

QUAD 2-INPUT OR GATE

- HIGH SPEED: $t_{PD} = 3.8 \text{ ns}$ (TYP.) at $V_{CC} = 5V$
- LOW POWER DISSIPATION: $I_{CC} = 2 \mu A \text{ (MAX.)}$ at $T_A = 25 \text{°C}$
- HIGH NOISE IMMUNITY: V_{NIH} = V_{NIL} = 28% V_{CC} (MIN.)
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE: |I_{OH}| = I_{OL} = 8 mA (MIN)
- BALANCED PROPAGATION DELAYS: tpi H ≅ tpHi
- OPERATING VOLTAGE RANGE: V_{CC}(OPR) = 2V to 5.5V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 32
- IMPROVED LATCH-UP IMMUNITY
- LOW NOISE: V_{OLP} = 0.8V (MAX.)

DESCRIPTION

The 74VHC32 is an advanced high-speed CMOS QUAD 2-INPUT OR GATE fabricated with sub-micron silicon gate and double-layer metal wiring C²MOS technology.

The internal circuit is composed of 2 stages including buffer output, which provides high noise immunity and stable output.

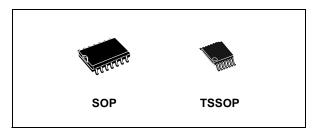


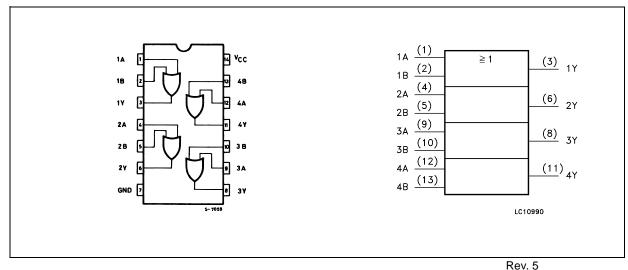
Table 1: Order Codes

PACKAGE	T & R
SOP	74VHC32MTR
TSSOP	74VHC32TTR

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



November 2004 1/11

Figure 2: Input Equivalent Circuit

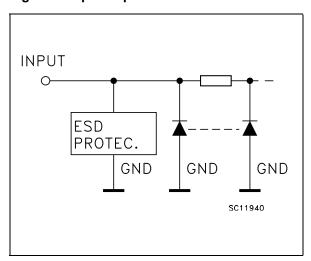


Table 2: Pin Description

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 _{CC}	Positive Supply Voltage

Table 3: Truth Table

Α	В	Y
L	L	L
L	Н	Н
Н	L	Н
Н	Н	Н

Table 4: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.5 to +7.0	V
V _I	DC Input Voltage	-0.5 to +7.0	V
Vo	DC Output Voltage	-0.5 to V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	- 20	mA
I _{OK}	DC Output Diode Current	± 20	mA
I _O	DC Output Current	± 25	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 50	mA
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	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 _{CC}	Supply Voltage	2 to 5.5	V
V _I	Input Voltage	0 to 5.5	V
Vo	Output Voltage	0 to V _{CC}	V
T _{op}	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time (note 1) (V_{CC} = 3.3 \pm 0.3V) (V_{CC} = 5.0 \pm 0.5V)	0 to 100 0 to 20	ns/V

¹⁾ $\rm V_{IN}$ from 30% to 70% of $\rm V_{CC}$

Table 6: DC Specifications

		est Condition				Value					
Symbol	Parameter	v _{cc}		T	T _A = 25°C -40 t			o 85°C -55 to 125°C			Unit
		(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
V _{IH}	High Level Input	2.0		1.5			1.5		1.5		
	Voltage	3.0 to 5.5		0.7V _{CC}			0.7V _{CC}		0.7V _{CC}		V
V_{IL}	Low Level Input	2.0				0.5		0.5		0.5	
	Voltage	3.0 to 5.5				0.3V _{CC}		0.3V _{CC}		0.3V _{CC}	V
V _{OH}	V _{OH} High Level Output Voltage	2.0	I _O =-50 μA	1.9	2.0		1.9		1.9		
		3.0	I _O =-50 μA	2.9	3.0		2.9		2.9		
		4.5	I _O =-50 μA	4.4	4.5		4.4		4.4		V
		3.0	I _O =-4 mA	2.58			2.48		2.4		
		4.5	I _O =-8 mA	3.94			3.8		3.7		
V _{OL}	Low Level Output	2.0	I _O =50 μA		0.0	0.1		0.1		0.1	
	Voltage	3.0	I _O =50 μA		0.0	0.1		0.1		0.1	
		4.5	I _O =50 μA		0.0	0.1		0.1		0.1	V
		3.0	I _O =4 mA			0.36		0.44		0.55	
		4.5	I _O =8 mA			0.36		0.44		0.55	
I _I	Input Leakage Current	0 to 5.5	V _I = 5.5V or GND			± 0.1		± 1		± 1	μΑ
Icc	Quiescent Supply Current	5.5	$V_I = V_{CC}$ or GND			2		20		20	μΑ

