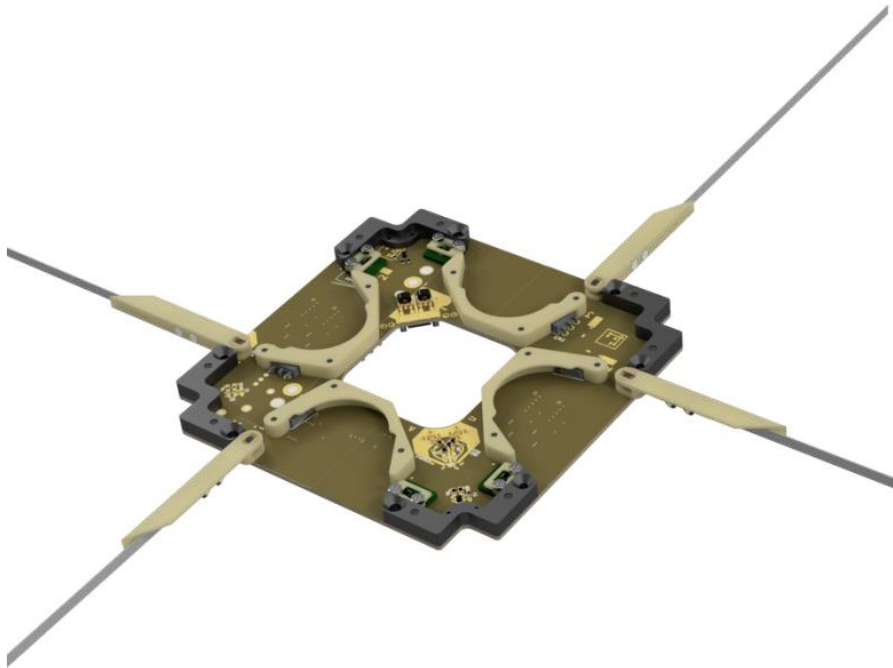




# **SAM S**

# **SATELLITE 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  | Satellite Antenna Module        |
| UHF  | Ultra High Frequency            |
| VCC  | Voltage at the Common Collector |
| VHF  | Very High Frequency             |

## 1 PRODUCT OVERVIEW

The Satellite 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<br>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<br>503763-0691              |
| Mates with (cable) | Molex PicoLock<br>503764-0601<br>(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  $\Omega$  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<br>73415-1000              |
| Mates with (cable) | Molex MMCX<br>73415-0950 on<br>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.

