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## CMOS Logic

## ■ GENERAL DESCRIPTION

XC74WL4053SR is 2-channel analog multiplexer / demultiplexer manufactured using silicon gate CMOS processes. The small supply current, which is one of the features of the CMOS logic, gives way to high speed operations which enables LS-TTL. With wave forming buffers connected internally, stabilized output can be achieved as the series offers high noise immunity. As the series is integrated into a mini molded, MSOP-8B package, high density mounting is possible.

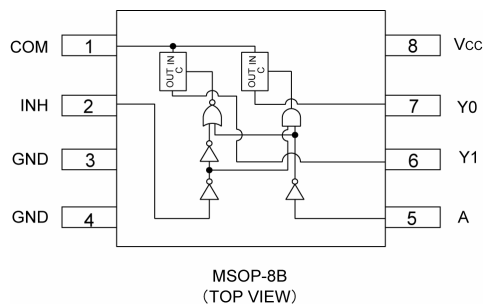
## ■ APPLICATIONS

- Palmtops
- Digital equipment

## ■ FEATURES

- High Speed Operations** :  $t_{pd} = 1.5\text{ns}$  (TYP.) ( $V_{CC}=5\text{V}$ )
- Operating Voltage Range** :  $2\text{V} \sim 5.5\text{V}$
- Low ON Resistance** :  $R_{ON} = 12\Omega$  (TYP.)
- Low Power Consumption** :  $2\mu\text{A}$  (MAX.)@ $T_a=25^\circ\text{C}$
- CMOS Logic 2-channel Analog Multiplexer/Demultiplexer**
- Small Package** : MSOP-8B

## ■ PIN CONFIGURATION



## ■ FUNCTIONS

CONTROL INPUT		ON CHANNEL
INH	A	
H	X	NONE
L	H	Y1
L	L	Y0

H=High level

L=Low level

X=Don't care

## ■ ABSOLUTE MAXIMUM RATINGS

 $T_a = -40^\circ\text{C} \sim 85^\circ\text{C}$ 

PARAMETER	SYMBOL	RATINGS	UNITS
Supply Voltage	$V_{CC}$	$-0.5 \sim +6.0$	V
Control Input Voltage	$V_{CONT}$	$-0.5 \sim +6.0$	V
Switch Input/Output Voltage	$V_{i/o}$	$-0.5 \sim V_{CC} + 0.5$	V
Control Input Diode Current	$I_{IK}$	-20	mA
Switch Output Diode Current	$I_{OK}$	$\pm 20$	mA
Switch Input/Output Current	$I_{i/O}$	$\pm 25$	mA
$V_{CC}, GND$ Current	$I_{CC}, I_{GND}$	$\pm 50$	mA
Power Dissipation ( $T_a = 25^\circ\text{C}$ )	$P_d$	300	mW
Storage Temperature Range	$T_{stg}$	$-65 \sim +150$	$^\circ\text{C}$

Note: Voltage is all ground standardized

## RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	UNITS
Supply Voltage	V <sub>CC</sub>	2~5.5	V
Control Input Voltage	V <sub>CONT</sub>	0~5.5	V
Switch Input/Output Voltage	V <sub>io</sub>	0~V <sub>CC</sub>	V
Operating Temperature Range	T <sub>opr</sub>	-40~+85	°C
Input Rise and Fall Time	t <sub>r,tf</sub>	0~200 (V <sub>CC</sub> =3.3V)	ns
		0~100 (V <sub>CC</sub> =5V)	

