Descriptions

The TS3USB3000RSER is a high-speed bidirectional passive switch in mux or demux configurations suited for USB Type-C™ application supporting USB 3.1 Gen 1 and Gen 2 data rates. Based on control pin SEL, the device provides switching on differential channels between Port L0 or Port L1 to Port C0. The TS3USB3000RSER is a generic analog differential passive switch that can work for any high-speed interface applications requiring a common mode voltage range of 0 to 2 V and differential signaling with differential amplitude up to 1800mVpp. It employs adaptive tracking that ensures the channel remains unchanged for the entire common mode voltage range. Excellent dynamic characteristics of the device allow high-speed switching with minimum attenuation to the signal eye diagram with very little added jitter. It consumes <2mW of power when operational and has a shutdown mode exercisable by _EN pin resulting <20uW.

The TS3USB3000RSER is available in QFN1520(UQFN-10(1.5x2)) with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

Order Information

Package		Part Number	Top-Side Marking
QFN1520(UQFN-10(1.5x2))	Tape and Reel	TS3USB3000RSER	A773

Features

- Pin-to-Pin TS3USB3000, DIA3000
- Wide Supply Range 1.5 V to 5.5 V
- Differential 2:1 or 1:2 Switch/Multiplexer
- USB 3.1 Super Speed 10Gbps Switch
- High Bandwidth: 5.1GHz @-3dB Bandwidth
- Isolation: -24dB @ 1.25 GHz
- Crosstalk: -34dB @ 1.25 GHz
- Low bit-to-bit skew, Bidirectional
- ESD Tolerance: 2kV HBM
- Powered Off Protection When VDD = 0 V
- 1.8-V Compatible Logic Inputs

Applications

- Anywhere a USB Type-C™ Ecosystem
- Mobile Phones, Tablets and Notebooks
- PCI Express Backplanes

Functions and Pin Configuration

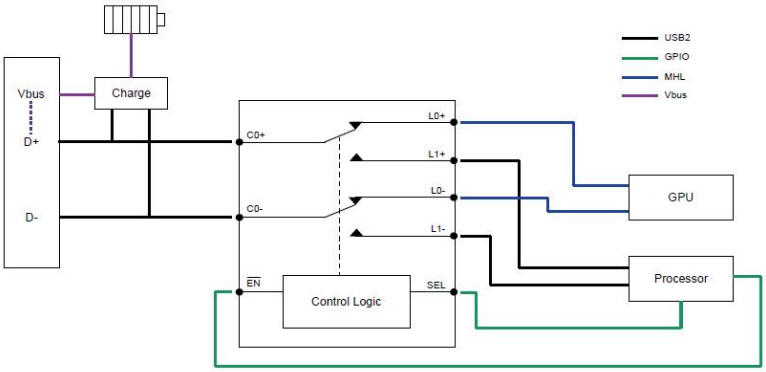


Fig.1 Functional Diagram

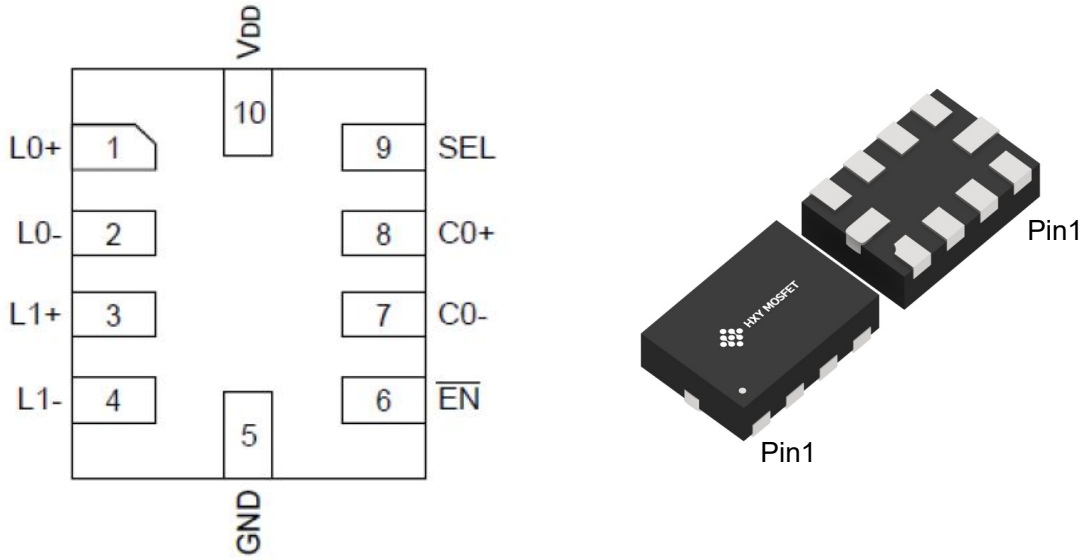


Fig.2 QFN1520(UQFN-10(1.5x2))

