

FAIRCHILD
SEMICONDUCTOR™

April 1988
Revised September 2000

74F157A Quad 2-Input Multiplexer

General Description

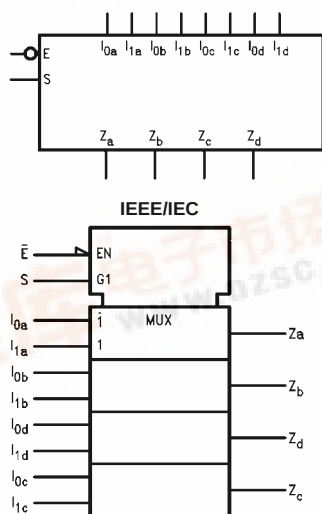
The F157A is a high-speed quad 2-input multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four outputs present the selected data in the true (non-inverted) form. The F157A can also be used to generate any four of the 16 different functions to two variables.

Ordering Code:

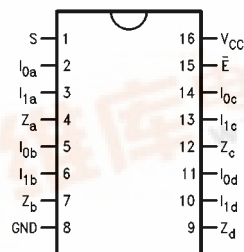
Order Number	Package Number	Package Description
74F157ASC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
74F157ASJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F157APC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

Logic Symbols



Connection Diagram



74F157A Quad 2-Input Multiplexer



Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
$I_{0a}-I_{0d}$	Source 0 Data Inputs	1.0/1.0	20 $\mu A/-0.6$ mA
$I_{1a}-I_{1d}$	Source 1 Data Inputs	1.0/1.0	20 $\mu A/-0.6$ mA
$\bar{E}$	Enable Input (Active LOW)	1.0/1.0	20 $\mu A/-0.6$ mA
S	Select Input	1.0/1.0	20 $\mu A/-0.6$ mA
Z_a-Z_d	Outputs	50/33.3	-1 mA/20 mA

Truth Table

Inputs				Output
$\bar{E}$	S	I_0	I_1	Z
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

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

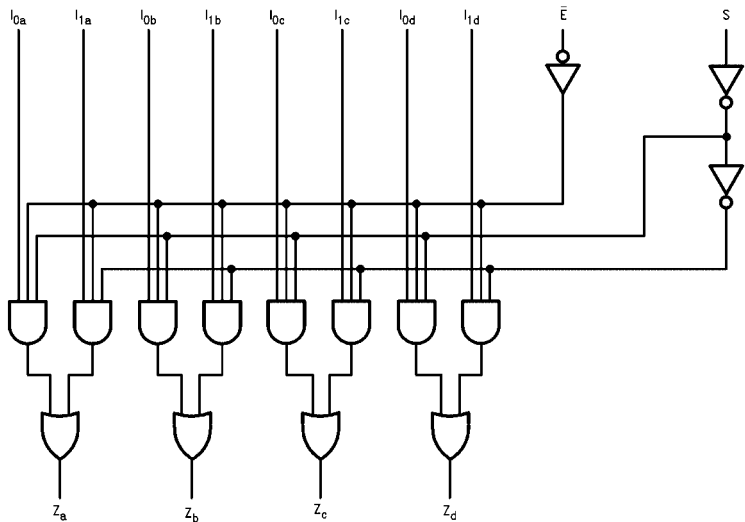
Functional Description

The F157A is a quad 2-input multiplexer. It selects 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 (Z) are forced LOW regardless of all other inputs. The F157A 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. The logic equations for the outputs are shown below:

$$Z_n = \bar{E} \cdot (I_{1n}S + I_{0n}\bar{S})$$

A common use of the F157A 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 F157A can generate any four of the 16 different functions of two variables with one variable common. This is useful for implementing highly irregular logic.

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)
ESD Last Passing Voltage (Min)	4000V

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.

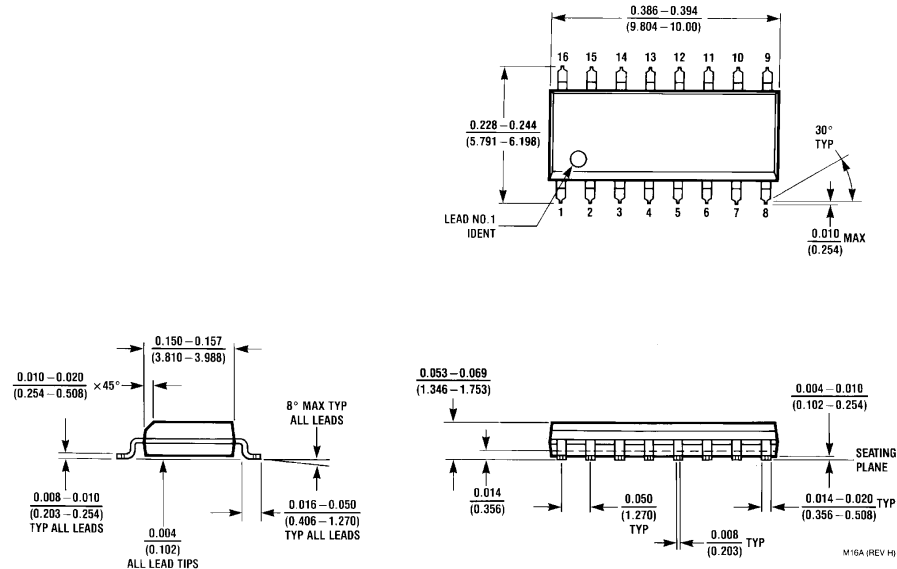
DC Electrical Characteristics

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} 5% V _{CC}	2.5 2.7		V	Min	I _{OH} = –1 mA 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 _{CCH}	Power Supply Current		15	23	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current		15	23	mA	Max	V _O = LOW

