

7445 Decoder/Driver

BCD-To-Decimal Decoder/Driver (Open Collector)
Product Specification

Logic Products

FEATURES

- 80mA output sink capability
- 30V output breakdown voltage
- Ideally suited as lamp or solenoid driver
- See '42 for standard TTL output version
- See '145 for "LS" version

DESCRIPTION

The '45 decoder accepts BCD inputs on the A₀ to A₃ address lines and generates 10 mutually exclusive active LOW outputs. When an input code greater than "9" is applied, all outputs are off. This device can therefore be used as a 1-of-8 decoder with A₃ used as an active LOW enable.

The '45 can sink 20mA while maintaining the standardized guaranteed output LOW voltage (V_{OL}) of 0.4V, but it can sink up to 80mA with a guaranteed V_{OL} of less than 0.9V.

The '45 features an output breakdown voltage of 30V and is ideally suited as a lamp or solenoid driver.

TYPE	MAX I _{OL}	TYPICAL SUPPLY CURRENT (TOTAL)
7445	80mA	43mA

ORDERING CODE

PACKAGES	COMMERCIAL RANGE V _{CC} = 5V ±5%; T _A = 0°C to +70°C
Plastic DIP	N7445N

NOTE:

For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

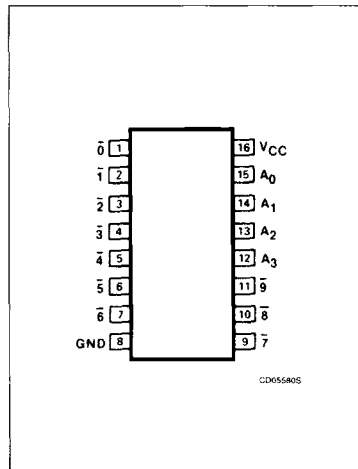
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74
A ₀ - A ₃	Inputs	1ul
0 - 9	Outputs	12.5ul

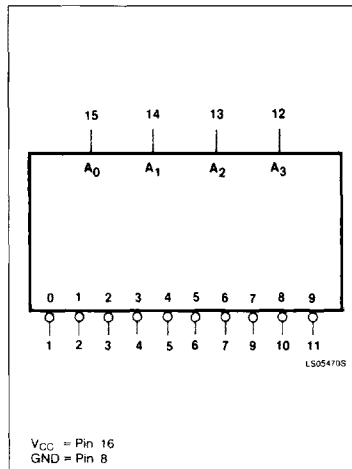
NOTE:

A 74 unit load (ul) is understood to be 40μA I_{IH} and -1.6mA I_{IL}.

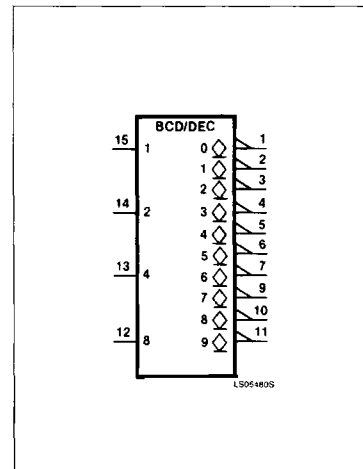
PIN CONFIGURATION



LOGIC SYMBOL



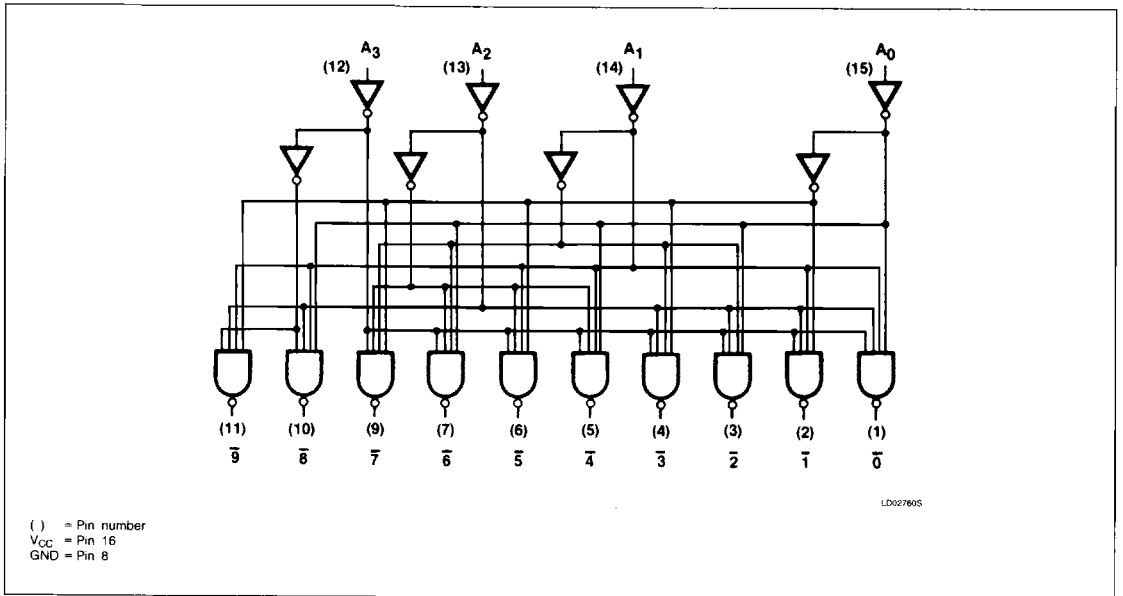
LOGIC SYMBOL (IEEE/IEC)



