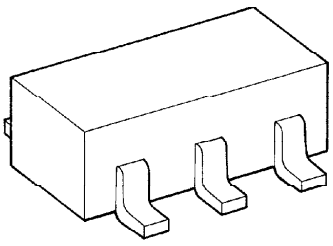
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4S66F

BILATERAL SWITCH

TC4S66F contains one circuit of bidirectional switches. When control input, CONT is set to "H" level, the impedance between input and output of the switch becomes low and when it is set to "L" level, the switch becomes high. This can be applied for switching of analog signals and digital signals.



SSOP5-P-0.95

Weight : 0.016g (Typ.)

FEATURES

- ON-resistance (R_{ON})

  300Ω (Typ.) .... $V_{DD} - V_{SS} = 5V$
  110Ω (Typ.) .... $V_{DD} - V_{SS} = 10V$
  70Ω (Typ.) ..... $V_{DD} - V_{SS} = 15V$

- OFF-resistance (R_{OFF})

  R_{OFF} (Typ.) $> 10^9\Omega$

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS} - 0.5 \sim V_{SS} + 20$	V
Control Input Voltage	$V_{C\ IN}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Switch I/O Voltage	$V_{I/O}$	$V_{SS} - 0.5 \sim V_{DD} + 0.5$	V
Power Dissipation	P_D	200	mW
Potential difference across I/O during ON	V_I-V_O	±0.5	V
Control Input Current	$I_{C\ IN}$	±10	mA
Operating Temperature Range	T_{opr}	−40~85	°C
Storage Temperature	T_{stg}	−65~150	°C
Lead Temperature (10s)	T_L	260	°C

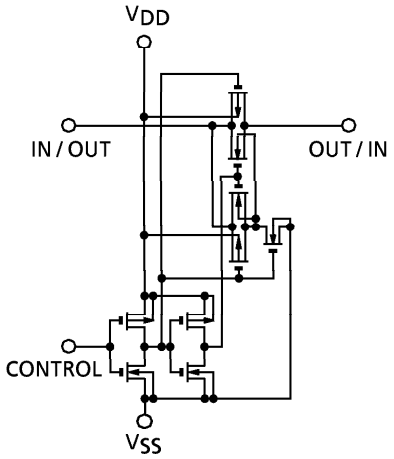
TRUTH TABLE

CONTROL	IMPEDANCE BETWEEN IN/OUT-OUT/IN *
H	$0.5 \sim 5 \times 10^2\Omega$
L	$> 10^9\Omega$

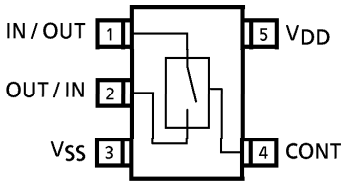
* See static electrical characteristics.

961001EBA2

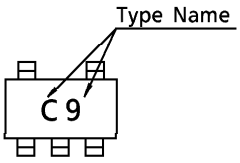
CIRCUIT DIAGRAM



PIN ASSIGNMENT (TOP VIEW)



MARKING



RECOMMENDED OPERATING CONDITIONS (V_{SS} = 0V)

CHARACTERISTIC	SYMBOL		MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}	—	3	—	18	V
Input / Output Voltage	V_{IN} / V_{OUT}	—	0	—	V_{DD}	V

