



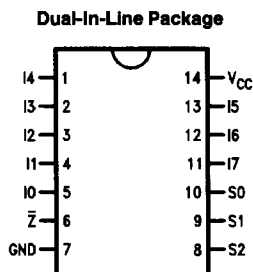
54LS152

8-Input Multiplexer

General Description

The 54LS152 is a high speed 8-input digital multiplexer. It provides, in one package, the ability to select one line of data from up to eight sources. The 54LS152 can be used as a universal function generator to generate any logic function of four variables. It is supplied in Flatpak only; for Dual-In-Line Package applications use the 'LS151.

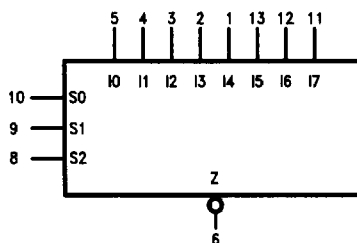
Connection Diagram



Order Number 54LS152FMQB
 See NS Package Number W14B

TL/F/10206-1

Logic Symbol



V_{CC} = Pin 14
 GND = Pin 7

TL/F/10206-2

Pin Names	Description
I_0 – I_7	Data Inputs
S_0 – S_2	Select Inputs
$\bar{Z}$	Inverted Data Outputs

Truth Table

Inputs			Output
S_2	S_1	S_0	$\bar{Z}$
L	L	L	$\bar{i}_0$
L	L	H	$\bar{i}_1$
L	H	L	$\bar{i}_2$
L	H	H	$\bar{i}_3$
H	L	L	$\bar{i}_4$
H	L	H	$\bar{i}_5$
H	H	L	$\bar{i}_6$
H	H	H	$\bar{i}_7$

H = HIGH Voltage Level
 L = LOW Voltage Level

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	
54LS	−55°C to +25°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	54LS152			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			−0.4	mA
I _{OL}	Low Level Output Current			4.0	mA
T _A	Free Air Operating Temperature	−55		125	°C

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

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V _I	Input Clamp Voltage	V _{CC} = Min, I _I = −18 mA			−1.5	V
V _{OH}	High Level Output Voltage	V _{CC} = Min, I _{OH} = Max, V _{IL} = Max, V _{IH} = Min	2.5	3.4		V
V _{OL}	Low Level Output Voltage	V _{CC} = Min, I _{OL} = Max, V _{IH} = Min, V _{IL} = Max			0.4	V
I _I	Input Current @ Max Input Voltage	V _{CC} = Max, V _I = 10.0V			0.1	mA
I _{IH}	High Level Input Current	V _{CC} = Max, V _I = 2.7V			20	μA
I _{IL}	Low Level Input Current	V _{CC} = Max, V _I = 0.5V	−30		−400	μA
I _{OS}	Short Circuit Output Current	V _{CC} = Max (Note 2)	−20		−100	mA
I _{CC}	Supply Current	V _{CC} = Max (Note 3)			9	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°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°C (See Section 1 for test waveforms and output load)

Symbol	Parameter	C _L = 15 pF		Units
		Min	Max	
t _{PLH} t _{PHL}	Propagation Delay, S _n to Z		23 32	ns
t _{PLH} t _{PHL}	Propagation Delay, I _n to Z		21 20	ns

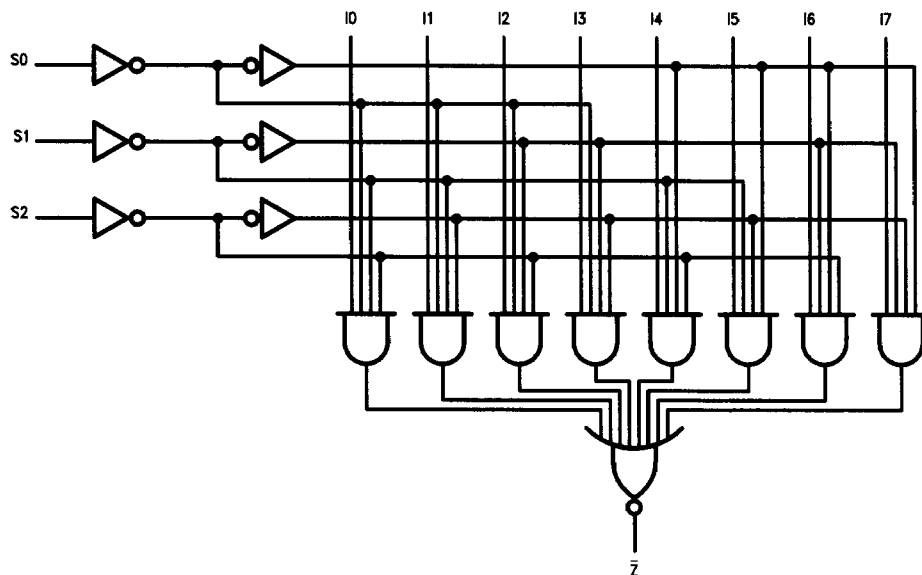
Functional Description

The 54LS152 is a logical implementation of a single pole, 8-position switch with the switch position controlled by the state of three Select inputs, S0, S1, S2. The logic function provided at the output is:

$$Z = (I_0 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_1 \cdot S_0 \cdot \bar{S}_1 \cdot \bar{S}_2 + I_2 \cdot \bar{S}_0 \cdot S_1 \cdot \bar{S}_2 + I_3 \cdot S_0 \cdot S_1 \cdot \bar{S}_2 \\ + I_4 \cdot \bar{S}_0 \cdot \bar{S}_1 \cdot S_2 + I_5 \cdot S_0 \cdot \bar{S}_1 \cdot S_2 + I_6 \cdot \bar{S}_0 \cdot S_1 \cdot S_2 + I_7 \cdot S_0 \cdot S_1 \cdot S_2).$$

The 54LS152 provides the ability, in one package, to select from eight sources of data or control information.

Logic Diagram



TL/F/10206-3