

### 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 ( $-3dB @ 550MHz$ ) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current ( $<2\mu A$ ) With Very Wide Supply Range ( $1.5V \sim 5.5V$ )

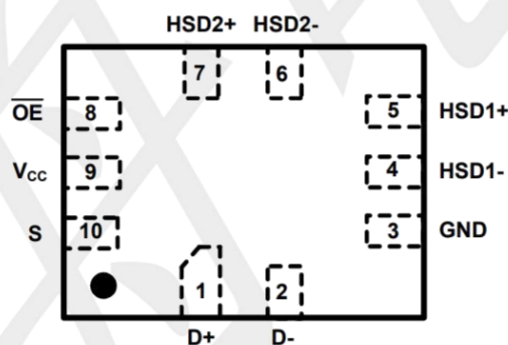
### Applications

- Mobile Phones, Tablets and Notebooks
- Anywhere a USB Type-C™ or Micro-B Connector is Used

### General Description

The is a bidirectional low-power dual port, high-speed, USB 2.0 analog switch with integrated protection for USB Type-C™ systems. The device is configured as a dual 2:1 or 1:2 switch. It is optimized for use with the USB 2.0 DP/DM lines in a USB Type-C™ system. The device is capable of true isolation. Even when COM+/- overrides VCC, very little current will flow back to the supply. has low bit-to-bit skew and high channel-to-channel noise isolation, and is compatible with various standards, such as high-speed USB 2.0 (480Mbps). Each switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs. Its bandwidth is wide enough to pass high-speed USB 2.0 differential signals (480 Mb/s) with good signal integrity.

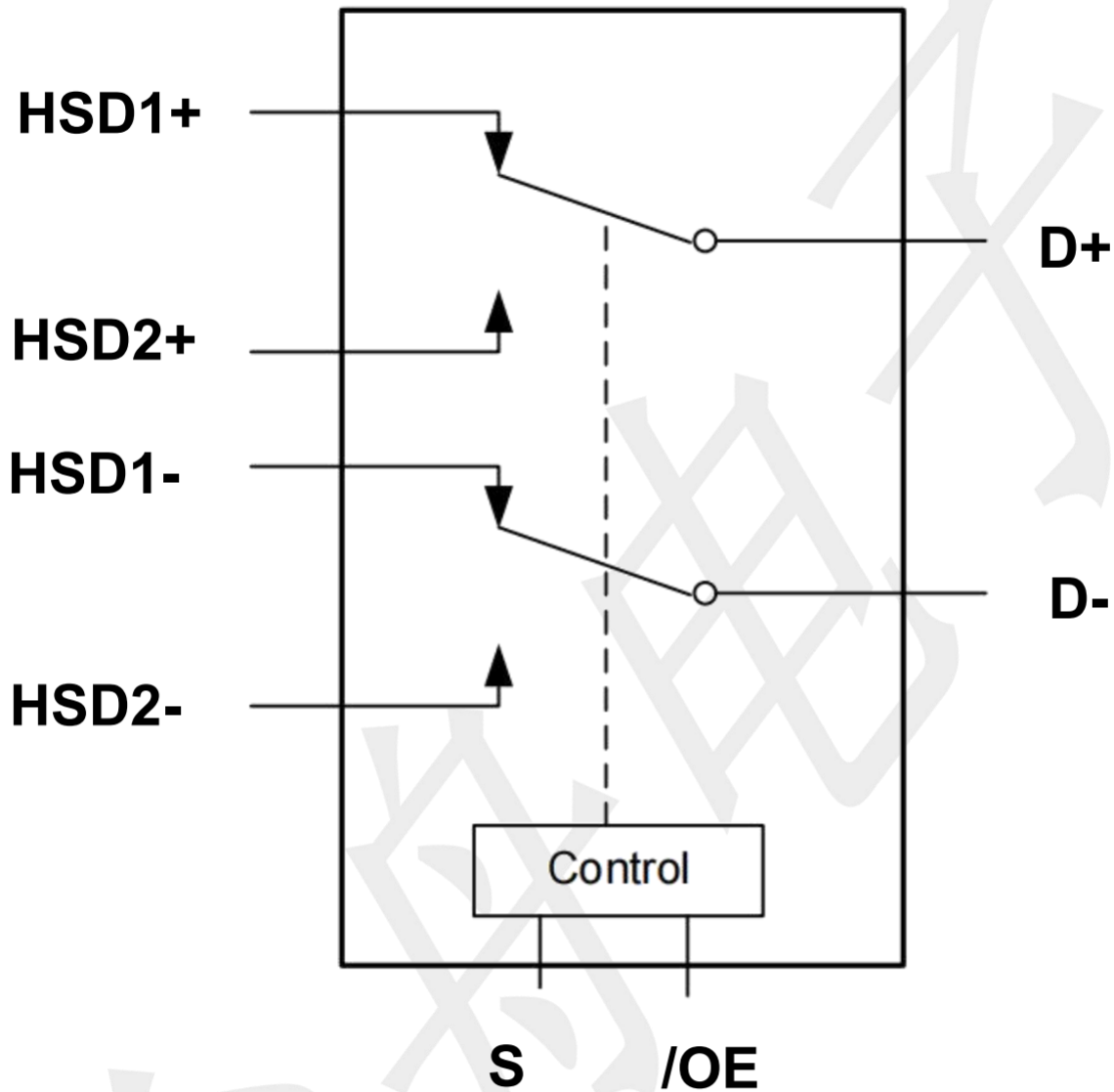
### PIN CONFIGURATIONS (TOP VIEW)



### PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION                      |
|---------|----------|----------------------------------|
| 1       | D+       | USB Data Bus                     |
| 2       | D-       | USB Data Bus                     |
| 3       | GND      | Ground                           |
| 4       | HSD1-    | Multiplexed Source Inputs        |
| 5       | HSD1+    | Multiplexed Source Inputs        |
| 6       | HSD2-    | Multiplexed Source Inputs        |
| 7       | HSD2+    | Multiplexed Source Inputs        |
| 8       | /OE      | output enable input (active LOW) |
| 9       | VCC      | Supply voltage                   |
| 10      | S        | Logic Input Selection            |

## BLOCK DIAGRAM



## Function Table

| /OE | Input S | HSD1+ ,HSD1- | HSD2+ ,HSD2- |
|-----|---------|--------------|--------------|
| 0   | 0       | ON           | OFF          |
| 0   | 1       | OFF          | ON           |
| 1   | X       | OFF          | OFF          |

Switches Shown For Logic "0" Input

### 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 HSD1,HSD2, D                             |                  | ±100        | mA   |
| Peak Current Through HSD1,HSD2, D<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>D</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 |

### DC Electrical Characteristics (TA =25°C, VC=+3.3V, 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 COMx to NCx (or NOx) | ICOMx  | VCOM = 5.5V, VNC(or NO) = 0V           | --  | --  | ±2.0 | uA   |
| On-Resistance                               | RON1   | VA=0 ~ 0.5V, IA=30mA                   | --  | 3.6 | 3.9  | Ω    |
|                                             | RON2   | VA=0.5 ~ 2.0V, IA=30mA                 | --  | 3.0 | 3.5  | Ω    |
|                                             | RON3   | VA=2.0 ~ 4.0V, IA=30mA                 | --  | 2.5 | 3.5  | Ω    |
|                                             | RON4   | VA=4.0 ~ 5.5V, IA=30mA                 | --  | 1.5 | 1.8  | 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=25°C, 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=5pF                         | --  | 550 | --  | MHz  |
|                           |        | RL=50Ω, CL=0pF                         | --  | 800 | --  | 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   |

