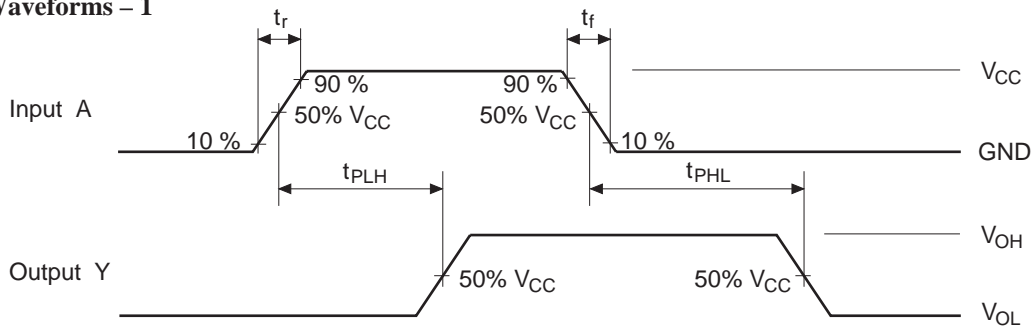
($V_{CC} = 2.7 \text{ V}$, $V_{CC} = 3.3 \pm 0.3 \text{ V}$, $V_{CC} = 5.0 \pm 0.5 \text{ V}$)



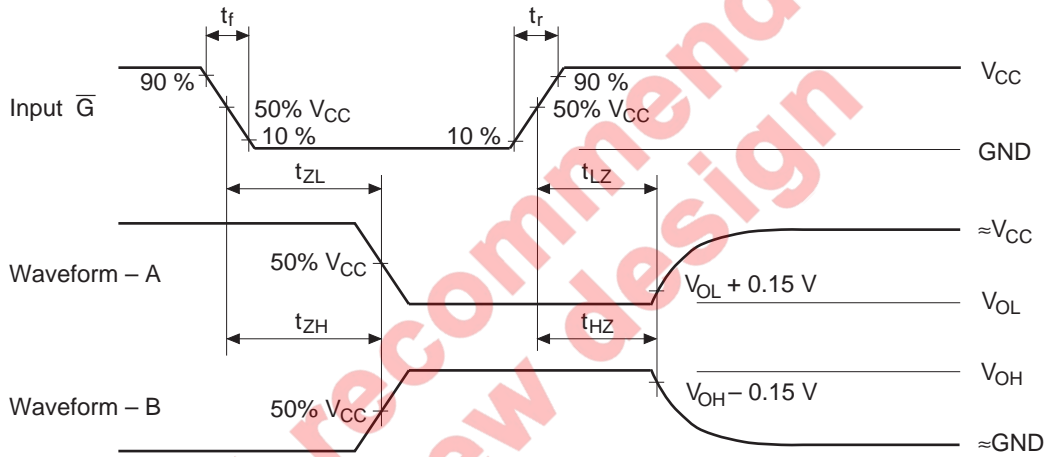
Waveforms

($V_{CC} = 1.8 \pm 0.15 \text{ V}$, $V_{CC} = 2.5 \pm 0.2 \text{ V}$)

