

DUAL 4-INPUT MULTIPLEXER

- MULTIFUNCTION CAPABILITY
- NON-INVERTING OUTPUTS
- SEPARATE ENABLE FOR EACH MULTIPLEXER
- INPUT CLAMP DIODES LIMIT HIGH SPEED TERMINATION EFFECTS
- FULLY TTL AND CMOS COMPATIBLE

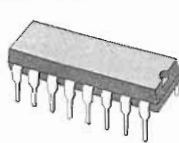
DESCRIPTION

The T74LS153 is a high speed Dual 4-input Multiplexer with common select inputs and individual enable inputs for each section. It can select two bits data from four sources. The two buffered outputs present data in the true (non-inverted) form. In addition to multiplexer operation, the LS153 can generate any two functions of three variables. The

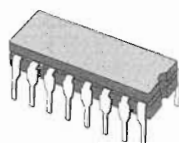
LS153 is fabricated with the Schottky barrier diode process for high speed and is completely compatible with all TTL families.

PIN NAMES

S_0	COMMON SELECT INPUT
E	ENABLE (active LOW) INPUT
I_0, I_1	MULTIPLEXER INPUTS
Z	MULTIPLEXER OUTPUT



B1
(Plastic Package)



D1
(Ceramic Package)



M1
(Micro Package)



C1
(Plastic Chip Carrier)

ORDER CODES :

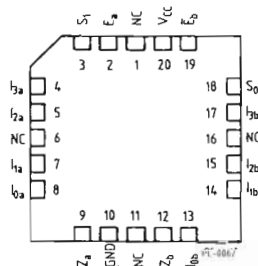
T74LS153 D1	T74LS153 C1
T74LS153 B1	T74LS153 M1

PIN CONNECTION (top view)

DUAL IN LINE

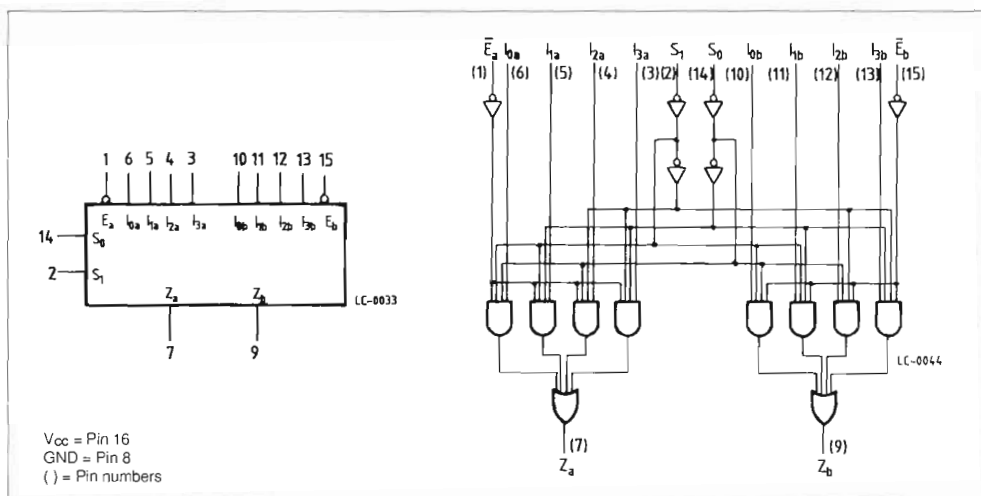


CHIP CARRIER



NC = No Internal Connection

LOGIC SYMBOL AND LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	- 0.5 to 7	V
V _I	Input Voltage, Applied to Input	- 0.5 to 15	V
V _O	Output Voltage, Applied to Output	- 0.6 to 10	V
I _I	Input Current, into Inputs	- 30 to 5	mA
I _O	Output Current, into Outputs	50	mA

Stresses in excess of those listed under "Absolute Maximum Ratings" may cause permanent damage to the device.

This is a stress rating only and functional operation of the device at these or any other conditions in excess of those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

GUARANTEED OPERATING RANGE

Part Numbers	Supply Voltage			Temperature
	Min.	Typ.	Max.	
T74LS153XX	4.75 V	5.0 V	5.25 V	0 °C to + 70 °C

XX = package type.

FUNCTIONAL DESCRIPTION

The LS153 is a Dual 4-Input Multiplexer fabricated with Low Power Schottky barrier diode process for high speed. It can select two bits of data from up to four sources under the control of the common Select Inputs (S₀, S₁). The two 4-input multiplexer circuits

have individual active LOW Enables ($\bar{E}_a$, $\bar{E}_b$) which can be used to strobe the outputs independently. When the Enables ($\bar{E}_a$, $\bar{E}_b$) are HIGH, the corresponding outputs (Z_a, Z_b) are forced LOW.

