

For the customer use only

PI3EQX1204-BZHE miniSAS EVB User Guide

Introduction

The PI3EQX1204-B is a SAS3/10Gb Ethernet, 4 differential channels ReDriver. It provides 16 steps programmable equalization, 4 steps output swing, pre-shoot and de-emphasis by I2C control to optimize performance over a variety of physical mediums by reducing inter-symbol interference. The integrated equalization circuitry provides flexibility with signal integrity of the signal before the ReDriver, whereas the integrated de-emphasis and pre-shoot circuitry provides flexibility with signal integrity of the signal after the ReDriver.

This user guide describes how to use PI3EQX1204-BZHE miniSAS EVB in the system.

Figure1 shows top view and bottom view of PI3EQX1204-BZHE miniSAS EVB.

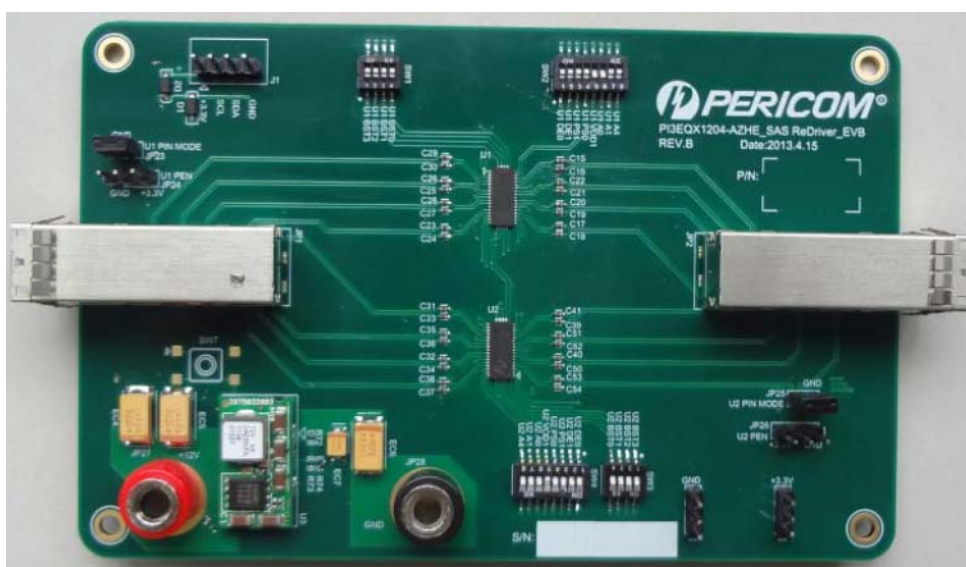


Figure1a. TOP view of PI3EQX1204-BZHE miniSAS EVB

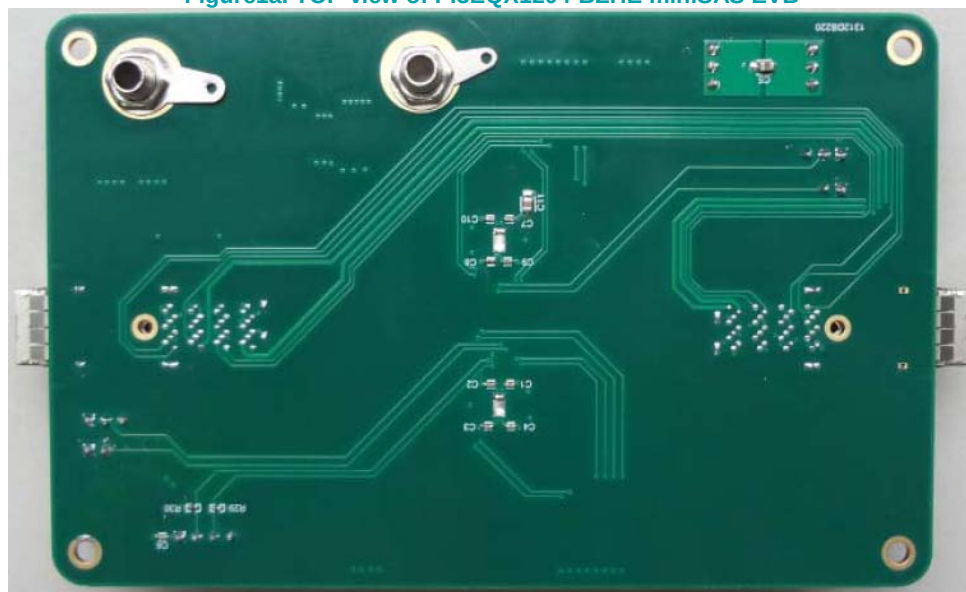


Figure1b. Bottom view of PI3EQX1204-BZHE miniSAS EVB

Board Operation

● Logical Block Diagram

Figure2 shows the logical block diagram of PI3EQX1204-BZHE.

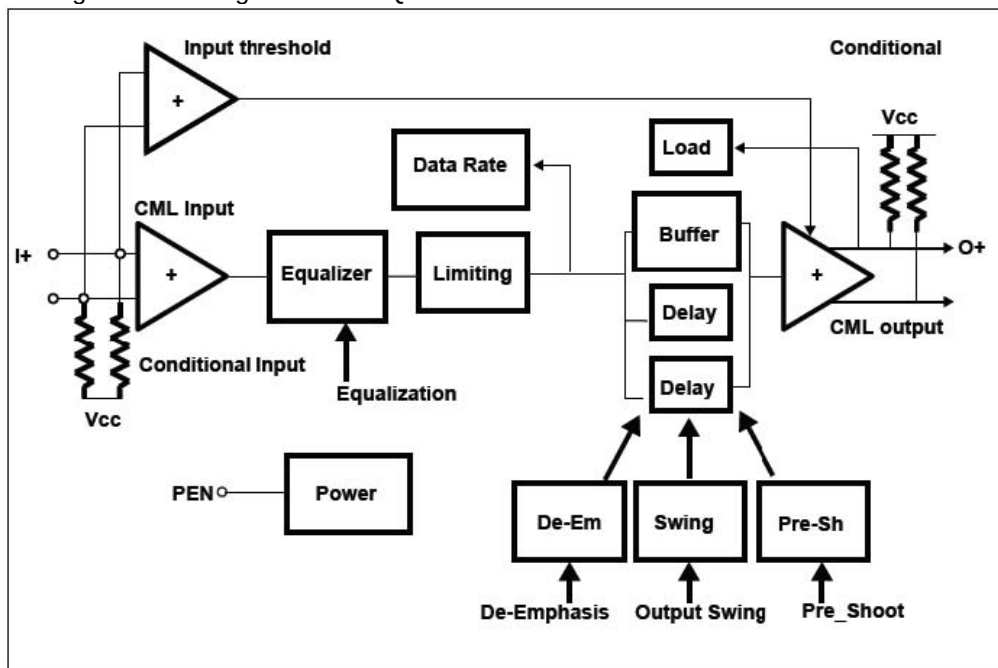


Figure2. Logical Block Diagram of PI3EQX1204-BZHE

● Board Setting and Operation

1) Power Supply

On the EV board, there are two ways for the power supply below.

1. From two 3-Pin headers (**JP21 as 3.3V input, JP22 as ground**). For this 3.3V current, it must be keep 1A capability for EVB.
2. From two Banana Jacks (**JP27 (RED) as 12V input, JP28 (Black) as ground**). For this 12V current, it must be keep 800mA capability for EVB.

