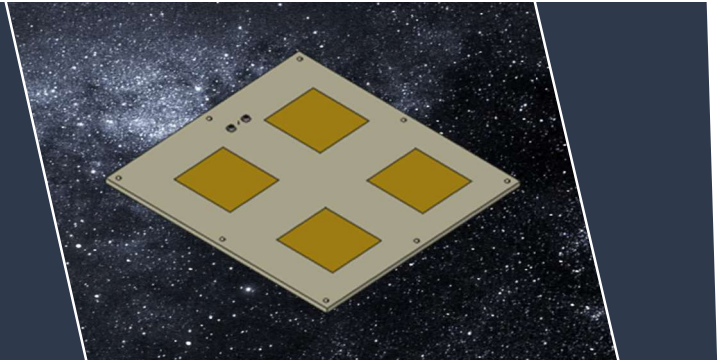


S Band Patch Antenna with SMA Interface Control Document

- Quad Patch Antenna with SMA
- 160 x 160 mm, 2220 MHz

HIGHLIGHTS

- Circular polarization (RHCP)
- TRL 9 for basic design with Flight Heritage since 2017
- High gain 11.5 dBi
- Robust design



This **COTS antenna** is designed for small satellite applications to realize high performance satellite radio links.

With circular polarization, the antenna provides a robust antenna solution regarding the steering accuracy to the ground station antenna and in case of a randomly rotation of wave polarization plane by refracts of the ionosphere.

As RF connectors, connectors of type SMA Female (manufacturer RADIALL) are used. Upon request and after detailed negotiation, suitable RF feeder cables could be provided optionally.

A proper mounting of the antenna can be provided by screws.

The antenna backside shall be grounded properly to the satellite chassis.

As dielectric, ROGERS™ laminate for space applications is used. Patches and conductors are copper with gold surface finish.

With the basic design, TRL9 has been achieved with various successful LEO missions.

FEATURES

- Flight grade tested design
- Patch antenna design matched to customer specific frequencies
- Short delivery time

KEY SPECIFICATIONS

Rx center frequency:
2.220 GHz

RF bandwidth Tx:
30 MHz

**Maximum gain:
(main direction)**
11.5 dBi

Beam width:
±24° x ±24°

RF power input:
< 4 W

VSWR:
< 1.43 min.
< 1.8 typical for freq. range

Impedance
50 Ω

Polarization:
RHCP

**Temperature range:
(operationally)**
-40°C ...+85°C

Mass:
≈ 187 grams

Type:
Quad patch

Connector type:
SMA

**Outer dimensions
(x/y/z, w/o connector):**
160 x 160 x 3.4 mm³

Document Information			
Action	Name / Signature	Company	Date
Prepared by	SPI Stefan Pirwitz	IQ spacecom	2023-10-31
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Issue	Date	Page and/or paragraph affected	Change description	Responsible
00	2023-05-25		Initial issue	Author BBH
01	2023-06-15		Revised	Author BBH
02	2023-10-31		Update Drawing Fig. 1,	SPI
03	2024-02-26		Data sheet design updated	TSO
04	2026-04-21		Updated wording	JML
05	2026-06-25	1	Updated wording	TMA

