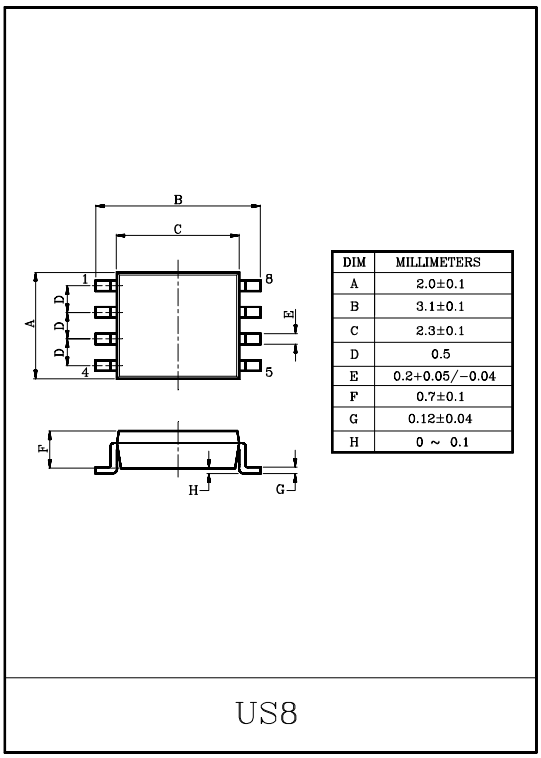
2-CHANNEL MULTIPLEXER/DEMULTIPLEXER

The KIC7W53FK is a high speed CMOS ANALOG MULTIPLEXER/DEMULTIPLEXER fabricated with silicon gate CMOS technology.
They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.
The KIC7W53FK has a 2 channel configuration.
The digital signal to the control terminal turns "ON" the corresponding switch of each channel a large amplitude signal (V_{CC}-V_{EE}) can then be switched by the small logical amplitude (V_{CC}-GND) control signal.
For example, in the case of V_{CC}=5V, GND=0V, V_{EE}=-5V, signals between -5V and +5V can be switchd from the logical circuit with a single power supply of 5V.
As the ON-resistance of each switch is low, they can be connected to circuit with low input impedance.
All inputs are equipped with protection circuits against static discharge or transient excess voltage.



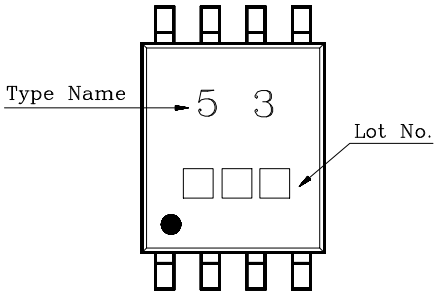
DIM	MILLIMETERS
A	2.0±0.1
B	3.1±0.1
C	2.3±0.1
D	0.5
E	0.2+0.05/−0.04
F	0.7±0.1
G	0.12±0.04
H	0 ~ 0.1

US8

FEATURES

- High Speed : t_{pd}=15ns(Typ.) at V_{CC}=5V, V_{EE}=0V
- Low Power Dissipation : I_{CC}=4μA(Max.) at Ta=25℃.
- High Noise Immunity : V_{NIH}=V_{NIL}=28% V_{CC}(Min.).
- Low ON Resistance : R_{ON}=50Ω(Typ.) at V_{CC}-V_{EE}=9V
- High Degree of Linearity : THD=0.02(Typ.) at V_{CC}-V_{EE}=9V

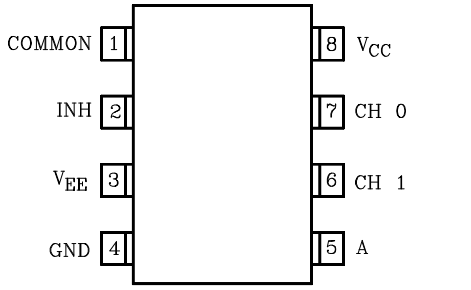
MARKING



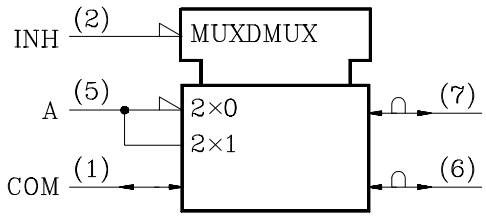
MAXIMUM RATINGS (Ta=25℃)

