

## Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[STMicroelectronics](#)  
[74VHC08MTR](#)

For any questions, you can email us directly:

[sales@integrated-circuit.com](mailto:sales@integrated-circuit.com)



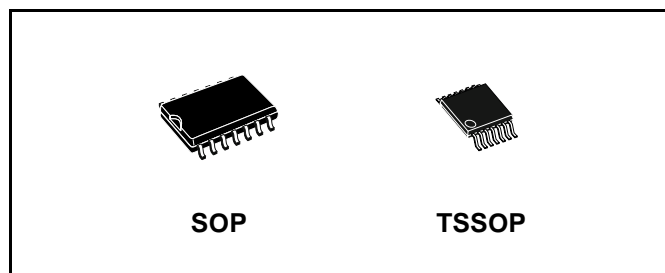
# 74VHC08

## QUAD 2-INPUT AND GATE

- HIGH SPEED:  $t_{PD} = 4.3 \text{ ns}$  (TYP.) at  $V_{CC} = 5V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 2 \mu A$  (MAX.) at  $T_A = 25^\circ C$
- HIGH NOISE IMMUNITY:  
 $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (MIN.)
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OH}| = I_{OL} = 8mA$  (MIN)
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:  
 $V_{CC(OPR)} = 2V$  to  $5.5V$
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 08
- IMPROVED LATCH-UP IMMUNITY
- LOW NOISE:  $V_{OLP} = 0.8V$  (MAX.)

### DESCRIPTION

The 74VHC08 is an advanced high-speed CMOS QUAD 2-INPUT AND GATE fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology. The internal circuit is composed of 2 stages including buffer output, which provides high noise immunity and stable output.



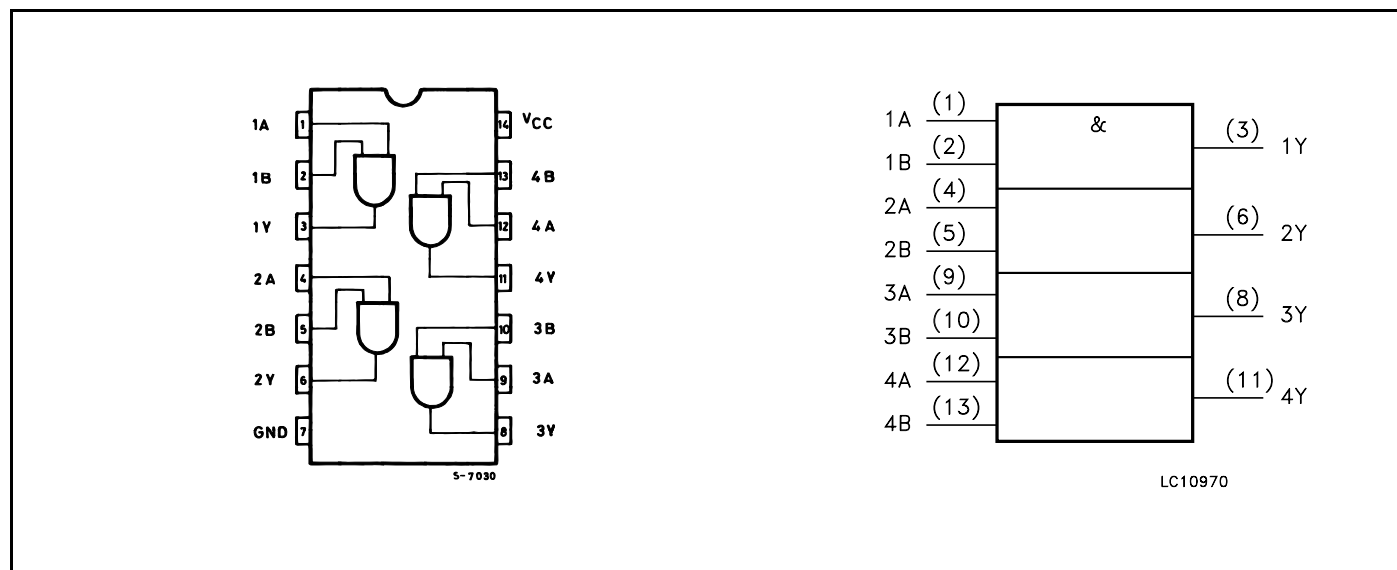
**Table 1: Order Codes**

PACKAGE	T & R
SOP	74VHC08MTR
TSSOP	74VHC08TTR

Power down protection is provided on all inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V.

