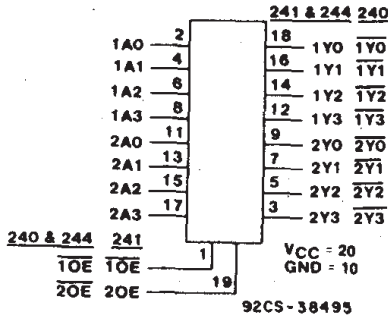


CD54/74AC240/241/244 CD54/74ACT240/241/244



Data sheet acquired from Harris Semiconductor
SCHS287



FUNCTIONAL DIAGRAM & TERMINAL ASSIGNMENT

Octal Buffer/Line Drivers, 3-State

- CD54/74AC/ACT240 - Inverting
- CD54/74AC/ACT241 - Non-Inverting
- CD54/74AC/ACT244 - Non-Inverting

Type Features:

- Buffered inputs
- Typical propagation delay:
3.6 ns @ $V_{CC} = 5V$, $T_A = 25^\circ C$, $C_L = 50 pF$

The RCA CD54/74AC240, CD54/74AC241, and CD54/74AC-244 and the CD54/74ACT240, CD54/74ACT241, and CD54/74ACT244 3-state octal buffer/line drivers use the RCA ADVANCED CMOS technology. The CD54/74AC/ACT240 and CD54/74AC/ACT244 have active-LOW output enables ($\overline{10E}$, $\overline{20E}$). The CD54/74AC/ACT241 has one active-LOW ($\overline{10E}$) and one active-HIGH (20E) output enable.

The CD74AC240, CD74AC241, and CD74AC244 and the CD74ACT240, CD74ACT241, and CD74ACT244 are supplied in 20-lead dual-in-line plastic packages (E suffix) and in 20-lead dual-in-line small-outline plastic packages (M suffix). Both package types are operable over the following temperature ranges: Commercial (0 to 70°C); Industrial (-40 to +85°C); and Extended Industrial/Military (-55 to +125°C).

The CD54AC240, CD54AC241, and CD54AC244 and the CD54ACT240, CD54ACT241, and CD54ACT244, available in chip form (H suffix), are operable over the -55 to +125°C temperature range.

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 consumption
- 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 Registered Trademark of Fairchild Semiconductor Corp.

TRUTH TABLES

INPUTS		OUTPUT	
$\overline{10E}$, $\overline{20E}$	A	Y	
L	L	H	
L	H	L	
H	X	Z	

(AC/ACT240)

INPUTS		OUTPUT	
$\overline{10E}$, $\overline{20E}$	A	Y	
L	L	L	
L	H	H	
H	X	Z	

(AC/ACT244)

INPUTS		OUTPUT		INPUTS		OUTPUT	
$\overline{10E}$	1A	1Y	20E	2A	2Y		
L	L	L	L	X	Z		
L	H	H	H	L	L		
H	X	Z	H	H	H		

(AC/ACT241)

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = HIGH Impedance

This data sheet is applicable to the CD54/74AC240, CD54ACT240, CD54AC241, and CD54/74ACT241. The CD74AC241 was not acquired from Harris Semiconductor. See SCHS244 for information on the CD74ACT240, CD74AC244, and CD74ACT244.

CD54/74AC240/241/244 CD54/74ACT240/241/244

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 $+100^\circ\text{C}$ (PACKAGE TYPE E)	500 mW
For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE E)	Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW
For $T_A = -55$ to $+70^\circ\text{C}$ (PACKAGE TYPE M)	400 mW
For $T_A = +70$ to $+125^\circ\text{C}$ (PACKAGE TYPE M)	Derate Linearly at 6 mW/ $^\circ\text{C}$ to 70 mW
OPERATING-TEMPERATURE RANGE (T_A)	-55 to $+125^\circ\text{C}$
STORAGE TEMPERATURE (T_{stg})	-65 to $+150^\circ\text{C}$
LEAD TEMPERATURE (DURING SOLDERING):	
At distance $1/16 \pm 1/32$ in. (1.59 ± 0.79 mm) from case for 10 s maximum	$+265^\circ\text{C}$
Unit inserted into PC board min. thickness $1/16$ in. (1.59 mm) with solder contacting lead tips only	$+300^\circ\text{C}$

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

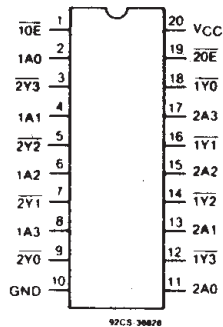
RECOMMENDED OPERATING CONDITIONS:

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

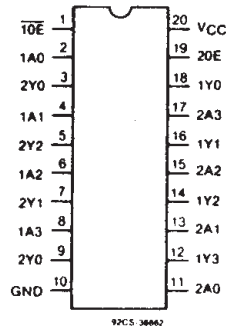
CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range, V_{CC} *: (For $T_A =$ Full Package-Temperature Range) AC Types ACT Types	1.5 4.5	5.5 5.5	V
DC Input or Output Voltage, V_I, V_O	0	V_{CC}	V
Operating Temperature, T_A	-55	$+125$	$^\circ\text{C}$
Input Rise and Fall Slew Rate, dt/dv at 1.5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

