

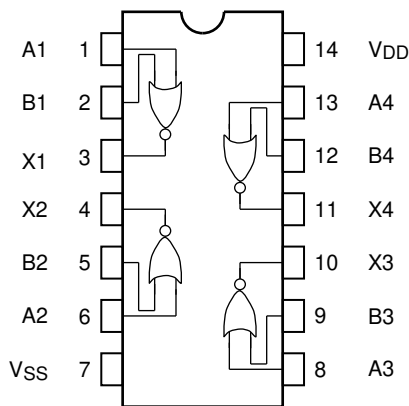
TC4001BP, TC4001BF, TC4001BFT

TC4001B Quad 2 Input NOR Gate

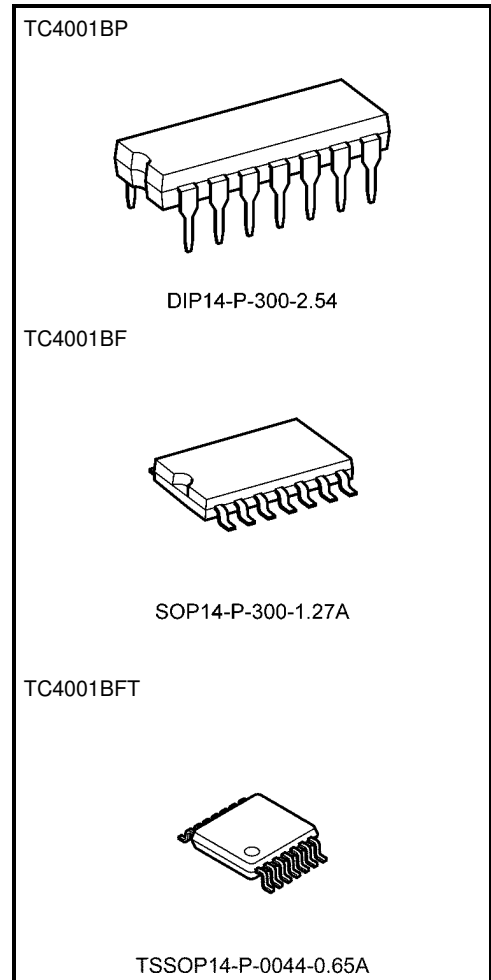
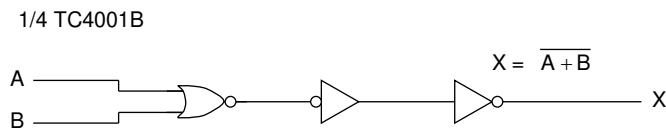
The TC4001B is 2-input positive NOR gate, respectively.

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.

Pin Assignment (top view)



Logic Diagram



Weight	
DIP14-P-300-2.54	: 0.96 g (typ.)
SOP14-P-300-1.27A	: 0.18 g (typ.)
TSSOP14-P-0044-0.65A	: 0.06 g (typ.)

Start of commercial production
1978-04

Absolute Maximum Ratings (Note)

Characteristics	Symbol	Rating	Unit
DC supply voltage	V _{DD}	V _{SS} - 0.5 to V _{SS} + 20	V
Input voltage	V _{IN}	V _{SS} - 0.5 to V _{DD} + 0.5	V
Output voltage	V _{OUT}	V _{SS} - 0.5 to V _{DD} + 0.5	V
DC input current	I _{IN}	±10	mA
Power dissipation	P _D	300 (DIP)/180 (SOP/TSSOP)	mW
Operating temperature range	T _{opr}	-40 to 85	°C
Storage temperature range	T _{stg}	-65 to 150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Operating Ranges (V_{SS} = 0 V) (Note)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
DC supply voltage	V _{DD}	—	3	—	18	V
Input voltage	V _{IN}	—	0	—	V _{DD}	V

Note: The operating ranges must be maintained to ensure the normal operation of the device. Unused inputs must be tied to either V_{DD} or V_{SS}.

