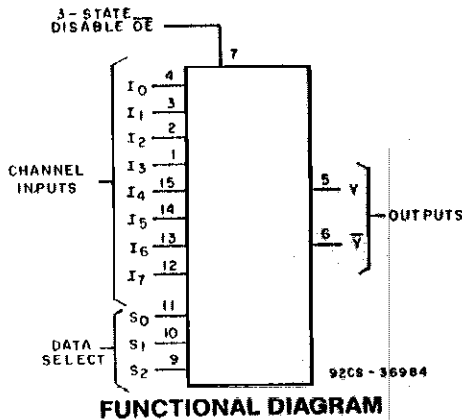


CD54/74AC251 CD54/74ACT251



8-Input Multiplexer, 3-State

Type Features:

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

The Harris CD54/74AC251 and CD54/74ACT251 8-input multiplexers use the Harris ADVANCED CMOS technology. This multiplexer features both true (Y) and complement (\bar{Y}) outputs as well as an Output Enable (\overline{OE}) input. The \overline{OE} must be at a LOW logic level to enable this device. When the \overline{OE} input is HIGH, both outputs are in the high-impedance state. When enabled, address information on the data select inputs determines which data input is routed to the Y and \bar{Y} outputs.

The CD74AC251 and CD74ACT251 are supplied in 16-lead dual-in-line plastic packages (E suffix) and in 16-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 CD54AC251 and CD54ACT251, 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-Latchup-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
- $\pm 24\text{-mA}$ output drive current
 - Fanout to 15 FAST* ICs
 - Drives 50-ohm transmission lines

*FAST is a Registered Trademark of Fairchild Semiconductor Corp.

TRUTH TABLE

INPUTS			OUTPUT ENABLE \overline{OE}	OUTPUTS	
SELECT				Y	\bar{Y}
S2	S1		S0		
X	X	X	H	Z	Z
L	L	L	L	I_0	\bar{I}_0
L	L	H	L	I_1	\bar{I}_1
L	H	L	L	I_2	\bar{I}_2
L	H	H	L	I_3	\bar{I}_3
H	L	L	L	I_4	\bar{I}_4
H	L	H	L	I_5	\bar{I}_5
H	H	L	L	I_6	\bar{I}_6
H	H	H	L	I_7	\bar{I}_7

H = High logic level X = Irrelevant
 L = Low logic level Z = High impedance (off)
 I_0, I_1, \dots, I_7 = The level of the respective input

Technical Data
CD54/74AC251
CD54/74ACT251

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	.....	$+300^\circ\text{C}$

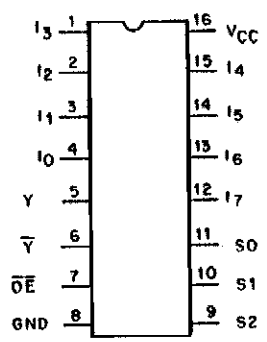
*For up to 4 outputs per device; add ± 25 mA for each additional output.

RECOMMENDED OPERATING CONDITIONS:

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

CHARACTERISTICS	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 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.



TERMINAL ASSIGNMENT

CD54/74AC251

CD54/74ACT251

STATIC ELECTRICAL CHARACTERISTICS: AC Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS
				+25		-40 to +85		-55 to +125		
				MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V _{IH}			1.5 3 5.5	1.2 2.1 3.85	— — —	1.2 2.1 3.85	— — —	1.2 2.1 3.85	— — —	V
Low-Level Input Voltage V _{IL}			1.5 3 5.5	— — —	0.3 0.9 1.65	— — —	0.3 0.9 1.65	— — —	0.3 0.9 1.65	V
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	—	—	—	
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.

Technical Data
CD54/74AC251
CD54/74ACT251

STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS		V _{CC} (V)	AMBIENT TEMPERATURE (T _A) - °C						UNITS
				+25		-40 to +85		-55 to +125		
				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

#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 TABLE

INPUT	UNIT LOAD*
S0, S1, S3	1
OE	1
I ₀ - I ₇	1

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

Technical Data

CD54/74AC251
CD54/74ACT251

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 Y Output	t_{PLH}	1.5	—	153	—	169	ns
	t_{PHL}	3.3*	4.9	17.2	4.7	18.9	
Data to \bar{Y} Output	t_{PLH}	1.5	—	169	—	186	ns
	t_{PHL}	3.3	5.4	19	5.2	20.9	
Select to Y Output	t_{PLH}	5	3.8	13.5	3.7	14.9	ns
	t_{PHL}	5	4.7	16.5	4.6	18.2	
Select to \bar{Y} Output	t_{PLH}	1.5	—	207	—	228	ns
	t_{PHL}	3.3	6.6	23.2	6.4	25.5	
Output Enable and Output Disable to Output	t_{PLH}	5	4.7	16.5	4.6	18.2	ns
	t_{PHL}	5	5.1	17.8	4.9	19.6	
Power Dissipation Capacitance	$C_{PD}\S$	—	120 Typ.		120 Typ.		pF
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

$\S C_{PD}$ is used to determine the dynamic power consumption, per device.
 $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$ where f_i = input frequency
 C_L = output load capacitance
 V_{CC} = supply voltage.

