

# HD74LVC245A

## Octal Bidirectional Transceivers with 3-state Outputs

REJ03D0353-0400Z  
 (Previous ADE-205-111B (Z))  
 Rev.4.00  
 Jul. 27, 2004

### Description

The HD74LVC245A has eight buffers with three state outputs in a 20 pin package. When ( $T / \bar{R}$ ) is high, data flows from the A inputs to the B outputs, and when ( $T / \bar{R}$ ) is low, data flows from the B inputs to the A outputs. A and B bus are separated by making enable input ( $\overline{OE}$ ) high level. Low voltage and high-speed operation is suitable at the battery drive product (note type personal computer) and low power consumption extends the life of a battery for long time operation.

### Features

- $V_{CC} = 2.0\text{ V to }5.5\text{ V}$
- All inputs  $V_{IH} (\text{Max.}) = 5.5\text{ V} (@V_{CC} = 0\text{ V to }5.5\text{ V})$
- All input outputs  $V_{IO} (\text{Max.}) = 5.5\text{ V} (@V_{CC} = 0\text{ V or output off state})$
- Typical  $V_{OL}$  ground bounce  $< 0.8\text{ V} (@V_{CC} = 3.3\text{ V, }T_a = 25^\circ\text{C})$
- Typical  $V_{OH}$  undershoot  $> 2.0\text{ V} (@V_{CC} = 3.3\text{ V, }T_a = 25^\circ\text{C})$
- High output current  $\pm 24\text{ mA} (@V_{CC} = 3.0\text{ V to }5.5\text{ V})$
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LVC245AFPEL	SOP-20 pin (JEITA)	FP-20DAV	FP	EL (2,000 pcs/reel)
HD74LVC245ATELL	TSSOP-20 pin	TTP-20DAV	T	ELL (2,000 pcs/reel)

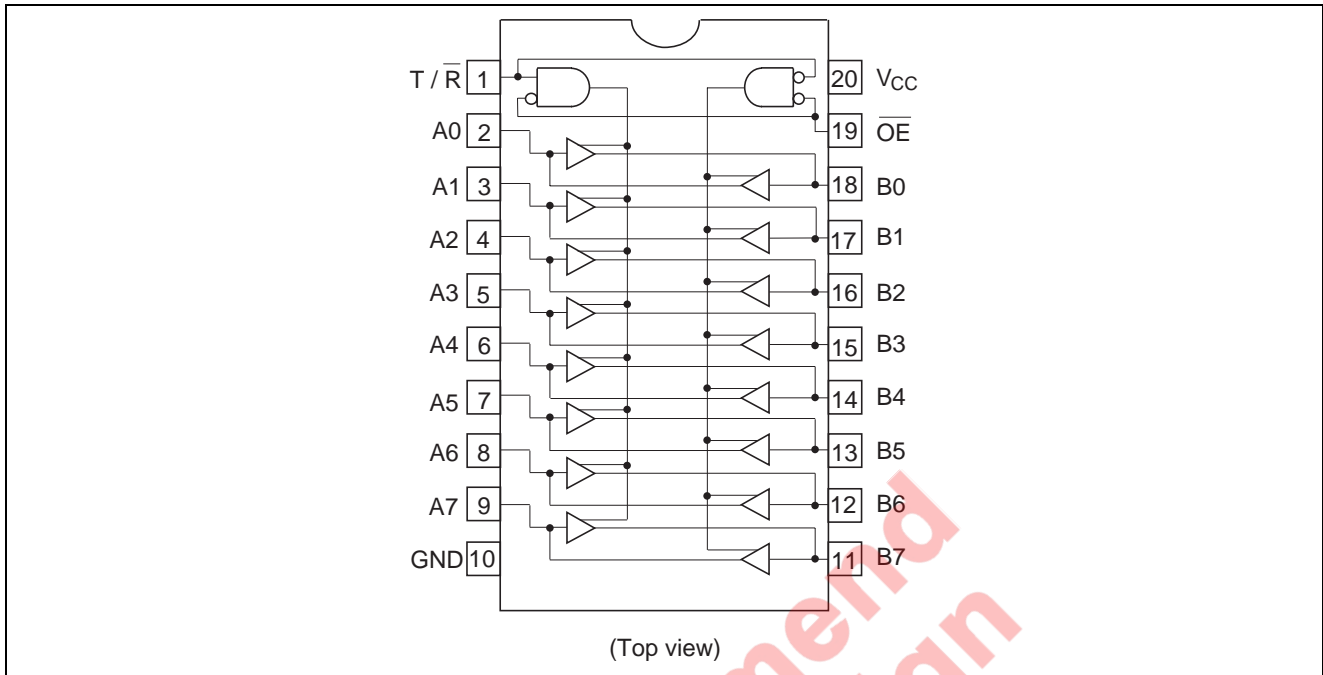
Note: Please consult the sales office for the above package availability.

