



Descriptions

The FUSB340TMX 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 L0 or Port L1 to Port C0.

The FUSB340TMX 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 2V 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 FUSB340TMX is available in QFN 2x3 (X2-QFN-18) with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

Order Information

Package		Part Number	Top-Side Marking
QFN2x3(X2-QFN-18)	Tape and Reel	FUSB340TMX	A340UXYW

Features

- Pin-to-Pin ASW3410, D103340, FUSB340
- 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

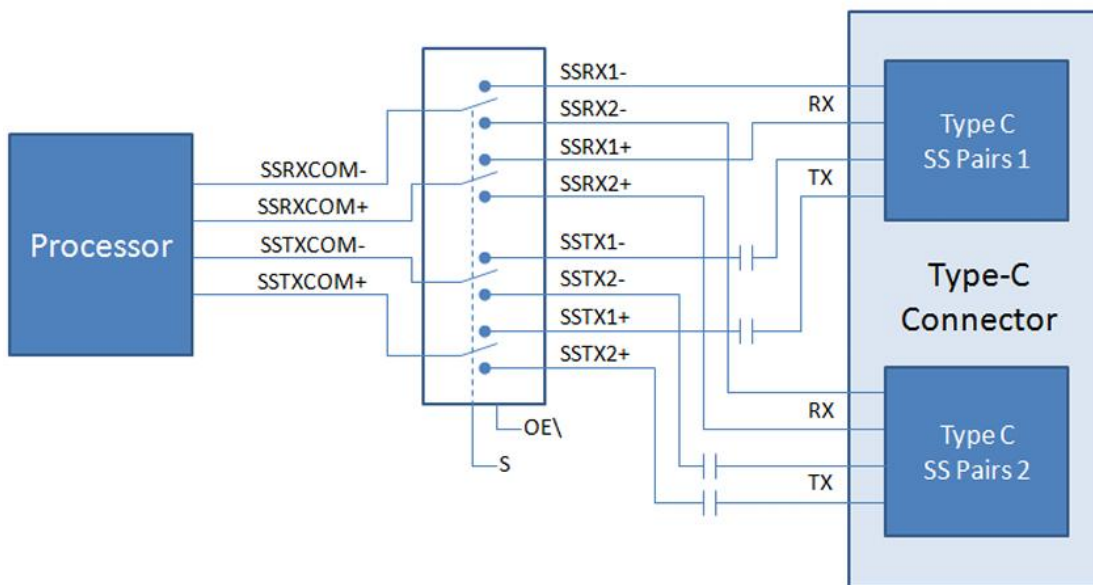


Fig.1 Block Diagram

Typical Application

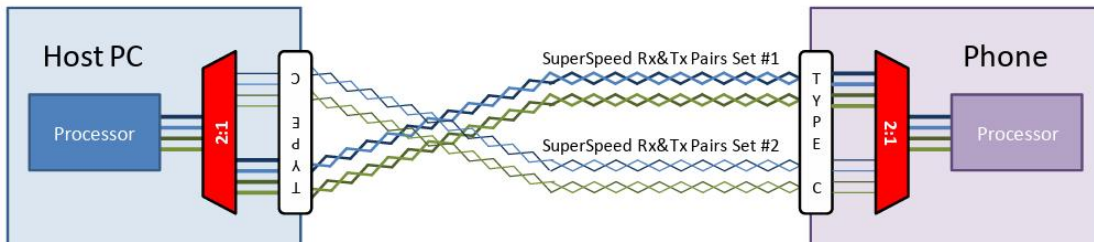


Fig.2 Typical Application



Pin Configuration

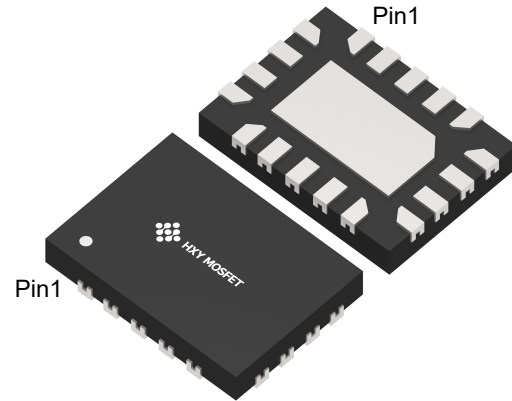
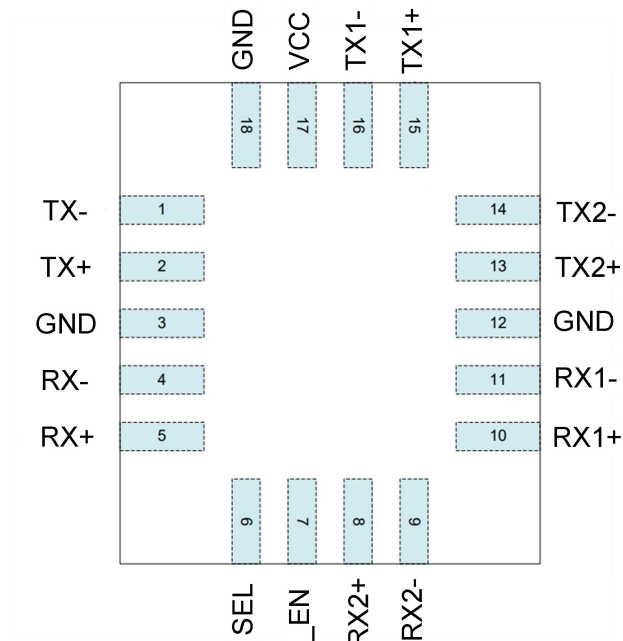


