

MC74AC20, MC74ACT20

Dual 4-Input NAND Gate

- Outputs Source/Sink 24 mA
- 'ACT20 Has TTL Compatible Inputs

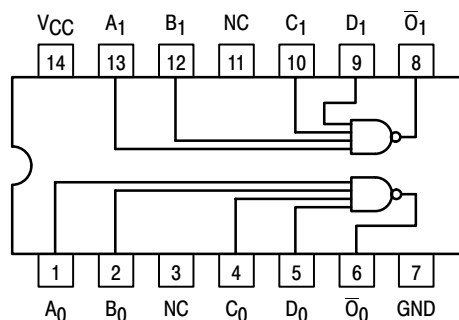


Figure 1. Pinout: 14-Lead Packages
(Top View)

PIN ASSIGNMENT

PIN	FUNCTION
A_n, B_n, C_n, D_n	Inputs
$\bar{O}_n$	Outputs

MAXIMUM RATINGS*

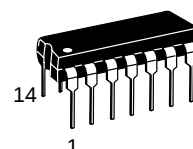
Rating	Symbol	Value	Unit
DC Supply Voltage (Referenced to GND)	V_{CC}	-0.5 to +7.0	V
DC Input Voltage (Referenced to GND)	V_{in}	-0.5 to $V_{CC} + 0.5$	V
DC Output Voltage (Referenced to GND)	V_{out}	-0.5 to $V_{CC} + 0.5$	V
DC Input Current, per Pin	I_{in}	± 20	mA
DC Output Sink/Source Current, per 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	°C

*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

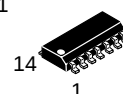


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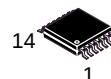
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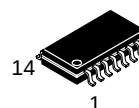
PDIP-14
N SUFFIX
CASE 646



SO-14
D SUFFIX
CASE 751A



TSSOP-14
DT SUFFIX
CASE 948G



EIAJ-14
M SUFFIX
CASE 965

ORDERING INFORMATION

Device	Package	Shipping
MC74AC20N	PDIP-14	25 Units/Rail
MC74ACT20N	PDIP-14	25 Units/Rail
MC74AC20D	SOIC-14	55 Units/Rail
MC74AC20DR2	SOIC-14	2500 Tape & Reel
MC74ACT20D	SOIC-14	55 Units/Rail
MC74ACT20DR2	SOIC-14	2500 Tape & Reel
MC74AC20DT	TSSOP-14	96 Units/Rail
MC74AC20DTR2	TSSOP-14	2500 Tape & Reel
MC74ACT20DT	TSSOP-14	96 Units/Rail
MC74ACT20DTR2	TSSOP-14	2500 Tape & Reel
MC74AC20M	EIAJ-14	50 Units/Rail
MC74AC20MEL	EIAJ-14	2000 Tape & Reel
MC74ACT20M	EIAJ-14	50 Units/Rail
MC74ACT20MEL	EIAJ-14	2000 Tape & Reel

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 88 of this data sheet.

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RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Min	Unit
V _{CC}	Supply Voltage	'AC	2.0	5.0	6.0
		'ACT	4.5	5.0	5.5
V _{REG}	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	–
		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	–
		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

1. V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. 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		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	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 Low 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		
	Maximum Low Level Output Voltage	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		
		3.0	–	–	–		
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		
	Maximum Low Level Output Voltage	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		
		3.0	–	–	–		
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.

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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 _{PLH}	Propagation Delay	3.3 5.0	2.0 1.5	6.0 5.0	8.5 7.0	1.5 1.0	10.0 8.0	ns
t _{PHL}	Propagation Delay	3.3 5.0	1.5 1.5	5.0 4.0	7.0 6.0	1.0 1.0	9.0 7.0	ns

*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				
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 _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4		V	I _{OUT} = − 50 μA
		4.5 5.5	− −	3.86 4.86	3.76 4.76		V	*V _{IN} = V _{IL} or V _{IH} − 24 mA I _{OH} − 24 mA
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		V	*V _{IN} = V _{IL} or V _{IH} 24 mA 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}	†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

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 _{PLH}	Propagation Delay	5.0	2.0	6.5	9.0	1.5	10.5	ns
t _{PHL}	Propagation Delay	5.0	2.0	5.5	9.0	1.5	10.5	ns

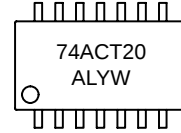
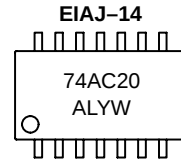
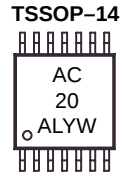
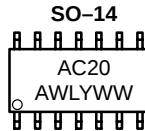
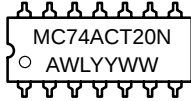
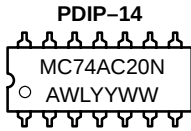
*Voltage Range 5.0 V is 5.0 V ±0.5 V.

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	40	pF	V _{CC} = 5.0 V

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MARKING DIAGRAMS



A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week