

## DUAL BILATERAL SWITCH

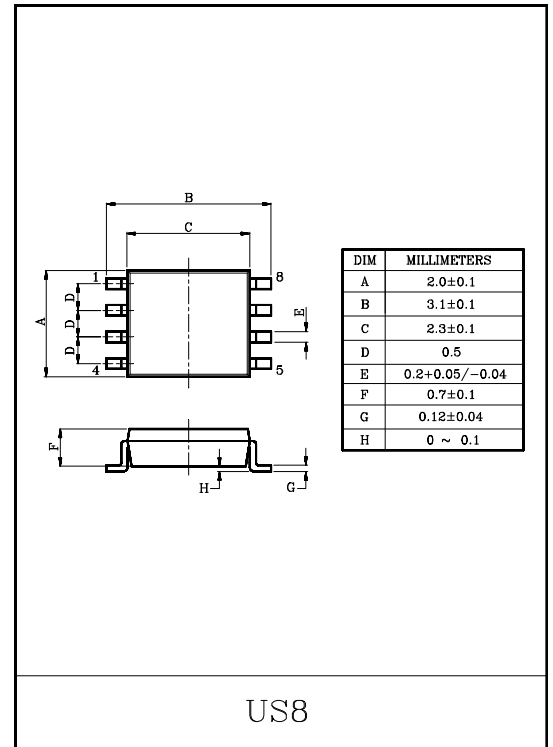
The KIC7W66FK is a high speed C<sup>2</sup>MOS DUAL BILATERAL SWITCH fabricated with silicon gate C<sup>2</sup>MOS technology. It consists of four independent high speed switches capable of controlling either digital or analog signals while maintaining the CMOS low power dissipation. Control input (C) is provided to control the switch. The switch turns ON while the C input is high, and the switch turns OFF while low. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

### FEATURES

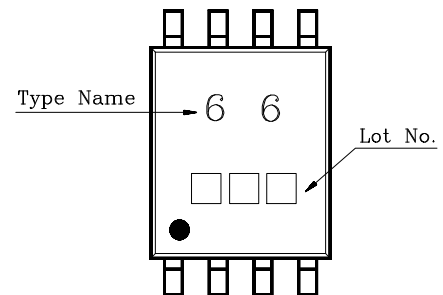
- High Speed :  $t_{pd}=7ns$ (Typ.) at  $V_{CC}=5V$ .
- Low Power Dissipation :  $I_{CC}=1\mu A$ (Max.) at  $T_a=25^\circ C$ .
- High Noise Immunity :  $V_{NIH}=V_{NIL}=28\% V_{CC}(\text{Min.})$ .
- Low ON Resistance :  $R_{ON}=50\Omega$ (Typ.) at  $V_{CC}=9V$
- High Degree of Linearity :  $THD=0.05$ (Typ.) at  $V_{CC}=5V$

### MAXIMUM RATINGS ( $T_a=25^\circ C$ )

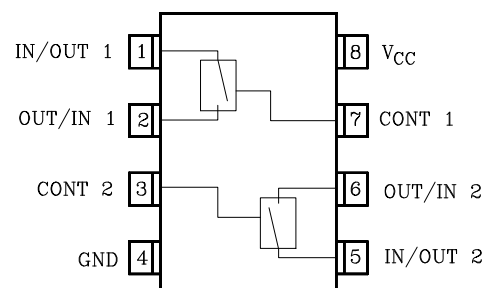
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage Range	$V_{CC}$	-0.5~10	V
Control Input Voltage	$V_{IN}$	-0.5~ $V_{CC}+0.5$	V
Switch I/O Voltage	$V_{IO}$	-0.5~ $V_{CC}+0.5$	V
Control Input Diode Current	$I_{CK}$	$\pm 20$	mA
I/O Diode Current	$I_{IOK}$	$\pm 20$	mA
Switch Through Current	$I_T$	$\pm 25$	mA
DC $V_{CC}$ /Ground Current	$I_{CC}$	$\pm 50$	mA
Power Dissipation	$P_D$	200	mW
Storage Temperature	$T_{stg}$	-65~150	$^\circ C$
Lead Temperature (10s)	$T_L$	260	$^\circ C$



