

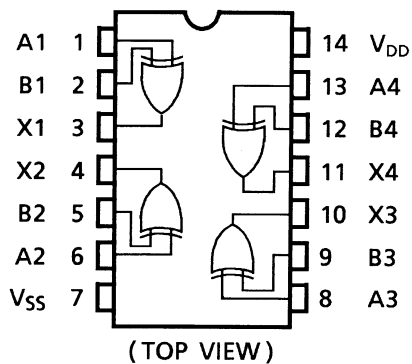
# TC4030BP, TC4030BF, TC4030BFN

## 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.

### Pin Assignment

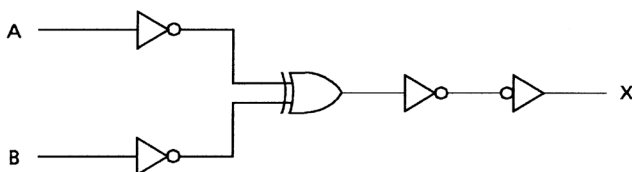


### Truth Table

Inputs		Output
A	B	X
L	L	L
L	H	H
H	L	H
H	H	L

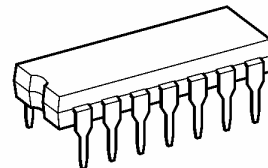
### Circuit Diagram

#### 1/4 TC4030B



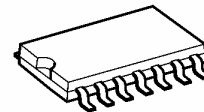
Note: xxxFN (JEDEC SOP) is not available in Japan.

#### TC4030BP

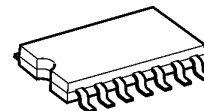


DIP14-P-300-2.54

#### TC4030BF

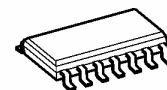


SOP14-P-300-1.27A



SOP14-P-300-1.27

#### TC4030BFN



SOL14-P-150-1.27

#### Weight

DIP14-P-300-2.54	: 0.96 g (typ.)
SOP14-P-300-1.27A	: 0.18 g (typ.)
SOP14-P-300-1.27	: 0.18 g (typ.)
SOL14-P-150-1.27	: 0.12 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	$I_{IN}$	$\pm 10$	mA
Power dissipation	$P_D$	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.

**Recommended Operating Conditions ( $V_{SS} = 0$  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 recommended operating conditions are required to ensure the normal operation of the device. Unused inputs must be tied to either VCC or GND.

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

Characteristics		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\text{ }\mu\text{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\text{ }\mu\text{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		$I_{OH}$	$V_{OH} = 4.6\text{ V}$	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
			$V_{OH} = 2.5\text{ V}$	5	-2.50	—	-2.10	-4.0	—	-1.70	—	
			$V_{OH} = 9.5\text{ V}$	10	-1.50	—	-1.30	-2.2	—	-1.10	—	
			$V_{OH} = 13.5\text{ V}$	15	-4.00	—	-3.40	-9.0	—	-2.80	—	
			$V_{IN} = V_{SS}, V_{DD}$									
Output low current		$I_{OL}$	$V_{OL} = 0.4\text{ V}$	5	0.61	—	0.51	1.2	—	0.42	—	mA
			$V_{OL} = 0.5\text{ V}$	10	1.50	—	1.30	3.2	—	1.10	—	
			$V_{OL} = 1.5\text{ V}$	15	4.00	—	3.40	12.0	—	2.80	—	
			$V_{IN} = V_{SS}, V_{DD}$									
Input high voltage		$V_{IH}$	$V_{OUT} = 0.5\text{ V}, 4.5\text{ V}$	5	3.5	—	3.5	2.75	—	3.5	—	V
			$V_{OUT} = 1.0\text{ V}, 9.0\text{ V}$	10	7.0	—	7.0	5.50	—	7.0	—	
			$V_{OUT} = 1.5\text{ V}, 13.5\text{ V}$	15	11.0	—	11.0	8.25	—	11.0	—	
			$ I_{OUT}  < 1\text{ }\mu\text{A}$									
Input low voltage		$V_{IL}$	$V_{OUT} = 0.5\text{ V}, 4.5\text{ V}$	5	—	1.5	—	2.25	1.5	—	1.5	V
			$V_{OUT} = 1.0\text{ V}, 9.0\text{ V}$	10	—	3.0	—	4.50	3.0	—	3.0	
			$V_{OUT} = 1.5\text{ V}, 13.5\text{ V}$	15	—	4.0	—	6.75	4.0	—	4.0	
			$ I_{OUT}  < 1\text{ }\mu\text{A}$									
Input current	"H" level	$I_{IH}$	$V_{IH} = 18\text{ V}$	18	—	0.1	—	$10^{-5}$	0.1	—	1.0	$\mu\text{A}$
	"L" level	$I_{IL}$	$V_{IL} = 0\text{ V}$	18	—	-0.1	—	$-10^{-5}$	-0.1	—	-1.0	
Quiescent supply current		$I_{DD}$	$V_{IN} = V_{SS}, V_{DD}$ (Note)	5	—	1	—	0.001	1	—	7.5	$\mu\text{A}$
				10	—	2	—	0.001	2	—	15.0	
				15	—	4	—	0.002	4	—	30.0	

