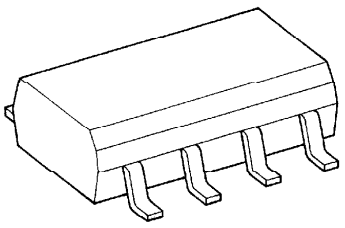
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4W66F, TC4W66FU

DUAL BILATERAL SWITCH

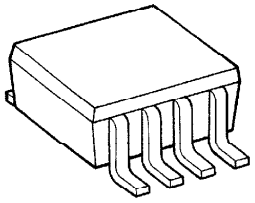
The TC4W66 contains two independence circuits of bidirectional switches.
When control input CONT is set to "H" level, the impedance between input and output of the switch becomes low and when it is set to "L" level, the switch becomes high. This can be applied for switching of analog signals and digital signals.

TC4W66F



SOP8-P-1.27

TC4W66FU



SSOP8-P-0.65

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

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

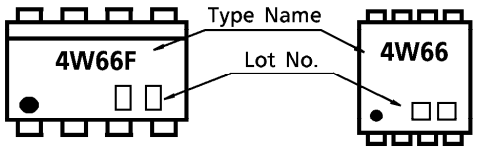
- OFF-resistance, R_{OFF}

  R_{OFF} (Typ.) > 10^9Ω

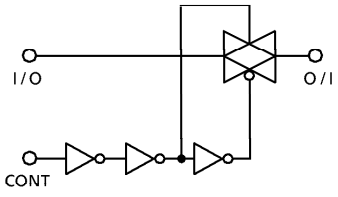
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	V_{SS} – 0.5~V_{SS} + 20	V
Control Input Voltage	$V_{C\ IN}$	V_{SS} – 0.5~V_{DD} + 0.5	V
Switch I/O Voltage	$V_{I/O}$	V_{SS} – 0.5~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}	– 40~85	°C
Storage Temperature	T_{stg}	– 65~150	°C
Lead Temp. / Time	T_L	260°C / 10s	

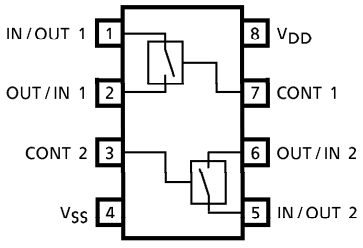
MARKING



LOGIC DIAGRAM
(1 / 2 TC4W66F)



PIN ASSIGNMENT (TOP VIEW)



TRUTH TABLE

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

* See static electrical characteristics.

961001EBA2

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		SYMBOL	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	
				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	
Δ On-State Resistance (Between Any2 Switches)		R_{ON} Δ	—	5	—	—	—	10	—	—	—	
				10	—	—	—	6	—	—	—	
				15	—	—	—	4	—	—	—	
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_{IL}	V_{IL} = 0V	18	—	−0.1	—	-10^{-5}	−0.1	—	−1.0	

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	ϕI-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 = 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 Cutoff 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 Feed through Frequency	—	R_L = 1kΩ (*3)	−5	5	—	600	—	kHz
−50dB Crosstalk Frequency	—	R_L = 1kΩ (*4)	−5	5	—	1	—	MHz
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	—	
Feed through Capacitance	C_{IN-OUT}	—			—	0.5	—	

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

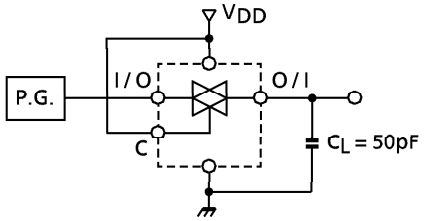
*2 V_{IS} shall be sine wave of ±2.5V_{p-p}.

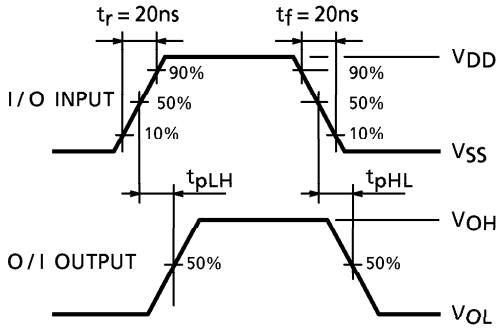
*3 Sine wave of ±2.5V_{p-p} shall be used for V_{IS} and the frequency of $20\ell og_{10}\frac{V_{OUT}}{V_{IS}}$ = −50dB shall be feed-through.

