

DM54L42A/DM74L42A BCD/Decimal Decoders

General Description

These BCD-to-decimal decoders consist of eight inverters and ten, four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of input logic ensures that all outputs remain off for all invalid (10-15) input conditions.

- Typical power dissipation 15 mW
- Typical propagation delay 53 ns

Absolute Maximum Ratings (Note 1)

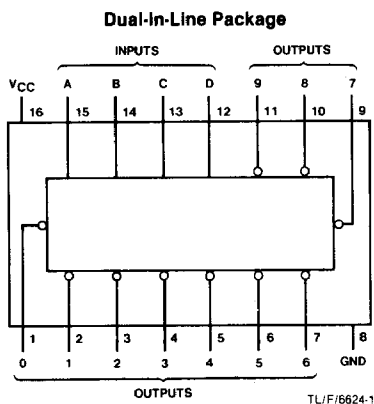
Supply Voltage	8V
Input Voltage	5.5V
Storage Temperature Range	- 65°C to 150°C

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device can not 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.

Features

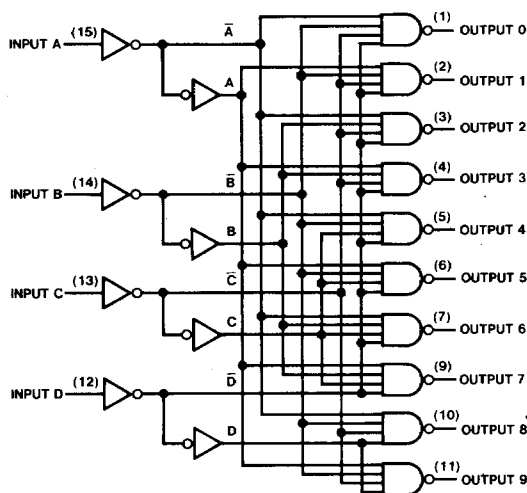
- Diode clamped inputs
- Also for application as 4-line-to-16-line decoders; 3-line-to-8-line decoders
- All outputs are high for invalid input conditions

Connection Diagram



54L42A (J) 74L42A (N)

Logic Diagram



Function Table

No.	L42A BCD Input				Decimal Output										
	D	C	B	A	0	1	2	3	4	5	6	7	8	9	
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	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	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
	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H

H = High Level
L = Low Level

Recommended Operating Conditions

Sym	Parameter	DM54L42A			DM74L42A			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.7	V
I_{OH}	High Level Output Current			-0.2			-0.2	mA
I_{OL}	Low Level Output Current			2			3.6	mA
T_A	Free Air Operating Temperature	-55		125	0		70	°C

Electrical Characteristics

over recommended operating free air temperature (unless otherwise noted)

Sym	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_{OH}	High Level Output Voltage	$V_{CC} = \text{Min}$, $I_{OH} = \text{Max}$ $V_{IL} = \text{Max}$, $V_{IH} = \text{Min}$	2.4	3.4		V
V_{OL}	Low Level Output Voltage	$V_{CC} = \text{Min}$ $I_{OL} = \text{Max}$ $V_{IL} = \text{Max}$ $V_{IH} = \text{Min}$	DM54	0.15	0.3	V
			DM74	0.2	0.4	
I_I	Input Current @ Max Input Voltage	$V_{CC} = \text{Max}$, $V_I = 5.5\text{V}$			0.1	mA
I_{IH}	High Level Input Current	$V_{CC} = \text{Max}$, $V_I = 2.4\text{V}$			10	μA
I_{IL}	Low Level Input Current	$V_{CC} = \text{Max}$, $V_I = 0.3\text{V}$			-0.18	mA
I_{OS}	Short Circuit Output Current	$V_{CC} = \text{Max}$ (Note 2)	DM54	-3	-15	mA
			DM74	-3	-15	
I_{CC}	Supply Current	$V_{CC} = \text{Max}$ (Note 3)		3.0	5.3	mA

Note 1: All typicals are at $V_{CC} = 5\text{V}$, $T_A = 25^\circ\text{C}$.

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

Note 3: I_{CC} is measured with all outputs open and all inputs grounded.

Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25^\circ C$ (See Section 1 for Test Waveforms and Output Load)

Parameter	From (Input) To (Output)	$R_L = 4\text{ k}\Omega$ $C_L = 50\text{ pF}$			Units
		Min	Typ	Max	
t_{PHL} Propagation Delay Time High to Low Level Output	A, B, C or D through 2 Levels of Logic		65	130	ns
t_{PHL} Propagation Delay Time High to Low Level Output	A, B, C or D through 3 Levels of Logic		70	140	ns
t_{PLH} Propagation Delay Time Low to High Level Output	A, B, C or D through 2 Levels of Logic		30	60	ns
t_{PLH} Propagation Delay Time Low to High Level Output	A, B, C or D through 3 Levels of Logic		35	70	ns