

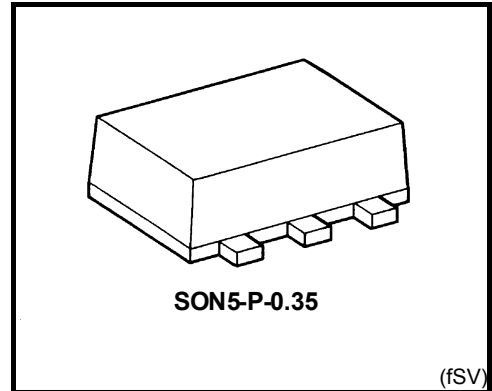
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7SZ14AFS

Schmitt Inverter

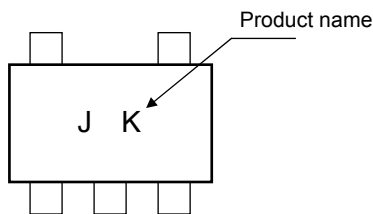
Features

- High-level output current : $\pm 24\text{mA}$ (min) at $V_{CC} = 3.0\text{V}$ Super high speed operation : $t_{pd} = 3.7\text{ ns}$ (typ.) at $V_{CC} = 5\text{V}$, 50pF
- Operation voltage range : $V_{CC(opr)} = 1.65\text{ to }5.5\text{V}$
- 5.5-V tolerant input

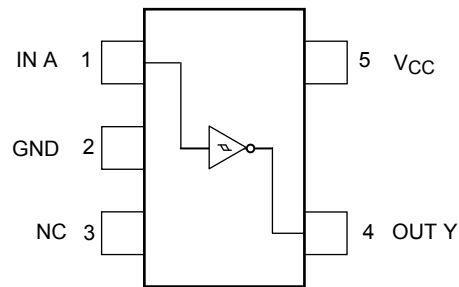


Weight : 0.001 g (typ.)

Marking



Pin Assignment (top view)



Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to 6	V
DC input voltage	V_{IN}	-0.5 to 6	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC}+0.5\text{V}$	V
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	± 20 (Note1)	mA
DC output current	I_{OUT}	± 50	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	50	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: $V_{OUT} < GND, V_{OUT} > V_{CC}$

IEC Logic Symbol



Truth Table

A	Y
L	H
H	L

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	1.65 to 5.5	V
		1.5 to 5.5 (Note 2)	
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	-40 to 85	°C

Note 2: Data retention only

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit
					Min	Typ.	Max	Min	Ma	
Threshold voltage	High level	V _P	—	1.65	0.6	1.0	1.4	0.6	1.4	V
				1.8	0.7	1.1	1.5	0.7	1.5	
				2.3	1.0	1.4	1.8	1.0	1.8	
				3.0	1.3	1.75	2.2	1.3	2.2	
				4.5	1.9	2.45	3.1	1.9	3.1	
	Low level	V _N	—	1.65	0.2	0.5	0.8	0.2	0.8	
				1.8	0.25	0.55	0.9	0.25	0.9	
				2.3	0.4	0.75	1.15	0.4	1.15	
				3.0	0.6	1.0	1.5	0.6	1.5	
				4.5	1.0	1.43	2.0	1.0	2.0	
Hysteresis voltage	V _H	—	1.65	0.1	0.48	0.9	0.1	1.0	V	
			1.8	0.15	0.54	1.0	0.15	1.0		
			2.3	0.25	0.65	1.1	0.25	1.1		
			3.0	0.4	0.77	1.2	0.4	1.2		
			4.5	0.6	1.01	1.5	0.6	1.5		
			5.5	0.7	1.18	1.7	0.7	1.7		

Characteristics	Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40 to 85°C		Unit	
				Min	Typ.	Max	Min	Ma		
Output voltage	High level	V _{OH} V _{IN} = V _N	I _{OH} = -100 μA	1.65	1.55	1.65	—	1.55	—	V
				1.8	1.7	1.8	—	1.7	—	
				2.3	2.2	2.3	—	2.2	—	
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			I _{OH} = -4 mA	1.65	1.29	1.52	—	1.29	—	
				2.3	1.9	2.15	—	1.9	—	
				3.0	2.4	2.8	—	2.4	—	
				4.5	3.8	4.2	—	3.8	—	
	Low level	V _{OL} V _{IN} = V _P	I _{OL} = 100 μA	1.65	—	0	0.1	—	0.1	
				1.8	—	0	0.1	—	0.1	
				2.3	—	0	0.1	—	0.1	
				3.0	—	0	0.1	—	0.1	
				4.5	—	0	0.1	—	0.1	
			I _{OL} = 4 mA	1.65	—	0.08	0.24	—	0.24	
				2.3	—	0.1	0.3	—	0.3	
				3.0	—	0.15	0.4	—	0.4	
				4.5	—	0.22	0.55	—	0.55	
I _{OL} = 8 mA	2.3	—	0.1	0.3	—	0.3				
	3.0	—	0.15	0.4	—	0.4				
	4.5	—	0.22	0.55	—	0.55				
I _{OL} = 16 mA	3.0	—	0.15	0.4	—	0.4				
	3.0	—	0.22	0.55	—	0.55				
	4.5	—	0.22	0.55	—	0.55				
Input leakage current	I _{IN}	V _{IN} = 5.5 V or GND	0 to 5.5	—	—	±1	—	±10	μA	
Power OFF leakage current	I _{OFF}	V _{IN} or V _{OUT} = 5.5 V	0.0	—	—	1	—	10	μA	
Quiescent supply current	I _{CC}	V _{IN} = 5.5 V or GND	1.65 to 5.5	—	—	1	—	10	μA	

