

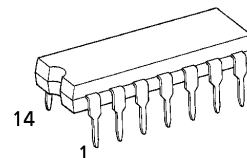
TC4011BP, TC4011BF, TC4011BFN, TC4011BFT

TC4011B QUAD 2 INPUT NAND GATE

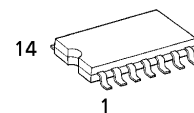
The TC4011B is 2-input positive logic NAND gate respectively.

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.

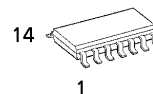
(Note) The JEDEC SOP (FN) is not available in Japan.



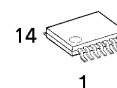
P (DIP14-P-300-2.54)
Weight : 0.96g (Typ.)



F (SOP14-P-300-1.27)
Weight : 0.18g (Typ.)



FN (SOL14-P-150-1.27)
Weight : 0.12g (Typ.)

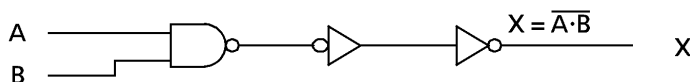


FT (TSSOP14-P-0044-0.65)
Weight : 0.06g (Typ.)

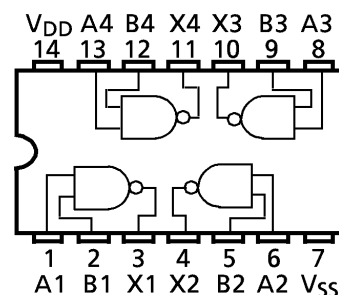
MAXIMUM RATINGS

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_{opr}	$-40 \sim 85$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-65 \sim 150$	$^{\circ}\text{C}$

LOGIC DIAGRAM



PIN ASSIGNMENT (TOP VIEW)



980910EBA2

● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}		3	—	18	V
Input Voltage	V_{IN}		0	—	V_{DD}	V

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

CHARACTERISTIC	SYM-BOL	TEST CONDITION	V_{DD} (V)	- 40°C		25°C			85°C		UNIT
				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}	$V_{OH} = 4.6V$	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
		$V_{OH} = 2.5V$	5	-2.50	—	-2.10	-4.0	—	-1.70	—	
		$V_{OH} = 9.5V$	10	-1.50	—	-1.30	-2.2	—	-1.10	—	
		$V_{OH} = 13.5V$	15	-4.00	—	-3.40	-9.0	—	-2.80	—	
		$V_{IN} = V_{SS}, V_{DD}$									
Output Low Current	I_{OL}	$V_{OL} = 0.4V$	5	0.61	—	0.51	1.2	—	0.42	—	mA
		$V_{OL} = 0.5V$	10	1.50	—	1.30	3.2	—	1.10	—	
		$V_{OL} = 1.5V$	15	4.00	—	3.40	12.0	—	2.80	—	
		$V_{IN} = V_{DD}$									
Input High Voltage	V_{IH}	$V_{OUT} = 0.5V$	5	3.5	—	3.5	2.75	—	3.5	—	V
		$V_{OUT} = 1.0V$	10	7.0	—	7.0	5.50	—	7.0	—	
		$V_{OUT} = 1.5V$	15	11.0	—	11.0	8.25	—	11.0	—	
		$ I_{OUT} < 1\mu A$									
Input Low Voltage	V_{IL}	$V_{OUT} = 4.5V$	5	—	1.5	—	2.25	1.5	—	1.5	V
		$V_{OUT} = 9.0V$	10	—	3.0	—	4.50	3.0	—	3.0	
		$V_{OUT} = 13.5V$	15	—	4.0	—	6.75	4.0	—	4.0	
		$ I_{OUT} < 1\mu A$									
Input Current	"H" Level	I_{IH}	$V_{IH} = 18V$	18	—	0.1	—	10^{-5}	0.1	—	μA
	"L" Level	I_{IL}	$V_{IL} = 0V$	18	—	-0.1	—	-10^{-5}	-0.1	—	
Quiescent Supply Current	I_{DD}	$V_{IN} = V_{SS}, V_{DD}^*$	5	—	0.25	—	0.001	0.25	—	7.5	μA
			10	—	0.50	—	0.001	0.50	—	15.0	
			15	—	1.00	—	0.002	1.00	—	30.0	

* All valid input combinations.

