

# **MC74HC05ADTG Datasheet**



DiGi Electronics Part Number

Manufacturer

Manufacturer Product Number

Description

Detailed Description

onsemi MC74HC05ADTG

MC74HC05ADTG-DG

IC INVERTER 6CH 1-INP 14TSSOP

Inverter IC 6 Channel Open Drain 14-TSSOP

https://www.DiGi-Electronics.com



Tel: +00 852-30501935

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## Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
MC74HC05ADTG	onsemi
Series:	Product Status:
74HC	Active
Logic Type:	Number of Circuits:
Inverter	б
Number of Inputs:	Features:
1	Open Drain
Voltage - Supply:	Current - Quiescent (Max):
2V ~ 6V	1 μΑ
Current - Output High, Low:	Input Logic Level - Low:
-, 5.2mA	0.5V ~ 1.8V
Input Logic Level - High:	Max Propagation Delay @ V, Max CL:
1.5V ~ 4.2V	15ns @ 6V, 50pF
Operating Temperature:	Mounting Type:
-55°C ~ 125℃	Surface Mount
Supplier Device Package:	Package / Case:
14-TSSOP	14-TSSOP (0.173", 4.40mm Width)
Base Product Number:	
74HC05	

## **Environmental & Export classification**

8542.39.0001

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	

# onsemi

MARKING DIAGRAMS

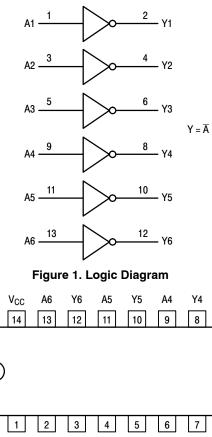
## Hex Inverter with Open Drain Outputs

# **MC74HC05A**

The MC74HC05A contains six inverters with open drain outputs. The MC74HC05A is identical to the MC74HC04A, except for the open drain outputs. The outputs can be connected to other open drain outputs to implement active LOW wired–OR or active High wired–AND logic functions. The open drain outputs require pull–up resistors to perform correctly.

#### Features

- Output Drive Capability: 10 LSTTL Loads with Suitable Pull-up Resistor
- Outputs Directly Interface to CMOS, NMOS and TTL
- High Noise Immunity Characteristic of CMOS Devices
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1 µA
- In Compliance With the JEDEC Standard No. 7A Requirements
- Chip Complexity: 36 FETs or 9 Equivalent Gates
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant



<sup>14</sup> A A A A A A A A SOIC-14 XXXXXG **D SUFFIX** AWLYWW CASE 751A 8888 1T H 14 RAAAAAA TSSOP-14 DT SUFFIX CASE 948G 1 HHHHHHH XXXX = Specific Device Code = Assembly Location А WL, L = Wafer Lot = Year Y WW, W = Work Week G or • = Pb-Free Package (Note: Microdot may be in either location)

**FUNCTION TABLE** 

Outputs
Y
н
L

#### **ORDERING INFORMATION**

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

A1

Y1

A2

Y2

Figure 2. Pinout Diagram (Top View)

A3

Y3

GND

#### MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V <sub>CC</sub>	DC Supply Voltage		–0.5 to +6.5	V
V <sub>IN</sub>	DC Input Voltage		-0.5 to V <sub>CC</sub> + 0.5	V
V <sub>OUT</sub>	DC Output Voltage		$-0.5$ to $V_{CC}$ + 0.5	V
I <sub>IN</sub>	DC Input Current, per Pin		±20	mA
I <sub>OUT</sub>	DC Output Current, per Pin		±25	mA
I <sub>CC</sub>	DC Supply Current, V <sub>CC</sub> and GND Pins		±50	mA
I <sub>IK</sub>	Input Clamp Current ( $V_{IN} < 0$ or $V_{IN} > V_{CC}$ )		±20	mA
I <sub>OK</sub>	Output Clamp Current (V <sub>OUT</sub> < 0 or V <sub>OUT</sub> > V <sub>CC</sub> )		±20	mA
T <sub>STG</sub>	Storage Temperature		-65 to +150	°C
ΤL	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
TJ	Junction Temperature Under Bias		±150	°C
$\theta_{JA}$	Thermal Resistance (Note 1)	SOIC-14 TSSOP-14	116 150	°C/W
PD	Power Dissipation in Still Air at 25°C	SOIC-14 TSSOP-14	1077 833	mW
MSL	Moisture Sensitivity		Level 1	-
F <sub>R</sub>	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	-
V <sub>ESD</sub>	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.

