

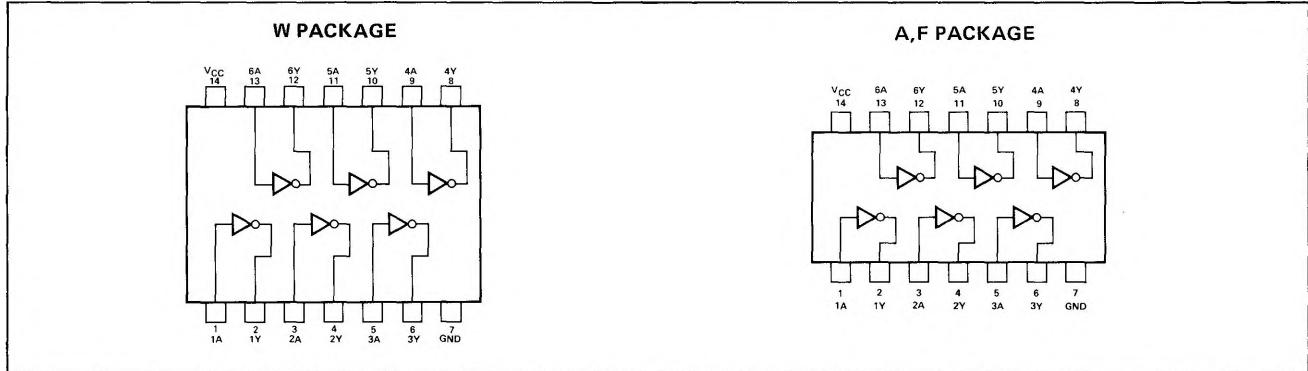
# OPEN COLLECTOR POSITIVE-HEX INVERTER

**S54S04**  
**S54S05**  
**N74S04**  
**N74S05**

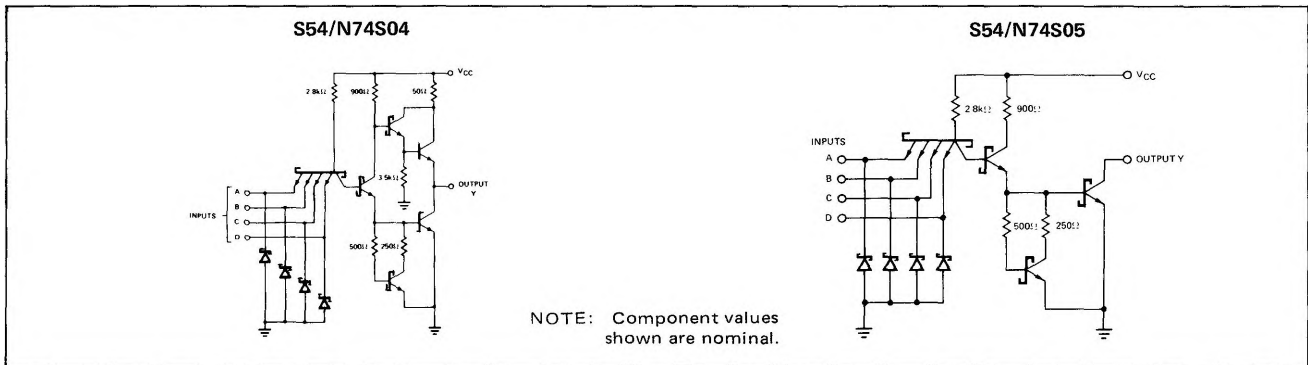
S54S04—A,F,W • S54S05—A,F,W • N74S04—A,F,W • N74S05—A,F

DIGITAL 54/74 TTL SERIES

## PIN CONFIGURATIONS



## SCHEMATIC (each gate)



## RECOMMENDED OPERATING CONDITIONS

	S54S04			N74S04			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply Voltage $V_{CC}$	4.5	5	5.5	4.75	5	5.25	V
Normalized Fan-Out from each Output, N:	High logic level		20	Low logic level		10	
Operating Free-Air Temperature, $T_A$	-55		125	0		70	$^{\circ}C$

