

## PI3EQX5801 PI3EQX5801 EVB Rev.A User Manual By YT Tso, Anne Wu and Jessy Chen

- Introduce:**

PI3EQX5801 is a low power, high performance 5.0Gbps signal ReDriver designed for the PCIe 2.0 protocol. The device provides programmable Equalization (EQ), De-Emphasis (DE) and input threshold controls to optimize performance over a variety of physical mediums by reducing Inter-Symbol Interference (ISI)

- Quick Start — For Default Setting & Pin Strap:**

To start-up the PI3EQX5801 EVB, complete the following steps:

1. Check the head pin status and follow Table 1.
2. Short JP11 to power on PI3EQX5801.

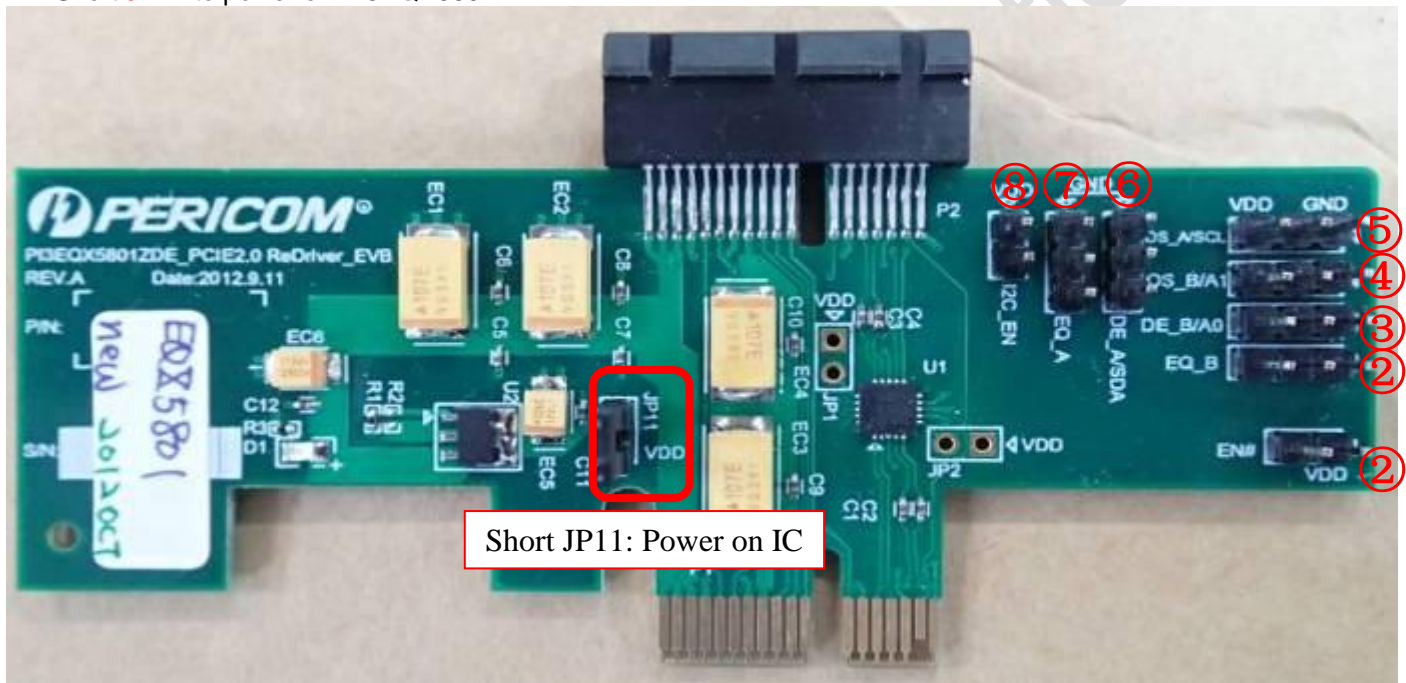


Figure.1 Top view of PI3EQX5801 EVB in Pin Strap default setting.

Table 1--Header pin is set as defaulted on EVB.