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

1. t_{pLH}, t_{pHL}

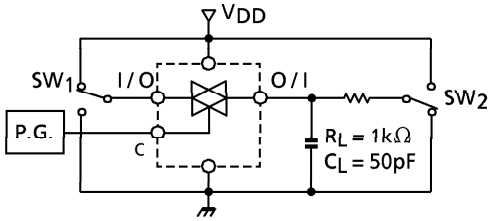
I / O-O / I

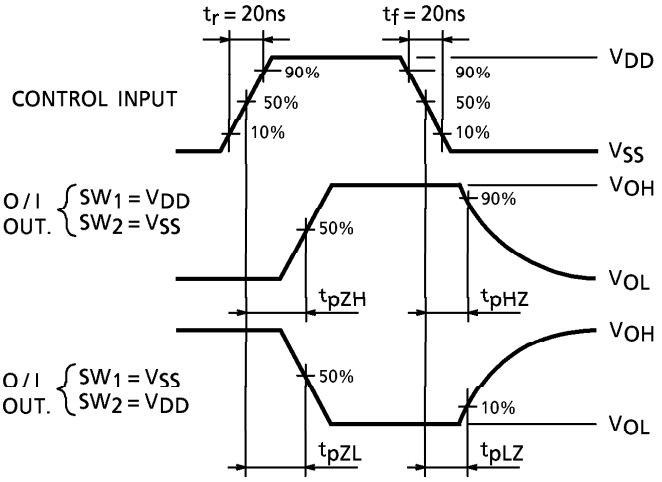




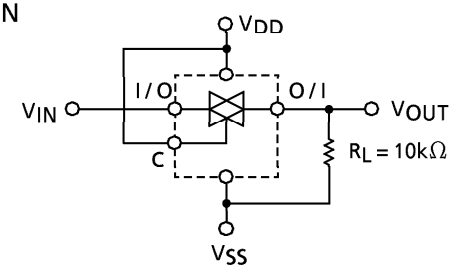
2. t_{pZL}, t_{pZH}, t_{pLZ}, t_{pHZ}

CONTROL-O / I



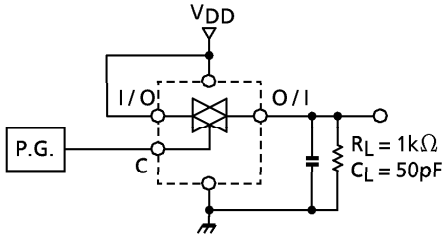


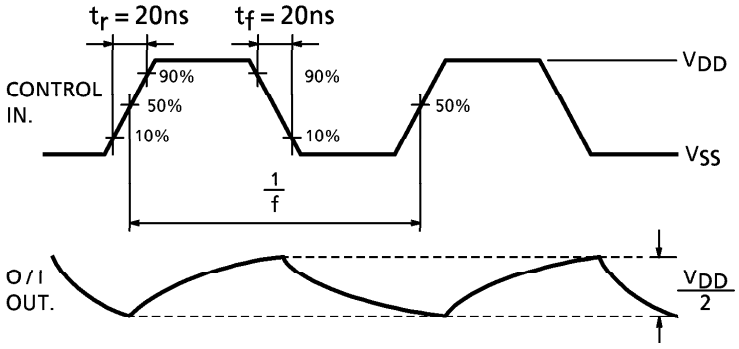
3. R_{ON}



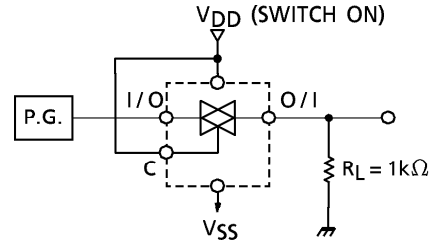
$$R_{ON} = 10 \times \frac{(V_{IN} - V_{OUT})}{V_{OUT}} (k\Omega)$$

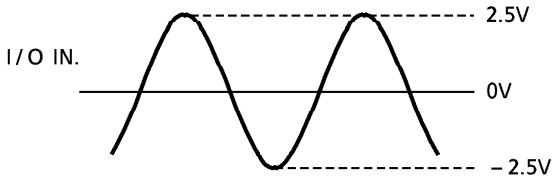
4. f_{MAX} (C)

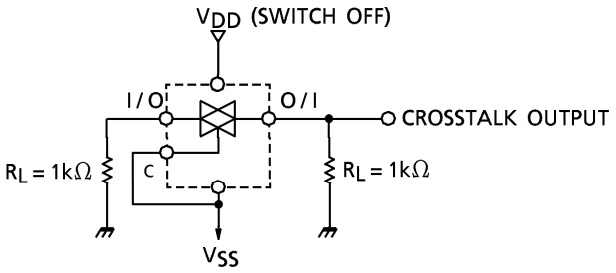




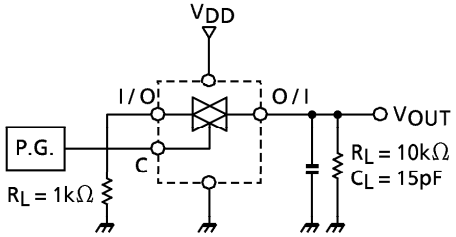
5. CROSSTALK (SWITCH I/O)

