
HD74LV573A

Octal D-type Transparent Latches with 3-state Outputs

HITACHI

ADE-205-279A (Z)
2nd Edition
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Description

The HD74LV573A has eight D-type latches with three-state outputs in a 20-pin package. When the latch enable input is high, the Q outputs will follow the D inputs. When the latch enable goes low, data at the D inputs will be retained at the outputs until latch enable returns high again. When a high logic level is applied to the output control input, all outputs go to a high impedance state, regardless of what signals are present at the other inputs and the state of the storage elements. 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

- V_{CC} = 2.0 V to 5.5 V operation
- 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)
- Typical V_{OL} ground bounce < 0.8 V (@ V_{CC} = 3.3 V, T_a = 25°C)
- Typical V_{OH} undershoot > 2.3 V (@ V_{CC} = 3.3 V, T_a = 25°C)
- Output current ± 8 mA (@ V_{CC} = 3.0 V to 3.6 V), ± 16 mA (@ V_{CC} = 4.5 V to 5.5 V)

Function Table

Inputs			
OE	LE	D	Output Q
L	H	H	H
L	H	L	L
L	L	X	Q_0
H	X	X	Z

Note: H:High level

L:Low level

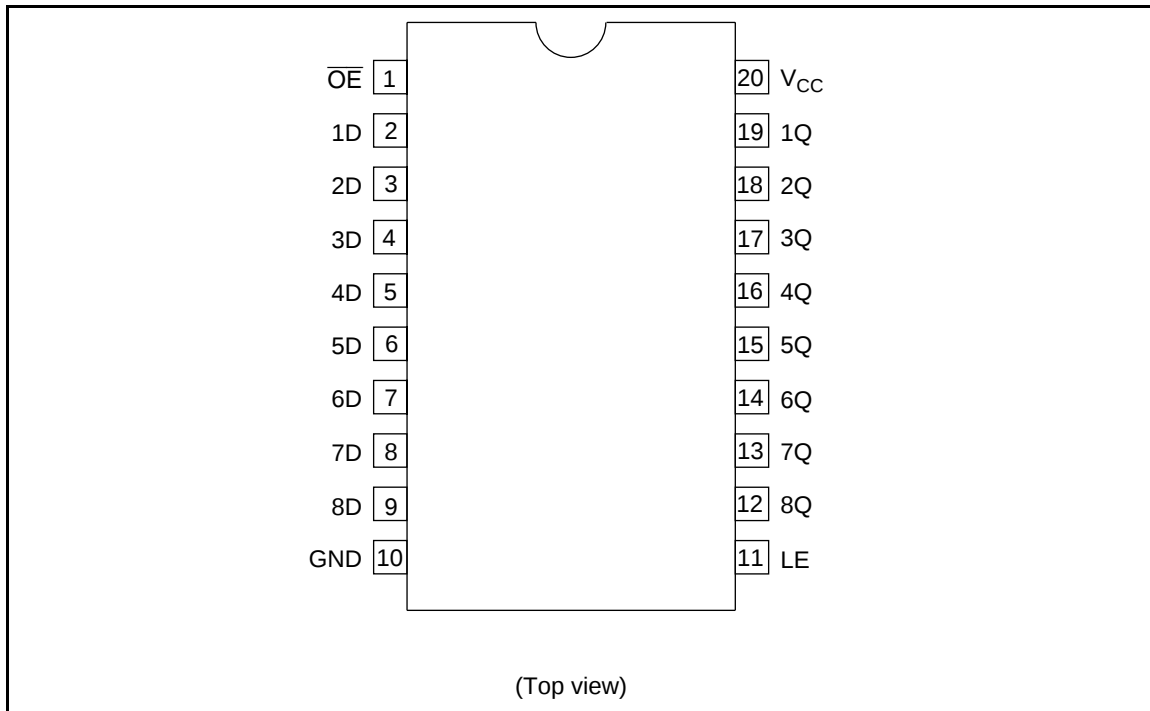
X:Immaterial

Z:High impedance

Q_0 :Output level before the indicated steady state input conditions were established

HD74LV573A

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
Supply voltage range	V_{CC}	-0.5 to 7.0	V	
Input voltage range ^{*1}	V_I	-0.5 to 7.0	V	
Output voltage range ^{*1, 2}	V_O	-0.5 to $V_{CC} + 0.5$ -0.5 to 7.0	V	Output: H or L V_{CC} : Z or V_{CC} : OFF
Input clamp current	I_{IK}	-20	mA	$V_I < 0$
Output clamp current	I_{OK}	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	I_O	±35	mA	$V_O = 0$ to V_{CC}
Continuous current through V_{CC} or GND	I_{CC} or I_{GND}	±70	mA	
Maximum power dissipation at P_T $T_a = 25^\circ\text{C}$ (in still air) ^{*3}		835 757	mW	SOP TSSOP
Storage temperature	T_{stg}	-65 to 150	°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.

