

HD74HC374, HD74HC534

Octal D-type Flip-Flops (with 3-state outputs)

Octal D-type Flip-Flops (with inverted 3-state outputs)

REJ03D0620-0200
(Previous ADE-205-499)
Rev.2.00
Mar 30, 2006

Description

These devices are positive edge triggered flip-flops. The difference between HD74HC374 and HD74HC534 is only that the former is a true outputs and the latter is a false outputs. Data at the D inputs, meeting the setup and hold time requirements, are transferred to the Q outputs on positive going transitions of the clock (CK) input. When a high logic level is applied to the output control (OC) 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.

Features

- High Speed Operation: t_{pd} (Clock to Q) = 18 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)
- **Ordering Information**

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC374P HD74HC534P	DILP-20 pin	PRDP0020AC-B (DP-20NEV)	P	—
HD74HC374FPEL HD74HC534FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HC534RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)
HD74HC374TELL	TSSOP-20 pin	PTSP0020JB-A (TTP-20DAV)	T	ELL (2,000 pcs/reel)

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

Function Table

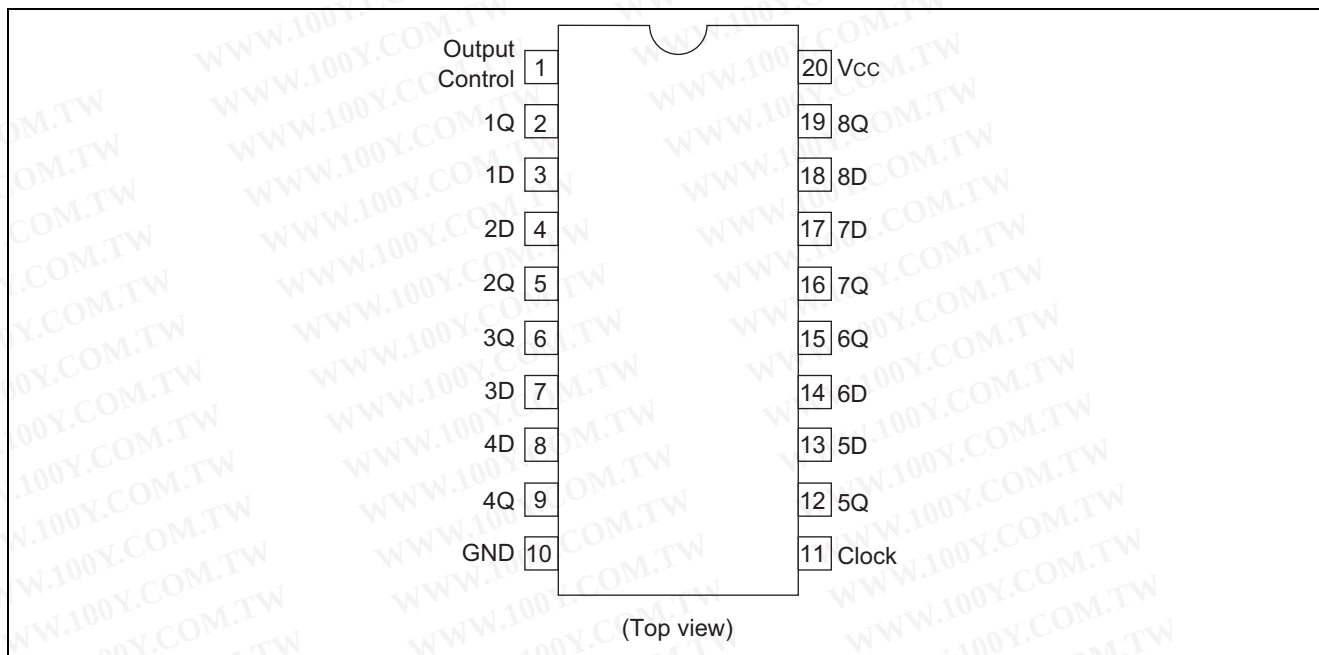
Output Control	Clock	D	HD74HC374 Q	HD74HC534 $\bar{Q}$
L		H	H	L
L		L	L	H
L	L	X	No change	No change
H	X	X	Z	Z