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

PIN CONNECTION(TOP VIEW)



LOGIC SYMBOL

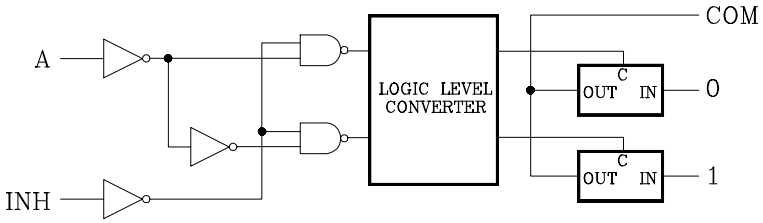


TRUTH TABLE

CONTROL INPUT		ON CHANNEL
INH	A	
L	L	ch 0
L	H	ch 1
H	X	NONE

X : Don't care

LOGIC DIAGRAM



RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	2~9	V
	V_{EE}	-4.5~0	
	V_{CC}~V_{EE}	2~9	
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	℃
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)	ns

DC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITION			Ta=25℃			Ta=-40~85℃		UNIT
			V_{EE}(V)	V_{CC}(V)	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Control Input Voltage	V_{IHC}			2.0 4.5 6.0	1.5 3.15 4.2	- - -	- - -	1.5 3.15 4.2	- - -	V
Low-Level Control Input Voltage	V_{ILC}			2.0 4.5 6.0	- - -	- - -	0.5 1.35 1.8	- - -	0.5 1.35 1.8	V
ON Resistance	R_{ON}	V_{IN}=V_{IHC} $V_{I/O}$=V_{CC} to GND $I_{I/O}$≦2mA	GND -4.5	4.5 4.5	- -	85 55	180 120	- -	225 150	Ω
		V_{IN}=V_{IHC} $V_{I/O}$=V_{CC} or GND $I_{I/O}$≦2mA	GND GND -4.5	2.0 4.5 4.5	- - -	150 70 50	- 150 100	- - -	- 190 125	
Difference of ON Resistance Between Switches	ΔR_{ON}	V_{IN}=V_{IHC} $V_{I/O}$=V_{CC} to GND $I_{I/O}$≦2mA	GND -4.5	4.5 4.5	- -	10 5	30 12	- -	35 15	Ω
Input/Output Leakage Current (SWITCH OFF)	I_{OFF}	V_{OS}=GND $V_{I/S}$=GND to V_{CC} V_{IN}=V_{ILC} or V_{IHC}	GND -4.5	6.0 4.5	-	-	±60 ±100	-	±600 ±1000	nA
Switch Input Leakage Current (SWITCH ON OUTPUT OPEN)	I_{IZ}	V_{OS}=V_{CC} or GND V_{IN}=V_{ILC} or V_{IHC}	GND -4.5	6.0 4.5	-	-	±60 ±100	-	±600 ±1000	nA
Control Input Current	I_{IN}	V_{IN}=V_{CC} or GND	GND	6.0	-	-	±0.1	-	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN}=V_{CC} or GND	GND -4.5	6.0 4.5	- -	- -	4 8	- -	40 80	μA

AC ELECTRICAL CHARACTERISTICS (C_L=50pF, Input, t_r=t_f=6nS, GND=0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION			Ta=25℃			Ta=-40~85℃		UNIT
			V_{EE}(V)	V_{CC}(V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Phase Difference Between Input and Output	ϕ I/O		GND	2.0	-	25	60	-	75	ns
			GND	4.5	-	6	12	-	15	
			GND	6.0	-	5	10	-	13	
			-4.5	4.5	-	4	-	-	-	
Output Enable Time	t_{pZL} t_{pZH}	R_L=1kΩ	GND	2.0	-	50	225	-	280	ns
			GND	4.5	-	14	45	-	56	
			GND	6.0	-	12	38	-	48	
			-4.5	4.5	-	14	-	-	-	
Output Disable Time	t_{pLZ} t_{pHZ}	R_L=1kΩ	GND	2.0	-	95	225	-	280	ns
			GND	4.5	-	30	45	-	56	
			GND	6.0	-	26	38	-	48	
			-4.5	4.5	-	26	-	-	-	
Control Input Capacitance	C_{IN}		-	-	-	5	10	-	10	pF
Common Terminal Capacitance	C_{IS}		-4.5	4.5	-	11	20	-	20	pF
Switch Terminal Capacitance	C_{OS}		-4.5	4.5	-	7	15	-	15	pF
Feed Through Capacitance	C_{IOS}		-4.5	4.5	-	0.75	2	-	2	pF
Power Dissipation Capacitance	C_{PD}	(Note 1)	GND	5.0	-	67	-	-	-	pF

