

TC4W66F, TC4W66FU

DUAL BILATERAL SWITCH

The TC4W66 contains two independence circuits 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.

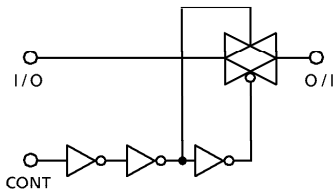
FEATURES

- ON-resistance, R_{ON}
 250Ω (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.) $> 10^9\Omega$

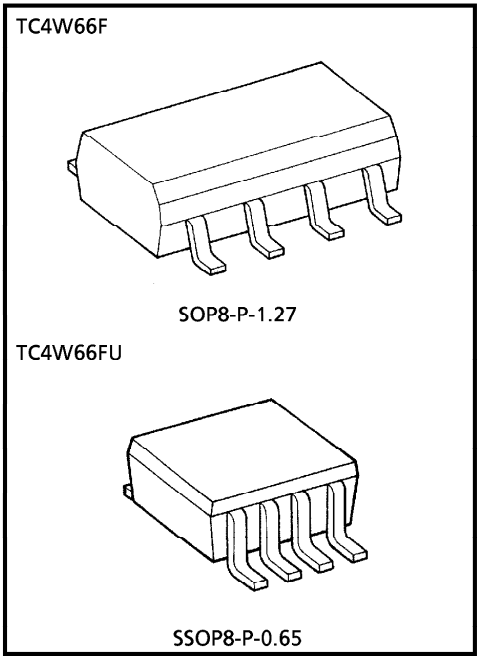
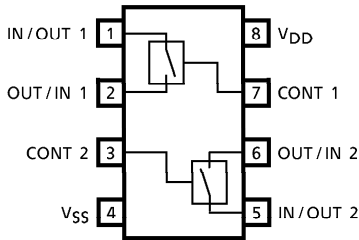
MAXIMUM RATINGS

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	300	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}	$-40 \sim 85$	$^{\circ}C$
Storage Temperature	T_{stg}	$-65 \sim 150$	$^{\circ}C$
Lead Temp. / Time	T_L	$260^{\circ}C / 10s$	

LOGIC DIAGRAM (1/2 TC4W66F)

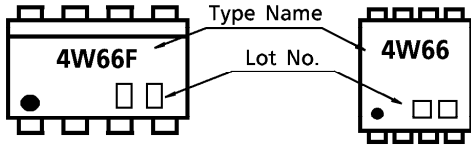


PIN ASSIGNMENT (TOP VIEW)



Weight SOP8-P-1.27 : 0.05g (Typ.)
SSOP8-P-0.65 : 0.02g (Typ.)

MARKING



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

● 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.

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

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

STATIC ELECTRICAL CHARACTERISTICS (In case not specifically appointed, $V_{SS} = 0V$)

CHARACTERISTICS		SYM-BOL	TEST CONDITION	V _{DD} (V)	Ta = − 40°C		Ta = 25°C			Ta = 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	V
				10	—	3.0	—	4.5	3.0	—	3.0	
				15	—	4.0	—	6.75	4.0	—	4.0	
On-State Resistance		R _{ON}	0 ≤ V _{IS} ≤ V _{DD} R _L = 10kΩ	5	—	800	—	290	950	—	1200	Ω
				10	—	210	—	120	250	—	300	
				15	—	140	—	85	160	—	200	
ΔOn-State Resistance (Between Any2 Switches)		R _{ON Δ}	—	5	—	—	—	10	—	—	—	Ω
				10	—	—	—	6	—	—	—	
				15	—	—	—	4	—	—	—	
Input / Output Leakage Current		I _{OFF}	V _{IN} = 18V, V _{OUT} = 0V V _{IN} = 0V, V _{OUT} = 18V	18	—	± 100	—	± 0.1	± 100	—	± 1000	nA
				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 _{IL}	V _{IL} = 0V	18	—	− 0.1	—	− 10 ^{−5}	− 0.1	—	− 1.0	

961001EBA2'

- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{SS} = 0V, C_L = 50pF)