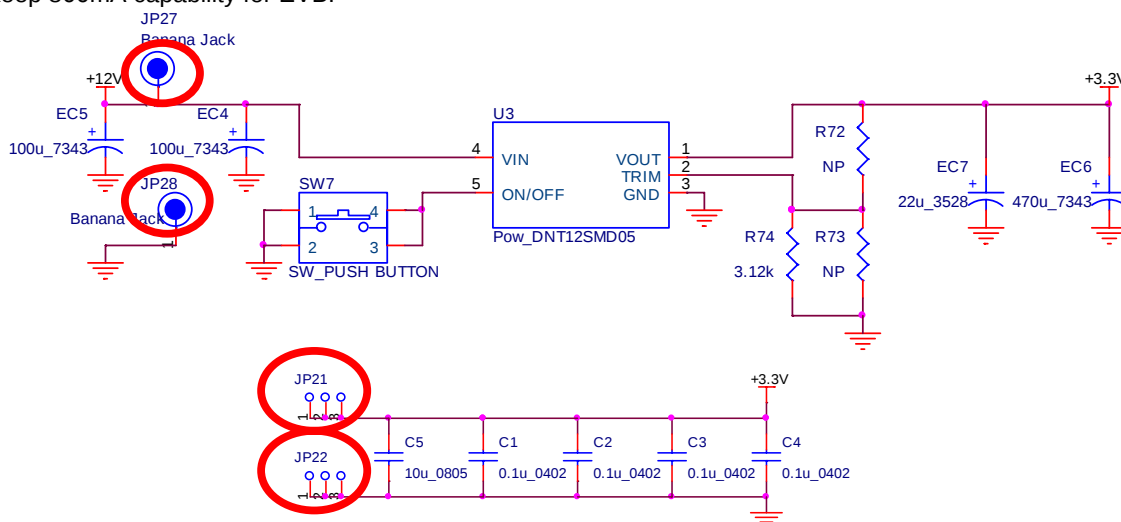


Figure3. Power Circuit for PI3EQX1204-BZHE miniSAS EVB

Figure4 shows the power supply input locations on EVB.



Figure4. Power Supply Input Location on PI3EQX1204-BZHE miniSAS EVB

2) Configuration Control

PI3EQX1204-BZHE provides I2C configuration control and Pin control depending on the state of the Pin_MODE pin input. This EV board has two PI3EQX1204-BZHE parts, one (U1) for TX side from host to device, another (U2) for RX side from device to host. When Pin_Mode is set to **high** or **Open**, each channel is programmed by the external pin voltage level. When Pin_Mode is set to **low**, each channel is programmed by the data stored in the I2C bus. In EV board, the PIN_mode pins of U1 and U2 are connected to JP23 and JP25 in Figure5.

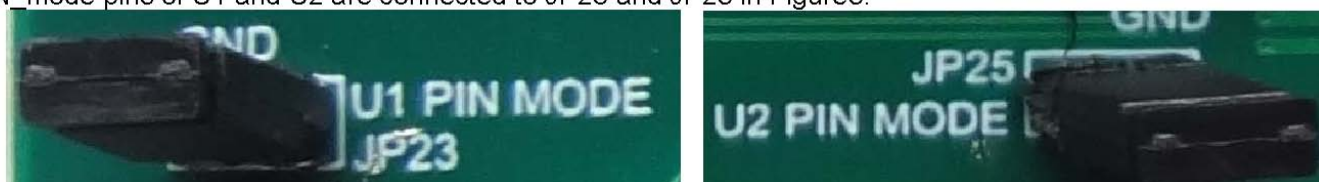


Figure5. PIN_MODE Location on PI3EQX1204-BZHE miniSAS EVB

In PI3EQX1204-BZHE EVB, the DEFAULT is I2C configuration control. So JP23 and JP25 are shorted to ground. And also the I2C address was set to C0 for U1 and C2 for U2.

NOTE: there are 3 pins for I2C address, A0/A1/A4. And the address assignment is below, so the user can get total 8 addresses for 8 different ReDrivers.

Address assignment							
A6	A5	A4	A3	A2	A1	A0	R/W
1	1	Program	0	0	Program	Program	1=R, 0=W

Table1, the relations between address pins and I2C address

Address Pin			I2C address	ReDriver No.
A4	A1	A0		
L	L	L	0xC0	1
L	L	H	0xC2	2
L	H	L	0xC4	3
L	H	H	0xC6	4
H	L	L	0xE0	5
H	L	H	0xE2	6
H	H	L	0xE4	7
H	H	H	0xE6	8

For the customer use only

Figure6 is control pin location on EVB.

