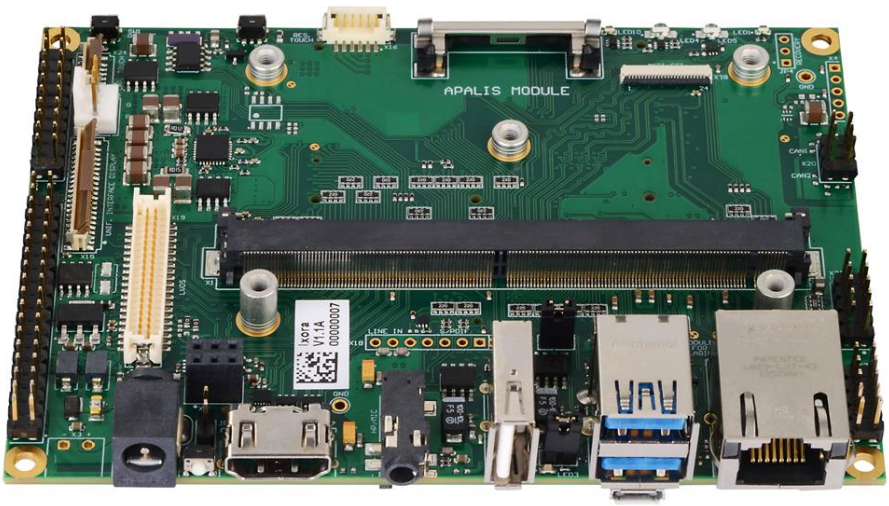
Ixora Carrier Board

Errata Document



Document Revision History

Date	Doc. Rev.	Notes
2017-06-02	Rev. 1.0	Errata #1: Added
2018-04-14	Rev. 1.1	Errata #2: Added
2018-05-11	Rev. 1.2	Errata #1: Modified section 1.1.3 Errata #2: Modified title; Updated description and workaround
2018-12-17	Rev. 1.3	Errata #3: Added
2022-01-11	Rev. 1.4	Adding ticket numbers and customer impact descriptions Errata #4: Added Minor changes

Overview

Errata #1: HAR-527 – HDMI DDC issues with Apalis TK1

Affected Version: **Ixora Carrier Board V1.0**
Ixora Carrier Board V1.1
Ixora Carrier Board V1.2
Ixora Carrier Board V1.3

Fixed in: **Not scheduled**

1.1 Customer impact

In combination with the Apalis TK1, the DDC information of some monitors cannot be read successfully, and therefore, no picture is shown.

1.2 Description

The Apalis TK1 module, combined with the Ixora carrier board, shows issues with some HDMI monitors. In case of failure, the module cannot read the monitor's DDC information and will not show any picture. It depends on the monitor whether the issue appears. In some module/monitor combinations, the problem occurs only when hot-plugging the HDMI cable, while in other cases, the issue also appears when booting the module. The issue only appears if the Apalis TK1 module is combined with the Ixora Carrier Board. Apalis T30 and Apalis iMX6 are not affected by this erratum.

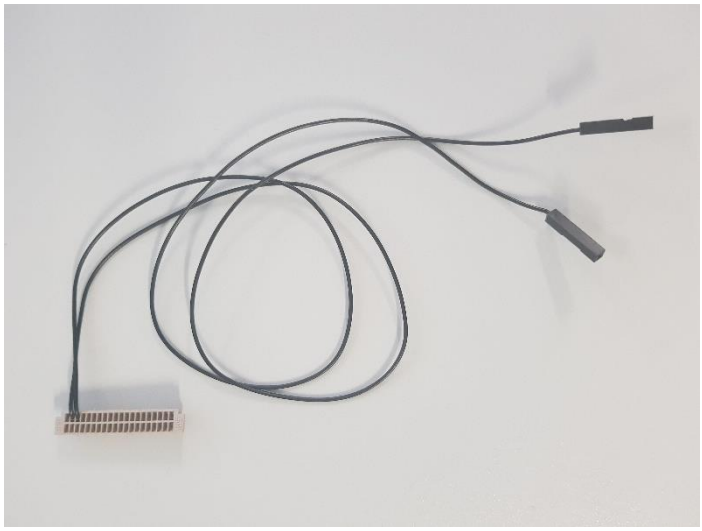
The issue is caused by an incompatible low logic level of the DDC interface. The Ixora board features the Nexperia IP4791CZ12 HDMI ESD protection and level shifter. This device is used for level shifting the 5V HDMI DDC signals to the 3.3V level of the Apalis module. According to the datasheet, the maximum output low-level of this device is 0.92V for the 3.3V level output. The maximum input low-level of the Apalis TK1 2GB V1.1A DDC signals is 0.45V.