### MARKING

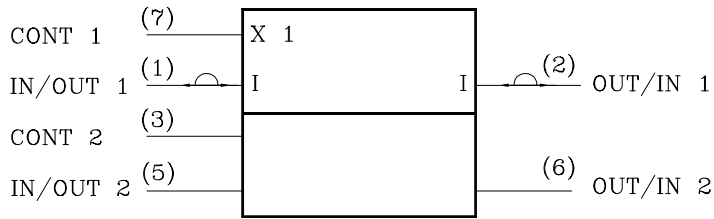


### PIN CONNECTION(TOP VIEW)



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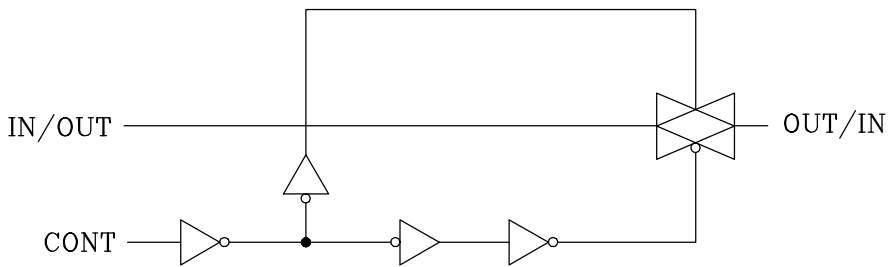
## LOGIC SYMBOL



## TRUTH TABLE

CONTROL	SWITCH FUNCTION
H	ON
L	OFF

## LOGIC DIAGRAM



## RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	$V_{CC}$	2~9	V
Control Input Voltage	$V_{IN}$	0~ $V_{CC}$	V
Switch I/O Voltage	$V_{I/O}$	0~ $V_{CC}$	V
Operating Temperature	$T_{opr}$	-40~85	°C
Input Rise and Fall Time	$t_r, t_f$	0~1000 ( $V_{CC}=2.0V$ ) 0~ 500 ( $V_{CC}=4.5V$ ) 0~ 400 ( $V_{CC}=6.0V$ ) 0~ 250 ( $V_{CC}=9.0V$ )	ns

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## DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>CC</sub>	Ta=25°C			Ta=-40~85°C		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Control Input Voltage	V <sub>IHC</sub>		2.0	1.5	-	-	1.5	-	V
			4.5	3.15	-	-	3.15	-	
			9.0	6.3	-	-	6.3	-	
Low-Level Control Input Voltage	V <sub>ILC</sub>		2.0	-	-	0.5	-	0.5	V
			4.5	-	-	1.35	-	1.35	
			9.0	-	-	2.7	-	2.7	
ON Resistance	R <sub>ON</sub>	V <sub>IN</sub> =V <sub>IHC</sub> V <sub>I/O</sub> =V <sub>CC</sub> or GND I <sub>I/O</sub> ≤1mA	4.5	-	96	170	-	200	Ω
			9.0	-	55	85	-	100	
			2.0	-	160	-	-	-	
		4.5	-	70	100	-	130		
		9.0	-	50	75	-	95		
		9.0	-	50	75	-	95		
Difference of ON Resistance Between Switches	ΔR <sub>ON</sub>	V <sub>IN</sub> =V <sub>IHC</sub> V <sub>I/O</sub> =V <sub>CC</sub> to GND I <sub>I/O</sub> ≤1mA	4.5	-	10	-	-	-	Ω
			9.0	-	5	-	-	-	
Input/Output Leakage Current (SWITCH OFF)	I <sub>OFF</sub>	V <sub>OS</sub> =V <sub>CC</sub> or GND V <sub>I/S</sub> =GND or V <sub>CC</sub> V <sub>IN</sub> =V <sub>ILC</sub>	9.0	-	-	±100	-	±1000	nA
Switch Input Leakage Current (SWITCH ON OUTPUT OPEN)	I <sub>IZ</sub>	V <sub>OS</sub> =V <sub>CC</sub> or GND V <sub>INH</sub> =V <sub>IHC</sub>	9.0	-	-	±100	-	±1000	nA
Control Input Current	I <sub>IN</sub>	V <sub>IN</sub> =V <sub>CC</sub> or GND	6.0	-	-	±100	-	±1000	nA
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> =V <sub>CC</sub> or GND	6.0	-	-	1.0	-	10.0	μA
			9.0	-	-	4.0	-	40.0	

