

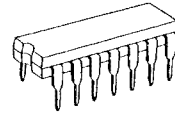
# TC4030BP/BF/BFN

C<sup>2</sup>MOS DIGITAL INTEGRATED CIRCUIT  
SILICON MONOLITHIC

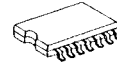
## TC4030B QUAD EXCLUSIVE-OR GATE

TC4030B contains four circuits of exclusive OR gates. Since the buffers of two stage inverters are provided for all the outputs, the input / output voltage characteristic has been improved and the noise immunity has been also improved. And increase of transmission time due to load capacity increase is kept minimum.

Wide variety of applications are offered, such as digital comparators and parity circuits.



P (DIP14-P-300)



F (SOP14-P-300)



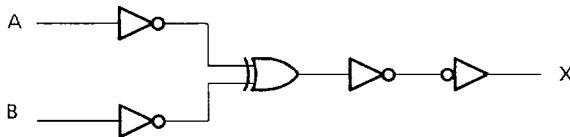
FN (SOL14-P-150)

## ABSOLUTE MAXIMUM RATINGS

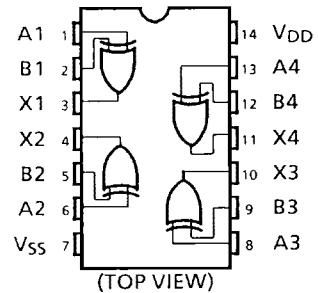
CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	$V_{DD}$	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Input Voltage	$V_{IN}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Output Voltage	$V_{OUT}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
DC Input Current	$I_{IN}$	$\pm 10$	mA
Power Dissipation	$P_D$	300 (DIP) / 180 (SOIC)	mW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

## CIRCUIT DIAGRAM

1/4 TC4030B



## PIN ASSIGNMENT



## TRUTH TABLE

INPUTS		OUTPUT
A	B	X
L	L	L
L	H	H
H	L	H
H	H	L

RECOMMENDED OPERATING CONDITIONS (V<sub>SS</sub> = 0V)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS
DC Supply Voltage	V <sub>DD</sub>	3	-	18	V
Input Voltage	V <sub>IN</sub>	0	-	V <sub>DD</sub>	V

STATIC ELECTRICAL CHARACTERISTICS (V<sub>SS</sub> = 0V)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	V <sub>DD</sub> (V)	-40°C		25°C			85°C		UNITS	
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Output Voltage	V <sub>OH</sub>	I <sub>OUT</sub>   < 1μA V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	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 <sub>OL</sub>	I <sub>OUT</sub>   < 1μA V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	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 <sub>OH</sub>	V <sub>OH</sub> = 4.6V V <sub>OH</sub> = 2.5V V <sub>OH</sub> = 9.5V V <sub>OH</sub> = 13.5V V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	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	-		
			15	-4.0	-	-3.4	-9.0	-	-2.8	-		
Output Low Current	I <sub>OL</sub>	V <sub>OL</sub> = 0.4V V <sub>OL</sub> = 0.5V V <sub>OL</sub> = 1.5V V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	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	-		
			15	4.0	-	3.4	12.0	-	2.8	-		
Input High Voltage	V <sub>IH</sub>	V <sub>OUT</sub> = 0.5V, 4.5V V <sub>OUT</sub> = 1.0V, 9.0V V <sub>OUT</sub> = 1.5V, 13.5V  I <sub>OUT</sub>   < 1μA	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	-		
			15	11.0	-	11.0	8.25	-	11.0	-		
Input Low Voltage	V <sub>IL</sub>	V <sub>OUT</sub> = 0.5V, 4.5V V <sub>OUT</sub> = 1.0V, 9.0V V <sub>OUT</sub> = 1.5V, 13.5V  I <sub>OUT</sub>   < 1μA	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		
			15	-	4.0	-	6.75	4.0	-	4.0		
Input Current	"H" Level	I <sub>IH</sub>	V <sub>IH</sub> = 18V	18	-	0.1	-	10 <sup>-5</sup>	0.1	-	1.0	μA
	"L" Level	I <sub>IL</sub>	V <sub>IL</sub> = 0V	18	-	-0.1	-	-10 <sup>-5</sup>	-0.1	-	-1.0	
Quiescent Device Current	I <sub>DD</sub>	V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub> *	5	-	1	-	0.001	1	-	7.5	μA	
			10	-	2	-	0.001	2	-	15		
			15	-	4	-	0.002	4	-	30		

\* All valid input combinations.

# TC4030BP/BF/BFN

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

CHARACTERISTICS	SYMBOL	TEST CONDITION	VDD (V)	MIN.	TYP.	MAX.	UNITS
Output Transition Time (Low to High)	$t_{TLH}$		5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	$t_{THL}$		5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	$t_{pLH}$ $t_{pHL}$		5	—	90	280	ns
			10	—	45	130	
			15	—	35	100	
Input Capacitance	CIN			—	5	7.5	pF

## CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

