

### Features

- Low On-resistance,  $R_{on}=1.5\Omega$  when  $V_{CC}=5V$
- 1.8V Logic Compatible Control Pin
- High Off-Isolation:  $-100dB @ 100KHz$
- COM+/- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- Low Channel-to-Channel Crosstalk:  $-97dB @ 100KHz$
- High Bandwidth ( $-3dB @ 700MHz$ ) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current ( $<2\mu A$ ) With Very Wide Supply Range ( $1.5V \sim 5.5V$ )

### Applications

- Mobile Phones, Tablets and Notebooks
- Portable media players or Personal media players

### General Description

This is a high-speed dual channel analog switch, which has First disconnect, then connect, and bidirectional signal switching function. It can be used Create a dual 2:1 multiplexer or a 1:2 dual de multiplexer.

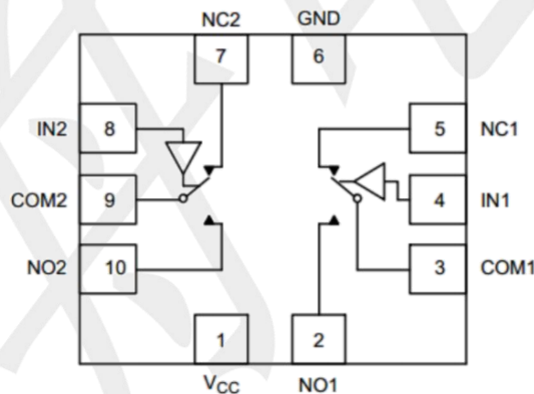
It provides extremely low on resistance, very low THD, and channels

Interstitial interference and high shutdown isolation. These characteristics make

It is suitable for audio signal transmission and switching applications.

The control logic supports 1.5V-5.5V CMOS logic levels. This logic interface can directly interface with various CPU and microcontrollers without increasing the power output current (ICC), thereby reducing Power consumption.

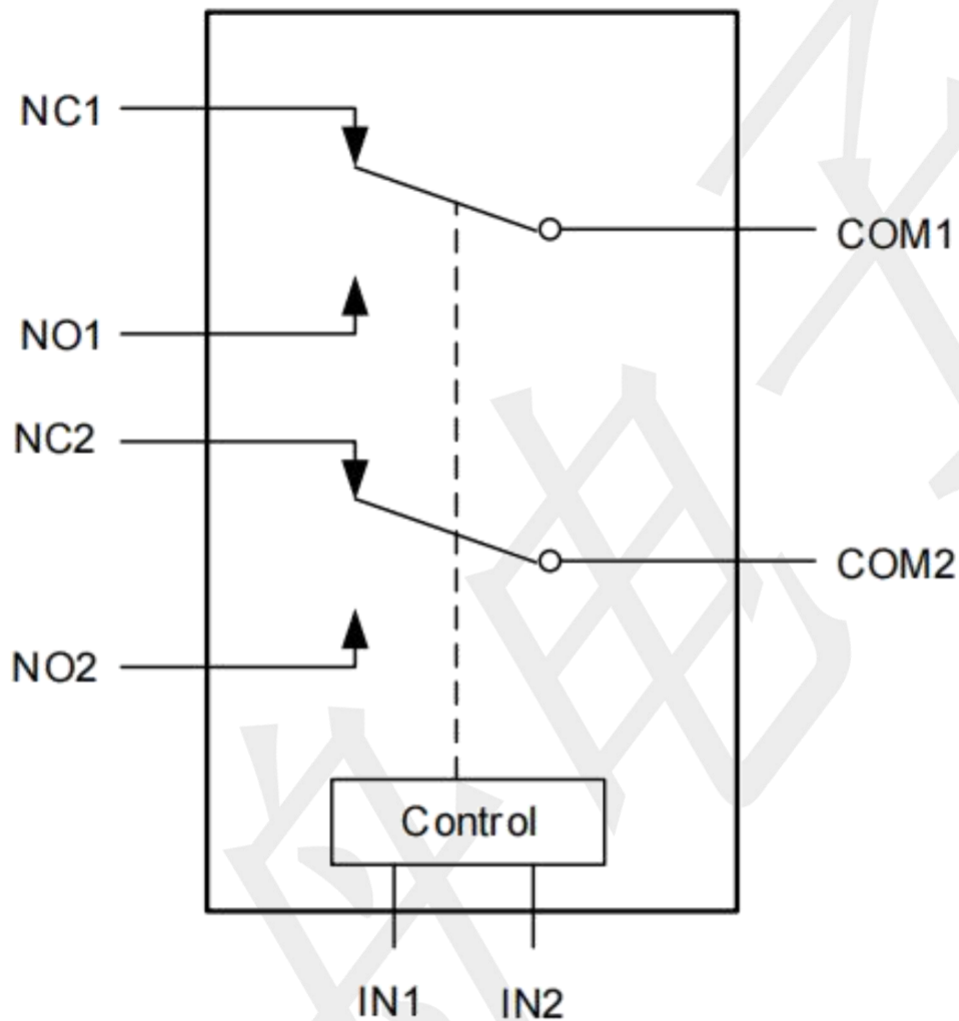
### PIN CONFIGURATIONS (TOP VIEW)



### PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION                                   |
|---------|----------|-----------------------------------------------|
| 1       | VCC      | Supply voltage                                |
| 2       | NO1      | Analog/Digital Signal Ports (Normally open)   |
| 3       | COM1     | Common Signal Ports                           |
| 4       | IN1      | Logic Input Control                           |
| 5       | NC1      | Analog/Digital Signal Ports (Normally closed) |
| 6       | GND      | Ground                                        |
| 7       | NC2      | Analog/Digital Signal Ports (Normally closed) |
| 8       | IN2      | Logic Input Control                           |
| 9       | COM2     | Common Signal Ports                           |
| 10      | NO2      | Analog/Digital Signal Ports (Normally open)   |

## BLOCK DIAGRAM



## Function Table

### Function Descriptions

| Logic Input(IN <sub>x</sub> ) | Function              |
|-------------------------------|-----------------------|
| 0                             | NC1=COM1 and NC2=COM2 |
| 1                             | NO1=COM1 and NO2=COM2 |

Note: X= 1 or 2

# TPTS3A5223RSWR

## Dual channel SPDT bidirectional analog switch

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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    |
| Input Voltage                                                      | V <sub>IN</sub>  | -0.3 ~ +6.5 | V    |
| Continuous Current Through NO, NC, COM                             |                  | ±100        | mA   |
| Peak Current Through NO, NC, COM<br>(pulsed at 1ms 50% duty cycle) |                  | ±200        | mA   |
| Storage Temperature Range                                          | T <sub>STG</sub> | -55 ~ +150  | °C   |
| Operating Junction Temperature                                     | T <sub>J</sub>   | 150         | °C   |
| Lead Temperature (Soldering, 10 seconds)                           | T <sub>L</sub>   | 260         | °C   |
| Power Dissipation                                                  | P <sub>D</sub>   | 250         | mW   |

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>  | 1.5 ~ 5.5  | V    |
| Control Input Voltage    | V <sub>IN</sub>  | -0.3 ~ 5.5 | V    |
| Input Signal Voltage     | V <sub>COM</sub> | -0.3 ~ 5.5 | V    |
| Operating Temperature    | T <sub>A</sub>   | -40 ~ +85  | °C   |
| Junction to Ambient      | R <sub>θJA</sub> | 360        | °C/W |

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### DC Electrical Characteristics (TA =25°C, VC=+3.3V, unless otherwise specified)

