

# TPG1067S5

## SINGLE-CHANNEL SPST Analog Switches

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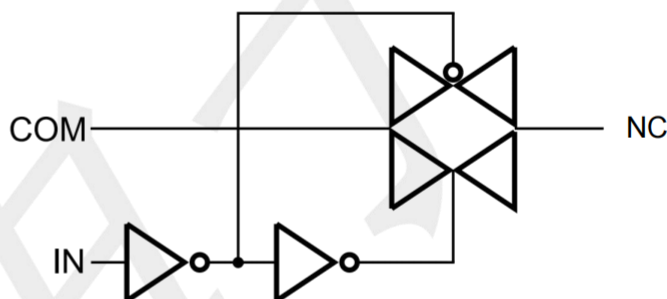
### Features

- Low On-resistance,  $R_{on}=3.3\Omega$
- 1.8V Logic Compatible Control Pin
- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- High Off-Isolation: -100dB @ 100KHz
- Low Channel-to-Channel Crosstalk: -97dB @ 100KHz
- High Bandwidth (-3dB @400MHz) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current (<2uA) With Very Wide Supply Range (1.5V ~ 5.5V)

### Applications

- Cell phones and TWS headset
- Audio, Video, UART, USB2.0 Signal and Supply Routing

### Logic Diagram



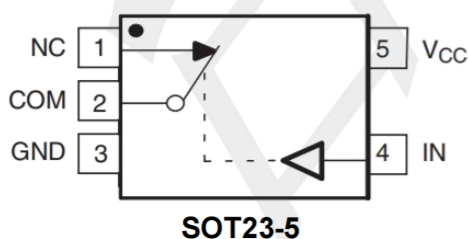
### General Description

The is a low voltage single-pole,double-throw (SPDT) analog switch intending for use in chopping,modem, signal gating, and signal multiplexing for analog-to-digital and digital -to-analog conversion systems.

### PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION                                             |
|---------|----------|---------------------------------------------------------|
| 1       | NC       | Normally Closed                                         |
| 2       | COM      | Common port                                             |
| 3       | GND      | Ground                                                  |
| 4       | IN       | Digital control pin, COM connected to NC when logic low |
| 5       | VCC      | Supply voltage                                          |

### Pin Configuratio



### Function Table

| INPUT(IN) | Switch |
|-----------|--------|
| L         | ON     |
| H         | OFF    |

Note:H: HIGH voltage level;L: LOW voltage level.

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### Absolute Maximum Ratings

(Unless otherwise specified)

| PARAMETER                                                          | SYMBOL           | RATINGS     | UNIT |
|--------------------------------------------------------------------|------------------|-------------|------|
| Supply Voltage                                                     | V <sub>CC</sub>  | -0.3 ~ +6.5 | V    |
| Switch Voltage                                                     | V <sub>S</sub>   | -0.3 ~ +6.5 | V    |
| Input Voltage                                                      | V <sub>IN</sub>  | -0.3 ~ +6.5 | V    |
| Continuous Current Through IN, COM, NC                             |                  | ±50         | mA   |
| Peak Current Through IN, COM, NC<br>(pulsed at 1ms 50% duty cycle) |                  | ±100        | mA   |
| Storage Temperature Range                                          | T <sub>STG</sub> | -55 ~ +150  | °C   |
| Operating Junction Temperature                                     | T <sub>J</sub>   | 150         | °C   |
| Junction to Ambient                                                | R <sub>θJA</sub> | 280         | °C/W |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### Recommend operating ratings

(Unless otherwise specified)

| PARAMETER                | SYMBOL           | RATINGS    | UNIT |
|--------------------------|------------------|------------|------|
| Supply Voltage Operating | V <sub>CC</sub>  | 1.6 ~ 5.5  | V    |
| Control Input Voltage    | V <sub>SEL</sub> | -0.3 ~ 5.5 | V    |
| Input Signal Voltage     | V <sub>A</sub>   | -0.3 ~ 5.5 | V    |
| Operating Temperature    | T <sub>A</sub>   | -40 ~ +85  | °C   |

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### Electrical Characteristics (TA = 25°C, unless otherwise specified)

