

# 74F258A

## Quad 2-Input Multiplexer with 3-STATE Outputs

### General Description

The 74F258A 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 the complement (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.

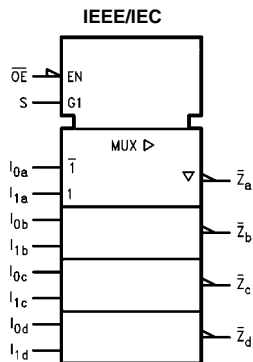
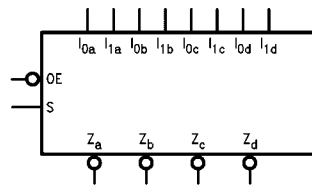
### Features

- Multiplexer expansion by tying outputs together
- Inverting 3-STATE outputs

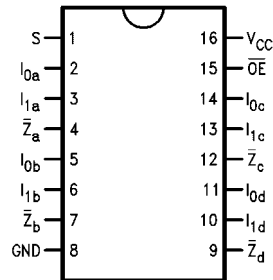
### Ordering Code:

Order Number	Package Number	Package Description
74F258ASC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow

### Logic Symbols



### Connection Diagram



74F258A Quad 2-Input Multiplexer with 3-STATE Outputs

## Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
S	Common Data Select Input	1.0/1.0	20 $\mu$ A/-0.6 mA
$\overline{OE}$	3-STATE Output Enable Input (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
$I_{0a}-I_{0d}$	Data Inputs from Source 0	1.0/1.0	20 $\mu$ A/-0.6 mA
$I_{1a}-I_{1d}$	Data Inputs from Source 1	1.0/1.0	20 $\mu$ A/-0.6 mA
$\overline{Z}_a-\overline{Z}_d$	3-STATE Inverting Data Outputs	150/40 (33.3)	-3 mA/24 mA (20 mA)

## Truth Table

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

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance

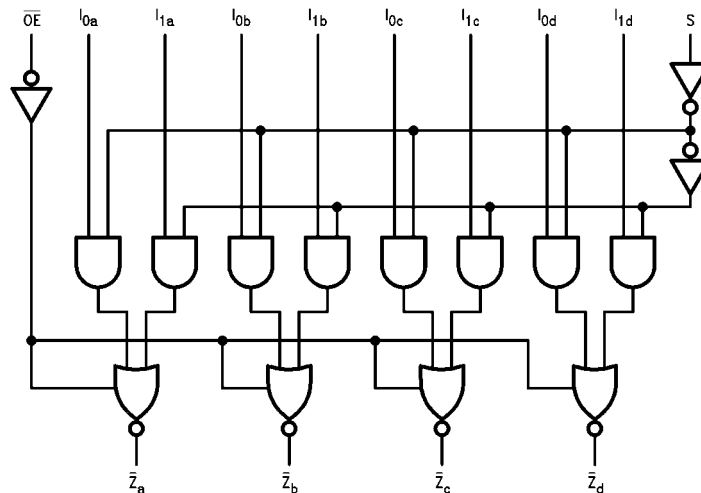
## Functional Description

The 74F258A is a quad 2-input multiplexer with 3-STATE outputs. It selects four bits of data from two sources under control of a common Select input (S). When the Select input is LOW, the  $I_{0x}$  inputs are selected and when Select input is HIGH, the  $I_{1x}$  inputs are selected. The data on the selected inputs appears at the outputs in inverted form. The 74F258A 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 equation for the outputs is shown below:

$$\overline{Z}_n = \overline{OE} \cdot (I_{1n} \cdot S + I_{0n} \cdot \overline{S})$$

When the Output Enable input ( $\overline{OE}$ ) is HIGH, the outputs are forced to a high impedance OFF state. If the outputs of the 3-STATE devices 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 that Output Enable signals to 3-STATE devices whose outputs are tied together are designed so there is no overlap.

## 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 <sub>CC</sub> 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 <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>OL</sub> (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.