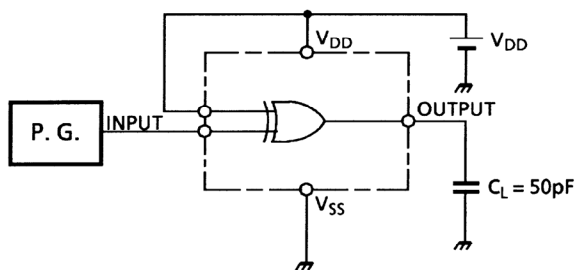
Note: All valid input combinations.

## Dynamic Electrical Characteristics (Ta = 25°C, VSS = 0 V, CL = 50 pF)

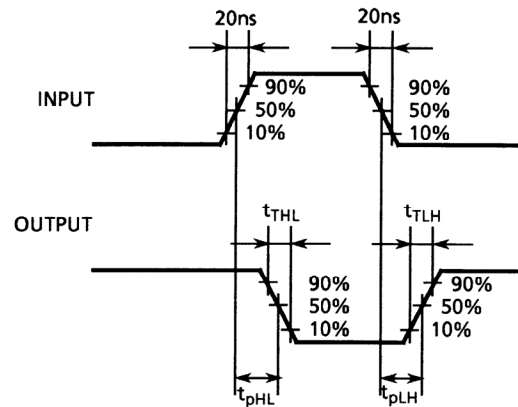
Characteristics	Symbol	Test Condition		Min	Typ.	Max	Unit
			VDD (V)				
Output transition time (low to high)	t <sub>TLH</sub>	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output transition time (high to low)	t <sub>THL</sub>	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation delay time	t <sub>pLH</sub> t <sub>pHL</sub>	—	5	—	90	280	ns
			10	—	45	130	
			15	—	35	100	
Input capacitance	C <sub>IN</sub>	—	—	—	5	7.5	pF

