Low Voltage and High Speed Dual SPDT Analog Switch with True Isolation

Descriptions

The RLCS23157 is a dual SPDT low on-resistance analog switch. It can operate from a single 1.5V to 5.5V power supply. The device offers low ON-state resistance and excellent ON-state resistance matching with break-before-make feature, to prevent signal distortion during the transferring of a signal from one channel to another. The device is capable of true isolation. Even when COMx overrides VCC, very little current will flow back to the supply.

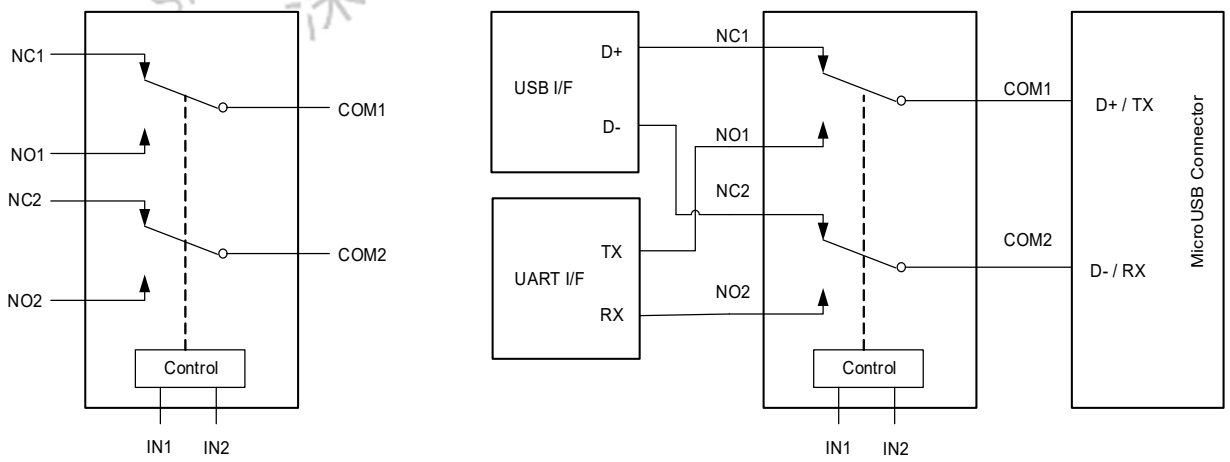
Features

- Low On-resistance, Ron=1.5Ω when COMX=5V
- 1.8V Logic Compatible Control Pin
- COMx 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 @700MHz) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current (<2uA) With Very Wide Supply Range (1.5V ~ 5.5V)
- MSOP-10 Package

Applications

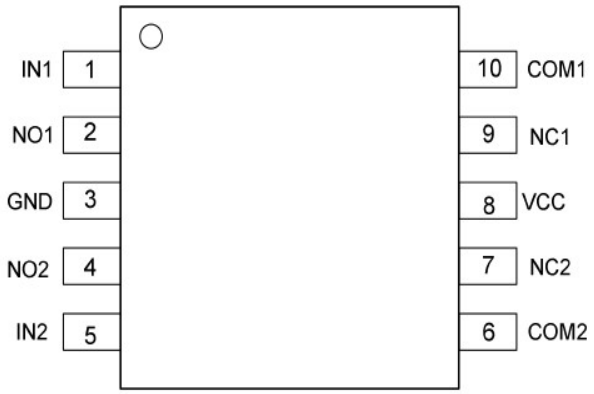
- Audio, Video
- UART,
- USB2.0 Signal and Supply Routing
- Cell phones
- TWS headset

Typical Application



Configured as USB2.0 Mux

Functions and Pin Configuration



MSOP-10L

Pin Descriptions

Pin Number	Symbol	Descriptions
1,5	IN_X	Logic Input Control
2,4	NO_X	Analog/Digital Signal Ports (Normally open)
3	GND	Ground
6,10	COMX	Common Signal Ports
7,9	NCX	Analog/Digital Signal Ports (Normally closed)
8	VCC	Single Power Supply

