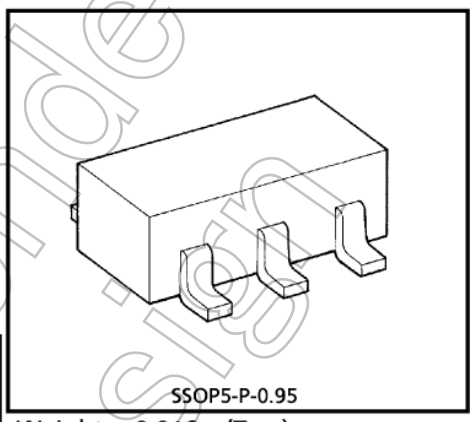
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4SU11F

2 INPUT NAND GATE

TC4SU11F is 2 input NAND gate respectively.
The internal circuit of only basic NAND circuit without the waveform shaping inverter.
Therefore, this is suitable for the applications in liner circuits such as oscillator circuits and amplifier circuits, and this has advantage in the applications of Logical processing systems with faster operating speed.

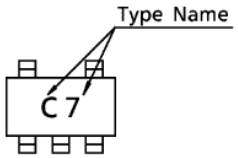


Weight : 0.016g (Typ.)

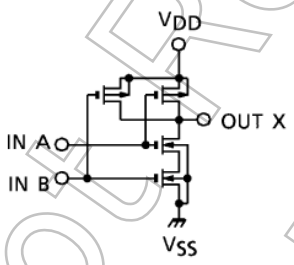
ABSOLUTE MAXIMUM RATINGS

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

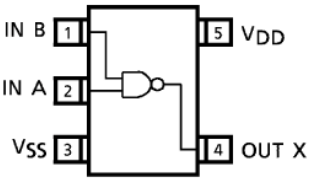
Marking



LOGIC DIAGRAM



PIN ASSIGNMENT (TOP VIEW)



Start of commercial production
1988-03

OPERATING RANGES (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)

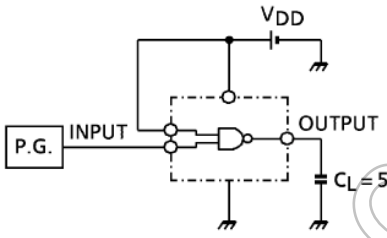
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	−40°C MIN.	−40°C MAX.	25°C MIN.	25°C TYP.	25°C MAX.	85°C MIN.	85°C MAX.	UNIT
High-Level Output Voltage	V_{OH}	$\|I_{OUT}\| < 1\mu A$, $V_{IN} = V_{SS}$	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage	V_{OL}	$\|I_{OUT}\| < 1\mu A$, $V_{IN} = V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	
			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	—	
		$V_{IN} = V_{SS}$, V_{DD}									
Output Low Current	I_{OL}	V_{OL} = 0.4V	5	0.61	—	0.51	1.2	—	0.42	—	
		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	4.0	—	4.0	3.0	—	4.0	—	V
		V_{OUT} = 1.0V	10	8.0	—	8.0	6.5	—	8.0	—	
		V_{OUT} = 1.5V	15	12.0	—	12.0	9.5	—	12.0	—	
		$\|I_{OUT}\| < 1\mu A$									
Input Low Voltage	V_{IL}	V_{OUT} = 4.5V	5	—	1.0	—	2.0	1.0	—	1.0	
		V_{OUT} = 9.0V	10	—	2.0	—	3.5	2.0	—	2.0	
		V_{OUT} = 13.5V	15	—	3.0	—	5.5	3.0	—	3.0	
		$\|I_{OUT}\| < 1\mu A$									
Input Current H Level	I_{IH}	V_{IH} = 18V	18	—	0.1	—	10^{-5}	0.1	—	1.0	μA
Input Current L Level	I_{IL}	V_{IL} = 0V	18	—	−0.1	—	-10^{-5}	−0.1	—	−1.0	μA
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	

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

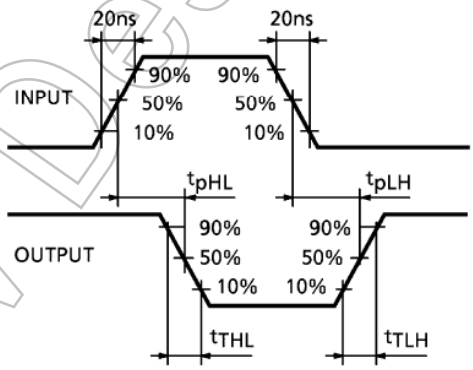
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t_{THL}	—	5	—	60	200	
			10	—	25	100	
			15	—	20	80	
Propagation Delay Time	t_{pLH}	—	5	—	50	110	ns
			10	—	28	60	
			15	—	22	50	
Propagation Delay Time	t_{pHL}	—	5	—	50	110	
			10	—	28	60	
			15	—	22	50	
Input Capacitance	C_{IN}	—		—	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

CIRCUIT



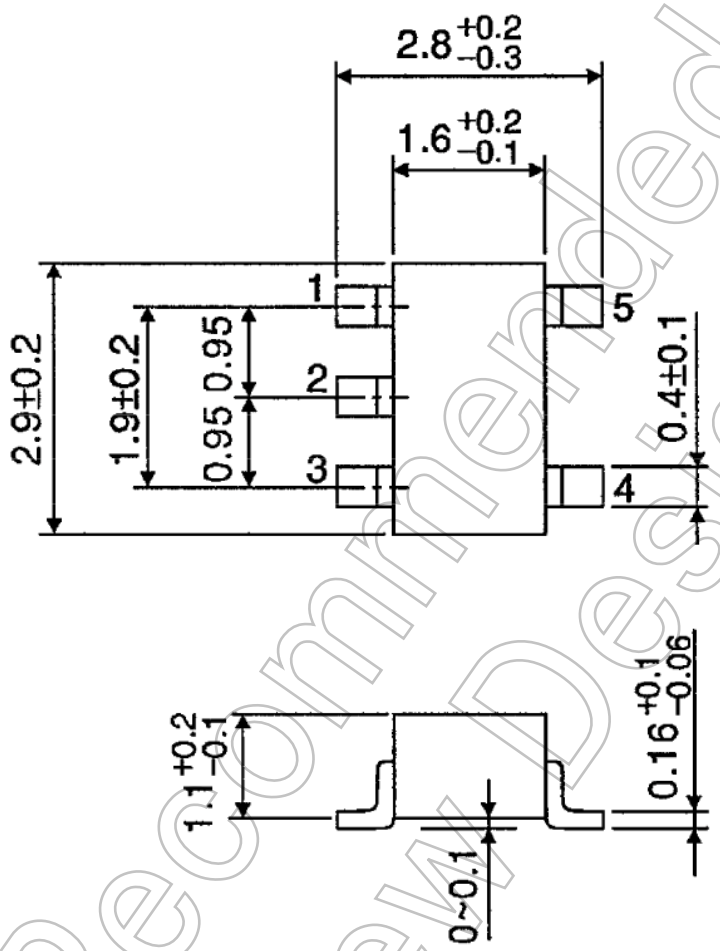
WAVEFORM



PACKAGE DIMENSIONS

SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

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