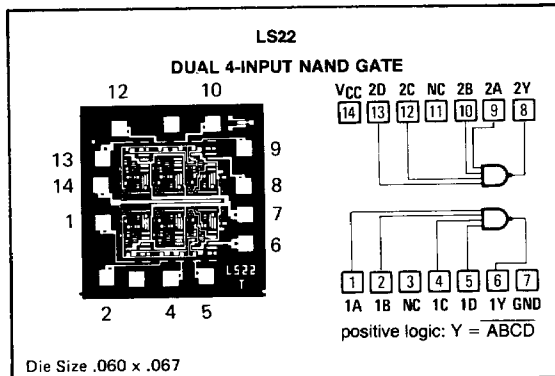
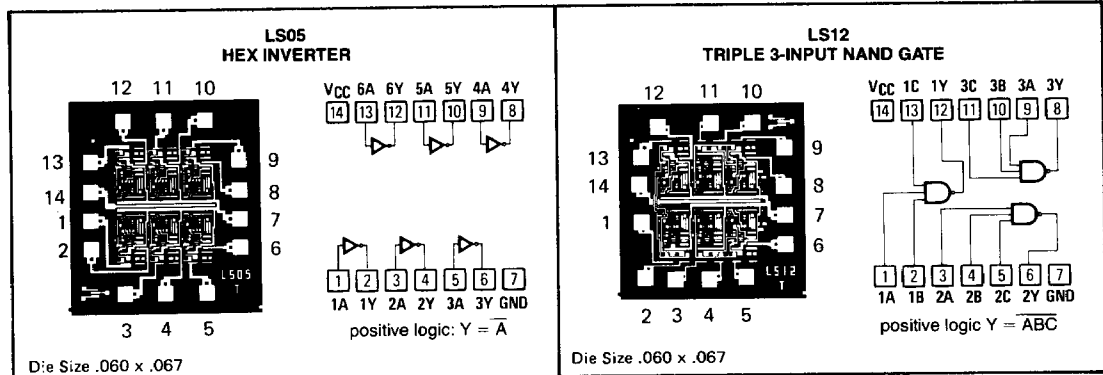
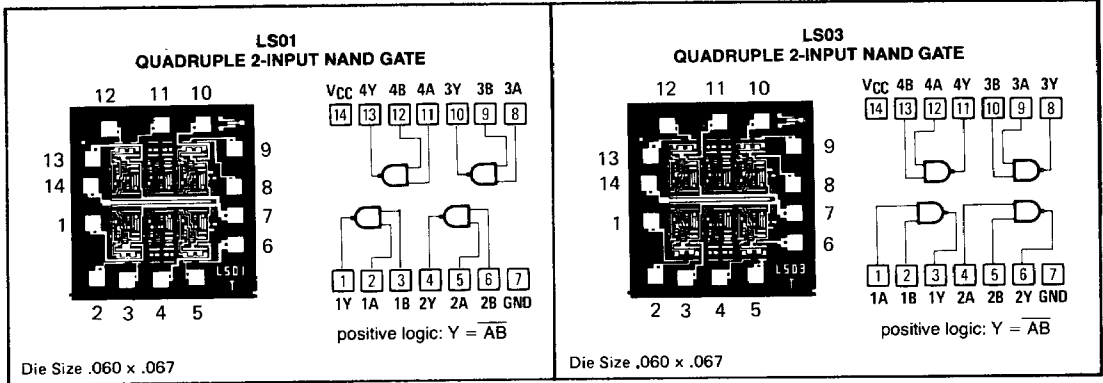


PIN-OUT AND LOGIC DIAGRAMS



NC—No internal connection

Positive-NAND Gates, Hex Inverters With Open-Collector Outputs

LS01 LS03
LS05 LS12 LS22

Recommended Operating Conditions

	9LS/54LS			9LS/74LS			Unit
	Min	Nom	Max	Min	Nom	Max	
Supply voltage, V_{CC} (See Note 1)	4.5	5	5.5	4.75	5	5.25	V
High-level output voltage, V_{OH}			5.5			5.5	V
Low-level output current, I_{OL}			4			8	mA
Operating free-air temperature, T_A	-55		125			70	°C

NOTE 1: Voltage values are with respect to network ground terminal.

Electrical Characteristics Over Recommended Free-Air Temperature Range (Unless Otherwise Noted)

Parameter	Test Conditions*	9LS/54LS			9LS/74LS			Unit	
		Min	Typ**	Max	Min	Typ**	Max		
V_{IH}		2			2			V	
V_{IL}				0.7			0.8	V	
V_I	$V_{CC}=\text{MIN}, I_I=-18\text{mA}$			-1.5			-1.5	V	
I_{OH}	$V_{CC}=\text{MIN}, V_{OH}=5.5\text{V}$			100			100	μA	
V_{OL}	$V_{CC}=\text{MIN}, V_{IH}=2\text{V}$			$I_{OL}=4\text{mA}$			0.25	0.4	V
				$I_{OL}=8\text{mA}$			0.25	0.4	
I_I	$V_{CC}=\text{MAX}, V_I=7.0\text{V}$			0.1			0.1	mA	
I_{IH}	$V_{CC}=\text{MAX}, V_I=2.7\text{V}$			20			20	μA	
I_{IL}	$V_{CC}=\text{MAX}, V_I=0.4\text{V}$			-0.4			-0.4	mA	
I_{CCH}	$V_{CC}=\text{MAX},$ All inputs at 0V (Per Gate)			0.2	0.4		0.2	0.4	mA
I_{CCL}	$V_{CC}=\text{MAX},$ All inputs at 4.5V (Per Gate)			0.6	1.1		0.6	1.1	mA

*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 $V_{CC} = 5\text{V}, T_A = 25^\circ\text{C}$.

†Not more than one output should be shorted at a time.

Switching Characteristics, $V_{CC} = 5\text{V}$ Over Recommended Free-Air Temperature Range

Parameter	-55°C			+25°C			+125°C			Unit
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Test Conditions: $C_L = 15\text{pF}, R_L = 2\text{k}\Omega$ (See Figure B, page 2-174)										
t_{PLH}	7.0	16	28	7.0	14	22	7.0	15	28	ns
t_{PHL}	6.0	12	22	4.0	10	18	4.0	10	18	ns
Test Conditions: $C_L = 50\text{pF}, R_L = 2\text{k}\Omega$ (See Figure B, page 2-174)										
t_{PLH}	12	18.0	35	12	20	30	12	21	35	ns
t_{PHL}	6.0	12	25	6.0	12	20	6.0	12	25	ns

Note: AC specification shown under -55°C and $+125^\circ\text{C}$ are for 9LS devices only. All 50pF specifications are for 9LS only.