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	V <sub>CC</sub> (V)	CONDITIONS	T <sub>a</sub> =25°C			T <sub>a</sub> =-40°C~85°C		UNITS
				MIN.	TYP.	MAX.	MIN.	MAX.	
High Level Control Input Voltage	V <sub>IH</sub>	2.0		1.50	—	—	1.50	—	V
		3.0		2.10	—	—	2.10	—	
		5.5		3.85	—	—	3.85	—	
Low Level Control Input Voltage	V <sub>IL</sub>	2.0		—	—	0.50	—	0.50	V
		3.0		—	—	0.90	—	0.90	
		5.5		—	—	1.65	—	1.65	
Peak ON Resistance	R <sub>ONmax</sub>	2.0	V <sub>INH</sub> =V <sub>IL</sub>	—	130	350	—	550	Ω
		3.0	V <sub>COM</sub> =0~V <sub>CC</sub>	—	22	50	—	65	
		4.5	I <sub>COM</sub> =1mA	—	12	25	—	35	
ON Resistance	R <sub>ON(1)</sub>	2.0	V <sub>INH</sub> =V <sub>IL</sub>	—	23	50	—	65	Ω
		3.0	V <sub>COM</sub> =GND OR V <sub>CC</sub>	—	14	30	—	40	
		4.5	I <sub>COM</sub> =1mA	—	10	20	—	25	
Switch ON Resistance Differential	ΔR <sub>ON</sub>	2.0	V <sub>INH</sub> =V <sub>IL</sub>	—	13	35	—	55	Ω
		3.0	V <sub>COM</sub> =0~V <sub>CC</sub>	—	3	6	—	8	
		4.5	I <sub>COM</sub> =1mA	—	2	4	—	6	
Power Off Leak Current	I <sub>S(OFF)</sub>	5.5	V <sub>INH</sub> =V <sub>IH</sub> , V <sub>OM</sub> =V <sub>CC</sub> , V <sub>Y</sub> =GND	—	—	±0.1	—	±0.1	μA
Power On Leak Current	I <sub>S(ON)</sub>	5.5	V <sub>INH</sub> =V <sub>IL</sub> , V <sub>COM</sub> =V <sub>CC</sub> , or GND	—	—	±0.1	—	±0.1	μA
Control Input Current	I <sub>INH</sub>	0~5.5	V <sub>COM</sub> =V <sub>CC</sub> or GND	—	—	±0.1	—	±0.1	μA
Static Supply Current	I <sub>CC</sub>	5.5	V <sub>COM</sub> =V <sub>CC</sub> or GND	—	—	2.0	—	20.2	μA

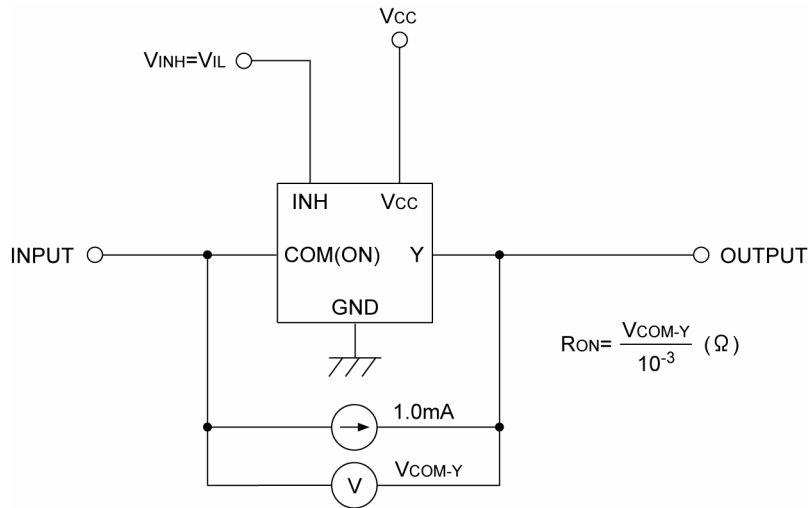
## SWITCHING ELECTRICAL CHARACTERISTICS

(tr=tf=3ns)