• Waveforms – 1

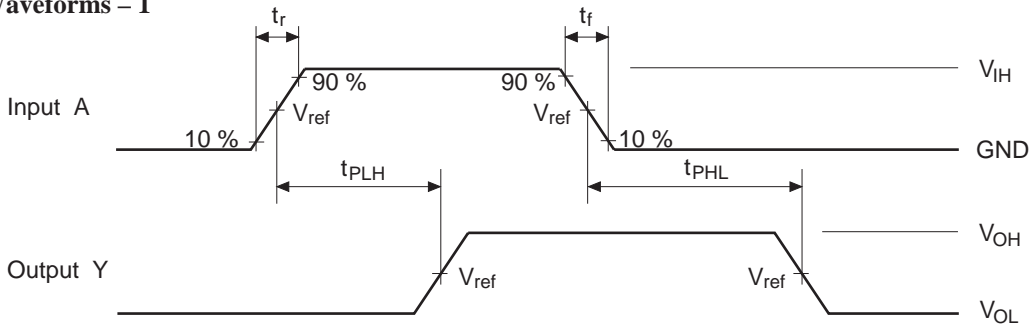


• Waveforms – 2

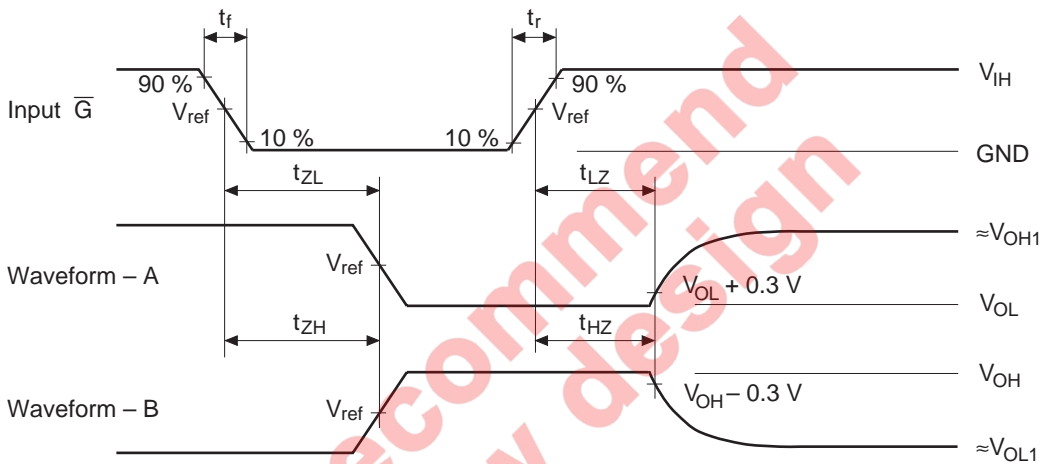


- Notes: 1. Input waveform : PRR = 10 MHz, duty cycle 50%, $t_r = 2.0 \text{ ns}$, $t_f = 2.0 \text{ ns}$
 2. Waveform – A shows input conditions such that the output is "L" level when enabled by the output control.
 3. Waveform – B shows input conditions such that the output is "H" level when enabled by the output control.

