

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HD74HCT564, HD74HCT574

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

REJ03D0670-0200  
 (Previous ADE-205-560)  
 Rev.2.00  
 Mar 30, 2006

### Description

These devices are positive edge triggered flip-flops. The difference between HD74HCT564 and HD74HCT574 is only that the former has inverting outputs and the latter has noninverting outputs.

Data at the D inputs, meeting the set-up and hold time requirements, are transferred to the Q or  $\bar{Q}$  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

- LSTTL Output Logic Level Compatibility as well as CMOS Output Compatibility
- High Speed Operation:  $t_{pd}$  (D to Q,  $\bar{Q}$ ) = 15 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 4.5$  to 5.5 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HCT564P HD74HCT574P	DILP-20 pin	PRDP0020AC-B (DP-20NEV)	P	—
HD74HCT564FPEL HD74HCT574FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HCT564RPEL HD74HCT574RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

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

### Function Table

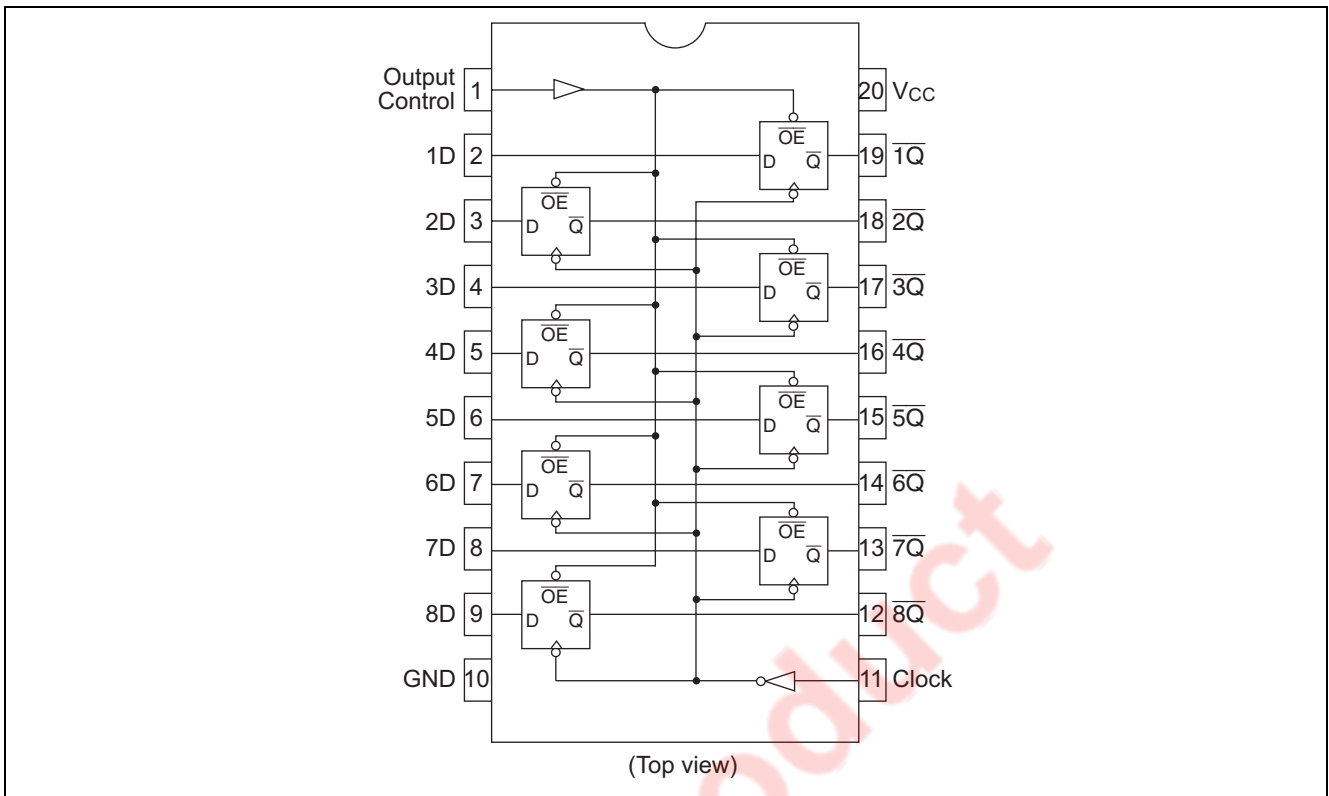
Inputs			Outputs	
Output Control	Clock	Data	HD74HCT564	HD74HCT574
L		H	L	H
L		L	H	L
L	L	X	$Q_0$	$Q_0$
H	X	X	Z	Z

$Q_0$  : level of Q before the indicated Steady-state input conditions were established.

