

PI2EQX6812ZHE PI2EQX6812ZHE Evaluation Board Rev.A User Guide Jun.16, 2011

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Introduction

PI2EQX6812ZHE Evaluation Board has been designed to allow convenient testing of its operation and features. This board can work with readily available SATA and eSATA cables for easy connection to SATA3.0 HDD, SSD, OMD storage components and PC system hosts.

This board allows the PI2EQX6812ZHE device to be powered in +1.2V directly from external power, or 5V with a mini-USB connector provided to convert.

This User Guide describes the setup, configuration and operation of PI2EQX6812ZHE Eval Board Rev.A. Figure1 provides a top view of PI2EQX6812ZHE Eval Board Rev.A, and Figure2 is bottom view of the board.

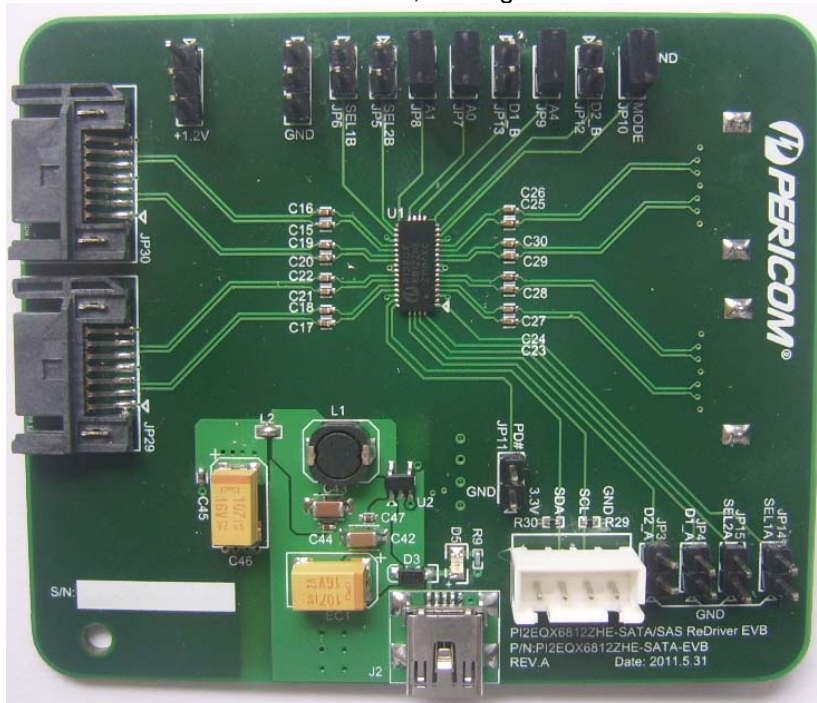


Figure1. Top view of PI2EQX6812ZHE Eval board Rev.A

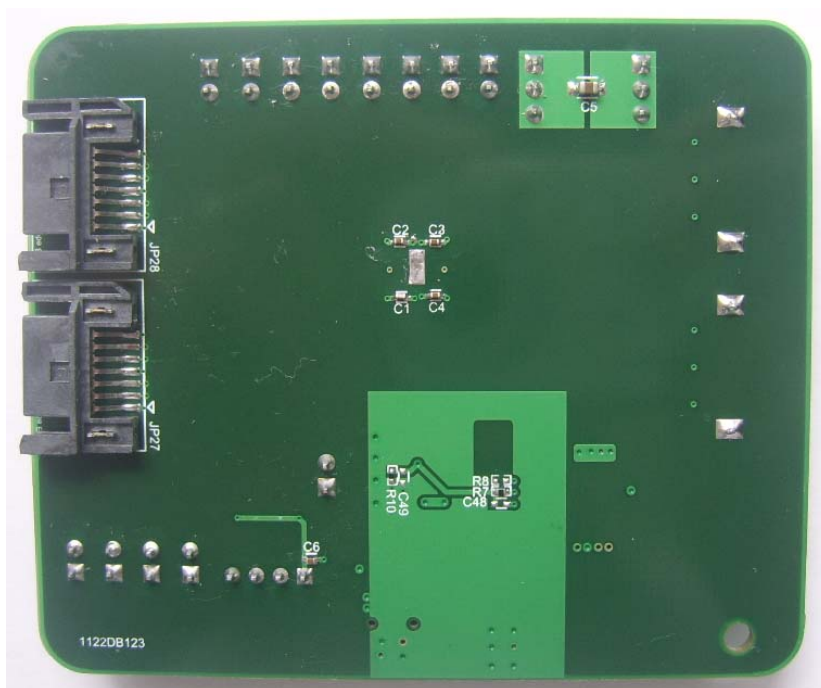


Figure2. Bottom view of PI2EQX6812ZHE Eval board Rev.A

Board Operation