1.3 Workaround

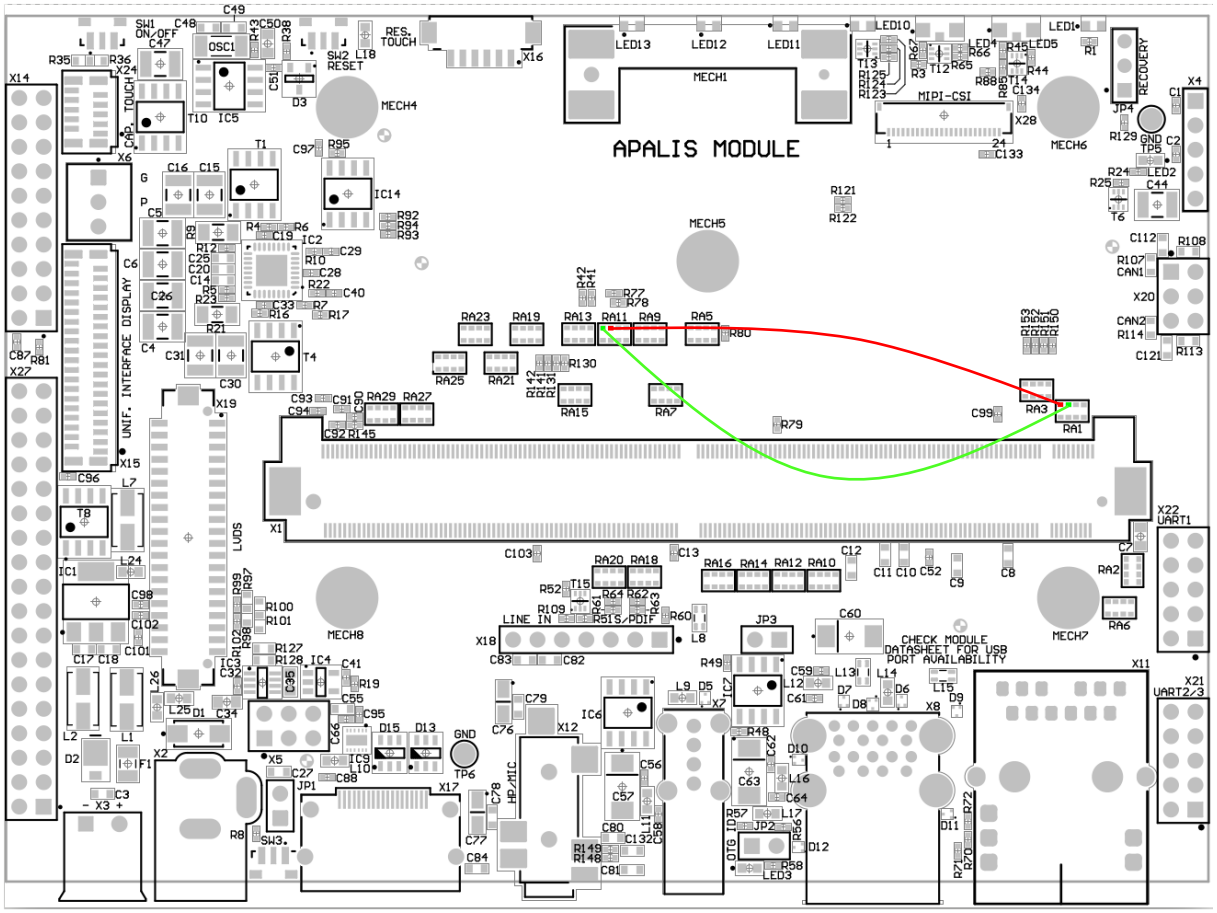
As a temporary workaround for evaluation purposes, using Ixora V1.0 or V1.1 in combination with Apalis TK1 2GB V1.1A, it is possible to patch the DDC signals from the Nexperia level shifter to the GPIO3 (MXM pin 5, DDC_SCL) and GPIO4 (MXM pin 7, DDC_SDA) of the Apalis module. The device tree and kernel must be patched to use these pins as a DDC channel for HDMI. Please don't implement this workaround as a permanent solution, as MXM pin 5 and 7 are not DDC signals by default and might not be available in potential future redesigns of the Apalis TK1 module anymore.

