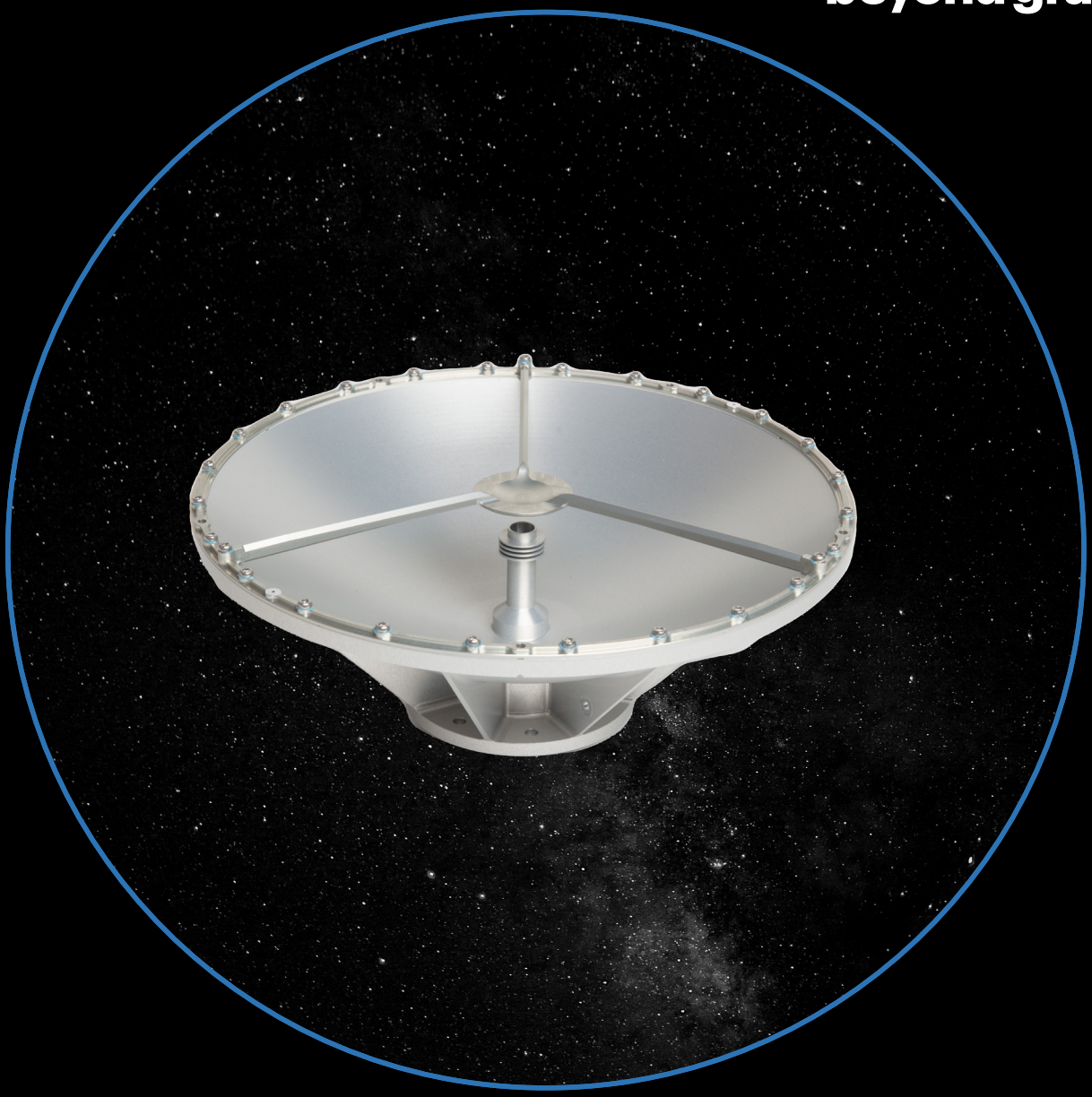
beyond gravity



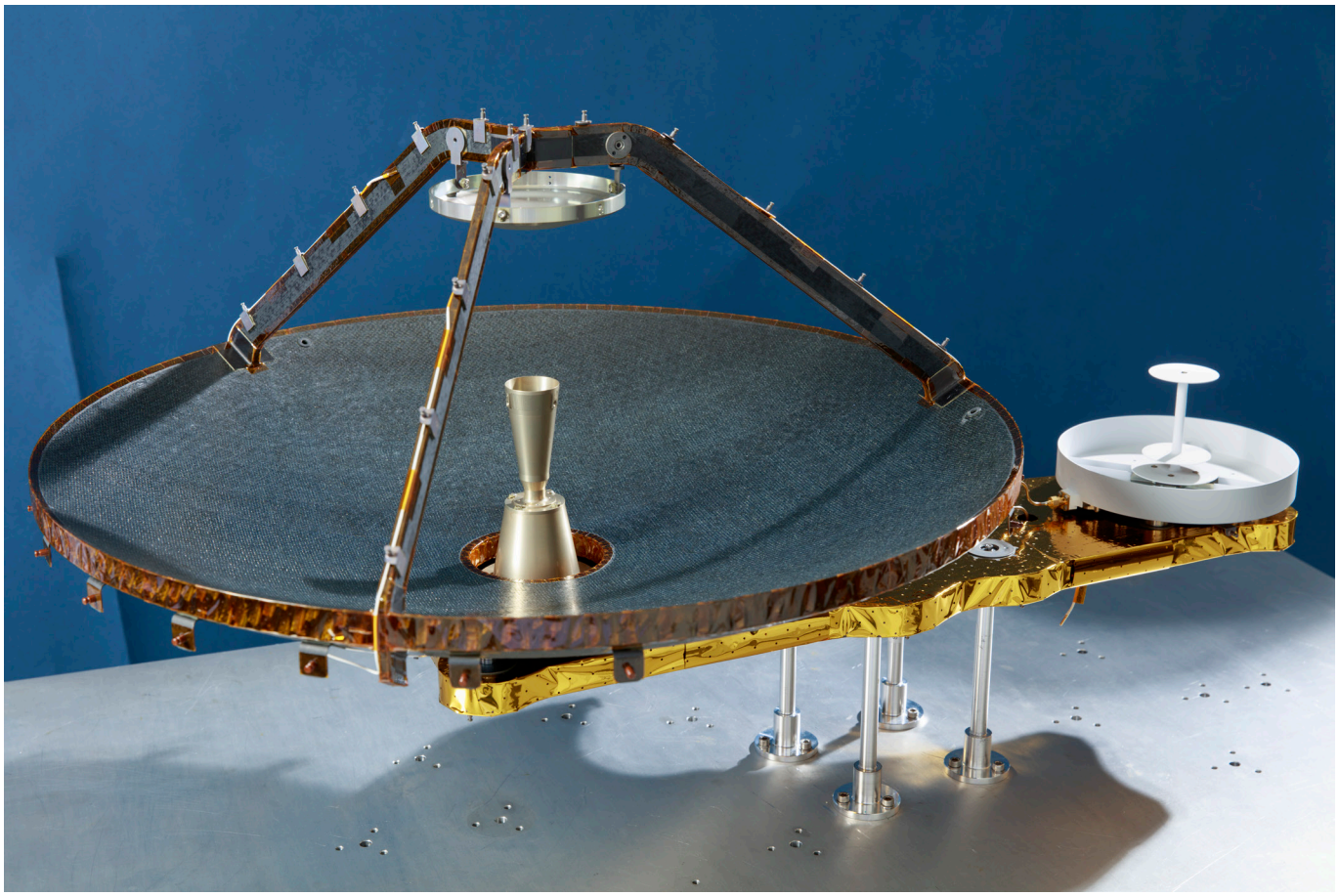
K-band Link Antennas

Enabling high data rate links from earth to orbit and beyond as well as inter satellite, our K-band all-metal reflector antennas provide cost-effective solutions.

Beyond Gravity Space has been developing world class reflector antenna products since the early 1980s within numerous programs, involving applications in deep-space science, earth observation, and telecommunications.

Building on our extensive design heritage, a new product line of K-band all-metal reflector antennas suitable for mechanically steerable link systems has been developed and space qualified.

For missions requiring other frequency ranges for the link, the products as presented below can easily be adapted for other frequency bands at the same time as the qualification status is kept.



Part of our design heritage is the K-band High Gain Antenna (HGA) for the James Webb Space Telescope (JWST). As the successor of the Hubble Space Telescope, JWST was launched in December 2021.

0.22 m diameter K-band all-metal reflector antenna

Beyond Gravity Space has developed and space qualified a small (0.22 m diameter) K-band all-metal reflector antenna for the MetOp-SG program.

The antenna is suitable for mounting on an antenna pointing mechanism (APM) for mechanically steerable data downlink systems, but can also be used for fixed mounting.

The all-metal concept is based on a reflector dish with an integrated feed horn, a sub-reflector integrated tripod, and a polarizer. The antenna is designed for high power transmission at K-band (25.5 - 27 GHz).

PIM is prevented via a high pressure flange between the septum polarizer and the reflector. The standard antenna is circularly polarized (RHCP or LHCP), with the unused port of the septum polarizer terminated. The design can easily be changed to dual polarization operation by adjusting the septum polarizer design only.

