



# 8-Input Data Selector/Multiplexer

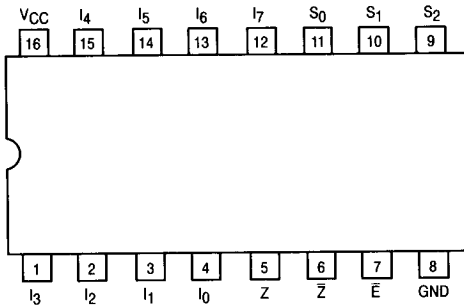
ELECTRICALLY TESTED PER:  
MIL-M-38510/33901

The 54F151 is a high-speed 8-input digital multiplexer. It provides in one package, the ability to select one line of data from up to eight sources. The 'F151 can be used as a universal function generator to generate any logic function of four variables. Both asserted and negated outputs are provided.

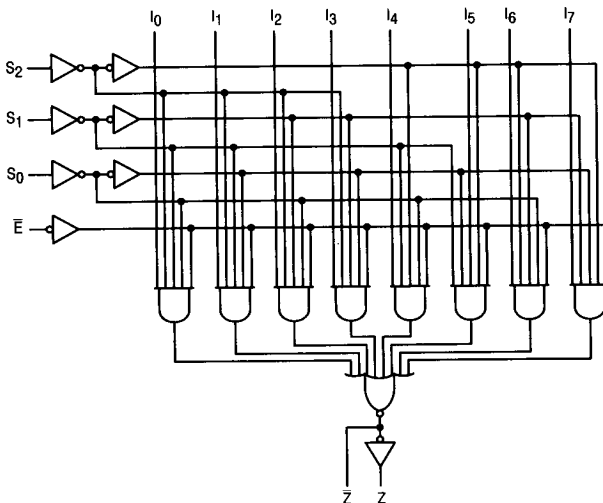
The 'F151 is a logic implementation of a single pole, 8-position switch with the switch position controlled by the state of the three Select inputs, S<sub>0</sub>, S<sub>1</sub>, S<sub>2</sub>. The Enable input ( $\bar{E}$ ) is active LOW. The logic function provided at the output is:

$$Z = \bar{E} \cdot (I_0 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_1 \cdot S_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_2 \cdot \bar{S}_0 \cdot S_1 \cdot \bar{S}_2 + I_3 \cdot S_0 \cdot S_1 \cdot \bar{S}_2 + I_4 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot S_2 + I_5 \cdot S_0 \cdot \bar{S}_1 \cdot S_2 + I_6 \cdot \bar{S}_0 \cdot S_1 \cdot S_2 + I_7 \cdot S_0 \cdot S_1 \cdot S_2)$$

### CONNECTION DIAGRAM



### LOGIC DIAGRAM



## Military 54F151



### AVAILABLE AS:

- 1) JAN: JM38510/33901BXA
- 2) SMD: N/A
- 3) 883: 54F151/BXAJC

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

THE LETTER "M" APPEARS BEFORE THE / ON LCC.

### PIN ASSIGNMENTS

FUNCT.	DIL 620-09	FLATS 650-05	LCC 756A-02	BURN-IN (COND. A)
I <sub>3</sub>	1	1	2	VCC
I <sub>2</sub>	2	2	3	VCC
I <sub>1</sub>	3	3	4	VCC
I <sub>0</sub>	4	4	5	VCC
Z	5	5	7	OPEN
$\bar{Z}$	6	6	8	OPEN
E	7	7	9	VCC
GND	8	8	10	GND
S <sub>2</sub>	9	9	12	VCC
S <sub>1</sub>	10	10	13	VCC
S <sub>0</sub>	11	11	14	VCC
I <sub>7</sub>	12	12	15	VCC
I <sub>6</sub>	13	13	17	VCC
I <sub>5</sub>	14	14	18	VCC
I <sub>4</sub>	15	15	19	VCC
VCC	16	16	20	VCC

