Ka-band Antennas

Company Overview

- Alpha Satcom is a privately owned, well financed, USA Company with HQ in Longview, Texas.
- We have access to all Engineering Disciplines and experienced Program Management needed to fully implement any given program.
- Our engineering portfolio consists of Limited & Full Motion, Mid Size antennas, Carbon Fiber, Fixed, Man-Pack, Terrestrial & Maritime COTM products.
- Present designs: 13.2, 11.3, 9.0, 7.3, 6.2 & 4.2-Mtr Limited Motion Antennas (LMA) plus Turning Head Pedestal designs capable of supporting up to a 13.2-mtr reflector system & a wide range of Man-pack & COTM antennas.
- All our structures can be interfaced to any Step-Track or Mono-pulse Controllers.

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Alpha Satcom Ka-band Antennas

- Alpha Satcom was founded in 2014 with the goal to bring to the market a new line of antennas dedicated to Ka-band operation. The following are some of the fundamental considerations upon which the designs are based.
- **All** Alpha Satcom antennas, regardless of frequency of operation, have the structural integrity required for Ka-band operation.
- The Ka-band panels are fabricated on air-craft quality tooling using, 0.060” skins with additional radial members , as required, to provide exceptional stiffness and close tolerance to the RF design. The panels fabrication process is carefully monitored and measured to assure conformance to the required values.
- Daily solar temperatures affects the gain of the antenna. To minimize this problem Alpha Satcom antenna structures, pedestal, hub, radial beams & lacing, and quadra-pod are fabricated from steel thus avoiding the twisting effects caused by differential coefficients of thermal expansion found in mixing dissimilar metals.
- Special attention is giving to the selection of close tolerance jack drives with minimal backlash, close tolerance mechanical components and field alignments to assure the performance of the required pointing and tracking values.

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Alpha Satcom Ka-band Antennas

- There are other effects that must be considered in the design such as rain fade, operation at low look angles, diffraction and scintillation which can be addressed, since they affect the stability of the signal, by means of the control system and diversity site.
- For the provision of precise Ka-band operation special features have been incorporated into the structure such close tolerance bearings, specially designed sub-reflector quadra-pod legs and a high precision sub-reflector.
- The large insulated hub is temperature controlled by either the introduction of a high volume of outside air or a 1:1 air condition system depending on the integrated equipment and geographical location,
- The hub is equipped with a rolling door and a program designed rack system for the installation of the RF and GCE equipment specific to any given program..
- The hub includes wave guide runs from the RF equipment to the feed, LNA interface, technical and utility power, maintenance light, and temperature sensing alarms.
- The RF design has been optimized for Ka-band performance and, depending on the model, the reflector is comprised of either single or multiple tiers of double contoured, high strength, lightweight panels fabricated to exact tolerances and profile, designed to provide maximum gain, and minimal loss.
- Alpha Satcom has the staff, knowledge and experience to address any Ka-band program and to develop the most economical and technologically sound solution supported with state-of-the-art products and services.

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On The Board

- All 13.2-mtr antenna structures are designed and fabricated for Ka-band operation as are all Alpha Satcom Antennas.
- The azimuth travel of 190 degrees for the Limited Motion Antenna (LMA) is provided via three separate jack positions.
- The azimuth jack is attached to the pedestal therefore the switching from one segment to another can be quickly done by one to two men using simple hand tools and without the need of lifting equipment.
- Under design is an upgrade to a Full Motion Antenna (FMA) pedestal that will include a counterweighted reflector, and which will simply interface to the bottom of the upper reflector assembly using dual, based azimuth drives interfaced to a slew gear.
- The FMA will use the proven Reflector Assembly and either a Smart Step Track ACU for frequencies up to DBS-band and Monopulse Tracking for DBS and Ka-band applications.

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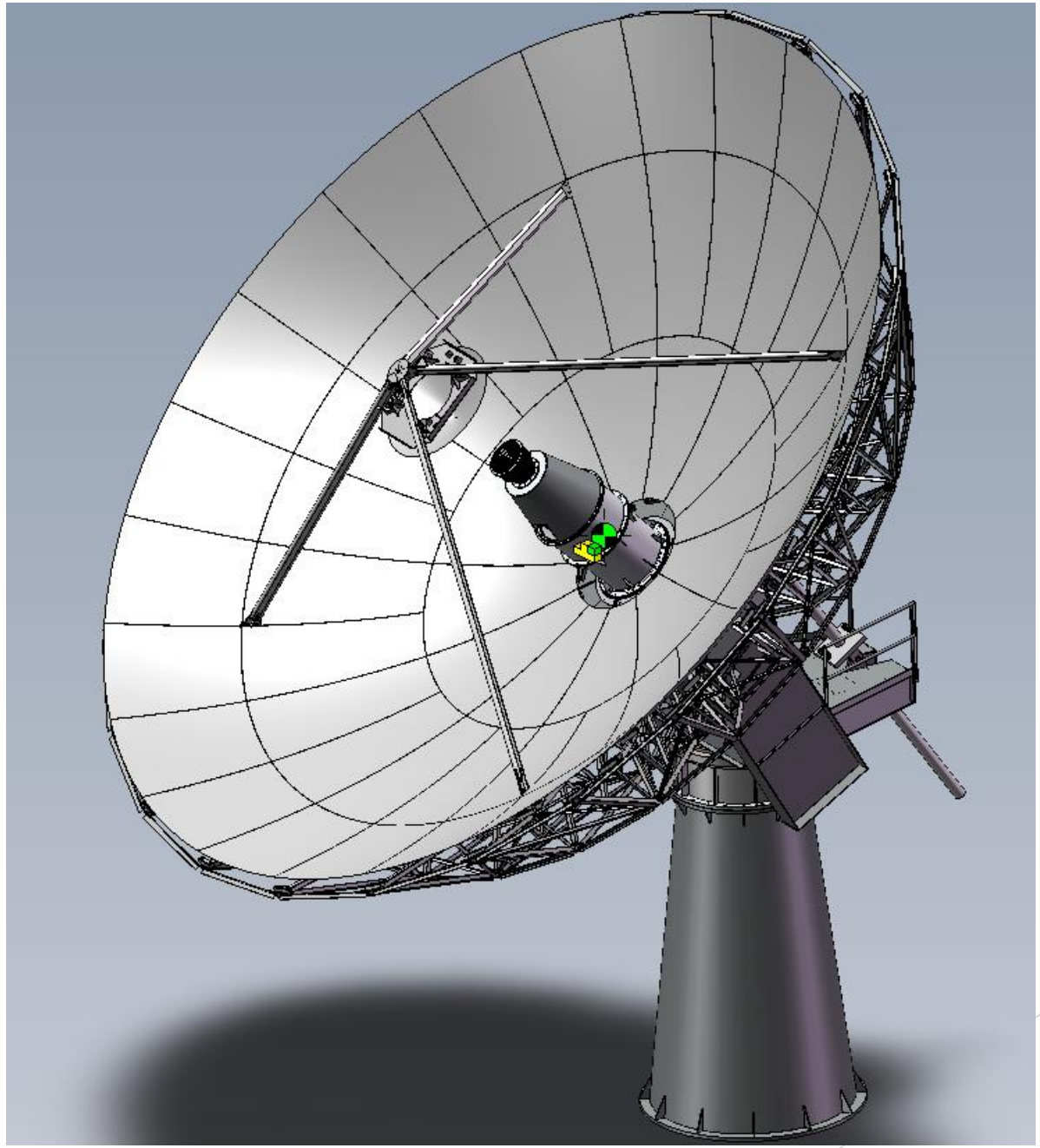
Full Motion Design (FMA)

Our existing 13.2-mtr Limited Motion Antenna will soon have a new +/- 180-degree, azimuth turning head pedestal. With stiffened panels, and a counter weighted reflector backup structure, the antenna system will easily provide fast & ready access to all satellites seen from any given geographical location.



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13.2-Mtr Antenna

Initial Concept

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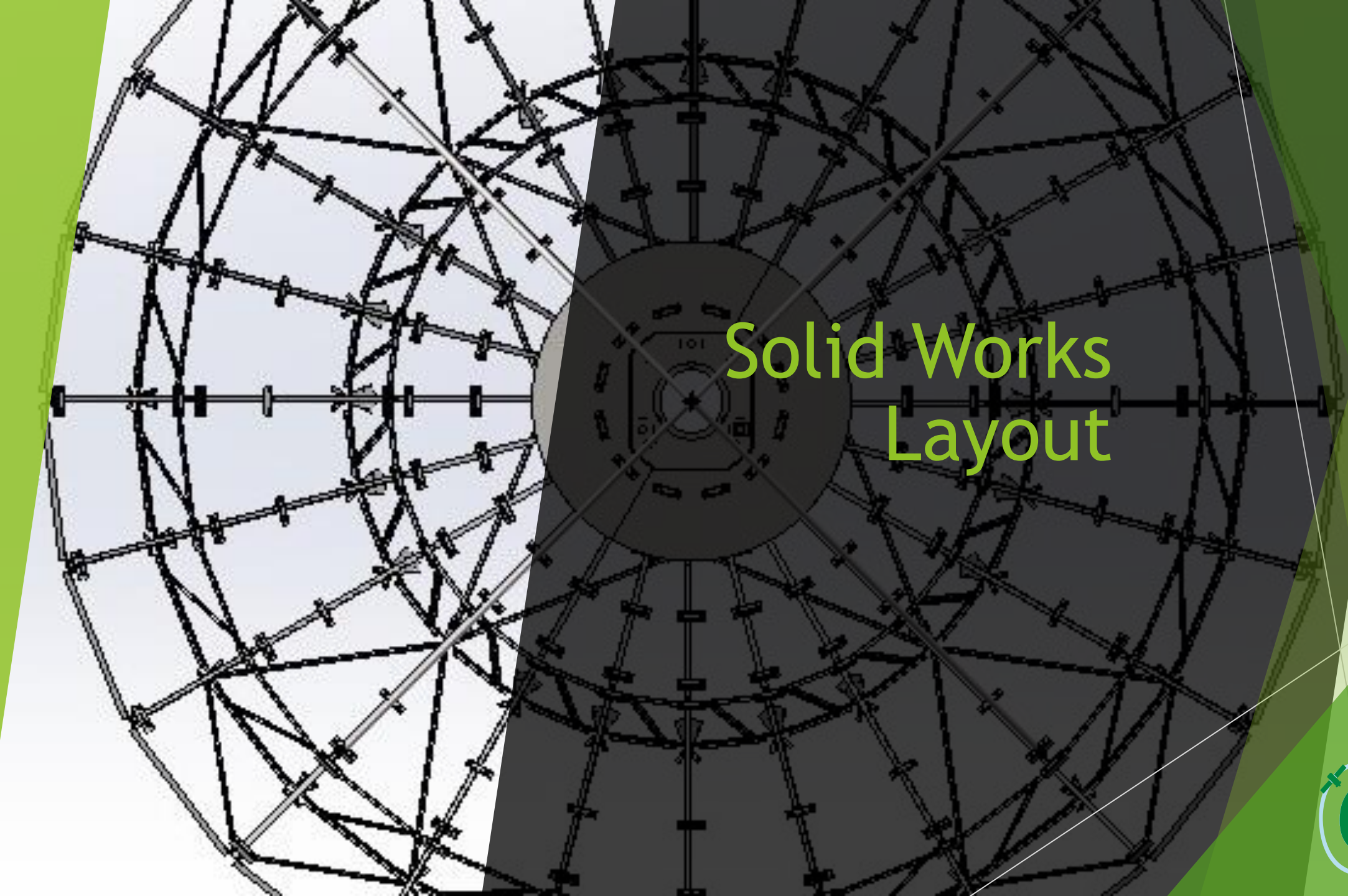

