

T54LS42  
T74LS42



## ONE-OF-TEN DECODER

### DESCRIPTION

The LSTTL/MSI T54LS42/T74LS42 is a Multipurpose Decoder designed to accept four BCD inputs and provide ten mutually exclusive outputs. The LS42 is fabricated with the Schottky barrier diode process for high speed and is completely compatible with all SGS TTL families.

- MULTI-FUNCTION CAPABILITY
- MUTUALLY EXCLUSIVE OUTPUTS
- DEMULTIPLEXING CAPABILITY
- INPUT CLAMP DIODES LIMIT HIGH SPEED TERMINATION EFFECTS
- FULLY TTL AND CMOS COMPATIBLE

### PIN NAMES

A <sub>0</sub> to A <sub>3</sub>	Address Inputs
$\bar{0}$ to $\bar{9}$	Outputs, Active LOW

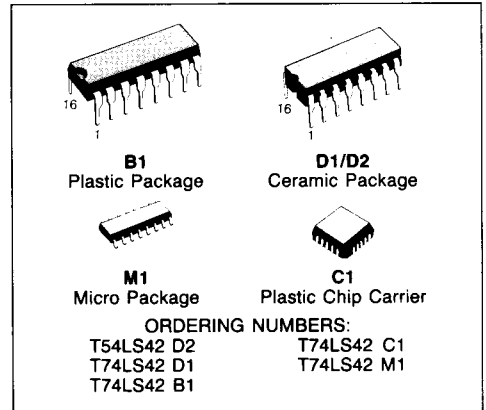
### TRUTH TABLE

A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	$\bar{0}$	$\bar{1}$	$\bar{2}$	$\bar{3}$	$\bar{4}$	$\bar{5}$	$\bar{6}$	$\bar{7}$	$\bar{8}$	$\bar{9}$
L	L	L	L	L	H	H	H	H	H	H	H	H	H
H	L	L	L	H	L	H	H	H	H	H	H	H	H
L	H	L	L	H	H	L	H	H	H	H	H	H	H
H	H	L	L	H	H	H	L	H	H	H	H	H	H
L	L	H	L	H	H	H	H	L	H	H	H	H	H
H	L	H	L	H	H	H	H	H	L	H	H	H	H
L	H	H	L	H	H	H	H	H	H	L	H	H	H
H	H	H	L	H	H	H	H	H	H	H	L	H	H
L	L	L	H	H	H	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L
L	H	L	H	H	H	H	H	H	H	H	H	H	H
H	H	L	H	H	H	H	H	H	H	H	H	H	H
L	L	H	H	H	H	H	H	H	H	H	H	H	H
H	L	H	H	H	H	H	H	H	H	H	H	H	H
L	H	H	H	H	H	H	H	H	H	H	H	H	H
H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = HIGH Voltage Level

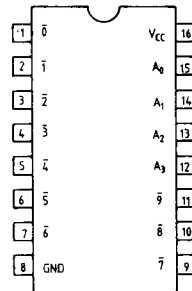
L = LOW Voltage Level

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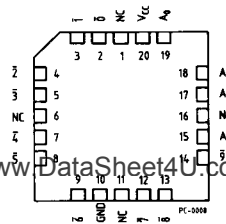
### PIN CONNECTION (top view)

