April 1988 Revised September 2000 74F157A Quad 2-Input Multiplexer

SEMICONDUCTOR IM

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:

16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
•	16E

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

	Description	U.L.	Input I _{IH} /I _{IL}		
Pin Names	Description	HIGH/LOW	Output I _{OH} /I _{OL}		
I _{0a} –I _{0d}	Source 0 Data Inputs	1.0/1.0	20 µA/–0.6 mA		
I _{1a} —I _{1d}	Source 1 Data Inputs	1.0/1.0	20 µA/–0.6 mA		
Ē	Enable Input (Active LOW)	1.0/1.0	20 µA/–0.6 mA		
S	Select Input	1.0/1.0	20 μA/–0.6 mA		
Z _a –Z _d	Outputs	50/33.3	–1 mA/20 mA		

Truth Table

	Output			
Ē	S	I ₀	I ₁	z
Н	Х	Х	Х	L
L	н	Х	L	L
L	н	х	н	н
L	L	L	х	L
L	L	Н	Х	Н

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 (\overline{E}) is active LOW. When 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:

$Z_n = \overline{E} \bullet (I_{1n}S + I_{0n} \overline{S})$

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.



Absolute Maximum Ratings(Note 1)

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	$-55^{\circ}C$ to $+125^{\circ}C$
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 Supply Voltage 74F157A

0°C to +70°C +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
VIH	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signa
VIL	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	IIGH 10% V _{CC}				V	Min	I _{OH} = -1 mA
	Voltage	5% V_{CC}	2.7			v	IVIIII	$I_{OH} = -1 \text{ mA}$
V _{OL}	Output LOW Voltage	10% V _{CC}			0.5	V	Min	I _{OL} = 20 mA
Ι _{ΙΗ}	Input HIGH Current				5.0	μΑ	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test				7.0	μΑ	Max	V _{IN} = 7.0V
ICEX	Output HIGH Leakage Current				50	μΑ	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	μΑ	0.0	V _{IOD} = 150 mV All Other Pins Grounded
IIL	Input LOW Current				-0.6	mA	Max	$V_{IN} = 0.5V$
los	Output Short-Circuit Current		-60		-150	mA	Max	$V_{OUT} = 0V$
I _{CCH}	Power Supply Current			15	23	mA	Max	V _O = HIGH
ICCL	Power Supply Current			15	23	mA	Max	$V_0 = LOW$

AC Electrical Characteristics

Symbol	Parameter	$T_A = +25^{\circ}C$ $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$			$T_A = -55^{\circ}C \text{ to } +125^{\circ}C$ $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$		$T_{A} = 0^{\circ}C \text{ to } +70^{\circ}C$ $V_{CC} = +5.0V$ $C_{L} = 50 \text{ pF}$		Units
		Min	Тур	Max	Min	Max	Min	Max	
t _{PLH}	Propagation Delay	4.0	7.0	10.0	4.0	12.0	4.0	11.0	
t _{PHL}	S to Z _n	3.0	5.0	7.0	3.0	9.0	3.0	8.0	ns
t _{PLH}	Propagation Delay	5.0	7.0	9.5	5.0	13.0	5.0	11.0	
t _{PHL}	E to Z _n	2.5	4.5	6.5	2.5	7.5	2.5	7.0	ns
t _{PLH}	Propagation Delay	2.5	4.5	6.0	2.5	7.5	2.5	6.5	
t _{PHL}	I _n to Z _n	2.5	4.0	5.5	1.5	7.5	2.0	7.0	ns







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