

### Features

- Low On-resistance,  $R_{on} \leq 5.5\Omega$
- 1.8V Logic Compatible Control Pin
- High Off-Isolation:  $-100\text{dB} @ 100\text{KHz}$
- COM+/- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- Low Channel-to-Channel Crosstalk:  $-97\text{dB} @ 100\text{KHz}$
- High Bandwidth ( $-3\text{dB} @ 720\text{MHz}$ ) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current ( $< 2\mu\text{A}$ ) With Very Wide Supply Range (1.5V ~ 5.5V)

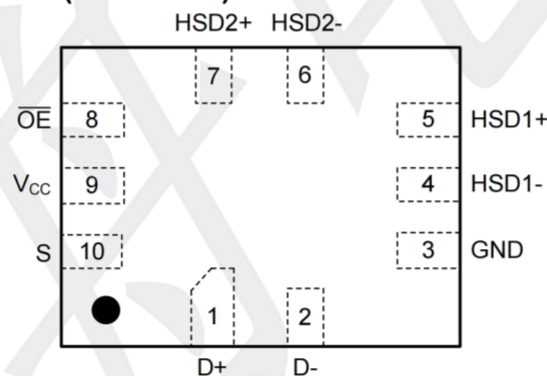
### Applications

- 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.

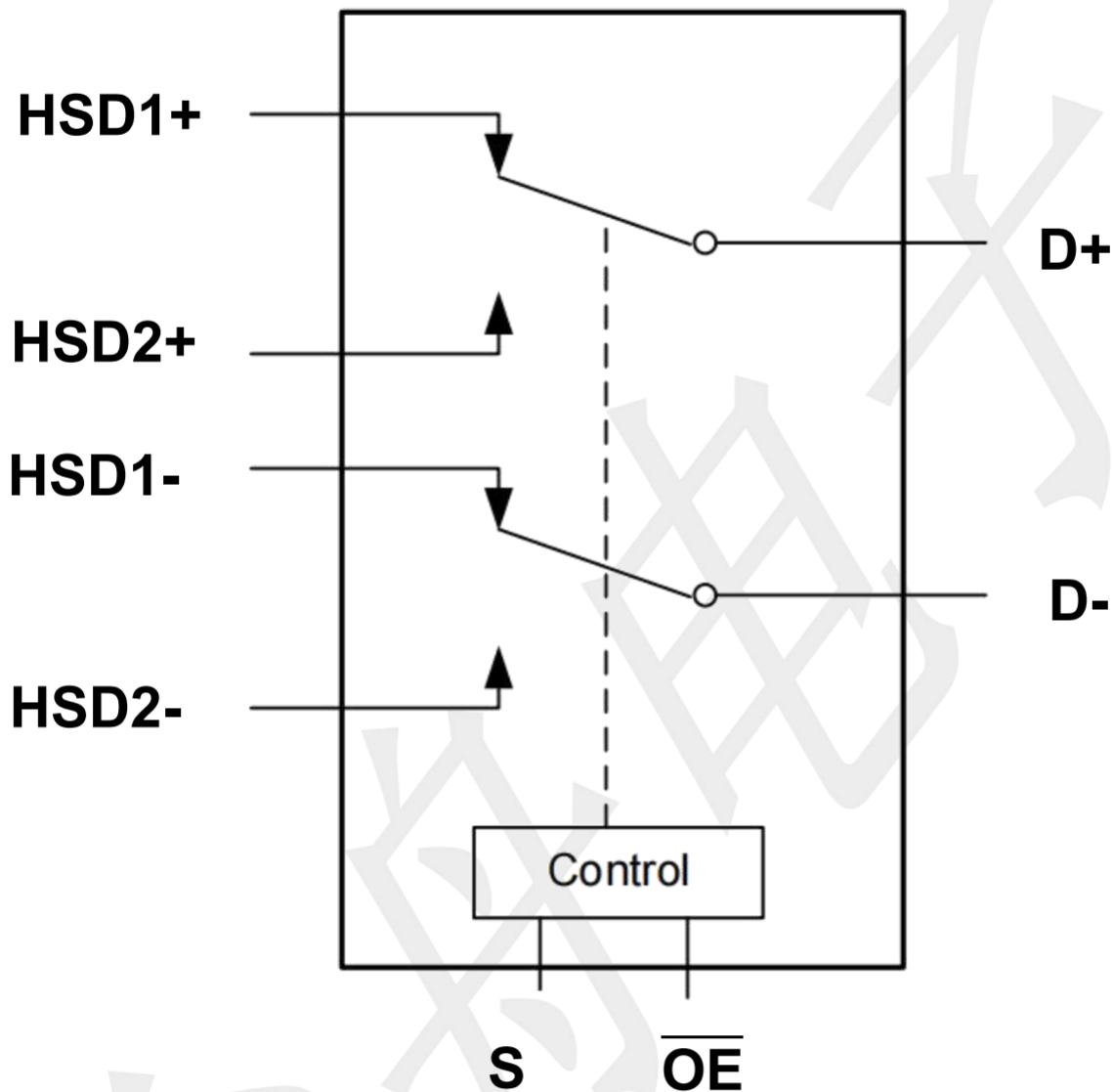
### PIN CONFIGURATIONS (TOP VIEW)



