

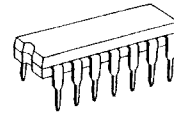
TC4093BP/BF/BFN

TC4093 QUAD 2-INPUT NAND SCHMITT TRIGGERS

The TC4093BP is a quad 2-input NAND gate having Schmitt trigger function for all the input terminals.

Since the circuit threshold voltage varies with rising time and falling time of the input waveform (V_P and V_N), this gate can be used for a wide variety of applications to line receivers, waveform shaping. Astable multivibrators, monostable multivibrators, etc. In addition to regular NAND gates.

As the TC4093B and the TC4011B are identical in pin assignment, they are compatible each other.



P (DIP14-P-300)



F (SOP14-P-300)

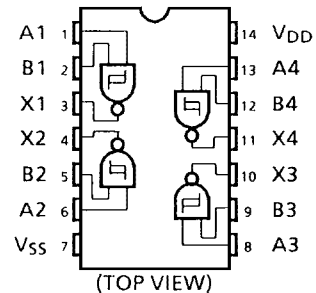


FN (SOL14-P-150)

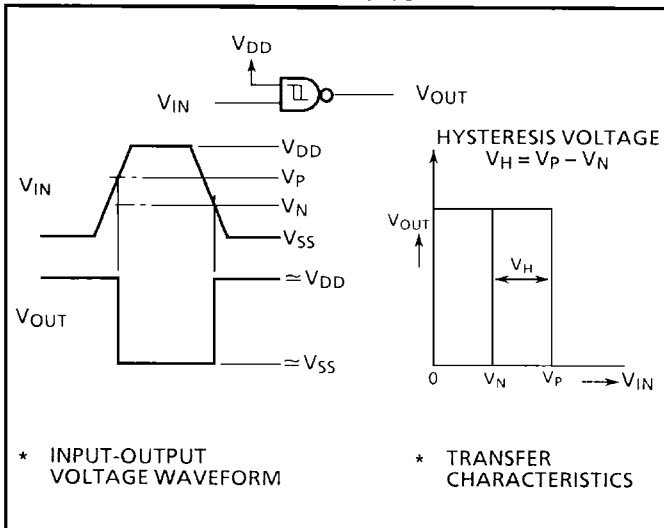
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Input Voltage	V_{IN}	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Output Voltage	V_{OUT}	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
DC Input Current	I_{IN}	± 10	mA
Power Dissipation	P_D	300 (DIP) / 180 (SOIC)	mW
Operating Temperature Range	T_A	$-40 \sim 85$	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	$-65 \sim 150$	$^{\circ}\text{C}$
Lead Temp./Time	T_{SOL}	$260^{\circ}\text{C} \cdot 10\text{sec}$	

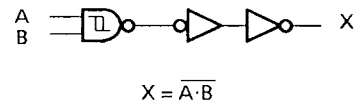
PIN ASSIGNMENT



INPUT-OUTPUT CHARACTERISTIC



LOGIC DIAGRAM



RECOMMENDED OPERATING CONDITIONS (V_{SS} = 0V)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS
DC Supply Voltage	V _{DD}	3	-	18	V
Input Voltage	V _{IN}	0	-	V _{DD}	V

STATIC ELECTRICAL CHARACTERISTICS (V_{SS} = 0V)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	V _{DD} (V)	- 40°C		25°C			85°C		UNITS	
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Output Voltage	V _{OH}	I _{OUT} < 1 μA V _{IN} = V _{SS} , V _{DD}	5	4.95	-	4.95	5.00	-	4.95	-	V	
			10	9.95	-	9.95	10.00	-	9.95	-		
			15	14.95	-	14.95	15.00	-	14.95	-		
Low-Level Output Voltage	V _{OL}	I _{OUT} < 1 μA V _{IN} = V _{DD}	5	-	0.05	-	0.00	0.05	-	0.05	V	
			10	-	0.05	-	0.00	0.05	-	0.05		
			15	-	0.05	-	0.00	0.05	-	0.05		
Output High Current	I _{OH}	V _{OH} = 4.6V V _{OH} = 2.5V V _{OH} = 9.5V V _{OH} = 13.5V V _{IN} = V _{SS} , V _{DD}	5	-0.61	-	-0.51	-1.0	-	-0.42	-	mA	
			5	-2.5	-	-2.1	-4.0	-	-1.7	-		
			10	-1.5	-	-1.3	-2.2	-	-1.1	-		
			15	-4.0	-	-3.4	-9.0	-	-2.8	-		
			5	0.61	-	0.51	1.5	-	0.42	-		
Output Low Current	I _{OL}	V _{OL} = 0.4V V _{OL} = 0.5V V _{OL} = 1.5V V _{IN} = V _{DD}	10	1.5	-	1.3	3.8	-	1.1	-		
			15	4.0	-	3.4	15.0	-	2.8	-		
			5	-	-	2.05	2.8	3.55	-	-		
			10	-	-	4.1	5.3	7.0	-	-		
High Threshold Voltage	V _P	V _{OUT} = 0.5V, 4.5V V _{OUT} = 1.0V, 9.0V V _{OUT} = 1.5V, 13.5V	15	-	-	6.2	7.8	10.4	-	-		
			5	-	-	1.5	2.3	3.15	-	-		
			10	-	-	3.2	4.5	6.3	-	-		
Low Threshold Voltage	V _N	V _{OUT} = 0.5V, 4.5V V _{OUT} = 1.0V, 9.0V V _{OUT} = 1.5V, 13.5V	15	-	-	4.8	6.6	9.3	-	-		
			5	-	-	0.2	0.5	0.85	-	-		
			10	-	-	0.3	0.8	1.4	-	-		
Hysteresis Voltage	V _H		15	-	-	0.45	1.2	1.9	-	-		
			5	-	-	0.2	0.5	0.85	-	-		
Input Current	"H" Level	I _{IH}	V _{IH} = 18V	18	-	0.1	-	10 ⁻⁵	0.1	-	1.0	μA
	"L" Level	I _{IL}	V _{IL} = 0V	18	-	-0.1	-	-10 ⁻⁵	-0.1	-	-1.0	
Quiescent Device Current	I _{DD}	V _{IN} = V _{SS} , V _{DD} *	5	-	1	-	0.001	1	-	7.5	μA	
			10	-	2	-	0.002	2	-	15		
			15	-	4	-	0.004	4	-	30		

* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, VSS = 0V, CL = 50pF)

CHARACTERISTICS	SYMBOL	TEST CONDITION	V _{DD} (V)	MIN.	TYP.	MAX.	UNITS
Output Transition Time (Low to High)	t _{TLH}		5	–	80	200	ns
			10	–	50	100	
			15	–	40	80	
Output Transition Time (High to Low)	t _{THL}		5	–	80	200	ns
			10	–	50	100	
			15	–	40	80	
Propagation Delay Time	t _{pLH}		5	–	130	260	ns
	t _{pHL}		10	–	60	120	
			15	–	40	80	
Input Capacitance	C _{IN}			–	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