PI2EQX6812ZHE is a 2-port (4-channel), bi-directional, signal SATA3.0 re-driver to provide indication when the load is connected to HOST or Device. Figure3 shows the logical block diagram of PI2EQX6812ZHE. Four channels of the PI2EQX6812ZHE are fully independent in operation and configuration by I2C function. Either SATA data connector can be connected to either the host controllers or target disk drive interchangeably. Channel configuration of output pre-emphasis, output swing and input equalization must be set appropriately to match the attached cable/trace length and type.

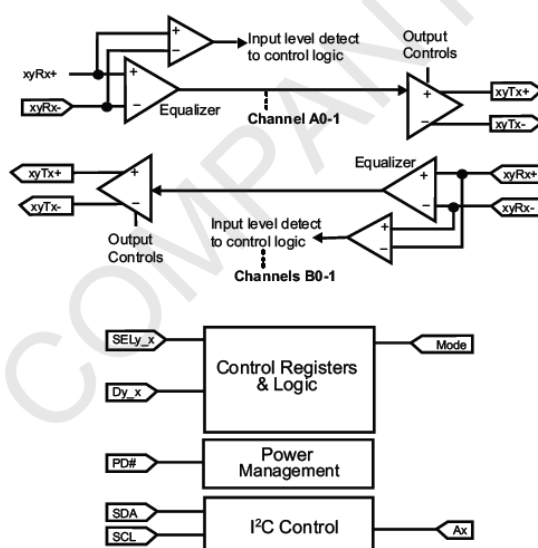


Figure3. Logical Block Diagram of PI2EQX6812ZHE

● Power Options

The PI2EQX6812ZHE Evaluation Board provides the options for supplying +1.2V directly or +5V power from mini-USB connector. Figure 4 circles the important connections.

- 1) Using the +5V power supplied by miniUSB connector (**J2**). The on-board DC-DC converts the voltage +5V to +1.2V.
- 2) Using +1.2V power input directly by **JP24** power pin header and **JP25** ground pin header. When using this source, note that **L2** must be removed.
- 3) For PI2EQX6812ZHE power supply, the evaluation board is shipped from the factory with **+5V default** from miniUSB port.