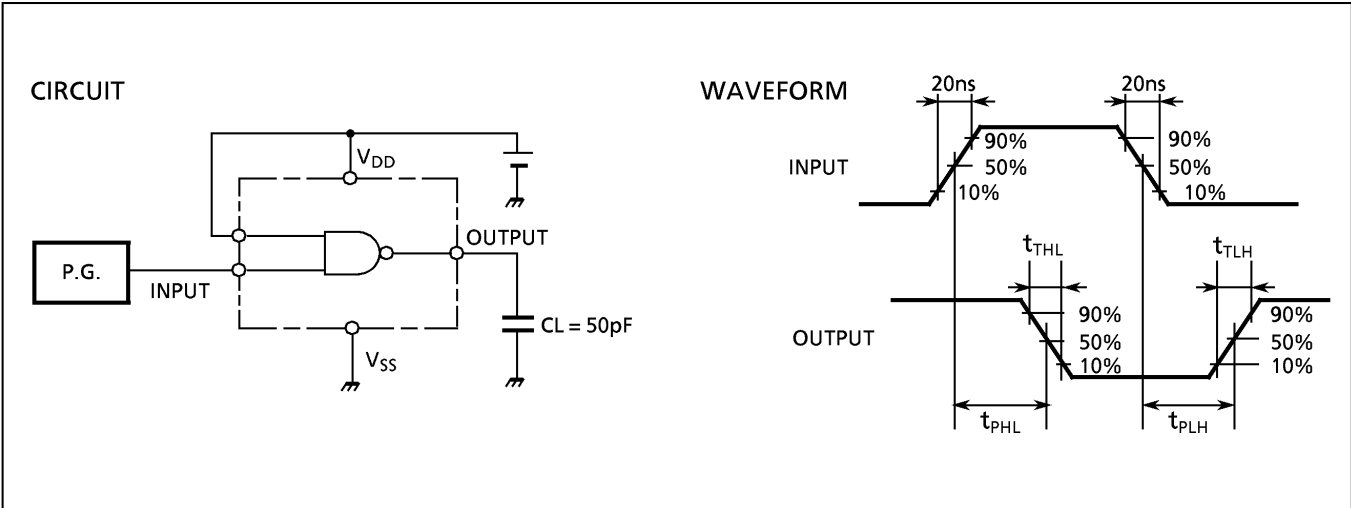
980910EBA2'

- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

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

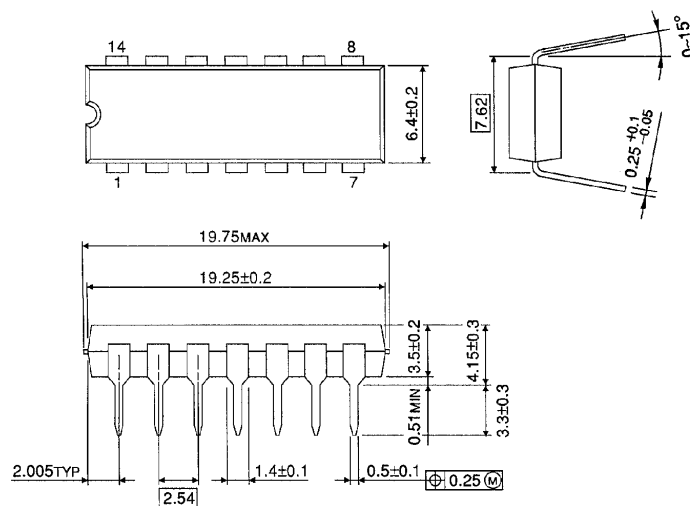
CHARACTERISTIC	SYMBOL	TEST CONDITION	VDD(V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time	tTLH		5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time	tTHL		5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	tPLH		5	—	65	200	
			10	—	30	100	
			15	—	25	80	
Propagation Delay Time	tPHL		5	—	65	200	
			10	—	30	100	
			15	—	25	80	
Input Capacitance	CIN			—	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)

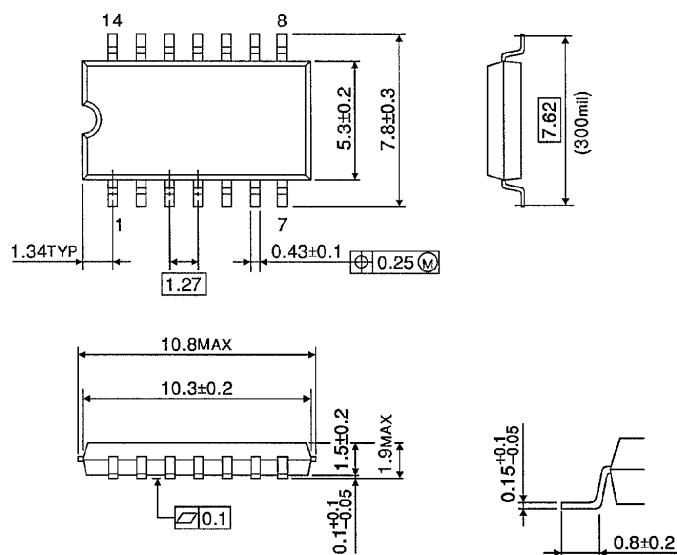
Unit in mm



Weight : 0.96g (Typ.)

SOP 14PIN (200mil BODY) OUTLINE DRAWING (SOP14-P-300-1.27)

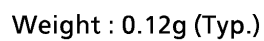
Unit in mm



Weight : 0.18g (Typ.)

Unit in mm

(Note) This package is not available in Japan.



Unit in mm

