

74VHC14 Hex Schmitt Inverter

Features

- High Speed: t_{PD} = 5.5 ns (Typ.) at V_{CC} = 5 V
- Low Power Dissipation: $I_{CC} = 2 \mu A$ (Max.) at $T_A = 25$ °C
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (Min.)
- · Power down protection is provided on all inputs
- Low Noise: V_{OLP} = 0.8 V (Max.)
- Pin and Function Compatible with 74HC14

General Description

The VHC14 is an advanced high speed CMOS Hex Schmitt Inverter fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation. Pin configuration and function are the same as the VHC04 but the inputs have hysteresis between the positive-going and negative-going input thresholds, which are capable of transforming slowly changing input signals into sharply defined, jitterfree output signals, thus providing greater noise margin than conventional inverters.

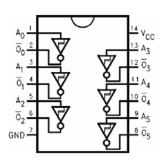
An input protection circuit ensures that 0 V to 7 V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5 V to 3 V systems and two supply systems such as battery back up. This circuit prevents device destruction due to mismatched supply and input voltages.

Ordering Information

Part Number	Top Mark	Package	Packing Method		
74VHC14M	74VHC14	SOIC 14L	Rail		
74VHC14MX	74VHC14	SOIC 14L	Tape and Reel		
74VHC14SJX	VHC14	SOP 14L	Tape and Reel		
74VHC14MTC	V14	TSSOP 14L	Rail		
74VHC14MTCX	V14	TSSOP 14L	Tape and Reel		

Logic Symbol/s

Connection Diagram/s



Pin Descriptions

Pin Names	Description			
A _n	Inputs			
\overline{O}_n	Outputs			

Truth Table/s

Α	0
L	Н
Н	L

Absolute Maximum Ratings(1)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.5 to +7.0	V
V _{IN}	DC Input Voltage	-0.5 to +7.0	V
V _{OUT}	DC Output Voltage	-0.5 to V _{CC} +0.5	V
I _{IK}	Input Diode Current	-20	mA
I _{OK}	Output Diode Current	±20	mA
I _{OUT}	DC Output Current	±25	mA
I _{CC}	DC V _{CC} / GND Current	±50	mA
T _{STG}	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature (Soldering 10 seconds)	260	°C

Note:

1. Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. The data book specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. ON Semiconductor does not recommend operation outside data-book specifications.

Recommended Operating Conditions(2)

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. ON Semiconductor does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Min.	Max.	Unit
V _{CC}	Supply Voltage	2.0	5.5	V
V _{IN}	Input Voltage	0	5.5	V
V _{OUT}	Output Voltage	0	V _{CC}	V
T _{OPR}	Operating Temperature Range	-40	85	°C

Note:

2. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Cumbal	Parameter	V	-	T _A = 25°(C	$T_A = -40$	T _A = -40 to 85°C		Conditions			
Symbol	Parameter	v _{cc}	Min.	Тур.	Max.	Min.	Max.	Unit	Con	attions		
		3.0			2.20		2.20					
V_{P}	Positive Threshold	4.5			3.15		3.15	V				
	Voltage	5.5			3.85		3.85					
		3.0	0.90			0.90						
V_N	Negative Threshold Voltage	4.5	1.35			1.35		V				
	Threshold voltage	5.5	1.65			1.65						
		3.0	0.30		1.20	0.30	1.20					
V_{H}	Hysteresis Voltage	4.5	0.40		1.40	0.40	1.40	V				
		5.5	0.50		1.60	0.50	1.60					
	HIGH Level Output	2.0	1.9	2.0		1.9		V				
		3.0	2.9	3.0		2.9			., .,	I _{OH} = -50 μA		
V _{OH}		4.5	4.4	4.5		4.4			$V_{IN} = V_{IL}$			
	Voltage	3.0	2.58			2.48						$I_{OH} = -4 \text{ mA}$
		4.5	3.94			3.80					I _{OH} = -8 mA	
		2.0		0.0	0.1		0.1		V V _{IN} = V _{IH}			
		3.0		0.0	0.1		0.1			I _{OL} = 50 μA		
V_{OL}	LOW Level Output	4.5		0.0	0.1		0.1	V				
	Voltage	3.0			0.36		0.44					
		4.5			0.36		0.44		I _{OL} = 8	I _{OL} = 8 mA		
I _{IN}	Input Leakage Current	0 - 5.5			±0.1		±1.0	μΑ	V _{IN} = 5.5	V or GND		
I _{CC}	Quiescent Supply Current	5.5			2.0		20.0	μА	$V_{IN} = V_{CC}$	or GND		

Noise Characteristics(2)

Symbol	Parameter	V _{CC}	T _A = 25°C		Unit	Conditions	
	Faiametei		Тур.	Max.			
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	5.0	0.4	0.8	V	C _L = 50 pF	
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	5.0	-0.4	0.8	٧	C _L = 50 pF	
V _{IHD}	Minimum HIGH Level Dynamic Input Voltage	5.0		3.5	V	C _L = 50 pF	
V _{ILD}	Maximum LOW Level Dynamic Input Voltage	5.0		1.5	V	C _L = 50 pF	

Note:

2. Parameter guaranteed by design.

AC Electrical Characteristics

Symbol	Parameter	V _{CC}	T _A = 25°C			$T_A = -40$	to 85°C	Unit	Conditions
			Min.	Тур.	Max.	Min.	Max.	Oilit	Conditions
t _{PLH} t _{PHL}	Propagation Delay Time	3.3 ± 0.3		8.3	12.8	1.0	15.0		C _L = 15 pF
				10.8	16.3	1.0	18.5		C _L = 50 pF
		5.0 ± 0.5		5.5	8.6	1.0	10.0		C _L = 15 pF
				7.0	10.6	1.0	12.0		C _L = 50 pF
C _{IN}	Input Capacitance			4	10		10	pF	V _{CC} = Open
C _{PD}	Power Dissipation Capacitance			21				pF	(3)

Note:

3. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the opening current consumption without load.

Average operating current can be obtained by the equation: I_{CC} (Opr) = C_{PD} * V_{CC} * f_{IN} + I_{CC} /6 (per Gate)

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