

RD74HC04A

R07DS0045EJ0100

Hex Inverters

Rev.1.00

Jul 20, 2010

Features

- High Speed Operation: $t_{pd} = 7.5 \text{ ns typ (} C_L = 50 \text{ pF)}$
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2 \text{ to } 6 \text{ V}$
- Low Input Current: $1 \mu\text{A max}$
- Low Quiescent Supply Current: $I_{CC} \text{ (static)} = 1 \mu\text{A max (} T_a = 25^\circ\text{C)}$
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)	Surface Treatment
RD74HC04APT0	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—	0 (Ni/Pd/Au)
RD74HC04AFPH0	SOP-14 pin (JEITA)	PRSP0014DF-B (FP-14DAV)	FP	H (2,000 pcs/reel)	0 (Ni/Pd/Au)
RD74HC04ARPH0	SOP-14 pin (JEDEC)	PRSP0014DE-A (FP-14DNV)	RP	H (2,500 pcs/reel)	0 (Ni/Pd/Au)

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

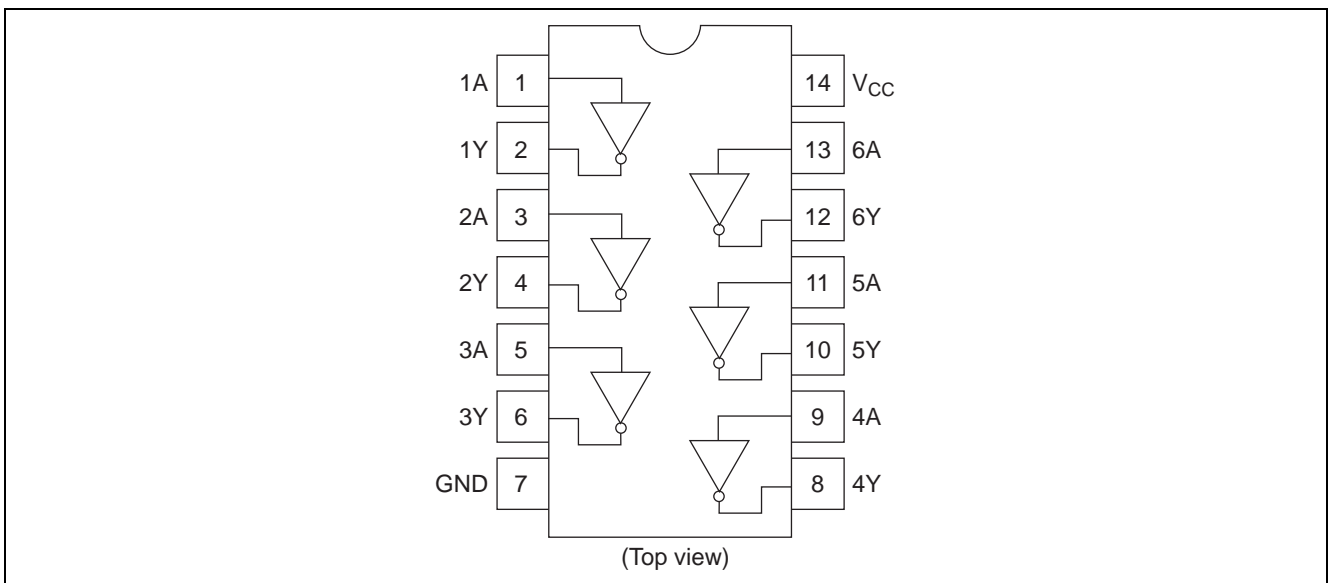
Function Table

Input	Output
A	Y
L	H
H	L

H : High level

L : Low level

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Conditions
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_O	± 25	mA	
V_{CC} , GND current	I_{CC} or I_{GND}	± 50	mA	
Power dissipation	P_T	1185	mW	DIP
		785	mW	SOP
		500	mW	TSSOP
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_{CC}	2 to 6	V	
Input / Output voltage	V_{IN}, V_{OUT}	0 to V_{CC}	V	
Operating temperature	T_a	-40 to 85	$^{\circ}C$	
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

