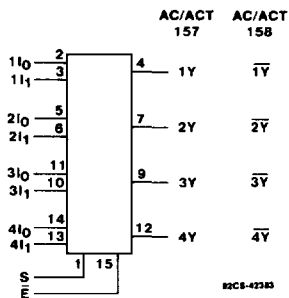


# CD54/74AC157, CD54/74AC158 CD54/74ACT157, CD54/74ACT158



FUNCTIONAL DIAGRAM

## Quad 2-Input Multiplexers

AC/ACT157 - Non-Inverting

AC/ACT158 - Inverting

### Type Features:

- Buffered inputs
- Typical propagation delay (AC/ACT158):  
3.8 ns @  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{ C}$ ,  $C_L = 50\text{ pF}$

The RCA CD54/74AC157, -158 and CD54/74ACT157, -158 quad 2-input multiplexers use the RCA ADVANCED CMOS technology. Both circuits can select four bits of data from two sources under the control of a common select input (S). The Enable input ( $\bar{E}$ ) is active LOW. When  $\bar{E}$  is HIGH, all of the outputs of the 158 are forced HIGH and in the 157, all of the outputs are forced LOW, regardless of all other input conditions.

The CD74AC/ACT157 and CD74AC/ACT158 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 CD54AC157, -158 and CD54ACT157, -158, available in chip form (H suffix), are operable over the -55 to +125°C temperature range.

### Family Features:

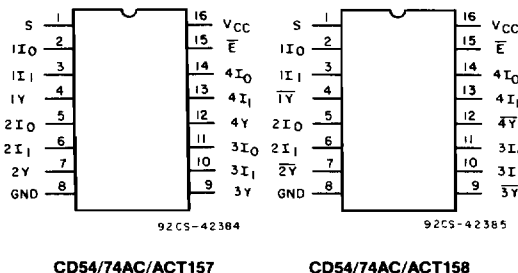
- Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015
- SCR-Latchup-resistant CMOS process and circuit design
- Speed of bipolar FAST®/AS/S with significantly reduced power consumption
- Balanced propagation delays
- AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the supply.
- ± 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 TABLE

Enable	Select Input	Data Inputs		Output	
		$I_0$	$I_1$	157	158
$\bar{E}$	S			Y	$\bar{Y}$
H	X	X	X	L	H
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

H = High level, L = Low level, X = Don't care



CD54/74AC/ACT157

CD54/74AC/ACT158

9

# CD54/74AC157, CD54/74AC158 CD54/74ACT157, CD54/74ACT158

**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)	.....	$\pm 20$ mA
DC OUTPUT DIODE CURRENT, $I_{OK}$ (for $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V)	.....	$\pm 50$ 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)	.....	$\pm 50$ mA
DC $V_{CC}$ or GROUND CURRENT ( $I_{CC}$ or $I_{GND}$ )	.....	$\pm 100$ 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. ( $1.59 \pm 0.79$ 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  $\pm 25$  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	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, $T_A$	-55	+125	$^\circ\text{C}$
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.

# CD54/74AC157, CD54/74AC158 CD54/74ACT157, CD54/74ACT158

**STATIC ELECTRICAL CHARACTERISTICS: AC Series**

CHARACTERISTICS	TEST CONDITIONS		V <sub>CC</sub> (V)	AMBIENT TEMPERATURE (T <sub>A</sub> ) - °C						UNITS
				+25		-40 to +85		-55 to +125		
	V <sub>I</sub> (V)	I <sub>O</sub> (mA)		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
High-Level Input Voltage V <sub>IH</sub>			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 <sub>IL</sub>			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 <sub>OH</sub>	V <sub>IH</sub> or V <sub>IL</sub> #,* {	-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 <sub>OL</sub>	V <sub>IH</sub> or V <sub>IL</sub> #,* {	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 <sub>I</sub>	V <sub>CC</sub> or GND		5.5	—	±0.1	—	±1	—	±1	μA
Quiescent Supply Current, MSI I <sub>CC</sub>	V <sub>CC</sub> 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.

# CD54/74AC157, CD54/74AC158 CD54/74ACT157, CD54/74ACT158

## STATIC ELECTRICAL CHARACTERISTICS: ACT Series

CHARACTERISTICS	TEST CONDITIONS		V <sub>CC</sub> (V)	AMBIENT TEMPERATURE (T <sub>A</sub> ) - °C						UNITS	
				+25		-40 to +85		-55 to +125			
				MIN.	MAX.	MIN.	MAX.	MIN.	MAX.		
High-Level Input Voltage	V <sub>IH</sub>		4.5 to 5.5	2	—	2	—	2	—	V	
Low-Level Input Voltage	V <sub>IL</sub>		4.5 to 5.5	—	0.8	—	0.8	—	0.8	V	
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IH</sub> or V <sub>IL</sub> #, *	-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 <sub>OL</sub>	V <sub>IH</sub> or V <sub>IL</sub> #, *	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 <sub>I</sub>	V <sub>CC</sub> or GND	5.5	—	±0.1	—	±1	—	±1	μA	
Quiescent Supply Current, MSI	I <sub>CC</sub>	V <sub>CC</sub> or GND	0	5.5	—	8	—	80	—	160	μA
Additional Quiescent Supply Current per Input Pin TTL Inputs High 1 Unit Load	ΔI <sub>CC</sub>	V <sub>CC</sub> -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*	
	157	158
I (All)	0.37	0.37
E	0.83	0.83
S	1.33	1.33

