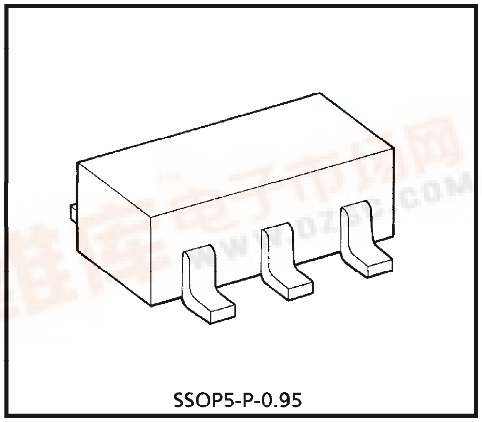
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

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.

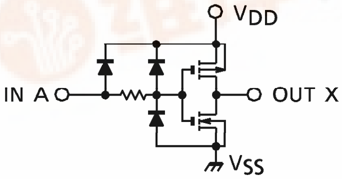


Weight : 0.016g (Typ.)

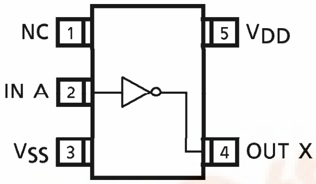
MAXIMUM RATINGS (Ta = 25°C)

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

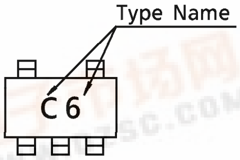
LOGIC DIAGRAM



PIN CONFIGURATION (TOP VIEW)



Marking



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 ($V_{SS}=0V$)

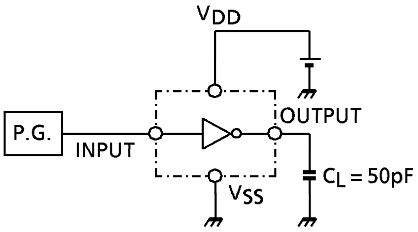
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	−40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage	V_{OH}	$\lvert I_{OUT}\rvert < 1\mu A$	5	4.95	—	4.95	5.00	—	4.95	—	V
		$V_{IN}=V_{SS}$	10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level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

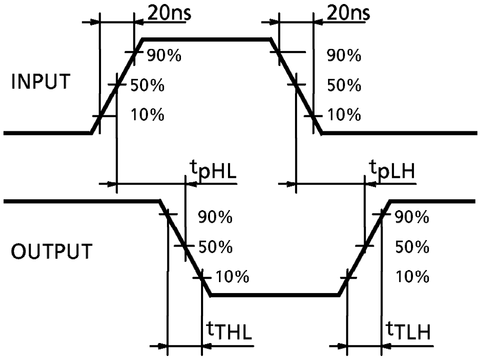
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t_{THL}	—	5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t_{pLH}	—	5	—	55	110	ns
			10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



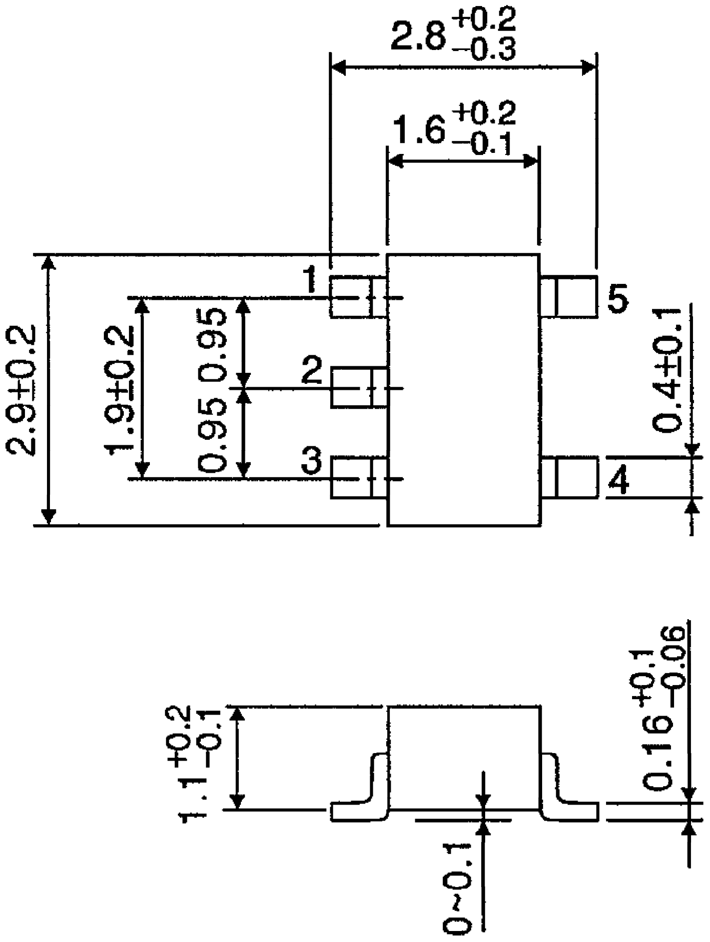
WAVEFORM



OUTLINE DRAWING

SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)