CHT 7400 DATASHEET

Revision: 3.6
15-Feb-21
(Last Modified Date)

High-Temperature Quad 2-Inputs NAND Gate

General Description

The CHT-7400 contains four independent 2-input NAND gates, performing the Boolean function :

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

This circuit is designed assuring low leakage current and latch-up free operation for all supply and temperature conditions.

The CHT-7400 can operate with supply voltages from 3.3 to 5V (±10%).

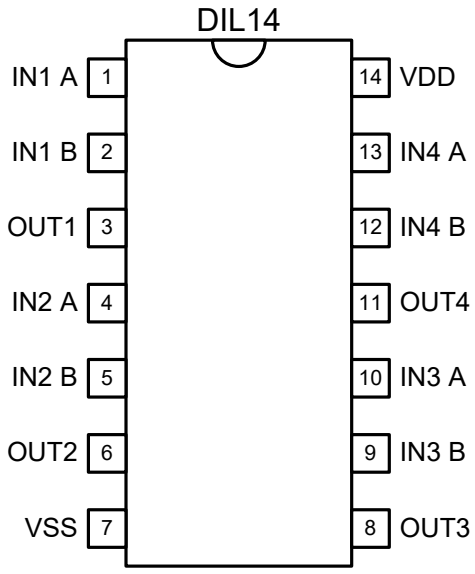
Features

- 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

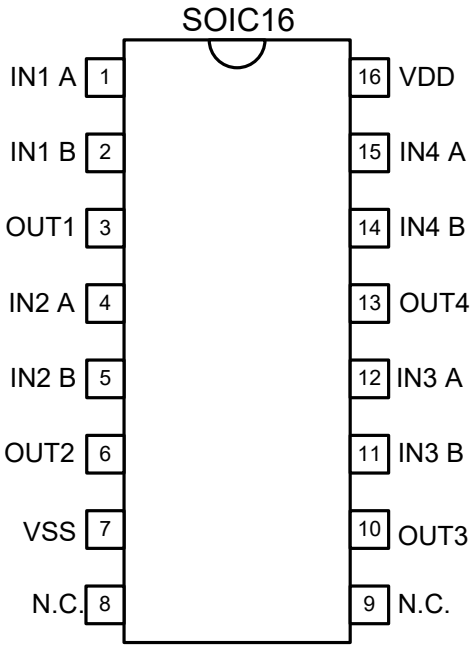
Applications

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

Package and Pin Configuration



Pin	Symbol	Description
1	**IN1 A**	Input A of the NAND gate number 1
2	**IN1 B**	Input B of the NAND gate number 1
3	**OUT1**	Output of the NAND gate number 1
4	**IN2 A**	Input A of the NAND gate number 2
5	**IN2 B**	Input B of the NAND gate number 2
6	**OUT2**	Output of the NAND gate number 2
7	**VSS**	Circuit core ground terminal.
8	**OUT3**	Output of the NAND gate number 3
9	**IN3 B**	Input B of the NAND gate number 3
10	**IN3 A**	Input A of the NAND gate number 3
11	**OUT4**	Output of the NAND gate number 4
12	**IN4 B**	Input B of the NAND gate number 4
13	**IN4 A**	Input A of the NAND gate number 4
14	**VDD**	Circuit core power supply terminal.



Pin	Symbol	Description
1	**IN1 A**	Input A of the NAND gate number 1
2	**IN1 B**	Input B of the NAND gate number 1
3	**OUT1**	Output of the NAND gate number 1
4	**IN2 A**	Input A of the NAND gate number 2
5	**IN2 B**	Input B of the NAND gate number 2
6	**OUT2**	Output of the NAND gate number 2
7	**VSS**	Circuit core ground terminal.
8	**N.C.**	No connected terminal.
9	**N.C.**	No connected terminal.
10	**OUT3**	Output of the NAND gate number 3
11	**IN3 B**	Input B of the NAND gate number 3
12	**IN3 A**	Input A of the NAND gate number 3
13	**OUT4**	Output of the NAND gate number 4
14	**IN4 B**	Input B of the NAND gate number 4
15	**IN4 A**	Input A of the NAND gate number 4
16	**VDD**	Circuit core power supply terminal.

