

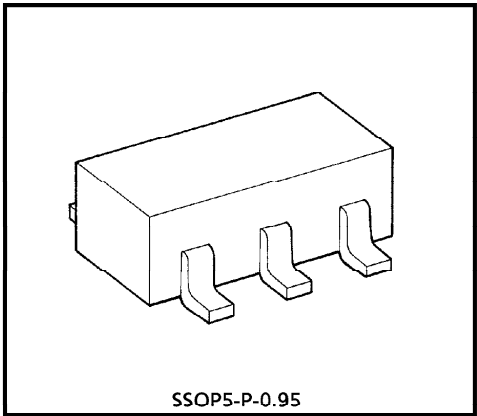
TC4S66F

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.

FEATURES

- ON-resistance (RON)  
300Ω (Typ.) . . . . VDD - VSS = 5V  
110Ω (Typ.) . . . . VDD - VSS = 10V  
70Ω (Typ.) . . . . VDD - VSS = 15V
- OFF-resistance (ROFF)  
ROFF (Typ.) > 10<sup>9</sup>Ω



Weight : 0.016g (Typ.)

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	VDD	VSS - 0.5~VSS + 20	V
Control Input Voltage	VC IN	VSS - 0.5~VDD + 0.5	V
Switch I/O Voltage	VI/O	VSS - 0.5~VDD + 0.5	V
Power Dissipation	PD	200	mW
Potential difference across I/O during ON	VI-VO	± 0.5	V
Control Input Current	IC IN	± 10	mA
Operating Temperature Range	Topr	- 40~85	°C
Storage Temperature	Tstg	- 65~150	°C
Lead Temperature (10s)	TL	260	°C

TRUTH TABLE

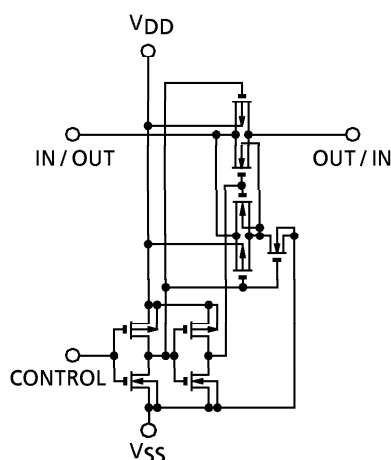
CONTROL	IMPEDANCE BETWEEN IN / OUT-OUT / IN *
H	0.5~5 × 10 <sup>2</sup> Ω
L	> 10 <sup>9</sup> Ω

\* See static electrical characteristics.

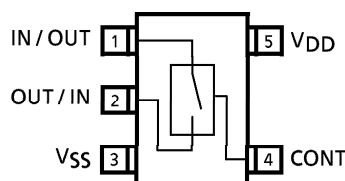
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● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

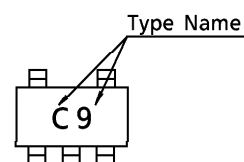
## CIRCUIT DIAGRAM



## 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 <sub>DD</sub> (V)	- 40°C		25°C			85°C		UNIT
					MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
Control Input High Voltage		V <sub>IH</sub>	I <sub>IS</sub>   = 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 <sub>IL</sub>	I <sub>IS</sub>   = 10μA	5	—	1.5	—	2.25	1.5	—	1.5	V
				10	—	3.0	—	4.5	3.0	—	3.0	
				15	—	4.0	—	6.75	4.0	—	4.0	
On-State Resistance		R <sub>ON</sub>	0 ≤ V <sub>IS</sub> ≤ V <sub>DD</sub> R <sub>L</sub> = 10kΩ	5	—	800	—	290	950	—	1200	Ω
				10	—	210	—	120	250	—	300	
				15	—	140	—	85	160	—	200	
Input / Output Leakage Current		I <sub>OFF</sub>	V <sub>IN</sub> = 18V, V <sub>OUT</sub> = 0V V <sub>IN</sub> = 0V, V <sub>OUT</sub> = 18V	18	—	± 100	—	± 0.1	± 100	—	± 1000	nA
				18	—	± 100	—	± 0.1	± 100	—	± 1000	
Quiescent Device Current		I <sub>DD</sub>	V <sub>IN</sub> = V <sub>DD</sub> , V <sub>SS</sub>	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 <sub>IH</sub>	V <sub>IH</sub> = 18V	18	—	0.1	—	10 <sup>-5</sup>	0.1	—	1.0	μA
	L Level	I <sub>OL</sub>	V <sub>IL</sub> = 0V	18	—	-0.1	—	-10 <sup>-5</sup>	-0.1	—	-1.0	

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## DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