#### DUAL IN LINE



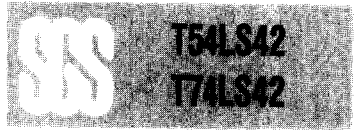
PC-0041

#### CHIP CARRIER

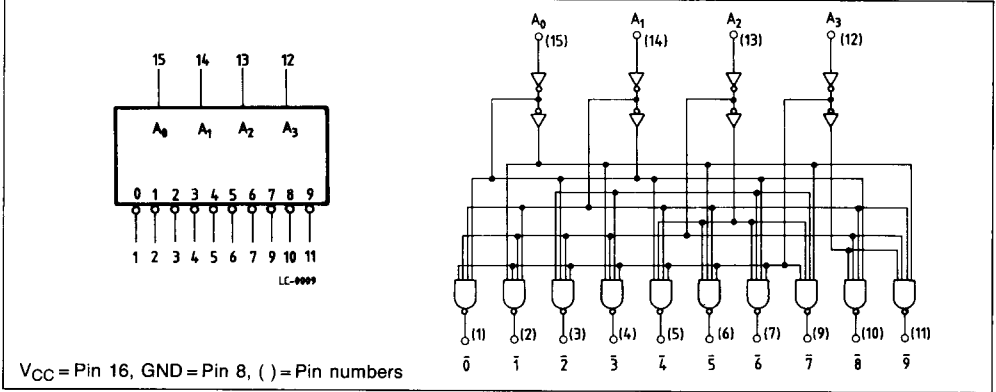


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NC = No Internal Connection



## 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	-0.5 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 RANGES

Part Numbers	Supply Voltage			Temperature
	Min	Typ	Max	
T54LS42D2	4.5 V	5.0 V	5.5 V	-55°C to +125°C
T74LS42XX	4.75 V	5.0 V	5.25 V	0°C to +70°C

XX = package type.

## FUNCTIONAL DESCRIPTION

The LS42 decoder accepts four active HIGH BCD inputs and provides ten mutually exclusive active LOW outputs, as shown by logic symbol or diagram. The active LOW outputs facilitate addressing other MSI units with active LOW input enables. The logic design of the LS42 ensures that all outputs are HIGH when binary codes greater than ni-

ne are applied to the inputs.

The most significant input  $A_3$  produces a useful inhibit function when the LS42 is used as a one-of-eight decoder. The  $A_3$  input can also be used as the Data input in an 8-output demultiplexer application.



## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE

Symbol	Parameter		Limits			Test Conditions (Note 1)	Units
			Min.	Typ.	Max.		
$V_{IH}$	Input HIGH Voltage		2.0			Guaranteed input HIGH Threshold Voltage for all Inputs	V
$V_{IL}$	Input LOW Voltage	54			0.7	Guaranteed input LOW Threshold Voltage for all Inputs	V
		74			0.8		
$V_{CD}$	Input Clamp Diode Voltage			-0.65	-1.5	$V_{CC} = \text{MIN}, I_{IN} = -18\text{mA}$	V
$V_{OH}$	Output HIGH Voltage	54	2.5	3.4		$V_{CC} = \text{MIN}, I_{OH} = -400\mu\text{A}, V_{IN} = V_{IH}$ or $V_{IL}$ per Truth Table	V
		74	2.7	3.4			
$V_{OL}$	Output LOW Voltage	54,74		0.25	0.4	$I_{OL} = 4.0\text{mA}$ $V_{CC} = \text{MIN}, V_{IN} = V_{IH}$ or $V_{IL}$ per Truth Table	V
		74		0.35	0.5		
$I_{IH}$	Input HIGH Current				20 0.1	$V_{CC} = \text{MAX}, V_{IN} = 2.7\text{V}$ $V_{CC} = \text{MAX}, V_{IN} = 7.0\text{V}$	$\mu\text{A}$ mA
$I_{IL}$	Input LOW Current				-0.4	$V_{CC} = \text{MAX}, V_{IN} = 0.4\text{V}$	mA
$I_{OS}$	Output Short Circuit Current (Note 2)		-20		-100	$V_{CC} = \text{MAX}, V_{OUT} = 0\text{V}$	mA
$I_{CC}$	Power Supply Current			7.0	13	$V_{CC} = \text{MAX}$	mA

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

Symbol	Parameter		Limits			Test Conditions	Units
			Min.	Typ.	Max.		
$t_{PLH}$ $t_{PHL}$	Propagation Delay (2 Levels) Fig. 2			15 15	25 25	$V_{CC} = 5.0\text{V}$ $C_L = 15\text{pF}$	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay (3 Levels) Fig. 1			20 20	30 30		

### Notes:

- 1) For conditions shown as MIN or MAX, use the appropriate value specified under guaranteed operating ranges.
- 2) Not more than one output should be shorted at a time.
- 3) Typical values are at  $V_{CC} = 5.0\text{V}$ ,  $T_A = 25^\circ\text{C}$

## AC WAVEFORMS