 Measured with minimum pad spacing on an FR4 board, using 76mm-by-114mm, 2-ounce copper trace no air flow per JESD51-7.
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	Мах	Unit
V <sub>CC</sub>	DC Supply Voltage (Referenced to GND)		2.0	6.0	V
V <sub>IN</sub> , V <sub>OUT</sub>	DC Input Voltage, Output Voltage (Referenced to GND) (Note 3)		0	V <sub>CC</sub>	V
T <sub>A</sub>	Operating Free-Air Temperature		55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise or Fall Time	$\begin{array}{l} V_{CC} = 2.0 \ V \\ V_{CC} = 4.5 \ V \\ V_{CC} = 6.0 \ V \end{array}$	0 0 0	1000 500 400	ns

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 always be tied to an appropriate logic voltage level (e.g., either GND or V<sub>CC</sub>). Unused outputs must be left open.

#### DC CHARACTERISTICS

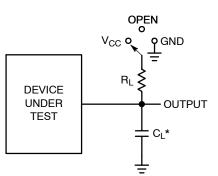
			Vcc	Guara	nteed Lin	nit	
Symbol	Parameter	Condition	v	–55 to 25°C	≤ <b>85°C</b>	≤125°C	Unit
V <sub>IH</sub>	Minimum High-Level Input Voltage	$\begin{array}{l} V_{out} = 0.1V \text{ or } V_{CC} - 0.1V \\ \left  I_{out} \right  \leq 20 \mu A \end{array}$	2.0 4.5 6.0	1.50 3.15 4.20	1.50 3.15 4.20	1.50 3.15 4.20	V
VIL	Maximum Low-Level Input Voltage	$\label{eq:Vout} \begin{split} V_{out} &= 0.1 V \text{ or } V_{CC} - 0.1 V \\ & \left  I_{out} \right  \leq 20 \mu A \end{split}$		0.50 1.35 1.80	0.50 1.35 1.80	0.50 1.35 1.80	V
V <sub>OL</sub>	Maximum Low-Level Output Voltage	$\label{eq:Vout} \begin{split} V_{out} &= 0.1 V \text{ or } V_{CC} - 0.1 V \\ \left  I_{out} \right  &\leq 20 \mu A \end{split}$	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
			4.5 6.0	0.26 0.26	0.33 0.33	0.40 0.40	
l <sub>in</sub>	Maximum Input Leakage Current	V <sub>in</sub> = V <sub>CC</sub> or GND	6.0	±0.1	±1.0	±1.0	μA
I <sub>CC</sub>	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC} \text{ or } GND$ $I_{out} = 0\mu A$	6.0	1.0	10	40	μΑ
I <sub>OZ</sub>	Maximum Three-State Leakage Current	Output in High-Impedance State $V_{in} = V_{IL} \text{ or } V_{IH}$ $V_{out} = V_{CC} \text{ or GND}$	6.0	±0.5	±5.0	±10	μΑ

