



## Descriptions

The FSUSB74UMX 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 4:1 or 1:4 switch. It is optimized for use with the USB 2.0 DP/DM lines in a USB Type-C™ system.

The FSUSB74UMX 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 USB2.0 differential signals (480 Mb/s) with good signal integrity.

GPIO controls of SELx are 1.8V logic compatible. The FSUSB74UMX is available in QFN 2 x 2.55 with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

## Features

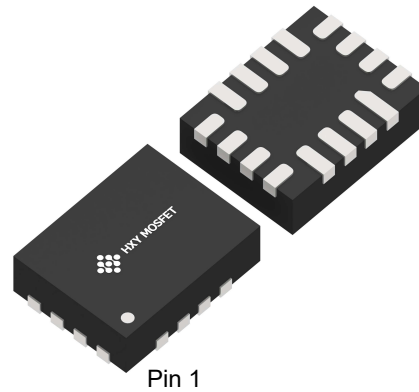
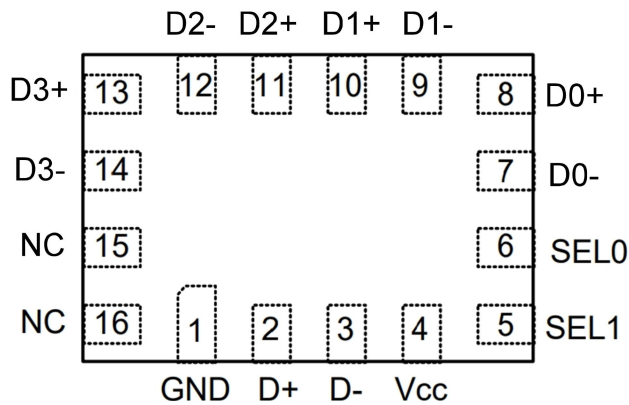
- Low On-resistance, Ron=3Ω when VCC =5V
- 1.8V Logic Compatible Control Pin
- D+/- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- High Off-Isolation: -100dB @ 100KHz
- Low Channel-to-Channel Crosstalk: -97dB @ 100KHz
- High Bandwidth ( -3dB @800MHz) Suitable for USB2.0 High-Speed Routing
- Low Quiescent Current (<2uA) With Very Wide Supply Range (1.5V ~ 5.5V)

## Applications

- Anywhere a USB Type-C™ or Micro-B Connector is Used
- Mobile Phones, Tablets and Notebooks

## Order Information

Part Number	Package		Marking	Quantity Per Reel
FSUSB74UMX	QFN2X2.55	Tape and Reel	A4735 xxxxx	3,000PCS



QFN2x2.55

### Pin Descriptions

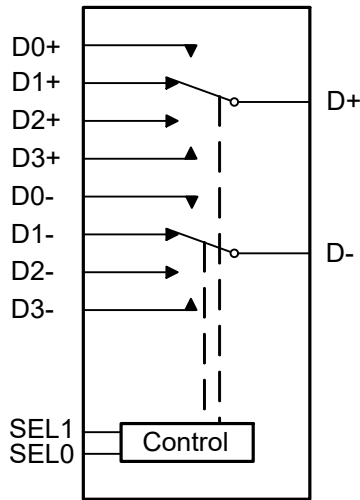
Pin Number	Symbol	Descriptions
1	GND	Ground
2	D+	D+ Common Port (HS or FS USB)
3	D-	D- Common Port (HS or FS USB)
4	VCC	Power Supply
5	SEL1	Path Selection Control Input (See Table Below)
6	SEL0	Path Selection Control Input (See Table Below)
7	D0-	D- From the 1st Source Path (HS or FS USB)
8	D0+	D+ From the 1st Source Path (HS or FS USB)
9	D1-	D- From the 2nd Source Path (HS or FS USB)
10	D1+	D+ From the 2nd Source Path (HS or FS USB)
11	D2+	D+ From the 3rd Source Path (HS or FS USB)
12	D2-	D- From the 3rd Source Path (HS or FS USB)
13	D3+	D+ From the 4th Source Path (HS or FS USB)
14	D3-	D- From the 4th Source Path (HS or FS USB)
15,16	NC	No Connect

