Descriptions

The RLCS822 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 RLCS822 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. The RLCS822 contains special circuitry on the COM+/- pins which allows the device to withstand a VBUS short to USB 2.0 DP/DM lines when the USB devices are either powered off or powered on. The AS3USB4000Q integrated over-voltage protection on the COM+/- pins can withstand up to DC 30V with automatic shutoff circuitry in order to protect system components behind the switch.

GPIO controls of S1/2 and _EN are 1.8V logic compatible. The RLCS822 is available in QFN 2.5x3.4-24L with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

Features

- Supply Range 2.5 V to 5.5 V
- Differential 4:1 or 1:4 Switch/Multiplexer
- Up to DC 30V Overvoltage Protection (OVP) on COM+/- Ports
- IEC 64000-4-5 Surge Protection w/o External TVS onto COM+/- Ports: ±30V
- Powered Off Protection When VDD = 0 V
- Low RON of 10 Ω Typical
- Insertion loss: -1dB@200MHz, -2dB@650MHz, -3dB@**1G**Hz
- C_{ON} of 4.8 pF**,** 1.8-V Compatible Logic Inputs
- Standard Temperature Range of 0°C to 85°C

Applications

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

Typical Application

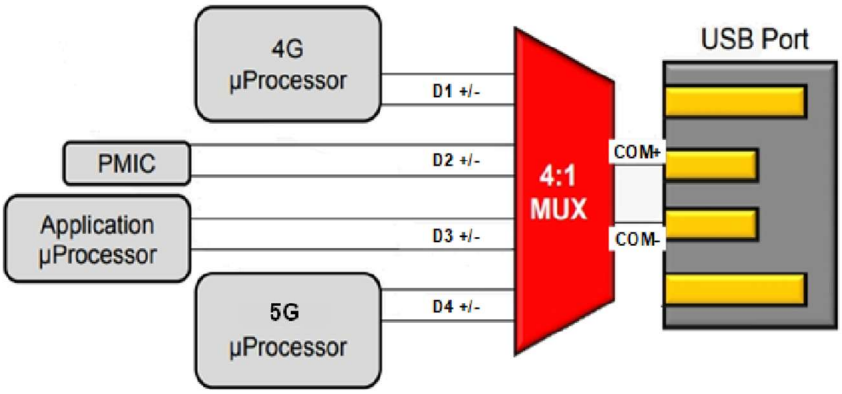


Fig.1 Typical Application

Functional Diagram

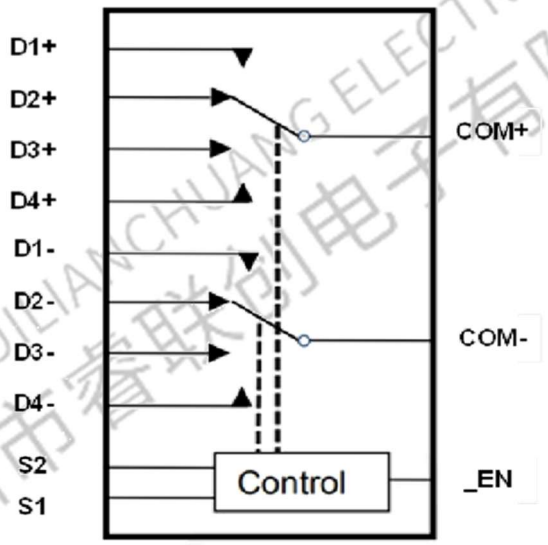


Fig.2 Functional Diagram

Order Information

Package		Part Number	Quantity per Reel
QFN 2.5 x 3.4 -24L	Tape and Reel	RLCS822QN24	3000PCS