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

Table 1

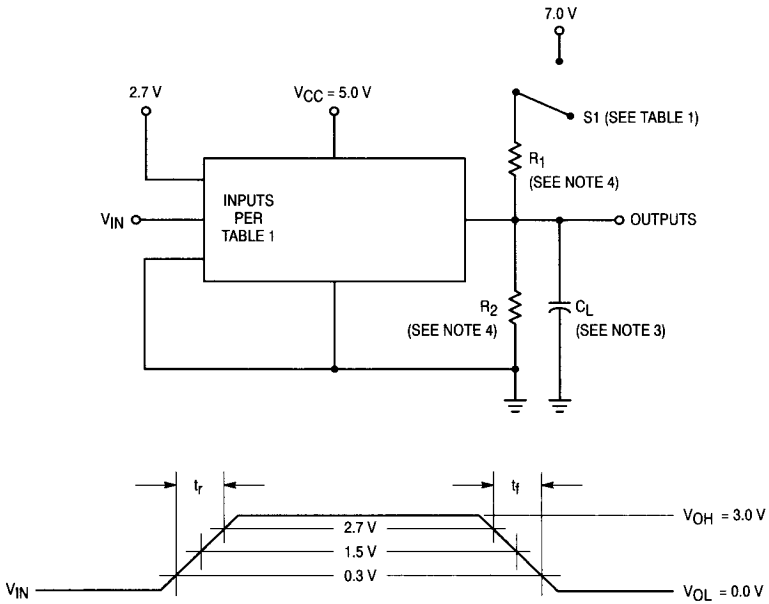
Test Type	S1
t <sub>PLH</sub>	open
t <sub>PHL</sub>	open
t <sub>PHZ</sub>	open
t <sub>PZH</sub>	open
t <sub>PLZ</sub>	closed
t <sub>PZL</sub>	closed

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TRUTH TABLE					
Inputs				Outputs	
$\bar{E}$	$S_2$	$S_1$	$S_0$	$\bar{Z}$	Z
H	X	X	X	H	L
L	L	L	L	$i_0$	$l_0$
L	L	L	H	$i_1$	$l_1$
L	L	H	L	$i_2$	$l_2$
L	L	H	H	$i_3$	$l_3$
L	H	L	L	$i_4$	$l_4$
L	H	L	H	$i_5$	$l_5$
L	H	H	L	$i_6$	$l_6$
L	H	H	H	$i_7$	$l_7$

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

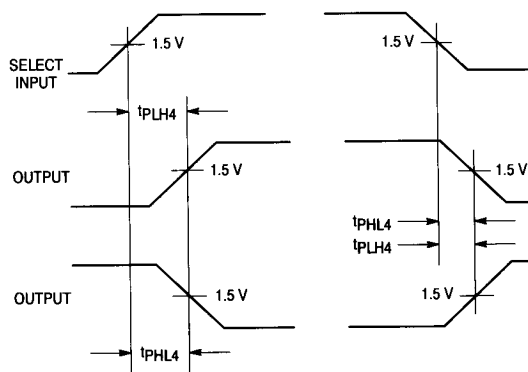
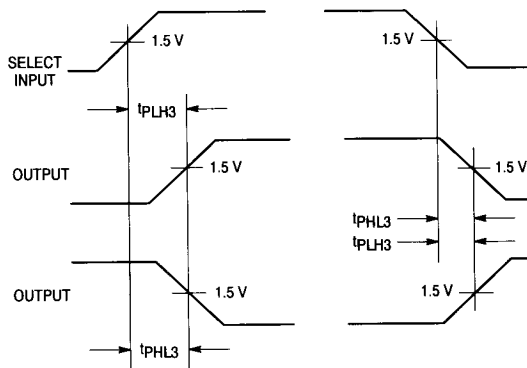
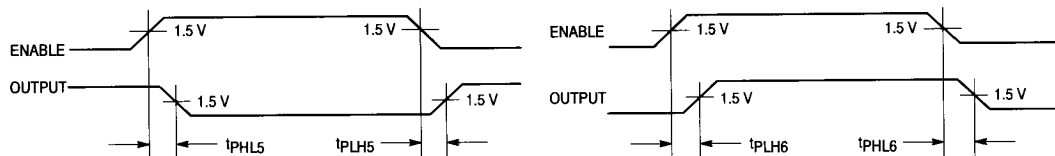
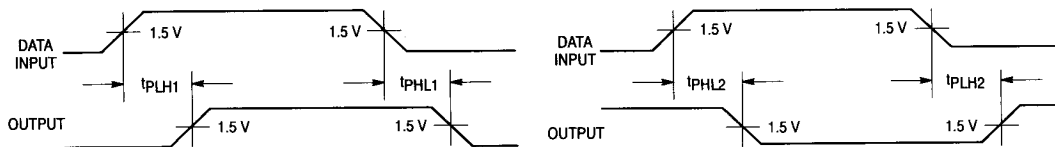
AC TEST CIRCUIT



