

# XC74WL4053SR



## CMOS Logic

### ◆CMOS Logic 2-channel Analog

#### Multiplexer/Demultiplexer

### ◆Operating Voltage Range : 2V ~ 5.5V

### ◆High Speed Operations : tpd = 1.5ns TYP

### ◆Low Power Consumption : 2μA (max)

### ◆MSOP-8B Package

## ■Description

XC74WL4053SR is 2-channel Analog Multiplexer/Demultiplexer manufactured using silicon gate CMOS processes. The small quiescent 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

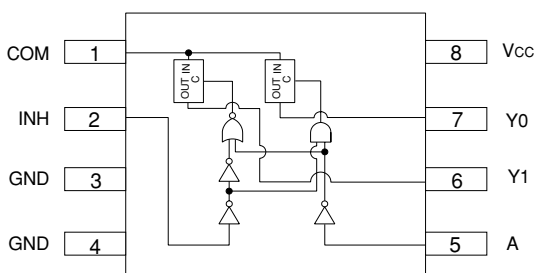
**High Speed Operations** : tpd = 1.5ns TYP (Vcc=5V)

**Operating Voltage Range**: 2V ~ 5.5V

**Low Power Consumption**: 2μA (max)

**Small Package** : MSOP-8B

## ■Pin Configuration



MSOP-8B  
(TOP VIEW)

## ■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

Ta = -40°C ~ 85°C

| PARAMETER                     | SYMBOL    | RATINGS          | UNITS |
|-------------------------------|-----------|------------------|-------|
| Power Supply Voltage          | VCC       | -0.5 ~ +6.0      | V     |
| Control Input Voltage         | VCONT     | -0.5 ~ +6.0      | V     |
| Switch Input/Output Voltage   | Vi/o      | -0.5 ~ VCC + 0.5 | V     |
| Control Input Diode Current   | IiK       | -20              | mA    |
| Switch Output Diode Current   | IoK       | ±20              | mA    |
| Switch Input/Output Current   | Ii/O      | ±25              | mA    |
| VCC, GND Current              | ICC, IGND | ±50              | mA    |
| Power Dissipation (Ta = 25°C) | Pd        | 300              | mW    |
| Storage Temperature           | Tstg      | -65 ~ +150       | °C    |

Note; Voltage is all Ground standardized.

## ■ Recommended Operating Conditions

| PARAMETER                   | SYMBOL           | CONDITIONS       | UNITS |
|-----------------------------|------------------|------------------|-------|
| Supply Voltage              | VCC              | 2~5.5            | V     |
| Control Input Voltage       | VCONT            | 0~5.5            | V     |
| Switch Input/Output Voltage | V <sub>i/o</sub> | 0~VCC            | V     |
| Operating Temperature       | Topr             | −40~+85          | °C    |
| Input Rise and Fall Time    | tr, tf           | 0~200 (VCC=3.3V) | ns    |
|                             |                  | 0~100 (VCC=5V)   |       |

