Dual 4:1 High-Speed USB2.0 (480Mbps) SPQT Analog Switch

Descriptions

The RLCS4735Q 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 RLCS4735Q 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.

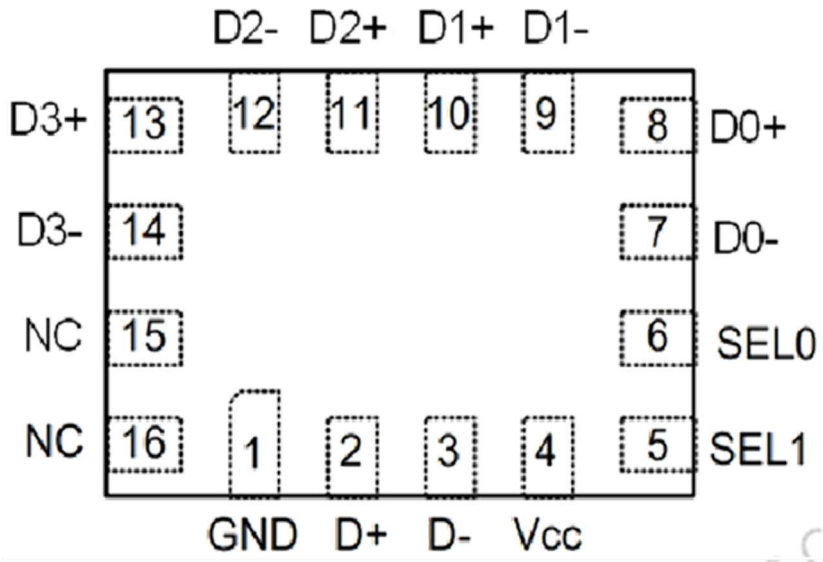
GPIO controls of SELx are 1.8V logic compatible. The RLCS4735Q is available in QFN 1.8x2.6-16L with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

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: **-100**dB @ 100KHz
- Low Channel-to-Channel Crosstalk: **-97**dB @ 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



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

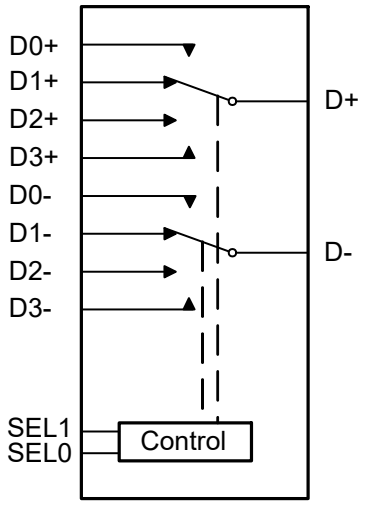
Function Descriptions

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-

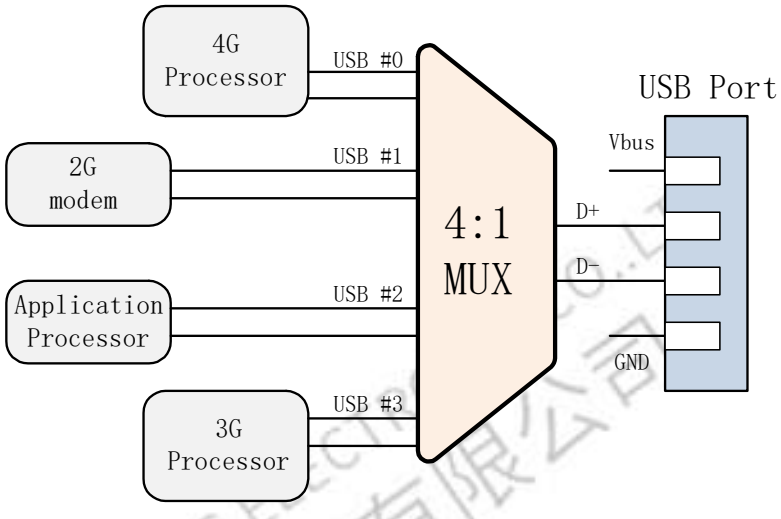
Order Information

Package		Part Number	Quantity Per Reel
QFN 1.8x2.6 -16L	Tape and Reel	RLCS4735QN16/R6	3,000PCS

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:

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.

