STELLAR BLU SOLUTIONS, LLC
6-MONTH STA REQUEST FOR IN-FLIGHT CONNECTIVITY ("IFC") SOLUTION

Technical Supplement

Stellar Blue Solutions, LLC ("SBS") submits this technical supplement to its application for experimental Special Temporary Authority, ELS File No. 0730-EX-ST-2022, in response to the requests set forth in ELS correspondence, reference number 69209, of May 4, 2022.

(a) Please provide the size (meter), antenna gain (dBi), input power at antenna flange (watts), and EIRP(dBW) of the proposed Stellar Blu Solutions Sidewinder (Sidewinder) antenna.

Please see Attachment A: SBS Sidewinder Antenna Details.

Aperture size of the Antennas are:

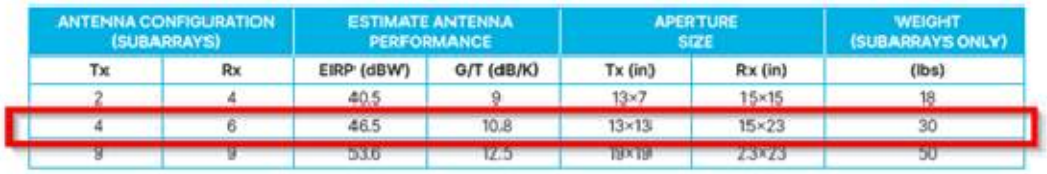
- RX-6Ku = 0.381m x 0.584m
- TX-4Ku = 0.33m x 0.33m

Other details of the Antenna's Transmit are:

Tx Antenna Boresight Characteristics	
Diameter (m) *	N/A
Antenna Gain (dBi)	34.1dB
Antenna Full Beamwidth (deg)	3.5°
TX Power max (W)	15.5 W
TX ERP max (kW)	39.8 kW
TX EIRP max (dBW)	46 dBW
TX Power nominal (W)	7.7 W
TX ERP nominal (kW)	19.9 kW
TX EIRP nominal (dBW)	43 dBW

(b) Please provide a manufacture specification sheet for the Sidewinder antenna.

Please see Attachment B: Antenna Supplier Specification Sheet. SBS will be using Ball's TX4 x RX6 configuration for this testing campaign.



ANTENNA CONFIGURATION (SUBARRAYS)		ESTIMATE ANTENNA PERFORMANCE		APERTURE SIZE		WEIGHT (SUBARRAYS ONLY)
Tx	Rx	EIRP (dBW)	G/T (dB/K)	Tx (in)	Rx (in)	(lbs)
2	4	40.5	9	13×7	15×15	18
4	6	46.5	10.8	13×13	15×23	30
9	9	53.6	12.5	19×19	23×23	50

(c) Please submit antenna's gain pattern performances. please provide the following information if it has not already been submitted to the Commission:

Please see Attachment C: OneWeb Flight Demo Antenna Patterns.

(d) Please include the co-polarized gain (dbi), plus and minus from 0 to 10 degrees, 0 to 45 degrees, and 0 to 180 degrees with FCC 25.209 envelop superimposed on each measured pattern, in the azimuth and elevation planes, at 14.25 GHz for the user terminal (antenna).
Please see Attachment C: OneWeb Flight Demo Antenna Patterns. As this system will be tested on OneWeb's LEO constellation with restrictions to not transmit towards the GEO arc, it is assumed to meet this requirement

(e) Please include the Off-axis EIRP density envelopes (dBW/4 kHz), plus and minus from 0 to 10 degrees, 0 to 45 degrees, and 0 to 180 degrees with FCC 25.218 envelop superimposed on each measured pattern, in the azimuth and elevation planes, at 14.25 GHz for the user terminal (antenna).
Please see Attachment C: OneWeb Flight Demo Antenna Patterns. As this system will be tested on OneWeb's LEO constellation with restrictions to not transmit towards the GEO arc, it is assumed to meet this requirement