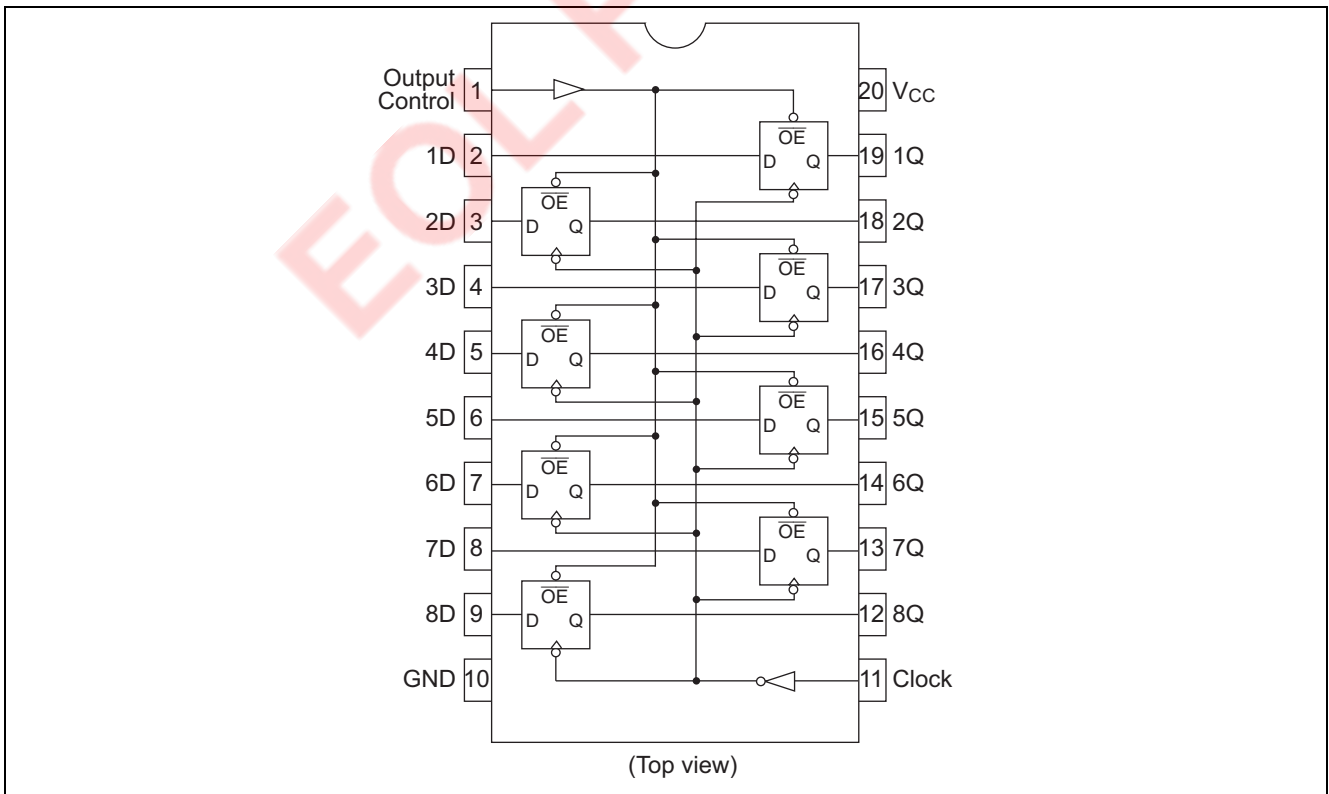
$\bar{Q}_0$  : complement of  $Q_0$  or level of  $\bar{Q}$  before the indicated Steady-state input Conditions were established.