Pin Configuration

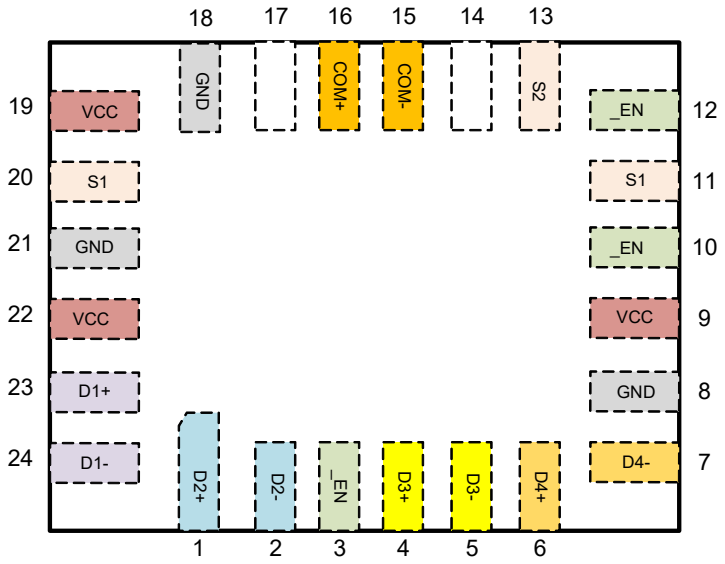


Fig.3 QFN 2.5 x 3.4 -24L

Pin Descriptions

QFN2.5x3.4-24L	Pin Name	Signal Type	Description
1	D2+	I/O	Signal I/O, Channle 2
2	D2-	I/O	Signal I/O, Channle 2
3,10,12	_EN	I	Chip Enable, Active Low
4	D3+	I/O	Signal I/O, Channle 3
5	D3-	I/O	Signal I/O, Channle 3
6	D4+	I/O	Signal I/O, Channle 4
7	D4-	I/O	Signal I/O, Channle 4
8,18,21	GND	GND	Power Ground
9,19,22	VCC	PWR	Positive Supply Voltage
11,20	S1	I	Channel Select
13	S2	I	Channel Select
14,17	NC	/	Not Connection
15	COM-	I/O	Signal I/O, Common Port
16	COM+	I/O	Signal I/O, Common Port
23	D1+	I/O	Signal I/O, Channle 1
24	D1-	I/O	Signal I/O, Channle 1

Table-1 Pin Descriptions

Truth Table

Function	S2	S1	_EN
COM+/- to D1+/-	L	L	L
COM+/- to D2+/-	L	H	L
COM+/- to D3+/-	H	L	L
COM+/- to D4+/-	H	H	L
All Switches Hi-Z	X	X	H

Table-2 Truth Table

Electrical Characteristics (Ta=25°C, VDD=3.3V, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
POWER SUPPLY						
Supply Voltage Range	VDD		2.5	3.3	5.5	V
Supply Current	I_{CC}	_EN =1 switch-off		0.6	2	uA
		_EN =0 switch-on		33		uA
SEL/_EN DIGITAL INPUT CONTOL						
control input logic high	V_{IH}		1.6		5.5	V
control input logic low	V_{IL}		-0.1		0.5	V
Internal pull-down resistor	R_{PD}			2		MΩ
SWITCH ON RESISTANCE AND OFF LEAKAGE						
On-Resistance	R_{ON}	V_{IS}= 0V~0.4V I_{OUT}=8mA		10	11	Ω
R_{ON} Flatness(1)	R_{FLAT}	V_{IS}= 0V~0.4V I_{OUT}=8mA		0.3	0.5	Ω
R_{ON} Matching Between Channels(2)	ΔR_{ON}	V_{IS}= 0V~0.4V I_{OUT}=8mA		0.1	0.2	Ω
OFF Leakage Current	I_{LEAK}	$V_{C0+/-}$= 10V $V_{L1+/-}$= $V_{D2+/-}$ =0V		31	50	uA
SWITCH DYNAMICS						
On Capacitance	C_{ON}	$V_{C0+/-}$ = 0.2V, f = 1MHz		4		pF
Off Capacitance	C_{OFF}	$V_{C0+/-}$ = 0.2V, f = 1MHz		3		pF
Off Isolation	Off	f = 250MHz, R_T = 50Ω, C_L = 0pF		-38		dB
Crosstalk(3) (Channel-to-Channel)	X_{TALK}	f = 250MHz, R_T = 50Ω, C_L = 0pF		-41		dB
-3dB Bandwidth	BW	R_T=50Ω, C_L=0pF Signal Power 0dBm	0.9	1		GHz
Break-Before-Make	BBM	$V_{L1+/-}$ = $V_{D2+/-}$ = 0.4V, R_L=50Ω		1.5		uS
Turn-on Time	t_{OFF}	$V_{C0+/-}$ = 0.4V, R_L=50Ω _EN switches from High to Low		20		uS
Turn-off Time	t_{OFF}	$V_{C0+/-}$ = 0.4V, R_L=50Ω _EN switches from Low to High		1.2		uS
Propagation Delay	t_{PD}	$V_{C0+/-}$ = 0.4V, R_L=50Ω		200		pS

