FAIRCHILD SEMICONDUCTOR™

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74F151A
8-Input Multiplexer

General Description

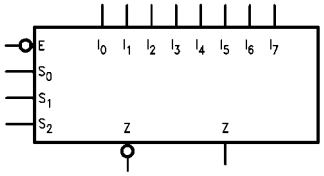
The F151A is a high-speed 8-input digital multiplexer. It provides in one package the ability to select one line of data from up to eight sources. The F151A can be used as a universal function generator to generate any logic function of four variables. Both assertion and negation outputs are provided.

Ordering Code:

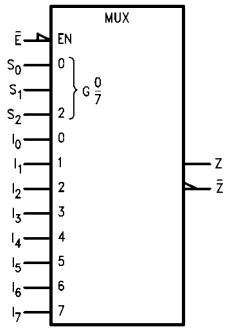
Order Number	Package Number	Package Description
74F151ASC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
74F151ASJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F151APC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

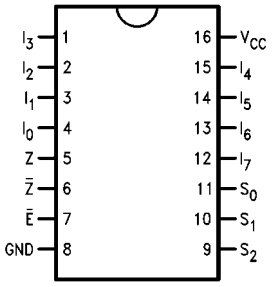
Logic Symbols



IEEE/IEC



Connection Diagram



Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} 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
$\overline{E}$	Enable Input (Active LOW)	1.0/1.0	20 µA/–0.6 mA
Z	Data Output	50/33.3	–1 mA/20 mA
$\overline{Z}$	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:

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

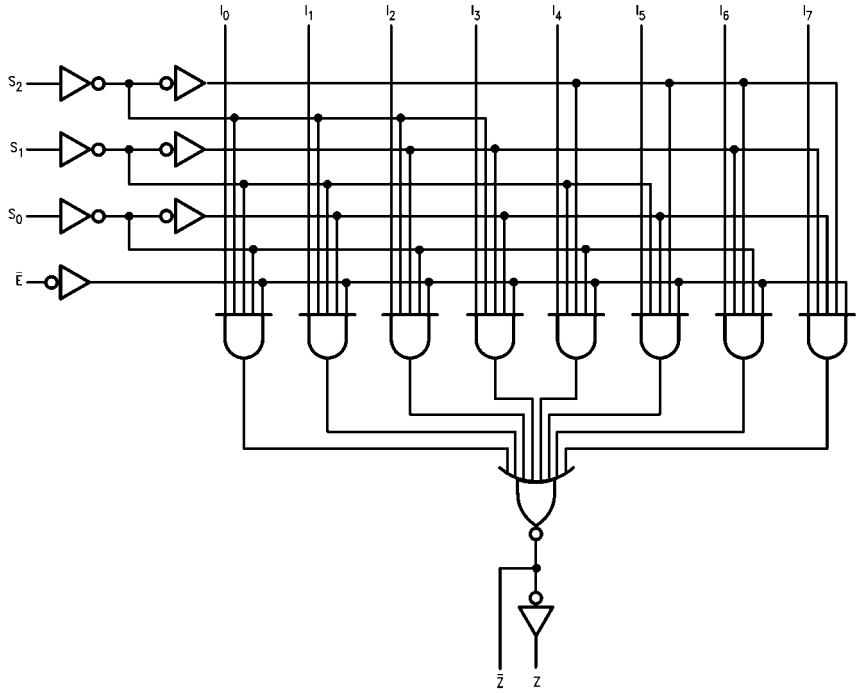
The F151A provides the ability, in one package, to select from eight sources of data or control information. By proper manipulation of the inputs, the F151A can provide any logic function of four variables and its negation.

Truth Table

Inputs				Outputs	
$\overline{E}$	S_2	S_1	S_0	$\overline{Z}$	Z
H	X	X	X	H	L
L	L	L	L	$\overline{I}_0$	I_0
L	L	L	H	$\overline{I}_1$	I_1
L	L	H	L	$\overline{I}_2$	I_2
L	L	H	H	$\overline{I}_3$	I_3
L	H	L	L	$\overline{I}_4$	I_4
L	H	L	H	$\overline{I}_5$	I_5
L	H	H	L	$\overline{I}_6$	I_6
L	H	H	H	$\overline{I}_7$	I_7

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

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.

Absolute Maximum Ratings(Note 1)

Storage Temperature	−65°C to +150°C
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)	
Standard Output	−0.5V to V_{CC}
3-STATE Output	−0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I_{OL} (mA)

Recommended Operating Conditions

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.

