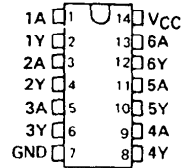


TYPES SN7407, SN7417, SN5407, SN5417  
 HEX BUFFERS/DRIVERS WITH  
 OPEN-COLLECTOR HIGH-VOLTAGE OUTPUTS

DECEMBER 1983 - REVISED MARCH 1988

- 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

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

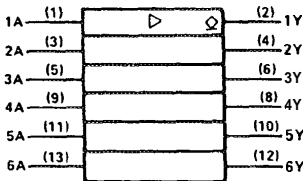


description

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 are also characterized for use as buffers for driving TTL inputs. The SN5407 and SN7407 have minimum breakdown voltages of 30 volts and the SN5417 and SN7417 have minimum breakdown voltages of 15 volts. The maximum sink current is 30 milliamperes for the SN5407 and SN5417, and 40 milliamperes for the SN7407 and SN7417.

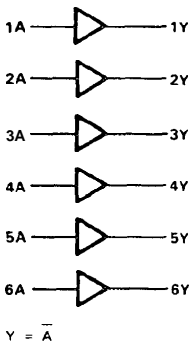
These circuits are completely compatible with most TTL families. Inputs are diode-clamped to minimize transmission-line effects which simplifies design. Typical power dissipation is 145 milliwatts and average propagation delay time is 14 nanoseconds. The SN5407 and SN5417 are characterized for Operation 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†

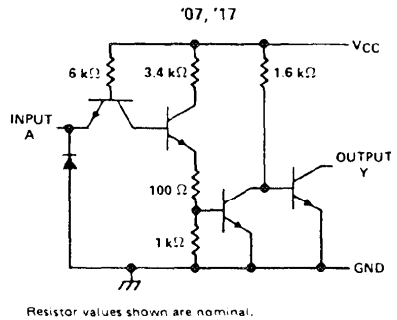


† This symbol is in accordance with ANSI/IEEE Std 91-1964 and IEC Publication 617-12.

logic diagram (positive logic)



schematic



PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

# TYPES SN7407, SN7417, SN5407, SN5417

## HEX BUFFERS/DRIVERS WITH OPEN-COLLECTOR HIGH-VOLTAGE OUTPUTS

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

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

NOTES: 1. Voltage values are with respect to network ground terminal.  
2. This is the maximum voltage which 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			30			30	v
			15			15	v
$I_{OL}$ 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 <sup>†</sup>	SN5407 SN5417		SN7407 SN7417		UNIT	
		MIN	TYP <sup>‡</sup> MAX	MIN	TYP <sup>‡</sup> MAX		
$V_{IK}$	$V_{CC} = \text{MIN.}$ $I_I = -12 \text{ mA}$		-1.5		-1.5	v	
$I_{OH}$	$V_{CC} = \text{MIN.}$ $V_{IL} = 0.8 \text{ V}$ , $V_{OH} = \S$		0.25		0.25	mA	
$V_{OL}$	$V_{CC} = \text{MIN.}$ , $V_{IH} = 2 \text{ V}$		0.4		Ob	v	
	$I_{OL} = 16 \text{ mA}$		0.7		0.7	v	
	$I_{OL} = \P$						
$I_I$	$V_{CC} = \text{MAX.}$ $V_I = 5.5 \text{ V}$		1		1	mA	
$I_{IH}$	$V_{CC} = \text{MAX.}$ $V_{IH} = 2.4 \text{ V}$		40		40	µA	
$I_{IL}$	$V_{CC} = \text{MAX.}$ $V_{IL} = 0.4 \text{ v}$		-1.6		-16	mA	
$I_{CCH}$	$V_{CC} = \text{MAX}$		29		29	41	mA
$I_{CCL}$	$V_{CC} = \text{MAX}$		21		21	30	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions

‡ All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ \text{C}$ .

§  $V_{OH} = 30 \text{ V}$  for '07 and 15 V for '17.

¶  $I_{OL} = 30 \text{ mA}$  for SN54<sup>†</sup> and 40 mA for SN74<sup>†</sup>.

### SN7407, SN7417 switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ \text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN TYP MAX		UNIT
$t_{PLH}$	A	Y	$R_L = 110 \Omega$ $C_L = 15 \text{ pF}$	6	10	nS
$t_{PHL}$	A	Y	$R_L = 110 \Omega$ $C_L = 15 \text{ pF}$	20	3 <sup>†</sup>	nS

### SN5407, SN5417 switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ \text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN TYP MAX		UNIT
$t_{PLH}$	A	Y	$R_L = 150 \Omega$ $C_L = 50 \text{ pF}$		15	nS
$t_{PHL}$	A	Y	$R_L = 150 \Omega$ $C_L = 50 \text{ pF}$		26	nS

NOTE 3 See General Information Section for load circuits and voltage waveforms

# TYPES SN74LS07, SN54LS07 HEX BUFFERS/DRIVERS WITH OPEN-COLLECTOR HIGH-VOLTAGE OUTPUTS

D3517, MAY 1990

- 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
- Package Options Include Standard Plastic (N) and Ceramic (J) 300-mil Dual-In-Line Packages, Plastic Small Outline (D) and Ceramic Chip Carrier (FK) Package

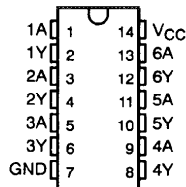
## description

These monolithic hex buffers/drivers feature high-voltage open-collector Outputs to interface with high-level circuits or for driving high-current loads. They are also characterized for use as buffers for driving TTL inputs. The 'LS07 has a rated output voltage of 30 V. The maximum sink current is 30 mA for the SN54LS07 and 40 mA for the SN74LS07.

