Single 2-Input OR Gate

MC74HC1G32

The MC74HC1G32 is a high speed CMOS 2−input OR gate fabricated with silicon gate CMOS technology.

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

The MC74HC1G32 output drive current is 1/2 compared to MC74HC series.

Features

- High Speed: t_{PD} = 7 ns (Typ) at V_{CC} = 5 V
- Low Power Dissipation: I_{CC} = 1 µA (Max) at T_A = 25°C
- High Noise Immunity
- Balanced Propagation Delays (t_{pLH} = t_{pHL})
- Symmetrical Output Impedance (I_{OH} = I_{OL} = 2 mA)
- Chip Complexity: < 100 FETs
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
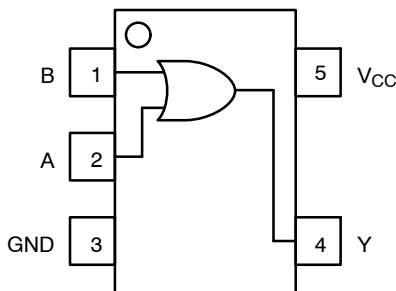- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

MARKING DIAGRAMS
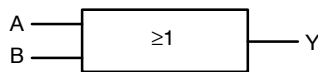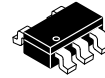
SC−88A
DF SUFFIX
CASE 419A

5

XX M▪

1

TSOP−5
DT SUFFIX
CASE 483

5

XX M▪

1

XX = Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)
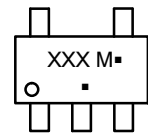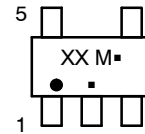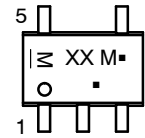*Date Code orientation and/or position may vary depending upon manufacturing location.

SC−74A
DBV SUFFIX
CASE 318BQ

5
1

XXX M▪

XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

Figure 1. Pinout

Pin	Signal
B	1
A	2
GND	3
5	V_{CC}
4	Y

Figure 2. Logic Symbol

PIN ASSIGNMENT	
1	B
2	A
3	GND
4	Y
5	V_{CC}

FUNCTION TABLE

Inputs		Output
A	**B**	**Y**
L	L	L
L	H	H
H	L	H
H	H	H

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data sheet.

MC74HC1G32

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage	SC−88A (NLV), TSOP−5 SC−88A, SC−74A	−0.5 to +7.0 −0.5 to +6.5	V
V_{IN}	DC Input Voltage		−0.5 to V_{CC} +0.5	V
V_{OUT}	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_{OUT}	DC Output Source/Sink Current		±12.5	mA
I_{CC} or I_{GND}	DC Supply Current per Supply Pin or Ground Pin		±25	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)	SC−88A SC−74A	377 320	°C/W
P_D	Power Dissipation in Still Air at 85°C	SC−88A SC−74A	332 390	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage (Note 2)	Human Body Model Charged Device Model	2000 1000	V
$I_{LATCHUP}$	Latchup Performance (Note 3)	SC−88A (NLV), TSOP−5 SC−88A, SC−74A	±500 ±100	mA

