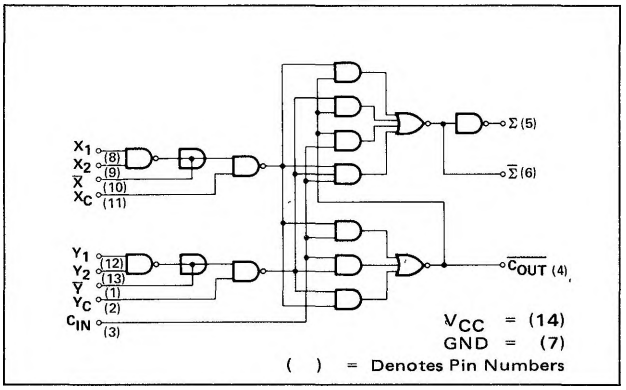
DESCRIPTION

The 8268 is a single-bit full adder with gated true and complementary inputs, complementary sum (Σ and $\overline{\Sigma}$) outputs and an inverted carry output. By taking advantage of the unique true or inverted inputs and true or inverted outputs, parallel addition speed is greatly enhanced (by eliminating unnecessary inversions).

The device is designed for medium speed parallel and serial adder systems.

LOGIC DIAGRAM



TRUTH TABLE (See Notes 1, 2 and 3)

C_{IN}	Y	X	$\overline{C_{OUT}}$	Σ	$\overline{\Sigma}$
0	0	0	1	1	0
0	0	1	1	0	1
0	1	0	1	0	1
0	1	1	0	1	0
1	0	0	1	0	1
1	0	1	0	1	0
1	1	0	0	1	0
1	1	1	0	0	1

NOTES:

1. $X = \overline{\bar{X} \cdot X_c}$; $Y = \overline{\bar{Y} \cdot Y_c}$
   where $\bar{X} = \overline{X_1 \cdot Y_2}$; $\bar{Y} = \overline{Y_1 \cdot Y_2}$
2. When $\bar{X}$ or $\bar{Y}$ are used as inputs, X_1 and X_2 or Y_1 and Y_2 respectively must be tied to GND.
3. When X_1 and X_2 or Y_1 and Y_2 are used as inputs, $\bar{X}$ or $\bar{Y}$ respectively must be left open or used to perform the WIRED-AND function.

ELECTRICAL CHARACTERISTICS (Over Recommended Operating Temperature And Voltage)