Fig.3 Pin Configuration

Pin Description

Pin#	Pin Name	Signal Type	Description
1	TX-	I/O	Super Speed TX- Common
2	TX+	I/O	Super Speed TX+ Common
3,12,18	GND	GND	Ground
4	RX-	I/O	Super Speed RX- Common
5	RX+	I/O	Super Speed RX+ Common
6	SEL	I	Switch logic control
7	_EN	I	Chip Enable, Active Low
8	RX2+	I/O	Super Speed RX2+
9	RX2-	I/O	Super Speed RX2-
10	RX1+	I/O	Super Speed RX1+
11	RX1-	I/O	Super Speed RX1-
13	TX2+	I/O	Super Speed TX2+
14	TX2-	I/O	Super Speed TX2-
15	TX1+	I/O	Super Speed TX1+
16	TX1-	I/O	Super Speed TX1-
17	VCC	Power	Supply Voltage

Table-1 Pin Description



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-

Table-2 Truth Table

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

Table-3 Maximum Description

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 _{PD}	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-Resistance for 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}	_EN=VCC , Tx, Rx =VCC TX1, TX2, RX1, RX2=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	500	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=1.2GHzV _{IS} = 0.2V _{PP}		-27		dB
Crosstalk	X _{TALK}	R _L =50Ω f=1.2GHzV _{IS} = 0.2V _{PP}		-43		dB
-3dB Bandwidth	BW _{-3dB}	R _L =50Ω C _L =0pF Signal 0dBm	4.5	5.1		GHz
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

Table-4 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



Typical Performance Curves (Ta=25°C VCC=3.0V CAP=0.1μF unless otherwise noted)