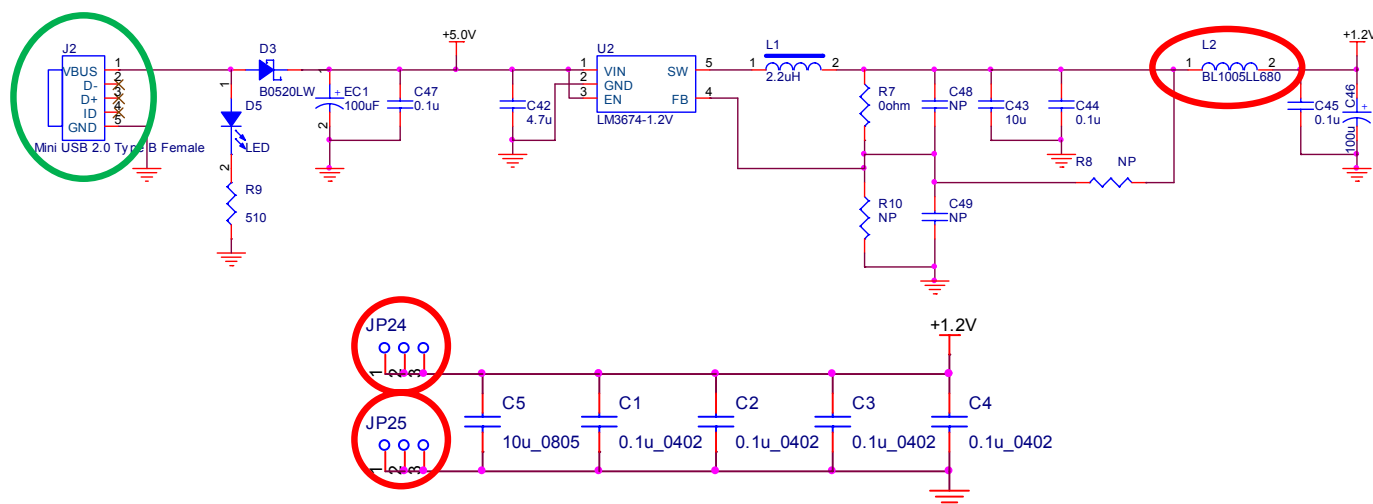


Figure4. Power supply of PI2EQX6812ZHE

● Device Configuration

The PI2EQX6812ZHE ReDriver supports De-emphasis, swing adjustment and input equalization for optimum operation and signal margins.

PI2EQX6812 provides two ways configuration controls depending on the state of the MODE pin with 100k pull-up resistor internally.

- ◆ When MODE is set to HIGH (JP10 open), the configuration input pins set the configuration operating state and changes to these control pins will change the operating mode. For pin configurations, there are some configuration values to be selected only.
- ◆ When MODE pin is set to LOW (JP10 shorted), reprogramming of these control registers via I2C is allowed. For I2C configurations, all the configuration values can be used by I2C.

NOTE that the MODE pin is not latched and is always active to enable or disable I2C access. And it is default setting on EVB by JP10 shorted to GND.

During initial power-on, the value at the configuration input pins: PD#, SEL1_A, SEL2_A, D1_A, D2_A, SEL1_B, SEL2_B, D1_B, D2_B, will be latched to the configuration registers as initial startup states. All these pins have internal 100K pull-up resistor.

1) Pin Configurations

The location of pin configuration jumpers is shown in Figure5. Configuration begins with MODE pin as **JP10**, which must be open for normal operation. The PD# pin of the PI2EQX6812ZHE has an internal 100K pull-up resistor to define a high level default (**JP11** Open) for normal operation.

When PD# pin is shorted to GND (**JP11** is shorted), device operation is disabled. This is useful for checking PI2EQX6812ZHE disabled-state power consumption.

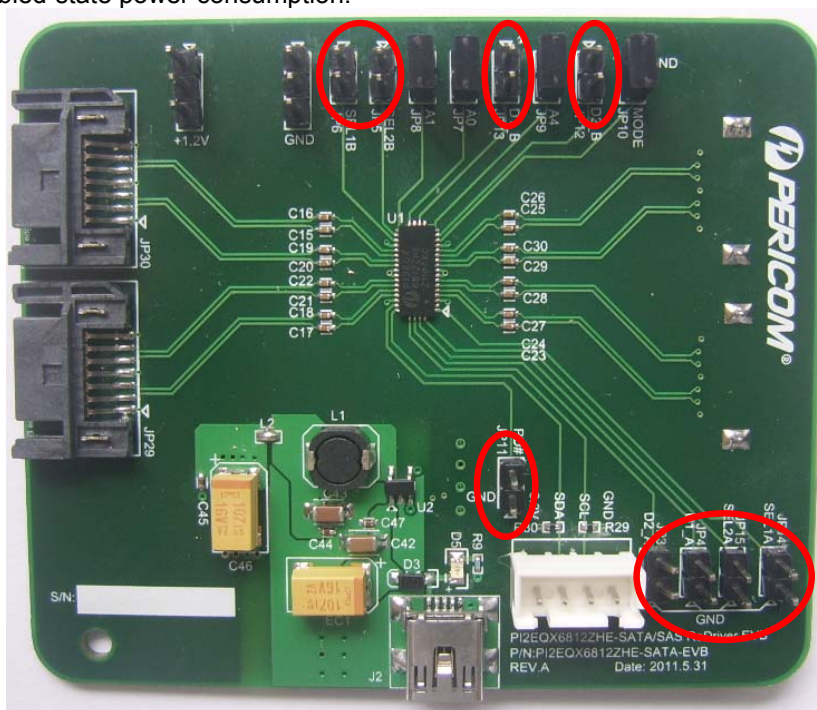


Figure5. Configuration Jumpers location on EVB

◆ Input Equalizer Setting

Input equalizer setting has only SEL2_[A:B] and SEL1_[A:B] pin configuration by JP5&6 and JP14&15. So it is available 4 values in **Blue** color in Table1 below. Note that Jumper is shorted for 0, Jumper is open for 1.