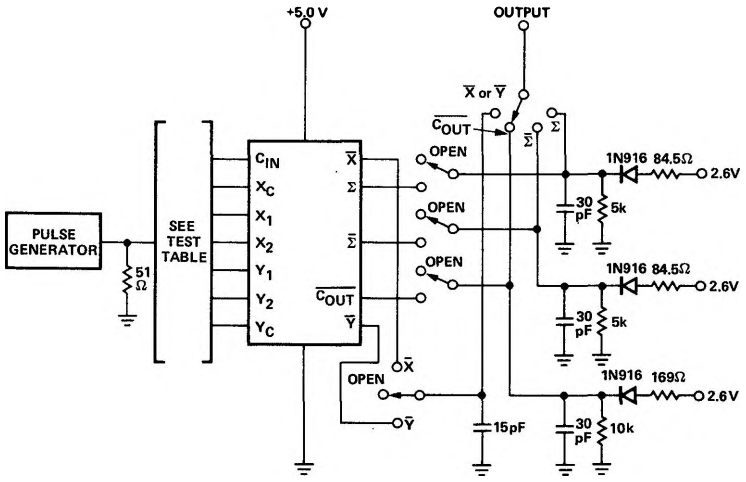
CHARACTERISTICS	LIMITS				TEST CONDITIONS										NOTES
	MIN.	TYP.	MAX.	UNITS	X_1	X_2	X	X_c	Y_1	Y_2	Y	Y_c	C_{IN}	OUTPUTS	
"1" Output Voltage	2.6	3.5		V	0.8V	0.8V	2.0V	2.0V	0.8V	0.8V	0.8V	2.0V	0.8V	-500μA	6
"0" Output Voltage			0.4	V	0.8V	0.8V	2.0V	2.0V	0.8V	0.8V	2.0V	2.0V	0.8V	16mA	7
"0" Input Current															
X_1	-0.1		-1.6	mA	0.4V	4.5V									
X_2	-0.1		-1.6	mA	4.5V	0.4V									
X	-0.1		-2.6	mA	0.0V	0.0V	0.4V	4.5V							
X_c	-0.1		-1.6	mA	0.0V	0.0V		0.4V							
Y_1	-0.1		-1.6	mA					0.4V	4.5V					
Y_2	-0.1		-1.6	mA					4.5V	0.4V					
Y	-0.1		-2.6	mA					0.0V	0.0V	0.4V	4.5V			
Y_c	-0.1		-1.6	mA					0.0V	0.0V		0.4V			
C_{IN}	-0.1		-8.0	mA									0.4V		
"1" Input Current															
X_1			40	μA	4.5V										
X_2			40	μA	0.0V										
X_c			40	μA			0.0V	4.5V							
Y_1			40	μA					4.5V	4.5V					
Y_2			40	μA					0.0V	0.4V					
Y_c			40	μA							0.0V	4.5V			
C_{IN}			160	μA	0.0V	0.0V			0.0V	0.0V			4.5V		
Input Voltage Rating															12
X_1	5.5			V	10mA	0.0V									
X_2	5.5			V	0.0V	10mA									
X_c	5.5			V			0.0V	10mA							
Y_1	5.5			V					10mA	0.0V					
Y_2	5.5			V					0.0V	10mA					
Y_c	5.5			V							0.0V	10mA			
C_{IN}	5.5			V									10mA		

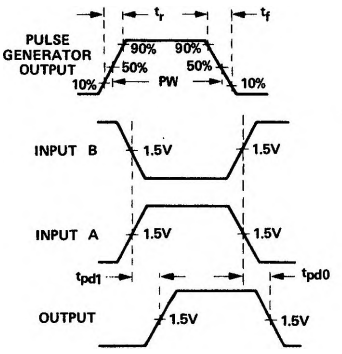
$T_A = 25°C$ and $V_{CC} = 5.0V$

CHARACTERISTICS	LIMITS				TEST CONDITIONS										NOTES
	MIN.	TYP.	MAX.	UNITS	X_1	X_2	X	X_c	Y_1	Y_2	Y	Y_c	C_{IN}	OUTPUTS	
Power/Current Consumption		152/ 29	185/ 35	mW/ mA											14
Output Short Circuit Current (Σ)	-18		-57	mA	0.0V	0.0V			0.0V	0.0V	0.0V		2.0V	0.0V	11, 14
Output Short Circuit Current ($\overline{\Sigma}$)	-18		-57	mA	0.0V	0.0V			0.0V	0.0V			0.0V	0.0V	11, 14
Output Short Circuit Current ($\overline{C}_{out}$)	-18		-70	mA	0.0V	0.0V			0.0V	0.0V			0.0V	0.0V	11, 14
t_{pd} 1 C_{in} to $\overline{C}_{out}$		8	13	ns											8
t_{pd} 0 C_{in} to $\overline{C}_{out}$		8	13	ns											8
t_{pd} 1 Y_c to $\overline{C}_{out}$		20	25	ns											8
t_{pd} 0 Y_c to $\overline{C}_{out}$		20	25	ns											8
t_{pd} 1 X_c to Σ		35	45	ns											8
t_{pd} 0 X_c to Σ		35	45	ns											8
t_{pd} 1 Y_c to $\overline{\Sigma}$		25	35	ns											8
t_{pd} 0 Y_c to $\overline{\Sigma}$		25	35	ns											8
t_{pd} X_1, X_2 to $\overline{X}$		30	40	ns											8, 9
t_{pd} 0 X_1, X_2, to $\overline{X}$		15	20	ns											8, 9
t_{pd} 1 Y_1, Y_2, to $\overline{Y}$		30	40	ns											8, 9
t_{pd} 0 Y_1, Y_2, to $\overline{Y}$		15	20	ns											8, 9

