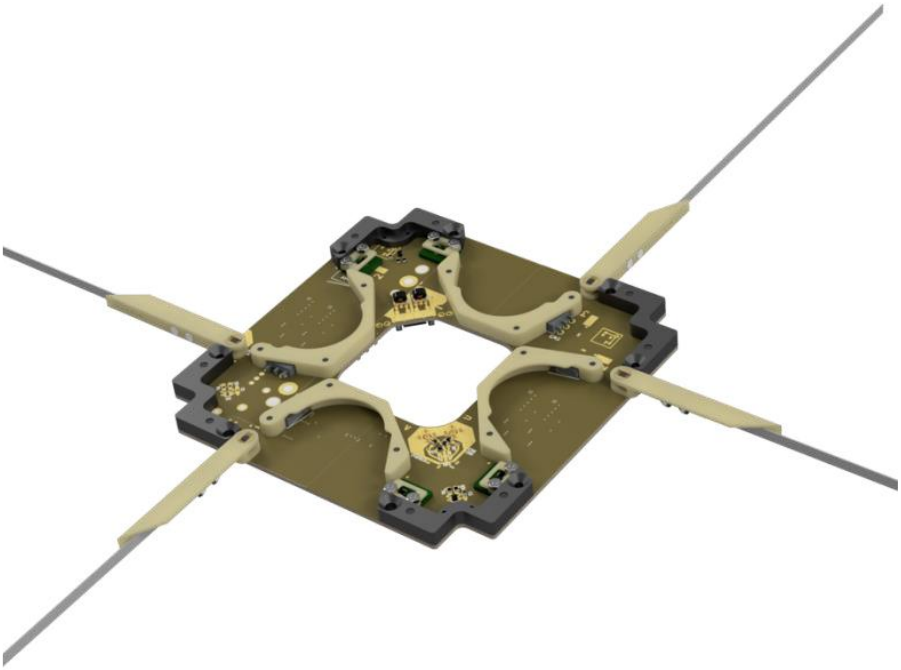

1U SAM
Small Antenna Module

DATASHEET

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GLOSSARY

ASSY	Assembly
CLI	Command Line Interface
CSK	Countersunk
CSP	Cubesat Space Protocol
DWG	Drawing
GND	Ground
ICD	Interface Control Document
PCB	Printed Circuit Board
PEEK	polyetheretherketone
SAM	Small Antenna Module
UHF	Ultra High Frequency
VCC	Voltage at the Common Collector
VHF	Very High Frequency

1 PRODUCT OVERVIEW

The Small Antenna Module (SAM) is the antenna module with the deployable mechanism and two-level deployment safety feature. The module can be configured in several variants listed below.

Configurations options available:

- VHF + UHF dipole
- UHF cross dipole (turnstile)
- VHF cross dipole (turnstile)
- 1x UHF dipole
- 1x VHF dipole
- 2x UHF dipole
- 2x VHF dipole
- 1x UHF V-dipole
- 1x VHF V-dipole

Flight heritage on multiple missions (e.g. LASARsat, CroCube, GRBBeta and external customers).

2 TECHNICAL SPECIFICATION

Table 2-1: Technical specification

Parameter	Value	Unit
Operating Temperature	-40 to +85	°C
Recommended deployment temperature	0 to +40	°C
Dimensions	98 x 98 x 6.2 98 x 98 x 10,1 (incl. components)	mm
Power Supply	5	V
Mass	~55	g
Power Consumption - average	0.075	W
Power Consumption - peak	1.5 (deployment mode)	W

Table 2-2: RF technical specification

Parameter	Value	Unit
VHF Frequency covering	133 - 150	MHz
UHF Frequency covering	380 – 450	MHz
VHF dipole antenna gain	~2.3	dBi
UHF dipole antenna gain	~2.6	dBi
UHF turnstile antenna gain	~2.6	dBi

List of used materials is provided in the Table 2-3.

