**COMPHY\_112G**

**RX IMP Calibration**

**R1.0**

**Macro Architecture Specification**

For Internal Use Only

Design Version V1.0

**Revision History**

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

**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 RX Impedance calibration.

# **2. Interafces**

## **2.1 Firmware Interface Signal**

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

## 

## **2.2 Digital Interface Signal**

|  |  |  |
| --- | --- | --- |
| **Port Name** | **Dir** | **Description** |
| PHY\_STATUS | O | The running status of PHY. |
| RX\_IMP\_CAL\_TOP\_START | I/O | RX IMP Cal Top start. |
| RX\_IMP\_CAL\_TOP\_DONE | I/O | RX IMP Cal Top done. |
|  |  |  |

## **2.3 Analog Interface Signal**

|  |  |  |  |
| --- | --- | --- | --- |
| **Port Name** | **Dir** | **Default** | **Description** |
| RXIMPCAL\_EN\_LANE | R/W | 0 | Rx impedence calibration enable |
| TRX\_IMPCAL\_CLK | R.W | 0 | Tx & Rx impedance calibration input clock  100KHz |
| RXIMPCAL\_EN | R/W | 0 | RX IMP common calibration block enable. The common calibration blocks includes calibration current generation and a voltage comparator. RXIMP\_IVREF\_CAL\_EN is high until all lane IMPCAL\_RX\_LANE\_CAL\_EN is done  0: Not enable.  1: enable |
| IMPCAL\_RX\_LANE[4:0] | R/W | 0x0C | Rx impedence calibration results for different lanes |
| VTH\_RXIMPCAL[2:0] | R/W | 0x04 | Voltage refence for Rx impedance calibration:  3'b000 --> 225mV 🡪 37.5 ohm  3'b001 --> 255mV 🡪 42.5 ohm  3'b010 --> 270mV 🡪 45.0 ohm  3'b011 --> 285mV 🡪 47.5 ohm  3'b100 --> 300mV 🡪 50.0 ohm  3'b101 --> 315mV 🡪 52.5 ohm  3'b110 --> 330mV 🡪 55.0 ohm  3'b111 --> 345mV 🡪 57.5 ohm |
| RXIMP\_IVREF[4:0] | R/W | 0x0C | RX IMP CAL control from digital part. The bigger this value, the smaller the actual impedance due to parallel impedance structure. (common register, used to be mux from IMCAL\_RX\_LANE[4:0], not the physical register, this version, add it as real register) |
| CMN\_IMPCAL\_OUT | R |  | Comparator output |
|  |  |  |  |
|  |  |  |  |

## **2.4 Time Flow**

# **Block Diagram**



# **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\_IMP\_CAL\_TOP\_START. Covered by local test. |
| **3** | **Calibration done.** |
|  | **Verify the calibration done.**  Check the lnx\_RX\_IMP\_CAL\_DONE. Covered by local test. |