Table 7: AC Electrical Characteristics (Input $t_r = t_f = 3ns$)

	1	Test Condition		Value								
Symbol	Symbol Parameter		CL	nE)	T _A = 25°C			-40 to 85°C		-55 to 125°C		Unit
	V _{CC} C _L (pF)		Min.		Тур.	Max.	Min.	Max.	Min.	Max.		
t _{PLH}	Propagation Delay	3.3 ^(*)	15			5.5	7.9	1.0	9.5	1.0	9.5	
t _{PHL}	Time	3.3 ^(*)	50			8.0	11.4	1.0	13.0	1.0	13.0	ne
	5.0 ^(**)	15			3.8	5.5	1.0	6.5	1.0	6.5	ns	
		5.0 ^(**)	50			5.3	7.5	1.0	8.5	1.0	8.5	

^(*) Voltage range is $3.3\text{V} \pm 0.3\text{V}$ (**) Voltage range is $5.0\text{V} \pm 0.5\text{V}$

Table 8: Capacitive Characteristics

Symbol Parameter		Test Condition		Value						
			Т	T _A = 25°C		-40 to 85°C		-55 to 125°C		Unit
			Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
C _{IN}	Input Capacitance			6	10		10		10	pF
C _{PD}	Power Dissipation Capacitance (note 1)			16						pF

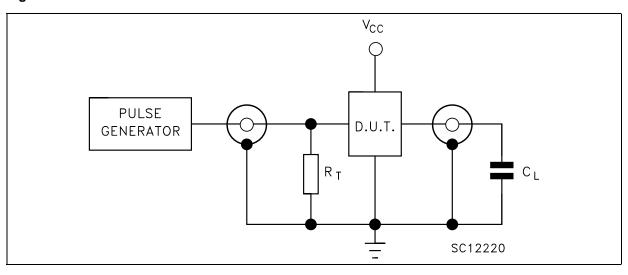
¹⁾ C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/4$ (per gate)

Table 9: Dynamic Switching Characteristics

		1	est Condition	Value								
Symbol	Parameter	V _{CC}		T _A = 25°C			-40 to 85°C		-55 to	125°C	Unit	
	(V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.			
V _{OLP}	Dynamic Low	5.0	5.0			0.3	0.8					.,
V _{OLV}	Voltage Quiet Output (note 1, 2)			-0.8	-0.3						V	
V _{IHD}	Dynamic High Voltage Input (note 1, 3)	5.0	C _L = 50 pF	3.5							V	
V _{ILD}	Dynamic Low Voltage Input (note 1, 3)	5.0				1.5					V	

¹⁾ Worst case package.

Figure 3: Test Circuit

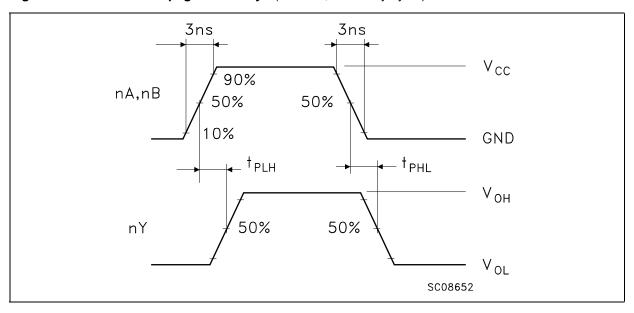


 $\rm C_L$ =15/50pF or equivalent (includes jig and probe capacitance) $\rm R_T$ = $\rm Z_{OUT}$ of pulse generator (typically 50 Ω)

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.

