

MN40174B/MN40174BS

Hex D-Type Flip-Flop

■ Outline

The MN40174B/S consists of six built-in circuits of D-type flip-flops having common CP and \overline{MR} pins.

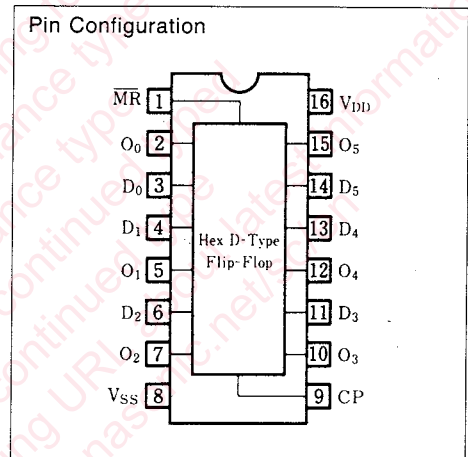
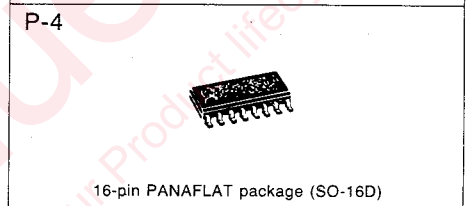
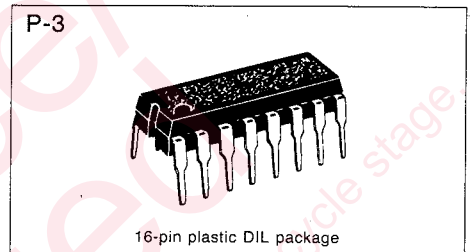
The D_n input is transmitted to the O_n output at the rise of the clock input. When the level of the \overline{MR} input is set to "L", all the six circuit of the flip-flops can be simultaneously reset.

This MN40174B/S is equivalent to Motorola's MC14164B and RCA's CD40174B.

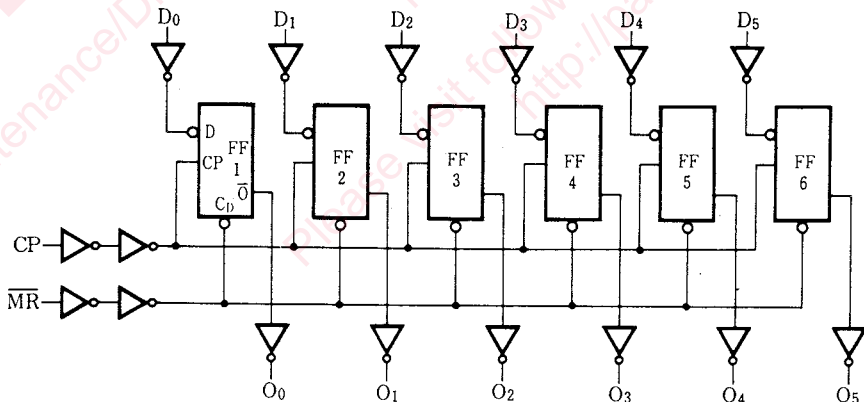
■ Truth Table

Input			Output
CP	D	\overline{MR}	O
	H	H	H
	L	H	L
	x	H	No Change
x	x	L	L

Note) x: don't care



■ Logic Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply voltage	V _{DD}	-0.5~+18	V
Input voltage	V _I	-0.5~V _{DD} +0.5*	V
Output pin voltage	V _O	-0.5~V _{DD} +0.5*	V
Peak input · output pin current	±I _I	max. 10	mA
Power dissipation (per package)	Ta=-40~+60°C	max. 400	mW
	Ta=+60~+80°C	Decrease to 200mW at the rate of 8mW/°C	
Power dissipation (per output pin)	P _D	max. 100	mW
Operating ambient temperature	T _{opr}	-40~+85	°C
Storage temperature	T _{strg}	-65~+150	°C

* V_{DD}+0.5V should be lower than 18V.

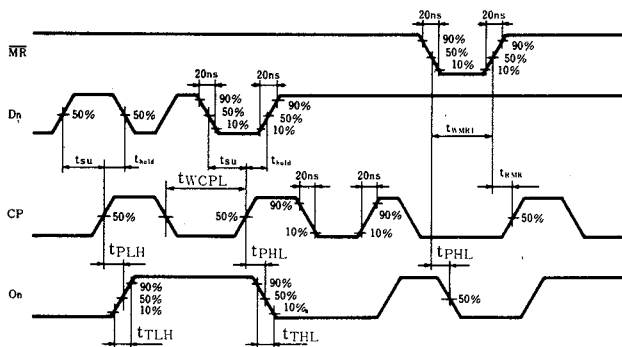
■ DC Characteristics (V_{SS}=0V)

Item	V _{DD} (V)	Symbol	Condition	Ta=-40°C		Ta=25°C		Ta=85°C		Unit
				min.	max.	min.	max.	min.	max.	
Static 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	—	
	15			V _O =1.5V or 13.5V	—	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 time CP→ON (H→L)	5	t _{PHL}	—	75	225	ns
	15		—	30	90	
	15		—	20	60	
Propagation time CP→On (L→H)	5	t _{PLH}	—	75	225	ns
	15		—	30	90	
	15		—	20	60	
Propagation time MR→On (H→L)	5	t _{PHL}	—	85	255	ns
	10		—	35	105	
	15		—	25	75	
Set-up time Dn→CP	5	t _{su}	—	10	30	ns
	10		—	5	15	
	15		—	5	15	
Hold time Dn→CP	5	t _{hold}	—	0	20	ns
	10		—	0	10	
	15		—	0	10	
Minimum clock pulse width	5	t _{WCPL}	—	35	100	ns
	10		—	15	45	
	15		—	10	30	
Minimum MR pulse width	5	t _{WMRL}	—	35	100	ns
	10		—	15	45	
	15		—	10	30	
Reset recovery time	5	t _{RMR}	—	25	75	ns
	10		—	10	30	
	15		—	5	15	
Maximum clock frequency	5	f _{max}	5	11	—	MHz
	10		15	30	—	
	15		20	45	—	
Input capacitance		C _I	—	—	7.5	pF

● Switching waveforms



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