

4-BIT BINARY FULL ADDER (LOOK AHEAD CARRY)

S5483 N7483

S5483-B,F,W • N7483-B, F

DIGITAL 54/74 TTL SERIES

DESCRIPTION

The 54/7483 is a 4-Bit Binary Full Adder for adding two four bit binary numbers. A Carry Look Ahead circuit is included to provide minimum carry propagation delays.

Propagation delays of carry-in to carry-out is typically 12 nsec.

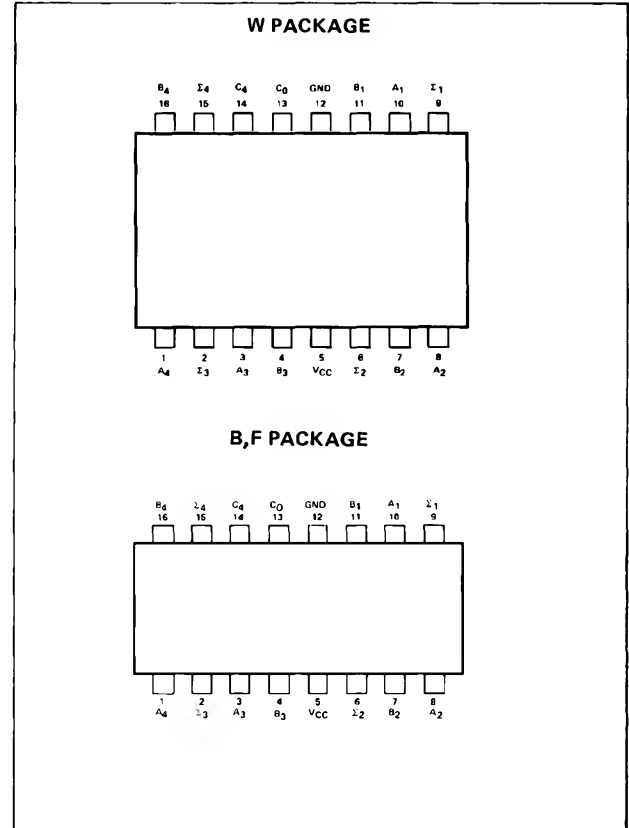
TRUTH TABLE

INPUT				OUTPUT					
				WHEN $C_0 = 0$			WHEN $C_0 = 1$		
				WHEN $C_2 = 0$			WHEN $C_2 = 1$		
A_1	B_1	A_2	B_2	Σ_1	Σ_2	C_2	Σ_1	Σ_2	C_2
A_3	B_3	A_4	B_4	Σ_3	Σ_4	C_4	Σ_3	Σ_4	C_4
0	0	0	0	0	0	0	1	0	0
1	0	0	0	1	0	0	0	1	0
0	1	0	0	1	0	0	0	1	0
1	1	0	0	0	1	0	1	1	0
0	0	1	0	0	1	0	1	1	0
1	0	1	0	1	1	0	0	0	1
0	1	1	0	1	1	0	0	0	1
1	1	1	0	0	0	1	1	0	1
0	0	0	1	0	1	0	1	1	0
1	0	0	1	1	1	0	0	0	1
0	1	0	1	1	1	0	0	0	1
1	1	0	1	0	0	1	1	0	1
0	0	1	1	0	0	1	1	0	1
1	0	1	1	1	1	0	1	0	1
0	1	1	1	1	1	0	1	0	1
1	1	1	1	0	1	1	1	1	1

NOTES:

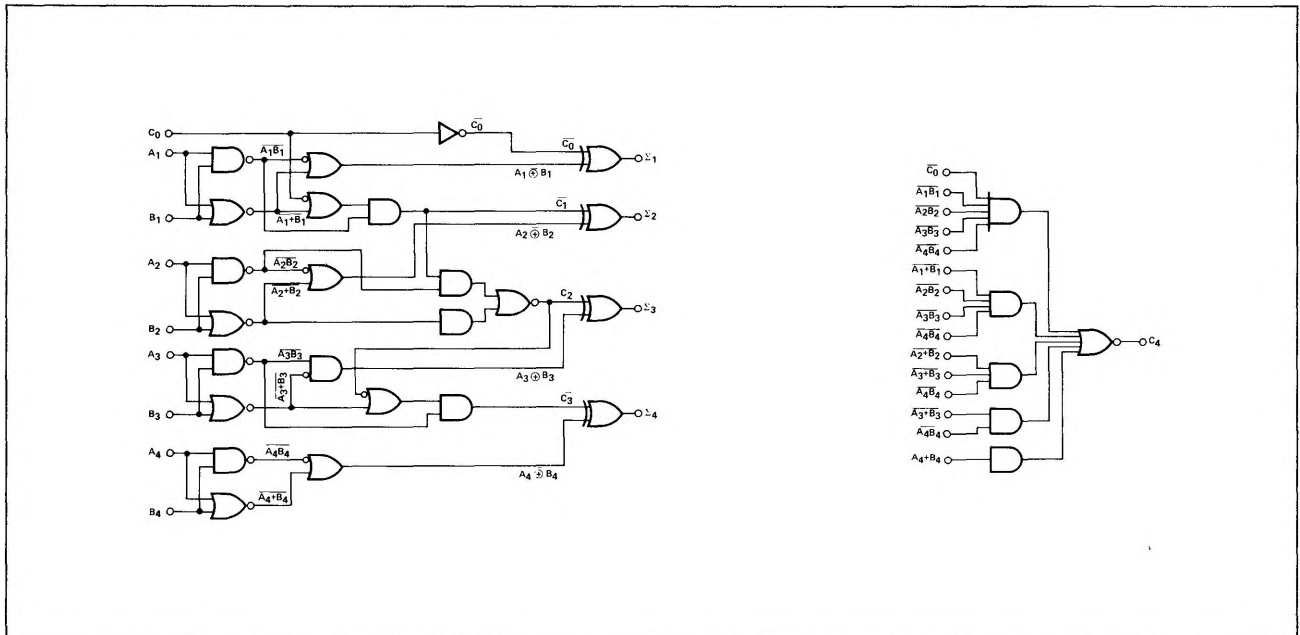
Input conditions at A_1 , A_2 , B_1 , B_2 , and C_0 are used to determine outputs Σ_1 and Σ_2 , and the value of the internal carry C_2 . The