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## AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub>=50pF, Input, t<sub>r</sub>=t<sub>f</sub>=6ns)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Ta=25°C			Ta=-40~85°C		UNIT	
			V <sub>CC</sub>	MIN.	TYP.	MAX.	MIN.		MAX.
Phase Difference Between Input and Output	φ I/O		2.0	-	10	50	-	65	ns
			4.5	-	4	10	-	13	
			9.0	-	3	8	-	10	
Output Enable Time	t <sub>pZL</sub> t <sub>pZH</sub>	R <sub>L</sub> =1kΩ	2.0	-	18	100	-	125	ns
			4.5	-	8	20	-	25	
			9.0	-	6	12	-	22	
Output Disable Time	t <sub>pLZ</sub> t <sub>pHZ</sub>	R <sub>L</sub> =1kΩ	2.0	-	20	115	-	145	ns
			4.5	-	10	23	-	29	
			9.0	-	8	20	-	25	
Maximum Control Input Frequency		R <sub>L</sub> =1kΩ C <sub>L</sub> =15pF V <sub>OUT</sub> =1/2V <sub>CC</sub>	2.0	-	30	-	-	-	MHz
			4.5	-	30	-	-	-	
			9.0	-	30	-	-	-	
Control Input Capacitance	C <sub>IN</sub>		-	5	10	-	10	pF	
Switch Terminal Capacitance	C <sub>I/O</sub>		-	6	-	-	-	pF	
Feed Through Capacitance	C <sub>IOS</sub>		-	0.5	-	-	-	pF	
Power Dissipation Capacitance	C <sub>PD</sub>	(Note 1)	-	15	-	-	-	pF	

Note 1 : C<sub>PD</sub> is defined as the value of internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC(opp)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2$$

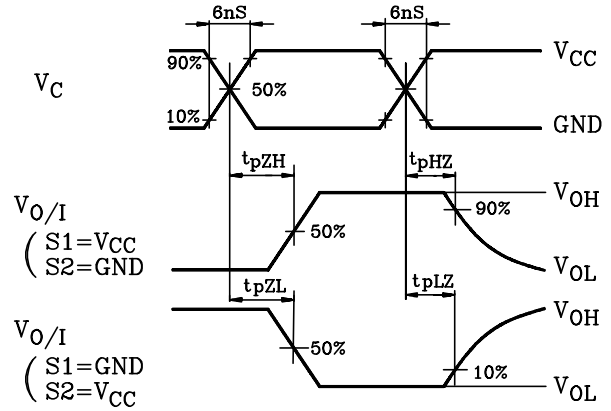
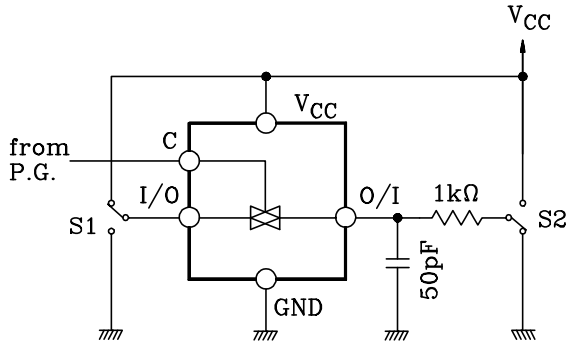
## ANALOG SWITCH CHARACTERISTICS (GND=0V, Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V <sub>CC</sub>	TYP.	UNIT
Sine Wave Distortion (T.H.D)		f <sub>IN</sub> =1kHz, V <sub>IN</sub> =4.0V <sub>P-P</sub> @V <sub>CC</sub> =4.5V R <sub>L</sub> =10kΩ, V <sub>IN</sub> =8.0V <sub>P-P</sub> @V <sub>CC</sub> =9.0V C <sub>L</sub> =50pF	4.5	0.05	%
			9.0	0.04	
Frequency Response (Switch ON)	f <sub>MAX</sub>	Adjust f <sub>IN</sub> voltage to obtain 0dBm at V <sub>OS</sub> Increase f <sub>IN</sub> Frequency until dB Meter reads -3dB R <sub>L</sub> =50Ω, C <sub>L</sub> =10pF, f <sub>IN</sub> =1MHz, Sine Wave	4.5	200	MHz
			9.0	200	
Feedthrough Attenuation (Switch OFF)		V <sub>in</sub> is centered at V <sub>CC</sub> /2 Adjust input for 0dBm R <sub>L</sub> =600Ω, C <sub>L</sub> =50pF, f <sub>IN</sub> =1MHz, Sine Wave	4.5	-60	dB
			9.0	-60	
Crosstalk (Control Input to Signal Output)		R <sub>L</sub> =600Ω, C <sub>L</sub> =50pF, f <sub>IN</sub> =1MHz, Square Wave (t <sub>r</sub> =t <sub>f</sub> =6ns)	4.5	60	mV
			9.0	100	
Crosstalk (Between any switches)		Adjust V <sub>IN</sub> to obtain 0dBm at Input R <sub>L</sub> =600Ω, C <sub>L</sub> =50pF, f <sub>IN</sub> =1MHz, Sine Wave	4.5	-60	dB
			9.0	-60	

