MOTOROLA

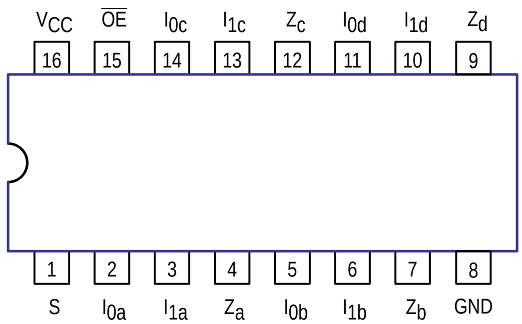
MC74F257A

QUAD 2-INPUT MULTIPLEXER WITH 3-STATE OUTPUTS

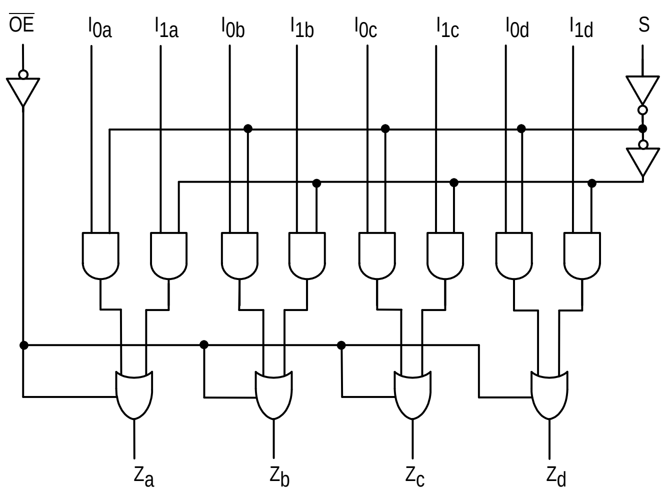
The MC74F257 is a quad 2-input multiplexer with 3-state outputs. Four bits of data from two sources can be selected using a common Data Select input. The four outputs present the selected data in true (non-inverted) form. The outputs may be switched to a high impedance state with a HIGH on the common Output Enable ($\overline{OE}$) input, allowing the outputs to interface directly with bus oriented systems.

- Multiplexer Expansion by Tying Outputs Together
- Non-Inverting 3-State Outputs
- Input Clamp Diodes Limit High-Speed Termination Effects
- AC Enhanced Version of the F257

CONNECTION DIAGRAM



LOGIC DIAGRAM



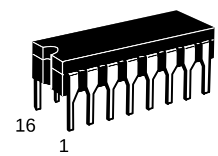
FUNCTION TABLE

Output Enable	Select Input	Data Inputs		Outputs
$\overline{OE}$	S	I_0	I_1	Z
H	X	X	X	Z
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

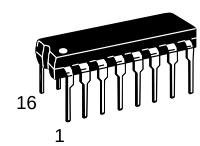
H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High Impedance

QUAD 2-INPUT MULTIPLEXER WITH 3-STATE OUTPUTS

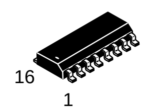
FAST™ SCHOTTKY TTL



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08

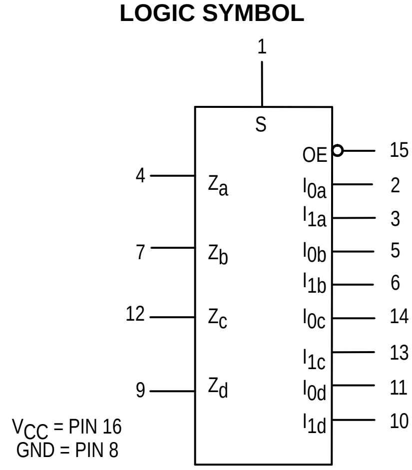


D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

MC54FXXXAJ Ceramic
MC74FXXXAN Plastic
MC74FXXXAD 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			–3.0	mA
I_{OL}	Output Current — Low	74			24	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	2.4	3.3		V	I_{OH} = –3.0 mA	V_{CC} = 4.50 V
		74	2.7	3.3		V	I_{OH} = –3.0 mA	V_{CC} = 4.75 V
V_{OL}	Output LOW Voltage			0.35	0.5	V	I_{OL} = 24 mA	V_{CC} = MIN
I_{OZH}	Output OFF Current — HIGH				50	µA	V_{OUT} = 2.7 V	V_{CC} = MAX
I_{OZL}	Output OFF Current — LOW				–50	µA	V_{OUT} = 0.5 V	V_{CC} = MAX
I_{IH}	Input HIGH Current				20	µA	V_{IN} = 2.7 V	V_{CC} = MAX
					100		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_{CCH}	Power Supply Current			9.0	15	mA	S, I_{1x} = 4.5 V $\overline{OE}$, I_{0x} = GND	V_{CC} = MAX
I_{CCL}				14.5	22		I_{1x} = 4.5 V $\overline{OE}$, I_{0x}, S = GND	
I_{CCZ}				15	23		S, I_{0x} = GND $\overline{OE}$, I_{1x} = 4.5 V	

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.

FUNCTIONAL DESCRIPTION

The F257A is a quad 2-input multiplexer with 3-state outputs. It selects four bits of data from two sources under control of a Common Data Select input. When the Select input is LOW, the I_{0x} inputs are selected and when Select is HIGH, the I_{1x} inputs are selected. The data on the selected inputs appears at the outputs in true (non-inverted) form. The device 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:

$Z_a = \overline{OE} \bullet (I_{1a} \bullet S + I_{0a} \bullet \overline{S})$
$Z_b = \overline{OE} \bullet (I_{1b} \bullet S + I_{0b} \bullet \overline{S})$
$Z_c = \overline{OE} \bullet (I_{1c} \bullet S + I_{0c} \bullet \overline{S})$
$Zd = \overline{OE} \bullet (I_{1d} \bullet S + I_{0d} \bullet \overline{S})$

When the Output Enable input ($\overline{OE}$) is HIGH, the outputs are forced to a high impedance OFF state. If the outputs are tied together, all but one device must be in the high impedance state to avoid high currents that would exceed the maximum ratings. Designers should ensure the Output Enable signals to 3-state devices whose outputs are tied together are designed so there is no overlap.

MC74F257A

AC CHARACTERISTICS

Symbol	Parameter	74F $T_A = +25°C$ $V_{CC} = +5.0$ V $C_L = 50$ pF		74F $T_A = 0°C$ to $70°C$ $V_{CC} = 5.0$ V ± 10% $C_L = 50$ pF		Unit
		Min	Max	Min	Max	
t_{PLH}	Propagation Delay	1.5	5.5	1.5	6.0	ns
t_{PHL}	I_n to Z_n	2.0	5.5	2.0	6.0	
t_{PLH}	Propagation Delay	3.0	9.5	3.0	10.5	ns
t_{PHL}	S to Z_n	2.5	7.0	2.5	8.0	
t_{PZH}	Output Enable Time	2.0	6.5	2.0	7.0	ns
t_{PZL}		2.5	7.0	2.5	8.0	
t_{PHZ}	Output Disable Time	2.0	6.0	2.0	7.0	ns
t_{PLZ}		2.0	6.0	2.0	7.0	