

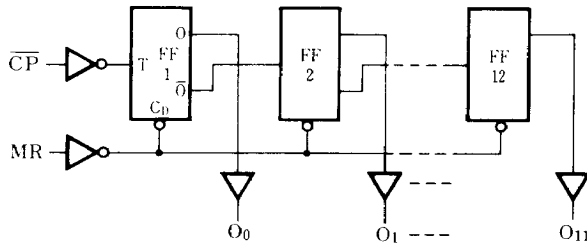
MN4040B / MN4040BS

12-Stage Binary Counters

■ Description

The MN4040B/S are 12-stage binary ripple counters with a clock input. The reset input and outputs are fully buffered. The counter advances on the negative going edge of the clock input. A High on the MR input clears all counter stages and forces all outputs ($O_0 \sim O_{11}$) Low, independent of the clock input. These are suitable for frequency dividers and center-control circuits, and are equivalent to MOTOROLA MC14040B and RCA CD4040B.

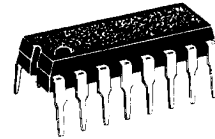
■ Logic Diagram



Pin Explanation

- \overline{CP} : Clock input ()
- MR : Reset input
- $O_0 \sim O_{11}$: Output (12 Bits)

P- 3



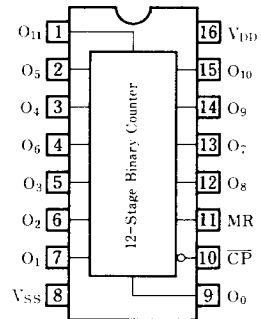
16-Pin • Plastic DIL Package

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

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

■ DC Characteristics (V_{SS}=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 < 1μA	—	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 < 1μA	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 < 1μA	V _O =0.5V or 4.5V	—	1.5	—	1.5	—	V	
	10			V _O =1V or 9V	—	3	—	3	—		3
	15			V _O =1.5V or 13.5V	—	4	—	4	—		4
Input Voltage High Level	5	V _{IH}	I _O < 1μA	V _O =0.5V or 4.5V	3.5	—	3.5	—	3.5	V	
	10			V _O =1V or 9V	7	—	7	—	7		—
	15			V _O =1.5V or 13.5V	11	—	11	—	11		—
Output Current Low Level	5	I _{OL}	V _O =0.4V, V _i =0 or 5V	0.52	—	0.44	—	0.36	—	mA	
	10		V _O =0.5V, V _i =0 or 10V	1.3	—	1.1	—	0.9	—		
	15		V _O =1.5V, V _i =0 or 15V	3.6	—	3	—	2.4	—		
Output Current High Level	5	-I _{OH}	V _O =4.6V, V _i =0 or 5V	0.52	—	0.44	—	0.36	—	mA	
	10		V _O =9.5V, V _i =0 or 10V	1.3	—	1.1	—	0.9	—		
	15		V _O =13.5V, V _i =0 or 15V	3.6	—	3	—	2.4	—		
Output Current High Level	5	-I _{OH}	V _O =2.5V, V _i =0 or 5V	1.7	—	1.4	—	1.1	—	mA	
Input Leakage Current	15	±I _I	V _i =0 or 15V	—	0.3	—	0.3	—	1	μA	

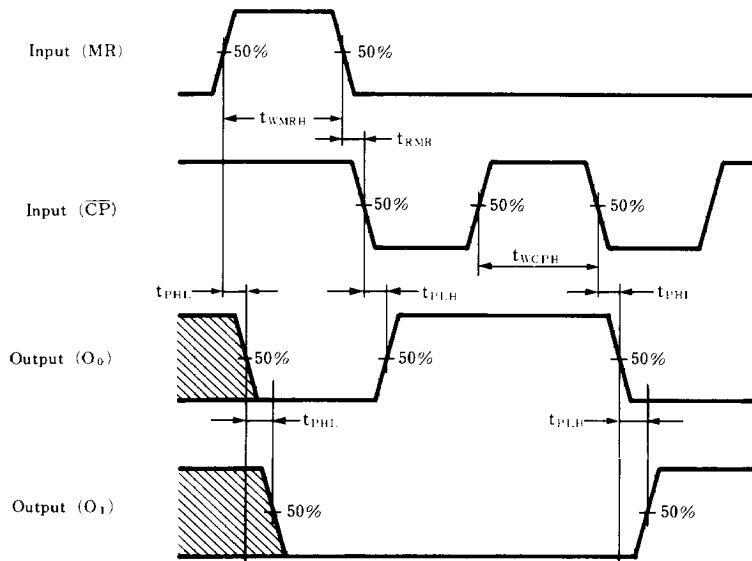
■ Switching Characteristics (Ta=25°C, V_{SS}=0V, C_L=50pF)

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 CP→O ₀ (L→H)	5	t _{PLH}	—	105	315	ns
	10		—	50	150	
	15		—	35	105	
Propagation Delay Time CP→O ₀ (H→L)	5	t _{PHL}	—	105	315	ns
	10		—	45	135	
	15		—	30	90	
Propagation Delay Time On→On-1 (L→H)	5	t _{PLH}	—	70	210	ns
	10		—	25	75	
Propagation Delay Time On→On-1 (H→L)	5	t _{PRL}	—	80	240	ns
	10		—	30	90	
	15		—	20	60	

■ Switching Characteristics (Ta = 25°C, Vss = 0V, Cl = 50pF)

Item	VDD(V)	Symbol	min.	typ.	max.	Unit
Propagation Delay Time MR→On (H→L)	5	t _{PHL}	—	180	540	ns
	10		—	90	270	
	15		—	70	210	
Minimum Clock Pulse Width	5	t _{WCPH}	—	25	75	ns
	10		—	15	45	
	15		—	10	30	
Minimum Reset Pulse Width	5	t _{WNRH}	—	65	195	ns
	10		—	50	150	
	15		—	45	135	
Reset Recovery Time	5	t _{RMR}	—	60	180	ns
	10		—	35	105	
	15		—	25	75	
Maximum Clock Frequency	5	f _{max}	5	10	—	MHz
	10		13	25	—	
	15		18	35	—	
Input Capacitance		C _I	—	—	7.5	pF

● Dynamic Signal Waveforms



Waveforms showing propagation delays for MR to O₁ and CP to O₀, minimum MR and CP pulse widths and recovery time for MR