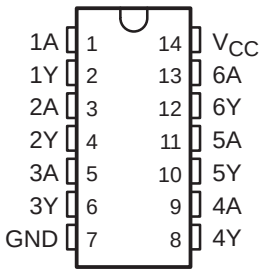
- **Converts TTL Voltage Levels to MOS Levels**
- **High Sink-Current Capability**
- **Input Clamping Diodes Simplify System Design**
- **Open-Collector Driver for Indicator Lamps and Relays**
- **Inputs Fully Compatible With Most TTL Circuits**
- **Package Options Include Ceramic Flat (W) Package and Plastic (N) and Ceramic (J) DIPs**

SN5407, SN5417 . . . J OR W PACKAGE
SN7407, SN7417 . . . N PACKAGE
(TOP VIEW)



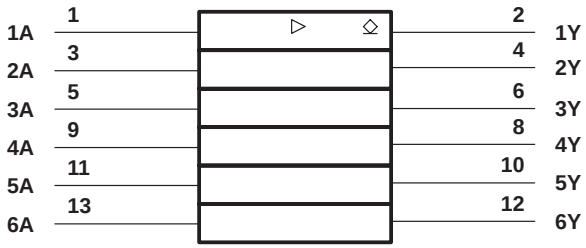
description

These monolithic TTL hex buffers/drivers feature high-voltage open-collector outputs for interfacing with high-level circuits (such as MOS), or for driving high-current loads (such as lamps or relays), and also are characterized for use as buffers for driving TTL inputs. The SN5407 and SN7407 have minimum breakdown voltages of 30 V, and the SN5417 and SN7417 have minimum breakdown voltages of 15 V. The maximum sink current is 30 mA for the SN5407 and SN5417 and 40 mA for the SN7407 and SN7417.

These circuits are completely compatible with most TTL families. Inputs are diode clamped to minimize transmission-line effects, which simplifies design. Typical power dissipation is 145 mW and average propagation delay time is 14 ns.

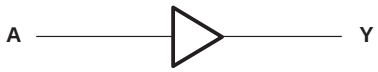
The SN5407 and SN5417 are characterized for operation over the full military temperature range of –55°C to 125°C. The SN7407 and SN7417 are characterized for operation from 0°C to 70°C.

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram, each buffer/driver (positive logic)



Y = A

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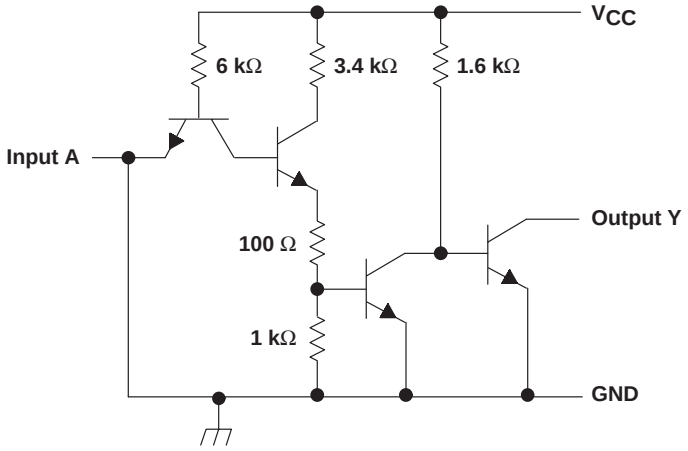
schematic



Resistor values shown are nominal.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage, V_I (see Note 1) . . . . . 5.5 V
Output voltage, V_O (see Notes 1 and 2): SN5407, SN7407 . . . . . 30 V
SN5417, SN7417 . . . . . 15 V
Operating free-air temperature range, T_A: SN5407, SN5417 . . . . . –55°C to 125°C
SN7407, SN7417 . . . . . 0°C to 70°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to GND.
2. This is the maximum voltage that should be applied to any output when it is in the off state.

recommended operating conditions

			SN5407 SN5417			SN7407 SN7417			UNIT
			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				0.8			0.8	V
V_{OH}	High-level output voltage	SN5407, SN7407			30			30	V
		SN5417, SN7417			15			15	
I_{OL}	Low-level output current				30			40	mA
T_A	Operating free-air temperature		–55		125	0		70	°C