Header pin #	Pin name for PI3EQX5801	Switch status	Remark
JP11	VDD	Short	Power on PI3EQX5801
①	EN#	Open	Normal Operating mode
②	EQ_B	Open	Equalizer setting of B channel: 3.3dB
③	DE_B	Open	De-emphasis setting of B channel: -3.5dB
④	OS_B	Open	Output swing of B channel @5Gbps: 1000Vppd
⑤	OS_A	Open	Output swing of A channel @5Gbps: 1000Vppd
⑥	DE_A	Open	De-emphasis setting of A channel: -3.5dB
⑦	EQ_A	Open	Equalizer setting of A channel: 3.3dB
⑧	I2C_EN	Open	Pin-Strap mode

Equalizer setting:

Header pin #	Pin name for PI3EQX5801	Switch status	Remark	
②	EQ_B	Open	Equalizer setting	
			EQ_A/B	@ 2.5GHz
			0	3.3dB
⑦	EQ_A	Open	1/2 V <sub>DD</sub>	8.1dB (Default)
			V <sub>DD</sub>	11.7dB

De-emphasis setting:

Header pin #	Pin name for PI3EQX5801	Switch status	Remark	
③	DE_B	Open	De-emphasis setting	
			DE_A/B	De-emphasis @ 5Gbps
			0	0dB
⑥	DE_A	Open	1/2 V <sub>DD</sub>	-3.5dB (default)
			V <sub>DD</sub>	-6dB

Output Swing setting:

Header pin #	Pin name for PI3EQX5801	Switch status	Remark	
④	OS_B	Open	Output swing setting	
			OS_A/B	Output swing @ 5Gbps
			0	900mVppd
⑤	OS_A	Open	1/2 V <sub>DD</sub>	1000mVppd (default)
			V <sub>DD</sub>	1200mVppd

• **Quick Start — For Default Setting & I2C:**

To start-up the PI3EQX5801 EVB, complete the following steps:

