

# HD74LVC541A

## Octal Buffers / Line Drivers with 3-state Outputs

REJ03D0359-0500Z  
 (Previous ADE-205-115B (Z))  
 Rev.5.00  
 Jul. 28, 2004

### Description

The HD74LVC541A has eight line drivers with three state outputs in a 20 pin package. When  $\overline{G1}$  and  $\overline{G2}$  is low level, this drivers set up output is enable. 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 outputs  $V_{OUT} (\text{Max.}) = 5.5\text{ V} (@V_{CC} = 0\text{ V or output off state})$
- 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)
HD74LVC541AFPEL	SOP-20 pin (JEITA)	FP-20DAV	FP	EL (2,000 pcs/reel)
HD74LVC541ATELL	TSSOP-20 pin	TTP-20DAV	T	ELL (2,000 pcs/reel)

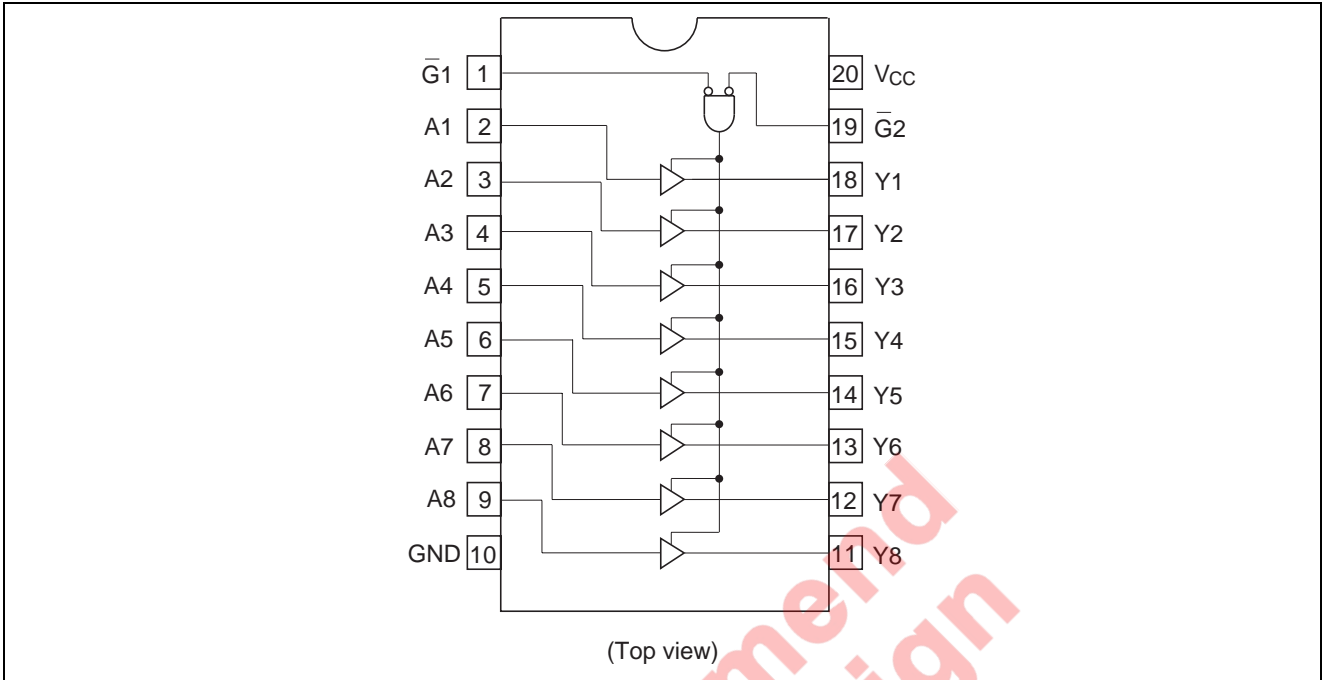
Note: Please consult the sales office for the above package availability.

