

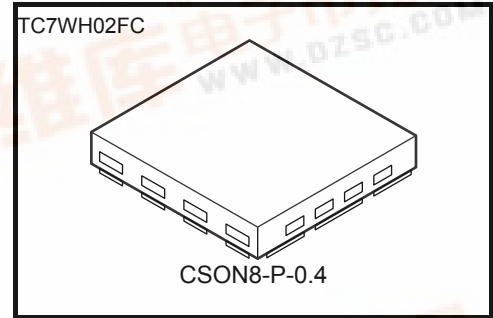
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7WH02FC

Dual 2-Input NOR Gate

Features

- High-speed : $t_{pd} = 3.6ns$ (Typ.) at $V_{CC} = 5V$
- Low power dissipation : $I_{CC} = 2\mu A$ (Max.) at $T_a = 25^\circ C$
- High noise immunity : $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (Min.)
- Operation voltage range : $V_{CC} (opr.) = 2 \sim 5.5V$
- 5.5-V Tolerant inputs.



Weight: 0.002g (typ.)

Absolute Maximum Ratings ($T_a = 25^\circ C$)

Characteristics	Symbol	Ratingh	Unit
Power supply voltage	V_{CC}	$-0.5 \sim 7.0$	V
DC input voltage	V_{IN}	$-0.5 \sim 7.0$	V
DC output voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5$ (Note1)	V
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	± 20 (Note2)	mA
DC output current	I_{OUT}	± 25	mA
DC V_{CC}/GND current	I_{CC}	± 50	mA
Power dissipation	P_D	150 (Note3)	mW
Storage temperature	T_{stg}	$-65 \sim 150$	$^\circ C$

Note: 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.).

Note1 : High or Low State.

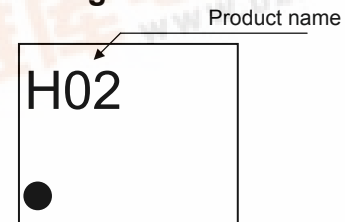
I_{OUT} absolute maximum rating must be observed.

Note2 : $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

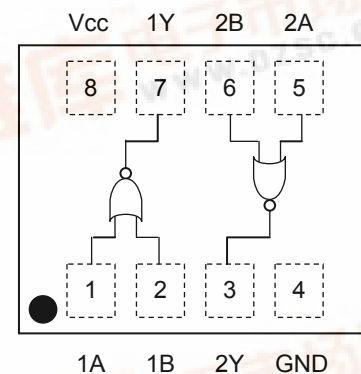
Note3 : Mounted on an FR4 board.

(25.4 mm \times 25.4 mm \times 1.6 t, Cu Pad: 11.56 mm²)

Marking



Pin Assignment (top view)



Truth Table

Inputs		Outputs
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

IEC Logic Diagram



Operating Ranges

Characteristics	Symbol	Rating	Unit
Power supply voltage	V_{CC}	2.0~5.5	V
Input voltage	V_{IN}	0~5.5	V
Output voltage	V_{OUT}	0~ V_{CC}	V
Operating temperature	T_{opr}	-40~85	°C
Input rise and fall time	dt/dv	0~100 ($V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$)	ns/V
		0~20 ($V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$)	

