

Table 3-3 Manufacturer's data sheet for a typical CMOS device, the 54/74HC00 quad NAND gate.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE							
The following conditions apply unless otherwise specified: Commercial: $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 5\%$; Military: $T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 10\%$							
Sym.	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
V_{IH}	Input HIGH level	Guaranteed logic HIGH level		3.15	—	—	V
V_{IL}	Input LOW level	Guaranteed logic LOW level		—	—	1.35	V
I_{IH}	Input HIGH current	$V_{CC} = \text{Max.}, V_I = V_{CC}$		—	—	1	μA
I_{IL}	Input LOW current	$V_{CC} = \text{Max.}, V_I = 0\text{ V}$		—	—	-1	μA
V_{IK}	Clamp diode voltage	$V_{CC} = \text{Min.}, I_N = -18\text{ mA}$		—	-0.7	-1.2	V
I_{IOS}	Short-circuit current	$V_{CC} = \text{Max.}, V_O = \text{GND}$ ⁽³⁾		—	—	-35	mA
V_{OH}	Output HIGH voltage	$V_{CC} = \text{Min.}, V_{IN} = V_{IL}$	$I_{OH} = -20\ \mu\text{A}$	4.4	4.499	—	V
			$I_{OH} = -4\text{ mA}$	3.84	4.3	—	V
V_{OL}	Output LOW voltage	$V_{CC} = \text{Min.}, V_{IN} = V_{IH}$	$I_{OL} = 20\ \mu\text{A}$	—	.001	0.1	V
			$I_{OL} = 4\text{ mA}$		0.17	0.33	
I_{CC}	Quiescent power supply current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND or } V_{CC}, I_O = 0$		—	2	10	μA
SWITCHING CHARACTERISTICS OVER OPERATING RANGE, $C_L = 50\text{ pF}$							
Sym.	Parameter ⁽⁴⁾	Test Conditions		Min.	Typ.	Max.	Unit
t_{PD}	Propagation delay	A or B to Y		—	9	19	ns
C_I	Input capacitance	$V_{IN} = 0\text{ V}$		—	3	10	pF
C_{pd}	Power dissipation capacitance per gate	No load		—	22	—	pF

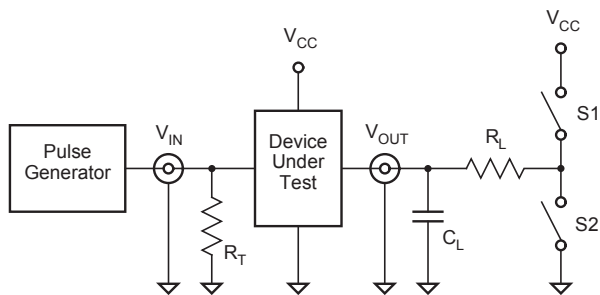
NOTES:

1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics.
2. Typical values are at $V_{CC} = 5.0\text{ V}, +25^\circ\text{C}$ ambient.
3. Not more than one output should be shorted at a time. Duration of short-circuit test should not exceed one second.
4. This parameter is guaranteed but not tested.

WHAT'S IN A NUMBER?

Two different prefixes, “74” and “54,” are used in the part numbers of CMOS and TTL devices. These prefixes simply distinguish between commercial and military versions. A 74HC00 is the commercial part and the 54HC00 is the military version.

TEST CIRCUIT FOR ALL OUTPUTS



LOADING

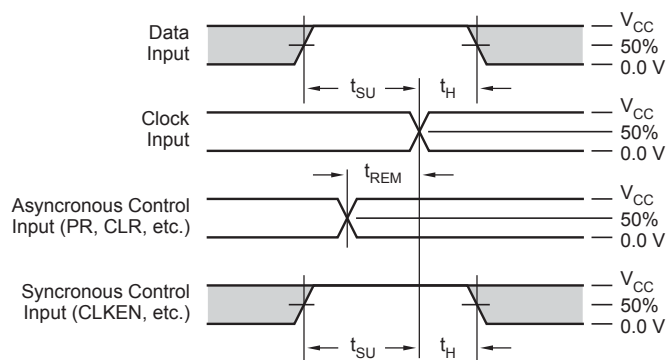
Parameter	R_L	C_L	S1	S2
t_{en}	1 K Ω	50 pF or 150 pF	Open	Closed
			Closed	Open
t_{dis}	1 K Ω		Open	Closed
			Closed	Open
t_{pd}	—	50 pF or 150 pF	Open	Open

DEFINITIONS:

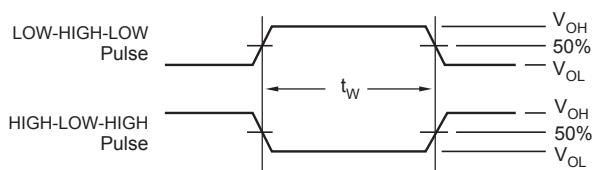
C_L = Load capacitance, includes jig and probe capacitance.

R_T = Termination resistance, should equal Z_{OUT} of the Pulse Generator.

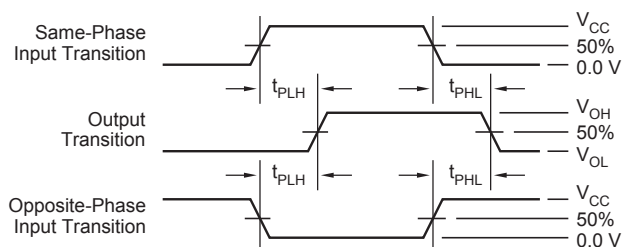
SETUP, HOLD, AND RELEASE TIMES



PULSE WIDTH



PROPAGATION DELAY



THREE-STATE ENABLE AND DISABLE TIMES

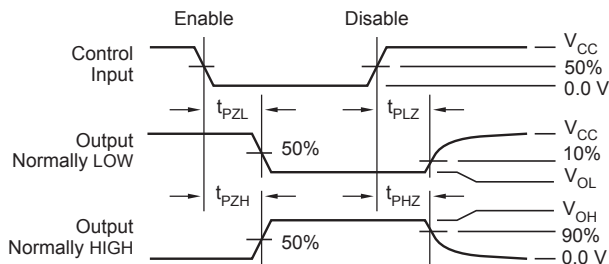


Figure 3-24 Test circuits and waveforms for HC-series logic.