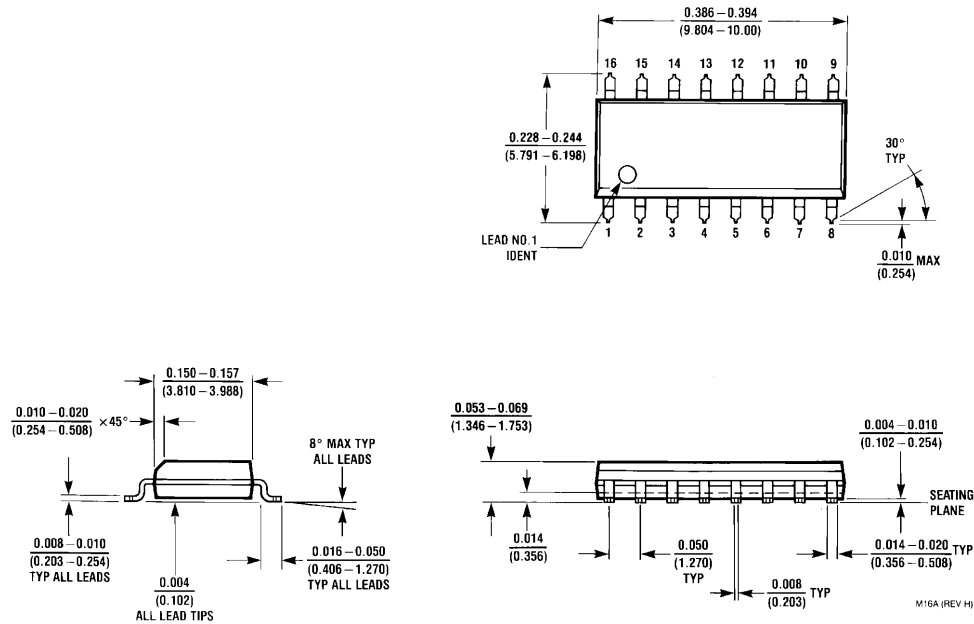
**DC Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Units	V <sub>CC</sub>	Conditions
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	10% V <sub>CC</sub> 10% V <sub>CC</sub> 5% V <sub>CC</sub> 5% V <sub>CC</sub>	2.5 2.4 2.7 2.7		V	Min	I <sub>OH</sub> = -1 mA I <sub>OH</sub> = -3 mA I <sub>OH</sub> = -1 mA I <sub>OH</sub> = -3 mA
V <sub>OL</sub>	Output LOW Voltage	10% V <sub>CC</sub>		0.5	V	Min	I <sub>OL</sub> = 24 mA
I <sub>IH</sub>	Input HIGH Current			5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test			7.0	μA	Max	V <sub>IN</sub> = 7.0V
I <sub>CEx</sub>	Output HIGH Leakage Current			50	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	4.75			V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current			3.75	μA	0.0	V <sub>IOD</sub> = 150 mV All Other Pins Grounded
I <sub>IL</sub>	Input LOW Current			-0.6	mA	Max	V <sub>IN</sub> = 0.5V
I <sub>OZH</sub>	Output Leakage Current			50	μA	Max	V <sub>OUT</sub> = 2.7V
I <sub>OZL</sub>	Output Leakage Current			-50	μA	Max	V <sub>OUT</sub> = 0.5V
I <sub>OS</sub>	Output Short-Circuit Current	-60		-150	mA	Max	V <sub>OUT</sub> = 0V
I <sub>ZZ</sub>	Bus Drainage Test			500	μA	0.0V	V <sub>OUT</sub> = V <sub>CC</sub>
I <sub>CCH</sub>	Power Supply Current		6.2	9.5	mA	Max	V <sub>O</sub> = HIGH
I <sub>CCL</sub>	Power Supply Current		15.1	23	mA	Max	V <sub>O</sub> = LOW
I <sub>CCZ</sub>	Power Supply Current		11.3	17	mA	Max	V <sub>O</sub> = HIGH Z

## AC Electrical Characteristics

Symbol	Parameter	$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A = -5^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = 5.0\text{V}$ $C_L = 50\text{ pF}$		$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = 5.0\text{V}$ $C_L = 50\text{ pF}$		Units
		Min	Typ	Max	Min	Max	Min	Max	
$t_{PLH}$	Propagation Delay	2.5		5.3	2.0	7.5	2.0	6.0	ns
$t_{PHL}$	$I_n$ to $\bar{Z}_n$	1.0		4.0	1.0	6.0	1.0	5.0	
$t_{PLH}$	Propagation Delay	3.0		7.5	3.0	9.5	3.0	8.5	ns
$t_{PHL}$	S to $\bar{Z}_n$	2.5		7.0	2.5	9.0	2.5	8.0	
$t_{PZH}$	Output Enable Time	2.0		6.0	2.0	8.0	2.0	7.0	ns
$t_{PZL}$		2.5		7.0	2.5	9.0	2.5	8.0	
$t_{PHZ}$	Output Disable Time	2.0		6.0	1.5	7.0	2.0	7.0	
$t_{PLZ}$		2.0		6.0	2.0	8.5	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**

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