

CHT-74021 DATASHEET

Revision: 03.6
15-Feb-21
(Last Modified Date)

High-Temperature, Quad 2-Inputs NOR Gate

General Description

The CHT-74021 contains four independent 2-inputs NOR gates, performing the Boolean function :

$$Y = \overline{A + B}$$

This circuit is designed assuring latchup-free operation for all supply and temperature conditions.

The CHT-74021 can operate with supply voltages from 3.3 to 5V (±10%).

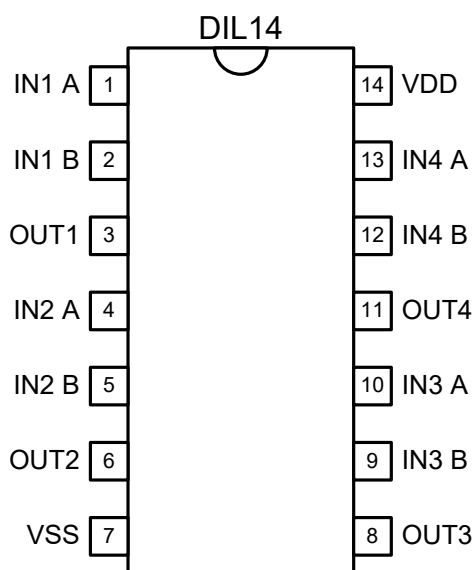
Features

- Qualified from -55 to +225°C (Tj)
- 3.3 to 5V (±10%) supply voltages
- Latchup-free at any supply and temperature condition
- Validated at 225°C for 30000 hours (CDIL14) and 20000 hours (CSOIC16) (and still on-going)
- Available in DIL14 and CSOIC16 hermetic standard package

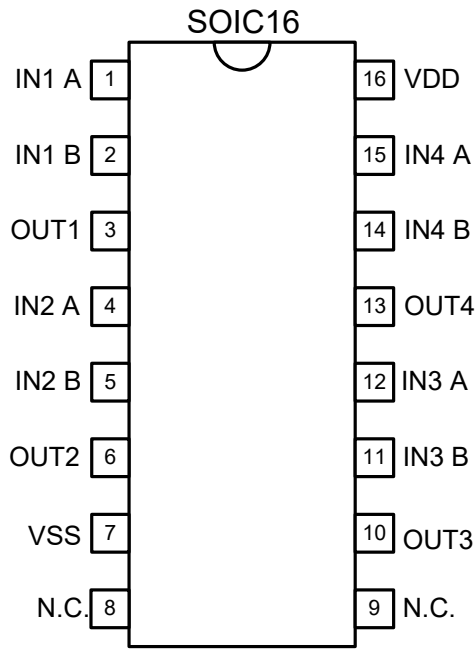
Applications

- Well logging,
- Automotive, Aeronautics & Aerospace
- Harsh Environments

Package and Pin Configuration



Pin	Symbol	Description
1	IN1 A	Input A of the NOR gate number 1
2	IN1 B	Input B of the NOR gate number 1
3	OUT1	Output of the NOR gate number 1
4	IN2 A	Input A of the NOR gate number 2
5	IN2 B	Input B of the NOR gate number 2
6	OUT2	Output of the NOR gate number 2
7	VSS	Circuit core ground terminal.
8	OUT3	Output of the NOR gate number 3
9	IN3 B	Input B of the NOR gate number 3
10	IN3 A	Input A of the NOR gate number 3
11	OUT4	Output of the NOR gate number 4
12	IN4 B	Input B of the NOR gate number 4
13	IN4 A	Input A of the NOR gate number 4
14	VDD	Circuit core power supply terminal.



Pin	Symbol	Description
1	IN1 A	Input A of the NOR gate number 1
2	IN1 B	Input B of the NOR gate number 1
3	OUT1	Output of the NOR gate number 1
4	IN2 A	Input A of the NOR gate number 2
5	IN2 B	Input B of the NOR gate number 2
6	OUT2	Output of the NOR gate number 2
7	VSS	Circuit core ground terminal.
8	NC	Not connected
9	NC	Not connected
10	OUT3	Output of the NOR gate number 3
11	IN3 B	Input B of the NOR gate number 3
12	IN3 A	Input A of the NOR gate number 3
13	OUT4	Output of the NOR gate number 4
14	IN4 B	Input B of the NOR gate number 4
15	IN4 A	Input A of the NOR gate number 4
16	VDD	Circuit core power supply terminal.