\*Unit load is ΔI<sub>CC</sub> limit specified in Static Characteristics Chart, e.g., 2.4 mA max. @ 25°C.

# CD54/74AC157, CD54/74AC158 CD54/74ACT157, CD54/74ACT158

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 Output	(157)	$t_{PLH}$ $t_{PHL}$	1.5	97	—	106	ns
			3.3*	10.8	3	11.9	
Enable to Output	(157)	$t_{PLH}$ $t_{PHL}$	5†	7.7	2.1	8.5	ns
			1.5	154	—	169	
Select to Output	(157)	$t_{PLH}$ $t_{PHL}$	3.3	17.2	4.7	18.9	ns
			5	12.3	3.4	13.5	
Data to Output	(158)	$t_{PLH}$ $t_{PHL}$	1.5	164	—	180	ns
			3.3	18.5	5.1	20.3	
Enable to Output	(158)	$t_{PLH}$ $t_{PHL}$	5	13.2	3.6	14.5	ns
			1.5	91	—	100	
Select to Output	(158)	$t_{PLH}$ $t_{PHL}$	3.3	12.8	2.8	11.2	ns
			5	7.3	2	8	
Power Dissipation Capacitance	(157) (158)	$C_{PD}\S$	—	156 Typ. 149 Typ.	—	156 Typ. 149 Typ.	pF
			—	—	10	—	
Input Capacitance	$C_i$	—	—	10	—	10	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 Output	(157)	$t_{PLH}$ $t_{PHL}$	5†	8.6	2.4	9.5	ns
			2.5	8.6	2.4	9.5	
Enable to Output	(157)	$t_{PLH}$ $t_{PHL}$	5	12.3	3.4	13.5	ns
Select to Output	(157)	$t_{PLH}$ $t_{PHL}$	5	13.2	3.6	14.5	ns
Data to Output	(158)	$t_{PLH}$ $t_{PHL}$	5	8.4	2.3	9.2	ns
Enable to Output	(158)	$t_{PLH}$ $t_{PHL}$	5	11.3	3.1	12.4	ns
Select to Output	(158)	$t_{PLH}$ $t_{PHL}$	5	12.3	3.4	13.5	ns
Power Dissipation Capacitance	(157) (158)	$C_{PD}\S$	—	156 Typ. 149 Typ.	—	156 Typ. 149 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

§ $C_{PD}$  is used to determine the dynamic power consumption, per function.

For AC Series,  $P_D = C_{PD}V_{CC}^2 f_i + \Sigma(C_L V_{CC}^2 f_o)$

For ACT Series,  $P_D = C_{PD}V_{CC}^2 f_i + \Sigma(C_L V_{CC}^2 f_o) + V_{CC} \Delta I_{CC}$

where  $f_i$  = input frequency

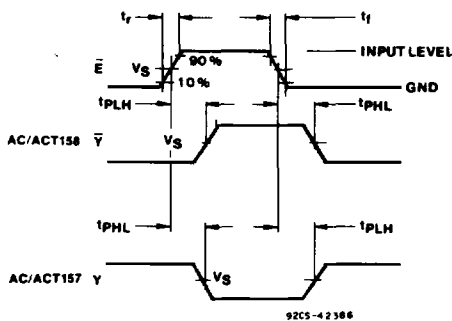
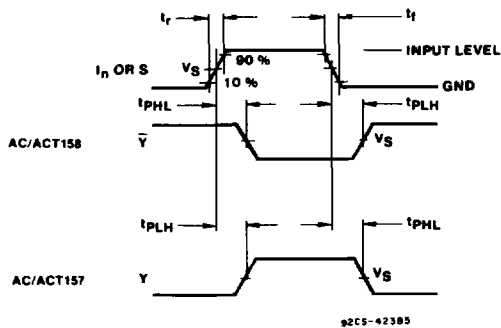
$f_o$  = output frequency

$C_L$  = output load capacitance

$V_{CC}$  = supply voltage.

9

**CD54/74AC157, CD54/74AC158**  
**CD54/74ACT157, CD54/74ACT158**



	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. 3 - Inputs or select to output propagation delays.

Fig. 4 -  $\overline{\text{Enable}}$  to output propagation delays.