## Pin Arrangement

### HD74HC564

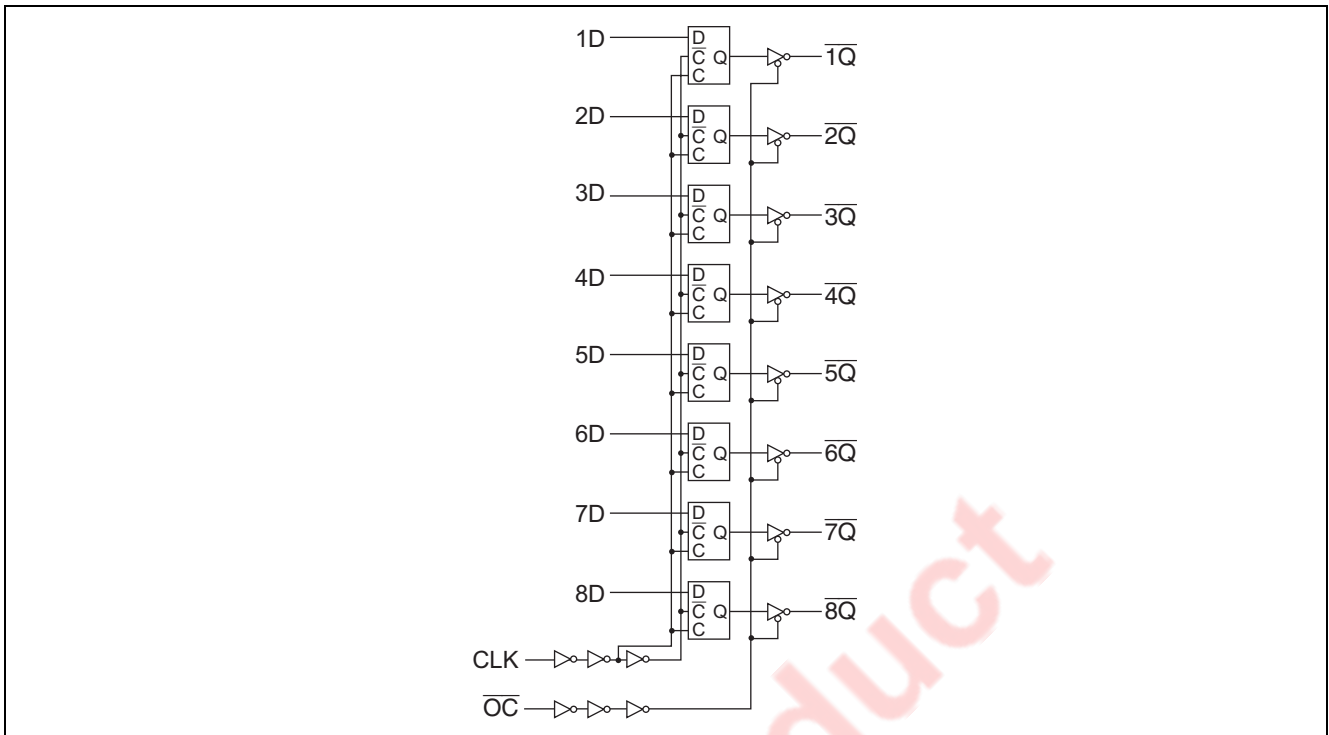


### HD74HC574

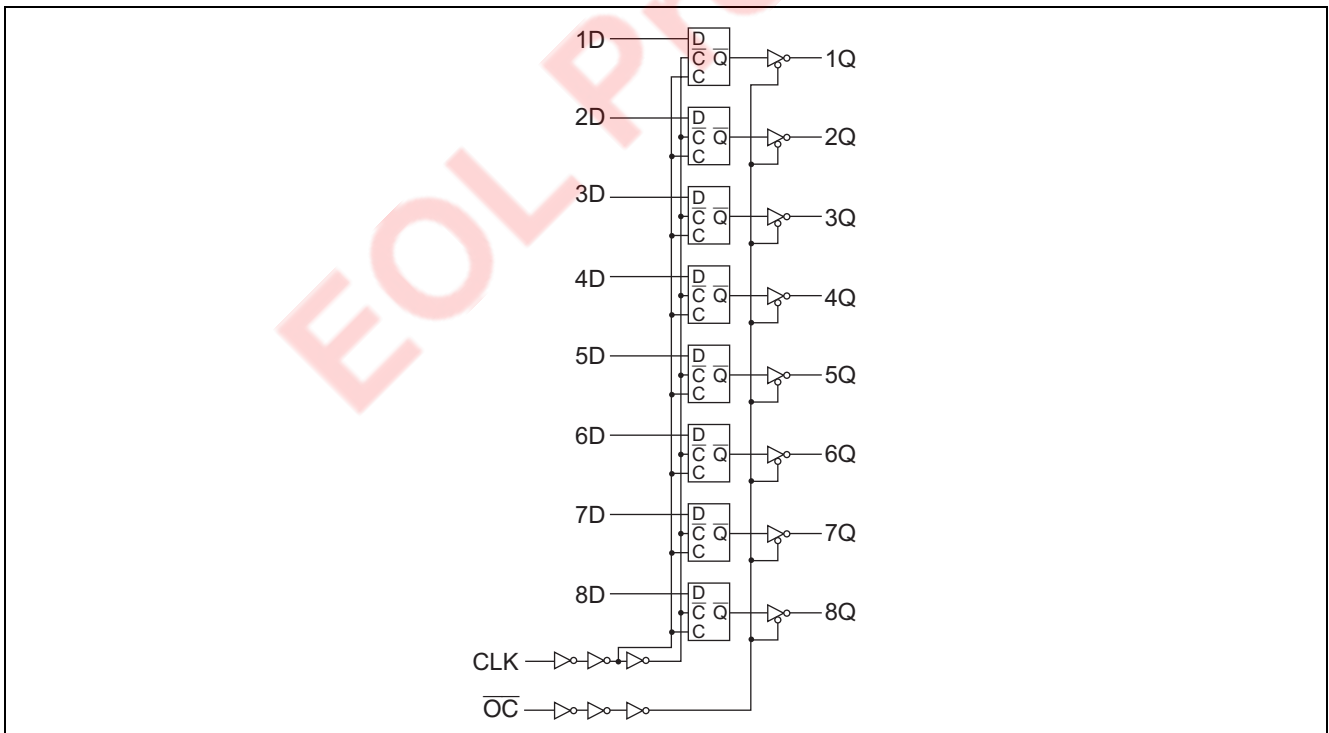


Logic Diagram

HD74HC564



HD74HC574



### 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	$I_{IK}, I_{OK}$	$\pm 20$	mA
Output current	$I_O$	$\pm 35$	mA
$V_{CC}$ , GND current	$I_{CC}$ or $I_{GND}$	$\pm 75$	mA
Power dissipation	$P_T$	500	mW
Storage temperature	Tstg	-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	$V_{CC}$	4.5 to 5.5	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 <sup>*1</sup>	$t_r, t_f$	0 to 500	ns	$V_{CC} = 4.5$ V