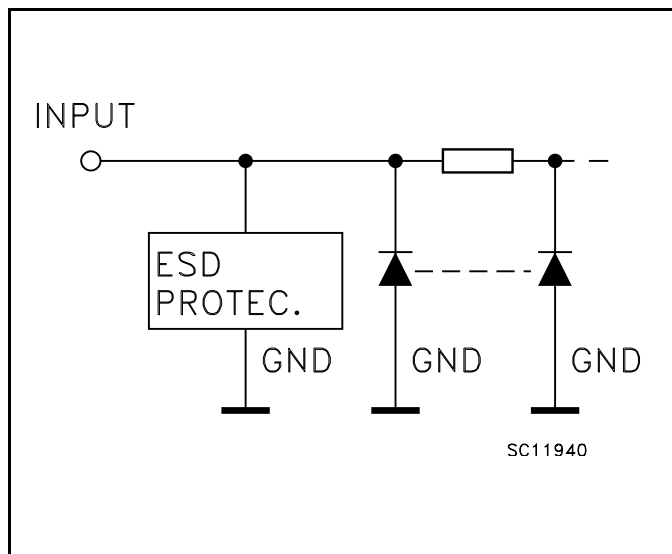
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

**Figure 1: Pin Connection And IEC Logic Symbols**



## 74VHC08

**Figure 2: Input Equivalent Circuit**



**Table 2: Pin Description**

PIN N°	SYMBOL	NAME AND FUNCTION
1, 4, 9, 12	1A to 4A	Data Inputs
2, 5, 10, 13	1B to 4B	Data Inputs
3, 6, 8, 11	1Y to 4Y	Data Outputs
7	GND	Ground (0V)
14	V <sub>CC</sub>	Positive Supply Voltage

**Table 3: Truth Table**

A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

**Table 4: Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	-0.5 to +7.0	V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	- 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	mA
I <sub>O</sub>	DC Output Current	± 25	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 50	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied

**Table 5: Recommended Operating Conditions**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	2 to 5.5	V
V <sub>I</sub>	Input Voltage	0 to 5.5	V
V <sub>O</sub>	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (note 1) (V <sub>CC</sub> = 3.3 ± 0.3V) (V <sub>CC</sub> = 5.0 ± 0.5V)	0 to 100 0 to 20	ns/V

1) V<sub>IN</sub> from 30% to 70% of V<sub>CC</sub>

**Table 6: DC Specifications**

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>IH</sub>	High Level Input Voltage	2.0		1.5			1.5		1.5		V
		3.0 to 5.5		0.7V <sub>CC</sub>			0.7V <sub>CC</sub>		0.7V <sub>CC</sub>		
V <sub>IL</sub>	Low Level Input Voltage	2.0				0.5		0.5		0.5	V
		3.0 to 5.5				0.3V <sub>CC</sub>		0.3V <sub>CC</sub>		0.3V <sub>CC</sub>	
V <sub>OH</sub>	High Level Output Voltage	2.0	I <sub>O</sub> =-50 μA	1.9	2.0		1.9		1.9		V
		3.0	I <sub>O</sub> =-50 μA	2.9	3.0		2.9		2.9		
		4.5	I <sub>O</sub> =-50 μA	4.4	4.5		4.4		4.4		
		3.0	I <sub>O</sub> =-4 mA	2.58			2.48		2.4		
		4.5	I <sub>O</sub> =-8 mA	3.94			3.8		3.7		
V <sub>OL</sub>	Low Level Output Voltage	2.0	I <sub>O</sub> =50 μA		0.0	0.1		0.1		0.1	V
		3.0	I <sub>O</sub> =50 μA		0.0	0.1		0.1		0.1	
		4.5	I <sub>O</sub> =50 μA		0.0	0.1		0.1		0.1	
		3.0	I <sub>O</sub> =4 mA			0.36		0.44		0.55	
		4.5	I <sub>O</sub> =8 mA			0.36		0.44		0.55	
I <sub>I</sub>	Input Leakage Current	0 to 5.5	V <sub>I</sub> = 5.5V or GND			± 0.1		± 1		± 1	μA
I <sub>CC</sub>	Quiescent Supply Current	5.5	V <sub>I</sub> = V <sub>CC</sub> or GND			2		20		20	μA

