

MC74AC05, MC74ACT05

Hex Inverter with Open-Drain Outputs

The MC74AC/ACT05 is identical in pinout to the LS05. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with TTL outputs.

Features

- Outputs Source/Sink 24 mA
- 'ACT05 Has TTL Compatible Inputs
- Pb-Free Packages are Available

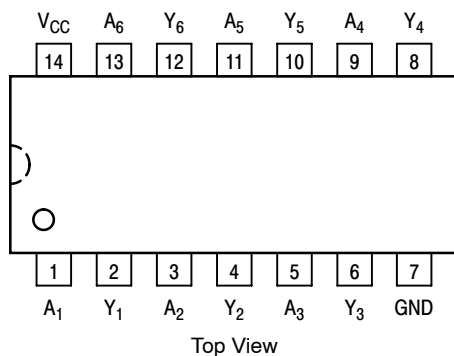


Figure 1. Pinout: 14-Lead Packages

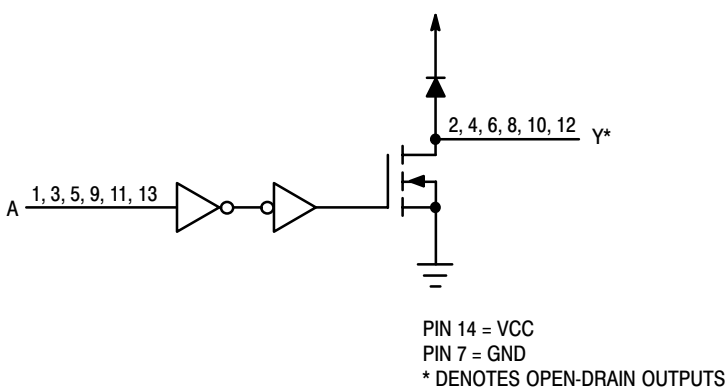
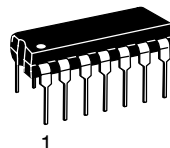


Figure 2. Logic Diagram

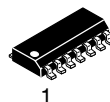


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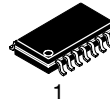
PDIP-14
N SUFFIX
CASE 646



SOIC-14
D SUFFIX
CASE 751A



TSSOP-14
DT SUFFIX
CASE 948G



SOEIAJ-14
M SUFFIX
CASE 965

FUNCTION TABLE

Input A	Output Y
L	Z
H	L

NOTE: Z = High Impedance

ORDERING INFORMATION

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

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 6 of this data sheet.

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MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V_{in}	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
V_{out}	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC} + 0.5$	V
I_{in}	DC Input Current, per Pin	± 20	mA
I_{out}	DC Output Sink/Source Current, per Pin	± 50	mA
I_{CC}	DC V_{CC} or GND Current per Output Pin	± 50	mA
T_{stg}	Storage Temperature	-65 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	'AC	2.0	5.0	V
		'ACT	4.5	5.0	
VREG	DC Regulated Power Voltage (Ref. to GND)	0	–	V_{CC}	V
t_r, t_f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	$V_{CC} @ 3.0 V$	–	150	ns/V
		$V_{CC} @ 4.5 V$	–	40	
		$V_{CC} @ 5.5 V$	–	25	
t_r, t_f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	$V_{CC} @ 4.5 V$	–	10	ns/V
		$V_{CC} @ 5.5 V$	–	8.0	
T_J	Junction Temperature (PDIP)	–	–	140	°C
T_A	Operating Ambient Temperature Range	-40	25	85	°C
I_{OH}	Output Current – HIGH	–	–	-24	mA
I_{OL}	Output Current – LOW	–	–	24	mA

- V_{in} from 30% to 70% V_{CC} ; see individual Data Sheets for devices that differ from the typical input rise and fall times.
- V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

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DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74AC		74AC		Unit	Conditions
			T _A = +25°C		T _A = −40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V	
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V	V _{OUT} = 0.1 V or V _{CC} − 0.1 V	
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	I _{OUT} = 50 μA	
		3.0 4.5 5.5	– – –	0.36 0.36 0.36	0.44 0.44 0.44	V	*V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA	
I _{IN}	Maximum Input Leakage Current	5.5	–	±0.1	±1.0	μA	V _I = V _{CC} , GND	
I _{OLD}	†Minimum Dynamic Output Current	5.5	–	–	75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}		5.5	–	–	−75	mA	V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5	–	4.0	40	μA	V _{IN} = V _{CC} or GND	

*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V.

AC CHARACTERISTICS

Symbol	Parameter	V _{CC} * (V)	74AC			74AC		Unit
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		
			Min	Typ	Max	Min	Max	
t _{PZL}	Propagation Delay Output Enable	3.3	1.5	–	8.0	1.0	9.0	ns
		5.0	1.5	–	6.0	1.0	6.5	
t _{PLZ}	Propagation Delay Output Enable	3.3	1.5	–	8.0	1.0	9.0	ns
		5.0	1.5	–	6.0	1.0	6.5	

*Voltage Range 3.3 V is 3.3 V ±0.3 V.