Note: 1. H; High level, L; Low level, X; Irrelevant, Z; High impedance

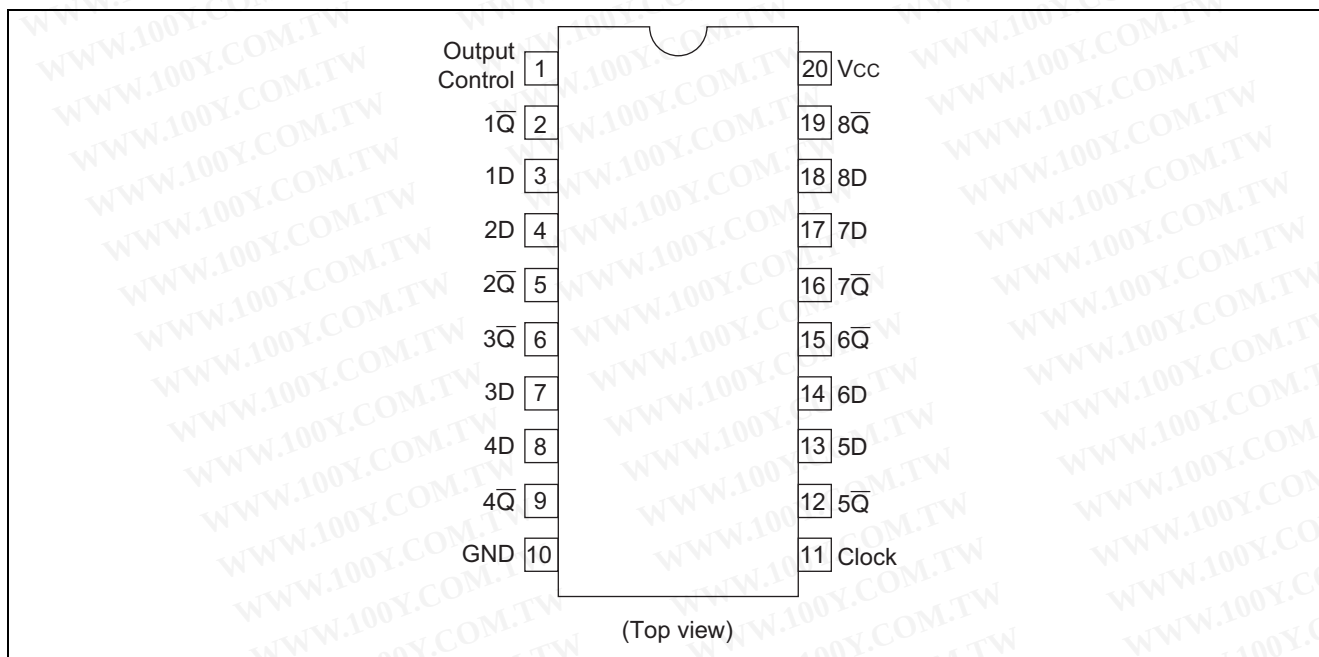
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Pin Arrangement

