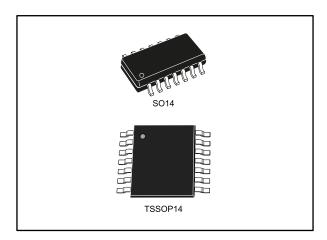


Hex Schmitt inverter

Datasheet - production data



Features

- High speed: t_{PD} = 12 ns (typ.) at V_{CC} = 6 V
- Low power dissipation: $I_{CC} = 1 \mu A$ (max.) at $T_A = 25 \, ^{\circ}C$
- High noise immunity: V_H = 1.2 V (typ.) at V_{CC} = 6 V
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 4 \text{ mA (min.)}$
- Balanced propagation delays: t_{PLH} ≃ t_{PHL}
- Wide operating voltage range:
 V_{CC} (opr) = 2 to 6 V
- Pin and function compatible with 74 series 14
- ESD performance
 - CDM: 1 kVHBM: 2 kVMM: 200 V

Description

The M74HC14 is a high speed CMOS hex Schmitt inverter fabricated with silicon gate C²MOS technology. Pin configuration and functions are the same as those of the M74HC04 but all inputs have a 20 % V_{CC} hysteresis level.

This, together with the Schmitt trigger function, allows the device to be used on line receivers with slow rise/fall input signals.

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

M74HC14

Contents

1	Pin info	ormation	3
2		onal description	
3	Electric	cal characteristics	5
4	Packag	e information	8
	4.1	SO14 package information	g
	4.2	SO14 tape and reel package information	10
	4.3	TSSOP14 package information	11
	4.4	TSSOP14 tape and reel package information	12
5	Orderin	ng information	13
6	Revisio	n history	14

M74HC14 Pin information

1 Pin information

Figure 1: Pin connections and IEC logic symbols

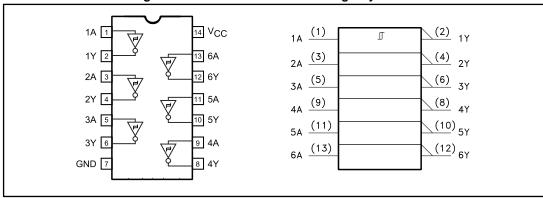


Table 1: Pin description

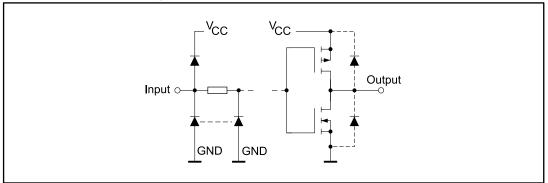
Pin number	Symbol	Name and function
1, 3, 5, 9, 11, 13	1A to 6A	Data inputs
2, 4, 6, 8, 10, 12	1Y to 6Y	Data outputs
7	GND	Ground (0 V)
14	V _{CC}	Positive supply voltage

2 Functional description

Table 2: Truth table

Α	Y
L	Н
Н	L

Figure 2: Input and output equivalent circuit



3 Electrical characteristics

Stressing the device above the ratings listed in the "Absolute maximum ratings" table may cause permanent damage to the device. These are stress ratings only, and operation of the device at these or any other conditions above those indicated in the operating sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Please refer to the STMicroelectronics SURE program and other relevant quality documents.

Table 3: Absolute maximum ratings

Symbol	Parameter	Value	Unit	
V _{CC}	Supply voltage	-0.5 to 7		
Vı	DC input voltage	-0.5 to V _{CC} + 0.5	V	
Vo	DC output voltage	-0.5 to V _{CC} + 0.5		
I _{IK}	DC input diode current	.20		
I _{OK}	DC output diode current	±20	A	
lo	DC output current	±25	mA	
I _{CC} or I _{GND}	DC V _{CC} or ground current	±50		
P _D	Power dissipation	500 ⁽¹⁾	mW	
T _{stg}	Storage temperature	-65 to 150	°C	
T _L	Lead temperature (10 s)	300	°C	

Notes:

Table 4: Recommended operating conditions

Symbol	Parameter	Value	Unit	
V _{CC}	Supply voltage	2 to 6		
Vı	Input voltage	O to V	V	
Vo	Output voltage	0 to V _{CC}		
T _{oper}	Operating temperature	-55 to 125	°C	

