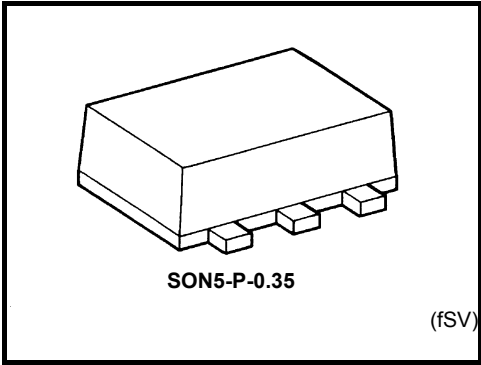


TC7SG04AFS

Inverter

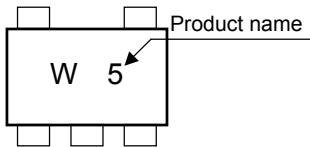
Features

- High-level output current: $I_{OH}/I_{OL} = \pm 8 \text{ mA (min)}$
at $V_{CC} = 3.0 \text{ V}$
- High-speed operation: $t_{pd} = 2.3 \text{ ns (typ.)}$
at $V_{CC} = 3.3 \text{ V}, 15\text{pF}$
- Operating voltage range: $V_{CC} = 0.9\sim 3.6 \text{ V}$
- 5.0-V tolerant inputs.

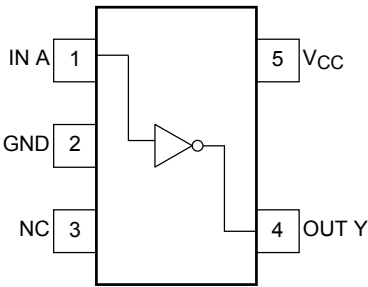


Weight: 0.001 g (typ.)

Marking



Pin Assignment (top view)



Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Value	Unit
Power supply voltage	V_{CC}	$-0.5\sim 4.6$	V
DC input voltage	V_{IN}	$-0.5\sim 7.0$	V
DC output voltage	V_{OUT}	$-0.5\sim V_{CC} + 0.5$	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}	$-65\sim 150$	°C

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

Truth Table

A	Y
L	H
H	L

IEC Logic Symbol



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: $V_{CC} = 3.0\sim 3.6\text{ V}$
- Note 3: $V_{CC} = 2.3\sim 2.7\text{ V}$
- Note 4: $V_{CC} = 1.65\sim 1.95\text{ V}$
- Note 5: $V_{CC} = 1.4\sim 1.6\text{ V}$
- Note 6: $V_{CC} = 1.1\sim 1.3\text{ V}$
- Note 7: $V_{CC} = 0.9\text{ V}$
- Note 8: $V_{IN} = 0.8\sim 2.0\text{ V}$, $V_{CC} = 3.0\text{ V}$

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} × 0.7	—	—	V _{CC} × 0.7	—	
				1.4~1.6	V _{CC} × 0.65	—	—	V _{CC} × 0.65	—	
				1.65~1.95	V _{CC} × 0.65	—	—	V _{CC} × 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} × 0.3	—	V _{CC} × 0.3	
				1.4~1.6	—	—	V _{CC} × 0.35	—	V _{CC} × 0.35	
				1.65~1.95	—	—	V _{CC} × 0.35	—	V _{CC} × 0.35	
				2.3~2.7	—	—	0.7	—	0.7	
				3.0~3.6	—	—	0.8	—	0.8	
High-level output voltage	V _{OH}	—	V _{IN} = 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} × 0.75	—	—	V _{CC} × 0.75	
				I _{OH} = -1.7 mA	1.4~1.6	V _{CC} × 0.75	—	—	V _{CC} × 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 _{IH}	I _{OL} = 0.02 mA	0.9	—	—	0.1	—	V
				I _{OL} = 0.3 mA	1.1~1.3	—	—	V _{CC} × 0.25	—	
				I _{OL} = 1.7 mA	1.4~1.6	—	—	V _{CC} × 0.25	—	
				I _{OL} = 3.0 mA	1.65~1.95	—	—	0.45	—	
				I _{OL} = 4.0 mA	2.3~2.7	—	—	0.4	—	
				I _{OL} = 8.0 mA	3.0~3.6	—	—	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)	$T_a = 25^\circ\text{C}$			$T_a = -40\sim 85^\circ\text{C}$		Unit
				Min	Typ.	Max	Min	Max	
Propagation delay time	t_{PLH} t_{PHL}	$C_L = 10$ pF, $R_L = 1$ M Ω	0.9	—	18.6	—	—	—	ns
			1.1~1.3	—	8.7	18.4	1.0	34.2	
			1.4~1.6	—	4.9	8.5	1.0	10.0	
			1.65~1.95	—	3.8	6.2	1.0	6.7	
			2.3~2.7	—	2.6	3.9	1.0	4.4	
			3.0~3.6	—	2.1	3.1	1.0	3.7	
		$C_L = 15$ pF, $R_L = 1$ M Ω	0.9	—	21.0	—	—	—	
			1.1~1.3	—	9.8	21.5	1.0	37.1	
			1.4~1.6	—	5.4	9.3	1.0	11.2	
			1.65~1.95	—	4.5	6.9	1.0	7.1	
			2.3~2.7	—	2.8	4.4	1.0	5.0	
			3.0~3.6	—	2.3	3.4	1.0	3.9	
		$C_L = 30$ pF, $R_L = 1$ M Ω	0.9	—	31.2	—	—	—	
			1.1~1.3	—	13.8	29.6	1.0	56.0	
			1.4~1.6	—	7.4	13.1	1.0	15.9	
			1.65~1.95	—	5.6	9.2	1.0	9.6	
			2.3~2.7	—	3.7	5.7	1.0	6.1	
			3.0~3.6	—	2.9	4.4	1.0	4.8	
Input capacitance	C_{IN}		3.6	—	3	—	—	—	pF
Power dissipation capacitance	C_{PD}	(Note9)	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.

