

93L22

Quad 2-Input Multiplexer

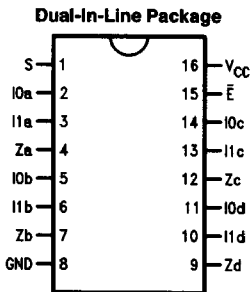
General Description

The 93L22 quad 2-input digital multiplexers consist of four multiplexing circuits with common select and enable logic; each circuit contains two inputs and one output.

Features

- Multifunction capability
- On-chip select logic decoding
- Fully buffered outputs

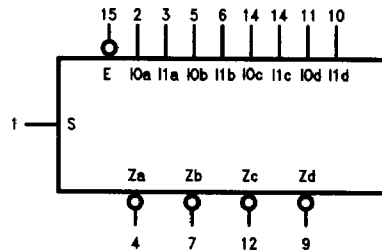
Connection Diagram



TL/F/10198-1

Order Number 93L22DMQB or 93L22FMQB
See NS Package Number J16A or W16A

Logic Symbol



TL/F/10198-2

VCC = Pin 16
GND = Pin 8

Truth Table

Pin Names	Description
S	Common Select Input
\bar{E}	Enable Input (Active LOW)
IOa–IOd } I1a–I1d }	Multiplexer Inputs
Za–Zd	Multiplexer Outputs

Inputs				Output
\bar{E}	S	IO _n	I1 _n	Z _n
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

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range	
MIL	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Recommended Operating Conditions

Symbol	Parameter	93L22 (MIL)			Units
		Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	V
V_{IH}	High Level Input Voltage	2			V
V_{IL}	Low Level Input Voltage			0.7	V
I_{OH}	High Level Output Current			-400	μA
I_{OL}	Low Level Output Current			4.8	mA
T_A	Free Air Operating Temperature	-55		125	°C

Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	$V_{CC} = \text{Min}, I_I = -10 \text{ mA}$			-1.5	V
V_{OH}	High Level Output Voltage	$V_{CC} = \text{Min}, I_{OH} = \text{Max}, V_{IL} = \text{Max}, V_{IH} = \text{Min}$	2.4			V
V_{OL}	Low Level Output Voltage	$V_{CC} = \text{Min}, I_{OL} = \text{Max}, V_{IH} = \text{Min}, V_{IL} = \text{Max}$			0.3	V
I_I	Input Current @ Max Input Voltage	$V_{CC} = \text{Max}, V_I = 5.5V$			1	mA
I_{IH}	High Level Input Current	$V_{CC} = \text{Max}, V_I = 2.4V$			20	μA
I_{IL}	Low Level Input Current	$V_{CC} = \text{Max}, V_I = 0.3V$			-400	μA
I_{OS}	Short Circuit Output Current	$V_{CC} = \text{Max}, (\text{Note } 2)$	-2.5		-25	mA
I_{CC}	Supply Current	$V_{CC} = \text{Max}$			13.2	mA

Note 1: All typicals are at $V_{CC} = 5V, T_A = 25^\circ C$.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Switching Characteristics

$V_{CC} = +5.0V$, $T_A = +25^\circ C$ (See Section 1 for test waveforms and output load)

Symbol	Parameter	$C_L = 15 pF$		Units
		Min	Max	
tPLH tPHL	Propagation Delay S to Z _n		36 49	ns
tPLH tPHL	Propagation Delay I ₀ or I ₁ to Z _n		30 22	ns
tPLH tPHL	Propagation Delay \bar{E} to Z _n		27 27	ns

Functional Description

The 93L22 quad 2-input multiplexer provides the ability to select four bits of either data or control from two sources, in one package. The Enable input (\bar{E}) is active LOW. When not activated all outputs (Z_n) are LOW regardless of all other inputs.

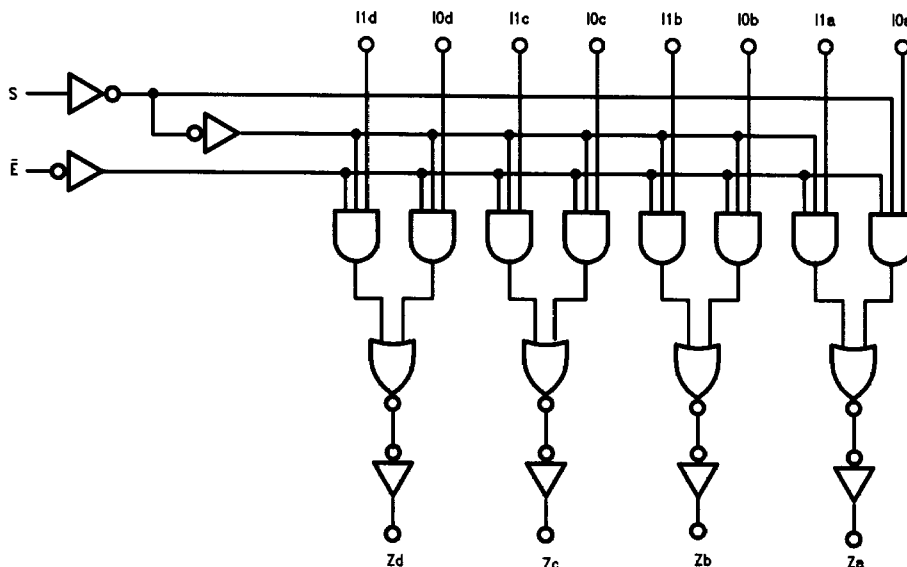
The 93L22 quad 2-input multiplexer is the logical implementation of a four-pole, two position switch, with the position of the switch being set by the logic levels supplied to the one select input. The logic equations for the outputs are shown below:

$$Z_a = E \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S}) \quad Z_b = E \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S})$$

$$Z_c = E \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S}) \quad Z_d = E \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S})$$

A common use of the 93L22 is the moving of data from a group 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 93L22 can generate four functions of two variables with one variable common. This is useful for implementing random gating functions.

Logic Diagram



TL/F/10196-3