

HD74HC592

8-bit Register/Binary Counter

REJ03D0633-0200
 (Previous ADE-205-513)
 Rev.2.00
 Mar 30, 2006

Description





The HD74HC592 consists of a parallel input, 8-bit storage register feeding an 8-bit binary counter. Both the register and the counter have individual positive edge-triggered clocks. In addition, the counter has direct load and clear functions. Expansion is easily accomplished by connecting \overline{RCO} of the first stage to the count enable of the second stage, etc.

Features

- High Speed Operation: t_{pd} (CCK to \overline{RCO}) = 24 ns typ ($C_L = 50$ pF)
- High Output Current: Fanout of 10 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)
HD74HC592FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)

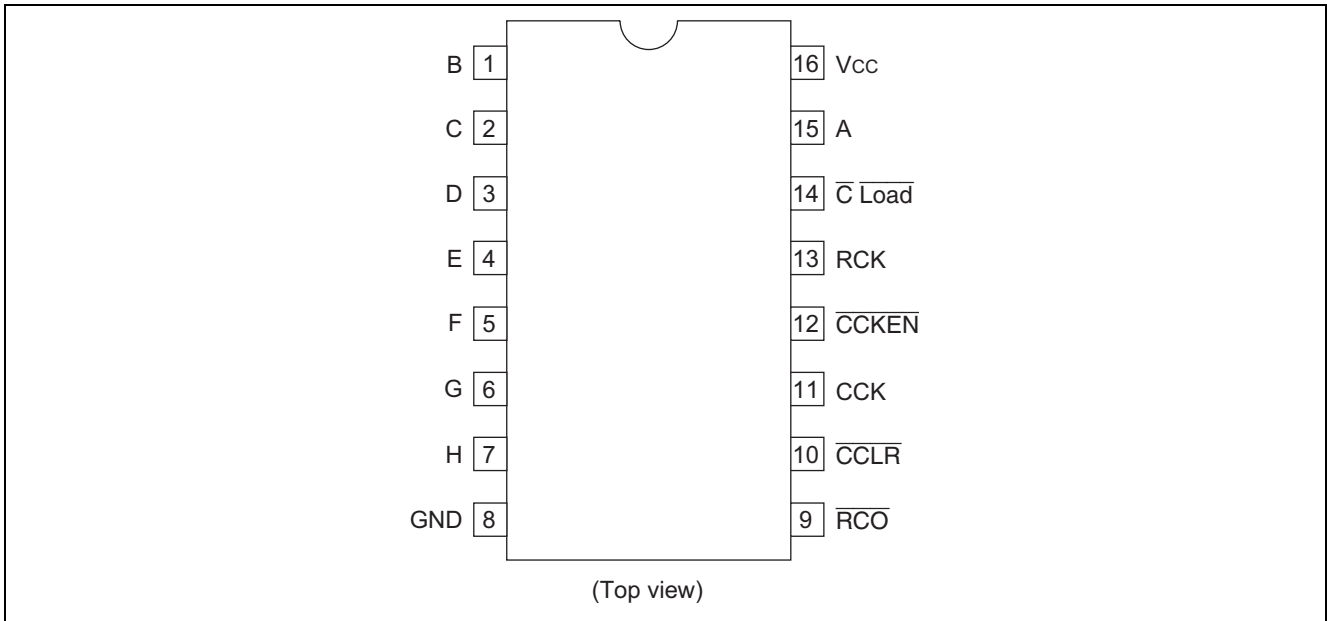
Function Table

Inputs					Function
RCK	\overline{CLoad}	\overline{CCLR}	\overline{CCKEN}	CCK	
X	L	H	X	X	Register data loaded into counter
X	H	L	X	X	Counter clear
	H	H	X	X	Input data A to H stored into register
	H	H	X	X	No change in register
X	H	H	L		Count up
X	H	H	L		No count
X	H	H	H	X	No cont