## ■ DC Electrical Characteristics

| PARAMETER                         | SYMBOL  | VCC (V) | CONDITIONS                 | Ta=25°C |     |      | Ta=−40~85°C |      | UNITS |
|-----------------------------------|---------|---------|----------------------------|---------|-----|------|-------------|------|-------|
|                                   |         |         |                            | MIN     | TYP | MAX  | MIN         | MAX  |       |
| Control Input Voltage             | VIH     | 2.0     |                            | 1.5     | —   | —    | 1.5         | —    | V     |
|                                   |         | 3.0     |                            | 2.1     | —   | —    | 2.1         | —    |       |
|                                   |         | 5.5     |                            | 3.85    | —   | —    | 3.85        | —    |       |
|                                   | VIL     | 2.0     |                            | —       | —   | 0.5  | —           | 0.5  | V     |
|                                   |         | 3.0     |                            | —       | —   | 0.9  | —           | 0.9  |       |
|                                   |         | 5.5     |                            | —       | —   | 1.65 | —           | 1.65 |       |
| Peak ON Resistance                | RONmax  | 2.0     | VINH=VIL                   | —       | 130 | 350  | —           | 550  | Ω     |
|                                   |         | 3.0     | VCOM=0~VCC                 | —       | 22  | 50   | —           | 65   |       |
|                                   |         | 4.5     | ICOM=1mA                   | —       | 12  | 25   | —           | 35   |       |
| ON Resistance                     | RON(1)  | 2.0     | VINH=VIL                   | —       | 23  | 50   | —           | 65   | Ω     |
|                                   |         | 3.0     | VCOM=GND or VCC            | —       | 14  | 30   | —           | 40   |       |
|                                   |         | 4.5     | ICOM=1mA                   | —       | 10  | 20   | —           | 25   |       |
| Switch ON Resistance Differential | △RON    | 2.0     | VINH=VIL                   | —       | 13  | 35   | —           | 55   | Ω     |
|                                   |         | 3.0     | VCOM=0~VCC                 | —       | 3   | 6    | —           | 8    |       |
|                                   |         | 4.5     | ICOM=1mA                   | —       | 2   | 4    | —           | 6    |       |
| Power Off Leakage Current         | IS(OFF) | 5.5     | VINH=VIH, VCOM=VCC, VY=GND | —       | —   | ±0.1 | —           | ±0.1 | μA    |
| Power On Leakage Current          | IS(ON)  | 5.5     | VINH=VIL, VCOM=VCC or GND  | —       | —   | ±0.1 | —           | ±0.1 | μA    |
| Control Input Current             | IINH    | 0~5.5   | VCOM=VCC or GND            | —       | —   | ±0.1 | —           | ±0.1 | μA    |
| Quiescent Supply Current          | ICC     | 5.5     | VCOM=VCC or GND            | —       | —   | 2.0  | —           | 20.2 | μA    |

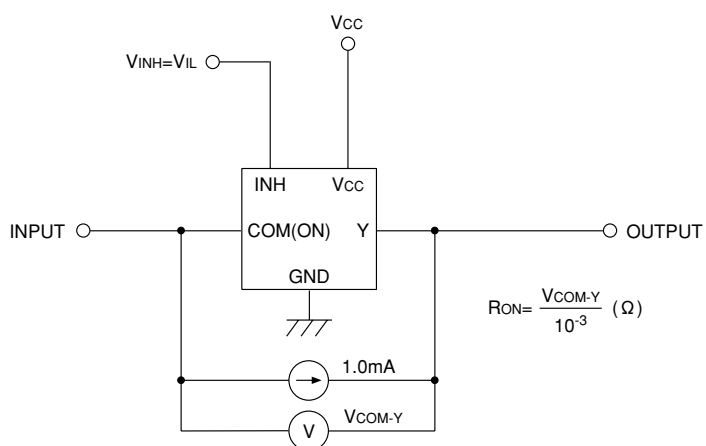
## Switching Electrical Characteristics

(tr=tf=3ns)

