

MN4008B / MN4008BS

4-Bit Full Adders

Description

The MN4008B/S are 4-bit parallel processing full adders with a high-speed parallel carry circuit.

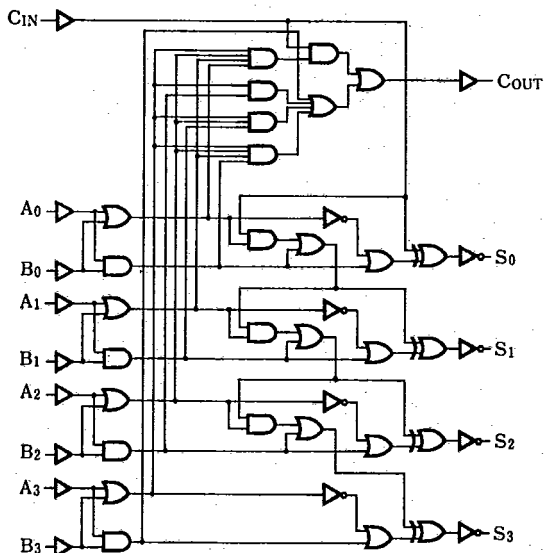
Summation of 4 added data input ($A_0 \sim A_3$), another 4 adding data inputs ($B_0 \sim B_3$) and binary input added to carry input (C_{IN}) from low row can be obtained by the binary code which is same as adding data outputs ($S_0 \sim S_3$) and carry output (C_{OUT}).

4 X n-bit addition by cascade connection and addition and subtraction circuit by external circuit can easily be composed.

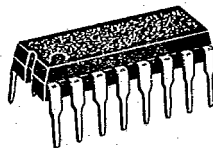
Truth Table

Input			Output	
C_{IN}	A	B	C_{OUT}	S
L	L	L	L	L
L	L	H	L	H
L	H	L	L	H
L	H	H	H	L
H	L	L	L	H
H	L	H	H	L
H	H	L	H	L
H	H	H	H	H

Logic Diagram



P-3



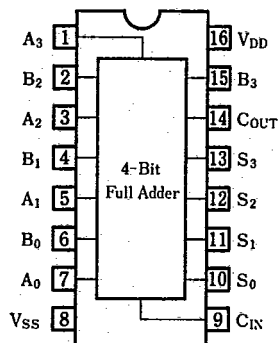
16-Pin • Plastic DIL Package

P-4



16-Pin • Panafiat Package (SO-16D)

Pin Configuration



■ Maximum Ratings (Ta=25°C)

Item		Symbol	Ratings	Unit
Supply Voltage		V_{DD}	$-0.5 \sim +18$	V
Input Voltage		V_I	$-0.5 \sim V_{DD} + 0.5^*$	V
Output Voltage		V_O	$-0.5 \sim V_{DD} + 0.5^*$	V
Peak Input · Output Current		$\pm I_I$	max. 10	mA
Power Dissipation (per package)	Ta = $-40 \sim +60^\circ\text{C}$	P_D	max. 400	mW
	Ta = $+60 \sim +85^\circ\text{C}$		Decrease up to 200mW rating at $8\text{mW}/^\circ\text{C}$	
Power Dissipation (per output terminal)		P_D	max. 100	mW
Operating Ambient Temperature		Topr	$-40 \sim +85$	$^\circ\text{C}$
Storage Temperature		Tstg	$-65 \sim +150$	$^\circ\text{C}$

* $V_{DD} + 0.5\text{V}$ should be under 18V

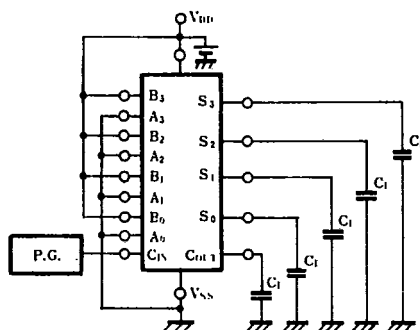
■ DC Characteristics (Vss=0V)

