



Descriptions

The DIA3000QN10 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 A3000 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 DIA3000QN10 is available in UQFN 1.5x2-10L 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(QFN2x1.5-10)	Tape and Reel	DIA3000QN10

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

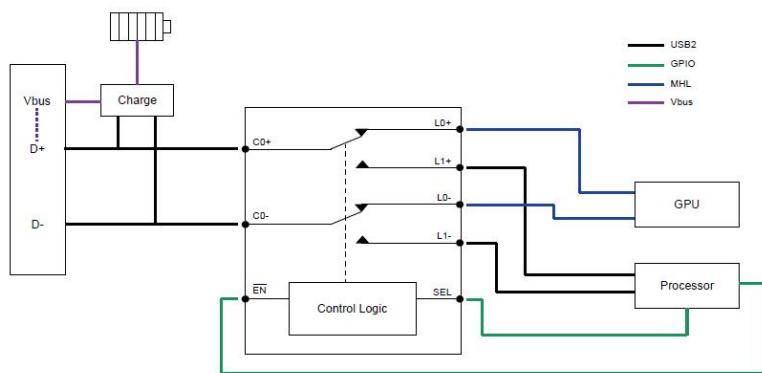


Fig.1 Functional Diagram

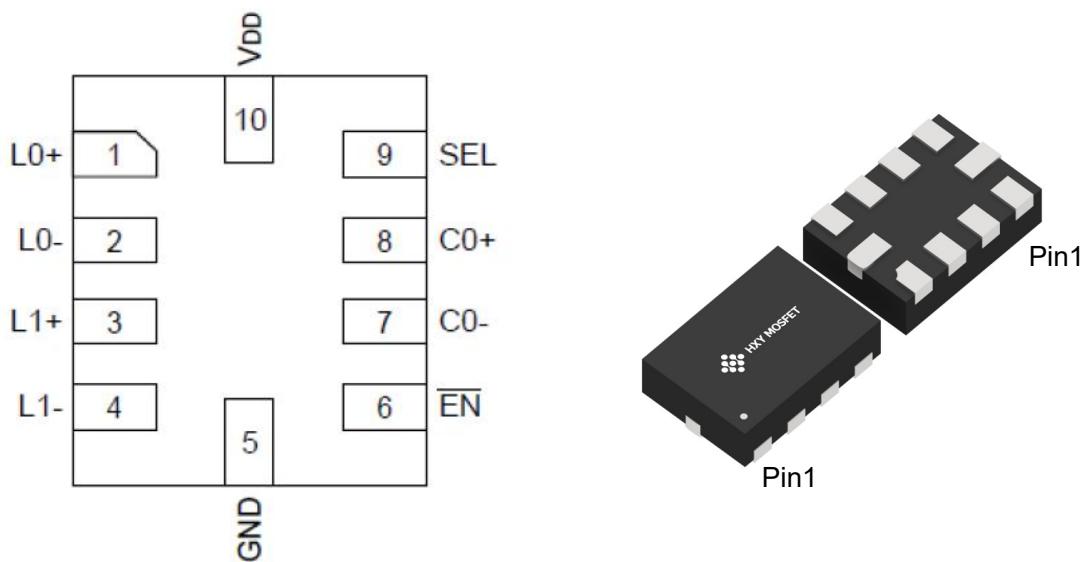


Fig.2 QFN1520(QFN2x1.5-10)

Pin Descriptions

QFN1520 (QFN2x1.5-10)	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, Channel 1
4	L1-	I/O	Signal I/O, Channel 1
1	L0+	I/O	Signal I/O, Channel 0
2	L0-	I/O	Signal I/O, Channel 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 Control						
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		GH _z
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

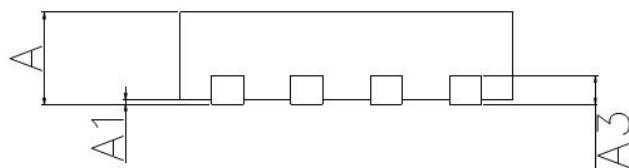
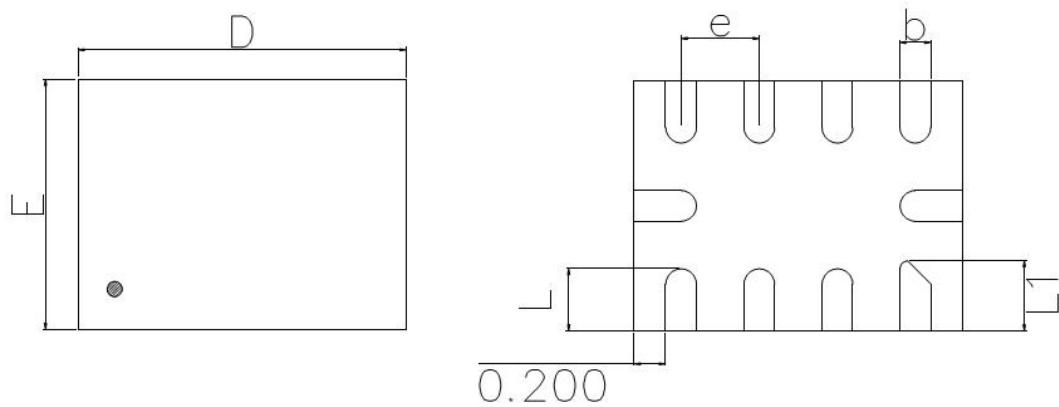
Note:

- (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(QFN2x1.5-10)



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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