Static Electrical Characteristics (V_{SS} = 0 V)

Characteristics	Symbol	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 μA V _{IN} = V _{SS}	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 _{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} = 4.6 V	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
		V _{OH} = 2.5 V	5	-2.50	—	-2.10	-4.0	—	-1.70	—	
		V _{OH} = 9.5 V	10	-1.50	—	-1.30	-2.2	—	-1.10	—	
		V _{OH} = 13.5 V	15	-4.00	—	-3.40	-9.0	—	-2.80	—	
Output low current	I _{OL}	V _{OL} = 0.4 V	5	0.61	—	0.51	1.2	—	0.42	—	mA
		V _{OL} = 0.5 V	10	1.50	—	1.30	3.2	—	1.10	—	
		V _{OL} = 1.5 V	15	4.00	—	3.40	12.0	—	2.80	—	
		V _{IN} = V _{SS} , V _{DD}									
Input high voltage	V _{IH}	V _{OUT} = 0.5 V	5	3.5	—	3.5	2.75	—	3.5	—	V
		V _{OUT} = 1.0 V	10	7.0	—	7.0	5.50	—	7.0	—	
		V _{OUT} = 1.5 V	15	11.0	—	11.0	8.25	—	11.0	—	
		I _{OUT} < 1 μA									
Input low voltage	V _{IL}	V _{OUT} = 0.5 V, 4.5 V	5	—	1.5	—	2.25	1.5	—	1.5	V
		V _{OUT} = 1.0 V, 9.0 V	10	—	3.0	—	4.50	3.0	—	3.0	
		V _{OUT} = 1.5 V, 13.5 V	15	—	4.0	—	6.75	4.0	—	4.0	
		I _{OUT} < 1 μA									
Input current	"H" level	I _{IH}	V _{IH} = 18 V	18	—	0.1	—	10 ⁻⁵	0.1	—	μA
	"L" level	I _{IL}	V _{IL} = 0 V	18	—	-0.1	—	-10 ⁻⁵	-0.1	—	
Quiescent supply current	I _{DD}	V _{IN} = V _{SS} , V _{DD} (Note)	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	

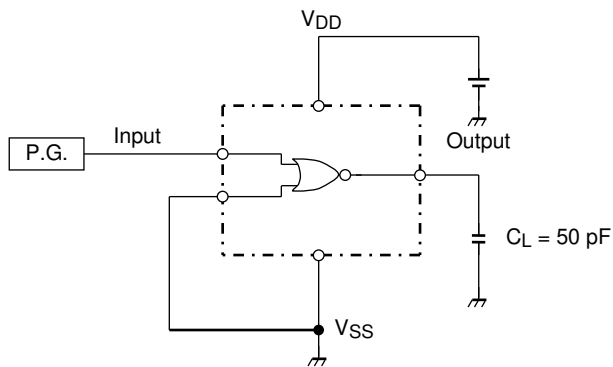
Note: All valid input combinations.

Switching Characteristics (Ta = 25°C, Vss = 0 V, CL = 50 pF)

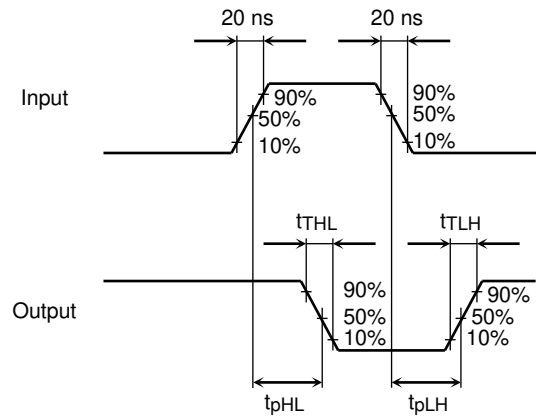
Characteristics	Symbol	Test Condition	VDD (V)	Min	Typ.	Max	Unit
			5	10	15	—	—
Output transition time	tTLH	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output transition time	tTHL	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation delay time	tpLH	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Propagation delay time	tpHL	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Input capacitance	CIN	—	—	5	7.5	pF	

