



Descriptions

The WAS4735Q-16/TR 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 WAS4735Q-16/TR 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.

GPIO controls of SELx are 1.8V logic compatible. The WAS4735Q-16/TR 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

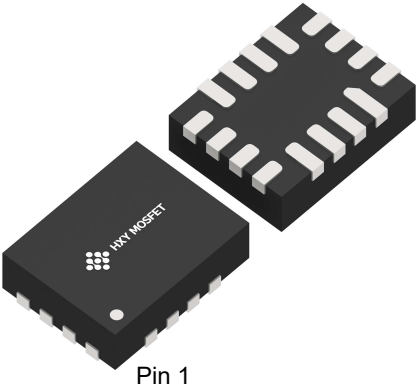
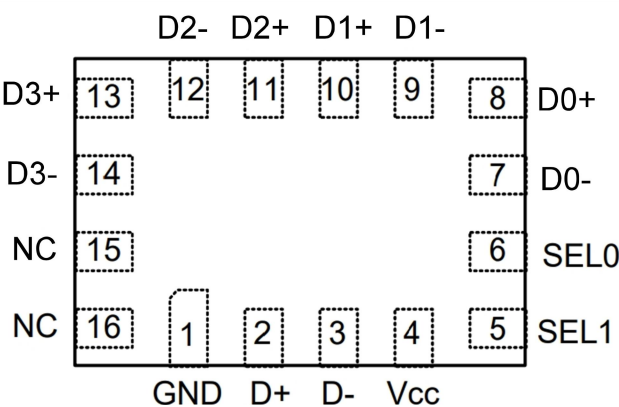
- Low On-resistance, Ron=3Ω when VCC =5V
- 1.8V Logic Compatible Control Pin
- D+/- Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- High Off-Isolation: -100dB @ 100KHz
- Low Channel-to-Channel Crosstalk: -97dB @ 100KHz
- High Bandwidth (-3dB @800MHz) Suitable for USB2.0 High-Speed 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		Quantity Per Reel
WAS4735Q-16/TR	QFN2X2.55	Tape and Reel	3,000PCS



QFN2x2.55

Pin Descriptions

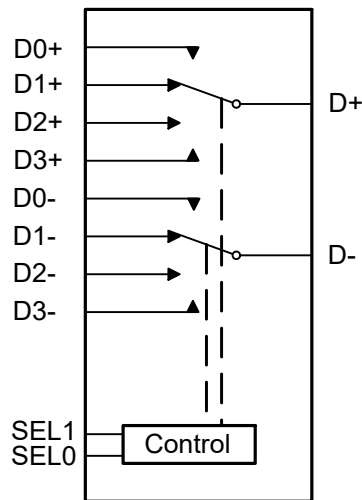
Pin Number	Symbol	Descriptions
1	GND	Ground
2	D+	D+ Common Port (HS or FS USB)
3	D-	D- Common Port (HS or FS USB)
4	VCC	Power Supply
5	SEL1	Path Selection Control Input (See Table Below)
6	SEL0	Path Selection Control Input (See Table Below)
7	D0-	D- From the 1st Source Path (HS or FS USB)
8	D0+	D+ From 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

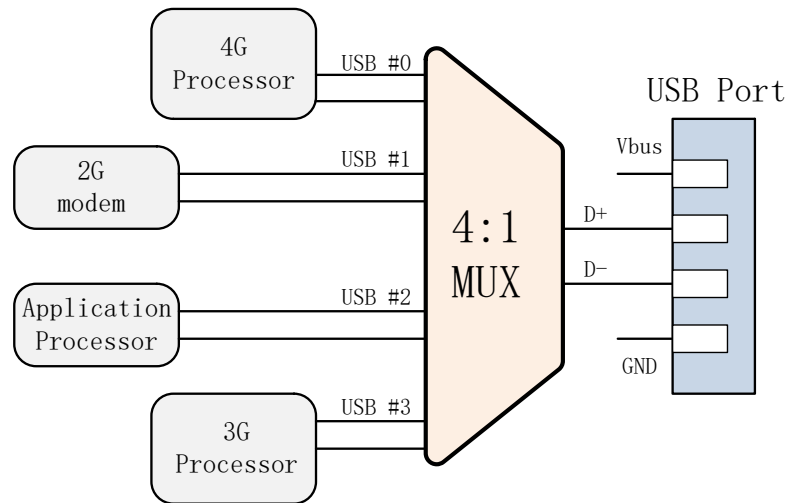
SEL1	SEL0	Function
0	0	D+ = D0+, D- = D0-
0	1	D+ = D1+, D- = D1-
1	0	D+ = D2+, D- = D2-
1	1	D+ = D3+, D- = D3-



