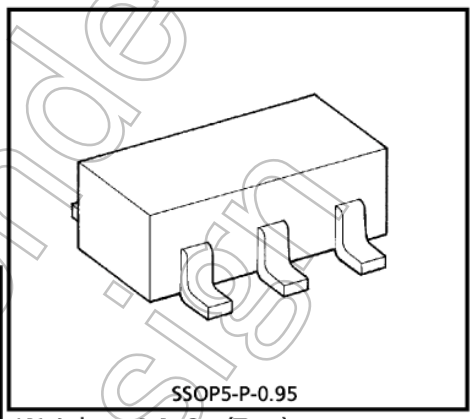
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4SU69F

INVERTER GATE

The TC4SU69F is single inverter.
Therefore, this is suitable for the applications of C, R oscillator circuits, crystal oscillator circuits and linear amplifiers in addition to its application as inverters.

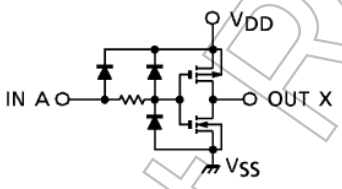


Weight : 0.016g (Typ.)

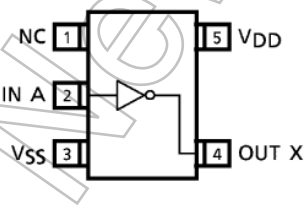
ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

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

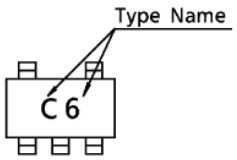
LOGIC DIAGRAM



PIN CONFIGURATION (TOP VIEW)



Marking



Start of commercial production
1987-02

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)

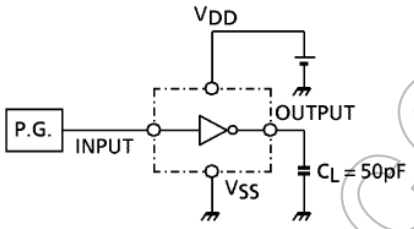
CHARACTERISTIC	SYM-BOL	TEST CONDITION	V_{DD} (V)	−40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage	V_{OH}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{SS}$	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage	V_{OL}	$\|I_{OUT}\| < 1\mu A$ $V_{IN} = V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	
			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	—	
			10	1.5	—	1.3	3.2	—	1.1	—	
			15	4.0	—	3.4	12.0	—	2.8	—	
Input High Voltage	V_{IH}	V_{OUT} = 0.5V V_{OUT} = 1.0V V_{OUT} = 1.5V $\|I_{OUT}\| < 1\mu A$	5	4.0	—	4.0	—	—	4.0	—	V
			10	8.0	—	8.0	—	—	8.0	—	
			15	12.0	—	12.0	—	—	12.0	—	
Input Low Voltage	V_{IL}	V_{OUT} = 4.5V V_{OUT} = 9.0V V_{OUT} = 13.5V $\|I_{OUT}\| < 1\mu A$	5	—	1.0	—	—	1.0	—	1.0	
			10	—	2.0	—	—	2.0	—	2.0	
			15	—	3.0	—	—	3.0	—	3.0	
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)

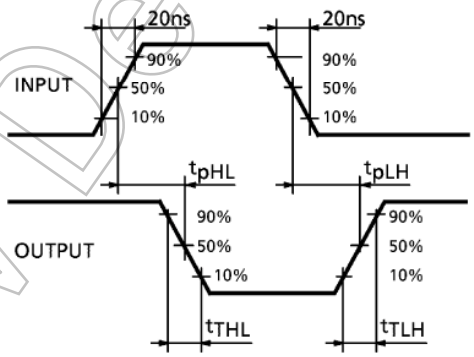
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t_{THL}	—	5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t_{pLH}	—	5	—	55	110	ns
			10	—	30	60	
			15	—	25	50	
Propagation Delay Time	t_{pHL}	—	5	—	55	110	
			10	—	30	60	
			15	—	25	50	
Input Capacitance	C_{IN}	—		—	7.5	15	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

TEST CIRCUIT



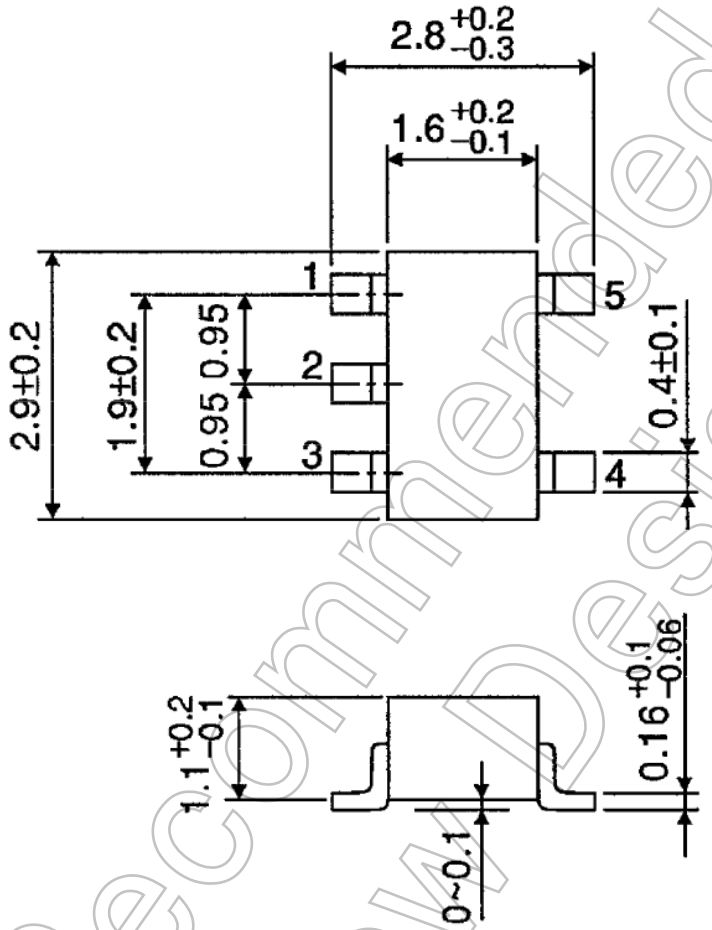
WAVEFORM



PACKAGE DIMENSIONS

SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

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