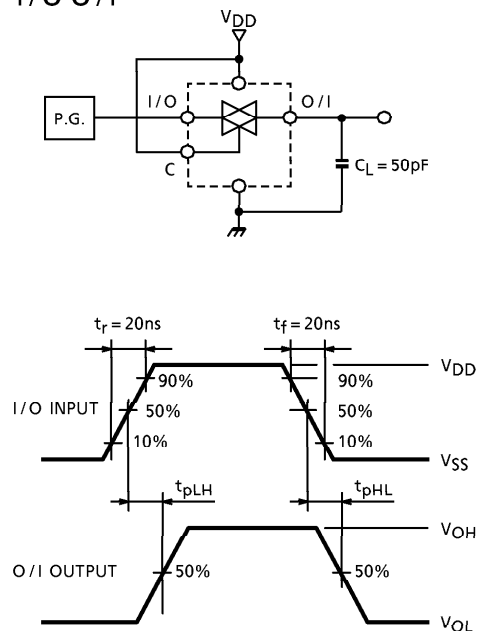
\*1 The frequency at  $20\log_{10} \frac{V_{OS}}{V_{IS}} = -3\text{dB}$  shall be f<sub>MAX</sub> (I/O) using sine wave of ±2.5V<sub>p-p</sub> for V<sub>IS</sub>.

\*2 V<sub>IS</sub> shall be sine wave of ±2.5V.

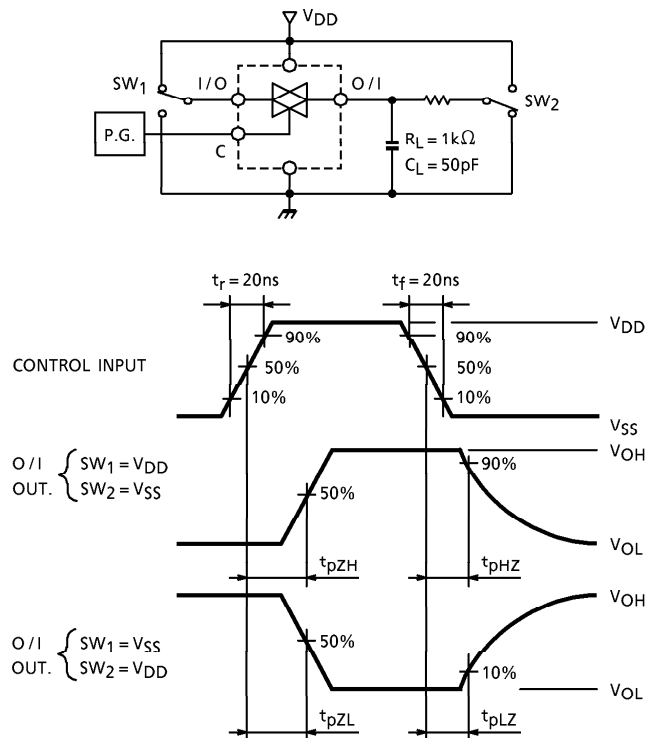
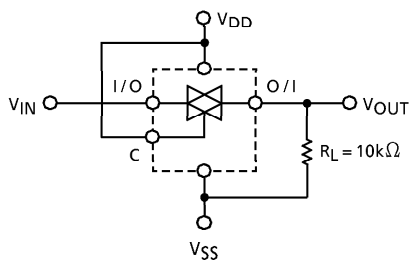
\*3 The frequency at  $20\log_{10} \frac{V_{OS}}{V_{IS}} = 50\text{dB}$  shall be the feed through using of ±2.5V<sub>p-p</sub>.

1.  $t_{pLH}$ ,  $t_{pHL}$ 

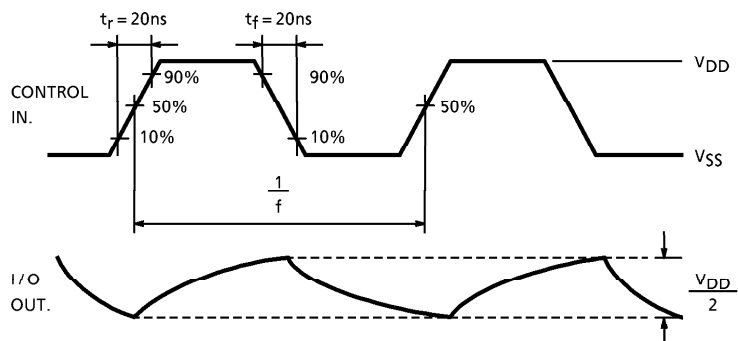
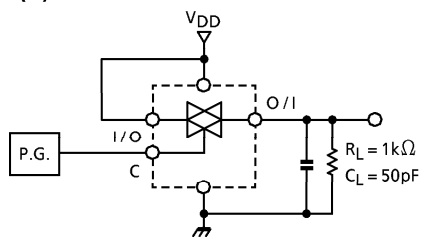
I/O-O/I