HD74HC374



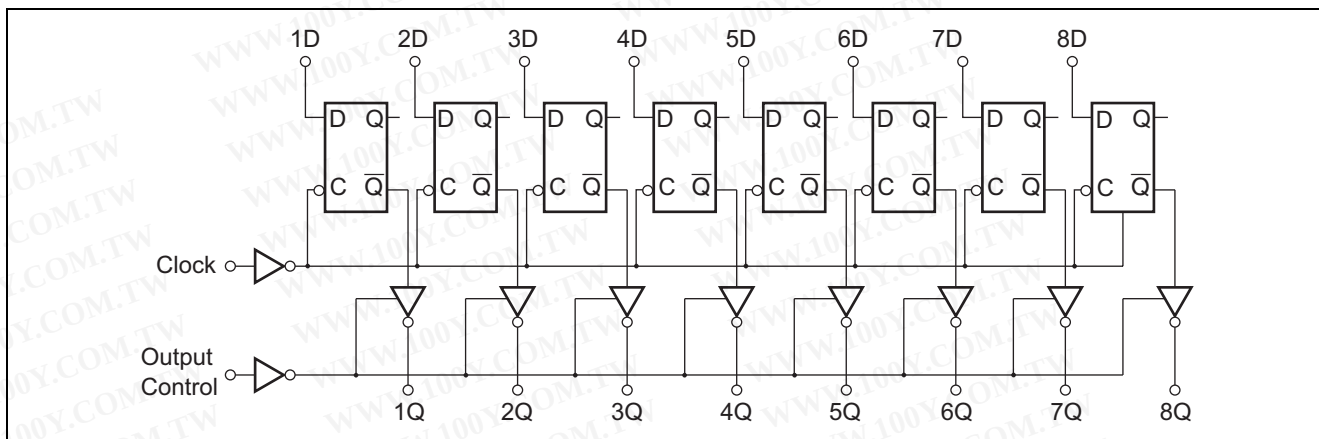
HD74HC534



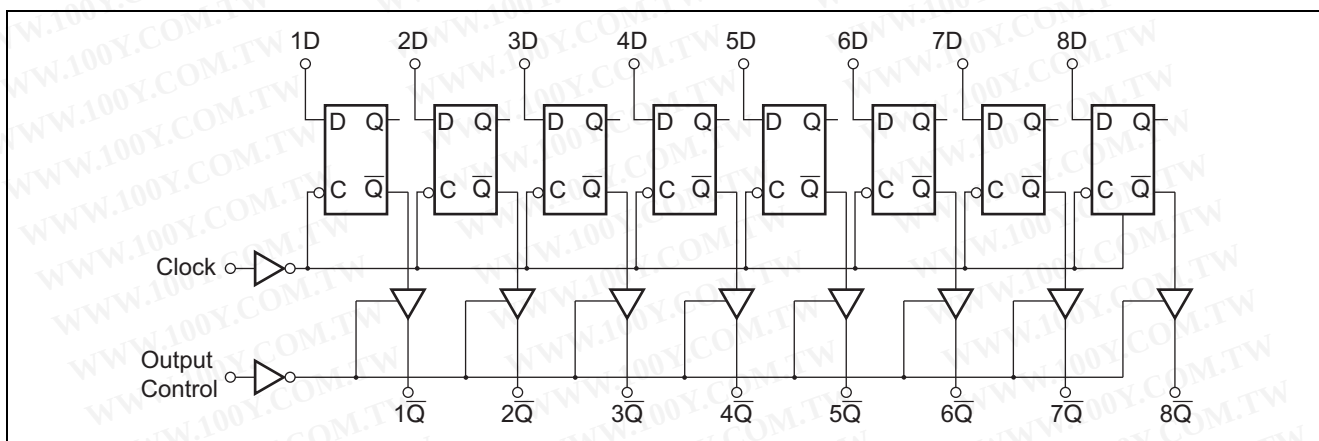
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Logic Diagram

HD74HC374



HD74HC534



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	$^{\circ}\text{C}$

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.

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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

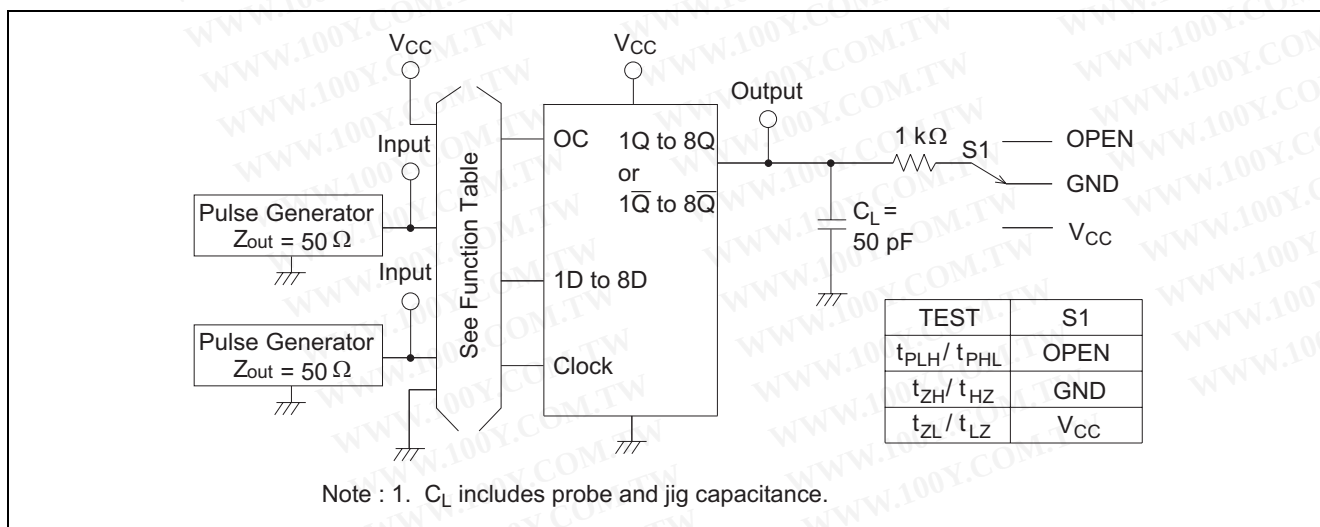
Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V_{IL}	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	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	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			$I_{OH} = -6\text{ mA}$
		6.0	5.68	—	—	5.63	—			$I_{OH} = -7.8\text{ mA}$
	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	$V_{in} = V_{CC}\text{ or GND}$, $I_{out} = 0\text{ }\mu\text{A}$	

