

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

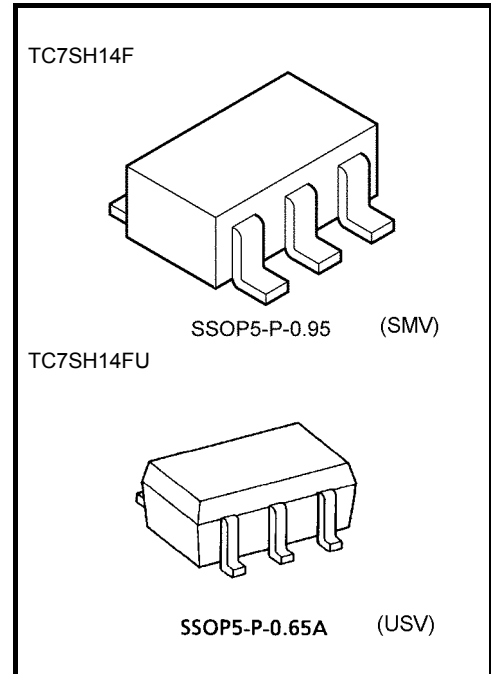
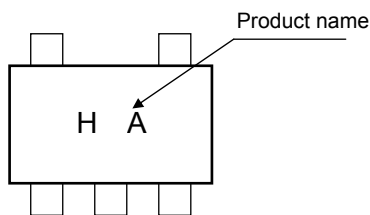
TC7SH14F, TC7SH14FU

Schmitt Inverter

Features

- High speed operation : $t_{pd} = 5.5 \text{ ns (typ.)}$
at $V_{CC} = 5 \text{ V}$, $C_L = 15 \text{ pF}$
- Low power dissipation : $I_{CC} = 2 \text{ } \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
- High noise immunity : $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (min)}$
- Wide operating voltage range: $V_{CC} = 2 \text{ to } 5.5 \text{ V}$
- 5.5-V tolerant input

Marking



Weight

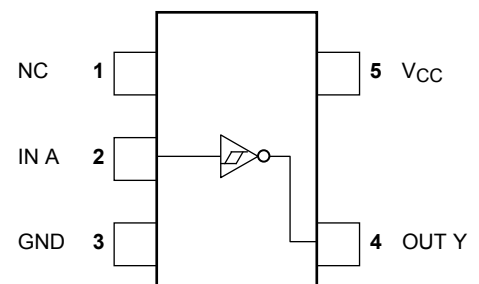
SSOP5-P-0.95 : 0.016 g (typ.)

SSOP5-P-0.65A : 0.006 g (typ.)

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

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5 to 7	V
DC input voltage	V_{IN}	-0.5 to 7	V
DC output voltage	V_{OUT}	-0.5 to $V_{CC} + 0.5$	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	200	mW
Storage temperature	T_{stg}	-65 to 150	$^\circ\text{C}$
Lead temperature (10 s)	T_L	260	$^\circ\text{C}$

Pin Assignment (top view)

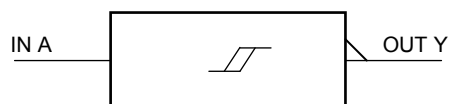


Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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: $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

IEC Logic Symbol



Truth Table

A	Y
L	H
H	L

Operating Ranges

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.0 to 5.5	V
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

Electrical Characteristics

DC Characteristics

Characteristics		Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit			
					V _{CC} (V)	Min	Typ.	Max	Min		Max		
Input voltage	Positive threshold voltage	V _P	—	3.0	—	—	2.20	—	2.20	V			
				4.5	—	—	3.15	—	3.15				
				5.5	—	—	3.85	—	3.85				
	Negative threshold voltage	V _N	—	3.0	0.90	—	—	0.90	—				
				4.5	1.35	—	—	1.35	—				
				5.5	1.65	—	—	1.65	—				
Hysteresis Voltage		V _H	—	3.0	0.30	—	1.20	0.30	1.20	V			
				4.5	0.40	—	1.40	0.40	1.40				
				5.5	0.50	—	1.60	0.50	1.60				
Output voltage	High level	V _{OH}	V _{IN} = V _{IL}	I _{OH} = -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	—			
				I _{OH} = -4 mA	3.0	2.58	—	—	2.48	—			
					I _{OH} = -8 mA	4.5	3.94	—	—	3.80		—	
						Low level	V _{OL}	V _{IN} = V _{IH}	I _{OL} = 50 μA	2.0		—	0
	3.0	—	0	0.1						—		0.1	
	4.5	—	0	0.1	—					0.1			
	I _{OL} = 4 mA	3.0	—	—	0.36				—	0.44			
		I _{OL} = 8 mA	4.5	—	—				0.36	—		0.44	
			Input leakage current		I _{IN}				V _{IN} = 5.5 V or GND	0 to 5.5		—	—
	Quiescent supply current		I _{CC}	V _{IN} = V _{CC} or GND	5.5	—	—	2.0	—	20.0		μA	

