

PCN# 20160929000

Continuous Improvement on:

MitySOM-5CSx  
All 5CSE and 5CSX Modules

Date: September 29, 2016

To: Purchasing Agents

Dear Customer,

This is an initial announcement of a change to a product that is currently offered by Critical Link. The details of this change are on the following pages.

For questions regarding this notice, contact the Hardware Manager Bill Halpin (bill.halpin@criticallink.com).

Sincerely,

Critical Link, LLC

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**PCN Number:** 20160929000

**PCN Date:** September 29, 2016

**Title:** Continuous Improvement

**Contact:** Bill Halpin

**Phone:** (315) 425-4045

**Ship Date:** 10/27/2016

## **Overview**

Changes to MitySOM-5CSx are identified in the following sections.

### **1 Fix gold finger silkscreen numbering 160-280**

#### **1.1 Description of Change**

The top-side silkscreen markers that indicate the edge connector pad number from 160 and above has been shifted.

#### **1.2 Reason for Change**

There are small silkscreen labels marking the edge connector pin numbers. On the top side of the MitySOM, the gap between the 140 and 160 markings is smaller than it should be and all the indicators starting at 160 and higher are not pointing to the correct pad.

#### **1.3 Anticipated Impact on Form, Fit, Function (positive / negative)**

There is no impact to form, fit, or function.

#### **1.4 Anticipated Impact on Quality or Reliability (positive / negative)**

There is no change to Reliability. The Quality is improved with the silkscreen identifiers indicating the proper pad.

### **2 Thermal Connect +1.1V\_CORE pads**

#### **2.1 Description of Change**

The center of the Cyclone V FPGA has a number of power and ground pads for the core power supply. The core voltage supply connections included thermal spokes on the vias resulting in more thermal resistance than desired. The thermal spokes have been removed and these vias now have direct connections to the copper fills.

Additionally, two internal copper plane layers were added to help reduce the thermal resistance under the FPGA and improve the heat spreading across the Module.

#### **2.2 Reason for Change**

Critical Link strives for continual improvement where a change may be beneficial to end customers. While investigating options to improve the thermal impedance, some minor adjustments were identified. These adjustments are intended to help reduce hot spots on the FPGA.

**2.3 Anticipated Impact on Form, Fit, Function (positive / negative)**

There is no impact to Form, Fit, or Function.

**2.4 Anticipated Impact on Quality or Reliability (positive / negative)**

The thermal analysis performed for a customer design should still be considered valid and this change is only intended to improve thermal margin. There should be no impact to quality and if any impact to reliability is verified, it is anticipated to be minimally positive.

**3 Survive Some Shorts on +VPD Switched Rails****3.1 Description of Change**

The MitySOM includes a number of I/O power rails that are defined by the baseboard design that the module plugs into. Internal to the MitySOM, the Cyclone V requires a VCCPD rail that correlates to the I/O voltage for the respective I/O Bank. These voltage rails are automatically selected based on the power inputs and rely on a 3.3V supply that is sequenced last.

The VCCPD voltage selection circuit has been updated to add an extra level of safety. Under fault situations on the carrier board, the MitySOM should be able to avoid power sequencing anomalies induced by the fault.

**3.2 Reason for Change**

There was an assembly issue identified on one of the MitySOMs that shorted the 3.3V rail and put the VCCPD power switch into an unstable state. This resulted in a damaged VCCPD power switch that could be avoided with a small change to the circuit. It is believed the MitySOM will survive additional anomalous power connections with the improved circuit.

**3.3 Anticipated Impact on Form, Fit, Function (positive / negative)**

There should be no discernible impact to Form, Fit, or Function. This change is only intended to help the device survive through some forms of power shorts.

**3.4 Anticipated Impact on Quality or Reliability (positive / negative)**

There is no impact to Quality as functional Modules will not behave differently. A minor improvement to Reliability is expected under certain conditions that the Module should not experience during normal operation.

**4 Update Hardware Id****4.1 Description of Change**

The HPS-GPI[9:0] pins are used to identify the hardware baseline for PCB revisions. These pin settings are updated to read a unique value based on the hardware build. This version updates the value read and changes HPS-GPI[7,6,3 & 2] to floating pins. In previous builds, these four pins were tied to ground.

	<b>GPI[9,8]</b>	<b>GPI[7,6,5,4]</b>	<b>GPI[3,2,1,0]</b>
90-000211-2	1,1	0,0,0,0	0,0,0,0
90-000211-4	S,1	0,0,0,0	0,0,0,1
90-000211-5	S,0	Z,Z,0,0	Z,Z,0,1

The 'S' indicates the silicon die size in the FPGA. This is pulled high for 85kLE and 110kLE devices and pulled low for the 25kLE and 40kLE devices. The 'Z' indicates high-impedance inputs with no connection.

#### **4.2 Reason for Change**

The design includes a feature to identify the hardware baseline that the MitySOM was built from. This is updated on each revision of the PCB as standard update practice.

#### **4.3 Anticipated Impact on Form, Fit, Function (positive / negative)**

There is no impact to Form or Fit. The value read for the hardware ID has been updated.

#### **4.4 Anticipated Impact on Quality or Reliability (positive / negative)**

There is no impact to Quality or Reliability.