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

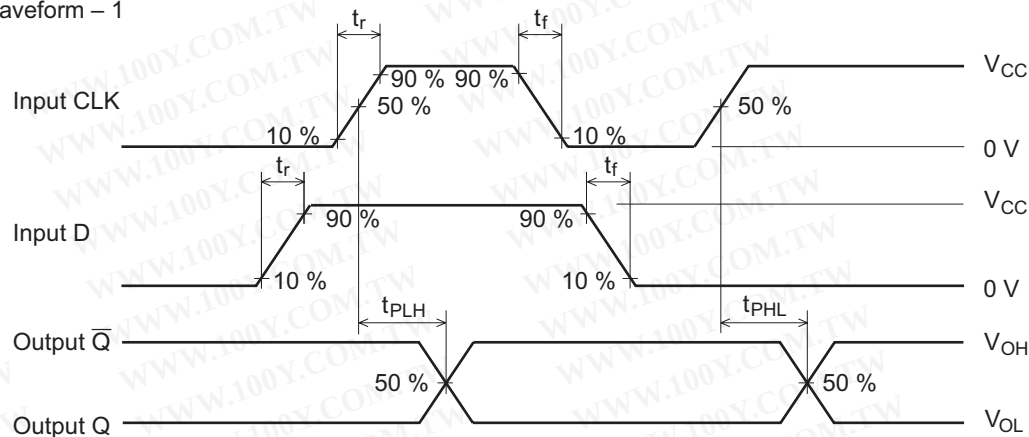
Item	Symbol	$V_{CC} \text{ (V)}$	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } +85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Maximum clock frequency	$f_{\max}$	2.0	—	—	6	—	5	MHz	
		4.5	—	—	30	—	24		
		6.0	—	—	35	—	28		
Propagation delay time	t_{PHL} t_{PLH}	2.0	—	—	140	—	175	ns	
		4.5	—	18	28	—	35		
		6.0	—	—	24	—	30		
Output enable time	t_{ZL}	2.0	—	—	150	—	190	ns	
		4.5	—	11	30	—	38		
		6.0	—	—	26	—	33		
	t_{ZH}	2.0	—	—	150	—	190	ns	
		4.5	—	14	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t_{LZ}	2.0	—	—	150	—	190	ns	
		4.5	—	13	30	—	38		
		6.0	—	—	26	—	33		
	t_{HZ}	2.0	—	—	150	—	190	ns	
		4.5	—	16	30	—	38		
		6.0	—	—	26	—	33		
Setup time	t_{su}	2.0	100	—	—	125	—	ns	Data to Clock
		4.5	20	1	—	25	—		
		6.0	17	—	—	21	—		
Hold time	t_h	2.0	25	—	—	31	—	ns	Clock to Data
		4.5	5	1	—	6	—		
		6.0	5	—	—	6	—		
Pulse width	t_w	2.0	80	—	—	100	—	ns	Clock or Output control
		4.5	16	6	—	20	—		
		6.0	14	—	—	17	—		
Output rise/fall time	t_{TLH} t_{THL}	2.0	—	—	60	—	75	ns	
		4.5	—	4	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	C_{in}	—	—	5	10	—	10	pF	