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 10 mm−by−1 inch, 20 ounce copper trace with no air flow per JESD51−7.
2. HBM tested to ANSI/ESDA/JEDEC JS−001−2017. CDM tested to JESD22−C101−F. JEDEC recommends that ESD qualification to EIA/JESD22−A115A (Machine Model) be discontinued per JEDEC/JEP172A.
3. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage		2.0	6.0	V
V_{IN}	DC Input Voltage		0.0	V_{CC}	V
V_{OUT}	DC Output Voltage		0.0	V_{CC}	V
T_A	Operating Temperature Range		−55	+125	°C
t_r , t_f	Input Rise and Fall Time	SC−88A (NLV), TSOP−5 V_{CC} = 2.0 V V_{CC} = 3.0 V V_{CC} = 4.5 V V_{CC} = 6.0 V	0 0 0 0	1000 600 500 400	ns
	Input Rise and Fall Time	SC−88A, SC−74A V_{CC} = 2.0 V V_{CC} = 2.3 V to 2.7 V V_{CC} = 3.0 V to 3.6 V V_{CC} = 4.5 V to 6.0 V	0 0 0 0	20 20 10 5	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.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions	V_{CC} (V)	T_A = 25°C			−40°C ≤ T_A ≤ 85°C		−55°C ≤ T_A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V_{IH}	High−Level Input Voltage		2.0 3.0 4.5 6.0	1.5 2.1 3.15 4.20	– – – –	– – – –	1.5 2.1 3.15 4.20	– – – –	1.5 2.1 3.15 4.20	– – – –	V
V_{IL}	Low−Level Input Voltage		2.0 3.0 4.5 6.0	– – – –	– – – –	0.5 0.9 1.35 1.80	– – – –	0.5 0.9 1.35 1.80	– – – –	0.5 0.9 1.35 1.80	V
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OH} = −20 μA	2.0 3.0 4.5 6.0	1.9 2.9 4.4 5.9	2.0 3.0 4.5 6.0	– – – –	1.9 2.9 4.4 5.9	– – – –	1.9 2.9 4.4 5.9	– – – –	V
		V_{IN} = V_{IH} or V_{IL} I_{OH} = −2 mA I_{OH} = −2.6 mA	4.5 6.0	4.18 5.68	4.31 5.80	– –	4.13 5.63	– –	4.08 5.58	– –	
V_{OL}	Low−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OL} = 20 μA	2.0 3.0 4.5 6.0	– – – –	0.0 0.0 0.0 0.0	0.1 0.1 0.1 0.1	– – – –	0.1 0.1 0.1 0.1	– – – –	0.1 0.1 0.1 0.1	V
		V_{IN} = V_{IH} or V_{IL} I_{OL} = 2 mA I_{OL} = 2.6 mA	4.5 6.0	– –	0.17 0.18	0.26 0.26	– –	0.33 0.33	– –	0.40 0.40	
I_{IN}	Input Leakage Current	V_{IN} = 6.0 V or GND	6.0	–	–	± 0.1	–	± 1.0	–	± 1.0	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND	6.0	–	–	1.0	–	10	–	40	μA

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Conditions		$T_A = 25°C$			$-40°C \leq T_A \leq 85°C$		$-55°C \leq T_A \leq 125°C$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay, (A or B) to Y	$V_{CC} = 5.0$ V	$C_L = 15$ pF	–	3.5	15	–	20	–	25	ns
		$V_{CC} = 2.0$ V	$C_L = 50$ pF	–	20	100	–	125	–	155	
		$V_{CC} = 3.0$ V		–	11	27	–	35	–	90	
		$V_{CC} = 4.5$ V		–	8	20	–	25	–	35	
		$V_{CC} = 6.0$ V		–	7	17	–	21	–	26	
t_{TLH}, t_{THL}	Output Transition Time	$V_{CC} = 5.0$ V	$C_L = 15$ pF	–	3	10	–	15	–	20	ns
		$V_{CC} = 2.0$ V	$C_L = 50$ pF	–	25	125	–	155	–	200	
		$V_{CC} = 3.0$ V		–	16	35	–	45	–	60	
		$V_{CC} = 4.5$ V		–	11	25	–	31	–	38	
		$V_{CC} = 6.0$ V		–	9	21	–	26	–	32	
C_{IN}	Input Capacitance			–	5	10	–	10	–	10	pF

		Typical @ 25°C, $V_{CC} = 5.0$ V	
C_{PD}	Power Dissipation Capacitance (Note 4)	10	pF

4. 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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

MC74HC1G32

*C_L includes probe and jig capacitance
R_T is Z_{OUT} of pulse generator (typically 50 W)
f = 1 MHz