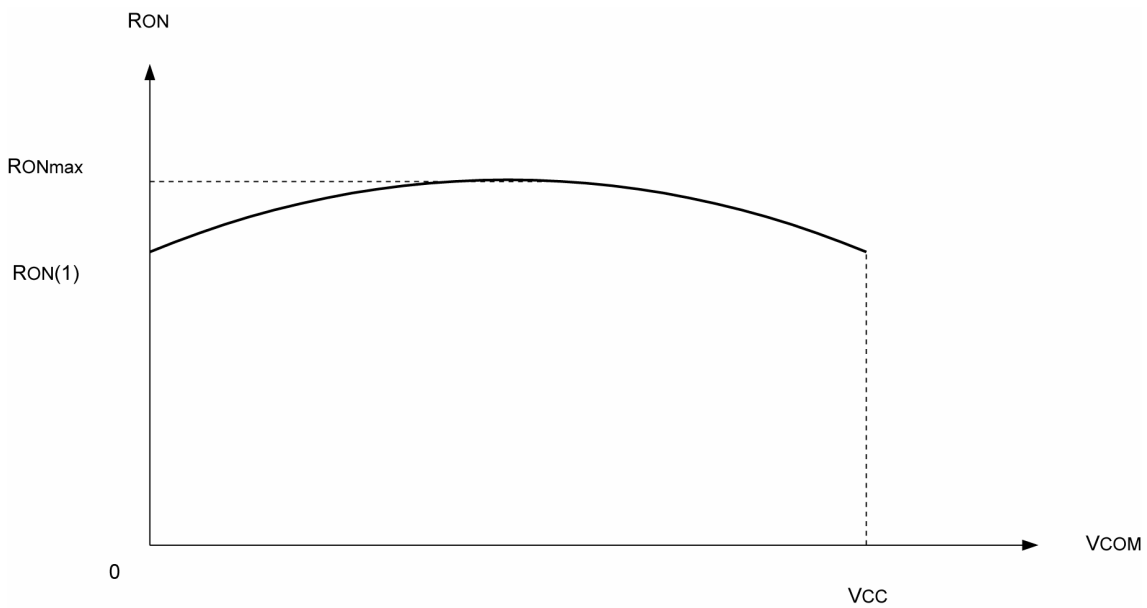
PARAMETER	SYMBOL			CONDITIONS	Ta=25°C			Ta=-40°C~85°C		UNITS	
		CL	VCC(V)		MIN.	TYP.	MAX.	MIN.	MAX.		
Delay Time	tPLH tPHL	15pF	2.0	RL=1kΩ	—	2.5	12.0	—	15.0	ns	
			3.3		—	2.0	4.0	—	5.5		
			5.0		—	1.5	3.0	—	4.0		
		50pF	2.0		RL=1kΩ	—	4.0	20.0	—	23	ns
			3.3			—	3.0	6.0	—	8.0	
			5.0			—	2.0	5.0	—	6.0	
Output Enable Time	tzL tzH	15pF	2.0	RL=1kΩ		—	8.5	45.0	—	60.0	ns
			3.3			—	4.5	9.0	—	11.0	
			5.0			—	3.5	7.5	—	9.0	
		50pF	2.0		RL=1kΩ	—	9.0	50.0	—	65.0	ns
			3.3			—	5.0	10.0	—	12.0	
			5.0			—	4.0	8.5	—	10.0	
Output Disable Time	tlZ thZ	15pF	2.0	RL=1kΩ		—	9.0	45.0	—	55.0	ns
			3.3			—	7.0	17.0	—	20.0	
			5.0			—	6.0	14.0	—	18.0	
		50pF	2.0		RL=10kΩ	—	12	60.0	—	75.0	ns
			3.3			—	10	23.0	—	27.0	
			5.0			—	8.0	20.0	—	25.0	
Sine Wave Distortion Rate		50pF	3.0	RL=1kΩ fCOM=1kHz		—	0.05	—	—	—	%
-3dB Band Width		50pF	3.0	RL=600kΩ $20\log_{10}\frac{V_Y}{V_{COM}}=-3dB$		—	200	—	—	—	MHz
Feed Through (Switch off)		50pF	3.0	RL=600kΩ		—	-60	—	—	—	dB
Cross Talk (Control Switches)		50pF	2.0	RL=600kΩ fINH=1MHz	—	60	—	—	—	mV	
			3.0		—	100	—	—	—		
			4.5		—	150	—	—	—		
Cross Talk (Between Switches)		50pF	2.0	RL=600kΩ fCOM=1kHz	—	-60	—	—	—	dB	
			3.0		—	-60	—	—	—		
			4.5		—	-60	—	—	—		
Control Input Capacitance	CINH	—	—		—	5	10	—	10	pF	
Switch Input/Output Capacitance	COM/Y	—	—		—	6	—	—	—	pF	
Feed Through Capacitance	COM/Y	—	—		—	0.5	—	—	—	pF	
Power Dissipation Capacitance	Cpd	—	—		—	13	—	—	—	pF	

