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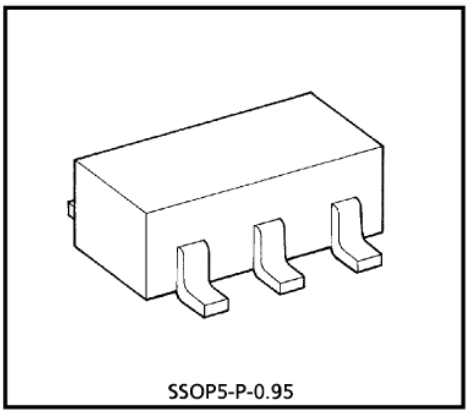
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

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.



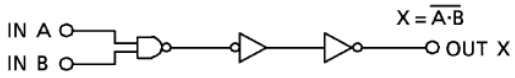
SSOP5-P-0.95

Weight : 0.016g (Typ.)

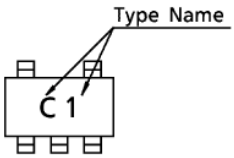
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS}-0.5 \sim V_{SS}+20$	V
Input Voltage	V_{IN}	$V_{SS}-0.5 \sim V_{DD}+0.5$	V
Output Voltage	V_{OUT}	$V_{SS}-0.5 \sim V_{DD}+0.5$	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

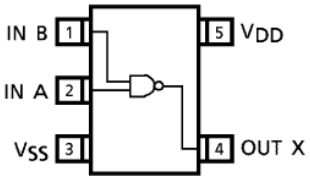
LOGIC DIAGRAM



MARKING



PIN CONFIGURATION (TOP VIEW)



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		SYMBOL	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}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{SS}$, V_{DD}	5 10 15	4.95 9.95 14.95	— — —	4.95 9.95 14.95	5.00 10.00 15.00	— — —	4.95 9.95 14.95	— — —	V
Low-Level Output Voltage		V_{OL}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{DD}$	5 10 15	— — —	0.05 0.05 0.05	— — —	0.00 0.00 0.00	0.05 0.05 0.05	— — —	0.05 0.05 0.05	V
Output High Current		I_{OH}	V_{OH} = 4.6V V_{OH} = 2.5V V_{OH} = 9.5V V_{OH} = 13.5V $V_{IN} = V_{SS}$, V_{DD}	5 5 10 15	−0.61 −2.5 −1.5 −4.0	— — — —	−0.51 −2.1 −1.3 −3.4	−1.0 −4.0 −2.2 −9.0	— — — —	−0.42 −1.7 −1.1 −2.8	— — — —	mA
Output Low Current		I_{OL}	V_{OL} = 0.4V V_{OL} = 0.5V V_{OL} = 1.5V $V_{IN} = V_{DD}$	5 10 15	0.61 1.5 4.0	— — —	0.51 1.3 3.4	1.2 3.2 12.0	— — —	0.42 1.1 2.8	— — —	
Input High Voltage		V_{IH}	V_{OUT} = 0.5V, 4.5V V_{OUT} = 1.0V, 9.0V V_{OUT} = 1.5V, 13.5V $\|I_{OUT}\| < 1\mu A$	5 10 15	3.5 7.0 11.0	— — —	3.5 7.0 11.0	2.75 5.5 8.25	— — —	3.5 7.0 11.0	— — —	V
Input Low Voltage		V_{IL}	V_{OUT} = 4.5V V_{OUT} = 9.0V V_{OUT} = 13.5V $\|I_{OUT}\| < 1\mu A$	5 10 15	— — —	1.5 3.0 4.0	— — —	2.25 4.5 6.75	1.5 3.0 4.0	— — —	1.5 3.0 4.0	
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 10 15	— — —	0.25 0.5 1.0	— — —	0.001 0.001 0.002	0.25 0.5 1.0	— — —	7.5 15 30	μA

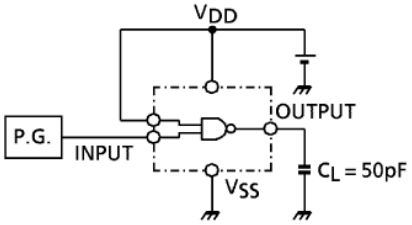
* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{SS} = 0V, C_L = 50pF)

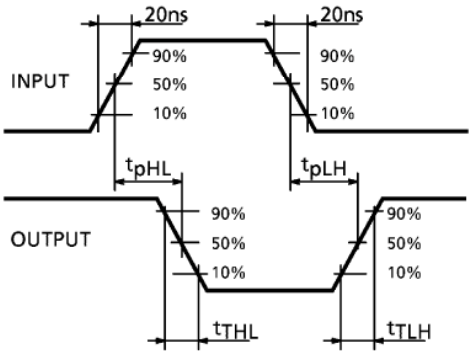
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t_{THL}	—	5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t_{pLH}	—	5	—	65	200	ns
			10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

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

TEST CIRCUIT



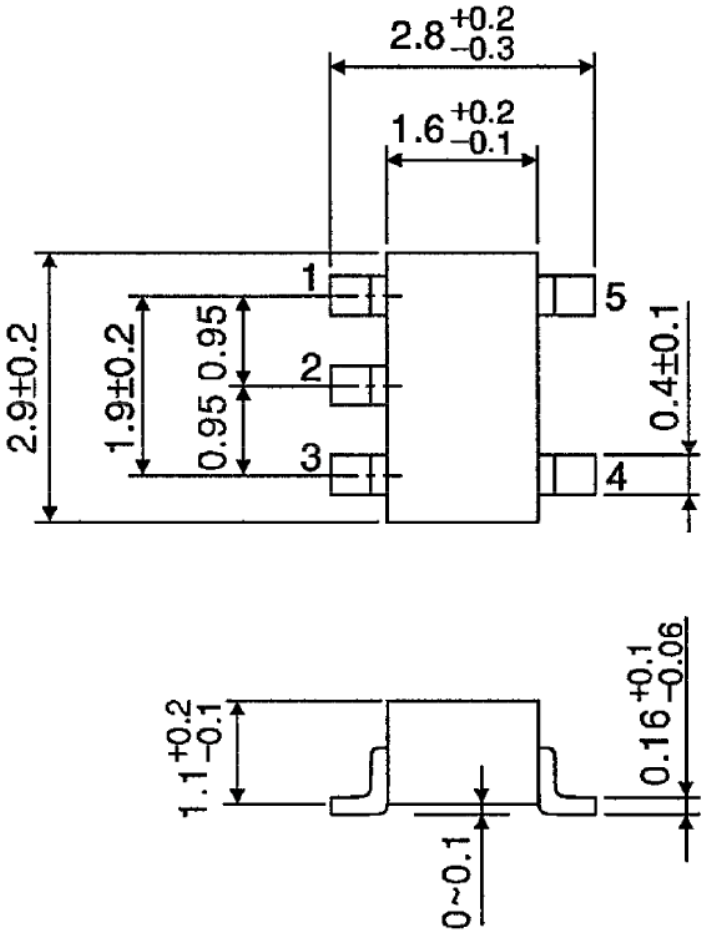
WAVEFORM



PACKAGE DIMENSIONS

SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

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