

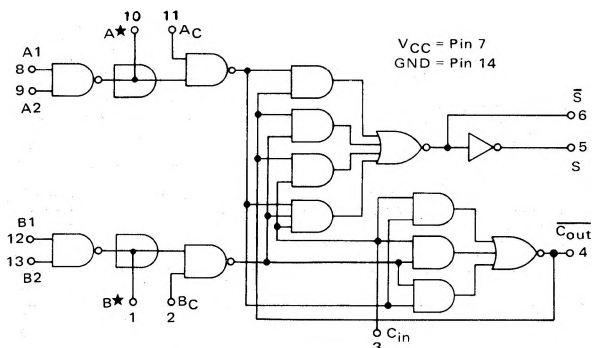
GATED FULL ADDER

MC5400/7400 series

MC5480L* MC7480L,P*

The MC5480/7480 is a one-bit binary full adder with gated complementary inputs, complementary Sum and Sum outputs, and an inverted Carry output. The circuit uses DTL inputs and a high-speed, high-fan-out, TTL "totem pole" configuration for the Sum, Sum, and Carry outputs. The design of the high-speed carry circuitry reduces the need for external "look ahead carry" cascading in system designs. The use of low-level, low-power gates in a monolithic design provides significantly lower power dissipation than equivalent adders built from standard integrated circuits.

This full adder provides a basic building block for medium and high-speed, multiple-bit, parallel-add/serial-carry subsystems.



Input Loading Factor:

A1, A2, AC, B1, B2, BC = 1

A*, B* = 1.625

Cin = 5

Output Loading Factor:

Cout = 5

S, S-bar = 10

A*, B* = 3

TRUTH TABLE

C _{in}	B	A	C _{out}	S̄	S
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

$$1. A = A^* \cdot AC, B = B^* \cdot BC$$

$$\text{where } A^* = A_1 \cdot A_2$$

$$B^* = B_1 \cdot B_2$$

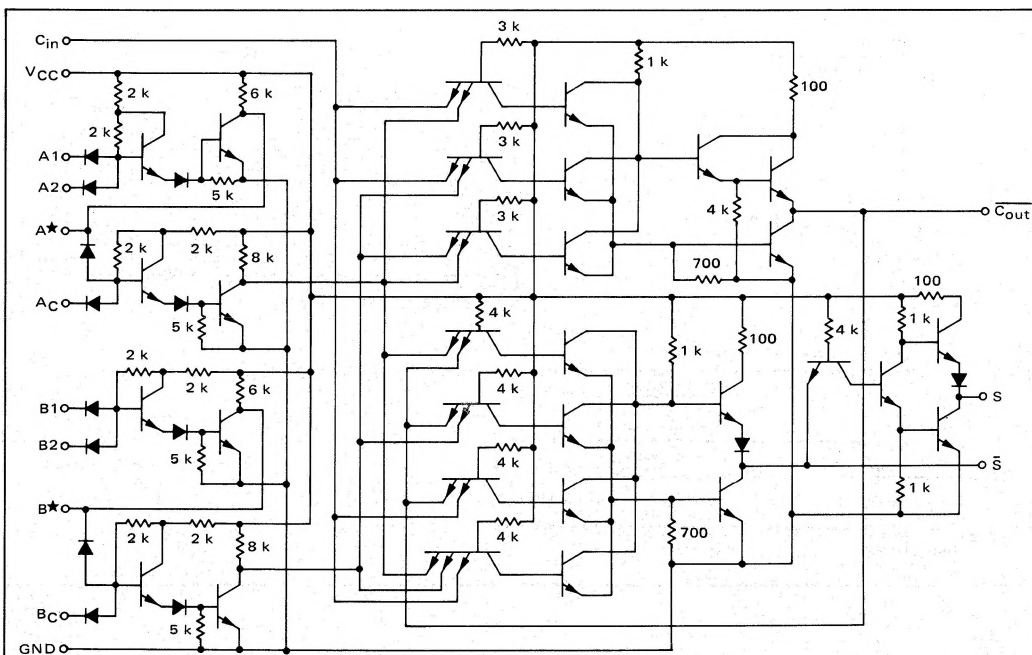
- When A* (or B*) is used as an input, A1 and A2 (or B1 and B2) must be connected to ground.
- When A1 and A2 (or B1 and B2) are used as inputs, A* (or B*) must be open, or used to perform wired-OR logic.