Test Circuit

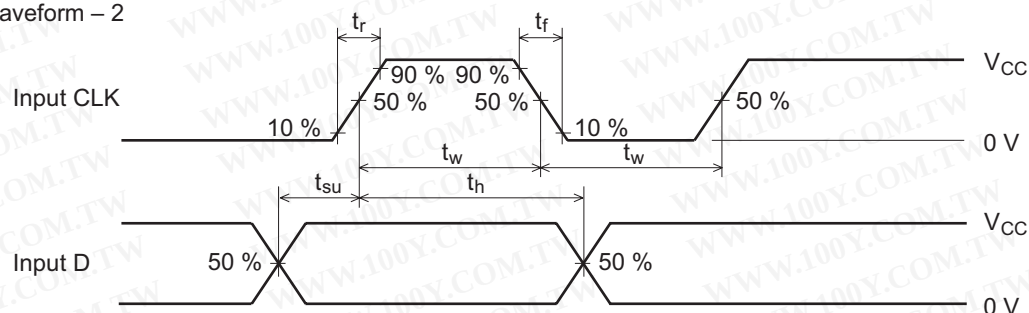


Waveforms

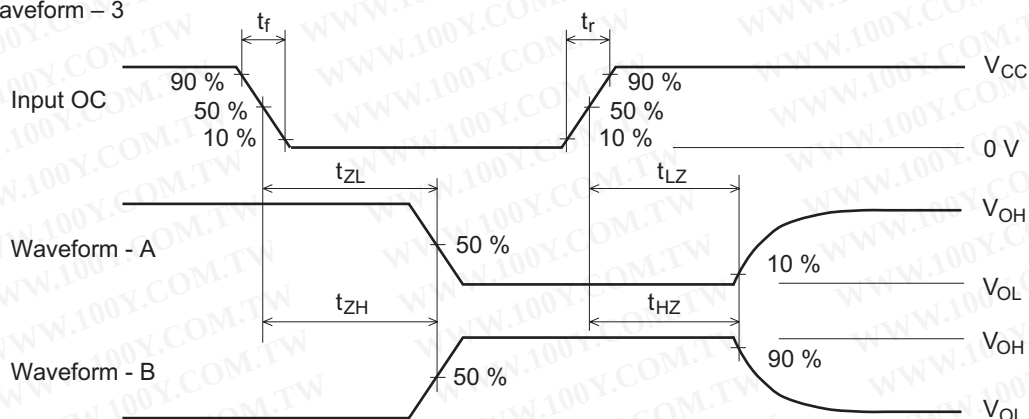
• Waveform – 1



