

April 1988 Revised September 2000

74F151A 8-Input Multiplexer

General Description

The F151A 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 F151A can be used as a

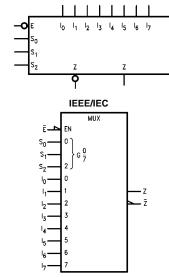
universal function generator to generate any logic function of four variables. Both assertion and negation outputs are provided

Ordering Code:

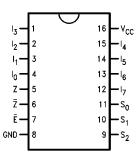
Order Number	Package Number	Package Description				
74F151ASC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow				
74F151ASJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide				
74F151APC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide				

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbols



Connection Diagram



Unit Loading/Fan Out

Pin Names	Description	U.L.	Input I _{IH} /I _{IL}	
Fill Names	Description	HIGH/LOW	Output I _{OH} /I _{OL}	
I ₀ –I ₇	Data Inputs	1.0/1.0	20 μA/-0.6 mA	
S ₀ -S ₂	Select Inputs	1.0/1.0	20 μA/–0.6 mA	
Ē	Enable Input (Active LOW)	1.0/1.0	20 μA/-0.6 mA	
Z	Data Output	50/33.3	–1 mA/20 mA	
Z	Inverted Data Output	50/33.3	–1 mA/20 mA	

Functional Description

The F151A is a logic implementation of a single pole, 8-position switch with the switch position controlled by the state of three Select inputs, $S_0,\,S_1,\,S_2.$ Both assertion and negation outputs are provided. The Enable input (\overline{E}) is active LOW. When it is not activated, the negation output is HIGH and the assertion output is LOW regardless of all other inputs. The logic function provided at the output is:

$$\begin{split} Z = \overline{E} \bullet (I_0 \ \overline{S}_2 \ \overline{S}_1 \ \overline{S}_0 + I_1 \ \overline{S}_2 \ \overline{S}_1 \ S_0 + I_2 \ \overline{S}_2 \ S_1 \ \overline{S}_0 + \\ I_3 \ \overline{S}_2 \ S_1 \ S_0 + I_4 \ S_2 \ \overline{S}_1 \ \overline{S}_0 + I_5 \ S_2 \ \overline{S}_1 \ S_0 + \end{split}$$

$$I_6 S_2 S_1 \overline{S}_0 + I_7 S_2 S_1 S_0$$

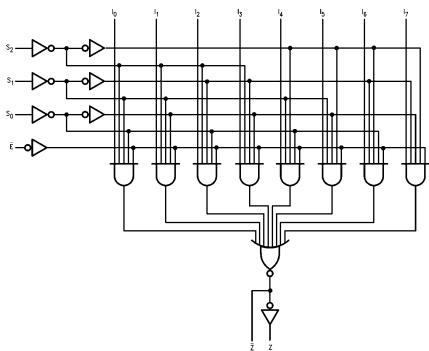
The F151A provides the ability, in one package, to select from eight sources of data or control information. By proper manipulation of the inputs, the F151A can provide any logic function of four variables and its negation.

Truth Table

	Inj	Out	puts		
Ē	S ₂	S ₁	S ₀	Z	Z
Н	Х	Х	Х	Н	L
L	L	L	L	Ī ₀	I _O
L	L	L	Н	Ī ₁	I ₁
L	L	Н	L	Ī ₂	l ₂
L	L	Н	Н	Ī ₃	l ₃
L	Н	L	L	\overline{I}_4	I ₄
L	Н	L	Н	Ī ₅	I ₅
L	Н	Н	L	Ī ₆	I ₆
L	Н	Н	Н	Ī ₇	I ₇

H = HIGH Voltage Level

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

L = LOW Voltage Level

X = Immaterial

Absolute Maximum Ratings(Note 1)

Recommended Operating Conditions

 $\begin{array}{ll} \mbox{Storage Temperature} & -65^{\circ}\mbox{C to } +150^{\circ}\mbox{C} \\ \mbox{Ambient Temperature under Bias} & -55^{\circ}\mbox{C to } +125^{\circ}\mbox{C} \\ \end{array}$

