

# Status of the future RAEGE station at Gran Canaria

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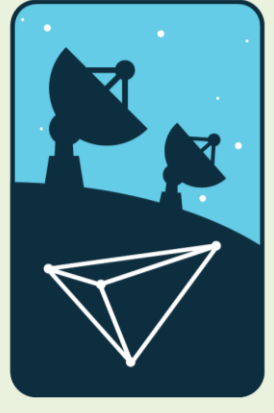
## THE RAEGE PROJECT

Each RAEGE station will have:

- VGOS 13.2m diameter radiotelescope equipped with a broadband (2-14GHz) receiver for geodetic VLBI.
- Gravimeter
- Permanent GNSS station
- Satellite Laser Ranging system (only at Yebes)

### Radiotelescope specifications:

- Max. azimuth, elevation speed: 12°/s, 6°/s.
- Acceleration: 3°/s<sup>2</sup>
- Frequency operation range: up to 40 GHz.
- Path length error < 0.26 mm.
- Elevation, azimuth movement range: 0 - 100°, 0 - 540°
- Pointing accuracy < 16 arcsec
- Power consumption < 170 kW
- Aperture efficiency > 60 % @ 8 GHz (using VGOS receiver).



RAEGE  
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Figure 1. RAEGE network station map



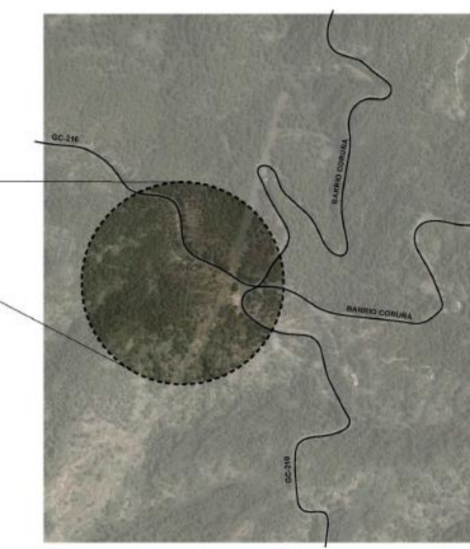
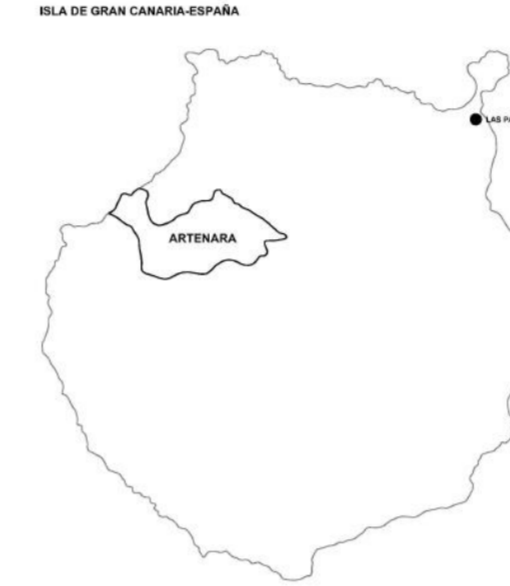
## FUTURE ARTENARA RAEGE SITE (GRAN CANARIA)

Several factors were considered for the selection of the RAEGE Gran Canaria site:

- High altitude (1100 m a.s.l)
- Low humidity
- Low RFI
- Public owned terrain
- Electrical infrastructure available

The ground below the future antenna is geologically stable. The site is located on old ignimbrite rocks with various million years. Most recent volcanic activity is far from the site and the probability of a future volcanic eruption on the island is of lower than 1% for the next 100 years.

Location



(Eva Llorca, Arquitectura S.L.)



Figure 2. RAEGE station at Artenara (artistic view).

### RFI MEASUREMENT CAMPAIGN

The RAEGE Gran Canaria site was chosen after an intensive RFI measurement campaign around the island. At the center of Gran Canaria there are some military and meteorological radars whose electromagnetic radiation covers most of the island so it was hard to find a suitable place with low RFI levels. Eventually Artenara was chosen as it is shadowed by a nearby mountain from the radar, and as it is in the border of a Natural Park, the electromagnetic pollution is guaranteed to remain as low as possible for the future years.