STATIC ELECTRICAL CHARACTERISTICS (In case not specifically appointed, 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.	
Control Input High Voltage		V_{IH}	$\|I_{IS}\|$ = 10μA	5	3.5	—	3.5	2.75	—	3.5	—	V
				10	7.0	—	7.0	5.50	—	7.0	—	
				15	11.0	—	11.0	8.25	—	11.0	—	
Control Input Low Voltage		V_{IL}	$\|I_{IS}\|$ = 10μA	5	—	1.5	—	2.25	1.5	—	1.5	
				10	—	3.0	—	4.5	3.0	—	3.0	
				15	—	4.0	—	6.75	4.0	—	4.0	
On-State Resistance		R_{ON}	$0 \leqq V_{IS} \leqq V_{DD}$, R_L = 10kΩ	5	—	800	—	290	950	—	1200	Ω
				10	—	210	—	120	250	—	300	
				15	—	140	—	85	160	—	200	
Input / Output Leakage Current		I_{OFF}	V_{IN} = 18V, V_{OUT} = 0V	18	—	±100	—	±0.1	±100	—	±1000	nA
			V_{IN} = 0V, V_{OUT} = 18V	18	—	±100	—	±0.1	±100	—	±1000	
Quiescent Device Current		I_{DD}	V_{IN} = V_{DD}, V_{SS}	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	
Input Current	H Level	I_{IH}	V_{IH} = 18V	18	—	0.1	—	10^{-5}	0.1	—	1.0	μA
	L Level	I_{OL}	V_{IL} = 0V	18	—	−0.1	—	-10^{-5}	−0.1	—	−1.0	

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{SS} (V)	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time (IN-OUT)	t_{pLH} t_{pHL}	C_L = 50pF	0	5	—	15	40	ns
			0	10	—	8	20	
			0	15	—	5	15	
Propagation Delay Time (CONTROL-OUT)	t_{pZL} t_{pZH}	R_L = 1kΩ C_L = 50pF	0	5	—	55	120	
			0	10	—	25	40	
			0	15	—	20	30	
Propagation Delay Time (CONTROL-OUT)	t_{pLZ} t_{pHZ}	R_L = 1kΩ C_L = 50pF	0	5	—	45	80	
			0	10	—	30	70	
			0	15	—	25	60	
Max. Control Input Repetition Rate	f_{MAX} (C)	R_L = 1kΩ C_L = 50pF	0	5	—	10	—	MHz
			0	10	—	12	—	
			0	15	—	12	—	
−3dB Cut Off Frequency	f_{MAX} (I-O)	R_L = 1kΩ C_L = 50pF (*1)	−5	5	—	30	—	
Total Harmonic Distortion	—	R_L = 10kΩ f = 1kHz (*2)	−5	5	—	0.03	—	%
−50dB Feedthrough Frequency	—	R_L = 1kΩ (*3)	−5	5	—	600	—	kHz
Crosstalk (CONTROL-OUT)	—	R_{IN} = 1kΩ R_{OUT} = 10kΩ C_L = 15pF	0	5	—	200	—	mV
			0	10	—	400	—	
			0	15	—	600	—	
Input Capacitance	C_{IN}	Control Input			—	5	7.5	pF
		Switch I/O			—	10	—	
Feedthrough Capacitance	C_{IN-OUT}	—			—	0.5	—	

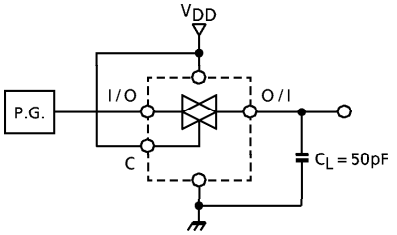
*1 The frequency at $20\ell og_{10} \frac{V_{OS}}{V_{IS}}$ = −3dB shall be $f_{MAX\,(I/O)}$ using sine wave of $\pm 2.5V_{p-p}$ for V_{IS}.

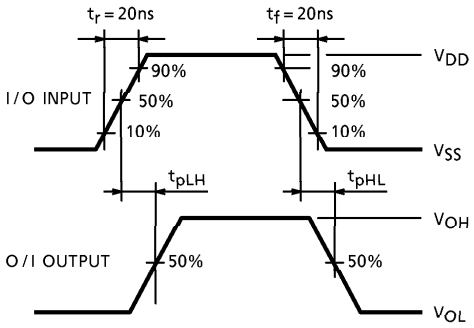
*2 V_{IS} shall be sine wave of ±2.5V.

