



## DM5483 / DM7483 (SN5483/SN7483) four-bit binary full adder and dual single-bit binary full adder

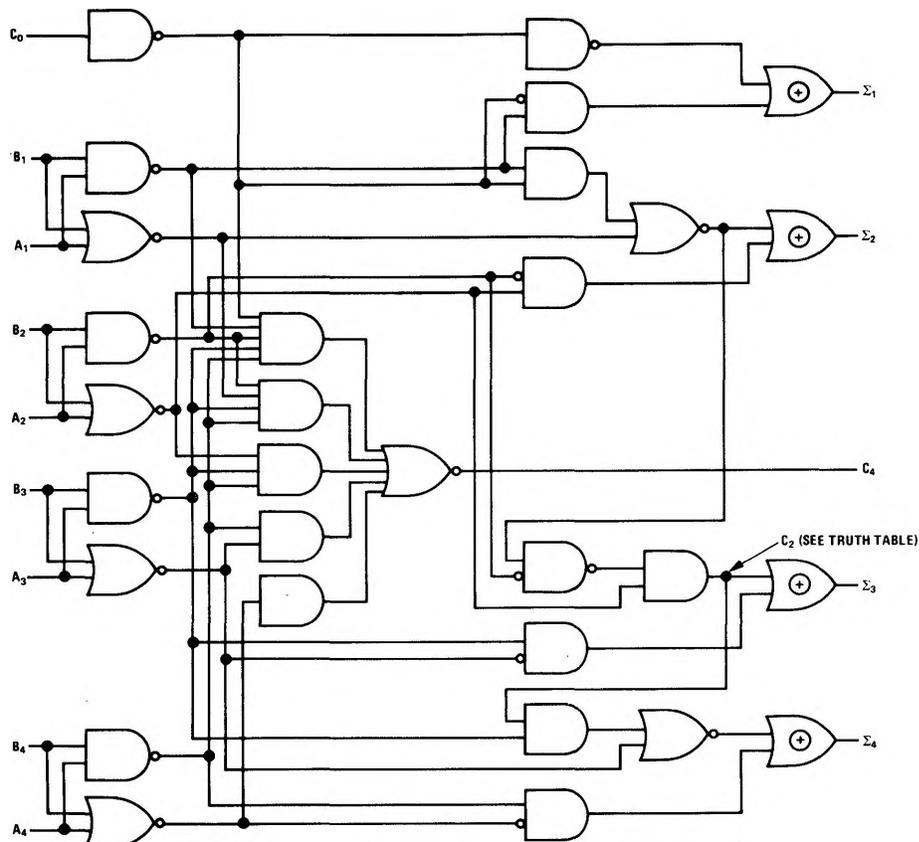
### general description

The DM5483/DM7483 binary full adder adds two four-bit binary numbers. A carry input is included and four  $\Sigma$  outputs are provided along with the resultant carry. Since the carry-ripple-time is the limiting delay in the addition of a long word length, carry look-ahead circuitry has been included in the design to minimize this delay. Typical propagation delay from Carry-input to Carry output is 12 ns.

The device can also be used as a dual single-bit binary full adder. (See application.) In this application the  $\Sigma_2$  output is used as the CARRY output for BIT 1; and the  $A_3B_3$  inputs are used as the CARRY input for Bit 2.

It is completely compatible with other Series 54/74 devices.

### logic diagram



**absolute maximum ratings**

$V_{CC}$		7V
Input Voltage		5.5V
Operating Temperature Range	DM7483	0°C to 70°C
	DM5483	-55°C to +125°C
Storage Temperature Range		-65°C to +150°C
Lead Temperature (Soldering, 10 sec)		300°C

**electrical characteristics** (Note 1)

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Input Diode Clamp Voltage	$V_{CC} = 5.0V, T_A = 25^\circ C, I_{IN} = -12 \text{ mA}$			-1.5	V
Logical "1" Input Voltage	DM5483 $V_{CC} = 4.5V$ DM7483 $V_{CC} = 4.75V$	2.0			V
Logical "0" Input Voltage	DM5483 $V_{CC} = 4.5V$ DM7483 $V_{CC} = 4.75V$			0.8	V
Logical "1" Output Voltage	DM5483 $V_{CC} = 4.5V$ $V_{IN} = 0.8V, I_{OUT} = -400 \mu A$ DM7483 $V_{CC} = 4.75V$ (Note 3)	2.4			V
Logical "0" Output Voltage	DM5483 $V_{CC} = 4.5V$ $V_{IN} = 2.0V, I_{OUT} = 16 \text{ mA}$ DM7483 $V_{CC} = 4.75V$ (Note 3)			0.4	V
Logical "1" Input Current (all inputs)	DM5483 $V_{CC} = 5.5V$ DM7483 $V_{CC} = 5.25V$ $V_{IN} = 2.4V$			80	$\mu A$
Logical "1" Input Current	DM5483 $V_{CC} = 5.5V$ DM7483 $V_{CC} = 5.25V$ $V_{IN} = 5.5V$			1	mA
Logical "0" Input Current (all inputs)	DM5483 $V_{CC} = 5.5V$ DM7483 $V_{CC} = 5.25V$ $V_{IN} = 0.4V$			-3.2	mA
Output Short Circuit Current (Note 2) (except $C_4$ )	DM5483 $V_{CC} = 5.5V$ DM7483 $V_{CC} = 5.25V$	-20 -18		-55	mA
Output Short Circuit Current (for $C_4$ )	DM5483 $V_{CC} = 5.5V$ DM7483 $V_{CC} = 5.25V$	-27		-70	mA
Supply Current	DM5483 $V_{CC} = 5.5V$ DM7483 $V_{CC} = 5.25V$		58	79	mA