### Function Table

Inputs		$T / \bar{R}$	Operation
$\overline{OE}$			
L	L	L	B data to A bus
L	L	H	A data to B bus
H	H	X	Z

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 6.0	V	
Input diode current	$I_{IK}$	-50	mA	$V_I = -0.5$ V
Input voltage	$V_I$	-0.5 to 6.0	V	$T / \bar{R}, \overline{OE}$
Output diode current	$I_{OK}$	-50	mA	$V_O = -0.5$ V
		50		$V_O = V_{CC} + 0.5$ V
Input / output voltage	$V_{IO}$	-0.5 to $V_{CC} + 0.5$	V	Output "H" or "L"
		-0.5 to 6.0		Output "Z" or $V_{CC}$ :OFF
Output current	$I_O$	$\pm 50$	mA	
$V_{CC}$ , GND current / pin	$I_{CC}$ or $I_{GND}$	100	mA	
Storage temperature	$T_{stg}$	-65 to 150	$^{\circ}$ 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	$V_{CC}$	1.5 to 5.5	V	Data retention
		2.0 to 5.5		At operation
Input / output voltage	$V_I$	0 to 5.5	V	T / R, $\overline{OE}$
	$V_{IO}$	0 to $V_{CC}$	V	Output "H" or "L"
		0 to 5.5		Output "Z" or $V_{CC}$ :OFF
Operating temperature	$T_a$	-40 to 85	°C	
Output current	$I_{OH}$	-12	mA	$V_{CC} = 2.7 V$
		-24 <sup>*2</sup>		$V_{CC} = 3.0 V$ to 5.5 V
	$I_{OL}$	12	mA	$V_{CC} = 2.7 V$
		24 <sup>*2</sup>		$V_{CC} = 3.0 V$ to 5.5 V
Input rise / fall time <sup>*1</sup>	$t_r, t_f$	10	ns/V	

- Notes: 1. This item guarantees maximum limit when one input switches.  
 Waveform: Refer to test circuit of switching characteristics.  
 2. Duty cycle  $\leq$  50%

**Electrical Characteristics**

Item	Symbol	$V_{CC}$ (V)	$T_a = -40$ to $85^\circ C$		Unit	Test Conditions
			Min	Max		
Input voltage	$V_{IH}$	2.7 to 3.6	2.0	—	V	
		4.5 to 5.5	$V_{CC} \times 0.7$	—		
	$V_{IL}$	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	$V_{CC} \times 0.3$		
Output voltage	$V_{OH}$	2.7 to 5.5	$V_{CC} - 0.2$	—	V	$I_{OH} = -100 \mu A$
		2.7	2.2	—		$I_{OH} = -12 mA$
		3.0	2.4	—		$I_{OH} = -24 mA$
		3.0	2.2	—		
		4.5	3.8	—		
	$V_{OL}$	2.7 to 5.5	—	0.2	V	$I_{OL} = 100 \mu A$
		2.7	—	0.4		$I_{OL} = 12 mA$
		3.0	—	0.55		$I_{OL} = 24 mA$
		4.5	—	0.55		
Input current	$I_{IN}$	0 to 5.5	—	$\pm 5.0$	$\mu A$	$V_{IN} = 5.5 V$ or GND
Off state output current	$I_{OZ}$	2.7 to 5.5	—	$\pm 5.0$	$\mu A$	$V_{IN} = V_{CC}, GND,$ $V_{OUT} = 5.5 V$ or GND
Output leak current	$I_{OFF}$	0	—	20	$\mu A$	$V_{IN} / V_{OUT} = 5.5 V$
Quiescent supply current	$I_{CC}$	2.7 to 3.6	—	$\pm 10$	$\mu A$	$V_{IN} / V_{OUT} = 3.6$ to 5.5 V
		2.7 to 5.5	—	10		$V_{IN} = V_{OUT}$ or GND
	$\Delta I_{CC}$	3.0 to 3.6	—	500	$\mu A$	$V_{IN} =$ one input at $(V_{CC} - 0.6)V,$ other inputs at $V_{CC}$ or GND