*3 The frequency at $20\ell og_{10} \frac{V_{OS}}{V_{IS}}$ = 50dB shall be the feed through using of $\pm 2.5V_{p-p}$.

1. t_{pLH}, t_{pHL}

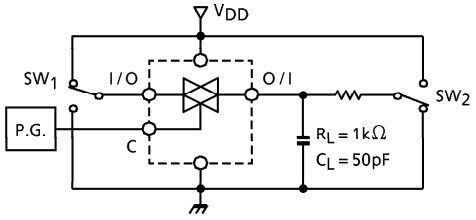
I / O-O / I

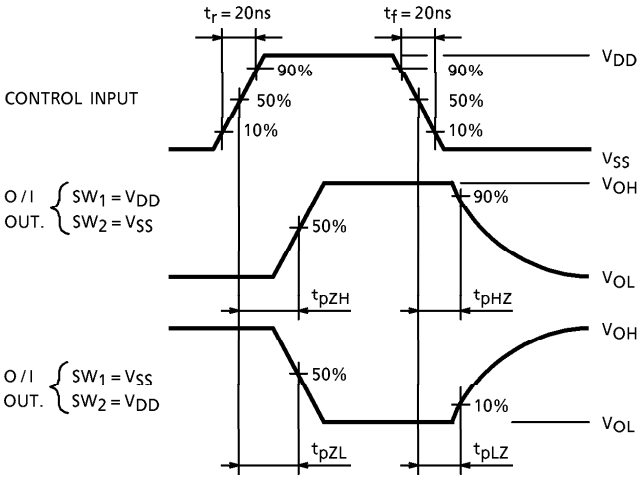




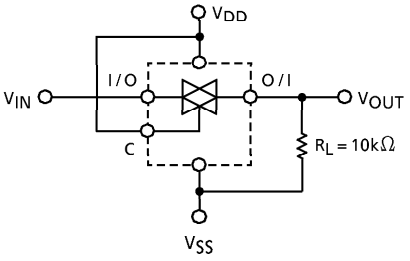
2. t_{pZL}, t_{pZH}, t_{pLZ}, t_{pHZ}

CONTROL-O / I



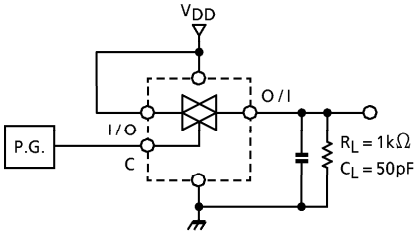


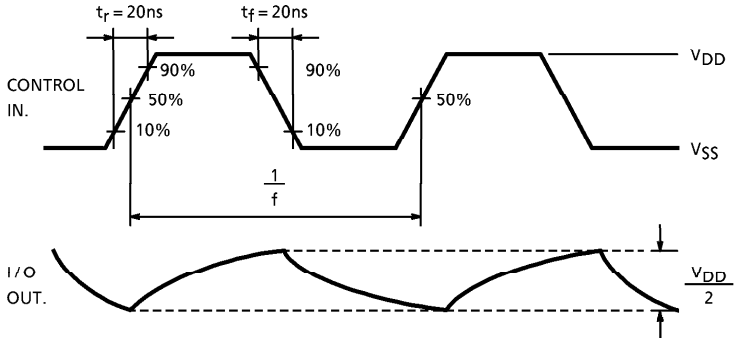
3. R_{ON}



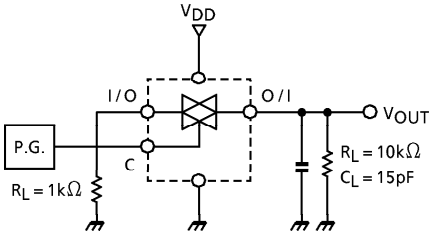
$$R_{ON} = 10 \times \frac{(V_{IN} - V_{OUT})}{V_{OUT}} (k\Omega)$$