**Table 7: AC Electrical Characteristics (Input t<sub>r</sub> = t<sub>f</sub> = 3ns)**

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)	C <sub>L</sub> (pF)	T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time	3.3(*)	15		6.2	8.8	1.0	10.5	1.0	10.5	ns
		3.3(*)	50		8.7	12.3	1.0	14.0	1.0	14.0	
		5.0(**)	15		4.3	5.9	1.0	7.0	1.0	7.0	
		5.0(**)	50		5.8	7.9	1.0	9.0	1.0	9.0	

(\*) Voltage range is 3.3V ± 0.3V

(\*\*) Voltage range is 5.0V ± 0.5V

## 74VHC08

**Table 8: Capacitive Characteristics**

Symbol	Parameter	Test Condition	Value						Unit	
			T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
			Min.	Typ.	Max.	Min.	Max.	Min.		Max.
C <sub>IN</sub>	Input Capacitance			6	10		10		10	pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)			15						pF

1) C<sub>PD</sub> 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. I<sub>CC(opr)</sub> = C<sub>PD</sub> × V<sub>CC</sub> × f<sub>IN</sub> + I<sub>CC</sub>/4 (per gate)

**Table 9: Dynamic Switching Characteristics**

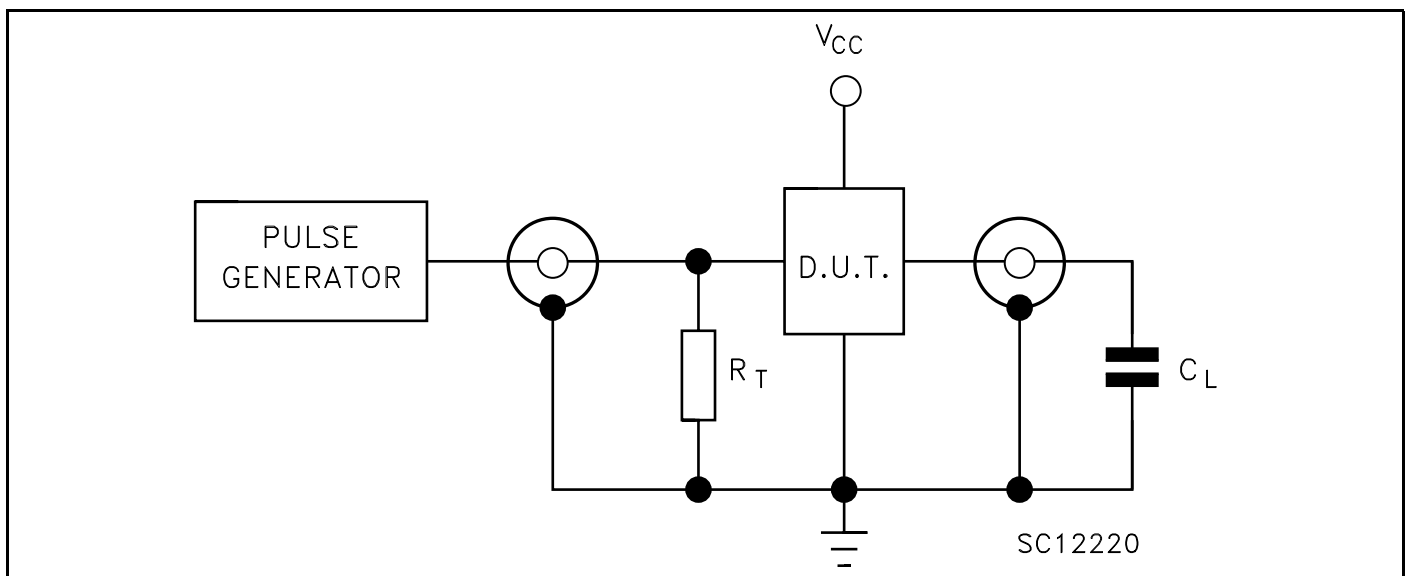
Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>OLP</sub>	Dynamic Low Voltage Quiet Output (note 1, 2)	5.0	C <sub>L</sub> = 50 pF		0.3	0.8					V
V <sub>OLV</sub>				-0.8	-0.3						
V <sub>IHD</sub>	Dynamic High Voltage Input (note 1, 3)	5.0		3.5						V	
V <sub>ILD</sub>	Dynamic Low Voltage Input (note 1, 3)	5.0				1.5				V	