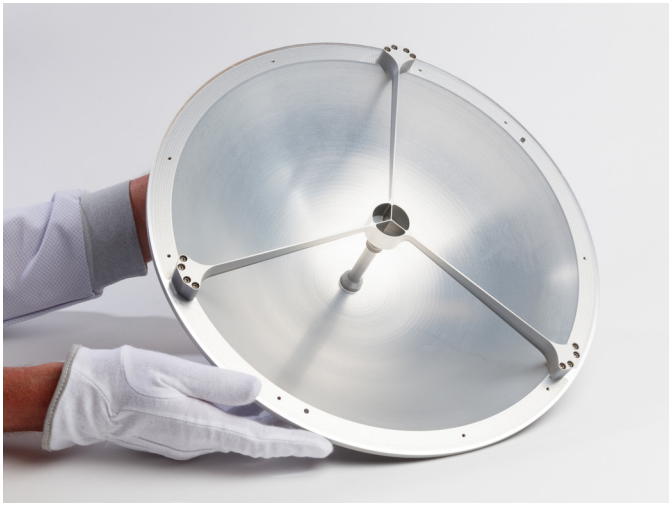
The performance of the reflector antenna is detailed in the table below.

Technical data

Parameter	Performance
Frequency	25.5 - 27.0 GHz
Polarization	RHCP or LHCP (dual polarized optionally)
Boresight gain	32.6 dBi (25.5 GHz) - 33.3 dBi (27 GHz)
Edge-of-Coverage gain	@ ±0.5°: 32.3 dBi (25.5 GHz) – 33.0 dBi (27.0 GHz) @ ±0.75°: 32.0 dBi (25.5 GHz) – 32.6 dBi (27.0 GHz) @ ±1.0°: 31.6 dBi (25.5 GHz) – 31.2 dBi (27.0 GHz)
Cross polarization discrimination	> 29 dB within ±1.0° (25.5 – 27.0 GHz)
Return loss	> 25 dB
RF interface	WR-42 (WR-34 optionally)
Power handling (average power)	30 W
Overall height	< 92.2 mm
Diameter	< 222 mm
Mass	< 0.50 kg
Mechanical interface	8 x M4 screws, 2x dowel pins
First eigenfrequency	> 359 Hz
Thermal environment	–150°C to +150°C

0.4 diameter K-band all-metal reflector antenna

Beyond Gravity Space has developed and space qualified a 0.4m diameter K-band all-metal reflector antenna for a US Government program. The antenna is suitable for mounting on an antenna pointing mechanism (APM) for mechanically steerable data downlink systems, but can also be used for fixed mounting.

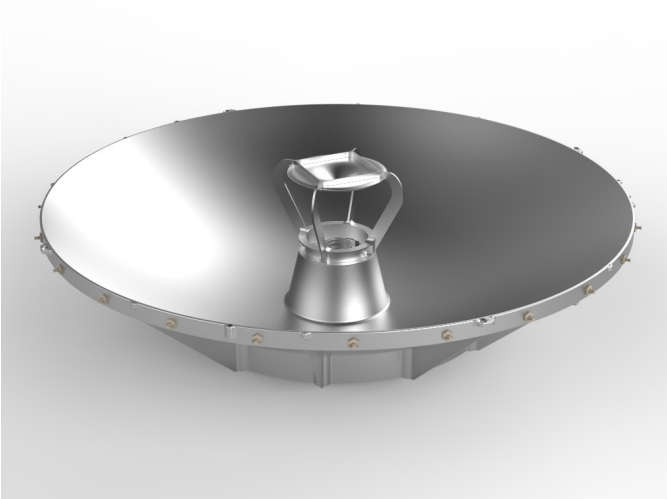


Technical data

Parameter	Performance
Frequency	25.5 - 27.0 GHz
Polarization	RHCP or LHCP (dual polarized optionally)
Boresight gain	37.2 dBi (25.5 GHz) - 37.7 dBi (27 GHz)
Edge-of-Coverage gain	@ ±0.5°: 36.4 dBi (25.5 GHz) – 36.8 dBi (27.0 GHz) @ ±0.75°: 35.5 dBi (25.5 GHz) – 35.8 dBi (27.0 GHz) @ ±1.0°: 34.3 dBi (25.5 GHz) – 34.5 dBi (27.0 GHz)
Cross polarization discrimination	> 22 dB within ±1.0° (25.5 – 27.0 GHz)
Return loss	> 25 dB
RF interface	WR-34 (WR-42 optionally)
Power handling (average power)	40 W
Overall height	< 140 mm
Diameter	< 400 mm
Mass	< 1.35 kg
Mechanical interface	9 x M5 screws, 2x dowel pins
First eigenfrequency	> 300 Hz
Thermal environment	–140°C to +150°C

0.6 m diameter K-band all-metal reflector antenna

Beyond Gravity Space has developed and space qualified a 0.6 m diameter K-band all-metal reflector antenna for an ongoing ESA science mission.
The antenna is suitable for mounting on an antenna pointing mechanism (APM) for mechanically steerable data downlink systems, but can also be used for fixed mounting.