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

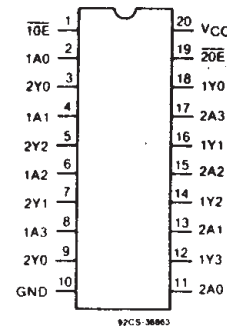
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**CD54/74AC, ACT240 TYPES
TERMINAL ASSIGNMENT**



**CD54/74AC, ACT241 TYPES
TERMINAL ASSIGNMENT**



**CD54/74AC, ACT244 TYPES
TERMINAL ASSIGNMENT**

CD54/74AC240/241/244

CD54/74ACT240/241/244

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS
				+25		-40 to +85		-55 to +125		
	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}	V _{IH} or V _{IL} #,*	-0.05	1.5	1.4	—	1.4	—	1.4	—	V
		-0.05	3	2.9	—	2.9	—	2.9	—	
		-0.05	4.5	4.4	—	4.4	—	4.4	—	
		-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}	V _{IH} or V _{IL} #,*	0.05	1.5	—	0.1	—	0.1	—	0.1	V
		0.05	3	—	0.1	—	0.1	—	0.1	
		0.05	4.5	—	0.1	—	0.1	—	0.1	
		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
3-State Leakage Current I _{OZ}	V _{IH} or V _{IL} V _O = V _{CC} or GND		5.5	—	±0.5	—	±5	—	±10	μA
Quiescent Supply Current, MSI I _{CC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	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 at +85°C, 75 ohms at +125°C.

CD54/74AC240/241/244 CD54/74ACT240/241/244

STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS	
				+25		-40 to +85		-55 to +125			
	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	
3-State Leakage Current	I _{OZ}	V _{IH} or V _{IL} V _O = V _{CC} or GND	5.5	—	±0.5	—	±5	—	±10	μA	
Quiescent Supply Current, MSI	I _{CC}	V _{CC} or GND	0	5.5	—	8	—	80	—	160	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	

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#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 at +85°C, 75 ohms at +125°C.

ACT INPUT LOADING TABLES

CD54/74ACT240	
INPUT	UNIT LOADS*
nA0 - A3	1.42
10E	0.83
20E	0.83

CD54/74ACT241	
INPUT	UNIT LOADS*
nA0 - A3	0.5
10E	0.83
20E	1.67

CD54/74ACT244	
INPUT	UNIT LOADS*
nA0 - A3	0.5
10E	0.83
20E	0.83

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

CD54/74AC240/241/244

CD54/74ACT240/241/244

SWITCHING CHARACTERISTICS: AC Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

CHARACTERISTICS	SYMBOL	V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Data to Outputs AC240	t_{PLH}	1.5	—	82	—	90	ns
	t_{PHL}	3.3*	2.6	9.2	2.5	10.1	
AC241, 244	t_{PLH}	1.5	—	93	—	103	ns
	t_{PHL}	3.3	3	10.5	2.9	11.5	
Output Enable Times	t_{PZL}	1.5	—	136	—	150	ns
	t_{PZH}	3.3	4.6	16.4	4.5	18	
Output Disable Times	t_{PLZ}	1.5	—	136	—	150	ns
	t_{PHZ}	3.3	3.9	13.6	3.8	15	
Power Dissipation Capacitance AC240 AC241, 244	$C_{PD}\ddagger$	—	65 Typ.		65 Typ.		pF
		—	71 Typ.		71 Typ.		
Min. (Valley) V_{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OHV} See Fig. 1	5	4 Typ. @ 25°C				V
Max. (Peak) V_{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OLP} See Fig. 1	5	1 Typ. @ 25°C				V
Input Capacitance	C_i	—	—	10	—	10	pF
3-State Output Capacitance	C_o	—	—	15	—	15	pF

SWITCHING CHARACTERISTICS: ACT Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

CHARACTERISTICS	SYMBOL	V_{CC} (V)	AMBIENT TEMPERATURE (T_A) - °C				UNITS
			-40 to +85		-55 to +125		
			MIN.	MAX.	MIN.	MAX.	
Propagation Delays: Data to Outputs ACT240	t_{PLH}	5†	2.3	7.8	2.2	8.6	ns
	t_{PHL}	5	2.5	8.7	2.4	9.6	
ACT241, 244	t_{PLH}	5	2.5	8.7	2.4	9.6	ns
	t_{PHL}	5	2.5	8.7	2.4	9.6	
Output Enable Times	t_{PZL}	5	3.5	12.2	3.4	13.4	ns
	t_{PZH}	5	3.5	12.2	3.4	13.4	
Output Disable Times	t_{PLZ}	5	3.5	12.2	3.4	13.4	ns
	t_{PHZ}	5	3.5	12.2	3.4	13.4	
Power Dissipation Capacitance ACT240 ACT241, 244	$C_{PD}\ddagger$	—	65 Typ.		65 Typ.		pF
		—	71 Typ.		71 Typ.		
Min. (Valley) V_{OH} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OHV} See Fig. 1	5	4 Typ. @ 25°C				V
Max. (Peak) V_{OL} During Switching of Other Outputs (Output Under Test Not Switching)	V_{OLP} See Fig. 1	5	1 Typ. @ 25°C				V
Input Capacitance	C_i	—	—	10	—	10	pF
3-State Output Capacitance	C_o	—	—	15	—	15	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

‡ C_{PD} is used to determine the dynamic power consumption, per package.