Table 2-3 Materials found on SAM

Part	Material
PCB	370HR
Module corners	Aluminium EN AW 6061 anodized
Element boxes, String holders	PEEK
Hinges	brass
RF elements	NiTi

3 INTERFACES

3.1 ELECTRICAL

3.1.1 Main connector

Table 3-1: SAM connector type

Placement	Connector type
On module	Molex PicoBlade 53261-0971
Mates with (cable)	Molex PicoBlade 51021-0900

Table 3-2 SAM connector pinout table

Pin	Signal	Description	Direction	Notes
1	I2C SDA	I2C Data signal	Input/Output	CSP communication
2	I2C CLK	I2C Clock signal	Input/Output	CSP communication
3	GND	Power supply ground	Power input	
4	VCC	Power supply	Power input	
5	VCC	Power supply	Power input	
6	GND	Power supply ground	Power input	
7	RS485 B	RS485 driver B signal	Input/Output	CSP communication
8	RS485 A	RS485 driver A signal	Input/Output	CSP communication
9	GND	Power supply ground	Power input	

3.1.2 Debug and programming connector

The debug connector is used for firmware manipulation and debugging purposes.

Table 3-3 Debug connector types

Placement	Connector type
On module	Molex PicoLock 503763-0691
Mates with (cable)	Molex PicoLock 503764-0601 (housing)

Table 3-4: Debug connector pinout table

Pin	Signal	Description	Direction	Notes
1	VCC	Power supply (+3.3 V)	Power input	
2	UART_0_TXD	3.3V level UART	Output	CLI communication
3	UART_0_RX	3.3V level UART	Input	CLI communication
4	SBWTCK	Spy-bi-wire test clock	Input/Output	Programming interface
5	RST#SBWTDIO	Spy-bi-wire data in/out	Input/Output	Programming interface
6	GND	Power supply ground	Power input	

3.1.3 Radio Interface

The radio interface consists of two 50 Ω coaxial connectors (J2 and J3) for direct connection to the onboard transceiver. If only one frequency band is used, only one connector is utilized.

Table 3-5 SAM radio interface connector type

Placement	Connector type
On module	Molex MMCX 73415-1000
Mates with (cable)	Molex MMCX 73415-0950 on RG-178

3.2 SOFTWARE

SAM implements CSP v1 as the main communication protocol on its RS485 and I2C interfaces. The CSP address is always the same as I2C slave address. Additionally, the module includes a command line interface (CLI) for operation and configuration available over debug UART and a CSP service. For software support and development support contact Spacemanic directly.

3.3 MECHANICAL

The SAM is designed to be mounted on the very top or bottom of the CubeSat structure. It is recommended to use four M2.5x8 CSK Head screws. Mounting holes can be found on two sides of the module (Figure 3-1, red circles) These are M2.5 clearance holes.

Additional solar panel can be mounted on the top of the module. Four M2.5x6 screws are required. Mounting holes with the same spacing can be found on the other two sides of the module (Figure 3-1 blue circles). These are M2.5 threaded holes.

The overall dimensions and mounting interface are depicted in Figure 3-2.