Circuit and Waveform for Measurement of Switching Characteristics

Circuit



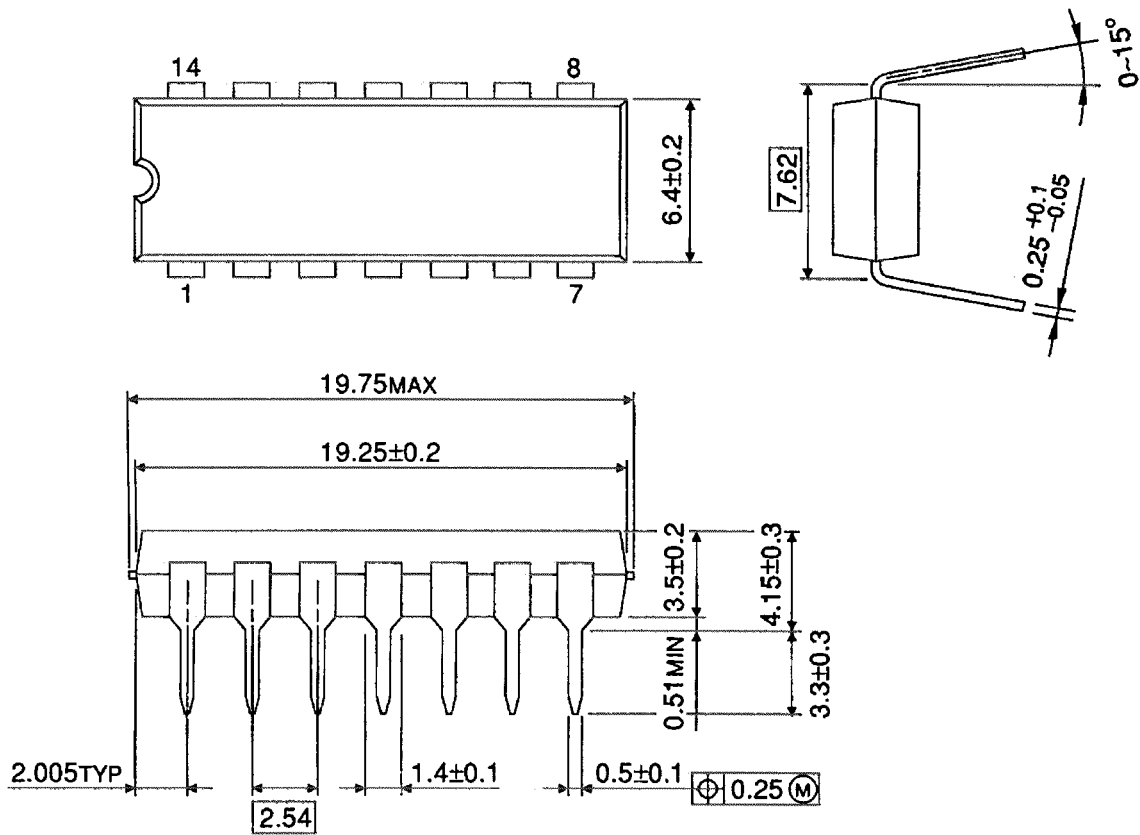
Waveform



Package Dimensions

DIP14-P-300-2.54

Unit : mm

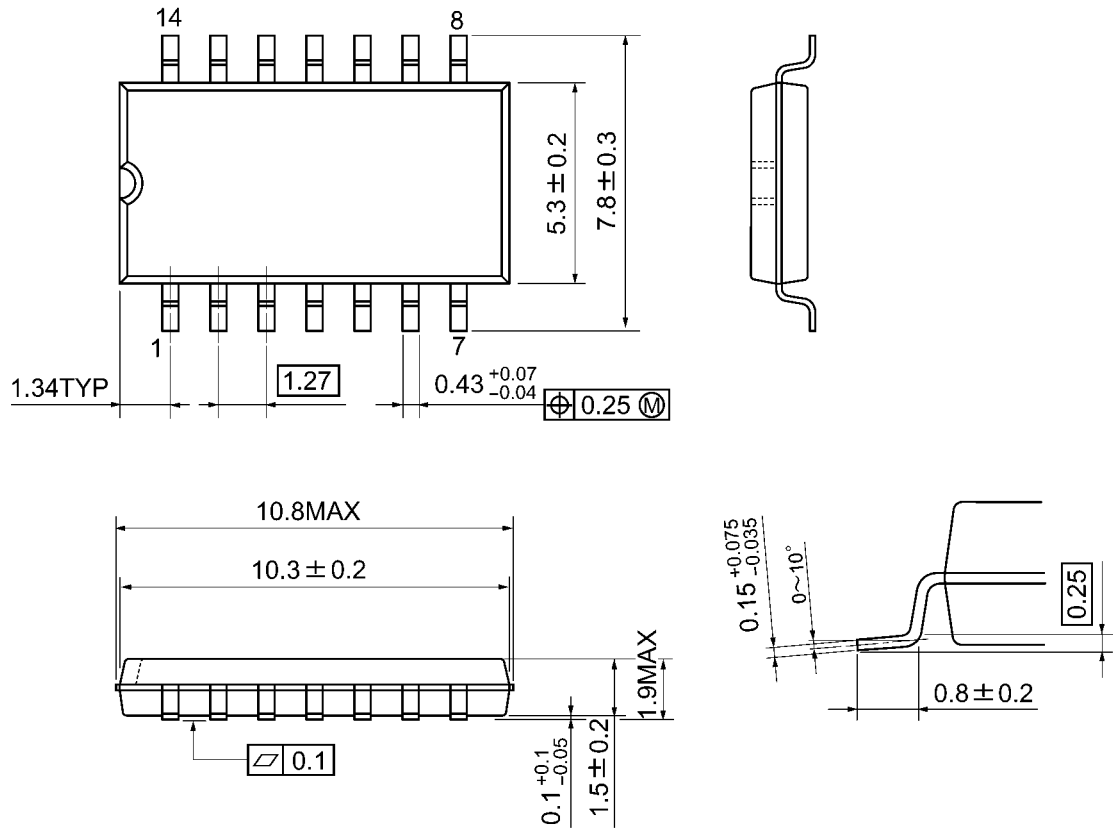


Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A

Unit: mm

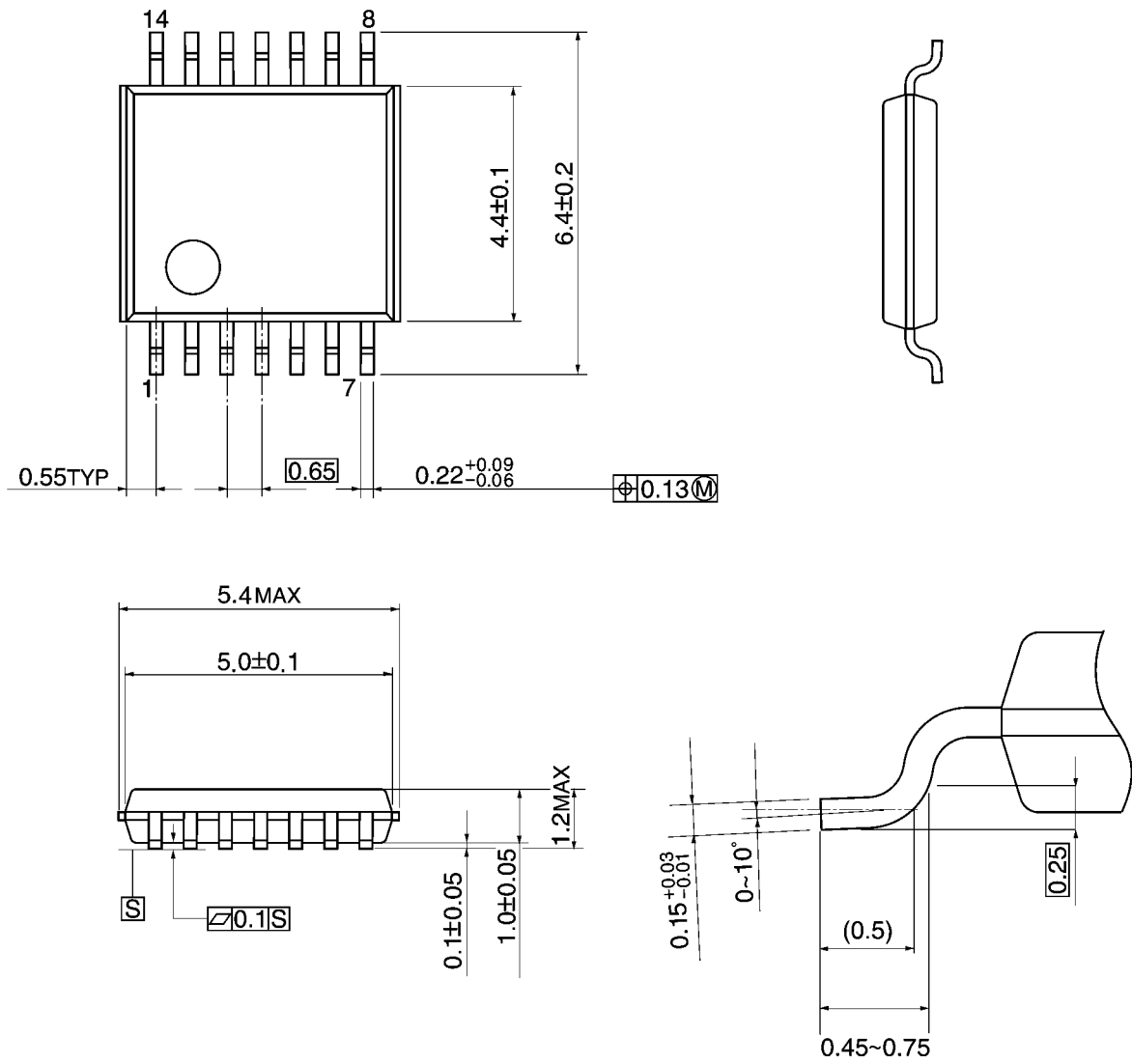


Weight: 0.18 g (typ.)

Package Dimensions

TSSOP14-P-0044-0.65A

Unit: mm



Weight: 0.06 g (typ.)

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