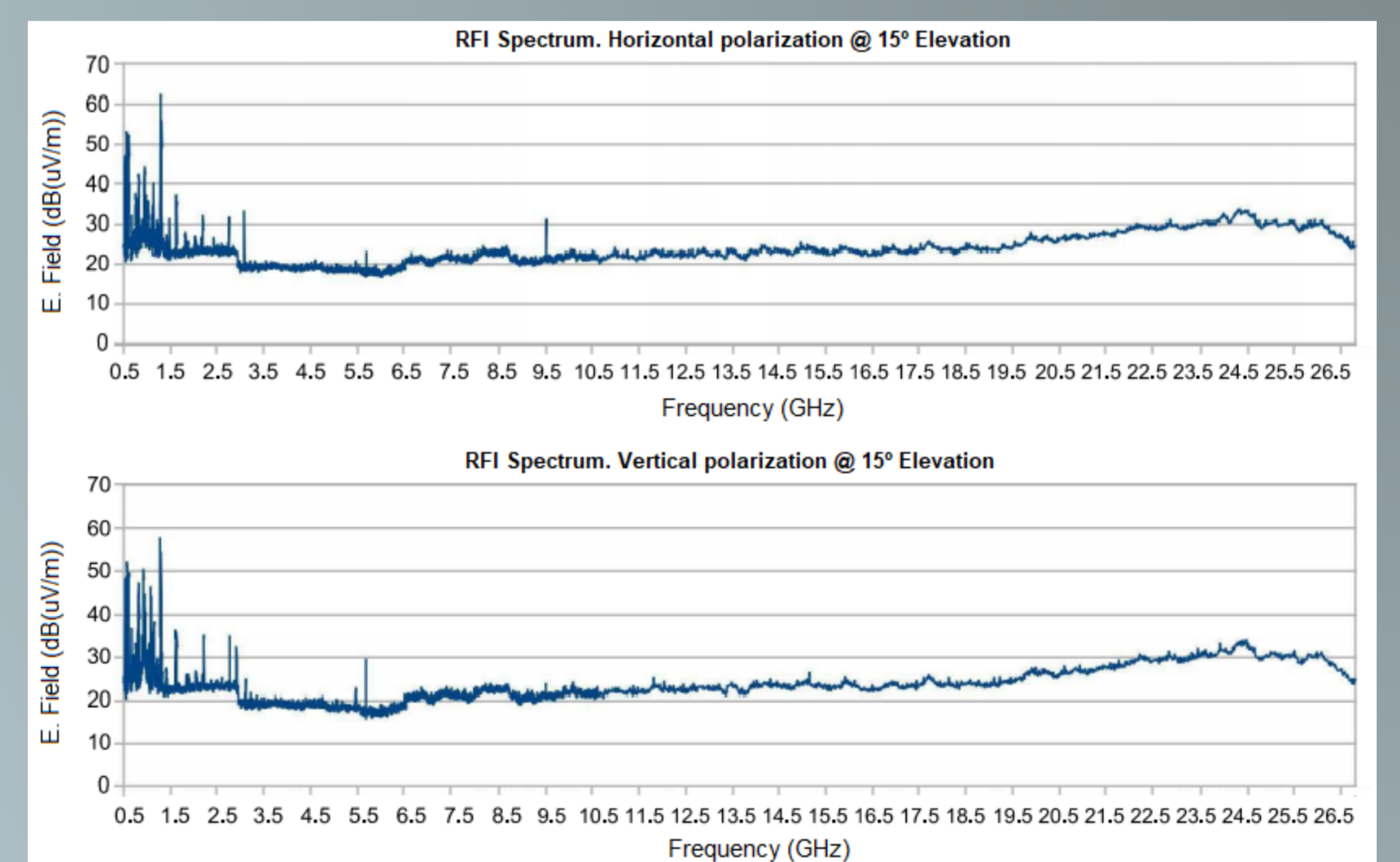


Figure 3. RFI spectrum at Artenara RAEGE site