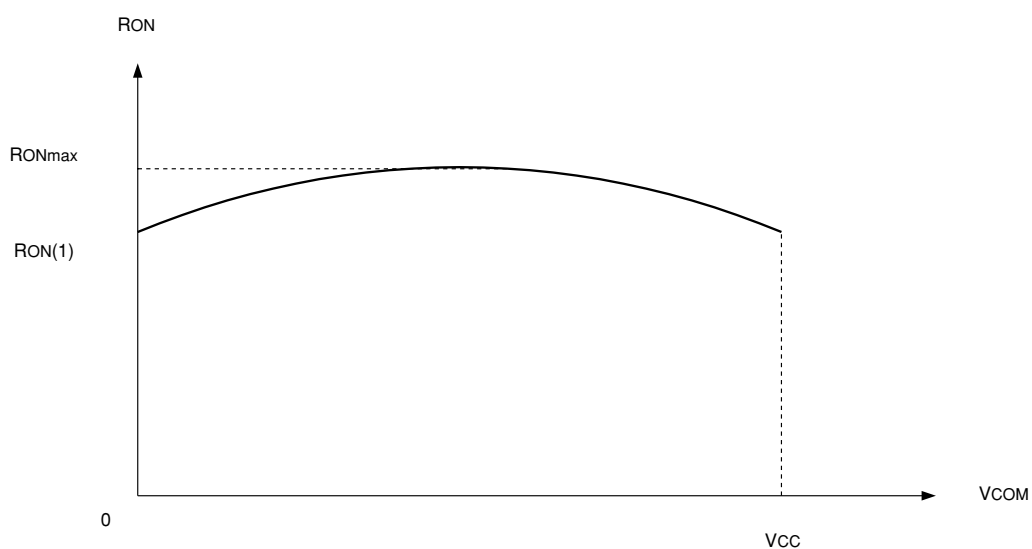
| PARAMETER                        | SYMBOL | CL   | VCC (V) | CONDITIONS                                                  | Ta=25°C |      |     | Ta=-40~85°C |     | UNITS |
|----------------------------------|--------|------|---------|-------------------------------------------------------------|---------|------|-----|-------------|-----|-------|
|                                  |        |      |         |                                                             | MIN     | TYP  | MAX | MIN         | MAX |       |
| Propagation Delay Time           | tPLH   | 15pF | 2.0     |                                                             | —       | 2.5  | 12  | —           | 15  | ns    |
|                                  |        |      | 3.3     |                                                             | —       | 2    | 4   | —           | 5.5 |       |
|                                  |        |      | 5.0     |                                                             | —       | 1.5  | 3   | —           | 4   |       |
|                                  | tPHL   | 50pF | 2.0     |                                                             | —       | 4    | 20  | —           | 23  | ns    |
|                                  |        |      | 3.3     |                                                             | —       | 3    | 6   | —           | 8   |       |
|                                  |        |      | 5.0     |                                                             | —       | 2    | 5   | —           | 6   |       |
| Output Enable Time               | tZL    | 15pF | 2.0     | RL=1kΩ                                                      | —       | 8.5  | 45  | —           | 60  | ns    |
|                                  |        |      | 3.3     |                                                             | —       | 4.5  | 9   | —           | 11  |       |
|                                  |        |      | 5.0     |                                                             | —       | 3.5  | 7.5 | —           | 9   |       |
|                                  | tZH    | 50pF | 2.0     | RL=1kΩ                                                      | —       | 9    | 50  | —           | 65  | ns    |
|                                  |        |      | 3.3     |                                                             | —       | 5    | 10  | —           | 12  |       |
|                                  |        |      | 5.0     |                                                             | —       | 4    | 8.5 | —           | 10  |       |
| Output Disable Time              | tLZ    | 15pF | 2.0     | RL=1kΩ                                                      | —       | 9    | 45  | —           | 55  | ns    |
|                                  |        |      | 3.3     |                                                             | —       | 7    | 17  | —           | 20  |       |
|                                  |        |      | 5.0     |                                                             | —       | 6    | 14  | —           | 18  |       |
|                                  | tHZ    | 50pF | 2.0     | RL=1kΩ                                                      | —       | 12   | 60  | —           | 75  | ns    |
|                                  |        |      | 3.3     |                                                             | —       | 10   | 23  | —           | 27  |       |
|                                  |        |      | 5.0     |                                                             | —       | 8    | 20  | —           | 25  |       |
| Sine Wave Distortion Rate        |        | 50pF | 3.0     | RL=10kΩ<br>fCOM=1kHz                                        | —       | 0.05 | —   | —           | —   | %     |
| -3dB Band Width                  |        | 50pF | 3.0     | RL=600kΩ<br>$20\log_{10} \frac{V_Y}{V_{COM}} = -3\text{dB}$ | —       | 200  | —   | —           | —   | MHz   |
| Feed Through<br>(Switch off)     |        | 50pF | 3.0     | RL=600kΩ                                                    | —       | -60  | —   | —           | —   | dB    |
| Cross Talk<br>(Control Switch)   |        | 50pF | 2.0     | RL=600kΩ                                                    | —       | 60   | —   | —           | —   | mV    |
|                                  |        |      | 3.0     | fINH=1MHz                                                   | —       | 100  | —   | —           | —   |       |
|                                  |        |      | 4.5     |                                                             | —       | 150  | —   | —           | —   |       |
| Cross Talk<br>(between Switches) |        | 50pF | 2.0     | RL=600kΩ                                                    | —       | -60  | —   | —           | —   | dB    |
|                                  |        |      | 3.0     | fCOM=1kHz                                                   | —       | -60  | —   | —           | —   |       |
|                                  |        |      | 4.5     |                                                             | —       | -60  | —   | —           | —   |       |
| Control Input Capacitance        | CINH   | —    | —       |                                                             | —       | 5    | 10  | —           | 10  | pF    |
| Switch Input/Output Capacitance  | CCOM/Y | —    | —       |                                                             | —       | 6    | —   | —           | —   | pF    |
| Feed Through Capacitance         | CCOM-Y | —    | —       |                                                             | —       | 0.5  | —   | —           | —   | pF    |
| Power Dissipation Capacitance    | Cpd    | —    | —       |                                                             | —       | 13   | —   | —           | —   | pF    |

