



## Descriptions

The DIO3402WL12 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 2:1 or 1:2 switch. It is optimized for use with the USB 2.0 DP/DM lines in a USB Type-C™ system.

The DIO3402WL12 integrated over-voltage protection on the D+/- pins can withstand up to DC 30V with automatic shutoff circuitry in order to protect system components behind the switch. GPIO controls of S1, S2 and \_OE are 1.8V logic compatible. The A6743 is available in 12 Ball Wafer Level Chip Scale Package (CSP) with 1.2x1.6x0.6mm 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
CSP-12(WLCSP-12(1.1x1.5))	Tape and Reel	DIO3402WL12	UXYW

## Features

- Pin-to-Pin MAX14743EWC, TS5USBC412, TS5USBC410, KTU1002AEVA, CSP-12(WLCSP-12(1.1x1.5))
- Supply Range 2.5 V to 5.5 V
- Differential 2:1 or 1:2 Switch/Multiplexer
- Up to DC 30V Overvoltage Protection (OVP) on D+/- Ports
- IEC 64000-4-5 Surge Protection w/o External TVS onto D+/- Ports: ±30V
- System Side Clamp Voltage Pulse Less than 9V, Duration Less than 200nS
- Powered Off Protection When VCC = 0 V
- Low RON of 10 Ω Typical
- Insertion loss: -1dB@200MHz, -2dB@650MHz, -3dB@1GHz
- CON 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



## Functions and Pin Configuration

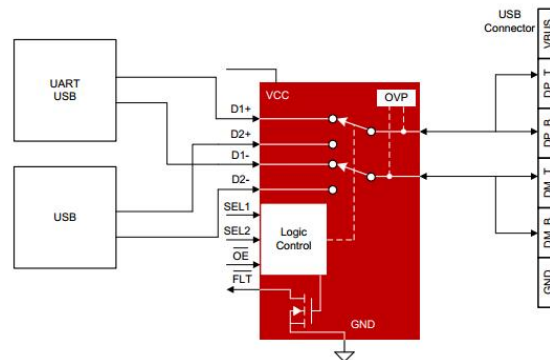


Fig.1 Functional Diagram

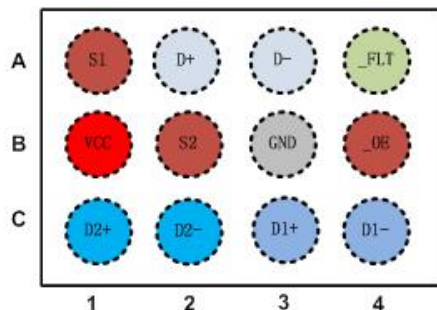


Fig.2 Top-Through View

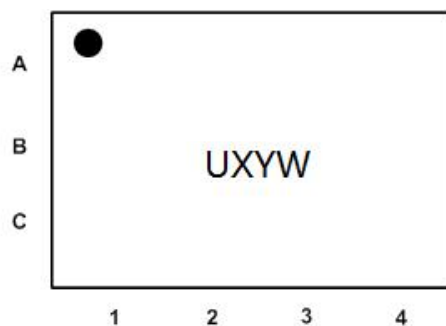
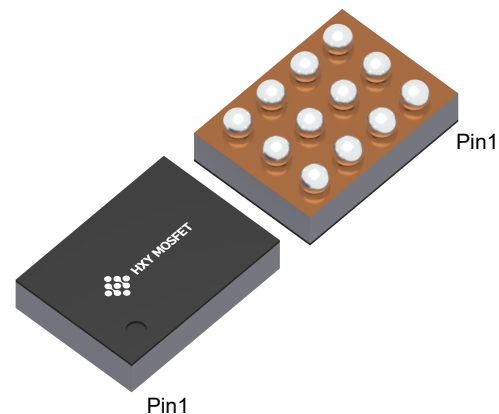


Fig.3 Top Side Marking View



CSP-12(WLCSP-12(1.1x1.5))

## Pin Descriptions

Pin	Name	Type	Description
A1	S1	I	Switch Select 1 (Active High)
A2	D+	I/O	Data switch input (Differential +)
A3	D-	I/O	Data switch input (Differential -)
A4	_FLT	O	Fault indicator output (Active Low) open drain
B1	VCC	PWR	Power Supply
B2	S2	I	Switch Select 2 (Active High)
B3	GND	GND	Ground
B4	_OE	I	Output Enable (Active Low)
C1	D2+	I/O	Data switch output 2 (Differential +)
C2	D2-	I/O	Data switch output 2 (Differential -)
C3	D1+	I/O	Data switch output 1 (Differential +)
C4	D1-	I/O	Data switch output 1 (Differential -)

