

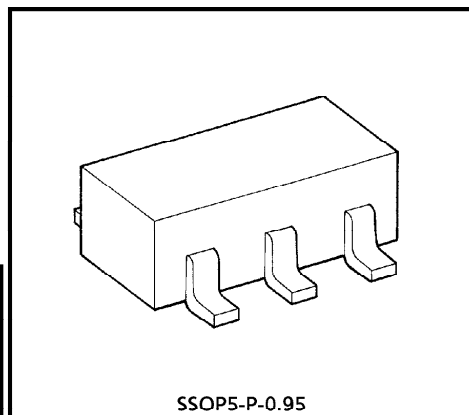
# TC4S69F

## 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.

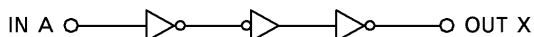
### MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V <sub>DD</sub>	V <sub>SS</sub> - 0.5 ~ V <sub>SS</sub> + 20	V
Input Voltage	V <sub>IN</sub>	V <sub>SS</sub> - 0.5 ~ V <sub>DD</sub> + 0.5	V
Output Voltage	V <sub>OUT</sub>	V <sub>SS</sub> - 0.5 ~ V <sub>DD</sub> + 0.5	V
DC Input Current	I <sub>IN</sub>	± 10	mA
Power Dissipation	P <sub>D</sub>	200	mW
Operating Temperature Range	T <sub>opr</sub>	- 40 ~ 85	°C
Storage Temperature Range	T <sub>stg</sub>	- 65 ~ 150	°C
Lead Temperature (10s)	T <sub>L</sub>	260	°C

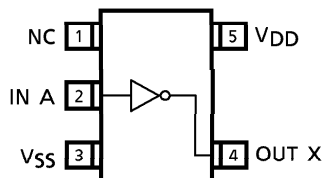


SSOP5-P-0.95  
 Weight : 0.016g (Typ.)

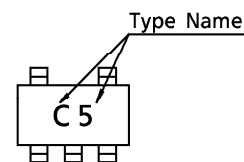
### LOGIC DIAGRAM



### PIN CONFIGURATION (TOP VIEW)



### MARKING



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**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\mu A$ $V_{IN} = V_{SS}$	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\mu A$ $V_{IN} = V_{DD}$	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	$I_{OH}$	$V_{OH} = 4.6V$ $V_{OH} = 2.5V$ $V_{OH} = 9.5V$ $V_{OH} = 13.5V$ $V_{IN} = V_{SS}$	5	-0.61	—	-0.51	-1.0	—	-0.42	—	mA
			5	-2.5	—	-2.1	-4.0	—	-1.7	—	
			10	-1.5	—	-1.3	-2.2	—	-1.1	—	
			15	-4.0	—	-3.4	-9.0	—	-2.8	—	
Output Low Current	$I_{OL}$	$V_{OL} = 0.4V$ $V_{OL} = 0.5V$ $V_{OL} = 1.5V$ $V_{IN} = V_{DD}$	5	0.61	—	0.51	1.2	—	0.42	—	mA
			10	1.5	—	1.3	3.2	—	1.1	—	
			15	4.0	—	3.4	12.0	—	2.8	—	
			5	3.5	—	3.5	2.75	—	3.5	—	
Input High Voltage	$V_{IH}$	$V_{OUT} = 0.5V$ $V_{OUT} = 1.0V$ $V_{OUT} = 1.5V$ $ I_{OUT}  < 1\mu A$	5	3.5	—	3.5	2.75	—	3.5	—	V
			10	7.0	—	7.0	5.5	—	7.0	—	
			15	11.0	—	11.0	8.25	—	11.0	—	
			5	—	1.5	—	2.25	1.5	—	1.5	
Input Low Voltage	$V_{IL}$	$V_{OUT} = 4.5V$ $V_{OUT} = 9.0V$ $V_{OUT} = 13.5V$ $ I_{OUT}  < 1\mu A$	5	—	1.5	—	2.25	1.5	—	1.5	V
			10	—	3.0	—	4.5	3.0	—	3.0	
			15	—	4.0	—	6.75	4.0	—	4.0	
			18	—	0.1	—	$10^{-5}$	0.1	—	1.0	
Input Current	H Level	$I_{IH}$	$V_{IH} = 18V$	18	—	0.1	—	$10^{-5}$	0.1	—	$\mu A$
	L Level	$I_{IL}$	$V_{IL} = 0V$	18	—	-0.1	—	$-10^{-5}$	-0.1	—	$\mu A$
Quiescent Device Current	$I_{DD}$	$V_{IN} = V_{SS}, V_{DD}$	5	—	0.25	—	0.001	0.25	—	7.5	$\mu A$
			10	—	0.5	—	0.001	0.5	—	15	
			15	—	1.0	—	0.002	1.0	—	30	

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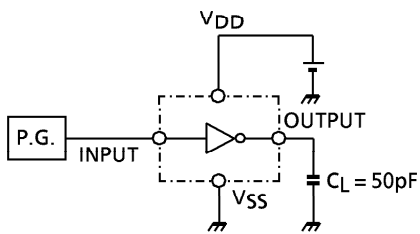
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**DYNAMIC ELECTRICAL CHARACTERISTICS** (Ta = 25°C, VSS = 0V, CL = 50pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	VDD (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t <sub>TLH</sub>	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t <sub>THL</sub>	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t <sub>pLH</sub>	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Propagation Delay Time	t <sub>pHL</sub>	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Input Capacitance	C <sub>IN</sub>	—	—	5	7.5	pF	

**CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS**

TEST CIRCUIT



WAVEFORM