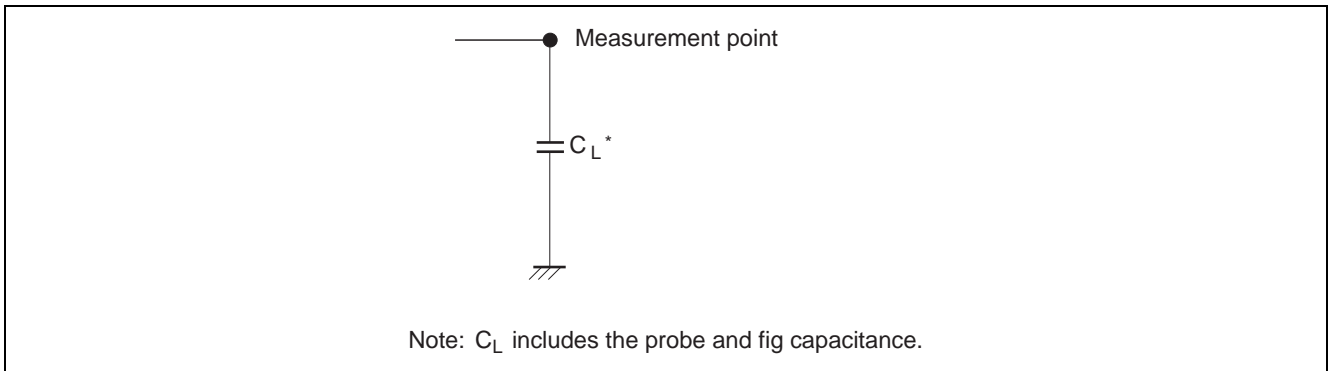
Item	Symbol	V_{CC} (V)	$T_a = 25^{\circ}C$			$T_a = -40 \text{ to } +85^{\circ}C$		Unit	Test Conditions		
			Min	Typ	Max	Min	Max				
Input voltage	V_{IH}	2.0	1.5	—	—	1.5	—	V			
		4.5	3.15	—	—	3.15	—				
		6.0	4.2	—	—	4.2	—				
	V_{IL}	2.0	—	—	0.5	—	0.5	V			
		4.5	—	—	1.35	—	1.35				
		6.0	—	—	1.8	—	1.8				
Output voltage	V_{OH}	2.0	1.9	2.0	—	1.9	—	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu A$	
		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	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu A$	
		4.5	—	0.0	0.1	—	0.1				
		6.0	—	0.0	0.1	—	0.1				
		4.5	—	—	0.26	—	0.33				$I_{OL} = 4 \text{ mA}$
		6.0	—	—	0.26	—	0.33				$I_{OL} = 5.2 \text{ mA}$
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	—	—	1.0	—	10	μA	$V_{in} = V_{CC} \text{ or } GND, I_{out} = 0 \mu A$		

Switching Characteristics

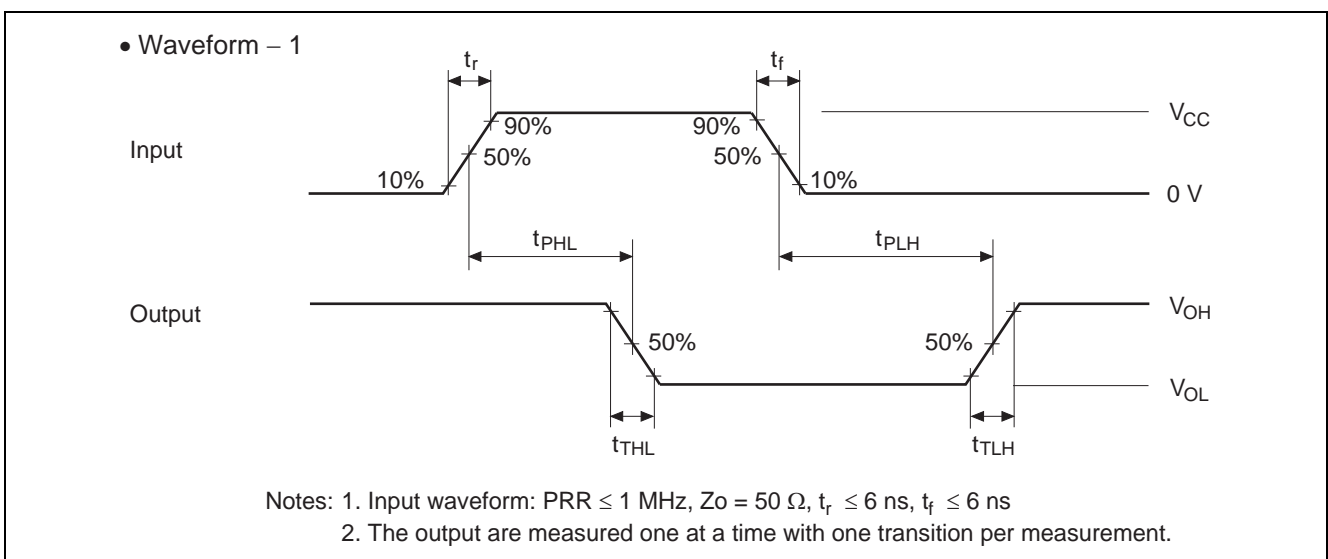
($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

Item	Symbol	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t_{PLH}	2.0	—	—	90	—	115	ns	
		4.5	—	7	18	—	23		
		6.0	—	—	15	—	20		
	t_{PHL}	2.0	—	—	90	—	115	ns	
		4.5	—	8	18	—	23		
		6.0	—	—	15	—	20		
Output rise time	t_{TLH}	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Output fall time	t_{THL}	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	C_{in}	—	—	5	10	—	10	pF	

