Two Channel Differential 2:1/1:2 USB 3.1 Super Speed 10Gbps Mux/DeMux

Descriptions

The FSW3410 is a high speed bidirectional passive switch in mux or demux configurations suited for USB Type-C™ application supporting USB 3.1 Gen 1 and Gen 2 data rates. Based on control pin SEL, the device provides switching on differential channels between Port A or Port B to Port COM. The FSW3410 is a generic analog differential passive switch that can work for any high speed interface applications requiring a common mode voltage range of 0 to 2 V and differential signaling with differential amplitude up to 1800 mVpp. It employs adaptive tracking that ensures the channel remains unchanged for the entire common mode voltage range. Excellent dynamic characteristics of the device allow high speed switching with minimum attenuation to the signal eye diagram with very little added jitter. It consumes <2mW of power when operational and has a shutdown mode exercisable by EN pin resulting <20uW.

Features

- 2-Differertial Channel 1:2/2:1 Mux/DeMux
- USB 3.1 Super Speed 10Gbps Switch
- High Bandwidth: 11GHz @-3dB BW
- Supports both AC coupled and DC coupled signals
- Isolation: -40dB @ 5GHz
- Crosstalk: -39dB @ 5GHz
- ESD Tolerance: 2kV HBM
- Low bit-to-bit skew, Bidirectional
- Wide VCC Operating Range: 1.5V ~ 5.5V

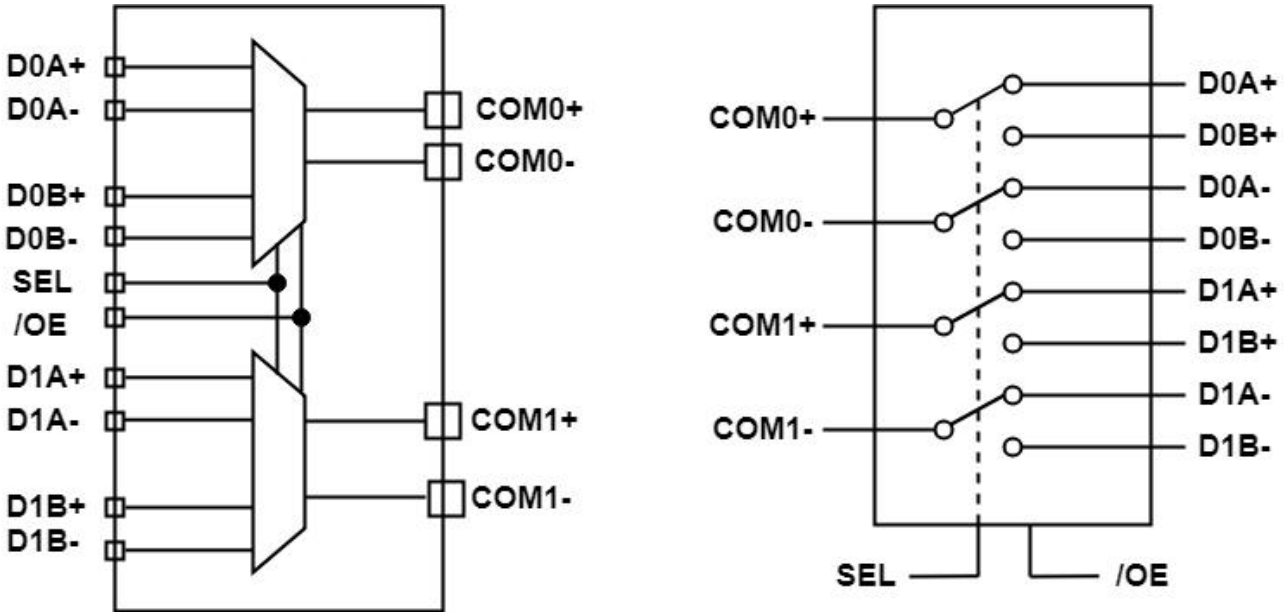
Applications

- USB Type-C Ecosystem
- Desktop and Notebook PCs
- Server/Storage Area Networks
- PCI Express Backplanes
- Shared I/O Ports
- FPD LinkII and FPD LinkIII Switching

