

TC4001BP/BF/BFN, TC4002BP/BF B²MOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4025BP/BF/BFN

TC4001B QUAD 2 INPUT NOR GATE
 TC4002B DUAL 4 INPUT NOR GATE
 TC4025B TRIPLE 3 INPUT NOR GATE

The TC4001B, the TC4025B and TC4002B are 2-input, 3-input, 4-input positive NOR gate, respectively.

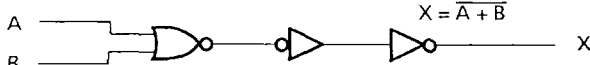
Since the outputs of these gates are equipped with the buffers, the input / output transmission characteristics have been improved and the variation of transmission time due to an increase in the load capacity is kept minimum.

ABSOLUTE MAXIMUM RATINGS

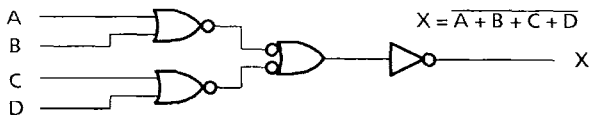
CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Input Voltage	V_{IN}	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Output Voltage	V_{OUT}	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
DC Input Current	I_{IN}	± 10	mA
Power Dissipation	P_D	300 (DIP) / 180 (SOIC)	mW
Operating Temperature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

LOGIC DIAGRAM

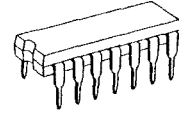
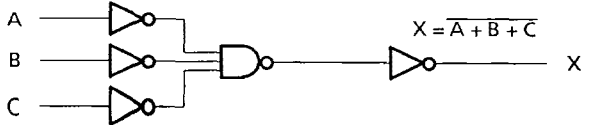
1/4 TC4001B



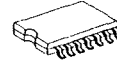
1/2 TC4002B



1/3 TC4025B



P (DIP14-P-300)



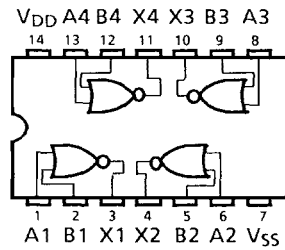
F (SOP14-P-300)



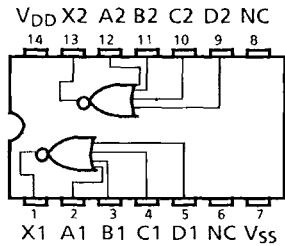
FN (SOL14-P-150)

PIN ASSIGNMENT (TOP VIEW)

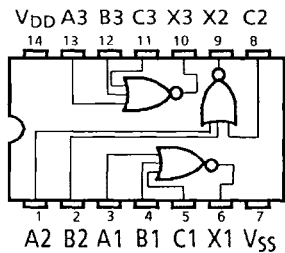
TC4001B



TC4002B



TC4025B



TC4001BP/BF/BFN, TC4002BP/BF TC4025BP/BF/BFN

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\mu A$ $V_{IN} = V_{SS}, V_{DD}$	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\mu A$ $V_{IN} = V_{SS}, V_{DD}$	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	–		
Output Low Current	I_{OL}	$V_{OL} = 0.4V$ $V_{OL} = 0.5V$ $V_{OL} = 1.5V$ $V_{IN} = V_{SS}, V_{DD}$	5	0.61	–	0.51	1.2	–	0.42	–	mA	
			10	1.5	–	1.3	3.2	–	1.1	–		
			15	4.0	–	3.4	12.0	–	2.8	–		
Input High Voltage	V_{IH}	$V_{OUT} = 0.5V$ $V_{OUT} = 1.0V$ $V_{OUT} = 1.5V$ $ I_{OUT} < 1\mu A$	5	3.5	–	3.5	2.75	–	3.5	–	V	
			10	7.0	–	7.0	5.5	–	7.0	–		
			15	11.0	–	11.0	8.25	–	11.0	–		
Input Low Voltage	V_{IL}	$V_{OUT} = 4.5V$ $V_{OUT} = 9.0V$ $V_{OUT} = 13.5V$ $ I_{OUT} < 1\mu A$	5	–	1.5	–	2.25	1.5	–	1.5	V	
			10	–	3.0	–	4.5	3.0	–	3.0		
			15	–	4.0	–	6.75	4.0	–	4.0		
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	–	0.25	–	0.001	0.25	–	7.5	μA	
			10	–	0.5	–	0.001	0.5	–	15		
			15	–	1.0	–	0.002	1.0	–	30		

* All valid input combinations.

TC4001BP/BF/BFN, TC4002BP/BF TC4025BP/BF/BFN

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

CHARACTERISTICS	SYMBOL	TEST CONDITION	VDD (V)	MIN.	TYP.	MAX.	UNITS
			5				
Output Transition Time (TC4002B)	t _{TLH}		5	—	80	200	ns
			10	—	50	100	
			15	—	40	80	
Output Transition Time (TC4002B)	t _{THL}		5	—	80	200	
			10	—	50	100	
			15	—	40	80	
Output Transition Time (TC4001B, TC4025B)	t _{TLH}		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Output Transition Time (TC4001B, TC4025B)	t _{THL}		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time (TC4001B)	t _{pLH}		5	—	65	200	
			10	—	30	100	
			15	—	25	80	
Propagation Delay Time (TC4001B)	t _{pHL}		5	—	65	200	
			10	—	30	100	
			15	—	25	80	
Propagation Delay Time (TC4002B)	t _{pLH}		5	—	100	250	
			10	—	40	120	
			15	—	30	90	
Propagation Delay Time (TC4002B)	t _{pHL}		5	—	100	250	
			10	—	40	120	
			15	—	30	90	
Propagation Delay Time (TC4025B)	t _{pLH}		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time (TC4025B)	t _{pHL}		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Input Capacitance	C _{IN}			—	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