CHARACTERISTICS	SYMBOL	TEST CONDITION	V _{SS} (V)	V _{DD} (V)	MIN.	TYP.	MAX.	UNIT
Phase Difference between Input to Output	ϕ I-O	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 = 1k Ω 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 = 1k Ω 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 = 1k Ω C _L = 50pF	0	5	—	10	—	MHz
			0	10	—	12	—	
			0	15	—	12	—	
– 3dB Cutoff Frequency	f _{MAX} (I-O)	R _L = 1k Ω C _L = 50pF (*1)	– 5	5	—	30	—	
Total Harmonic Distortion	—	R _L = 10k Ω f = 1kHz (*2)	– 5	5	—	0.03	—	%
– 50dB Feed through Frequency	—	R _L = 1k Ω (*3)	– 5	5	—	600	—	kHz
– 50dB Crosstalk Frequency	—	R _L = 1k Ω (*4)	– 5	5	—	1	—	MHz
Crosstalk (CONTROL-OUT)	—	R _{IN} = 1k Ω R _{OUT} = 10k Ω 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	—	
Feed through Capacitance	C _{IN-OUT}	—	—	—	—	0.5	—	

*1 Since wave of $\pm 2.5V_{p-p}$ shall be used for V_{IS} and the frequency of $20\log_{10} \frac{V_{OS}}{V_{IS}}$ = – 3dB shall be f_{MAX}.

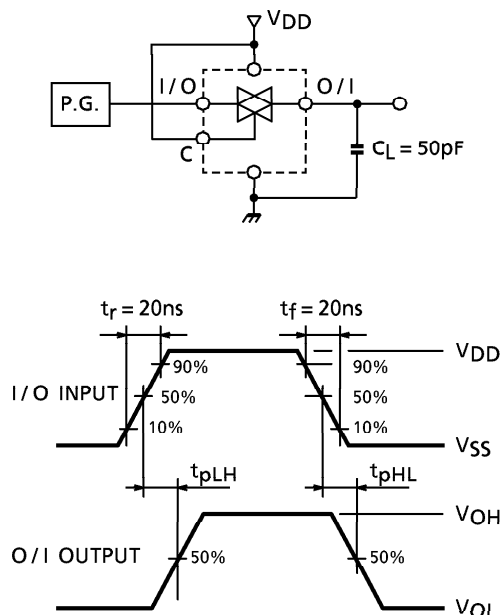
*2 V_{IS} shall be sine wave of $\pm 2.5V_{p-p}$.

*3 Sine wave of $\pm 2.5V_{p-p}$ shall be used for V_{IS} and the frequency of $20\log_{10} \frac{V_{OUT}}{V_{IS}}$ = – 50dB shall be feed-through.

*4 Sine wave of $\pm 2.5V_{p-p}$ shall be used for V_{IS} and the frequency of $20\log_{10} \frac{V_{OUT}}{V_{IS}}$ = – 50dB shall be crosstalk.

