Quad 2-Input OR Gate

74VHC32

General Description

The VHC32 is an Advanced High Speed CMOS 2−Input OR Gate 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.

The internal circuit is composed of 4 stages including buffer output, which provide high noise immunity and stable output. An input protection circuit ensures that 0 V to 5.5 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.

Features

- High Speed: t_{PD} = 3.8 ns (typ.) at V_{CC} = 5 V
- Low Power Dissipation: I_{CC} = 2 μA (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 74HC32
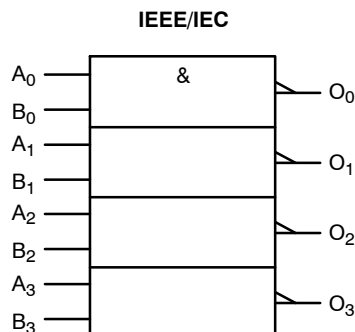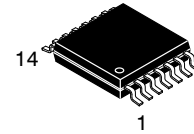- Pb−Free, Halogen Free/BFR Free and RoHS Compliant
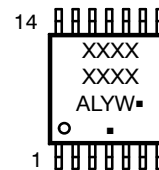
Logic Symbol

IEEE/IEC

Figure 1. Logic Symbol

TRUTH TABLE

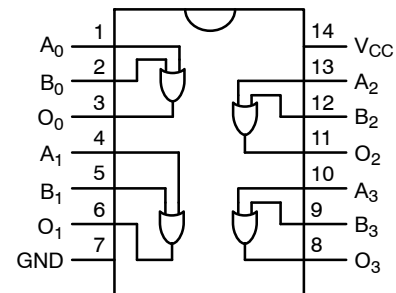| A	B	O
H	H	H
L	H	H
H	L	H
L	L	L

TSSOP−14 WB
CASE 948G

MARKING DIAGRAM

XXXXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

CONNECTION DIAGRAM

PIN DESCRIPTION

Pin Names	Description
A_n, B_n	Inputs
O_n	Ouputs

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	−0.5 to +6.5	V
V_{IN}	DC Input Voltage	−0.5 to +6.5	V
V_{OUT}	DC Output Voltage	−0.5 to V_{CC} + 0.5	V
I_{IN}	DC Input Current, per Pin	±20	mA
I_{OUT}	DC Output Current, Per Pin	±25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	±50	mA
I_{IK}	Input Clamp Current	−20	mA
I_{OK}	Output Clamp Current	±20	mA
T_{STG}	Storage Temperature Range	−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 seconds	260	°C
T_J	Junction Temperature Under Bias	+150	°C
θ_{JA}	Thermal Resistance (Note 1)	150	°C/W
P_D	Power Dissipation in Still Air at 25°C	833	mW

V_{ESD}	ESD Withstand Voltage (Note 2)
	  Human Body Model
	  Charged Device Model
		> 2000
		N/A
			V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. Measured with minimum pad spacing on an FR4 board, using 76mm−by−114mm, 2−ounce copper trace no air flow per JESD51−7.
2. HBM tested to EIA / JESD22−A114−A. CDM tested to JESD22−C101−A. JEDEC recommends that ESD qualification to EIA/JESD22−A115A (Machine Model) be discontinued.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	2.0	5.5	V
V_{IN}	DC Input Voltage (Note 3)	0	5.5	V
V_{OUT}	DC Output Voltage (Note 3)	0	V_{CC}	V
T_A	Operating Temperature	−40	+85	°C