Ambient Temperature under Bias -55°C to +125°C

Junction Temperature under Bias -55°C to +150°C

V_{CC} Pin Potential to

Ground Pin -0.5V to +7.0V Input Voltage (Note 2) -0.5V to +7.0V Input Current (Note 2) -30 mA to +5.0 mA

Voltage Applied to Output in HIGH State (with V_{CC} = 0V)

 $\begin{array}{lll} \mbox{Standard Output} & -0.5\mbox{V to V}_{\mbox{CC}} \\ \mbox{3-STATE Output} & -0.5\mbox{V to } +5.5\mbox{V} \end{array}$

Current Applied to Output

in LOW State (Max) $\qquad \qquad \text{twice the rated I}_{\text{OL}} \, (\text{mA})$

Free Air Ambient Temperature 0°C to +70°C Supply Voltage +4.5V to +5.5V

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation

under these conditions is not implied.

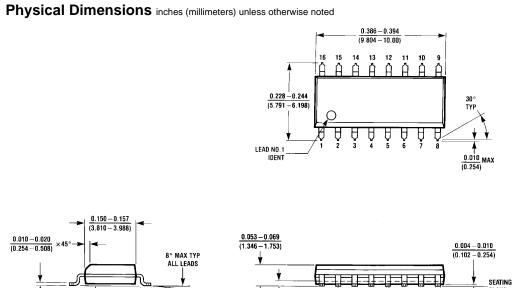
Note 2: Either voltage limit or current limit is sufficient to protect inputs.

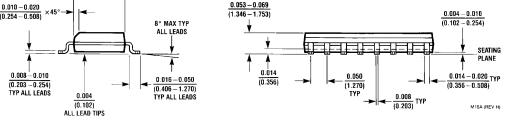
DC Electrical Characteristics

Symbol	Parameter		Min	Тур	Max	Units	V _{CC}	Conditions	
V _{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal	
V _{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal	
V _{CD}	Input Clamp Diode Voltage				-1.2	V	Min	$I_{IN} = -18 \text{ mA}$	
V _{OH}	Output HIGH	10% V _{CC}	2.5			V	NA:	I _{OH} = -1 mA	
	Voltage	5% V _{CC}	2.7			V	Min	$I_{OH} = -1 \text{ mA}$	
V _{OL}	Output LOW Voltage	10% V _{CC}			0.5	V	Min	I _{OL} = 20 mA	
I _{IH}	Input HIGH Current				5.0	μΑ	Max	$V_{IN} = 2.7V$	
I _{BVI}	Input HIGH Current				7.0	μА	Max	V _{IN} = 7.0V	
	Breakdown Test							$v_{IN} = 7.0 v$	
I _{CEX}	Output HIGH			50		Max	., ,,		
	Leakage Current				50	μА	IVIAX	$V_{OUT} = V_{CC}$	
V _{ID}	Input Leakage		4.75			V	0.0	$I_{ID} = 1.9 \mu A$	
	Test							All Other Pins Grounded	
I _{OD}	Output Leakage			3.75	μА	0.0	$V_{IOD} = 150 \text{ mV}$		
	Circuit Current	3.75 μΑ	μΑ	0.0	All Other Pins Grounded				
I _{IL}	Input LOW Current				-0.6	mA	Max	$V_{IN} = 0.5V$	
Ios	Output Short-Circuit Curre	ent	-60		-150	mA	Max	V _{OUT} = 0V	
Icc	Power Supply Current			13.5	21.0	mA	Max	$V_0 = HIGH$	

