TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

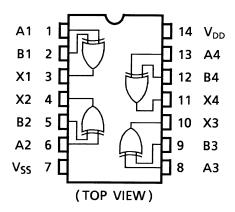
TC4030BP, TC4030BF

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 offerred, such as digital comparators and parity circuits.

Pin Assignment

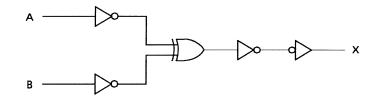


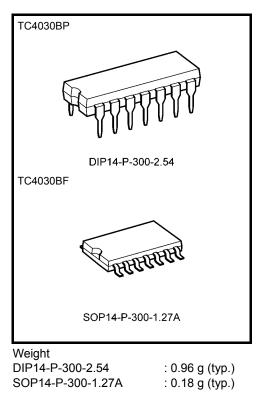
Truth Table

Inputs		Output
А	В	Х
L	L	L
L	Н	Н
Н	L	Н
Н	Н	L

Circuit Diagram

1/4 TC4030B





Start of commercial production 1978-04

2014-03-01

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}	$V_{\mbox{\scriptsize SS}} - 0.5$ to $V_{\mbox{\scriptsize DD}} + 0.5$	V
Output voltage	V _{OUT}	$V_{\mbox{\scriptsize SS}} - 0.5$ to $V_{\mbox{\scriptsize DD}} + 0.5$	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}	_	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 ($V_{SS} = 0 V$)

		Sym-	Test Condition		-40°C		25°C			85°C			
Charac	Characteristics bol			V _{DD} (V)	Min	Max	Min	Тур.	Max	Min	Max	Unit	
High-level output voltage			I _{OUT} < 1 μΑ	5	4.95	_	4.95	5.00	_	4.95	_	v	
		VOH		10	9.95	—	9.95	10.00	—	9.95			
9			$V_{IN} = V_{SS}, V_{DD}$	15	14.95	_	14.95	15.00	_	14.95			
			I _{OUT} < 1 μA	5	_	0.05	_	0.00	0.05	_	0.05		
Low-level voltage	output	V _{OL}	$V_{IN} = V_{SS}, V_{DD}$	10	—	0.05	—	0.00	0.05	—	0.05	V	
0			VIN - VSS, VDD	15		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			
Output hig	h current	IOH	V _{OH} = 9.5 V	10	-1.50	—	-1.30	-2.2	—	-1.10	—	mA	
			V _{OH} = 13.5 V	15	-4.00	—	-3.40	-9.0	—	-2.80	—		
			$V_{IN}=V_{SS},V_{DD}$										
			$V_{OL} = 0.4 V$	5	0.61	—	0.51	1.2	—	0.42	—		
	/ current	IOL	$V_{OL} = 0.5 V$	10	1.50	—	1.30	3.2	—	1.10	—	mA	
Output low current	IOL	V _{OL} = 1.5 V	15	4.00	—	3.40	12.0	—	2.80	—			
			$V_{IN} = V_{SS}, V_{DD}$										
			$V_{OUT} = 0.5 V, 4.5 V$	5	3.5	—	3.5	2.75	—	3.5	—	v	
Input high	voltage	VIH	V _{OUT} = 1.0 V, 9.0 V	10	7.0	—	7.0	5.50	—	7.0	—		
mput nign	voltage		$V_{OUT} = 1.5 V, 13.5 V$	15	11.0	—	11.0	8.25	—	11.0	—		
			$ I_{OUT} < 1 \ \mu A$										
Input low voltage		VIL	$V_{OUT} = 0.5 V, 4.5 V$	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 \ \mu A$										
Input	"H" level	IIH	V _{IH} = 18 V	18	_	0.1		10 ⁻⁵	0.1		1.0	μA	
current	"L" level	١ _{IL}	$V_{IL} = 0 V$	18	—	-0.1		-10 ⁻⁵	-0.1	_	-1.0	μΑ	
				5	_	1	_	0.001	1	_	7.5		
Quiescent supply current		I _{DD}	V _{IN} = V _{SS} , V _{DD} (Note)	10	—	2	—	0.001	2	—	15.0	μA	
				15		4		0.002	4	—	30.0		

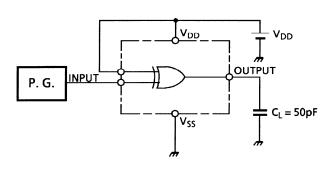
Note: All valid input combinations.

Dynamic Electrical Characteristics ($Ta = 25^{\circ}C$, $V_{SS} = 0 V$, $C_{L} = 50 pF$)

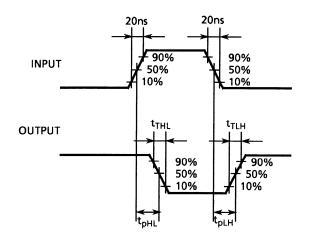
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit	
Onaracteristics	Gymbol		V _{DD} (V)	IVIIII	тур.	IVIAA	Offic
Output transition time			5	_	70	200	
(low to high)	tтLH	—	10	—	35	100	ns
(low to high)			15	—	30	80	
Output transition time	t _{THL}		5	_	70	200	ns
(high to low)		—	10	—	35	100	
(high to low)			15	_	30	80	
	^t pLH t _{pHL}		5		90	280	
Propagation delay time		_	10	—	45	130	ns
			15	_	35	100	
Input capacitance	C _{IN}	_		_	5	7.5	pF

Circuit and Waveform for Measurement of Dynamic Characteristics

Circuit



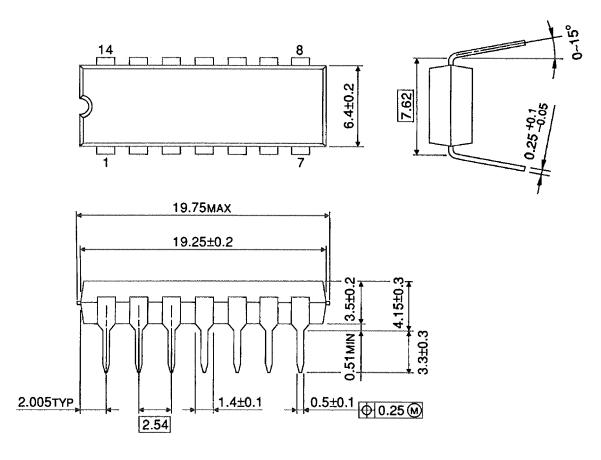
Waveform



Package Dimensions

DIP14-P-300-2.54

Unit : mm



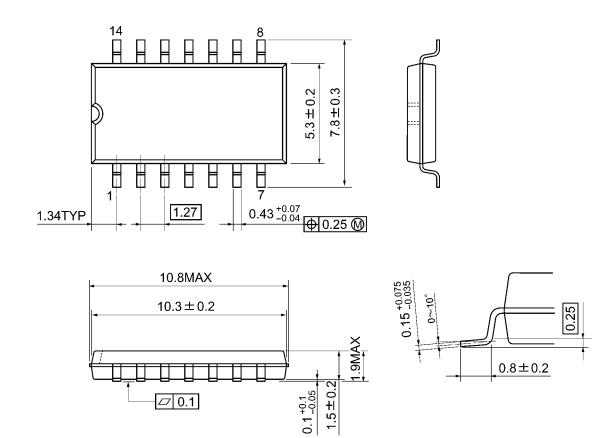
Weight: 0.96 g (typ.)



Package Dimensions

SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

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