## Circuit and Waveform for Measurement of Dynamic Characteristics

### Circuit



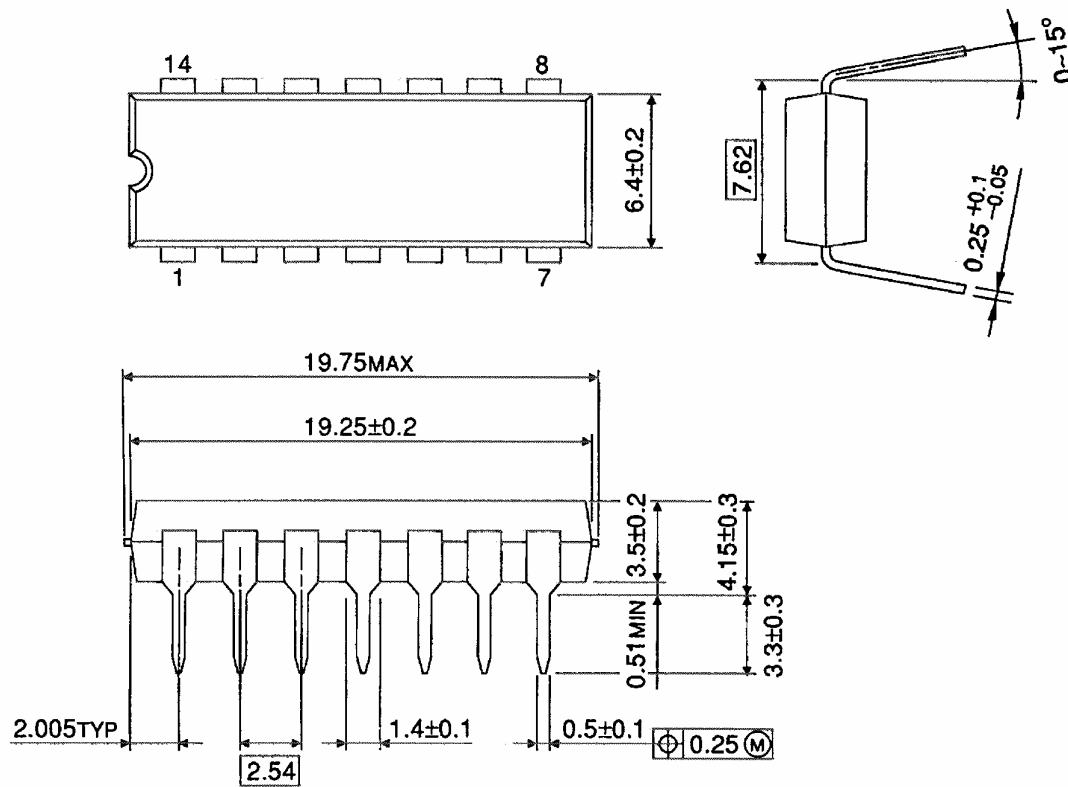
### Waveform



## Package Dimensions

DIP14-P-300-2.54

Unit : mm