## ON RESISTANCE

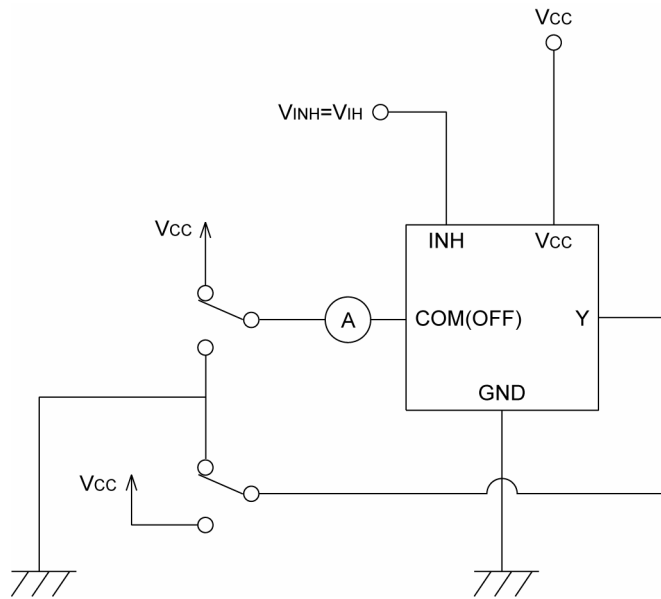
### Test Circuit



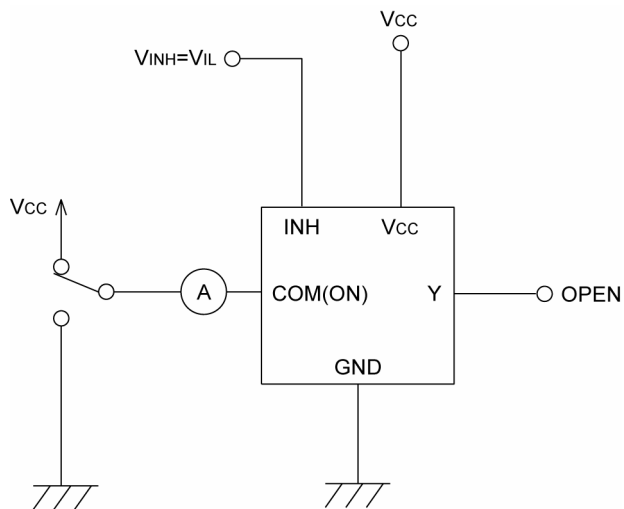
### Input Voltage Dependencies of ON Resistance



