

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.

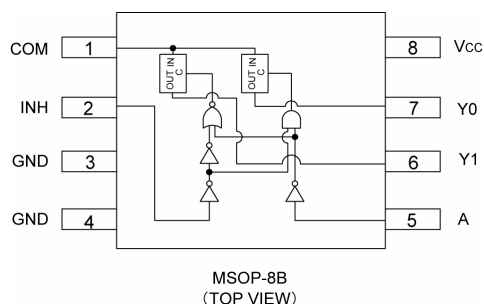
■ APPLICATIONS

- 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}	± 20	mA
Switch Input/Output Current	$I_{i/o}$	± 25	mA
V_{CC}, GND Current	I_{CC}, I_{GND}	± 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 _{CC}	2~5.5	V
Control Input Voltage	V _{CONT}	0~5.5	V
Switch Input/Output Voltage	V _{io}	0~V _{CC}	V
Operating Temperature Range	T _{opr}	-40~+85	°C
Input Rise and Fall Time	t _r ,t _f	0~200 (V _{CC} =3.3V)	ns
		0~100 (V _{CC} =5V)	

DC ELECTRICAL CHARACTERISTICS

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

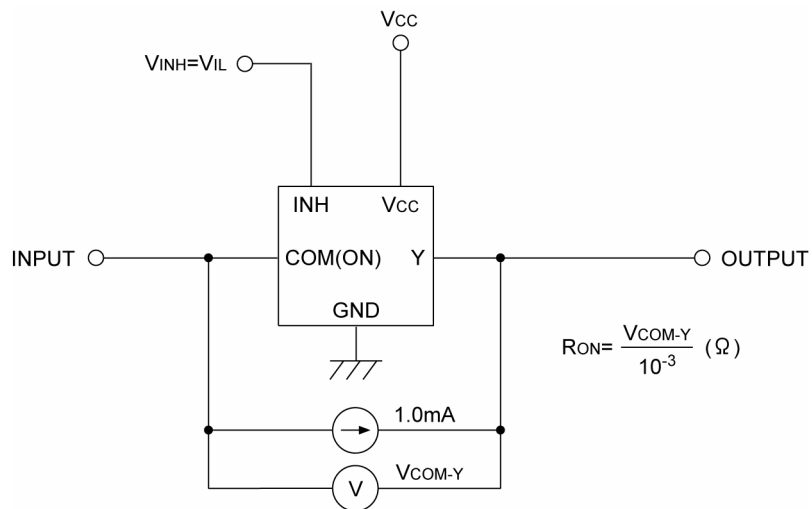
SWITCHING ELECTRICAL CHARACTERISTICS

(tr=tf=3ns)

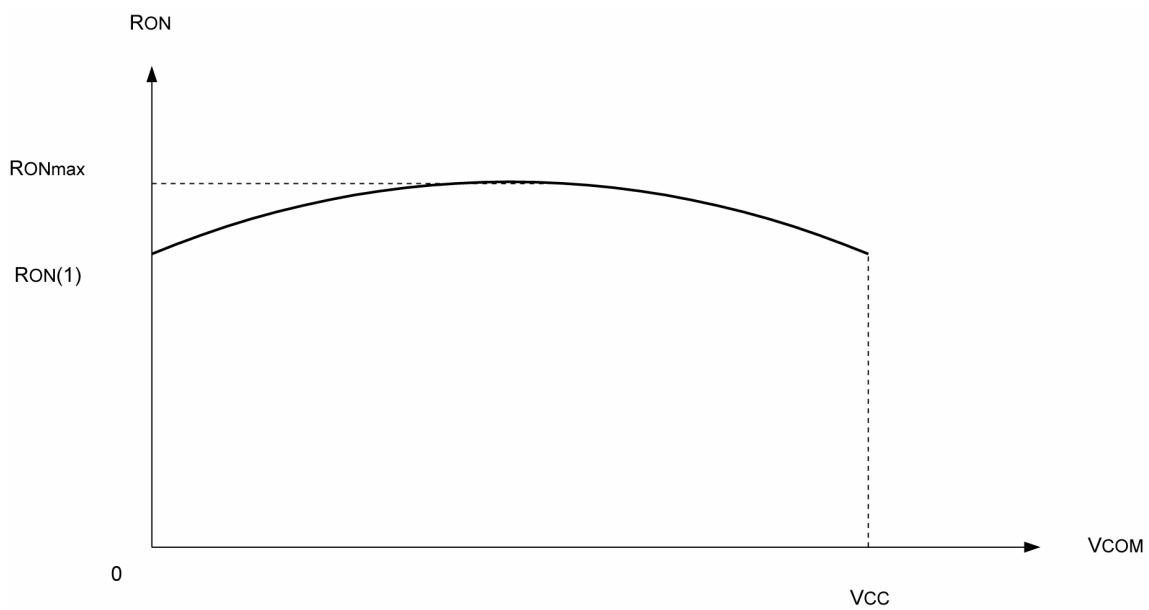
PARAMETER	SYMBOL			CONDITIONS	Ta=25°C			Ta=-40°C~85°C		UNITS
		CL	VCC(V)		MIN.	TYP.	MAX.	MIN.	MAX.	
Delay Time	tPLH tPHL	15pF	2.0		—	2.5	12.0	—	15.0	ns
			3.3		—	2.0	4.0	—	5.5	
			5.0		—	1.5	3.0	—	4.0	
		50pF	2.0		—	4.0	20.0	—	23	ns
			3.3		—	3.0	6.0	—	8.0	
			5.0		—	2.0	5.0	—	6.0	
Output Enable Time	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 $20\log_{10} \frac{V_Y}{V_{COM}} = -3\text{dB}$	—	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