Notes: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

### Electrical Characteristics

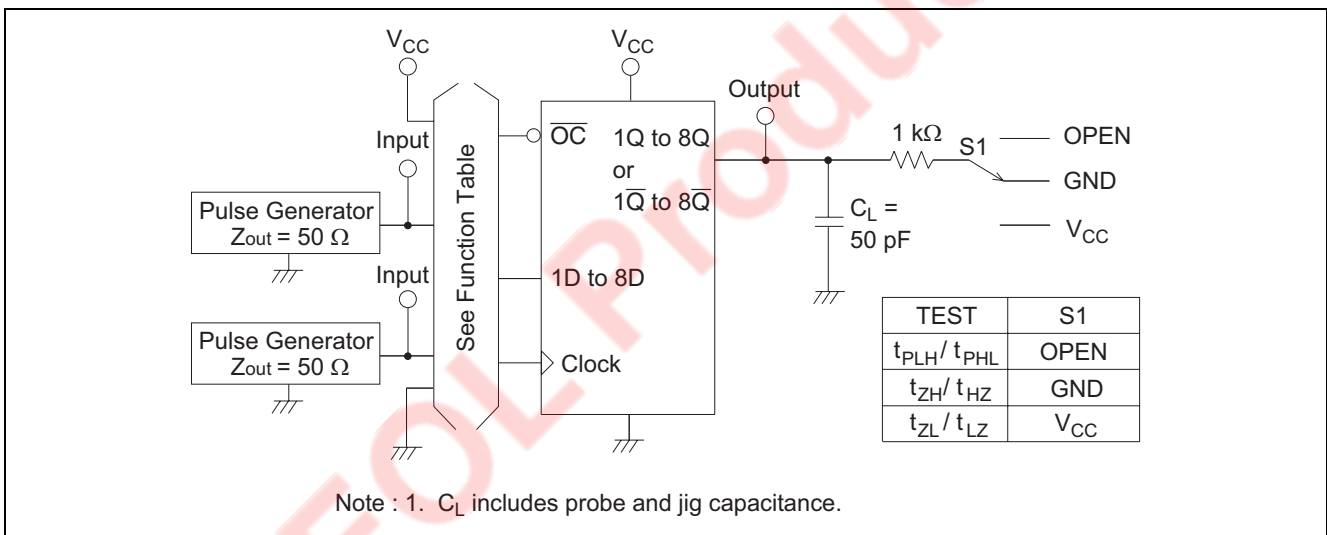
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } +85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	$V_{IH}$	4.5 to 5.5	2.0	—	—	2.0	—	V		
	$V_{IL}$	4.5 to 5.5	—	—	0.8	—	0.8	V		
Output voltage	$V_{OH}$	4.5	4.4	—	—	4.4	—	V	$V_{in} = V_{IH}$ or $V_{IL}$	$I_{OH} = -20 \mu\text{A}$
		4.5	4.18	—	—	4.13	—	V		$I_{OH} = -6 \text{ mA}$
	$V_{OL}$	4.5	—	—	0.1	—	0.1	V	$V_{in} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20 \mu\text{A}$
		4.5	—	—	0.26	—	0.33	V		$I_{OL} = 6 \text{ mA}$
Off-state output current	$I_{OZ}$	5.5	—	—	$\pm 0.5$	—	$\pm 5.0$	$\mu\text{A}$	$V_{in} = V_{IH}$ or $V_{IL}$ , $V_{out} = V_{CC}$ or GND	
Input current	$I_{in}$	5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	$V_{in} = V_{CC}$ or GND	
Quiescent current	$I_{CC}$	5.5	—	—	4.0	—	40	$\mu\text{A}$	$V_{in} = V_{CC}$ or GND, $I_{out} = 0 \mu\text{A}$	

Switching Characteristics

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

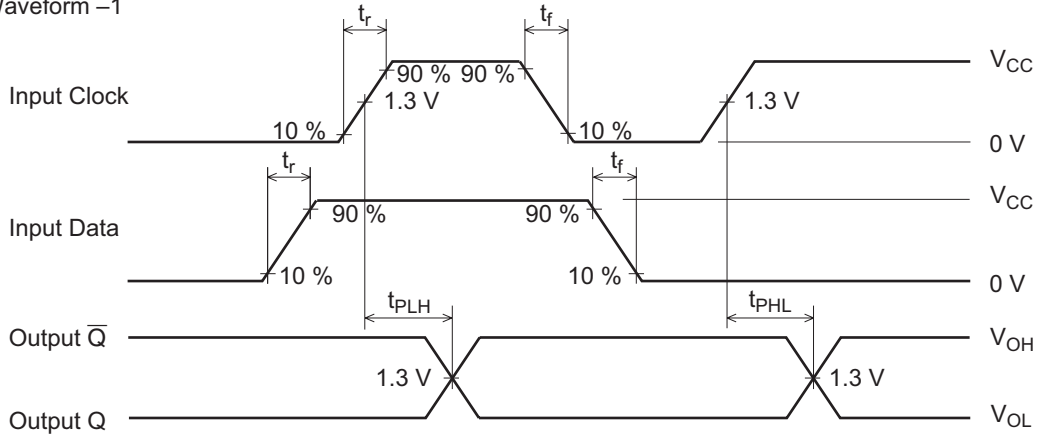
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Maximum clock frequency	$f_{max}$	4.5	—	—	30	—	24	ns	
Propagation delay time	$t_{PLH}$	4.5	—	14	31	—	39	ns	
	$t_{PHL}$	4.5	—	15	31	—	39		
Output enable time	$t_{ZL}$	4.5	—	16	30	—	38	ns	
	$t_{ZH}$	4.5	—	16	30	—	38		
Output disable time	$t_{LZ}$	4.5	—	15	30	—	38	ns	
	$t_{HZ}$	4.5	—	18	30	—	38		
Setup time	$t_{su}$	4.5	20	3	—	25	—	ns	
Hold time	$t_h$	4.5	5	-2	—	5	—	ns	
Pulse width	$t_w$	4.5	16	7	—	20	—	ns	
Output rise/fall time	$t_{TLH}$	4.5	—	4	12	—	15	ns	
	$t_{THL}$	4.5	—	4	12	—	15		
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF	

