Single Inverter

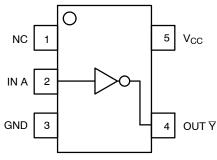
The MC74HC1G04 is a high speed CMOS inverter fabricated with silicon gate CMOS technology.

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

The MC74HC1G04 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





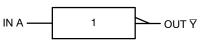


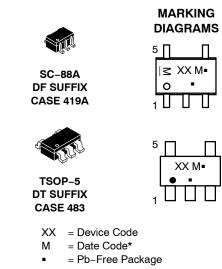
Figure 2. Logic Symbol

PIN ASSIGNMENT						
1	NC					
2	IN A					
3	GND					
4	OUT T					
5	V _{CC}					

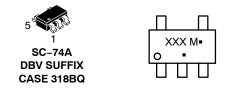


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(Note: Microdot may be in either location) *Date Code orientation and/or position may vary depending upon manufacturing location.



XXX	= Specific Device Code
М	= Date Code
	= Pb-Free Package

(Note: Microdot may be in either location)

FUNCTION TABLE

Input A	Output Y
L	Н
Н	L

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

MAXIMUM RATINGS

Symbol	Paramete	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
Ι _{ΟΚ}	DC Output Diode Current	±20	mA	
I _{OUT}	DC Output Source/Sink Current	±12.5	mA	
$I_{CC} \text{ or } I_{GND}$	DC Supply Current per Supply Pin or Ground	±25	mA	
T _{STG}	Storage Temperature Range	-65 to +150	°C	
ΤL	Lead Temperature, 1 mm from Case for 10 S	Seconds	260	°C
TJ	Junction Temperature Under Bias		+150	°C
θ_{JA}	Thermal Resistance (Note 1)	SC70-5/SC-88A/SOT-353 SOT23-5/TSOP-5/SC59-5 SC-74A	659 555 555	°C/W
P _D	Power Dissipation in Still Air at 85°C SC70–5/SC–88A/SOT–353 SOT23–5/TSOP–5/SC59–5 SC–74A		190 225 225	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
ILATCHUP	Latchup Performance (Note 3)	SC-88A (NLV), SOT-23 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 Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 20 ounce copper trace with no air flow.
 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), TSO V _{CC} = 2 V _{CC} = 3 V _{CC} = 4 V _{CC} = 6	0 V 0 0 V 0 .5 V 0	1000 600 500 400	ns/V
	Input Rise and Fall Time $V_{CC} = 1.65 V to 1.9$ $V_{CC} = 2.3 V to 2$ $V_{CC} = 3.0 V to 3$ $V_{CC} = 4.5 V to 6$	95 V 0 7 V 0 6 V 0	20 20 10 5	

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.

			V _{CC}	т	A = 25°	С	-40°C ≤ 1	Γ _A ≤ 85°C	–55°C ≤ T	A ≤ 125°C	
Symbol	Parameter	Test Conditions	(V)	Min	Тур	Max	Min	Max	Min	Max	Uni
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		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
		$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -2 \text{ mA}$ $I_{OH} = -2.6 \text{ mA}$	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	$\begin{array}{l} V_{IN} = V_{IH} \text{ or } V_{IL} \\ I_{OL} = 20 \ \mu A \end{array}$	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
		$\begin{array}{l} V_{IN} = V_{IH} \text{ or } V_{IL} \\ I_{OL} = 2 \text{ mA} \\ I_{OL} = 2.6 \text{ mA} \end{array}$	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

DC ELECTRICAL CHARACTERISTICS

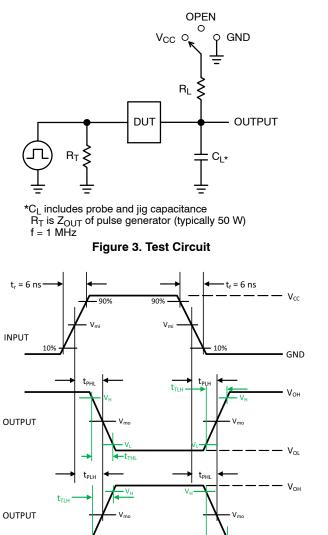
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions. *Guaranteed by design.

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 6.0 \text{ ns}$)

			Т	$T_{A} = 25^{\circ}C \qquad -40^{\circ}C \le T_{A} \le 85^{\circ}C$			T _A ≤ 85°C	$\textbf{-55^{\circ}C} \leq \textbf{T}_{\textbf{A}} \leq \textbf{125^{\circ}C}$		
Symbol	Parameter	Test Conditions	Min	Тур	Max	Min	Max	Min	Max	Unit
t _{PLH} ,	Propagation Delay,	$V_{CC} = 5.0 \text{ V}$ $C_{L} = 15 \text{ pF}$	-	3.5	15	-	20	-	25	ns
t _{PHL}	Input A or B to Ÿ	$\begin{array}{ll} V_{CC} = 2.0 \ V & C_L = 50 \ pF \\ V_{CC} = 3.0 \ V \\ V_{CC} = 4.5 \ V \\ V_{CC} = 6.0 \ V \end{array}$		20 11 8 7	100 27 20 17		125 35 25 21	- - -	155 90 35 26	
t _{TLH} ,	Output Transition	$V_{CC} = 5.0 \text{ V}$ $C_L = 15 \text{ pF}$	1	3	10	-	15	-	20	ns
t⊤HL	Time	$\begin{array}{ll} V_{CC} = 2.0 \ V & C_L = 50 \ pF \\ V_{CC} = 3.0 \ V \\ V_{CC} = 4.5 \ V \\ V_{CC} = 6.0 \ V \end{array}$		25 16 11 9	125 35 25 21		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							