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 Y Output	t_{PLH}	5†	3.5	12.3	3.4	13.5	ns
	t_{PHL}						
Data to \bar{Y} Output	t_{PLH}	5	3.8	13.5	3.7	14.9	ns
	t_{PHL}						
Select to Y Output	t_{PLH}	5	4.7	16.5	4.6	18.2	ns
	t_{PHL}						
Select to \bar{Y} Output	t_{PLH}	5	5.1	17.8	4.9	19.6	ns
	t_{PHL}						
Output Enable and Output Disable to Output	t_{PZH}	5	3.5	12.3	3.4	13.5	ns
	t_{PZL}						
	t_{PHZ}						
	t_{PLZ}						
Power Dissipation Capacitance	$C_{PD}\S$	—	120 Typ.		120 Typ.		pF
Input Capacitance	C_i	—	—	10	—	10	pF
3-State Output Capacitance	C_o	—	—	15	—	15	pF

†5 V: min. is @ 5.5 V
max. is @ 4.5 V

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

Technical Data
CD54/74AC251
CD54/74ACT251

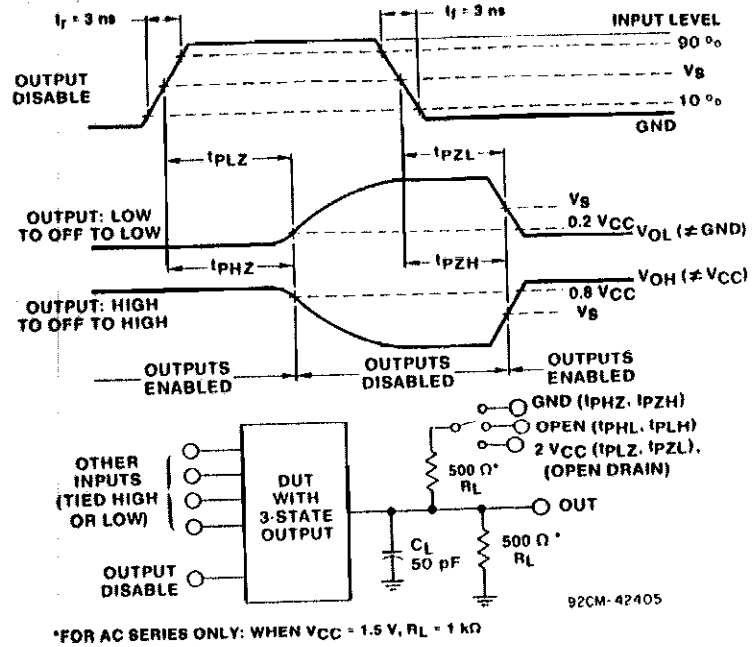


Fig. 1 - Three-state propagation delay times and test circuit.

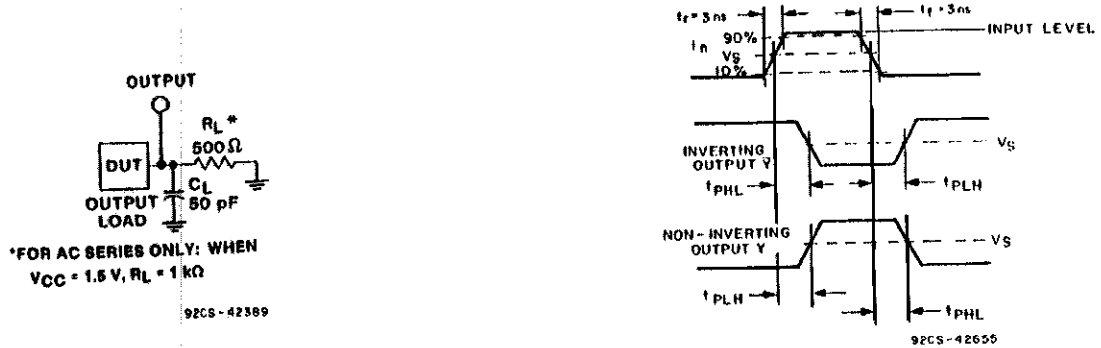


Fig. 2 - Propagation delay times and test circuit.

	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	$0.5 V_{CC}$	$0.5 V_{CC}$