Descriptions

RLCS310 is a high performance four-data lane MIPI, D-PHY switch. This single-pole, double-throw (SPDT) switch is optimized for switching between two high-speed or low-power MIPI sources. The RLCS310 has wide bandwidth and maintains good signal integrity, which makes it ideal is designed for the MIPI specification and allows connection to a CSI or DSI module.

Features

- 2-Differential Channel 1:2/2:1 Mux/De-Mux
- USB 3.1 Super Speed 10Gbps Switch
- MIPI D-PHY Switch
- High Bandwidth: 5.1GHz @-3dB BW
- Isolation: -40dB @ 2.0 Gbps
- Crosstalk: -31dB @ 2.0 Gbps
- ESD Tolerance: 2kV HBM
- Low bit-to-bit skew, Bidirectional
- Wide VCC Operating Range: 1.5v ~ 5.0v
- Small Packaging, QFN 4 x 4 -24 Lead

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

Order information

Package		Part Number	Top-Side Marking	Quantity per Reel
QFN 4×4 -24L	Tape and Reel	RLCS310QN24/R10	3412	5000PCS

Table-1 Order information

Pin Configuration

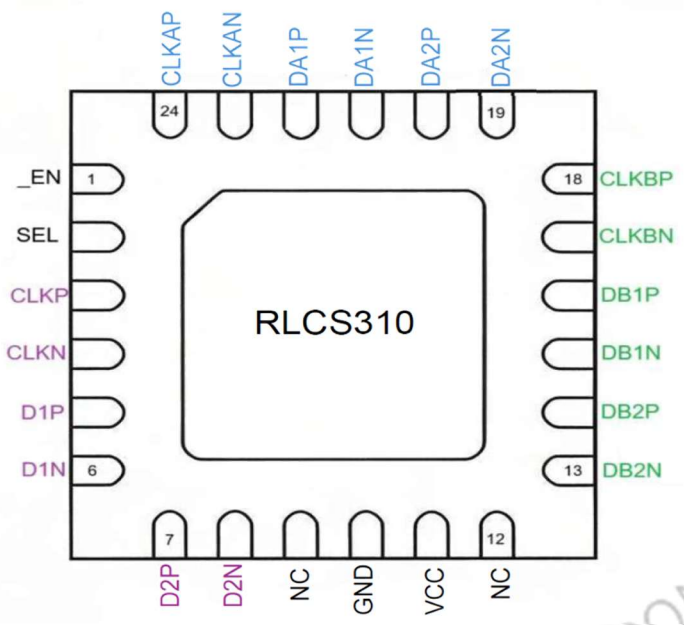


Fig.1 Top-Through View Pin Configuration

Pin Descriptions

Pin#	Pin Name	Signal Type	Description
1	_EN	I	Chip Enable, Active Low
2	SEL	I	Switch logic control
3	CLKP	I/O	Common Side Clock Path Positive
4	CLKN	I/O	Common Side Clock Path Negative
5	D1P	I/O	Common Side Data Path 1 Positive
6	D1N	I/O	Common Side Data Path 1 Negative
7	D2P	I/O	Common Side Data Path 2 Positive
8	D2N	I/O	Common Side Data Path 2 Negative
9,12	NC		Not Connect
10	GND	GND	Ground
11	VCC	Power	Supply Voltage
13	DB2N	I/O	B Side Data Path 2 Negative
14	DB2P	I/O	B Side Data Path 2 Positive
15	DB1N	I/O	B Side Data Path 1 Negative
16	DB1P	I/O	B Side Data Path 1 Positive
17	CLKBN	I/O	B Side Clock Path Negative
18	CLKBP	I/O	B Side Clock Path Positive
19	DA2N	I/O	A Side Data Path 2 Negative
20	DA2P	I/O	A Side Data Path 2 Positive
21	D1N	I/O	Common Side Data Path 1 Negative
22	DA1P	I/O	A Side Data Path 1 Positive
23	CLKAN	I/O	A Side Clock Path Negative
24	CLKAP	I/O	A Side Clock Path Positive

Table-2 Pin Descriptions

Truth Table

_EN	SEL	CLKP	CLKN	D1P	D1N	D2P	D2N
High	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Hi-Z
Low	Low	CLKAP	CLKAN	DA1P	DA1N	DA2P	DA2N
Low	High	CLKBP	CLKBN	DB1P	DB1N	DB2P	DB2N