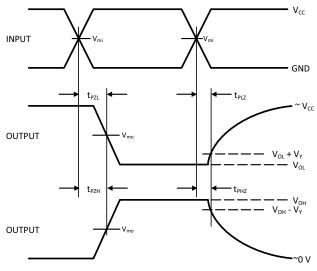
		Typical @ 25°C, V _{CC} = 5.0 V					
C _{PD}	Power Dissipation Capacitance (Note 4)	10	рF				

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



Test	Switch Position	C _L , pF	R_L, Ω
t_{PLH} / t_{PHL}	Open		Х
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





VOL

		V _{mo} , V				
V_{CC}, V	V _{mi} , V	t _{PLH} , t _{PHL}	$t_{\text{PZL}}, t_{\text{PLZ}}, t_{\text{PZH}}, t_{\text{PHZ}}$	V _L , V	V _H , V	V _Y , V
3.0 to 3.6	V _{CC} /2	$(V_{OH} - V_{OL})/2$	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 _{OH} – V _{OL})/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.

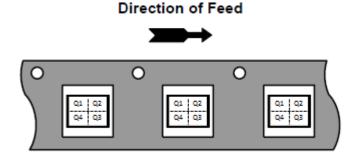
ORDERING INFORMATION

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping [†]
MC74HC1G04DFT1G	SC-88A	H5	Q2	3000 / Tape & Reel
NLVHC1G04DFT1G*	SC-88A	H5	Q2	3000 / Tape & Reel
MC74HC1G04DFT2G	SC-88A	H5	Q4	3000 / Tape & Reel
NLVHC1G04DFT2G*	SC-88A	H5	Q4	3000 / Tape & Reel
MC74HC1G04DTT1G	TSOP-5	H5	Q4	3000 / Tape & Reel
MC74HC1G04DBVT1G (In Development)	SC-74A	TBD	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.

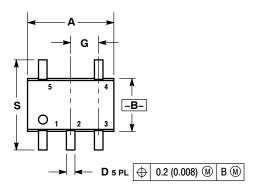
*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q100 Qualified and PPAP Capable.

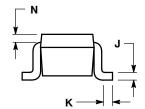
Pin 1 Orientation in Tape and Reel



PACKAGE DIMENSIONS

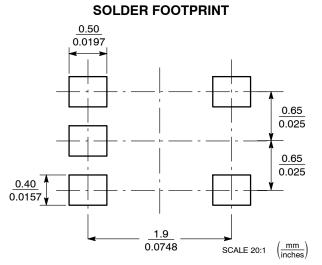
SC-88A (SC-70-5/SOT-353) CASE 419A-02 ISSUE L





С ۷ Н





- NOTES: 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: INCH. 3. 419A-01 OBSOLETE. NEW STANDARD 419A-02. 4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	INC	HES	MILLIM	ETERS	
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	
Ν	0.008 REF		0.20	REF	
S	0.079	0.087	2.00	2.20	

PACKAGE DIMENSIONS

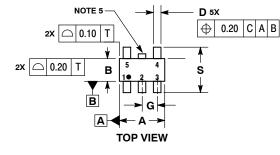
TSOP-5 **CASE 483 ISSUE M**

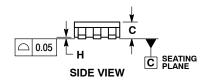
DETAIL Z

DETAIL Z

- 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. DIMENSION A.
 OPTIONAL CONSTRUCTION: AN ADDITIONAL
- 5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

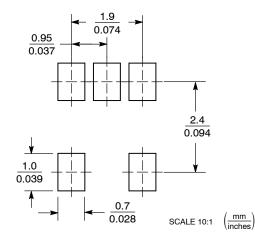
	MILLIMETERS	
DIM	MIN	MAX
Α	2.85	3.15
В	1.35	1.65
С	0.90	1.10
D	0.25	0.50
G	0.95 BSC	
н	0.01	0.10
J	0.10	0.26
К	0.20	0.60
М	0 °	10 °
S	2.50	3.00







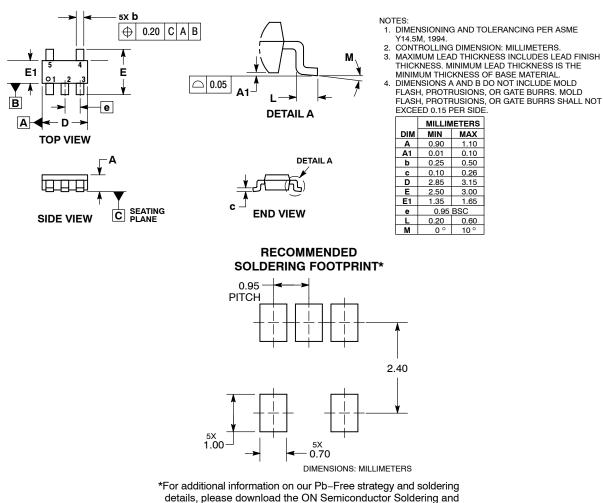
END VIEW



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

PACKAGE DIMENSIONS

SC-74A CASE 318BQ ISSUE B



Mounting Techniques Reference Manual, SOLDERRM/D.

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