# TPSGM7227YUWQ10G

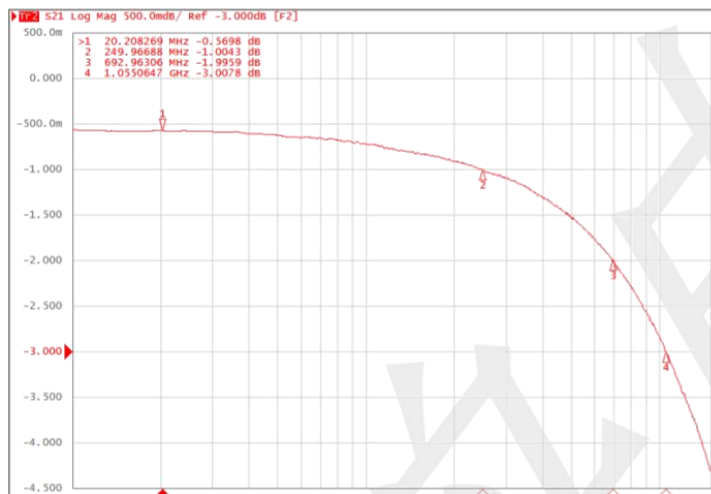
High Speed USB 2.0 (480Mbps) DPDT Analog Switch

WWW.TECHPUBIC.COM

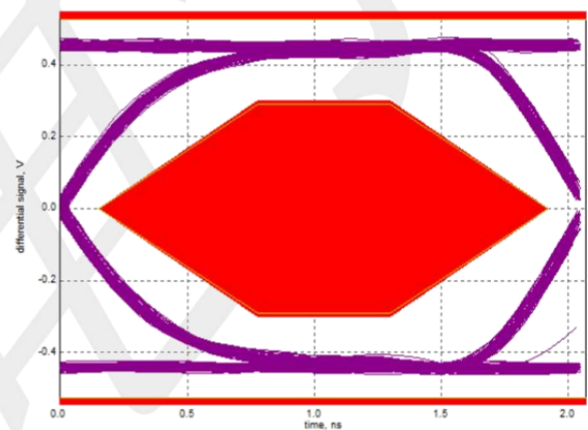
**Capacitance** ( $T_a=25^\circ\text{C}$ ,  $V_{CC}=+3.3\text{V}$ , unless otherwise noted)

| 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   |

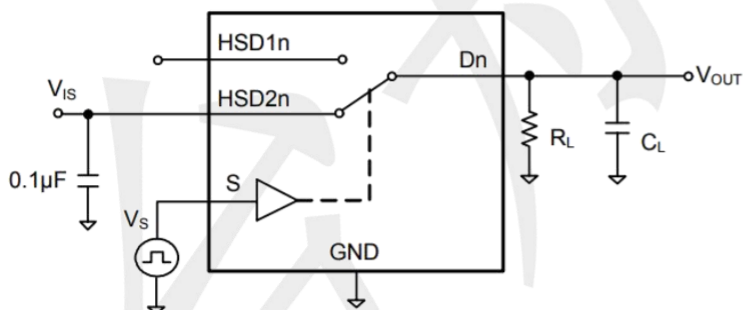
**Typical Characteristics** ( $T_a=25^\circ\text{C}$ ,  $V_{CC}=3.3\text{V}$ , unless otherwise noted)



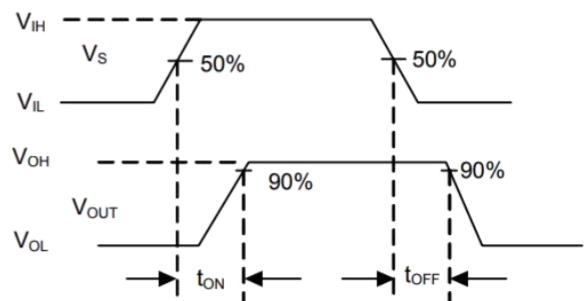
Bandwidth



Eye Diagram (480Mbps)