### 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	$\overline{OE}$	output enable input (active LOW)
9	VCC	Supply voltage
10	S	Logic Input Selection

### BLOCK DIAGRAM



### Function Table

$\overline{OE}$	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	VCC	-0.3 ~ +6.5	V
Input Voltage	VIN	-0.3 ~ +6.5	V
Continuous Current Through HSD1,HSD2, D		±100	mA
Peak Current Through HSD1,HSD2, D (pulsed at 1ms 50% duty cycle)		±200	mA
Storage Temperature Range	TSTG	-55 ~ +150	°C
Operating Junction Temperature	TJ	150	°C
Lead Temperature (Soldering, 10 seconds)	TL	260	°C
Power Dissipation	PD	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	VCC	1.5 ~ 5.5	V
Control Input Voltage	VIN	-0.3 ~ 5.5	V
Input Signal Voltage	VD	-0.3 ~ 5.5	V
Operating Temperature	TA	-40 ~ +85	°C
Junction to Ambient	RθJA	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	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 V <sub>SEL</sub> >1.8 or V <sub>SEL</sub> <0.5	--	--	1.0	uA
Off state leakage from Dx to HSD1x (or HSD2x)	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	--	4.1	5.5	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

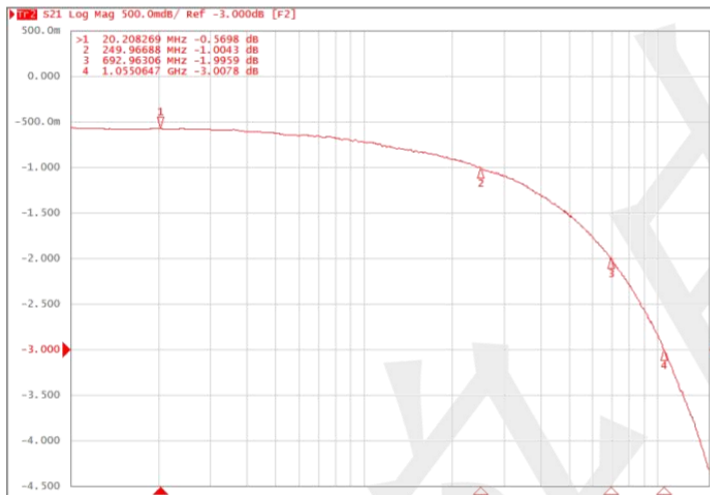
### AC Electronics Characteristics (Ta=25°C, VCC=+3.3V, unless otherwise noted)

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>B</sub> BM	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	--	720	--	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 V <sub>A</sub> =600mVp-p @R <sub>L</sub> =32Ω	--	-80	--	dB

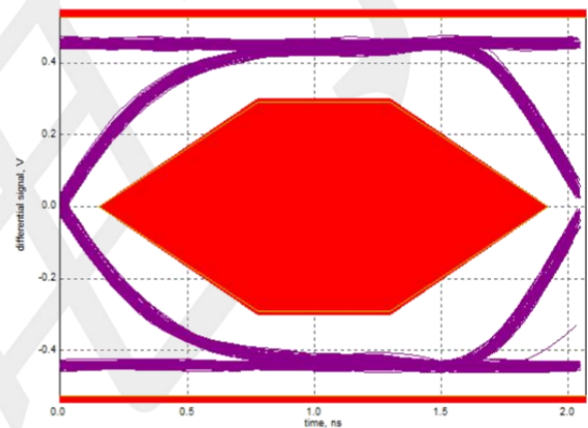
### Capacitance (Ta=25°C, VCC=+3.3V, unless otherwise noted)

PARAMETER	SYMBOL	TEST Conditions	MIN	TYP	MAX	UNIT
Off capacitance	C <sub>OFF</sub>	F=100KHZ,	--	5.0	--	pF
On capacitance	C <sub>ON</sub>	F=100KHZ,	--	7.0	--	pF