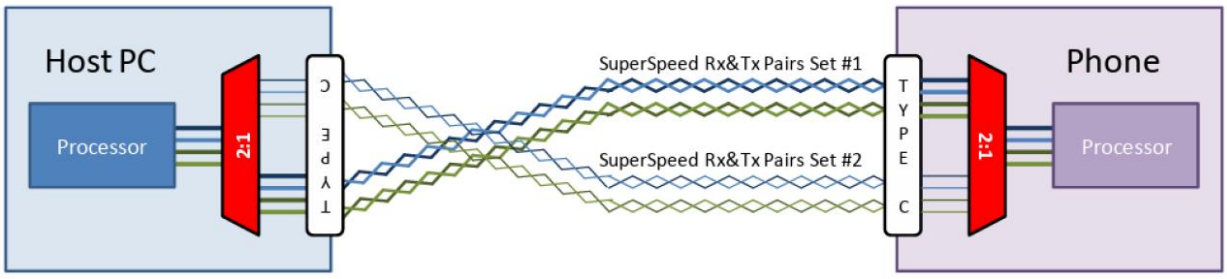
Order information

Mode	Package	Ordering Number	Packing Option
FSW3410	QFN2.8x2.0-18L	FSW3410YQFN18G/TR	Tape and Reel,5000

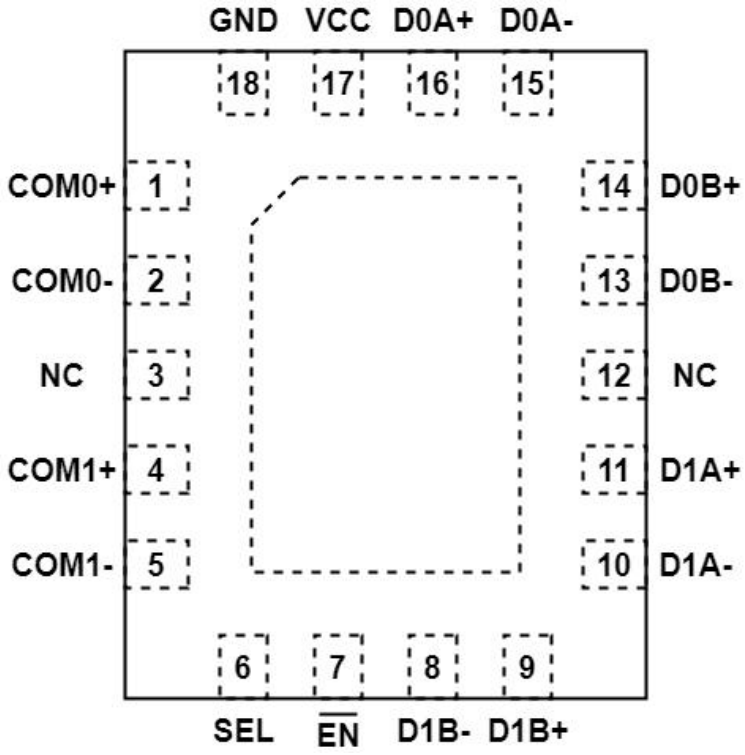
Block Diagram



Typical Application



Pin Configuration



Pin#	Pin Name	Signal Type	Description
1	COM0+	I/O	Positive differential signal 0 for COM port
2	COM0-	I/O	Negative differential signal 0 for COM port
3	NC	/	Not Connected
4	COM1+	I/O	Positive differential signal 1 for COM port
5	COM1-	I/O	Negative differential signal 1 for COM port
6	SEL	I	Select Pin, See Truth Table
7	$\overline{EN}$	I	Enable Pin,Active Low
8	D1B-	I/O	Negative differential signal 1 for port B
9	D1B+	I/O	Positive differential signal 1 for port B
10	D1A-	I/O	Negative differential signal 1 for port A
11	D1A+	I/O	Positive differential signal 1 for port A
12	NC	/	Not Connected
13	D0B-	I/O	Negative differential signal 0 for port B
14	D0B+	I/O	Positive differential signal 0 for port B
15	D0A-	I/O	Negative differential signal 0 for port A
16	D0A+	I/O	Positive differential signal 0 for port A
17	VCC	Power	Positive Supply Voltage
18	GND	Ground	Power Ground

Truth Table

$\overline{EN}$	SEL	COM0-	COM0+	COM1-	COM1+
High	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z
Low	Low	D0A-	D0A+	D1A-	D1A+
Low	High	D0B-	D0B+	D1B-	D1B+

Maximum Ratings

(Above which useful life may be impaired. For user guidelines, not tested.)

