PI3EQX6801ZDE

PI3EQX6801ZDE Evaluation Board Rev.A User Guide
Nov. 11, 2011

Contents

Introduction

The PI3EQX6801ZDE Evaluation Board has been designed to allow convenient testing of the operation and features of Pericom's PI3EQX6801ZDE SATA ReDriver. This board is designed to 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 PI3EQX6801ZDE device to be powered in either +1.5V, or 3.3V with an on-board regulator provided or directly from external power.

This User Guide describes the setup, configuration and operation of PI3EQX6801ZDE Eval Board Rev.A. Figure1 provides a top view of PI3EQX6801ZDE Eval Board Rev.A, and Figure2 is bottom view of the board.
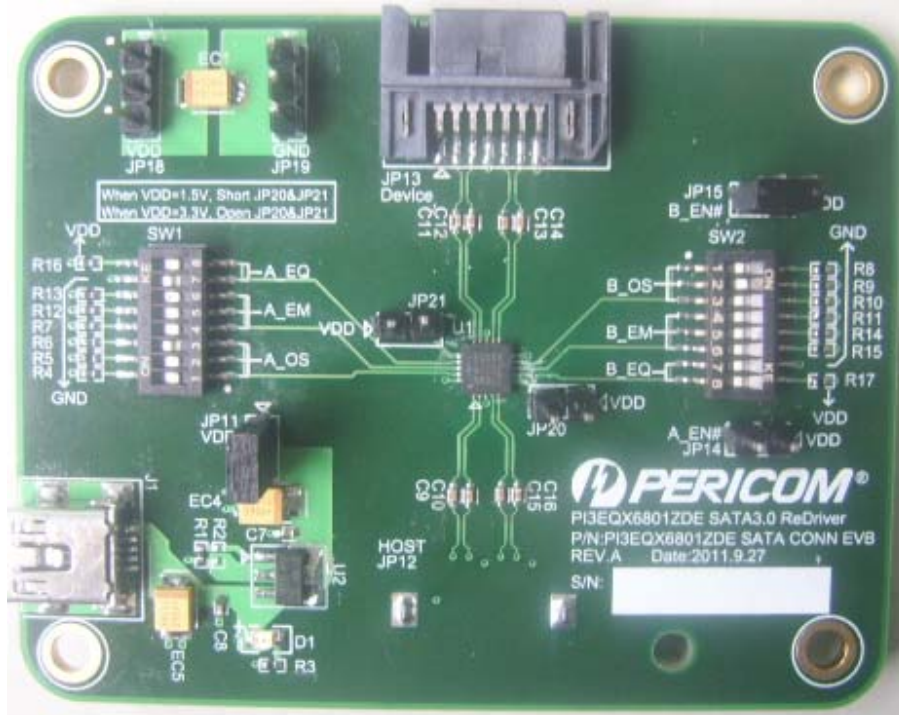

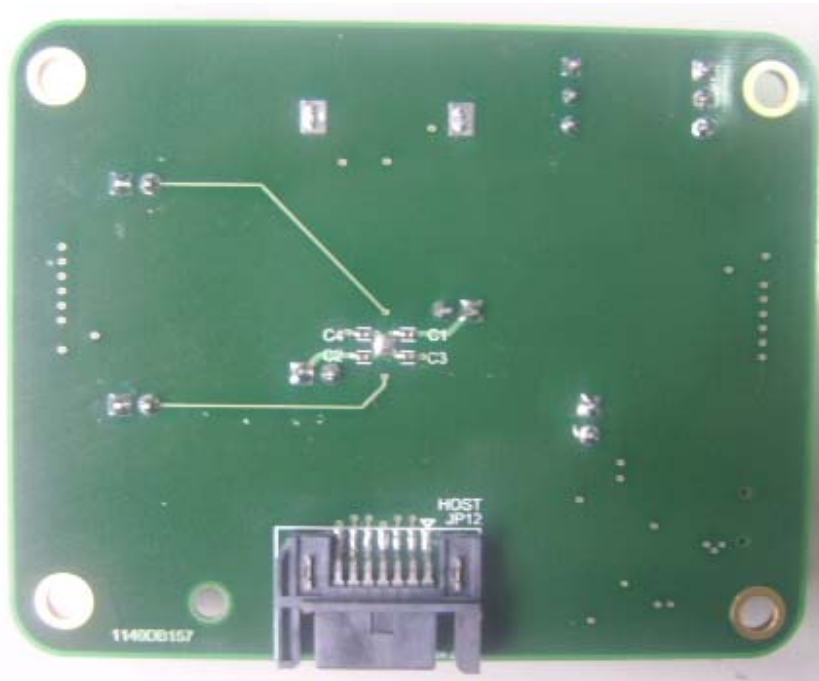**Figure1. Top view of PI3EQX6801ZDE Eval board Rev.A**