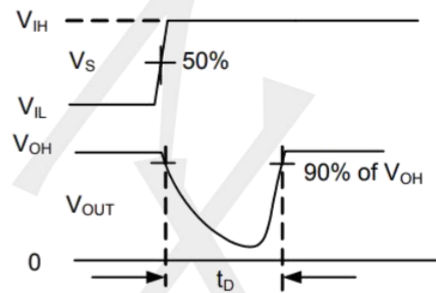
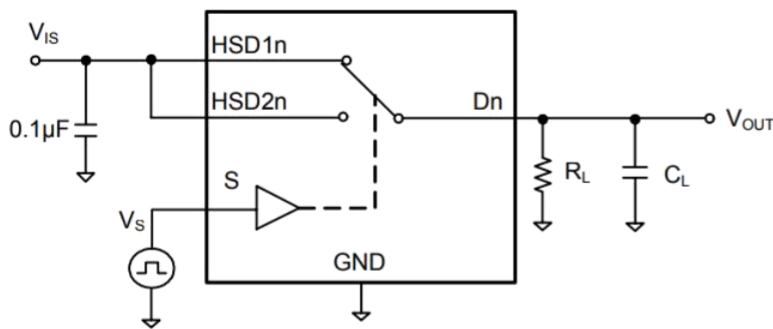


Test Circuit . Switching Times ( $t_{ON}$ ,  $t_{OFF}$ )

