Single Inverter with Schmitt-Trigger Input

MC74HC1G14

The MC74HC1G14 is a high speed CMOS inverter with Schmitt-Trigger input 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 MC74HC1G14 output drive current is 1/2 compared to MC74HC series.

Features

- High Speed: $t_{PD} = 7 \text{ ns (Typ)}$ at $V_{CC} = 5 \text{ V}$
- Low Power Dissipation: $I_{CC} = 1 \mu A$ (Max) at $T_A = 25^{\circ}C$
- High Noise Immunity
- Balanced Propagation Delays (t_{pLH} = t_{pHL})
- Symmetrical Output Impedance ($I_{OH} = I_{OL} = 2 \text{ mA}$)
- 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

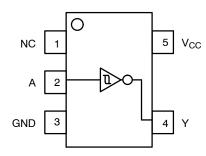


Figure 1. Pinout

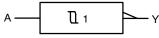


Figure 2. Logic Symbol

PIN ASSIGNMENT				
1	N/C			
2	А			
3	GND			
4	Y			
5	V _{CC}			



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CASE 419A



MARKING







XX = Device Code M = Date Code*

A = Assembly Location

Y = Year W = Work Week

= Pb-Free Package

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



CASE 318BQ



XXX = Specific Device Code

M = Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

FUNCTION TABLE

Input	Output
Α	Υ
L	Н
Н	L

ORDERING INFORMATION

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

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	٧
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
TL	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
TJ	Junction Temperature Under Bias		+150	°C
$\theta_{\sf JA}$	Thermal Resistance (Note 1)	SC-88A SC-74A	377 320	°C/W
P_{D}	Power Dissipation in Still Air	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.

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.
 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}	٧
V _{OUT}	DC Output Voltage		0.0	V _{CC}	V
T _A	Operating Temperature Range		-55	+125	°C
t _r , t _f	V _C , V _C	TSOP-5 C = 2.0 V C = 3.0 V C = 4.5 V C = 6.0 V		No Limit No Limit No Limit No Limit	ns/V
	Input Rise and Fall Time $SC-88A, \\ V_{CC} \\ V_{CC}=2.3 \ V \\ V_{CC}=3.0 \ V \\ V_{CC}=4.5 $	c = 2.0 V to 2.7 V to 3.6 V	- - - -	No Limit No Limit No Limit No Limit	

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

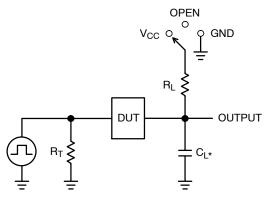
		Test	V _{CC}	Т	A = 25°	С	-40°C ≤ 1	T _A ≤ 85°C	-55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Conditions	(V)	Min	Тур	Max	Min	Max	Min	Max	Unit
V _{T+}	Positive Threshold Voltage		3.0 4.5 5.5	- - -	2.0 3.0 3.6	2.20 3.15 3.85		2.20 3.15 3.85		2.20 3.15 3.85	V
V _{T-}	Negative Threshold Voltage		3.0 4.5 5.5	0.9 1.35 1.65	1.5 2.3 2.9	1 1 1	0.9 1.35 1.65	- - -	0.9 1.35 1.65	- - -	V
V _H	Hysteresis Voltage		3.0 4.5 5.5	0.30 0.40 0.50	0.57 0.67 0.74	1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	V
V _{OH}	High-Level Output Voltage	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -20 \mu A$	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 1 1	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	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OL} = 20 \mu\text{A}$	2.0 3.0 4.5 6.0		0.0 0.0 0.0 0.0	0.1 0.1 0.1 0.1	1 1 1 1	0.1 0.1 0.1 0.1		0.1 0.1 0.1 0.1	V
		$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OL} = 2 \text{ mA}$ $I_{OL} = 2.6 \text{ mA}$	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	μΑ
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	6.0	_	-	1.0	-	10	-	40	μА

AC ELECTRICAL CHARACTERISTICS

			Т	T _A = 25°C		$-40^{\circ}\text{C} \le \text{T}_{\text{A}} \le 85^{\circ}\text{C}$		-55°C ≤ T _A ≤ 125°C		
Symbol	Parameter	Test Conditions	Min	Тур	Max	Min	Max	Min	Max	Unit
t _{PLH} ,	Propagation Delay,	V _{CC} = 5.0 V C _L = 15 pF	-	3.5	15	-	20	ı	25	ns
^t PHL	Input A or B to Y	$ \begin{array}{c} V_{CC} = 2.0 \text{ V} & C_L = 50 \text{ pF} \\ V_{CC} = 3.0 \text{ V} \\ V_{CC} = 4.5 \text{ V} \\ V_{CC} = 6.0 \text{ V} \end{array} $		19 10.5 7.5 6.5	100 27 20 17	1111	125 35 25 21		155 90 35 26	
t _{TLH} ,	Output Transition	V _{CC} = 5.0 V C _L = 15 pF	_	3	10	-	15	-	20	ns
t _{THL} Time	$ \begin{array}{c} V_{CC} = 2.0 \ V & C_L = 50 \ pF \\ V_{CC} = 3.0 \ V & \\ V_{CC} = 4.5 \ V & \\ V_{CC} = 6.0 \ V & \\ \end{array} $		25 16 11 9	125 35 25 21	1111	155 45 31 26	- - -	200 60 38 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	рF

^{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} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no–load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.