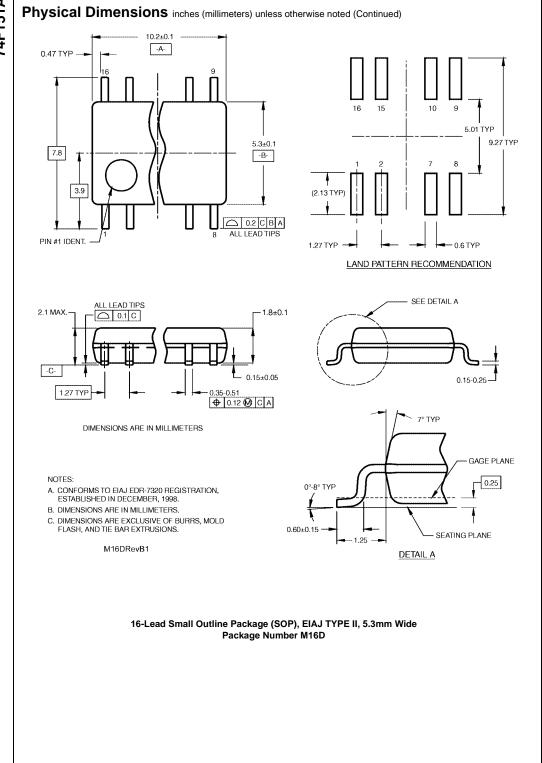
AC Electrical Characteristics

Symbol	Parameter		$T_A = +25$ °C $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$			$T_A = 0$ °C to +70°C $C_L = 50$ pF		
		Min	Тур	Max	Min	Max	†	
t _{PLH}	Propagation Delay	4.0	6.2	9.0	3.5	9.5	ns	
t _{PHL}	S_n to \overline{Z}	3.2	5.2	7.5	3.2	7.5		
t _{PLH}	Propagation Delay	4.5	7.5	10.5	4.5	12.0	ns	
t _{PHL}	S _n to Z	4.0	6.2	9.0	4.0	9.0		
t _{PLH}	Propagation Delay	3.0	4.7	6.1	3.0	7.0	ns	
t _{PHL}	E to Z	3.0	4.4	6.0	2.5	6.0		
t _{PLH}	Propagation Delay	5.0	7.0	9.5	4.0	10.5	ns	
t _{PHL}	E to Z	3.5	5.3	7.0	3.0	7.5		
t _{PLH}	Propagation Delay	3.0	4.8	6.5	3.0	7.0		
t _{PHL}	I_n to \overline{Z}	1.5	2.5	4.0	1.5	5.0	ns	
t _{PLH}	Propagation Delay	3.0	4.8	6.5	2.5	7.5		
t _{PHL}	I _n to Z	3.7	5.5	7.0	3.7	7.5	ns	





16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow Package Number M16A



Physical Dimensions inches (millimeters) unless otherwise noted (Continued) 0.740 - 0.780 0.090 (18.80 - 19.81)(2.286) 16 15 14 13 12 11 10 9 16 15 INDEX ARFA 0.250 ± 0.010 $\overline{(6.350 \pm 0.254)}$ PIN NO. 1 PIN NO. 1 1 2 3 4 5 6 7 8 1 2 IDENT OPTION 01 OPTION 02 0.065 $\frac{0.130 \pm 0.005}{(3.302 \pm 0.127)}$ $\frac{0.060}{(1.524)}$ TYP 4º TYP OPTIONAL (1.651)0.300 - 0.320 (7.620 - 8.128) 0.145 - 0.200 $\overline{(3.683 - 5.080)}$ 95° ± 5° $\frac{0.008 - 0.016}{(0.203 - 0.406)} \text{ TYP}$ 0.020 $\frac{0.280}{(7.112)}$ (0.508)0.125 - 0.150 (3.175 - 3.810) 0.030 ± 0.015 (0.762 ± 0.381) 0.014 - 0.0230.100 ± 0.010 (0.325 +0.040 -0.015 (0.356 - 0.584)0.050 ± 0.010 (2.540 ± 0.254) N16E (REV F) (1.270 ± 0.254)

16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N16E

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