

Features

- Low On-resistance, $R_{on} \leq 5.5\Omega$
- 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 @ 720MHz) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current ($< 2\mu A$) With Very Wide Supply Range (1.5V ~ 5.5V)

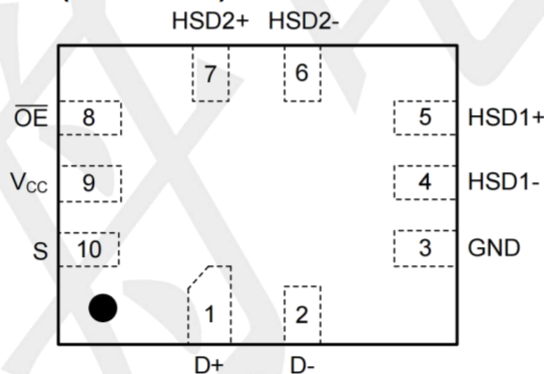
Applications

- 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.

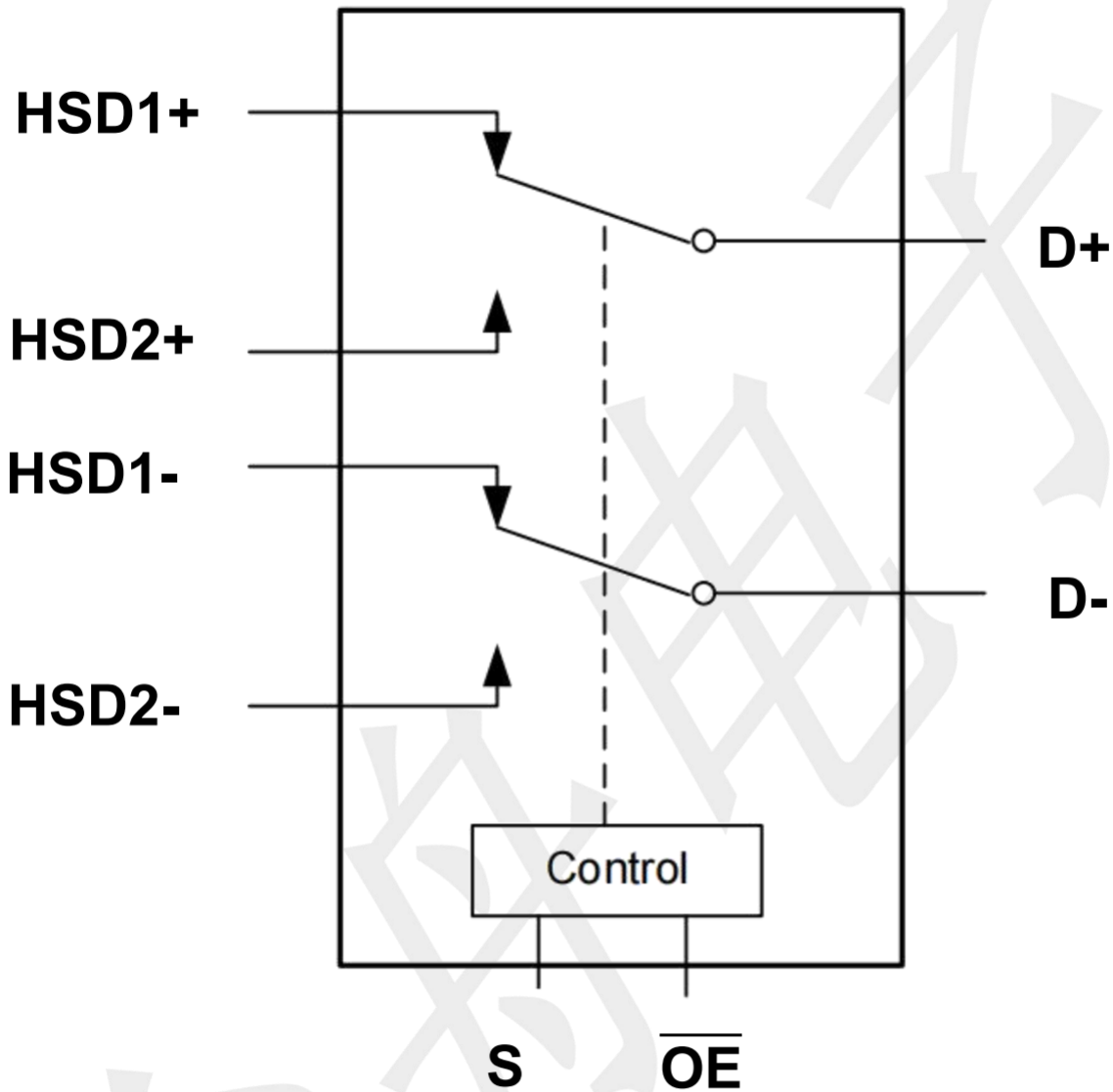
PIN CONFIGURATIONS (TOP VIEW)