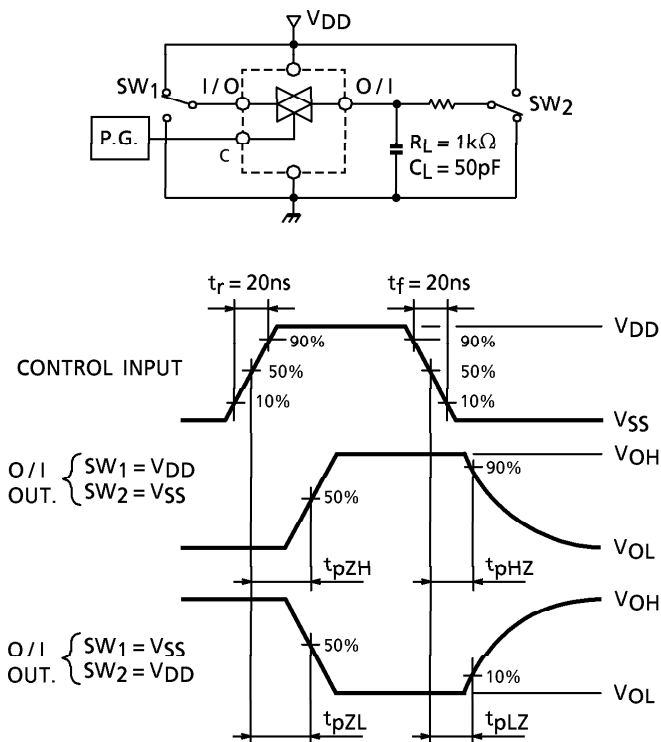
1. t_{pLH} , t_{pHL}

I/O-O/I

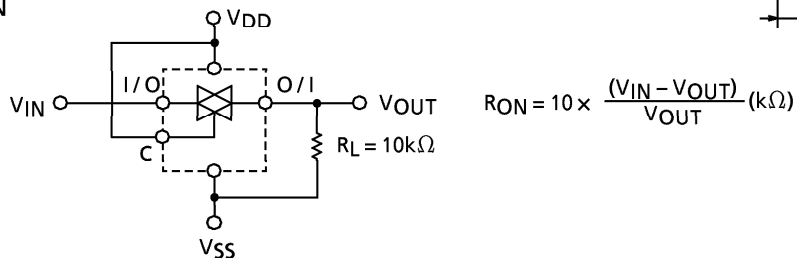


2. t_{pZL} , t_{pZH} , t_{pLZ} , t_{pHZ}

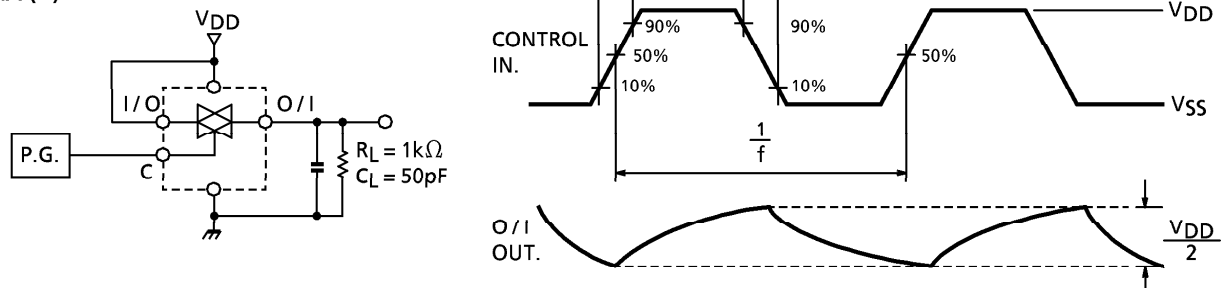
CONTROL-O/I



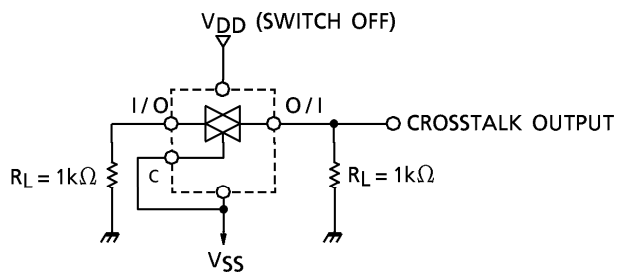
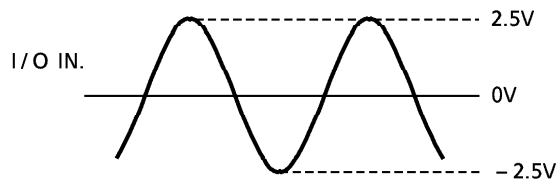
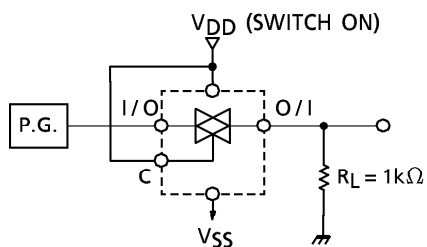
3. R_{ON}



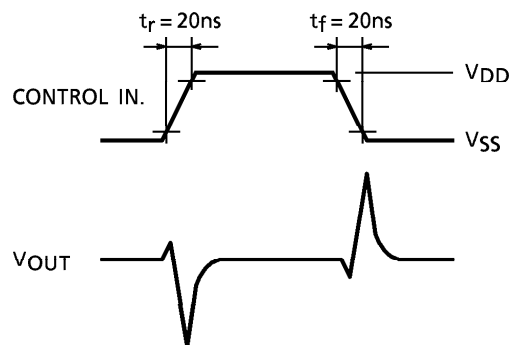
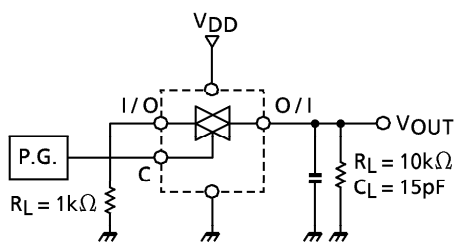
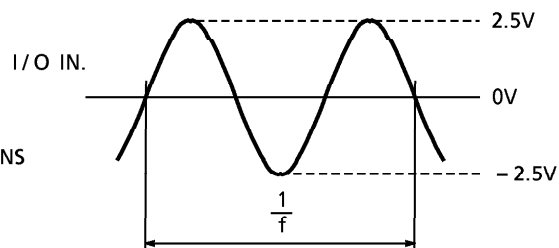
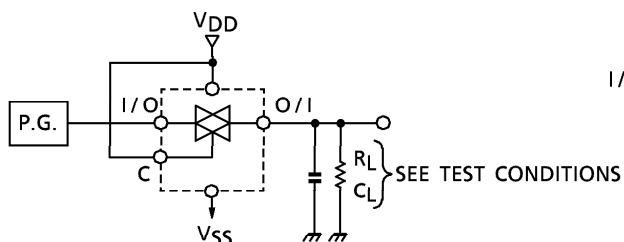
4. $f_{MAX}(C)$