1) Worst case package.

2) Max number of outputs defined as (n). Data inputs are driven 0V to 5.0V, (n-1) outputs switching and one output at GND.

3) Max number of data inputs (n) switching. (n-1) switching 0V to 5.0V. Inputs under test switching: 5.0V to threshold (V<sub>ILD</sub>), 0V to threshold (V<sub>IHD</sub>), f=1MHz.

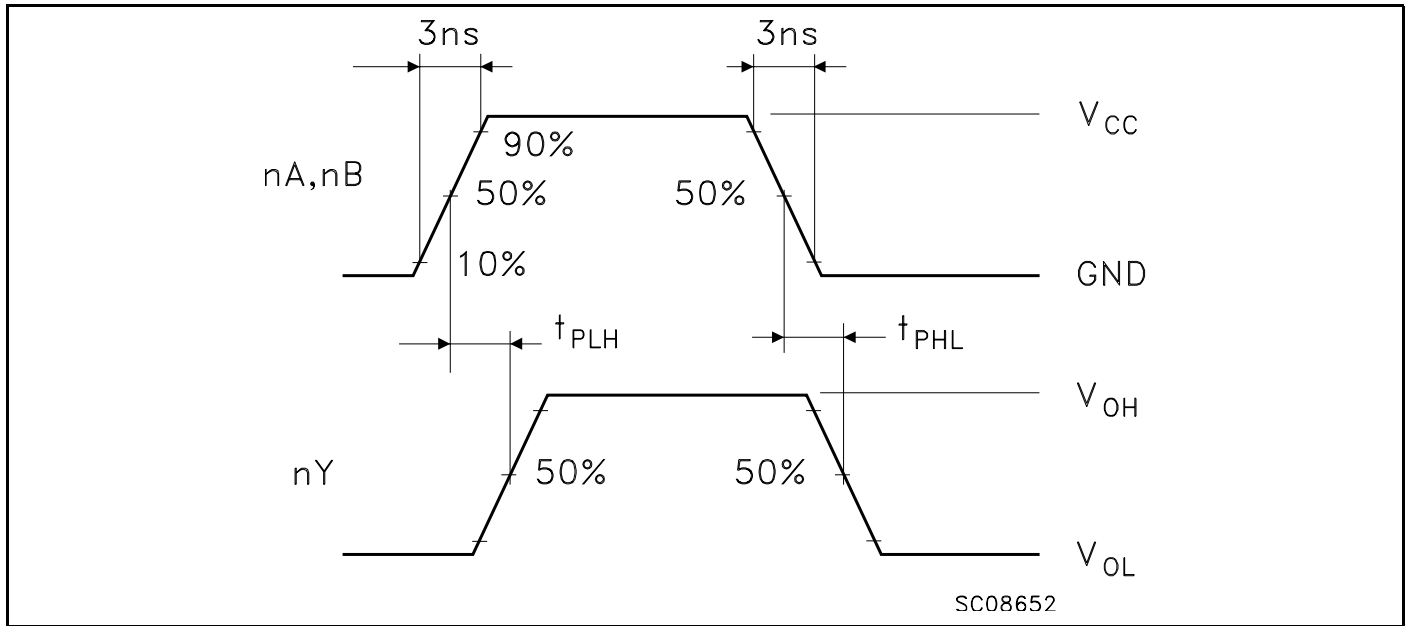
**Figure 3: Test Circuit**



C<sub>L</sub> = 15/50pF or equivalent (includes jig and probe capacitance)