Figure2. Bottom view of PI3EQX6801ZDE Eval board Rev.A

Board Operation

PI3EQX6801ZDE is a 1-port (2-channel), bi-directional, signal SATA3.0 re-driver. Figure3 shows the logical block diagram of PI3EQX6801ZDE.   Both channels of the PI3EQX6801ZDE are fully independent in operation and configuration, except for the chip Enable function. Either SATA data connector, J12 or J13 can be connector 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.
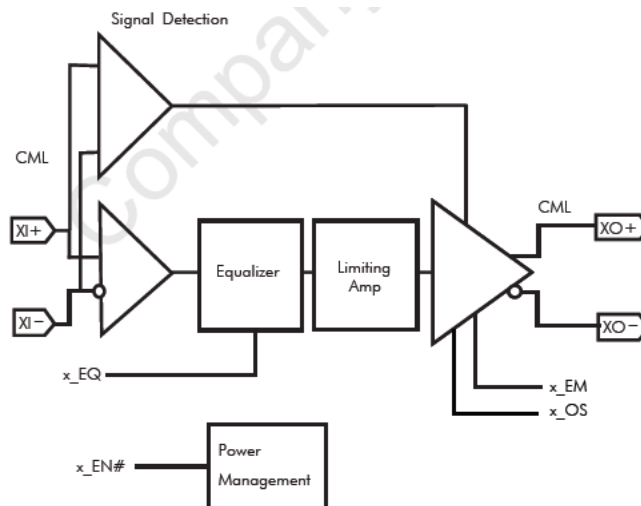

Figure3. Logical Block Diagram of PI3EQX6801ZDE

● **Power Options**

The PI3EQX6801ZDE Evaluation Board provides two options for supplying +1.5V or +3.3V power to the ReDriver. Figure 4 circles the important connections.

1) Using the +5V power supplied by miniUSB connector (**J1**). The on-board LDO down-steps the voltage to +1.5V or +3.3V. When using this source, note that jumper JP11 must be shorted (closed).

2) Using +1.5V or +3.3V power input directly by **JP18** power pin header and **JP19** ground pin header. When using this method, JP11 must be open.

3) For PI3EQX6801ZDE power supply, the evaluation board is shipped from the factory with +3.3V default from miniUSB port. Jumper JP11 must be shorted for normal operation. JP20 and JP21 must be open.

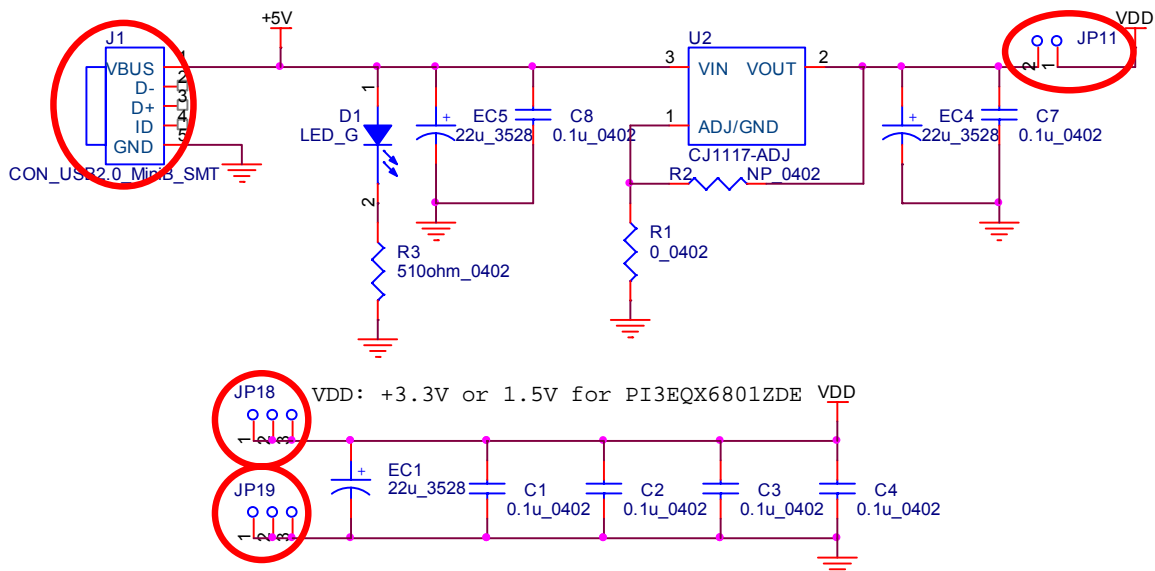**Please note ONLY when the power supply is +1.5V, JP20 and JP21 must be shorted.**