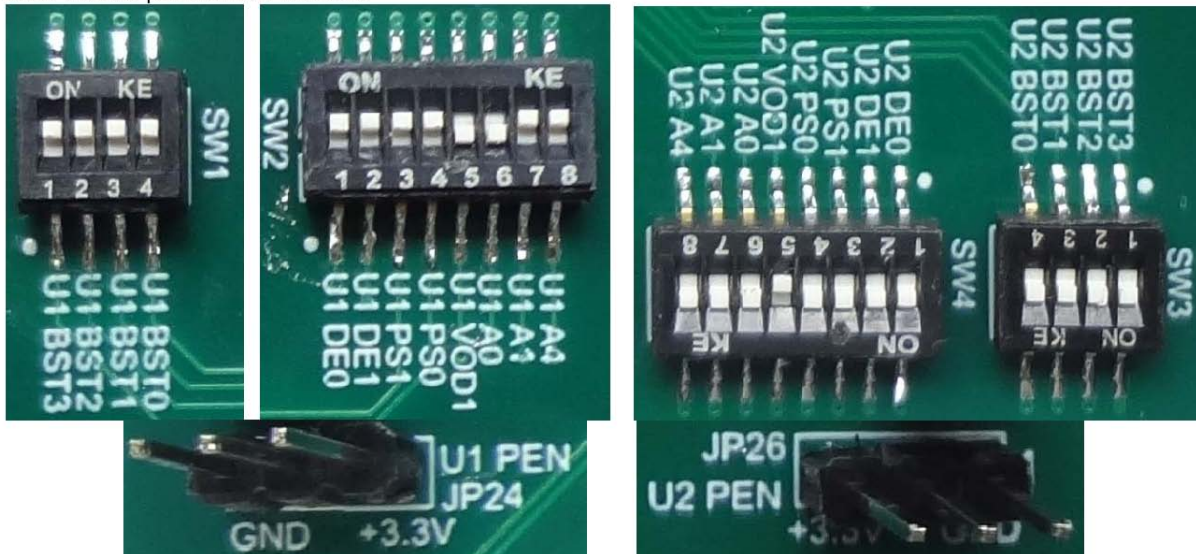


Figure6. Configuration Pins Location on PI3EQX1204-BZHE miniSAS EVB

Below are configuration tables for equalization, de-emphasis, Pre-shoot and swing control setting.

Equalization Setting

BST[0:3] are the selection pins for the equalization selection for each direction in Table1 below. It is available for pin configuration and I2C configuration control.

Equalizer setting							
BST3	BST2	BST1	BST0	@ 8GHz	@ 6.5GHz	@ 4GHz	@ 2.5GHz
0	0	0	0	0.7 dB	0.64 dB	0.4 dB	0.2 dB
0	0	0	1	2.4 dB	2.0 dB	1.1 dB	0.6 dB
0	0	1	0	3.3 dB	2.7 dB	1.6 dB	0.8 dB
0	0	1	1	5.7 dB	4.9 dB	3.1 dB	1.8 dB
0	1	0	0	8.8 dB	7.8 dB	5.4 dB	3.3 dB
0	1	0	1	13.0 dB	11.8 dB	8.9 dB	6.1 dB
0	1	1	0	15.0 dB	13.8 dB	10.8 dB	7.8 dB
0	1	1	1	16.6 dB	15.4 dB	12.2 dB	9.1 dB
1	0	0	0	18.3 dB	17.1 dB	13.8 dB	10.6 dB
1	0	0	1	20.3 dB	19.0 dB	15.8 dB	12.6 dB
1	0	1	0	21.8 dB	20.6 dB	17.3 dB	14.0 dB
1	0	1	1	23.5 dB	22.2 dB	19.0 dB	15.6 dB
1	1	0	0	24.7 dB	23.4 dB	20.0 dB	16.5 dB
1	1	0	1	26.1 dB	24.7 dB	21.3 dB	17.8 dB
1	1	1	0	27.4 dB	26.0 dB	22.6 dB	19.1 dB
1	1	1	1	28.8 dB	27.6 dB	24.3 dB	20.8 dB

Table2. Equalizer Configuration Selection Table for PI3EQX1204-BZHE

For the customer use only

De-emphasis Setting:

DE[0:1]_A/B are the selection bits for the de-emphasis value in Table3 below. It is available for pin configuration and I2C configuration control.