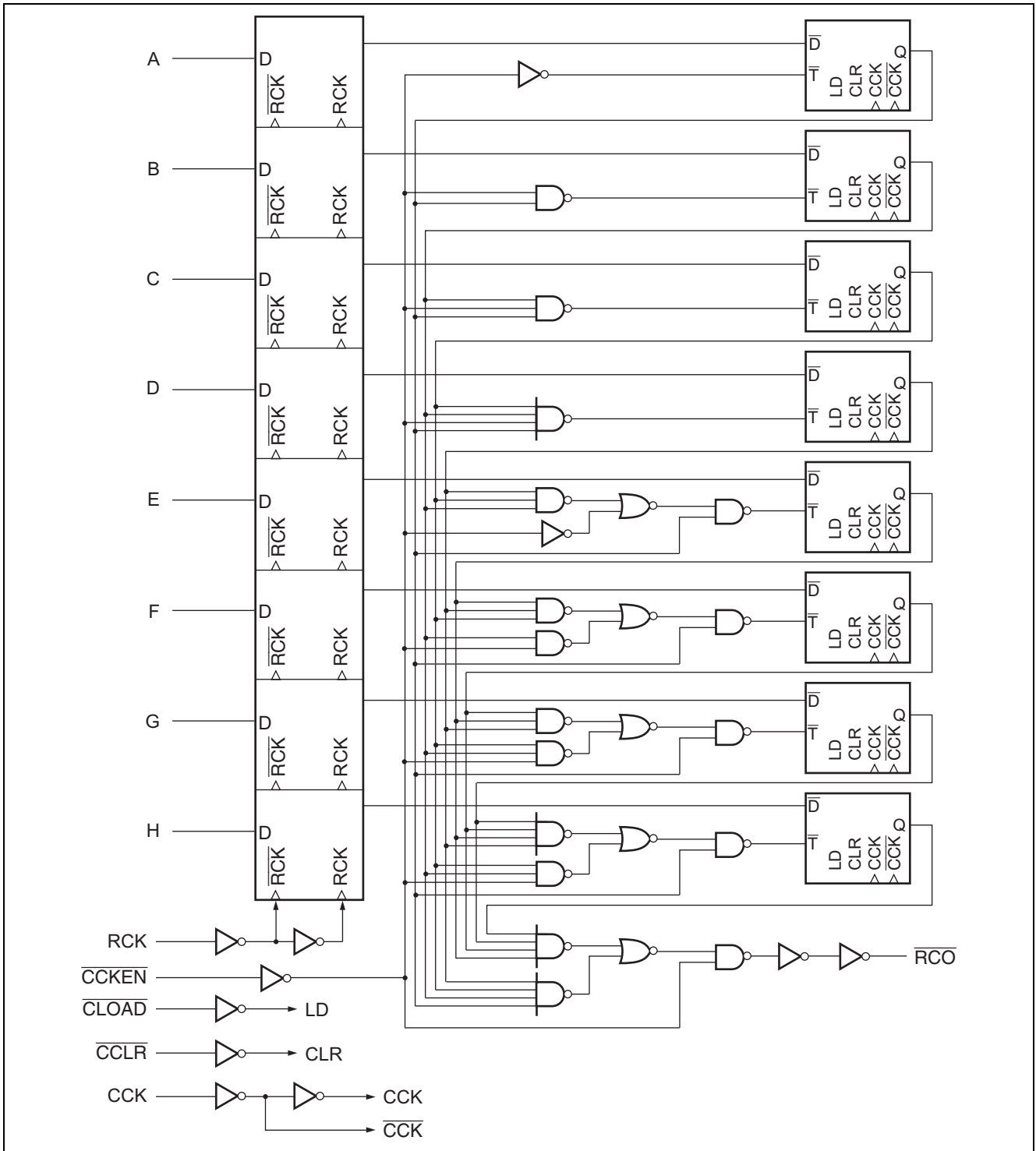
$$\overline{RCO} = QA' \cdot QB' \cdot QC' \cdot QD' \cdot QE' \cdot QF' \cdot QG' \cdot QH' \cdot (\overline{CCKEN})$$