5. CROSSTALK (SWITCH I/O)

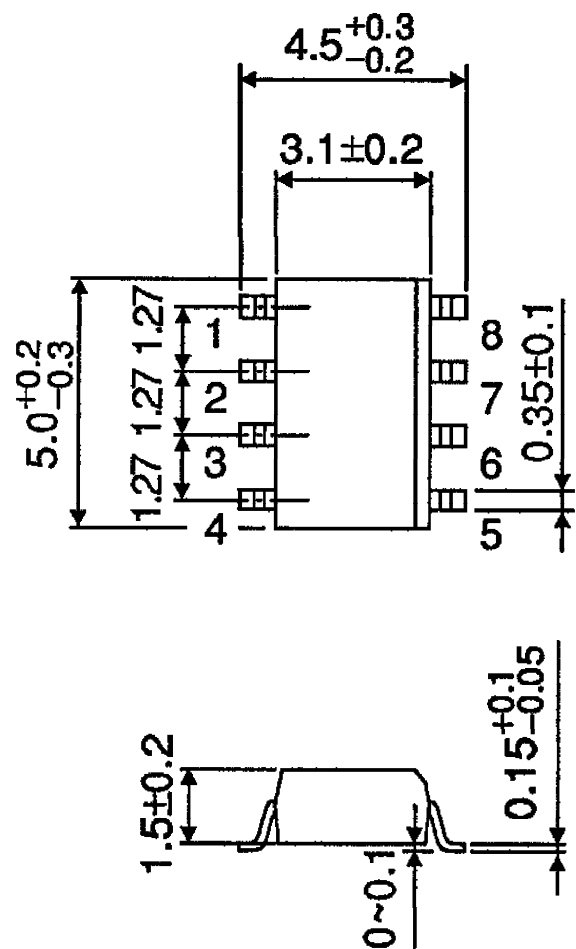


6. CROSSTALK (CONTROL INPUT)

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

OUTLINE DRAWING
SOP8-P-1.27

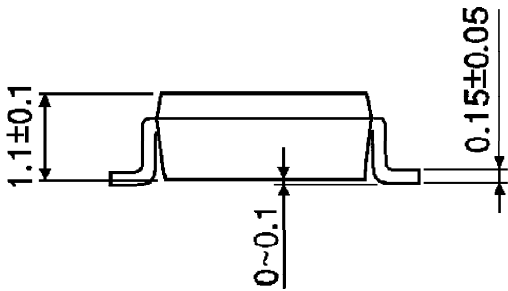
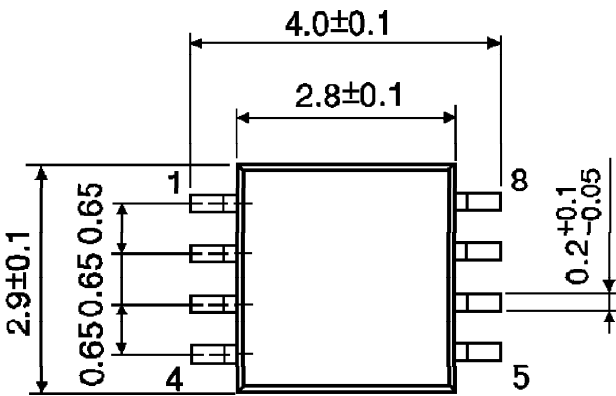
Unit : mm



Weight : 0.05g (Typ.)

OUTLINE DRAWING
SSOP8-P-0.65

Unit : mm



Weight : 0.02g (Typ.)