 $^{^{(1)}}$ 500 mW at 65 °C; derate to 300 mW by 10 mW/°C from 65 °C to 85 °C

Table 5: DC specification

		Tes	st condition	Value							
Sym	Parameter	V _{CC}		Т.	T _A = 25 °C		-40 to 85 °C		-55 to 125 °C		Unit
		(V)		Min	Тур	Max	Min	Max	Min	Max	
		2.0		1.0	1.28	1.5	1.0	1.5	1.0	1.5	
V_{t+}	High-level input voltage	4.5		2.3	2.8	3.15	2.3	3.15	2.3	3.15	
		6.0		3.0	3.7	4.2	3.0	4.2	3.0	4.2	
		2.0		0.3	0.74	0.9	0.3	0.9	0.3	0.9	
V_{t-}	Low-level input voltage	4.5		1.13	1.8	2.0	1.13	2.0	1.13	2.0	
		6.0		1.5	2.4	2.6	1.5	2.6	1.5	2.6	
		2.0		0.3	0.54	1.0	0.3	1.0	0.3	1.0	
V_{H}	Hysteresis voltage	4.5		0.6	1.0	1.4	0.6	1.4	0.6	1.4	
		6.0		0.8	1.3	1.4	0.8	1.7	0.8	1.7	
		2.0		1.9	2.0		1.9		1.9		V
		4.5	I _O = -20 μA	4.4	4.5		4.4		4.4		
V _{OH}	High-level output voltage	6.0		5.9	6.0		5.9		5.9		
		4.5	$I_0 = -4.0 \text{ mA}$	4.18	4.31		4.13		4.10		
		6.0	$I_0 = -5.2 \text{ mA}$	5.68	5.8		5.63		5.60		
		2.0			0.0	0.1		0.1		0.1	
		4.5	I _O = -20 μA		0.0	0.1		0.1		0.1	
V _{OL}	Low-level output voltage	6.0			0.0	0.1		0.1		0.1	
		4.5	I _O = -4.0 mA		0.17	0.26		0.33		0.40	
		6.0	I _O = -5.2 mA		0.18	0.26		0.33		0.40	
l ₁	Input leakage current		\/. = \/. = Cr			±0.1		±1		±1	
I _{CC}	Quiescent supply current	6.0	V _I = V _{CC} or GND			1		10		20	μΑ

Table 6: AC electrical characteristics (CL = 50 pF, input tr = tf = 6 ns)

		Test condition					
Sym.	Parameter	V 00	T _A = 25 °C		-40 to 85 °C	5 °C -55 to 125 °C	
		V _{CC} (V)	Тур	Max	Max	Max	
t _{тьн} , t _{тнь}	Output transition time	2.0	30	75	95	110	
		4.5	8	15	19	22	
		6.0	7	13	16	19	20
		2.0	42	125	155	190	ns
t _{PLH} , t _{PHL}	Propagation delay time	4.5	14	25	31	38	
		6.0	12	21	16	32	

Table 7:	Capacitive	characteristics

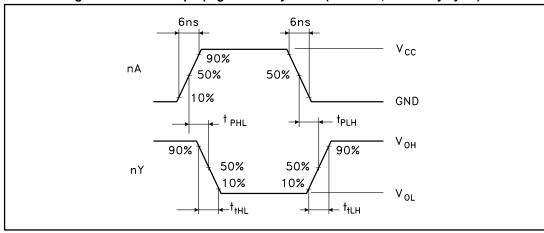
Sym.		Test	Value					
	Parameter	V _{cc} (V)		T _A = 25 °C		T _A = 25 °C		Value
				Тур	Max	Max	Max	
C _{IN}	Input capacitance	F 0		5	10	10	10	٠,
C_{PD}	Power dissipation capacitance (1)	5.0	f _{IN} = 10 MHz	28				pF

Notes:

Pulse generator D.U.T CL

Figure 3: Test circuit





 $^{^{(1)}}$ CPD is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load (refer to test circuit). Average operating current can be obtained by the following equation: ICC(opr) = CPD x VCC x fIN + ICC/6(per gate)

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: **www.st.com**. ECOPACK® is an ST trademark.

M74HC14 Package information

SO14 package information 4.1

D hx 45° A2 A В △ ddd C Seating Plane 0,25 mm GAGE PLANE С Ε Н

Figure 5: SO14 package outline

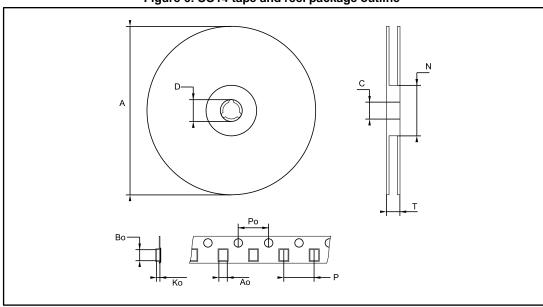
Table 8: SO14 mechanical data

	Dimensions								
Ref.		Millimeters		Inches					
	Min.	Тур.	Max.	Min.	Тур.	Max.			
А	1.35		1.75	0.05		0.068			
A1	0.10		0.25	0.004		0.009			
A2	1.10		1.65	0.04		0.06			
В	0.33		0.51	0.01		0.02			
С	0.19		0.25	0.007		0.009			
D	8.55		8.75	0.33		0.34			
Е	3.80		4.0	0.15		0.15			
е		1.27			0.05				
Н	5.80		6.20	0.22		0.24			
h	0.25		0.50	0.009		0.02			
L	0.40		1.27	0.015		0.05			
k			8°	(max)					
ddd			0.10			0.004			