### **5 Arrange Test-points for Internal Power Tests**

#### **5.1 Description of Change**

To improve the manufacturing process, some internal power test points are rearranged.

#### **5.2 Reason for Change**

This change was included to improve DFM.

#### **5.3 Anticipated Impact on Form, Fit, Function (positive / negative)**

The internal test-points are not intended for user connections and therefore, this change has no impact on Form, Fit, or Function.

#### **5.4 Anticipated Impact on Quality or Reliability (positive / negative)**

With improved test access during manufacturing, the Quality and Reliability should be improved if any impact is observed.

### **6 Add Resistors to the HPS-GPI Connections**

#### **6.1 Description of Change**

Series resistors have been added to the HPS-GPI "input-only" pins.

#### **6.2 Reason for Change**

The Quartus compile settings can change the HPS-GPI "input-only" pins to a few different settings, including driving them as outputs. Because these pins were connected directly to power and ground and could result in an undesired state, series resistors were added for protection.

#### **6.3 Anticipated Impact on Form, Fit, Function (positive / negative)**

There is no change to Form, Fit or Function.

#### **6.4 Anticipated Impact on Quality or Reliability (positive / negative)**

There is no impact to Quality or Reliability. Designs should still avoid setting the unused pins to Outputs.

## 7 Personality Variant Part Choices

### 7.1 Description of Change

On some of the models, a few of the previously not-fitted components will now be installed.

### 7.2 Reason for Change

This change was made to streamline the assembly process.

### 7.3 Anticipated Impact on Form, Fit, Function (positive / negative)

There should not be an impact to Form, Fit, or Function.

### 7.4 Anticipated Impact on Quality or Reliability (positive / negative)

Critical Link aims to continuously improve the product offerings. This is one of those cases where the impact is minor, but intended as an improvement to Quality. There is no anticipated impact to Reliability.

## 8 Power Sequencing for Slow 5V Ramp

### 8.1 Description of Change

The MitySOM will now allow the input voltage to rise above 3V before starting up the internal power supplies instead of the original 1V level.

### 8.2 Reason for Change

This change was added to improve the power-on experience in designs that have a slow power ramp-up on the 5V supply powering the MitySOM. In this case, there were often extra reset cycles as the module powered on. Starting at a higher voltage allows more energy storage at power-on and could help some current limited supplies.

### 8.3 Anticipated Impact on Form, Fit, Function (positive / negative)

There is no impact to Form or Fit. The MitySOM always powered on as long as the 5V supply was able to provide enough power, so the Function in general remains the same. A small improvement to the power-on Function of the MitySOM is expected because there is a lower current draw from the power input when starting up. In some cases, there may also be a small improvement to the total power consumed at power-on.

### 8.4 Anticipated Impact on Quality or Reliability (positive / negative)

This change is not expected to impact Quality or Reliability.

## 9 Update U19 1.8V/2.5V Power Supply Layout

### 9.1 Description of Change

The board layout has been updated to improve the 1.8V power supply ripple. There were a few aspects of the switcher supply layout that were less than ideal and resulted in a higher ripple on the 1.8V supply than desired. The adjustments made to the layout improve the supply's control loop to reduce the AC ripple on the supply.

### 9.2 Reason for Change

When investigating a USB issue on early MitySOM-5CSx Modules, the power supply layout was identified as a future improvement. The USB errors were resolved in a previous PCN and this improvement was noted as a future enhancement.

### 9.3 Anticipated Impact on Form, Fit, Function (positive / negative)

There is no anticipated impact to Form, Fit, or Function.

### 9.4 Anticipated Impact on Quality or Reliability (positive / negative)

There is no anticipated impact to Reliability. There is a small impact to Quality with lower ripple on the 1.8V supply provided to the edge connector for powering Bank 7B I/O pins that are often used for the RGMII Ethernet PHY interface.

## 10 Products Affected

Details regarding the full revision history can be located in the MitySOM-5CSx Revision History section on the Critical Link support site.

<https://support.criticallink.com/redmine/projects/mityarm-5cs/wiki>

**Table 1: Products Affected**

Model Number	Starting PCA	Replacement PCA
5CSE-L2-3Y8-RC	80-000705RC-5	80-000705RC-6
5CSE-S2-3Y8-RI	80-000729RI-5	80-000729RI-6
5CSE-H4-3YA-RC	80-000713RC-5	80-000713RC-6
5CSE-H4-3YA-RI	80-000713RI-5	80-000713RI-6
5CSX-H5-4YA-RC	80-000714RC-5	80-000714RC-6
5CSX-H5-4YA-RI	80-000714RI-5	80-000714RI-6
5CSX-H6-42A-RC	80-000642RC-5	80-000642RC-6
5CSX-H6-42A-RI	80-000642RI-5	80-000642RI-6
5CSX-H6-4YA-RC	80-000772RC-5	80-000772RC-6
5CSX-H6-4YA-RI	80-000772RI-5	80-000772RI-6
5CSX-H6-53B-RC	80-000646RC-5	80-000646RC-6

See MitySOM-5CSx Datasheet and Carrier Board Design Guide for migration options across the MitySOM-5CSx family.

## 11 Document Revision History

Date	Version	Change Description
29-Sept-2016	1.0	Initial Version