BCD/Decimal Decoders/Drivers

General Description

The DM5441A/DM7441A is a BCD-to-decimal decoder designed to drive gas-filled NIXIE tubes. The device is also capable of driving other types of low-current lamps and relays.

An over-range decoding feature provides that if binary numbers between 10 and 15 are applied to the input, the least significant bit (0-5) will be decoded on the output.

The DM54141/DM74141 is a BCD-to-decimal decoder designed specifically to drive cold-cathode indicator tubes.

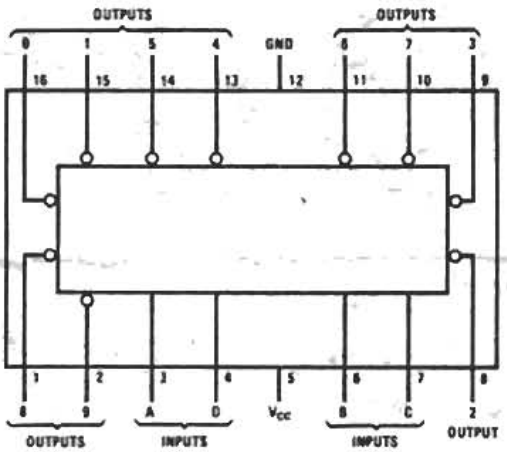
Full decoding is provided for all possible input states. For binary inputs 10 through 15, all the outputs are off. Therefore the DM54141/DM74141, combined with a minimum of external circuitry, can use these invalid codes in blanking leading- and/or trailing-edge zeros in a display.

Input clamp diodes are also provided to clamp negative-voltage transitions in order to minimize transmission-line effects.

Features

- Drive cold-cathode, numeric indicator tubes directly
- Fully decoded inputs
- Low leakage current
  - DM54/7441A 1.8μA @ 50V
  - DM54/74141 50μA @ 55V
- Low power dissipation
  - DM54/7441A 105 mW typical
  - DM54/74141 55 mW typical

Connection Diagram



5441A(J), (W); 7441A(J), (N), (W);
54141(J), (W); 74141(J), (N), (W)

Truth Tables

5441A/7441A

INPUT D	C	B	A	OUTPUT ON*
L	L	L	L	0
L	L	L	H	1
L	L	H	L	2
L	L	H	H	3
L	H	L	L	4
L	H	L	H	5
L	H	H	L	6
L	H	H	H	7
H	L	L	L	8
H	L	L	H	9
(OVER RANGE)				
H	L	H	L	0
H	L	H	H	1
H	H	L	L	2
H	H	L	H	3
H	H	H	L	4
H	H	H	H	5

54141/74141

INPUT D	C	B	A	OUTPUT ON*
L	L	L	L	0
L	L	L	H	1
L	L	H	L	2
L	L	H	H	3
L	H	L	L	4
L	H	L	H	5
L	H	H	L	6
L	H	H	H	7
H	L	L	L	8
H	L	L	H	9
(OVER RANGE)				
H	L	H	L	NONE
H	L	H	H	NONE
H	H	L	L	NONE
H	H	L	H	NONE
H	H	H	L	NONE
H	H	H	H	NONE

H = High Level, L = Low Level

*All other outputs are off

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

PARAMETER		CONDITIONS			DM54/74 41A MIN	DM54/74 41A TYP(1)	DM54/74 41A MAX	DM54/74 141 MIN	DM54/74 141 TYP(1)	DM54/74 141 MAX	UNITS
V_{IH}	High Level Input Voltage				2			2			V
V_{IL}	Low Level Input Voltage						0.8			0.8	V
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −12 mA					N/A			−1.5	V
V_{OL}	On-State Output Voltage	V_{CC} = Min, I_O = 7 mA		−55°C to +70°C			2.5			2.5	V
				125°C			3.0			3.0	
I_{OH}	Off-State Reverse Current	V_{CC} = Max	V_O = 50V	T_A = 125°C			60				μA
				T_A = 70°C			40				
				T_A = −55°C, 0°C, 25°C			1.8				
			V_O = 55V							50	
I_{OH}	Off-State Reverse Current for Input Counts 10-15	V_{CC} = Max, V_O = 30V		T_A = 55°C			N/A			5	μA
				T_A = 70°C			N/A			15	
V_{OH}	Off-State Output Voltage	V_{CC} = Max	I_O = 0.5 mA					60			V
			I_O = 1.0 mA		70						
I_I	Input Current at Maximum Input Voltage	V_{CC} = Max, V_I = 5.5V					1			1.0	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.4V		A Input		3	40			40	μA
				B, C, or D Input		3	40			80	
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V		A Input		−1.0	−1.6			−1.6	mA
				B, C, or D Input		−1.0	−1.6			−3.2	
I_{CC}	Supply Current	V_{CC} = Max(2)				21	36		11	25	mA

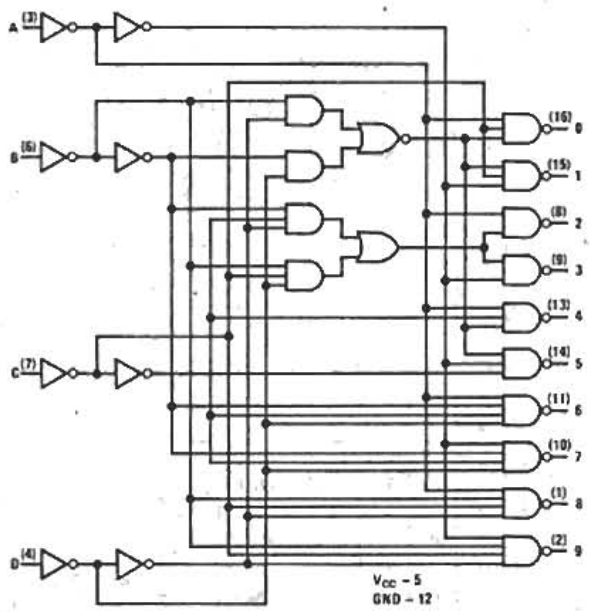
Notes

(1) All typical values are at V_{CC} = 5V, T_A = 25°C.

(2) I_{CC} is measured with all inputs grounded and outputs open.

Logic Diagrams

5441A/7441A



54141/74141