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	V _{CC}	-0.3 ~ +6.5	V
Input Voltage	V _{IN}	-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	T _{STG}	-55 ~ +150	°C
Operating Junction Temperature	T _J	150	°C
Lead Temperature (Soldering, 10 seconds)	T _L	260	°C
Power Dissipation	P _D	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 _{CC}	1.5 ~ 5.5	V
Control Input Voltage	V _{IN}	-0.3 ~ 5.5	V
Input Signal Voltage	V _D	-0.3 ~ 5.5	V
Operating Temperature	T _A	-40 ~ +85	°C
Junction to Ambient	R _{θJA}	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 _{IH}	VCC=3.3V ~ 5.5V	1.6	--	--	V
		VCC=1.5V ~ 3.3V	1.4	--	--	V
Low-Level Input Voltage	V _{IL}	VCC=3.3V ~ 5.5V	--	--	0.6	V
		VCC=1.5V ~ 3.3V	--	--	0.4	V
Supply quiescent current	I _{CC}	I _A =0, V _{SEL} =0 or V _{SEL} =VCC	--	--	1.0	uA
Increase in ICC per input	I _{CC} T	I _A =0, VCC=4.5V V _{SEL} >1.8 or V _{SEL} <0.5	--	--	1.0	uA
Off state leakage from Dx to HSD1x (or HSD2x)	I _{COMx}	V _{COM} = 5.5V, V _{NC(or NO)} = 0V	--	--	±2.0	uA
On-Resistance	R _{ON1}	V _A =0 ~ 0.5V, I _A =30mA	--	4.1	5.5	Ω
	R _{ON2}	V _A =0.5 ~ 2.0V, I _A =30mA	--	3.0	3.5	Ω
	R _{ON3}	V _A =2.0 ~ 4.0V, I _A =30mA	--	2.5	3.5	Ω
	R _{ON4}	V _A =4.0 ~ 5.5V, I _A =30mA	--	1.5	1.8	Ω
On-Resistance Flatness	R _{FLAT1}	V _A =0 ~ 0.5V, I _A =30mA	--	1.6	--	Ω
	R _{FLAT2}	V _A =0.5 ~ 2.0V, I _A =30mA	--	0.7	--	Ω
	R _{FLAT3}	V _A =2.0 ~ 4.0V, I _A =30mA	--	0.5	--	Ω
	R _{FLAT4}	V _A =4.0 ~ 5.5V, I _A =30mA	--	0.3	--	Ω
On-Resistance Matching Between Channels	Δ R _{ON}	V _A =0~5.5V, I _A =30mA	--	0.1	0.2	Ω

