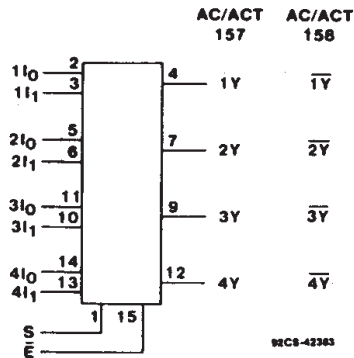




Data sheet acquired from Harris Semiconductor
SCHS283

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 $+85^\circ\text{C}$); and Extended Industrial/Military (-55 to $+125^\circ\text{C}$).

The CD54AC157, -158 and CD54ACT157, -158, available in chip form (H suffix), are operable over the -55 to $+125^\circ\text{C}$ temperature range.

Family Features:

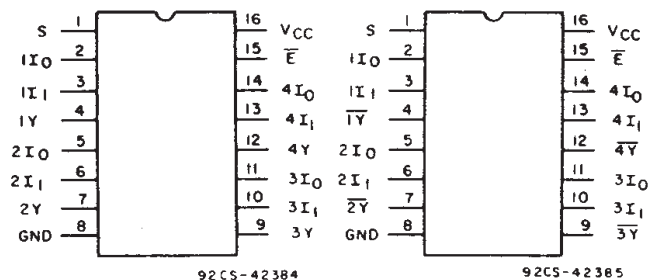
- Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015
- SCR-Latchup-resistant CMOS process and circuit design
- Speed of bipolar FAST®/AS/S with significantly reduced power consumption
- Balanced propagation delays
- AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the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

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

This data sheet is applicable to the CD54/74AC157 and CD74AC158. The CD54AC158, CD54ACT157, and CD54ACT158 were not acquired from Harris Semiconductor. See SCHS238 for information on the CD74ACT157 and CD74ACT158.

File Number 1910

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)	± 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	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 _{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
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.

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

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
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*	
	157	158
I (All)	0.37	0.37
$\bar{E}$	0.83	0.83
S	1.33	1.33

*Unit load is ΔI_{CC} 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 3.3* 5†	— 3.2 2.2	97 10.8 7.7	— 3 2.1	106 11.9 8.5	ns
Enable to Output	(157)	t _{PLH} t _{PHL}	1.5 3.3 5	— 5.1 3.6	154 17.2 12.3	— 4.7 3.4	169 18.9 13.5	ns
Select to Output	(157)	t _{PLH} t _{PHL}	1.5 3.3 5	— 5.4 3.8	164 18.5 13.2	— 5.1 3.6	180 20.3 14.5	ns
Data to Output	(158)	t _{PLH} t _{PHL}	1.5 3.3 5	— 3 2.2	91 12.8 7.3	— 2.8 2	100 11.2 8	ns
Enable to Output	(158)	t _{PLH} t _{PHL}	1.5 3.3 5	— 4.5 3.2	135 15.2 10.8	— 4.2 3	149 16.7 11.9	ns
Select to Output	(158)	t _{PLH} t _{PHL}	1.5 3.3 5	— 4.9 3.5	147 16.5 11.7	— 4.5 3.2	161 18.1 12.9	ns
Power Dissipation Capacitance	(157) (158)	C _{PD} §	—	156 Typ. 149 Typ.		156 Typ. 149 Typ.		pF
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†	2.5	8.6	2.4	9.5	ns
Enable to Output	(157) t _{PLH} t _{PHL}	5	3.6	12.3	3.4	13.5	ns
Select to Output	(157) t _{PLH} t _{PHL}	5	3.8	13.2	3.6	14.5	ns
Data to Output	(158) t _{PLH} t _{PHL}	5	2.4	8.4	2.3	9.2	ns
Enable to Output	(158) t _{PLH} t _{PHL}	5	3.3	11.3	3.1	12.4	ns
Select to Output	(158) t _{PLH} t _{PHL}	5	3.6	12.3	3.4	13.5	ns
Power Dissipation Capacitance	(157) (158) C _{PD} §	—	156 Typ. 149 Typ.		156 Typ. 149 Typ.		pF
Input Capacitance	C _I	—	—	10	—	10	pF

9

*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 function.

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

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

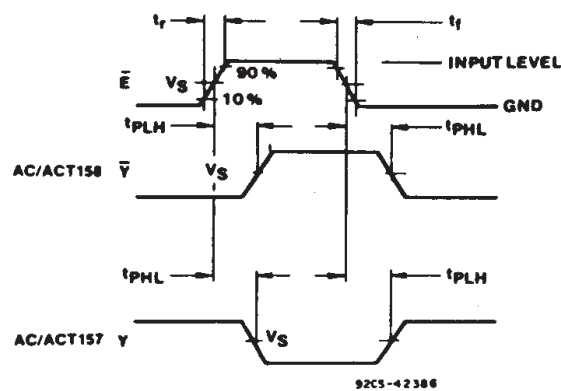
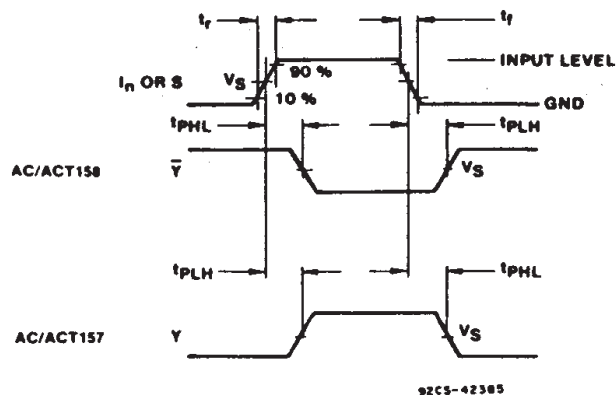
where f_i = input frequency

f_o = output frequency

C_L = output load capacitance

V_{CC} = supply voltage.

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 - $\bar{E}$ enable to output propagation delays.

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.