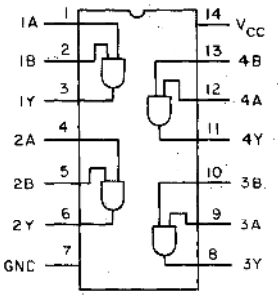
CD54/74AC08
CD54/74ACT08

Advance Information



FUNCTIONAL DIAGRAM & TERMINAL ASSIGNMENT

Quad 2-Input AND Gate

Type Features:

- *Buffered inputs*
- *Typical propagation delay (AC08): 4.3 ns @ V_{CC} = 5 V, T_A = 25°C, C_L = 50 pF*

The GE/RCA-CD54/74AC08 and CD54/74ACT08 are quad 2-input AND gates that utilize GE/RCA's new ADVANCED CMOS LOGIC technology. The CD54AC08 and CD54ACT08 are supplied in 14-lead dual-in-line ceramic packages (F suffix). The CD74AC08 and CD74ACT08 are supplied in 14-lead dual-in-line plastic packages (E suffix) and in 14-lead dual-in-line small-outline plastic packages (M suffix).

TRUTH TABLE

Inputs		Output
nA	nB	nY
L	L	L
H	L	L
L	H	L
H	H	H

Family Features:

- *Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015*
- *SCR-Latch-up-resistant CMOS process and circuit design*
- *Speed of bipolar FAST*/AS/S with significantly reduced power*
- *Balanced propagation delays*
- *AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the supply*
- *± 24-mA output drive current*
  - *Fanout to 15 FAST* ICs*
  - *Drives 50-ohm transmission lines*

*FAST is a Trademark of Fairchild Semiconductor Corp.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

DC SUPPLY-VOLTAGE (V_{CC}) ..... -0.5 to 6 V
DC INPUT DIODE CURRENT, I_{IK} (for $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V) ..... ±20 mA
DC OUTPUT DIODE CURRENT, I_{OK} (for $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V) ..... ±50 mA
DC OUTPUT SOURCE OR SINK CURRENT per Output Pin, I_O (for $V_O > -0.5$ V or $V_O < V_{CC} + 0.5$ V) ..... ±50 mA
DC V_{CC} or GROUND CURRENT (I_{CC} or I_{GND}) ..... ±100 mA*
POWER DISSIPATION PER PACKAGE (P_D):
For T_A = -55 to +100°C (PACKAGE TYPE F) ..... 500 mW
For T_A = +100 to +125°C (PACKAGE TYPE F) ..... Derate Linearly at 8 mW/°C to 300 mW
For T_A = -40 to +100°C (PACKAGE TYPE E) ..... 500 mW
For T_A = +100 to +125°C (PACKAGE TYPE E) ..... Derate Linearly at 8 mW/°C to 300 mW
For T_A = -40 to +70°C (PACKAGE TYPE M) ..... 400 mW
For T_A = +70 to +125°C (PACKAGE TYPE M) ..... Derate Linearly at 6 mW/°C to 70 mW
OPERATING-TEMPERATURE RANGE (T_A):
PACKAGE TYPE F ..... -55 to +125°C
PACKAGE TYPE E, M ..... -40 to +125°C
STORAGE TEMPERATURE (T_{stg}) ..... -65 to +150°C
LEAD TEMPERATURE (DURING SOLDERING):
At distance 1/16 ± 1/32 in. (1.59 ± 0.79 mm) from case for 10 s maximum ..... +265°C
Unit inserted into PC board min. thickness 1/16 in. (1.59 mm) with solder contacting lead tips only ..... +300°C

*(For up to 4 outputs per device; add ± 25 mA for each additional output.)

File Number **1950**

RECOMMENDED OPERATING CONDITIONS:
For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range, V_{CC}*: (For T_A = Full Package-Temperature Range)			
AC Types	1.5	5.5	V
ACT Types	4.5	5.5	V
DC Input or Output Voltage, V_I, V_O	0	V_{CC}	V
Operating Temperature, T_A:			
CD74 Types	-40	+125	°C
CD54 Types	-55	+125	°C
Input Rise and Fall Slew Rate, dt/dv			
at 1.5 V to 3 V (AC Types)	0	50	ns/V
at 3.6 V to 5.5 V (AC Types)	0	20	ns/V
at 4.5 V to 5.5 V (ACT Types)	0	10	ns/V

*Unless otherwise specified, all voltages are referenced to ground.

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C						UNITS
				+25		0 to +70 -40 to +85		-40 to +125(74) -55 to +125(54)		
	V_I (V)	I_O (mA)		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V_{IH}			1.5	1.2	—	1.2	—	1.2	—	V
			3	2.1	—	2.1	—	2.1	—	
			5.5	3.85	—	3.85	—	3.85	—	
Low-Level Input Voltage V_{IL}			1.5	—	0.3	—	0.3	—	0.3	V
			3	—	0.9	—	0.9	—	0.9	
			5.5	—	1.65	—	1.65	—	1.65	
High-Level Output Voltage V_{OH}		-0.05	1.5	1.4	—	1.4	—	1.4	—	V
	V_{IH}	-0.05	3	2.9	—	2.9	—	2.9	—	
	or	-0.05	4.5	4.4	—	4.4	—	4.4	—	
	V_{IL}	-4	3	2.58	—	2.48	—	2.4	—	
		-24	4.5	3.94	—	3.8	—	3.7	—	
	#	-75	5.5	—	—	3.85	—	—	—	
	*	-50	5.5	—	—	—	—	3.85	—	
Low-Level Output Voltage V_{OL}		0.05	1.5	—	0.1	—	0.1	—	0.1	V
	V_{IH}	0.05	3	—	0.1	—	0.1	—	0.1	
	or	0.05	4.5	—	0.1	—	0.1	—	0.1	
	V_{IL}	12	3	—	0.36	—	0.44	—	0.5	
		24	4.5	—	0.36	—	0.44	—	0.5	
	#	75	5.5	—	—	—	1.65	—	—	
	*	50	5.5	—	—	—	—	—	1.65	
Input Leakage Current I_I	V_{CC} or GND		5.5	—	±0.1	—	±1	—	±1	μA
Quiescent Supply Current, SSI I_{CC}	V_{CC} or GND	0	5.5	—	4	—	40	—	80	μA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.
*Test verifies a minimum 50-ohm transmission-line-drive capability for 74AC/ACT Series, 75 ohms for 54AC/ACT Series.