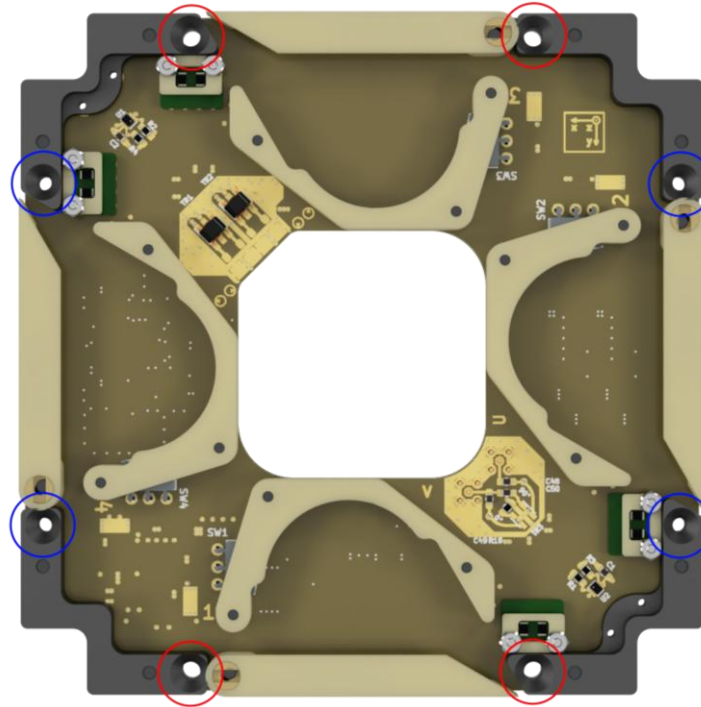


Figure 3-1: Mounting points

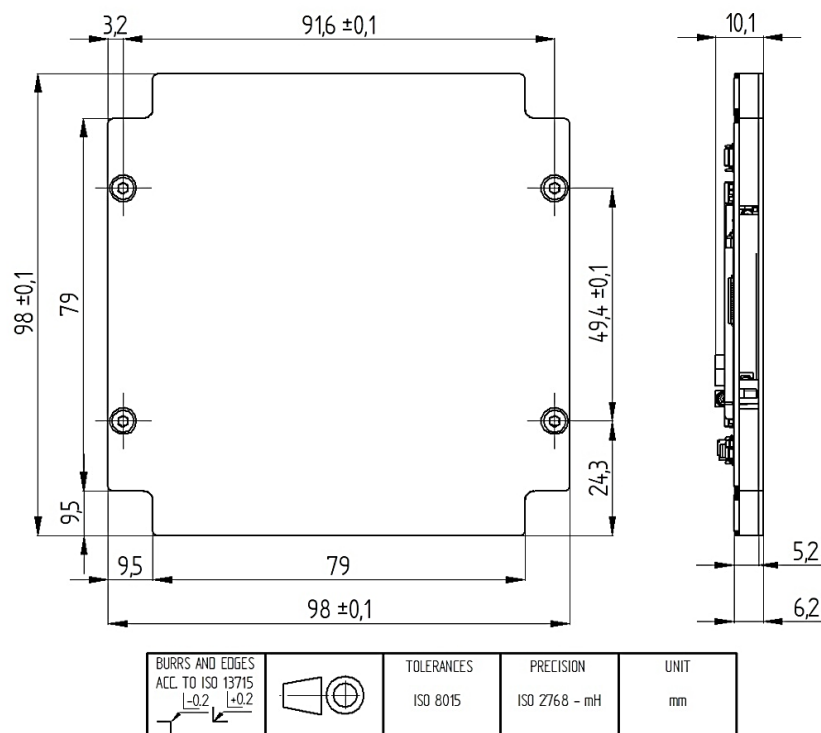


Figure 3-2: SAM Dimensions

## 4 DELIVERABLES

Table 4-1: Deliverables

| Type            | Item                                     | Note                                                                   |
|-----------------|------------------------------------------|------------------------------------------------------------------------|
| Mechanical Part | Top cover aluminium plate                |                                                                        |
| Wiring          | Debug cable                              | Molex PicoLock 503764-0601<br>~15cm terminated to female 2.54mm header |
| Wiring          | Platform cable                           | Molex PicoBlade 51021-0900<br>~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              |                                                                        |

### 4.1 AFFIRMATION NOTE

COAX is **not** included

## 5 RELATED PRODUCTS

You may be also interested in:

- [Murgas - The UHF / VHF Transceiver](#)
- SAM M - Satellite Antenna Module – *Coming Soon*
- [1-16U CubeSat Platforms / Complete Mission](#)

## 6 DISCLAIMER

Spacemanic shall not be liable for any damages, losses, delays, or other consequences arising from improper use, unauthorized modifications, or incompatibility of the product with other systems, even in cases where these products are deployed in demanding environments such as satellite or space applications. The product is designed for specific use according to the technical specifications outlined in the official documentation, and the company is not responsible for any issues arising from usage beyond this scope.

The company is also not liable for damages caused by external factors that cannot be predicted or controlled, including but not limited to infrastructure failures, space conditions (e.g., radiation, microgravity), natural disasters, human error, unauthorized third-party interference, or unplanned changes in regulatory or legal requirements.

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