recommended operating conditions

		SN54LS08			SN74LS08			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			0.7			0.8	V
I_{OH}	High-level output current			−0.4			−0.4	mA
I_{OL}	Low-level output current			4			8	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 †			SN54LS08			SN74LS08			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX		
V_{IK}	V_{CC} = MIN,	I_I = −18 mA			−1.5			−1.5		V
V_{OH}	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OH} = −0.4 mA	2.5	3.4		2.7	3.4		V
V_{OL}	V_{CC} = MIN,	V_{IL} = MAX,	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
	V_{CC} = MIN,	V_{IL} = MAX,	I_{OL} = 8 mA					0.35	0.5	
I_I	V_{CC} = MAX,	V_I = 7 V				0.1			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V				20			20	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V				−0.4			−0.4	mA
I_{OS} §	V_{CC} = MAX			−20		−100	−20		−100	mA
I_{CCH}	V_{CC} = MAX,	V_I = 4.5 V			2.4	4.8		2.4	4.8	mA
I_{CCL}	V_{CC} = MAX,	V_I = 0 V			4.4	8.8		4.4	8.8	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
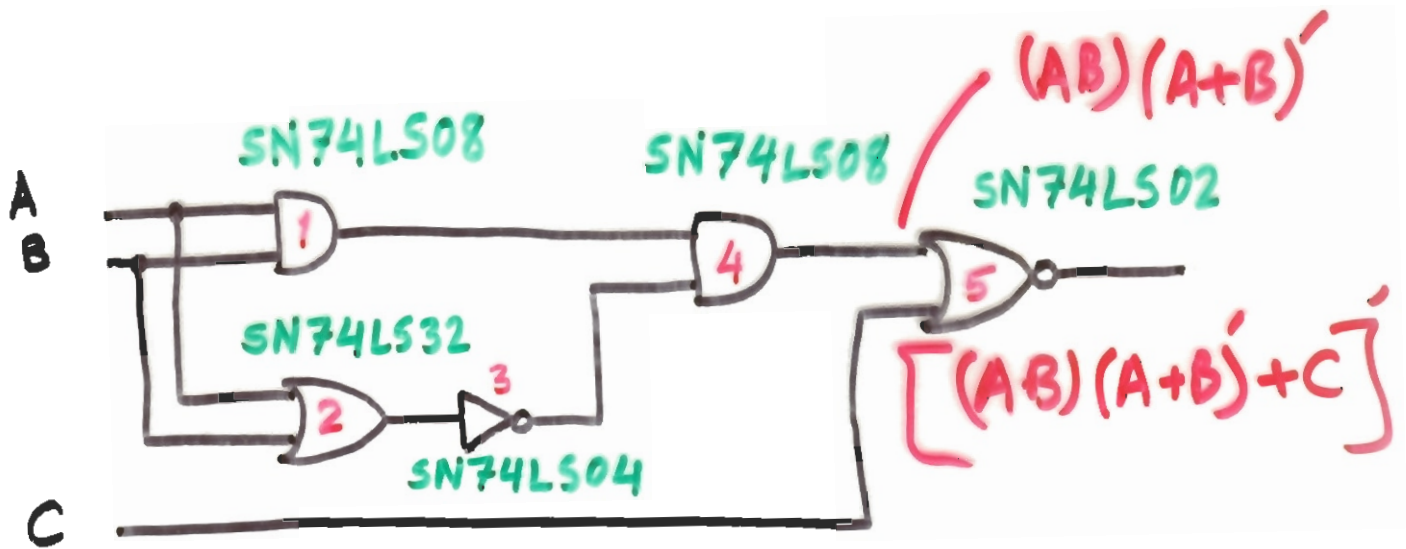‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Y	R_L = 2 kΩ,	C_L = 15 pF		8	15	ns
t_{PHL}						10	20	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

TEXAS
INSTRUMENTS
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2 TTL Devices

A
B

SN74LS08 — gate 1

SN74LS08 — gate 4

$(AB)(A+B)'$

SN74LS02 — gate 5

SN74LS32 — gate 2

3

SN74LS04

C

$$[(AB)(A+B)'+C]$$

3 paths from input to output:

(1) $1 \rightarrow 4 \rightarrow 5$

(2) $2 \rightarrow 3 \rightarrow 4 \rightarrow 5$

(3) 5

* **Propagational Delay:**

(1) $\text{Max}(t_{PLH_{max}}, t_{PHL_{max}})_{,08} + \text{Max}(t_{PLH_{max}}, t_{PHL_{max}})_{,08}$

$+ \text{Max}(t_{PLH_{max}}, t_{PHL_{max}})_{,02}$

$= \text{Max}(15\text{ ns}, 20\text{ ns}) + \text{Max}(15\text{ ns}, 20\text{ ns}) + \text{Max}(15\text{ ns}, 15\text{ ns})$

$= 20\text{ ns} + 20\text{ ns} + 15\text{ ns} = 55\text{ ns}$

(2) $\text{Max}(22\text{ ns}, 22\text{ ns}) + \text{Max}(15, 15) + \text{Max}(15, 20) + \text{Max}(15, 15)$

$= 22\text{ ns} + 15\text{ ns} + 20\text{ ns} + 15\text{ ns}$

$= 72\text{ ns}$

(3) $\text{Max}(15\text{ ns}, 15\text{ ns}) = 15\text{ ns}$

$\Rightarrow$ Worst-case propagational delay =
Max (case 1, case 2, case 3)
$= \text{Max}(55\text{ ns}, 72\text{ ns}, 15\text{ ns}) = \underline{72\text{ ns}}$