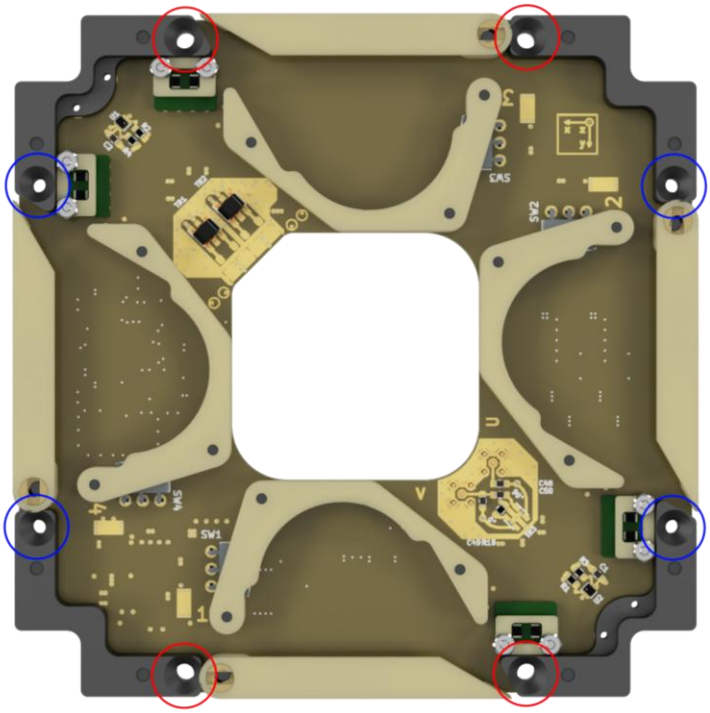

Figure 3-1: Mounting points

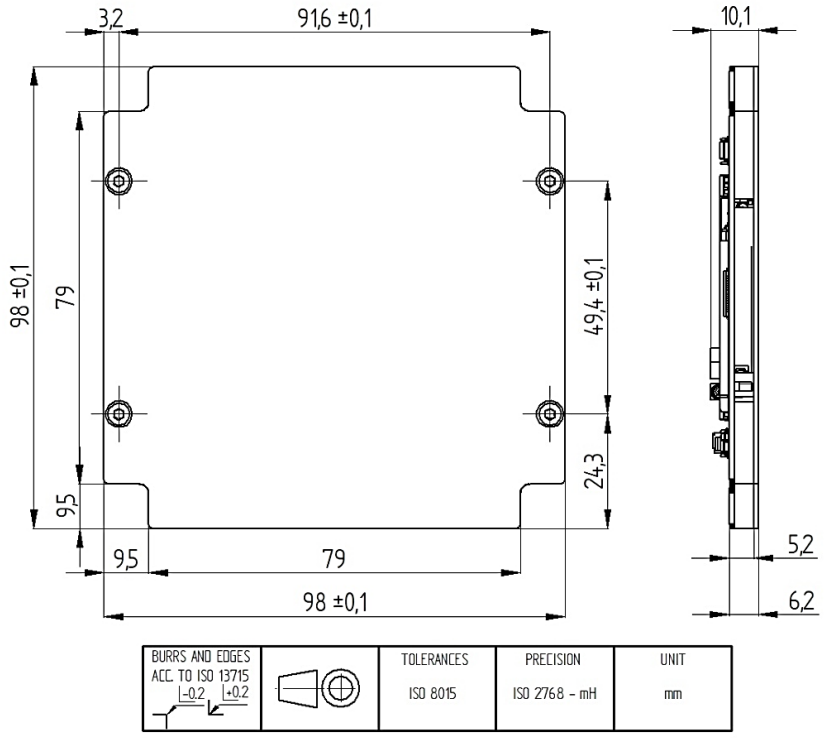

Figure 3-2: SAM Dimensions

4 DELIVERABLES

Table 4-1: Deliverables

Type	Item	Note
Mechanical Part	Top cover aluminium plate	
Wiring	Debug cable	Molex PicoLock 503764-0601 ~15cm terminated to female 2.54mm header
Wiring	Platform cable	Molex PicoBlade 51021-0900 ~15cm open-ended
Wiring	2 pcs of Refurbishment wires per element	e.g. for 4 elements, 8 wires
Tool	Refurbishment 3D printed tool	
Documentation	Interface Control Document	
Support	Engineering support: 1 hour	

5 RELATED PRODUCTS

You may be also interested in:

- Murgas - The UHF / VHF Transceiver
- SAM 6U - Small Antenna Module – *Coming Soon*
- 1-16U CubeSat Platforms / Complete Mission

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