1.3.1 Workaround for Ixora V1.1

The easiest way is to create a cable that connects pins 36 and 38 of the LVDS connector (X19 on Ixora V1.1, mating connector Hirose DF13-40DS-1.25C) to the pins 16 and 15 of the connector X27 on Ixora V1.1 (using normal patch-cable like female connectors, see picture).

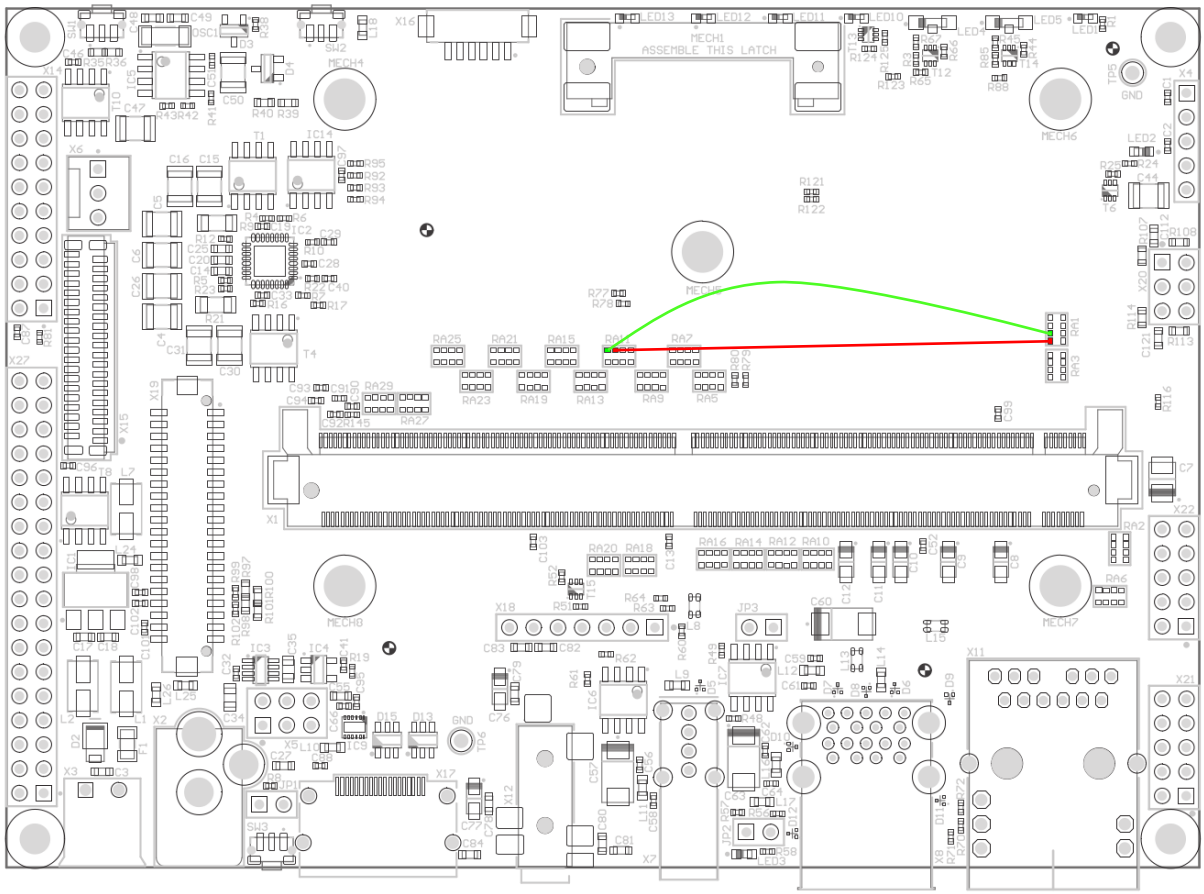


Alternatively, the first two pins of the resistor arrays RA11 and RA1 on Ixora V1.1 can be connected with soldered wires. See the diagram for more details (connect Green to Green, Red to Red):