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, VDD=3.0V, CAP=0.1uF, unless otherwise noted)

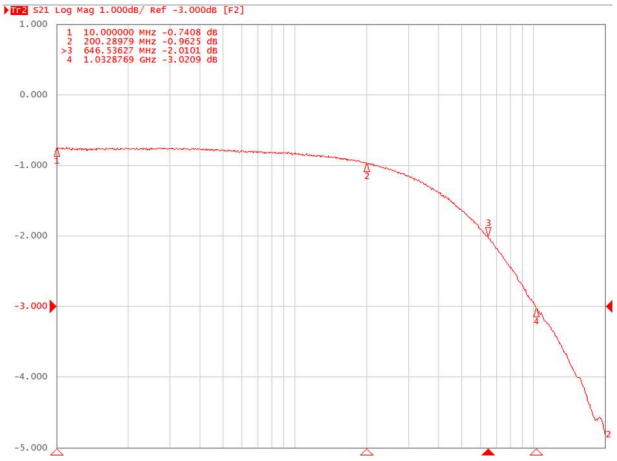


Fig.1 Switch Bandwidth or Insertion Loss

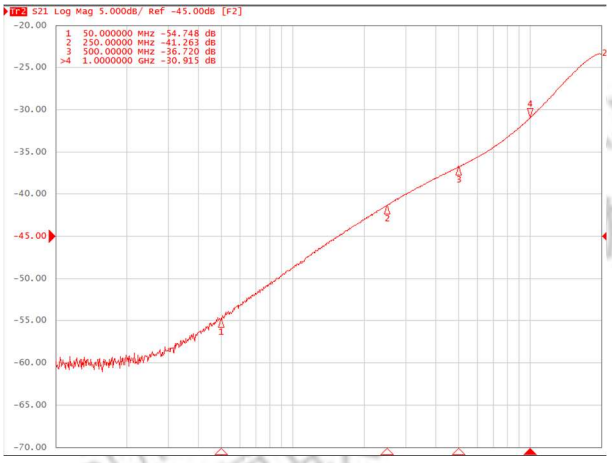


Fig.2 Switch Channel to Channel Cross-Talk

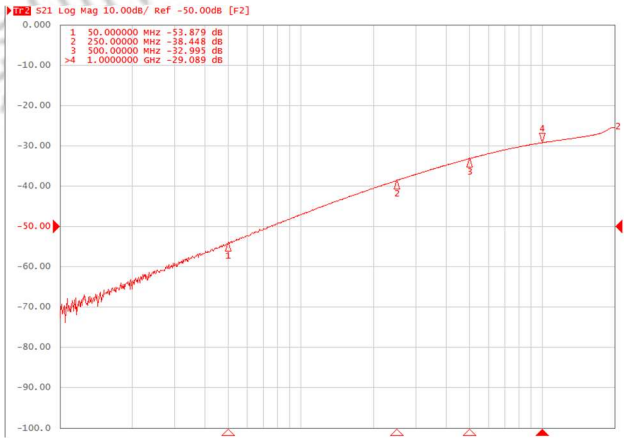
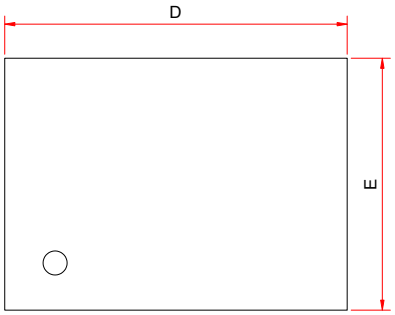