### Function Descriptions

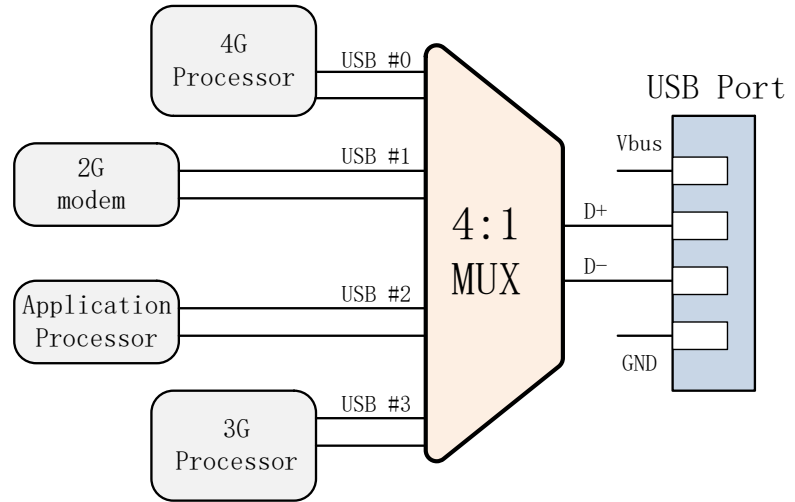
SEL1	SEL0	Function
0	0	D+ = D0+, D- = D0-
0	1	D+ = D1+, D- = D1-
1	0	D+ = D2+, D- = D2-
1	1	D+ = D3+, D- = D3-



## Logic Symbol and Typical Applications



Logic Symbol



Typical Applications (Mobile Phone Example)

## Absolute Maximum Ratings <sup>(1)</sup>

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	-0.3 ~ 6.5	V
Control Input Voltage	$V_{IN}$	-0.3 ~ 6.5	V
Continuous Current Through Dx +/- and D+/-		±100	mA
Peak Current Through Dx +/- and D+/- (pulsed at 1ms 50% duty cycle)		±200	mA
Storage Temperature Range	$T_{STG}$	-55 ~ 150	°C
Junction Temperature under Bias	$T_J$	150	°C
Lead Temperature (Soldering, 10 seconds)	$T_L$	260	°C
Power Dissipation	$P_D$	250	mW

## Recommend Operating Ratings <sup>(2)</sup>

Parameter	Symbol	Value	Unit
Supply Voltage Operating	$V_{CC}$	1.5 ~ 5.5	V
Control Input Voltage	$V_{IN}$	-0.3 ~ 5.5	V
Input Signal Voltage	$V_{SW}$	-0.3 ~ 5.5	V
Operating Temperature	$T_A$	-40 ~ 85	°C
Thermal Resistance	$R_{\theta JA}$	360	°C/W

### Note:

1. "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.
2. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.



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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input logic high level	V <sub>IH</sub>	VCC: 3.3 ~ 5.5V	1.6			V
		VCC: 1.5 ~ 3.3V	1.4			V
Input logic low level	V <sub>IL</sub>	VCC: 3.3 ~ 5.5V			0.6	V
		VCC: 1.5 ~ 3.3V			0.4	V
Supply quiescent current	I <sub>CC</sub>	I <sub>COM</sub> =0, V <sub>IN</sub> =0 or V <sub>IN</sub> =VCC			1.0	uA
Increase in I <sub>CC</sub> per input	I <sub>CCCT</sub>	I <sub>COM</sub> =0, VCC=4.5V V <sub>IN</sub> >1.8 or V <sub>IN</sub> <0.5			1.0	uA
Off state leakage from COM <sub>x</sub> to NC <sub>x</sub> (or NO <sub>x</sub> )	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>COM</sub> =0 ~ 0.5V, I <sub>COM</sub> =30mA		6.2	7.2	Ω
	R <sub>ON2</sub>	V <sub>COM</sub> =0.5 ~ 2.0V, I <sub>COM</sub> =30mA		7.2	7.9	Ω
	R <sub>ON3</sub>	V <sub>COM</sub> =2.0 ~ 4.0V, I <sub>COM</sub> =30mA		5.2	7.2	Ω
	R <sub>ON4</sub>	V <sub>COM</sub> =4.0 ~ 5.5V, I <sub>COM</sub> =30mA		3.3	3.8	Ω
On-Resistance Flatness	R <sub>FLAT1</sub>	V <sub>COM</sub> =0 ~ 0.5V, I <sub>COM</sub> =30mA		1.4		Ω
	R <sub>FLAT2</sub>	V <sub>COM</sub> =0.5 ~ 2.0V, I <sub>COM</sub> =30mA		1.0		Ω
	R <sub>FLAT3</sub>	V <sub>COM</sub> =2.0 ~ 4.0V, I <sub>COM</sub> =30mA		3.2		Ω
	R <sub>FLAT4</sub>	V <sub>COM</sub> =4.0 ~ 5.5V, I <sub>COM</sub> =30mA		0.6		Ω
On-Resistance Matching Between Channels	Δ R <sub>ON</sub>	V <sub>COM</sub> =0~5.5V, I <sub>COM</sub> =30mA,		0.2	0.4	Ω