### Cryogenic amplifiers

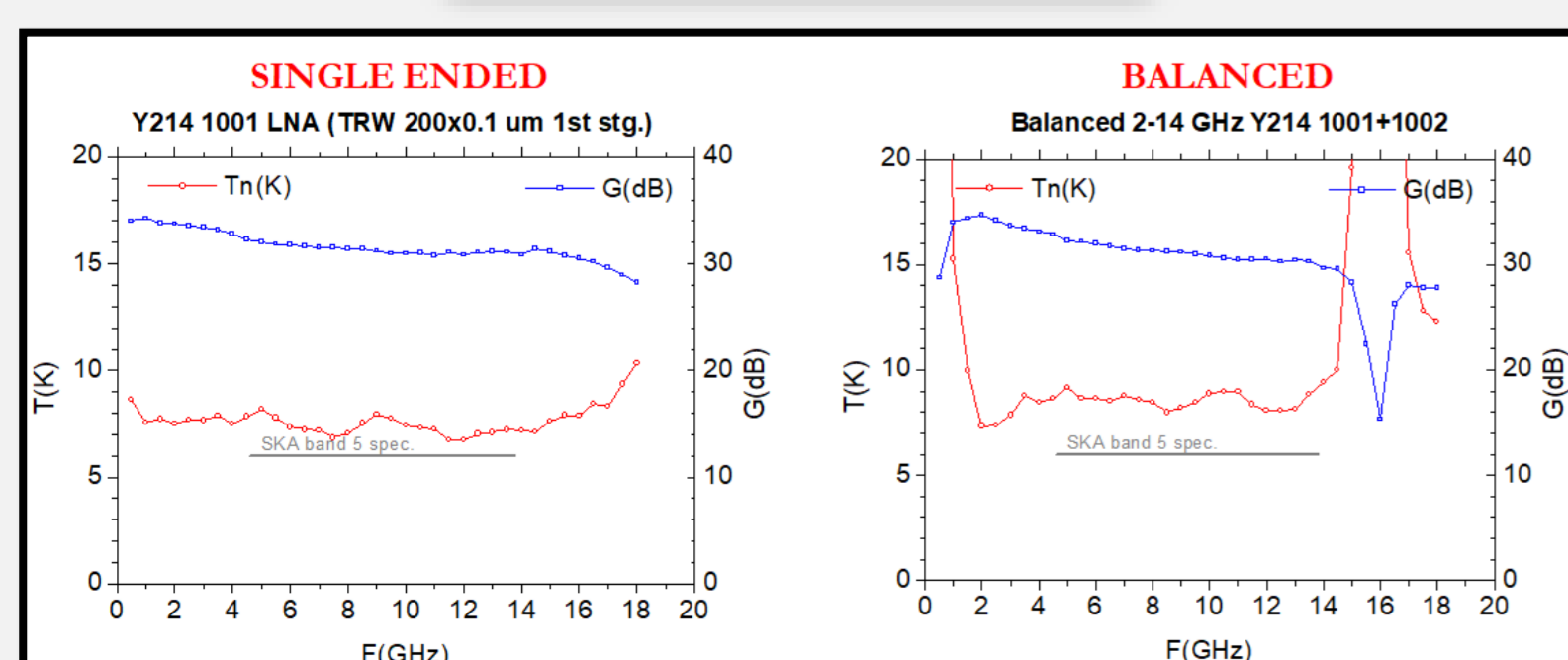
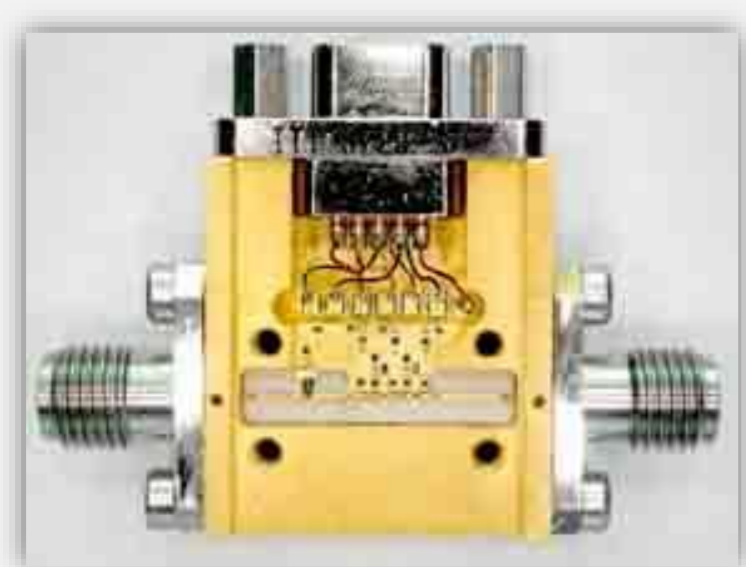