Test Circuit

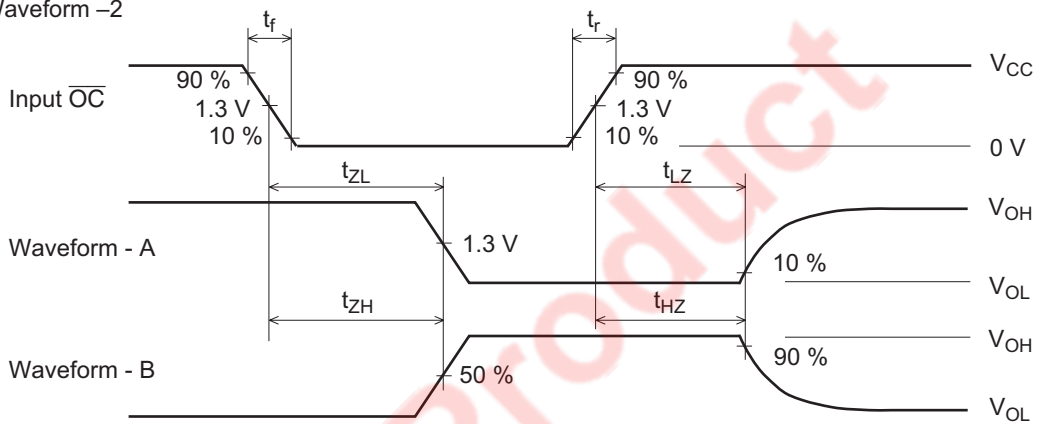


Waveforms

• Waveform –1