(QA' to QH': Output of Internal Counter)

Pin Arrangement



Logic Diagram



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}	± 25	mA
V_{CC} , GND current	I_{CC} or I_{GND}	± 50	mA
Power dissipation	P_T	500	mW
Storage temperature	T_{stg}	-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}	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	$V_{CC} = 2.0$ V
		0 to 500		$V_{CC} = 4.5$ V
		0 to 400		$V_{CC} = 6.0$ V

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

Waveform: Refer to test circuit of switching characteristics.

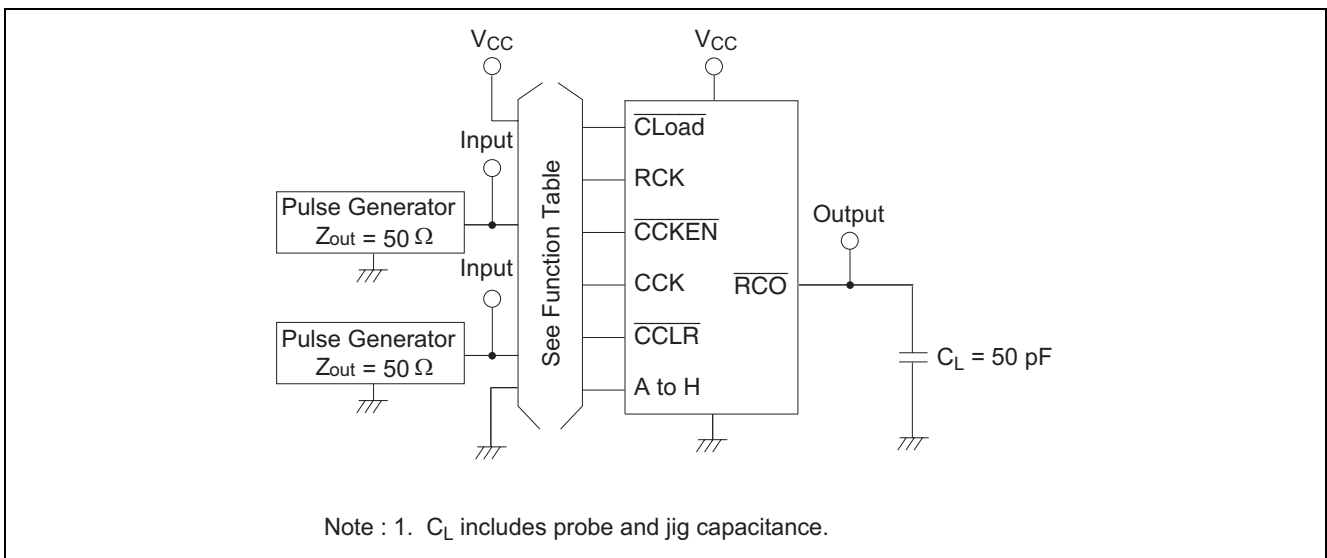
Electrical Characteristics

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	$V_{in} = V_{IH}$ or V_{IL}	$I_{OH} = -20 \mu\text{A}$	
		4.5	4.4	4.5	—	4.4	—			$I_{OH} = -4 \text{ mA}$	
		6.0	5.9	6.0	—	5.9	—			$I_{OH} = -5.2 \text{ mA}$	
		4.5	4.18	—	—	4.13	—				
		6.0	5.68	—	—	5.63	—				
	V_{OL}	2.0	—	0.0	0.1	—	0.1	V	$V_{in} = V_{IH}$ or V_{IL}	$I_{OL} = 20 \mu\text{A}$	
		4.5	—	0.0	0.1	—	0.1				
		6.0	—	0.0	0.1	—	0.1				
		4.5	—	—	0.26	—	0.33				$I_{OH} = 4 \text{ mA}$
		6.0	—	—	0.26	—	0.33				$I_{OH} = 5.2 \text{ mA}$
Input current	I_{in}	6.0	—	—	± 0.1	—	± 1.0	μA	$V_{in} = V_{CC}$ or GND		
Quiescent supply current	I_{CC}	6.0	—	—	4.0	—	40	μA	$V_{in} = V_{CC}$ or GND, $I_{out} = 0 \mu\text{A}$		