Pin Descriptions

QFN1520 (UQFN-10(1.5x2))	Pin Name	Signal Type	Description
8	C0+	I/O	Signal I/O, Common Port
7	C0-	I/O	Signal I/O, Common Port
3	L1+	I/O	Signal I/O, Channle 1
4	L1-	I/O	Signal I/O, Channle 1
1	L0+	I/O	Signal I/O, Channle 0
2	L0-	I/O	Signal I/O, Channle 0
9	SEL	I	Operation Model Select (when SEL=0: C0→L0, when SEL=1: C0→L1)
6	_EN	I	_EN=1, Power Down is Enabled.
10	VDD	PWR	Positive Supply Voltage
5	GND	GND	Power Ground

Table-1 Pin Descriptions

Truth Table

Function	SEL	_EN
C0+/- to L0+/-	L	L
C0+/- to L1+/-	H	L
All Switches Hi-Z	X	H

Table-2 Truth Table

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power Supply						
Supply Voltage Range	VDD		1.5	3.3	5.5	V
Supply Current	I_{CC}	_EN =1 disconnection		0.6	1	uA
		_EN =0 connection		28		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}= 0~0.4V I_{ON}=8mA		6.7	8	Ω
R_{ON} Flatness	R_{FLAT}	V_{IS}= 0 to 1.2V I_{ON}=8mA		0.8	1	Ω
		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
OFF Leakage Current	I_{LEAK}	$V_{C0+/-}$= VCC $V_{L1+/-}$= $V_{L0+/-}$ =0V	-0.5		0.5	uA
Switch Dynamics						
On Capacitance	C_{ON}	$V_{C0+/-}$ = 0.2V, f = 1.5GHz		1.5		pF
Off Capacitance	C_{OFF}	$V_{C0+/-}$ = 0.2V, f = 1.5GHz		1.0		pF
Off Isolation	Off	R_L = 50Ω f = 1.25GHz V_{IS}= $0.2V_{PP}$		-24		dB
Crosstalk	X_{TALK}	R_L = 50Ω f = 1.25GHz V_{IS}= $0.2V_{PP}$		-34		dB
-3dB Bandwidth	BW_{-3dB}	R_L=50Ω C_L=0pF Signal 0dBm	3.6	5.1		GHz
Break-Before-Make	BBM	$V_{L1+/-}$ = $V_{L0+/-}$ = 0.4V, R_L=50Ω		1.5		uS
Turn-on Time	t_{ON}	$V_{C0+/-}$ = 0.4V, R_L=50Ω _EN switches from High to Low		40		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:

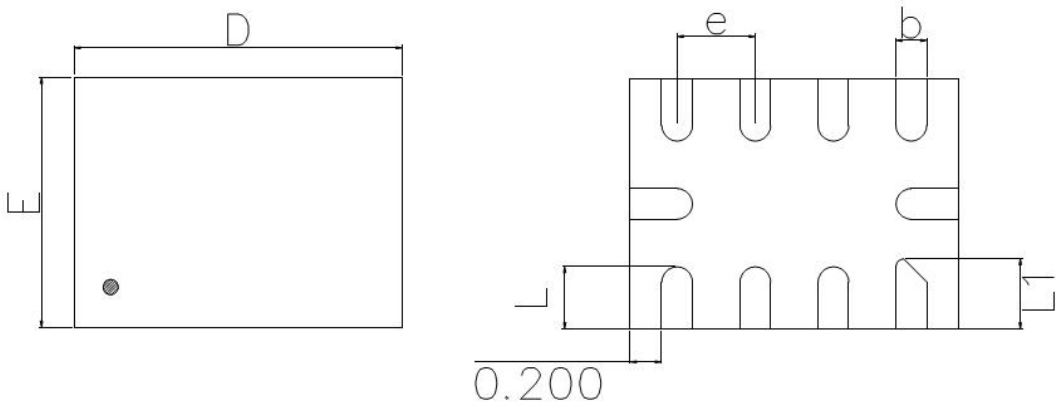
(1) Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.

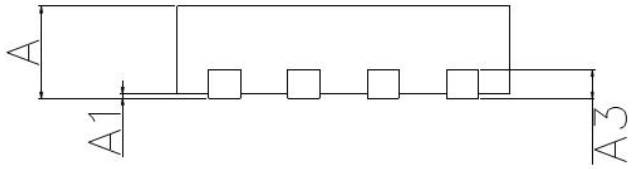
(2) R_{ON} matching between channels is calculated by subtracting the channel with the lowest max Ron value from the channel with the highest max Ron value.

(3) Crosstalk is inversely proportional to source impedance

Package Outline Dimensions

QFN1520(UQFN-10(1.5x2))





Symbol	Dimension in Millimeters		
	Min.	Typ.	Max.
A	0.500	0.550	0.600
A1	0.000		0.050
A3	0.150 Ref.		
D	1.950	2.000	2.050
E	1.450	1.500	1.550
b	0.150	0.200	0.250
e	0.500 (BSC)		
L	0.350	0.400	0.450
L1	0.450	0.450	0.550

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