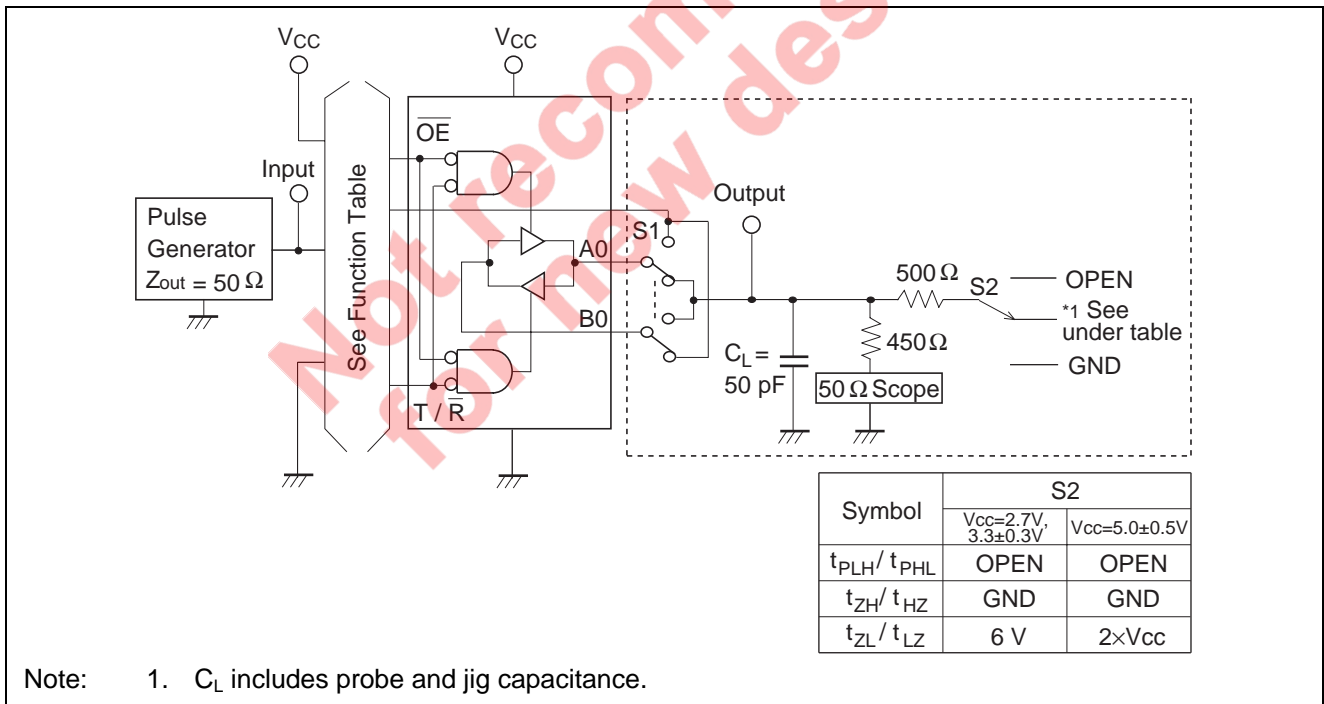
Switching Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = -40 to 85°C			Unit	From (Input)	To (Output)
			Min	Typ	Max			
Propagation delay time	t <sub>PLH</sub>	2.7	—	—	8.0	ns	A or B	B or A
	t <sub>PHL</sub>	3.3±0.3	1.5	—	7.0			
		5.0±0.5	—	—	5.5			
Output enable time	t <sub>ZH</sub>	2.7	—	—	9.5	ns	OE	A or B
	t <sub>ZL</sub>	3.3±0.3	1.5	—	8.5			
		5.0±0.5	—	—	7.0			
Output disable time	t <sub>ZH</sub>	2.7	—	—	8.5	ns	OE	A or B
	t <sub>LZ</sub>	3.3±0.3	1.5	—	7.5			
		5.0±0.5	—	—	6.5			
Between output pins skew <sup>*1</sup>	t <sub>OSLH</sub>	2.7	—	—	—	ns		
	t <sub>OSHL</sub>	3.3±0.3	—	—	1.0			
		5.0±0.5	—	—	1.0			
Input capacitance	C <sub>IN</sub>	2.7	—	3.0	—	pF		
Output capacitance	C <sub>O</sub>	2.7	—	15.0	—	pF		