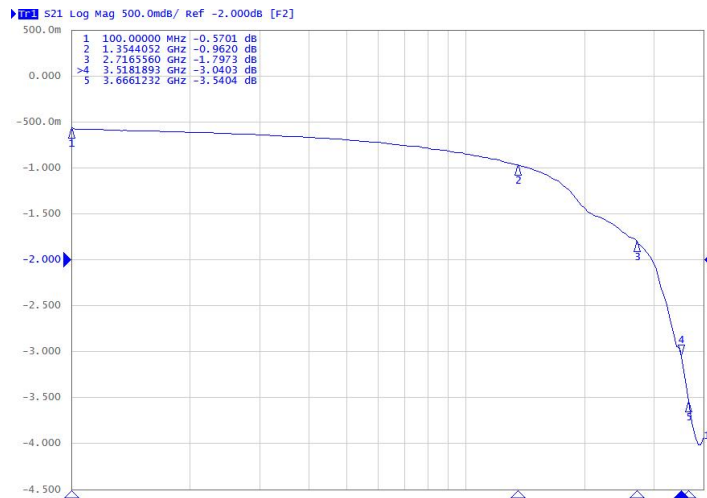


Fig.4 Switch Bandwidth or Insertion Loss

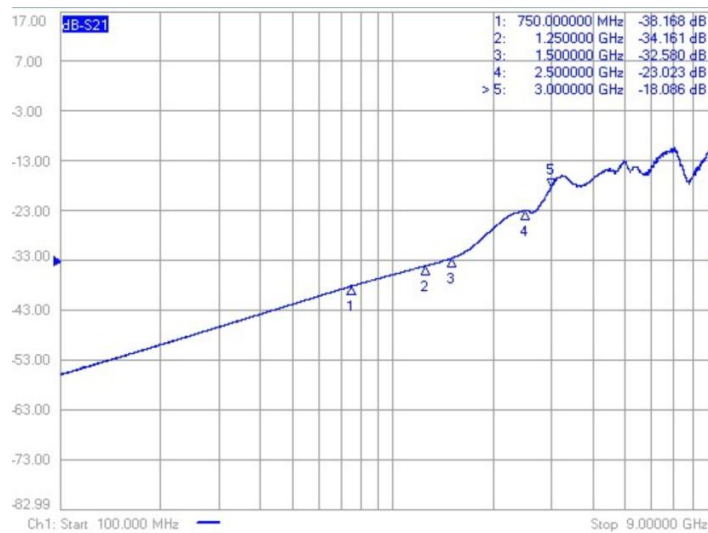


Fig.5 Switch Channel to Channel Cross-Talk



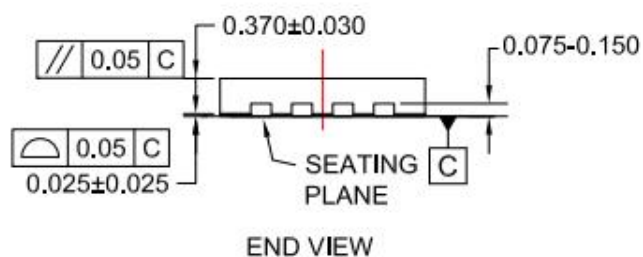
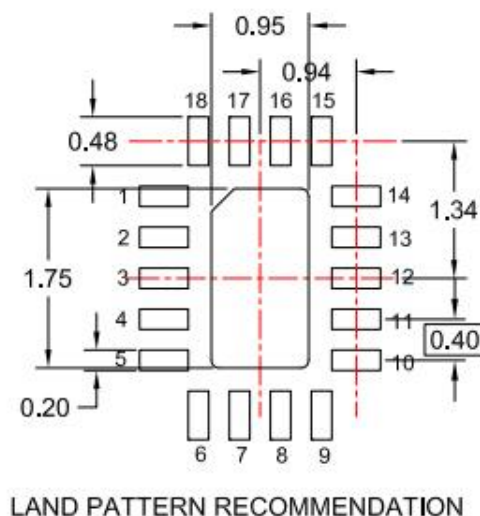
Fig.6 Switch Off Isolation



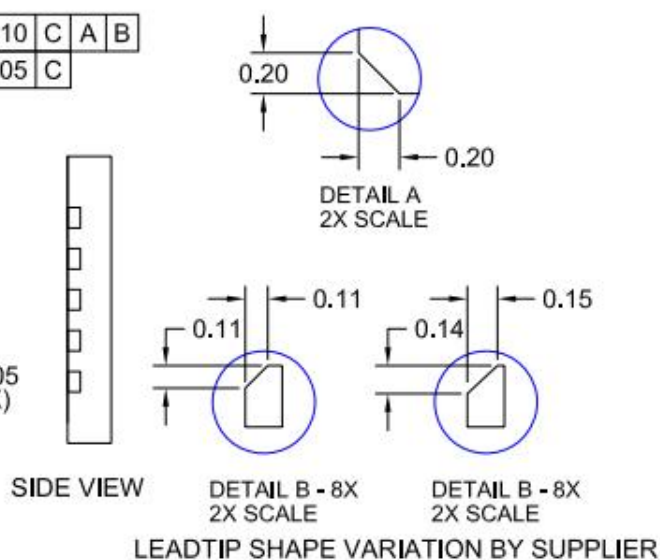
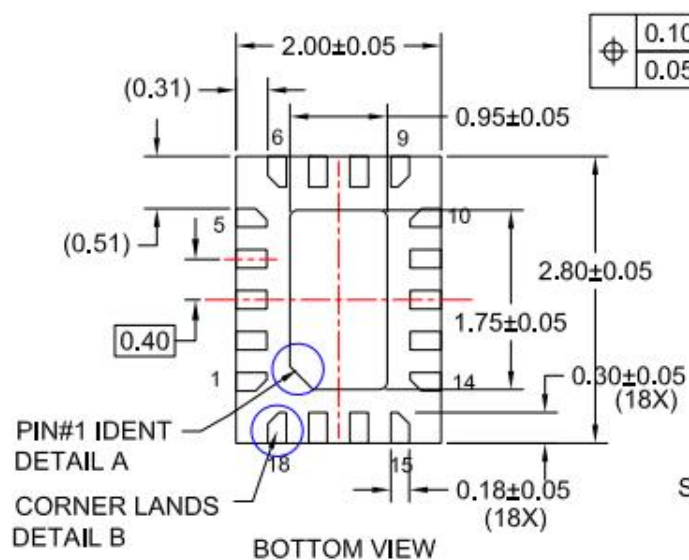
High-Speed Bidirectional Passive Switch

TOP VIEW

The top view shows a rectangular area with a hatched section in the upper left corner. A red crosshair is centered on the rectangle. Dimensions include a horizontal distance of 2.00 from the left edge to the center of the hatched area, and a vertical distance of 2.80 from the bottom edge to the center of the hatched area. A label 'PIN#1 IDENT' points to the hatched area. A circular feature with a diameter of 0.05 is shown in the upper left corner, and another similar feature is shown in the lower right corner. A dimension of 2X is indicated for the circular features.



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