Figure 4. VGOS Broad-band LNAs

## TECHNOLOGY DEVELOPMENTS FOR RAEGE

### Broadband receiver

- 2-14 GHz frequency range
- Double linear polarization, Trx < 25 K

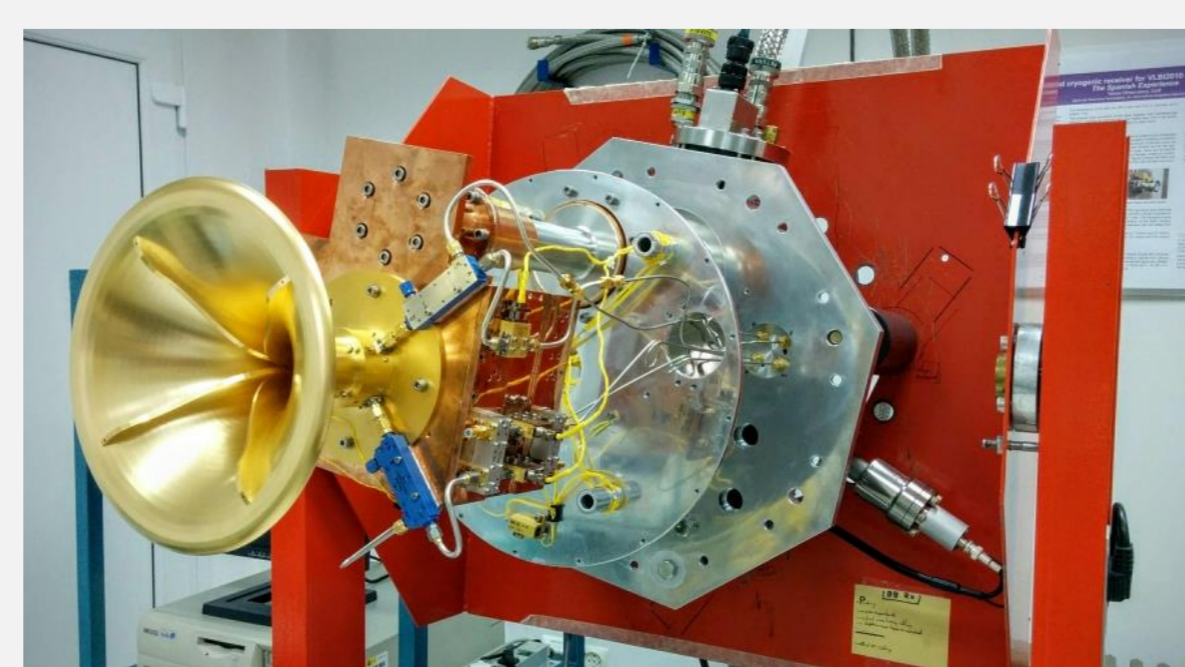


Figure 5. Inside the cryostat of the broadband receiver

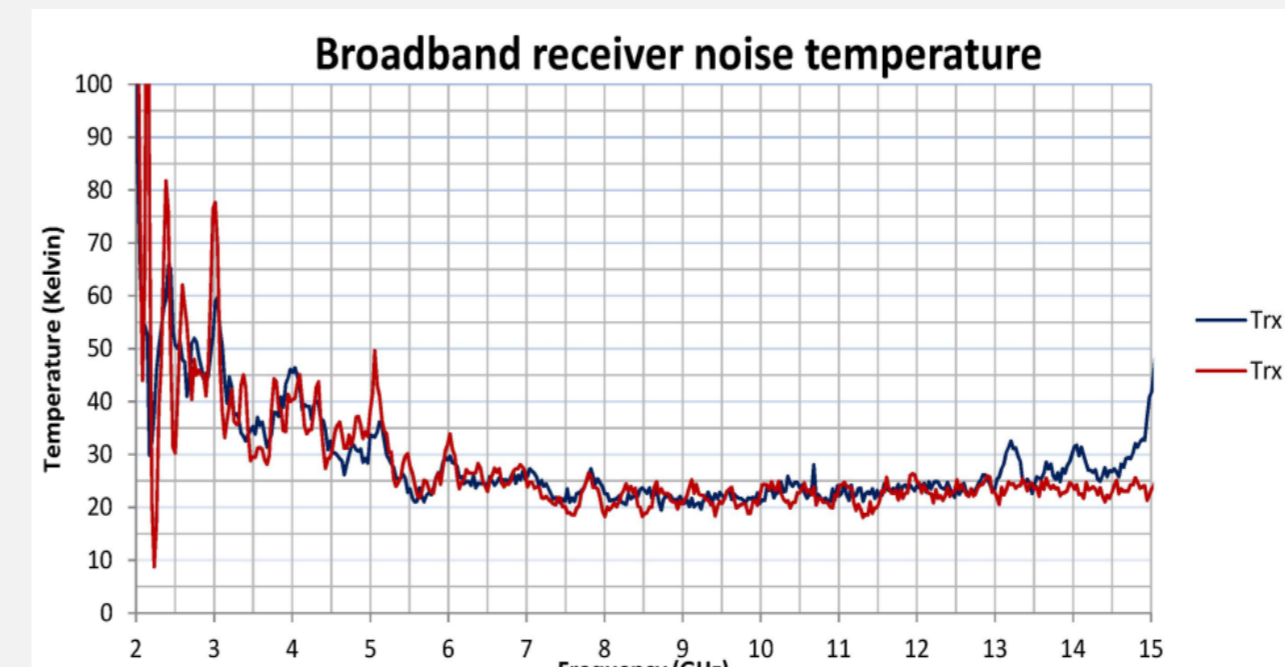