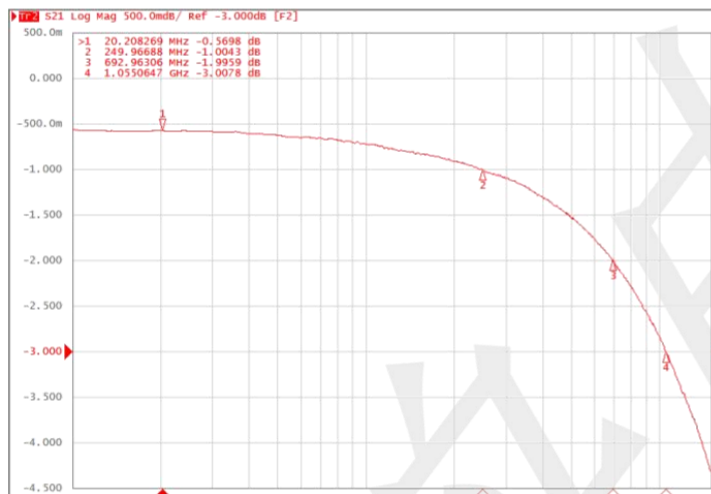
AC Electronics Characteristics (Ta=25°C, VCC=+3.3V, unless otherwise noted)

PARAMETER	SYMBOL	TEST Conditions	MIN	TYP	MAX	UNIT
Turn-On Time	T _{ON}	V _A =1.5V, C _L =35pF, R _L =50Ω	--	200	--	ns
Turn-Off Time	T _{OFF}	V _A =1.5V, C _L =35pF, R _L =50Ω	--	200	--	ns
Break-Before-Make time	T _{BBM}	V _A =1.5V, C _L =35pF, R _L =50Ω	--	500	--	ns
-3dB Bandwidth	BW	R _L =50Ω, C _L =5pF	--	550	--	MHz
		R _L =50Ω, C _L =0pF	--	720	--	MHz
Off isolation	OIRR	F=1KHz, R _L =50Ω	--	-81	--	dB
		F=10KHz, R _L =50Ω	--	-80	--	dB
Crosstalk	Xtalk	F=1KHz, R _L =50Ω	--	-83	--	dB
		F=10KHz, R _L =50Ω	--	-82	--	dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz V _A =600mVp-p @R _L =32Ω	--	-80	--	dB

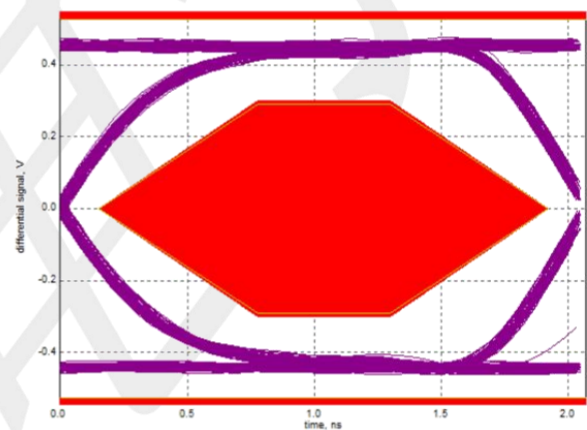
Capacitance ($T_a=25^\circ\text{C}$, $V_{CC}=+3.3\text{V}$, unless otherwise noted)

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

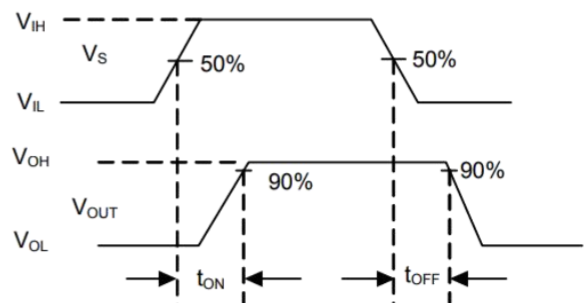
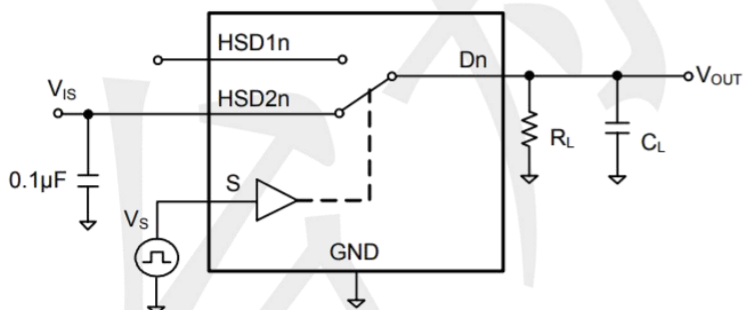
Typical Characteristics ($T_a=25^\circ\text{C}$, $V_{CC}=3.3\text{V}$, unless otherwise noted)