Function Table

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

Function and Logical Diagrams

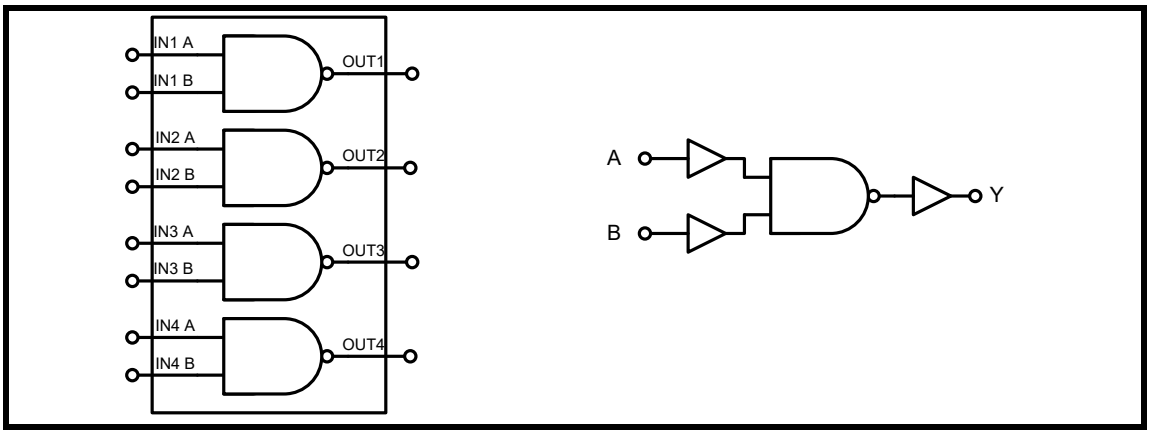


Figure 1. CHT-7400: simplified block diagram

Absolute Maximum Ratings

Supply Voltage V_{DD} to GND	-0.7 to 6.0V
Voltage on any Pin to GND	-0.5 to V_{DD}+0.5V

ESD Rating (expected)

Human Body Model	1kV

Operating Conditions

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

DC Electrical Characteristics

Unless otherwise stated: VDD=5V, T_j=25°C. **Bold underlined** figures indicate values valid over the whole temperature range (-55°C < T_j < +225°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°C			4	nA
	V_{DD} = 5V, T_j=-55°C			13	
	V_{DD} = 3.3V, T_j=225°C			**1980**	
	V_{DD} = 5V, T_j=225°C			**2230**	
Minimum HIGH level output voltage **V_{OH}**	V_{DD} = 3.3V, I_{OH}<4mA (source)	**2.7**	3.04		V
	V_{DD} = 5V, I_{OH}<4mA (source)	**4.6**	4.82		
Maximum LOW level output voltage **V_{OL}**	V_{DD} = 3.3V, I_{OL}<4mA (sink)		0.28	**0.5**	V
	V_{DD} = 5V, I_{OL}<4mA (sink)		0.20	**0.4**	
Minimum HIGH level input voltage **V_{IH}**	V_{DD} = 3.3V	**2.4**	2.10		V
	V_{DD} = 5V	**3.7**	3.49		
Maximum LOW level input voltage **V_{IL}**	V_{DD} = 3.3V		1.72	**1.5**	V
	V_{DD} = 5V		2.16	**2.0**	
Input leakage current (source / sink) **± I_I**	VI=VCC or GND, V_{DD} = 3.3V		±1	**±35**	nA
	VI=VCC or GND, V_{DD} = 5V		±2	**±37**	

AC Electrical Characteristics

Unless otherwise stated: VDD=5V, 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		9	16	ns
		T_j=25°C		10	18	
		T_j=225°C		14	25	
Propagation delay time from A or B to Y t_{PLH}	C_L=50pF	T_j=-55°C		9	16	ns
		T_j=25°C		10	18	
		T_j=225°C		13	23	
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	**22**	
Output transition time Low to High t_{TLH}	C_L=50pF	T_j=-55°C		19	25	ns
		T_j=25°C		20	26	
		T_j=225°C		23	**30**	

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		14	25	ns
		T_j=25°C		17	30	
		T_j=225°C		24	42	
Propagation delay time from A or B to Y t_{PLH}	C_L=50pF	T_j=-55°C		13	23	ns
		T_j=25°C		16	28	
		T_j=225°C		22	38	
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	**36**	
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	**34**	