SEL2_[A:B]	SEL1_[A:B]	SEL0_[A:B]	@1.5GHz	@3.0GHz	Available thru Pins
0	0	0	0.8dB	1.5dB	
0	0	1	1.0dB	1.9dB	✓
0	1	0	1.5dB	3.2dB	
0	1	1	2.5dB	5.2dB	✓
1	0	0	3.5dB	6.9dB	
1	0	1	4.4dB	8.3dB	✓
1	1	0	5.9dB	10.4dB	
1	1	1	8.7dB	13.8dB	✓

Table1. Input Equalizer Setting Values

◆ Output De-emphasis Setting

Output De-emphasis setting has both D2_ [A:B] and D1_ [A:B] pin configuration by JP3&4 and JP13&14. Table2 is selectable setting values. Note that Jumper is shorted for 0, Jumper is open for 1.

D2_ [A:B]	D1_ [A:B]	De-emphasis
0	0	2.5dB
0	1	4.5dB
1	0	6.5dB
1	1	8.5dB

Table2. Output De-emphasis Setting Values

◆ Output Swing Setting

There is no pin configuration for output swing setting, so its value is 1.1V default only.

◆ Input Threshold Setting

There is no pin configuration for input threshold setting, so its value is 120mVppd default only.

◆ Output De-emphasis Width Setting

There is no pin configuration for input threshold setting, so its value is half-bit default only.

2) I2C Configuration

Mode pin (**JP10**) is shorted to GND on EVB, so I2C configuration is default for all the setting. And A4 (JP9), A1 (JP8), and A0 (JP7) pins with internal pull-up resistor are also shorted to GND as default I2C address-**C0**. Figure6 is their locations on EVB and I2C interface connector definition and location.