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

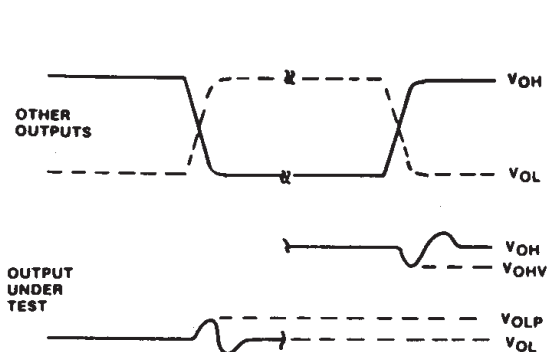
V_{CC} = supply voltage.

Technical Data

CD54/74AC240/241/244

CD54/74ACT240/241/244

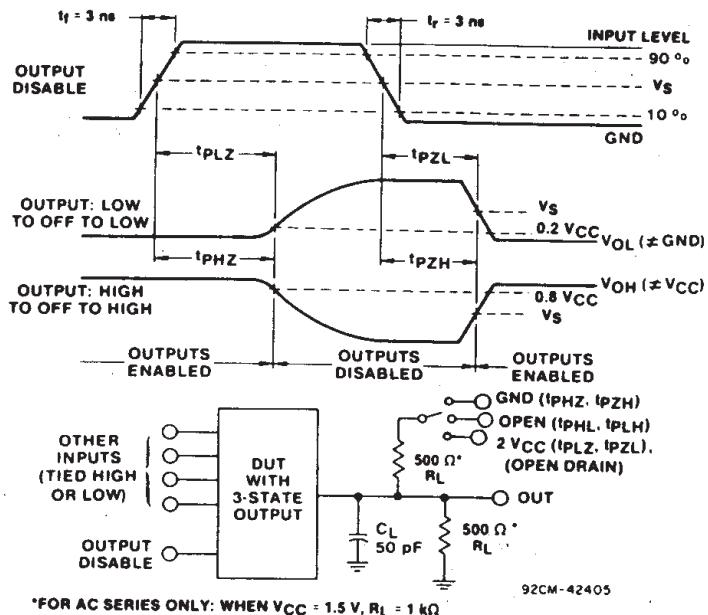
PARAMETER MEASUREMENT INFORMATION



NOTES:

- V_{OHV} and V_{OLP} ARE MEASURED WITH RESPECT TO A GROUND REFERENCE NEAR THE OUTPUT UNDER TEST.
- INPUT PULSES HAVE THE FOLLOWING CHARACTERISTICS:
PRR ≤ 1 MHz, t_r = 3 ns, t_f = 3 ns, SKEW 1 ns.
- R.F. FIXTURE WITH 700-MHz DESIGN RULES REQUIRED. IC SHOULD BE SOLDERED INTO TEST BOARD AND BYPASSED WITH 0.1 μF CAPACITOR. SCOPE AND PROBES REQUIRE 700-MHz BANDWIDTH.

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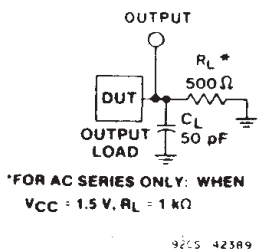


*FOR AC SERIES ONLY: WHEN V_{CC} = 1.5 V, R_L = 1 kΩ

92CM-42405

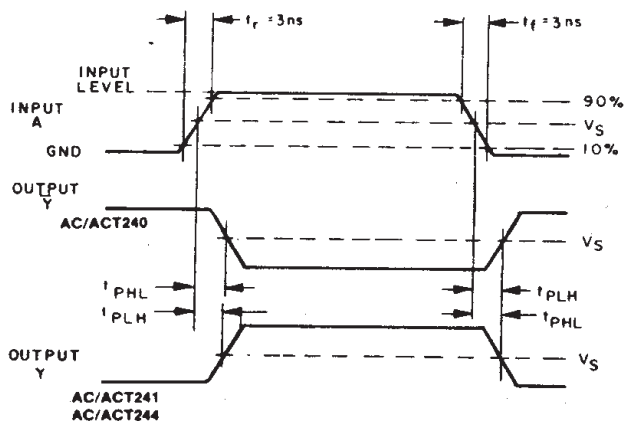
Fig. 1 - Simultaneous switching transient waveforms.

Fig. 2 - Three-state propagation delay times and test circuit.



*FOR AC SERIES ONLY: WHEN
V_{CC} = 1.5 V, R_L = 1 kΩ

92CS-42389



92CS-42407

Fig. 3 - Propagation delay times and test circuit.

	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}

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