

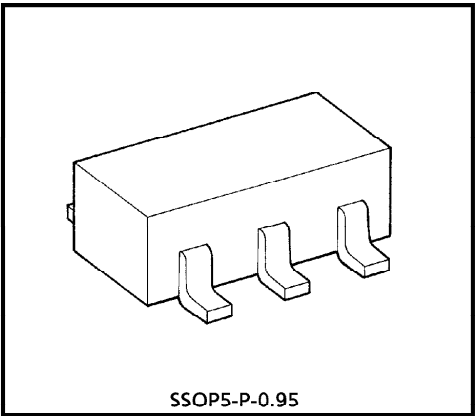
TC4S69F

INVERTER GATE

The TC4S69F is three stage inverter.
The output is provided with the buffer, the input/output voltage characteristic has been improved. Thus an increase in propagation delay time caused by an increase in load capacity is kept to a minimum.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V _{DD}	V _{SS} – 0.5~V _{SS} + 20	V
Input Voltage	V _{IN}	V _{SS} – 0.5~V _{DD} + 0.5	V
Output Voltage	V _{OUT}	V _{SS} – 0.5~V _{DD} + 0.5	V
DC Input Current	I _{IN}	± 10	mA
Power Dissipation	P _D	200	mW
Operating Temperature Range	T _{opr}	– 40~85	°C
Storage Temperature Range	T _{stg}	– 65~150	°C
Lead Temperature (10s)	T _L	260	°C

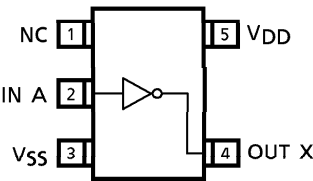


Weight : 0.016g (Typ.)

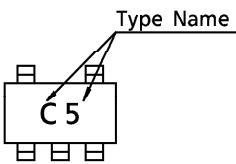
LOGIC DIAGRAM



PIN CONFIGURATION (TOP VIEW)



MARKING



961001EBA2

● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

RECOMMENDED OPERATING CONDITIONS ($V_{SS} = 0V$)

CHARACTERISTIC	SYMBOL		MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}	—	3	—	18	V
Input Voltage	V_{IN}	—	0	—	V_{DD}	V

STATIC ELECTRICAL CHARACTERISTICS ($V_{SS} = 0V$)

CHARACTERISTIC		SYM- BOL	TEST CONDITION	V _{DD} (V)	- 40°C		25°C			85°C		UNIT
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage		V _{OH}	I _{OUT} > 1 μA V _{IN} = V _{SS}	5	4.95	—	4.95	5.00	—	4.95	—	V
				10	9.95	—	9.95	10.00	—	9.95	—	
				15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage		V _{OL}	I _{OUT} < 1 μA V _{IN} = V _{DD}	5	—	0.05	—	0.00	0.05	—	0.05	V
				10	—	0.05	—	0.00	0.05	—	0.05	
				15	—	0.05	—	0.00	0.05	—	0.05	
Output High Current		I _{OH}	V _{OH} = 4.6V	5	- 0.61	—	- 0.51	- 1.0	—	- 0.42	—	mA
			V _{OH} = 2.5V	5	- 2.5	—	- 2.1	- 4.0	—	- 1.7	—	
			V _{OH} = 9.5V	10	- 1.5	—	- 1.3	- 2.2	—	- 1.1	—	
			V _{OH} = 13.5V	15	- 4.0	—	- 3.4	- 9.0	—	- 2.8	—	
			V _{IN} = V _{SS}									
Output Low Current		I _{OL}	V _{OL} = 0.4V	5	0.61	—	0.51	1.2	—	0.42	—	mA
			V _{OL} = 0.5V	10	1.5	—	1.3	3.2	—	1.1	—	
			V _{OL} = 1.5V	15	4.0	—	3.4	12.0	—	2.8	—	
			V _{IN} = V _{DD}									
Input High Voltage		V _{IH}	V _{OUT} = 0.5V	5	3.5	—	3.5	2.75	—	3.5	—	V
			V _{OUT} = 1.0V	10	7.0	—	7.0	5.5	—	7.0	—	
			V _{OUT} = 1.5V	15	11.0	—	11.0	8.25	—	11.0	—	
			I _{OUT} < 1 μA									
Input Low Voltage		V _{IL}	V _{OUT} = 4.5V	5	—	1.5	—	2.25	1.5	—	1.5	V
			V _{OUT} = 9.0V	10	—	3.0	—	4.5	3.0	—	3.0	
			V _{OUT} = 13.5V	15	—	4.0	—	6.75	4.0	—	4.0	
			I _{OUT} < 1 μA									
Input Current	H Level	I _{IH}	V _{IH} = 18V	18	—	0.1	—	10 ⁻⁵	0.1	—	1.0	μA
	L Level	I _{IL}	V _{IL} = 0V	18	—	- 0.1	—	- 10 ⁻⁵	- 0.1	—	- 1.0	
Quiescent Device Current		I _{DD}	V _{IN} = V _{SS} , V _{DD}	5	—	0.25	—	0.001	0.25	—	7.5	μA
				10	—	0.5	—	0.001	0.5	—	15	
				15	—	1.0	—	0.002	1.0	—	30	

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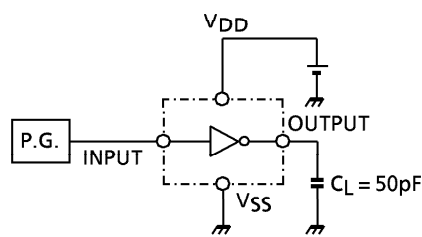
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DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, VSS = 0V, CL = 50pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	VDD (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	tTLH	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	tTHL	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t _p LH	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Propagation Delay Time	t _p HL	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Input Capacitance	CIN	—		—	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

TEST CIRCUIT



WAVEFORM