1.3.2 Workaround for Ixora V1.0:

On Ixora V1.0, the I2C bus connected to the HDMI level shifter is not accessible on any connector. Connecting the signals from the resistor array RA11 to RA1 is the only option. See the diagram for more details (connect Green to Green, Red to Red):



1.3.3 Patches for Ixora (V1.0A and V1.1A) HDMI DDC issue with Apalis TK1 (V1.1A/B and V1.1V):

Please refer to the following developer article for the software workaround patches:
https://developer.toradex.com/knowledge-base/ixora-hdmi-ddc-issues-with-apalis-tk1

1.3.4 Custom Carrier Board Design

A different DDC level shifter than the Nexperia IP4791CZ12 should be used on a custom carrier board design. Ensure the maximum output low signal level of the selected level shifter is compatible with the Apalis TK1 module.
For a possible solution, please have a look at the Toradex Apalis Evaluation Board design data:
http://developer.toradex.com/products/apalis-evaluation-board#design-resources
In the schematics http://docs.toradex.com/102212-apalis-evaluation-board-v1-1-schematics.zip you will find a level shifter solution for DDC signals which works with monitors which have a maximum low output value of 0.446V. This ensures that it remains below 0.45V after the level shifter, which is compliant with the Apalis TK1 V1.0 and V1.1 modules. All our available monitors work well with this circuit.

Errata #2: HAR-1924 – Ixora power supply is not capable of delivering peak power required by Apalis iMX8QM and Apalis TK1 V1.0 under stress

Affected Version: **Ixora Carrier Board V1.0**
Ixora Carrier Board V1.1

Fixed in: **Ixora Carrier Board V1.2**

2.1 Customer Impact

The overcurrent protection can unintentionally trigger and shut down the system in combination with the Apalis iMX8QM or Apalis TK1.

2.2 Description

Ixora Carrier Board (V1.1 and V1.0) power supply is designed to supply a maximum output current of **6.7A at 3.3V rail (Ixora V1.1)** and **5A at 3.3V rail (Ixora V1.0)**. The buck converter on the Ixora Carrier Board features Output Over-Current Protection (OCP), which shuts down the power supply immediately if the output current exceeds the maximum output current limit.

The peak current consumption of the Apalis iMX8QM or Apalis TK1 V1.0 module can be higher than 5A under stress conditions like processor / GPU intensive tasks. Under such conditions, the Ixora Carrier Board power supply might shut down due to OCP limits.

A higher continuous current also results in rising in temperature of the carrier board near the power supply region, which affects the current sense resistor value and lead/solder-joint resistance.

Customers who are evaluating/testing Apalis iMX8QM or Apalis TK1 (V1.0) module with Ixora Carrier Board can use the below-mentioned workaround.

We will develop a new power supply for Ixora Carrier Board that addresses this issue.