### Function Table

Inputs			Output Y
$\overline{G1}$	$\overline{G2}$	A	
L	L	L	L
L	L	H	H
H	X	X	Z
X	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	$V_I = -0.5\text{ V}$
Input voltage	$V_I$	-0.5 to 6.0	V	
Output diode current	$I_{OK}$	-50	mA	$V_O = -0.5\text{ V}$
		50		$V_O = V_{CC} + 0.5\text{ V}$
Output voltage	$V_O$	-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 <sub>CC</sub>	1.5 to 5.5	V	Data hold
		2.0 to 5.5		At operation
Input / output voltage	V <sub>I</sub>	0 to 5.5	V	$\overline{G1}, \overline{G2}, A$
	V <sub>O</sub>	0 to V <sub>CC</sub>	V	Output "H" or "L"
		0 to 5.5		Output "Z" or V <sub>CC</sub> :OFF
Operating temperature	T <sub>a</sub>	-40 to 85	°C	
Output current	I <sub>OH</sub>	-12	mA	V <sub>CC</sub> = 2.7 V
		-24 <sup>*2</sup>		V <sub>CC</sub> = 3.0 V to 5.5 V
	I <sub>OL</sub>	12	mA	V <sub>CC</sub> = 2.7 V
		24 <sup>*2</sup>		V <sub>CC</sub> = 3.0 V to 5.5 V
Input rise / fall time <sup>*1</sup>	t <sub>r</sub> , t <sub>f</sub>	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 ≤ 50%

**Electrical Characteristics**

Item	Symbol	V <sub>CC</sub> (V)	Ta = -40 to 85°C		Unit	Test Conditions
			Min	Max		
Input voltage	V <sub>IH</sub>	2.7 to 3.6	2.0	—	V	
		4.5 to 5.5	V <sub>CC</sub> ×0.7	—		
	V <sub>IL</sub>	2.7 to 3.6	—	0.8	V	
		4.5 to 5.5	—	V <sub>CC</sub> ×0.3		
Output voltage	V <sub>OH</sub>	2.7 to 5.5	V <sub>CC</sub> -0.2	—	V	I <sub>OH</sub> = -100 μA
		2.7	2.2	—		I <sub>OH</sub> = -12 mA
		3.0	2.4	—		I <sub>OH</sub> = -24 mA
		3.0	2.2	—		
		4.5	3.8	—		
	V <sub>OL</sub>	2.7 to 5.5	—	0.2	V	I <sub>OL</sub> = 100 μA
		2.7	—	0.4		I <sub>OL</sub> = 12 mA
		3.0	—	0.55		I <sub>OL</sub> = 24 mA
		4.5	—	0.55		
		Input current	I <sub>IN</sub>	0 to 5.5		—
Off state output current	I <sub>OZ</sub>	2.7 to 5.5	—	±5.0	μA	V <sub>IN</sub> = V <sub>CC</sub> , GND V <sub>OUT</sub> = 5.5 V or GND
Output leak current	I <sub>OFF</sub>	0	—	20	μA	V <sub>IN</sub> / V <sub>OUT</sub> = 5.5 V
Quiescent supply current	I <sub>CC</sub>	2.7 to 3.6	—	±10	μA	V <sub>IN</sub> / V <sub>OUT</sub> = 3.6 to 5.5 V
		2.7 to 5.5	—	10		V <sub>IN</sub> = V <sub>CC</sub> or GND
	ΔI <sub>CC</sub>	3.0 to 3.6	—	500	μA	V <sub>IN</sub> = one input at (V <sub>CC</sub> -0.6)V, other inputs at V <sub>CC</sub> or GND

