

7405, LS05, S05
Inverters

Hex Inverter (Open Collector)
Product Specification

Logic Products

FUNCTION TABLE

INPUT	OUTPUT
A	Y
L	H
H	L

H = HIGH voltage level
L = LOW voltage level

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
7405	40ns (t _{PLH}) 8ns (t _{PHL})	12mA
74LS05	17ns (t _{PLH}) 15ns (t _{PHL})	2.4mA
74S05	5ns (t _{PLH}) 4.5ns (t _{PHL})	20mA

ORDERING CODE

PACKAGES	COMMERCIAL RANGE V _{CC} = 5V ± 5%; T _A = 0°C to +70°C
Plastic DIP	N7405N, N74LS05N, N74S05N
Plastic SO	N74LS05D, N74S05D
Ceramic DIP	

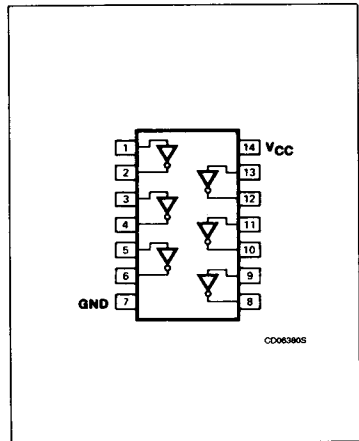
NOTE:
For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74	74S	74LS
A	Input	1uI	1Sul	1LSul
Y	Output	10uI	10Sul	10LSul

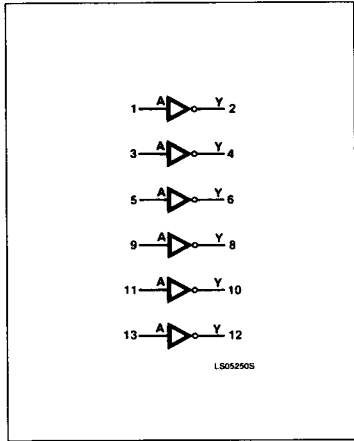
NOTE:
Where a 74 unit load (uI) is understood to be 40µA I_{IH} and -1.6mA I_{IL}, a 74S unit load (Sul) is 50µA I_{IH} and -2.0mA I_{IL}, and 74LS unit load (LSul) is 20µA I_{IH} and -0.4mA I_{IL}.

PIN CONFIGURATION



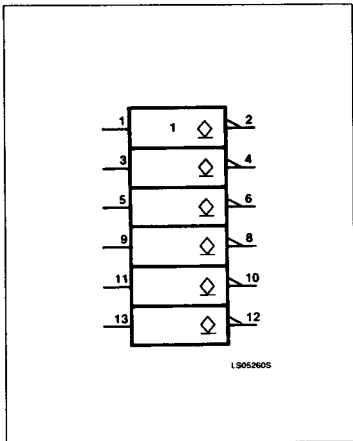
December 4, 1985

LOGIC SYMBOL



5-18

LOGIC SYMBOL (IEEE/IEC)



853-0505 81501

Inverters

7405, LS05, S05

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

PARAMETER		74	74LS	74S	UNIT
V _{CC}	Supply voltage	7.0	7.0	7.0	V
V _{IN}	Input voltage	−0.5 to +5.5	−0.5 to +7.0	−0.5 to +5.5	V
I _{IN}	Input current	−30 to +5	−30 to +1	−30 to +5	mA
V _{OUT}	Voltage applied to output in HIGH output state	−0.5 to +V _{CC}	−0.5 to +V _{CC}	−0.5 to +V _{CC}	V
T _A	Operating free-air temperature range	0 to 70			°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER		74			74LS			74S			UNIT
		Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
V _{CC}	Supply voltage	4.75	5.0	5.25	4.75	5.0	5.25	4.75	5.0	5.25	V
V _{IH}	HIGH-level input voltage	2.0			2.0			2.0			V
V _{IL}	LOW-level input voltage			+0.8			+0.8			+0.8	V
I _{IK}	Input clamp current			−12			−18			−18	mA
V _{OH}	HIGH-level output voltage			5.5			5.5			5.5	V
I _{OL}	LOW-level output current			16			8			20	mA
T _A	Operating free-air temperature	0		70	0		70	0		70	°C

TEST CIRCUITS AND WAVEFORMS

TC028305

WF064505

Test Circuit For 74 Open Collector Outputs

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.

D = Diodes are 1N916, 1N3064, or equivalent.

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

Input Pulse Definition

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

Inverters

7405, LS05, S05

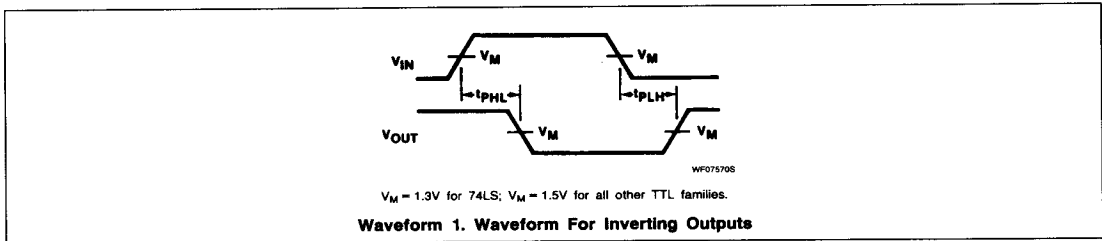
DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

PARAMETER		TEST CONDITIONS ¹		7405			74LS05			74S05			UNIT
				Min	Typ ²	Max	Min	Typ ²	Max	Min	Typ ²	Max	
I _{OH}	HIGH-level output current	V _{CC} = MIN, V _{IL} = MAX, V _{OH} = 5.5V				250			100			250	μA
V _{OL}	LOW-level output voltage	V _{CC} = MIN, V _{IH} = MIN	I _{OL} = MAX		0.2	0.4		0.35	0.5			0.5	V
			I _O = 4mA (74LS)				0.25	0.4					V
V _{IK}	Input clamp voltage	V _{CC} = MIN, I _I = I _{IK}				-1.5			-1.5			-1.2	V
I _I	Input current at maximum input voltage	V _{CC} = MAX	V _I = 5.5V			1.0						1.0	mA
			V _I = 7.0V					0.1					mA
I _{IH}	HIGH-level input current	V _{CC} = MAX	V _I = 2.4V			40							μA
			V _I = 2.7V					20			50		μA
I _{IL}	LOW-level input current	V _{CC} = MAX	V _I = 0.4V			-1.6			-0.4				mA
			V _I = 0.5V								-2.0		mA
I _{CC}	Supply current (total)	V _{CC} = MAX	I _{CCH} Outputs HIGH		6	12		1.2	2.4		9	19.8	mA
			I _{CCL} Outputs LOW		18	33		3.6	6.6		30	54	mA

NOTES:

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

AC WAVEFORM



AC ELECTRICAL CHARACTERISTICS T_A = 25°C, V_{CC} = 5.0V

PARAMETER		TEST CONDITIONS	74		74LS		74S		UNIT
			$C_L = 15\text{pF}, R_L = 400\Omega$		$C_L = 15\text{pF}, R_L = 2\text{k}\Omega$		$C_L = 15\text{pF}, R_L = 280\Omega$		
			Min	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay	For 7405 only, $R_L = 4\text{k}\Omega$ for t_{PLH} Waveform 1		55 15		32 28		7.5 7.0	ns