R<sub>T</sub> = Z<sub>OUT</sub> of pulse generator (typically 50Ω)

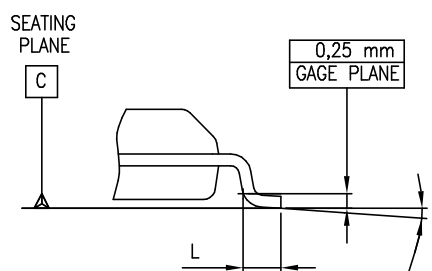
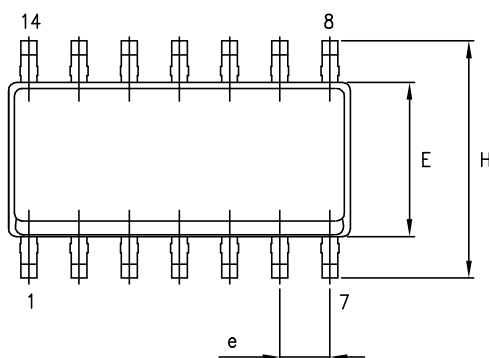
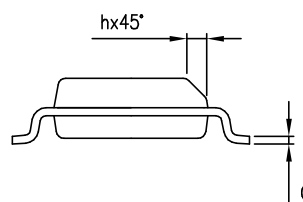
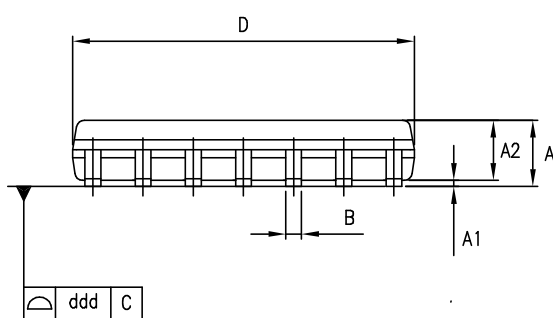
**Figure 4: Waveform - Propagation Delays (f=1MHz; 50% duty cycle)**



**74VHC08**

**SO-14 MECHANICAL DATA**

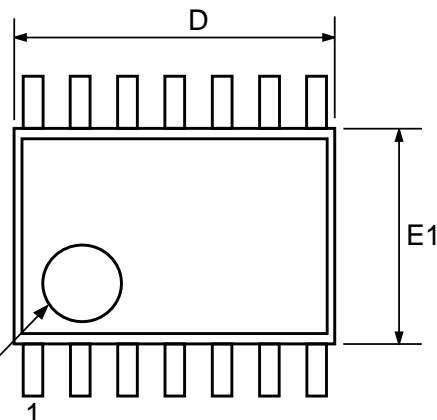
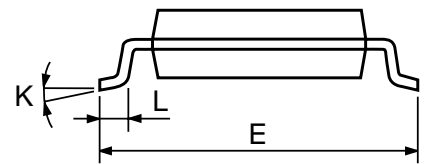
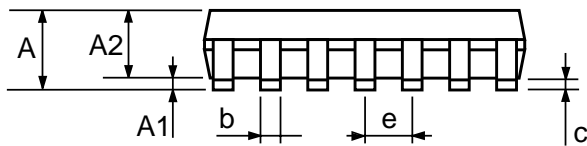
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.1		0.25	0.004		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	8.55		8.75	0.337		0.344
E	3.8		4.0	0.150		0.157
e		1.27			0.050	
H	5.8		6.2	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.4		1.27	0.016		0.050
k	0°		8°	0°		8°
ddd			0.100			0.004