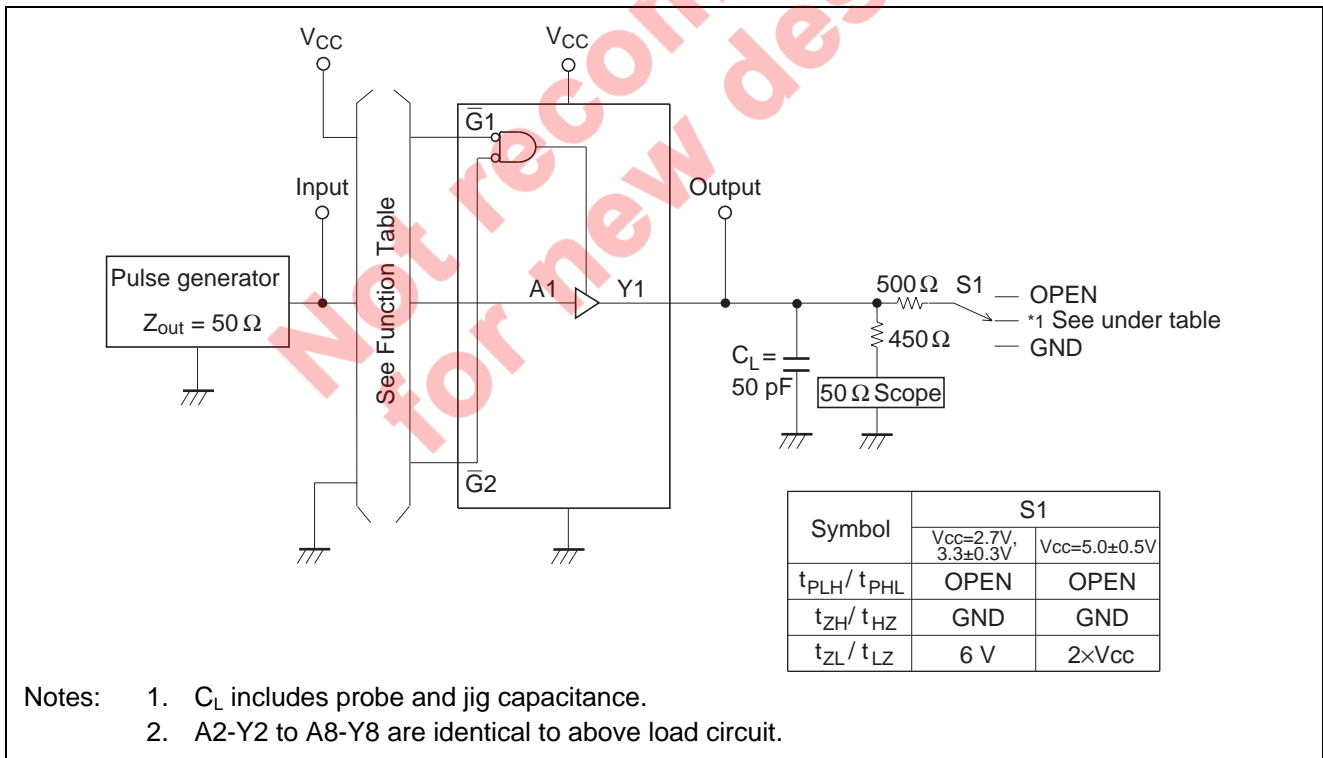
Switching Characteristics

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	—	—	7.5	ns	A	Y
	t <sub>PHL</sub>	3.3±0.3	1.5	—	6.5			
		5.0±0.5	—	—	5.0			
Output enable time	t <sub>ZH</sub>	2.7	—	—	9.5	ns	G1 or G2	Y
	t <sub>ZL</sub>	3.3±0.3	1.5	—	8.5			
		5.0±0.5	—	—	7.0			
Output disable time	t <sub>HZ</sub>	2.7	—	—	8.5	ns	G1 or G2	Y
	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		