AC Characteristics (unless otherwise specified, Input: $t_r = t_f = 3 \text{ ns}$)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
			VCC (V)	CL (pF)	Min	Typ.	Max	Min	Max	
Propagation delay time	tPLH tPHL		3.3 ± 0.3	15	—	8.3	12.8	1.0	15.0	ns
				50	—	10.8	16.3	1.0	18.5	
			5.0 ± 0.5	15	—	5.5	8.6	1.0	10.0	
				50	—	7.0	10.6	1.0	12.0	
Input capacitance	CIN	—			—	4	10	—	10	pF
Power dissipation capacitance	CPD	(Note 2)			—	14	—	—	—	pF

Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

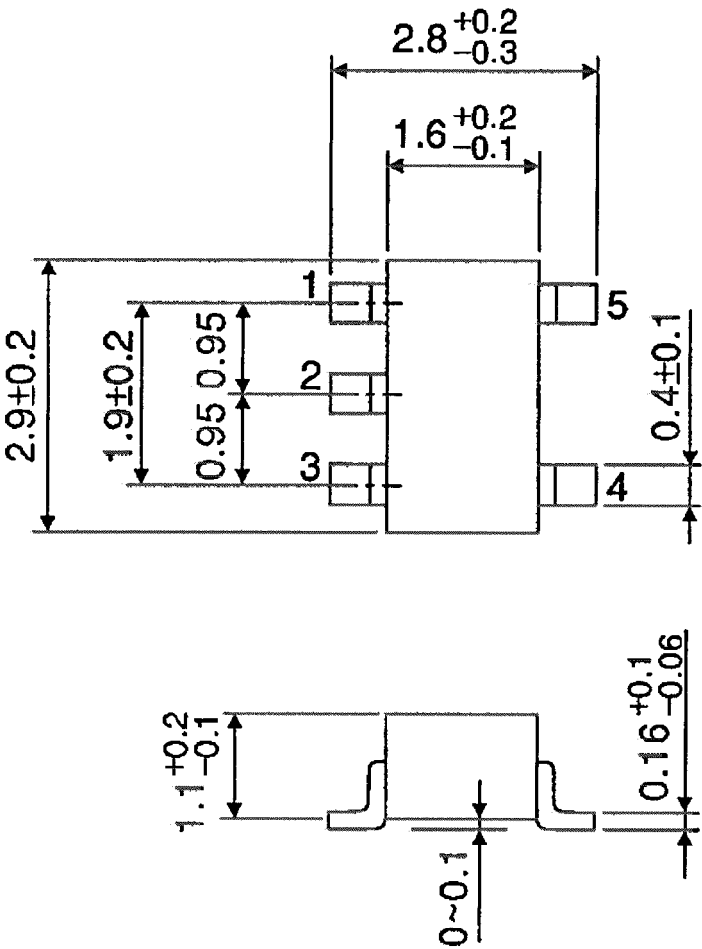
Average operating current can be obtained by the equation.

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

Package Dimensions

SSOP5-P-0.95

Unit : mm

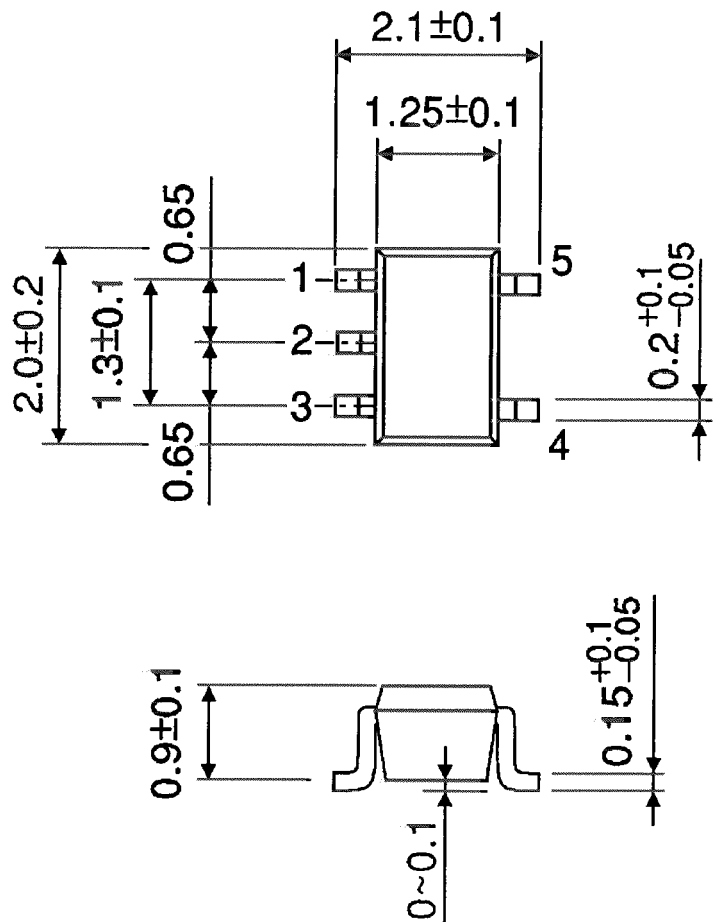


Weight: 0.016 g (typ.)

Package Dimensions

SSOP5-P-0.65A

Unit : mm



Weight: 0.006 g (typ.)

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