

Descriptions

The is a high-speed bidirectional passive switch in mux or de-mux 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 L0 or Port L1 to Port C0. The 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 1.8Vpp. 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.

The is available in both QFN3x3-16 with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

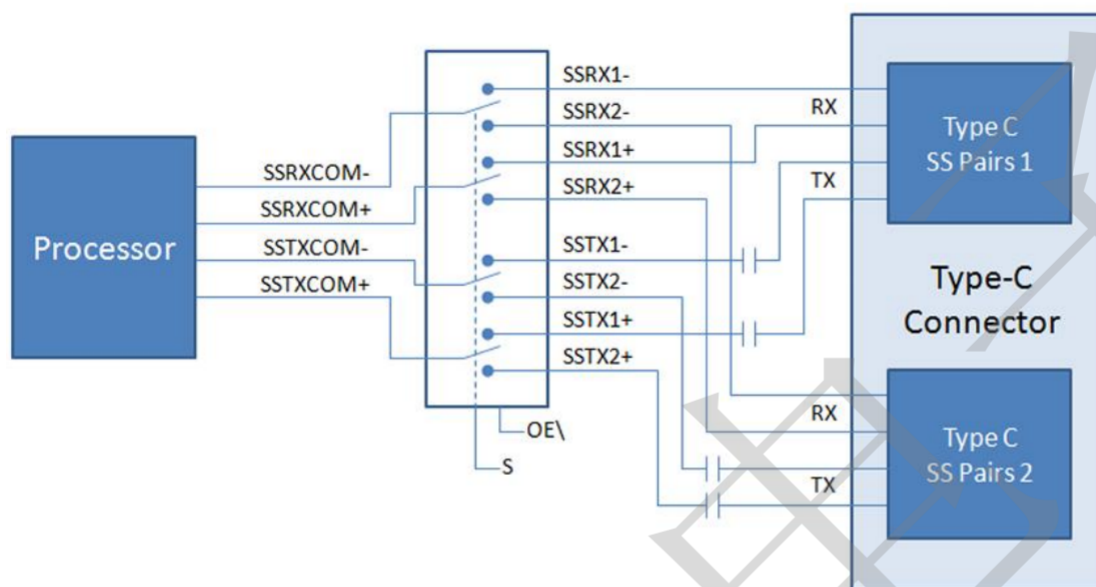
Features

- Pin-to-Pin ASW3410, DIO33340, FUSB340, BCT4340
- Wide Supply Range 1.5 V to 5.5 V
- Differential 2:1 or 1:2 Switch/Multiplexer
- USB 3.1 Super Speed 10Gbps Switch
- High Bandwidth: 5.1GHz @ -3dB Bandwidth
- Isolation: -24dB @ 1.25 GHz
- Crosstalk: -34dB @ 1.25 GHz
- Low bit-to-bit skew, Bidirectional
- ESD Tolerance: 2kV HBM
- Powered Off Protection When VDD = 0 V
- 1.8-V Compatible Logic Inputs