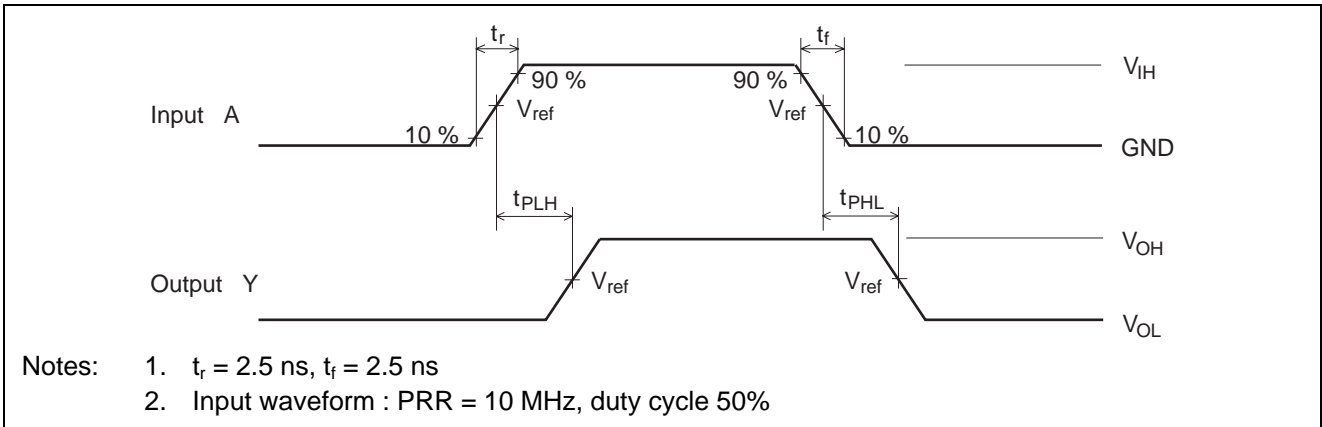
Note: 1. This parameter is characterized but not tested.