Function Table

INPUT		OUTPUT
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

Function and Logical Diagrams

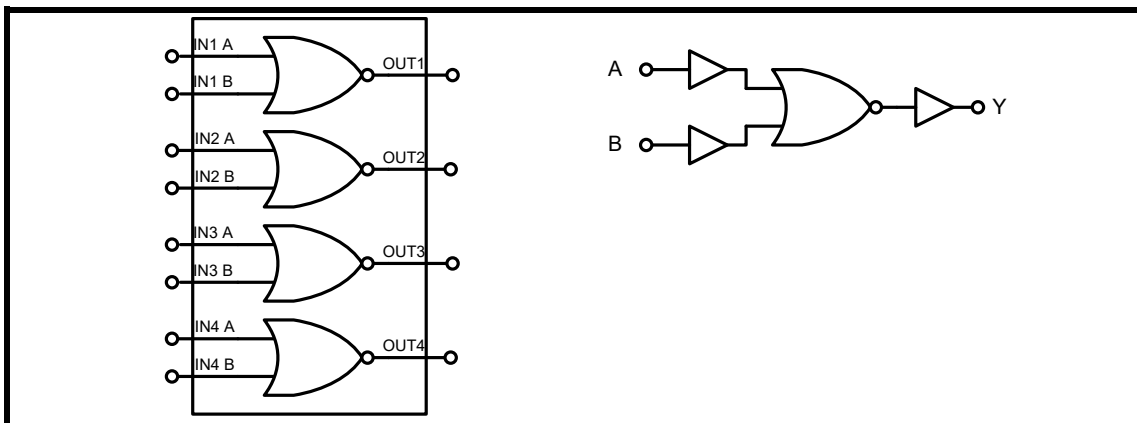


Figure 1. CHT-74021: simplified block diagram.

Absolute Maximum Ratings

 Supply Voltage V_{DD} to GND -0.5 to 6.0V
 Voltage on any Pin to GND -0.5 to $V_{DD}+0.5V$
Operating Conditions

 Supply Voltage V_{DD} to GND 3.3V to 5V ($\pm 10\%$)
 Junction temperature -55°C to +225°C

ESD Rating (expected)

Human Body Model 1kV

DC Electrical Characteristics

 Unless otherwise stated: $V_{DD}=5V$, $T_j=25^\circ C$. **Bold underlined** figures indicate values valid over the whole temperature range ($-55^\circ C < T_j < +225^\circ C$).

Parameter	Condition	Min	Typ	Max	Units
Supply voltage V_{DD}		2.97		5.5V	V
Quiescent current I_{DD}	$V_{DD} = 3.3V$, $T_j = -55^\circ C$			4	nA
	$V_{DD} = 5V$, $T_j = -55^\circ C$			13	
	$V_{DD} = 3.3V$, $T_j = 225^\circ C$			<u>2340</u>	
	$V_{DD} = 5V$, $T_j = 225^\circ C$			<u>2550</u>	
Minimum HIGH level output voltage V_{OH}	$V_{DD} = 3.3V$, $I_{OH} < 4mA$ (source)	<u>2.7</u>	3.04		V
	$V_{DD} = 5V$, $I_{OH} < 4mA$ (source)	<u>4.6</u>	4.82		
Maximum LOW level output voltage V_{OL}	$V_{DD} = 3.3V$, $I_{OL} < 4mA$ (sink)		0.28	<u>0.5</u>	V
	$V_{DD} = 5V$, $I_{OL} < 4mA$ (sink)		0.20	<u>0.4</u>	
Minimum HIGH level input voltage V_{IH}	$V_{DD} = 3.3V$	<u>2.4</u>	2.10		V
	$V_{DD} = 5V$	<u>3.7</u>	3.49		
Maximum LOW level input voltage V_{IL}	$V_{DD} = 3.3V$		1.72	<u>1.5</u>	V
	$V_{DD} = 5V$		2.16	<u>2.0</u>	
Input leakage current (source / sink) $\pm I_i$	$V_i = V_{CC}$ or GND, $V_{DD} = 3.3V$		± 1	<u>± 35</u>	nA
	$V_i = V_{CC}$ or GND, $V_{DD} = 5V$		± 2	<u>± 37</u>	

AC Electrical Characteristics

Unless otherwise stated: VDD=5V, T_i=25°C. **Bold underlined** figures indicate values valid over the whole temperature range (-55°C < T_j < +225°C).

