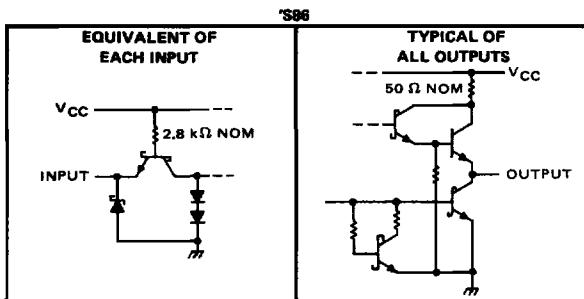
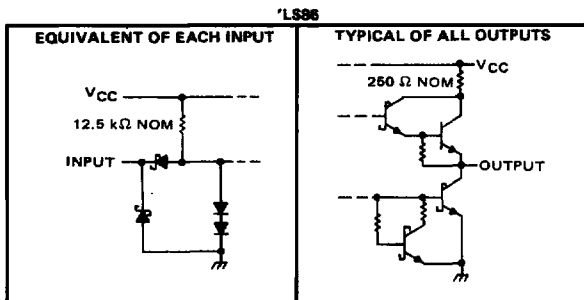
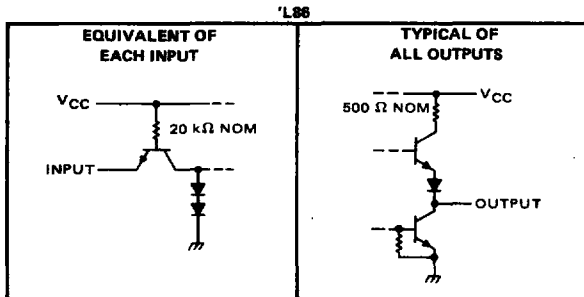
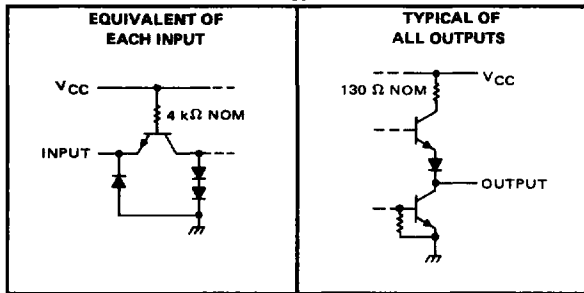


TTL
MSI

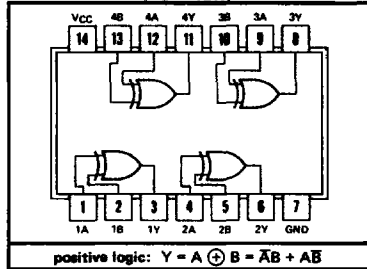
TYPES SN5486, SN54L86, SN54LS86, SN54S86, SN7486, SN74L86, SN74LS86, SN74S86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

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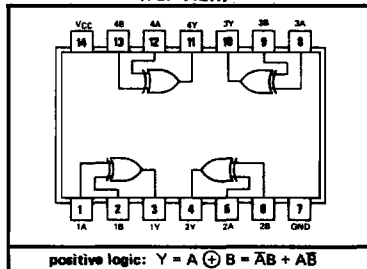
schematics of inputs and outputs



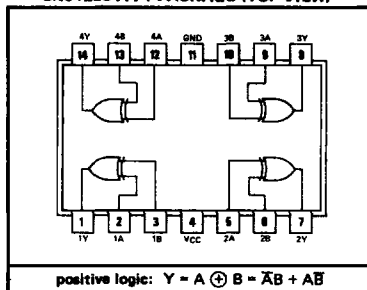
SN54*, SN54LS*, SN54S* ... J OR W PACKAGE
SN74*, SN74LS*, SN74S* ... J OR N PACKAGE
(TOP VIEW)



SN54L86 ... J PACKAGE
SN74L86 ... J OR N PACKAGE
(TOP VIEW)



SN54L86 ... T PACKAGE (TOP VIEW)



FUNCTION TABLE

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

H = high level, L = low level

TYPE	TYPICAL AVERAGE PROPAGATION DELAY TIME	TYPICAL TOTAL POWER DISSIPATION
'86	14 ns	150 mW
'L86	55 ns	15 mW
'LS86	10 ns	30.5 mW
'S86	7 ns	250 mW

TYPES SN5486, SN7486

QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	5.5 V
Operating free-air temperature range: SN5486	-55°C to 125°C
SN7486	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

recommended operating conditions

	SN5486			SN7486			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-800			-800	μ A
Low-level output current, I_{OL}			16			16	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	SN5486			SN7486			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage			0.8			0.8		V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -8 \text{ mA}$			-1.5			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -800 \mu\text{A}$	2.4	3.4		2.4	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 16 \text{ mA}$		0.2	0.4		0.2	0.4	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1			1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$			40			40	μ A
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-1.6			-1.6	mA
I_{OS} Short-circuit output current§	$V_{CC} = \text{MAX}$	-20		-55	-18		-55	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}, \text{ See Note 2}$	30		43	30		50	mA

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable 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.

NOTE 2: I_{CC} is measured with the inputs grounded and the outputs open.