Figure4. Power supply of PI3EQX6801ZDE

● **Device Configuration**

The PI3EQX6801ZDE SATA ReDriver supports analog emphasis and swing adjustment for continuous tuning via external resistor value for optimum operation and signal margins. For the input equalizer, equalization is controlled via tri-level input pin.

The location of configuration switch and jumpers is shown in Figure 5. Configuration begins with the Enable A_EN# (JP14) and B_EN# (JP15), which must be open for normal operation. The x_EN# pin of the PI3EQX6801ZDE has an internal 100K pull-down resistor to define a low level default for normal operation.

When both of A_EN# and B_EN# are shorted to VDD, device operation is disabled. This is useful for checking PI3EQX6801ZDE disabled-state power consumption.

1) Output pre-Emphasis Configuration

Output signal pre-emphasis can be tuned continuously from 0dB to over 6dB as determined by external resistor value. The PI3EQX6801ZDE Eval Board implements 3 resistors for adjusting output pre-emphasis on each channel as detailed in Table 1 below. If adjustment beyond what is provided is needed, the resistors can be replaced with other values as needed (refer to the PI3EQX6801ZDE datasheet for additional information on pre-emphasis tuning).

Table1. Pre-Emphasis Settings on PI3EQX6701ZDE Eval Board

A_EM(channel A) or B_EM(channel B)	Effective Resistance	Output emphasis	Recommended Use
Open	Do Not Connect	0db	Default Factory Setting
R7 R11	15.0k-Ohm	About 2.0dB	Short trace of 10 inches, or cable of 36 inches
R12 R14	10.0k-Ohm	3.0dB	Trace of 16 inches, or cable of 54 inches
R13 R15	5.6k-Ohm	About 4.0dB	Trace 20 inches, or cable of 60 inches

2) Output Swing Configuration

Output signal swing can be tuned continuously by external resistor value.
The PI3EQX6801ZDE Evaluation Board implements 3 resistors for adjusting output swing on each channel as detailed in Table 2 below. If adjustment beyond what is provided is needed, the resistors can be replaced with other values as needed (refer to the PI3EQX6801ZDE datasheet for additional information on swing tuning).

Table2. Swing Settings on PI3EQX6701ZDE Eval Board

A_OS(channel A) or B_OS(channel B)	Effective Resistance	Output Swing at 6Gbps	Recommended Use
Open	-	-	No Swing output
R4 R8	4.7k-Ohm	670mV	Default Factory Setting, SATA port use
R5 R9	3.9k-Ohm	830mV	For SAS/SATA port use
R6 R10	2.0k-Ohm	1200mV	For SAS port use

3) Equalizer Configuration

A_EQ sets channel-A input equalization, while B_EQ sets channel-B equalization, as shown in Table 3. The equalization control inputs to the PI3EQX6801ZDE, A_EQ and B_EQ, each have tri-level control input. Please refer to the table below for equalization selection.

Table3. EQ Settings on PI3EQX6801ZDE Eval Board (x means Open, 0 means short)