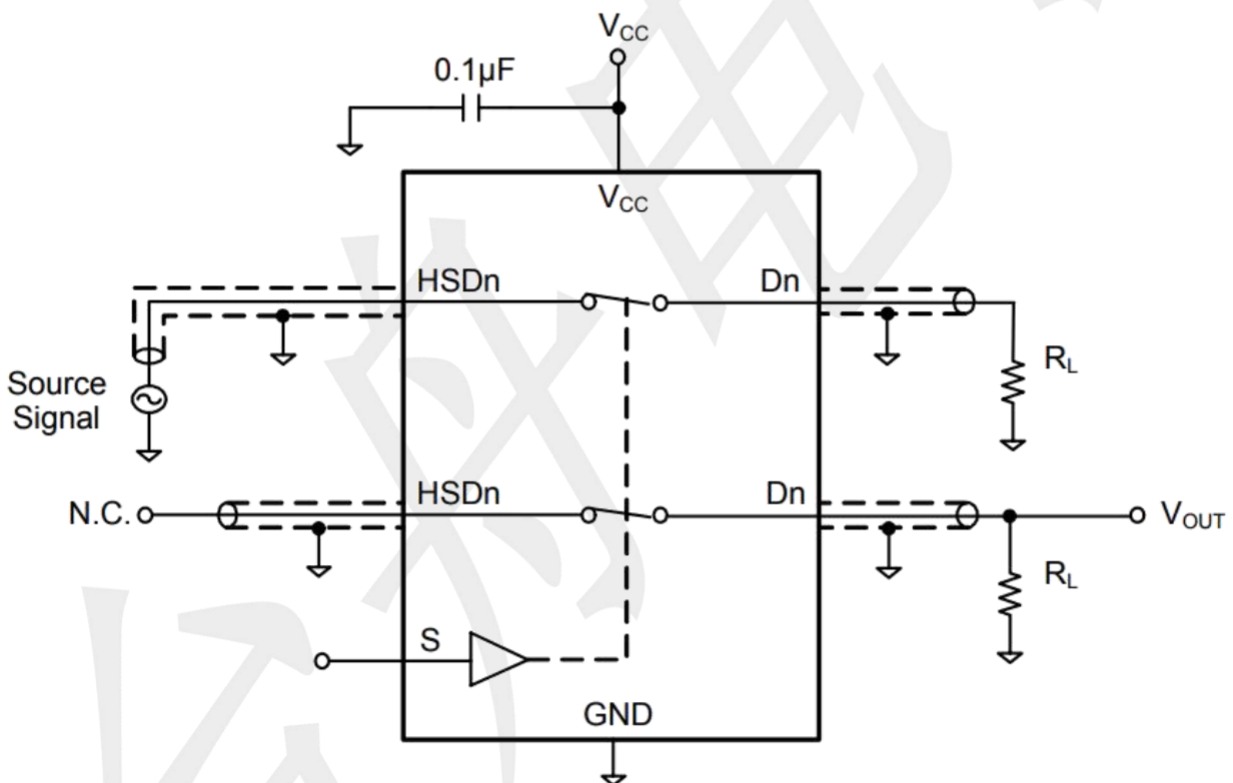




**Typical Characteristics** ( $T_a=25^\circ\text{C}$ ,  $V_{CC}=3.3\text{V}$ , unless otherwise noted)



Test Circuit . Break-Before-Make Time ( $t_D$ )

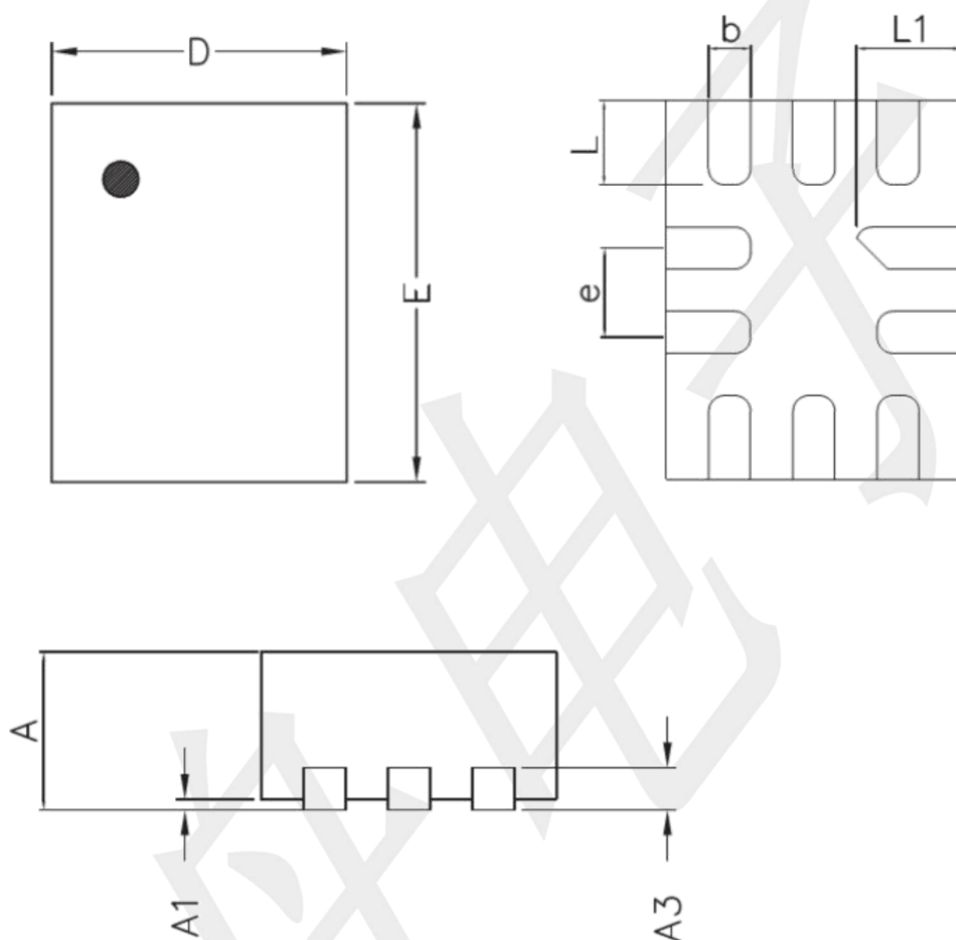


$$\text{Channel To Channel Crosstalk} = -20 \times \log \frac{V_{HSDn}}{V_{OUT}}$$

Test Circuit . Channel-to-Channel 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 |