Parameter	Condition	Temperature	Min	Typ	Max	Units
Propagation delay time from A or B to Y ¹ t _{PHL}	C _L =50pF	T _j =-55°C		9	12	ns
		T _j =25°C		11	14	
		T _j =225°C		15	<u>19</u>	
Propagation delay time from A or B to Y t _{PLH}	C _L =50pF	T _j =-55°C		14	17	ns
		T _j =25°C		15	20	
		T _j =225°C		17	<u>22</u>	
Output transition time High to Low t _{THL}	C _L =50pF	T _j =-55°C		13	17	ns
		T _j =25°C		14	18	
		T _j =225°C		17	<u>22</u>	
Output transition time High to Low t _{TLH}	C _L =50pF	T _j =-55°C		19	25	ns
		T _j =25°C		20	26	
		T _j =225°C		23	<u>30</u>	

¹ Input A is 1% to 2% faster than input B.

AC Electrical Characteristics (cntd)

Unless otherwise stated: VDD=3.3V, T_J=25°C. **Bold underlined** figures indicate values valid over the whole temperature range (-55°C < T_J < +225°C).

Parameter	Condition	Temperature	Min	Typ	Max	Units
Propagation delay time from A or B to Y t _{PHL}	C _L =50pF	T _J =-55°C		18	24	ns
		T _J =25°C		19	27	
		T _J =225°C		23	<u>37</u>	
Propagation delay time from A or B to Y t _{PLH}	C _L =50pF	T _J =-55°C		17	23	ns
		T _J =25°C		19	26	
		T _J =225°C		23	<u>35</u>	
Output transition time High to Low t _{THL}	C _L =50pF	T _J =-55°C		20	26	ns
		T _J =25°C		21	28	
		T _J =225°C		27	<u>36</u>	
Output transition time High to Low t _{TLH}	C _L =50pF	T _J =-55°C		23	30	ns
		T _J =25°C		24	32	
		T _J =225°C		26	<u>34</u>	

AC Waveforms

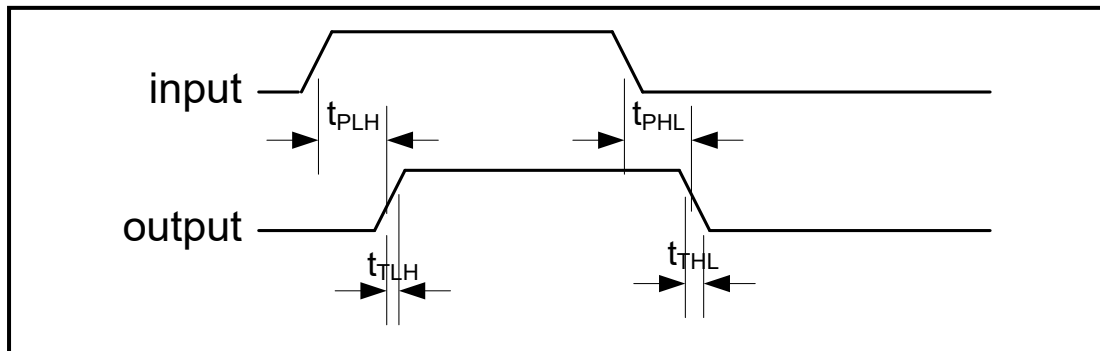
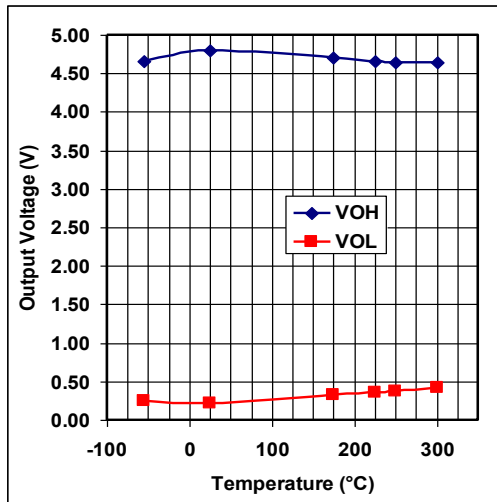
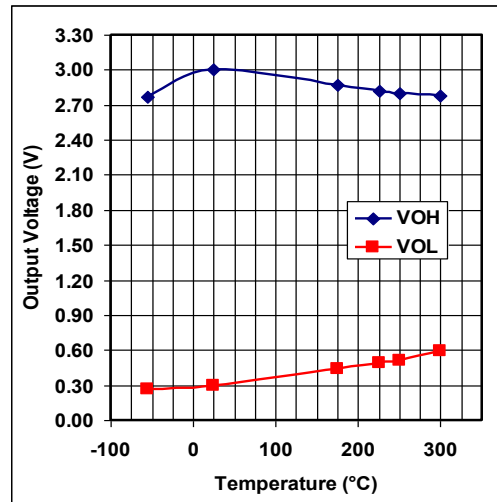