## ■ ON Resistance

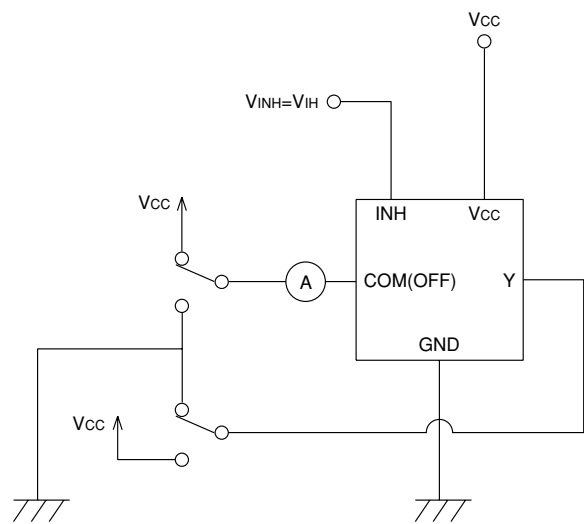
### ■ Typical Application Circuit



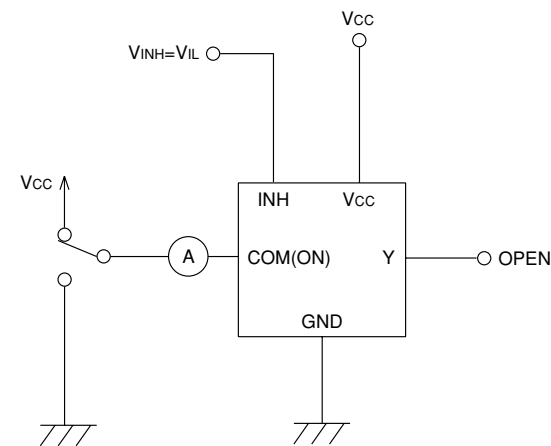
### ■ Voltage Dependencies of ON Resistance