Output de-emphasis setting		
DE1	DE0	@ VOD[0:1]=00
0	0	0db
0	1	3.5db
1	0	6db
1	1	9.5db

Table3. De-emphasis Configuration Selection Table for PI3EQX1204-BZHE

Pre-shoot Setting:

PS[0:1]_A/B are the selection bits for the pre-shoot value in Table4 below. It is available for pin configuration and I2C configuration control. Values of 6db can only be selected when de-emphasis is set for 0 or 3.5db. 3.5db can only be

Output pre-shoot setting		
PS1	PS0	@ VOD[0:1]=00
0	0	0db
0	1	2db
1	0	3.5db
1	1	6db

Table4. Pre-shoot Configuration Selection Table for PI3EQX1204-BZHE

Swing Setting:

VOD[0:1]_A/B are the selections for the output swing value in Table5 below. It is only available for I2C configuration

Output Swing Setting @ VOD[0:1]		
VOD1	VOD0	Swing
0	0	0.8Vppd
0	1	0.95Vppd
1	0	1.15Vppd
1	1	1.3Vppd

Table5. Swing Configuration Selection Table for PI3EQX1204-BZHE

Part Enable Setting:

PEN pin is for disable or enabling the PI3EQX1204-A part when necessary. In default, it is OPEN for normally operation.

3) I2C Configuration Function

For detail I2C configuration function please refer to Page6-9 on the datasheet. There is one connector-**J1** as Figure7 on the EV board for I2C connection.



Figure7. I2C Pins Location on PI3EQX1204-AZHE miniSAS EVB

For the customer use only

Below is I2C configuration data format sample based on this EVB default setting for the reference.

Msg #	Address	R/W	Message Data Bytes	Stop	Delay (msec)
3	C0	W	00,00,F0,00,00,55,00,00,F0,00,00,00,00,00,00,00,	Y	0
2	C0	R	00,00,F0,00,00,55,00,00,F0,00,00,00,00,00,00,00,	Y	0
4	C2	W	00,00,F0,00,00,55,00,00,F0,00,00,00,00,00,00,00,	Y	0
1	C2	R	00,00,F0,00,00,55,00,00,F0,00,00,00,00,00,00,00,	Y	0

Figure8 is WRITE sequence.

Write Sequence

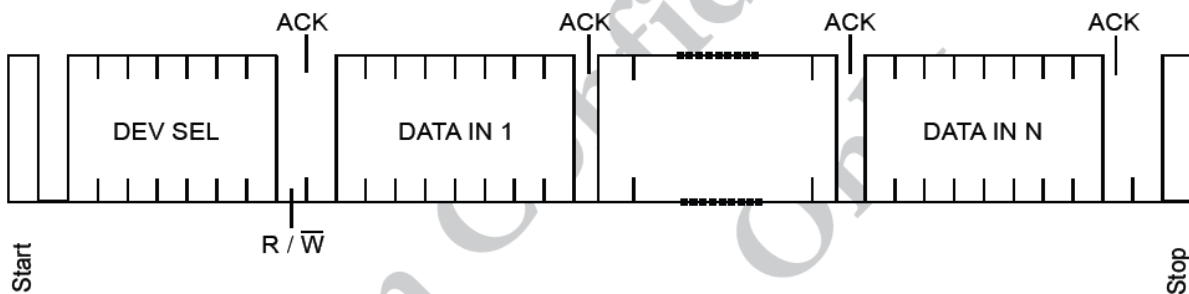


Figure8 I2C WRITE Sequence Diagram

Figure9 is one sample for write sequence. (0xC0, 00,00,F0,00,00,AA,00,55,F0,00,00,00,00,00,00)