REFERENCE NOTES ON PAGE 4-58

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## WAVEFORMS



### NOTES:

1. Input pulse and has the following characteristics:  
 $PRR \leq 1.0 \text{ MHz}$ ,  $t_r = t_f \leq 2.5 \text{ ns}$ ,  $Z_{OUT} \approx 50 \Omega$ .
2. Terminal conditions (pins not designated may be high  $\geq 2.0 \text{ V}$ , low  $\leq 0.8 \text{ V}$ , or open).
3.  $C_L = 50 \text{ pF} \pm 10\%$  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.

## 54F151

Symbol	Parameter	Limits						Unit	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>IL</sub> = 0.8 V, S = 0.8 V or 2.0 V, E = 2.0 V or 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>IH</sub> = 2.0 V, S = 0.8 V or 2.0 V, 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, E = 4.5 V or (2.7 V), S = 0 V, 4.5 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, E = 4.5 V or (7.0 V), S = 0 V, 4.5 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, E = 0 V or (0.5 V), S = 4.5 V, 0 V or (0.5 V).
I <sub>OD</sub>	Diode Current	60		60		60		mA	V <sub>CC</sub> = 4.5 V, other inputs are open, S = 0 V, V <sub>IN</sub> = 5.5 V, V <sub>OUT</sub> = 2.5 V, E = 5.5 V or 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, all other inputs are open, V <sub>OUT</sub> = 0 V, S = 0 V, E = 0 V.
I <sub>CC</sub>	Power Supply Current		21		21		21	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>IL</sub> = 0.5 V, and V <sub>IH</sub> = 2.5 V.

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Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
		+ 25°C		+ 125°C		- 55°C			
		Subgroup 9		Subgroup 10		Subgroup 11			
		Min	Max	Min	Max	Min	Max		
t <sub>PHL1</sub>	Propagation Delay /Data-Output I <sub>n</sub> to Z	3.7	7.0	3.5	9.0	3.5	9.0	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>PLH1</sub>	Propagation Delay /Data-Output I <sub>n</sub> to Z	3.0	6.5	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>PHL2</sub>	Propagation Delay /Data-Output I <sub>n</sub> to Z	1.5	4.0	1.5	6.0	1.5	6.0	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 Z	3.0	6.5	2.5	7.5	2.5	7.5	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>PHL3</sub>	Propagation Delay /Data-Output S <sub>n</sub> to Z	4.0	9.0	4.0	9.5	4.0	9.5	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>PLH3</sub>	Propagation Delay /Data-Output S <sub>n</sub> to Z	4.5	13	4.5	13.5	4.5	13.5	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>PHL4</sub>	Propagation Delay /Data-Output S <sub>n</sub> to Z	3.2	7.5	3.0	8.0	3.0	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 <sub>n</sub> to Z	4.0	9.0	3.5	11.5	3.5	11.5	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>PHL5</sub>	Propagation Delay /Data-Output E to Z	3.5	7.0	3.0	8.0	3.0	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>PLH5</sub>	Propagation Delay /Data-Output E to Z	5.0	9.5	4.0	12	4.0	12	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 E to Z	3.0	6.0	2.5	6.5	2.5	6.5	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>PLH6</sub>	Propagation Delay /Data-Output E to Z	3.0	6.1	3.0	7.5	3.0	7.5	ns	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = R <sub>2</sub> = 499 Ω

MOTOROLA MILITARY FAST/LS/TTL DATA

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