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

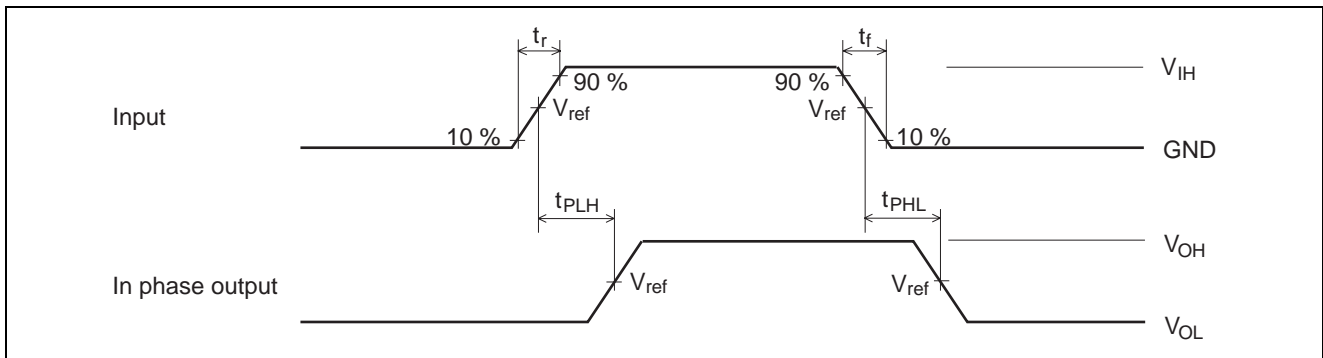
$$t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSHL} = |t_{PHLm} - t_{PHLn}|$$