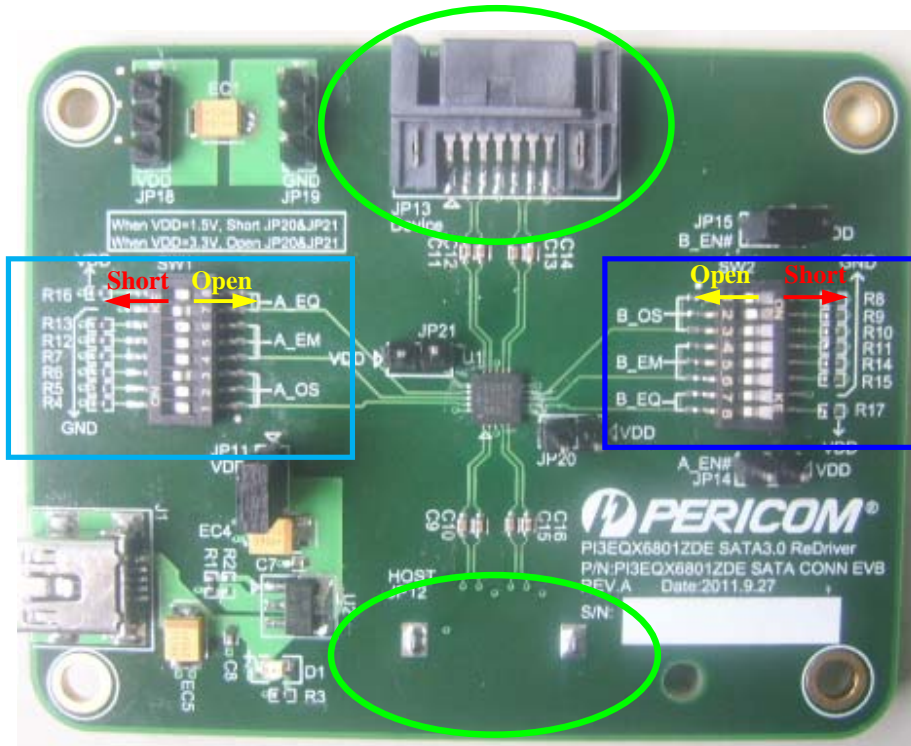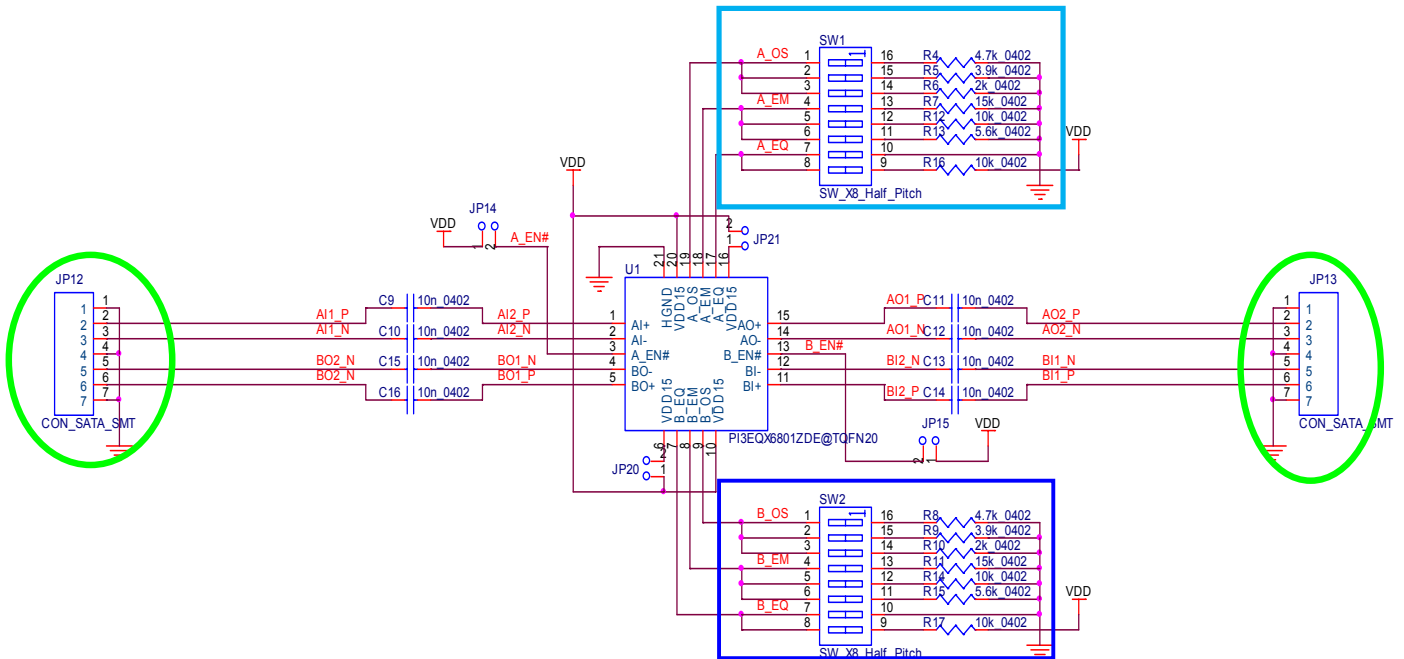| x_EN#	x_EQ	Equalization Level of PI3EQX6801 at 3.0GHz (A_EQ&B_EQ)	System Use
0	x	n/a	Channel disabled
x	0	8dB	Medium trace
x	Open	4dB	Short trace Default Factory Setting
x	1	16dB	Long trace

Figure 5. Configuration Switch and Jumper and their PCB location

● System Connection

The diagrams below show some example system test setups with the PI3EQX6801ZDE Eval Board.