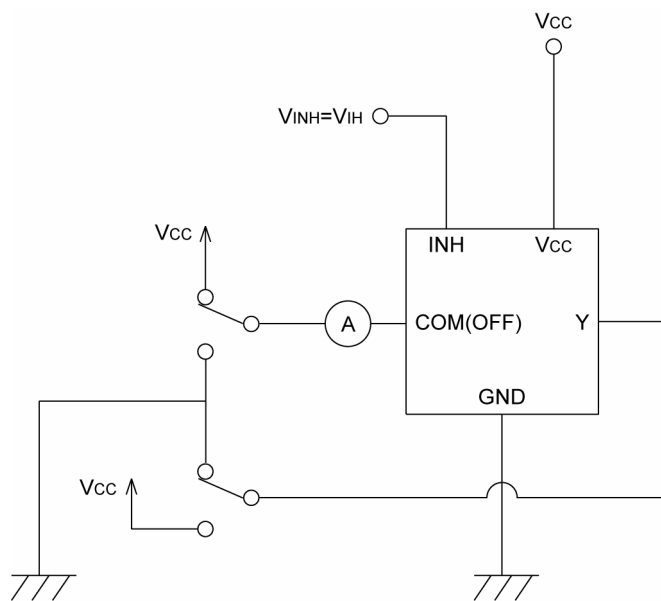
Test Circuit



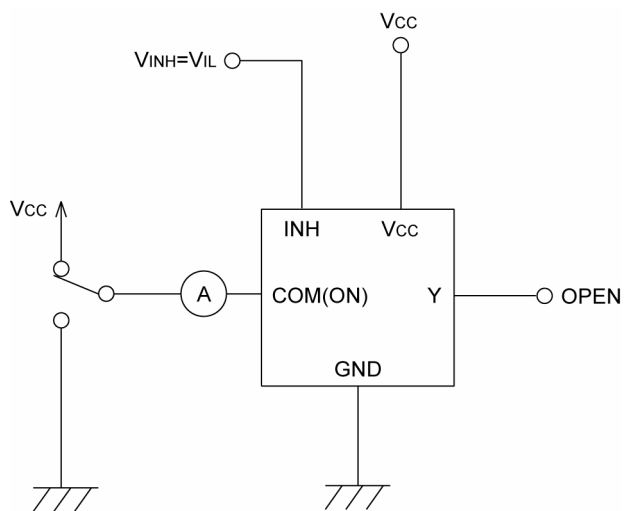
Input Voltage Dependencies of ON Resistance