Switching Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

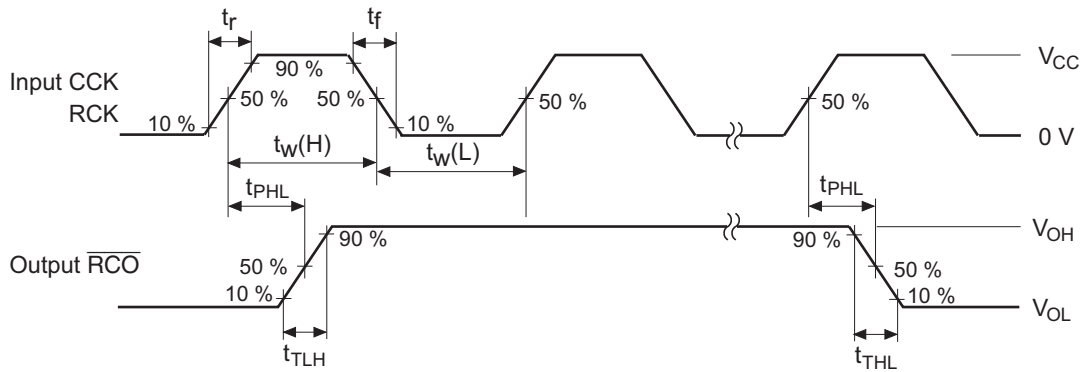
Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Maximum clock frequency	f _{max}	2.0	—	—	5	—	4	MHz	
		4.5	—	—	25	—	20		
		6.0	—	—	29	—	24		
Propagation delay time	t _{PLH}	2.0	—	—	200	—	250	ns	CCK to RCO
		4.5	—	24	40	—	50		
		6.0	—	—	34	—	43		
	t _{PHL}	2.0	—	—	200	—	250	ns	C Load to RCO
		4.5	—	27	40	—	50		
		6.0	—	—	34	—	43		
	t _{PLH}	2.0	—	—	200	—	250	ns	CCLR to RCO
		4.5	—	26	40	—	50		
		6.0	—	—	34	—	43		
	t _{PHL}	2.0	—	—	300	—	375	ns	RCK to RCO
		4.5	—	29	60	—	75		
		6.0	—	—	51	—	64		
Pulse width	t _w	2.0	80	—	—	100	—	ns	
		4.5	16	8	—	20	—		
		6.0	14	—	—	17	—		
Removal time	t _{rem}	2.0	100	—	—	125	—	ns	CCLR to CCK
		4.5	20	12	—	25	—		
		6.0	17	—	—	21	—		
Setup time	t _{su}	2.0	100	—	—	125	—	ns	CCKEN to CCK
		4.5	20	0	—	25	—		
		6.0	17	—	—	21	—		
	t _{PLH}	2.0	200	—	—	250	—	ns	CCK to RCK
		4.5	40	14	—	50	—		
		6.0	34	—	—	43	—		
Output rise/fall time	t _{TLH}	2.0	—	—	75	—	95	ns	
	t _{THL}	4.5	—	5	15	—	19		
	6.0	—	—	13	—	16			
Input capacitance	C _{in}	—	—	5	10	—	10	pF	