Solid Works Layout

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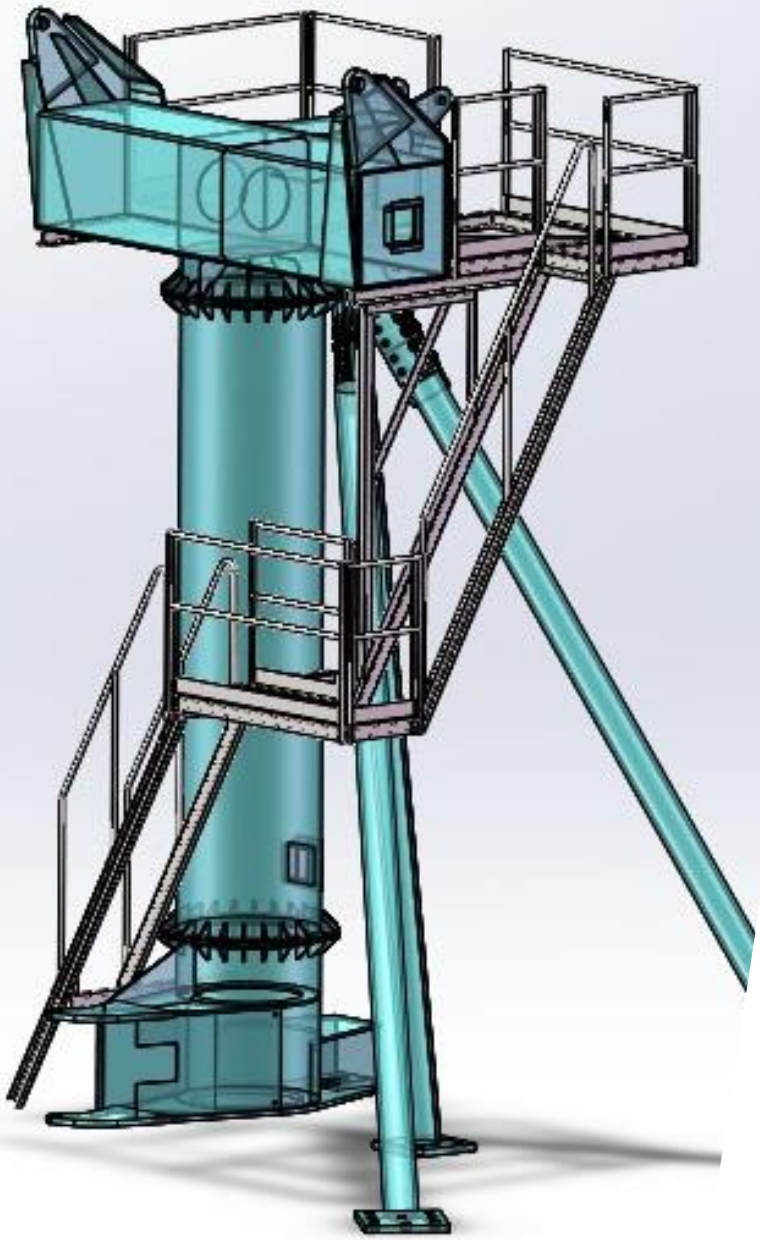

Pedestal Layout

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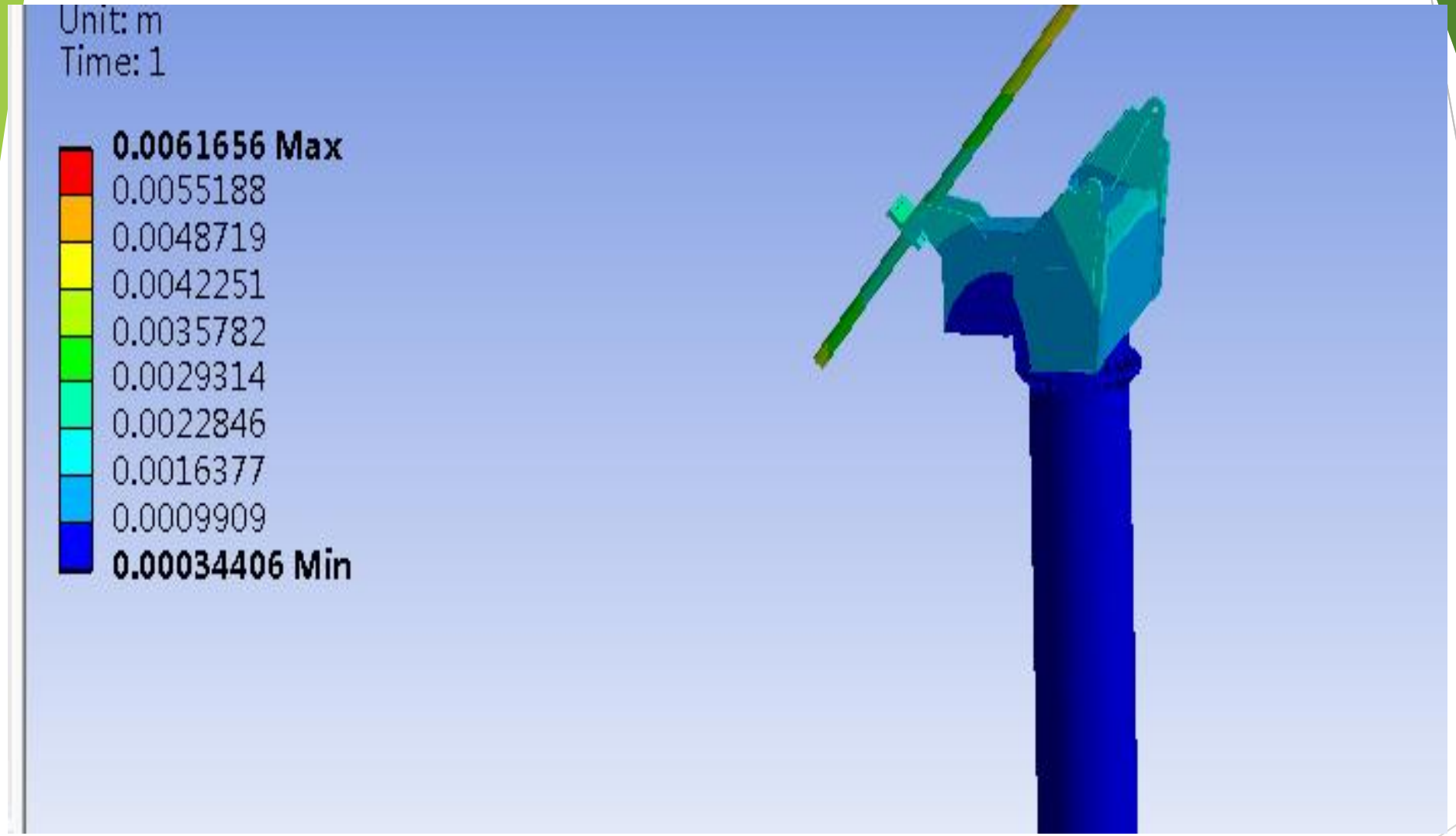