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_{CCT}	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

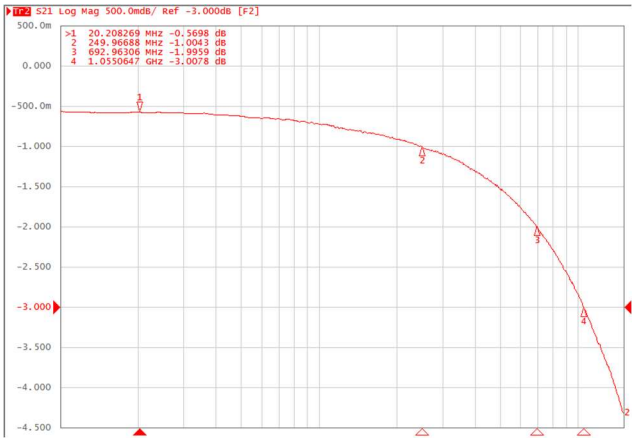
AC Electronics Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)

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

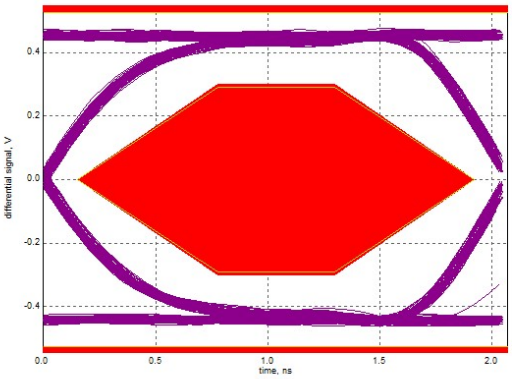
Capacitance (Ta=25°C, VCC=3.3V, unless otherwise noted)

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

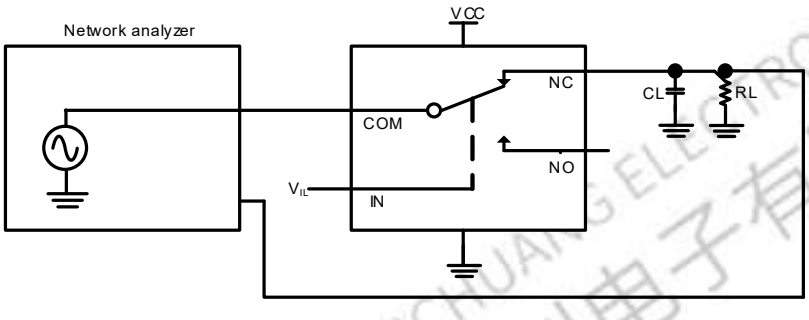
Typical Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)



Bandwidth



Eye Diagram (480Mbps)