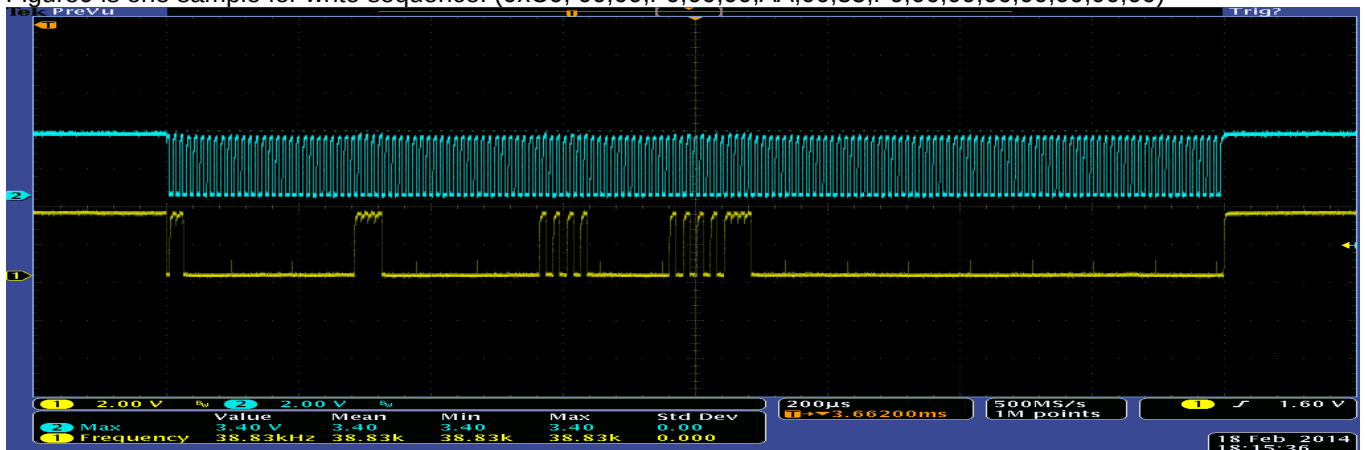


Figure9 I2C WRITE Sequence Sample

Figure10 is READ sequence.

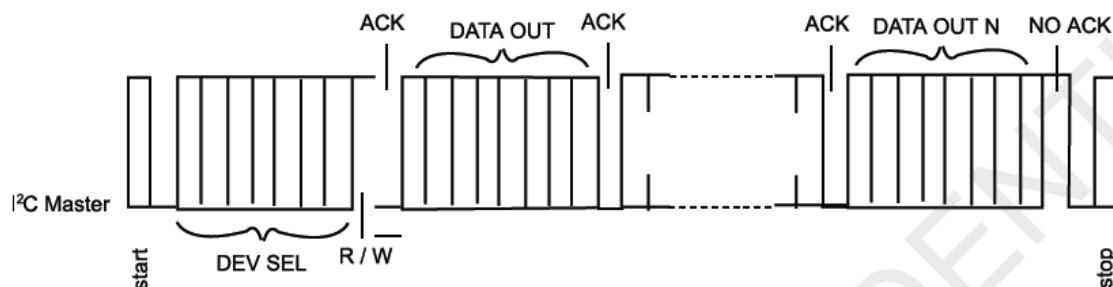


Figure10 I2C READ Sequence Diagram

For the customer use only

Figure11 is one sample for read sequence. (0xC0, 00,00,F0,00,00,AA,00,55,F0,00,00,00,00,00,00)