Bandwidth

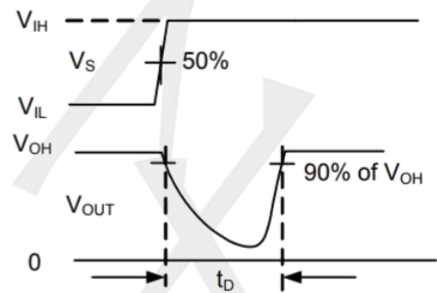
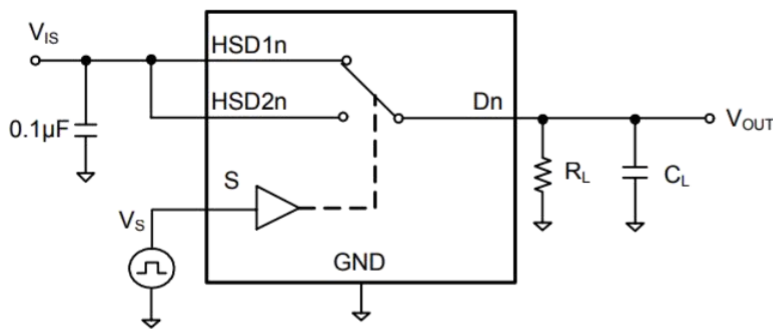


Eye Diagram (480Mbps)