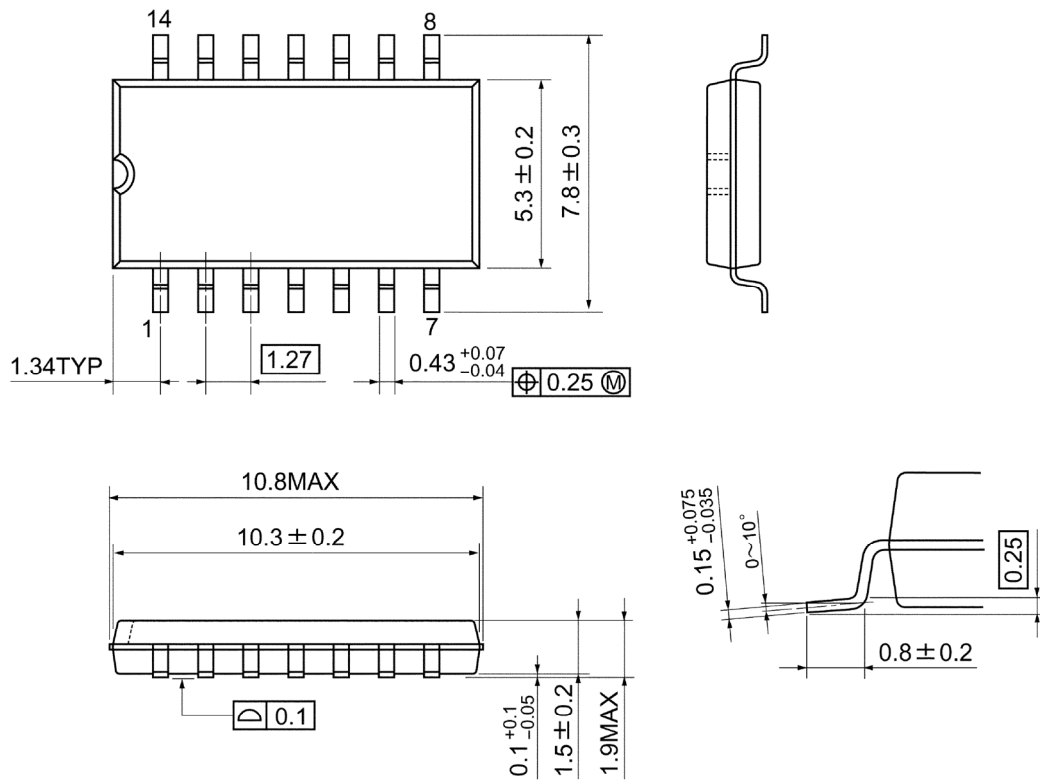


Weight: 0.96 g (typ.)

## Package Dimensions

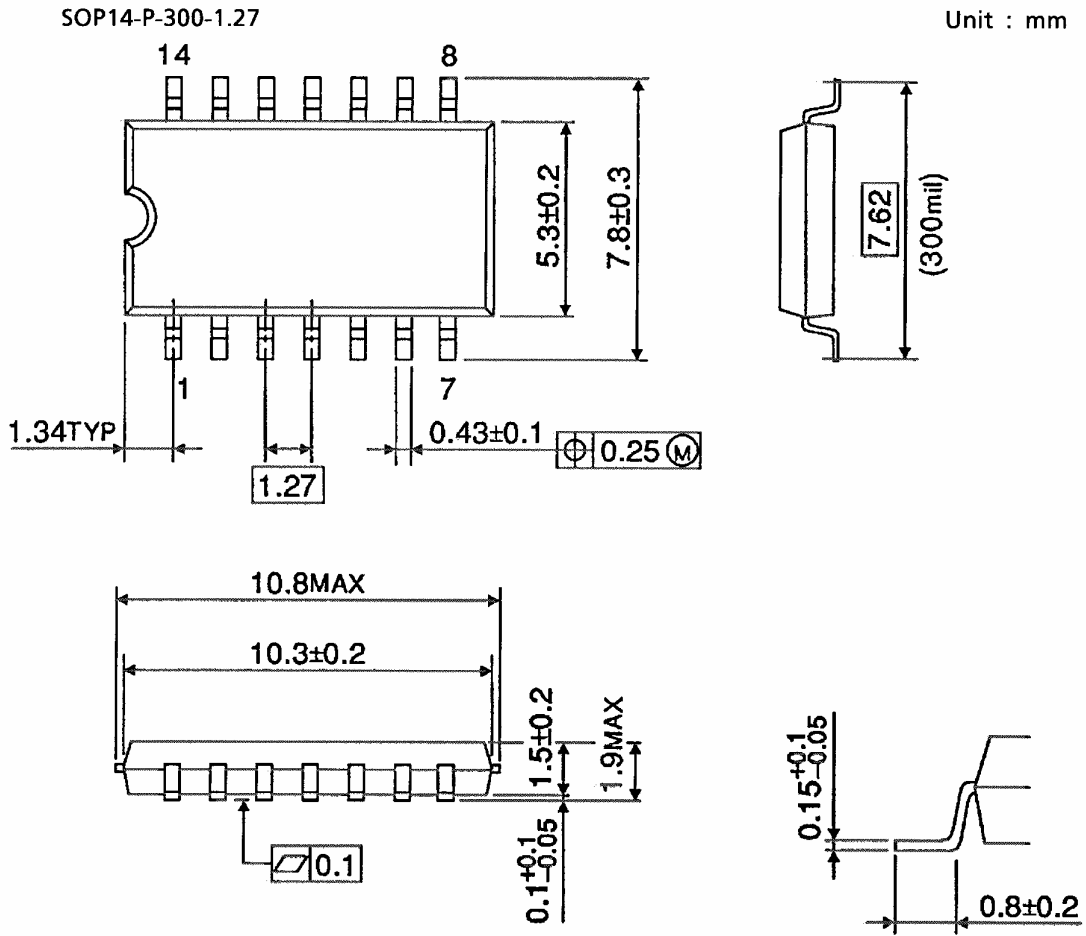
SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