Mechanical Dimensions

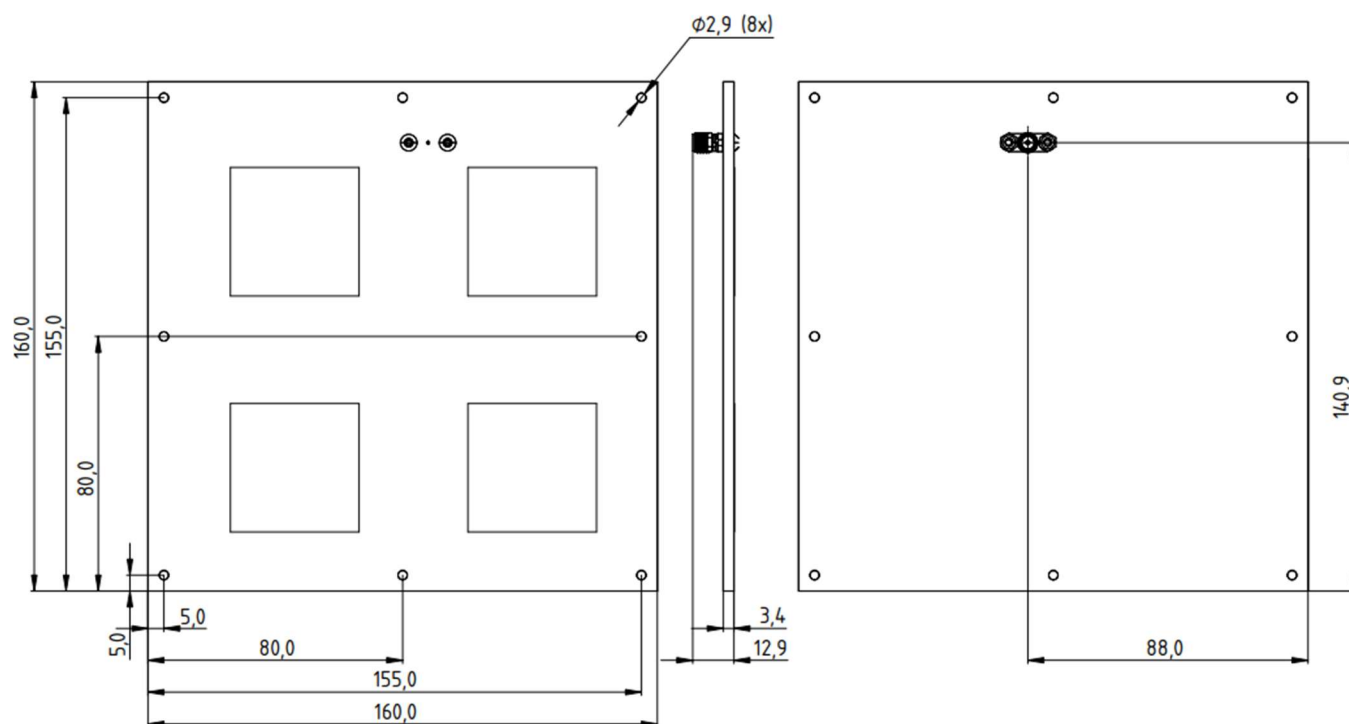


Figure 1: Mechanical dimensions and positions of RF connectors. All tolerances for all mechanical dimensions are $\pm 0.1\text{mm}$, for connector $\pm 0.5\text{mm}$ and high (z-dimension) $\pm 10\%$. These are based on manufacturing tolerances by the PCB manufacturer.

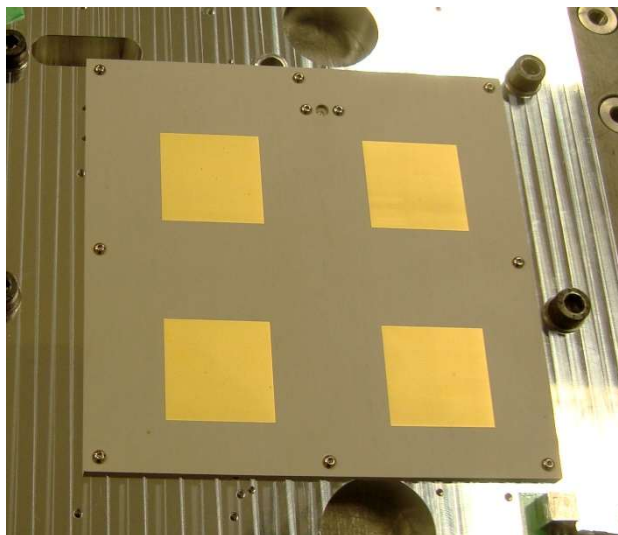


Figure 2: Antenna realization (example)

