TOSHIBA CMOS Digital Integrated Circuit   Silicon Monolithic
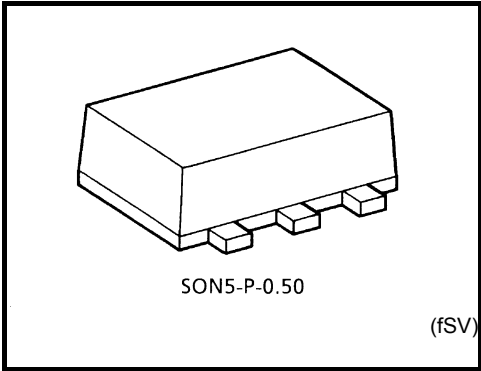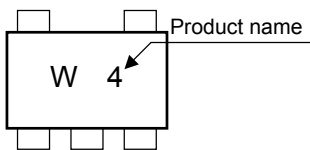
TC7SG32AFS

2 Input OR Gate

Features

- High-level output current: I_{OH}/I_{OL} = ±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} = 0.9~3.6 V
- 5.0-V tolerant inputs.

SON5-P-0.50

(fSV)

Weight: 0.001 g (typ.)

Marking

W   4

Product name

Pin Assignment (top view)

IN A 1	5 V_{CC}
GND 2	
IN B 3	4 OUT Y

SON5-P-0.35
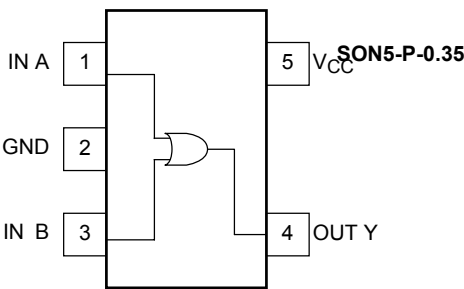
Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Value	Unit
Power supply voltage	V_{CC}	−0.5~4.6	V
DC input voltage	V_{IN}	−0.5~7.0	V
DC output voltage	V_{OUT}	−0.5~ V_{CC} + 0.5	V
Input diode current	I_{IK}	−20	mA
Output diode current	I_{OK}	±20 (Note 1)	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC}/ground current	I_{CC}	±50	mA
Power dissipation	P_D	50	mW
Storage temperature	T_{stg}	−65~150	°C

Note 1: V_{OUT} < GND, V_{OUT} > V_{CC}

Truth Table

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

IEC Logic Symbol

IN A

IN B

$\geqslant 1$

OUT Y
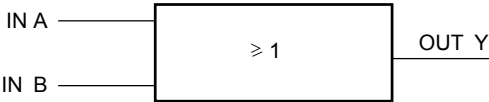
Recommended Operating Conditions

Characteristics	Symbol	Value		Unit
Power supply voltage	V_{CC}	0.9~3.6		V
Input voltage	V_{IN}	0~5.5		V
Output voltage	V_{OUT}	0~V_{CC}		V
Output Current	I_{OH}/I_{OL}	±8.0	(Note 2)	mA
		±4.0	(Note 3)	
		±3.0	(Note 4)	
		±1.7	(Note 5)	
		±0.3	(Note 6)	
		±0.02	(Note 7)	
Operating temperature	T_{opr}	−40~85		°C
Input rise and fall time	dt/dV	0~10	(Note 8)	ns/V