Total Power Dissipation = 105 mW typ/pkg

Propagation Delay Time:

Carry Delay = 10 ns typ

Add Delay = 55 ns typ



*L suffix = TO-116 ceramic dual in-line package (Case 632).

P suffix = TO-116 plastic dual in-line package (Case 605).

MC5480L, MC7480L, P (continued)

ELECTRICAL CHARACTERISTICS

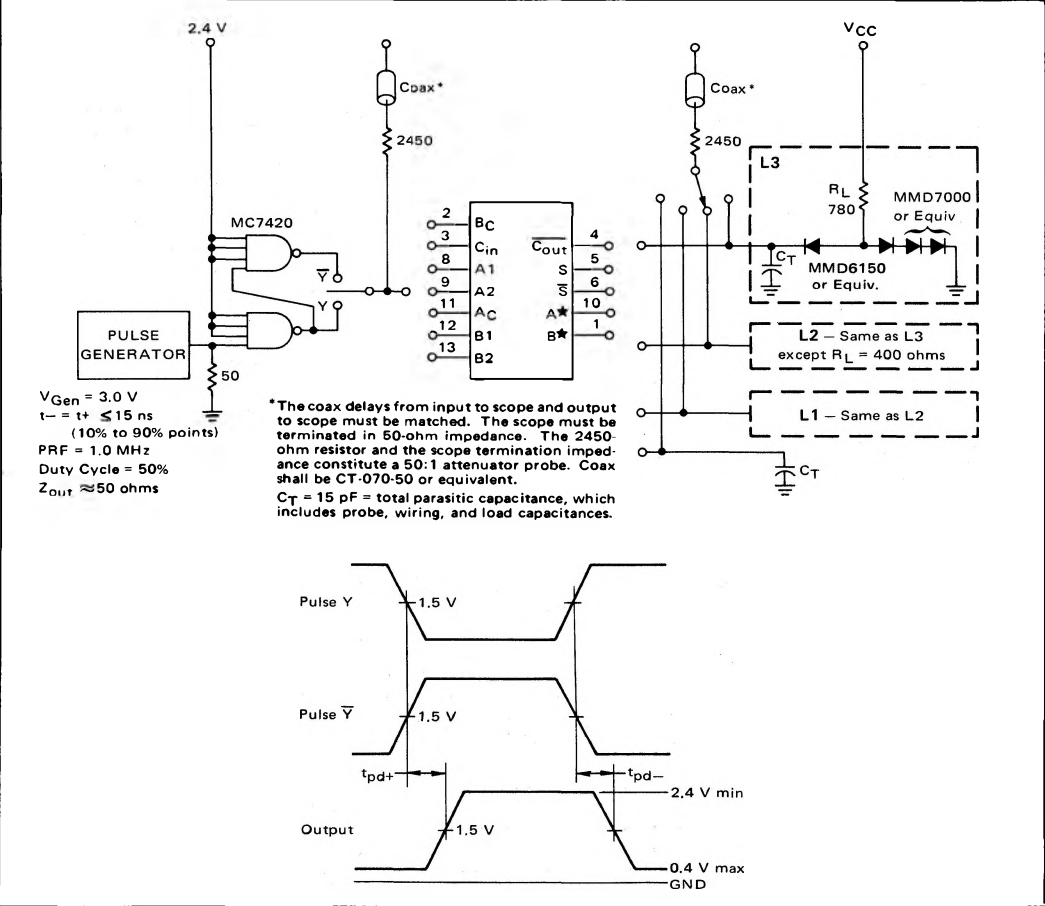
Output voltage (logic level) tests are shown only for each output. The complete circuit can be tested by following the truth table.

