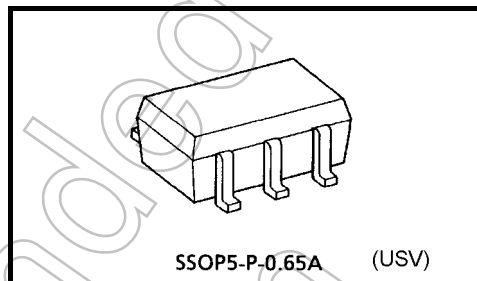


# TC7SG32FU

## 2 Input OR Gate

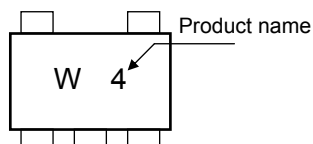
## Features

- High output current:  $\pm 8$  mA (min) at  $V_{CC} = 3.0$  V
- High-speed operation:  $t_{pd} = 2.4$  ns (typ.)  
at  $V_{CC} = 3.3$  V, 15pF
- Operating voltage range:  $V_{CC} = 0.9$  to  $3.6$  V
- 5.0-V tolerant inputs
- 3.6-V power down protection output.

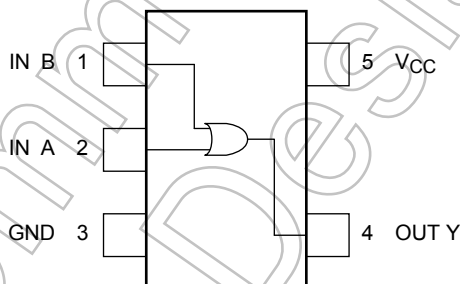


Weight: 0.006 g (typ.)

## Marking



### Pin Assignment (top view)



### Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	-0.5 to 4.6	V
DC input voltage	$V_{IN}$	-0.5 to 7.0	V
DC output voltage	$V_{OUT}$	-0.5 to 4.6 (Note 1)	V
		-0.5 to $V_{CC} + 0.5$ (Note 2)	
Input diode current	$I_{IK}$	-20	mA
Output diode current	$I_{OK}$	-20 (Note 3)	mA
DC output current	$I_{OUT}$	±25	mA
DC $V_{CC}$ /ground current	$I_{CC}$	±50	mA
Power dissipation	$P_D$	200	mW
Storage temperature	$T_{stg}$	-65 to 150	°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).

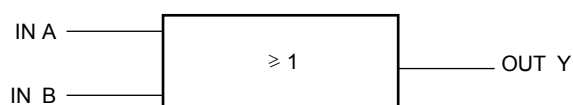
Note 1:  $V_{CC} = 0V$

Note 2: High or Low State. I<sub>OUT</sub> absolute maximum rating must be observed.

Note 3:  $V_{OUT} < GND$

Start of commercial production  
2005-02

## IEC Logic Symbol



## Truth Table

A	B	Y
L	L	L
L	H	H
H	L	H
H	H	H

## Operating Rating

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	0.9 to 3.6	V
Input voltage	$V_{IN}$	0 to 5.5	V
Output voltage	$V_{OUT}$	0 to 3.6 (Note 4)	V
		0 to $V_{CC}$ (Note 5)	
Output Current	$I_{OH}/I_{OL}$	$\pm 8.0$ (Note 6)	mA
		$\pm 4.0$ (Note 7)	
		$\pm 3.0$ (Note 8)	
		$\pm 1.7$ (Note 9)	
		$\pm 0.3$ (Note 10)	
		$\pm 0.02$ (Note 11)	
Operating temperature	$T_{opr}$	-40 to 85	°C
Input rise and fall time	$dt/dv$	0 to 10 (Note 12)	ns/V

Note 4:  $V_{CC} = 0V$

Note 5: High or Low state.

