

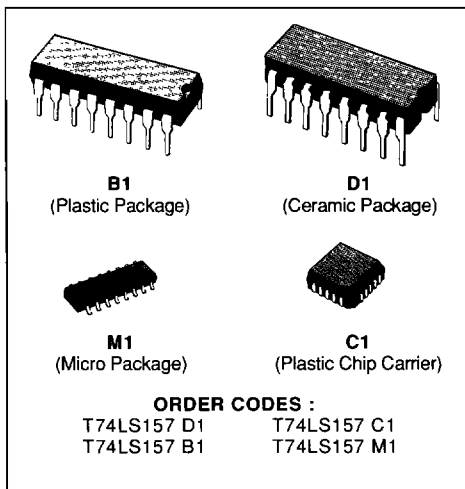
**QUAD 2-INPUT MULTIPLEXER**

- SCHOTTKY PROCESS FOR HIGH SPEED
- MULTIFUNCTION CAPABILITY
- NON-INVERTING OUTPUTS
- INPUT CLAMP DIODES LIMIT HIGH SPEED TERMINATION EFFECTS
- FULLY TTL AND CMOS COMPATIBLE

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

**DESCRIPTION**

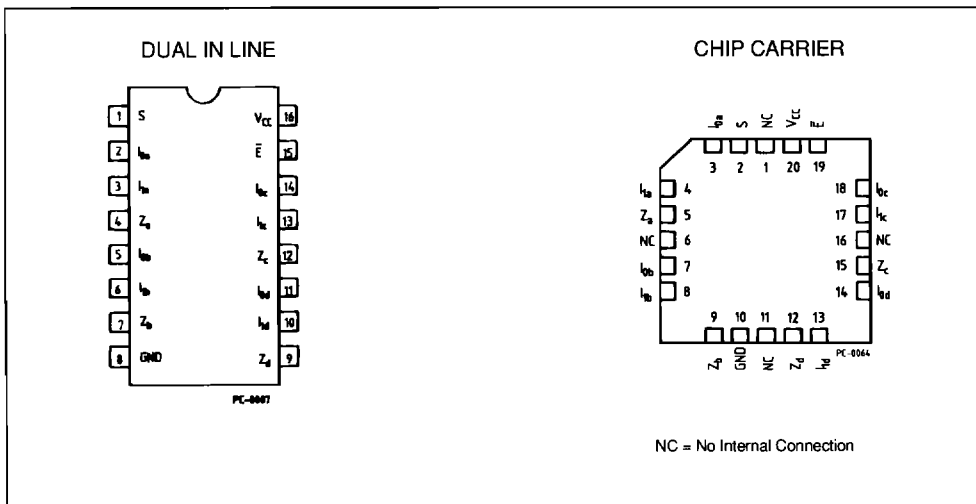
The TTL/MSI T74LS157 is a very high speed Quad 2-input Multiplexer, Four bits of data from two sources can be selected using the common Select and Enable inputs. The four buffered outputs present the selected data in the true (non-inverted) form. The LS157 can also be used to generate any four of the 16 different functions of two variables. The LS157 is



**PIN NAMES**

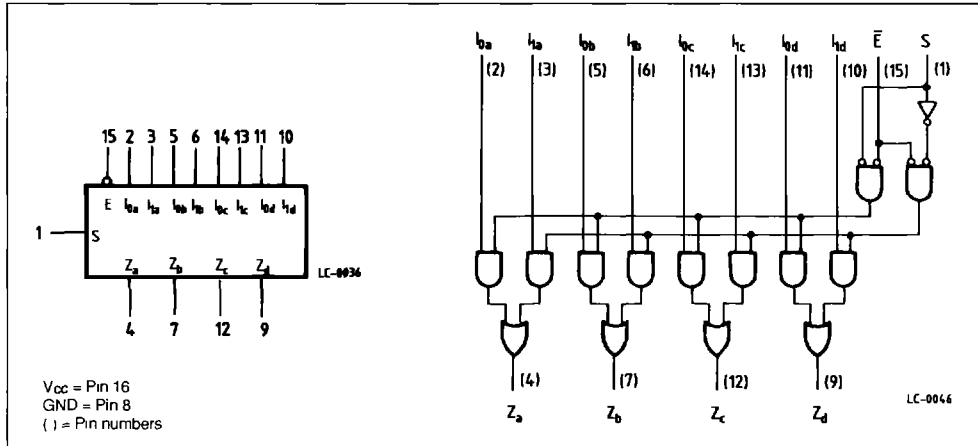
S	COMMON SELECT INPUT
E	ENABLE (active LOW) INPUT
I <sub>0a</sub> - I <sub>0b</sub>	DATA INPUTS FROM SOURCE 0
I <sub>1a</sub> - I <sub>1b</sub>	DATA INPUTS FROM SOURCE 1
Z <sub>a</sub> - Z <sub>b</sub>	MULTIPLEXER OUTPUTS