• Waveforms – 1



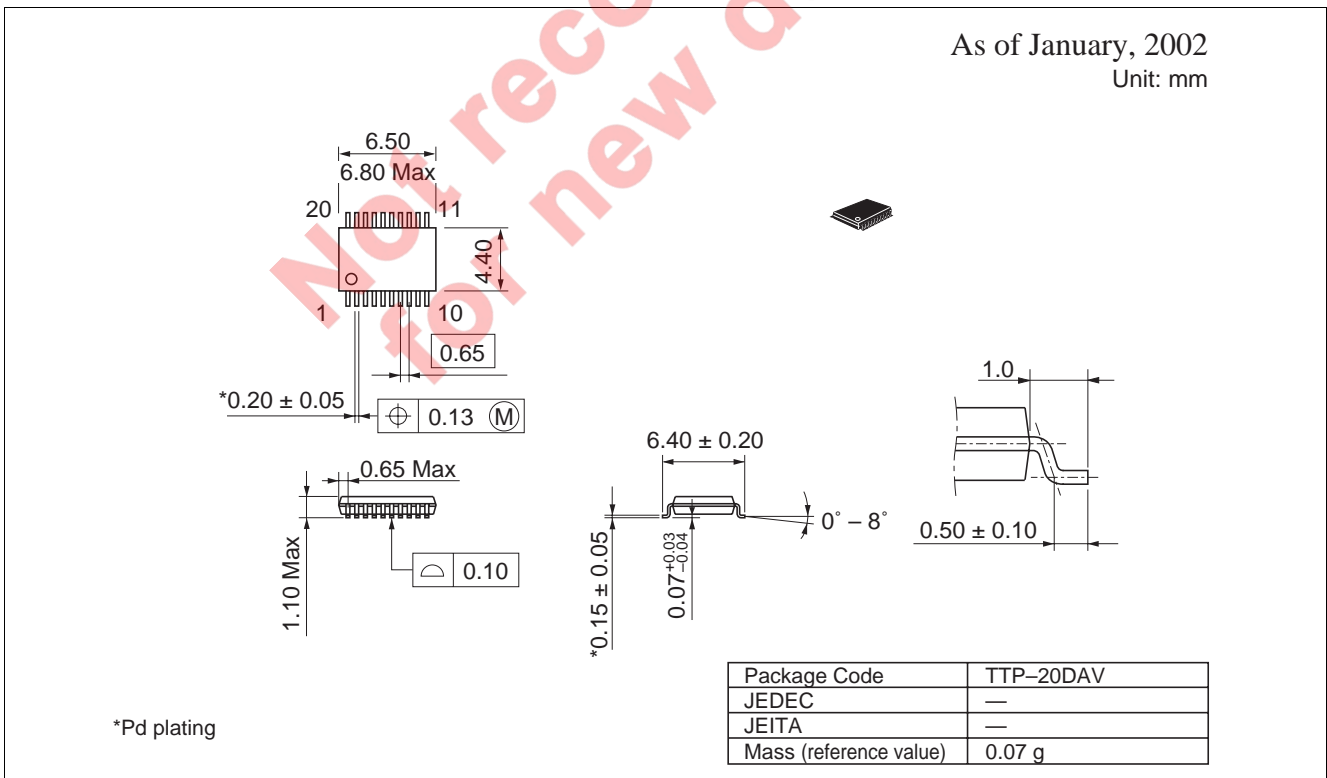
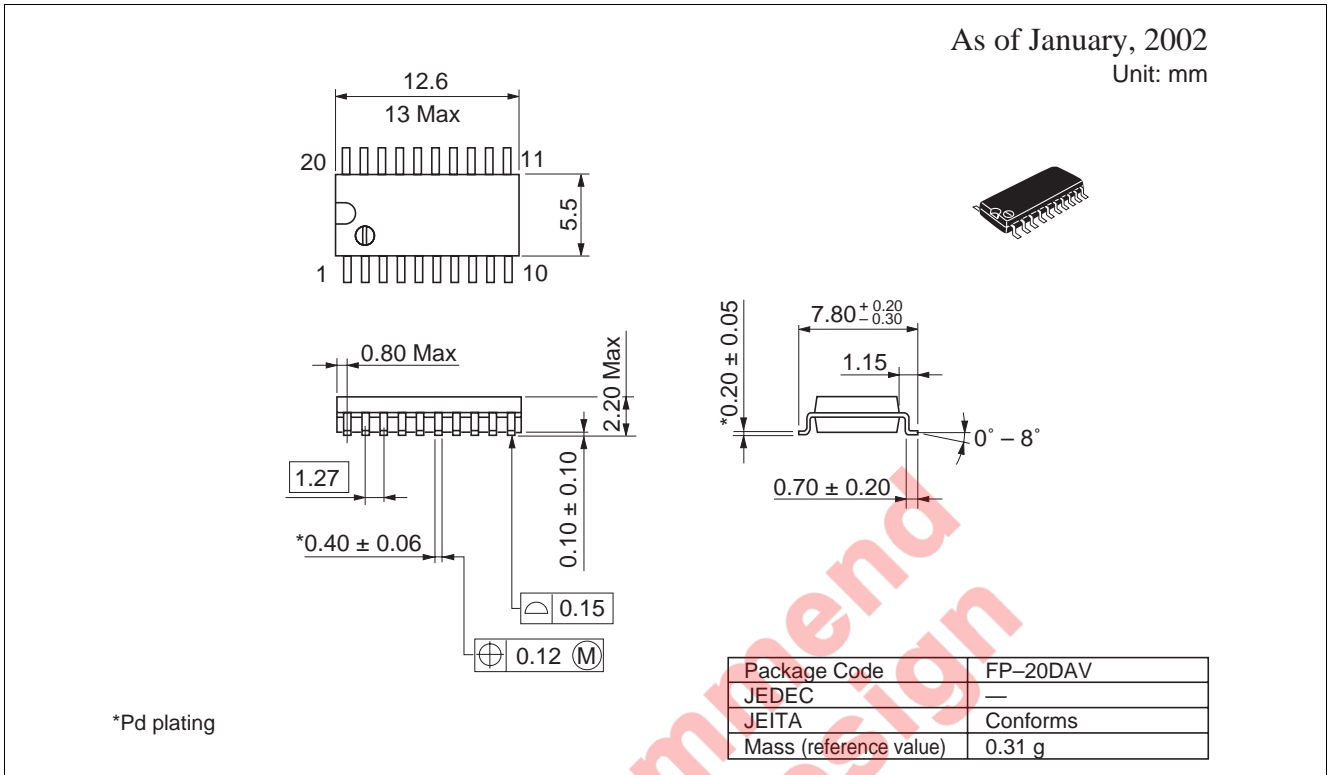
• Waveforms – 2



TEST	$V_{CC}=2.7\text{ V}$, $3.3 \pm 0.3\text{ V}$	$V_{CC}=5.0 \pm 0.5\text{ V}$
V_{IH}	2.7 V	V_{CC}
V_{ref}	1.5 V	$50\%V_{CC}$
V_{OH1}	3 V	V_{CC}
V_{OL1}	GND	GND

- Notes: 1. Input waveform : PRR = 10 MHz, duty cycle 50%, $t_r = 2.5\text{ ns}$, $t_f = 2.5\text{ ns}$
 2. Waveform – A shows input conditions such that the output is "L" level when enabled by the output control.
 3. Waveform – B shows input conditions such that the output is "H" level when enabled by the output control.

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