Test Circuit



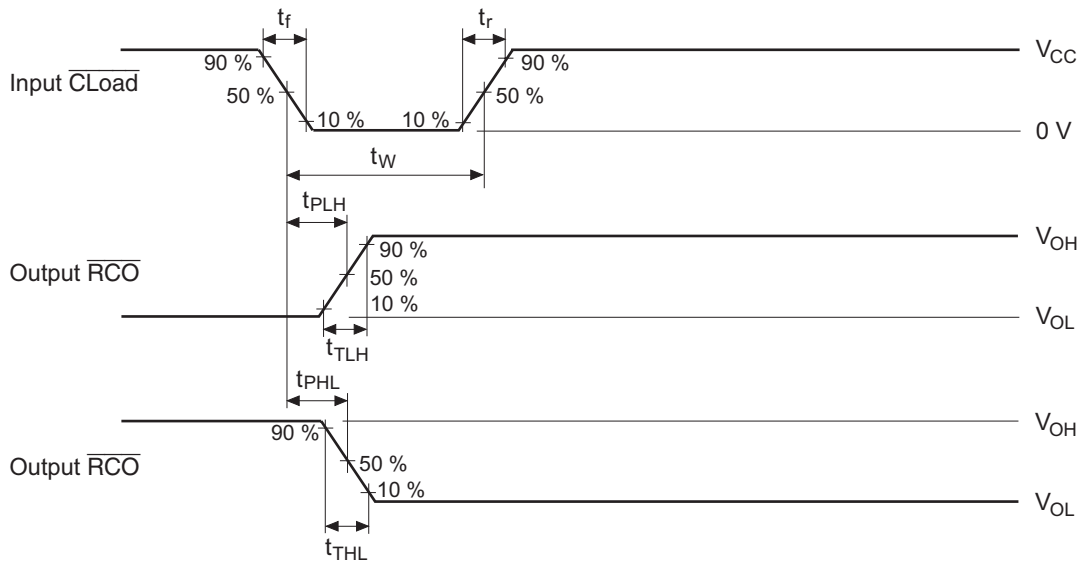
Waveforms

- Waveform – 1 (CCK, RCK to \overline{RCO})



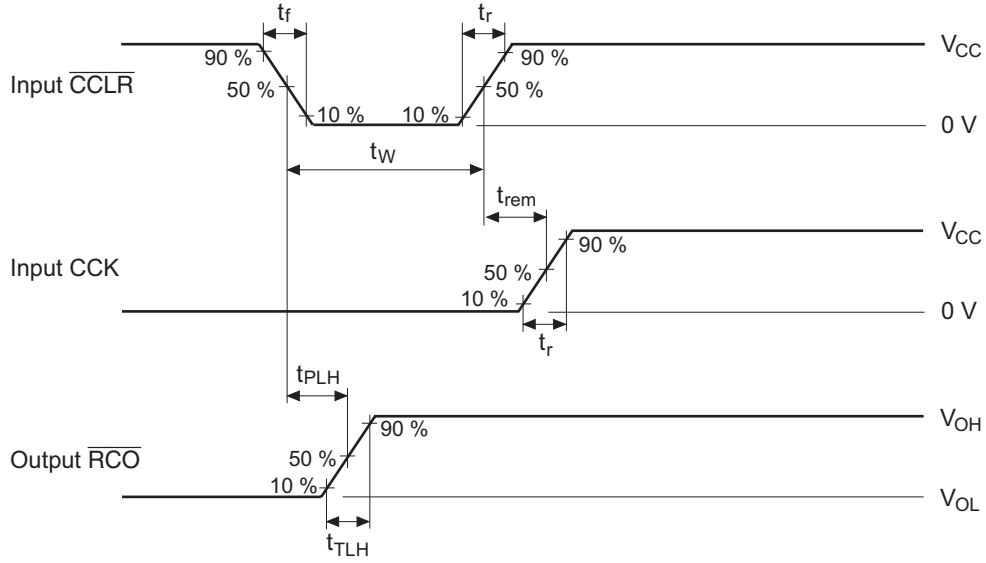
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns

- Waveform – 2 (\overline{CLoad} to \overline{RCO})