AC Electrical Characteristics

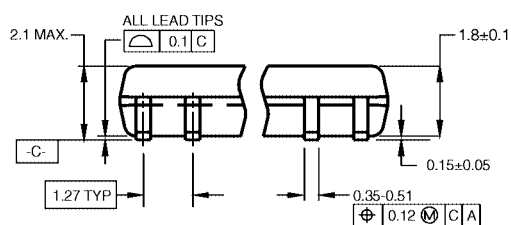
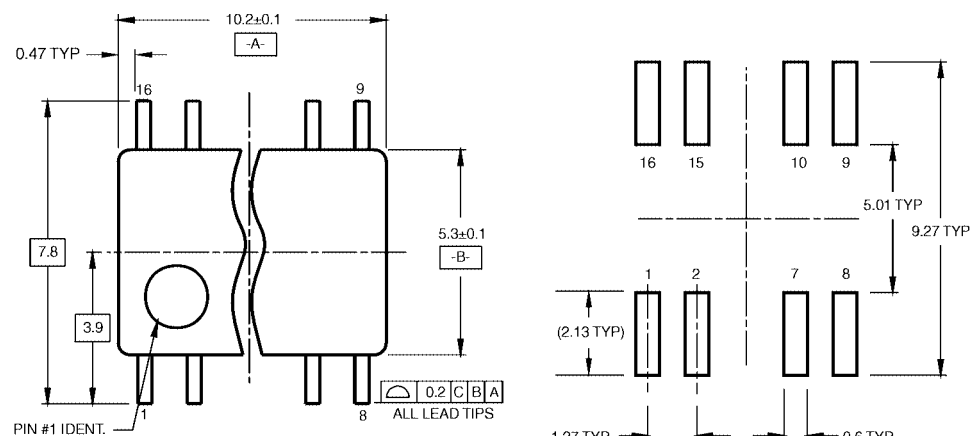
Symbol	Parameter	T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A = –55°C to +125°C V _{CC} = +5.0V C _L = 50 pF		T _A = 0°C to +70°C V _{CC} = +5.0V C _L = 50 pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
t _{PLH}	Propagation Delay S to Z _n	4.0	7.0	10.0	4.0	12.0	4.0	11.0	ns
t _{PHL}		3.0	5.0	7.0	3.0	9.0	3.0	8.0	
t _{PLH}	Propagation Delay Ē to Z _n	5.0	7.0	9.5	5.0	13.0	5.0	11.0	ns
t _{PHL}		2.5	4.5	6.5	2.5	7.5	2.5	7.0	
t _{PLH}	Propagation Delay I _n to Z _n	2.5	4.5	6.0	2.5	7.5	2.5	6.5	ns
t _{PHL}		2.5	4.0	5.5	1.5	7.5	2.0	7.0	

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)

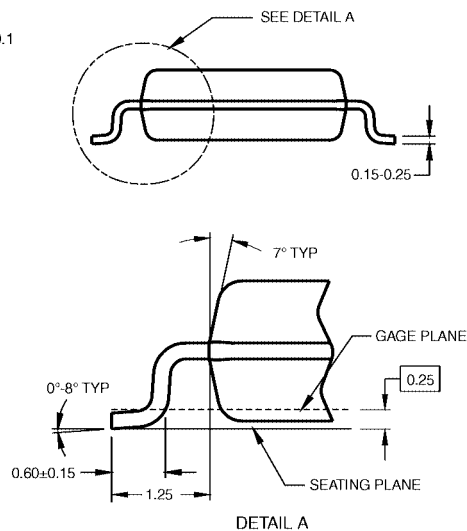


DIMENSIONS ARE IN MILLIMETERS

NOTES:

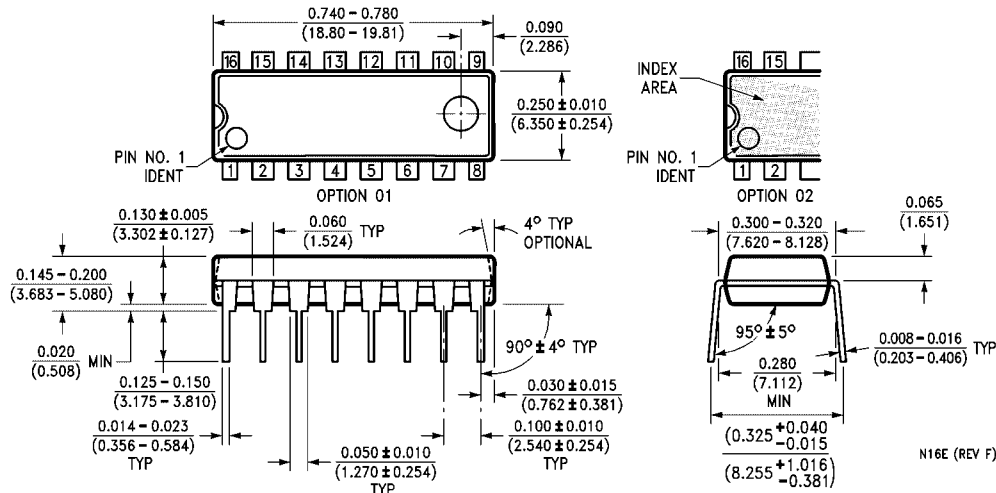
- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1



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

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



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