| PARAMETER                                                                        | SYMBOL             | TEST Conditions                                                               | MIN | TYP | MAX  | UNIT |
|----------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------|-----|-----|------|------|
| High-Level Input Voltage                                                         | V <sub>IH</sub>    | VCC=3.3V ~ 5.5V                                                               | 1.6 | --  | --   | V    |
|                                                                                  |                    | VCC=1.5V ~ 3.3V                                                               | 1.4 | --  | --   | V    |
| Low-Level Input Voltage                                                          | V <sub>IL</sub>    | VCC=3.3V ~ 5.5V                                                               | --  | --  | 0.6  | V    |
|                                                                                  |                    | VCC=1.5V ~ 3.3V                                                               | --  | --  | 0.4  | V    |
| Supply quiescent current                                                         | I <sub>CC</sub>    | I <sub>A</sub> =0, V <sub>SEL</sub> =0 or V <sub>SEL</sub> =VCC               | --  | --  | 1.0  | uA   |
| Increase in ICC per input                                                        | I <sub>CC</sub> T  | I <sub>A</sub> =0, VCC=4.5V<br>V <sub>SEL</sub> >1.8 or V <sub>SEL</sub> <0.5 | --  | --  | 1.0  | uA   |
| Off state leakage from COM <sub>x</sub> to NC <sub>x</sub> (or NO <sub>x</sub> ) | I <sub>COMx</sub>  | V <sub>COM</sub> = 5.5V, V <sub>NC(or NO)</sub> = 0V                          | --  | --  | ±2.0 | uA   |
| On-Resistance                                                                    | R <sub>ON1</sub>   | V <sub>A</sub> =0 ~ 0.5V, I <sub>A</sub> =30mA                                | --  | 3.6 | 3.9  | Ω    |
|                                                                                  | R <sub>ON2</sub>   | V <sub>A</sub> =0.5 ~ 2.0V, I <sub>A</sub> =30mA                              | --  | 3.0 | 3.5  | Ω    |
|                                                                                  | R <sub>ON3</sub>   | V <sub>A</sub> =2.0 ~ 4.0V, I <sub>A</sub> =30mA                              | --  | 2.5 | 3.5  | Ω    |
|                                                                                  | R <sub>ON4</sub>   | V <sub>A</sub> =4.0 ~ 5.5V, I <sub>A</sub> =30mA                              | --  | 1.5 | 1.8  | Ω    |
| On-Resistance Flatness                                                           | R <sub>FLAT1</sub> | V <sub>A</sub> =0 ~ 0.5V, I <sub>A</sub> =30mA                                | --  | 1.6 | --   | Ω    |
|                                                                                  | R <sub>FLAT2</sub> | V <sub>A</sub> =0.5 ~ 2.0V, I <sub>A</sub> =30mA                              | --  | 0.7 | --   | Ω    |
|                                                                                  | R <sub>FLAT3</sub> | V <sub>A</sub> =2.0 ~ 4.0V, I <sub>A</sub> =30mA                              | --  | 0.5 | --   | Ω    |
|                                                                                  | R <sub>FLAT4</sub> | V <sub>A</sub> =4.0 ~ 5.5V, I <sub>A</sub> =30mA                              | --  | 0.3 | --   | Ω    |
| On-Resistance Matching Between Channels                                          | Δ R <sub>ON</sub>  | V <sub>A</sub> =0~5.5V, I <sub>A</sub> =30mA                                  | --  | 0.1 | 0.2  | Ω    |

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

| PARAMETER                 | SYMBOL           | TEST Conditions                                                  | MIN | TYP | MAX | UNIT |
|---------------------------|------------------|------------------------------------------------------------------|-----|-----|-----|------|
| Turn-On Time              | T <sub>ON</sub>  | V <sub>A</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω  | --  | 200 | --  | ns   |
| Turn-Off Time             | T <sub>OFF</sub> | V <sub>A</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω  | --  | 200 | --  | ns   |
| Break-Before-Make time    | T <sub>BBM</sub> | V <sub>A</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω  | --  | 500 | --  | ns   |
| -3dB Bandwidth            | BW               | R <sub>L</sub> =50Ω, C <sub>L</sub> =5pF                         | --  | 550 | --  | MHz  |
|                           |                  | R <sub>L</sub> =50Ω, C <sub>L</sub> =0pF                         | --  | 700 | --  | MHz  |
| Off isolation             | OIRR             | F=1KHz, R <sub>L</sub> =50Ω                                      | --  | -81 | --  | dB   |
|                           |                  | F=10KHz, R <sub>L</sub> =50Ω                                     | --  | -80 | --  | dB   |
| Crosstalk                 | Xtalk            | F=1KHz, R <sub>L</sub> =50Ω                                      | --  | -83 | --  | dB   |
|                           |                  | F=10KHz, R <sub>L</sub> =50Ω                                     | --  | -82 | --  | dB   |
| Total Harmonic Distortion | THD              | F=20Hz to 20KHz<br>V <sub>A</sub> =600mVp-p @R <sub>L</sub> =32Ω | --  | -80 | --  | dB   |