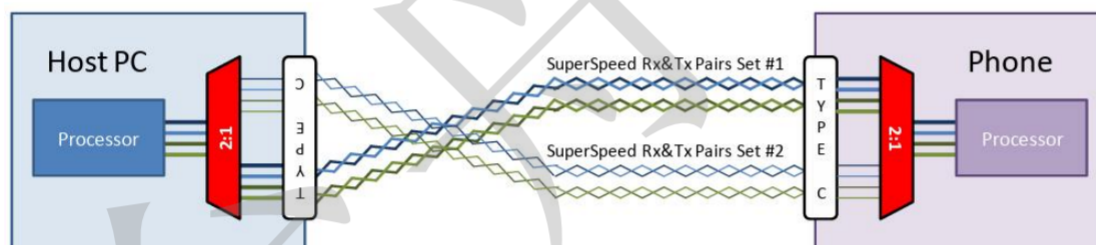
Applications

- 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

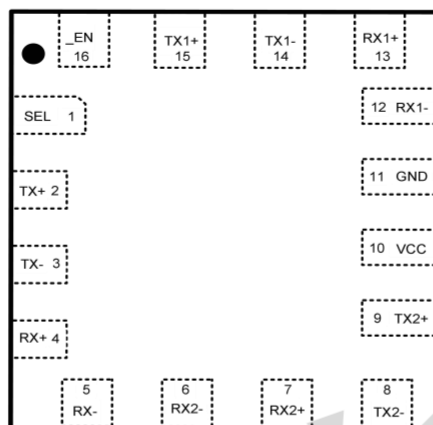
Block Diagram



Typical Application



Pin Configuration



QFN3x3-16

Pin Description

Pin#	Pin Name	Signal Type	Description
1	SEL	I	Switch logic control
2	TX+	I/O	Super Speed TX+ Common
3	TX-	I/O	Super Speed TX- Common
4	RX+	I/O	Super Speed RX+ Common
5	RX-	I/O	Super Speed RX- Common
6	RX2-	I/O	Super Speed RX2-
7	RX2+	I/O	Super Speed RX2+
8	TX2-	I/O	Super Speed TX2-
9	TX2+	I/O	Super Speed TX2+
10	VCC	Power	Supply Voltage
11	GND	GND	Ground
12	RX1-	I/O	Super Speed RX1-
13	RX1+	I/O	Super Speed RX1+
14	TX1-	I/O	Super Speed TX1-
15	TX1+	I/O	Super Speed TX1+
16	_EN	I	Chip Enable, Active Low

Truth Table

_EN	SEL	TX+	TX-	RX+	RX-
High	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z
Low	Low	TX1+	TX1-	RX1+	RX1-
Low	High	TX2+	TX2-	RX2+	RX2-

Maximum Ratings

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

Storage Temperature	-65°C to +150°C
Junction Temperature	125°C
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.