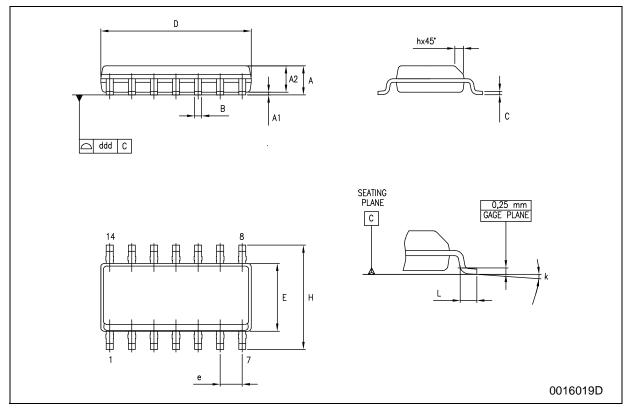
3) Max number of data inputs (n) switching. (n-1) switching 0V to 5.0V. Inputs under test switching: 5.0V to threshold (V_{ILD}), 0V to threshold (V_{IHD}) , f=1MHz.

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



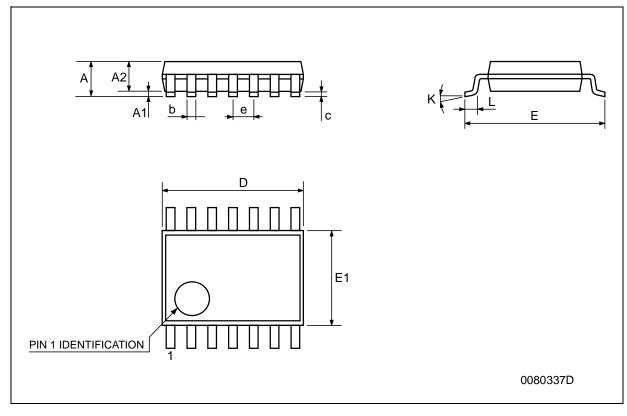
SO-14 MECHANICAL DATA

DIM.		mm.			inch	
DIIVI.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
А	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
В	0.33		0.51	0.013		0.020
С	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
е		1.27			0.050	
Н	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



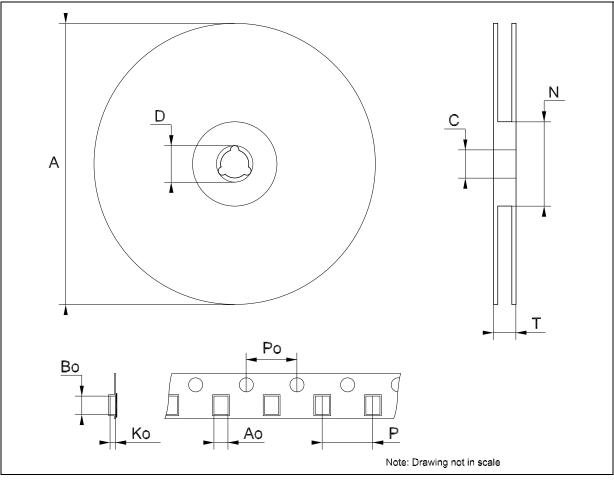
TSSOP14 MECHANICAL DATA

DIM		mm.		inch					
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.			
А			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			
С	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			
е		0.65 BSC			0.0256 BSC				
К	0°		8°	0°		8°			
L	0.45	0.60	0.75	0.018	0.024	0.030			



Tape & Reel SO-14 MECHANICAL DATA

DIM		mm.		inch				
DIM.	MIN.	TYP	MAX.	MIN.	TYP.	MAX.		
А			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		



Tape & Reel TSSOP14 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	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

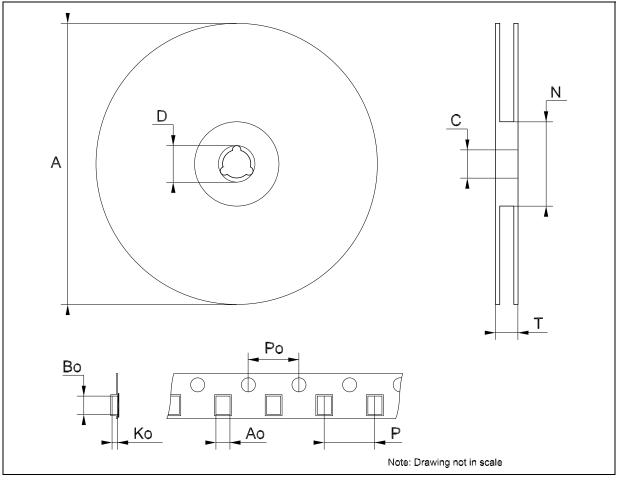


Table 10: Revision History

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



This datasheet has been download from:

www.datasheetcatalog.com

Datasheets for electronics components.