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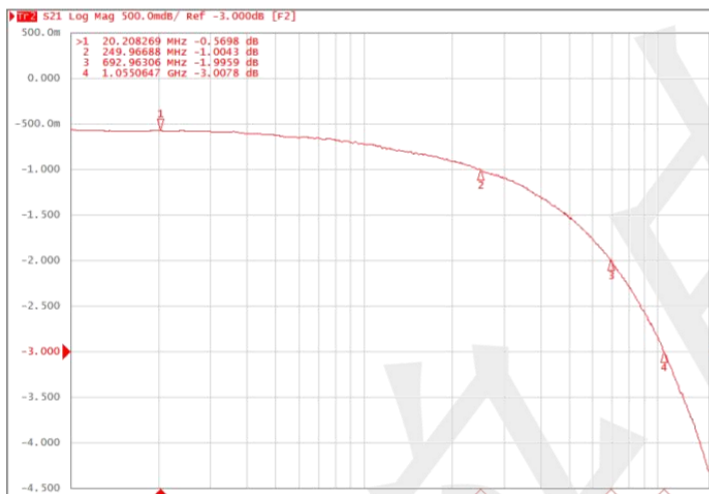
## Dual channel SPDT bidirectional analog switch

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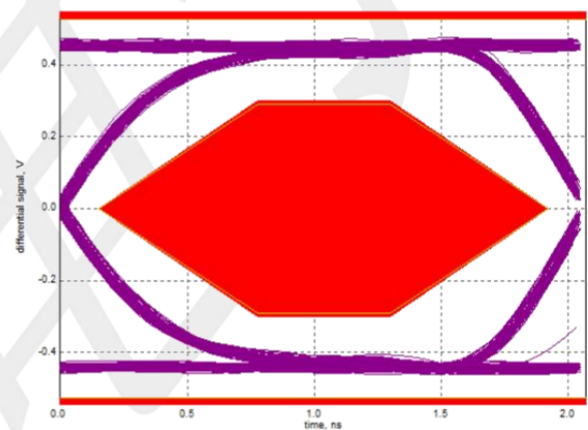
**Capacitance** ( $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=+3.3\text{V}$ , unless otherwise noted)

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

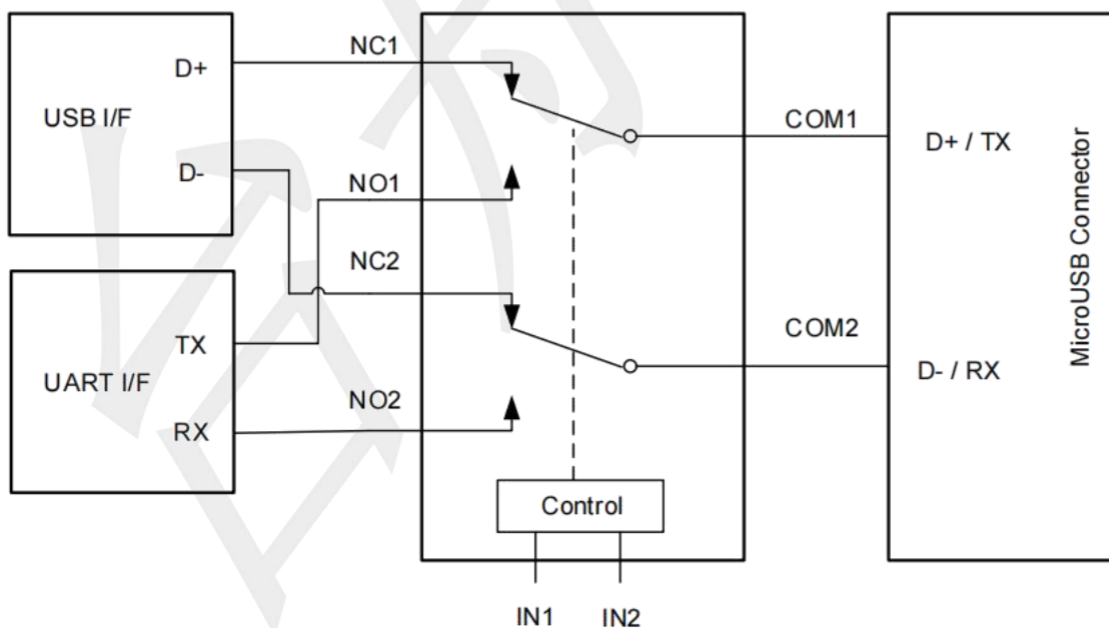
**Typical Characteristics** ( $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=3.3\text{V}$ , unless otherwise noted)