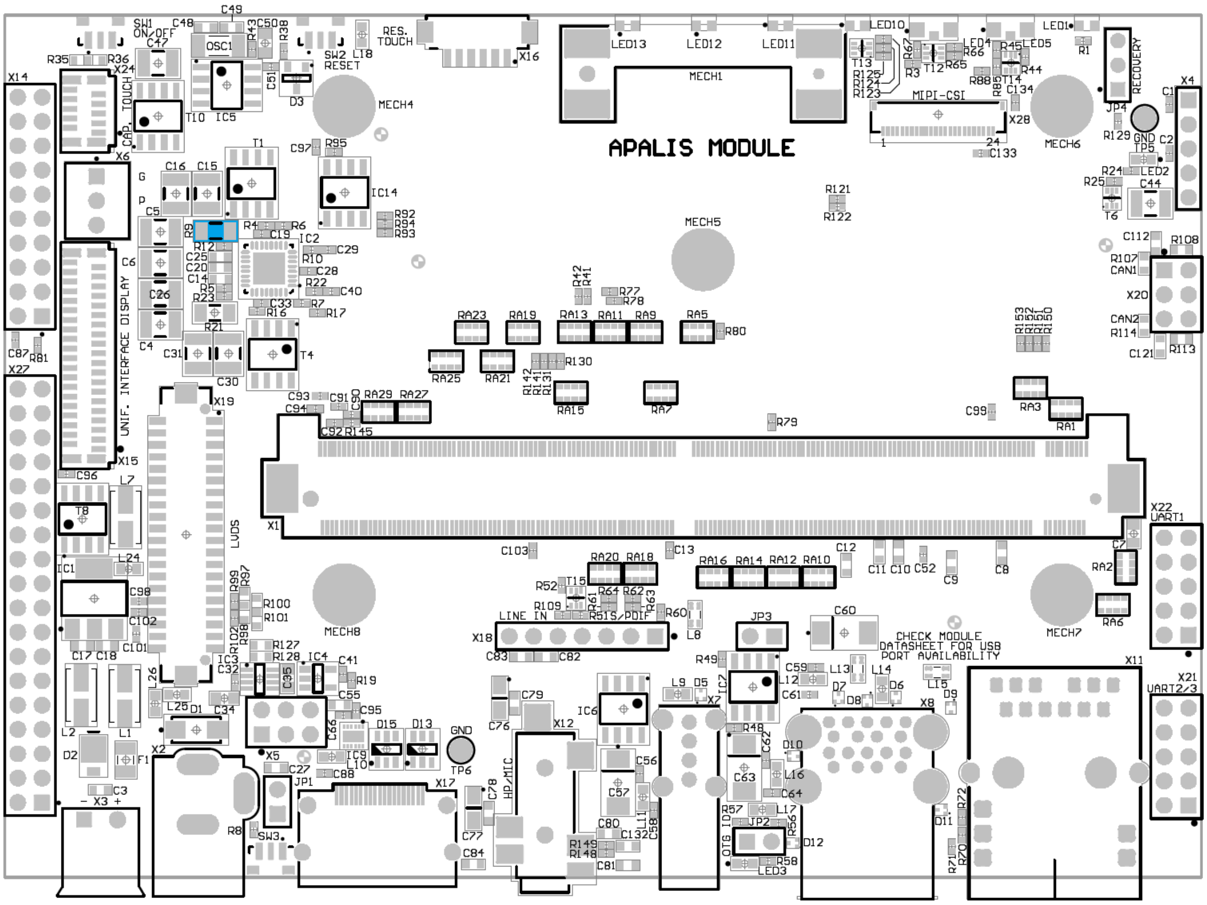
2.3 Workaround

To run the Apalis iMX8QM or Apalis TK1 (V1.0) module on the Ixora Carrier Board, the module performance needs to be reduced by ensuring that the CPU is not fully loaded while the GPU is extensively used.

As a temporary workaround for evaluation/testing purposes, it is possible to increase the output current of the power supply by changing the current sense resistor (R9) on the Ixora Carrier Board (V1.1 and V1.0). A 0Ω (zero ohms) sense resistor can be used to set the output current to maximum, only under lab/evaluation conditions. Please check the current rating of the inductor (L4) and ensure that the output current of the power supply doesn't exceed the rating of the inductor.

With the proposed workaround, the buck converter could be thermally overloaded due to higher continuous (average) current, resulting in overheating or failure of some components on the Ixora Carrier Board.

If required, it is OK to change the current sense resistor in the lab. However, we don't recommend such changes in the field.