• Waveform – 2



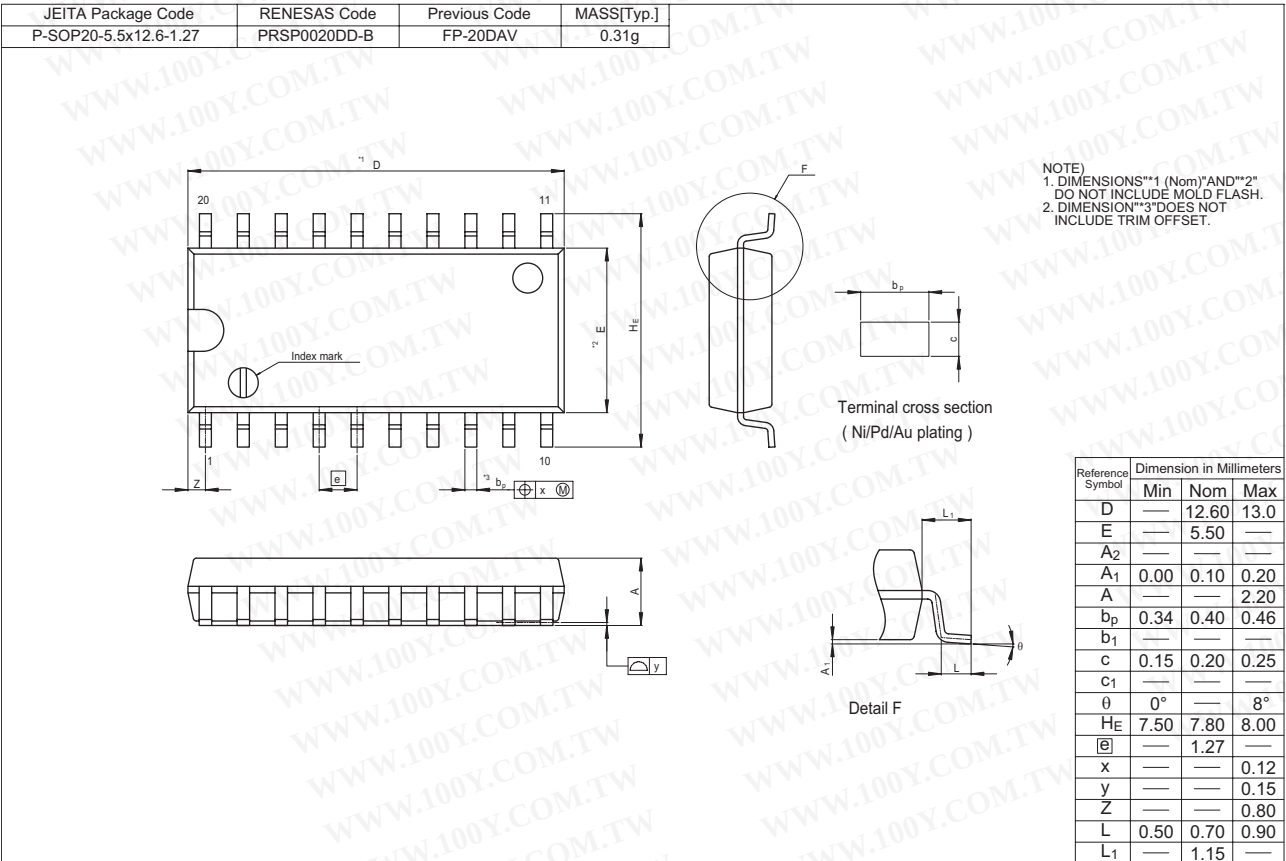
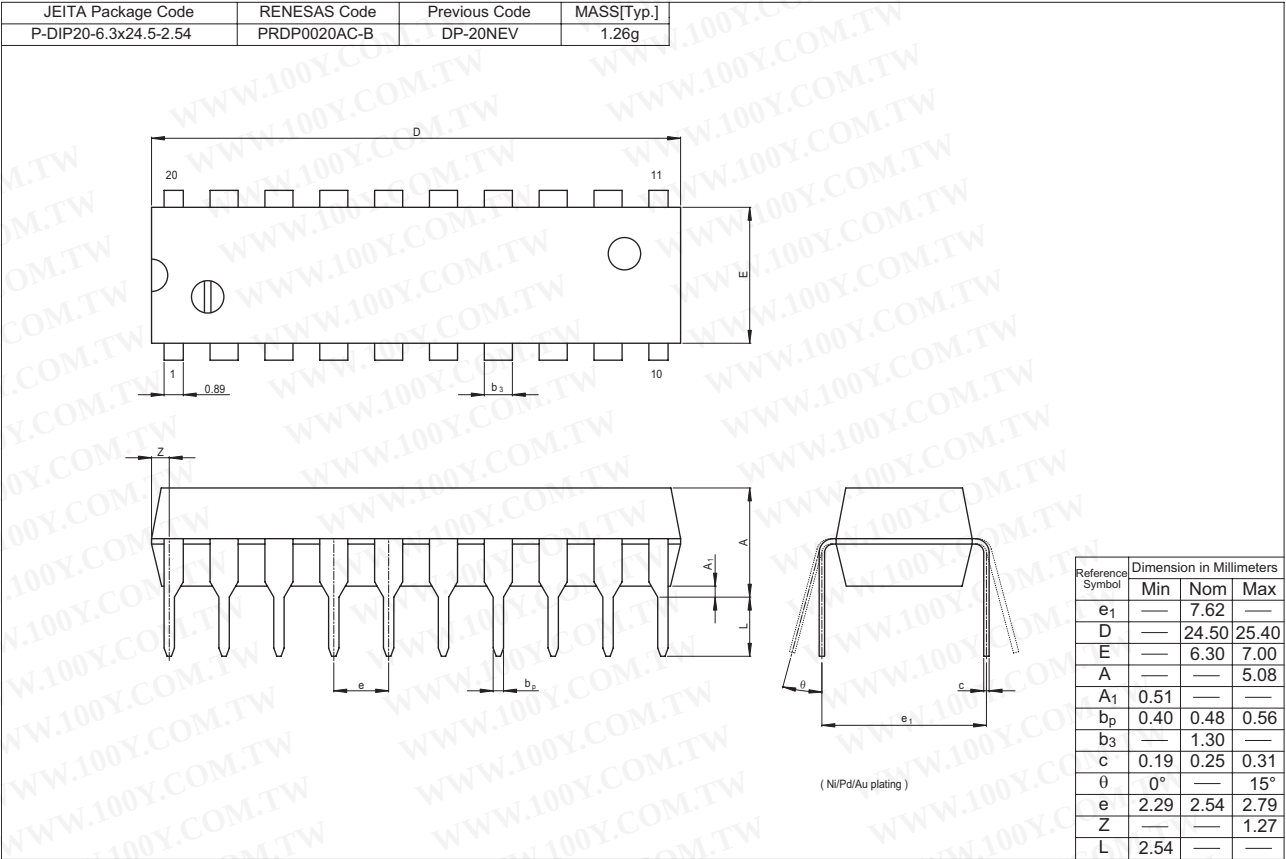
• Waveform – 3