Bandwidth



Eye Diagram (480Mbps)

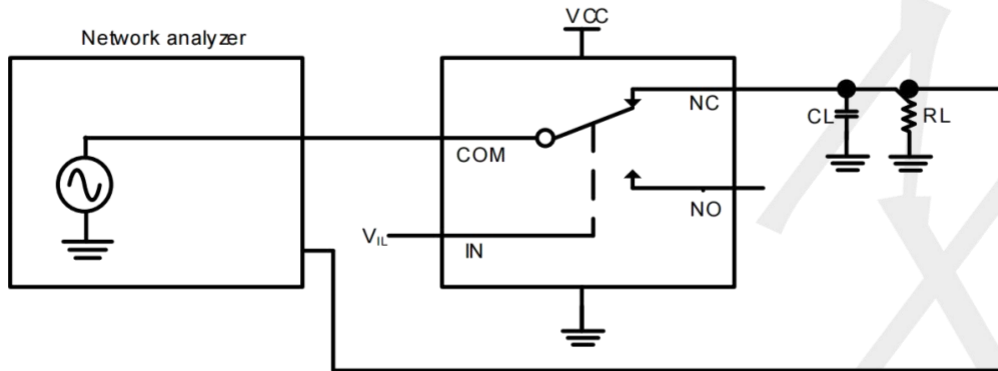


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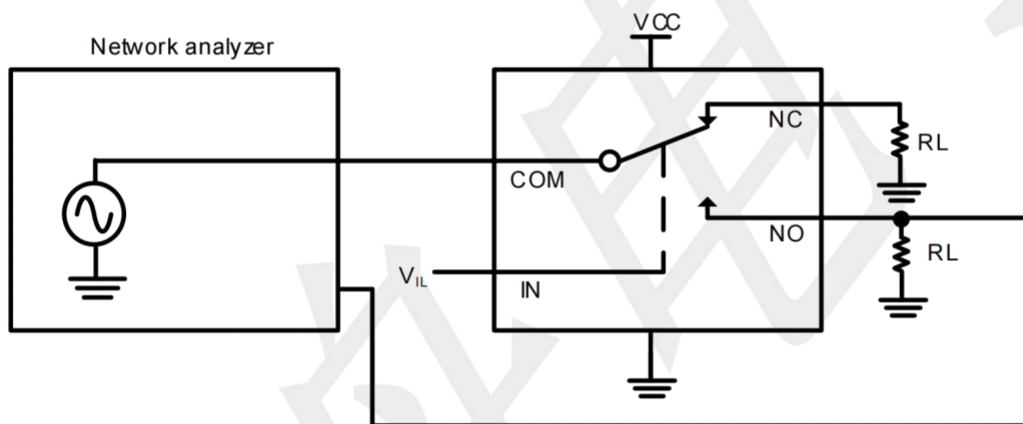
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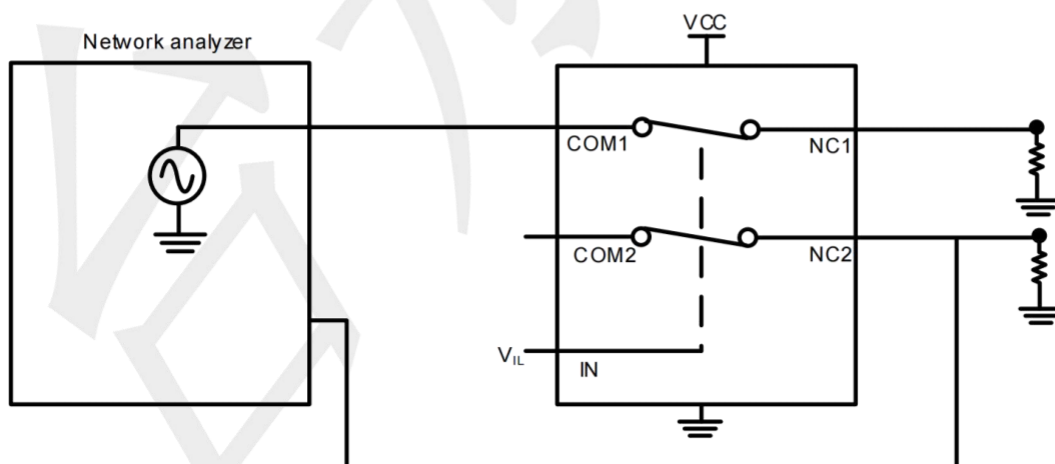
**Typical Characteristics** ( $T_a=25^{\circ}\text{C}$ ,  $V_{CC}=3.3\text{V}$ , unless otherwise noted)