PIN CONFIGURATIONS



values at C_2 , A_3 , B_3 , A_4 , and B_4 , are then used to determine outputs Σ_3 , Σ_4 , and C_4 .

LOGIC DIAGRAM



SIGNETICS DIGITAL 54/74 TTL SERIES - S5483 • N7483

RECOMMENDED OPERATING CONDITIONS

	MIN	NOM	MAX	UNIT
Supply Voltage V_{CC} : (See Note 1) S5483 Circuits	4.5	5	5.5	V
N7483 Circuits	4.75	5	5.25	V
Normalized Fan-Out From Outputs: C_4			5	
$\Sigma_1, \Sigma_2, \Sigma_3$ or Σ_4			10	

ELECTRICAL CHARACTERISTICS (over recommended operating free-air temperature range unless otherwise noted)

PARAMETER	TEST CONDITIONS*	MIN	TYP**	MAX	UNIT
$V_{in(1)}$ Input voltage required to ensure logical 1 at any input terminal	$V_{CC} = \text{MIN}$	2			V
$V_{in(0)}$ Input voltage required to ensure logical 0 at any input terminal	$V_{CC} = \text{MIN}$			0.8	V
$V_{out(1)}$ Logical 1 output voltage	$V_{CC} = \text{MIN}$	2.4			V
$V_{out(0)}$ Logical 0 output voltage	$V_{CC} = \text{MIN}$			0.4	V
$I_{in(0)}$ Logical 0 level input current at A_1, A_3, B_1, B_3 , or C_0	$V_{CC} = \text{MAX}, V_{in} = 0.4V$			-3.2	mA
$I_{in(0)}$ Logical 0 level input current at A_2, A_4, B_2 , or B_4	$V_{CC} = \text{MAX}, V_{in} = 0.4V$			-1.6	mA
$I_{in(1)}$ Logical 1 level input current A_1, A_3, B_1, B_3 , or C_0	$V_{CC} = \text{MAX}, V_{in} = 2.4V$			80	μA
$I_{in(1)}$ Logical 1 level input current A_1, A_3, B_1, B_3 , or C_0	$V_{CC} = \text{MAX}, V_{in} = 5.5V$			1	mA
$I_{in(1)}$ Logical 1 level input current A_2, A_4, B_2 , or B_4	$V_{CC} = \text{MAX}, V_{in} = 2.4V$			40	μA
$I_{in(1)}$ Logical 1 level input current A_2, A_4, B_2 , or B_4	$V_{CC} @ \text{MAX}, V_{in} = 5.5V$			1	mA
I_{OS} Short-circuit output current at $\Sigma_1, \Sigma_2, \Sigma_3$, or Σ_4 †	$V_{CC} = \text{MAX}$ S5483	-20		-55	mA
	N7483	-18		-55	mA
I_{OS} Short-circuit output current at C_4 †	$V_{CC} = \text{MAX}$ S5483	-20		-70	mA
	N7483	-18		-70	mA
I_{CC} Supply current	$V_{CC} = \text{MAX}$,		58	79	mA

SWITCHING CHARACTERISTICS, $V_{CC} = 5V, T_A = 25^\circ C$, unless otherwise noted $N = 10$

PARAMETER ‡	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{pd1} From C_0 to 1	$C_L = 50pF, R_L = 400\Omega$		23	34	ns
t_{pd0} From C_0 to 1	$C_L = 50pF, R_L = 400\Omega$		20	34	ns
t_{pd1} From C_0 to 2	$C_L = 50pF, R_L = 400\Omega$		24	35	ns
t_{pd0} From C_0 to 2	$C_L = 50pF, R_L = 400\Omega$		22	35	ns
t_{pd1} From C_0 to 3	$C_L = 50pF, R_L = 400\Omega$		30	50	ns
t_{pd0} From C_0 to 3	$C_L = 50pF, R_L = 400\Omega$		24	40	ns
t_{pd1} From C_0 to 4	$C_L = 50pF, R_L = 400\Omega$		30	50	ns
t_{pd0} From C_0 to 4	$C_L = 50pF, R_L = 400\Omega$		28	50	ns
t_{pd1} From C_0 to C_4	$C_L = 50pF, R_L = 780\Omega$		12	20	ns
t_{pd0} From C_0 to C_4	$C_L = 50pF, R_L = 780\Omega$		12	20	ns
t_{pd1} From A_2 or B_2 to 2	$C_L = 50pF, R_L = 400\Omega$			40	ns
t_{pd0} From A_2 or B_2 to 2	$C_L = 50pF, R_L = 400\Omega$			35	ns
t_{pd1} From A_4 of B_4 to 4	$C_L = 50pF, R_L = 400\Omega$			40	ns
t_{pd0} From A_4 of B_4 to 4	$C_L = 50pF, R_L = 400\Omega$			35	ns

† T_{pd1} is propagation delay time to logical 1 level. t_{pd0} is propagation delay time to logical 0 level.

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

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

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

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