#### AC CHARACTERISTICS

		V <sub>cc</sub>	Guaranteed Limit			
Symbol	Parameter	V	–55 to 25°C	≤ <b>85°C</b>	≤125°C	Unit
t <sub>PLZ</sub> , t <sub>PZL</sub>	Maximum Propagation Delay, A to Y (Figures 3 and 4)	2.0 4.5 6.0	90 18 15	115 23 20	135 27 23	ns
t <sub>THL</sub>	Maximum Output Transition Time, Any Output (Figures 3 and 4)	2.0 4.5 6.0	75 15 13	95 19 16	110 22 19	ns
C <sub>in</sub>	Maximum Input Capacitance		10	10	10	pF
C <sub>out</sub>	Maximum Three-State Output Capacitance (Output in High-Impedance State)		10	10	10	pF

		Typical @ 25°C, V <sub>CC</sub> = 5.0 V, V <sub>EE</sub> = 0 V	
C <sub>PD</sub>	Power Dissipation Capacitance (Per Buffer)*	4.0	pF

\*Used to determine the no-load dynamic power consumption:  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ .



Test	Switch Position	CL	RL
t <sub>PLH</sub> / t <sub>PHL</sub>	Open	50 pF	1 kΩ
t <sub>PLZ</sub> / t <sub>PZL</sub>	V <sub>CC</sub>		
t <sub>PHZ</sub> / t <sub>PZH</sub>	GND		

\*CL Includes probe and jig capacitance

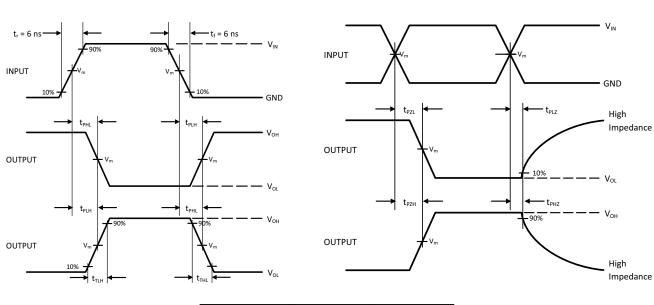
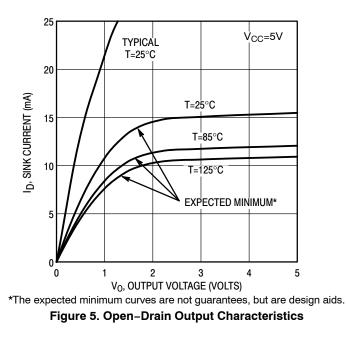


Figure	3.	Test	Circui	it
Inguic	υ.	1000	Onoui	

Device	V <sub>IN</sub> , V	V <sub>m</sub> , V
MC74HC05A	V <sub>CC</sub>	50% x V <sub>CC</sub>



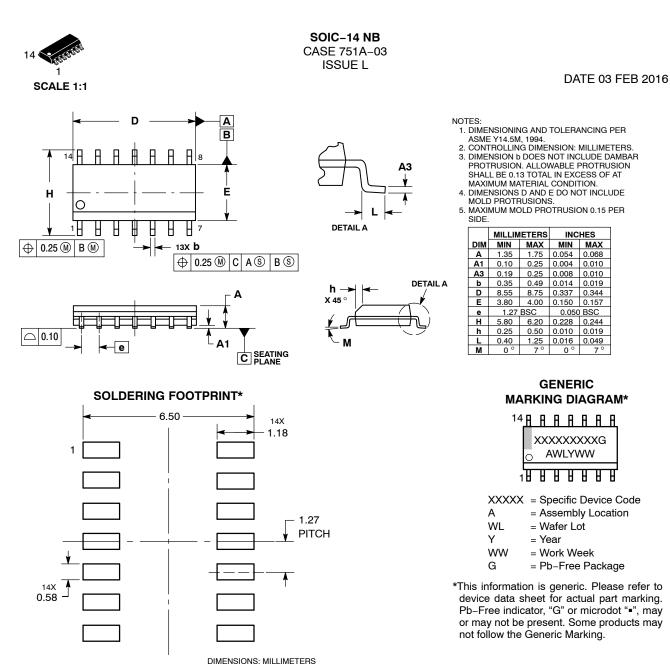
#### **ORDERING INFORMATION**

Device	Marking	Package	Shipping <sup>†</sup>
MC74HC05ADG	HC05A	SOIC-14	55 / Rail
MC74HC05ADR2G	HC05A	SOIC-14	2500 / Tape & Reel
MC74HC05ADTG	HC 05A	TSSOP-14	96 / Tube
MC74HC05ADTR2G	HC 05A	TSSOP-14	2500 / Tape & Reel
MC74HC05ADTR2G-Q*	HC 05A	TSSOP-14	2500 / 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.
\*-Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC–Q100 Qualified and PPAP