Note 6:  $V_{CC} = 3.0$  to  $3.6V$

Note 7:  $V_{CC} = 2.3$  to  $2.7V$

Note 8:  $V_{CC} = 1.65$  to  $1.95V$

Note 9:  $V_{CC} = 1.4$  to  $1.6V$

Note 10:  $V_{CC} = 1.1$  to  $1.3V$

Note 11:  $V_{CC} = 0.9V$

Note 12:  $V_{IN} = 0.8$  to  $2.0V$ ;  $V_{CC} = 3.0V$

## Electrical Characteristics

## DC Characteristics

Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C				Ta = -40 to 85°C		Unit
					VCC (V)	Min	Typ.	Max	Min	Max	
High-level input voltage	VIH	—	—		0.9	VCC	—	—	VCC	—	V
					1.1 to 1.3	VCC × 0.7	—	—	VCC × 0.7	—	
					1.4 to 1.6	VCC × 0.65	—	—	VCC × 0.65	—	
					1.65 to 1.95	VCC × 0.65	—	—	VCC × 0.65	—	
					2.3 to 2.7	1.7	—	—	1.7	—	
					3.0 to 3.6	2.0	—	—	2.0	—	
Low-level input voltage	VIL	—	—		0.9	—	—	GND	—	GND	V
					1.1 to 1.3	—	—	VCC × 0.3	—	VCC × 0.3	
					1.4 to 1.6	—	—	VCC × 0.35	—	VCC × 0.35	
					1.65 to 1.95	—	—	VCC × 0.35	—	VCC × 0.35	
					2.3 to 2.7	—	—	0.7	—	0.7	
					3.0 to 3.6	—	—	0.8	—	0.8	
High-level output voltage	VOH	—	VIN = VIH or VIL	IOH = -0.02 mA	0.9	0.75	—	—	0.75	—	V
				IOH = -0.3 mA	1.1 to 1.3	VCC × 0.75	—	—	VCC × 0.75	—	
				IOH = -1.7 mA	1.4 to 1.6	VCC × 0.75	—	—	VCC × 0.75	—	
				IOH = -3.0 mA	1.65 to 1.95	VCC -0.45	—	—	VCC -0.45	—	
				IOH = -4.0 mA	2.3 to 2.7	2.0	—	—	2.0	—	
				IOH = -8.0 mA	3.0 to 3.6	2.48	—	—	2.48	—	
Low-level output voltage	VOL	—	VIN = VIL	IOL = 0.02 mA	0.9	—	—	0.1	—	0.1	V
				IOL = 0.3 mA	1.1 to 1.3	—	—	VCC × 0.25	—	VCC × 0.25	
				IOL = 1.7 mA	1.4 to 1.6	—	—	VCC × 0.25	—	VCC × 0.25	
				IOL = 3.0 mA	1.65 to 1.95	—	—	0.45	—	0.45	
				IOL = 4.0 mA	2.3 to 2.7	—	—	0.4	—	0.4	
				IOL = 8.0 mA	3.0 to 3.6	—	—	0.4	—	0.4	
Input leakage current	IIN	—	VIN = 0 to 5.5 V		0 to 3.6	—	—	±0.1	—	±1.0	μA
Power off leakage current	IOFF	—	VIN = 0 to 5.5 V VOUT = 0 to 3.6 V		0	—	—	1.0	—	10.0	μA
Quiescent supply current	ICC	—	VIN = VCC or GND		3.6	—	—	1.0	—	10.0	μA

AC Electrical Characteristics (unless otherwise specified, input  $t_r = t_f = 3$  ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit
			C <sub>L</sub> (pF)	Min	Typ.	Max	Min	Max
Propagation delay time	$t_{PLH}$ $t_{PHL}$	C <sub>L</sub> = 10 pF, R <sub>L</sub> = 1 MΩ	0.9	—	17.0	—	—	—
			1.1 to 1.3	—	8.8	18.4	1.0	34.2
			1.4 to 1.6	—	5.0	8.5	1.0	10.0
			1.65 to 1.95	—	3.8	6.2	1.0	6.7
			2.3 to 2.7	—	2.7	3.9	1.0	4.4
			3.0 to 3.6	—	2.1	3.1	1.0	3.7
		C <sub>L</sub> = 15 pF, R <sub>L</sub> = 1 MΩ	0.9	—	20.7	—	—	—
			1.1 to 1.3	—	10.6	21.5	1.0	37.2
			1.4 to 1.6	—	5.9	9.3	1.0	11.2
			1.65 to 1.95	—	4.5	6.9	1.0	7.1
			2.3 to 2.7	—	3.0	4.4	1.0	5.0
			3.0 to 3.6	—	2.4	3.4	1.0	3.9
		C <sub>L</sub> = 30 pF, R <sub>L</sub> = 1 MΩ	0.9	—	29.6	—	—	—
			1.1 to 1.3	—	14.8	29.6	1.0	56.0
			1.4 to 1.6	—	8.0	13.1	1.0	15.9
			1.65 to 1.95	—	6.0	9.2	1.0	9.6
			2.3 to 2.7	—	3.9	5.7	1.0	6.1
			3.0 to 3.6	—	3.0	4.4	1.0	4.8
Input capacitance	C <sub>IN</sub>	—	3.6	—	3	—	—	pF
Power dissipation capacitance	C <sub>PD</sub>	(Note 13)	0.9 to 3.6	—	6	—	—	pF

Note 13: C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

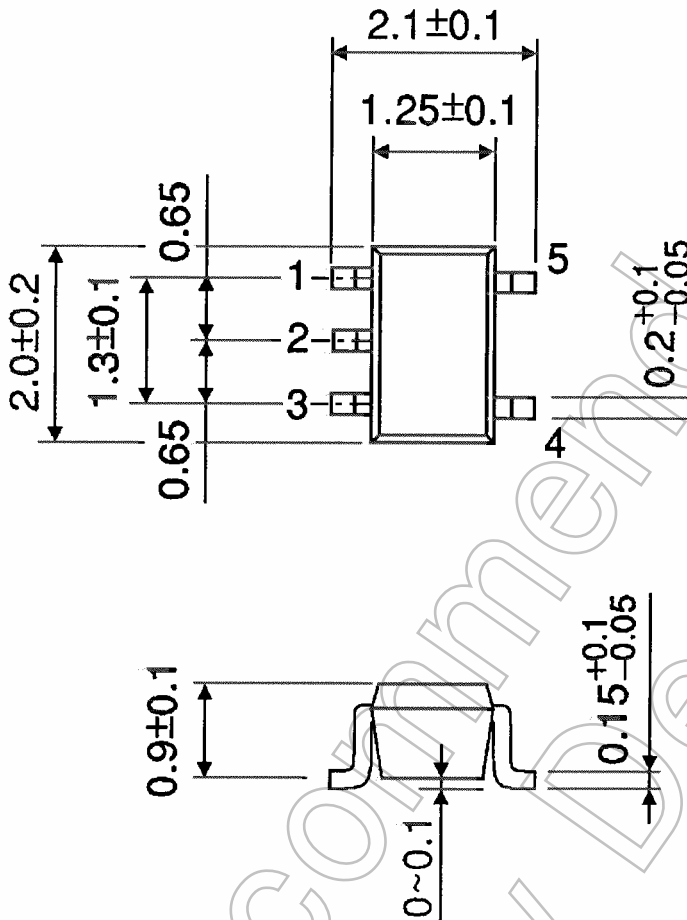
Average operating current can be obtained by the equation:

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

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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