Item	V_{DD} (V)	Sym- bol	Conditions	Ta = -40°C		Ta = 25°C		Ta = 85°C		Unit
				min.	max.	min.	max.	min.	max.	
Quiescent Power Supply Current	5	I_{DD}	$V_I = V_{SS}$ or V_{DD}	—	20	—	20	—	150	μA
	10			—	40	—	40	—	300	
	15			—	80	—	80	—	600	
Output Voltage Low Level	5	V_{OL}	$V_I = V_{SS}$ or V_{DD} $ I_O < 1\mu\text{A}$	—	0.05	—	0.05	—	0.05	V
	10			—	0.05	—	0.05	—	0.05	
	15			—	0.05	—	0.05	—	0.05	
Output Voltage High Level	5	V_{OH}	$V_I = V_{SS}$ or V_{DD} $ I_O < 1\mu\text{A}$	4.95	—	4.95	—	4.95	—	V
	10			9.95	—	9.95	—	9.95	—	
	15			14.95	—	14.95	—	14.95	—	
Input Voltage Low Level	5	V_{IL}	$ I_O < 1\mu\text{A}$ $V_O = 0.5\text{V}$ or 4.5V $V_O = 1\text{V}$ or 9V $V_O = 1.5\text{V}$ or 13.5V	—	1.5	—	1.5	—	1.5	V
	10			—	3	—	3	—	3	
	15			—	4	—	4	—	4	
Input Voltage High Level	5	V_{IH}	$ I_O < 1\mu\text{A}$ $V_O = 0.5\text{V}$ or 4.5V $V_O = 1\text{V}$ or 9V $V_O = 1.5\text{V}$ or 13.5V	3.5	—	3.5	—	3.5	—	V
	10			7	—	7	—	7	—	
	15			11	—	11	—	11	—	
Output Current Low Level	5	I_{OL}	$V_O = 0.4\text{V}$, $V_I = 0\text{V}$ or 5V $V_O = 0.5\text{V}$, $V_I = 0\text{V}$ or 10V $V_O = 1.5\text{V}$, $V_I = 0\text{V}$ or 15V	0.52	—	0.44	—	0.36	—	mA
	10			1.3	—	1.1	—	0.9	—	
	15			3.6	—	3	—	2.4	—	
Output Current High Level	5	$-I_{OH}$	$V_O = 4.6\text{V}$, $V_I = 0\text{V}$ or 5V $V_O = 9.5\text{V}$, $V_I = 0\text{V}$ or 10V $V_O = 13.5\text{V}$, $V_I = 0\text{V}$ or 15V	0.52	—	0.44	—	0.36	—	mA
	10			1.3	—	1.1	—	0.9	—	
	15			3.6	—	3	—	2.4	—	
Output Current High Level	5	$-I_{OH}$	$V_O = 2.5\text{V}$, $V_I = 0\text{V}$ or 5V	1.7	—	1.4	—	1.1	—	mA
Input Leakage Current	15	$\pm I_I$	$V_I = 0\text{V}$ or 15V	—	0.3	—	0.3	—	1	μA

■ **Switching Characteristics** ($T_a=25^{\circ}\text{C}$, $V_{SS}=0\text{V}$, $C_L=50\text{pF}$)

Item	V _{DD} (V)	Symbol	min.	typ.	max.	Unit
Output Rise Time	5	t _{TLH}	—	60	180	ns
	10		—	30	90	
	15		—	20	60	
Output Fall Time	5	t _{THL}	—	60	180	ns
	10		—	30	90	
	15		—	20	60	
Propagation Delay Time Sum in→Sum out (L→H)	5	t _{PLH}	—	135	405	ns
	10		—	55	165	
	15		—	40	120	
Propagation Delay Time Sum in→Sum out (H→L)	5	t _{PHL}	—	150	450	ns
	10		—	55	165	
	15		—	40	120	
Propagation Delay Time Sum in→Cout (L→H)	5	t _{PLH}	—	100	300	ns
	10		—	45	135	
	15		—	30	90	
Propagation Delay Time Sum in→Cout (H→L)	5	t _{PHL}	—	125	375	ns
	10		—	50	150	
	15		—	35	105	
Propagation Delay Time C _{IN} →Sum out (L→H)	5	t _{PLH}	—	115	345	ns
	10		—	50	150	
	15		—	35	105	
Propagation Delay Time C _{IN} →Sum out (H→L)	5	t _{PHL}	—	130	390	ns
	10		—	50	150	
	15		—	35	105	
Propagation Delay Time C _{IN} →Cout (L→H)	5	t _{PLH}	—	75	225	ns
	10		—	35	105	
	15		—	25	75	
Propagation Delay Time C _{IN} →Cout (H→L)	5	t _{PHL}	—	90	270	ns
	10		—	35	105	
	15		—	25	75	
Input Capacitance		C _I	—	—	7.5	pF

1. Switching Time Test Circuit



2. Waveforms