## 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	
$V_I$	Input clamp voltage			-1.2	V	
$V_{OH}$	High-level output voltage	2.5	3.4		V	
$V_{OL}$	Low-level output voltage	2.7	3.4		V	
$I_I$	Input current at maximum input voltage			0.5	V	
$I_{IH}$	High-level input current (each input)	$V_{CC} = MAX,$ $V_I = 5.5V$		1	mA	
$I_{IL}$	Low-level input current (each input)	$V_{CC} = MAX,$ $V_I = 2.7V$		50	$\mu A$	
$I_{OS}$	Short-circuit output current†	$V_{CC} = MAX,$ $V_I = 0.5V$		-2	mA	
$I_{CCH}$	Supply current, high-level output (average per gate)	$V_{CC} = MAX$	-40	-100	mA	
$I_{CCL}$	Supply current, low-level output (average per gate)	$V_{CC} = MAX,$ All inputs at 0V		2.5	4	mA
	$V_{CC} = MAX,$ All inputs at 5V			5	9	mA

**SIGNETICS DIGITAL 54/74 TTL SERIES — S54S04 • S54S05 • N74S04 • N74S05**

**SWITCHING CHARACTERISTICS,  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ ,  $N = 10$**

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$t_{PLH}$	Propagation delay time, low-to-high-level output	$C_L = 15\text{ pF}$ ,	$R_L = 280\ \Omega$	2	3	4.5	ns
		$C_L = 50\text{ pF}$ ,	$R_L = 280\ \Omega$		4.5		
$t_{PHL}$	Propagation delay time, high-to-low-level output	$C_L = 15\text{ pF}$ ,	$R_L = 280\ \Omega$	2	3	5	ns
		$C_L = 50\text{ pF}$ ,	$R_L = 280\ \Omega$		5		

**S54/N74S05**

**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
$V_I$	Input clamp voltage	$V_{CC} = \text{MIN}$ ,	$I_I = -18\text{ mA}$			-1.2	V
$I_{OH}$	High-level output current	$V_{CC} = \text{MIN}$ ,	$V_{IL} = 0.8\text{ V}$ ,			250	$\mu\text{A}$
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}$ ,	$V_{IH} = 2\text{ V}$ ,			0.5	V
$I_I$	Input current at maximum input voltage	$V_{CC} = \text{MAX}$ ,	$V_I = 5.5\text{ V}$			1	mA
$I_{IH}$	High-level input current (each input)	$V_{CC} = \text{MAX}$ ,	$V_I = 2.7\text{ V}$			50	$\mu\text{A}$
$I_{IL}$	Low-level input current (each input)	$V_{CC} = \text{MAX}$ ,	$V_I = 0.5\text{ V}$			-2	mA
$I_{CCH}$	Supply current, high-level output (average per gate)	$V_{CC} = \text{MAX}$ ,	All inputs at 0V		1.5	3.3	mA
$I_{CCL}$	Supply current, low-level output (average per gate)	$V_{CC} = \text{MAX}$ ,	All inputs at 5V		5	9	mA

**SWITCHING CHARACTERISTICS,  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ ,  $N = 10$**

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$t_{PLH}$	Propagation delay time, low-to-high-level output	$C_L = 15\text{ pF}$ ,	$R_L = 280\ \Omega$	2	5	7.5	ns
		$C_L = 50\text{ pF}$ ,	$R_L = 280\ \Omega$		7.5		
$t_{PHL}$	Propagation delay time, high-to-low-level output	$C_L = 15\text{ pF}$ ,	$R_L = 280\ \Omega$	2	4.5	7	ns
		$C_L = 50\text{ pF}$ ,	$R_L = 280\ \Omega$		7		

\* For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

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

† Not more than one output should be shorted at a time, and duration of the short-circuit test should not exceed one second.

**NOTES:**

- A. The pulse generator has the following characteristics:  $V_{in(1)} = 3V$ ,  $V_{in(0)} = 0V$ ,  $t_1 = t_0 = 2.5\text{ ns}$ ,  $\text{PRR} = 1\text{ MHz}$ , duty cycle = 50%, and  $Z_{out} \approx 50\ \Omega$ .
- B. Inputs not under test are at 2.7V.
- C.  $C_L$  includes probe and jig capacitance.