| PARAMETER                                | SYMBOL | TEST Conditions                        | MIN | TYP | MAX  | UNIT |
|------------------------------------------|--------|----------------------------------------|-----|-----|------|------|
| High-Level Input Voltage                 | VIH    | VCC=3.3V ~ 5.5V                        | 1.6 | --  | --   | V    |
|                                          |        | VCC=1.5V ~ 3.3V                        | 1.4 | --  | --   | V    |
| Low-Level Input Voltage                  | VIL    | VCC=3.3V ~ 5.5V                        | --  | --  | 0.6  | V    |
|                                          |        | VCC=1.5V ~ 3.3V                        | --  | --  | 0.4  | V    |
| Supply quiescent current                 | ICC    | IA=0, VSEL=0 or VSEL=VCC               | --  | --  | 1.0  | uA   |
| Increase in ICC per input                | ICCT   | IA=0, VCC=4.5V<br>VSEL>1.8 or VSEL<0.5 | --  | --  | 1.0  | uA   |
| Off state leakage from IN to COM (or NC) | IA     | VA = 5.5V, VB0(or B1) = 0V             | --  | --  | ±2.0 | uA   |
| On-Resistance                            | RON1   | VA=0 ~ 0.5V, IA=30mA                   | --  | 5.6 | 9.9  | Ω    |
|                                          | RON2   | VA=0.5 ~ 2.0V, IA=30mA                 | --  | 4.6 | 8.0  | Ω    |
|                                          | RON3   | VA=2.0 ~ 4.0V, IA=30mA                 | --  | 4.0 | 6.0  | Ω    |
|                                          | RON4   | VA=4.0 ~ 5.5V, IA=30mA                 | --  | 3.3 | 5.5  | Ω    |
| On-Resistance Flatness                   | RFLAT1 | VA=0 ~ 0.5V, IA=30mA                   | --  | 1.6 | --   | Ω    |
|                                          | RFLAT2 | VA=0.5 ~ 2.0V, IA=30mA                 | --  | 0.7 | --   | Ω    |
|                                          | RFLAT3 | VA=2.0 ~ 4.0V, IA=30mA                 | --  | 0.5 | --   | Ω    |
|                                          | RFLAT4 | VA=4.0 ~ 5.5V, IA=30mA                 | --  | 0.3 | --   | Ω    |
| On-Resistance Matching Between Channels  | Δ RON  | VA=0~5.5V, IA=30mA                     | --  | 0.1 | 0.2  | Ω    |

### AC Electronics Characteristics (Ta=25oC, VCC=3.3V, unless otherwise noted)

| PARAMETER                 | SYMBOL | TEST Conditions                        | MIN | TYP | MAX | UNIT |
|---------------------------|--------|----------------------------------------|-----|-----|-----|------|
| Turn-On Time              | TON    | VA=1.5V, CL=35pF, RL=50Ω               | --  | 200 | --  | ns   |
| Turn-Off Time             | TOFF   | VA=1.5V, CL=35pF, RL=50Ω               | --  | 200 | --  | ns   |
| Break-Before-Make time    | TBBM   | VA=1.5V, CL=35pF, RL=50Ω               | --  | 500 | --  | ns   |
| -3dB Bandwidth            | BW     | RL=50Ω, CL=0pF                         | --  | 400 | --  | MHz  |
| Off isolation             | OIRR   | F=1KHz, RL=50Ω                         | --  | -81 | --  | dB   |
|                           |        | F=10KHz, RL=50Ω                        | --  | -80 | --  | dB   |
| Crosstalk                 | Xtalk  | F=1KHz, RL=50Ω                         | --  | -83 | --  | dB   |
|                           |        | F=10KHz, RL=50Ω                        | --  | -82 | --  | dB   |
| Total Harmonic Distortion | THD    | F=20Hz to 20KHz<br>VA=600mVp-p @RL=32Ω | --  | -80 | --  | dB   |

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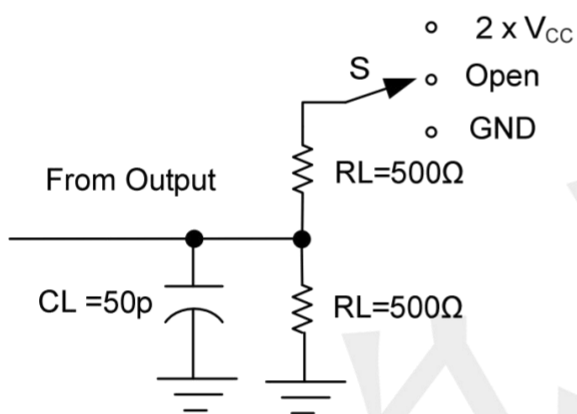
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**Capacitance** ( $T_a=25^\circ\text{C}$  unless otherwise noted)

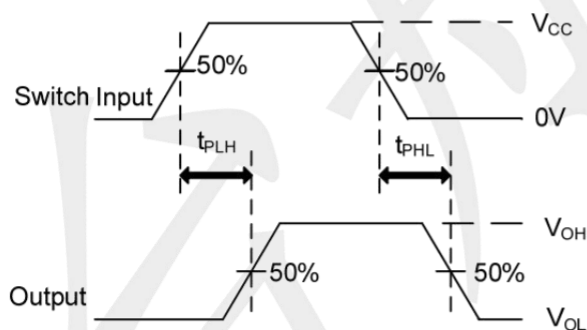
| PARAMETER       | SYMBOL    | TEST Conditions                  | MIN | TYP | MAX | UNIT |
|-----------------|-----------|----------------------------------|-----|-----|-----|------|
| Off capacitance | $C_{OFF}$ | $F=100\text{KHz}$ , $V_{CC}=3.3$ | --  | 5.0 | --  | pF   |
| On capacitance  | $C_{ON}$  | $F=100\text{KHz}$ , $V_{CC}=3.3$ | --  | 7.0 | --  | pF   |