## ■ POWER OFF LEAK CURRENT



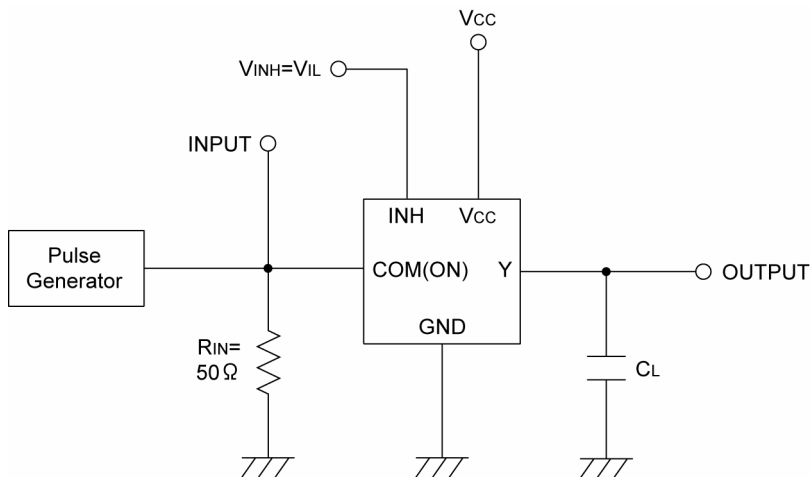
## ■ POWER ON LEAK CURRENT



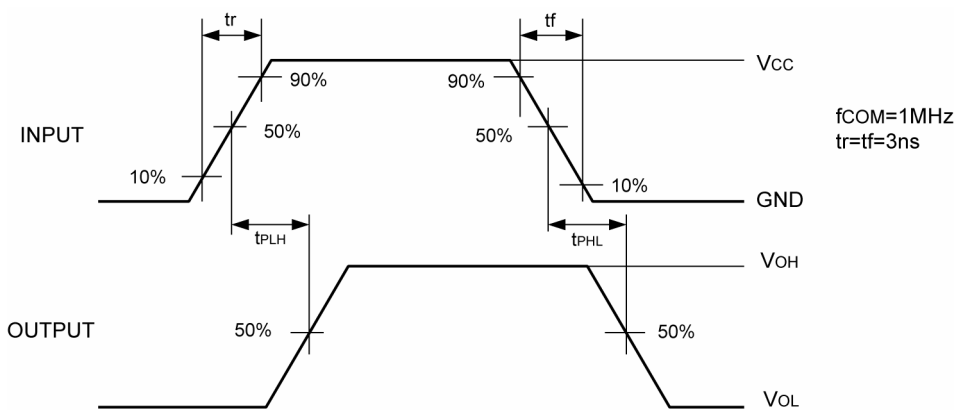
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## ■ DELAY TIME