Voltage Range 5.0 V is 5.0 V ±0.5 V.

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DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74ACT		74ACT		Unit	Conditions
			T _A = +25°C		T _A = -40°C to +85°C			
			Typ	Guaranteed Limits				
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	I _{OUT} = 50 μA	
		4.5 5.5	– –	0.36 0.36	0.44 0.44	0.44	*V _{IN} = V _{IL} or V _{IH} I _{OH} 24 mA	
I _{IN}	Maximum Input Leakage Current	5.5	–	±0.1	±1.0	μA	V _I = V _{CC} , GND	
ΔI _{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	–	1.5	mA	V _I = V _{CC} - 2.1 V	
I _{OLD} I _{OHD}	†Minimum Dynamic Output Current	5.5 5.5	– –	– –	75 -75	mA mA	V _{OLD} = 1.65 V Max V _{OHD} = 3.85 V Min	
I _{CC}	Maximum Quiescent Supply Current	5.5	–	4.0	40	μA	V _{IN} = V _{CC} or GND	

*All outputs loaded; thresholds on input associated with output under test.

†Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS

Symbol	Parameter	V _{CC} * (V)	74ACT			74ACT		Unit
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF		
			Min	Typ	Max	Min	Max	
t _{PZL}	Propagation Delay Output Enable	5.0	1.5	–	8.0	1.0	8.5	ns
t _{PLZ}	Propagation Delay Output Enable	5.0	1.5	–	8.5	1.0	9.0	ns

*Voltage Range 5.0 V is 5.0 V ±0.5 V.

CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	30	pF	V _{CC} = 5.0 V

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ORDERING INFORMATION

Device	Package	Shipping†
MC74AC05N	PDIP-14	25 Units / Rail
MC74AC05NG	PDIP-14 (Pb-Free)	
MC74AC05D	SOIC-14	55 Units / Rail
MC74AC05DG	SOIC-14 (Pb-Free)	
MC74AC05DR2	SOIC-14	2500 / Tape & Reel
MC74AC05DR2G	SOIC-14 (Pb-Free)	
MC74AC05MEL	SOEIAJ-14	2000 / Tape & Reel
MC74AC05MELG	SOEIAJ-14 (Pb-Free)	
MC74ACT05N	PDIP-14	25 Units / Rail
MC74ACT05NG	PDIP-14 (Pb-Free)	
MC74ACT05D	SOIC-14	55 Units / Rail
MC74ACT05DG	SOIC-14 (Pb-Free)	
MC74ACT05DR2	SOIC-14	2500 / Tape & Reel
MC74ACT05DR2G	SOIC-14 (Pb-Free)	
MC74ACT05DTR2	TSSOP-14*	
MC74ACT05DTR2G	TSSOP-14*	
MC74ACT05MEL	SOEIAJ-14	2000 / Tape & Reel
MC74ACT05MELG	SOEIAJ-14 (Pb-Free)	

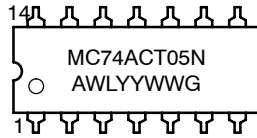
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*These packages are inherently Pb-Free.

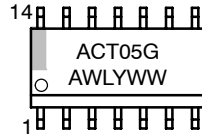
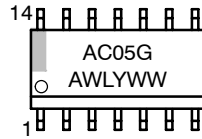
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MARKING DIAGRAMS

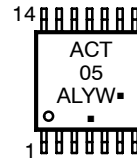
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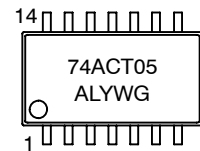
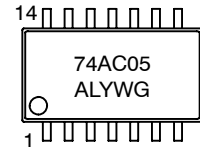
SOIC-14



TSSOP-14



SOEIAJ-14

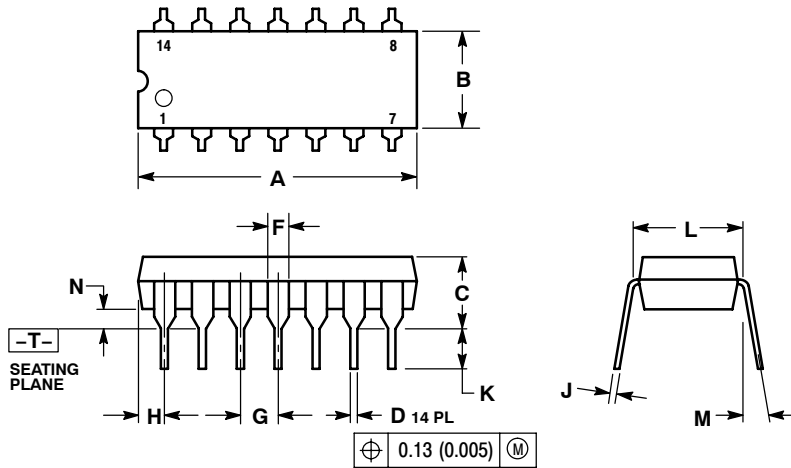


A = Assembly Location
 WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week
 G or ■ = Pb-Free Package
 (Note: Microdot may be in either location)