**PIN CONNECTION (top view)**



## T74LS157

### LOGIC SYMBOL AND LOGIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	- 0.5 to 7	V
V <sub>I</sub>	Input Voltage, Applied to Input	- 0.5 to 15	V
V <sub>O</sub>	Output Voltage, Applied to Output	- 0.6 to 10	V
I <sub>I</sub>	Input Current, into Inputs	- 30 to 5	mA
I <sub>O</sub>	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.	

XX = package type.

### FUNCTIONAL DESCRIPTION

The LS157 is a Quad 2-Input Multiplexer fabricated with the Schottky barrier diode process for high speed. It selects four bits of data from two sources under the control of the common Select Input (S). The Enable Input ( $\bar{E}$ ) is active LOW. When  $\bar{E}$  is HIGH, all of the outputs (Z) are forced LOW regardless of all other inputs.

The LS157 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 Inputs. The logic equation for the outputs are shown below.

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

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

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

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

A common use of the LS157 is the moving of data from two groups of registers to four common output buses. 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 LS157 can generate any four of the 16 different functions of two variables with one variable common. This is useful for implementing highly irregular logic.

## TRUTH TABLE

Enable	Select Input	Inputs		Output
		I <sub>0</sub>	I <sub>1</sub>	
$\bar{E}$	S	I <sub>0</sub>	I <sub>1</sub>	Z
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 = Don't Care

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE

Symbol	Parameter	Limits			Test Condition (note 1)	Unit	
		Min.	Typ. (*)	Max.			
V <sub>IH</sub>	Input HIGH Voltage	2.0			Guaranteed Input HIGH Threshold Voltage for All Inputs	V	
V <sub>IL</sub>	Input LOW Voltage			0.8	Guaranteed Input LOW Threshold Voltage for All Inputs	V	
V <sub>CD</sub>	Input Clamp Diode Voltage		- 0.65	- 1.5	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA	V	
V <sub>OH</sub>	Output HIGH Voltage	2.7	3.4		V <sub>CC</sub> = MIN, I <sub>OH</sub> = - 400 μA V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> per Truth Table	V	
V <sub>OL</sub>	Output LOW Voltage		0.25	0.4	I <sub>OL</sub> = 4.0 mA	V <sub>CC</sub> = MIN, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> per Truth Table	V
			0.35	0.5	I <sub>OL</sub> = 8.0 mA		V
I <sub>IH</sub>	Input HIGH Current I <sub>0</sub> , I <sub>1</sub> E, S			20 40	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	μA	
	Input HIGH Current at Max Input Voltage I <sub>0</sub> , I <sub>1</sub> E, S			0.1 0.2	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V	mA	
I <sub>IL</sub>	Input LOW Current I <sub>0</sub> , I <sub>1</sub> E, S			- 0.4 - 0.8	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V	mA	
I <sub>OS</sub>	Output Short Circuit Current (note 2)	- 20		- 100	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0 V	mA	
I <sub>CC</sub>	Power Supply Current		10	16	V <sub>CC</sub> = 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<sub>CC</sub> = 5.0 V, T<sub>A</sub> = 25 °C.

## T74LS157

### 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		15 18	23 27	Fig. 2	$V_{CC} = 5.0\text{ V}$ $C_L = 15\text{ pF}$	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay, Enable to Output		13 14	20 21	Fig. 1		ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay, Data to Output		9 9	14 14	Fig. 2		ns

### AC WAVEFORMS

Figure 1.

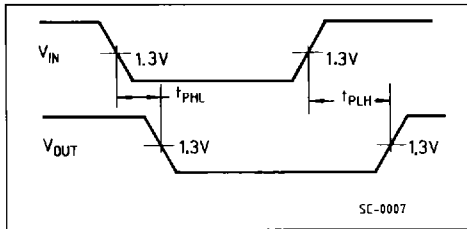


Figure 2.