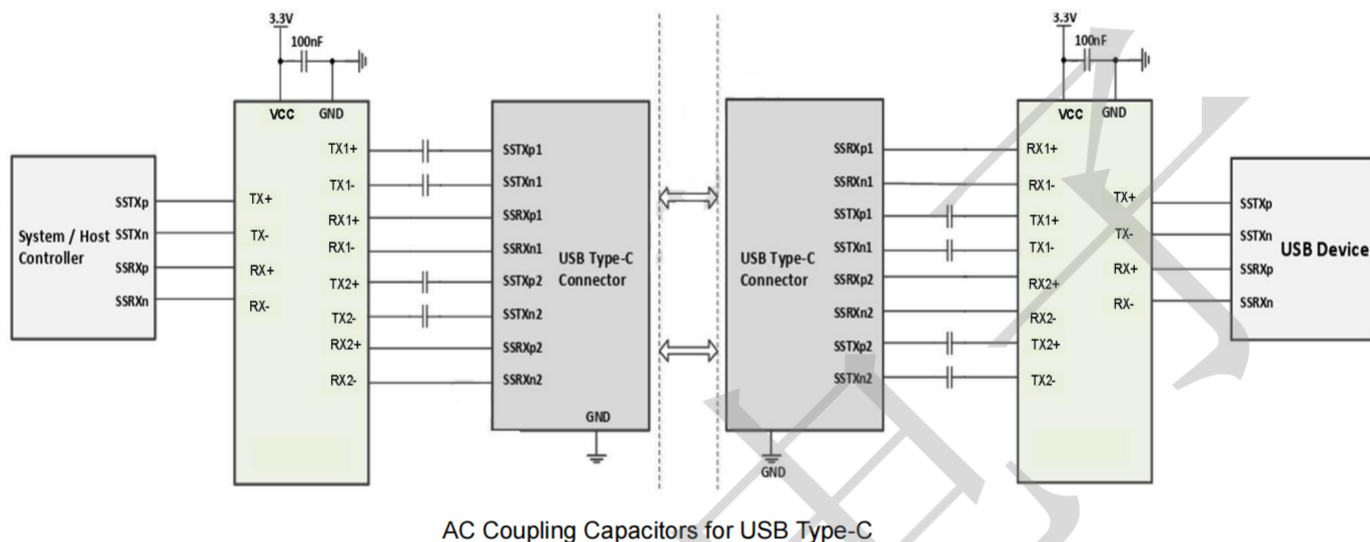
Electrical Characteristics($T_a=25^{\circ}\text{C}$, $V_{CC}=1.8\text{V}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
POWER SUPPLY						
VCC Quiescent Current	I_Q	SEL=0 or VCC, $_EN=0$		28		μA
Power-down Current	I_{PD}	SEL=0 or VCC, $_EN=V_{CC}$			1	μA
DC CHARACTERISTICS						
Input logic high	V_{IH}	$V_{CC}=1.8\sim 4.5\text{V}$	1.6			V
Input logic low	V_{IL}	$V_{CC}=1.8\sim 4.5\text{V}$			0.4	V
$_EN$ Internal pull-up resistor	R_{UP}			2		$\text{M}\Omega$
SEL Internal pull-down resistor	R_{DN}			2		$\text{M}\Omega$
On-Resistance for TX/RX	R_{ON_HS}	$V_{IS}=0.2\text{V}$ $I_{ON}=8\text{mA}$		6.7	8	Ω
R_{ON} Flatness for TX/RX	R_{FLAT_LP}	$V_{IS}=0$ to 1.2V $I_{ON}=8\text{mA}$		0.8	1	Ω
R_{ON} Flatness for TX/RX	R_{FLAT_LP}	$V_{IS}=0$ to 0.2V $I_{ON}=8\text{mA}$		0.2	0.3	Ω
R_{ON} Matching Between Channels	R_{MATCH}	$V_{IS}=0$ to 1.2V $I_{ON}=8\text{mA}$		0.1		Ω
Switch Off Leakage Current	I_{OFF}	$_EN=V_{CC}$, Tx, Rx =VCC TX1, TX2, RX1, RX2=0	-0.5		0.5	μA
AC CHARACTERISTICS						
Enable Time $_EN$ to Output	t_{EN}	$R_L=50\Omega$ $C_L=0\text{pF}$ $V_{IS}=0.6\text{V}$		80	150	μs
Disable Time $_EN$ to Output	t_{DIS}	$R_L=50\Omega$ $C_L=0\text{pF}$ $V_{IS}=0.6\text{V}$		40	250	nS
Turn-On Time SEL to Output	t_{ON}	$R_L=50\Omega$ $C_L=0\text{pF}$ $V_{IS}=0.6\text{V}$		400	1200	nS
Turn-Off Time SEL to Output	t_{OFF}	$R_L=50\Omega$ $C_L=0\text{pF}$ $V_{IS}=0.6\text{V}$		130	800	nS
Break-Before-Make Time	t_{BBM}	$R_L=50\Omega$ $C_L=0\text{pF}$ $V_{IS}=0.6\text{V}$		250	500	nS
Propagation Delay	t_{PD}	$R_L=50\Omega$ $C_L=0\text{pF}$ $V_{IS}=0.6\text{V}$		0.25		nS
Off Isolation	Off	$R_L=50\Omega$ $f=1.2\text{GHz}$ $V_{IS}=0.2\text{V}_{PP}$		-27		dB
Crosstalk	X_{TALK}	$R_L=50\Omega$ $f=1.2\text{GHz}$ $V_{IS}=0.2\text{V}_{PP}$		-43		dB
-3dB Bandwidth	BW_{-3dB}	$R_L=50\Omega$ $C_L=0\text{pF}$ Signal 0dBm	4.5	5.1		GHz
CAPACITANCE						
Switch On Capacitance	C_{ON}	$V_{Bias}=0.2\text{V}$, $f=1.5\text{GHz}$		1.5		pF
Switch Off Capacitance	C_{OFF}	$V_{Bias}=0.2\text{V}$, $f=1.5\text{GHz}$		1.0		pF