■Power Off Leakage Current

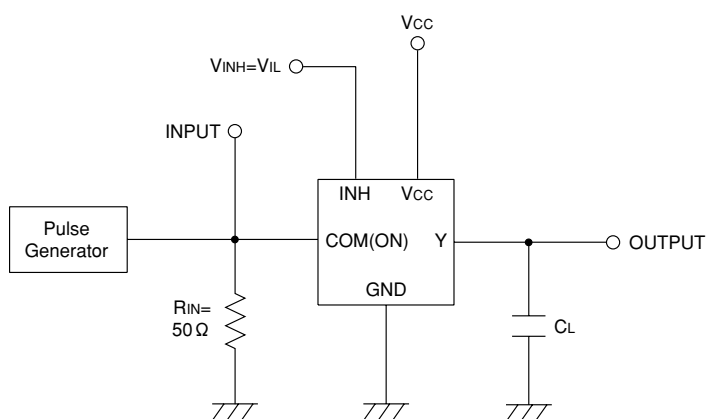


■Power On Leakage Current

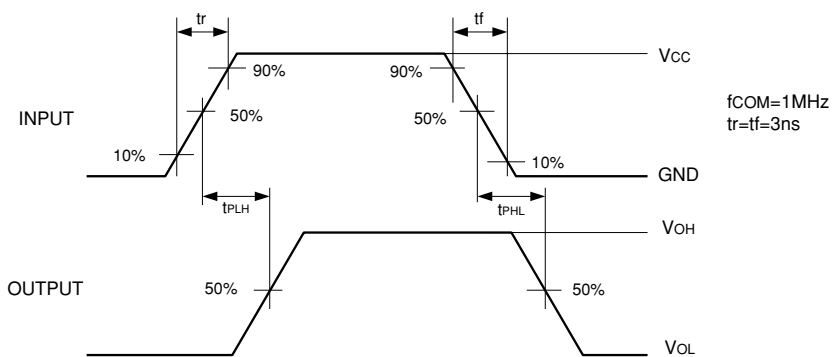


## ■ Propagation Delay Time

### ■ Typical Application Circuit

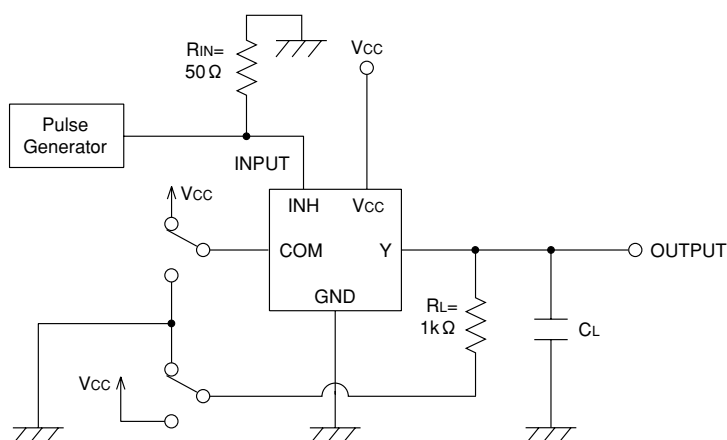


### ■ Waveforms

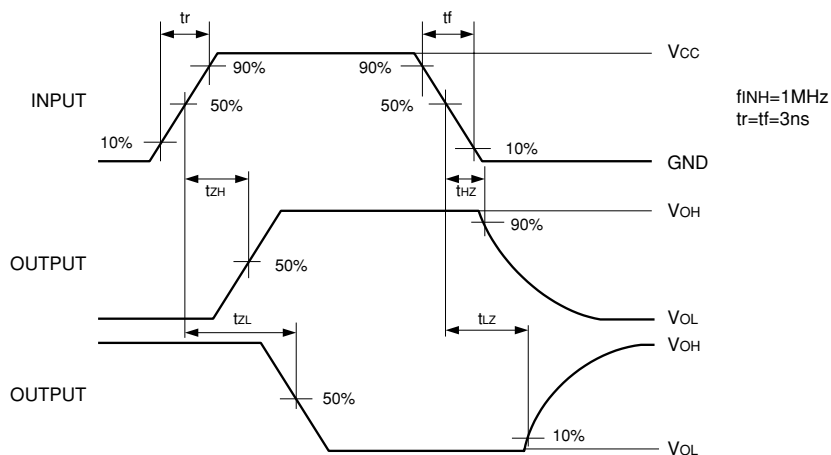


## ■ Output Enable Time, Output Disable Time

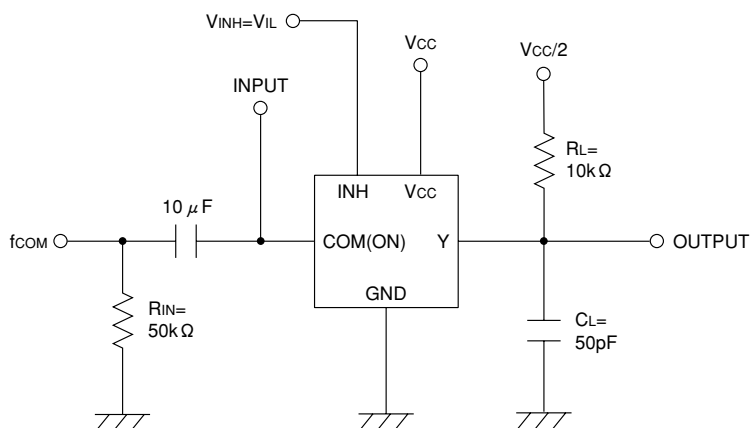
### ■ Typical Application Circuit



### ■ Waveforms

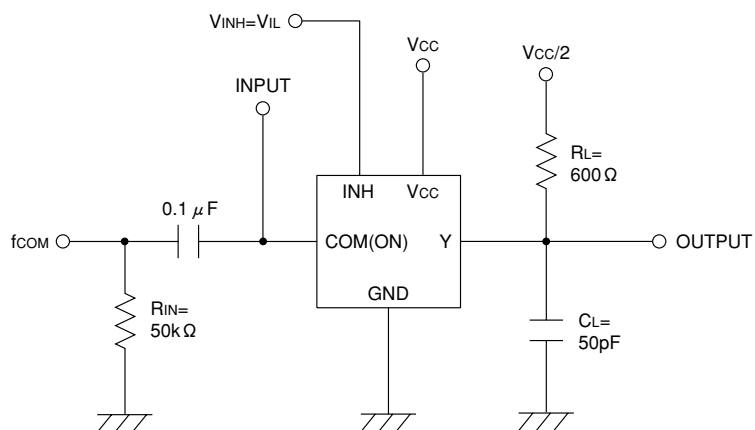


## ■ Sine Wave Distortion Rate



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