3. Check the head pin status and follow Table 2.
4. Short JP11 to power on PI3EQX5801.

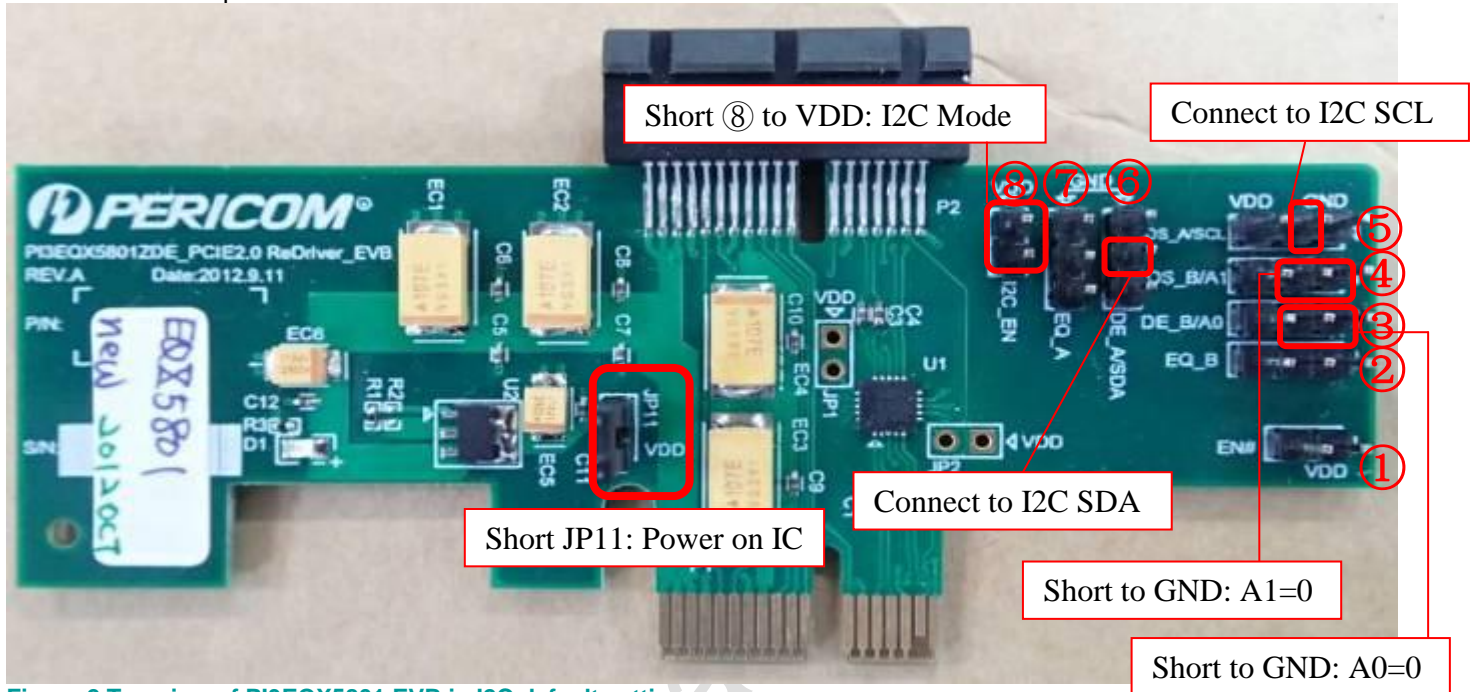


Figure.2 Top view of PI3EQX5801 EVB in I2C default setting.

Table 2--Header pin is set as defaulted on EVB.

Header pin #	Pin name for PI3EQX5801	Switch status	Remark
JP11	VDD	Short	Power on PI3EQX5801
①	EN#	Open	Normal Operating mode
②	EQ_B	Open	Reserved pin strap default Equalizer setting of B channel: 3.3dB
③	DE_B->A0	Short to GND	Set I2C Address A0=0
④	OS_B->A1	Short to GND	Set I2C Address A1=0
⑤	OS_A	Open	Connect middle pin to I2C SCL
⑥	DE_A	Open	Connect middle pin to I2C SDA
⑦	EQ_A	Open	Reserved pin strap default Equalizer setting of A channel: 3.3dB
⑧	I2C_EN	Short	Connect to VDD->I2C Mode

**I2C Addressing: C0 for default setting**

Address Assignment							
A6	A5	A4	A3	A2	A1	A0	R/W
1	1	0	0	0	Programmable		1=R, 0=W

## I2C...Stick defaulted setting:

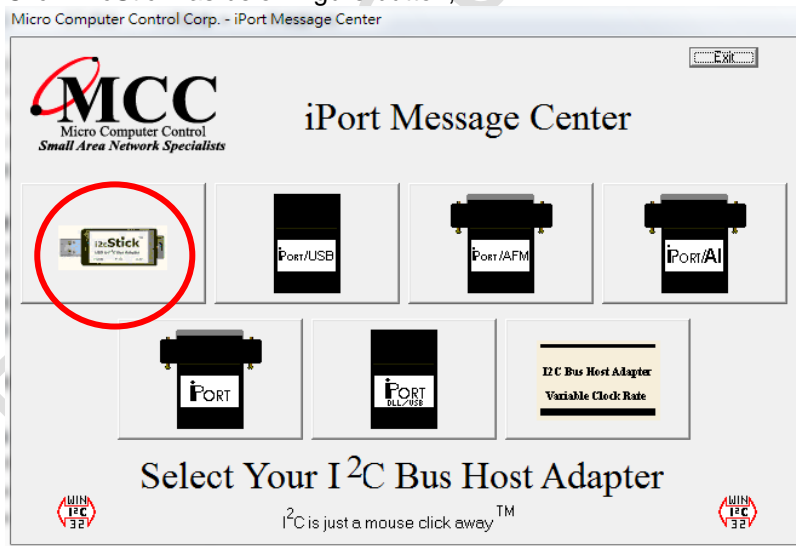
To start installing I2C program,

1. Insert iPort Utility Pack disk or download it from website at <http://www.mcc-us.com/iPuTil550CD.htm>
2. Open "iPuTil550CD" folder
3. Double click "SETUP.EXE" and follow the instructions to install I2C Software
4. Hit 'Finish'
5. Whole setup figure,



Running I2C Software,

1. Open iPort Message Center,
2. Click "i2cStick" as below figure button,



3. After above step, click "Open" to connect right 'ComPort' which port you inserted iPort.



**For READ....Default setting**

4. Check the default status of PI3EQX5801 I2C setting. Choose the 'address, C0,' and 'Read for 7 bytes'. Then click 'Send', once the 'status' displays "<I2C Master RX Complete>", "7 bytes will be read" as below figure.