### ● Test Circuit

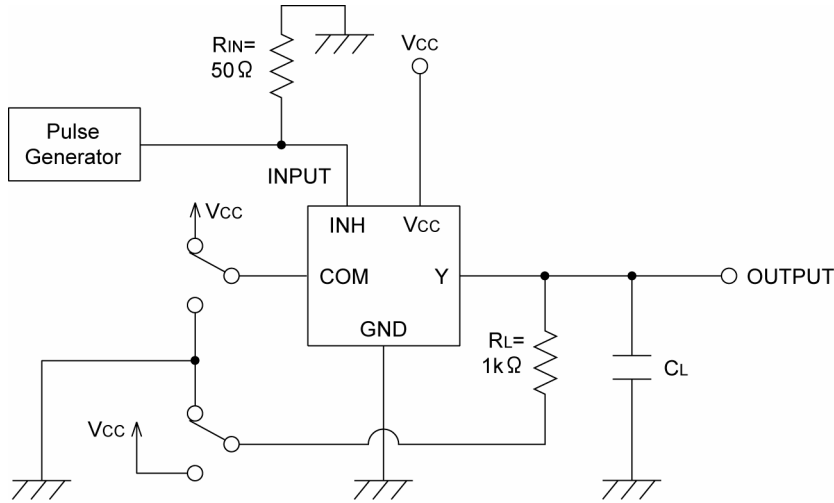


### ● Waveform

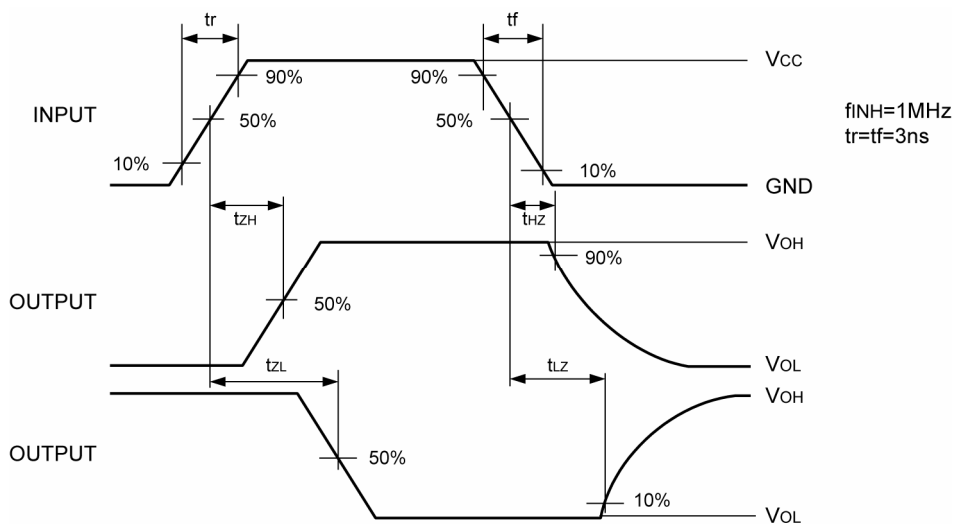


## OUTPUT ENABLE TIME, OUTPUT DISABLE TIME

### Test Circuit

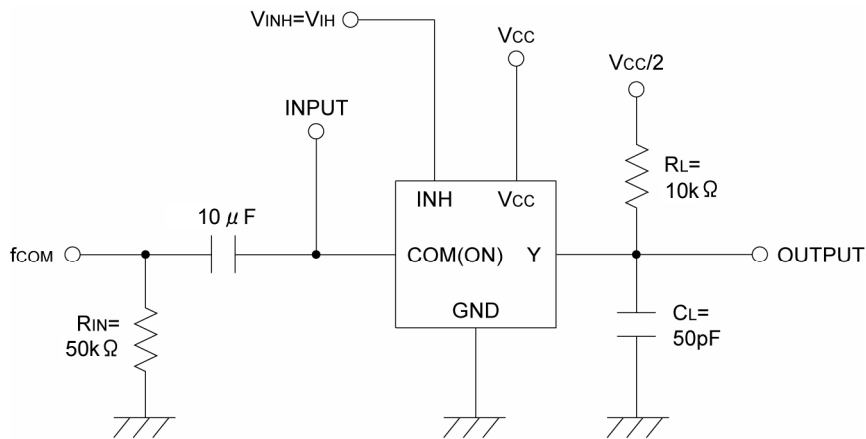


### Waveform



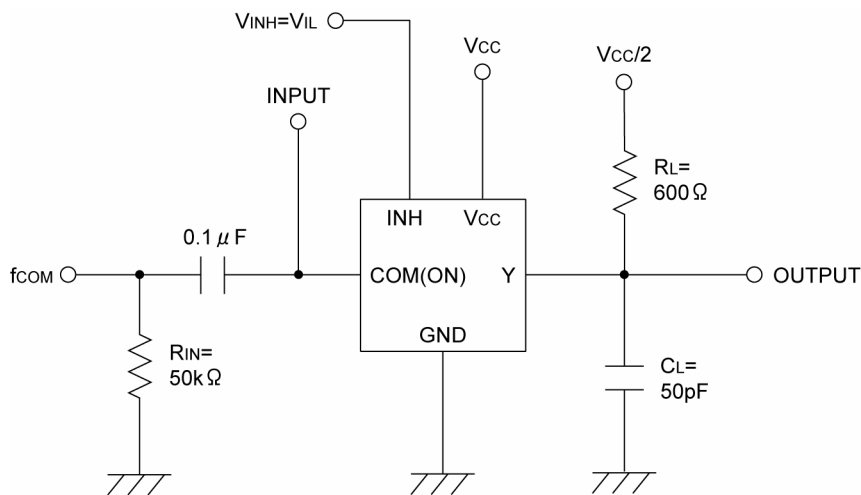


## ■ SINE WAVE DISTORTION RATE



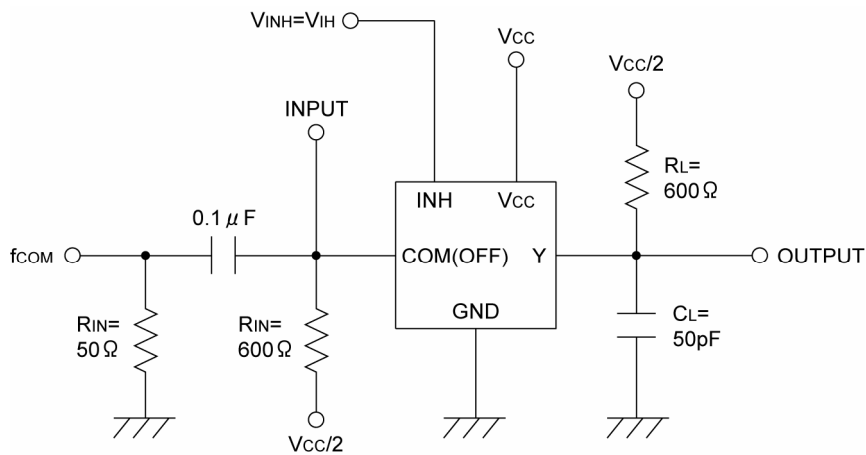
\*  $f_{COM}$  by sine wave ( $f=1\text{MHz}$ )

