

# SN54LS386A, SN74LS386A QUADRUPLE 2-INPUT EXCLUSIVE-OR GATES

SDLS171 – MARCH 1974 – REVISED MARCH 1988

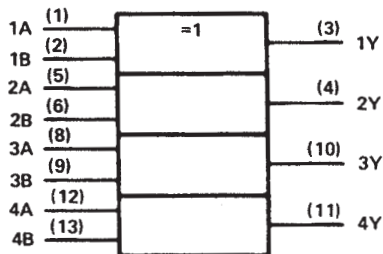
- Electrically Identical to SN54LS86A/SN74LS86A
- Mechanically Identical to SN54L86/SN74L86
- Total Average Propagation Delay Times . . . 10 ns
- Typical Total Power Dissipation . . . 30.5 mW

**FUNCTION TABLE  
(EACH GATE)**

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

H = high level  
L = low level

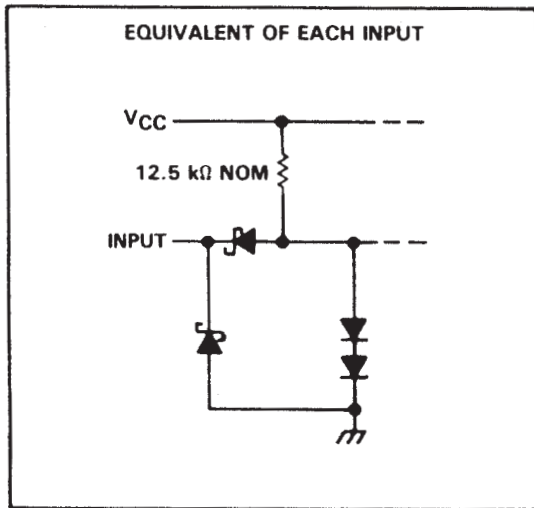
**logic symbol†**



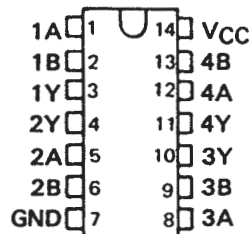
† This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, J, N, and W packages.

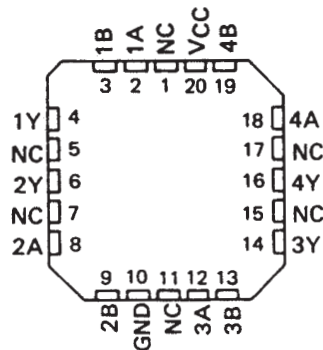
**schematics of inputs and outputs**



**SN54LS386A . . . J OR W PACKAGE  
SN74LS386A . . . D OR N PACKAGE  
(TOP VIEW)**



**SN54LS386A . . . FK PACKAGE  
(TOP VIEW)**



NC - No internal connection

**logic diagram (each gate)**



**positive logic**

$$Y = A \oplus B = \bar{A}B + A\bar{B}$$

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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## 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: SN54LS386A	-55°C to 125°C
SN74LS386A	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

	SN54LS386A			SN74LS386A			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	$\mu$ 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†	SN54LS386A			SN74LS386A			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	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OL} = 4 \text{ mA}$		0.25	0.4		0.25	0.4	V
	$I_{OL} = 8 \text{ mA}$					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	$\mu$ 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 §	$V_{CC} = \text{MAX}$	-20		-100	-20		-100	mA
$I_{CC}$ Supply current	$V_{CC} = \text{MAX},$ See Note 2		6.1	10		6.1	10	mA

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

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

§ 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 3		12	23	ns
$t_{PHL}$				10	17	
$t_{PLH}$	A or B	Other input high		20	30	ns
$t_{PHL}$				13	22	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



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