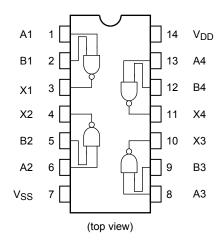
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC4011BP,TC4011BF,TC4011BFN,TC4011BFT

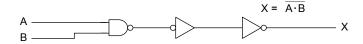
TC4011B Quad 2 Input NAND Gate

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.

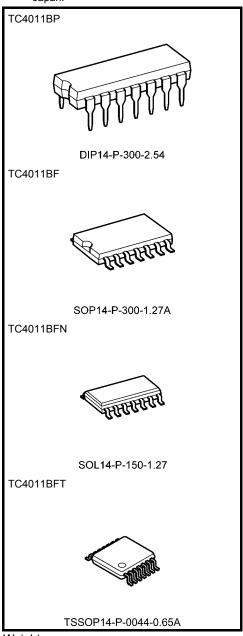
Pin Assignment



Logic Diagram



Note: xxxFN (JEDEC SOP) is not available in Japan.



Weight

DIP14-P-300-2.54 : 0.96 g (typ.) SOP14-P-300-1.27A : 0.18 g (typ.) SOL14-P-150-1.27 : 0.12 g (typ.) TSSOP14-P-0044-0.65A : 0.06 g (typ.)



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	PD	300 (DIP)/180 (SOIC)	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	Тур.	Max	Unit
DC supply voltage	V_{DD}	_	3	_	18	V
Input voltage	V _{IN}	I	0	1	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			Test Condition		-40°C		25°C			85°C		
		Symbol		V _{DD} (V)	Min	Max	Min	Тур.	Max	Min	Max	Unit
Lligh lovel		V _{OH}	I _{OUT} < 1 μA V _{IN} = V _{SS} , V _{DD}	5	4.95	_	4.95	5.00	_	4.95	_	
High-level output voltage	10			9.95	_	9.95	10.00	_	9.95	_	V	
-			VIN	15	14.95	_	14.95	15.00	_	14.95	_	
			I _{OUT} < 1 μΑ V _{IN} = V _{SS} , V _{DD}	5	_	0.05	_	0.00	0.05	_	0.05	
Low-leve output vo		V_{OL}		10	_	0.05	_	0.00	0.05	_	0.05	V
•	Ū		VIN - VSS, VDD	15	1	0.05	_	0.00	0.05	_	0.05	
			V _{OH} = 4.6 V	5	-0.61	-	-0.51	-1.0	_	-0.42	_	
			V _{OH} = 2.5 V	5	-2.50	_	-2.10	-4.0	_	-1.70	_	mA
Output h current	igh	I _{OH}	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	_	
			V _{IN} = V _{SS} , V _{DD}									
		loL	V _{OL} = 0.4 V	5	0.61	-	0.51	1.2	_	0.42	_	mA
Output lo	ow		V _{OL} = 0.5 V	10	1.50	_	1.30	3.2	_	1.10	_	
current			V _{OL} = 1.5 V	15	4.00	_	3.40	12.0	_	2.80	_	
			$V_{IN} = V_{DD}$									
		V _{IH}	V _{OUT} = 0.5 V	5	3.5	_	3.5	2.75	_	3.5	_	V
Input hia	ıh		V _{OUT} = 1.0 V	10	7.0	_	7.0	5.50	_	7.0	_	
voltage	,		V _{OUT} = 1.5 V	15	11.0	_	11.0	8.25	_	11.0	_	
Input high			I _{OUT} < 1 μA									
			V _{OUT} = 4.5 V	5		1.5	_	2.25	1.5	_	1.5	
Input low	v	V _{IL}	V _{OUT} = 9.0 V	10	_	3.0	_	4.50	3.0	_	3.0	V
	•		V _{OUT} = 13.5 V	15	_	4.0	_	6.75	4.0	_	4.0	
			I _{OUT} < 1 μA									
Input	"H" level	lіН	V _{IH} = 18 V	18	-	0.1	_	10 ⁻⁵	0.1	_	1.0	
current	"L" level	I _{IL}	V _{IL} = 0 V	18	_	-0.1	_	-10 ⁻⁵	-0.1	_	-1.0	μA
			., ., .,	5	_	0.25	_	0.001	0.25	_	7.5	
Quiescent supply current		I _{DD}	$V_{IN} = V_{SS}, V_{DD}$	10	_	0.50	_	0.001	0.50	_	15.0	μA
cappiy of			(Note)	15	_	1.00	_	0.002	1.00	_	30.0	

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Note: All valid input combinations.