Note 2: V_{CC} = 3.0~3.6 V

Note 3: V_{CC} = 2.3~2.7 V

Note 4: V_{CC} = 1.65~1.95 V

Note 5: V_{CC} = 1.4~1.6 V

Note 6: V_{CC} = 1.1~1.3 V

Note 7: V_{CC} = 0.9 V

Note 8: V_{IN} = 0.8~2.0 V, V_{CC} = 3.0 V

TOSHIBA

DC Electrical Characteristics

Characteristics	Symbol	Test Circuit	Test Condition		V_CC (V)	Ta = 25°C			Ta = −40~85°C		Unit
						Min	Typ.	Max	Min	Max	
High-level input voltage	V_{IH}	—	—		0.9	V_{CC}	—	—	V_{CC}	—	V
					1.1~1.3	$V_{CC} \times 0.7$	—	—	$V_{CC} \times 0.7$	—	
					1.4~1.6	$V_{CC} \times 0.65$	—	—	$V_{CC} \times 0.65$	—	
					1.65~1.95	$V_{CC} \times 0.65$	—	—	$V_{CC} \times 0.65$	—	
					2.3~2.7	1.7	—	—	1.7	—	
					3.0~3.6	2.0	—	—	2.0	—	
Low-level input voltage	V_{IL}	—	—		0.9	—	—	GND	—	GND	V
					1.1~1.3	—	—	$V_{CC} \times 0.3$	—	$V_{CC} \times 0.3$	
					1.4~1.6	—	—	$V_{CC} \times 0.35$	—	$V_{CC} \times 0.35$	
					1.65~1.95	—	—	$V_{CC} \times 0.35$	—	$V_{CC} \times 0.35$	
					2.3~2.7	—	—	0.7	—	0.7	
					3.0~3.6	—	—	0.8	—	0.8	
igh-level output voltage	V_{OH}	—	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -0.02$ mA	0.9	0.75	—	—	0.75	—	V
				$I_{OH} = -0.3$ mA	1.1~1.3	$V_{CC} \times 0.75$	—	—	$V_{CC} \times 0.75$	—	
				$I_{OH} = -1.7$ mA	1.4~1.6	$V_{CC} \times 0.75$	—	—	$V_{CC} \times 0.75$	—	
				$I_{OH} = -3.0$ mA	1.65~1.95	V_{CC} -0.45	—	—	V_{CC} -0.45	—	
				$I_{OH} = -4.0$ mA	2.3~2.7	2.0	—	—	2.0	—	
				$I_{OH} = -8.0$ mA	3.0~3.6	2.48	—	—	2.48	—	
Low-level output voltage	V_{OL}	—	$V_{IN} = V_{IL}$	$I_{OL} = 0.02$ mA	0.9	—	—	0.1	—	0.1	V
				$I_{OL} = 0.3$ mA	1.1~1.3	—	—	$V_{CC} \times 0.25$	—	$V_{CC} \times 0.25$	
				$I_{OL} = 1.7$ mA	1.4~1.6	—	—	$V_{CC} \times 0.25$	—	$V_{CC} \times 0.25$	
				$I_{OL} = 3.0$ mA	1.65~1.95	—	—	0.45	—	0.45	
				$I_{OL} = 4.0$ mA	2.3~2.7	—	—	0.4	—	0.4	
				$I_{OL} = 8.0$ mA	3.0~3.6	—	—	0.4	—	0.4	
Input leakage current	I_{IN}	—	$V_{IN} = 0$~5.5V		0~3.6	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	—	$V_{IN} = V_{CC}$ or GND		3.6	—	—	1.0	—	10.0	μA

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

Characteristics	Symbol	Test Condition	C_L (pF)	Ta = 25°C			Ta = −40~85°C		Unit
				Min	Typ.	Max	Min	Max	
Propagation delay time	t_{PLH} t_{PHL}	$C_L = 10$ pF, $R_L = 1$ MΩ	0.9	—	17.0	—	—	—	ns
			1.1~1.3	—	8.8	18.4	1.0	34.2	
			1.4~1.6	—	5.0	8.5	1.0	10.0	
			1.65~1.95	—	3.8	6.2	1.0	6.7	
			2.3~2.7	—	2.7	3.9	1.0	4.4	
			3.0~3.6	—	2.1	3.1	1.0	3.7	
		$C_L = 15$ pF, $R_L = 1$ MΩ	0.9	—	20.7	—	—	—	
			1.1~1.3	—	10.6	21.5	1.0	37.2	
			1.4~1.6	—	5.9	9.3	1.0	11.2	
			1.65~1.95	—	4.5	6.9	1.0	7.1	
			2.3~2.7	—	3.0	4.4	1.0	5.0	
			3.0~3.6	—	2.4	3.4	1.0	3.9	
		$C_L = 30$ pF, $R_L = 1$ MΩ	0.9	—	29.6	—	—	—	
			1.1~1.3	—	14.8	29.6	1.0	56.0	
			1.4~1.6	—	8.0	13.1	1.0	15.9	
			1.65~1.95	—	6.0	9.2	1.0	9.6	
			2.3~2.7	—	3.9	5.7	1.0	6.1	
			3.0~3.6	—	3.0	4.4	1.0	4.8	
Input capacitance	C_{IN}		3.6	—	3	—	—	—	pF
Power dissipation capacitance	C_{PD}	(Note 9)	0.9~3.6	—	6	—	—	—	pF

Note 9: 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:

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

Package Dimensions

SON5-P-0.35   Unit:mm

1.0 ± 0.05

0.1 ± 0.05   0.8 ± 0.05   0.1 ± 0.05

1.0 ± 0.05

0.7 ± 0.05

0.35

0.35

0.35

1

2

3

5

4

0.15 ± 0.05

0.48 +0.02 −0.04

0.1 ± 0.05

0.15max   0.15max

0.15 ± 0.05
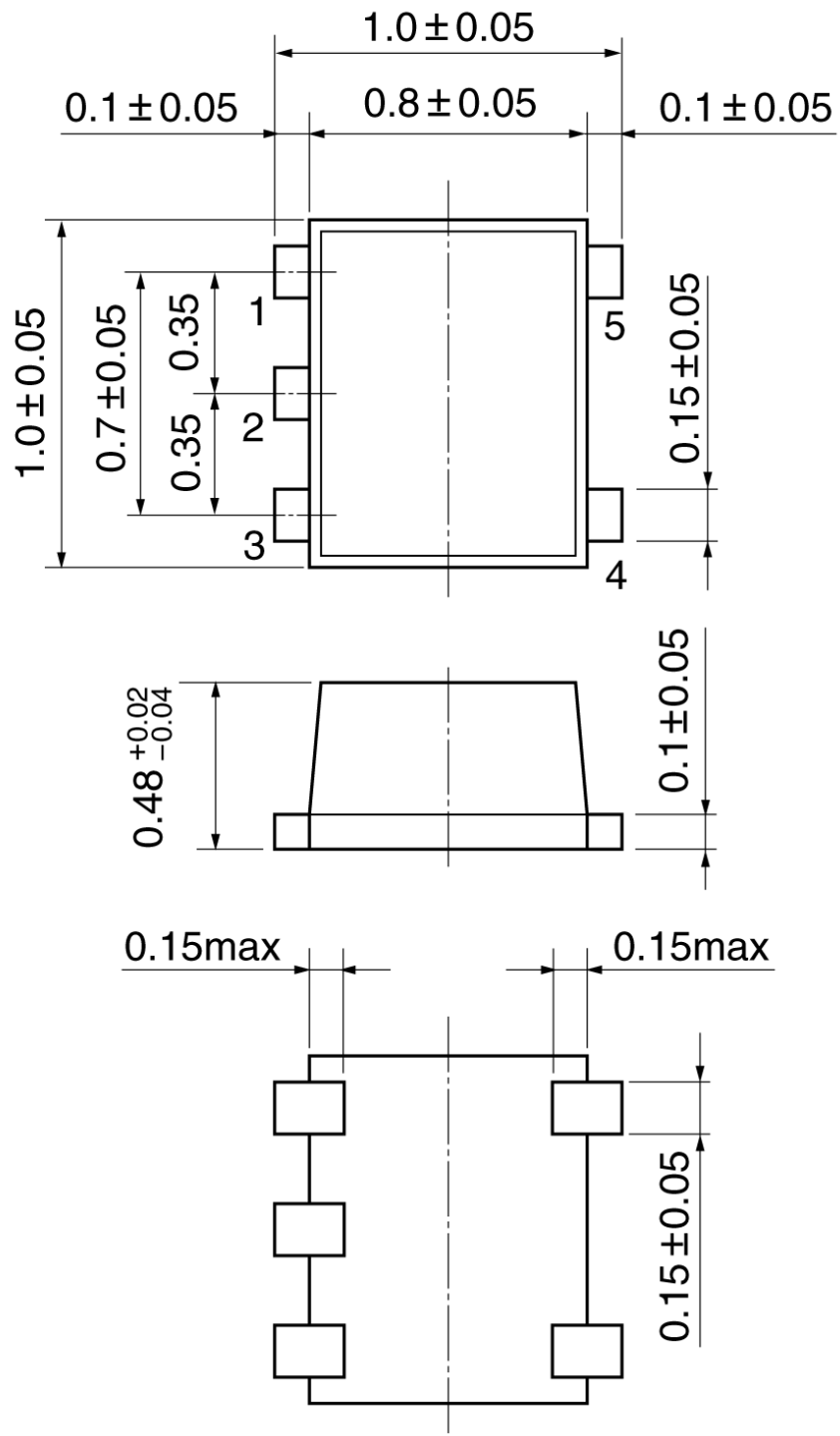
Weight: 0.001 g (typ.)

RESTRICTIONS ON PRODUCT USE