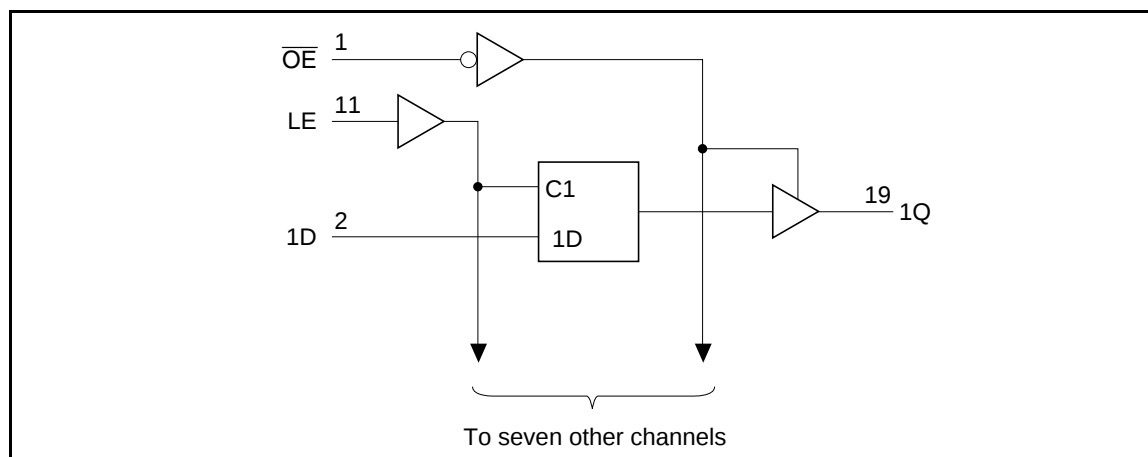
- 1.The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- 2.This value is limited to 5.5 V maximum.
- 3.The maximum package power dissipation was calculated using a junction temperature of 150°C.

Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V_{CC}	2.0	5.5	V	
Input voltage range	V_I	0	5.5	V	
Output voltage range	V_O	0	V_{CC}	V	H or L
		0	5.5		Output: Z
Output current	I_{OH}	—	−50	μA	$V_{CC} = 2.0 V$
		—	−2	mA	$V_{CC} = 2.3 \text{ to } 2.7 V$
		—	−8		$V_{CC} = 3.0 \text{ to } 3.6 V$
		—	−16		$V_{CC} = 4.5 \text{ to } 5.5 V$
	I_{OL}	—	50	μA	$V_{CC} = 2.0 V$
		—	2	mA	$V_{CC} = 2.3 \text{ to } 2.7 V$
		—	8		$V_{CC} = 3.0 \text{ to } 3.6 V$
		—	16		$V_{CC} = 4.5 \text{ to } 5.5 V$
Input transition rise or fall rate	$\Delta t/\Delta v$	0	200	ns/V	$V_{CC} = 2.3 \text{ to } 2.7 V$
		0	100		$V_{CC} = 3.0 \text{ to } 3.6 V$
		0	20		$V_{CC} = 4.5 \text{ to } 5.5 V$
Operating free-air temperature	T_a	−40	85	$^{\circ}C$	

Note: Unused or floating inputs must be held high or low.