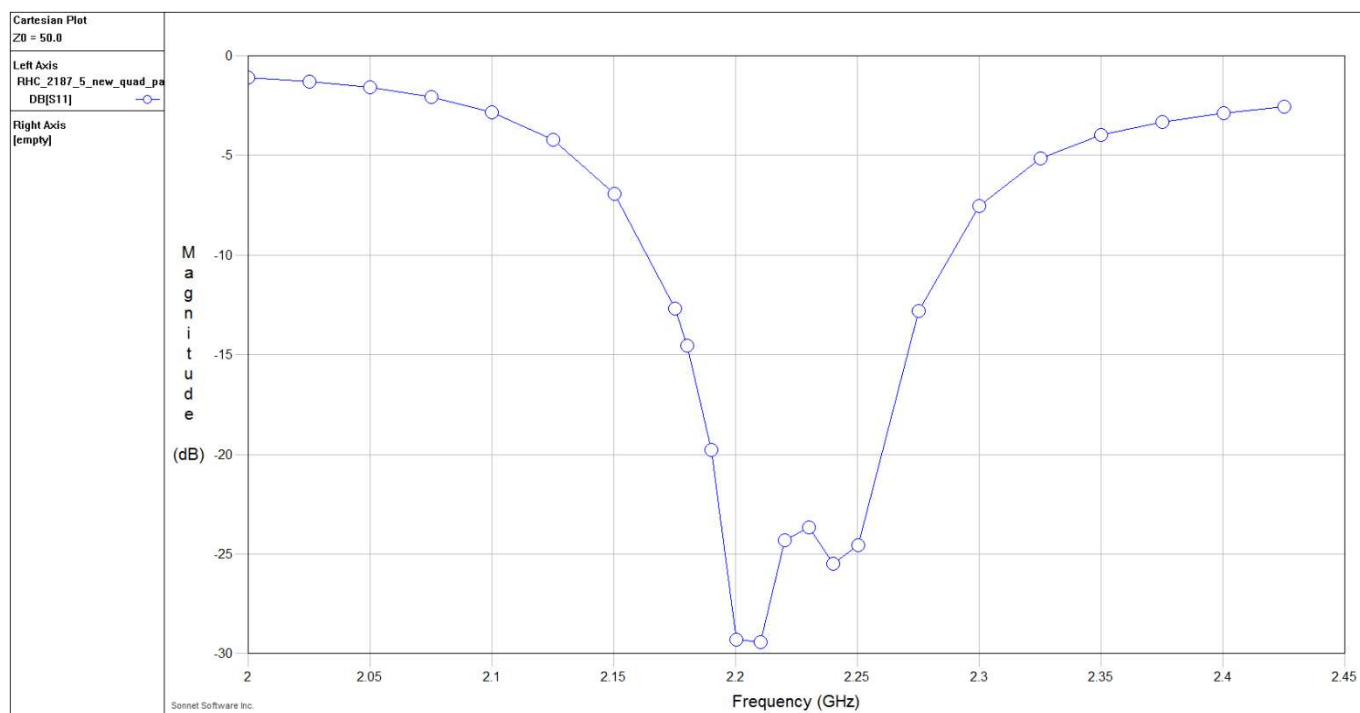


Figure 3: Simulation results of impedance matching (S11, blue)