■ POWER OFF LEAK CURRENT

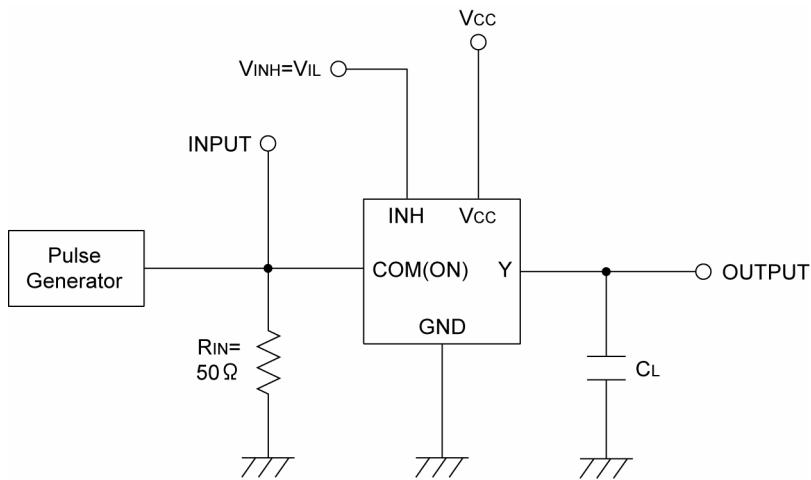


■ POWER ON LEAK CURRENT

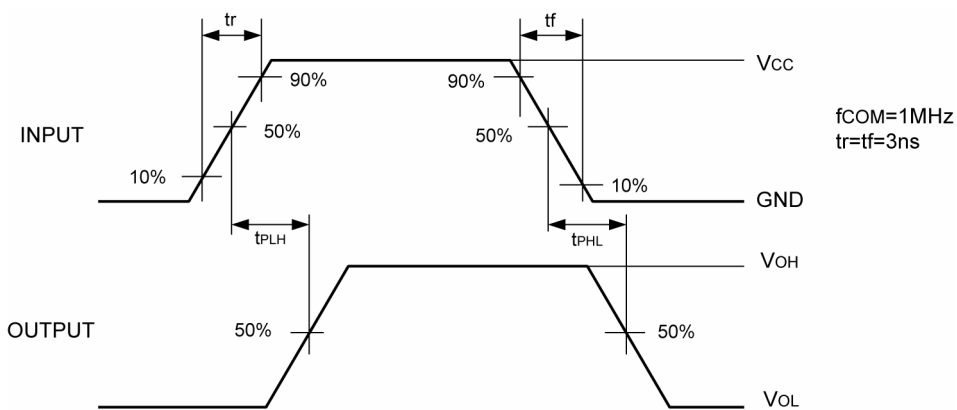


■ DELAY TIME

● Test Circuit

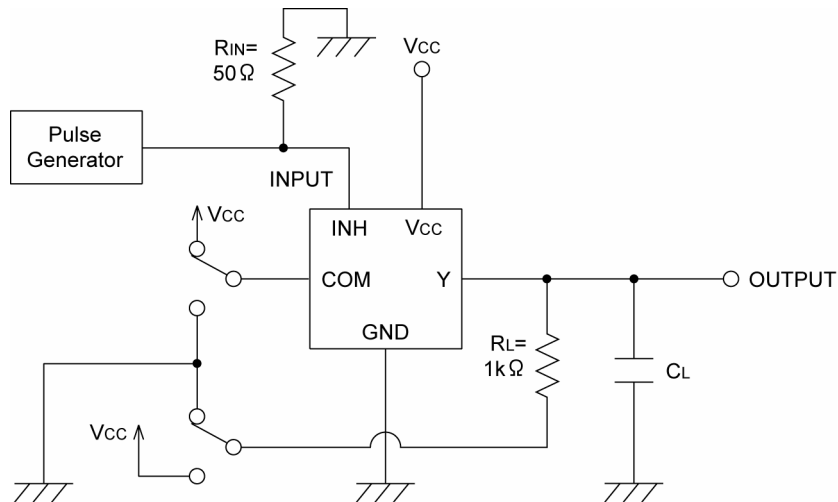


● Waveform

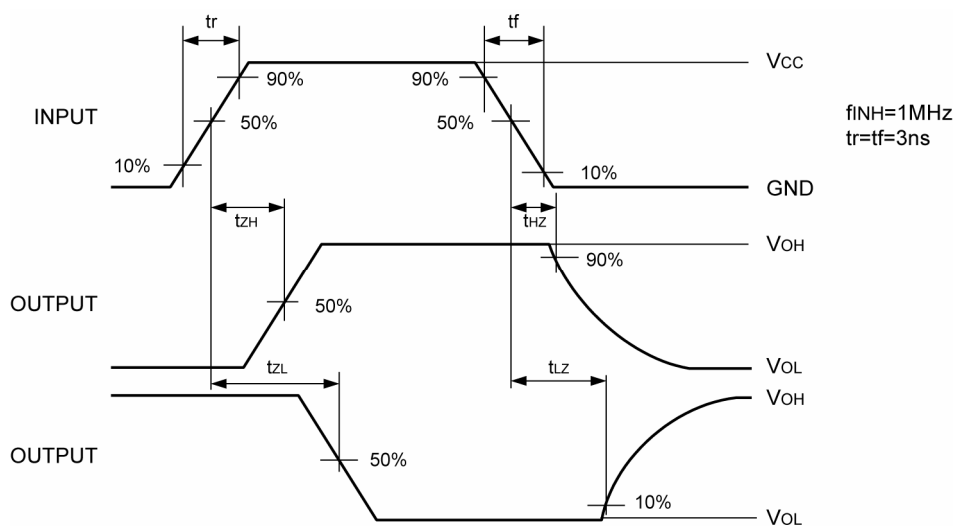


