

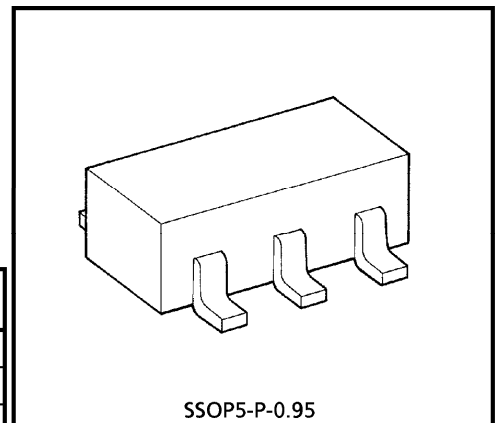
# TC4S11F

## 2 INPUT NAND GATE

The TC4S11F is 2-input positive logic NAND gates. Gate output with inverter buffer improve the input-output characteristics and even if the load capacitance increases, it can be stopped the change of propagation time.

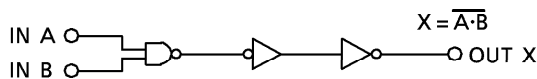
### MAXIMUM RATINGS (Ta = 25°C)

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

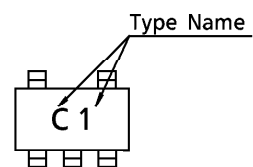


SSOP5-P-0.95  
Weight : 0.016g (Typ.)

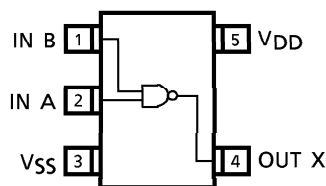
### LOGIC DIAGRAM



### MARKING



### PIN CONFIGURATION (TOP VIEW)



**RECOMMENDED OPERATING CONDITIONS (V<sub>SS</sub> = 0V)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	
DC Supply Voltage	V <sub>DD</sub>	—	3	—	18	V
Input Voltage	V <sub>IN</sub>	—	0	—	V <sub>DD</sub>	V

**STATIC ELECTRICAL CHARACTERISTICS (V<sub>SS</sub> = 0V)**

CHARACTERISTIC	SYM-BOL	TEST CONDITION	V <sub>DD</sub> (V)	- 40°C		25°C			85°C		UNIT	
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.		
High-Level Output Voltage	V <sub>OH</sub>	I <sub>OUT</sub>   < 1μA V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	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 <sub>OL</sub>	I <sub>OUT</sub>   < 1μA V <sub>IN</sub> = V <sub>DD</sub>	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 <sub>OH</sub>	V <sub>OH</sub> = 4.6V V <sub>OH</sub> = 2.5V V <sub>OH</sub> = 9.5V V <sub>OH</sub> = 13.5V V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub>	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 <sub>OL</sub>	V <sub>OL</sub> = 0.4V V <sub>OL</sub> = 0.5V V <sub>OL</sub> = 1.5V V <sub>IN</sub> = V <sub>DD</sub>	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 <sub>IH</sub>	V <sub>OUT</sub> = 0.5V, 4.5V V <sub>OUT</sub> = 1.0V, 9.0V V <sub>OUT</sub> = 1.5V, 13.5V  I <sub>OUT</sub>   < 1μA	10	7.0	—	7.0	5.5	—	7.0	—	V	
			15	11.0	—	11.0	8.25	—	11.0	—		
			5	—	1.5	—	2.25	1.5	—	1.5		—
Input Low Voltage	V <sub>IL</sub>	V <sub>OUT</sub> = 4.5V V <sub>OUT</sub> = 9.0V V <sub>OUT</sub> = 13.5V  I <sub>OUT</sub>   < 1μA	10	—	3.0	—	4.5	3.0	—	3.0	V	
			15	—	4.0	—	6.75	4.0	—	4.0		
			18	—	0.1	—	10 <sup>-5</sup>	0.1	—	1.0		—
Input Current	H Level	I <sub>IH</sub>	V <sub>IH</sub> = 18V	18	—	0.1	—	10 <sup>-5</sup>	0.1	—	1.0	μA
	L Level	I <sub>IL</sub>	V <sub>IL</sub> = 0V	18	—	-0.1	—	-10 <sup>-5</sup>	-0.1	—	-1.0	
Quiescent Device Current	I <sub>DD</sub>	V <sub>IN</sub> = V <sub>SS</sub> , V <sub>DD</sub> *	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		

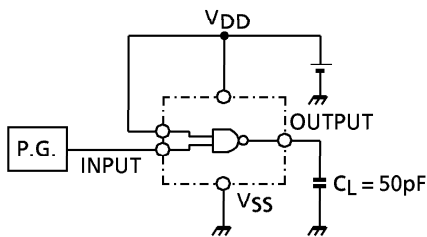
\* All valid input combinations.

**DYNAMIC ELECTRICAL CHARACTERISTICS** ( $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ ,  $C_L = 50\text{pF}$ )

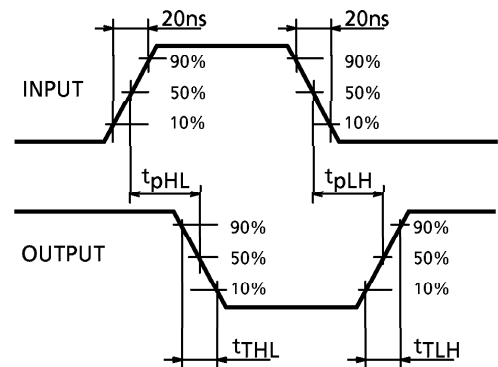
CHARACTERISTIC	SYMBOL	TEST CONDITION	$V_{DD}$ (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	$t_{TLH}$	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	$t_{THL}$	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	$t_{pLH}$	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Propagation Delay Time	$t_{pHL}$	—	5	—	65	200	ns
			10	—	30	100	
			15	—	25	80	
Input Capacitance	$C_{IN}$	—	—	5	7.5	pF	

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

TEST CIRCUIT



WAVEFORM



PACKAGE DIMENSIONS  
SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

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