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.

Connection Diagram



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

Pin Names Description S Common Select Input Ē Enable Input (Active LOW) I0a-I0d] Multiplexer Inputs Za-Zd Multiplexer Outputs

Features

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

Logic Symbol



Truth Table

inputs				Output
Ē	S	10n	l1n	Zn
н	х	х	х	L
L	н	х	L	L
L	н	х	н	н
L	L.	L	х	L
L	L	н	X	н

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		Units			
oy		Min	Nom	Max		
V _{CC}	Supply Voltage	4.5	5	5.5	v	
VIH	High Level Input Voltage	2			v	
VIL	Low Level Input Voltage			0.7	v	
I _{OH}	High Level Output Current			-400	μΑ	
IOL	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
VI	Input Clamp Voltage	$V_{CC} = Min$, I _I = -10 mA			-1.5	V
V _{OH}	High Level Output Voltage	$\label{eq:VCC} \begin{array}{l} V_{CC} = \mbox{Min}, \mbox{I}_{OH} = \mbox{Max}, \\ V_{IL} = \mbox{Max}, \mbox{V}_{IH} = \mbox{Min} \end{array}$	2.4			v
V _{OL}	Low Level Output Voltage	$\label{eq:V_CC} \begin{split} V_{CC} &= \text{Min, } I_{OL} = \text{Max,} \\ V_{IH} &= \text{Min, } V_{IL} = \text{Max} \end{split}$			0.3	v
11	Input Current @ Max Input Voltage	$V_{CC} = Max, V_I = 5.5V$			1	mA
IIH	High Level Input Current	$V_{CC} = Max, V_I = 2.4V$			20	μΑ
կլ	Low Level Input Current	$V_{CC} = Max, V_I = 0.3V$			-400	μΑ
los	Short Circuit Output Current	V _{CC} = Max, (Note 2)	-2.5		-25	mA
lcc	Supply Current	V _{CC} = 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)

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Symbol	Parameter	CL	Units	
- Cymbol	i diuliciti	Min	Max	
tPLH tPHL	Propagation Delay S to Zn		36 49	ns
tPLH tPHL	Propagation Delay I0 or I1 to Zn		30 22	ns
tPLH tPHL	Propagation Delay Ē to Zn		27 27	ns

Functional Description

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

The 93L22 guad 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:

 $Za = E \bullet (I1a \bullet S + I0a \bullet \overline{S})$ $Zb = E \bullet (I1b \bullet S + I0b \bullet \overline{S})$ $Zc = E \bullet (11c \bullet S + 10c \bullet \overline{S})$ $Zd = E \bullet (11d \bullet S + 10d \bullet \overline{S})$

Logic Diagram

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.