Storage Temperature	-65℃ to +150℃
Junction Temperature	125℃
Supply Voltage to Ground Potential	-0.5V to +5.5V
Supe Speed Data Channel TX / RX	-0.5V to 3.8V
DC Input Voltage	-0.5V to VCC
DC Output Current	50mA
Power Dissipation	300mW

Notes:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Electrical Characteristics

(TA=25°C, VCC=1.8V, unless otherwise specified)

Parameter	Symbol	conditions	Min.	Typ.	Max	Unit
POWER SUPPLY						
VCC Quiescent Current	I_Q	SEL=0 or VCC, _EN=0			28	uA
Power-down Current	I_{PO}	SEL=0 or VCC, _EN=VCC			1	uA
DC CHARACTERISTICS						
Input logic high	V_{IH}	VCC=1.8~4.5V	1.6			V
Input logic low	V_{IL}	VCC=1.8~4.5V			0.4	V
_EN Internal pull-up resistor	R_{UP}			2		MΩ
SEL Internal pull-down resistor	R_{DN}			2		MΩ
On-Resistancefor TX/RX	R_{ON_HS}	V_{IS}= 0.2V I_{ON}=8mA		6.7	8	Ω
R_{ON} Flatness for TX/RX	R_{FLAT_LP}	V_{IS}= 0 to 1.2V I_{ON}=8mA		0.8	1	Ω
R_{ON} Flatness for TX/RX	R_{FLAT_LP}	V_{IS}= 0 to 0.2V I_{ON}=8mA		0.2	0.3	Ω
R_{ON} Matching Between Channels	R_{MATCH}	V_{IS}= 0 to 1.2V I_{ON}=8mA		0.1		Ω
Switch Off Leakage Current	I_{OFF}	$\overline{EN}$ =VCC,COM0,COM1=VCC D0A,D1A,D0B,D1B=0	-0.5		0.5	uA
AC CHARACTERISTICS						
Enable Time _EN to Output	t_{EN}	R_L=50Ω C_L=0pF V_{IS}= 0.6V		80	150	uS
Disable Time _EN to Output	t_{DIS}	R_L=50Ω C_L=0pF V_{IS}= 0.6V		40	250	nS
Turn-On Time SEL to Output	t_{ON}	R_L=50Ω C_L=0pF V_{IS}= 0.6V		400	1200	nS
Turn-Off Time SEL to Output	t_{OFF}	R_L=50Ω C_L=0pF V_{IS}= 0.6V		130	800	nS
Break-Before-Make Time	t_{BBM}	R_L=50Ω C_L=0pF V_{IS}= 0.6V		250	800	nS
Propagation Delay	t_{PD}	R_L=50Ω C_L=0pF V_{IS}= 0.6V		0.25		nS

Off Isolation	Off	R_L = 50Ω f = 5GHz V_{IS}= 0.2V_{PP}, See Fig.2		-40		dB
Crosstalk	X_{TALK}	R_L = 50Ω f =5GHz V_{IS}= 0.2V_{PP}, See Fig.1		-39		dB
-3dB Bandwidth	BW_{-3dB}	R_L=50Ω C_L=0pF Signal 0dBm		11		GHz
Insertion Loss	IL	f=5GHz		-1.45		dB
Return Loss	RL	f=5GHz		-9.95		dB
CAPACITANCE						
Switch On Capacitance	C_{ON}	V_{Bias} = 0.2V, f = 1.5GHz		1.5		pF
Switch Off Capacitance	C_{OFF}	V_{Bias} = 0.2V, f = 1.5GHz		1.0		pF

Notes:

(1) Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.

(2) R_{ON} matching between channels is calculated by subtracting the channel with the lowest max Ron value from the channel with the highest max Ron value.