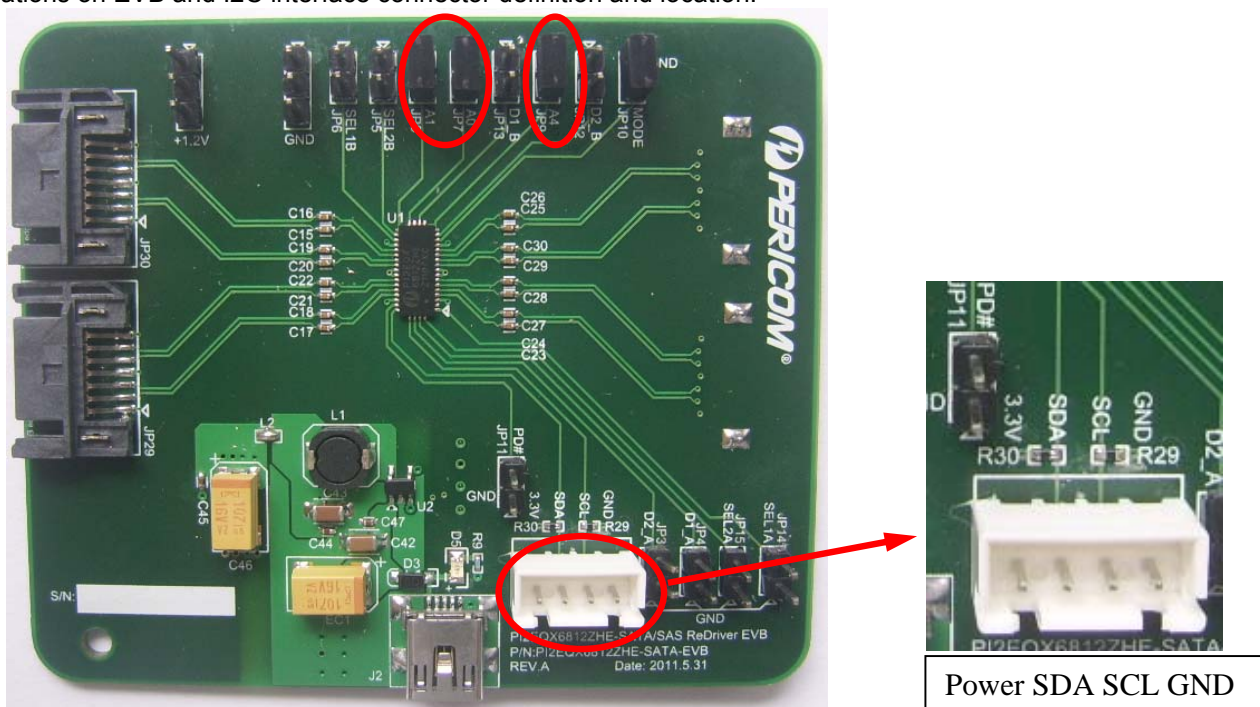


Figure6. I2C address Pins Jumper and Interface location

For PI2EQX6812ZHE's I2C interface, it is compliant with 3.3V power. Figure7 is read/write waveform sample at the register value below for the reference.

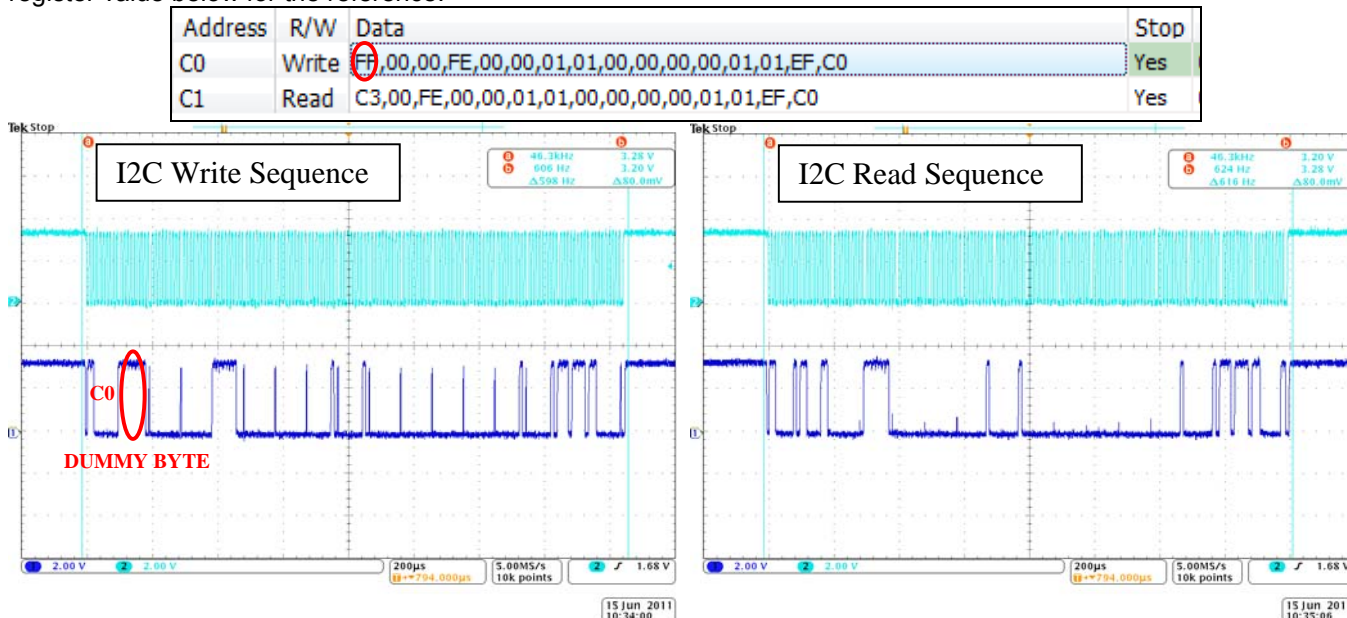


Figure7. I2C Write/Read Waveform Sample

NOTE that there is one dummy byte in Write Sequence.