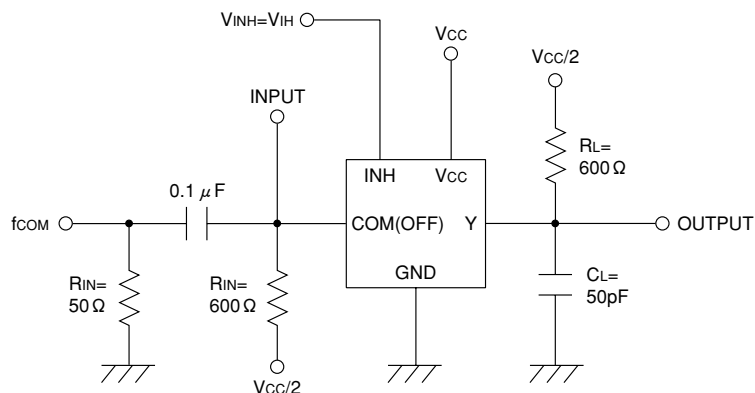
## ■ -3dB Band Width



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



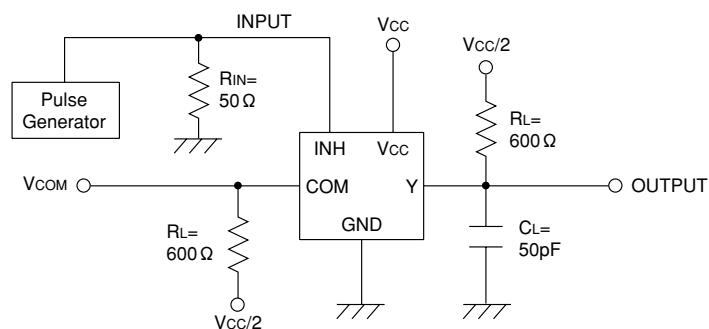
## ■Feed Through Test Circuit



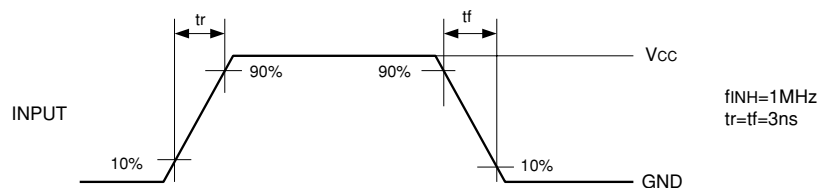
\*  $f_{COM}$  by sine wave ( $f=1\text{MHz}$ )

## ■Cross Talk (Control Input → Switch Output)

### ■Typical Application Circuit

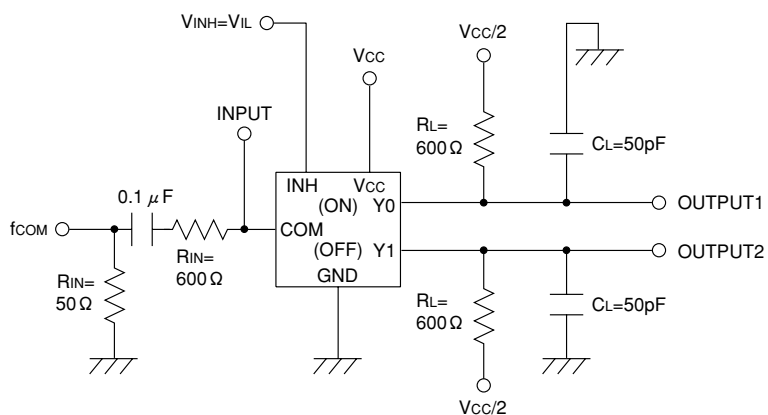


## ■Waveforms



## ■ Cross Talk (between Switches)

### ■ Typical Application Circuit



### ■ Waveforms