t_r, t_f	Input Rise or Fall Rate
	  V_{CC} = 3.0 V to 3.6 V
	  V_{CC} = 4.5 V to 5.5 V
		0
		0
			100
			20
				ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.
3. Unused inputs must be held HIGH or LOW. They may not float.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	Conditions		$T_A = 25°C$ Min	Typ	Max	$T_A = -40°C$ to $+85°C$ Min	Max	Unit
V_{IH}	HIGH Level Input Voltage	2.0			1.50	–	–	1.50	–	V
		3.0–5.5			$0.7 \times V_{CC}$	–	–	$0.7 \times V_{CC}$	–	
V_{IL}	LOW Level Input Voltage	2.0			–	–	0.50	–	0.50	V
		3.0–5.5			–	–	$0.3 \times V_{CC}$	–	$0.3 \times V_{CC}$	
V_{OH}	HIGH Level Output Voltage	2.0	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50\ \mu A$	1.9	2.0	–	1.9	–	V
		3.0			2.9	3.0	–	2.9	–	
		4.5			4.4	4.5	–	4.4	–	
		3.0		$I_{OH} = -4\ mA$	2.58	–	–	2.48	–	
		4.5		$I_{OH} = -8\ mA$	3.94	–	–	3.80	–	
V_{OL}	LOW Level Output Voltage	2.0	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50\ \mu A$	–	0.0	0.1	–	0.1	V
		3.0			–	0.0	0.1	–	0.1	
		4.5			–	0.0	0.1	–	0.1	
		3.0		$I_{OL} = 4\ mA$	–	–	0.36	–	0.44	
		4.5		$I_{OL} = 8\ mA$	–	–	0.36	–	0.44	
I_{IN}	Input Leakage Current	0–5.5	$V_{IN} = 5.5$ V or GND		–	–	±0.1	–	±1.0	μA
I_{CC}	Quiescent Supply Current	5.5	$V_{IN} = V_{CC}$ or GND		–	–	2.0	–	20.0	μA

NOISE CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	Conditions	$T_A = 25°C$ Typ	Limits	Unit
V_{OLP}	Quiet Output Maximum Dynamic V_{OL} (Note 4)	5.0	$C_L = 50$ pF	0.3	0.8	V
V_{OLV}	Quiet Output Minimum Dynamic V_{OL} (Note 4)	5.0	$C_L = 50$ pF	−0.3	−0.8	V
V_{IHD}	Minimum HIGH Level Dynamic Input Voltage (Note 4)	5.0	$C_L = 50$ pF	–	3.5	V
V_{ILD}	Maximum LOW Level Dynamic Input Voltage (Note 4)	5.0	$C_L = 50$ pF	–	1.5	V

4. Parameter guaranteed by design.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	Conditions	$T_A = 25°C$ Min	Typ	Max	$T_A = -40°C$ to $+85°C$ Min	Max	Unit
t_{PLH}, t_{PHL}	Propagation Delay	3.3 ±0.3	$C_L = 15$ pF	–	5.5	7.9	1.0	9.5	ns
			$C_L = 50$ pF	–	8.0	11.4	1.0	13.0	
		5.0 ±0.5	$C_L = 15$ pF	–	3.8	5.5	1.0	6.5	ns
			$C_L = 50$ pF	–	5.3	7.5	1.0	8.5	
C_{IN}	Input Capacitance		V_{CC} = Open	–	4	10	–	10	pF
C_{PD}	Power Dissipation Capacitance		(Note 5)	–	14	–	–	–	pF

