**COMPHY\_112G**

**RX Sampler Calibration**

**R1.0**

**Macro Architecture Specification**

For Internal Use Only

Design Version V1.0

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision** | **Author** | **Change List** | **Date** |
| V1.0 |  |  |  |
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# **Introduction**

This document describes the firmware of RXCLK calibration.

# **2. Interafces**

## **2.1 Firmware Interface Signal**

|  |  |  |
| --- | --- | --- |
| **Port Name** | **Dir** | **Description** |
| cmx\_SAMPLER\_CAL\_EXT\_EN | O | External enable. |
| cmx\_EXT\_FORCE\_CAL\_DONE | I/O | Force to skip calibration. |
| lnx\_SAMPLER\_CAL\_DONE\_LANE | I/O | Sampler Calibration done. |
| lnx\_SAMPLER\_CAL\_PASS\_LANE | I/O | Sampler Calibration pass. |

## 

## **2.2 Digital Interface Signal**

|  |  |  |
| --- | --- | --- |
| **Port Name** | **Dir** | **Description** |
| PHY\_STATUS | O | The running status of PHY. |
| SMPLR\_CAL\_EN\_P1P3 | I/O | Sampler calibration enable P1P3. |
| OFST\_RES | I/O | Offset resolution. |
| RX\_SMPLR\_P1P3\_CAL\_TOP\_START | I/O | Sampler calibration P1P3 start. |
| RX\_SMPLR\_P1P3\_CAL\_TOP\_DONE | I/O | Sampler calibration P1P3 done. |
| SMPLR\_CAL\_EN\_P2P4 | I/O | Sampler calibration enable P2P4. |
| RX\_SMPLR\_P2P4\_CAL\_TOP\_START | I/O | Sampler calibration P2P4 start. |
| RX\_SMPLR\_P2P4\_CAL\_TOP\_DONE | I/O | Sampler calibration P1P3 done. |
|  |  |  |
|  |  |  |

## **2.3 Analog Interface Signal**

## **2.4 Time Flow**

# **Block Diagram**

The sampler calibration scheme relay on the configuration of AC coupling switches between CTLE and samplers. Set ACCAP\_DISABLE\_LEFT = 1 to turn off the switch at left side of AC coupling cap; Set ACCAP\_DISABLE\_RIGHT = 1 to turn on the switch at right side of AC coupling cap.

Vrefp/n

CTLE

SAMPLER

ACCAP\_DISABLE\_LEFT = 1 to turn off the switch

ACCAP\_DISABLE\_RIGHT = 1 to turn on the switch

Vcom

The data/error samplers offset cancelling circuits are builded inside the samplers.

Sampler\_D\_TOP\_P\*

Sampler\_D\_MID\_P\*

Sampler\_S\_BOT\_P\*

SMPLR\_CAL\_SEL[3:0]

0000

1011

VOFF\_POS

Digital logic

DACs

OFST\_D\_TOP\_P\*[5:0] …. OFST\_S\_BOT\_P\*[5:0]

The edge samplers use Vrefp/n to cancel the offset.

1101

Sampler\_EDGE\_P\*

Sampler\_EDGE\_P\*

SMPLR\_CAL\_SEL[3:0]

0000

1100

VOFF\_POS

Digital logic

DACs

OFST\_EDGE\_SIGN\_\* & OFST\_EDGE\_POS\_\*[4:0] & OFST\_EDGE\_NEG\_\*[4:0]

Vrefp/n

# **FW Handling**

The firmware first initializes for the calibration, next starts the unicore and wait for the calibration to finish. After the calibration, the FW saves the calibration result.

## **4.1** **Flow Chart**



## **4.2 Code Size**

# **Features**

The calibration function has the following features.

1. Initialize registers;
2. Start the unicore;
3. Wait for the calibration to finish;
4. Save the calibration result.

# **Test Plan**

| **No** | **Description** |
| --- | --- |
| **1** | **Initialization** |
|  | **Verify the initialization.**  Check the registers needed to be initialized. Covered by local test. |
| **2** | **Calibration starts.** |
|  | **Verify the calibration starts.**  Check the RX\_SMPLR\_P1P3\_CAL\_TOP\_START and RX\_SMPLR\_P2P4\_CAL\_TOP\_START. Covered by local test. |
| **3** | **Calibration done.** |
|  | **Verify the calibration done.**  Check the RX\_SMPLR\_P1P3\_CAL\_TOP\_DONE and RX\_SMPLR\_P2P4\_CAL\_TOP\_DONE. Covered by local test. |