The screenshot shows the 'iPort Message Center' window. It features a table for message logs, a status field, and various control buttons. Red callout boxes with arrows point to specific elements:

- Step 1:** Points to the 'ComPort' dropdown menu, which is set to '3'.
- Step 2:** Points to the 'Open Link' button.
- Step 3:** Points to the 'Address' field in the message table, which contains 'C0'.
- Step 4:** Points to the 'Send' button.
- Step 5:** Points to the 'Status' field, which displays '<<I2C Master Rx Complete>>'.
- Step 6:** Points to the 'Message Data Bytes' field in the first row of the table, which contains '66,66,84,50,D0,10,00'.

Msg #	Address	R/W	Message Data Bytes	Stop	Delay (msec)
1	C0	R	66,66,84,50,D0,10,00	Y	0
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

**For WRITE**

1. After checking the default by "READ", adding WRITE list on address, C0.
2. Note that the first byte is dummy byte, so the first byte should be shifted to byte2.  
EX: Change EQ\_A (4 bits) from Byte0 [7:4] default 0110 (6) = 8.1dB to 0001(1) = 3.3dB
3. READ it again to check if write successfully!
4. Press 'Send' to do the above command and check the status in '<I2C Master RX Complete>'

**EQ\_A default setting:**  
6=>0110= 8.1dB

**Step4: click "Send"**

**Step1: READ C0 to check the default setting**

**Step2: 1) Change into Write**  
EX: change EQ\_A to 3.3dB  
1) Ignore 1<sup>st</sup> byte(dummy byte)  
2) BYTE0[4:7] (4 bits) is EQ\_A  
3) Write 1(=0001) into the 2<sup>nd</sup> byte to change into 3.3dB

**Step3: READ again to check if successfully write**

**Step5**

Status: <<I2C Master Rx Complete>>

Msg #	Address	R/W	Message Data Bytes
1	C0	R	66,66,84,50,50,10,00,
2	C0	W	16,16,
3	C0	R	16,66,84,50,50,10,00,
4			
5			
6			
7			
8			
9			
10			
11			
12			

ComPort: 3

Device Select:  
 iPort     iPort/USB  
 iPort D/U     iPort/AFM  
 Variable     iPort/AI  
 i2cStick

SN# 0000221

Stop On:  
 Busy  
 Arb. Loss  
 Slave Nak  
 Bus Error

Beep On:  
 Busy  
 Arb. Loss  
 Slave Nak  
 Bus Error

## Register Description

### BYTE 0 - Channel A Setting Register (A\_CH[7:0])

Bit	Type	Power-on State	Control Signal	Description
7	R/W	latch from pin	A_EQ[3]	Controls Equalization setting of CH A
6	R/W	latch from pin	A_EQ[2]	Default setting is 8.1dB; latched from pin A_EQ
5	R/W	latch from pin	A_EQ[1]	
4	R/W	latch from pin	A_EQ[0]	
3	R/W	0	A_OS[1]	Controls output swing of CH A
2	R/W	1	A_OS[0]	Default setting is 1000mVppd; A_OS[1:0]="01"
1	R/W	1	A_DE[1]	Controls output de-emphasis of CH A
0	R/W	0	A_DE[0]	Default setting is -3.5dB; A_DE[1:0]="10"

### BYTE 1 - Channel B Setting Register (B\_CH[7:0])

Bit	Type	Power-on State	Control Signal	Description
7	R/W	latch from pin	B_EQ[3]	Controls Equalization setting of CH B
6	R/W	latch from pin	B_EQ[2]	Default setting is 8.1dB; latched from pin B_EQ
5	R/W	latch from pin	B_EQ[1]	
4	R/W	latch from pin	B_EQ[0]	
3	R/W	0	B_OS[1]	Controls output swing of CH B
2	R/W	1	B_OS[0]	Default setting is 1000mVppd; B_OS[1:0]="01"
1	R/W	1	B_DE[1]	Controls output de-emphasis of CH B
0	R/W	0	B_DE[0]	Default setting is -3.5dB; B_DE[1:0]="10"