AC Waveforms

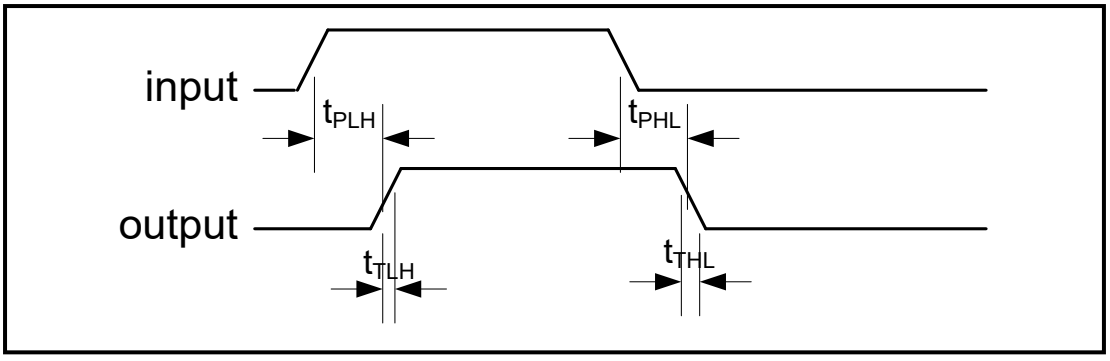
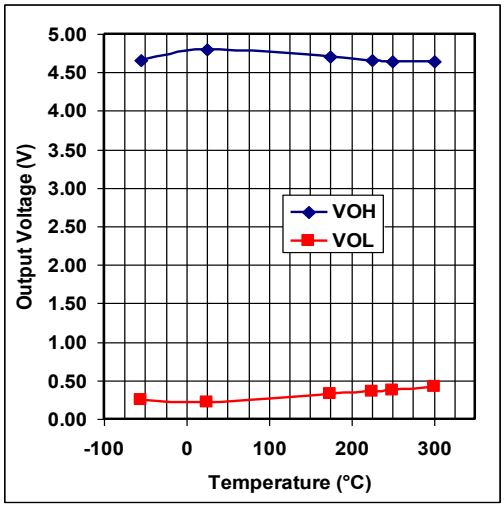
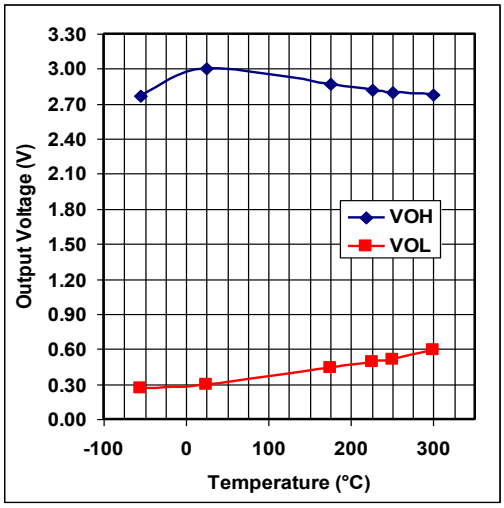


Figure 2. AC Waveforms

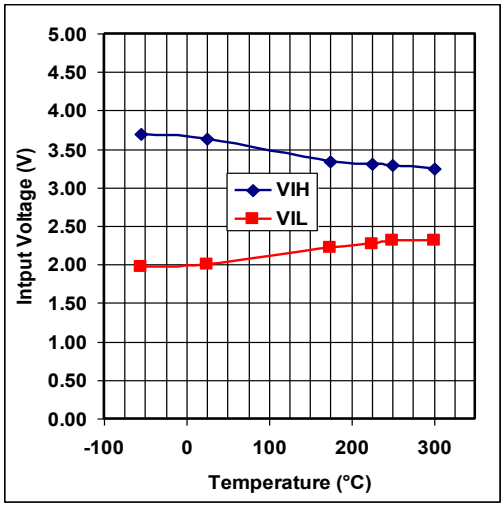
Typical Performance Characteristics



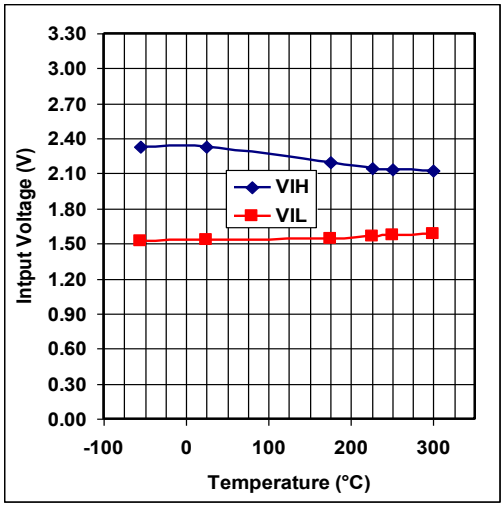
Output voltage levels versus temperature, V_{DD} = 5V