Table-1 Pin Descriptions



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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power Supply						
Supply Voltage Range	V <sub>CC</sub>		2.5	3.3	5.5	V
Supply Current	I <sub>CC</sub>	_OE =1 disconnection		0.6	2	uA
		_OE =0 connection		33		uA
S1/S2/_OE Digital Input Contol						
control input logic high	V <sub>IH</sub>		1.6		5.5	V
control input logic low	V <sub>IL</sub>		-0.1		0.5	V
Internal pull-down resistor	R <sub>PD</sub>			2		MΩ
Switch On Resistance And Off Leakage						
On-Resistance	R <sub>ON</sub>	V <sub>IS</sub> = 0V~0.4V I <sub>OUT</sub> =8mA		10	11	Ω
R <sub>ON</sub> Flatness <sup>(1)</sup>	R <sub>FLAT</sub>	V <sub>IS</sub> = 0V~0.4V I <sub>OUT</sub> =8mA		0.3	0.5	Ω
R <sub>ON</sub> Matching Between Channels <sup>(2)</sup>	ΔR <sub>ON</sub>	V <sub>IS</sub> = 0V~0.4V I <sub>OUT</sub> =8mA		0.1	0.2	Ω
OFF Leakage Current	I <sub>LEAK</sub>	V <sub>D+/-</sub> = 10V V <sub>D1+/-</sub> = V <sub>D2+/-</sub> =0V		31	50	uA
Switch Dynamics						
On Capacitance	C <sub>ON</sub>	V <sub>D+/-</sub> = 0.2V, f = 1MHz		4		pF
Off Capacitance	C <sub>OFF</sub>	V <sub>D+/-</sub> = 0.2V, f = 1MHz		3		pF
Off Isolation	Off	f = 250MHz, R <sub>T</sub> = 50Ω, C <sub>L</sub> = 0pF		-38		dB
Crosstalk <sup>(3)</sup> (Channel-to-Channel)	X <sub>TALK</sub>	f = 250MHz, R <sub>T</sub> = 50Ω, C <sub>L</sub> = 0pF		-41		dB
-3dB Bandwidth	BW	R <sub>T</sub> =50Ω, C <sub>L</sub> =0pF Signal Power 0dBm	0.9	1		GHz
Break-Before-Make	BBM	V <sub>D1+/-</sub> =V <sub>D2+/-</sub> =0.4V, R <sub>L</sub> =50Ω		1.5		uS
Turn-on Time	t <sub>ON</sub>	V <sub>D+/-</sub> = 0.4V, R <sub>L</sub> =50Ω _OE switches from High to Low		20		uS
Turn-off Time	t <sub>OFF</sub>	V <sub>D+/-</sub> = 0.4V, R <sub>L</sub> =50Ω _OE switches from Low to High		1.2		uS
Propagation Delay	t <sub>PD</sub>	V <sub>D+/-</sub> = 0.4V, R <sub>L</sub> =50Ω		200		pS
Over Voltage Protection						
OVP Lockout Threshold	V <sub>OVP</sub>	V <sub>D+/-</sub> Rising Edge	4.6	4.9	5.2	V
OVP Hysteresis	V <sub>HYS</sub>	V <sub>D+/-</sub> Falling Edge		200		mV
Clamp Voltage on D1+/- and D2+/-	V <sub>CLAMP</sub>	10V shorts to D+/- with R <sub>L</sub> =1KΩ @ D1+/- and D2+/-		6.5	8	V
OVP Response Time	t <sub>FP</sub>	10V shorts to D+/- with R <sub>L</sub> =1KΩ @ D1+/- and D2+/-		200	300	nS
OVP Recovery Time	t <sub>FPR</sub>	V <sub>D+/-</sub> jumps from 6V to 1V step	30	45	60	uS

**Table-2 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 ( $T_a=25^{\circ}\text{C}$ , $V_{CC}=3.0\text{V}$ , $CAP=0.1\mu\text{F}$ , unless otherwise noted)