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Time	T <sub>ON</sub>	V <sub>COM</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω		200		ns
Turn-Off Time	T <sub>OFF</sub>	V <sub>COM</sub> =1.5V, C <sub>L</sub> =35pF, R <sub>L</sub> =50Ω		200		ns
Break-Before-Make time	T <sub>BBM</sub>	V <sub>COM</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> =0pF		800		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>COM</sub> =600mVp-p @R <sub>L</sub> =32Ω,		-80		dB

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

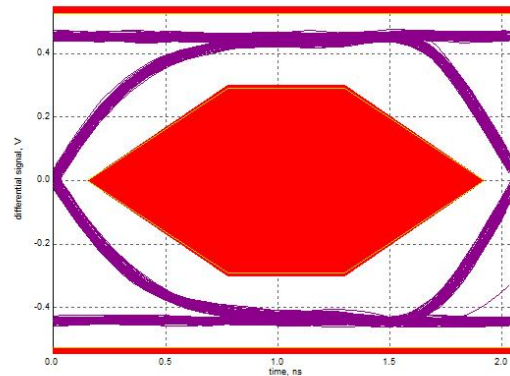
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C <sub>OFF</sub>	F=100KHz		5		pF
On capacitance	C <sub>ON</sub>	F=100KHz		7		pF



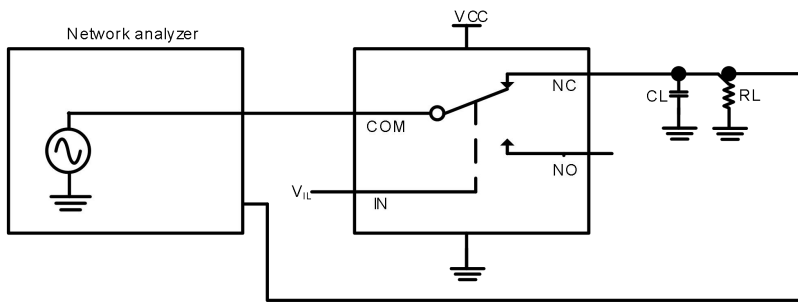
**Typical Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)**