Table-5 Electrical Characteristics
Note:

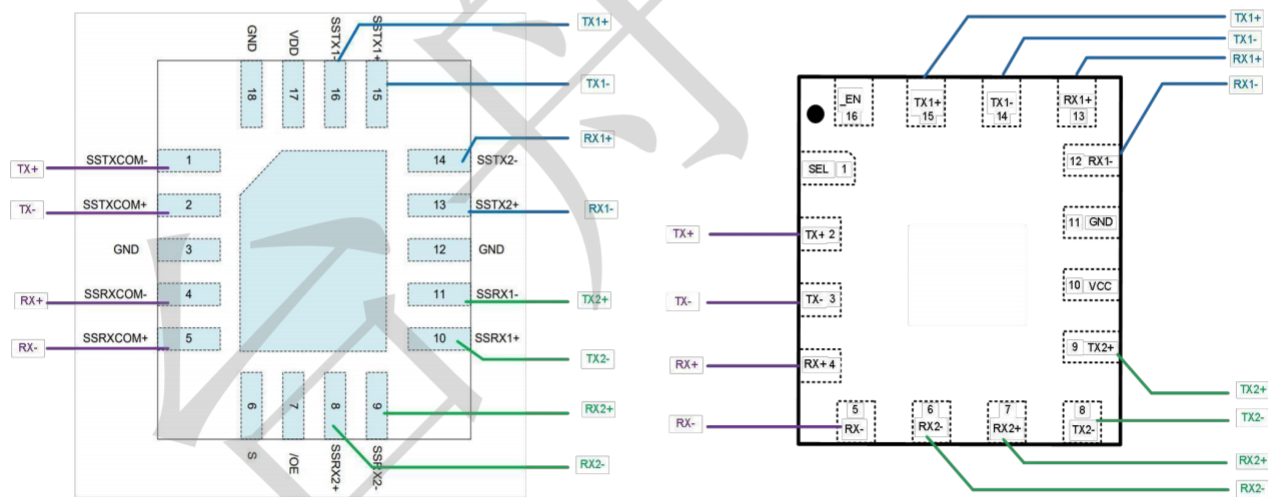
- (1) Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.
- (2) R_{ON} matching between channels is calculated by subtracting the channel with the lowest max Ron value from the channel with the highest max Ron value.
- (3) Crosstalk is inversely proportional to source impedance

Application Information



AC Coupling Capacitors for USB Type-C

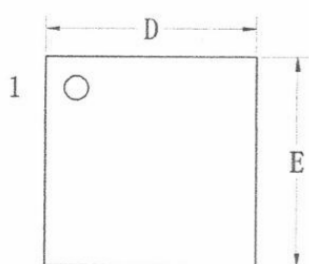
Layout Example



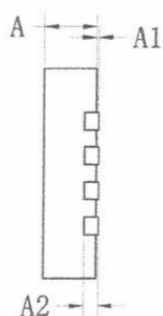
Layout Example

Package outline dimensions

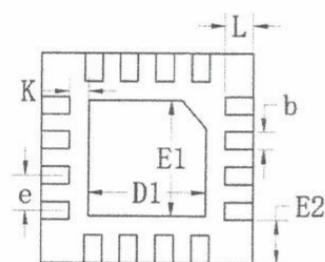
QFN3x3-16



顶视图



侧视图



底视图

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	—	0.05
A2	0.203 TYP		
b	0.20	0.25	0.30
D	2.95	3.00	3.05
D1	1.55	1.65	1.75
E	2.95	3.00	3.05
E1	1.55	1.65	1.75
E2	0.625 REF		
e	0.50 BSC		
K	0.275 REF		
L	0.35	0.40	0.45