Logic Diagram



HD74LV573A

DC Electrical Characteristics

- $T_a = -40$ to 85°C

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Item	Symbol	V_{CC} (V)*	Min	Typ	Max	Unit	Test Conditions
Input voltage	V_{IH}	2.0	1.5	—	—	V	
		2.3 to 2.7	$V_{CC} \times 0.7$	—	—		
		3.0 to 3.6	$V_{CC} \times 0.7$	—	—		
		4.5 to 5.5	$V_{CC} \times 0.7$	—	—		
	V_{IL}	2.0	—	—	0.5		
		2.3 to 2.7	—	—	$V_{CC} \times 0.3$		
		3.0 to 3.6	—	—	$V_{CC} \times 0.3$		
		4.5 to 5.5	—	—	$V_{CC} \times 0.3$		
Output voltage	V_{OH}	Min to Max	$V_{CC} - 0.1$	—	—	V	$I_{OH} = -50 \mu\text{A}$
		2.3	2.0	—	—		$I_{OH} = -2 \text{ mA}$
		3.0	2.48	—	—		$I_{OH} = -8 \text{ mA}$
		4.5	3.8	—	—		$I_{OH} = -16 \text{ mA}$
	V_{OL}	Min to Max	—	—	0.1		$I_{OL} = 50 \mu\text{A}$
		2.3	—	—	0.4		$I_{OL} = 2 \text{ mA}$
		3.0	—	—	0.44		$I_{OL} = 8 \text{ mA}$
		4.5	—	—	0.55		$I_{OL} = 16 \text{ mA}$
Input current	I_{IN}	0 to 5.5	—	—	± 1	μA	$V_I = 5.5 \text{ V}$ or GND
Off-state output current	I_{OZ}	5.5	—	—	± 5	μA	$V_O = V_{CC}$ or GND
Quiescent supply current	I_{CC}	5.5	—	—	20	μA	$V_I = V_{CC}$ or GND, $I_O = 0$
Output leakage current	I_{OFF}	0	—	—	5	μA	V_I or $V_O = 0 \text{ V}$ to 5.5 V
Input capacitance	C_{IN}	3.3	—	1.8	—	pF	$V_I = V_{CC}$ or GND

- Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

Switching Characteristics

- $V_{CC} = 2.5 \pm 0.2 \text{ V}$

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		Ta = 25°C			Ta = -40 to 85°C					FROM (Input)	TO (Output)
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions			
Propagation delay time	t_{PLH}	—	8.9	15.8	1.0	18.0	ns	$C_L = 15 \text{ pF}$		D	Q
	t_{PHL}	—	9.6	16.2	1.0	19.0				LE	
		—	10.9	18.7	1.0	21.0		$C_L = 50 \text{ pF}$		D	
		—	11.6	19.1	1.0	23.0				LE	
Enable time	t_{ZH}	—	9.3	16.2	1.0	19.0	ns	$C_L = 15 \text{ pF}$		$\overline{O}$	Q
	t_{ZL}	—	11.4	19.0	1.0	22.0		$C_L = 50 \text{ pF}$		$\overline{E}$	
Disable time	t_{HZ}	—	6.7	12.6	1.0	15.0	ns	$C_L = 15 \text{ pF}$		$\overline{OE}$	Q
	t_{LZ}	—	8.6	17.3	1.0	19.0		$C_L = 50 \text{ pF}$			
Setup time	t_{su}	5.0	—	—	5.0	—	ns			Data before LE ↓	
Hold time	t_h	2.0	—	—	2.0	—	ns			Data after LE ↓	
Pulse width	t_w	6.5	—	—	6.5	—	ns			LE "H"	

HD74LV573A

Switching Characteristics (cont)

- $V_{CC} = 3.3 \pm 0.3 \text{ V}$

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Ta = 25°C				Ta = −40 to 85°C						
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions	FROM (Input)	TO (Output)
Propagation delay time	t _{PLH}	—	6.2	11.0	1.0	13.0	ns	C _L = 15 pF	D	Q
	t _{PHL}	—	6.8	11.9	1.0	14.0			LE	
		—	7.7	14.5	1.0	16.5		C _L = 50 pF	D	
		—	8.2	15.4	1.0	17.5			LE	
Enable time	t _{ZH}	—	6.6	11.5	1.0	13.5	ns	C _L = 15 pF	$\overline{OE}$	Q
	t _{ZL}	—	8.0	15.0	1.0	17.0		C _L = 50 pF		
Disable time	t _{HZ}	—	4.9	11.0	1.0	13.0	ns	C _L = 15 pF	$\overline{OE}$	Q
	t _{LZ}	—	6.2	14.5	1.0	16.5		C _L = 50 pF		
Setup time	t _{su}	3.5	—	—	3.5	—	ns		Data before LE ↓	
Hold time	t _h	1.5	—	—	1.5	—	ns		Data after LE ↓	
Pulse width	t _w	5.0	—	—	5.0	—	ns		LE “H”	

Switching Characteristics (cont)

