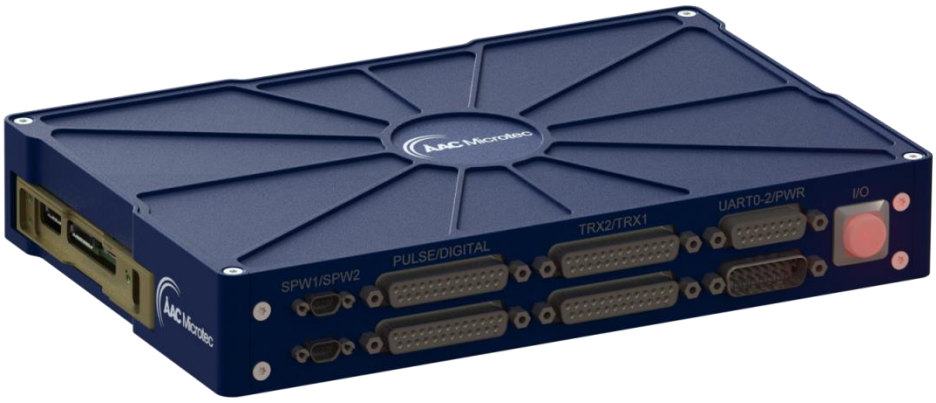
Sirius Development Kit User's Manual

Rev. A



REVISION LOG

Rev	Date	Change description	Prepared
Rev. A	2018-09-17	Released version	F. Persson

TABLE OF CONTENT

1. Introduction

1.1. Reference documents

RD#	Document ref	Document name
RD1	205089	ICD Sirius TCM Rev. A
RD2	205088	ICD Sirius OBC Rev. A
RD3	205065	Sirius OBC and TCM User Manual

1.2. Acronyms and abbreviations

Acronym	Description
ESD	Electrostatic discharge
ICD	Interface Control Document
ÅAC	Ångström Aerospace Corporation

2. Overview

2.1. Contents of delivery

Upon delivery verify that the Sirius development kit contains the following items:

- Sirius Development Kit with assembled TCM or OBC
- ÅAC debugger
- USB cord for ÅAC debugger
- 15-pin male nano-D to 15-pin female D-sub pigtail cable
- 12 V DC-power adapter

2.2. Safety and handling constraints

2.2.1. Intended use

The Sirius Development kit is a piece of laboratory equipment intended for use by qualified personnel and only for development work and electrical ground tests. The equipment shall not be used in any qualification activities or be fitted or connected to flight hardware.

2.2.2. Precautions for manual handling / ESD warnings

The Sirius Development shall be operated in an ESD protected environment. Should this not be possible, the Sirius Development shall be contained properly (e.g. stored in ESD safe packaging).

WARNING! This equipment does NOT comply with the CE marking requirements!

2.2.3. Using a benchtop power supply

If powering the Sirius Development kit with a benchtop power supply or a representative spacecraft power supply model, the maximum input voltage of 15 V must not be violated. The external supply should not have a current limit set below 1.5 A as this can interfere with the internal short circuit protection of the Sirius Development kit.

2.2.4. Connecting / disconnecting of connectors

The user must ensure that the unit is switched off or that the external power supply is disconnected before any connecting or disconnecting of electrical interface connectors is performed.

2.3. Specification

Absolute maximum rating and recommended operating conditions are listed in Sections 2.3.1 and 2.3.2.

2.3.1. Absolute maximum ratings

Parameter	Value			Unit
	Min.	Typ.	Max.	

INPUT SUPPLY				
Input voltage	-	-	18	V
Input current limit	0.5	-	-	A

2.3.2. Operating conditions

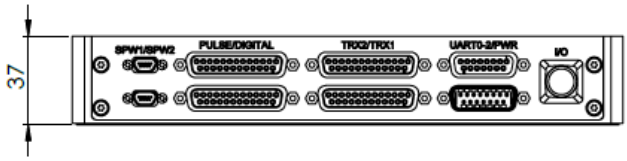
Parameter	Value			Unit
	Min.	Typ.	Max.	
INPUT VOLTAGE				
Input voltage	9.0	12.0	15.0	V
ENVIRONMENTAL				
Operating room temperature	0	-	+40	°C
Operating Pressure	Ambient pressure only			-

3. Mechanical properties

The OBC and TCM development kits have the same base enclosure but use different front panels to match the connectors of the Sirius units. When using more than one Development kit it is possible to stack units on top of the other. A low rim makes sure the Development kits do not slide of each other. Because the base enclosure is the same for both units the footprint is also the same for both units.

Figure 1 - TCM Development kit

Figure 2 - OBC Development kit



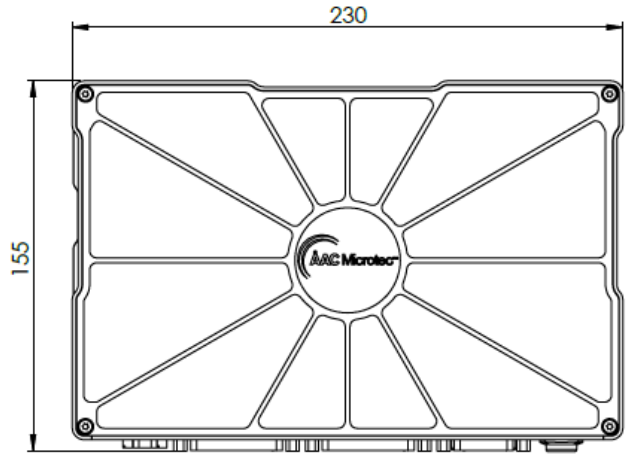


Figure 3 - Development kit Footprint (front view and top view)

4. Operation

Operation of, and development for, the Sirius development kit is done identically to what is described in the *Sirius OBC and TCM User Manual* [RD3] with the exception of powering the unit and connector interfaces.