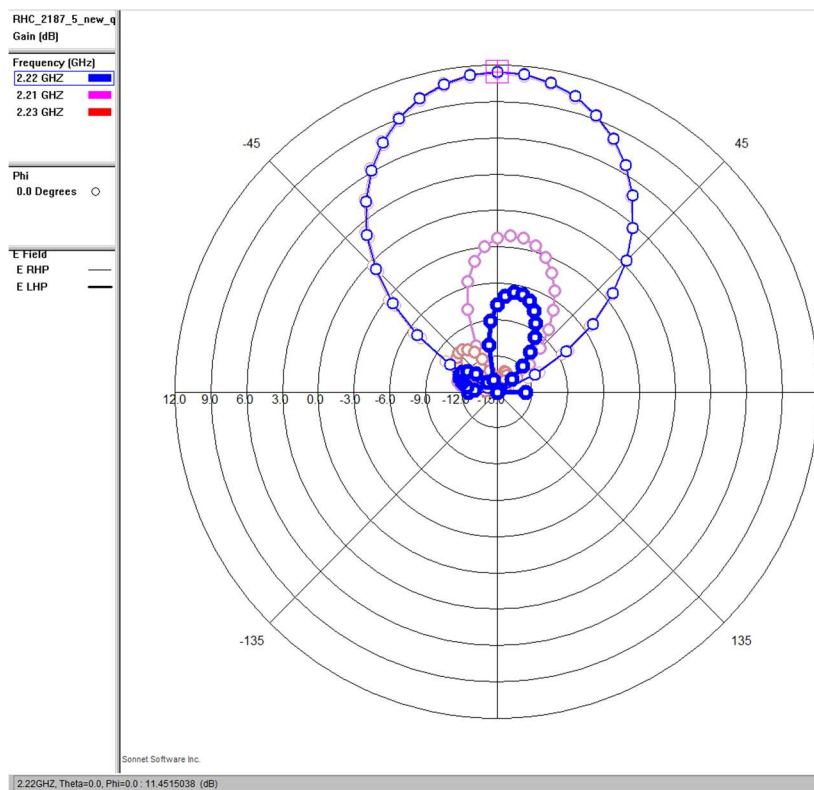


Figure 4: Simulation results of antenna pattern 0°, RHC vs. LHC (bold)

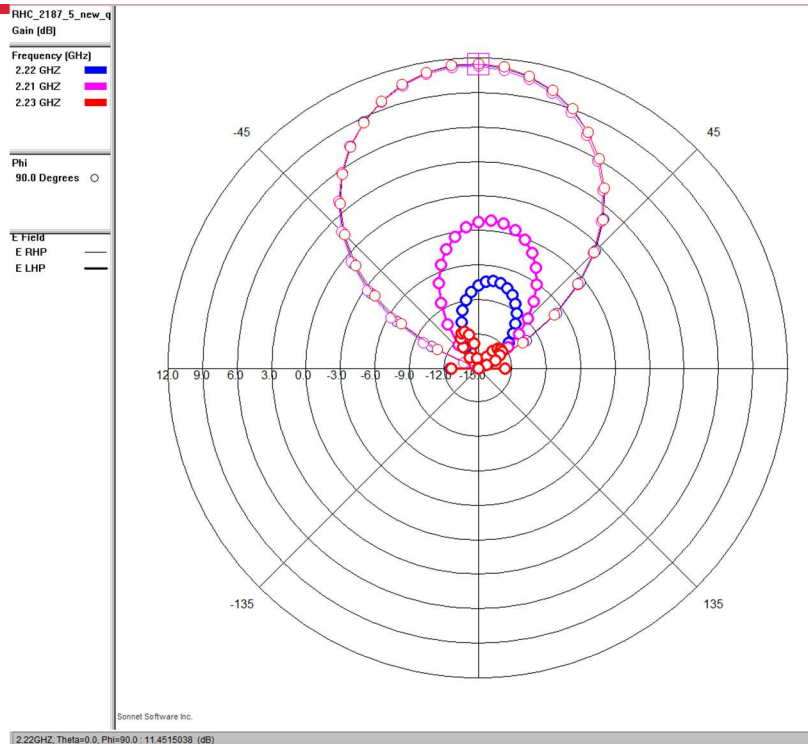


Figure 5: Simulation results of antenna pattern, 90° RHC vs. LHC (bold)

Interfacing and Mounting Hints for the Antenna

Please use suitable screws and washers according to your specific requirements for mounting the antenna to the satellite chassis. Mounting of the antenna is by 4 of those screws and washers with positions as indicated in figure 1. Please ensure that the mounting area is plane.

A step file for the antenna could be provided on request.

CAUTION:



Although all external interfaces are protected against ESD, proper precautions and grounding must still be observed when handling the device. Antenna backside and outer conductors of RF connectors and feeders have electrical ground potential. They should be connected properly to satellite chassis (ground).

CAUTION:



When interfacing and operating the antennas with radio transmitters, generators or similar equipment, special care is required regarding a potential irregular radio wave radiation. Please ensure that maximum power ratings are kept. RF interfaces to be connected to the antenna ports shall be free of DC.

Please make sure that no obstacles are arranged or mounted in beam direction of the antenna patches.

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