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STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS		V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C						UNITS
				+25		0 to +70 -40 to +85		-40 to +125(74) -55 to +125(54)		
	V_I (V)	I_O (mA)		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V_{IH}			4.5 to 5.5	2	—	2	—	2	—	V
Low-Level Input Voltage V_{IL}			4.5 to 5.5	—	0.8	—	0.8	—	0.8	V
High-Level Output Voltage V_{OH}	V_{IH} or V_{IL}	-0.05	4.5	4.4	—	4.4	—	4.4	—	V
		-24	4.5	3.94	—	3.8	—	3.7	—	
	#	-75	5.5	—	—	3.85	—	—	—	
	*	-50	5.5	—	—	—	—	3.85	—	
Low-Level Output Voltage V_{OL}	V_{IH} or V_{IL}	0.05	4.5	—	0.1	—	0.1	—	0.1	V
		24	4.5	—	0.36	—	0.44	—	0.5	
	#	75	5.5	—	—	—	1.65	—	—	
	*	50	5.5	—	—	—	—	—	1.65	
Input Leakage Current I_I	V_{CC} or GND		5.5	—	±0.1	—	±1	—	±1	μA
Quiescent Supply Current, SSI I_{CC}	V_{CC} or GND	0	5.5	—	4	—	40	—	80	μA
Additional Quiescent Supply Current per Input Pin, TTL Inputs High, 1 Unit Load ΔI_{CC}	V_{CC}-2.1		4.5 to 5.5		2.4	—	2.8	—	3	mA

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.
*Test verifies a minimum 50-ohm transmission-line-drive capability for 74AC/ACT Series, 75 ohms for 54AC/ACT Series.

ACT INPUT LOADING TABLE

INPUT	UNIT LOADS*
All	0.3

*Unit load is ΔI_{CC} limit specified in Static Characteristic Chart, e.g., 2.4 mA max. @ 25°C.

CD54/74AC08
CD54/74ACT08

SWITCHING CHARACTERISTICS: AC Series; t_r, t_f = 3 ns, C_L = 50 pF

CHARACTERISTICS	SYMBOL	V_{CC} (V)	0 to +70°C -40 to +85°C		-40 to +125°C(74) -55 to +125°C(54)		UNITS
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Input to Output	t_{PLH} t_{PHL}	1.5 3.3* 5†	— 2.5 1.7	102 11.3 8.1	— 2.2 1.5	109 12.2 8.7	ns
Power Dissipation Capacitance	C_{PD}§	—	100 Typ.		100 Typ.		pF
Input Capacitance	C_I	—	—	10	—	10	pF

SWITCHING CHARACTERISTICS: ACT Series; t_r, t_f = 3 ns, C_L = 50 pF

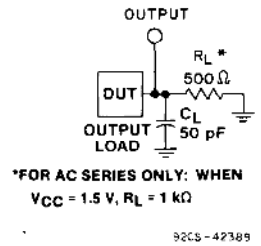
CHARACTERISTICS	SYMBOL	V_{CC} (V)	0 to +70°C -40 to +85°C		-40 to +125°C(74) -55 to +125°C(54)		UNITS
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Input to Output	t_{PLH} t_{PHL}	5†	2.6	12.9	2.4	13.8	ns
Power Dissipation Capacitance	C_{PD}§	—	115 Typ.		115 Typ.		pF
Input Capacitance	C_I	—	—	10	—	10	pF

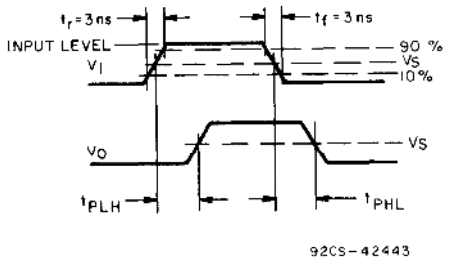
*3.3 V: min. is @ 3.6 V
max. is @ 3 V

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

5 V: min. is @ 5.25 V for 0 to +70°C
max. is @ 4.75 V for 0 to +70°C

§C_{PD} is used to determine the dynamic power consumption, per gate.
For AC series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$
For ACT series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L) + V_{CC} \Delta I_{CC}$ where f_i = input frequency
C_L = output load capacitance
V_{CC} = supply voltage.





	CD54/74AC	CD54/74ACT
Input Level	V_{CC}	3 V
Input Switching Voltage, V_S	0.5 V_{CC}	1.5 V
Output Switching Voltage, V_S	0.5 V_{CC}	0.5 V_{CC}

Fig. 1 - Propagation delay times and test circuit.