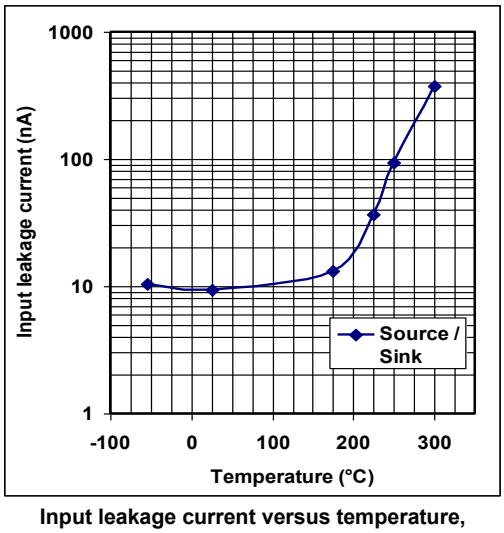
Output voltage levels versus temperature, V_{DD} = 3.3V



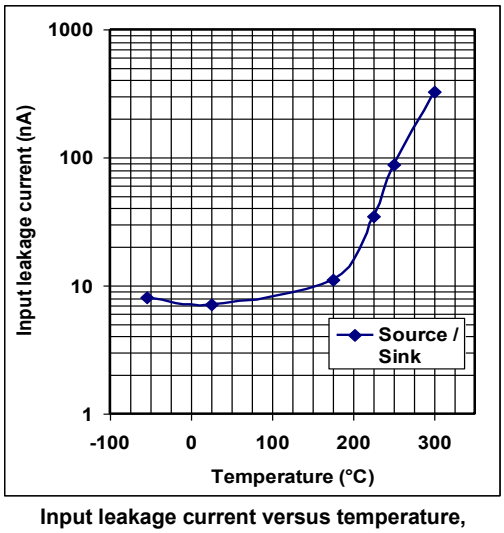
Input voltage levels versus temperature, V_{DD} = 5V



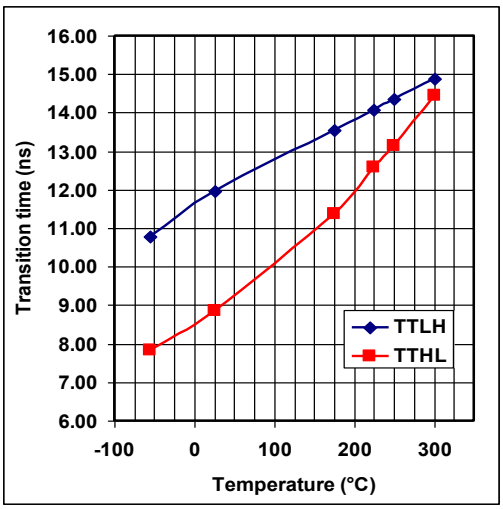
Input voltage levels versus temperature, V_{DD} = 3.3V



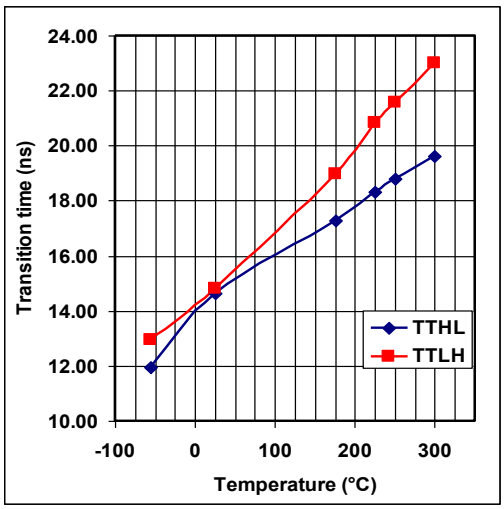
Input leakage current versus temperature, V_{DD} = 5V



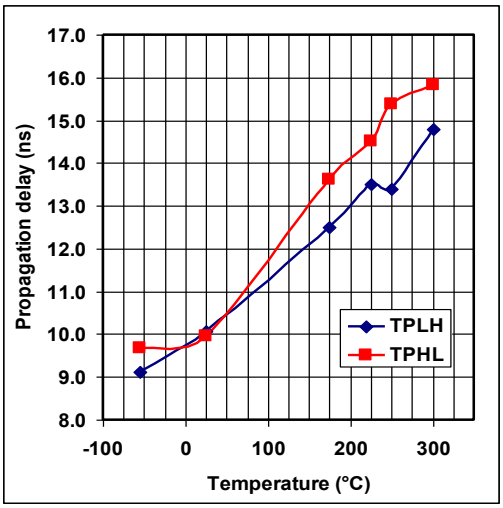
Input leakage current versus temperature, V_{DD} = 3.3V