Figure 2. AC Waveforms

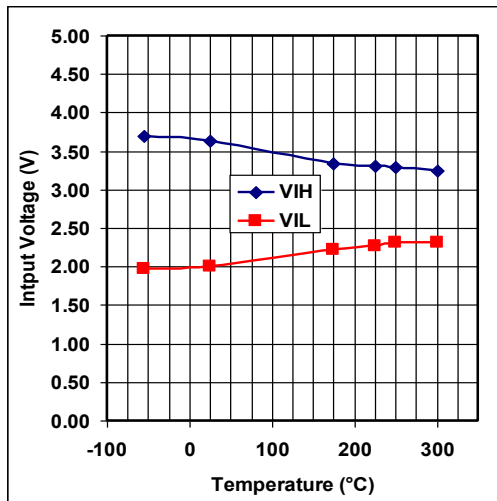
Typical Performance Characteristics



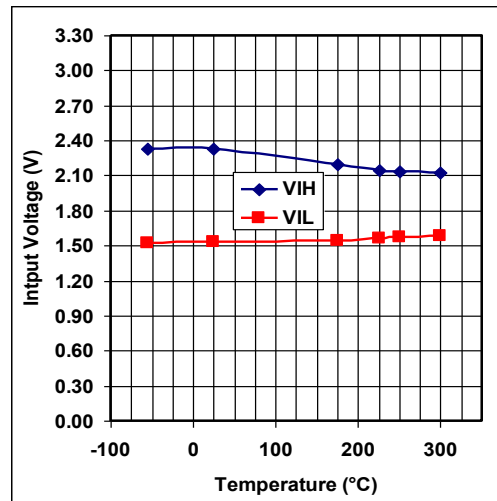
Output voltage levels versus temperature, V_{DD} = 5V



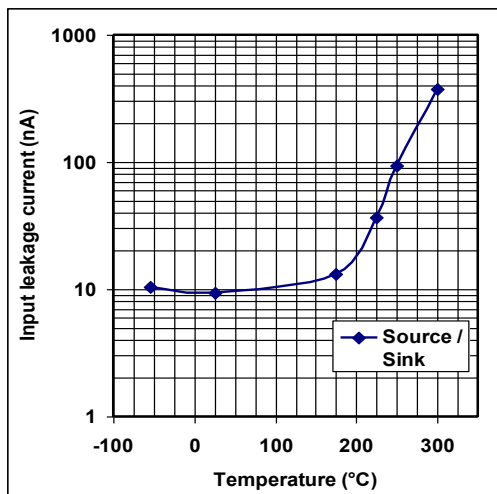
Output voltage levels versus temperature, V_{DD} = 3.3V