**Bandwidth**



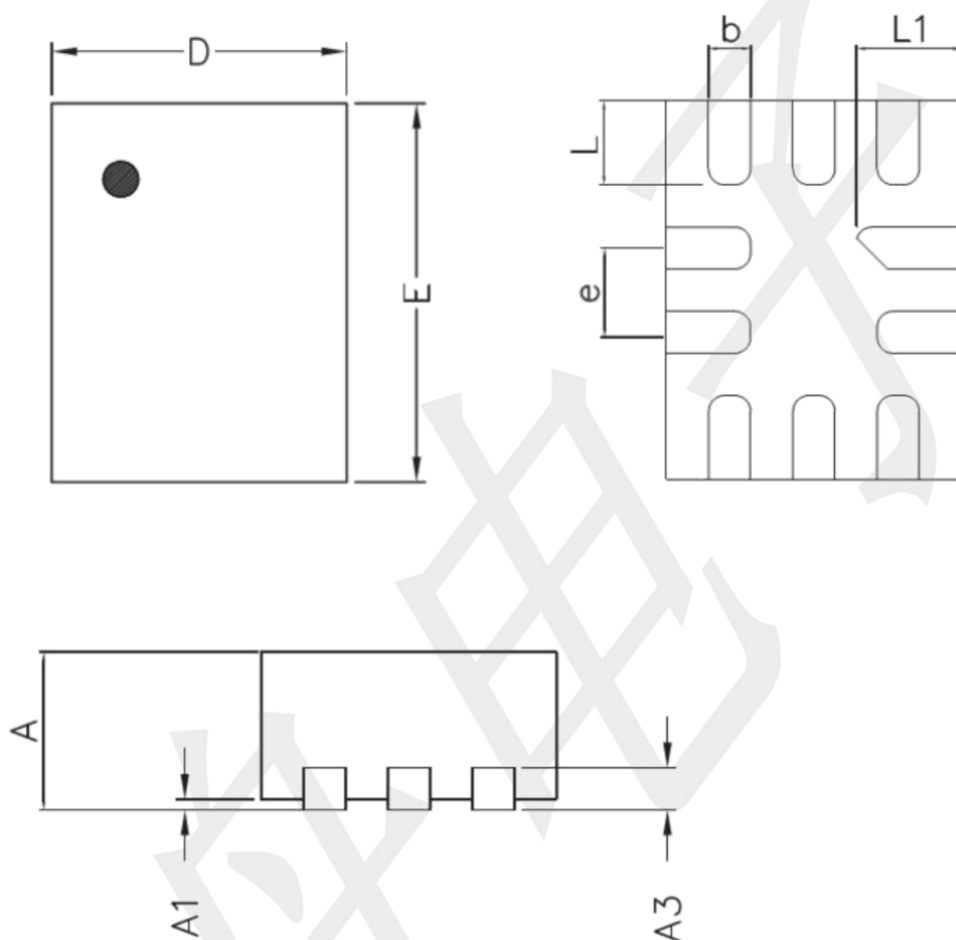
**Off isolation**



**Crosstalk**

## Package information

QFN1418-10L (Unit: mm)



| Symbol | Dimension in Millimeters |       |
|--------|--------------------------|-------|
|        | Min.                     | Max.  |
| A      | 0.450                    | 0.550 |
| A1     | 0.000                    | 0.050 |
| A3     | 0.152 Ref.               |       |
| D      | 1.350                    | 1.450 |
| E      | 1.750                    | 1.850 |
| b      | 0.150                    | 0.250 |
| e      | 0.400 Typ.               |       |
| L      | 0.350                    | 0.450 |
| L1     | 0.450                    | 0.550 |