APALIS MODULE
CHECK MODULE DATASHEET FOR USB PORT AVAILABILITY
UNIF. INTERFACE DISPLAY
LVDS
MIPI-CSI
LINE IN
HP/MIC
RECOVERY
UART1
UART2/3

Errata #3: HAR-1828 – Ethernet center tap circuit wrongly assembled

Affected Version: **Ixora Carrier Board V1.0**
Ixora Carrier Board V1.1

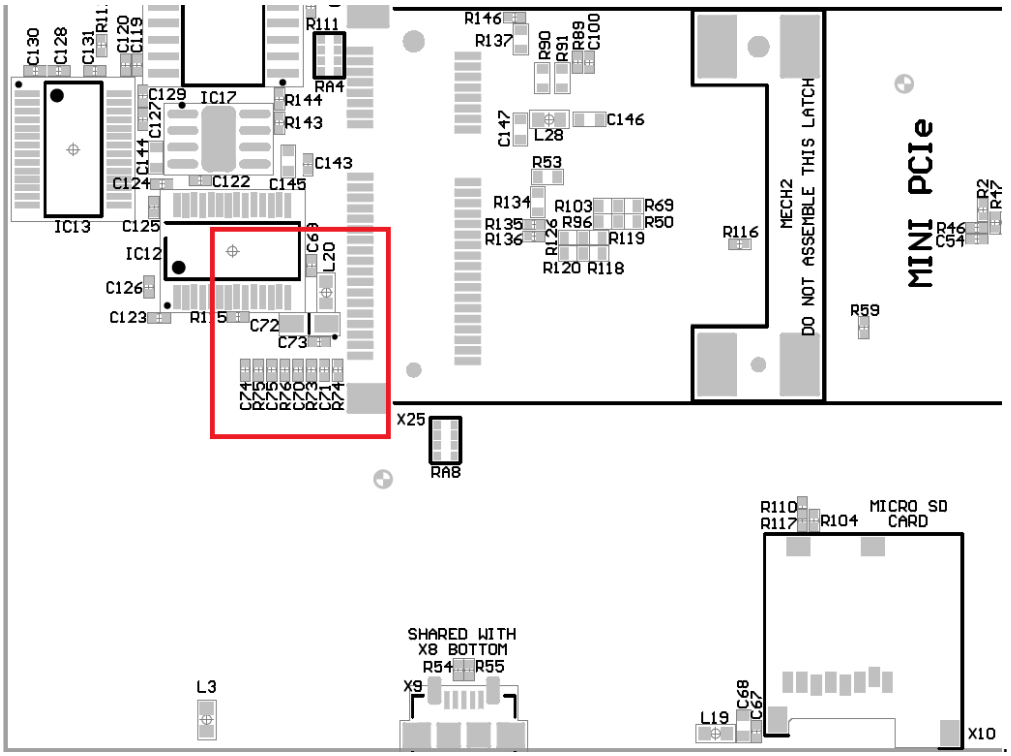
Fixed in: **Ixora Carrier Board V1.2**

3.1 Customer Impact

The Ethernet port fails the compliance test for 10BASE-T. 100BASE-TX and 1000BASE-T are passing.

3.2 Description

All currently available Toradex Apalis modules do not require a center tap voltage. Only 100nF capacitors are required on the center tap pins of the magnetics. Connecting the center tap signals together can degrade the signal quality and is therefore not recommended.
Currently, the center-tap circuit is assembled through R73-R76, C72/C73, and L20. This assembly has a measurable negative influence on the quality of the 10Mbps Ethernet signals on modules with Microchip's KSZ9031 Ethernet PHY. We haven't seen any impact on other PHY's or to 100BASE-TX and 1000BASE-T.



3.3 Patch

We recommend removing R73-R76, C72, C73, and L20 on the bottom of the Ixora Carrier Board. The center tap circuit is not assembled in the newer Ixora Carrier Board versions.

3.3.1 Custom Carrier Board Design

We recommend not to assemble the center-tap circuit. To have a compatible Carrier Board for any future module which requires a center tap voltage, we still recommend having an assembly option of the center tap circuit. Please see the section about Ethernet in our Apalis Carrier Board Design Guide for more details.

Errata #4: HAR-8891 – WAKE1_MICO# is pulled up to 3.3V instead of 3.3V_SW

Affected Version: **Ixora Carrier Board V1.1**
Ixora Carrier Board V1.2
Ixora Carrier Board V1.3

Fixed in: **Not scheduled**

4.1 Customer Impact

There is potential backfeeding from the WAKE1_MICO# pull-up resistor to the Apalis module in the off state. However, the backfeeding current is relatively small since the pull-up resistor is 10k (theoretical maximum is 0.33mA). Therefore, the impact is minimal, and no real issues have been reported.