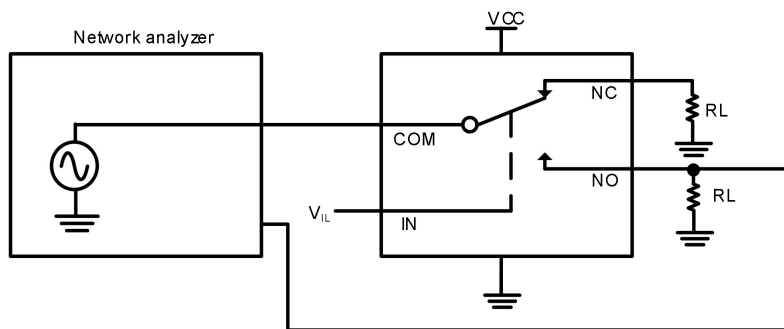
**Bandwidth**



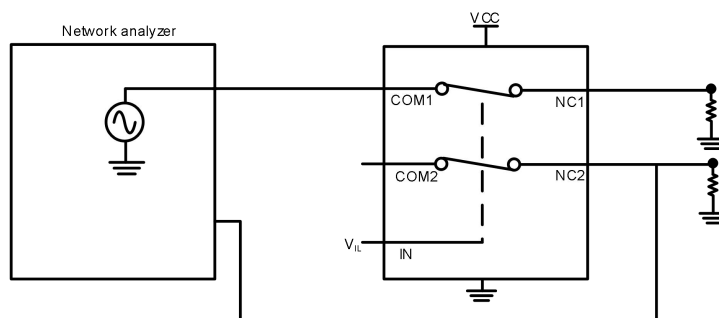
**Eye Diagram (480Mbps)**



**Bandwidth**



**Off isolation**

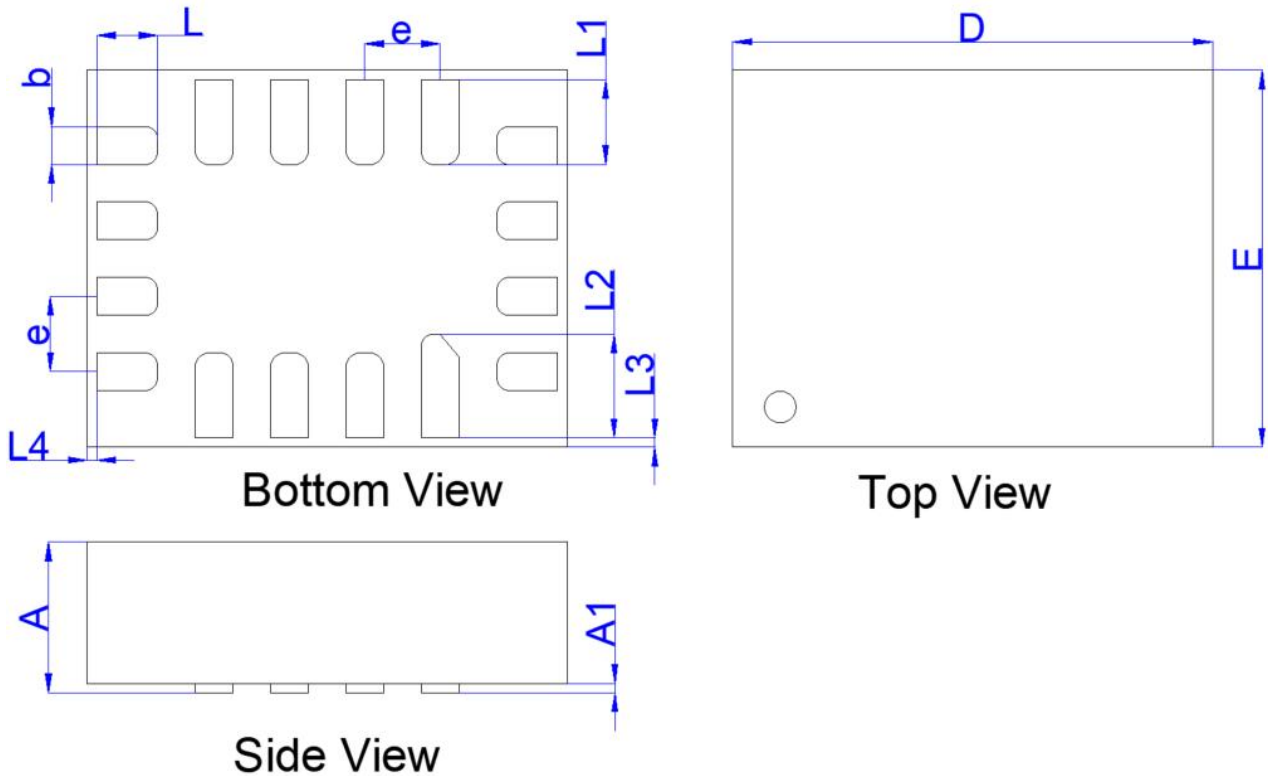


**Crosstalk**



### Package outline dimensions

QFN 2 x 2.55



Symbol	Dimension in Millimeters		
	Min.	Typ.	Max.
A	0.700	-	0.800
A1	0.025	-	0.075
D	2.500	2.550	2.600
E	1.950	2.000	2.050
b	0.150	0.200	0.250
L	0.275	0.325	0.375
L1	0.400	0.450	0.500
L2	0.500	0.550	0.600
L3	0.010	0.050	0.090
L4	0.010	0.050	0.090
e	0.400BSC		



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