Characteristic	Symbol	Pin Under Test	MC3480 Test Limits -55 to +125°C				MC7480 Test Limits 0 to +70°C				TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW:														
			Min	Max	Unit		Min	Max	Unit		I _{OL1}	I _{OL2}	I _{OL3}	I _{OH1}	I _{OH2}	I _{OH3}	V _{IL}	V _{IH}	V _{HH}	V _{HA1}	V _{HA0}	V _{CC1}	V _{CC0}	Gnd	
			Test				Test				Test				Test				Test				Test		
Input Forward Current	I _F	1	-	-2.6	mA _{dc}		-	-2.6	mA _{dc}		-	-	-	-	-	-	1	-	-	2	-	-	14	7, 12, 13	
		2	-	-1.6			-	-1.6			-	-	-	-	-	-	2	-	-	-	-	-	7	7, 12, 13	
		3	-	-8.0			-	-8.0			-	-	-	-	-	-	3	-	-	-	-	-			
		A1	-	-1.6			-	-1.6			-	-	-	-	-	-	8	-	-	9	-	-			
		A2	-	-1.6			-	-1.6			-	-	-	-	-	-	8	-	-	9	-	-			
		A*	-	-2.6			-	-2.6			-	-	-	-	-	-	10	-	-	11	-	-			
		A _C	-	-1.6			-	-1.6			-	-	-	-	-	-	11	-	-	-	-	-			
		B1	-				-				-	-	-	-	-	-	12	-	-	13	-	-			
		B2	-				-				-	-	-	-	-	-	13	-	-	12	-	-			
		B*	-				-				-	-	-	-	-	-	13	-	-	-	-	-			
		B _C	-				-				-	-	-	-	-	-	13	-	-	-	-	-			
Leakage Current	I _{R1}	2	-	15	μA _{dc}		-	15	μA _{dc}		-	-	-	-	-	-	2	-	-	-	-	-	14	1, 7	
		3	-	200			-	200			-	-	-	-	-	-	3	-	-	-	-	-		7, 8, 9, 12, 13	
		A1	-	15			-	15			-	-	-	-	-	-	8	-	-	-	-	-		7, 9	
		A2	-				-				-	-	-	-	-	-	9	-	-	-	-	-		7, 8	
		A _C	-				-				-	-	-	-	-	-	11	-	-	-	-	-		7, 10	
		B1	-				-				-	-	-	-	-	-	12	-	-	-	-	-		7, 13	
		B2	-				-				-	-	-	-	-	-	13	-	-	-	-	-		7, 12	
		B _C	-				-				-	-	-	-	-	-	13	-	-	-	-	-		1, 7	
		C _{in}	-	1.0	mA _{dc}		-	1.0	mA _{dc}		-	-	-	-	-	-	-	2	-	-	-	-	-	14	7, 8, 9, 12, 13
		A1	-				-				-	-	-	-	-	-	3	-	-	-	-	-		7, 9	
		A2	-				-				-	-	-	-	-	-	8	-	-	-	-	-		7, 8	
		A _C	-				-				-	-	-	-	-	-	11	-	-	-	-	-		7, 10	
Output Output Voltage	A* C _{out} S S B* A* C _{out} S S B*	1	-	0.4	V _{dc}		-	0.4	V _{dc}		1	-	-	-	-	-	-	-	-	-	12, 13	-	7		
		4	-				-				-	4	-	-	-	-	-	-	-	8, 12	2, 3, 9, 11, 13	-			
		5	-				-				-	-	5	-	-	-	-	-	-	2, 11	3, 8, 9, 12, 13	-			
		6	-				-				-	-	6	-	-	-	-	-	-	2, 3, 8, 11, 12	9, 13	-			
		10	-				-				-	10	-	-	-	-	-	-	-	8, 9	-	-			
		1	2.4	-	V _{dc}	2.4	-	V _{dc}	-	V _{dc}		-	1	-	-	-	-	-	-	-	2, 11	3, 8, 9, 12, 13	14	7	
		4					-				-	-	-	4	-	-	-	-	-	2, 9, 13	3, 8, 11, 12	-			
		5					-				-	-	-	5	-	-	-	-	-	3, 10, 11	1, 2, 8, 9, 12, 13	-			
		6					-				-	-	-	6	-	-	-	-	-	8, 9	-	-			
		10					-				-	-	-	10	-	-	-	-	-	-	-	-			
		10					-				-	-	-	-	-	-	-	-	-	-	-	-			
		Short-Circuit Current	I _{SC}	4	-20	-70	mA _{dc}	-18	-70	mA _{dc}		-	-	-	-	-	-	-	-	-	-	2, 3, 8, 11, 12	-	14	4, 7, 9, 13
5				-57			-	-57			-	-	-	-	-	-	-	-	2, 9, 13	3, 10, 13	-				
6				-57			-	-57			-	-	-	-	-	-	-	-	3, 10, 13	-	-				
6				-57			-	-57			-	-	-	-	-	-	-	-	-	-	-				
Power Requirements Power Supply Drain	I _{PD}	14	-	31**	mA _{dc}		-	35**	mA _{dc}		-	-	-	-	-	-	-	-	-	-	-	14	7		