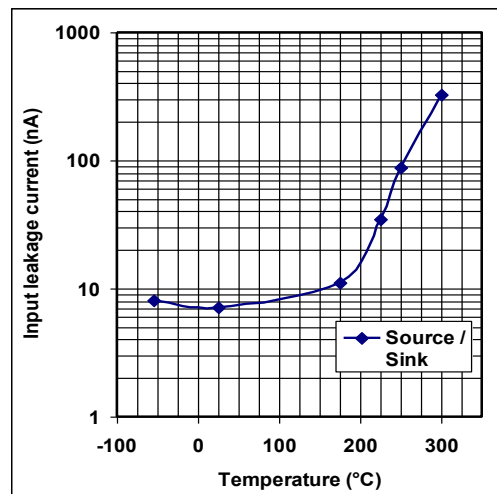
Input voltage levels versus temperature, V_{DD} = 5V



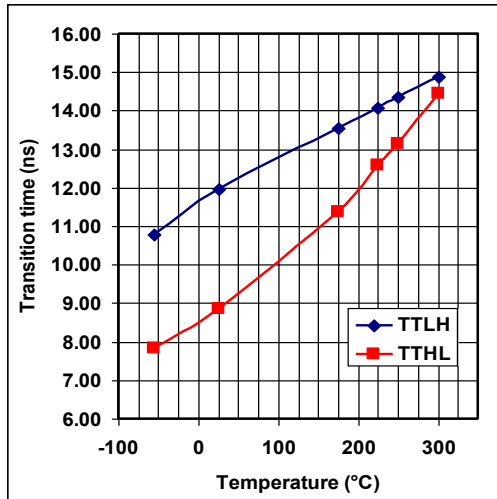
Input voltage levels versus temperature, V_{DD} = 3.3V



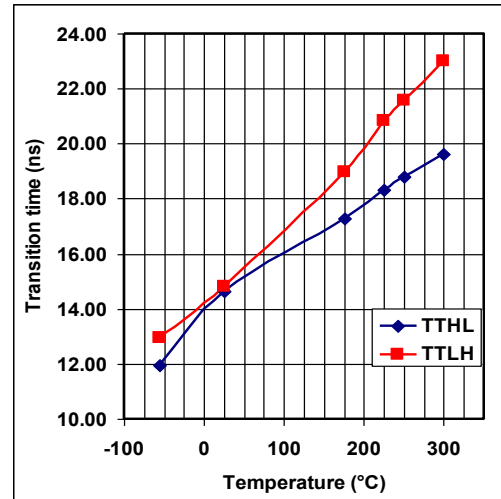
Input leakage current versus temperature, V_{DD} = 5V



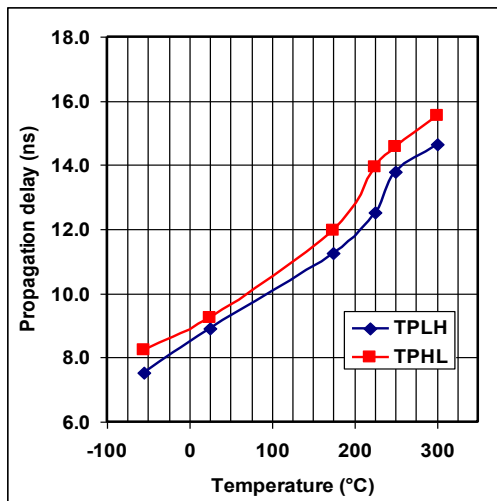
Input leakage current versus temperature, V_{DD} = 3.3V



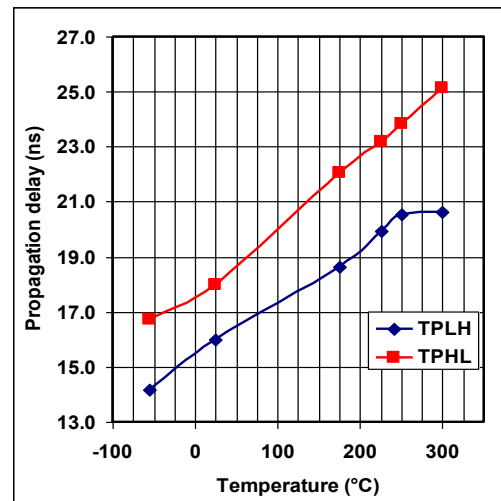
Transition times versus temperature,
 $V_{DD} = 5V$