The LS153 is the logic implementation of a 2-pole, 4-position switch, where the position of the switch is determined by the logic levels supplied to the two

Select Inputs. The logic equations for the outputs are shown below.

$$Z_a = \bar{E}_a \cdot (I_{0a} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1a} \cdot \bar{S}_1 \cdot S_0 + I_{2a} \cdot S_1 \cdot \bar{S}_0 + I_{3a} \cdot S_1 \cdot S_0)$$

$$Z_b = \bar{E}_b \cdot (I_{0b} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1b} \cdot \bar{S}_1 \cdot S_0 + I_{2b} \cdot S_1 \cdot \bar{S}_0 + I_{3b} \cdot S_1 \cdot S_0)$$

The LS153 can be used to move data from a group of registers to a common output bus. The particular register from which the data came would be determined by the state of the Select Inputs. A less ob-

vious application is a function generator. The LS153 can generate two functions of three variables. This is useful for implementing highly irregular random logic.

TRUTH TABLE

Select Inputs		Input (a or b)						Output
S ₀	S ₁	$\bar{E}$	I ₀	I ₁	I ₂	I ₃		Z
X	X	H	X	X	X	X		L
L	L	L	L	X	X	X		L
L	L	L	H	X	X	X		H
H	L	L	X	L	X	X		L
H	L	L	X	H	X	X		H
L	H	L	X	X	L	X		L
L	H	L	X	X	H	X		H
H	H	L	X	X	X	L		L
H	H	L	X	X	X	H		H

H = HIGH Voltage Level

L = LOW Voltage Level

X = Don't Care

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE

Symbol	Parameter	Limits			Test Condition (note 1)	Unit
		Min.	Typ. (*)	Max.		
V _{IH}	Input HIGH Voltage	2.0			Guaranteed Input HIGH Threshold Voltage for all Input	V
V _{IL}	Input LOW Voltage			0.8	Guaranteed Input LOW Threshold Voltage for all Input	V
V _{CD}	Input Clamp Diode Voltage		- 0.65	- 1.5	V _{CC} = MIN, I _{IN} = -18 mA	V
V _{OH}	Output HIGH Voltage	2.7	3.4		V _{CC} = MIN, I _{OH} = - 400 μ A V _{IN} = V _{IH} or V _{IL} per Truth Table	V
V _{OL}	Output LOW Voltage		0.25	0.4	I _{OL} = 4.0 mA	V
			0.35	0.5	I _{OL} = 8.0 mA	V
I _{IH}	Input HIGH Current		1.0	20	V _{CC} = MAX, V _{IN} = 2.7 V	μ A
I _{IL}	Input LOW Current			0.1	V _{CC} = MAX, V _{IN} = 7.0 V	mA
I _{OS}	Output Short Circuit Current (note 2)	- 20		- 100	V _{CC} = MAX, V _{OUT} = 0 V	mA
I _{CC}	Power Supply Current		6.0	10	V _{CC} = MAX	mA

Notes: 1. Conditions for testing, not shown in the table, are chosen to guarantee under "worst case" conditions.

2. Not more than one output should be shorted at a time.

(*) Typical values are at V_{CC} = 5.0 V, T_A = 25 °C.

AC CHARACTERISTICS : $T_A = 25\text{ }^{\circ}\text{C}$

Symbol	Parameter	Limits			Tests Conditions		Unit
		Min.	Typ.	Max.			
t_{PLH} t_{PHL}	Propagation Delay, Select to Output		19 25	25 38	Fig. 2	$V_{CC} = 5.0\text{ V}$ $C_L = 15\text{ pF}$	ns
t_{PLH} t_{PHL}	Propagation Delay, Enable to Output		16 21	24 32	Fig. 1		ns
t_{PLH} t_{PHL}	Propagation Delay, Data to Output		10 17	15 26	Fig. 2		ns

AC WAVEFORMS

Figure 1.

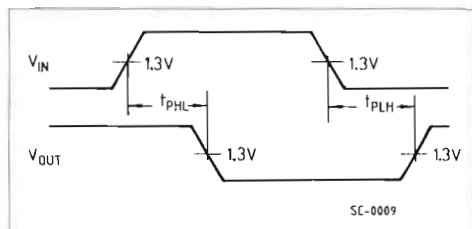


Figure 2.

