

# MC74AC11, MC74ACT11

## Triple 3-Input AND Gate

### High-Performance Silicon-Gate CMOS

#### Features

- Outputs Source/Sink 24 mA
- 'ACT11 Has TTL Compatible Inputs
- These are Pb-Free Devices

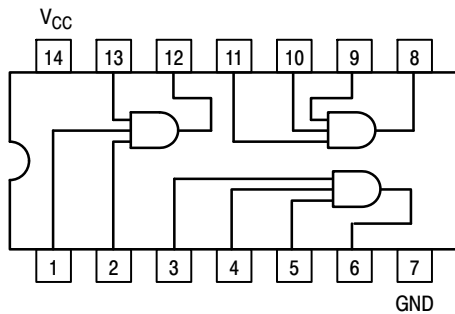


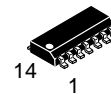
Figure 1. Pinout: 14-Lead Packages Conductors (Top View)



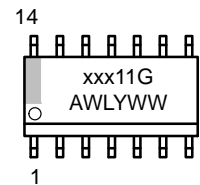
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#### MARKING DIAGRAM



SOIC-14  
D SUFFIX  
CASE 751A



xxx = AC or ACT  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# MC74AC11, MC74ACT11

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	-0.5 ≤ V <sub>I</sub> ≤ V <sub>CC</sub> + 0.5	V
V <sub>O</sub>	DC Output Voltage (Note 1)	-0.5 ≤ V <sub>O</sub> ≤ V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	±20	mA
I <sub>OK</sub>	DC Output Diode Current	±50	mA
I <sub>O</sub>	DC Output Sink/Source Current	±50	mA
I <sub>CC</sub>	DC Supply Current per Output Pin	±50	mA
I <sub>GND</sub>	DC Ground Current per Output Pin	±50	mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>L</sub>	Lead temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction temperature under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance (Note 2)	125	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	125	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 30% – 35%	UL 94 V-0 @ 0.125 in	
V <sub>ESD</sub>	ESD Withstand Voltage Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5)	> 2000 > 200 > 1000	V
I <sub>Latch-Up</sub>	Latch-Up Performance Above V <sub>CC</sub> and Below GND at 85°C (Note 6)	±100	mA

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.

1. I<sub>O</sub> absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD51-7.
3. Tested to EIA/JESD22-A114-A.
4. Tested to EIA/JESD22-A115-A.
5. Tested to JESD22-C101-A.
6. Tested to EIA/JESD78.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
V <sub>CC</sub>	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V <sub>in</sub> , V <sub>out</sub>	DC Input Voltage, Output Voltage (Ref. to GND)	0	-	V <sub>CC</sub>	V	
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V <sub>CC</sub> @ 3.0 V	-	150	-	ns/V
		V <sub>CC</sub> @ 4.5 V	-	40	-	
		V <sub>CC</sub> @ 5.5 V	-	25	-	
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V <sub>CC</sub> @ 4.5 V	-	10	-	ns/V
		V <sub>CC</sub> @ 5.5 V	-	8.0	-	
T <sub>J</sub>	Junction Temperature (PDIP)	-	-	140	°C	
T <sub>A</sub>	Operating Ambient Temperature Range	-40	25	85	°C	
I <sub>OH</sub>	Output Current – High	-	-	-24	mA	
I <sub>OL</sub>	Output Current – Low	-	-	24	mA	

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.

1. V<sub>in</sub> from 30% to 70% V<sub>CC</sub>; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. V<sub>in</sub> from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC11, MC74ACT11

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74AC		74AC		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	3.0	1.5	2.1	2.1	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		4.5	2.25	3.15	3.15			
		5.5	2.75	3.85	3.85			
V <sub>IL</sub>	Maximum Low Level Input Voltage	3.0	1.5	0.9	0.9	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		4.5	2.25	1.35	1.35			
		5.5	2.75	1.65	1.65			
V <sub>OH</sub>	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I <sub>OUT</sub> = -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 <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -12 mA I <sub>OH</sub> -24 mA -24 mA	
		4.5	-	3.86	3.76			
		5.5	-	4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I <sub>OUT</sub> = 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 <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 12 mA I <sub>OL</sub> 24 mA 24 mA	
		4.5	-	0.36	0.44			
		5.5	-	0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5	-	-	75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5	-	-	-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	-	4.0	40	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

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.

\*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<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

## AC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> * (V)	74AC			74AC		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay	3.3	1.5	5.5	9.5	1.0	10.0	ns	3-5
		5.0	1.5	4.0	8.0	1.0	8.5		
t <sub>PHL</sub>	Propagation Delay	3.3	1.5	5.5	8.5	1.0	9.5	ns	3-5
		5.0	1.5	4.0	7.0	1.0	7.5		

\*Voltage Range 3.3 V is 3.3 V ±0.3 V.

Voltage Range 5.0 V is 5.0 V ±0.5 V.