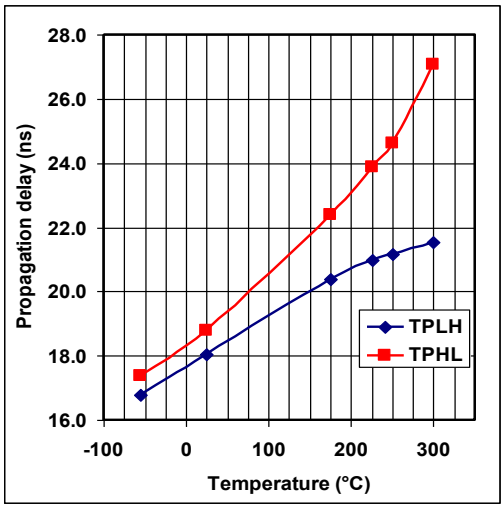
Transition times versus temperature, V_{DD} = 5V



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



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

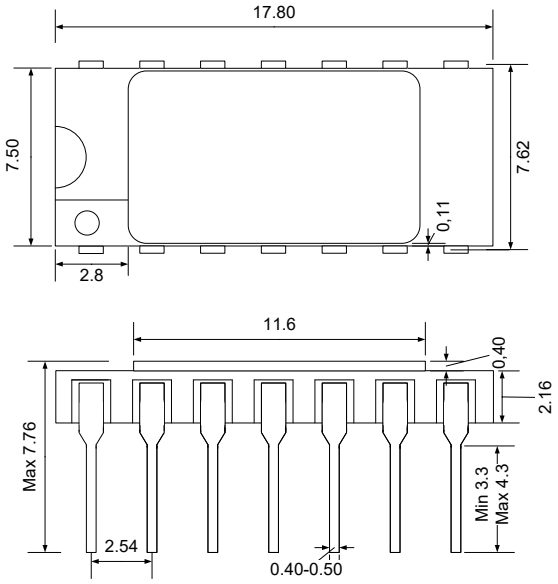


Propagation delays versus temperature, V_{DD} = 3.3V

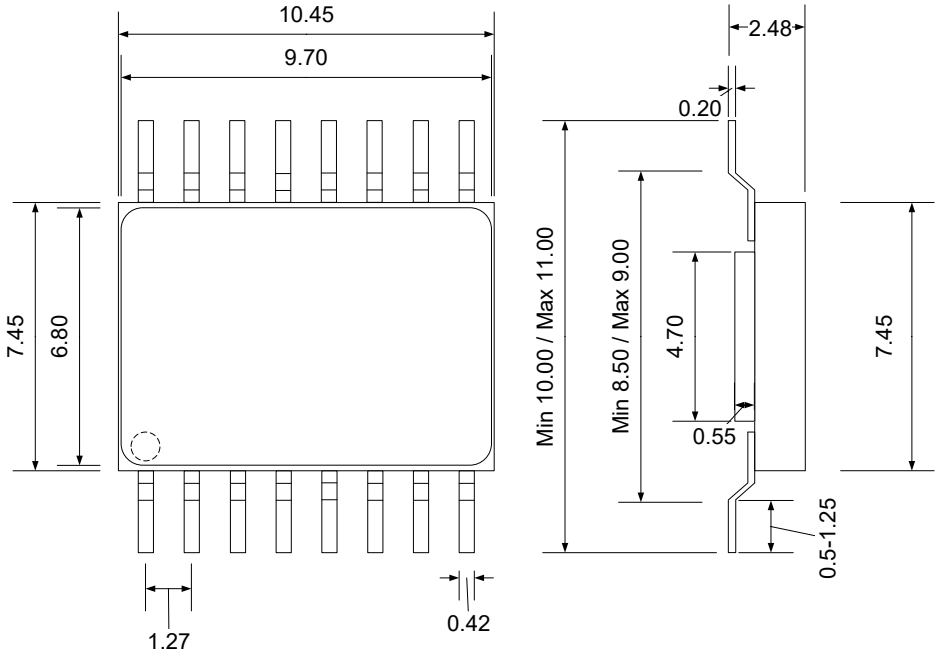
Ordering Information

Ordering Reference	Package	Temperature Range	Marking	Status
CHT-7400-CDIL14-T	Ceramic DIL14	-55°C to +225°C	CHT-7400	Not for new design
CHT-7400-CSOIC16-T	Ceramic SOIC 16	-55°C to +225°C	CHT-7400	Active

Package Dimensions



Drawing CDIL14 (mm +/- 10%)



Drawing CSOIC16 (mm +/- 10%)