For detail I2C register description, please refer to **Page7-10** in datasheet.

3) Board Connection

Figure8 is board connections for the reference.

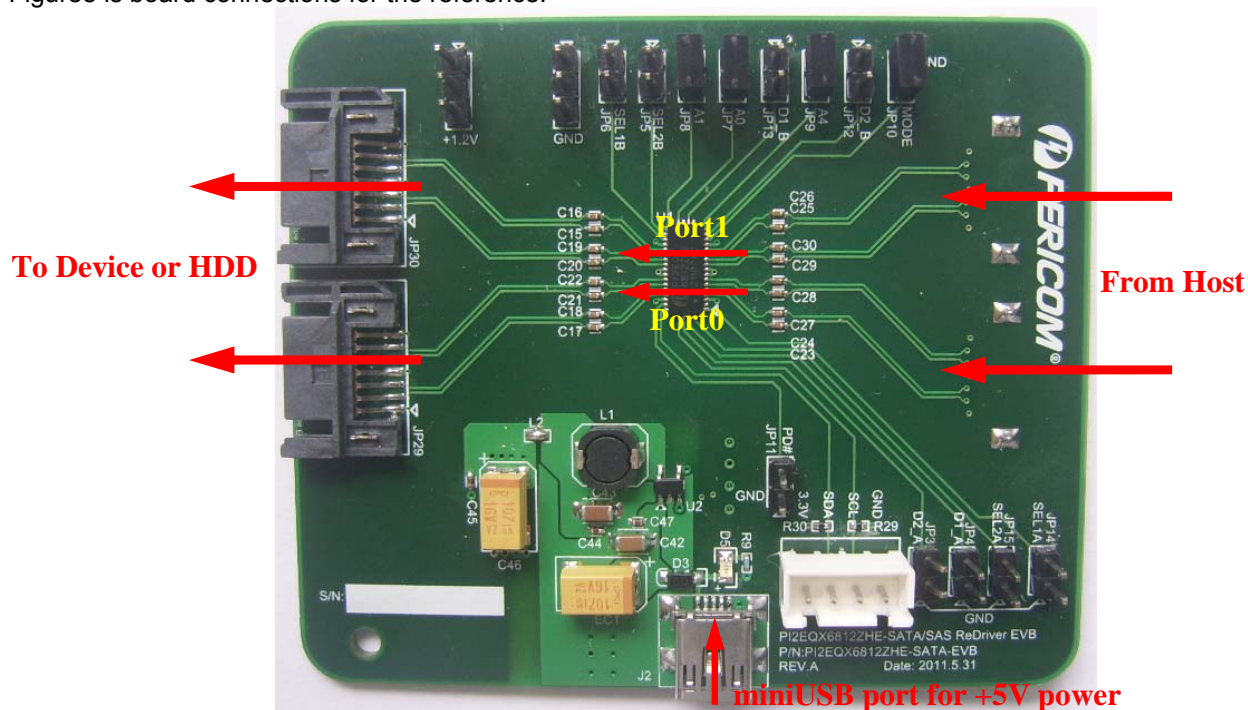


Figure8. Board Connection

● System Connection

The diagrams below show some example system test setups with the PI2EQX6812ZHE Eval Board.

Figure9 shows the connection using a NB PC and eSATA Express Card. Note that many notebooks PCs already offer an eSATA port which can be used as the test signal source without the add-in card.