Pedestal FEA

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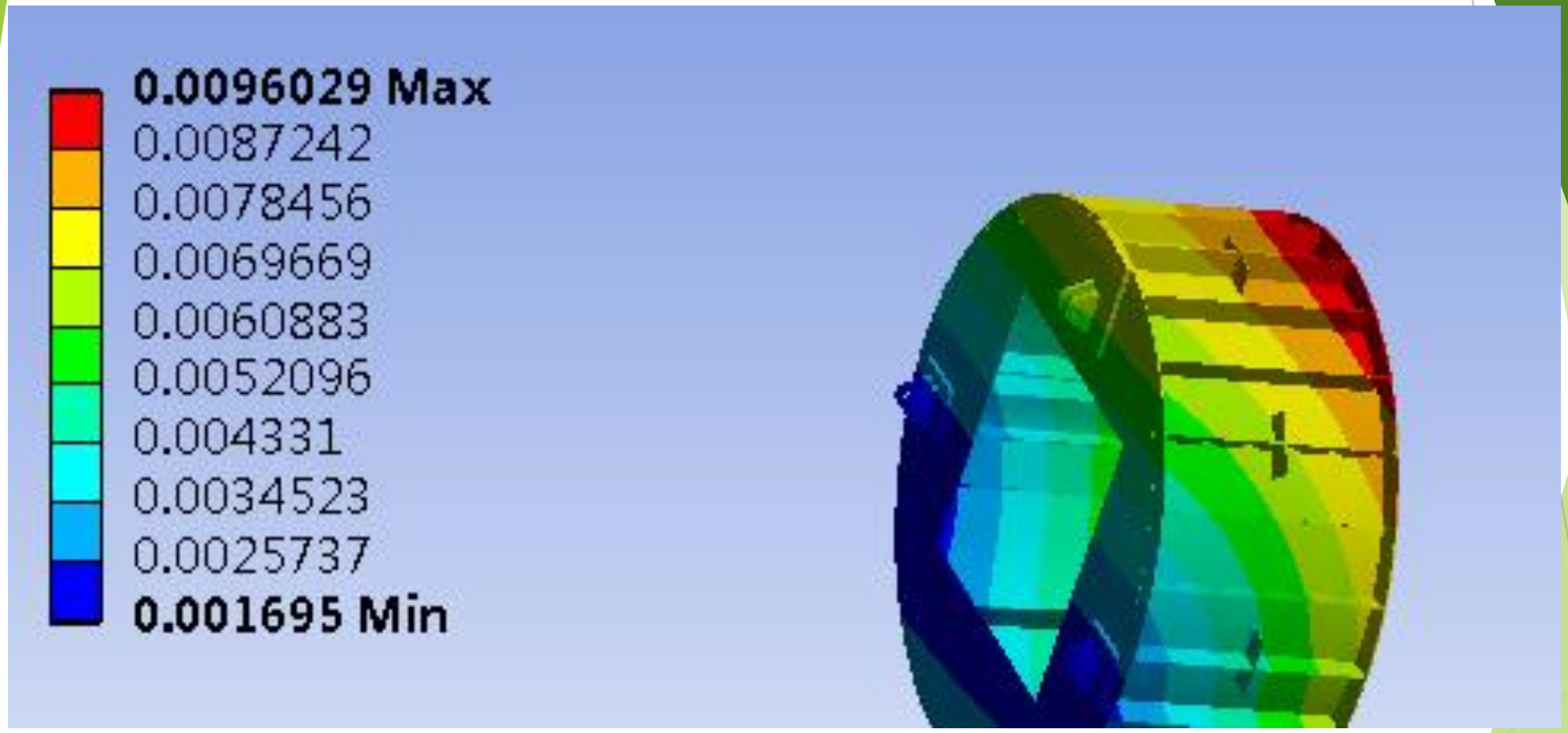

Hub FEA

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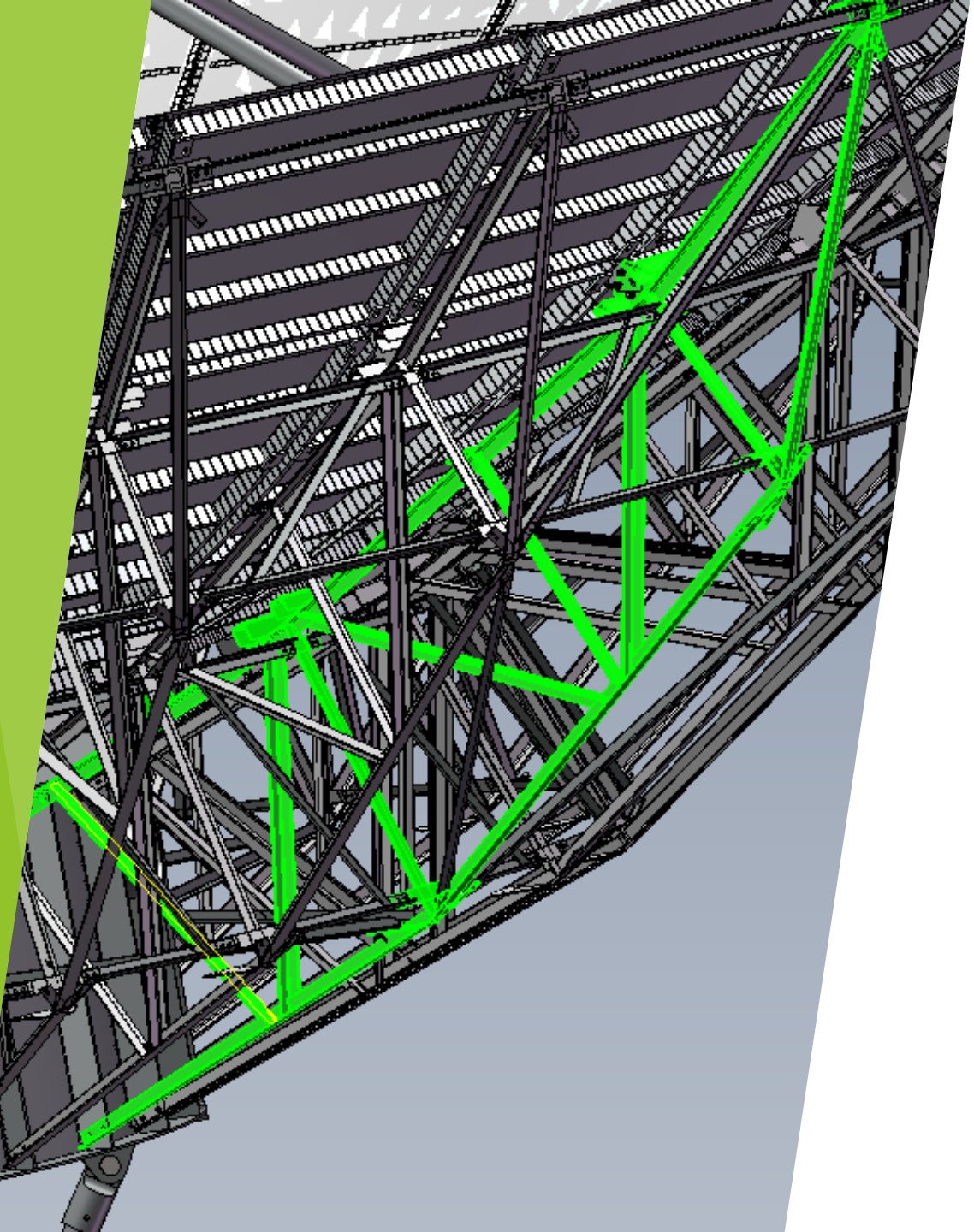

Radial Analysis

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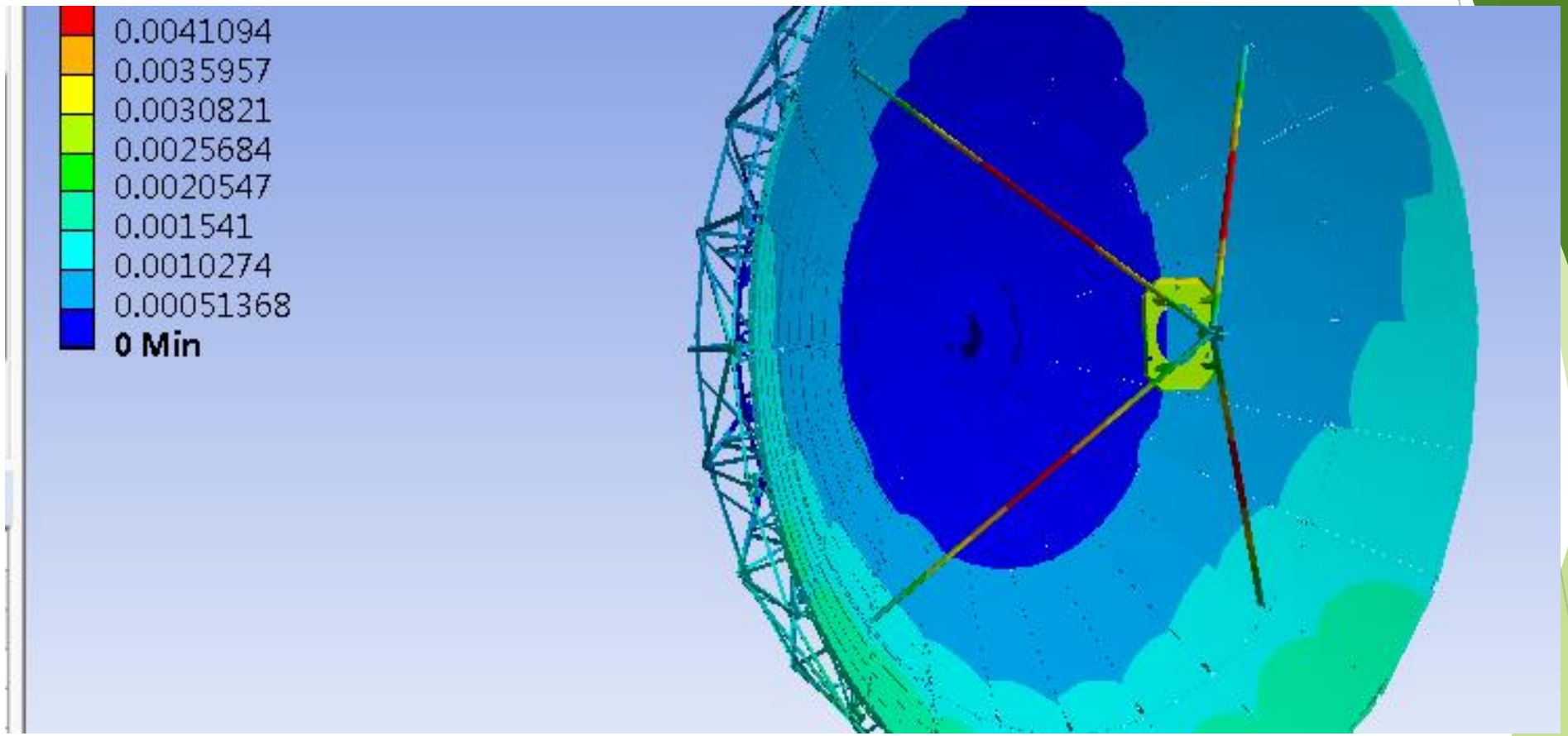

Reflector FEA

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Pedestal w/Upper Interface Sub-assembly