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	Х
t _{PLZ} / t _{PZL}	V _{CC}	Table	1 k
t _{PHZ} / t _{PZH}	GND		1 k

X - Don't Care

* 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

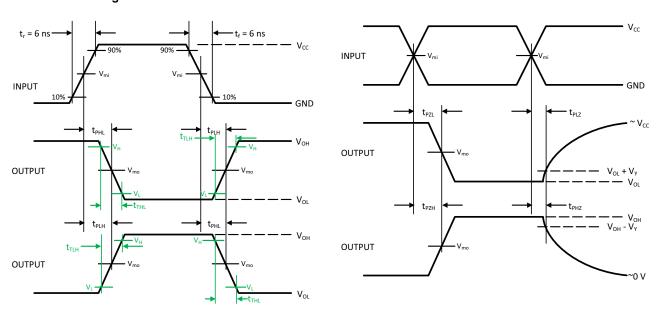


Figure 4. Switching Waveforms

		V _{mo} , V				
V _{CC} , V	V_{mi} , V	t _{PLH} , t _{PHL}	$t_{PZL}, t_{PLZ}, t_{PZH}, t_{PHZ}$	V_L, V	V _H , V	V _Y , V
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.

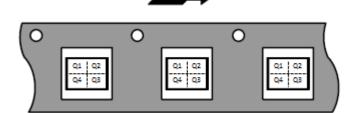
ORDERING INFORMATION

			Pin 1 Orientation	
Device	Packages	Specific Device Code	(See below)	Shipping [†]
MC74HC1G14DFT1G	SC-88A	HA	Q2	3000 / Tape & Reel
NLVHC1G14DFT1G*	SC-88A	HA	Q2	3000 / Tape & Reel
MC74HC1G14DFT2G	SC-88A	HA	Q4	3000 / Tape & Reel
NLVHC1G14DFT2G*	SC-88A	HA	Q4	3000 / Tape & Reel
MC74HC1G14DTT1G	TSOP-5	HA	Q4	3000 / Tape & Reel
NLV74HC1G14DTT1G*	TSOP-5	HA	Q4	3000 / Tape & Reel
MC74HC1G14DBVT1G	SC-74A	HA	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

Pin 1 Orientation in Tape and Reel

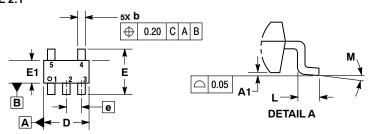
Direction of Feed

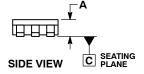


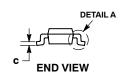
Specifications Brochure, BRD8011/D.
*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.



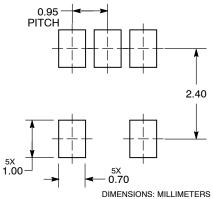
DATE 18 JAN 2018







RECOMMENDED SOLDERING 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.

NOTES:

- DIMENSIONING AND TOLERANCING PER ASME
 Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
 MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH
 THICKNESS. MINIMUM LEAD THICKNESS IS THE
 MINIMUM THICKNESS OF BASE MATERIAL.
- 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.

	MILLIMETERS				
DIM	MIN	MAX			
Α	0.90	1.10			
A1	0.01	0.10			
b	0.25	0.50			
С	0.10	0.26			
D	2.85	3.15			
E	2.50	3.00			
E1	1.35	1.65			
е	0.95 BSC				
L	0.20	0.60			
М	0 °	10°			

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code

Μ = 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.

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SC-88A (SC-70-5/SOT-353) CASE 419A-02 **ISSUE L**

DATE 17 JAN 2013



- TES:
 DIMENSIONING AND TOLERANCING
 PER ANSI Y14.5M, 1982.
 CONTROLLING DIMENSION: INCH.
 419A-01 OBSOLETE. NEW STANDARD 3.
- 419A-02.
 DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
Α	0.071	0.087	1.80	2.20
В	0.045	0.053	1.15	1.35
С	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
Н		0.004		0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code

= 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.



0.50 0.0197 0.65 0.025 0.65 0.025 0.40 0.0157 1.9 mm 0.0748 SCALE 20:1

SOLDER FOOTPRINT

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

5. COLLECTOR	5. CATHODE	5. CATHODE I	5. GATE 2	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.

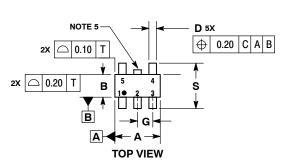
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TSOP-5 **CASE 483 ISSUE N**

DATE 12 AUG 2020









NOTES:

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- CONTROLLING DIMENSION: MILLIMETERS.
 MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH
 THICKNESS. MINIMUM LEAD THICKNESS IS THE
 MINIMUM THICKNESS OF BASE MATERIAL.
- 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. OPTIONAL CONSTRUCTION: AN ADDITIONAL
- TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

	MILLIMETERS		
DIM	MIN	MAX	
Α	2.85	3.15	
В	1.35	1.65	
C	0.90	1.10	
D	0.25	0.50	
G	0.95 BSC		
Н	0.01	0.10	
J	0.10	0.26	
K	0.20	0.60	
М	0 °	10 °	
S	2.50	3.00	

SOLDERING 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*





XXX = Specific Device Code XXX = Specific Device Code

= Assembly Location = Date Code

= Year = Pb-Free Package

= Work Week W

= 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.

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MC74HC1G14DFT1 MC74HC1G14DFT1G MC74HC1G14DFT2 MC74HC1G14DFT2G MC74HC1G14DTT1 MC74HC1G14DTT1G NLV74HC1G14DTT1G NLVHC1G14DFT2G NLVHC1G14DFT1G MC74HC1G14DBVT1G