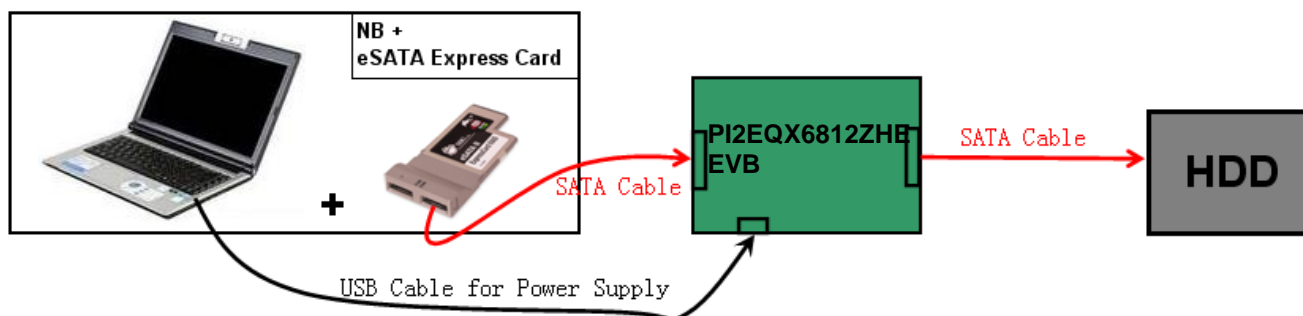


Figure9. eHDD connection Test Setup using NB+eSATA Express Card with PI2EQX6812ZHE Eval Board

Figure10 shows the connection using Intel MB

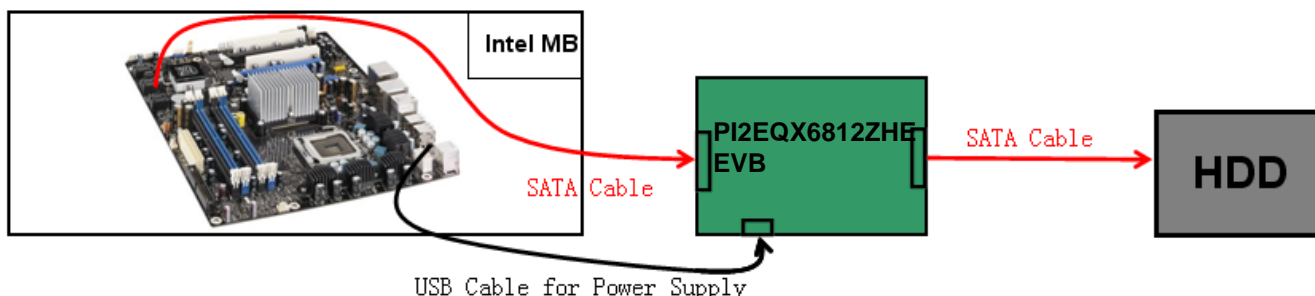


Figure10. internal HDD connection Test Setup using Intel MB with PI2EQX6812ZHE Eval Board