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Galvanized Radials

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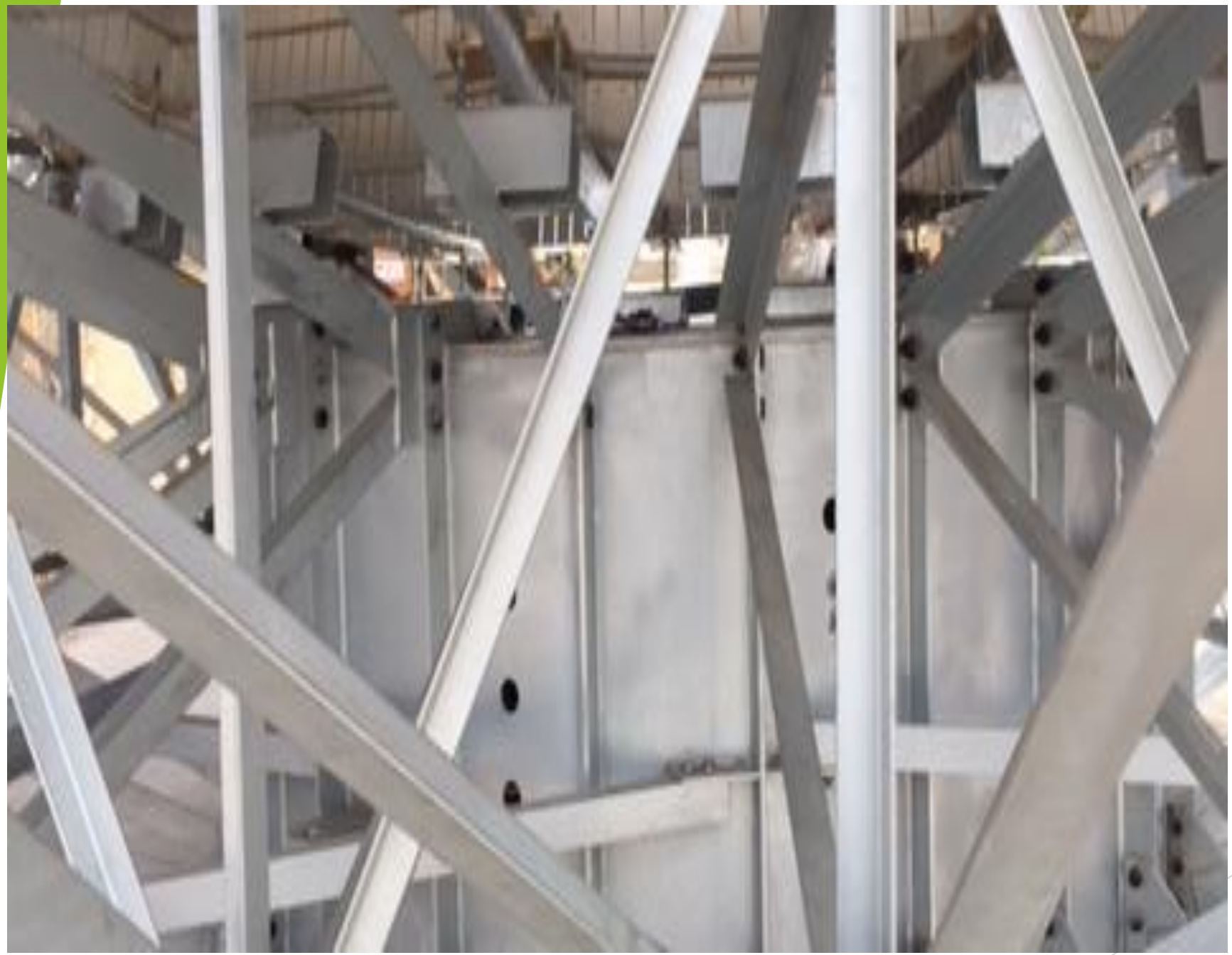

Hub, Radial, Panel Assembly

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Platform Assembly

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Azimuth Jack Assembly

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Inboard Panels

All panels are measured by Photogrammetry to assure quality.

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Initial Reflector Assembly

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13.2-mtr Limited Motion Kingpost

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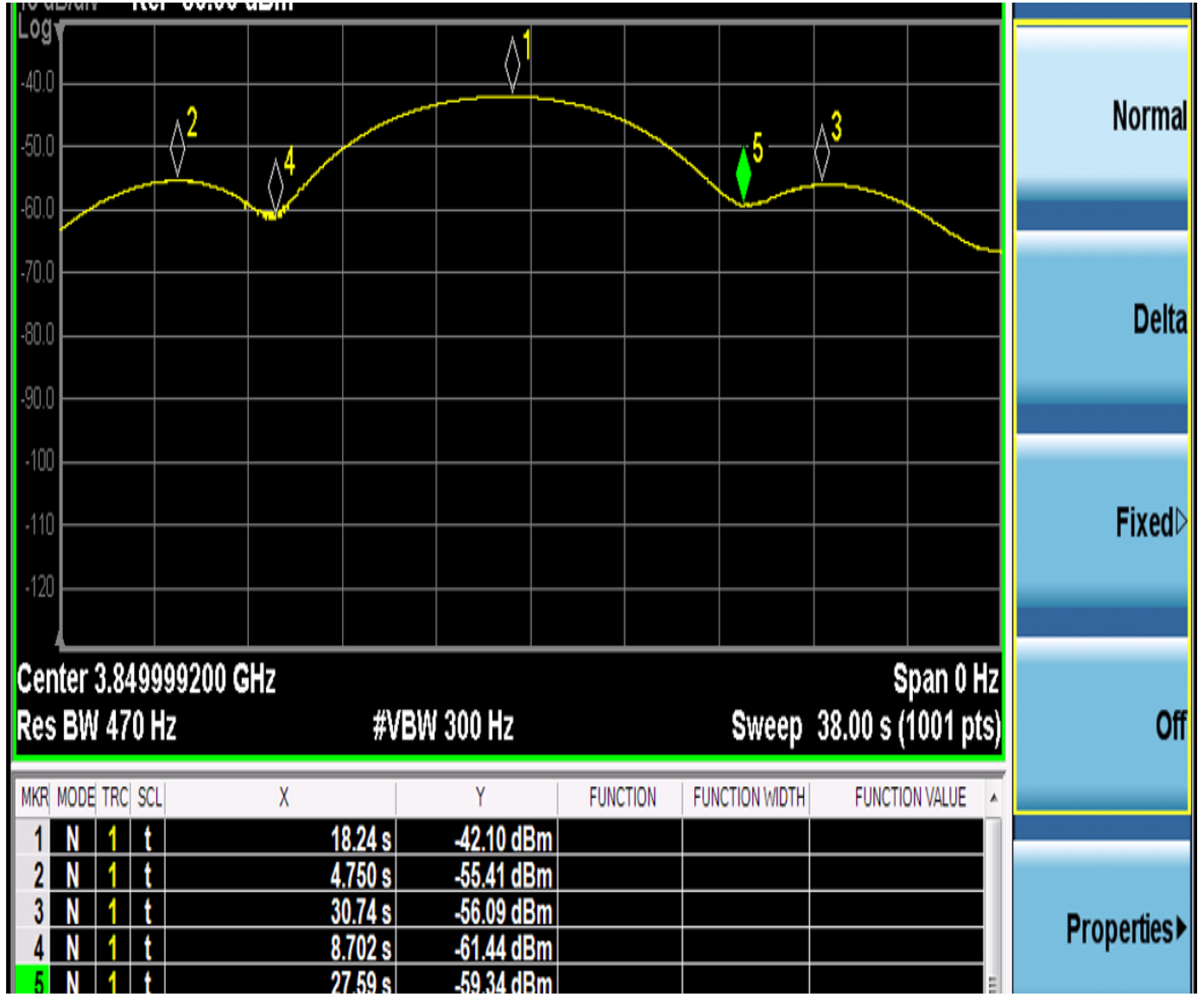
13.2-mtr C-Band Pattern



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	18.24 s	-42.10 dBm			
2	N	1	t	4.750 s	-55.41 dBm			
3	N	1	t	30.74 s	-56.09 dBm			
4	N	1	t	8.702 s	-61.44 dBm			
5	N	1	t	27.59 s	-59.34 dBm			

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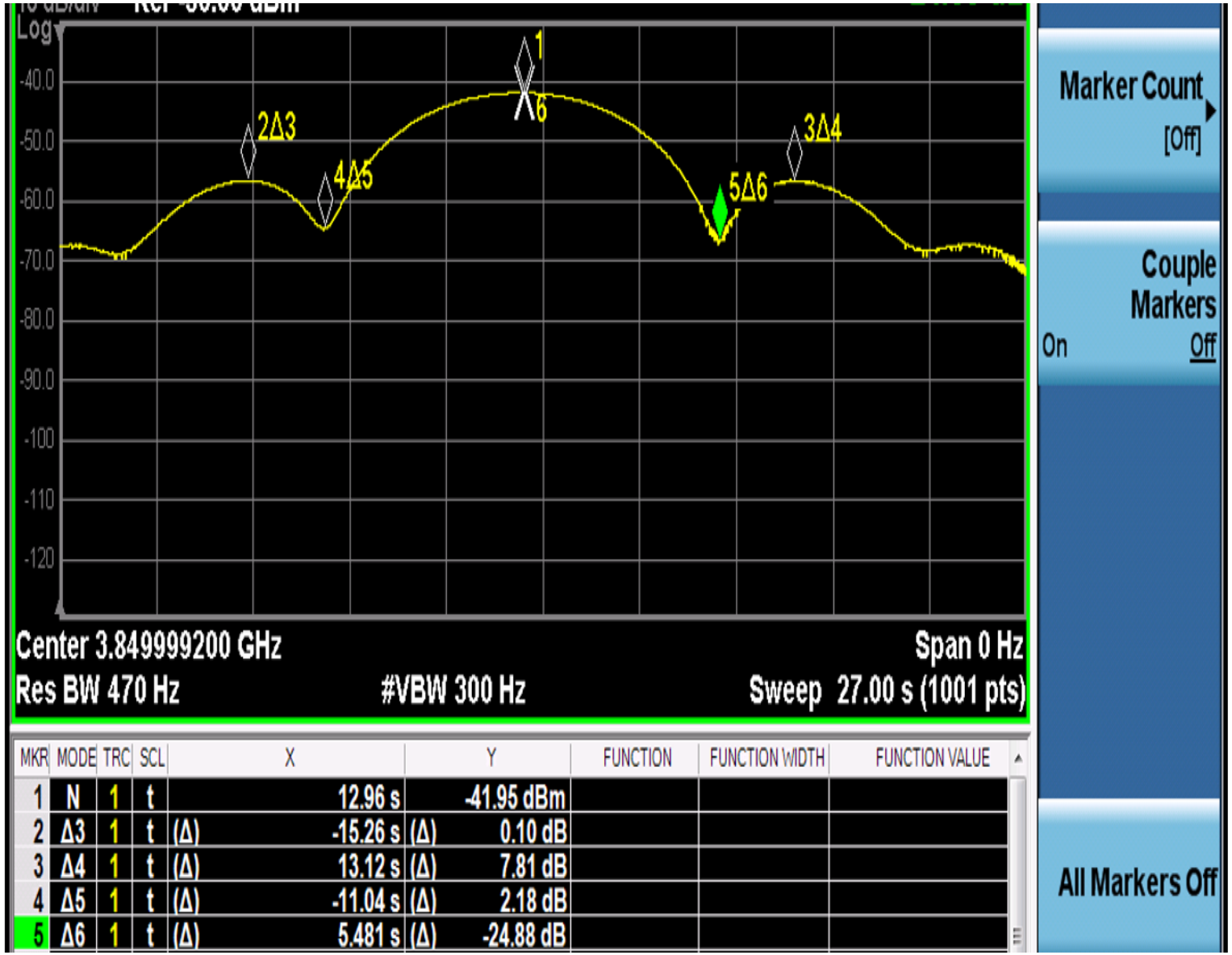

13.2-mtr Pattern

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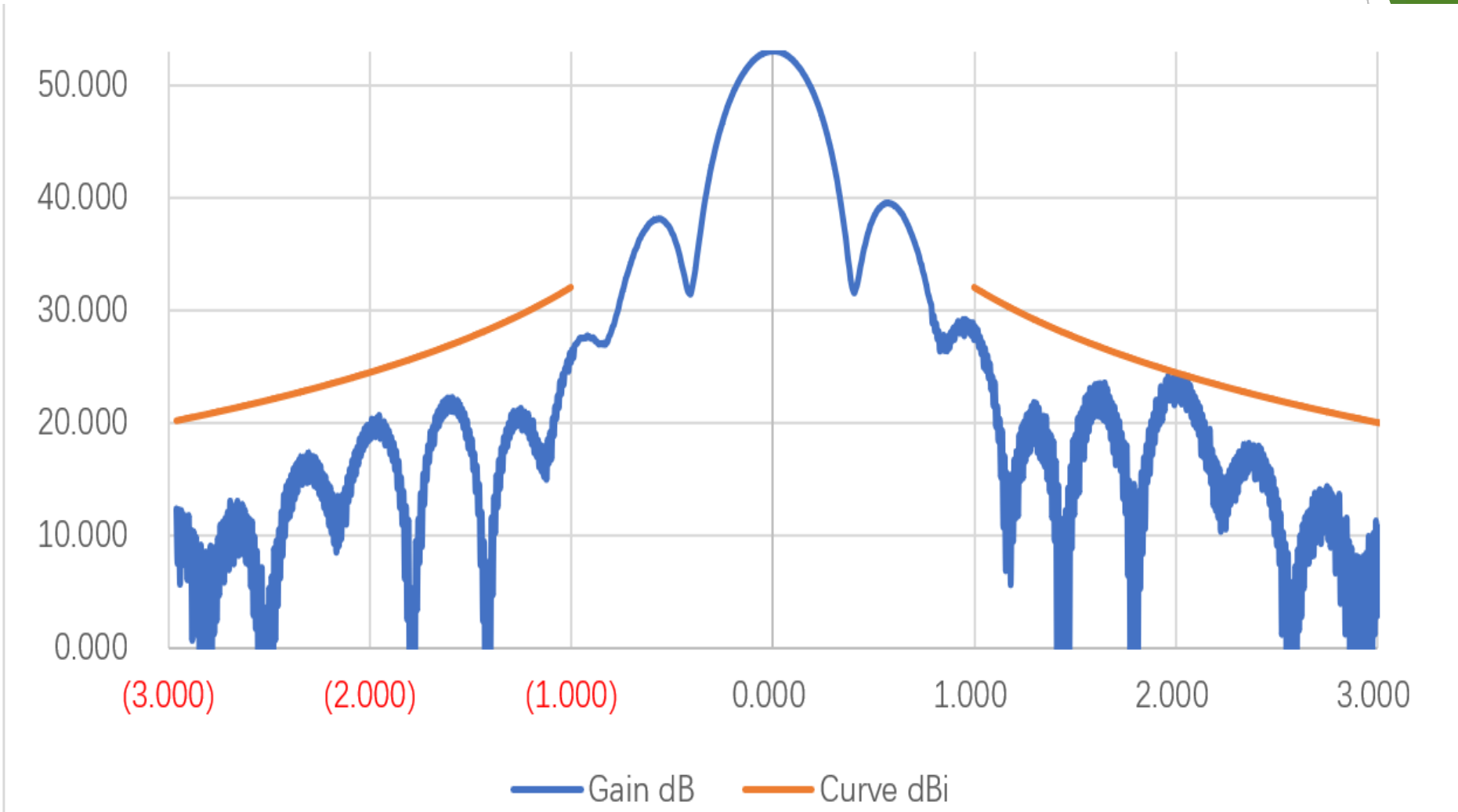

13.2-mtr Elevation Pattern

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9.0-Mtr Antenna

Wancom: 13.2-Mtr LMA with Hybrid Feed (Quantity 2)

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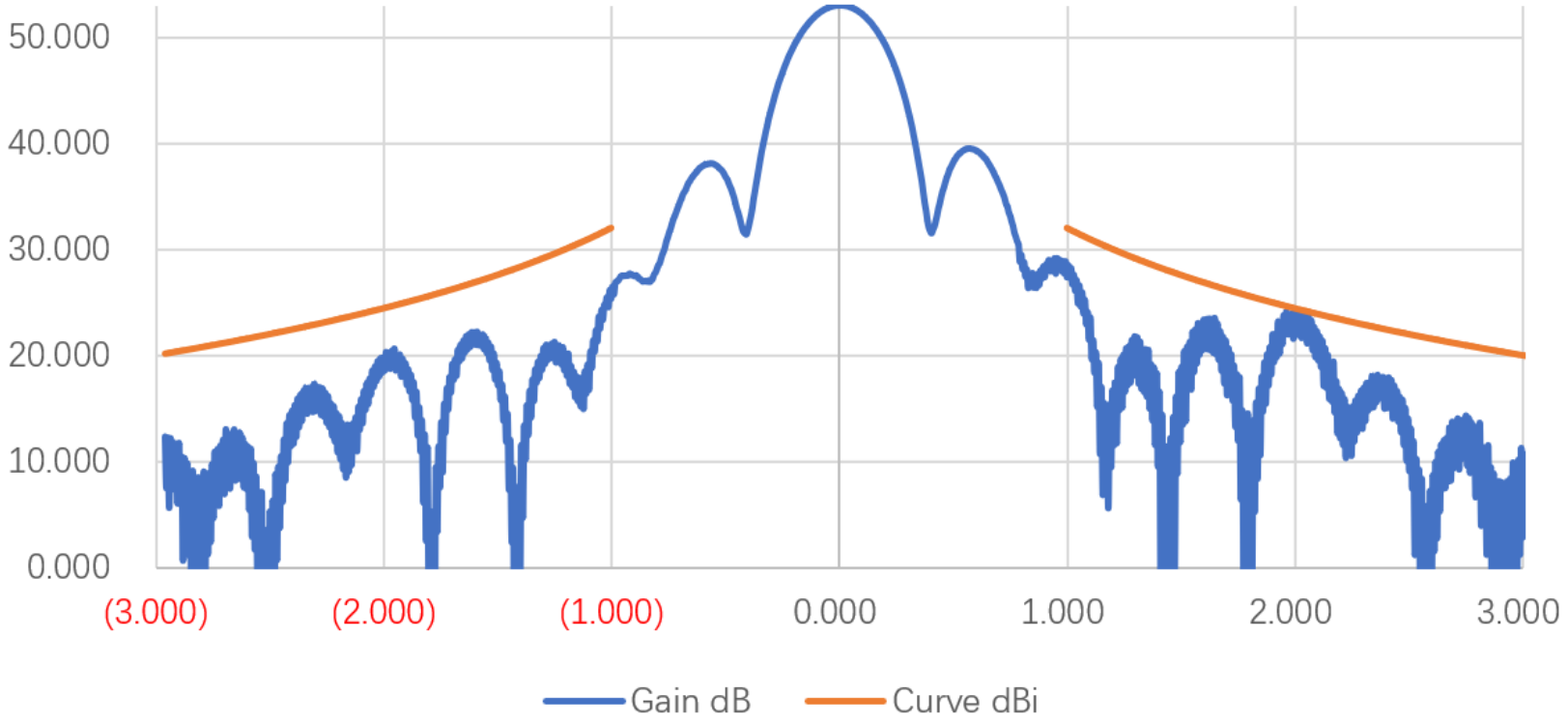

13.2-Mtr C-band Receive Pattern

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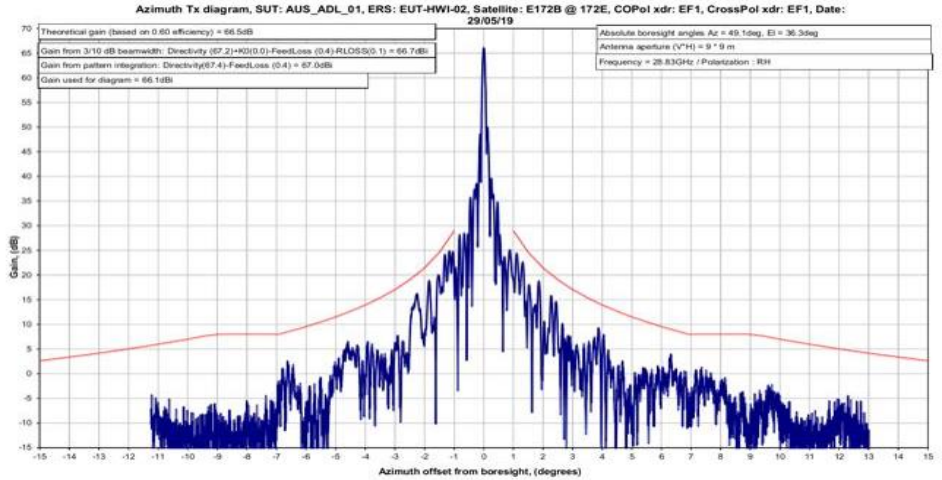
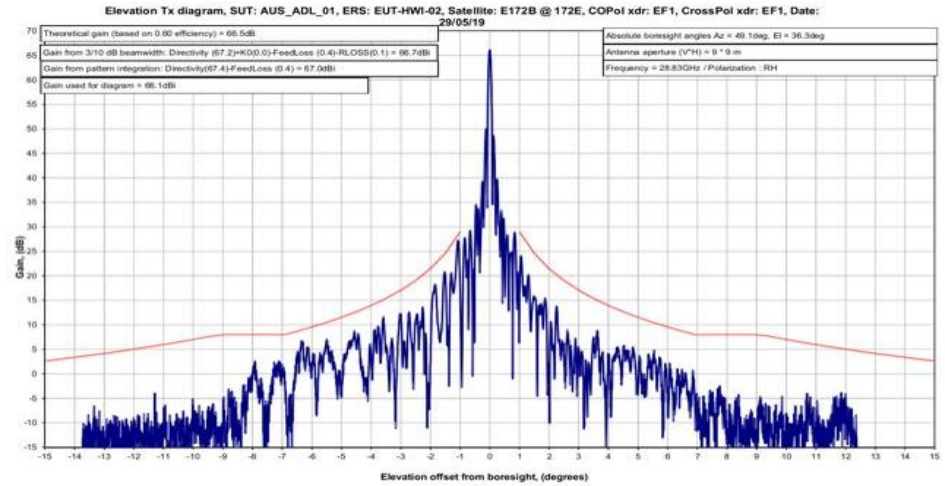
9.0-mtr Ka-band with Smart Step-track SpeedCast Teleport Adelaide

9.0-mtr Ka-Band Patterns - Adelaide





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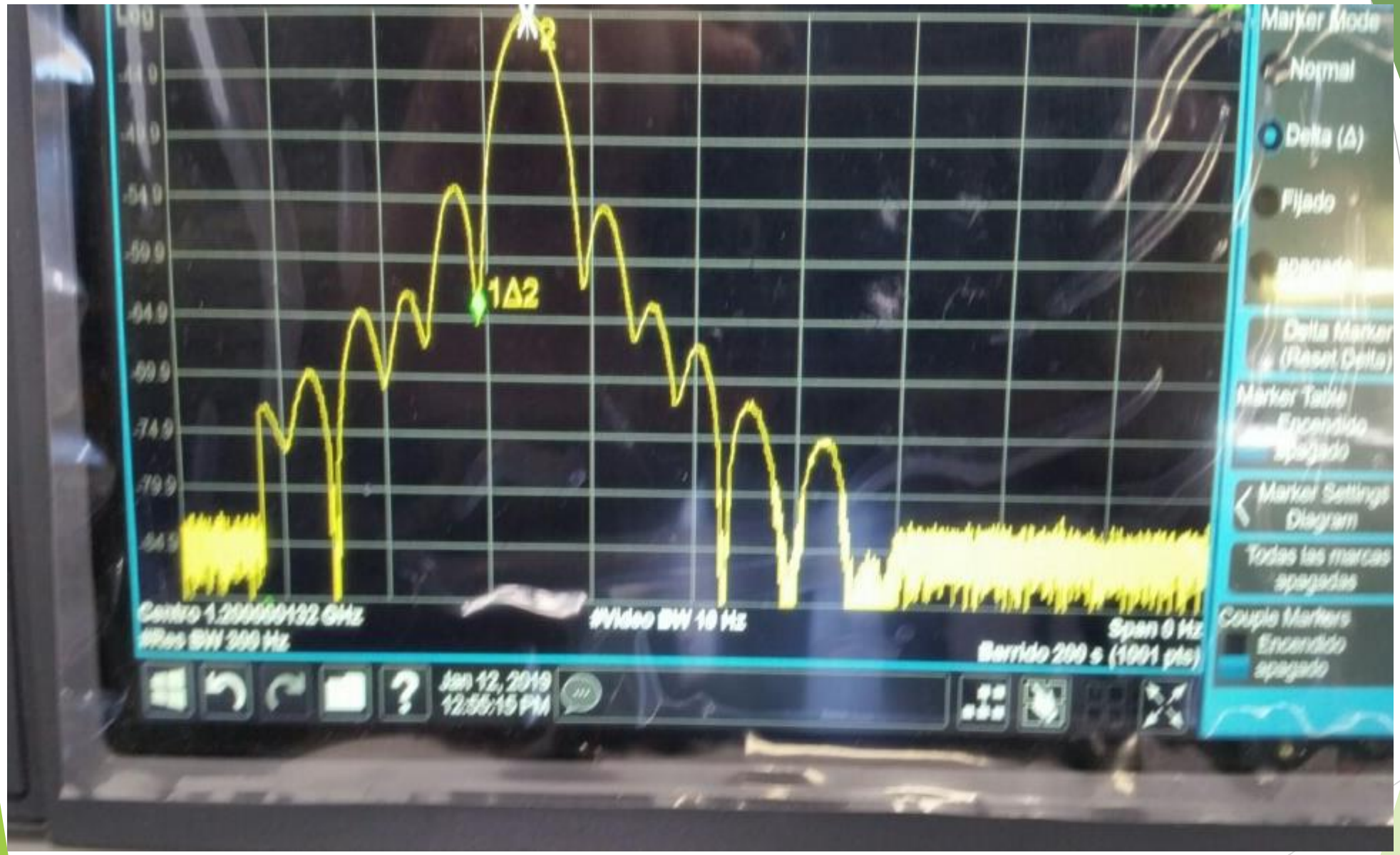
9.0-Mtr Ka-Band Monopulse - Madrid



Spain: 9.0-mtr Ka-band Receive Pattern

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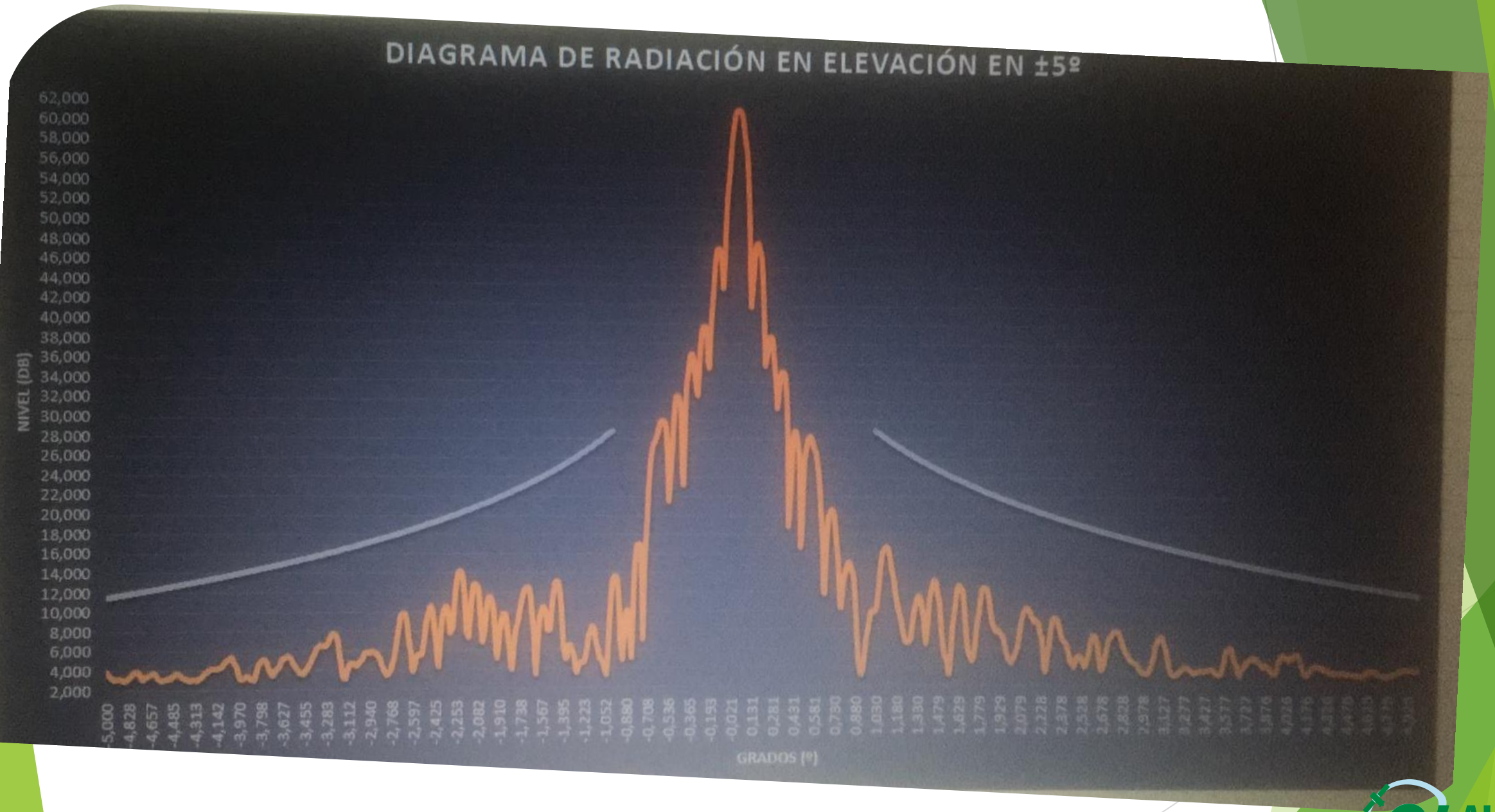

Madrid: 9.0-mtr Ka-band Elevation Transmit Pattern

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9.0-Mtr 6-Port DBS Band

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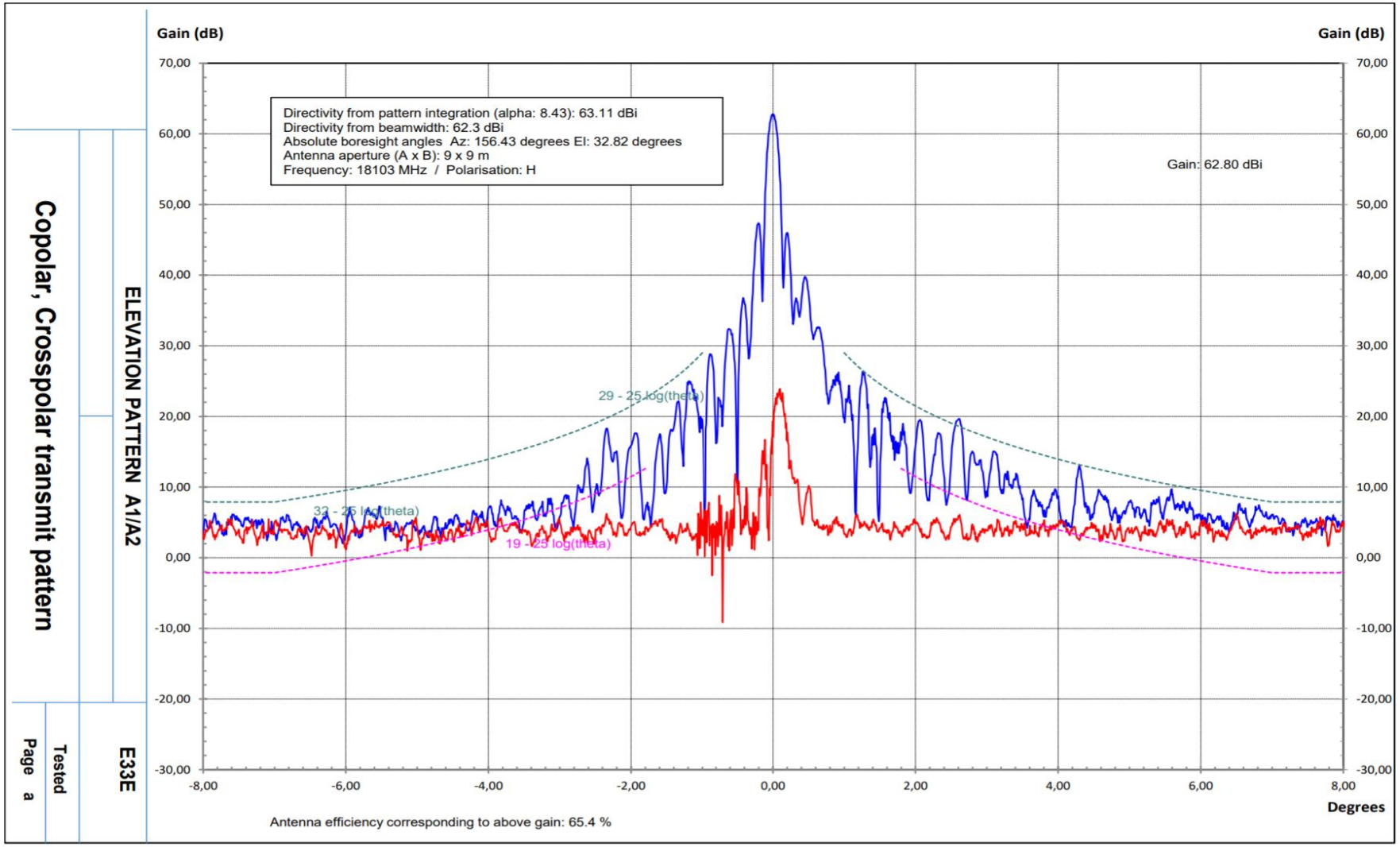

9.0-mtr 6-Port DBS Antenna

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7.3-Mtr Antenna

Hispasat Mexico: 7.3-mtr Ka-Band with Air-Conditioned Hub

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7.3-mtr Ka-Band Antenna – Hispasat - Mexico

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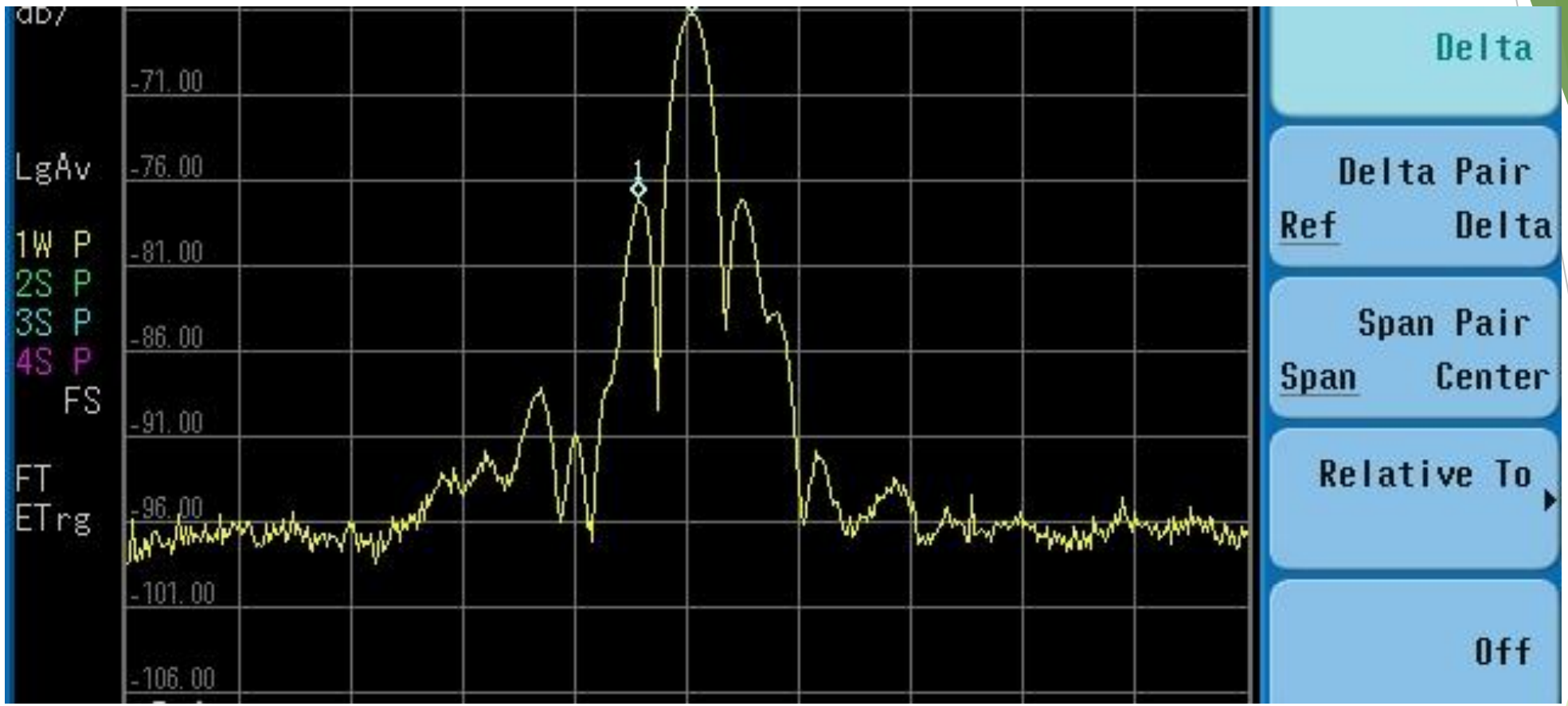

7.3-mtr Ka-band Pattern - Mexico

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Unit 1: 7.3-mtr Ka-band Antenna TSGN Malaysia

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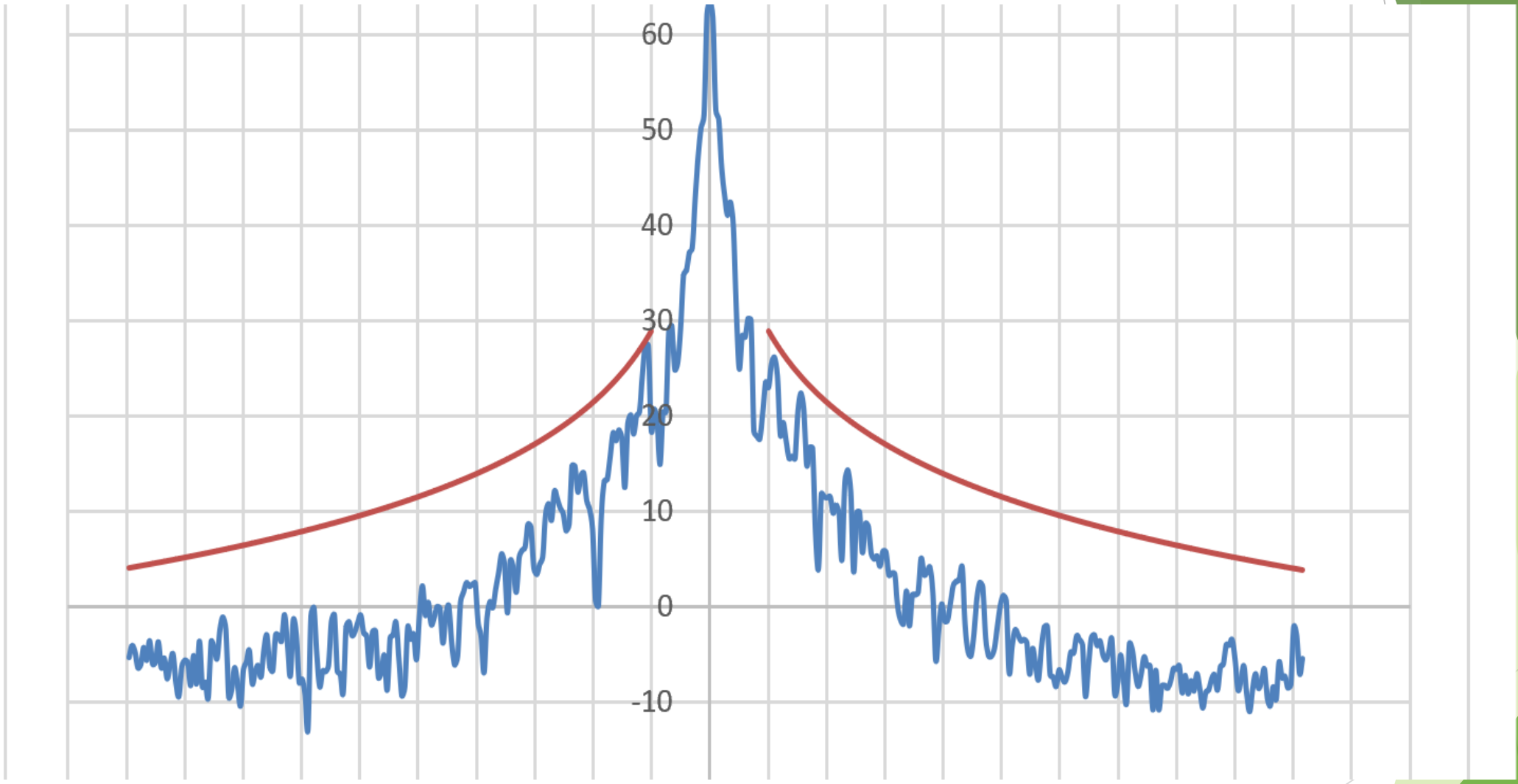

7.3-mtr Ka—band - TSGN Malaysia

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4.2-Mtr Carbon Fiber Antenna

DKET 4.2-mtr Carbon Fiber X-band Lo-PIM, Ku & Ka Gregorian Antenna for USA Military

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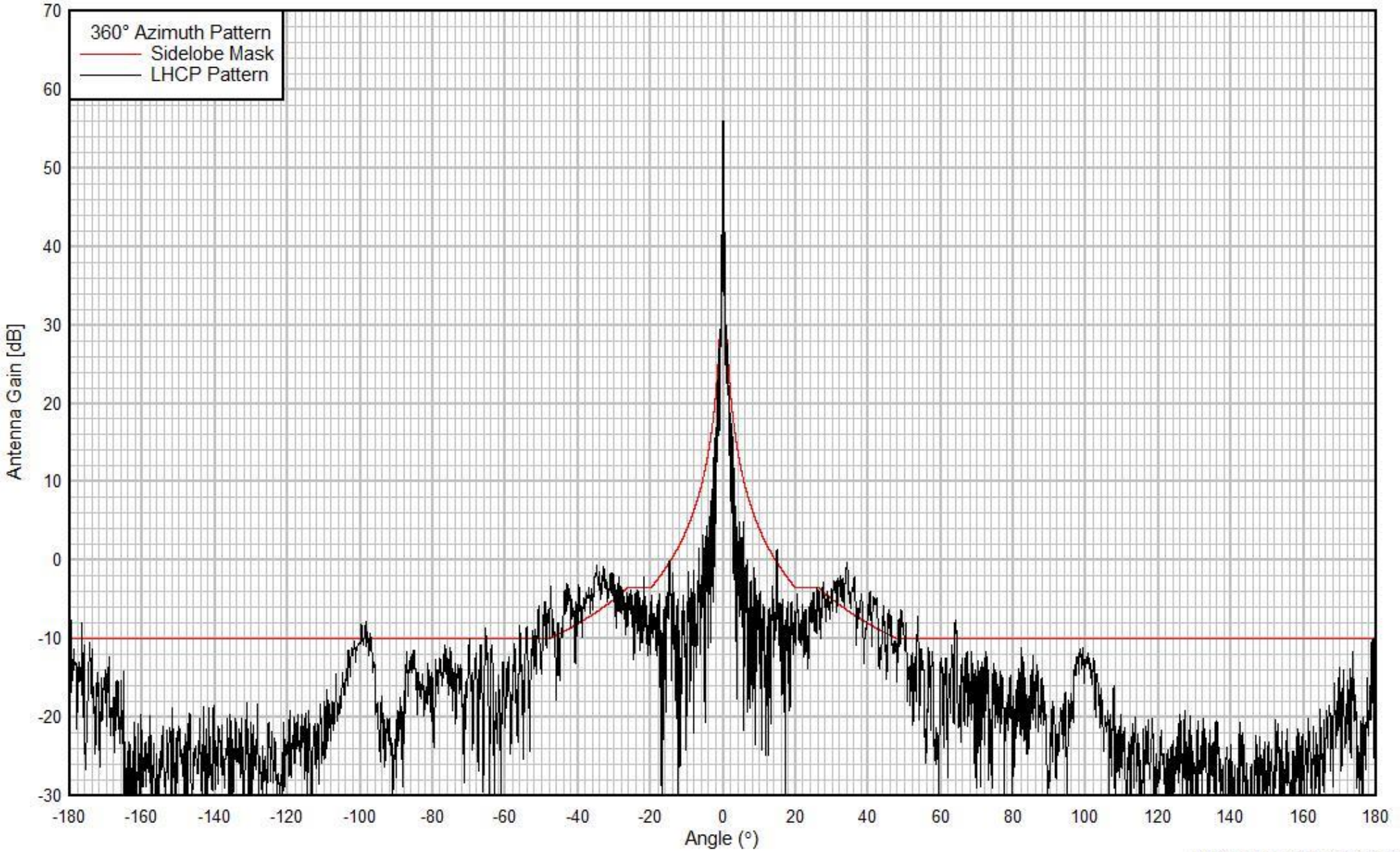
Alpha Satcom 4.2M Ka-band Antenna System

February 28, 2018

17.7 GHz RX LHCP Port Azimuth

Gain = 56.0 dB



17.7ghz rx lhcp azimuth.grf

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Custom Designed 4.2-mtr Carbon Fiber Reflector on a +/_ 170 deg Turning Head Pedestal with X & Ka-band Feeds

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Antenna System Component & Subsystem Comparison			
Item	**Description**	**Alpha Satcom**	**Brand X**
1	Panels	All panels are fabricated on Air Craft Quality panel tools and will support operation up to 20 GHz.	Panels are hand selected & tested at extra cost.
2	Azimuth Travel	190 deg in two 120 degree segments is standard.	120 deg std, extended travel at extra cost
3	Relocation of az segments	Az jack is attached to pedestal. Change to 2nd position can be done in 15 minutes by one man without any lifting equipment.	Majority of designs require lifitng equipment to change segments
4	Hub dimensions	Hubs are significantly larger providing more space for the inclusion of electronics. The larger hub provides also additional structural stiffness.	Smaller hubs result in less structural stiffness and reduced volume for the mounting of electronics
5	Antenna structure	All structures are designed for Ka-band stiffness and operation.	Quality of pedestals varies
6	All steel structures	Homogonous structure provides better Ku and Ka-band performance during the dailey passing of the sun over the structure.	Mixed structural materials can result in the warping of the reflector on a daily basis.
7	Feeds	LP Feeds have internal polarization adjustment. Therefore both LP and CP feeds have same interface and external pol drive systems are not required.	Typical LP feeds require external polarization sub assemblies.
8	Feed horn design	Fixed with flashing to prevent rain and sand from entering the hub.	Rotating feed tube difficult to keep water and sand from entering the hub.
9	Feed window rain blower	Incorporated into the feed.	External to feed requiring mounting of blower motor in the backup structure and running of the ductwork extraneous to the feed.
10	Reflector Alignment	All reflectors are aligned at the operational look angle using either optical or photogrammentry. This provides the best possible adherance to the RF design and therefore the best RF performance	Some antennas are offered as bolt together which will only provide optimum performance at the angle to which the tool was designed. Obviously, as the tool wears out so does the performance of the antenna.
11	Hardware	Galvanized and Stainless Steel - Metric	US Standard.
12	Hardware, bearings and bushings	Sourced in the USA.	Unknown.
13	Sub reflectors	All subreflectors are measured with a coordinate measuring machine (CMM) after manufacture.	Unknown.
14	Foundation hardware	Included in basic price.	Extra charge.
15	Hub closeout	Tightly sealed rolling door.	Unknown.
16	Upper Platform Access	Safety staircase as opposed to a ladder.	Unknown.

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NEYRPIC® ACU550

New generation of ACU for geostationary and low/medium orbit satellite tracking

- Monopulse, steptrack and orbital tracking
- Ephemeris tracking: Intelsat, CNES, AZ/EL/T, Norad TLE
- Monopulse autophasing function automatically cancels pointing errors on AZ and EL axes and nulls the crosstalk
- IPOP: Intelligent Progressive Orbit Prediction
- 64 satellite configurations, 128 RF configurations
- Can control 24 digital I/O's and 10 SPDT lines
- Full azimuth range antenna (< and > 360°)
- AZ-EL, X-Y, turning head, wheel and track mount
- 1.8 to 32.5m diameter antenna
- Transportable and mobile antenna
- Beacon receiver remote control
- Beacon signal variation compensation to eliminate noise components (running average and rms)

- Tilt compensation for fixed and transportable antennas
- Automatic antenna movement fault detection
- RF inhibit control
- Position sensor non-linearity compensation per 1°
- 3-axis position encoders
- Compatible with AC, DC and brushless motors
- Webserver for backup and restore, I/O monitoring, collection of raw data points
- Position offset nulling via webserver interface
- ARM Cortex® A8 600 MHz CPU
- 800x600 24-bit color touch screen

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