NOTES:
1. All voltage measurements are referenced to the ground terminal. Terminals not specifically referenced are left electrically open.
2. All measurements are taken with ground pin tied to zero volts.
3. Positive current flow is defined as into the terminal referenced.
4. Positive logic definition: "UP" Level = "1", "DOWN" Level = "0".
5. Precautionary measures should be taken to ensure current limiting in accordance with Absolute Maximum Ratings should the isolation diodes become forward biased.
6. Output source current is supplied through a resistor to ground.
7. Output sink current is supplied through a resistor to V_{CC}
8. Refer to AC Test Figure.
9. This test is a measure of the required worst-case data set-up time.
10. Manufacturer reserves the right to make design and process changes and improvements.
11. Not more than one output should be shorted at a time.
12. This test guarantees operation free of input latch-up over the specified operating power supply voltage range.
13. The total time required to perform the ADD function may be determined by summing the delays from X_1, X_2 to $\overline{X}$ or Y, Y_2 to $\overline{Y}$ with the delay from X_C or Y_C to Σ or $\overline{\Sigma}$.
14. V_{CC} = 5.25 volts.

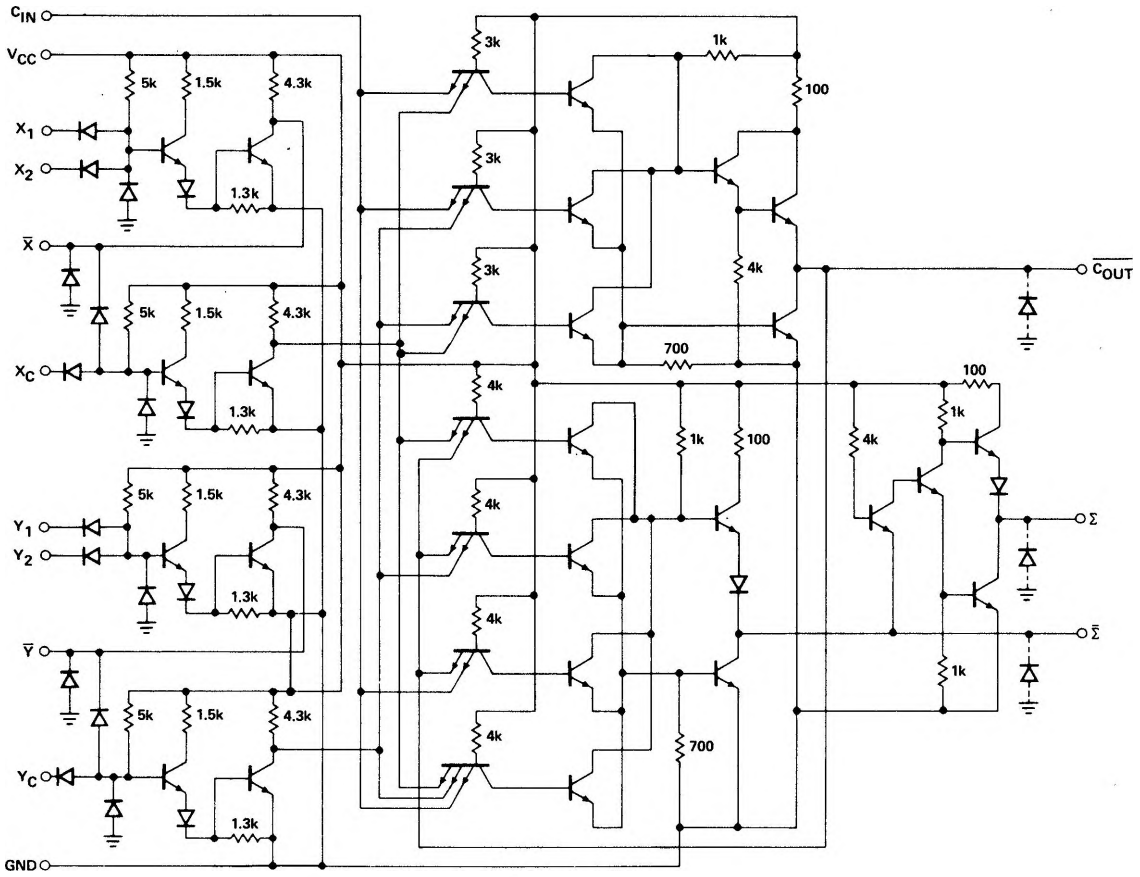
AC TEST FIGURE AND WAVE FORMS





NOTES:
1. Perform test in accordance with test table.
2. Each output is tested separately.
3. Voltage values are with respect to network GND terminal.
4. The generator has the following characteristics: V_{gen} = 2.6V, tr = tf ⩽ 15ns, PW = 0.5ns, PRR = 1MHz.
5. Inputs and outputs not otherwise specified are open.
6. Capacitance shown include probe and jig capacitance.
7. All resistances are in ohms.

SCHEMATIC DIAGRAM

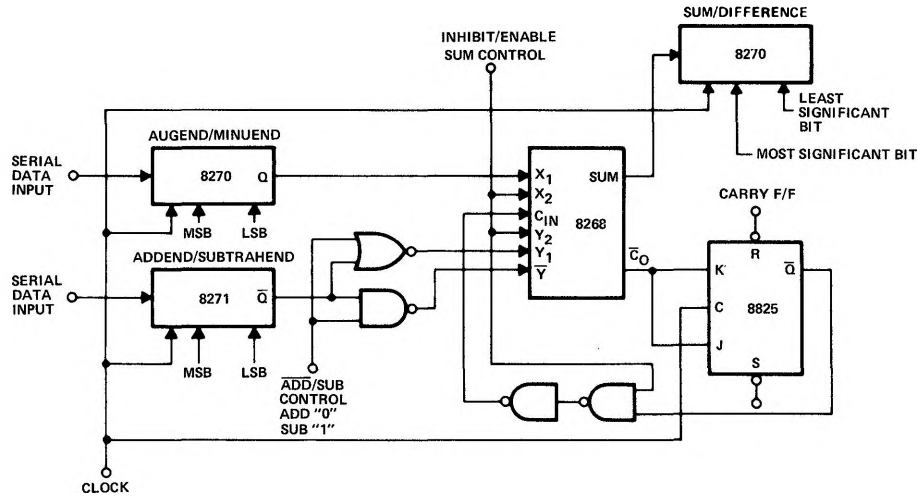


TEST TABLE (See Note 5)