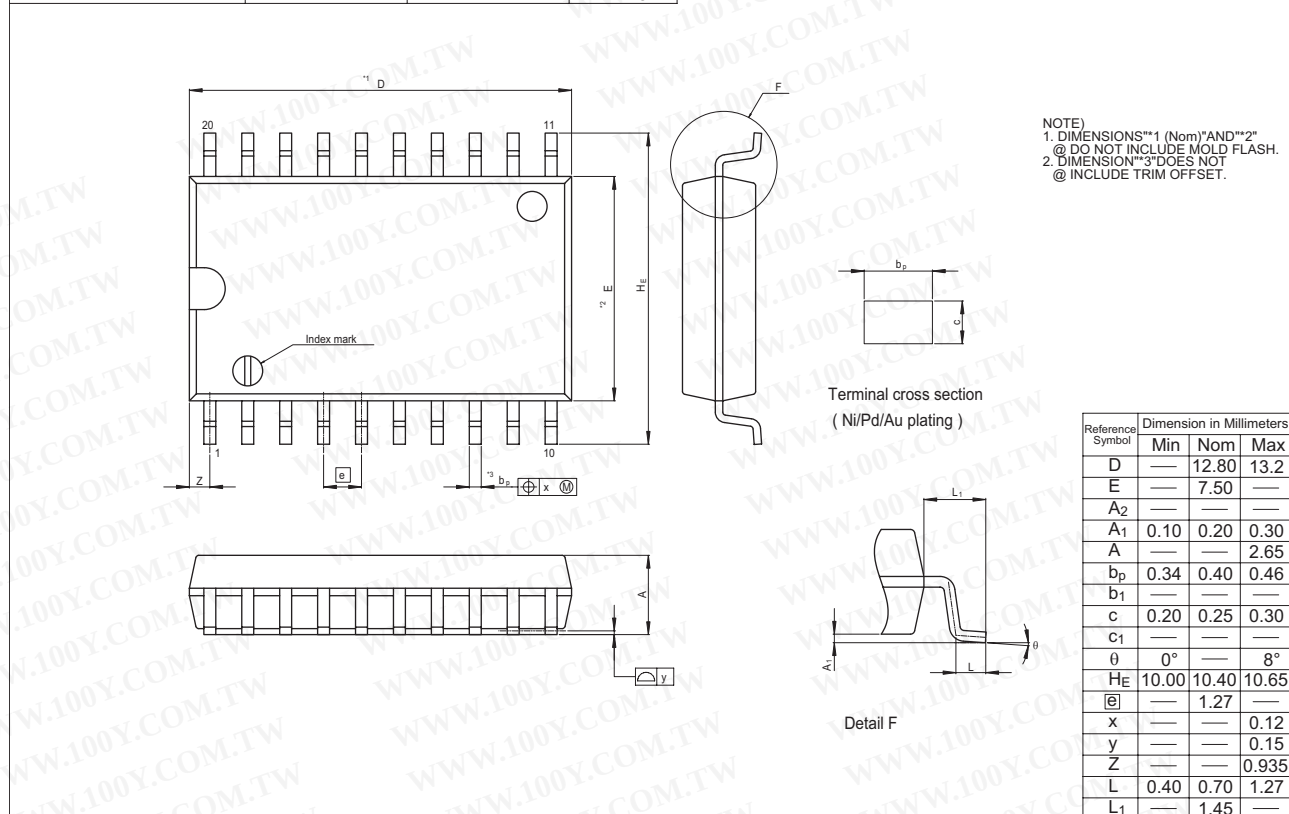
- Notes :
1. Input waveform : $PRR \leq 1 \text{ MHz}$, duty cycle 50%, $t_r \leq 6 \text{ ns}$, $t_f \leq 6 \text{ ns}$
 2. Waveform - A is for an output with internal conditions such that the output is low except when disabled by the output control.
 3. Waveform - B is for an output with internal conditions 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.