Function Descriptions

Logic Input(INX)	Function
0	NC1=COM1 and NC2=COM2
1	NO1=COM1 and NO2=COM2

Note: X= 1 or 2

Order Information

Package		Part Number	Quantity Per Reel
MSOP -10L	Tape and Reel	RLCS23157MS10/R6	3,000PCS

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 NO, NC, COM		±100	mA
Peak Current Through NO, NC, COM (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_{COM}	-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℃, 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		±20	±40	nA
On-Resistance	R_{ON1}	V_{COM}=0 ~ 0.5V, I_{COM}=30mA		3.0	3.5	Ω
	R_{ON2}	V_{COM}=0.5 ~ 2.0V, I_{COM}=30mA		3.6	3.9	Ω
	R_{ON3}	V_{COM}=2.0 ~ 4.0V, I_{COM}=30mA		2.5	3.5	Ω
	R_{ON4}	V_{COM}=4.0 ~ 5.5V, I_{COM}=30mA		1.5	1.8	Ω
On-Resistance Flatness	R_{FLAT1}	V_{COM}=0 ~ 0.5V, I_{COM}=30mA		0.7		Ω
	R_{FLAT2}	V_{COM}=0.5 ~ 2.0V, I_{COM}=30mA		0.5		Ω
	R_{FLAT3}	V_{COM}=2.0 ~ 4.0V, I_{COM}=30mA		1.6		Ω
	R_{FLAT4}	V_{COM}=4.0 ~ 5.5V, I_{COM}=30mA		0.3		Ω
On-Resistance Matching Between Channels	ΔR_{ON}	V_{COM}=0~5.5V, I_{COM}=30mA,		0.1	0.2	Ω

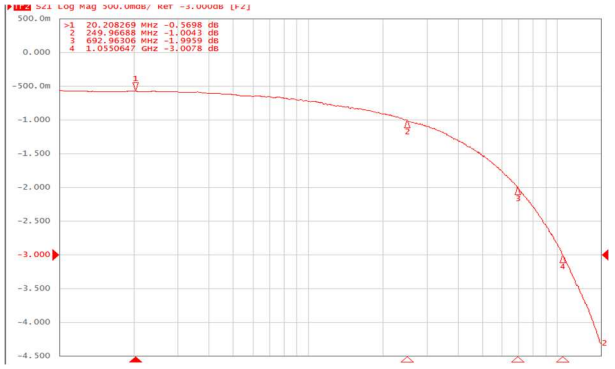
AC Electronics Characteristics (Ta=25℃, VCC=3.3V, unless otherwise noted)

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		850		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

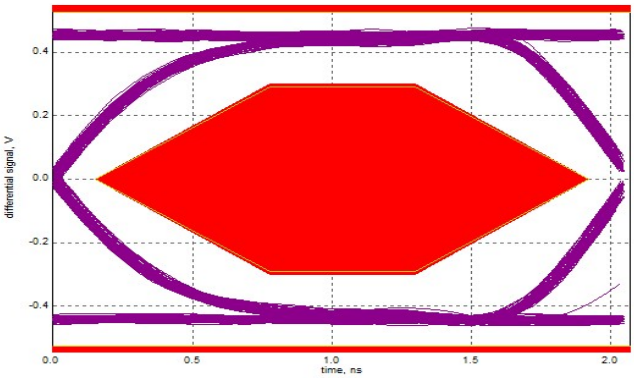
Capacitance (Ta=25℃, VCC=3.3V, unless otherwise noted)

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

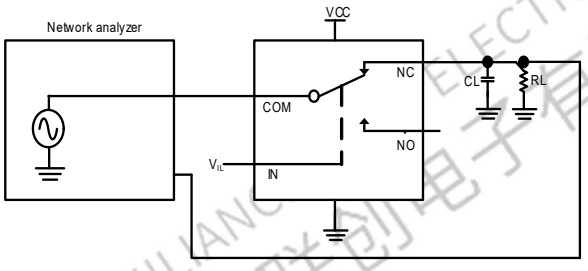
Typical Characteristics (Ta=25℃, VCC=3.3V, unless otherwise noted)