0016019D

**TSSOP14 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030



PIN 1 IDENTIFICATION

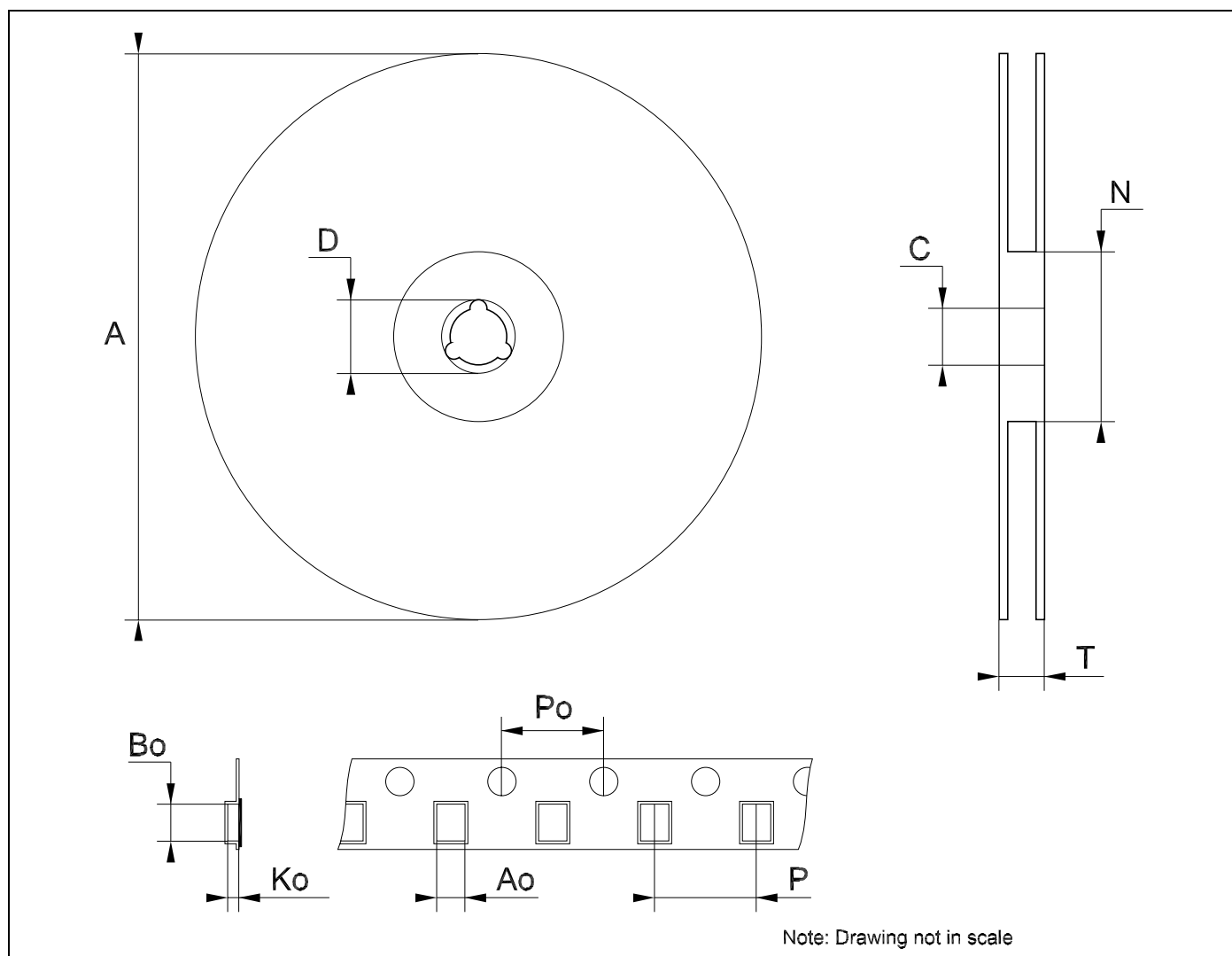
0080337D



**74VHC08**

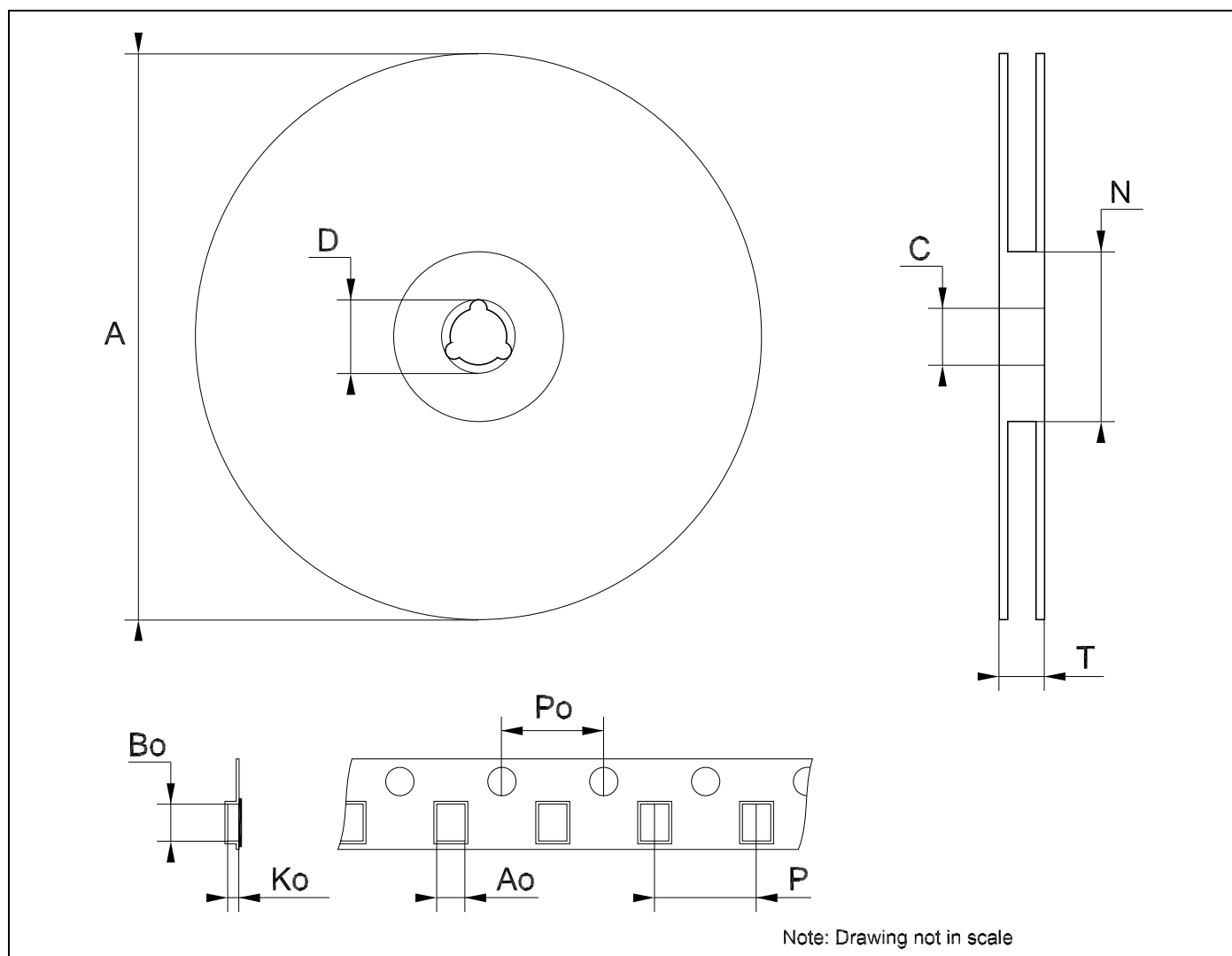
**Tape & Reel SO-14 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.4		6.6	0.252		0.260
Bo	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
P	7.9		8.1	0.311		0.319



**Tape & Reel TSSOP14 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.7		6.9	0.264		0.272
Bo	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
P	7.9		8.1	0.311		0.319



## 74VHC08

---

**Table 10: Revision History**

Date	Revision	Description of Changes
12-Nov-2004	5	Order Codes Revision - pag. 1.

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

All other names are the property of their respective owners

© 2004 STMicroelectronics - All Rights Reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)