Table-3 Truth Table

Functional Diagram

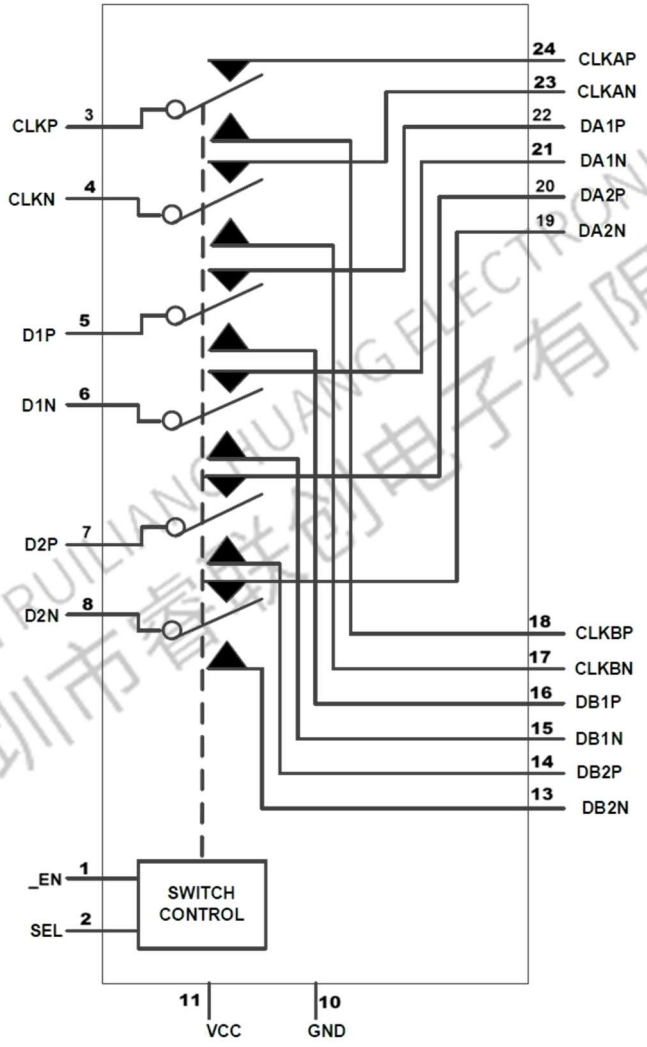


Fig.2 Functional Diagram

Maximum Ratings

(Above which useful life may be impaired. For user guidelines, not tested.)

Parameter	Value
Storage Temperature	-65℃ to +150℃
Junction Temperature	125°C
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-4 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 Clk/Data	R_{ON_HS}	V_{IS}= 0.2V I_{ON}=8mA		6.7	8	Ω
R_{ON} Flatness for Clk/Data	R_{FLAT_LP}	V_{IS}= 0 to 1.2V I_{ON}=8mA		0.8	1	Ω
R_{ON} Flatness for Clk/Data	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	-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 = 1.2GHz V_{IS}= 0.2V_{PP}		-27		dB
Crosstalk	X_{TALK}	R_L = 50Ω f = 1.2GHz V_{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-5 Electrical Characteristics

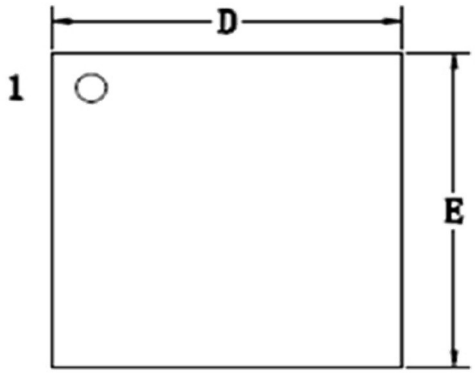
Note:

(1) Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.

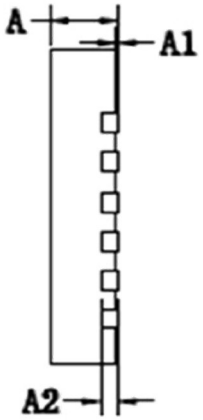
(2) R_{ON} matching between channels is calculated by subtracting the channel with the lowest max Ron value from the channel with the highest max Ron value.

(3) Crosstalk is inversely proportional to source impedance

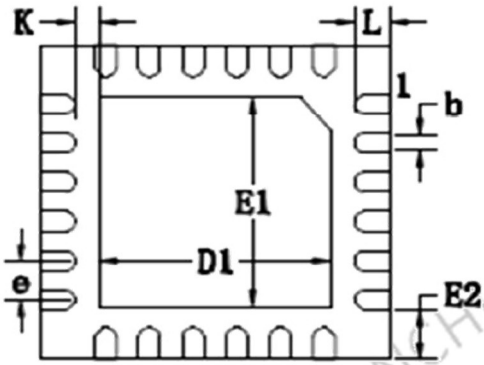
Package Outline Dimensions (QFN 4 x 4 -24L)



顶视图



侧视图



底视图

SYMBOL	MILIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	-	0.05
A2	0.203 TPY		
b	0.20	0.25	0.30
D	3.95	4.00	4.05
D1	2.55	2.65	2.75
E	3.95	4.00	4.05
E1	2.55	2.65	2.75
E2	0.625 TPY		
e	0.50 BSC		
K	0.275 BSC		
L	0.35	0.40	0.45

Table-6 Package Outline Dimensions

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.