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

PARAMETER¶	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
${}^{\dagger}t_{PLH}$	A or B	Other input low	$C_L = 15 \text{ pF}, R_L = 400 \Omega,$ See Note 3		15	23	ns
${}^{\dagger}t_{PHL}$					11	17	
${}^{\dagger}t_{PLH}$	A or B	Other input high			18	30	ns
${}^{\dagger}t_{PHL}$					13	22	

¶ ${}^{\dagger}t_{PLH}$ = propagation delay time, low-to-high-level output

${}^{\dagger}t_{PHL}$ = propagation delay time, high-to-low-level output

NOTE 3: Load circuit and voltage waveforms are shown on page 3-10.

TYPES SN54L86, SN74L86 QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage (see Note 4)	5.5 V
Operating free-air temperature range: SN54L86	-55°C to 125°C
SN74L86	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTES: 1. Voltage values are with respect to network ground terminal.
4. Input voltages must be zero or positive with respect to network ground terminal.

recommended operating conditions

	SN54L86			SN74L86			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-100			-200	μ A
Low-level output current, I_{OL}			2			3.6	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	SN54L86			SN74L86			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH} High-level input voltage		2			2		V	
V_{IL} Low-level input voltage				0.7			0.7 V	
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.7 \text{ V}$, $I_{OH} = \text{MAX}$	2.4	3.3		2.4	3.2	V	
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $V_{IL} = 0.7 \text{ V}$, $I_{OL} = \text{MAX}$		0.15	0.3		0.2	0.4 V	
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$			200			200 μ A	
I_{IH} High-level input current	$V_{CC} = \text{MAX}$, $V_I = 2.4 \text{ V}$			20			20 μ A	
I_{IL} Low-level input current	$V_{CC} = \text{MAX}$, $V_I = 0.3 \text{ V}$			-0.36			-0.36 mA	
I_{OS} Short-circuit output current	$V_{CC} = \text{MAX}$	-3		-15	-3		-15 mA	
I_{CCH} Supply current, all outputs high	$V_{CC} = \text{MAX}$, See Note 5		2.2	4.4		2.2	4.4 mA	
I_{CCL} Supply current, all outputs low	$V_{CC} = \text{MAX}$, See Note 6		3.8	6.68		3.8	6.68 mA	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

NOTES: 5. I_{CCH} is measured with all outputs open, one input of each gate at 4.5 V, and the other inputs grounded.

6. I_{CCL} is measured with all outputs open and all inputs at 4.5 V.

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

PARAMETER§	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Other input low	$C_L = 50 \text{ pF}$, $R_L = 4 \text{ k}\Omega$, See Note 7		75	150	ns
t_{PHL}					60	150	
t_{PLH}	A or B	Other input high			50	90	ns
t_{PHL}					35	60	

§ t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 7: Load circuit and voltage waveforms are shown on page 3-11.

TYPES SN54LS86, SN74LS86

QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

REVISED OCTOBER 1976

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	7 V
Operating free-air temperature range: SN54LS86	-55°C to 125°C
SN74LS86	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

recommended operating conditions

	SN54LS86			SN74LS86			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-400			-400	μ A
Low-level output current, I_{OL}			4			8	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	SN54LS86			SN74LS86			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage				0.7			0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			-1.5			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OH} = -400 \mu\text{A}$	2.5	3.4		2.7	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, I_{OL} = 4 \text{ mA}$		0.25	0.4		0.25	0.4	V
	$V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OL} = 8 \text{ mA}$					0.35	0.5	
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$			0.2			0.2	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			40			40	μ A
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-0.8			-0.8	mA
I_{OS} Short-circuit output current§	$V_{CC} = \text{MAX}$			-8			-42	mA
I_{CC} Supply current	$V_{CC} = \text{MAX},$ See Note 2			6.1			10	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable 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.

NOTE 2: I_{CC} is measured with the inputs grounded and the outputs open.

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

PARAMETER†	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Other input low	$C_L = 15 \text{ pF}, R_L = 2 \text{ k}\Omega,$ See Note 7		12	23	ns
t_{PHL}					10	17	
t_{PLH}	A or B	Other input high	See Note 7		20	30	ns
t_{PHL}					13	22	

† t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 7: Load circuit and voltage waveforms are shown on page 3-11.

TYPES SN54S86, SN74S86

QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage	5.5 V
Operating free-air temperature range: SN54S86	-55°C to 125°C
SN74S86	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

recommended operating conditions

	SN54S86			SN74S86			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-1			-1	mA
Low-level output current, I_{OL}			20			20	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	SN54S86			SN74S86			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage				0.8			0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			-1.2			-1.2	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$	2.5	3.4		2.7	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$			0.5			0.5	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1			1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			50			50	µA
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5 \text{ V}$			-2			-2	mA
I_{OS} Short-circuit output current§	$V_{CC} = \text{MAX}$	-40	-100		-40	-100		mA
I_{CC} Supply current	$V_{CC} = \text{MAX}, \text{ See Note 2}$		50	75		50	75	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable 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, and duration of the short-circuit should not exceed one second.

NOTE 2: I_{CC} is measured with the inputs grounded and the outputs open.

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

PARAMETER †	FROM (INPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	A or B	Other input low	$C_L = 15 \text{ pF}, R_L = 280 \Omega, \text{ See Note 3}$		7	10.5	ns
t_{PHL}					6.5	10	
t_{PLH}	A or B	Other input high			7	10.5	ns
t_{PHL}					6.5	10	

† $t_{PLH} \equiv$ propagation delay time, low-to-high-level output

$t_{PHL} \equiv$ propagation delay time, high-to-low-level output

NOTE 3: Load circuit and voltage waveforms are shown on page 3-10.