Transition times versus temperature,
 $V_{DD} = 3.3V$



Propagation delays versus temperature,
 $V_{DD} = 5V$

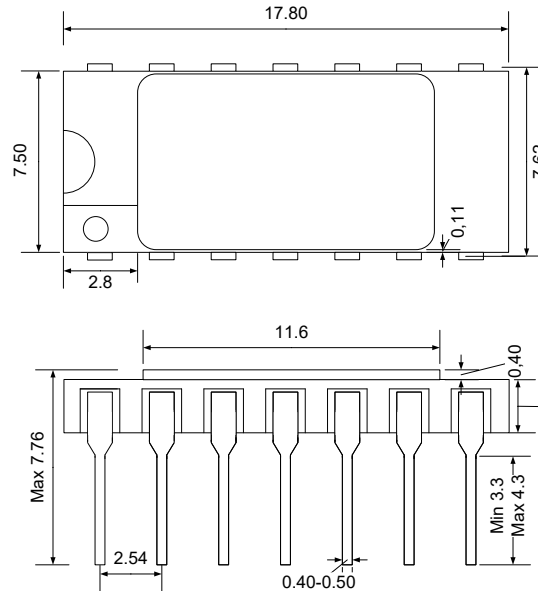


Propagation delays versus temperature,
 $V_{DD} = 3.3V$

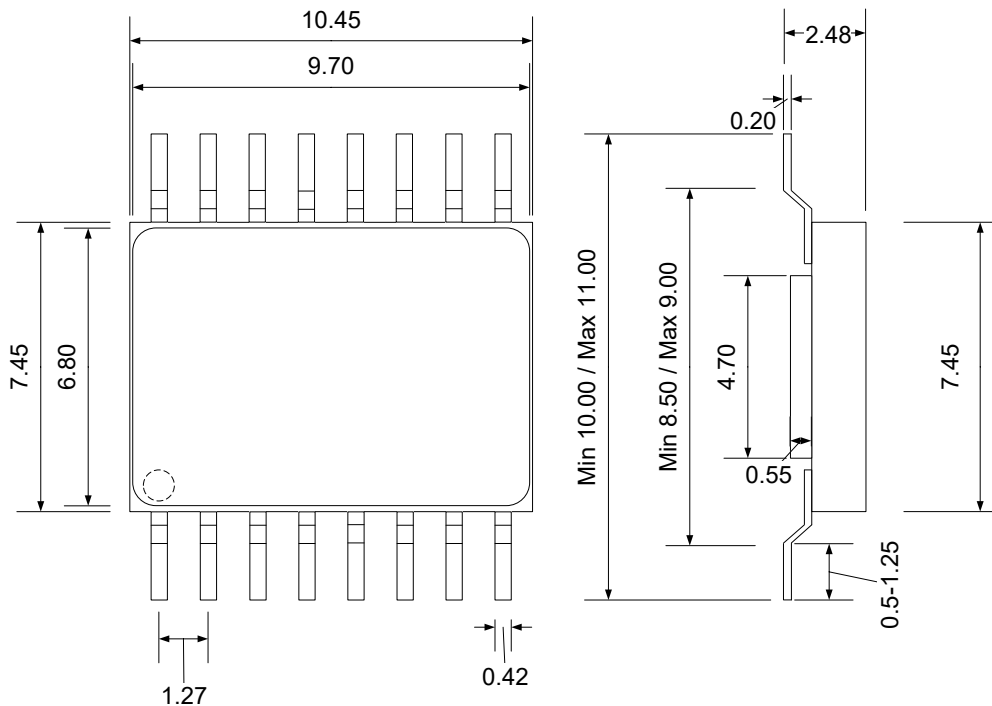
Ordering Information

Ordering Reference	Package	Temperature Range	Marking	Status
CHT-74021-CDIL14-T	Ceramic DIL14	-55°C to +225°C	CHT-74021	Not for new design
CHT-74021-CSOIC16-T	Ceramic SOIC16	-55°C to +225°C	CHT-74021	Active

Package Dimensions



Drawing CDIL14 (mm +/- 10%)



Drawing CSOIC16 (mm +/- 10%)