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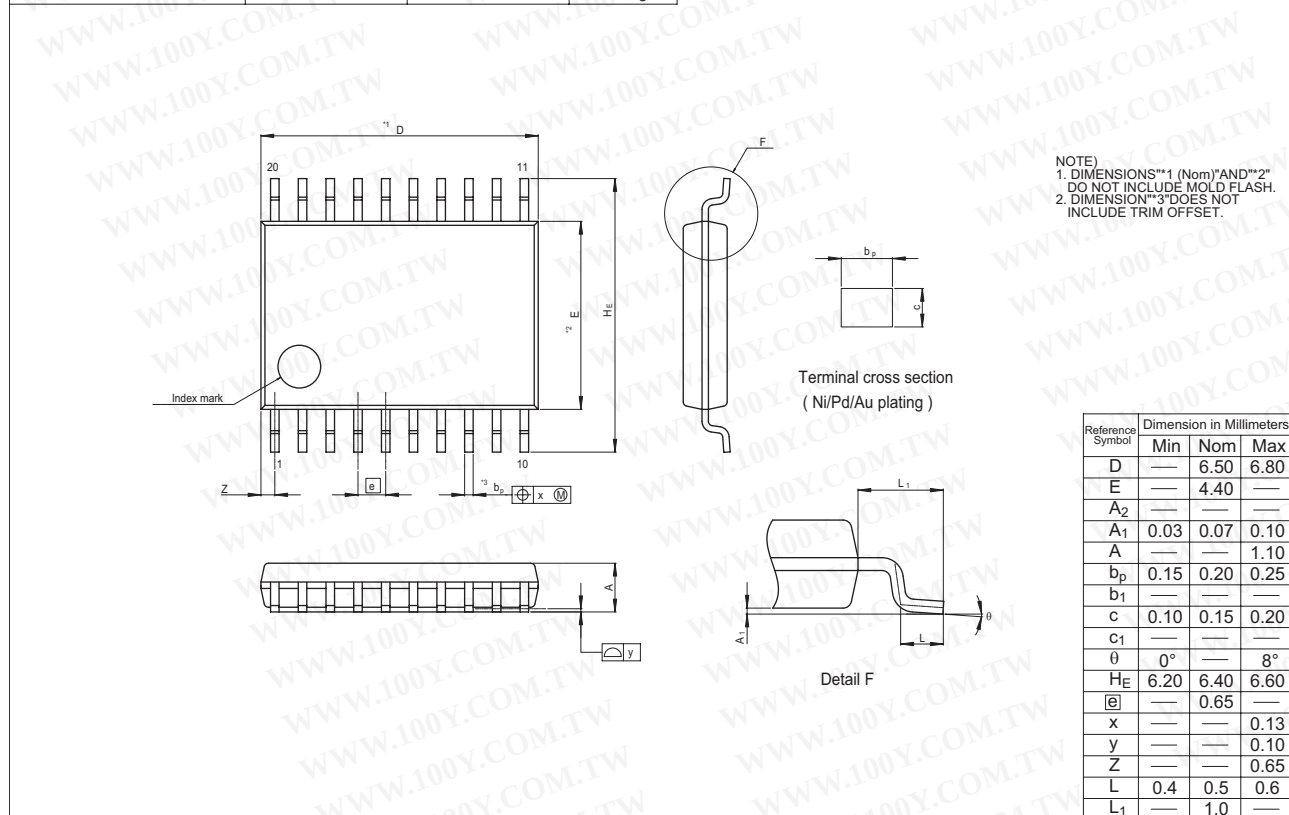
Package Dimensions



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



JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-TSSOP20-4.4x6.5-0.65	PTSP0020JB-A	TTP-20DAV	0.07g



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