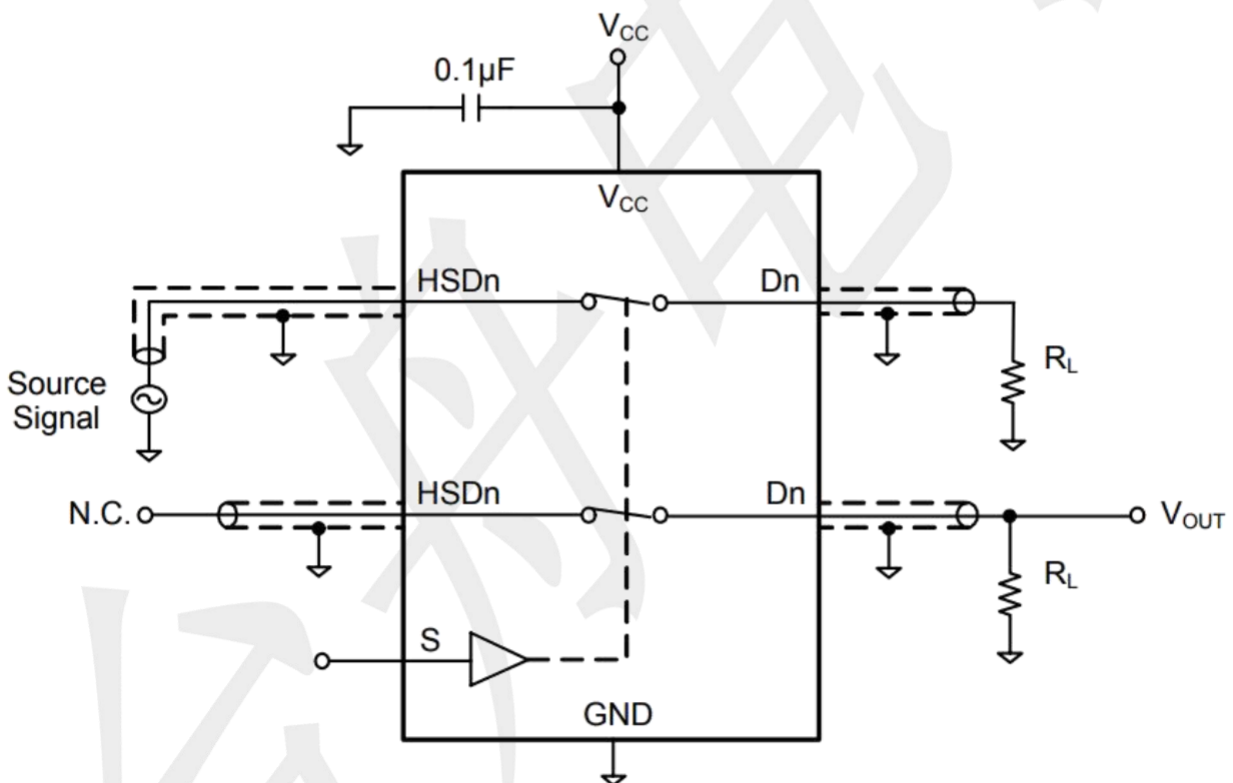


Test Circuit . Switching Times (t_{ON} , t_{OFF})

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)

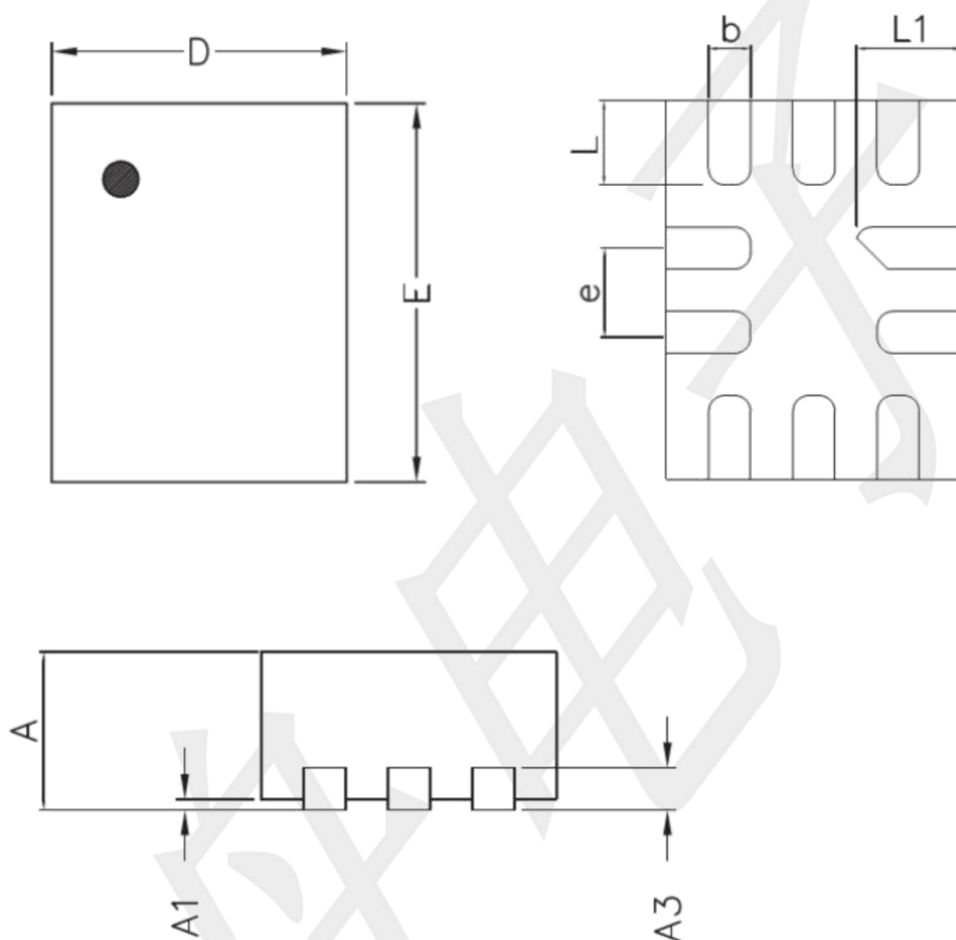


$$\text{Channel To Channel Crosstalk} = -20 \times \log \frac{V_{HSDn}}{V_{OUT}}$$

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