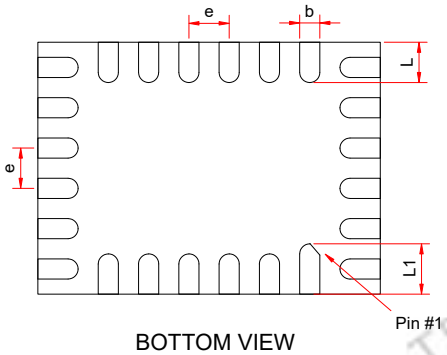
Fig.3 Switch Off Isolation

PACKAGE OUTLINE DIMENSIONS

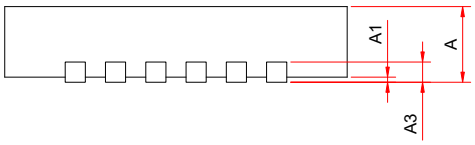
QFN 2.5 x 3.4 -24L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.70	0.75	0.80
A1	0.00	-	0.05
A3	0.20Ref		
D	3.35	3.40	3.45
E	2.45	2.50	2.55
L	0.30	0.40	0.50
L1	0.40	0.50	0.60
b	0.15	0.20	0.25
e	0.40BSC		

Important Note

As the RLC product continues to improve gradually, we may experience significant changes. RLC reserves the right to correct, modify, enhance, and amend the products and services they provide, as well as the right to discontinue any product or service. Before placing an order, customers should obtain the latest information to verify that it is current and complete. All products sold must comply with RLC's terms and conditions in order to ensure proper processing of orders. RLC guarantees that the products they sell conform to the terms and conditions applicable to semiconductor sales. Only under this guarantee does RLC consider it necessary to employ testing and quality control measures for their products. Unless mandated by applicable laws requiring strict compliance, there is no obligation for testing all product parameters. RLC does not assume responsibility for customer product design or application. The materials provided contain circuit examples and usage methods solely for reference purposes; they do not guarantee suitability for volume production designs. Additionally, these materials may contain errors that could result in damages incurred by customers; therefore, RLC disclaims any liability in such cases. Customers are advised to use products within the limits specified in these materials while paying particular attention to absolute maximum ratings, operating voltages, and voltage characteristics. Any use of products outside of these specifications absolves RLC from responsibility; customers must accept full responsibility themselves. To minimize risks associated with customer-designed applications, adequate design safety measures should be implemented. When using RLC products, please ensure compliance with relevant laws and regulations pertaining to your country or region regarding application standards as well as testing requirements related to safety performance. For exports of RLC products overseas, it is essential that you adhere strictly to foreign exchange regulations and transaction laws throughout all necessary procedures involved in exportation processes. In case of disposal of any abandoned RLC product(s), please follow appropriate rules and regulations for proper disposal.

RLC products are not designed to be radiation - resistant. Based on the intended usage, customers can incorporate radiation protection measures during the product design process. Under normal circumstances, RLC products do not harm human health. However, since they contain chemicals and heavy metals, do not put them in your mouth. Additionally, the fracture surfaces of wafers and chips can be sharp. When touching them with bare hands, please be careful to avoid injury.Semiconductor products have a certain probability of failure or malfunction. To prevent disruptions and social damages resulting from personal accidents, fire accidents, etc., as well as to avoid malfunctions, customers are required to be responsible for comprehensive design, implementing fire - spread prevention measures, and safety design against misoperation. Please conduct a full assessment of the entire system, and customers can determine its applicability on their own.

This material also includes content related to the company's copyright and know - how. The records in this material are not intended to promise or guarantee the implementation and use of the company's and third - party intellectual property and other rights. Without the permission of our company, it is strictly prohibited to reprint, copy any part of this work, or disclose the material information to third parties.

RLC shall not be held responsible for any damage or harm that occurs which is not related to the product itself, as well as for any infringement of third - party rights such as intellectual property rights.

For more details about this material, please contact our sales office.