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

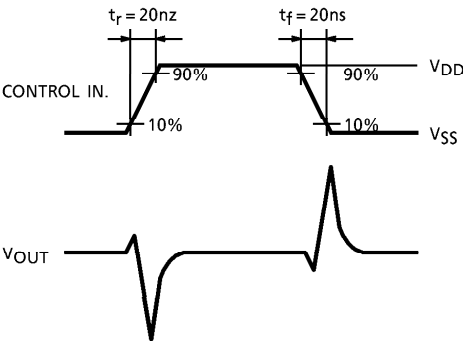
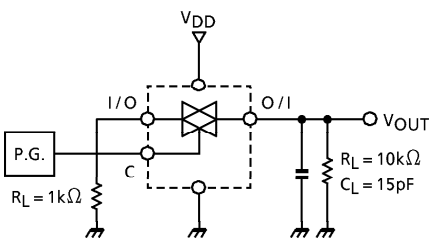
CONTROL-O/I

3.  $R_{ON}$ 

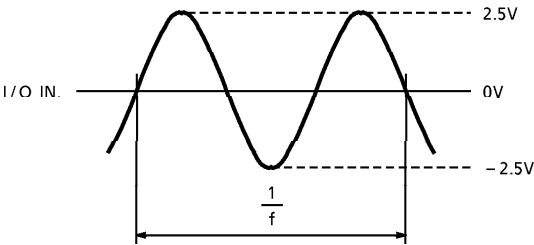
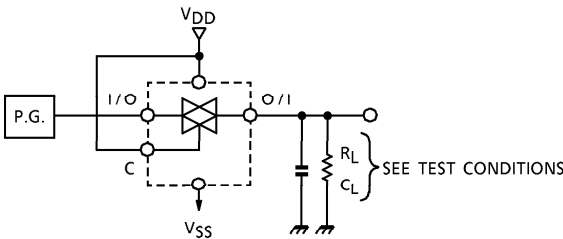
$$R_{ON} = 10 \times \frac{(V_{IN} - V_{OUT})}{V_{OUT}} \text{ (k}\Omega\text{)}$$

4.  $f_{MAX}(C)$ 

5. CROSSTALK (CONTROL INPUT)

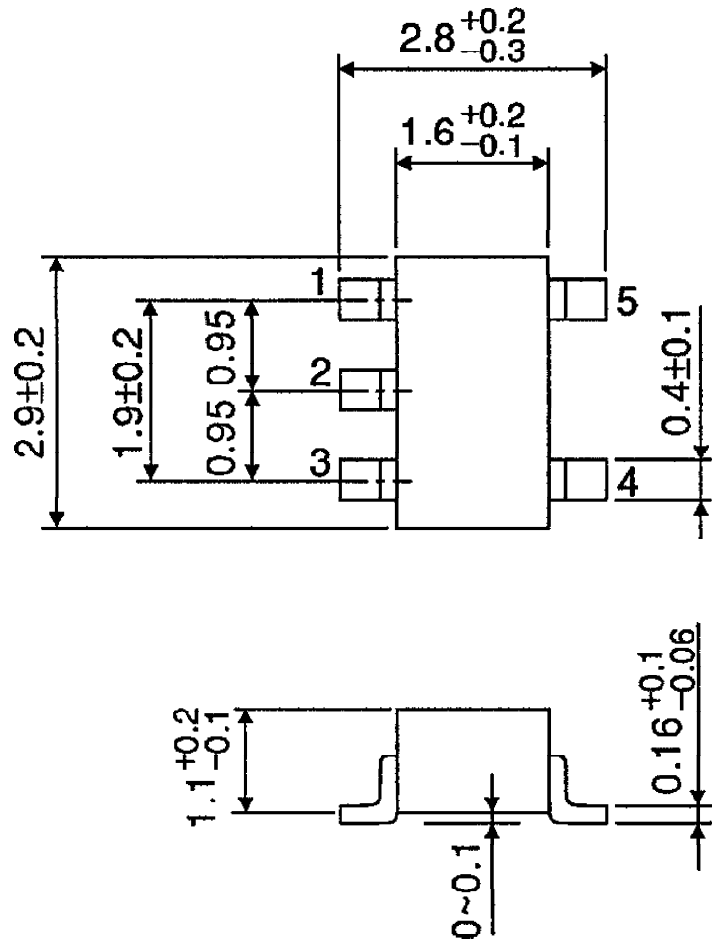


6. TOTAL HARMONIC DISTORTION, fMAX (I/O-O/I), FEEDTHROUGH (SWITCH OFF)



OUTLINE DRAWING  
SSOP5-P-0.95

Unit : mm



Weight : 0.016g (Typ.)