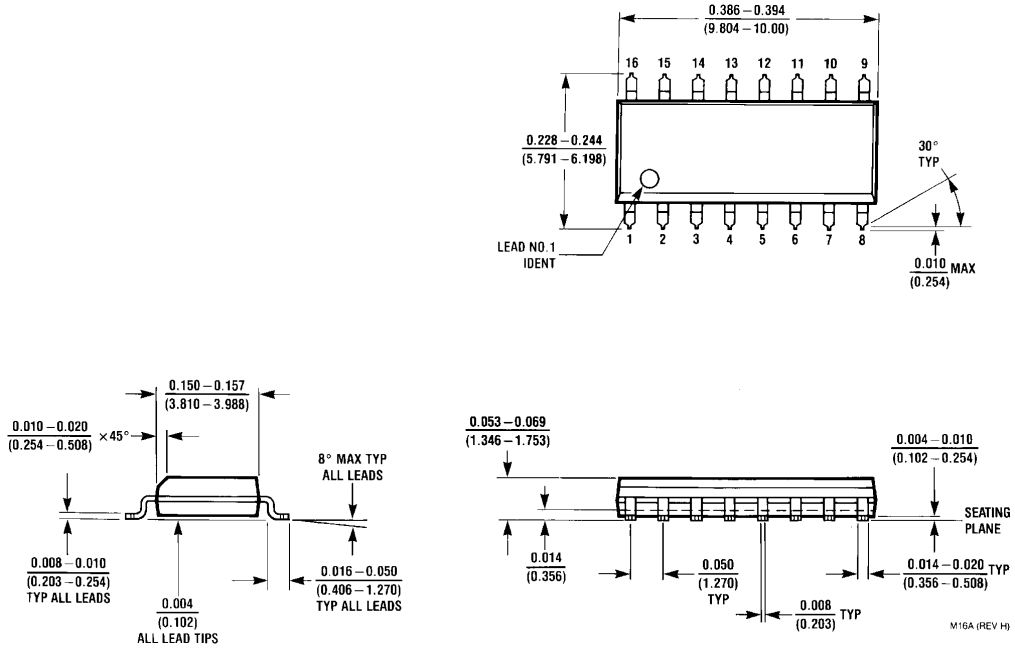
DC Electrical Characteristics

Symbol	Parameter		Min	Typ	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 mA
V_{OH}	Output HIGH Voltage	10% V_{CC}	2.5			V	Min	I_{OH} = −1 mA
		5% V_{CC}	2.7					I_{OH} = −1 mA
V_{OL}	Output LOW Voltage	10% V_{CC}			0.5	V	Min	I_{OL} = 20 mA
I_{IH}	Input HIGH Current				5.0	µA	Max	V_{IN} = 2.7V
I_{BVI}	Input HIGH Current Breakdown Test				7.0	µA	Max	V_{IN} = 7.0V
I_{CEX}	Output HIGH Leakage Current				50	µA	Max	V_{OUT} = V_{CC}
V_{ID}	Input Leakage Test		4.75			V	0.0	I_{ID} = 1.9 µA All Other Pins Grounded
I_{OD}	Output Leakage Circuit Current				3.75	µA	0.0	V_{IOD} = 150 mV All Other Pins Grounded
I_{IL}	Input LOW Current				−0.6	mA	Max	V_{IN} = 0.5V
I_{OS}	Output Short-Circuit Current		−60		−150	mA	Max	V_{OUT} = 0V
I_{CC}	Power Supply Current			13.5	21.0	mA	Max	V_O = HIGH