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

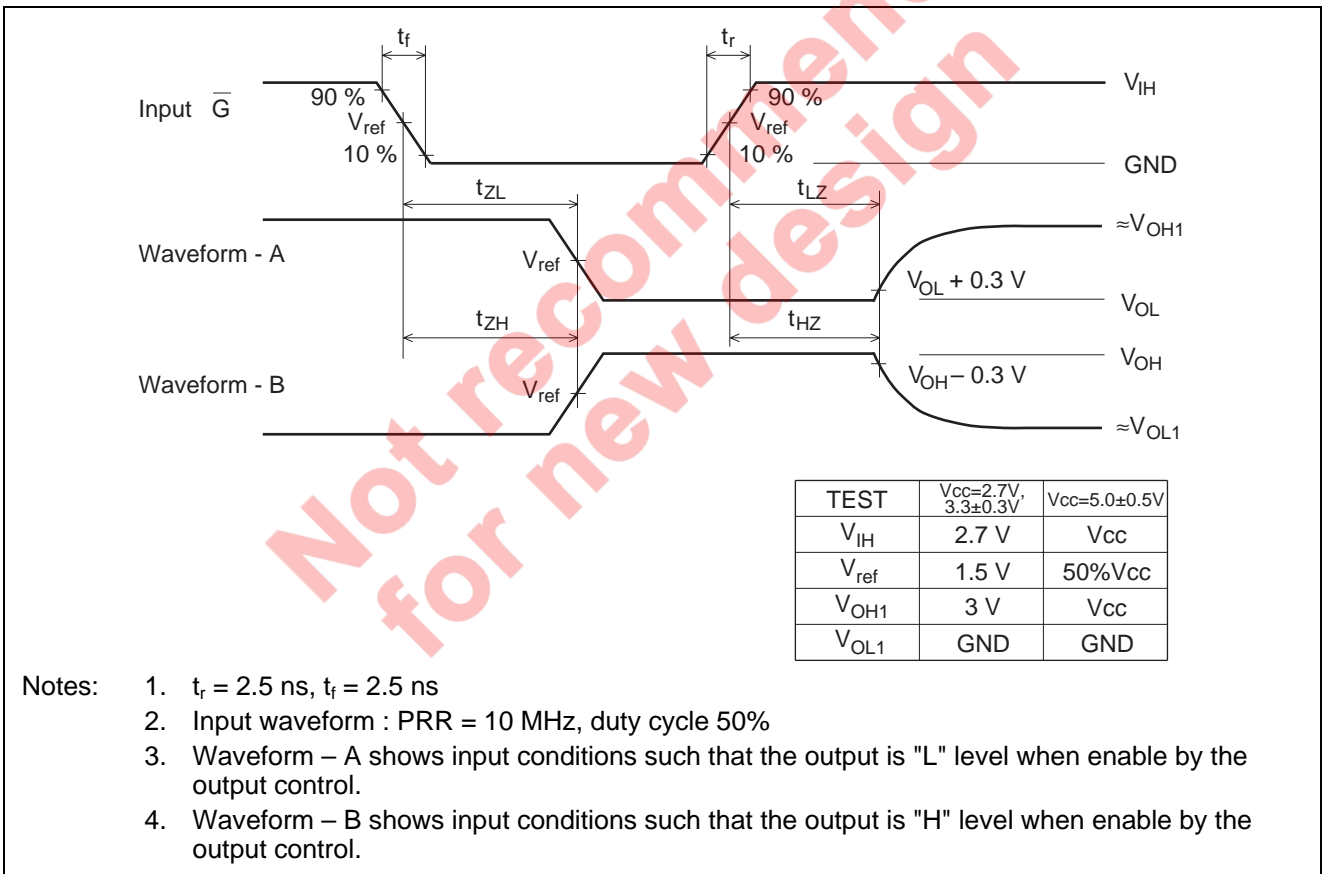
Test Circuit



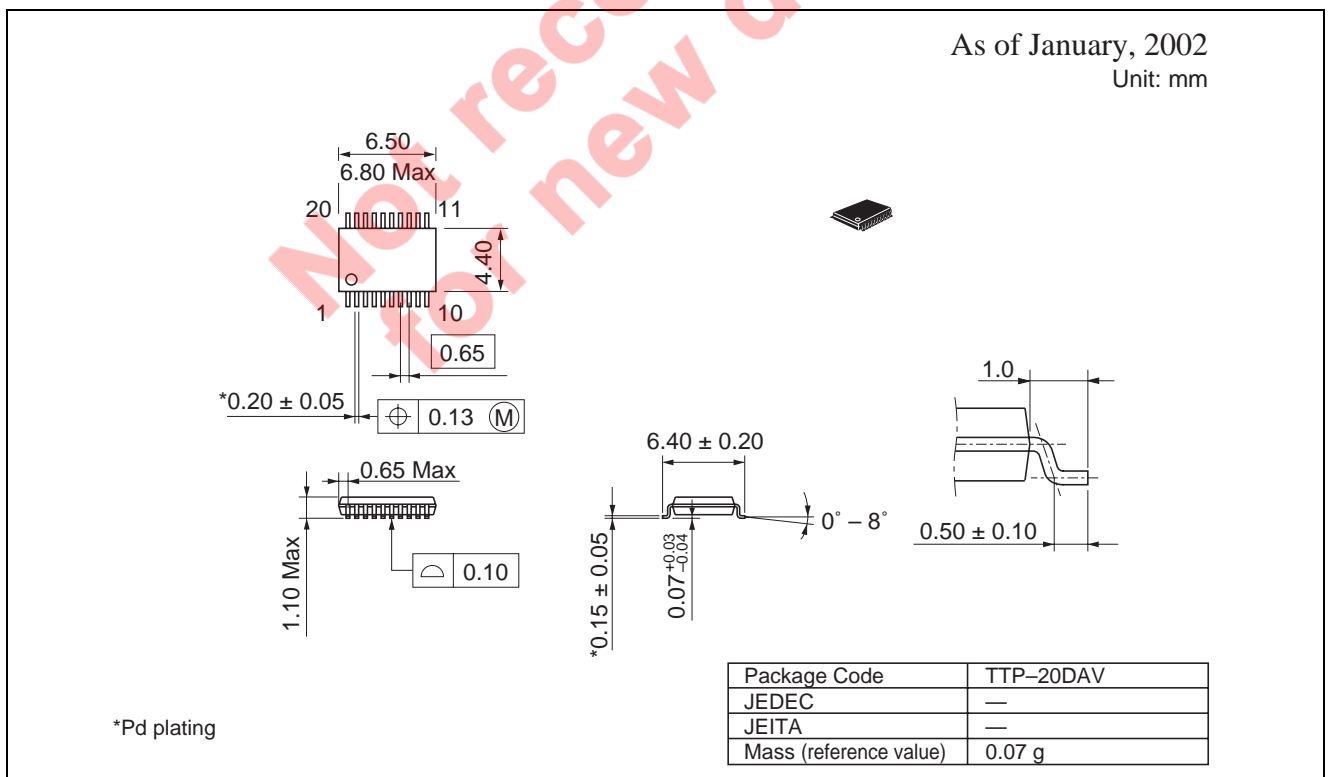