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

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		Ta = 25°C			Ta = -40 to 85°C					FROM (Input)	TO (Output)
Item	Symbol	Min	Typ	Max	Min	Max	Unit	Test Conditions			
Propagation delay time	t_{PLH}	—	4.3	6.8	1.0	8.0	ns	$C_L = 15 \text{ pF}$		D	Q
	t_{PHL}	—	4.7	7.7	1.0	9.0				LE	
		—	5.3	8.8	1.0	10.0		$C_L = 50 \text{ pF}$		D	
		—	5.7	9.7	1.0	11.0				LE	
Enable time	t_{ZH}	—	4.7	7.7	1.0	9.0	ns	$C_L = 15 \text{ pF}$		$\overline{OE}$	Q
	t_{ZL}	—	5.7	9.7	1.0	11.0		$C_L = 50 \text{ pF}$			
Disable time	t_{HZ}	—	3.5	7.7	1.0	9.0	ns	$C_L = 15 \text{ pF}$		$\overline{OE}$	Q
	t_{LZ}	—	4.2	9.7	1.0	11.0		$C_L = 50 \text{ pF}$			
Setup time	t_{su}	3.5	—	—	3.5	—	ns			Data before LE ↓	
Hold time	t_h	1.5	—	—	1.5	—	ns			Data after LE ↓	
Pulse width	t_w	5.0	—	—	5.0	—	ns			LE "H"	

Output-skew Characteristics

		Ta = 25°C				Ta = -40 to 85°C		
Item	Symbol	$V_{CC} \text{ (V)}$	Min	Typ	Max	Min	Max	Unit
Output skew	$t_{sk} (O)$	2.3 to 2.7	—	—	2.0	—	2.0	ns
		3.0 to 3.6	—	—	1.5	—	1.5	
		4.5 to 5.5	—	—	1.0	—	1.0	

Note: Skew between any outputs of the same package switching in the same direction. This parameter is warranted but not production tested.

HD74LV573A

Operating Characteristics

- $C_L = 50 \text{ pF}$

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Ta = 25°C							
Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test Conditions
Power dissipation	C _{PD}	3.3	—	16	—	pF	f = 10 MHz
		5.0	—	18	—		

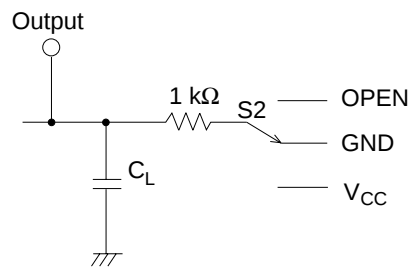
Noise Characteristics

- $C_L = 50 \text{ pF}$

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Ta = 25°C							
Item	Symbol	V _{CC} (V)	Min	Typ	Max	Unit	Test Conditions
Quiet output, maximum dynamic V _{OL}	V _{OL} (P)	3.3	—	0.6	0.8	V	
Quiet output, minimum dynamic V _{OL}	V _{OL} (V)	3.3	—	−0.5	−0.8		
Quiet output, minimum dynamic V _{OH}	V _{OH} (V)	3.3	—	2.9	—		
High-level dynamic input voltage	V _{IH} (D)	3.3	2.31	—	—		
Low-level dynamic input voltage	V _{IL} (D)	3.3	—	—	0.99		