■ OUTPUT ENABLE TIME, OUTPUT DISABLE TIME

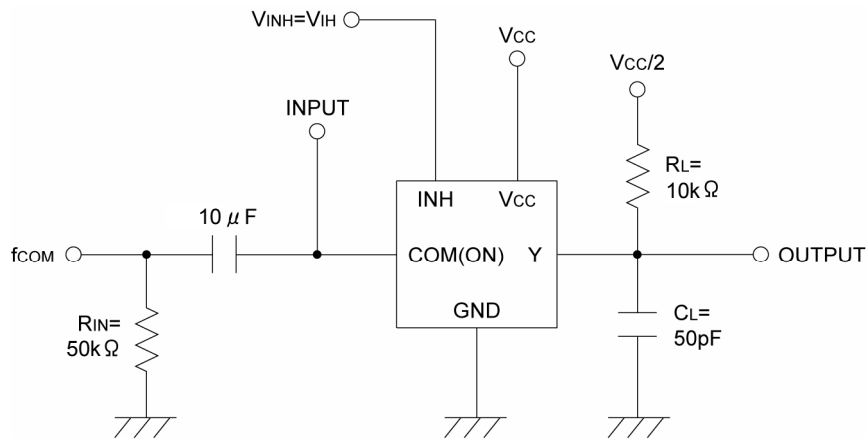
● Test Circuit



● Waveform

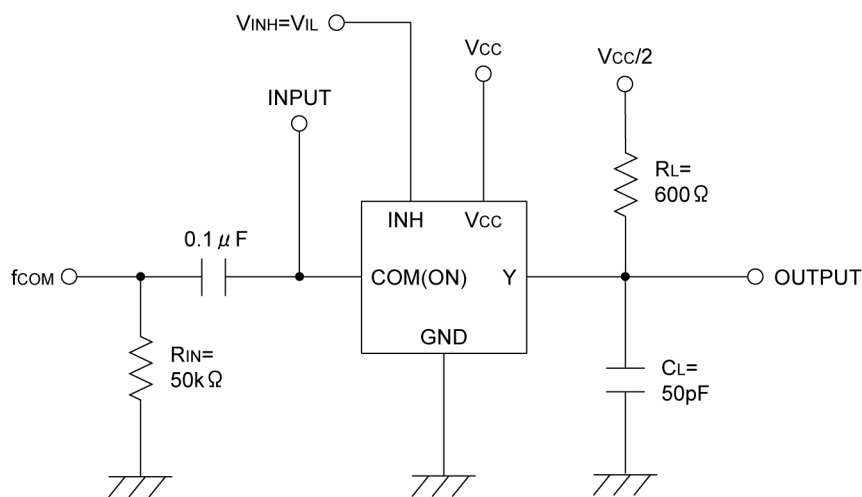


■ SINE WAVE DISTORTION RATE



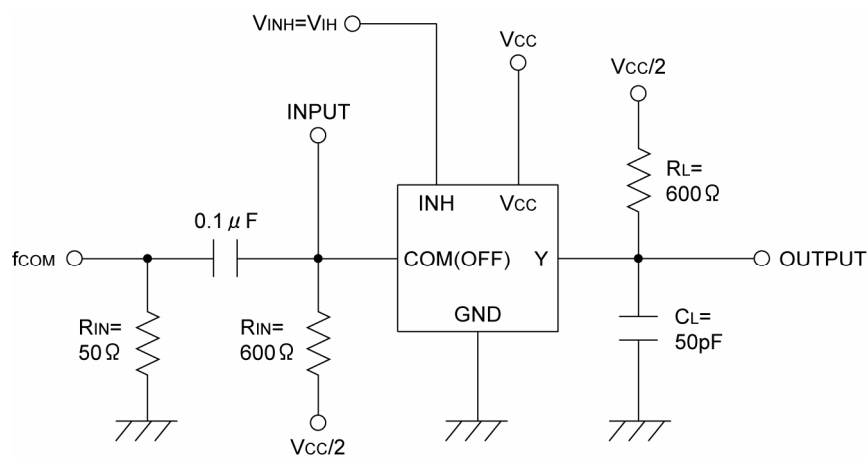
* f_{COM} by sine wave ($f=1MHz$)