Decoder/Driver

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LOGIC DIAGRAM



FUNCTION TABLE

A ₃	A ₂	A ₁	A ₀	0̄	1̄	2̄	3̄	4̄	5̄	6̄	7̄	8̄	9̄
L	L	L	L	L	H	H	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	H	H
L	L	H	L	H	H	L	H	H	H	H	H	H	H
L	L	H	H	H	H	H	L	H	H	H	H	H	H
L	H	L	L	H	H	H	H	L	H	H	H	H	H
L	H	L	H	H	H	H	H	L	H	H	H	H	H
L	H	H	L	H	H	H	H	H	H	L	H	H	H
L	H	H	H	H	H	H	H	H	H	H	L	H	H
H	L	L	L	H	H	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L
H	L	H	L	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	L	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	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 = HIGH voltage levels
 L = LOW voltage levels

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ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER		74	UNIT
V_{CC}	Supply voltage	7.0	V
V_{IN}	Input voltage	-0.5 to +5.5	V
I_{IN}	Input current	-30 to +5	mA
V_{OUT}	Voltage applied to output in HIGH output state	-0.5 to +30	V
T_A	Operating free-air temperature range	0 to 70	°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER		74			UNIT
		Min	Nom	Max	
V_{CC}	Supply voltage	4.75	5.0	5.25	V
V_{IH}	HIGH-level input voltage	2.0			V
V_{IL}	LOW-level input voltage			+0.8	V
I_{IK}	Input clamp current			-12	mA
V_{OH}	HIGH-level output voltage			30	V
I_{OL}	LOW-level output current			80	mA
T_A	Operating free-air temperature	0		70	°C

DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

PARAMETER	TEST CONDITIONS ¹	7445			UNIT
		Min	Typ ²	Max	
I_{OH}	HIGH-level output current $V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, V_{IL} = \text{MAX}, V_{OH} = 30V$			250	μA
V_{OL}	LOW-level output voltage $V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, V_{IL} = \text{MAX}$			0.4	V
				0.9	V
V_{IK}	Input clamp voltage $V_{CC} = \text{MIN}, I_I = I_{IK}$			-1.5	V
I_I	Input current at maximum input voltage $V_{CC} = \text{MAX}, V_I = 5.5V$			1.0	mA
I_{IH}	HIGH-level input current $V_{CC} = \text{MAX}, V_I = 2.4V$			40	μA
I_{IL}	LOW-level input current $V_{CC} = \text{MAX}, V_I = 0.4V$			-1.6	mA
I_{CC}	Supply current ³ (total) $V_{CC} = \text{MAX}$		43	70	mA

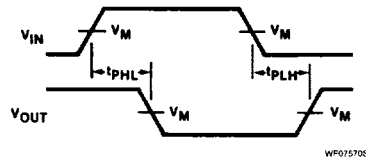
NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at $V_{CC} = 5V, T_A = 25^\circ\text{C}$.
- Measure I_{CC} with all inputs grounded and outputs open.

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AC WAVEFORM



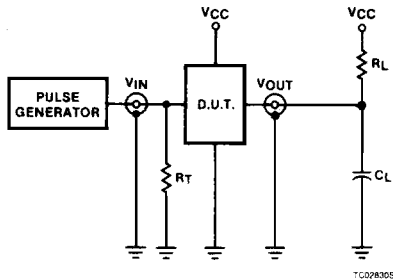
$V_M = 1.3V$ for 74LS; $V_M = 1.5V$ for all other TTL families.

Waveform 1. Waveform For Inverting Outputs

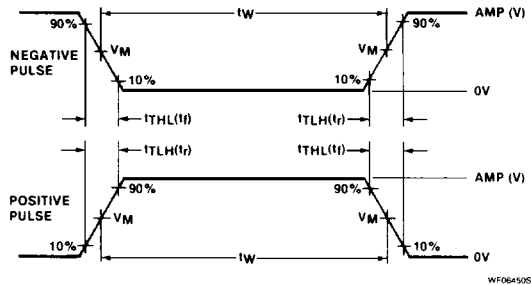
AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ C, V_{CC} = 5.0V$

PARAMETER	TEST CONDITIONS	74		UNIT
		$C_L = 15pF, R_L = 100\Omega$		
		Min	Max	
t_{PLH} t_{PHL}	Propagation delay Address to output	Waveform 1	50 50	ns

TEST CIRCUITS AND WAVEFORMS



Test Circuit For 74
Open Collector Outputs



$V_M = 1.3V$ for 74LS; $V_M = 1.5V$ for all other TTL families.

Input Pulse Definition

DEFINITIONS

R_L = Load resistor to V_{CC} ; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of Pulse Generators.

t_{TLH}, t_{THL} Values should be less than or equal to the table entries.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t_{TLH}	t_{THL}
74	3.0V	1MHz	500ns	7ns	7ns
74LS	3.0V	1MHz	500ns	15ns	6ns
74S	3.0V	1MHz	500ns	2.5ns	2.5ns

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