



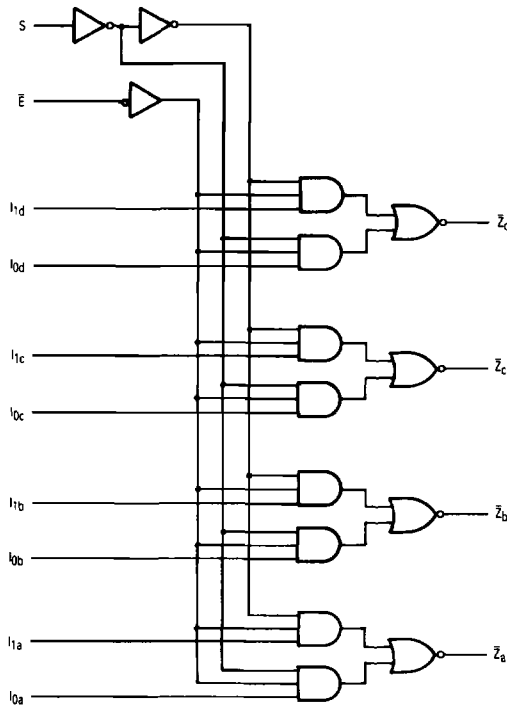
**MOTOROLA**

## Quad 2-Input Data Selector/Multiplexer With Inverted Outputs

**ELECTRICALLY TESTED PER:  
MIL-M-38510/33904**

The 54F158A is a high-speed quad 2-input multiplexer. It selects four bits of data from two sources using the common Select and Enable inputs. The four buffered outputs present the selected data in the true inverted form. The 'F158A can also be used to generate any four of the 16 different functions of two variables.

**LOGIC DIAGRAM**



## Military 54F158A



**AVAILABLE AS:**

- 1) JAN: JM38510/33904BXA
- 2) SMD: \*
- 3) 883C: 54F158A/BXAJC

**X = CASE OUTLINE AS FOLLOWS:  
PACKAGE: CERDIP: E  
CERFLAT: F  
LCC: 2**

**\*Call Factory for latest update**

**PIN ASSIGNMENTS**

FUNCTION	DIL	FLATS	LCC	BURN-IN (CONDITION A)
S	1	1	2	VCC
I0a	2	2	3	VCC
I1a	3	3	4	VCC
Za	4	4	5	OPEN
I0b	5	5	7	VCC
I1b	6	6	8	VCC
Zb	7	7	9	OPEN
GND	8	8	10	GND
Zd	9	9	12	OPEN
I1d	10	10	13	VCC
I0d	11	11	14	VCC
Zc	12	12	15	OPEN
I1c	13	13	17	VCC
I0c	14	14	18	VCC
E	15	15	19	VCC
VCC	16	16	20	VCC

**BURN-IN CONDITIONS:  
VCC = 5.0 V MIN/6.0 V MAX**

**TRUTH TABLE**

Inputs				Output
E	S	I0n	I1n	Zn
H	X	X	X	H
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

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

# 54F158A

## FUNCTIONAL DESCRIPTION

The F158A is a quad 2-input multiplexer. It selects four bits of data from two sources under the control of a common Select input (S) and presents the data in inverted form at the four outputs. The Enable input ( $\bar{E}$ ) is active LOW. When  $\bar{E}$  is HIGH, all of the outputs ( $\bar{Z}$ ) are forced HIGH regardless of all other inputs. The F158A is the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels

supplied to the Select input.

A common use of the F158A is the moving of data from two groups of registers to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The F158A can generate Four functions of two variables with one variable common. This is useful for implementing gating functions.

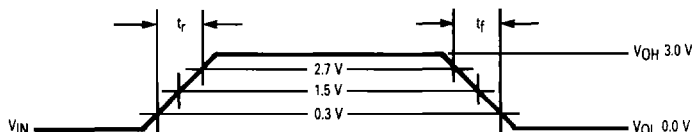
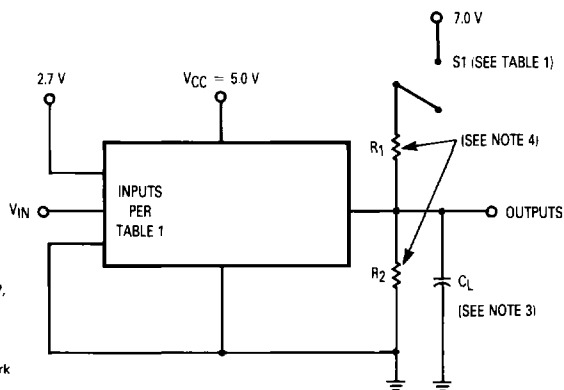
## AC TEST CIRCUIT

Table 1

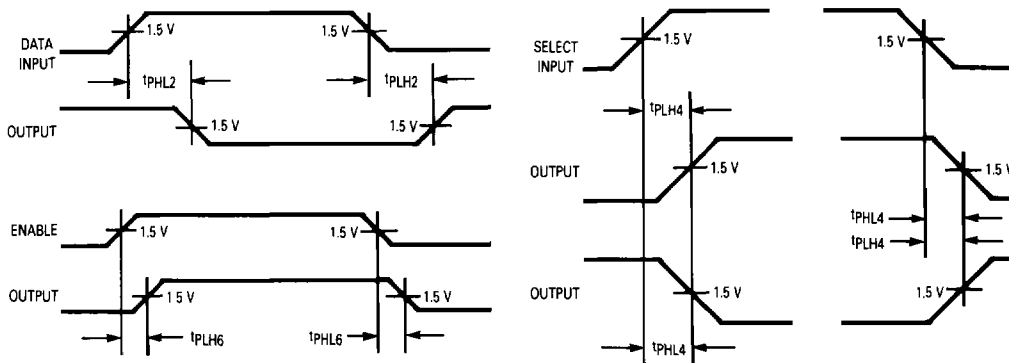
Test Type	S1
t <sub>PLH</sub>	open
t <sub>PHL</sub>	open
t <sub>PHZ</sub>	open
t <sub>PZH</sub>	open
t <sub>PLZ</sub>	closed
t <sub>PZL</sub>	closed