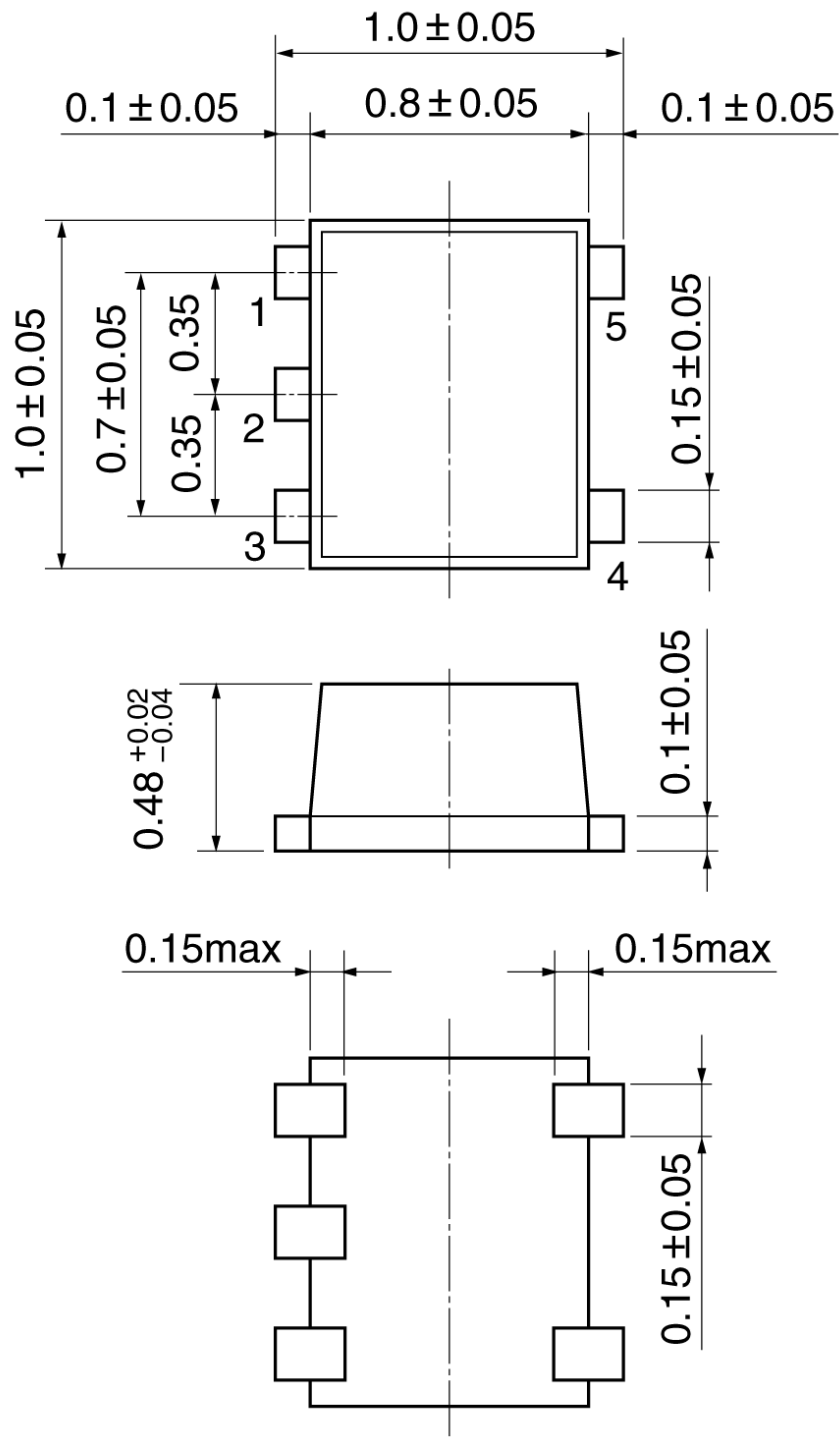
Average operating current can be obtained by the equation:

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

Package Dimensions

SON5-P-0.35

Unit:mm



Weight: 0.001 g (typ.)

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