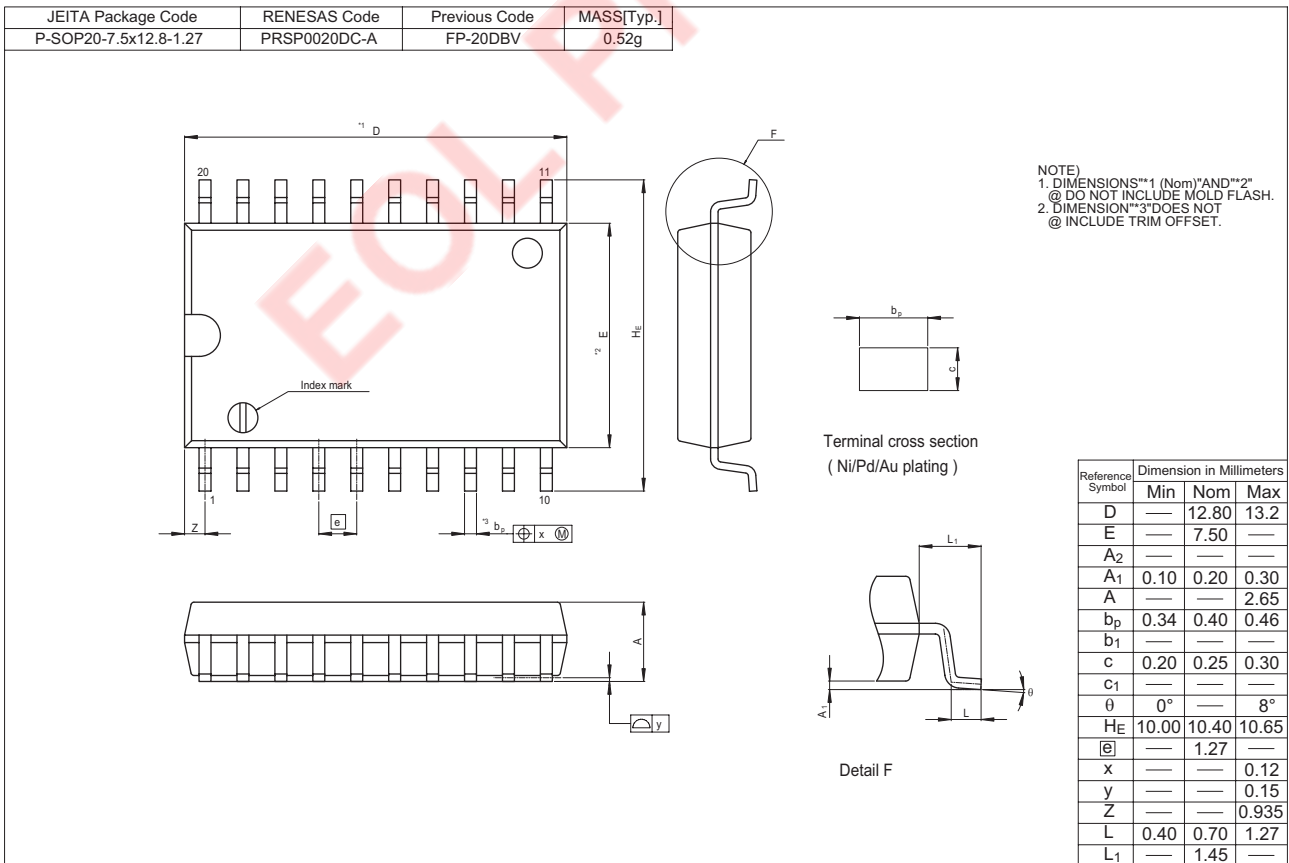
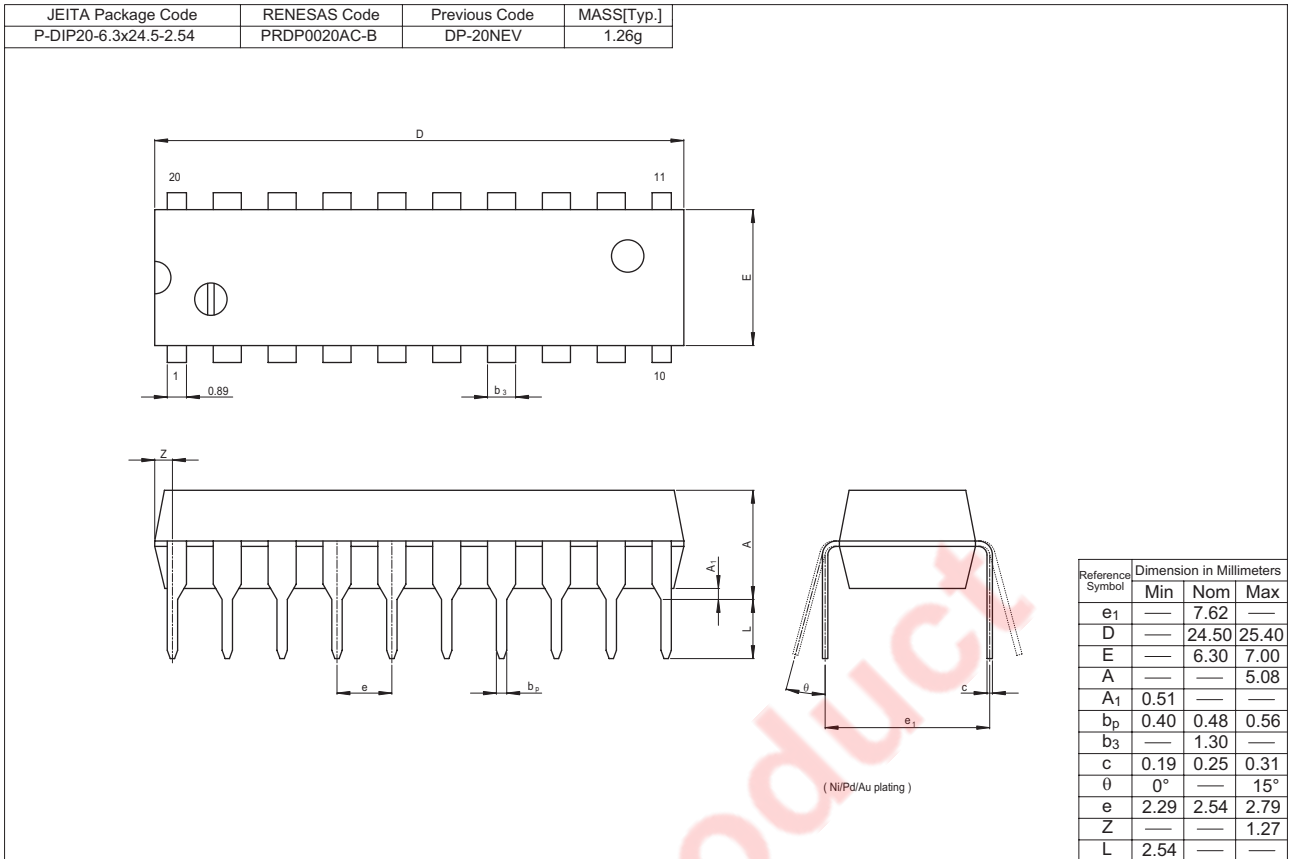
• Waveform –2