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	CONDITION	MIN	TYP	MAX	UNITS
$t_{pd1}$	$C_{IN}$	$\Sigma_1$	$N = 10, C = 50 \text{ pF}$		23	34	ns
$t_{pd0}$			$N = 10, C = 50 \text{ pF}$	20	34	ns	
$t_{pd1}$	$C_{IN}$	$\Sigma_2$	$N = 10, C = 50 \text{ pF}$		24	35	ns
$t_{pd0}$			$N = 10, C = 50 \text{ pF}$	22	35	ns	
$t_{pd1}$	$C_{IN}$	$\Sigma_3$	$N = 10, C = 50 \text{ pF}$		30	50	ns
$t_{pd0}$			$N = 10, C = 50 \text{ pF}$	24	40	ns	
$t_{pd1}$	$C_{IN}$	$\Sigma_4$	$N = 10, C = 50 \text{ pF}$		30	50	ns
$t_{pd0}$			$N = 10, C = 50 \text{ pF}$	28	50	ns	
$t_{pd1}$	$C_{IN}$	$C_4$	$N = 5, C = 50 \text{ pF}$		12	20	ns
$t_{pd0}$			$N = 5, C = 50 \text{ pF}$	12	20	ns	
$t_{pd1}$	$A_2 \text{ or } B_2$	$\Sigma_2$	$N = 10, C = 50 \text{ pF}$			40	ns
$t_{pd0}$			$N = 10, C = 50 \text{ pF}$		35	ns	
$t_{pd1}$	$A_4 \text{ or } B_4$	$\Sigma_4$	$N = 10, C = 50 \text{ pF}$			40	ns
$t_{pd0}$			$N = 10, C = 50 \text{ pF}$		35	ns	

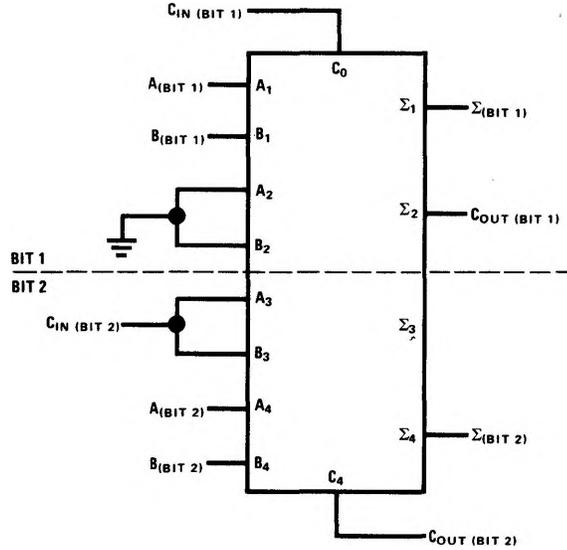
Note 1: Min/Max limits apply across the guaranteed temperature range of 0°C to 70°C for the DM7483 and -55°C to +125°C for the DM5483 unless otherwise specified. All typicals are given for  $V_{CC} = 5.0V$  and  $T_A = 25^\circ C$

Note 2: Only one output at a time should be short circuited.

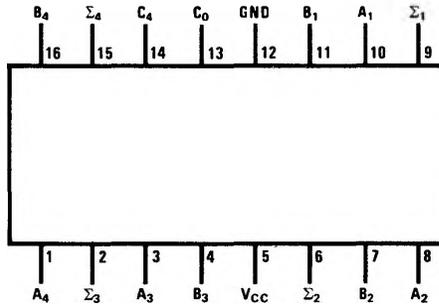
Note 3: For  $C_4$  output,  $I_{OUT(1)} = -200 \mu A$ ,  $I_{OUT(0)} = 8 \text{ mA}$ .

### typical application

Connect the DM5483/DM7483 in the following manner to implement a dual single-bit full adder.



### connection diagram



### truth table (See Note 1)

INPUT				OUTPUT					
				WHEN $C_{in} = 0$			WHEN $C_{in} = 1$		
$A_1$	$B_1$	$A_2$	$B_2$	WHEN $C_2 = 0$			WHEN $C_2 = 1$		
				$\Sigma_1$	$\Sigma_2$	$C_2$	$\Sigma_1$	$\Sigma_2$	$C_2$
$A_3$	$B_3$	$A_4$	$B_4$	$\Sigma_3$	$\Sigma_4$	$C_4$	$\Sigma_3$	$\Sigma_4$	$C_4$
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	1	0
0	0	1	1	0	0	1	1	0	1
1	0	1	1	1	0	1	0	1	1
0	1	1	1	1	0	1	0	1	1
1	1	1	1	0	1	1	1	1	1

Note 1: Input conditions at  $A_1$ ,  $A_2$ ,  $B_1$ ,  $B_2$ , and  $C_{in}$  are used to determine outputs  $\Sigma_1$  and  $\Sigma_2$ , and the value of the internal carry  $C_2$ . The values at  $C_2$ ,  $A_3$ ,  $B_3$ ,  $A_4$ , and  $B_4$ , are then used to determine outputs  $\Sigma_3$ ,  $\Sigma_4$ , and  $C_4$ .