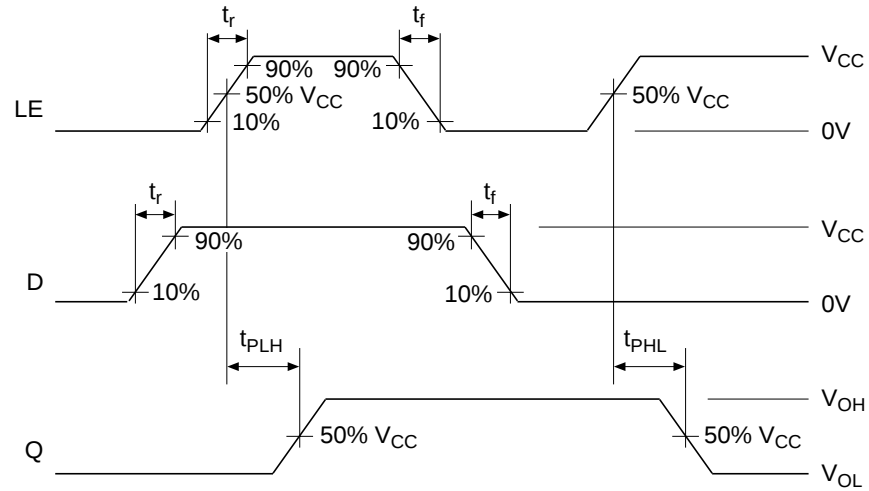
Test Circuit



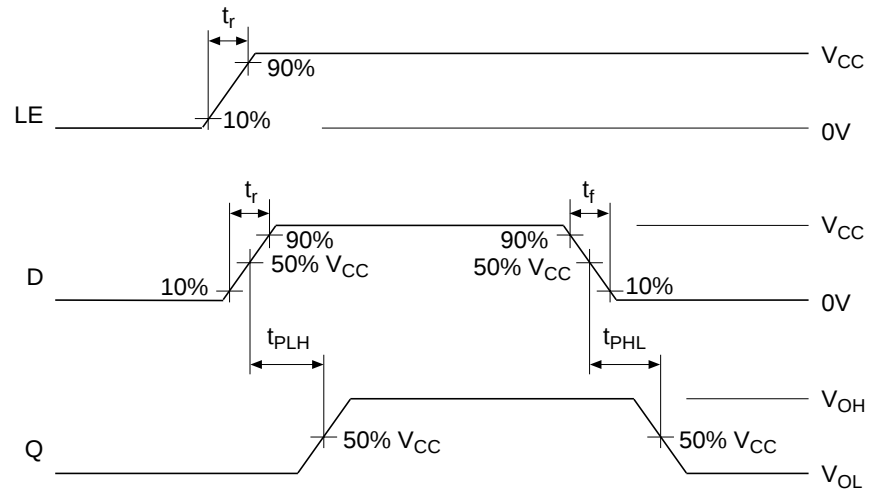
TEST	S2
t _{PLH} /t _{PHL}	OPEN
t _{ZH} /t _{HZ}	GND
t _{ZL} /t _{LZ}	V _{CC}

Note: C_L includes the probe and jig capacitance.