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

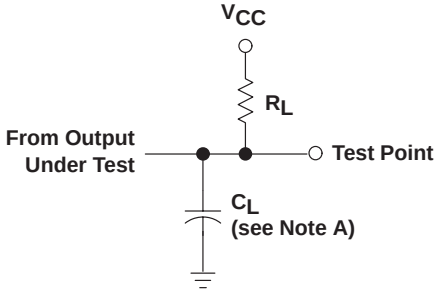
PARAMETER	TEST CONDITIONS†		SN5407 SN5417			SN7407 SN7417			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN,	I_I = –12 mA			–1.5			–1.5	V
I_{OH}	V_{CC} = MIN, V_{IL} = 0.8 V	V_{OH} = 30 V (SN5407, SN7407)			0.25			0.25	mA
		V_{OH} = 15 V (SN5417, SN7417)			0.25			0.25	
V_{OL}	V_{CC} = MIN, V_{IH} = 2 V	I_{OL} = 16 mA			0.4			0.4	V
		I_{OL} = 30 mA (SN5407, SN5417)			0.7			0.7	
		I_{OL} = 40 mA (SN7407, SN7417)			0.7			0.7	
I_I	V_{CC} = MAX,	V_I = 5.5 V			1			1	mA
I_{IH}	V_{CC} = MAX,	V_{IH} = 2.4 V			40			40	µA
I_{IL}	V_{CC} = MAX,	V_{IL} = 0.4 V			–1.6			–1.6	mA
I_{CCH}	V_{CC} = MAX			29	41		29	41	mA
I_{CCL}	V_{CC} = MAX			21	30		21	30	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

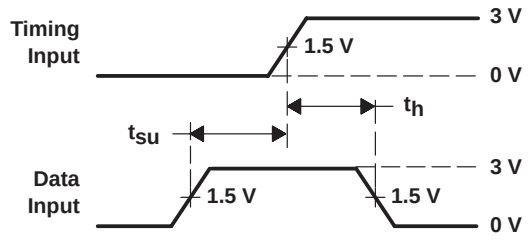
switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	A	Y	R_L = 110 Ω, C_L = 15 pF		6	15	ns
t_{PHL}					20	26	
t_{PLH}	A	Y	R_L = 150 Ω, C_L = 50 pF			15	ns
t_{PHL}						26	

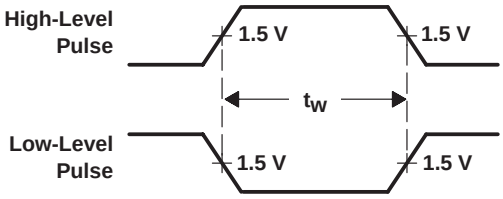
PARAMETER MEASUREMENT INFORMATION



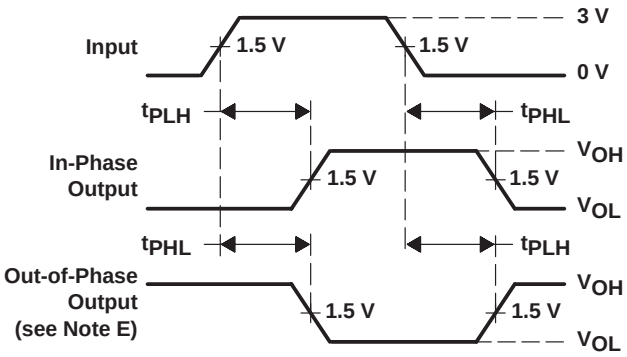
LOAD CIRCUIT



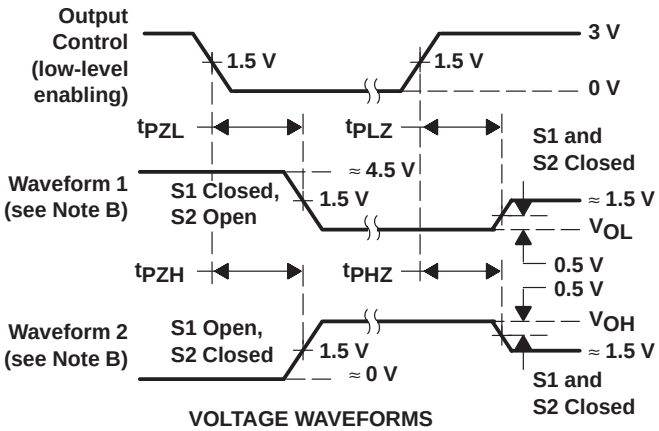
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE WIDTHS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS

NOTES: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
C. In the examples above, the phase relationships between inputs and outputs have been chosen arbitrarily.
D. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 7 ns, t_f ≤ 7 ns.
E. When measuring propagation delay times of 3-state outputs, switches S1 and S2 are closed.
F. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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