AC Electrical Characteristics (Unless otherwise specified Input, t_r = t_f = 3 ns)

Characteristics	Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40~85°C		Unit	
				Min	Typ.	Max	Min	Max		
Propagation delay time	t _{pLH} t _{pHL}	C _L = 15 pF, R _L = 1 MΩ	1.8 ± 0.15	2.0	9.1	15.0	2.0	15.6	ns	
			2.5 ± 0.2	1.0	5.0	9.0	1.0	9.5		
			3.3 ± 0.3	1.0	3.7	6.3	1.0	6.5		
			5.0 ± 0.5	0.5	3.1	5.2	0.5	5.5		
			C _L = 50 pF, R _L = 500 Ω	3.3 ± 0.3	1.5	4.4	7.2	1.5		7.5
				5.0 ± 0.5	0.5	3.7	5.9	0.5		6.2
Input capacitance	C _{IN}	—	0 to 5.5	—	4	—	—	—	pF	
Power dissipation capacitance	C _{PD}	(Note 3)	3.3	—	15	—	—	—	pF	
			5.5	—	20	—	—	—	pF	

Note 3: CPD is defined as the value of the internal equivalent capacitance which is Calculated from the operating current consumption without load.

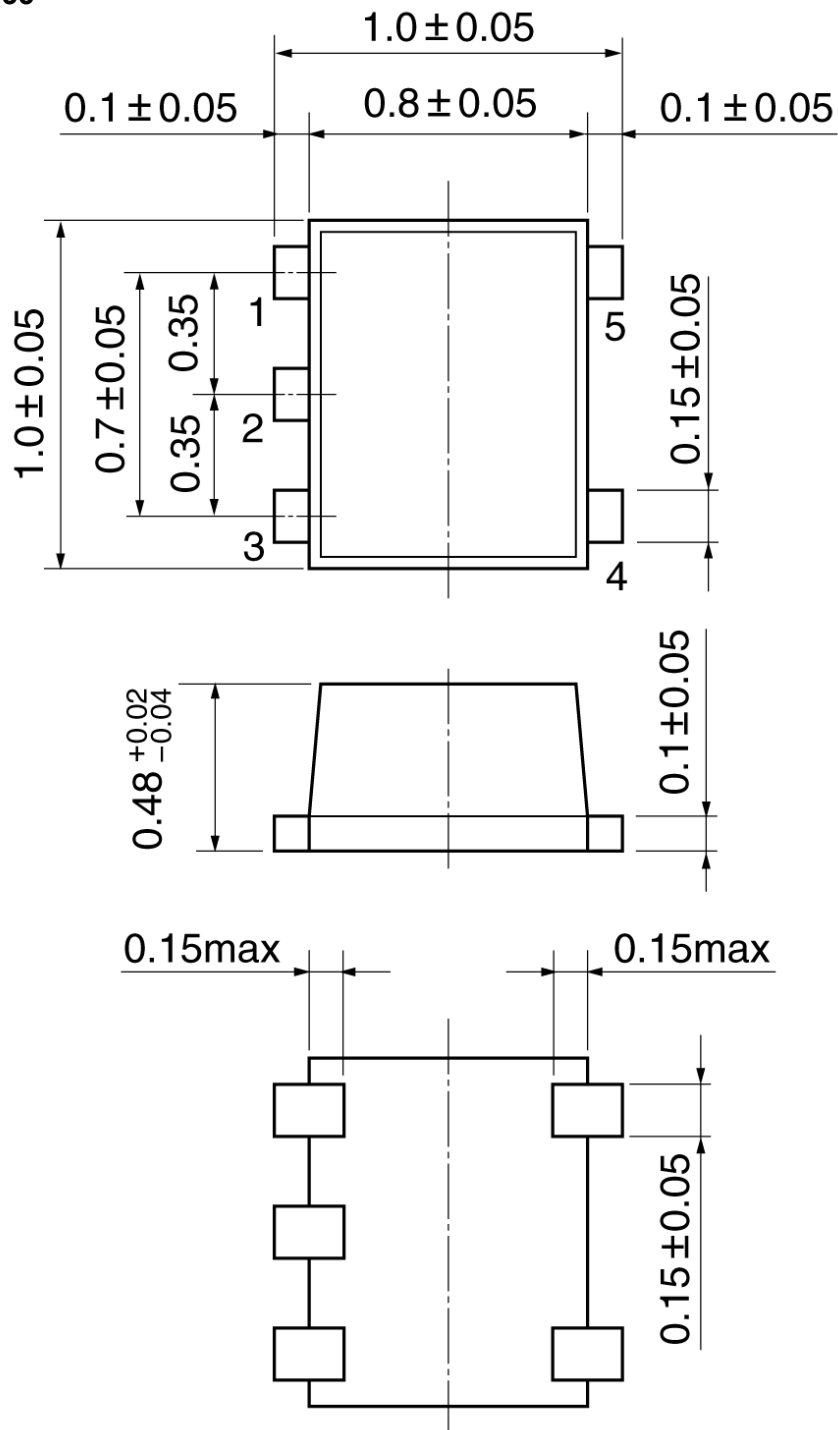
Average operating current can be obtained by the equation.

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

Package Dimensions

SON5-P-0.35

Unit: mm



Weight: 0.001 g (typ.)

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