Figure 3. Test Circuit

Test	Switch Position	C_L, pF	R_L, Ω
t_{PLH} / t_{PHL}	Open		X
t_{TLH} / t_{THL} (Note 5)	Open	See AC Characteristics Table	X
t_{PLZ} / t_{PZL}	V_{CC}		1 k
t_{PHZ} / t_{PZH}	GND		1 k

X – Don't Care

Figure 4. Switching Waveforms

V_{CC}, V	V_{mi}, V	V_{mo}, V		V_L, V	V_H, V	V_Y, V
		t_{PLH}, t_{PHL}	t_{PZL}, t_{PLZ}, t_{PZH}, t_{PHZ}			
3.0 to 3.6	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	V_{OL} + 0.1 ($V_{OH} - V_{OL}$)	V_{OL} + 0.9 ($V_{OH} - V_{OL}$)	0.3
4.5 to 5.5	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	V_{OL} + 0.1 ($V_{OH} - V_{OL}$)	V_{OL} + 0.9 ($V_{OH} - V_{OL}$)	0.3

5. t_{TLH} and t_{THL} are measured from 10% to 90% of ($V_{OH} - V_{OL}$), and 90% to 10% of ($V_{OH} - V_{OL}$), respectively.

ORDERING INFORMATION

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping†
MC74HC1G32DFT1G	SC−88A	H4	Q2	3000 / Tape & Reel
MC74HC1G32DFT1G−L22038**	SC−88A	H4	Q2	3000 / Tape & Reel
NLVHC1G32DFT1G*	SC−88A	H4	Q2	3000 / Tape & Reel
MC74HC1G32DFT2G	SC−88A	H4	Q4	3000 / Tape & Reel
MC74HC1G32DFT2G−L22038**	SC−88A	H4	Q4	3000 / Tape & Reel
NLVHC1G32DFT2G*	SC−88A	H4	Q4	3000 / Tape & Reel
MC74HC1G32DTT1G**	TSOP−5	H4	Q4	3000 / Tape & Reel
NLV74HC1G32DTT1G*	TSOP−5	H4	Q4	3000 / Tape & Reel
MC74HC1G32DBVT1G	SC−74A	H4	Q4	3000 / Tape & Reel

†For complete information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.
**Please refer to NLV specifications for this device.

Pin 1 Orientation in Tape and Reel
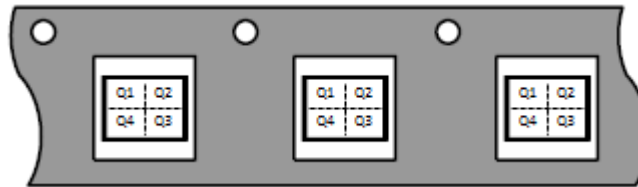
SC−74A
CASE 318BQ
ISSUE B

DATE 18 JAN 2018
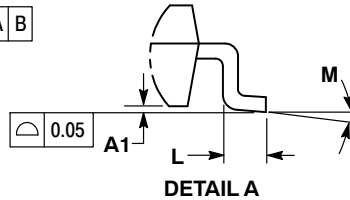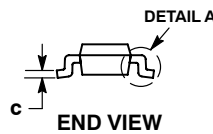
5
1
SCALE 2:1

5X **b**

⊕ | 0.20 | C | A | B

E1

5 4

1 2 3

B

A **D**

E

e

TOP VIEW

A

C SEATING
PLANE

SIDE VIEW

M

⌒ | 0.05

A1 **L**

DETAIL A

DETAIL A

c

END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.

| DIM | MILLIMETERS | |
	MIN	MAX
A	0.90	1.10
A1	0.01	0.10
b	0.25	0.50
c	0.10	0.26
D	2.85	3.15
E	2.50	3.00
E1	1.35	1.65
e	0.95 BSC	
L	0.20	0.60
M	0 °	10 °