### BYTE 2 - Global Function Setting Register (GBL\_FUNC[7:0])

Bit	Type	Power-on State	Control Signal	Description
7	R/W	1	TDET_EN	Termination Detect Enable
6	R/W	0	APD_EN	Auto Slumber Mode Enable
5	R/W	0	ADE_EN	Auto-De-emphasis Enable
4	R/W	0	EM_HALF	Half bit de-emphasis Enable
3	R/W	0	UNPLUG_EN	Unplug detector Enable
2	R/W	1	UNPLUG_VTH	Unplug Detector Threshold
1	R/W	Latch from pin	A_PD	Channel A Power Down; latched from pin EN#
0	R/W	Latch from pin	B_PD	Channel B Power Down; latched from pin EN#

### BYTE 3 - Channel A Status Register (A\_STAT[7:0])

Bit	Type	Power-on State	Control Signal	Description
7	R	N/A	TDET_A	"HIGH" indicates receiver detected at channel A
6	R	N/A	APD_A	"HIGH" indicates power saving mode at channel A
5	R	N/A	SDET_A	"HIGH" indicates signal detected at channel A
4	R	N/A	ADE_A	"HIGH" indicates de-emphasis enable @5Gbps data only at channel A
3	R	0	Reserved	
2	R	0	Reserved	
1	R	0	Reserved	
0	R	0	Reserved	

### BYTE 4 - Channel B Status Register (B\_STAT[7:0])

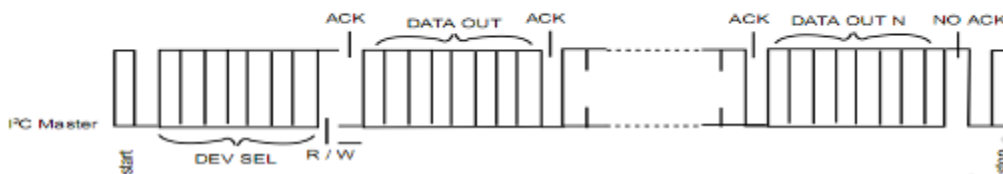
Bit	Type	Power-on State	Control Signal	Description
7	R	N/A	TDET_B	"HIGH" indicates receiver detected at channel B
6	R	N/A	APD_B	"HIGH" indicates power saving mode at channel B
5	R	N/A	SDET_B	"HIGH" indicates signal detected at channel B
4	R	N/A	ADE_B	"HIGH" indicates de-emphasis enable @5Gbps data only at channel B
3	R	0	Reserved	
2	R	0	Reserved	
1	R	0	Reserved	
0	R	0	Reserved	

BYTE 5 - RESERVED, Default Power On State = "00010000"

BYTE 6-14 - RESERVED

## I2C Data Transfer

### 1. Read sequence



### 2. Write sequence





I2C Equalizer setting:

Equalizer setting	
A/B_CH Byte Register [7:4]*	@ 2.5GHz
0000	0 dB
0001	3.3 dB
0010	4.5 dB
0011	5.6 dB
0100	6.8 dB
0101	7.4 dB
0110	8.1 dB (Default)
0111	8.7 dB
1000	9.3 dB
1001	10 dB
1010	10.8 dB
1011	11.7 dB
1100	12.5 dB
1101	13.3 dB
1110	14.2 dB
1111	15 dB

I2C De-emphasis setting:

De-emphasis setting	
A/B_CH[1:0]*	De-emphasis @ 5Gbps
00	0dB
01	-2dB
10	-3.5dB (default)
11	-6dB

I2C Output swing setting:

Output swing setting	
A/B_CH[3:2]*	Output swing @ 5Gbps
00	900mVppd
01	1000mVppd (default)
10	1100mVppd
11	1200mVppd

## PI3EQX5801 EVB Schematic