Test Circuit

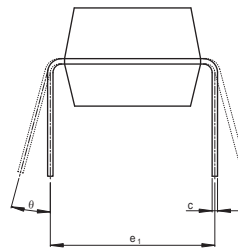
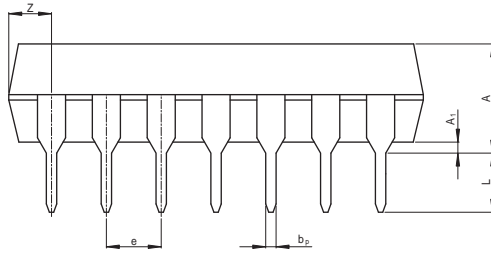
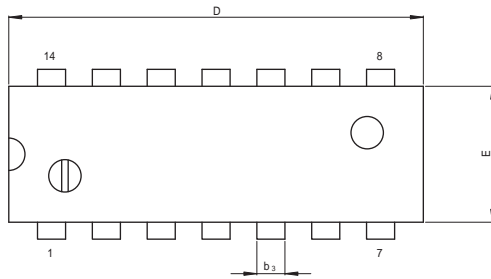


Waveforms



Package Dimensions

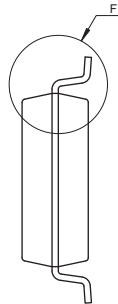
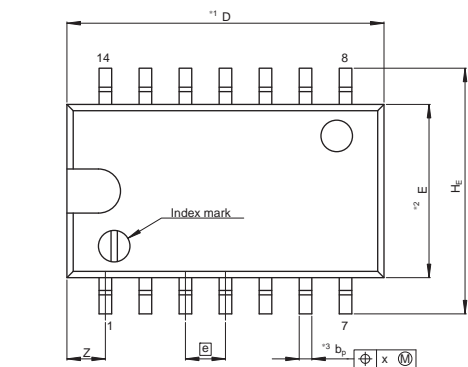
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP14-6.3x19.2-2.54	PRDP0014AB-B	DP-14AV	0.97g



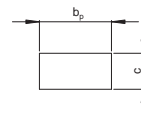
(Ni/Pd/Au plating)

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e ₁	—	7.62	—
D	—	19.2	20.32
E	—	6.3	7.4
A	—	—	5.06
A ₁	0.51	—	—
b _p	0.40	0.48	0.56
b ₃	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	2.39
L	2.54	—	—

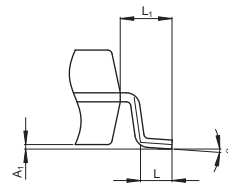
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP14-5.5x10.06-1.27	PRSP0014DF-B	FP-14DAV	0.23g



Terminal cross section (Ni/Pd/Au plating)



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

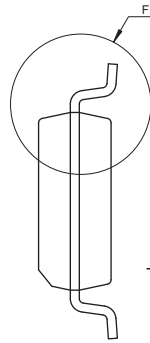
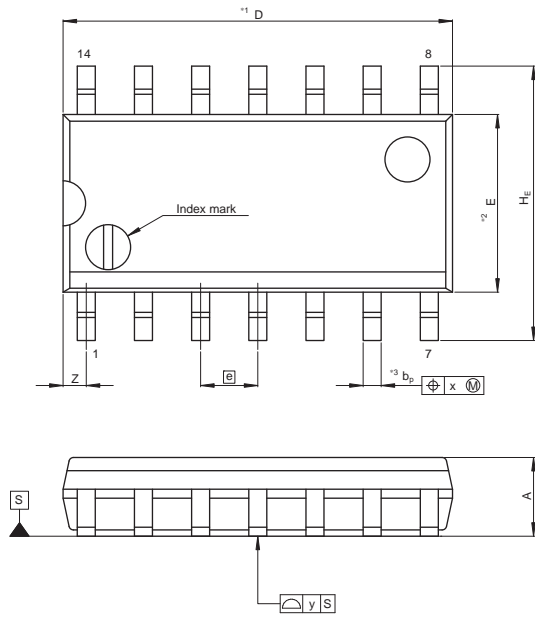


Detail F

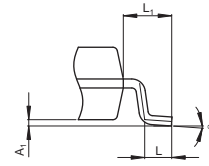
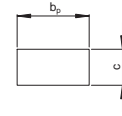
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A ₂	—	—	—
A ₁	0.00	0.10	0.20
A	—	—	2.20
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	7.50	7.80	8.00
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	1.42
L	0.50	0.70	0.90
L ₁	—	1.15	—

RD74HC04A

JEITA Package Code P-SOP14-3.95x8.65-1.27	RENESAS Code PRSP0014DE-A	Previous Code FP-14DNV	MASS[Typ.] 0.13g
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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	—	8.65	9.05
E	—	3.95	—
A ₂	—	—	—
A ₁	0.10	0.14	0.25
A	—	—	1.75
b _p	0.34	0.40	0.46
b ₁	—	—	—
c	0.15	0.20	0.25
c ₁	—	—	—
θ	0°	—	8°
H _E	5.80	6.10	6.20
E	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L ₁	—	1.08	—

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