Package information M74HC14

4.2 SO14 tape and reel package information

Figure 6: SO14 tape and reel package outline



1. Drawing is not to scale

Table 9: SO14 tape and reel mechanical data

	Dimensions						
Ref	Millir	neters	In	ches			
	Min.	Max.	Min.	Max.			
Α		330		12.992			
С	12.8	13.2	0.504	0.519			
D	20.2		0.795				
N	60		2.362				
Т		22.4		0.882			
Ao	6.4	6.6	0.252	0.260			
Во	9	9.2	0.354	0.362			
Ko	2.1	2.3	0.082	0.090			
Po	3.9	4.1	0.153	0.161			
Р	7.9	8.1	0.311	0.319			

4.3 TSSOP14 package information

PIN 1 IDENTIFICATION

PIN 1 IDENTIFICATION

PIN 1 IDENTIFICATION

PIN 2 IDENTIFICATION

PIN 3 IDENTIFICATION

PIN 1 IDENTIFICATION

PIN 1 IDENTIFICATION

PIN 2 IDENTIFICATION

PIN 3 IDENTIFICATION

PIN 4 IDENTIFICATION

PIN 1 IDENTIFICATION

Figure 7: TSSOP14 package outline

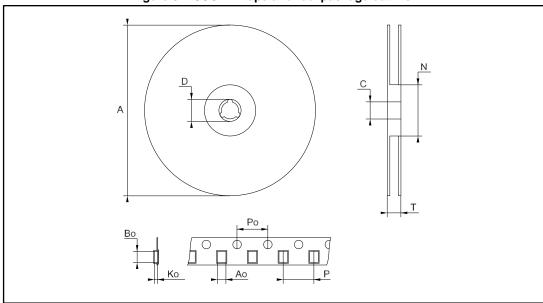
Table 10: TSSOP14 mechanical data

	Dimensions								
Ref.		Millimeters		Inches					
	Min.	Тур.	Max.	Min.	Тур.	Max.			
А			1.20			0.047			
A1	0.05		0.15	0.002	0.004	0.006			
A2	0.80	1.00	1.05	0.031	0.039	0.041			
b	0.19		0.30	0.007		0.012			
С	0.09		0.20	0.004		0.0089			
D	4.90	5.00	5.10	0.193	0.197	0.201			
Е	6.20	6.40	6.60	0.244	0.252	0.260			
E1	4.30	4.40	4.50	0.169	0.173	0.176			
е		0.65			0.0256				
L	0.45	0.60	0.75	0.018	0.024	0.030			
L1		1.00			0.039				
k	0°		8°	0°		8°			
aaa			0.10			0.004			

Package information M74HC14

4.4 TSSOP14 tape and reel package information

Figure 8: TSSOP14 tape and reel package outline



1. Drawing is not to scale

Table 11: TSSOP14 tape and reel mechanical data

	Dimensions				
Ref	Millimeters		Inches		
	Min.	Max.	Min.	Max.	
Α		330		12.992	
С	12.8	13.2	0.504	0.519	
D	20.2		0.795		
N	60		2.362		
Т		22.4		0.882	
Ao	6.7	6.9	0.264	0.272	
Во	5.3	5.5	0.209	0.217	
Ko	1.6	1.8	0.063	0.071	
Po	3.9	4.1	0.153	0.161	
Р	7.9	8.1	0.311	0.319	

5 Ordering information

Table 12: Order codes

Order code	Temperature range	Package	Packing	Marking
M74HC14YRM13TR (1)	-40 °C to 125 °C	SO14 (automotive grade)	Tana and	74HC14Y
M74HC14YTTR (1)	-40 °C to 125 °C	TSSOP14 (automotive grade)	Tape and reel	74HC14Y

Notes:

⁽¹⁾Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 and Q002.

Revision history M74HC14

6 Revision history

Table 13: Document revision history

Date	Revisi on	Changes	
01-Jul-2001	1	Initial release.	
23-May-2008	2	Document converted and restructured to new template. Removed: M74HC14M1R order code. Added: tape and reel specifications for SO-14 and TSSOP14 packages.	
09-Aug-2013	3	Features: added ESD information Table 1: Device summary: added automotive grade order codes. Added Section 5: Ordering information.	
13-Jan-2014	4	Removed DIP14 package Table 1: Device summary and Table 13: Order codes: added "Temperature range" and "Marking"; updated 1.	
17-Feb-2016	5	Removed Table 1: Device summary (same table appears in Section 5: "Ordering information"). Replaced SO14 package information TSSOP14 package information: updated max E1 parameter (mm), added L1 and aaa parameters. Replaced TSSOP14 tape and reel package outline Table 12: "Order codes": removed obsolete order codes M74HC14M13TR and M74HC14TTR; replaced the marking of order code M74HC14YTTR (74HC14Y instead of HC14Y).	

IMPORTANT NOTICE - PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics - All rights reserved