Note 1 : C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current can be obtained by the equation :
$I_{CC(opr)}=C_{PD}\cdot V_{CC}\cdot f_{IN}+I_{CC}/2$

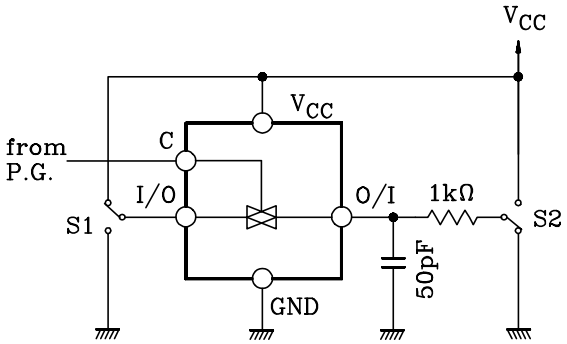
ANALOG SWITCH CHARACTERISTICS (GND=0V, Ta=25℃)

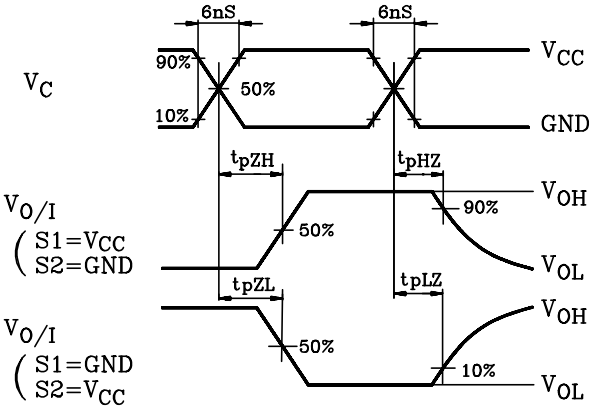
CHARACTERISTIC	SYMBOL	TEST CONDITION			V_{EE}(V)	V_{CC}(V)	TYP.	UNIT
Sine Wave Distortion (T.H.D)		R_L=10kΩ, f_{IN}=1kHz, C_L=50pF	V_{IN}=4.0V_{P-P}		-2.25	2.25	0.025	%
			V_{IN}=8.0V_{P-P}		-4.5	4.5	0.02	
Frequency Response (Switch ON)	f_{MAX}	Adust f_{IN} voltage to obtain 0dBm at V_{OS} increase f_{IN} until dB Meter reads -3dB R_L=50Ω, f_{IN}=1MHz, C_L=10pF, Sine Wave		(*1)	-2.25	2.25	120	MHz
				(*2)			95	
				(*1)	-4.5	4.5	190	
				(*2)			150	
Feedthrough Attenuation (Switch OFF)		Vin is centered at (V_{CC}-V_{EE})/2 Adjust input for 0dBm R_L=600Ω, C_L=50pF, f_{IN}=1MHz, Sine Wave			-2.25	2.25	-50	dB
					-4.5	4.5	-50	
Crosstalk (Control Input to Signal Output)		R_L=600Ω, C_L=50pF, f_{IN}=1MHz, Square Wave (t_r=t_f=6ns)			-2.25	2.25	60	mV
					-4.5	4.5	140	
Crosstalk (Between any switches)		Adjust V_{IN} to obtain 0dBm at Input R_L=600Ω, C_L=50pF, f_{IN}=1MHz, Sine Wave			-2.25	2.25	-50	dB
					-4.5	4.5	-50	

(*1) Input COMMON Terminal, and measured at SWITCH Terminal.
(*2) Input SWITCH Terminal, and measured at COMMON Terminal.
(Note) These characteristics are determined by design of device.