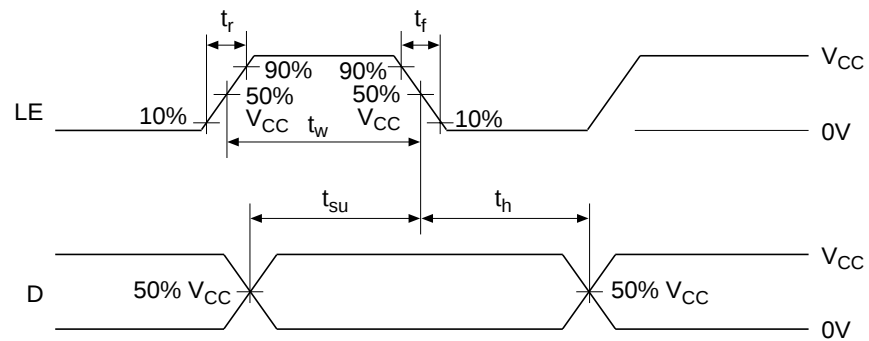
• Waveform – 1



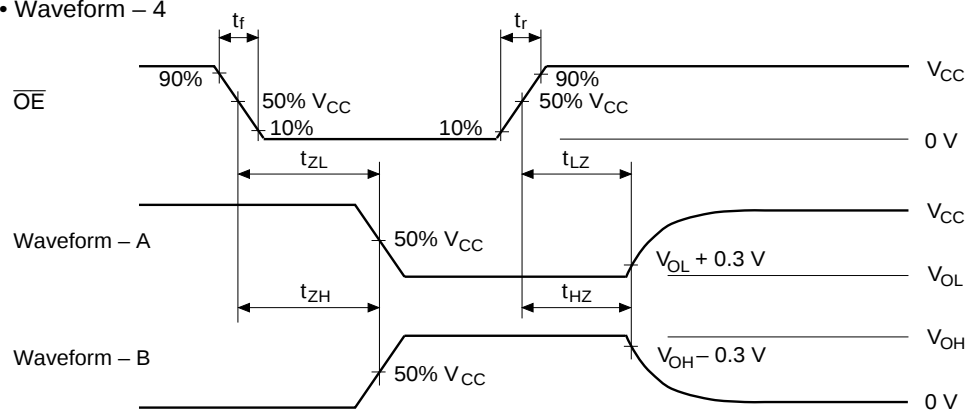
• Waveform – 2



• Waveform – 3



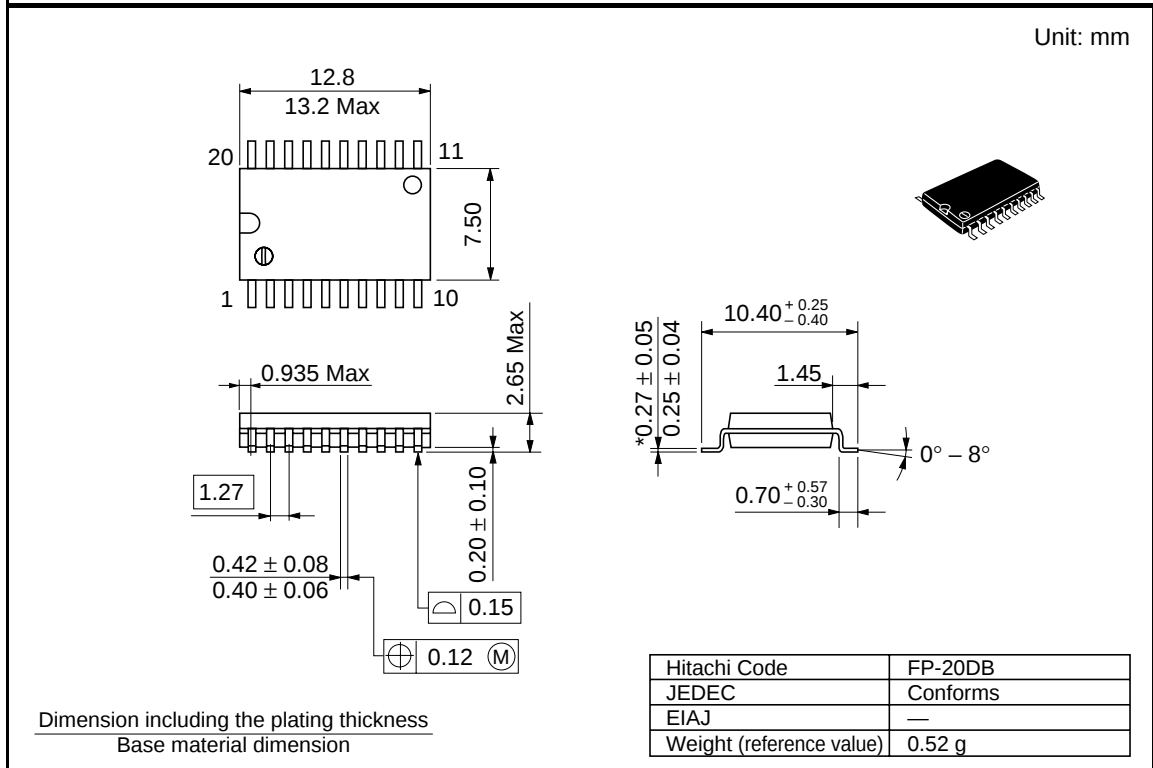
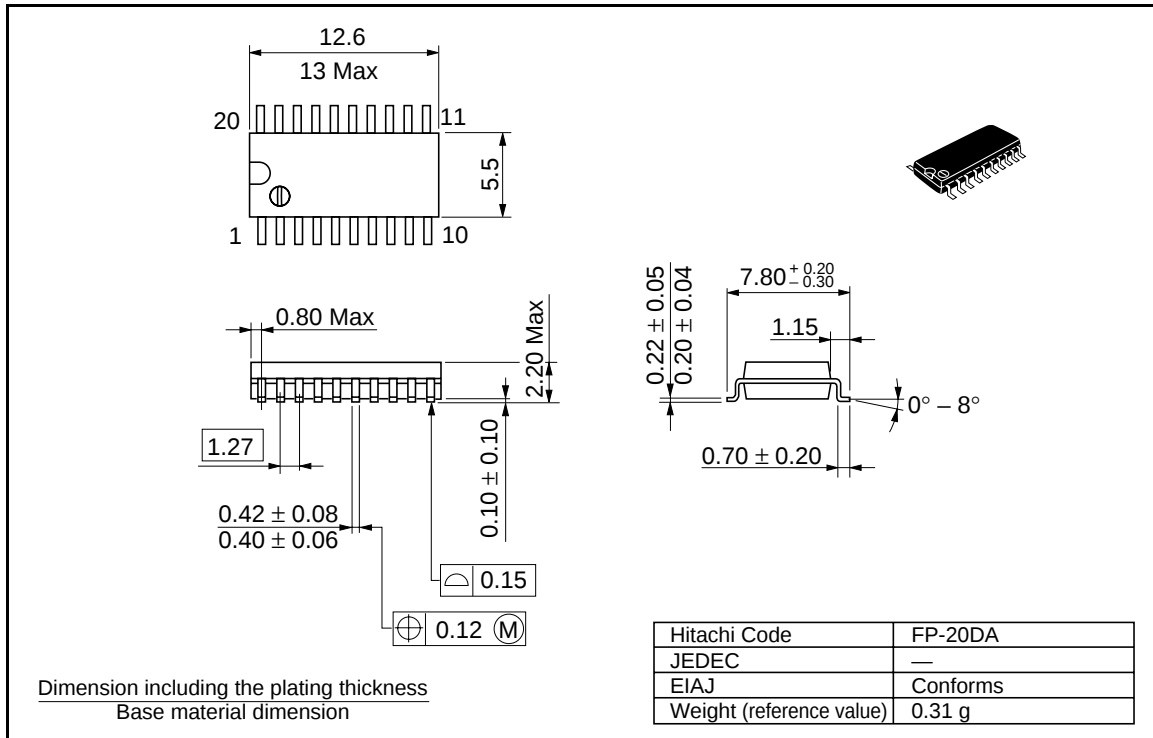
• Waveform – 4