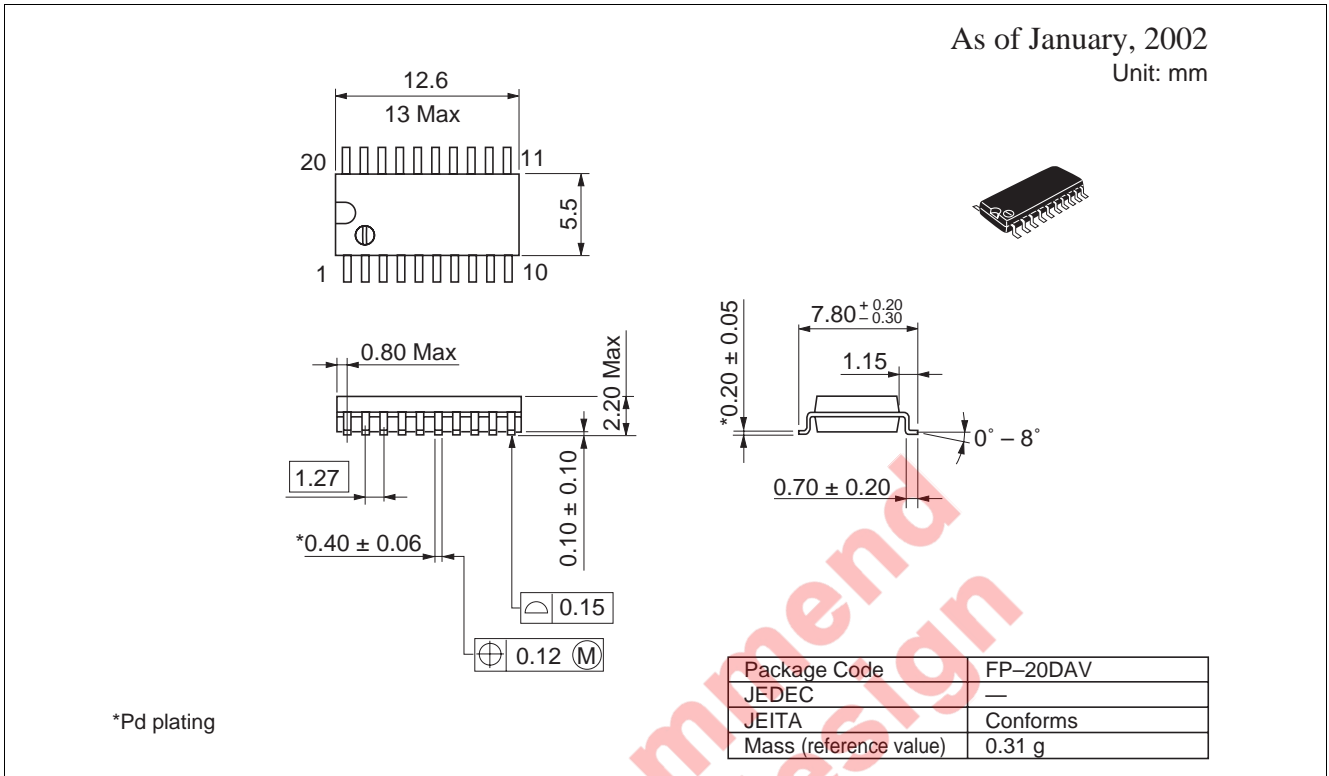
Waveforms – 1



Waveforms – 2



Package Dimensions



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