Technical data

Parameter	Performance
Frequency	25.5 - 27.0 GHz
Polarization	RHCP or LHCP (dual polarized optionally)
Boresight gain	41.0 dBi (25.5 GHz) – 41.3 dBi (27 GHz)
Edge-of-Coverage Gain	@ ±0.5°: 39.4 dBi (25.5 GHz) – 39.6 dBi (27.0 GHz) @ ±0.75°: 37.3 dBi (25.5 GHz) – 37.2 dBi (27.0 GHz) @ ±1.0°: 34.0 dBi (25.5 GHz) – 33.3 dBi (27.0 GHz)
Cross polarization discrimination	> 22 dB within ±0.75° (25.5 – 27.0 GHz)
Return loss	> 25 dB (25.5GHz – 26.5 GHz) > 20 dB (26.5 GHz – 27 GHz)
RF Interface	WR-42 (WR-34 optionally)
Power handling (average power)	> 60 W
Overall height	< 160 mm (148 mm w/o SLI)
Diameter	< 575 mm
Mass	< 1.75 kg
Mechanical interface	12 x M5 screws, 2x dowel pins
SLI interface	24 threaded stand-offs with clip-washers (Vespel)
First eigenfrequency	> 300 Hz
Thermal environment	–150°C to +150°C

0.4 m diameter K-band all-metal reflector antenna

Beyond Gravity Space are developing a 0.4 m diameter K-band all-metal reflector antenna for the ongoing EU Galileo second generation mission. The antenna is suitable for mounting on an antenna pointing mechanism (APM) for mechanically steerable data downlink systems, but can also be used for fixed mounting.

Technical data

Parameter	Performance
Frequency	22.5 - 23.5 GHz
Polarization	RHCP or LHCP (dual polarized optionally)
Boresight Gain	35.1 dBi (22.5 GHz) - 35.5 dBi (23.5 GHz)
Edge-of-Coverage Gain	@ ±0.25°: 35.0 dBi (22.5 GHz) – 35.4 dBi (23.5 GHz) @ ±0.5°: 34.6 dBi (22.5 GHz) – 35.0 dBi (23.5 GHz)
Cross Polarization Discrimination	> 25 dB within ±0.5°
Return loss	> 25 dB
RF Interface	WR-34 (WR-42 optionally)
Power Handling (Average Power)	> 40 W
Overall height	< 120 mm
Diameter	< 350 mm
Mass	< 1 kg
Mechanical Interface	12 x M5 screws, 2x dowel pins
First Eigenfrequency	> 400 Hz
Thermal Environment	–150°C to +150°C

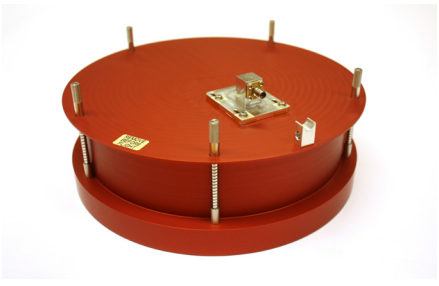
Integration with antenna pointing mechanisms

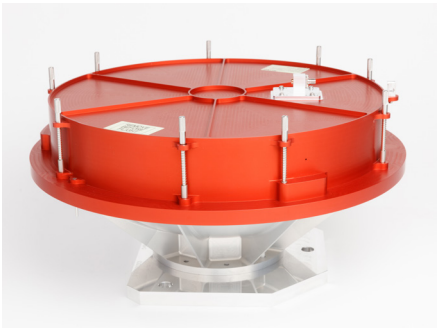
Beyond Gravity Space provides the reflector antennas to customers that integrate the antenna with suitable antenna pointing mechanisms (APM). The mechanical interface to the APM is through numerous bolts on a pitch circle diameter, and the RF interface is through a waveguide flange.

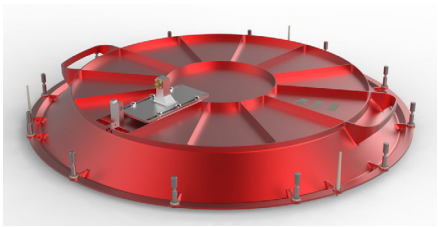
Interface details, e.g. CoG/MoI and Interface Control Drawing (ICD), as well as detailed RF performance can be supplied on request.

Test hats (test caps)

High power test hats for ambient and thermal vacuum environments can be provided to facilitate a welldefined RF test environment, while ensuring low leakage for maintaining electromagnetic compatibility and occupational safety.







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