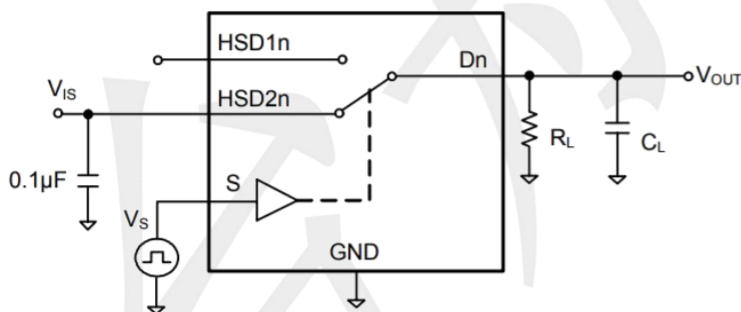
### Typical Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)



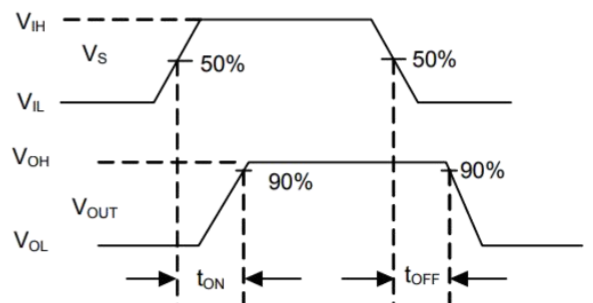
Bandwidth



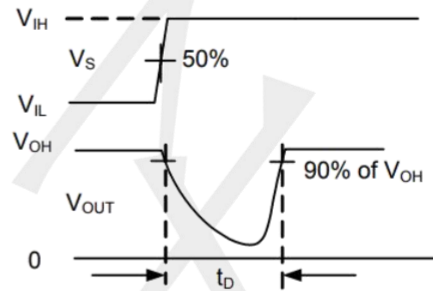
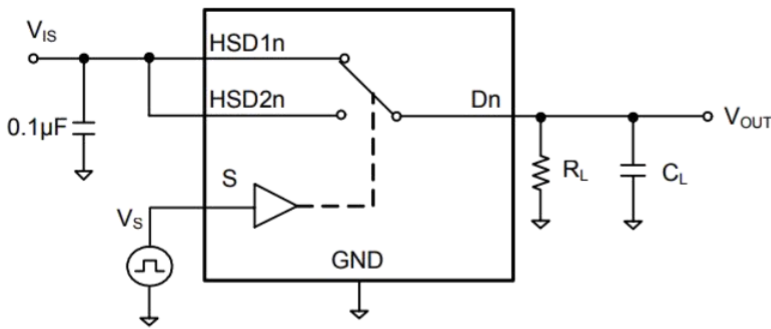
Eye Diagram (480Mbps)



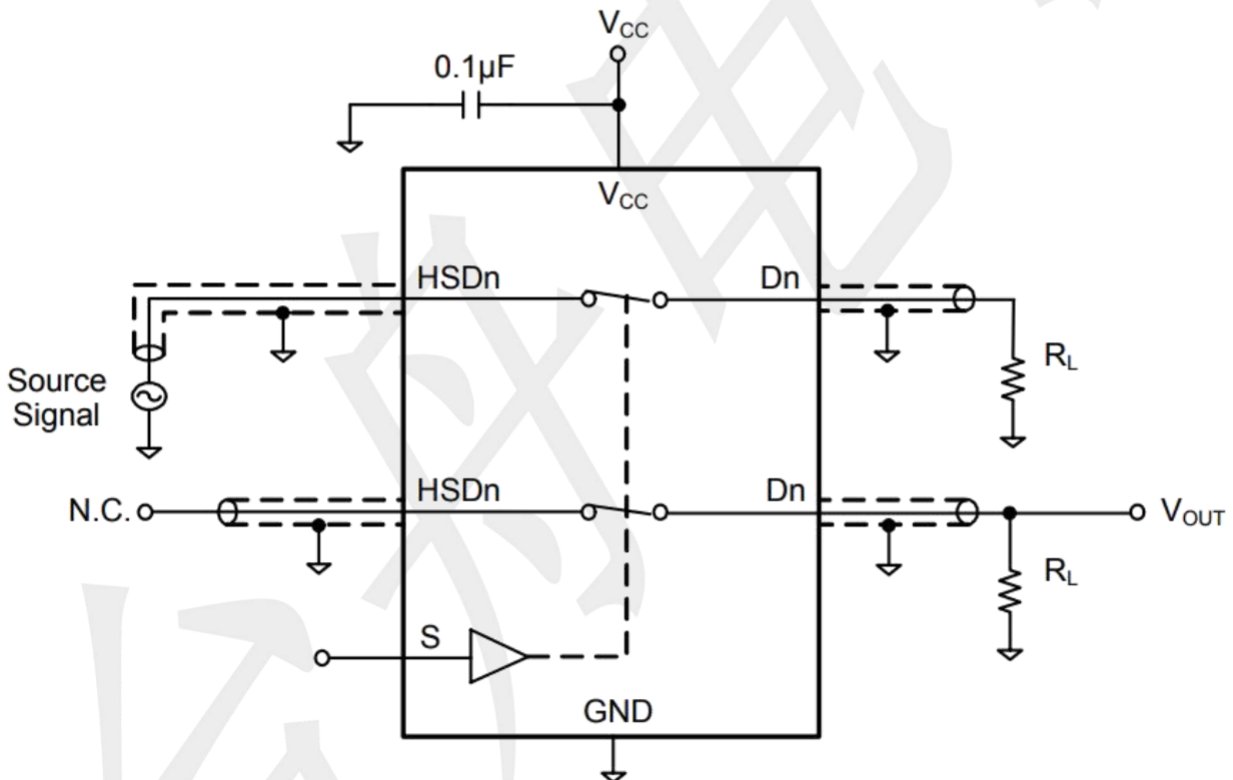
Test Circuit . Switching Times ( $t_{ON}$ ,  $t_{OFF}$ )