**RECOMMENDED
SOLDERING FOOTPRINT***
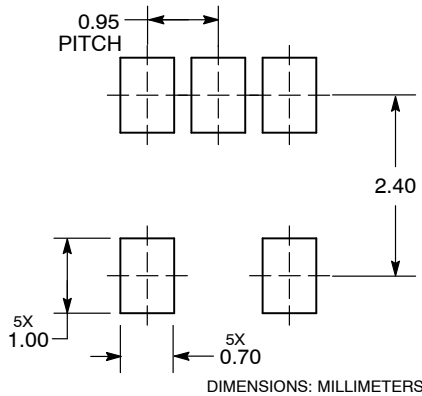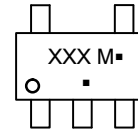
0.95
PITCH

2.40

5X
1.00

5X
0.70

DIMENSIONS: MILLIMETERS

**GENERIC
MARKING DIAGRAM***

XXX M▪

○ ▪

XXX   = Specific Device Code
M   = Date Code
▪   = 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.

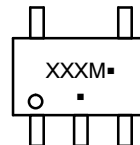*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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DESCRIPTION:	SC−74A		PAGE 1 OF 1

SC−88A (SC−70−5/SOT−353)
CASE 419A−02
ISSUE M

DATE 11 APR 2023

SCALE 2:1

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. 419A−01 OBSOLETE. NEW STANDARD 419A−02
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.1016MM PER SIDE.

5X b

⊕ 0.2 Ⓜ B Ⓜ

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.80	0.95	1.10
A1	---	---	0.10
A3	0.20 REF		
b	0.10	0.20	0.30
c	0.10	---	0.25
D	1.80	2.00	2.20
E	2.00	2.10	2.20
E1	1.15	1.25	1.35
e	0.65 BSC		
L	0.10	0.15	0.30

0.50
0.65
0.40
0.65
1.90

RECOMMENDED MOUNTING FOOTPRINT

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

GENERIC MARKING DIAGRAM*

XXXM▪

*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.

XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

STYLE 1:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR
5. CATHODE

STYLE 3:
PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. CATHODE 1

STYLE 4:
PIN 1. SOURCE 1
2. DRAIN 1/2
3. SOURCE 1
4. GATE 1
5. GATE 2

STYLE 5:
PIN 1. CATHODE
2. COMMON ANODE
3. CATHODE 2
4. CATHODE 3
5. CATHODE 4

STYLE 6:
PIN 1. EMITTER 2
2. BASE 2
3. EMITTER 1
4. COLLECTOR
5. COLLECTOR 2/BASE 1

STYLE 7:
PIN 1. BASE
2. EMITTER
3. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 8:
PIN 1. CATHODE
2. COLLECTOR
3. N/C
4. BASE
5. EMITTER

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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DESCRIPTION:	SC−88A (SC−70−5/SOT−353)	PAGE 1 OF 1

TSOP−5
CASE 483
ISSUE N

DATE 12 AUG 2020

5
1
SCALE 2:1

NOTE 5

2X | 0.10 | T

D 5X

⊕ | 0.20 | C | A | B

2X | 0.20 | T

B

5   4

1   2   3

B

A

G

A

A

S

TOP VIEW

M

K

DETAIL Z

C

0.05

H

C | SEATING PLANE

SIDE VIEW

J

DETAIL Z

END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSION A.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

DIM	MILLIMETERS	
	MIN	MAX
A	2.85	3.15
B	1.35	1.65
C	0.90	1.10
D	0.25	0.50
G	0.95 BSC	
H	0.01	0.10
J	0.10	0.26
K	0.20	0.60
M	0 °	10 °
S	2.50	3.00

SOLDERING FOOTPRINT*

$\frac{1.9}{0.074}$

$\frac{0.95}{0.037}$

$\frac{2.4}{0.094}$

$\frac{1.0}{0.039}$

$\frac{0.7}{0.028}$

SCALE 10:1 $\left(\frac{mm}{inches}\right)$

GENERIC MARKING DIAGRAM*

5

XXXAYW▪

● ▪

1

Analog

5

XXX M▪

● ▪

1

Discrete/Logic

XXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package

XXX = Specific Device Code
M = Date Code
▪ = 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.

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

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DESCRIPTION:	TSOP−5		PAGE 1 OF 1

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