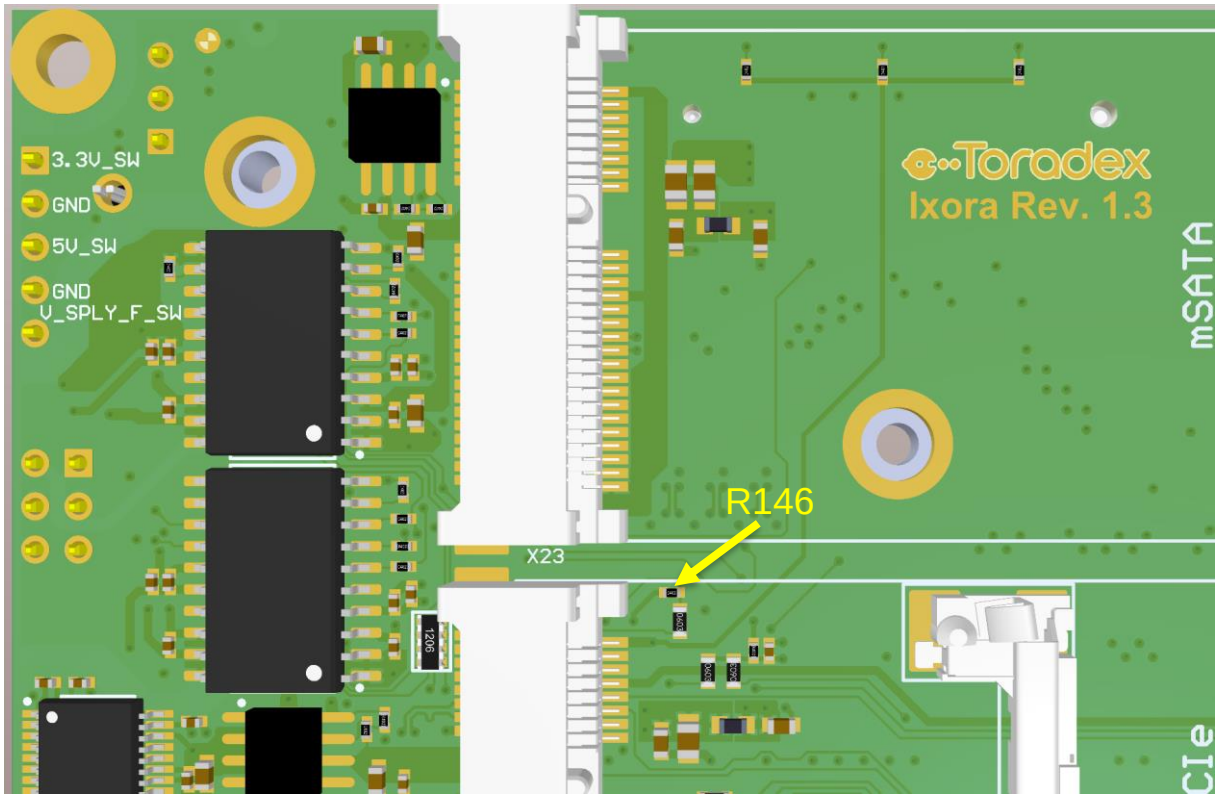
4.2 Description

The WAKE1_MICO# signal is pulled up to the 3.3V rail. The 3.3V rail remains on, even if the module is shut down (off state). The WAKE1_MICO# signal is a regular GPIO with wake capability on the Apalis modules. The IO rail of this GPIO is turned off during the off state. Therefore, a small backfeeding current can exist in the off state from the pull-up resistor into the SoC.

It is recommended to pull up the WAKE1_MICO# to the 3.3V_SW, which is turned off in the off state. The WAKE1_MICO# signal is only used to wake the module from suspend mode (sleep mode). It is not possible to wake the module up from the off state anyway. The module can only be woken up from the off state by the RESET_MICO# signal or a complete power cycle.

4.3 Workaround

The 10k pull-up resistor on the carrier board (R146) can be removed if the internal pull-up resistor in the SoC is enabled or the wake function is entirely disabled. This eliminates backfeeding over the WAKE1_MICO# signal.



Location of R146 on Ixora V1.3 (bottom side)