MOTOROLA

MC74F157A

QUAD 2-INPUT MULTIPLEXER

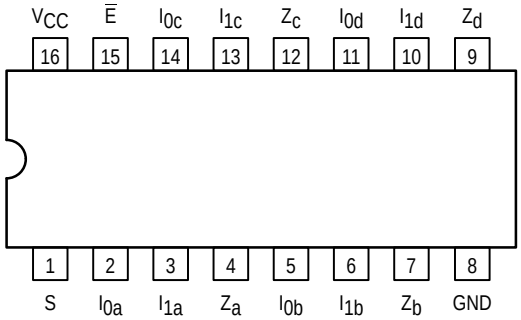
The MC74F157A is a high-speed quad 2-input multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four buffered outputs present the selected data in the true (non-inverted) form. The F157A can also be used to generate any four of the 16 different functions to two variables.

- AC Enhanced Version of the F157

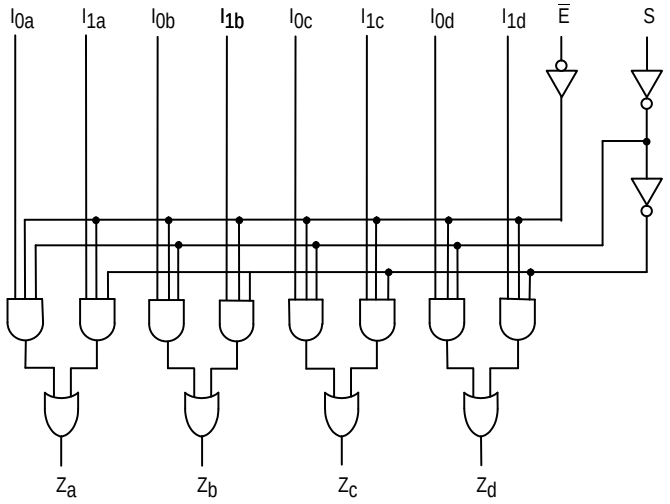
QUAD 2-INPUT MULTIPLEXER

FAST™ SHOTTKY TTL

CONNECTION DIAGRAM DIP (TOP VIEW)



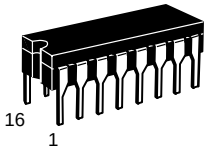
LOGIC DIAGRAM



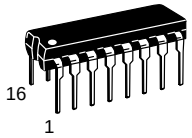
FUNCTION TABLE

Inputs				Output
$\overline{E}$	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

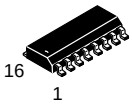
H = HIGH Voltage Level; L = LOW Voltage Level; X = Don't Care



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08

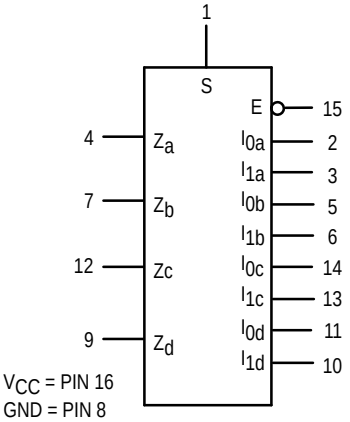


D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

MC74FXXXJ	Ceramic
MC74FXXXN	Plastic
MC74FXXXD	SOIC

LOGIC SYMBOL



GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	74	4.5	5.0	5.5	V
T_A	Operating Ambient Temperature Range	74	0	25	70	°C
I_{OH}	Output Current — High	74			–1.0	mA
I_{OL}	Output Current — Low	74			20	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits Min	Limits Typ	Limits Max	Unit	Test Conditions	
V_{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage	
V_{IL}	Input LOW Voltage				0.8	V	Guaranteed Input LOW Voltage	
V_{IK}	Input Clamp Diode Voltage				–1.2	V	I_{IN} = –18 mA	V_{CC} = MIN
V_{OH}	Output HIGH Voltage	74	2.7	3.4		V	I_{OH} = –1.0 mA	V_{CC} = 4.75 V
		74	2.5					V_{CC} = 4.50 V
V_{OL}	Output LOW Voltage			0.35	0.5	V	I_{OL} = 20 mA	V_{CC} = MIN
I_{IH}	Input HIGH Current				20	µA	V_{IN} = 2.7 V	V_{CC} = MAX
					100	µA	V_{IN} = 7.0 V	
I_{IL}	Input LOW Current				–0.6	mA	V_{IN} = 0.5 V	V_{CC} = MAX
I_{OS}	Output Short Circuit Current (Note 2)		–60		–150	mA	V_{OUT} = 0 V	V_{CC} = MAX
I_{CC}	Power Supply Current			15	23	mA	All Inputs = 4.5 V	V_{CC} = MAX

NOTES:
1. For conditions shown as MIN or MAX, use the appropriate value specified under guaranteed operating ranges.
2. Not more than one output should be shorted at a time, nor for more than 1 second.

AC CHARACTERISTICS

Symbol	Parameter	74F T_A = +25°C, V_{CC} = +5.0 V, C_L = 50 pF Min	74F T_A = +25°C, V_{CC} = +5.0 V, C_L = 50 pF Max	74F T_A = 0°C to 70°C, V_{CC} = 5.0 V ±10%, C_L = 50 pF Min	74F T_A = 0°C to 70°C, V_{CC} = 5.0 V ±10%, C_L = 50 pF Max	Unit
t_{PLH}	Propagation Delay	3.5	10	3.5	11	ns
t_{PHL}	S to Z_n	3.0	7.0	3.0	8.0	
t_{PLH}	Propagation Delay	3.5	9.5	3.5	11	ns
t_{PHL}	$\overline{E}$ to Z_n	2.5	6.5	2.5	7.0	
t_{PLH}	Propagation Delay	2.0	6.0	2.0	6.5	ns
t_{PHL}	I_n to Z_n	2.5	5.5	2.0	7.0	

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 $\overline{E}$ 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:

$Z_a = \overline{E} \bullet (I_{1a} \bullet S + I_{0a} \bullet \overline{S})$

$Z_c = \overline{E} \bullet (I_{1c} \bullet S + I_{0c} \bullet \overline{S})$

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.

$Z_b = \overline{E} \bullet (I_{1b} \bullet S + I_{0b} \bullet \overline{S})$

$Z_d = \overline{E} \bullet (I_{1d} \bullet S + I_{0d} \bullet \overline{S})$