

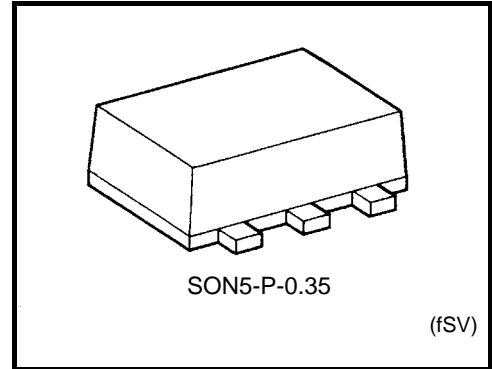
TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC7SH04FS

INVERTER

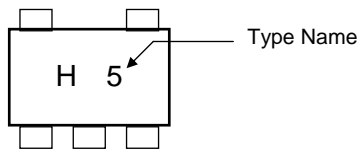
Features

High speed: $t_{pd} = 3.8 \text{ ns (typ.)}$ at $V_{CC} = 5 \text{ V}$
Low power dissipation: $I_{CC} = 2 \mu\text{A (max)}$ at $T_a = 25^\circ\text{C}$
High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (min)}$
5.5V tolerant input.
Wide operating voltage range: $V_{CC} \text{ (opr)} = 2\text{--}5.5 \text{ V}$

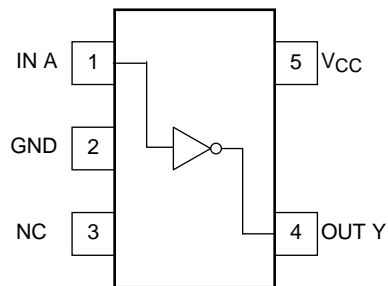


Weight : 0.001 g (Typ.)

Marking



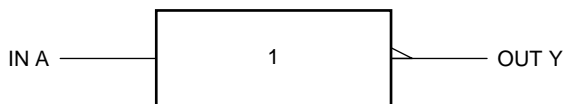
Pin Assignment (top view)



Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V _{CC}	-0.5~7.0	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	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

Logic Diagram



Truth Table

A	Y
L	H
H	L

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Supply voltage	V _{CC}	2.0~5.5	V
Input voltage	V _{IN}	0~5.5	V
Output voltage	V _{OUT}	0~V _{CC}	V
Operating temperature	T _{opr}	-40~85	°C
Input rise and fall time	dt/dv	0~100 (V _{CC} = 3.3 ± 0.3 V)	ns/V
		0~20 (V _{CC} = 5 ± 0.5 V)	

Electrical Characteristics

DC 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}	—	—	2.0	1.50	—	—	1.50	—	V	
				3.0~5.5	V _{CC} × 0.7	—	—	V _{CC} × 0.7	—		
Low-level input voltage	V _{IL}	—	—	2.0	—	—	0.50	—	0.50	V	
				3.0~5.5	—	—	V _{CC} × 0.3	—	V _{CC} × 0.3		
High-level output voltage	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	—	
4.5	3.94	—	—		3.80	—					
Low-level output voltage	V _{OL}	—	V _{IN} = V _{IH}	I _{OL} = 50 μA	2.0	—	0.0	0.1	—	0.1	V
					3.0	—	0.0	0.1	—	0.1	
					4.5	—	0.0	0.1	—	0.1	
				I _{OL} = 4 mA	3.0	—	—	0.36	—	0.44	
					4.5	—	—	0.36	—	0.44	
Input leakage current	I _{IN}	—	V _{IN} = 5.5 V or GND	0~5.5	—	—	±0.1	—	±1.0	μA	
Quiescent supply current	I _{CC}	—	V _{IN} = V _{CC} or GND	5.5	—	—	2.0	—	20.0	μA	

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

Characteristics	Symbol	Test Circuit	Test Condition		Ta = 25°C			Ta = -40~85°C		Unit	
			V _{CC} (V)	C _L (pF)	Min	Typ.	Max	Min	Max		
Propagation delay time	t _{pLH}	—	—	3.3 ± 0.3	15	—	5.0	7.1	1.0	8.5	ns
					50	—	7.5	10.6	1.0	12.0	
	t _{pHL}			5.0 ± 0.5	15	—	3.8	5.5	1.0	6.5	
					50	—	5.3	7.5	1.0	8.5	
Input capacitance	C _{IN}	—	—		—	4	10	—	10	pF	
Power dissipation capacitance	C _{PD}	—	(Note)		—	13	—	—	—	pF	