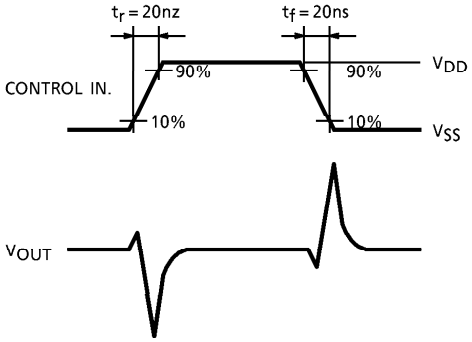
4. f_{MAX} (C)



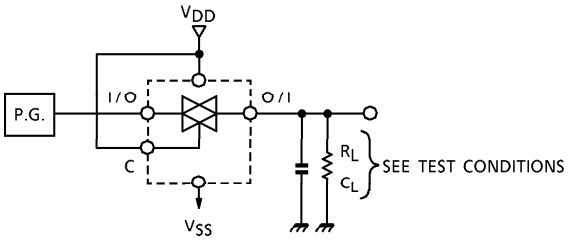


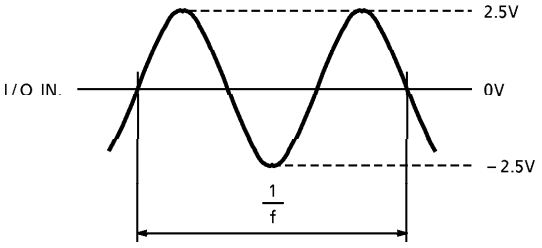
5. CROSSTALK (CONTROL INPUT)





6. TOTAL HARMONIC DISTORTION, f_{MAX} (I/O-O/I), FEEDTHROUGH (SWITCH OFF)

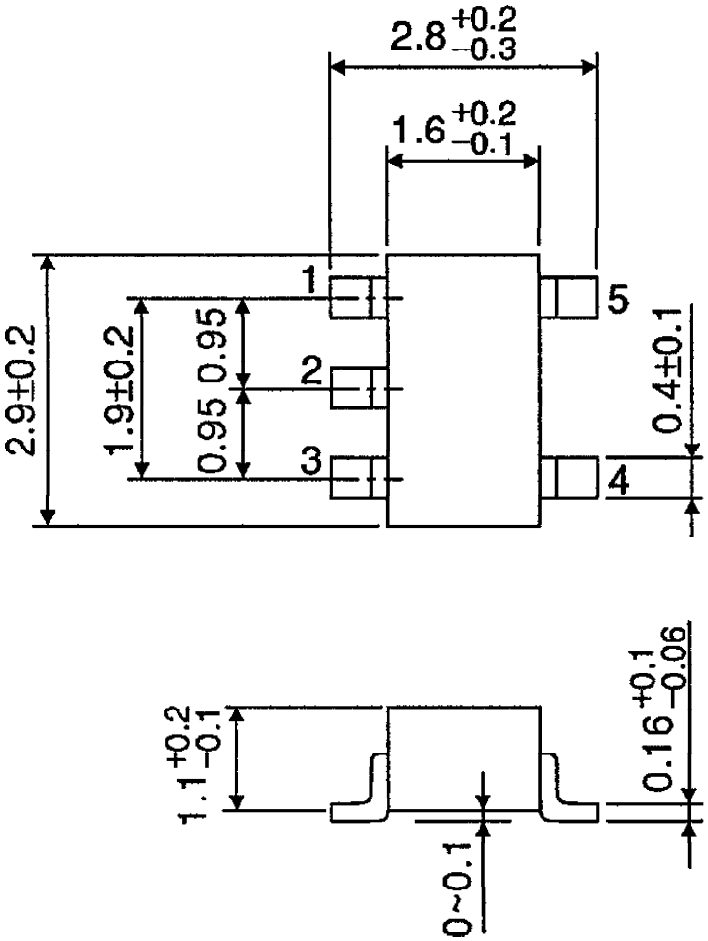




OUTLINE DRAWING

SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)