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TYPE SN74141
BCD-TO-DECIMAL DECODER/DRIVER

DECEMBER 1972—REVISED DECEMBER 1983

- Drives Gas-filled Cold-cathode Indicator Tubes Directly
- Fully Decoded Inputs Ensure all Outputs are Off for Invalid Codes
- Input Clamping Diodes Minimize Transmission-line Effects

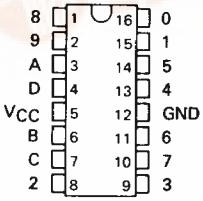
description

The SN74141 is a second-generation BCD-to-decimal decoder designed specifically to drive cold-cathode indicator tubes. This decoder demonstrates an improved capability to minimize switching transients in order to maintain a stable display.

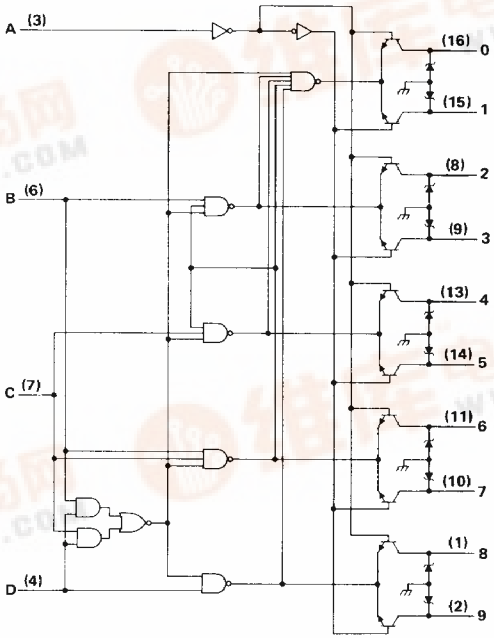
Full decoding is provided for all possible input states. For binary inputs 10 through 15, all the outputs are off. Therefore the SN74141, combined with a minimum of external circuitry, can use these invalid codes in blanking leading- and/or trailing-edge zeros in a display. The ten high-performance, n-p-n output transistors have a maximum reverse current of 50 microamperes at 55 volts.

Low-forward-impedance diodes are also provided for each input to clamp negative-voltage transitions in order to minimize transmission-line effects. Power dissipation is typically 80 milliwatts. The SN74141 is characterized for operation over the temperature range of 0°C to 70°C.

J OR N PACKAGE
(TOP VIEW)



logic diagram



FUNCTION TABLE

INPUT				OUTPUT
D	C	B	A	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
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

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PRODUCTION DATA
This document contains information current as of publication date. Products conform to specifications per the terms of Texas Instruments

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	5.5 V
Current into any output (off-state)	2 mA
Operating free-air temperature range	0°C to 70°C
Storage temperature range	−65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
Off-state output voltage			60	V
Operating free-air temperature, T_A	0		70	°C

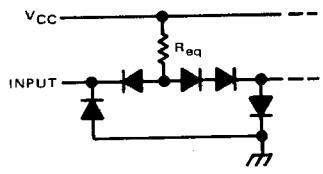
electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER			TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IH}	High-level input voltage				2			V
V_{IL}	Low-level input voltage						0.8	V
V_{IK}	Input clamp voltage		V_{CC} = MIN, I_I = −5 mA				−1.5	V
$V_{O(on)}$	On-state output voltage		V_{CC} = MIN, I_O = 7 mA				2.5	V
$V_{O(off)}$	Off-state output voltage for input counts 0 thru 9		V_{CC} = MAX, I_O = 0.5 mA		60			V
$I_{O(off)}$	Off-state reverse current		V_{CC} = MAX, V_O = 55 V				50	μA
$I_{O(off)}$	Off-state reverse current for input counts 10 thru 15		V_{CC} = MAX, V_O = 30 V	T_A = 55°C			5	μA
				T_A = 70°C			15	
I_I	Input current at maximum input voltage		V_{CC} = MAX, V_I = 5.5 V				1	mA
I_{IH}	High-level input current	A input	V_{CC} = MAX, V_I = 2.4 V				40	μA
		B, C, or D input					80	
I_{IL}	Low-level input current	A input	V_{CC} = MAX, V_I = 0.4 V				−1.6	mA
		B, C, or D input					−3.2	
I_{CC}	Supply current		V_{CC} = MAX, See Note 2			16	25	mA

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡This typical value is at V_{CC} = 5 V, T_A = 25°C.
NOTE 2: I_{CC} is measured with all inputs grounded and outputs open.

schematics of inputs and outputs

EQUIVALENT OF EACH INPUT



Input A: R_{eq} = 6 kΩ NOM
Inputs B, C, D: R_{eq} = 2 kΩ NOM

TYPICAL OF ALL OUTPUTS