## ■ -3dB BAND WIDTH



\*  $f_{COM}$  by sine wave ( $V_{COM}=V_{CC}/10[V_{p-p}]$ )

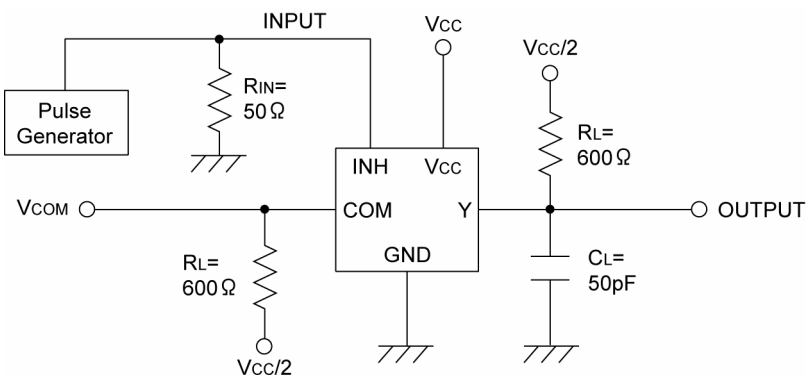
## ■ FEED THROUGH TEST CIRCUIT



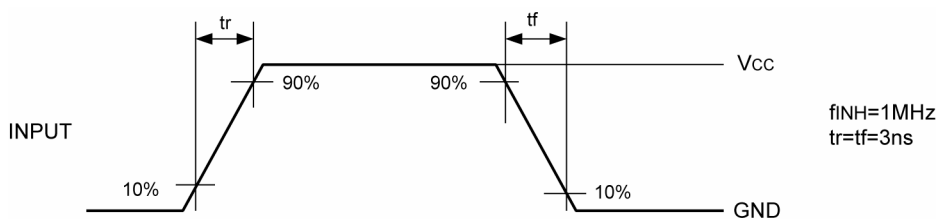
\* fcom by sine wave (f=1MHz)

## ■ CROSS TALK (CONTROL INPUT → SWITCH OUTPUT)

### ● Test Circuit



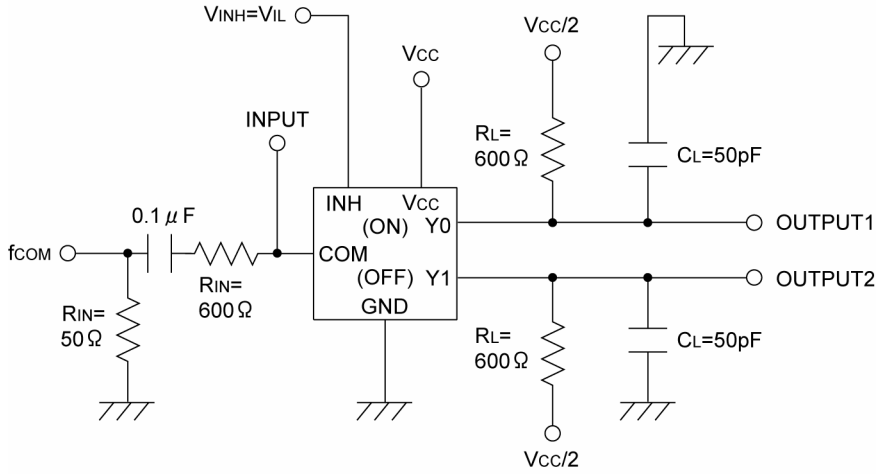
### ● Waveform



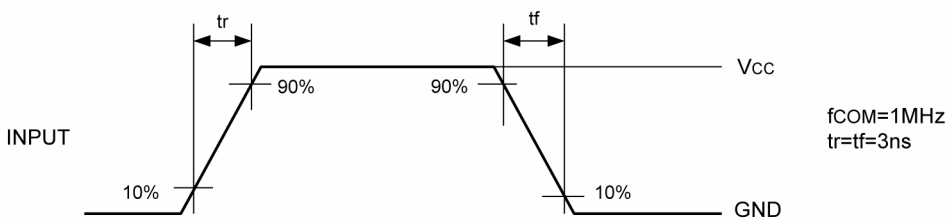
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## CROSS TALK (BETWEEN SWITCHES)

### Test Circuit



### Waveform



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