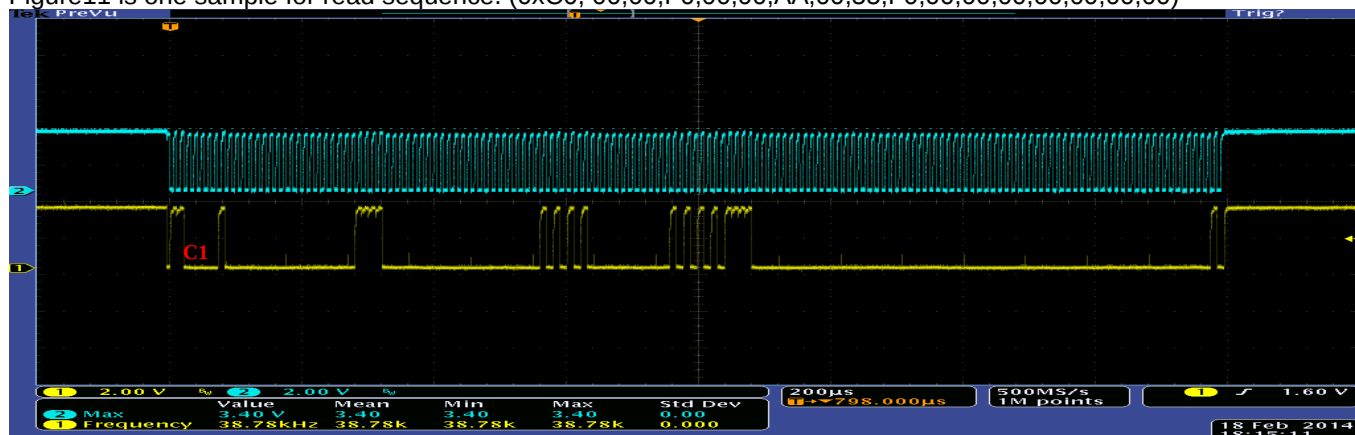


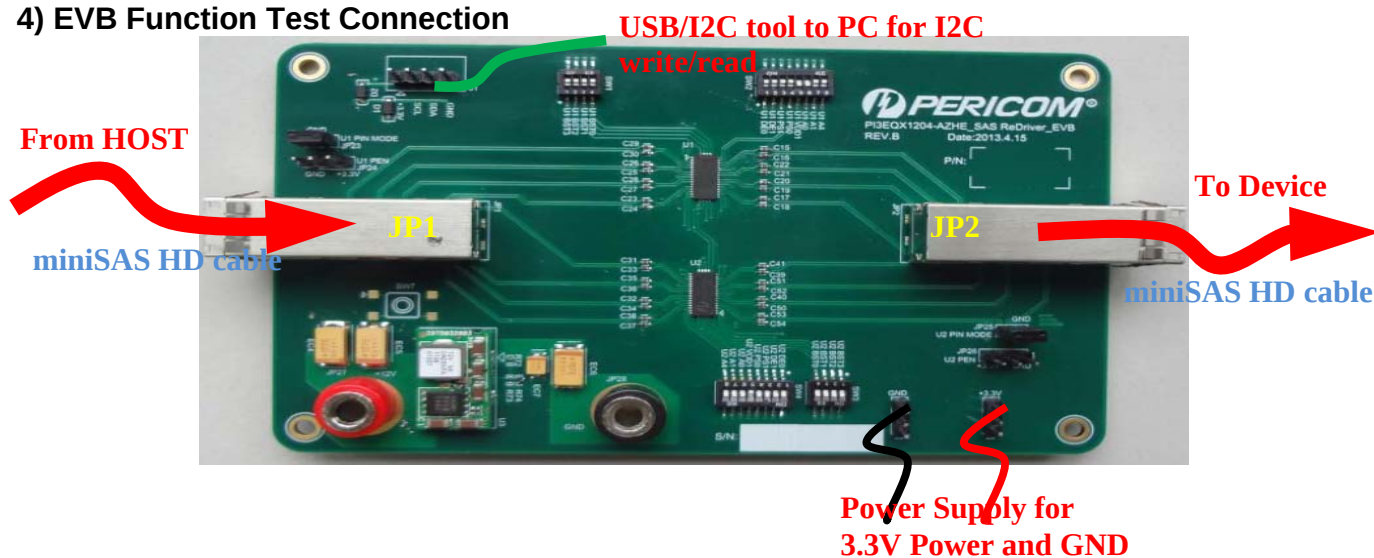
Figure11 I2C READ Sequence Sample

Table6 is the relations between miniSAS ports and lanes of PI3EQX1204-BZHE on EVB.

MiniSAS Port	Pin Name at CONN JP1	Lane of PI3EQX1204-BZHE	Pin Name at CONN JP2
Port0	RX0	U1_A3	TX0
	TX0	U2_A3	RX0
Port1	RX1	U1_A1	TX1
	TX1	U2_A1	RX1
Port2	RX2	U1_A2	TX2
	TX2	U2_A2	RX2
Port3	RX3	U1_A0	TX3
	TX3	U2_A0	RX3