### TEST CIRCUIT AND WAVEFORMS



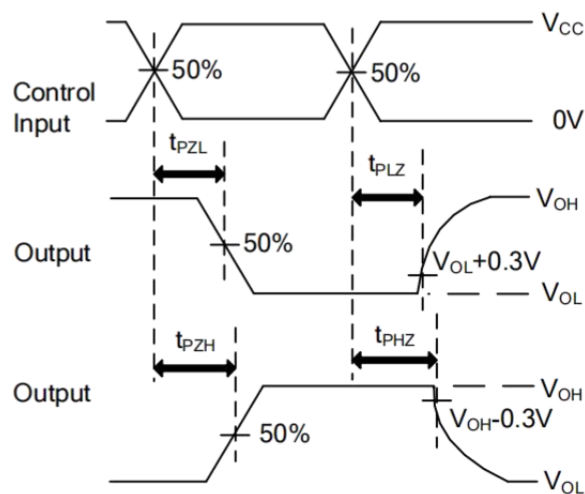
TEST CIRCUIT

| TEST              | S                 |
|-------------------|-------------------|
| $t_{PLH}/t_{PHL}$ | Open              |
| $t_{PHZ}/t_{PZH}$ | GND               |
| $t_{PLZ}/t_{PZL}$ | $2 \times V_{CC}$ |



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES

Note:  $C_L$  includes probe and jig capacitance.  
 $PRR \leq 1\text{MHz}$ ,  $Z_O = 50\Omega$ ,  $t_r \leq 2.5\text{ns}$ ,  $t_f \leq 2.5\text{ns}$ .



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES

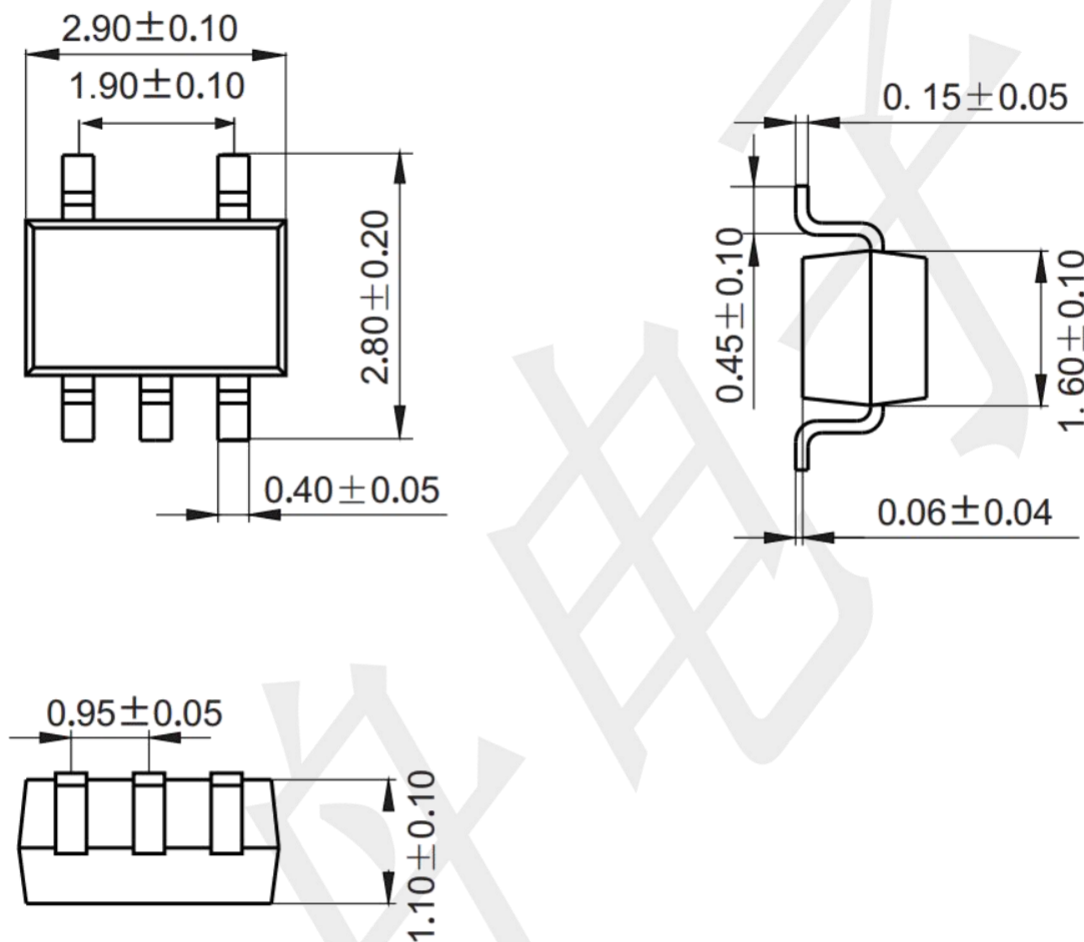
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### Package information

SOT23-5 (Unit: mm)



### Mounting Pad Layout (Unit: mm)