Logic Symbol and Typical Applications



Logic Symbol



Typical Applications (Mobile Phone Example)

Absolute Maximum Ratings ⁽¹⁾

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 ⁽²⁾

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:

- “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.
- 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 _{IH}	VCC: 3.3 ~ 5.5V	1.6			V
		VCC: 1.5 ~ 3.3V	1.4			V
Input logic low level	V _{IL}	VCC: 3.3 ~ 5.5V			0.6	V
		VCC: 1.5 ~ 3.3V			0.4	V
Supply quiescent current	I _{CC}	I _{COM} =0, V _{IN} =0 or V _{IN} =VCC			1.0	uA
Increase in I _{CC} per input	I _{CC} T	I _{COM} =0, VCC=4.5V V _{IN} >1.8 or V _{IN} <0.5			1.0	uA
Off state leakage from COM _x to NC _x (or NO _x)	I _{COMx}	V _{COM} = 5.5V, V _{NC(or NO)} = 0V			±2.0	uA
On-Resistance	R _{ON1}	V _{COM} =0 ~ 0.5V, I _{COM} =30mA		6.2	7.2	Ω
	R _{ON2}	V _{COM} =0.5 ~ 2.0V, I _{COM} =30mA		7.2	7.9	Ω
	R _{ON3}	V _{COM} =2.0 ~ 4.0V, I _{COM} =30mA		5.2	7.2	Ω
	R _{ON4}	V _{COM} =4.0 ~ 5.5V, I _{COM} =30mA		3.3	3.8	Ω
On-Resistance Flatness	R _{FLAT1}	V _{COM} =0 ~ 0.5V, I _{COM} =30mA		1.4		Ω
	R _{FLAT2}	V _{COM} =0.5 ~ 2.0V, I _{COM} =30mA		1.0		Ω
	R _{FLAT3}	V _{COM} =2.0 ~ 4.0V, I _{COM} =30mA		3.2		Ω
	R _{FLAT4}	V _{COM} =4.0 ~ 5.5V, I _{COM} =30mA		0.6		Ω
On-Resistance Matching Between Channels	Δ R _{ON}	V _{COM} =0~5.5V, I _{COM} =30mA,		0.2	0.4	Ω

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

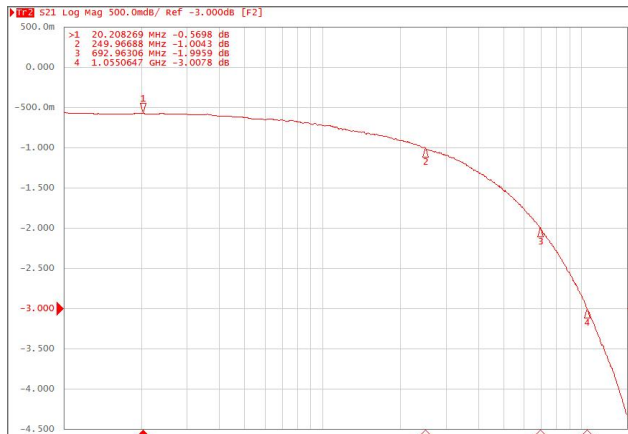
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Time	T _{ON}	V _{COM} =1.5V, C _L =35pF, R _L =50Ω		200		ns
Turn-Off Time	T _{OFF}	V _{COM} =1.5V, C _L =35pF, R _L =50Ω		200		ns
Break-Before-Make time	T _{BBM}	V _{COM} =1.5V, C _L =35pF, R _L =50Ω		500		ns
-3dB Bandwidth	BW	R _L =50Ω, C _L =0pF		800		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 _{COM} =600mVp-p @R _L =32Ω,		-80		dB

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

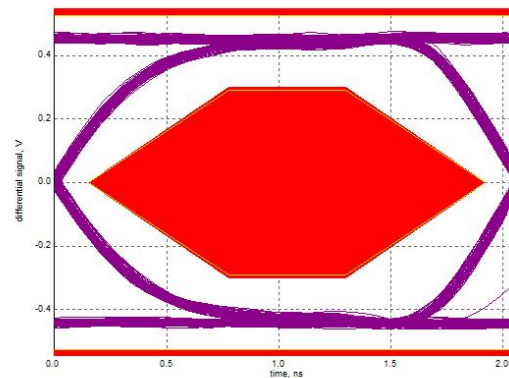
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C _{OFF}	F=100KHz		5		pF
On capacitance	C _{ON}	F=100KHz		7		pF