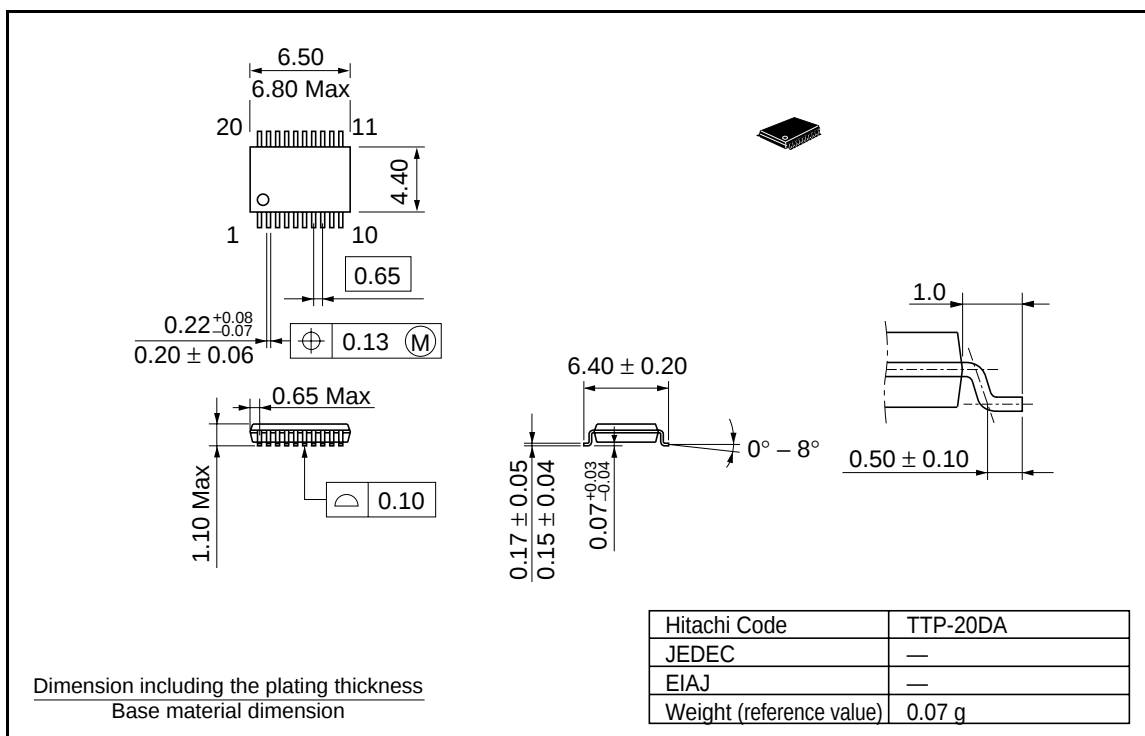


- Notes:
1. Input waveform: $\text{PRR} \leq 1\text{ MHz}$, $Z_o = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$
 2. Waveform-A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform-B is for an output with internal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

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Package Dimensions





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