Capable





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

#### **STYLES ON PAGE 2**

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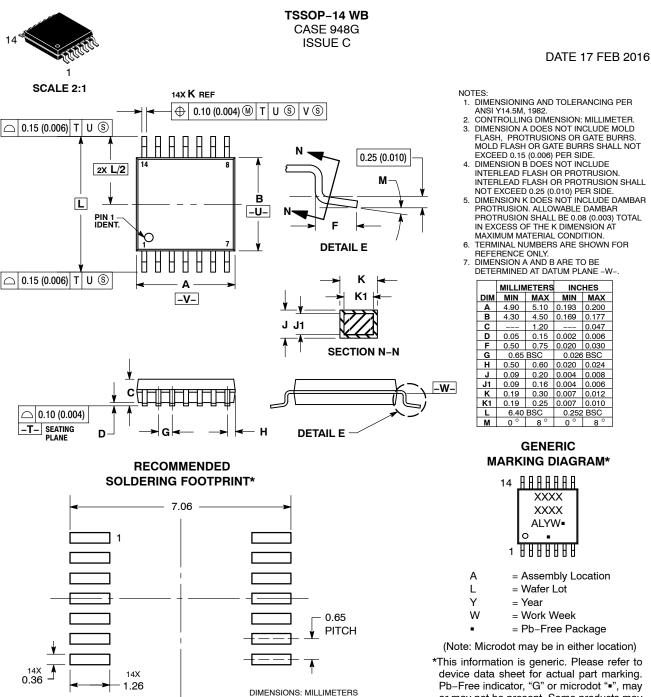
STYLE 1: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. NO CONNECTION 7. ANODE/CATHODE 9. ANODE/CATHODE 10. NO CONNECTION 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE	STYLE 2: CANCELLED	STYLE 3: PIN 1. NO CONNECTION 2. ANODE 3. ANODE 4. NO CONNECTION 5. ANODE 6. NO CONNECTION 7. ANODE 8. ANODE 9. ANODE 10. NO CONNECTION 11. ANODE 12. ANODE 13. NO CONNECTION 14. COMMON CATHODE	STYLE 4: PIN 1. NO CONNECTION 2. CATHODE 3. CATHODE 4. NO CONNECTION 5. CATHODE 6. NO CONNECTION 7. CATHODE 8. CATHODE 10. NO CONNECTION 11. CATHODE 12. CATHODE 13. NO CONNECTION 14. COMMON ANODE
STYLE 5: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. NO CONNECTION 7. COMMON ANODE 8. COMMON ANODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE	STYLE 6: PIN 1. CATHODE 2. CATHODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE 7. CATHODE 8. ANODE 9. ANODE 10. ANODE 11. ANODE 12. ANODE 13. ANODE 14. ANODE	STYLE 7: PIN 1. ANODE/CATHODE 2. COMMON ANODE 3. COMMON CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. ANODE/CATHODE 7. ANODE/CATHODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. COMMON CATHODE 12. COMMON ANODE 13. ANODE/CATHODE 14. ANODE/CATHODE	STYLE 8: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. ANODE/CATHODE 7. COMMON ANODE 8. COMMON ANODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. NO CONNECTION 12. ANODE/CATHODE 13. ANODE/CATHODE 14. COMMON CATHODE

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**MECHANICAL CASE OUTLINE** PACKAGE DIMENSIONS



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

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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