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

ORDERING INFORMATION

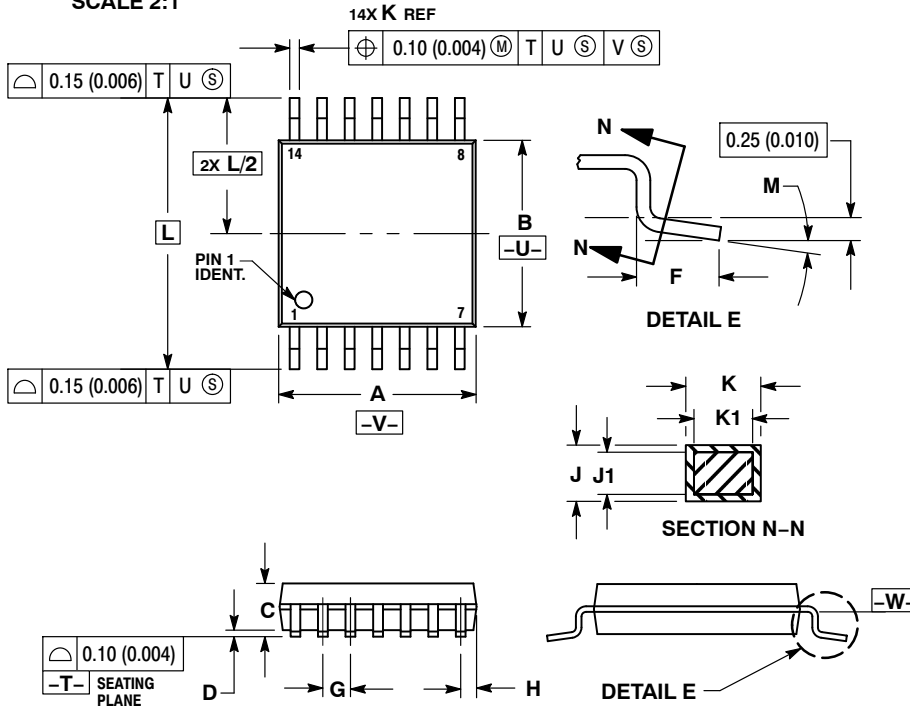| Device Order Number	Top Marking	Package	Packing Method
74VHC32MTCX	VHC 32	TSSOP−14 WB (Pb−Free, Halide Free)	2,500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

TSSOP−14 WB
CASE 948G
ISSUE C

DATE 17 FEB 2016

14

SCALE 2:1

1

14X **K** REF

⊕ | 0.10 (0.004) Ⓜ | T | U Ⓢ | V Ⓢ

⌂ 0.15 (0.006) T U Ⓢ

2X **L/2**

L

PIN 1
IDENT.

14 ... 8

B
−U−

1 ... 7

⌂ 0.15 (0.006) T U Ⓢ

A
−V−

N

0.25 (0.010)

M

N

F

DETAIL E

K
K1

J J1

SECTION N−N

C

⌂ 0.10 (0.004)
−T− SEATING
PLANE

D   **G**   **H**

DETAIL E

−W−

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE −W−.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	–––	1.20	–––	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.50	0.60	0.020	0.024
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0 °	8 °	0 °	8 °

**RECOMMENDED
SOLDERING FOOTPRINT***

7.06

1

0.65
PITCH

14X
0.36

14X
1.26

DIMENSIONS: MILLIMETERS
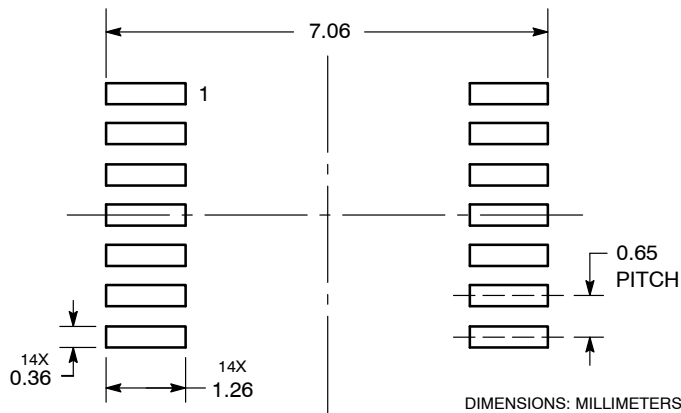
*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**GENERIC
MARKING DIAGRAM***
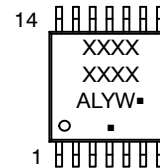
14

XXXX
XXXX
ALYW▪

1

A	= Assembly Location
L	= Wafer Lot
Y	= Year
W	= Work Week
▪	= Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical–documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales

◊

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[onsemi](#):

74VHC32MTC   74VHC32MTCX   74VHC32N   74VHC32M   74VHC32SJX   74VHC32MX