■ -3dB BAND WIDTH



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

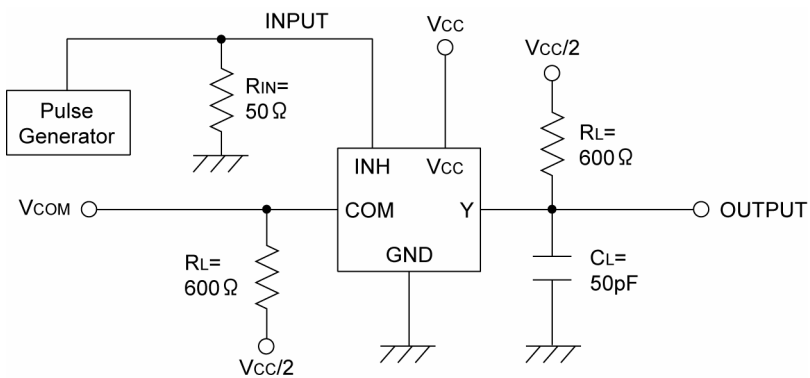
■ FEED THROUGH TEST CIRCUIT



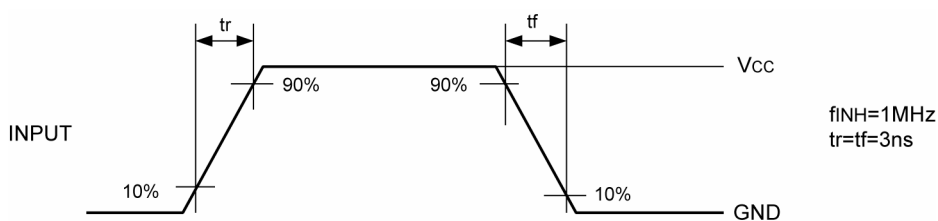
* fcom by sine wave (f=1MHz)

■ CROSS TALK (CONTROL INPUT → SWITCH OUTPUT)

● Test Circuit

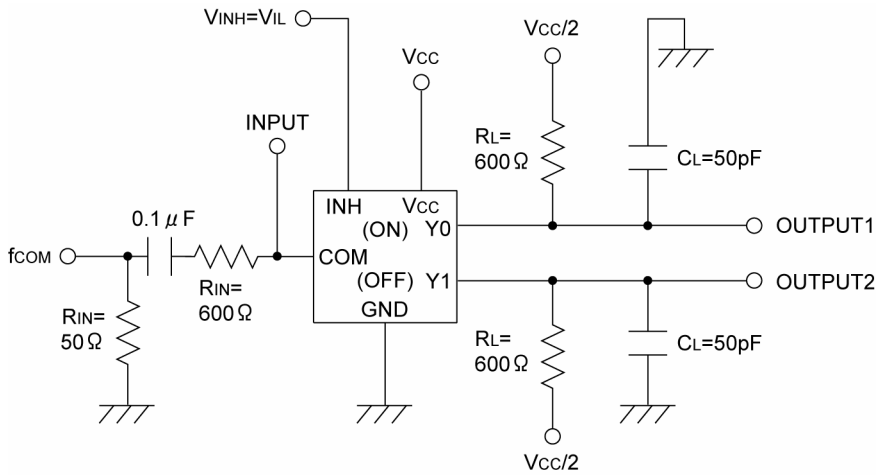


● Waveform

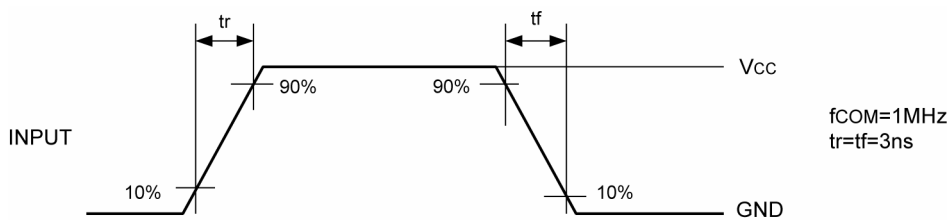


■ CROSS TALK (BETWEEN SWITCHES)

● Test Circuit



● Waveform



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