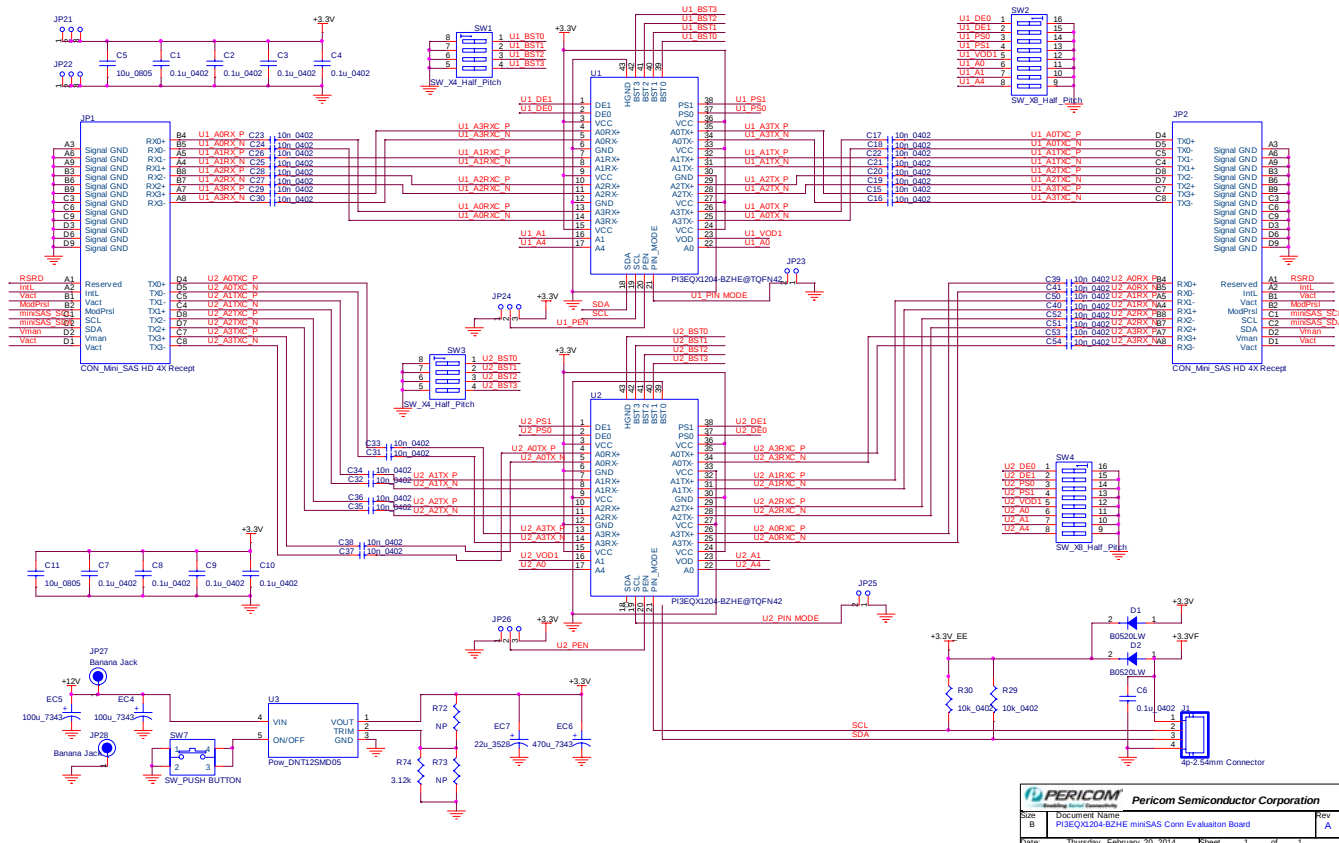
Table6. Relations between miniSAS ports and lanes of PI3EQX1204-BZHE

4) EVB Function Test Connection



For the customer use only

Appendix A: PCB Schematic



Appendix B: PCB Stack-up

Unit: mil			
Layer #	Plane	Material Type	ReferThickness
	Solder Mask		0.4
Layer 1/2	Signal/GND	RO4350	21
	Prepreg	Prepreg 2116 Prepreg 7628 Prepreg 2116	16.26
Layer 3/4	Power/Signal	RO4350	21
	Solder Mask		0.4

For the customer use only

History

Version 1.0

Original Version

2014/2/11