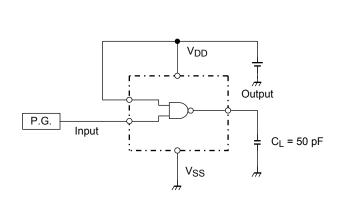


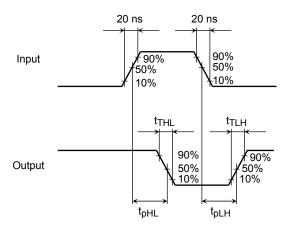
Dynamic Electrical Characteristics (Ta = 25°C, V_{SS} = 0 V, C_L = 50 pF)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit	
Characteristics	Symbol		V _{DD} (V)	IVIIII	τyp.	IVIAX	Offic
			5	_	70	200	
Output transition time	t _{TLH}	_	10	_	35	100	ns
			15	1	30	80	
			5	_	70	200	
Output transition time	t_{THL}	_	10	_	35	100	ns
			15	_	30	80	
			5	_	65	200	
Propagation delay time	t_{pLH}	_	10	_	30	100	ns
			15	_	25	80	
			5	-	65	200	
Propagation delay time	t_{pHL}	_	10	_	30	100	ns
			15	-	25	80	
Input capacitance	C _{IN}	-		_	5	7.5	pF

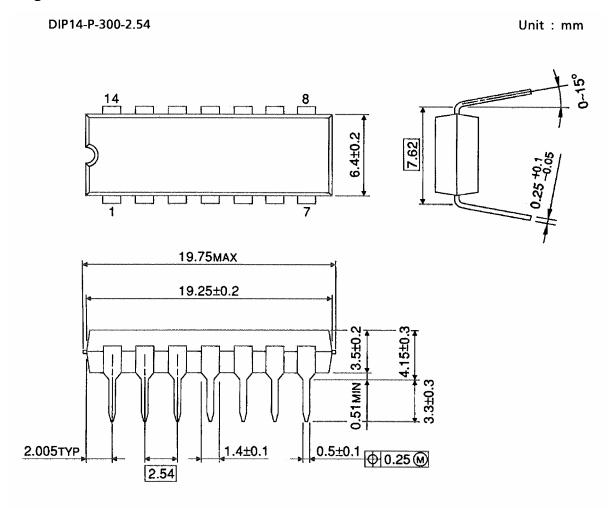
Circuit and Waveform for Measurement of Dynamic Characteristics

Circuit Waveform





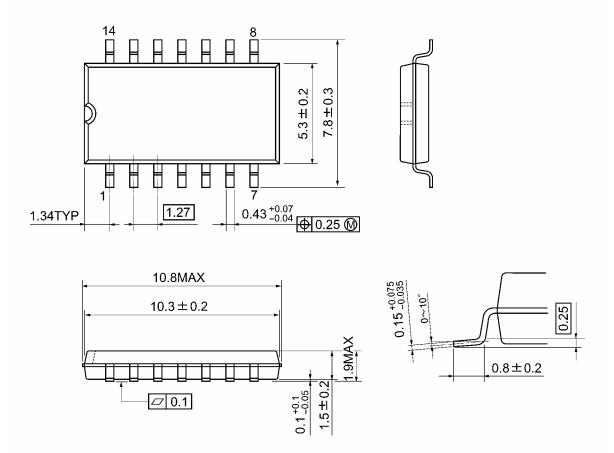
Package Dimensions



Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A Unit: mm

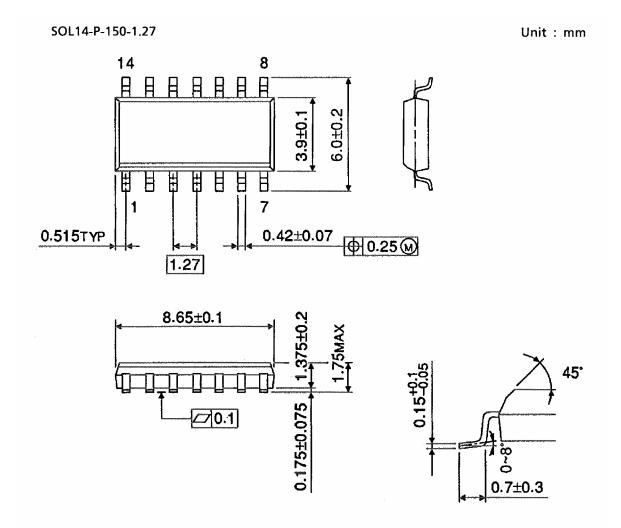


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Weight: 0.18 g (typ.)



Package Dimensions (Note)



Note: This package is not available in Japan.

Weight: 0.12 g (typ.)



Package Dimensions

TSSOP14-P-0044-0.65A Unit: mm 6.4 ± 0.2 $0.22^{+0.09}_{-0.06}$ 0.65 0.55TYP **⊕**0.13**M** 5.4MAX 5.0±0.1 0~10 0.25 1.0±0.05 0.1±0.05 S Ø.1S (0.5)

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Weight: 0.06 g (typ.)

0.45~0.75

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20070701-EN GENERAL

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