# MC74AC11, MC74ACT11

## DC CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	74ACT		74ACT		Unit	Conditions
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C			
			Typ	Guaranteed Limits				
V <sub>IH</sub>	Minimum High Level Input Voltage	4.5	1.5	2.0	2.0	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	2.0	2.0			
V <sub>IL</sub>	Maximum Low Level Input Voltage	4.5	1.5	0.8	0.8	V	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	
		5.5	1.5	0.8	0.8			
V <sub>OH</sub>	Minimum High Level Output Voltage	4.5	4.49	4.4	4.4	V	I <sub>OUT</sub> = -50 μA	
		5.5	5.49	5.4	5.4			
		4.5	-	3.86	3.76	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -24 mA	
		5.5	-	4.86	4.76			
V <sub>OL</sub>	Maximum Low Level Output Voltage	4.5	0.001	0.1	0.1	V	I <sub>OUT</sub> = 50 μA	
		5.5	0.001	0.1	0.1			
		4.5	-	0.36	0.44	V	*V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 24 mA	
		5.5	-	0.36	0.44			
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μA	V <sub>I</sub> = V <sub>CC</sub> , GND	
ΔI <sub>CC</sub> T	Additional Max. I <sub>CC</sub> /Input	5.5	0.6	-	1.5	mA	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	
I <sub>OLD</sub>	†Minimum Dynamic Output Current	5.5	-	-	75	mA	V <sub>OLD</sub> = 1.65 V Max	
I <sub>OHD</sub>		5.5	-	-	-75	mA	V <sub>OHD</sub> = 3.85 V Min	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	-	4.0	40	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND	

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.

\*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 <sub>CC</sub> * (V)	74ACT			74ACT		Unit	Fig. No.
			T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
			Min	Typ	Max	Min	Max		
t <sub>PLH</sub>	Propagation Delay	5.0	1.5	-	9.5	1.0	10.5	ns	3-5
t <sub>PHL</sub>	Propagation Delay	5.0	1.5	-	9.5	1.0	10.5	ns	3-5

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

## CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = 5.0 V
C <sub>PD</sub>	Power Dissipation Capacitance	20	pF	V <sub>CC</sub> = 5.0 V

## ORDERING INFORMATION

## MC74AC11, MC74ACT11

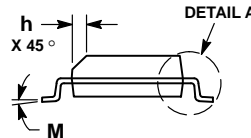
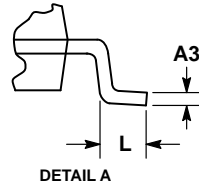
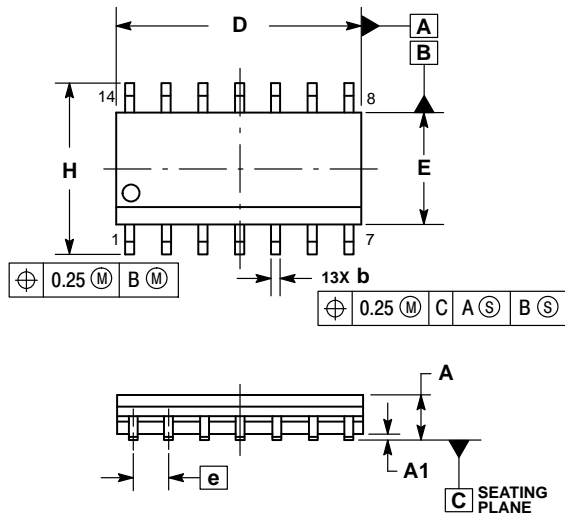
Device	Package	Shipping†
MC74AC11DG	SOIC-14 (Pb-Free)	55 Units/Rail
MC74AC11DR2G	SOIC-14 (Pb-Free)	2500/Tape & Reel
MC74ACT11DR2G	SOIC-14 (Pb-Free)	2500/Tape & Reel

†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.

# MC74AC11, MC74ACT11

## PACKAGE DIMENSIONS

SOIC-14 NB  
CASE 751A-03  
ISSUE K

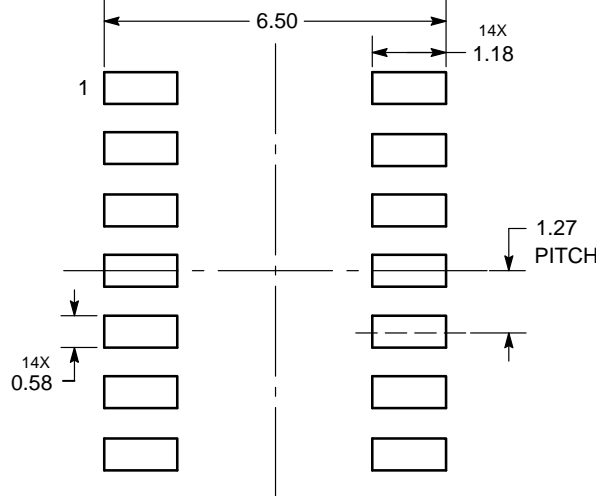


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.054	0.068
A1	0.10	0.25	0.004	0.010
A3	0.19	0.25	0.008	0.010
b	0.35	0.49	0.014	0.019
D	8.55	8.75	0.337	0.344
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.019
L	0.40	1.25	0.016	0.049
M	0°	7°	0°	7°

### SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*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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