### NOTES:

1.  $V_{IN}$  = Input pulse and has the following characteristics:  
 $PRR \leq 1.0$  MHz,  $t_r = t_f \approx 2.5$  ns,  $Z_{IN} \approx 50 \Omega$ .
2. Terminal conditions (pins not designated may be high  $\geq 2.0$  V, low  $\leq 0.8$  V, or open).
3.  $C_L = 50$  pF  $\pm 10\%$  including scope probe, wiring and stray capacitance, without package in test fixture.
4.  $R_1 = R_2 = 499 \Omega \pm 5.0\%$ .
5. Voltage measurements are to be made with respect to network ground terminal.



## WAVEFORMS



54F158A

Symbol	Parameter	Limits						Units	Test Condition (Unless Otherwise Specified)
		+25°C		+125°C		-55°C			
		Subgroup 1		Subgroup 2		Subgroup 3			
		Min	Max	Min	Max	Min	Max		
V <sub>OH</sub>	Logical "1" Output Voltage	2.5		2.5		2.5		V	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -1.0 mA, V <sub>IH</sub> = 2.0 V, S = 0.8 V or 2.0 V, V <sub>IL</sub> = 0.8 V, $\bar{E}$ = 0.8 V.
V <sub>OL</sub>	Logical "0" Output Voltage		0.5		0.5		0.5	V	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 20 mA, V <sub>IL</sub> = 0.8 V, S = 0.8 V or 2.0 V, V <sub>IN</sub> = 2.0 V, $\bar{E}$ = 0.8 V.
V <sub>IC</sub>	Input Clamping Voltage		-1.2					V	V <sub>CC</sub> = 4.5 V, I <sub>IN</sub> = -18 mA, other inputs are open.
I <sub>IH</sub>	Logical "1" Input Current		20		20		20	μA	V <sub>CC</sub> = 5.5 V, V <sub>IH</sub> = 2.7 V, other inputs are open, $\bar{E}$ = 4.5 V or (2.7 V), S = 4.5 V, 0 V or (2.7 V).
I <sub>IHH</sub>	Logical "1" Input Current		100		100		100	μA	V <sub>CC</sub> = 5.5 V, V <sub>IHH</sub> = 7.0 V, other inputs are open, $\bar{E}$ = 4.5 V or (7.0 V), S = 4.5 V, 0 V or (7.0 V).
I <sub>IL</sub>	Logical "0" Input Current	-0.03	-0.6	-0.03	-0.6	-0.03	-0.6	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0.5 V, other inputs are open, $\bar{E}$ = 0 V, S = 0.5 V, 4.5 V or (0.5 V).
I <sub>OD</sub>	Diode Current	60		60		60		mA	V <sub>CC</sub> = 4.5 V, V <sub>IN</sub> = 5.5 V, other inputs are open, V <sub>OUT</sub> = 2.5 V, S & $\bar{E}$ = 0 V.
I <sub>OS</sub>	Output Short Circuit Current	-60	-150	-60	-150	-60	-150	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 4.5 V or 0 V, all other inputs are open, V <sub>OUT</sub> = 0 V, S = 0 V, $\bar{E}$ = 0 V.
I <sub>CC</sub>	Power Supply Current		15		15		15	mA	V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 4.5 V (all inputs).
V <sub>IH</sub>	Logical "1" Input Voltage	2.0		2.0		2.0		V	V <sub>CC</sub> = 4.5 V.
V <sub>IL</sub>	Logical "0" Input Voltage		0.8		0.8		0.8	V	V <sub>CC</sub> = 4.5 V.
	Functional Tests	Subgroup 7		Subgroup 8A		Subgroup 8B			per Truth Table with V <sub>CC</sub> = 4.5 V, (Repeat at), V <sub>CC</sub> = 5.5 V, V <sub>INL</sub> = 0.5 V, and V <sub>INH</sub> = 2.5 V.

54F158A

Symbol	Parameter	Limits						Units	Test Condition (Unless Otherwise Specified)
		+ 25°C		+ 125°C		- 55°C			
		Subgroup 1		Subgroup 2		Subgroup 3			
		Min	Max	Min	Max	Min	Max		
t <sub>PHL2</sub>	Propagation Delay /Data-Output I <sub>n</sub> to Z̄	1.5	4.0	1.5	5.0	1.5	5.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PLH2</sub>	Propagation Delay /Data-Output I <sub>n</sub> to Z̄	2.5	5.9	2.5	8.5	2.5	8.5	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PHL6</sub>	Propagation Delay /Data-Output Ē to Z̄ <sub>n</sub>	2.0	6.0	2.0	7.0	2.0	7.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PLH6</sub>	Propagation Delay /Data-Output Ē to Z̄ <sub>n</sub>	2.5	6.0	2.5	8.0	2.5	8.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PHL4</sub>	Propagation Delay /Data-Output S to Z̄	2.5	6.5	2.5	8.0	2.5	8.0	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.
t <sub>PLH4</sub>	Propagation Delay /Data-Output S to Z̄	3.0	8.5	3.0	10.5	3.0	10.5	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω.