

Sepura STP8X Antennas – June 2024 – GPS Gain Measurements

Background

Sepura had requested Panorama Antennas to carry out measurements to estimate the peak gain of the 300-00882, 300-00883, 300-00884 and 310-00008 antennas at three frequencies in the L1 GPS band.

Set up and Equipment for Anechoic Chamber Measurements

Equipment used:-

Calibrated Keysight E5063A network analyser.

Panorama proprietary antenna measurement software.

9m tapered anechoic chamber.

EMCO turntable and turntable controller.

ETS-Lindgren 3164 Dual Polarised Horn Antenna (set up for RHCP).

Sepura STP8X radio chassis (including GPS matching components).

The radio chassis was mounted on a non-conductive support, the base of which is fitted to the anechoic chamber turntable.

Methodology

As previously agreed with Sepura, measurements would be taken with the antenna fitted to a STP8X radio chassis, supplied by Sepura, mounted in the centre of the anechoic chamber quiet zone. E-Plane measurements would be taken and the peak gain compared to a reference GPS active patch antenna.

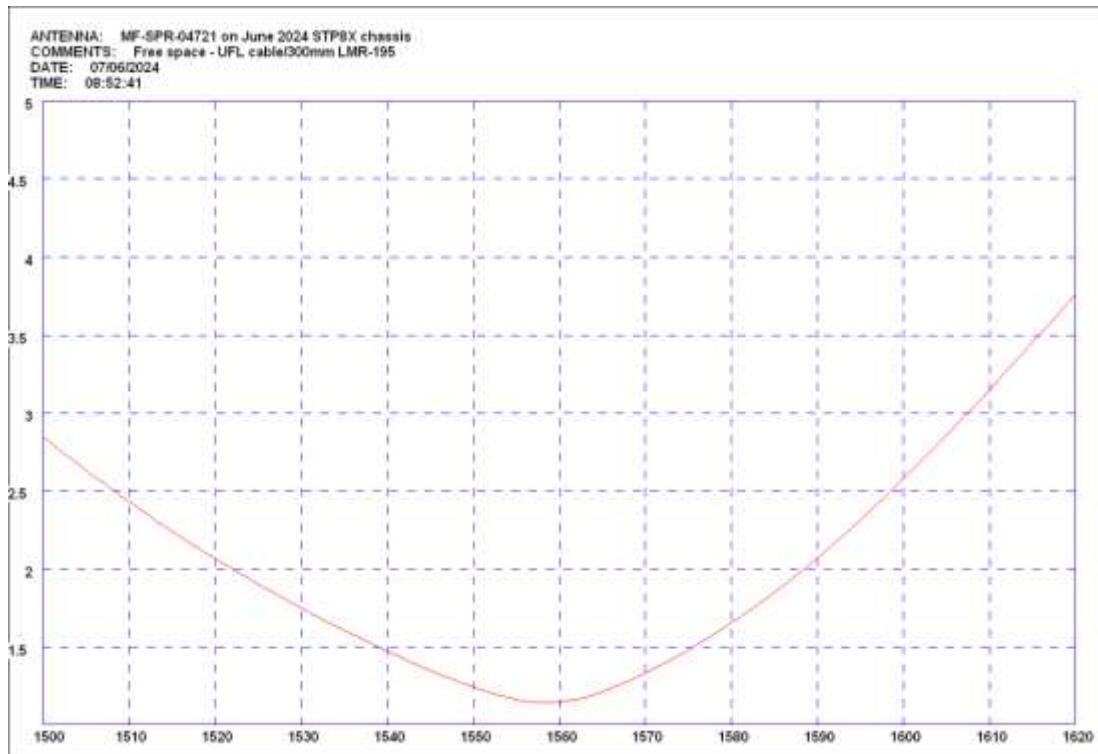
Initially, E-Plane patterns were taken at two orthogonal angles – along the radio and across the radio. It was seen that, in all cases, the peak gain in the upper hemisphere of the patterns occurred in the patterns taken along the radio. The position and orientation of the radio in the anechoic chamber for this E-Plane cut is shown below.

The chamber transmitting antenna was set up to produce right hand circularly polarised signals.

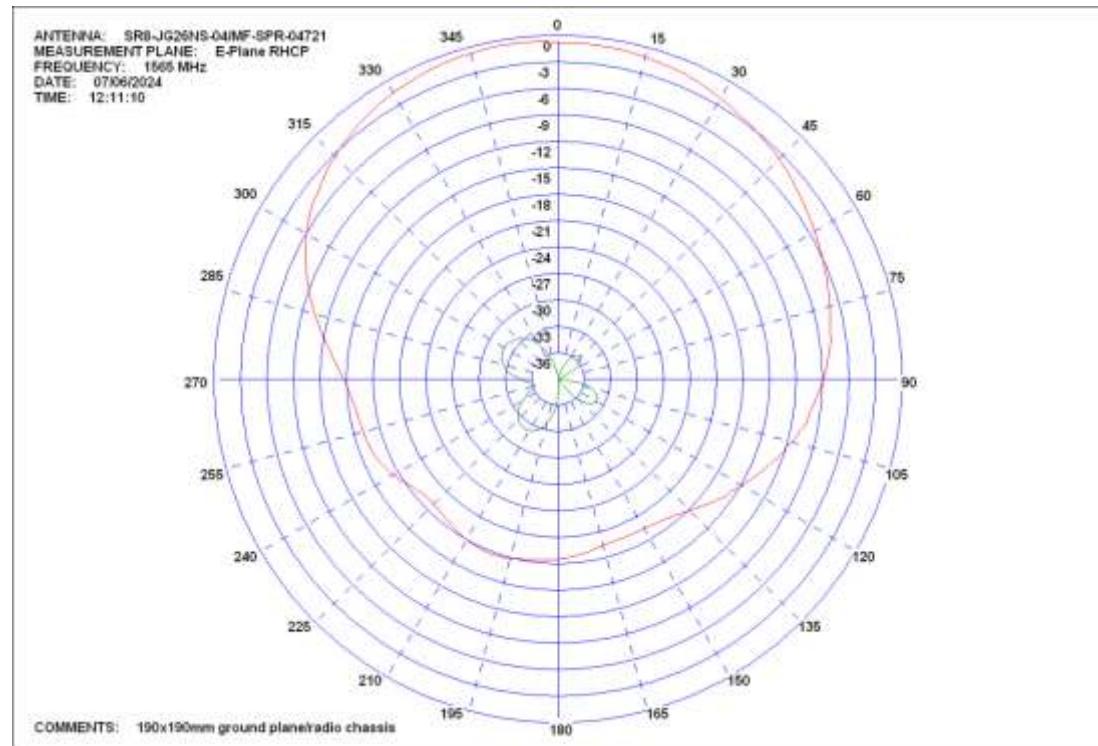
Results

300-00882

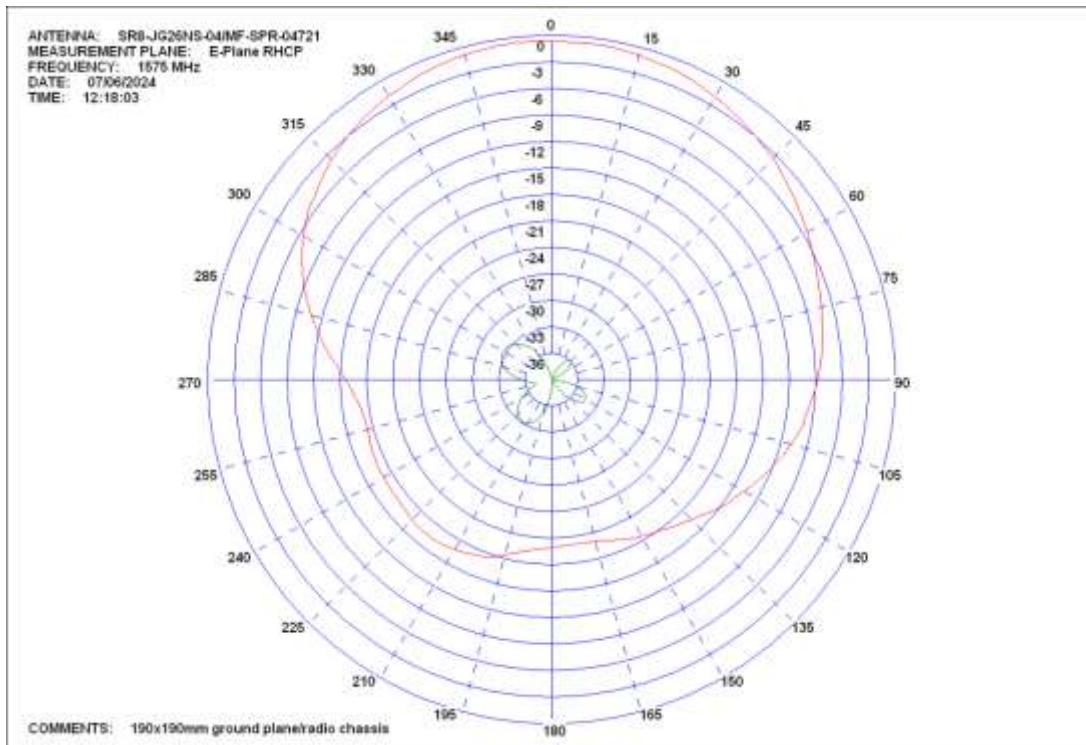
VSWR



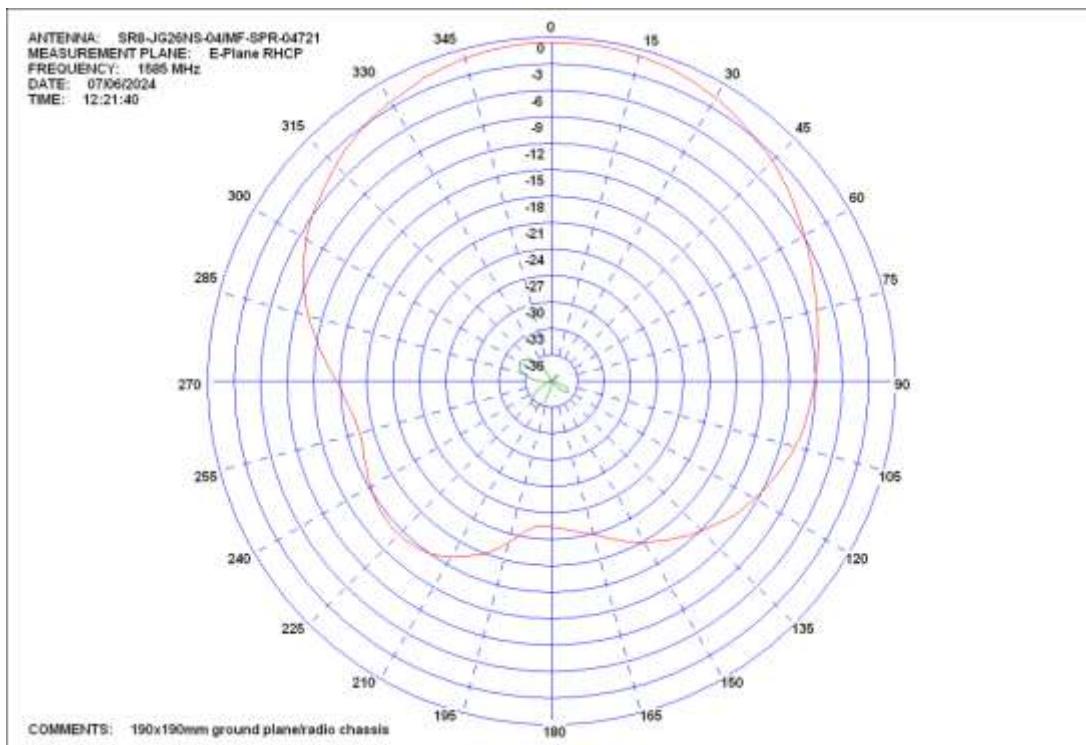
E-Plane – 1565MHz



E-Plane – 1575MHz

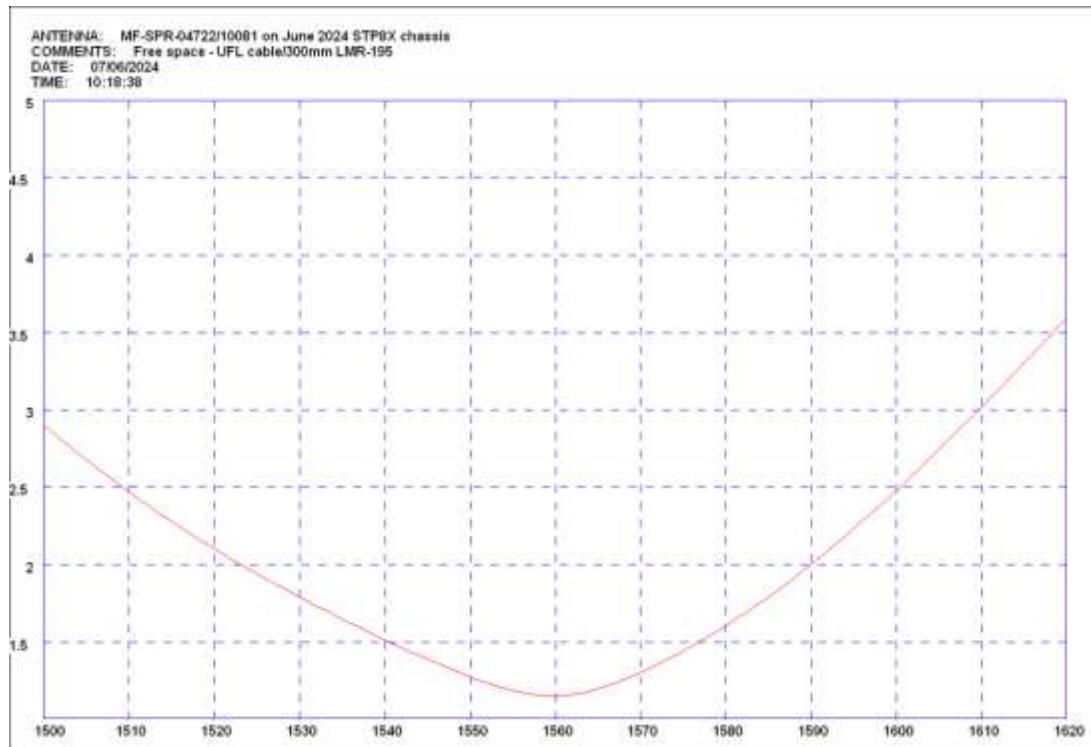


E-Plane 1585MHz

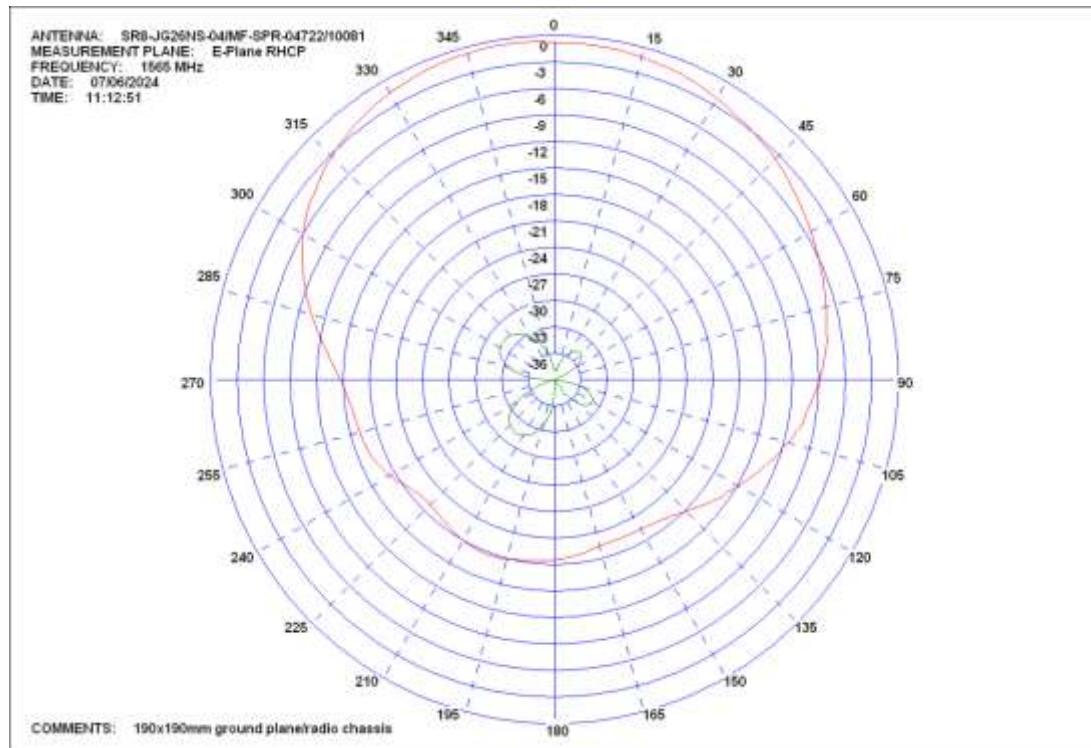


300-00883/310-00008

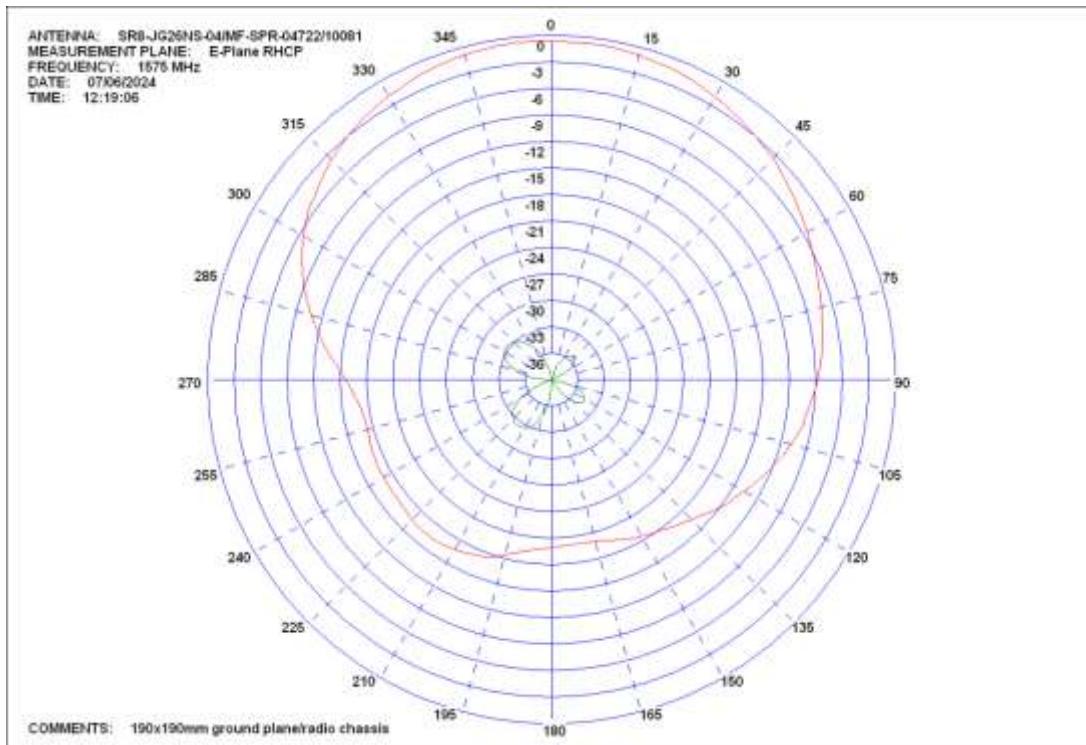
VSWR



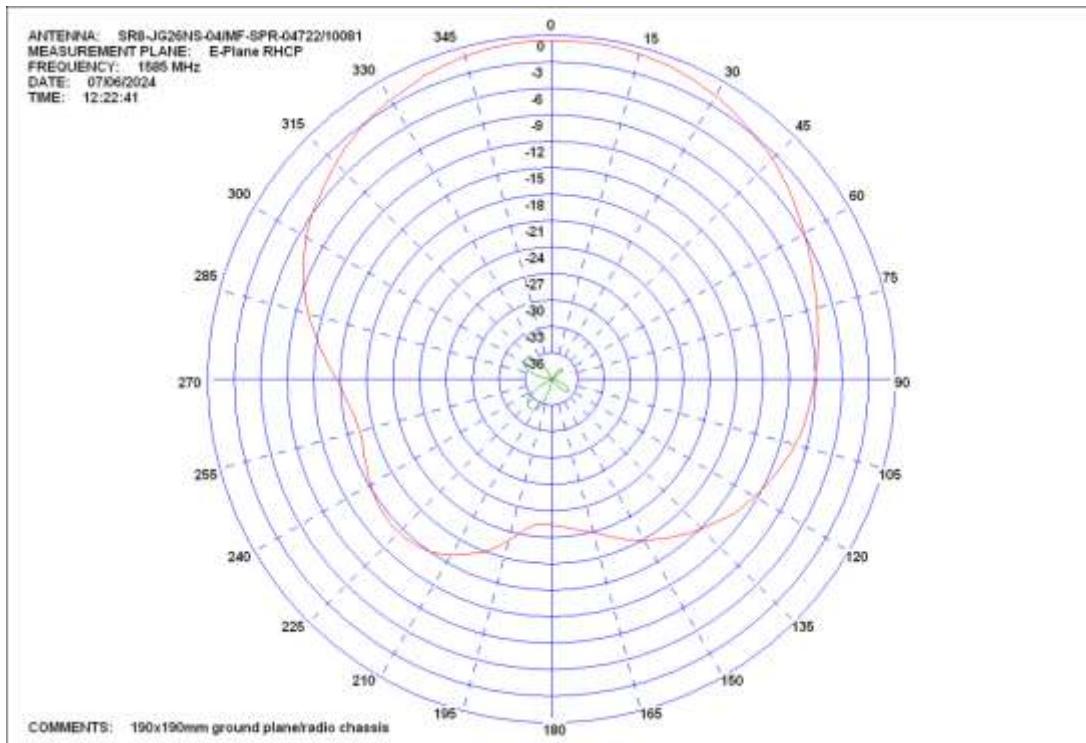
E-Plane – 1565MHz



E-Plane – 1575MHz

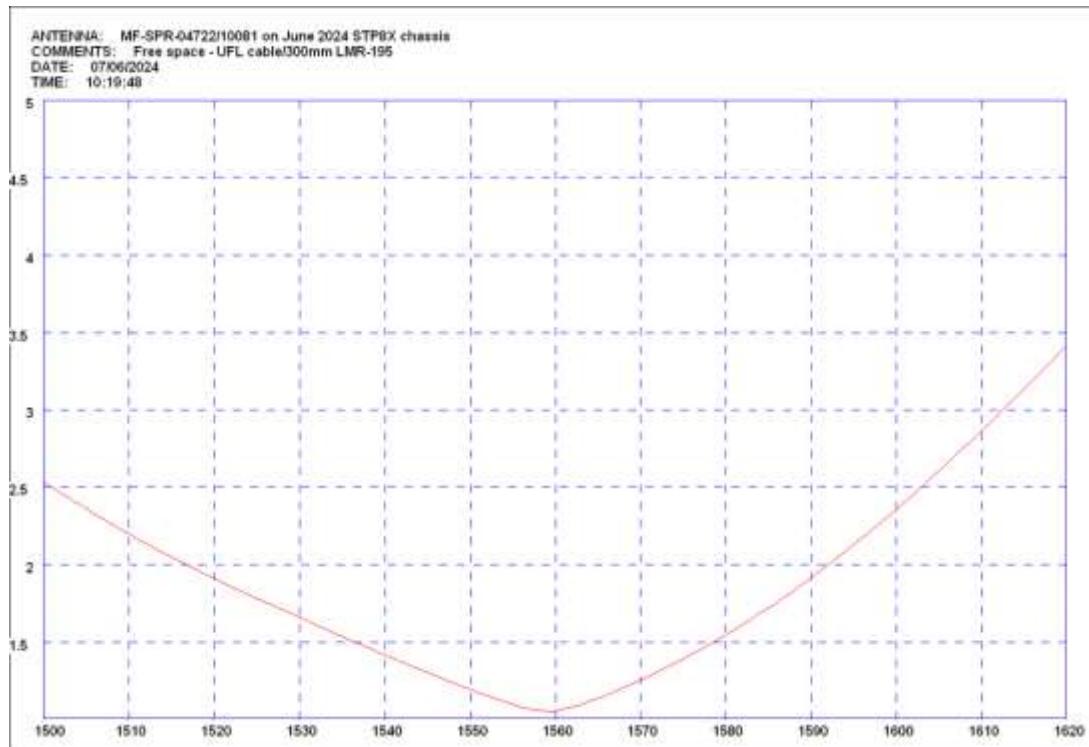


E-Plane 1585MHz

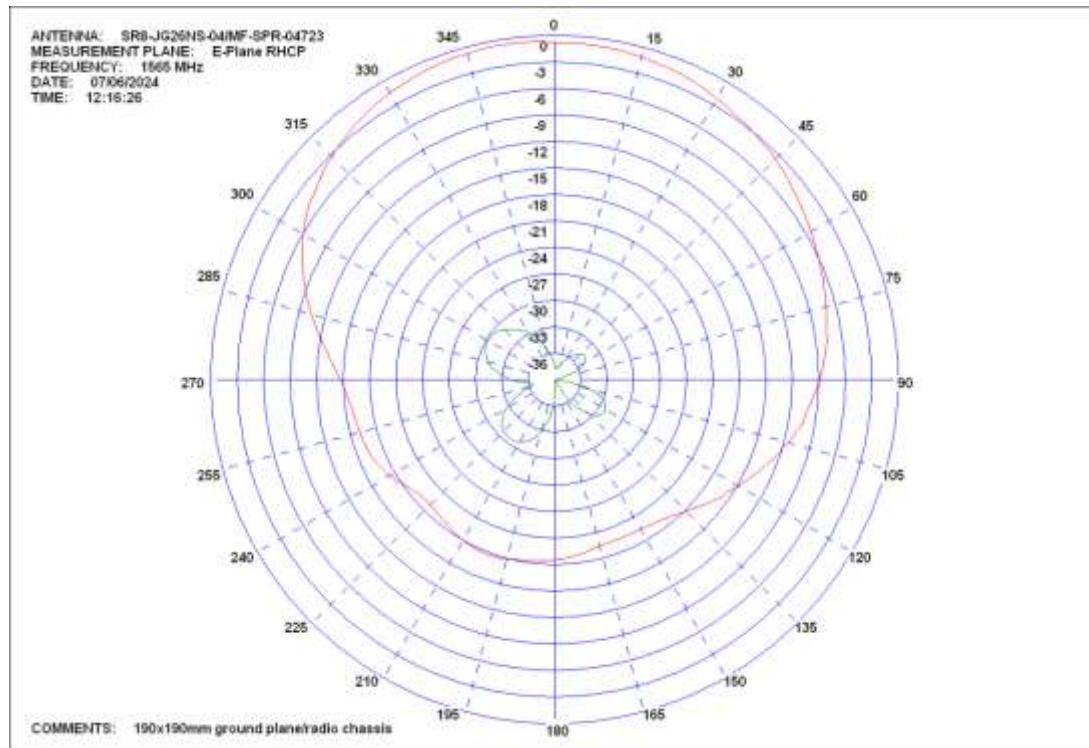


300-00884

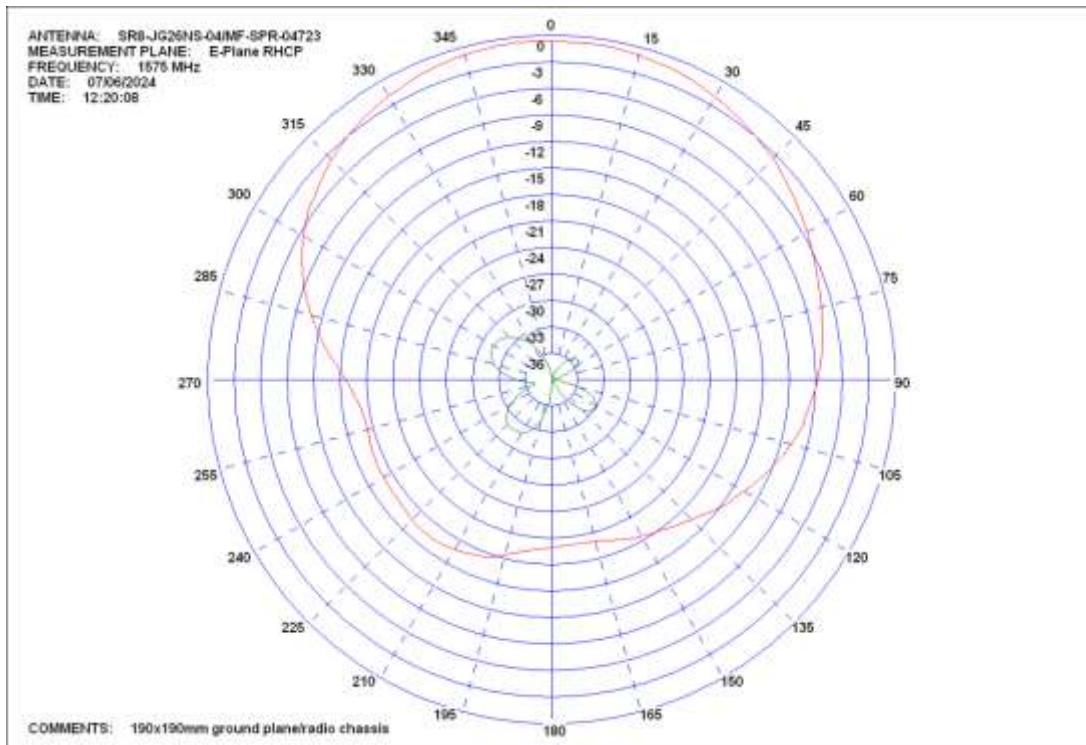
VSWR



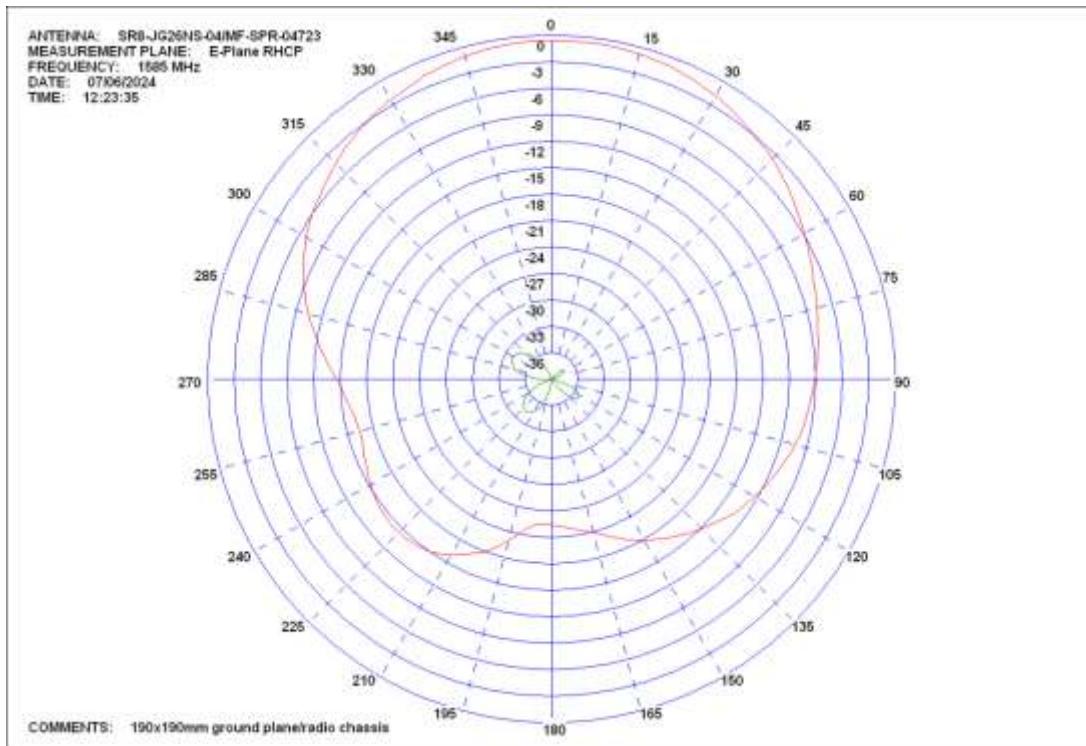
E-Plane – 1565MHz



E-Plane – 1575MHz



E-Plane 1585MHz



In all the radiation patterns above, the red plots show the reference SR8-JG26NS-04 active patch antenna and the green plots show the SPR helical antennas. The plots are normalised to the peak of the reference antenna. Therefore, the gain level of the helical antennas compared to the reference antenna can be read directly from the patterns.

Gain Calculations

From previous measurements and information provided from the supplier, the peak gain of the reference antenna can be taken as being as follows.

1565MHz – 28dBic

1575MHz – 27dBic

1585MHz – 30dBic

Reading the difference in gain levels directly from the radiation patterns, the peak gain levels of the helical antennas can be estimated as being as shown in the table below.

Antenna	1565MHz Peak Gain	1575MHz Peak Gain	1585MHz Peak Gain
300-00882	-4dBic	-5.5dBic	-5dBic
300-00883/310-00008	-3.5dBic	-5.5dBic	-5dBic
300-00884	-2dBic	-4dBic	-4dBic