**COMPHY\_112G**

**SQ 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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**Table of Contents**

[**1.** **Introduction** 2](#_Toc512591103)

[**2. Interafces** 2](#_Toc512591104)

[**2.1 Firmware Interface Signal** 2](#_Toc512591105)

[**2.2 Digital Interface Signal** 2](#_Toc512591106)

[**2.3 Analog Interface Signal** 3](#_Toc512591107)

[**2.4 Time Flow** 4](#_Toc512591108)

[**3** **Block Diagram** 5](#_Toc512591109)

[**4** **FW Handling** 5](#_Toc512591110)

[**4.1** **Flow Chart** 5](#_Toc512591111)

[**4.2 Code Size** 5](#_Toc512591112)

[**5** **Features** 5](#_Toc512591113)

[**6** **Test Plan** 5](#_Toc512591114)

# **Introduction**

This document describes the firmware of RXCLK calibration.

# **2. Interafces**

## **2.1 Firmware Interface Signal**

|  |  |  |
| --- | --- | --- |
| **Port Name** | **Dir** | **Description** |
| cmx\_SQ\_OFST\_CAL\_EXT\_EN | O | SQ OFST Cal External enable. |
| cmx\_SQ\_THRE\_CAL\_EXT\_EN | O | SQ THRE Cal External enable. |
| cmx\_EXT\_FORCE\_CAL\_DONE | I/O | Force to skip calibration. |
| lnx\_ SQ\_OFST \_CAL\_DONE\_LANE | I/O | SQ OFST Calibration done. |
| lnx\_ SQ\_OFST \_CAL\_PASS\_LANE | I/O | SQ OFST Calibration pass. |
| lnx\_ SQ\_THRE \_CAL\_DONE\_LANE | I/O | SQ THRE Calibration done. |
| lnx\_ SQ\_THRE \_CAL\_PASS\_LANE | I/O | SQ THRE Calibration pass. |

## **2.2 Digital Interface Signal**

|  |  |  |
| --- | --- | --- |
| **Port Name** | **Dir** | **Description** |
| PHY\_STATUS | O | The running status of PHY. |
| RX\_SQ\_OFST\_CAL\_TOP\_START | I/O | SQ OFST Cal start. |
| RX\_SQ\_OFST\_CAL\_TOP\_DONE | I/O | SQ OFST Cal done. |
| RX\_SQ\_THRESH\_CAL\_TOP\_START | I/O | SQ Threshold Cal start. |
| RX\_SQ\_THRESH\_CAL\_TOP\_DONE | I/O | SQ Threshold Cal done. |

## 

## **2.3 Analog Interface Signal**

|  |  |  |
| --- | --- | --- |
| Port Name | Dir | Description |
| RX<i>\_SQ\_OUT | O | SQ calibration output from analog part. This is the SQ calibration comparator output. |
| RX<i>\_SQ\_CAL\_EN | I | Power up SQ calibration circuit  0: Power down  1: Power up  It is asserted when any SQ calibration mode is enabled. |
| RX<i>\_SQ\_OFFSET\_CAL\_EN | I | SQ calibration enable for OFFSET.  0: Not enabled  1: enabled |
| RX<i>\_SQ\_THRESH\_CAL\_EN | I | SQ calibration enable for squelch threshold Vth .  0: Not enabled  1: enabled |
| RX<i>\_SQ\_OFFSET[4:0] | I | Comparator offset voltage calibration output. It cancels the comparator Vos. SQ\_OFFSET[4] is the polarity.  1: positive;(op>on)  0: negative (op<on) |
| RX<i>\_SQ\_REFTHR[4:0] | I | Voltage setting  to set the peak detector input voltage Vin SQ\_REFTHR[4] is the polarity.  1: inp<inn  0: inp>inn  Step size 10mV  Range : 320mV ppd |
| RX<i>\_SQ\_THRESH[5:0] | I | SQ calibration output to control squelch threshold Vth SQ\_THRESH[5] is the polarity.  If SQ\_THRESH[5]=1. VPK+VTH compare with VREF,  if SQ\_THRESH[5]=0 VPK-VTH compare with VREF |
| RX<i>\_OFFSETCAL\_SEL[1:0] | I | Select peak detector two branches during offset calibration |
| RX<i>\_PU\_SQ | I | Power up SQ calibration circuit  0: Power down  1: Power up |
|  |  |  |
|  |  |  |

## **2.4 Time Flow**

# **Concept Diagram**

Peak detector

RXP

RXN

Vpk

Vcm

Vth

SQ\_OUT

Vpk

Vcm

comparator

Vcm> Vpk+Vth, SQ\_OUT=0, signal detected, non-squelch state

Vpk

Vcm

Vcm< Vpk+Vth, SQ\_OUT=1, signal not detected, squelch state

\_

+

Vos

+

\_

Amplifier

SQ\_OFFSET[4:0]

SQ\_THRESH[5:0]

SQ\_OUT

SQ\_CAL\_CTRL

# **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**

### 4.1.1 OFST Cal



### 4.1.2 Threshold Cal



## **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** | **SQ OFST Calibration starts.** |
|  | **Verify the calibration starts.**  Check the RX\_SQ\_OFST\_CAL\_TOP\_START. Covered by local test. |
| **3** | **SQ THRE Calibration starts.** |
|  | **Verify the calibration starts.**  Check the RX\_SQ\_THRESH\_CAL\_TOP\_START. Covered by local test. |
| **4** | **Calibration done.** |
|  | **Verify the calibration done.**  Check the cmx\_CAL\_DONE. Covered by local test. |