Power can be supplied to the Sirius Development kit using either the provided DC-power adapter, through the 4 mm connector interface, or through the PWR input DA15 connector. The three inputs are fitted with a diode-OR function which results in power being drawn from the most positive supply connected.

For controlling the power to the Sirius unit, the Sirius Development Kit has an illuminated (Red) external power ON/OFF button that is mechanically latching. Pressing this button will switch on or switch off the unit depending on its previous state. If it is desired to operate the equipment from an externally controllable power supply, the ON/OFF button should be left in the ON state, which as the button is mechanically latching, allows power to be controlled externally.

Whenever switched on, the Sirius unit switches on a Red LED that is visible through the debug and programming hatch.

Connector interfaces on the Sirius Development kit are scaled up from nano-D to standard D-subminiature with the exception of the Spacewire (SPW1 and SPW2) connectors which are configured as ECSS-E-ST-50-12C [RD4] compliant micro-D pin connectors

5. Interfaces

The connector pin-outs can be found in the ICD Sirius TCM [RD2] and ICD Sirius OBC [RD3]. Even though the connectors are different between the OBC/TCM and the Development the pin-out is kept the same. In each section below in Chapter 5 the connector that the user will interface with is described.

5.1. PWR – Power

The power input connector is a DA15 pin connector, see [RD2] and [RD3] for pin-out.

5.2. SPW1 – Spacewire 1

The Spacewire connectors (1 and 2) are both 9-pin Micro-D plug connectors, see [RD2] and [RD3] for pin-out.

5.3. SPW2 – Spacewire 2

The Spacewire connectors (1 and 2) are both 9-pin Micro-D plug connectors, see [RD2] and [RD3] for pin-out.

5.4. ANALOG, Analog input and 3xGPIO (Sirius OBC only)

The Analog input and GPIO connector us a DB25 socket connector, see [RD2] for pin-out.

5.5. DIGITAL, PPS input and 12xGPIO

The Digital connector is a DB25 socket connector, see [RD2] and [RD3] for pin-out.

5.6. UART0-2 - RS422/485

The UART0-2 connector is a DA15 socket connector, see [RD2] and [RD3] for pin-out.

5.7. UART3-5 - RS422/485 (Sirius OBC only)

The UART3-5 connector is a DA15 socket connector, see [RD2] for pin-out.

5.8. TRX1 - RS422 Transceiver interface (Sirius TCM only)

The TRX1 connector is a DB25, socket connector, see [RD3] for pin-out. This connector can, for instance, be used for an S-BAND radio.

5.9. TRX2 - LVDS Transceiver interface (Sirius TCM only)

The TRX2 connector is a DB25, socket connector, see [RD3] for pin-out. This connector can, for instance, be used for an X-BAND or S-BAND radio.

5.10. UMBI – Baseband Umbilical (Sirius TCM only)

The UMBI, umbilical, connector is a 15-pin nano-D socket connector, see [RD3] for pin-out

5.11. Pulse Command Outputs (Sirius TCM only)

The Pulse command output connector uses a DB25, socket connector, see [RD3] for pin-out.

6. Troubleshooting

Issue	Common cause	Procedure
The unit is unresponsive	Unit is not powered	• Verify that a power source is plugged in. • Verify that the status LED of the power button is illuminated. • Verify that the Red power LED on the Sirius unit is illuminated
The unit suddenly became unresponsive	Tripping of internal electronic fuse	• Verify that no short circuit exists in your external harness. • Remove any probes connected to the Sirus unit or connector interfaces • Switch the unit off using the power button or removal of the external power source. • Wait 1 minute to allow for the electronic fuse to reset before reapplying power.

7. Getting started

Below follows 5 easy steps to ready your Sirius Development Kit for use:

1. Start by placing the Sirius Development Kit in an ESD safe environment

2. Power on the board using one of the 3 methods described in Chapter 3
3. Attach the appropriate end of the ÅAC Debugger to the Debug port and the other end of the ÅAC Debugger to a PC
4. Power on the Sirius Development Kit by pressing the Power button on the front panel
5. Your Sirius Development Kit is now ready to be used!

For information regarding getting started with software development and anything further, refer to the Sirius OBC and TCM User Manual [RD3].

8. Extract OBC/TCM EM unit

The extraction of an OBC and a TCM EM unit from the development kit is both performed in the same way. The extraction shall be performed in accordance with the safety and handling constraints stated in Section 2.2. A step-by-step instruction follows below:

1. Disconnect the Debugger and FPGA programmer (if connected)
2. Remove UMBI cable (if connected)
3. Unscrew the 4 screws holding the development kit cover and remove the cover
4. Unscrew the 3 screws attaching the OBC/TCM EM unit to the development kit floor
5. Cut the cable ties holding the cables inside the development kit
6. Carefully lift the OBC/TCM EM unit from the development kit floor
7. Carefully unscrew the nanoD connectors on the OBC/TCM EM unit one-by-one. To not strain the nanoD connectors by unscrewing one of the nanoD screws a little then unscrew the other nanoD screw a little. Continue switching like this between the screws until the nanoD screws are completely unscrewed
8. Your OBC/TCM EM unit is now detached and ready to be used outside of the development kit