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

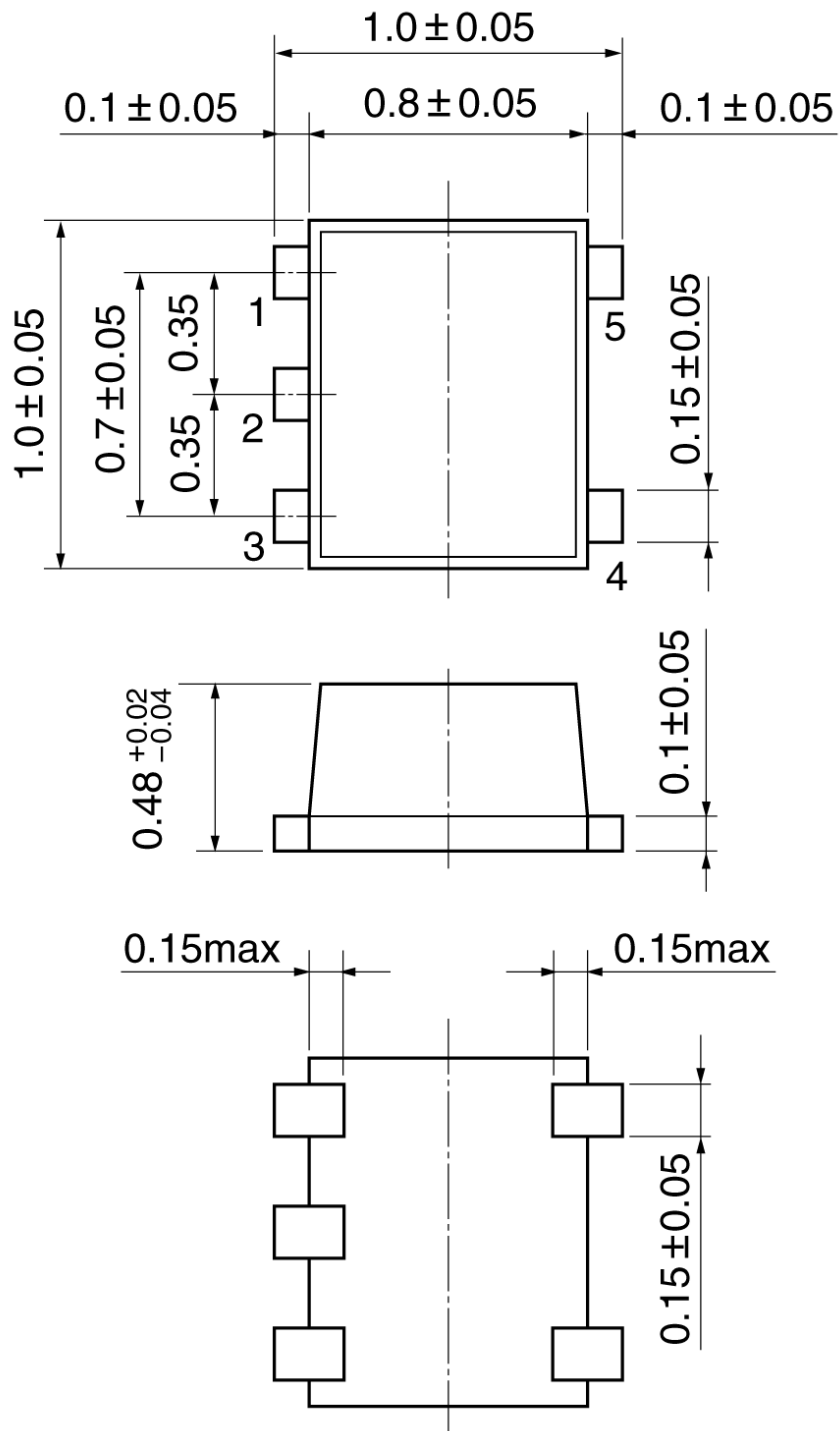
Average operating current can be obtained by the equation:

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

Package Dimensions

SON5-P-0.35

Unit:mm



Weight: 0.001 g (typ.)

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Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.