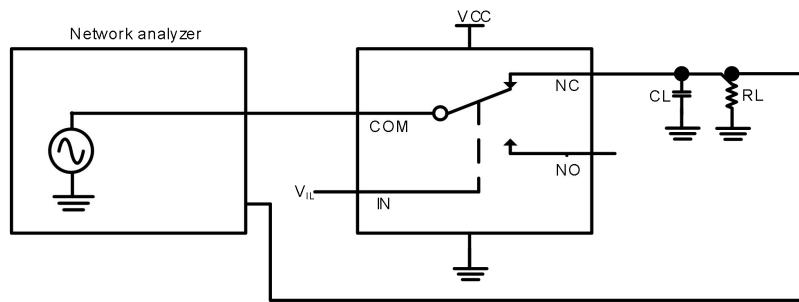
Typical Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)



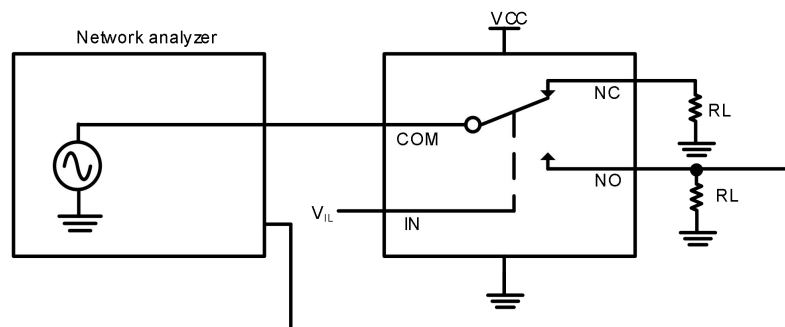
Bandwidth



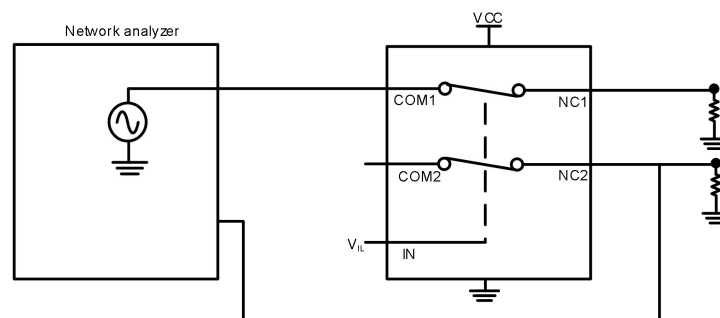
Eye Diagram (480Mbps)



Bandwidth



Off isolation

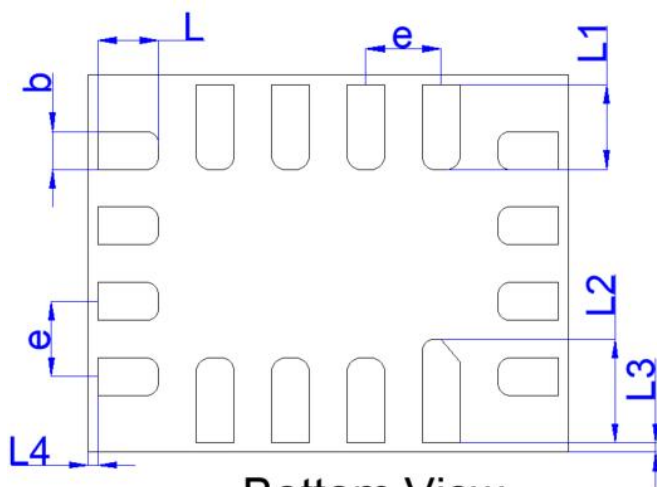


Crosstalk

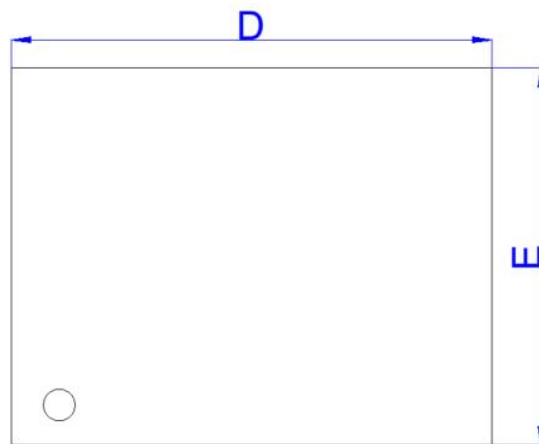


Package outline dimensions

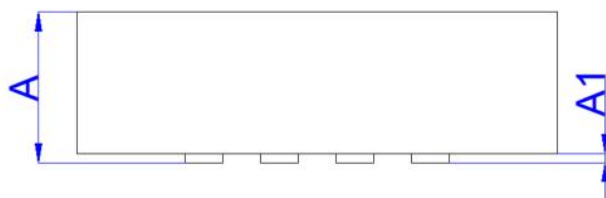
QFN 2 x 2.55



Bottom View



Top View



Side View

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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