SWITCHING CHARACTERISTICS TEST CIRCUITS

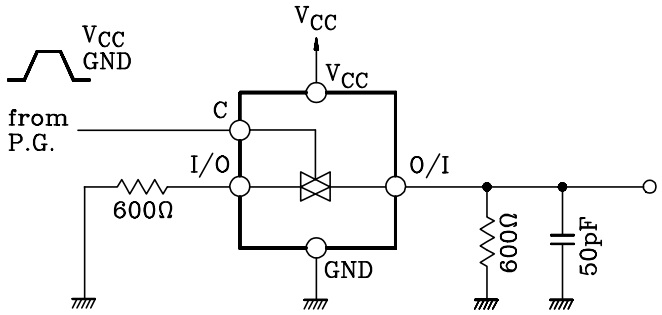
1. t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}



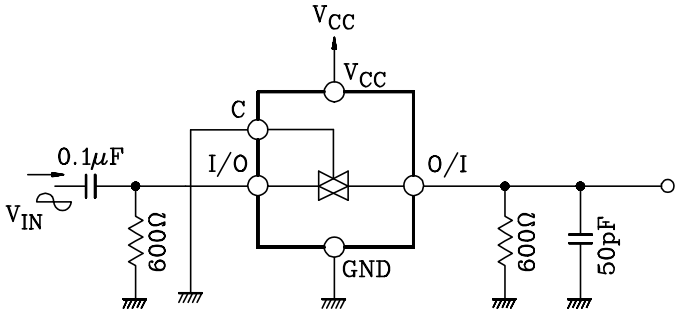


2. CROSS TALK (CONTROL INPUT−SWITCH OUTPUT)

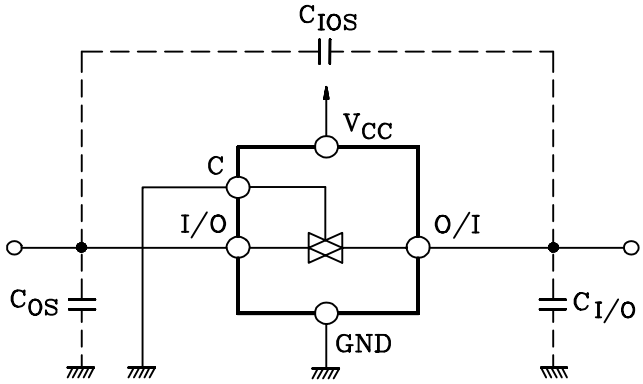
fin=1MHz, duty=50%, $t_r=t_f=6ns$



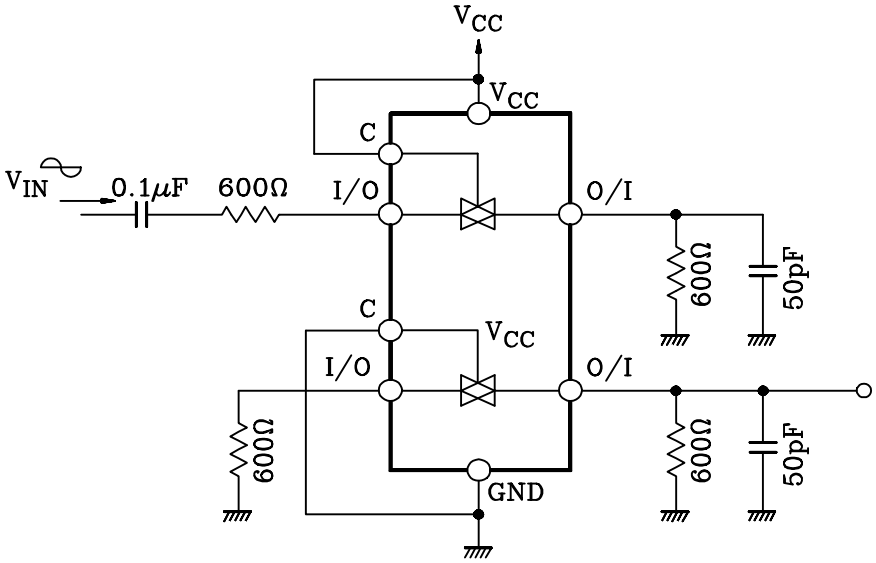
3. FEEDTHROUGH ATTENUATION



4. Clos, $C_{I/O}$



5. CROSS TALK (BETWEEN ANY TWO SWITCHES)



6. FREQUENCY RESPONSE (SWITCH ON)