

TC4011BP/TC4011BF QUAD 2 INPUT NAND GATE
TC4012BP/TC4012BF DUAL 4 INPUT NAND GATE
TC4023BP/TC4023BF TRIPLE 3 INPUT NAND GATE

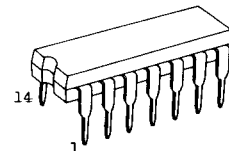
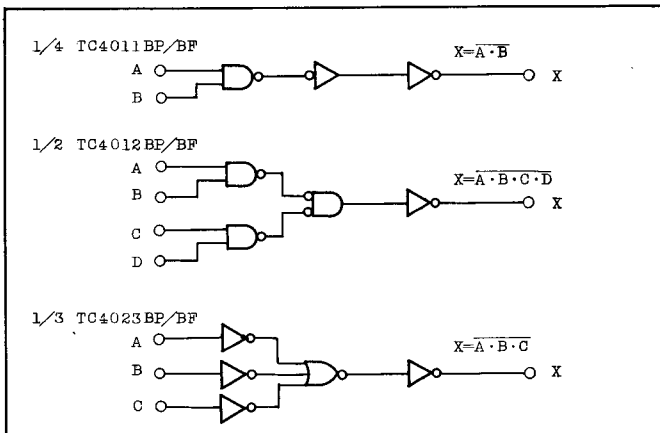
The TC4011BP/BF, TC4023BP/BF, and TC4012BP/BF are 2-input, 3-input, and 4-input positive logic NAND gates respectively.

Since all the outputs of these gates are provided with the inverters as buffers, the input/output characteristics have been improved and the variation of propagation delay time due to the increase in load capacity is kept down to the minimum.

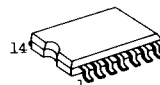
ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V _{DD}	V _{SS} -0.5 ~ V _{SS} +20	V
Input Voltage	V _{IN}	V _{SS} -0.5 ~ V _{DD} +0.5	V
Output Voltage	V _{OUT}	V _{SS} -0.5 ~ V _{DD} +0.5	V
DC Input Current	I _{IN}	±10	mA
Power Dissipation	P _D	300(DIP)/180(MFP)	mW
Operating Temperature Range	T _A	-40 ~ 85	°C
Storage Temperature Range	T _{stg}	-65 ~ 150	°C
Lead Temp./Time	T _{sol}	260°C • 10 sec	

LOGIC DIAGRAM



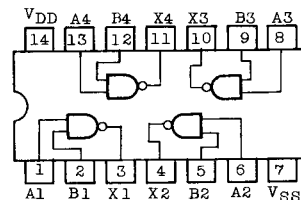
DIP14 (3D14A-P)



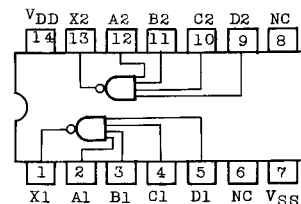
MFP14 (F14GB-P)

PIN ASSIGNMENT (TOP VIEW)

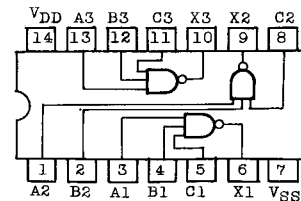
TC4011BP/BF



TC4012BP/BF



TC4023BP/BF



TC4011BP/BF, TC4012BP/BF, TC4023BP/BF

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

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

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

CHARACTERISTIC		SYMBOL	TEST CONDITION	VDD (V)	-40°C		25°C			85°C		UNITS
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage		VOH	IOUT <1μA VIN=VSS, VDD	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		VOL	IOUT <1μA VIN=VDD	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		IOH	VOH=4.6V	5	-0.61	-	-0.51	-1.0	-	-0.42	-	mA
			VOH=2.5V	5	-2.5	-	-2.1	-4.0	-	-1.7	-	
			VOH=9.5V	10	-1.5	-	-1.3	-2.2	-	-1.1	-	
			VOH=13.5V	15	-4.0	-	-3.4	-9.0	-	-2.8	-	
			VIN=VSS, VDD									
Output Low Current		IOL	VOL=0.4V	5	0.61	-	0.51	1.2	-	0.42	-	mA
			VOL=0.5V	10	1.5	-	1.3	3.2	-	1.1	-	
			VOL=1.5V	15	4.0	-	3.4	12.0	-	2.8	-	
			VIN=VDD									
Input High Voltage		VIH	VOUT=0.5V, 4.5V	5	3.5	-	3.5	2.75	-	3.5	-	V
			VOUT=1.0V, 9.0V	10	7.0	-	7.0	5.5	-	7.0	-	
			VOUT=1.5V, 13.5V	15	11.0	-	11.0	8.25	-	11.0	-	
			IOUT <1μA									
Input Low Voltage		VIL	VOUT=4.5V	5	-	1.5	-	2.25	1.5	-	1.5	V
			VOUT=9.0V	10	-	3.0	-	4.5	3.0	-	3.0	
			VOUT=13.5V	15	-	4.0	-	6.75	4.0	-	4.0	
			IOUT <1μA									
Input Current	"H" Level	IIH	VIH=18V	18	-	0.1	-	10 ⁻⁵	0.1	-	1.0	μA
	"L" Level	IIL	VIL=0V	18	-	-0.1	-	-10 ⁻⁵	-0.1	-	-1.0	
Quiescent Device Current		IDD	VIN=VSS, VDD *	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.

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{DD} (V)	MIN.	TYP.	MAX.	UNITS
Output Transition Time (TC4012BP/BF)	t_{TLH}		5	-	80	200	ns
			10	-	50	100	
			15	-	40	80	
Output Transition Time (TC4012BP/BF)	t_{THL}		5	-	80	200	
			10	-	50	100	
			15	-	40	80	
Output Transition Time (TC4011BP/BF) (TC4023BP/BF)	t_{TLH}		5	-	70	200	
			10	-	35	100	
			15	-	30	80	
Output Transition Time (TC4011BP/BF) (TC4023BP/BF)	t_{THL}		5	-	70	200	
			10	-	35	100	
			15	-	30	80	
Propagation Delay Time (TC4011BP/BF)	t_{PLH}		5	-	65	200	
			10	-	30	100	
			15	-	25	80	
Propagation Delay Time (TC4011BP/BF)	t_{PHL}		5	-	65	200	
			10	-	30	100	
			15	-	25	80	
Propagation Delay Time (TC4012BP/BF)	t_{PLH}		5	-	95	250	
			10	-	45	120	
			15	-	30	90	
Propagation Delay Time (TC4012BP/BF)	t_{PHL}		5	-	95	250	
			10	-	45	120	
			15	-	30	90	
Propagation Delay Time (TC4023BP/BF)	t_{PLH}		5	-	90	250	
			10	-	45	100	
			15	-	35	80	
Propagation Delay Time (TC4023BP/BF)	t_{PHL}		5	-	90	250	
			10	-	45	100	
			15	-	35	80	
Input Capacitance	C _{IN}			-	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