## Package Dimensions

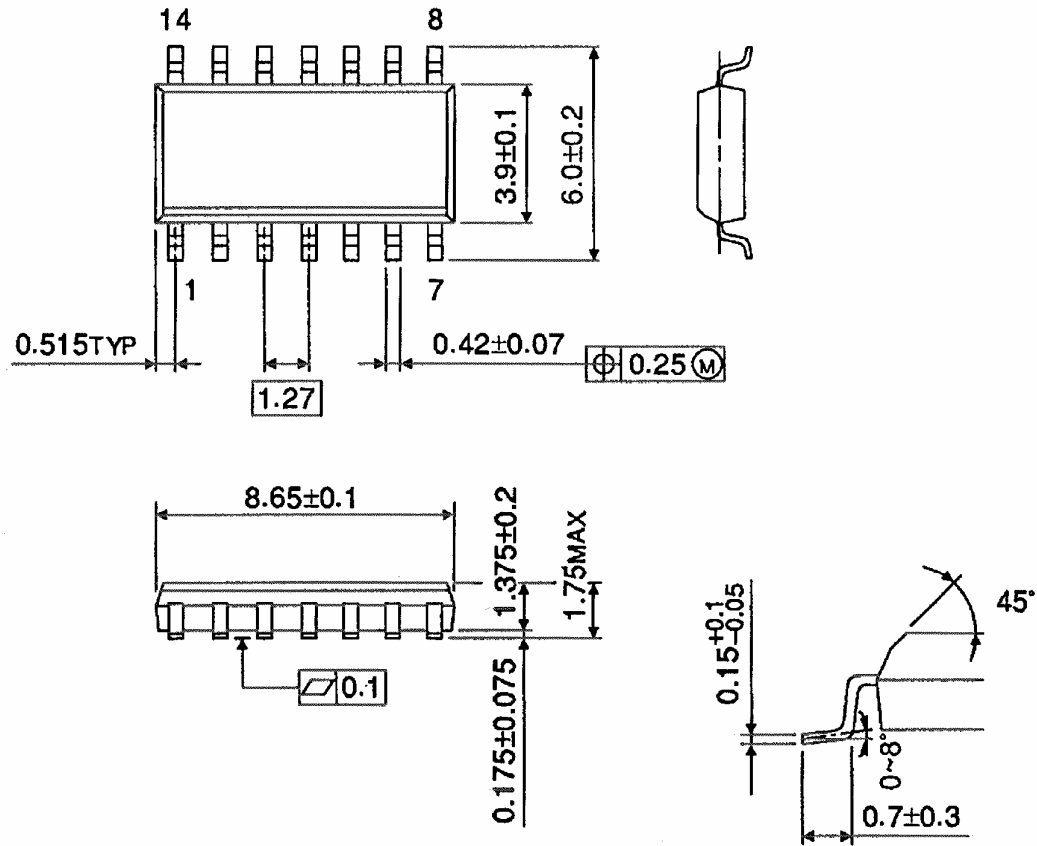


Weight: 0.18 g (typ.)

## Package Dimensions (Note)

SOL14-P-150-1.27

Unit : mm



Note: This package is not available in Japan.

Weight: 0.12 g (typ.)



**Note: Lead (Pb)-Free Packages****DIP14-P-300-2.54 SOP14-P-300-1.27A SOL14-P-150-1.27****RESTRICTIONS ON PRODUCT USE**

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