

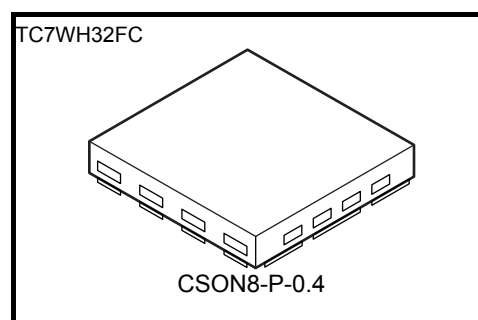
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

# TC7WH32FC

## Dual 2-Input OR Gate

### Features

- High-speed :  $t_{pd} = 3.8 \text{ ns (Typ.) at } V_{CC} = 5 \text{ V}$
- Low power dissipation :  $I_{CC} = 2\mu\text{A (Max.) at } T_a = 25^\circ\text{C}$
- High noise immunity :  $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (Min.)}$
- Operation voltage range :  $V_{CC} \text{ (opr.)} = 2 \sim 5.5 \text{ V}$
- 5.5-V Tolerant inputs.



Weight: 0.002g (typ.)

### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	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	$I_{OK}$	$\pm 20$ (Note2)	mA
DC output current	$I_{OUT}$	$\pm 25$	mA
DC $V_{CC}$ /GND current	$I_{CC}$	$\pm 50$	mA
Power dissipation	$P_D$	150 (Note3)	mW
Storage temperature	$T_{stg}$	$-65 \sim 150$	$^\circ\text{C}$

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.

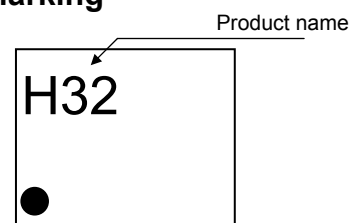
$I_{OUT}$  absolute maximum rating must be observed.

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

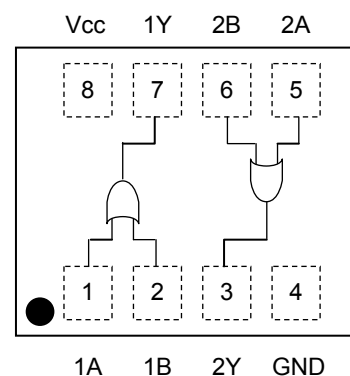
Note3 : Mounted on an FR4 board.

( $25.4 \text{ mm} \times 25.4 \text{ mm} \times 1.6 \text{ t}$ , Cu Pad:  $11.56 \text{ mm}^2$ )

### Marking



### Pin Assignment (top view)



### Truth Table

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

### 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	
				VCC (V)	Min.	Typ.	Max.	Min.		Max.
High-level input voltage	VIH	—		2.0	1.5	—	—	1.5	—	V
				3.0~5.5	VCC × 0.7	—	—	VCC × 0.7	—	
Low-level input voltage	VIL	—		2.0	—	—	0.5	—	0.5	
				3.0~5.5	—	—	VCC × 0.3	—	VCC × 0.3	
high-level output voltage	VOH	VIN = VIL or VIH	IOH = -50 μA	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	—	
			IOH = -4 mA	3.0	2.58	—	—	2.48	—	
			IOH = -8 mA	4.5	3.94	—	—	3.80	—	
Low-level output voltage	VOL	VIN = VIL	IOL = 50 μA	2.0	—	0.0	0.1	—	0.1	
				3.0	—	0.0	0.1	—	0.1	
				4.5	—	0.0	0.1	—	0.1	
			IOL = 4 mA	3.0	—	—	0.36	—	0.44	
			IOL = 8 mA	4.5	—	—	0.36	—	0.44	
Input leakage current	IIN	VIN = 5.5 V or GND		0~5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	ICC	VIN = VCC or GND		5.5	—	—	2.0	—	20.0	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 <sub>CC</sub> (V)	C <sub>L</sub> (pF)	Min.	Typ.	Max.	Min.	Max.	
Propagation delay time	t <sub>pLH</sub> t <sub>pHL</sub>	3.3 ± 0.3	15	—	5.5	7.9	1.0	9.5	ns
			50	—	8.0	11.4	1.0	13.0	
		5.0 ± 0.5	15	—	3.8	5.5	1.0	6.5	
			50	—	5.3	7.5	1.0	8.5	
Input capacitance	C <sub>IN</sub>	—		—	4	10	—	10	pF
Power dissipation capacitance	C <sub>PD</sub>	(Note 4)		—	14	—	—	—	pF

Note 4 : C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

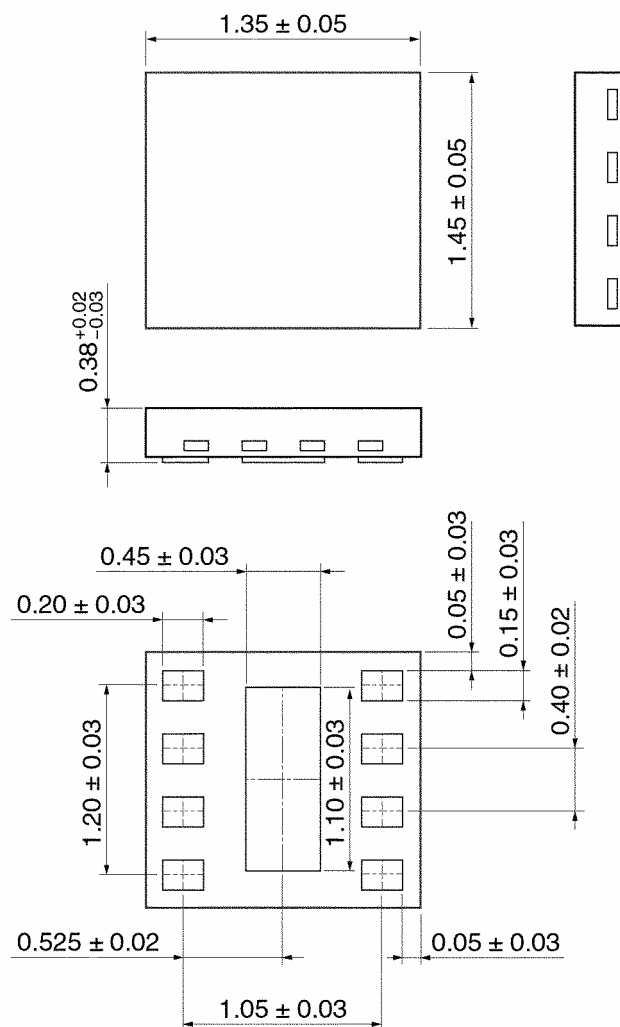
Average operating current can be obtained by the equation:

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

## Package Dimensions

CSON8-P-0.4

Unit: mm



Weight : 0.002 g (Typ.)

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20070701-EN GENERAL

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