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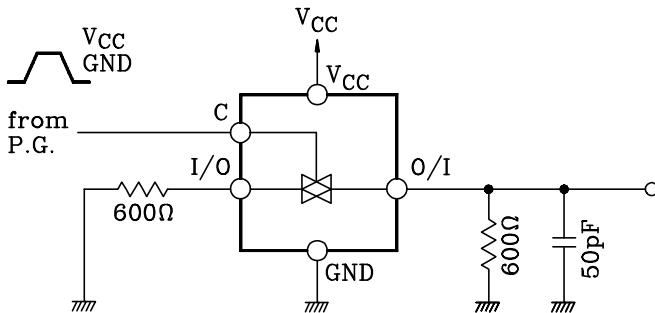
## SWITCHING CHARACTERISTICS TEST CIRCUITS

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

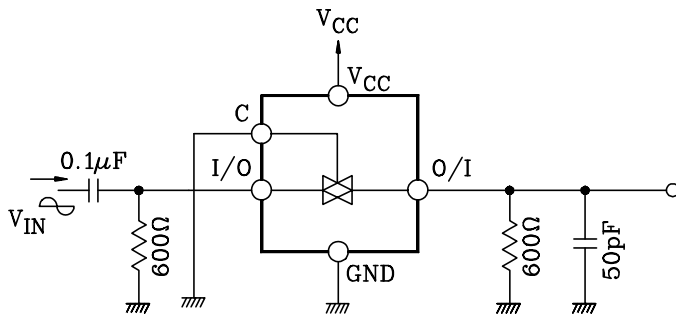


2. CROSS TALK (CONTROL INPUT-SWITCH OUTPUT)

$f_{IN}=1\text{MHz}$ , duty=50%,  $t_r=t_f=6\text{ns}$

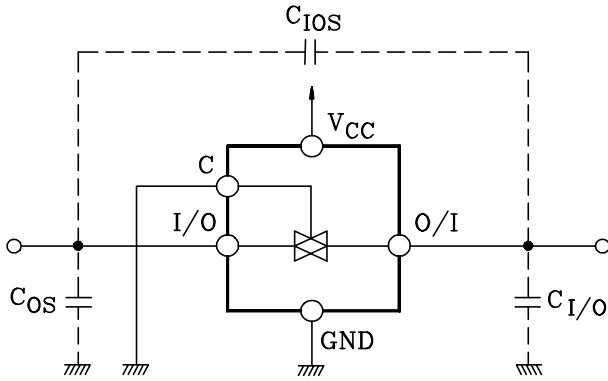


3. FEEDTHROUGH ATTENUATION

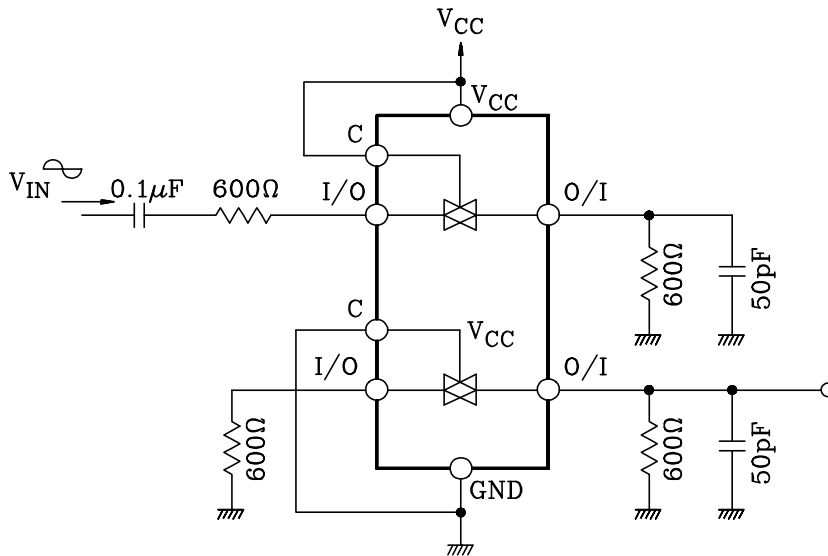


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## 4. $C_{IOS}$ , $C_{I/O}$



## 5. CROSS TALK (BETWEEN ANY TWO SWITCHES)



## 3. FREQUENCY RESPONSE (SWITCH ON)