Test Circuit

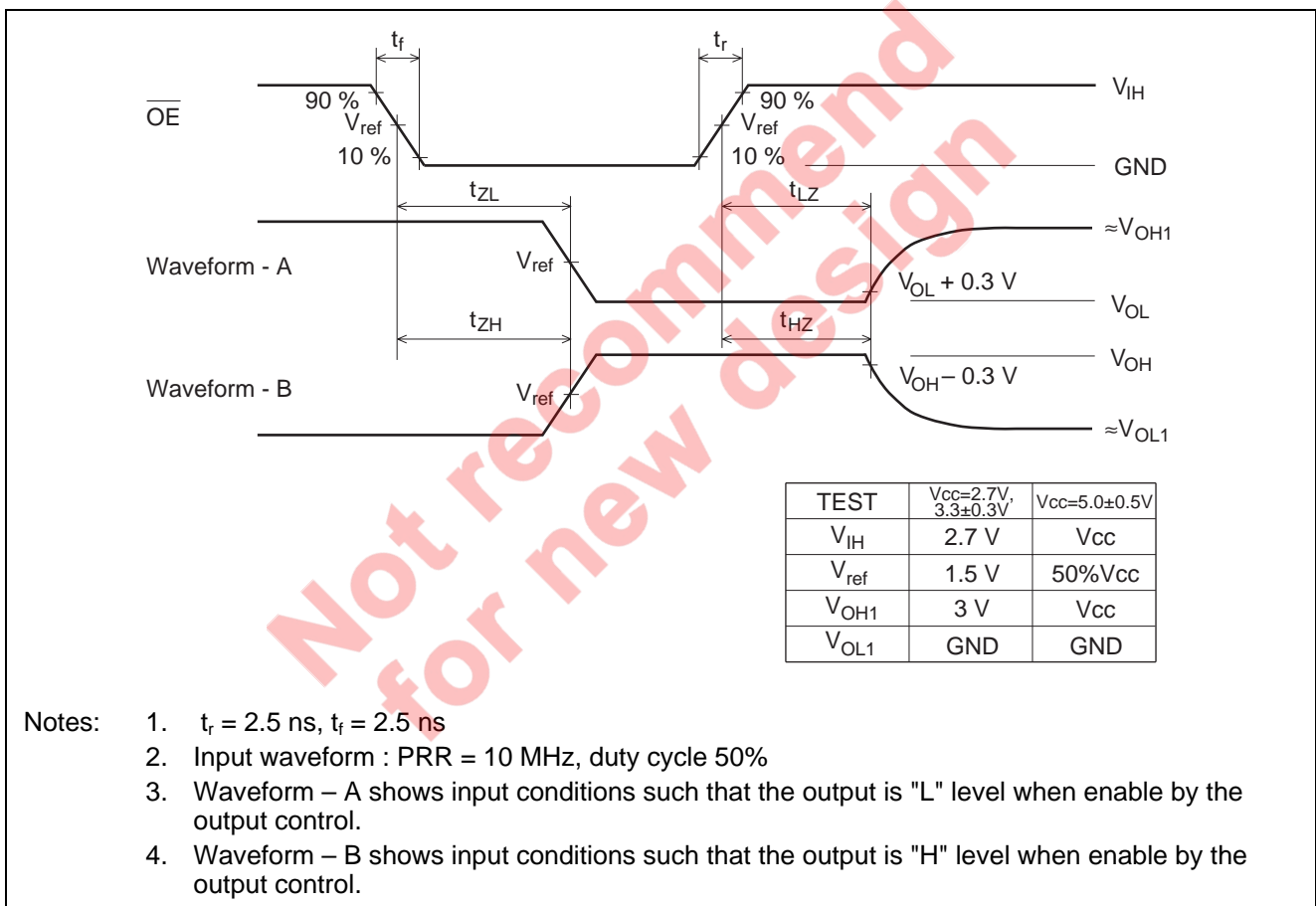


Note: 1. C<sub>L</sub> includes probe and jig capacitance.