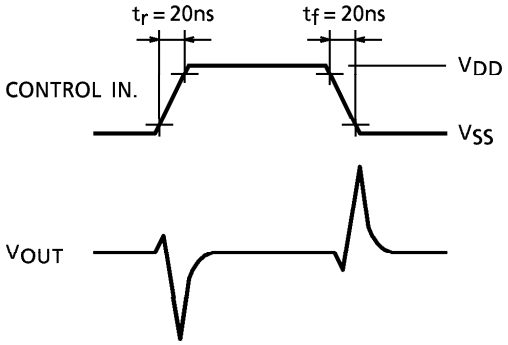




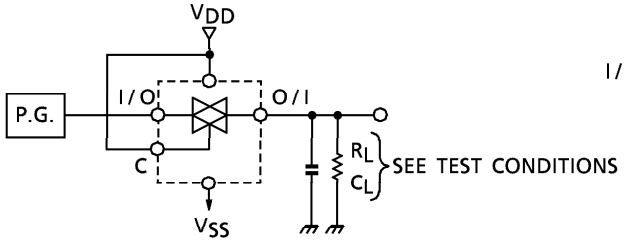


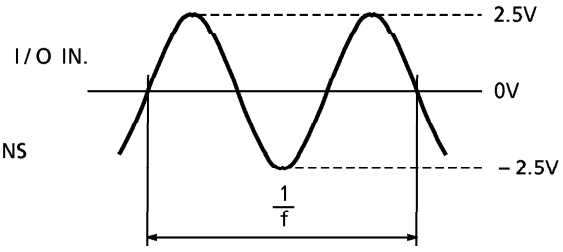
6. CROSSTALK (CONTROL INPUT)





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

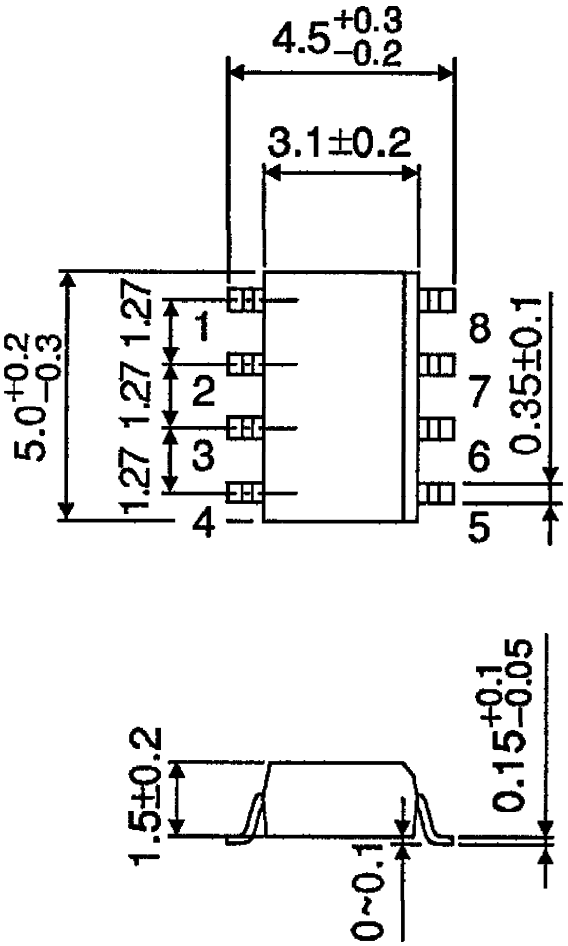




OUTLINE DRAWING

SOP8-P-1.27

Unit : mm

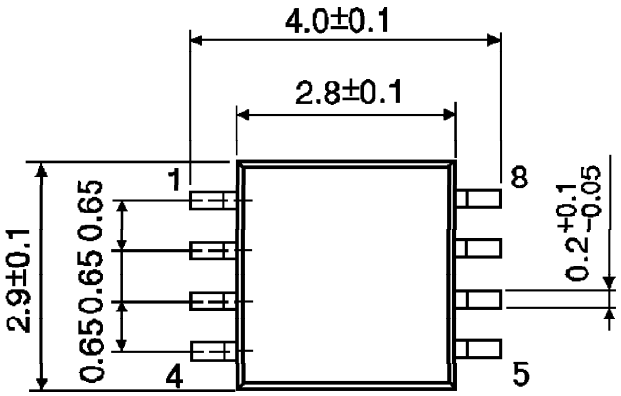


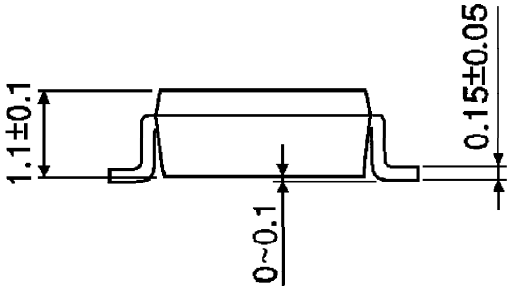
Weight : 0.05g (Typ.)

OUTLINE DRAWING

SSOP8-P-0.65

Unit : mm





Weight : 0.02g (Typ.)