

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

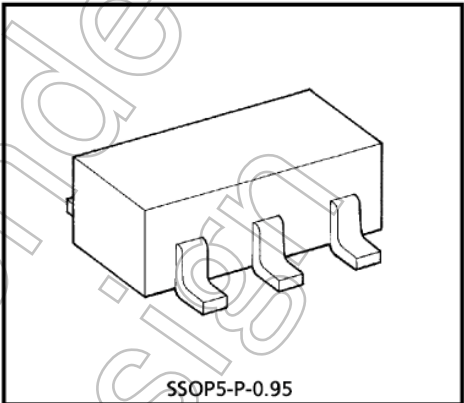
TC4SU69F

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.

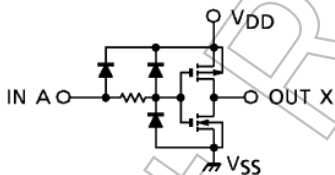
ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V _{DD}	V _{SS} - 0.5~V _{SS} + 20	V
Input Voltage	V _{IN}	V _{SS} - 0.5~V _{DD} + 0.5	V
Output Voltage	V _{OUT}	V _{SS} - 0.5~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

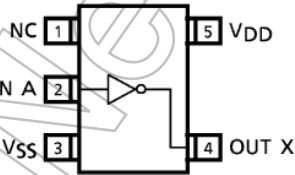


Weight : 0.016g (Typ.)

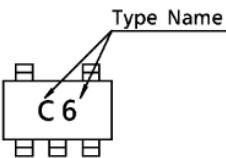
LOGIC DIAGRAM



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 ($V_{SS} = 0V$)

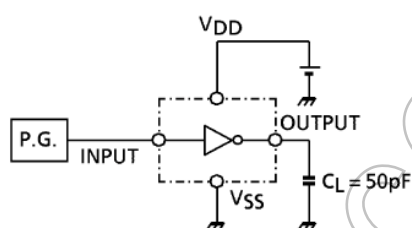
CHARACTERISTIC		SYM-BOL	TEST CONDITION	V _{DD} (V)	- 40°C		25°C			85°C		UNIT
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage		V _{OH}	I _{OUT} < 1 μA V _{IN} = V _{SS}	5	4.95	—	4.95	5.00	—	4.95	—	V
				10	9.95	—	9.95	10.00	—	9.95	—	
				15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage		V _{OL}	I _{OUT} < 1 μA 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	—	
Input High Voltage		V _{IH}	V _{OUT} = 0.5V V _{OUT} = 1.0V V _{OUT} = 1.5V I _{OUT} < 1 μA	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 μA	5	—	1.0	—	—	1.0	—	1.0	V
				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
	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	—	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)

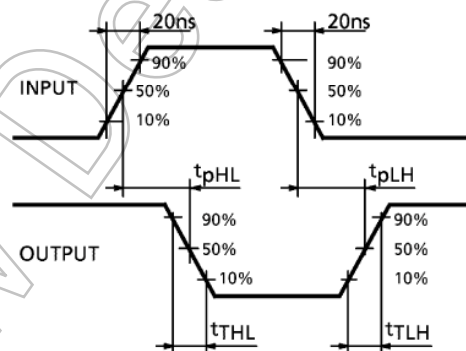
CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t _{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t _{THL}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t _{pLH}	—	5	—	55	110	ns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

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

TEST CIRCUIT

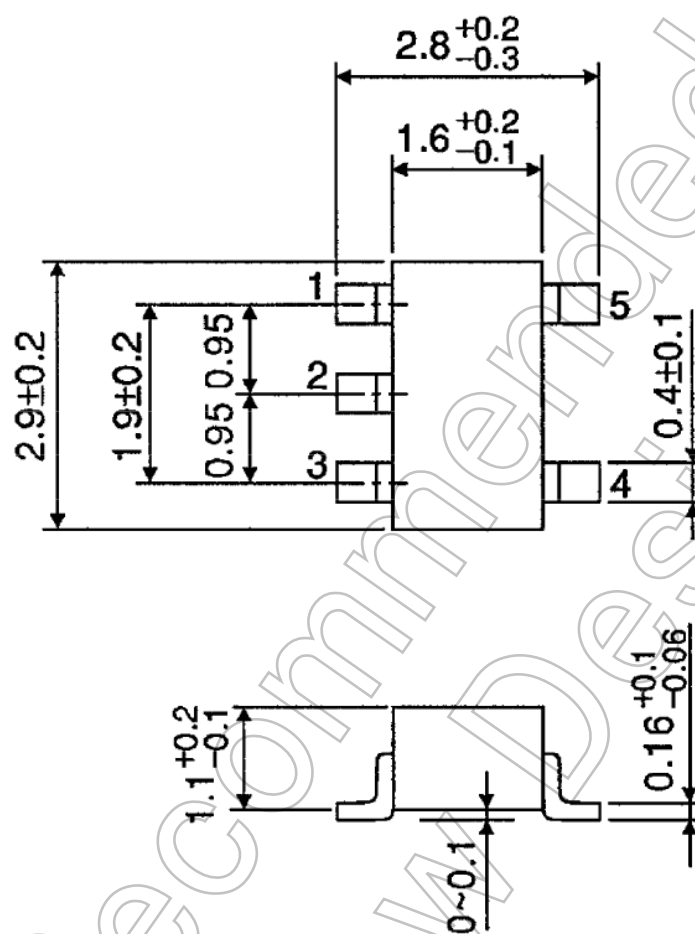


WAVEFORM



PACKAGE DIMENSIONS
SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)

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