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PACKAGE DIMENSIONS

PDIP-14
CASE 646-06
ISSUE P



NOTES:

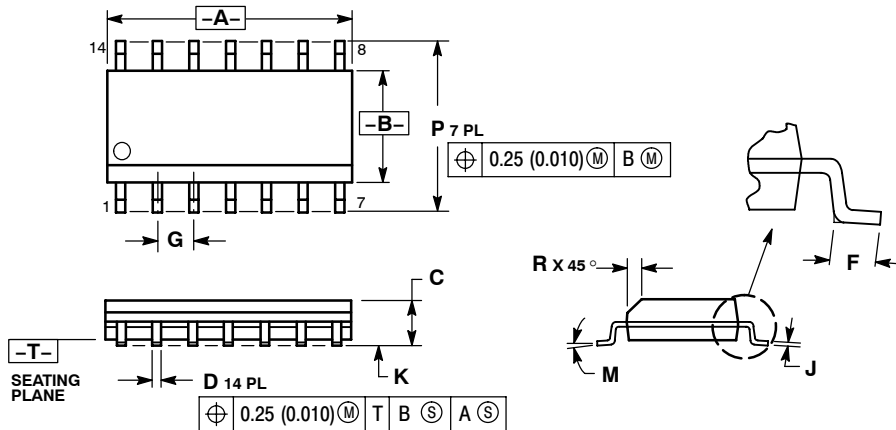
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	19.56
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.290	0.310	7.37	7.87
M	---	10 °	---	10 °
N	0.015	0.039	0.38	1.01

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PACKAGE DIMENSIONS

SOIC-14
CASE 751A-03
ISSUE H

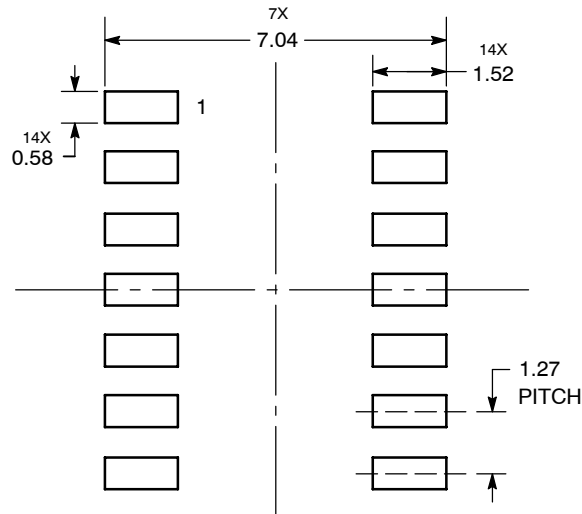


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

SOLDERING FOOTPRINT*

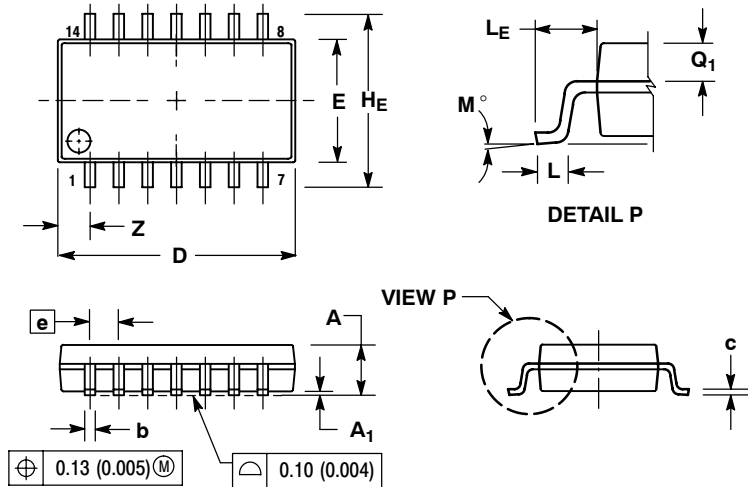


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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PACKAGE DIMENSIONS

SOEIAJ-14
CASE 965-01
ISSUE A



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A ₁	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.10	0.20	0.004	0.008
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
HE	7.40	8.20	0.291	0.323
0.50	0.50	0.85	0.020	0.033
LE	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q ₁	0.70	0.90	0.028	0.035
Z	---	1.42	---	0.056

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MC74AC05/D