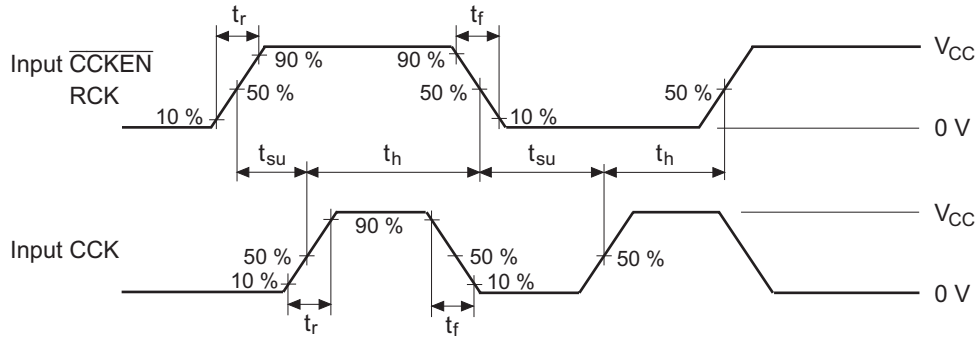
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns

• Waveform – 3 ($\overline{\text{CCLR}}$ to $\overline{\text{RCO}}$, $\overline{\text{CCLR}}$ to CCK)



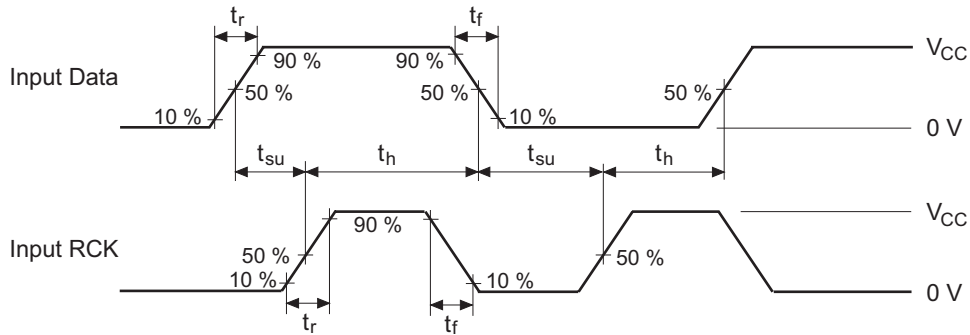
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns

• Waveform – 4 ($\overline{\text{CCKEN}}$, RCK to CCK)



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

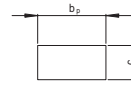
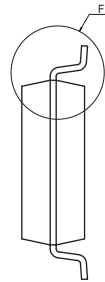
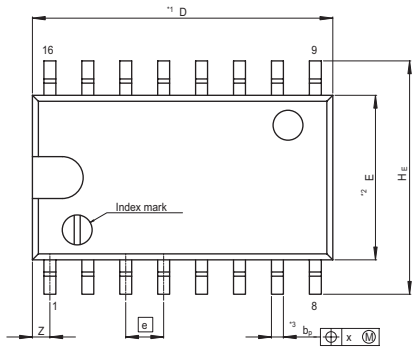
• Waveform – 5 (Data to RCK)



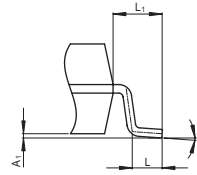
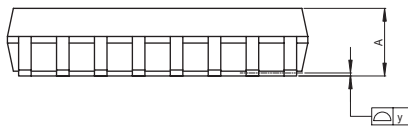
Note : 1. Input waveform : PRR \leq 1 MHz, duty cycle 50%, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns

Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-5.5x10.06-1.27	PRSP0016DH-B	FP-16DAV	0.24g



Terminal cross section
(Ni/Pd/Au plating)



Detail F

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	—	10.06	10.5
E	—	5.50	—
A ₂	—	—	—
A ₁	0.00	0.10	0.20
A	—	—	2.20
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	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 ₁	—	1.15	—

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