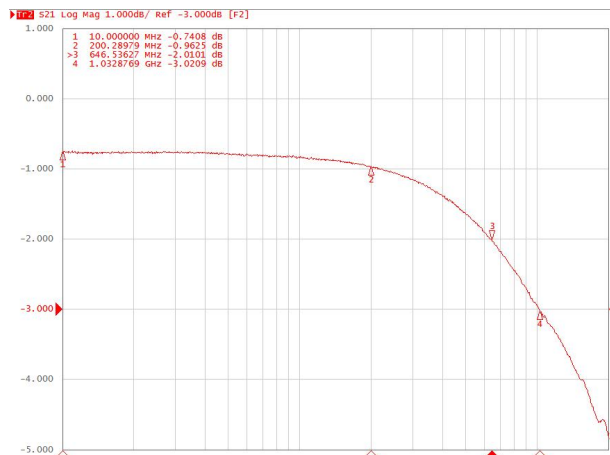


Fig.4 Switch Bandwidth or Insertion Loss

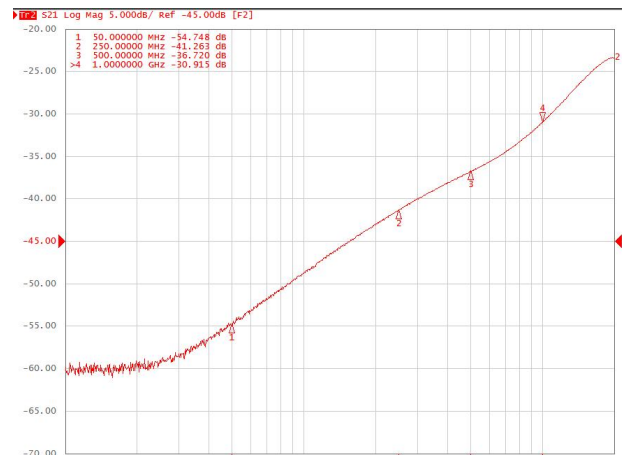


Fig.5 Switch Channel to Channel Cross-Talk

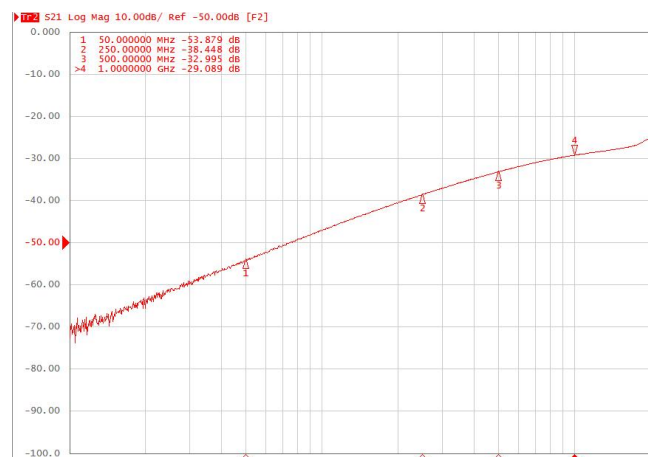


Fig.6 Switch Off Isolation



## Package Outline Dimensions

### CSP-12(WLCSP-12(1.1x1.5))

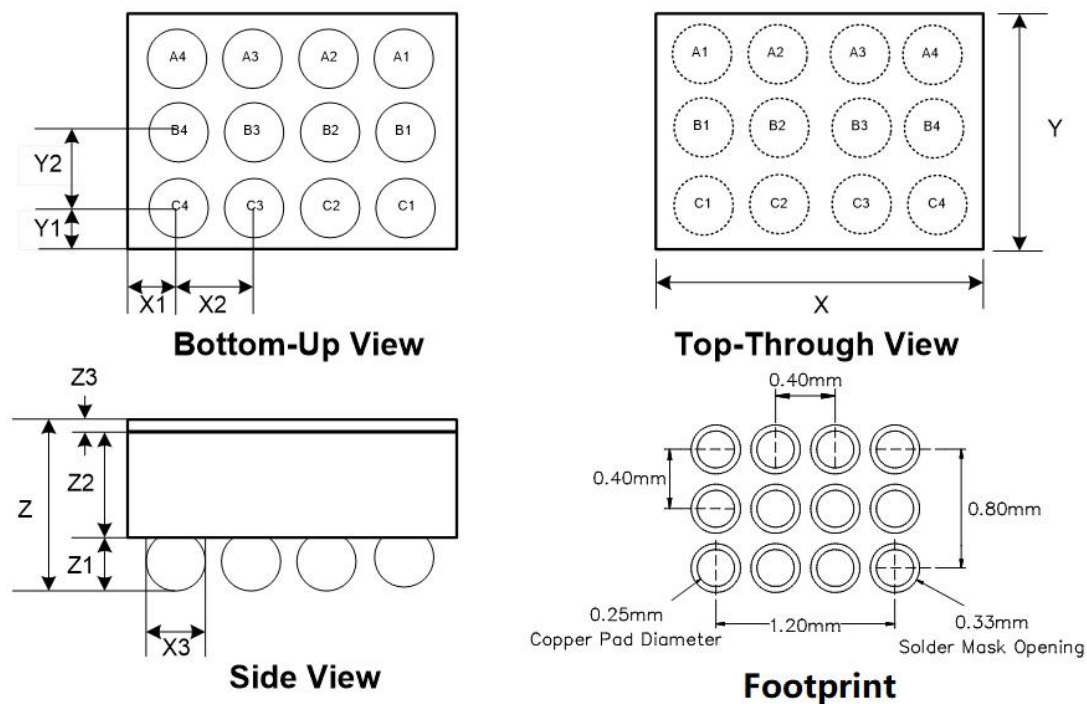


Fig-7 Package Outline Dimensions

Symbol	Dimensions In Millimeter		
	Min.	Typ.	Max.
X	1.58	1.6	1.62
Y	1.18	1.2	1.22
X1		0.20	
X2		0.40	
X3	0.21	0.23	0.25
Y1		0.20	
Y2		0.40	
Z	0.525	0.575	0.625
Z1	0.165	0.185	0.205
Z2	0.340	0.365	0.390
Z3	0.020	0.025	0.030



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