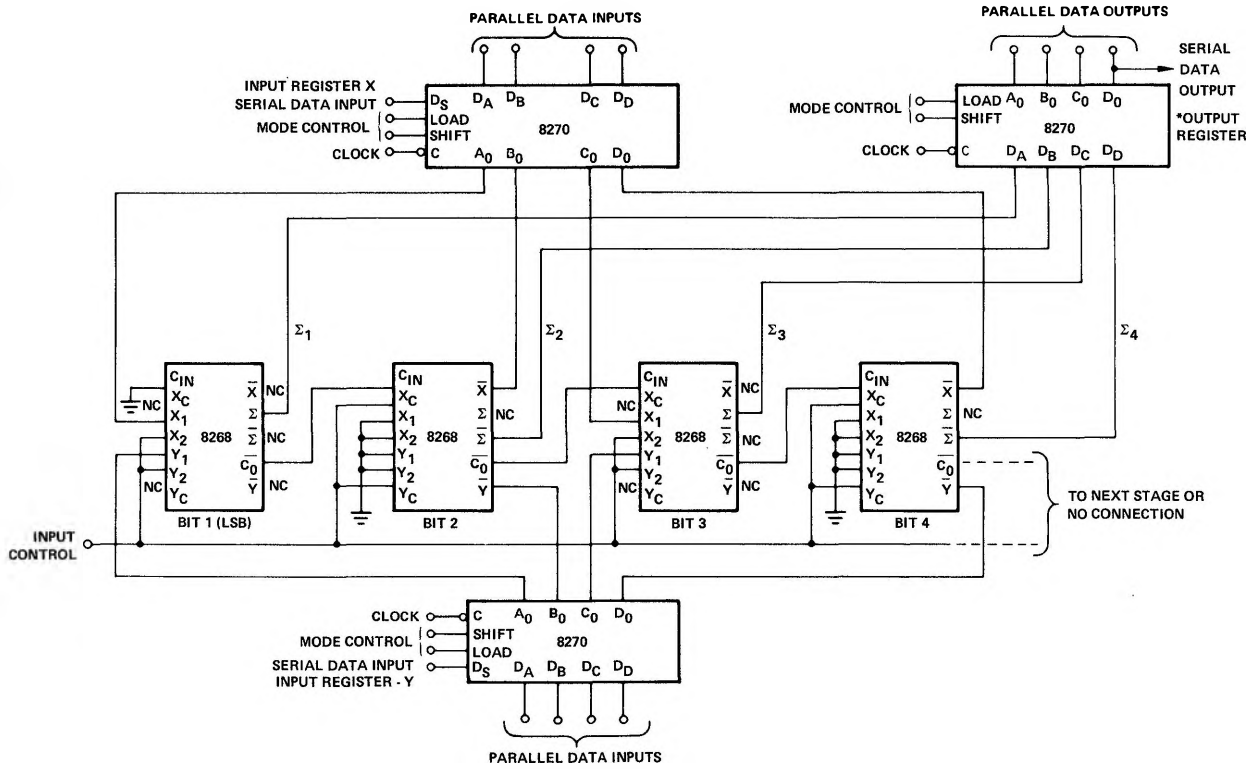
TEST NO.	OUTPUTS UNDER TEST	APPLY INPUT A TO	APPLY INPUT B TO	APPLY +2.6V TO	APPLY GND TO	APPLY OUTPUT LOADING TO
1	$\overline{C}_{out}$	None	C_{in}	None	Y_1	$\overline{C}_{out}$
2	$\overline{C}_{out}$	None	C_{in}	None	Y_1	$\overline{C}_{out}$
3	$\overline{C}_{out}$	Y_C	None	C_{in}	X_1, Y_1	$\overline{C}_{out}$
4	$\overline{C}_{out}$	Y_C	None	C_{in}	X_1, Y_1	$\overline{C}_{out}$
5	Σ	X_C	None	C_{in}	X_1, Y_1	Σ $\overline{\Sigma}$ $\overline{C}_{out}$
6	Σ	X_C	None	C_{in}	X_1, Y_1	Σ $\overline{\Sigma}$ $\overline{C}_{out}$
7	$\overline{\Sigma}$	Y_C	None	C_{in}	Y_1	$\overline{\Sigma}$
8	$\overline{\Sigma}$	Y_C	None	C_{in}	Y_1	$\overline{\Sigma}$
9	$\overline{X}$	None	X_1	X_2	None	$\overline{X}$ (CL = 15 pF)
10	$\overline{X}$	None	X_1	X_2	None	$\overline{X}$ (CL = 15 pF)
11	$\overline{Y}$	None	Y_1	Y_2	None	$\overline{Y}$ (CL = 15 pF)
12	$\overline{Y}$	None	Y_1	Y_2	None	$\overline{Y}$ (CL = 15 pF)

TYPICAL APPLICATIONS

4-BIT SERIAL ADD/SUBTRACTOR



N-BIT PARALLEL ADDER



NOTES:
To expand storage register for serial/parallel operation, connect D_0 to D_s of next stage and common the mode control lines and the clock line of the first stage to their respective second stage equivalents.

*NOTE:
To expand output register for parallel outputs common clock, shift and load lines with their respective counterparts. For serial data output, also connect D_0 of first register to D_s of next register.