(3) Crosstalk is inversely proportional to source impedance

Insertion loss

Application Information

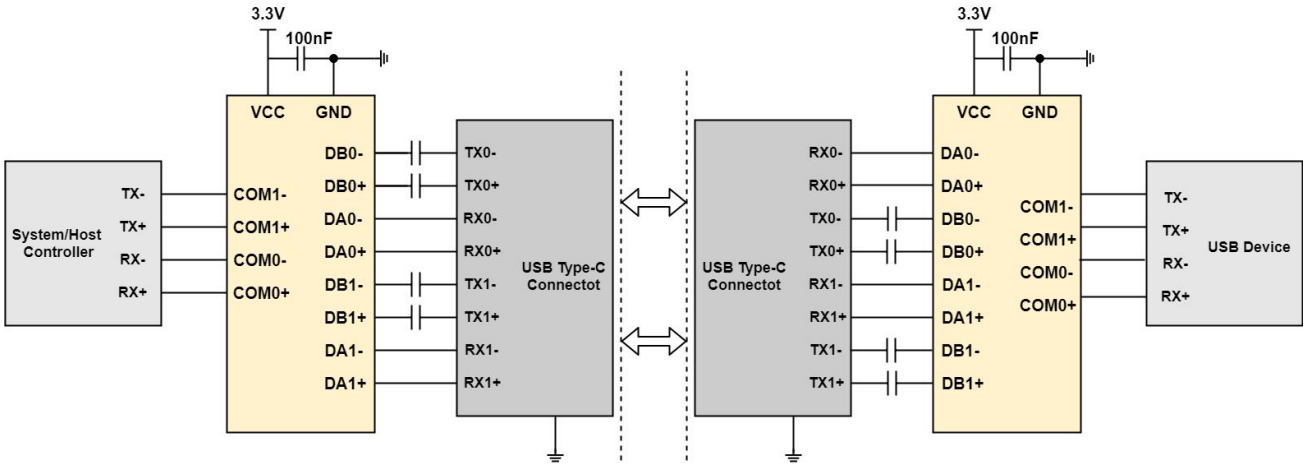
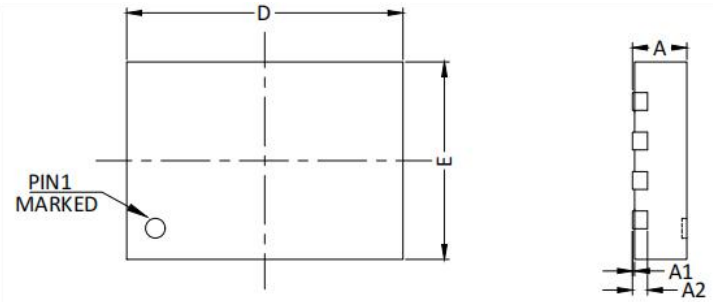


Fig. AC Coupling Capacitors for USB Type-C

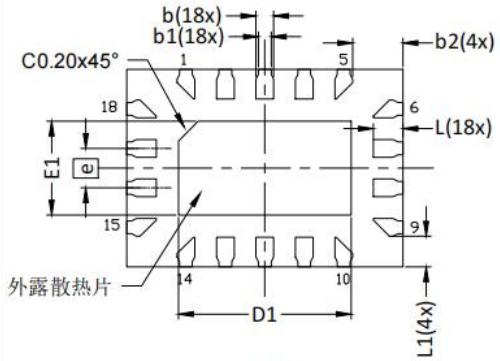
Package Outline Dimensions(All dimensions in mm.)

(1) Package Type: QFN2.8x2.0-18L



主视图

侧视图



后视图

COMMON DIMENSIOS (UNITS OF MEASURE=MILLIMETER)			
SYMBOL	DIMENSION(MM)		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	---	0.05
A2		0.152BSC	
b	0.13	0.18	0.23
b1		0.13REF	
b2		0.51REF	
D	2.70	2.80	2.90
D1	1.70	1.75	1.80
E	1.90	2.00	2.10
E1	0.90	0.95	1.00
e		0.40BSC	
L	0.20	0.30	0.40
L1		0.31REF	

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- We reserves the right to change the instruction manual without prior notice.
- Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design and overall manufacturing to avoid potential failure risks that may cause personal injury or property damage.
- The improvement of product quality is endless, our company will be dedicated to provide customers with better products.

Version Modification Record

Version Number	Revision
first edition	
V1.0	1. Update the order information on page 2
V2.0	1. Update theElectrical Characteristics on page 4-5 2. Update the Features on page 1. 3. Update the Block Diagram on page 2.
V3.0	1. Update the Truth Table on page 4.
V4.0	1. Update the Important Notice And Disclaimer on page 7.