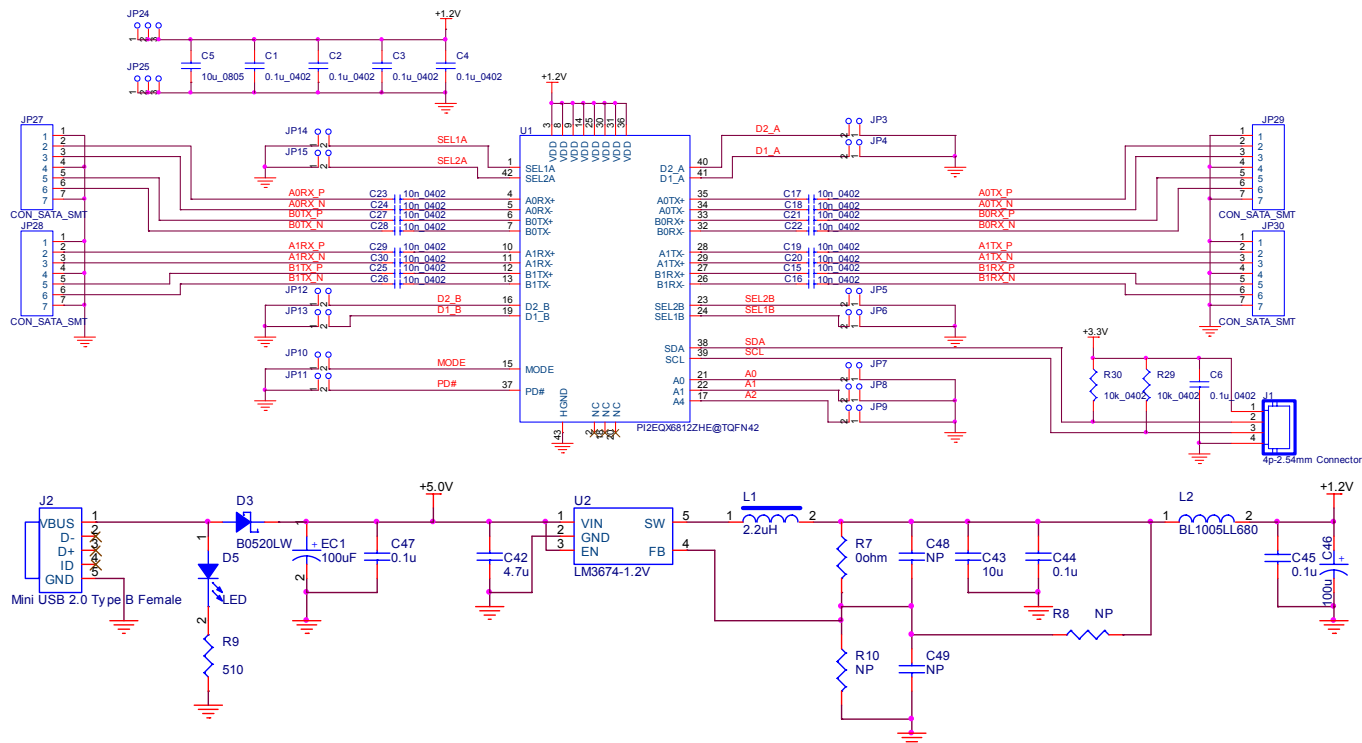
● Power-on Sequence

It is recommended as good practice, that all system components be powered off while connections and configuration settings are made. There is no specific power-on sequence required when applying power to the PI2EQX6812ZHE Eval Board. When connected to the system and powered by USB as shown above, then all devices will power-up together.

If the host PC and/or HDD are powered on, while the Eval Board is off, there will be no damage to the PI2EQX6812ZHE under typical conditions. If the Eval Board is then powered on, the system will generally detect the SATA HDD as a hot-plug event, and the HDD will begin to operate properly. Note that some PC systems offer BIOS control over hot plug events, and if the HDD is not recognized, this BIOS setting is the most likely cause and should be changed. When connecting to the system as shown above, all devices will power on together and avoid this BIOS issue.

Board Design Information

● PCB Schematic



● PCB Layout Reference

a. Stack Up:

Layer #	Plane	Material type	mil
	Solder Mask		0.4
Layer 1	Signal		1.9
	Prepreg	Prepreg 1080 Prepreg 2116	7.3
Layer 2	Gnd		1.2
	Core		44
Layer 3	Power		1.2
	Prepreg	Prepreg 2116 Prepreg 1080	7.3
Layer 4	Signal		1.9
	Solder Mask		0.4

b. Isolation Spacing = 30 mil

c. Width & Spacing (W/S) of 100Ω Differential Trace = 10 / 9 mil

● PCB BOM List

Reference	Description	Package	Qty
U2	LM3674-1.2V	SOT23-5	1
U1	PI2EQX6812ZHE@TQFN42	TQFN42	1
D5	LED	0805	1
JP27,JP28,JP29,JP30	SATA L-type connector	L-type	4
J1	4p-2.54mm Connector	2.54mm	1
J2	miniUSB connector	B-type	1
JP3,JP4,JP5,JP6,JP7,JP8, JP9,JP10,JP11,JP12,JP13, JP14,JP15	2PIN HEADER	2.54mm	13
JP24,JP25	3PIN HEADER	2.54mm	2
C15,C16,C17,C18,C19,C20, C21,C22,C23,C24,C25,C26, C27,C28,C29,C30	Ceramic Capacitor, 10nF	0402	16
C1,C2,C3,C4,C6,C44,C45,C47	Ceramic Capacitor, 0.1uF	0402	7
C46, EC1	Tan cap, 100u	7343	2
C43	Ceramic Capacitor, 10u	1206	1
C42	Ceramic Capacitor, 4.7u	1206	1
C5	Ceramic Capacitor, 10u	0805	2
D3	B0520LW	1206	1
L1	2.2uH Inductor		1
L2	BL1005LL680 Inductor		1
R9	Chip Resistor, 510ohm	0402	1
R29,R30	Chip Resistor, 10Kohm	0402	2
R7	Chip Resistor, 0ohm	0402	1

History

Version 1.0

Original Version

June 16, 2011