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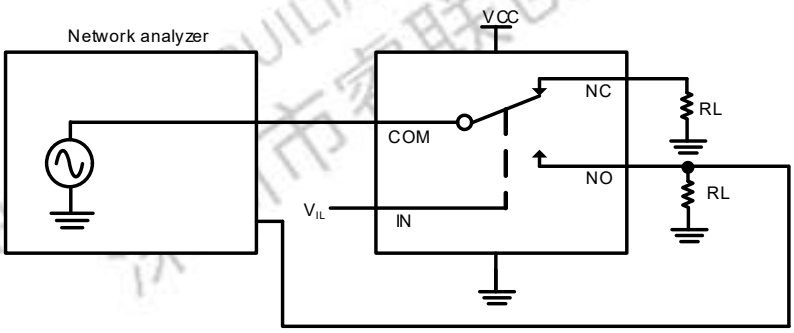
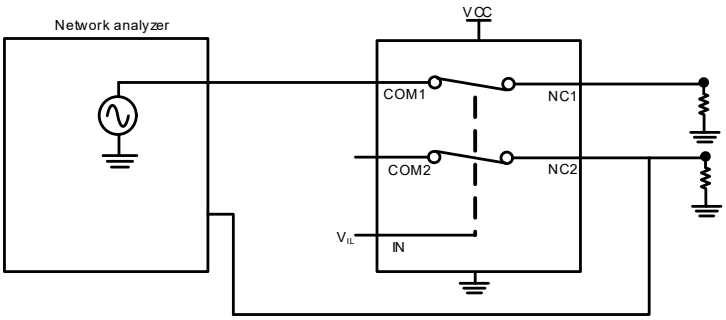
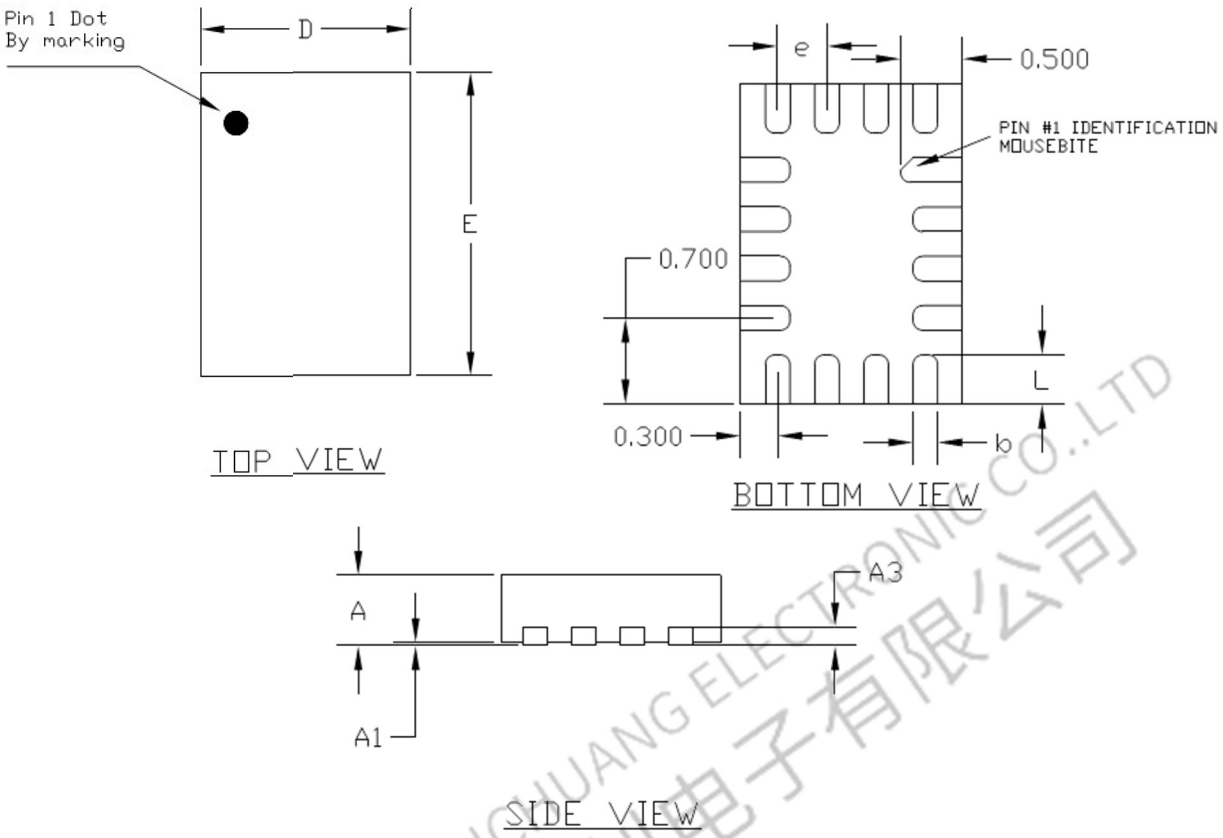


Off isolation



Crosstalk

QFN 1.8x2.6 -16L



Package outline dimensions

Symbol	Dimension in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 Typ.		
D	1.75	1.80	1.85
E	2.55	2.60	2.65
L	0.30	0.40	0.50
b	0.15	0.20	0.25
e	0.40 Typ.		

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