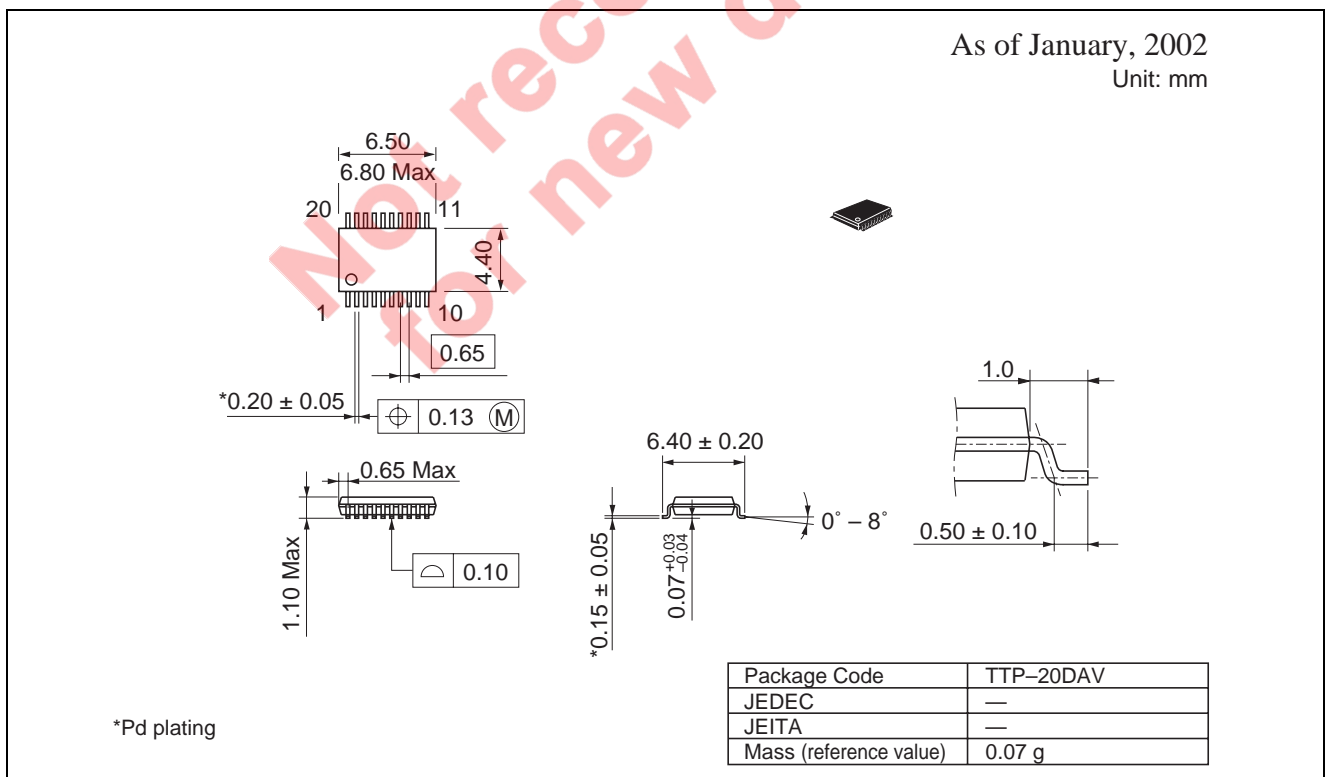
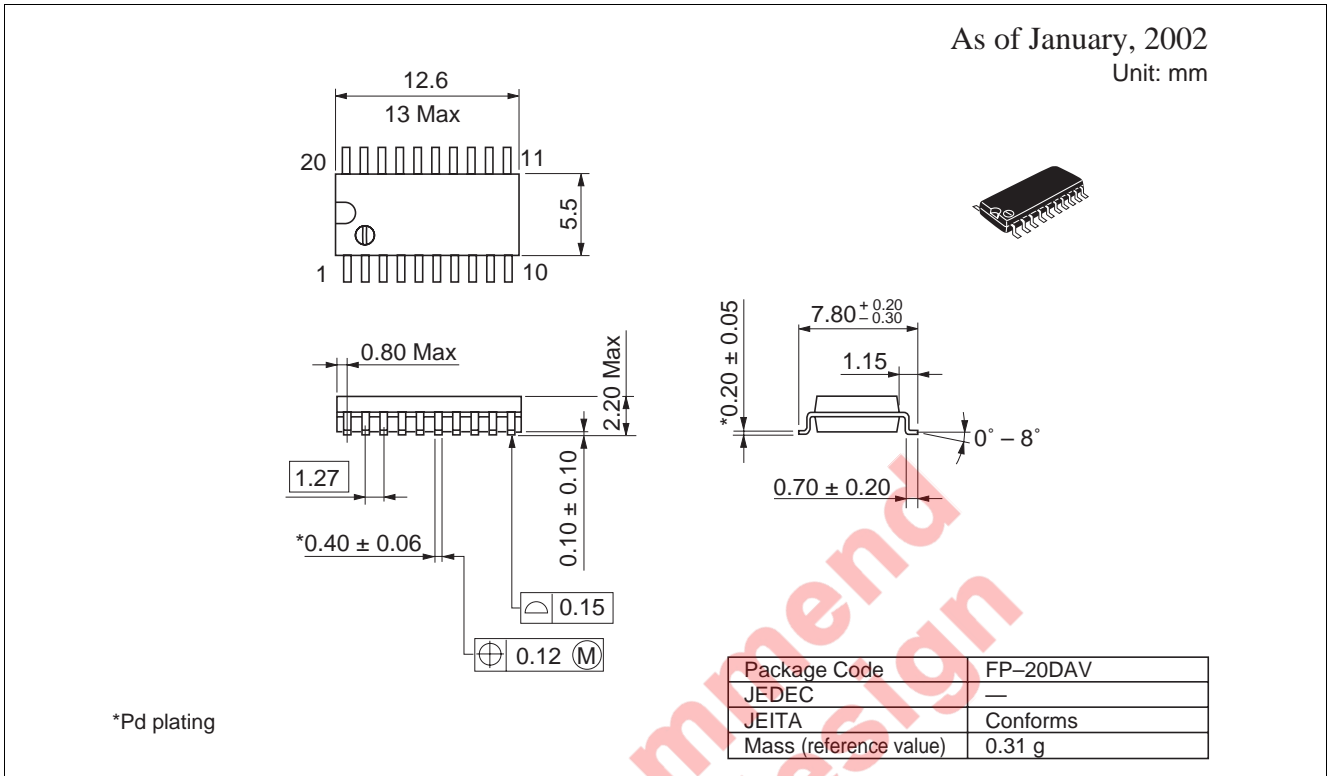
Waveforms – 1



Waveforms – 2



Package Dimensions



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