AC Electrical Characteristics

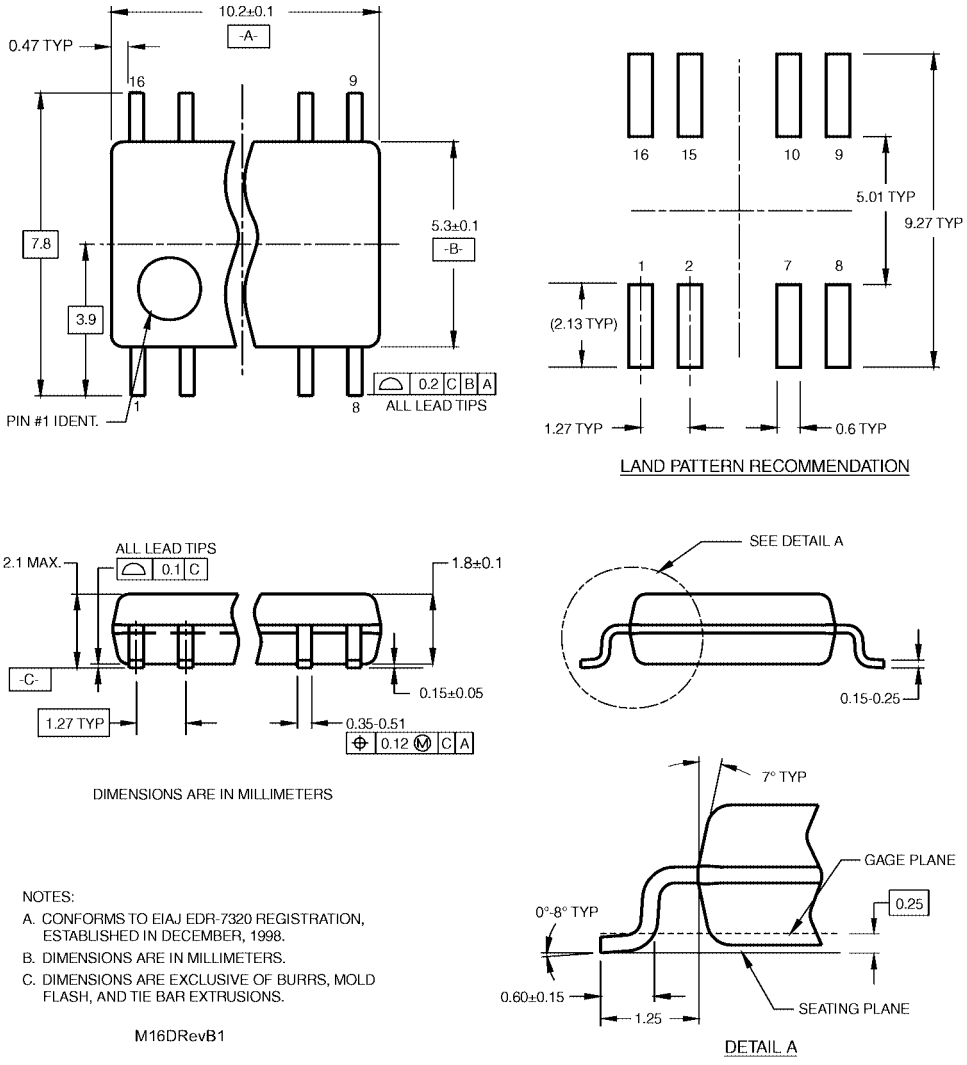
Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF			$T_A = 0°C$ to $+70°C$, $C_L = 50$ pF		Units
		Min	Typ	Max	Min	Max	
t_{PLH}	Propagation Delay	4.0	6.2	9.0	3.5	9.5	ns
t_{PHL}	S_n to $\overline{Z}$	3.2	5.2	7.5	3.2	7.5	
t_{PLH}	Propagation Delay	4.5	7.5	10.5	4.5	12.0	ns
t_{PHL}	S_n to Z	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}	$\overline{E}$ to $\overline{Z}$	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}	$\overline{E}$ 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	ns
t_{PHL}	I_n to $\overline{Z}$	1.5	2.5	4.0	1.5	5.0	
t_{PLH}	Propagation Delay	3.0	4.8	6.5	2.5	7.5	ns
t_{PHL}	I_n to Z	3.7	5.5	7.0	3.7	7.5	

Physical Dimensions inches (millimeters) unless otherwise noted



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

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

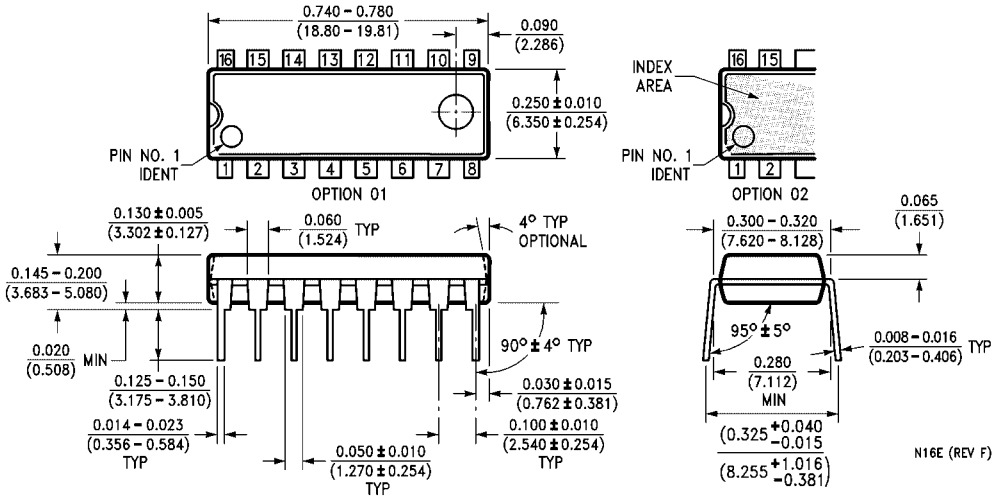
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1

16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M16D

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



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