

MC74AC04, MC74ACT04

Hex Inverter

Features

- Outputs Source/Sink 24 mA
- 'ACT04 Has TTL Compatible Inputs
- Pb-Free Packages are Available

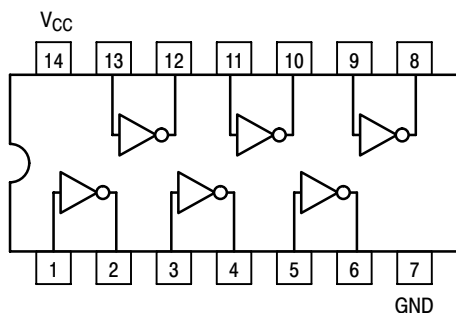


Figure 1. Pinout: 14-Lead Packages Conductors
(Top View)

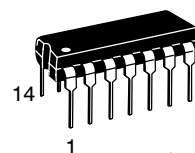
MAXIMUM RATINGS

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

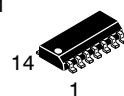
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



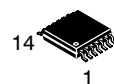
ON Semiconductor®



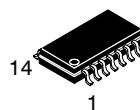
PDIP-14
N SUFFIX
CASE 646



SOIC-14
D SUFFIX
CASE 751A



TSSOP-14
DT SUFFIX
CASE 948G



SOEIAJ-14
M SUFFIX
CASE 965

ORDERING INFORMATION

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

MC74AC04, MC74ACT04

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
V _{CC}	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V _{in} , V _{out}	DC Input Voltage, Output 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.

DC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	74AC		74ACT	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	1.5	2.1	2.1	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
		4.5	2.25	3.15	3.15		
		5.5	2.75	3.85	3.85		
V _{IL}	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
		4.5	2.25	1.35	1.35		
		5.5	2.75	1.65	1.65		
V _{OH}	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I _{OUT} = –50 μA
		4.5	4.49	4.4	4.4		
		5.5	5.49	5.4	5.4		
		3.0	–	2.56	2.46	V	*V _{IN} = V _{IL} or V _{IH} –12 mA I _{OH} –24 mA –24 mA
		4.5	–	3.86	3.76		
		5.5	–	4.86	4.76		
V _{OL}	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I _{OUT} = 50 μA
		4.5	0.001	0.1	0.1		
		5.5	0.001	0.1	0.1		
		3.0	–	0.36	0.44	V	*V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA
		4.5	–	0.36	0.44		
		5.5	–	0.36	0.44		
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 V_{CC}.

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AC CHARACTERISTICS (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

Symbol	Parameter	V _{CC} * (V)	74AC			74AC		Unit	Fig. No.
			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 _{PLH}	Propagation Delay	3.3 5.0	1.5 1.5	4.5 4.0	9.0 7.0	1.0 1.0	10 7.5	ns	3–5
t _{PHL}	Propagation Delay	3.3 5.0	1.5 1.5	4.5 3.5	8.5 6.5	1.0 1.0	9.5 7.0	ns	3–5

*Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

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	Typ	Guaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
		5.5	1.5	2.0	2.0			
V _{IL}	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
		5.5	1.5	0.8	0.8			
V _{OH}	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I _{OUT} = –50 μA	
		5.5	5.49	5.4	5.4			
		4.5	–	3.86	3.76	V	*V _{IN} = V _{IL} or V _{IH} –24 mA	
		5.5	–	4.86	4.76			
V _{OL}	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I _{OUT} = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5	–	0.36	0.44	V	*V _{IN} = V _{IL} or V _{IH} 24 mA	
		5.5	–	0.36	0.44			
I _{IN}	Maximum Input Leakage Current	5.5	–	±0.1	±1.0	μA	V _I = V _{CC} , GND	
ΔI _{CC} T	Additional Max. I _{CC} /Input	5.5	0.6	–	1.5	mA	V _I = V _{CC} – 2.1 V	
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.

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AC CHARACTERISTICS (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

Symbol	Parameter	V _{CC} * (V)	74ACT			74ACT		Unit	Fig. No.
			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 _{PLH}	Propagation Delay	5.0	1.5		8.5	1.0	9.0	ns	3-6
t _{PHL}	Propagation Delay	5.0	1.5		8.0	1.0	8.5	ns	3-6

*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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DEVICE ORDERING INFORMATION

Device	Package	Shipping†
MC74AC04N	PDIP-14	25 Units/Rail
MC74AC04NG	PDIP-14 (Pb-Free)	
MC74ACT04N	PDIP-14	
MC74ACT04NG	PDIP-14 (Pb-Free)	
MC74AC04D	SOIC-14	55 Units/Rail
MC74AC04DG	SOIC-14 (Pb-Free)	
MC74AC04DR2	SOIC-14	2500/Tape & Reel
MC74AC04DR2G	SOIC-14 (Pb-Free)	
MC74ACT04D	SOIC-14	55 Units/Rail
MC74ACT04DG	SOIC-14 (Pb-Free)	
MC74ACT04DR2	SOIC-14	2500/Tape & Reel
MC74ACT04DR2G	SOIC-14 (Pb-Free)	
MC74AC04DT	TSSOP-14*	96 Units/Rail
MC74AC04DTR2	TSSOP-14*	2500/Tape & Reel
MC74AC04DTR2G	TSSOP-14*	
MC74ACT04DT	TSSOP-14*	96 Units/Rail
MC74ACT04DTR2	TSSOP-14*	2500/Tape & Reel
MC74ACT04DTR2G	TSSOP-14*	
MC74AC04MEL	SOEIAJ-14	2000/Tape & Reel
MC74AC04MELG	SOEIAJ-14 (Pb-Free)	
MC74ACT04M	SOEIAJ-14	50 Units/Rail
MC74ACT04MG	SOEIAJ-14 (Pb-Free)	
MC74ACT04MEL	SOEIAJ-14	2000/Tape & Reel
MC74ACT04MELG	SOEIAJ-14 (Pb-Free)	

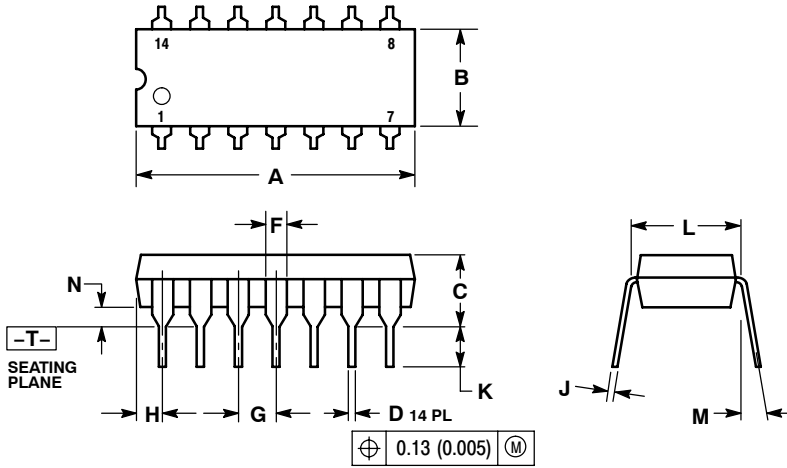
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*This package is inherently Pb-Free.

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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