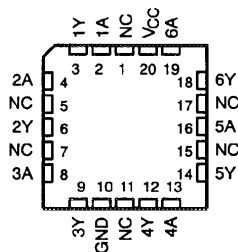
These circuits are compatible with most TTL families. Input are diode-clamped to minimize transmission-line effects, which simplifies design. Typical power dissipation is 140 mW and average propagation delay time is 12 ns.

The SN54LS07 is characterized over the full military temperature range of -55°C to 125°C. The SN74LS07 is characterized for Operation from 0°C to 70°C.

SN54LS07 . . . J PACKAGE  
SN74LS07 . . . D OR N PACKAGE  
(TOP VIEW)

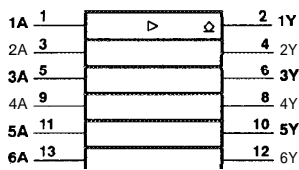


SN54LS07 . . . FK PACKAGE  
(TOP VIEW)



NC - No internal connection

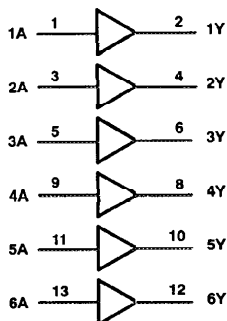
## logic symbol†



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

Pin numbers shown are for D, J, and N packages.

## logic diagram (positive logic)



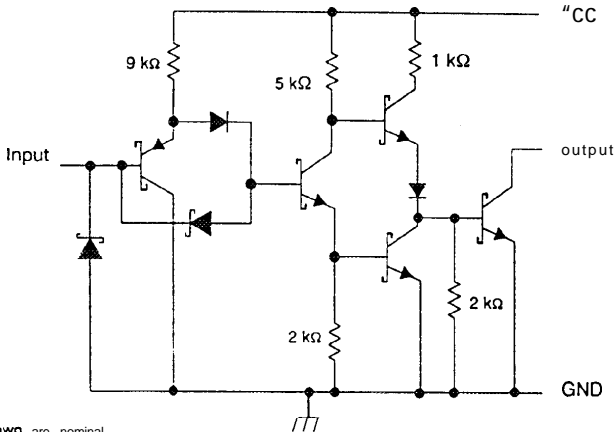
UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

# SN74LS07, SN54LS07

## HEX BUFFERS/DRIVERS WITH OPEN-COLLECTOR HIGH-VOLTAGE OUTPUTS

### schematic (each gate)



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): SN54LS07, SN74LS07 .....	30 V
Operating free-air temperature range: SN54LS07 .....	-55°C to 125°C
SN74LS07 .....	0°C to 70°C
Storage temperature range .....	-65°C to 150°C

† Stresses beyond those listed under 'absolute maximum ratings' may cause permanent damage to the device. This 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. Voltage values are with respect to network ground terminal.  
 2. This is the maximum voltage that should be applied to any output when it is in the off state.

### recommended operating conditions

	SN54LS07			SN74LS07			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			30			30	V
$I_{OL}$ Low-level output current			30			40	mA
$T_A$ Operating free-air temperature	-55		125	0		70	°C

PRODUCT PREVIEW Information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



**TYPES SN74LS07, SN54LS07**  
**HEX BUFFERS/DRIVERS WITH**  
**OPEN-COLLECTOR HIGH-VOLTAGE OUTPUTS**

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

PARAMETER	TEST CONDITIONS†		SN54LS07			SN74LS07			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IK}$	$V_{CC} = \text{MIN.}$	$I_I = -12 \text{ mA}$			-1.5			-1.5	V
$I_{OH}$	$V_{CC} = \text{MIN.}$	$V_{IH} = 2 \text{ V}$	$V_{OH} = 30 \text{ V}$		0.25		0.25		mA
$V_{OL}$	$V_{CC} = \text{MIN.}$	$V_{IL} = 0.8 \text{ V}$	$I_{OL} = 16 \text{ mA}$		0.4		0.4		V
			$I_{OL} = \text{MAX}^{\S}$		0.7		0.7		
$I_I$	$V_{CC} = \text{MAX.}$	$V_I = 7 \text{ V}$			1		1		mA
$I_{IH}$	$V_{CC} = \text{MAX.}$	$V_I = 2.4 \text{ V}$			20		20		$\mu\text{A}$
$I_{IL}$	$V_{CC} = \text{MAX.}$	$V_I = 0.4 \text{ V}$			-0.2		-0.2		m A
$I_{CCH}$	$V_{CC} = \text{MAX}$				14		14		mA
$I_{CCL}$	$V_{CC} = \text{MAX}$				45		45		mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

§  $I_{OL} = 30 \text{ mA}$  for SN54 series parts and 40 mA for SN74 series parts.

switching characteristics,  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ\text{C}$  (see Note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
$t_{PLH}$	A	Y	$R_L = 110 \Omega$	$C_L = 15 \text{ pF}$		6	10	ns
$t_{PHL}$						19	30	

NOTE 3: Load circuit and voltage waveforms are shown in Section 1.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.