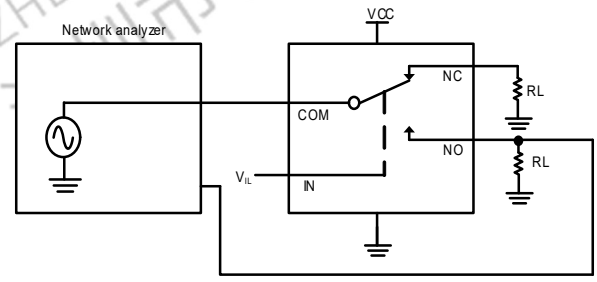
Eye Diagram (480Mbps)



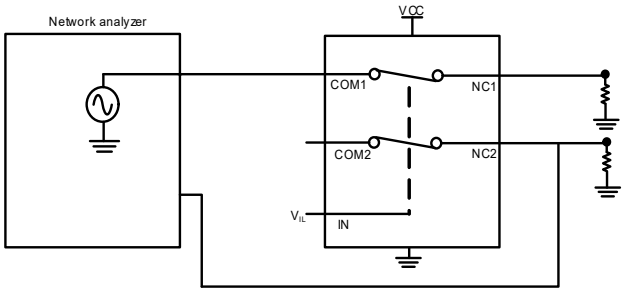
Bandwidth



Bandwidth



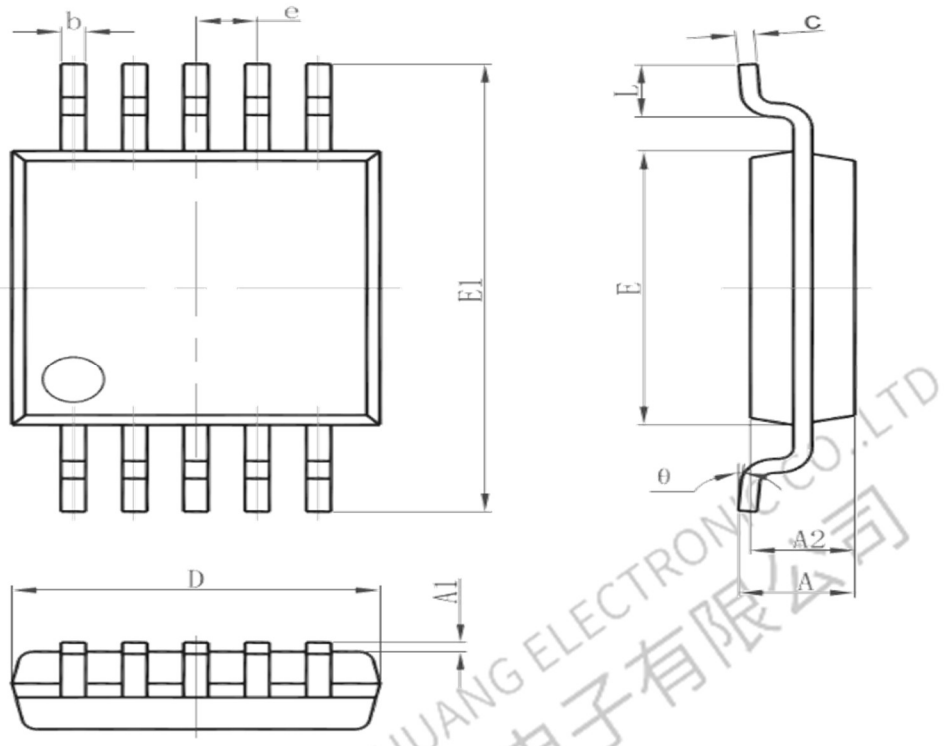
Off isolation



Crosstalk

Package Outline Dimensions

MSOP-10L



Symbol	Dimension in Millimeters	
	Min.	Max.
A	0.820	1.100
A1	0.020	0.150
A2	0.750	0.950
b	0.180	0.280
c	0.090	0.230
D	2.900	3.100
e	0.50(BSC)	
E	2.900	3.100
E1	4.750	5.050
L	0.400	0.800
θ	0°	6°

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