****Tested only at 25°C.**

MC5480L, MC7480L, P (continued)

SWITCHING TIME TEST CIRCUIT AND VOLTAGE WAVEFORMS



TEST PROCEDURES ($T_A = 25^\circ\text{C}$)

TEST	PIN UNDER TEST	INPUT							OUTPUT					MAX LIMIT
		BC	C _{in}	A1	A2	A _C	B1	B2	C _{out}	S	$\bar{S}$	A*	B*	
		Pin 2	Pin 3	Pin 8	Pin 9	Pin 11	Pin 12	Pin 13	Pin 4	Pin 5	Pin 6	Pin 10	Pin 1	
t_{pd+} C _{out}	4	—	Y	—	—	—	Gnd	—	L3	—	—	—	—	17 ns
t_{pd-} C _{out}	4	—	Y	—	—	—	Gnd	—	L3	—	—	—	—	12 ns
t_{pd+} C _{out}	4	—	$\bar{Y}$	2.4 V	Gnd	—	Gnd	—	L3	—	—	—	—	25 ns
t_{pd-} C _{out}	4	—	$\bar{Y}$	2.4 V	Gnd	—	Gnd	—	L3	—	—	—	—	55 ns
t_{pd+} S	5	—	2.4 V	Gnd	—	$\bar{Y}$	Gnd	—	L3	L1	L2	—	—	70 ns
t_{pd-} S	5	—	2.4 V	Gnd	—	$\bar{Y}$	Gnd	—	L3	L1	L2	—	—	80 ns
t_{pd+} $\bar{S}$	6	—	$\bar{Y}$	2.4 V	—	—	Gnd	—	—	—	L2	—	—	55 ns
t_{pd-} $\bar{S}$	6	—	$\bar{Y}$	2.4 V	—	—	Gnd	—	—	—	L2	—	—	75 ns
t_{pd+} A*	10	—	—	Y	2.4 V	—	—	—	—	—	—	C _T	—	65 ns
t_{pd-} A*	10	—	—	Y	2.4 V	—	—	—	—	—	—	C _T	—	25 ns
t_{pd+} B*	1	—	—	—	—	—	Y	2.4 V	—	—	—	—	C _T	65 ns
t_{pd-} B*	1	—	—	—	—	—	Y	2.4 V	—	—	—	—	C _T	25 ns