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



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

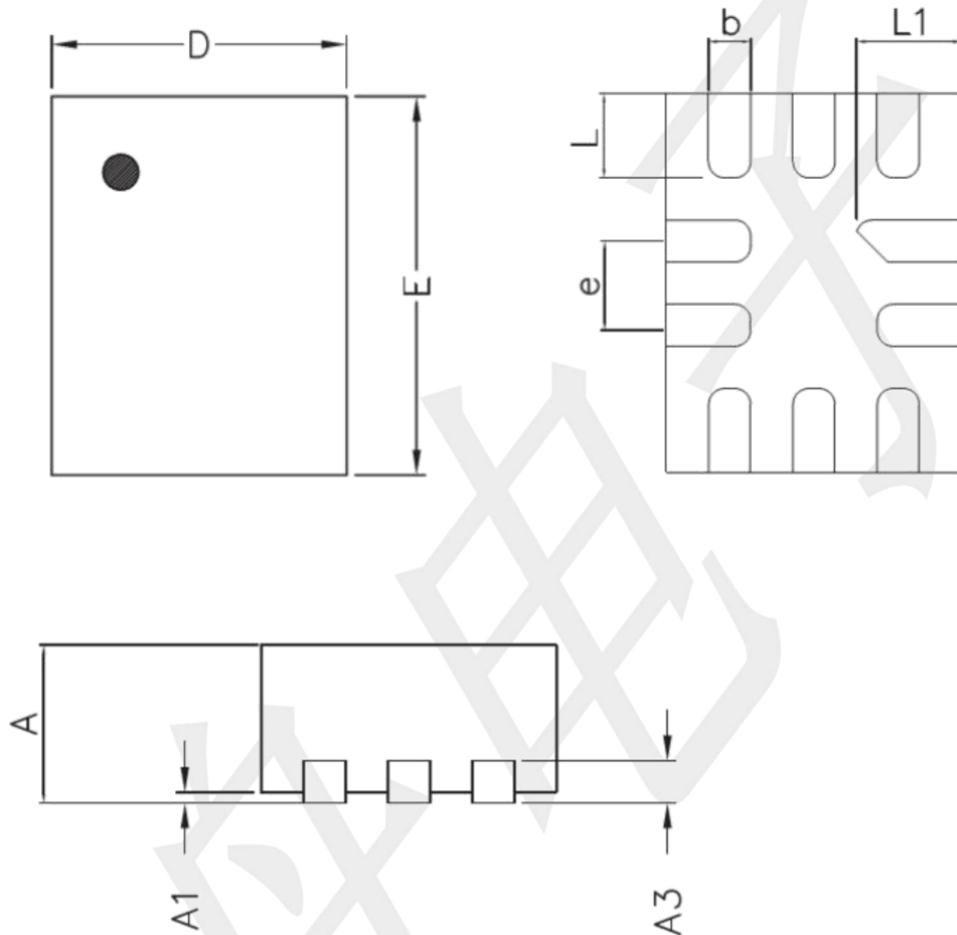


$$\text{Channel To Channel Crosstalk} = -20 \times \log \frac{V_{\text{HSDn}}}{V_{\text{OUT}}}$$

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