- Notes :
1. Input waveform : PRR  $\leq$  1 MHz, duty cycle 50%,  $t_r \leq$  6 ns,  $t_f \leq$  6 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.

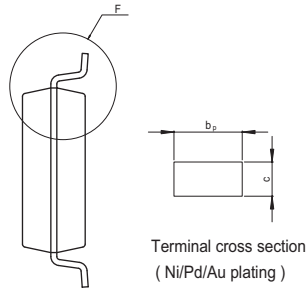
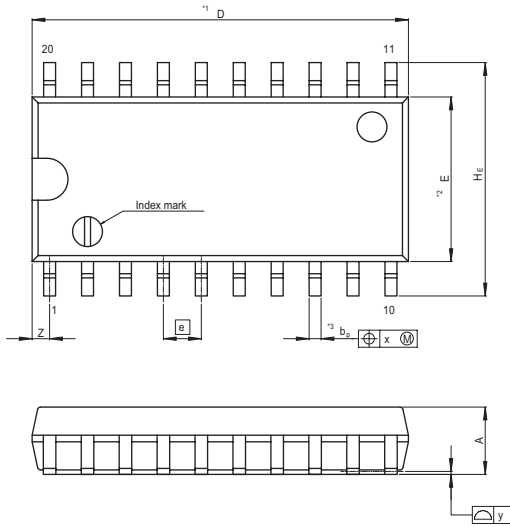


Package Dimensions

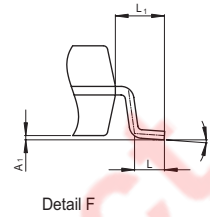


HD74HCT564, HD74HCT574

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-5.5x12.6-1.27	PRSP0020DD-B	FP-20DAV	0.31g



NOTE  
 1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\*  
 DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION\*\*3\*DOES NOT  
 INCLUDE TRIM OFFSET.



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	12.60	13.0
E	—	5.50	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.10	0.20
A	—	—	2.20
b <sub>p</sub>	0.34	0.40	0.46
d <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	7.50	7.80	8.00
ⓔ	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.80
L	0.50	0.70	0.90
L <sub>1</sub>	—	1.15	—

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