Figure 6. Noise temperature of the broadband receiver

### Feed horns

#### Broadband feed optimization

- Genetic algorithms NSGA-II
- Feed optimization QRFH for RAEGE

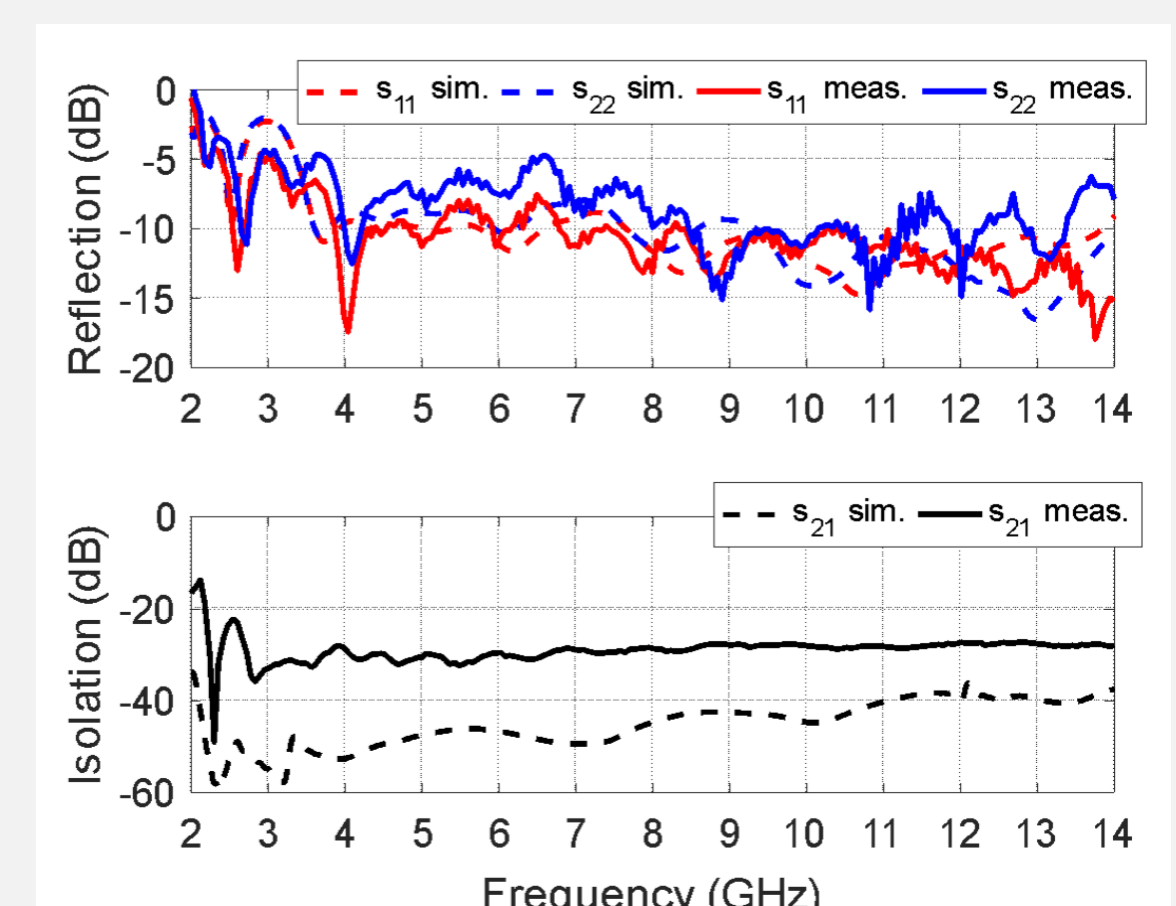


Figure 7. S-parameters of the optimized QRFH feed horn