Figure 6 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.
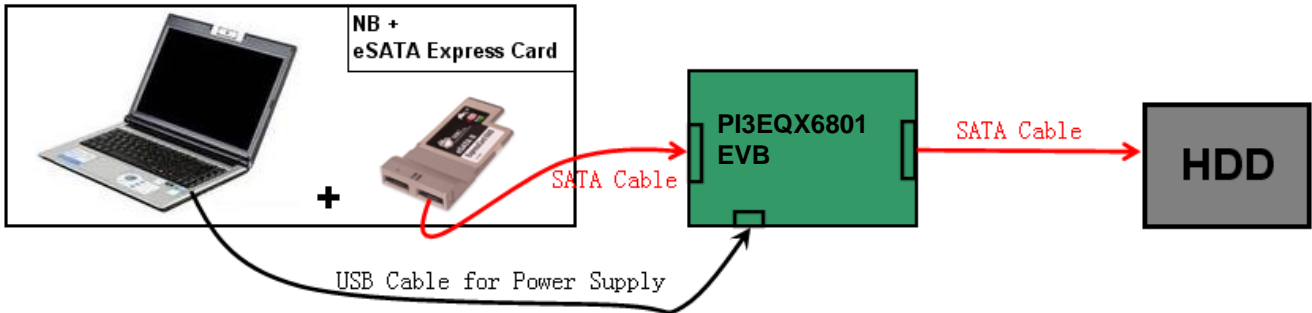

Figure 6. eSATA HDD connection Test Setup using NB+eSATA Express Card with PI3EQX6801ZDE

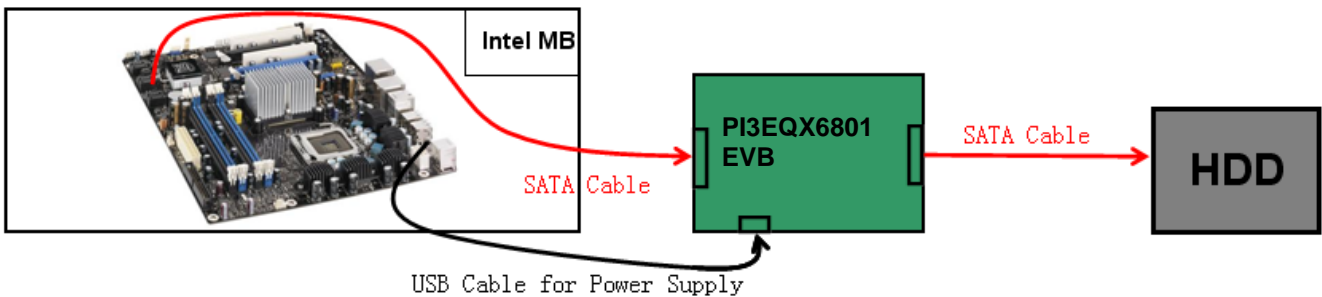Figure 7 shows the connection using Intel MB