DC Electrical Characteristics

Characteristic	Symbol	Test condition		Ta = 25°C			Ta = -40~85°C		unit
				V_{CC} (V)	Min.	Typ.	Max.	Min.	Max.
High-level input voltage	V_{IH}	—		2.0	1.5	—	—	1.5	V
				3.0~5.5	$V_{CC} \times 0.7$	—	—	$V_{CC} \times 0.7$	
Low-level input voltage	V_{IL}	—		2.0	—	—	0.5	—	V
				3.0~5.5	—	—	$V_{CC} \times 0.3$	—	
High-level output voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -50 \mu\text{A}$	2.0	1.9	2.0	—	1.9	V
				3.0	2.9	3.0	—	2.9	
				4.5	4.4	4.5	—	4.4	
			$I_{OH} = -4 \text{ mA}$	3.0	2.58	—	—	2.48	
			$I_{OH} = -8 \text{ mA}$	4.5	3.94	—	—	3.80	
Low-level output voltage	V_{OL}	$V_{IN} = V_{IL}$ or V_{IH}	$I_{OL} = 50 \mu\text{A}$	2.0	—	0.0	0.1	—	V
				3.0	—	0.0	0.1	—	
				4.5	—	0.0	0.1	—	
			$I_{OL} = 4 \text{ mA}$	3.0	—	—	0.36	—	
			$I_{OL} = 8 \text{ mA}$	4.5	—	—	0.36	—	
Input leakage current	I_{IN}	$V_{IN} = 5.5 \text{ V}$ or GND		0~5.5	—	—	± 0.1	—	μA
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC}$ or GND		5.5	—	—	2.0	—	μA

AC Electrical Characteristics (Input : $t_r = t_f = 3 \text{ ns}$)

Characteristic	Symbol	Test condition		Ta = 25°C			Ta = -40~85°C		Unit
		V _{CC} (V)	C _L (pF)	Min.	Typ.	Max.	Min.	Max.	
Propagation delay time	t _{pLH}	3.3 ± 0.3	15	—	5.6	7.9	1.0	9.5	ns
			50	—	8.1	11.4	1.0	13.0	
	t _{pHL}	5.0 ± 0.5	15	—	3.6	5.5	1.0	6.5	
			50	—	5.1	7.5	1.0	8.5	
Input capacitance	C _{IN}	—		—	4	10	—	10	pF
Power dissipation capacitance	C _{PD}	(Note 4)		—	15	—	—	—	pF

Note 4 : C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

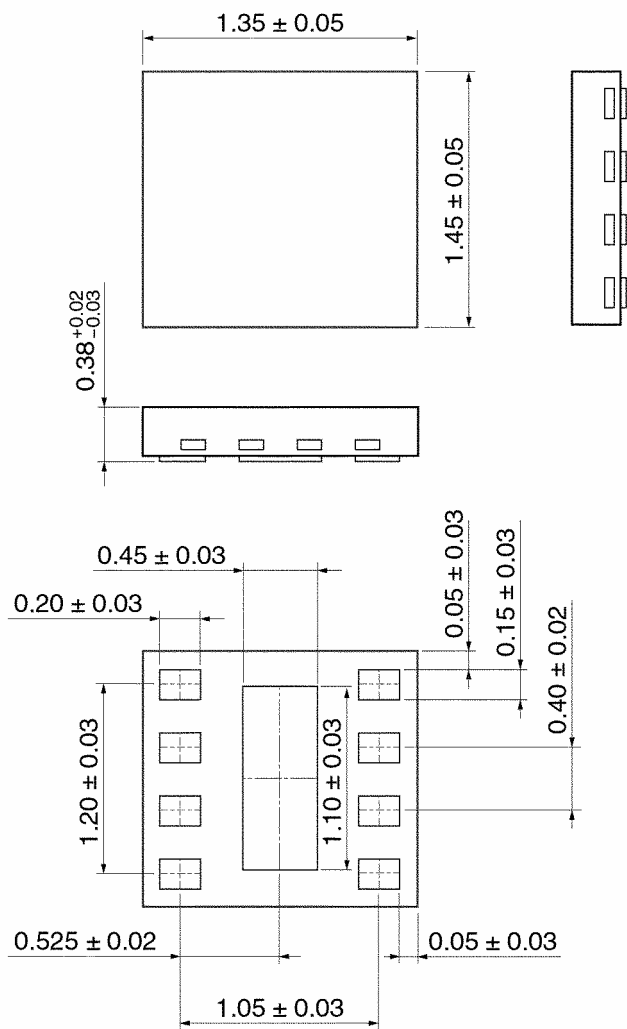
Average operating current can be obtained by the equation:

$$I_{CC \text{ (opr.)}} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2$$

Package Dimensions

CSON8-P-0.4

Unit: mm



Weight : 0.002 g (Typ.)

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20070701-EN GENERAL

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