Figure 7. internal HDD connection Test Setup using Intel MB with PI3EQX6801ZDE

● 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 PI3EQX6801ZDE 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 PI3EQX6801 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**
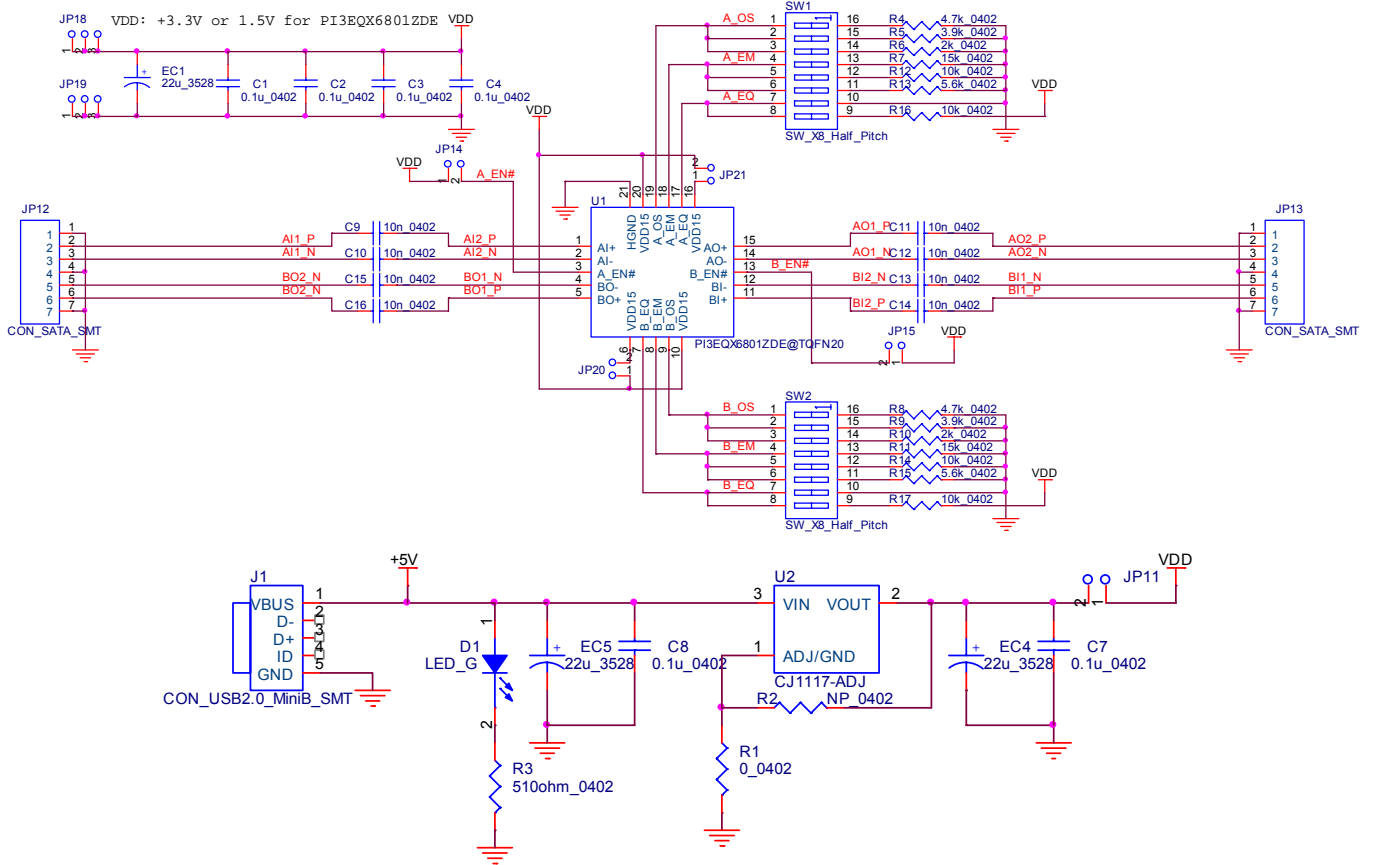
● **PCB Layout Reference**

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	3.3V Regulator	SOT89	1
U1	PI3EQX6801ZDE	TQFN20-ZD	1
D1	LED	0805	1
JP12,JP13	SATA L-type connector	L-type	2
J1	miniUSB connector	B-type	1
JP11,JP14,JP15,JP20,JP21	2PIN HEADER	2.54mm	5
JP18,JP19	3PIN HEADER	2.54mm	2
SW1,SW2	x8 Switch	mini	2
C9,C10,C11,C12,C13,C14, C15,C16	Ceramic Capacitor, 10nF	0402	8
C1,C2,C3,C4,C7,C8	Ceramic Capacitor, 0.1uF	0402	6
EC1,EC4,EC5	Tan cap, 22u	3528	3
R5,R9	Chip Resistor, 3.9Kohm	0402	2
R6,R10	Chip Resistor, 2.0Kohm	0402	2
R7,R11	Chip Resistor, 15.0Kohm	0402	2
R12,R14,R16,R17	Chip Resistor, 10.0Kohm	0402	4
R4,R8	Chip Resistor, 4.7Kohm	0402	2
R13,R15	Chip Resistor, 5.6Kohm	0402	2
R3	Chip Resistor, 510ohm	0402	1
R1	Chip Resistor, 0ohm	0402	1

History

Version 1.0   Original Version   Nov. 11, 2011