ATTACHMENT A

SBS SIDEWINDER ANTENNA DETAILS

Sidewinder Adapter Plate

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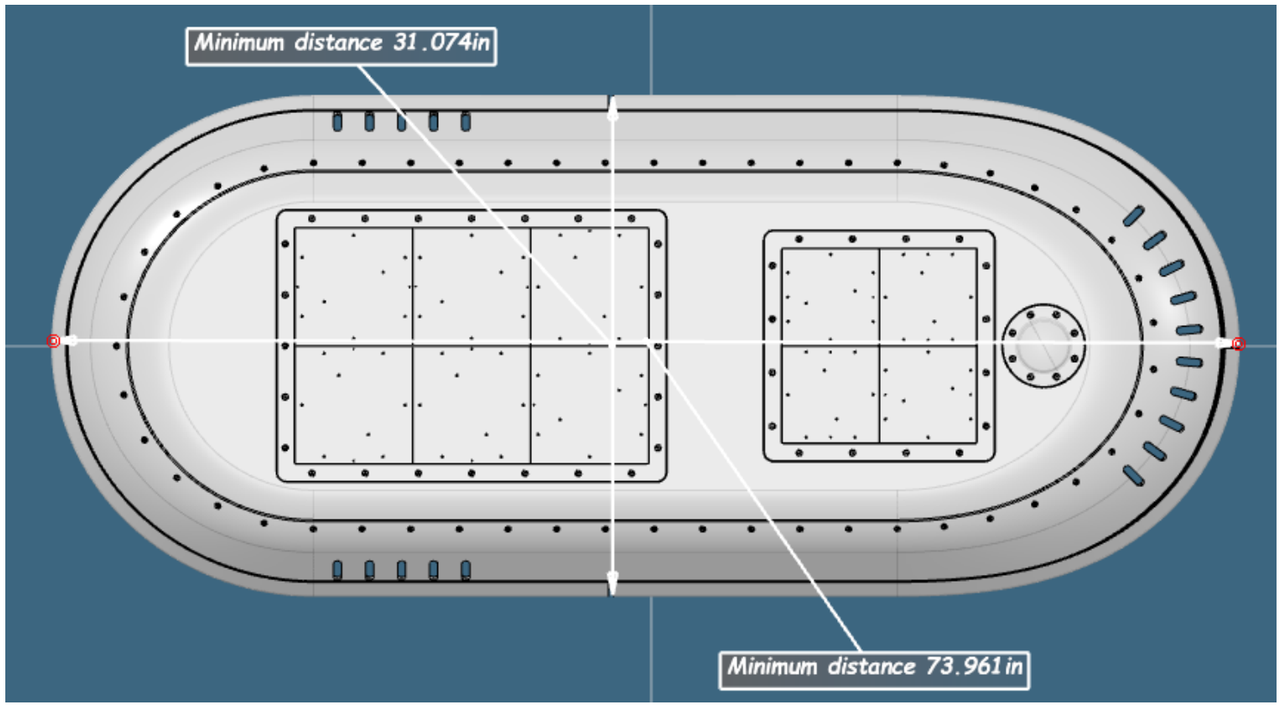

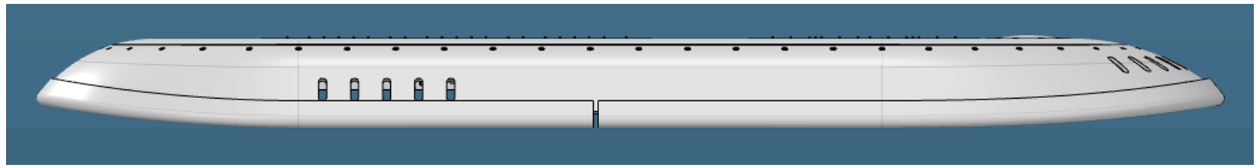

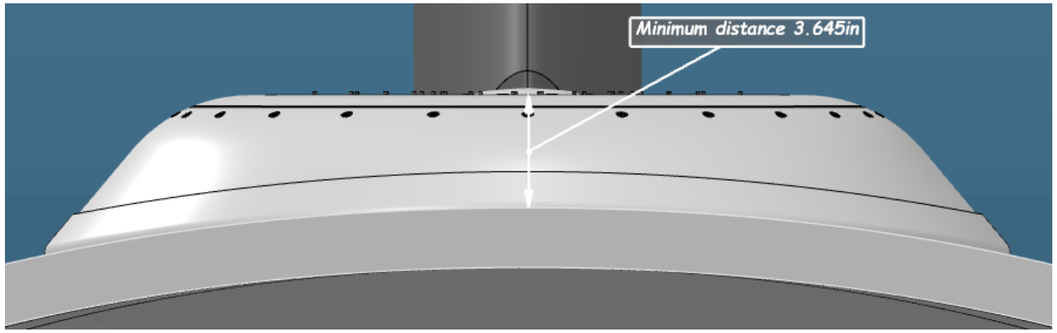

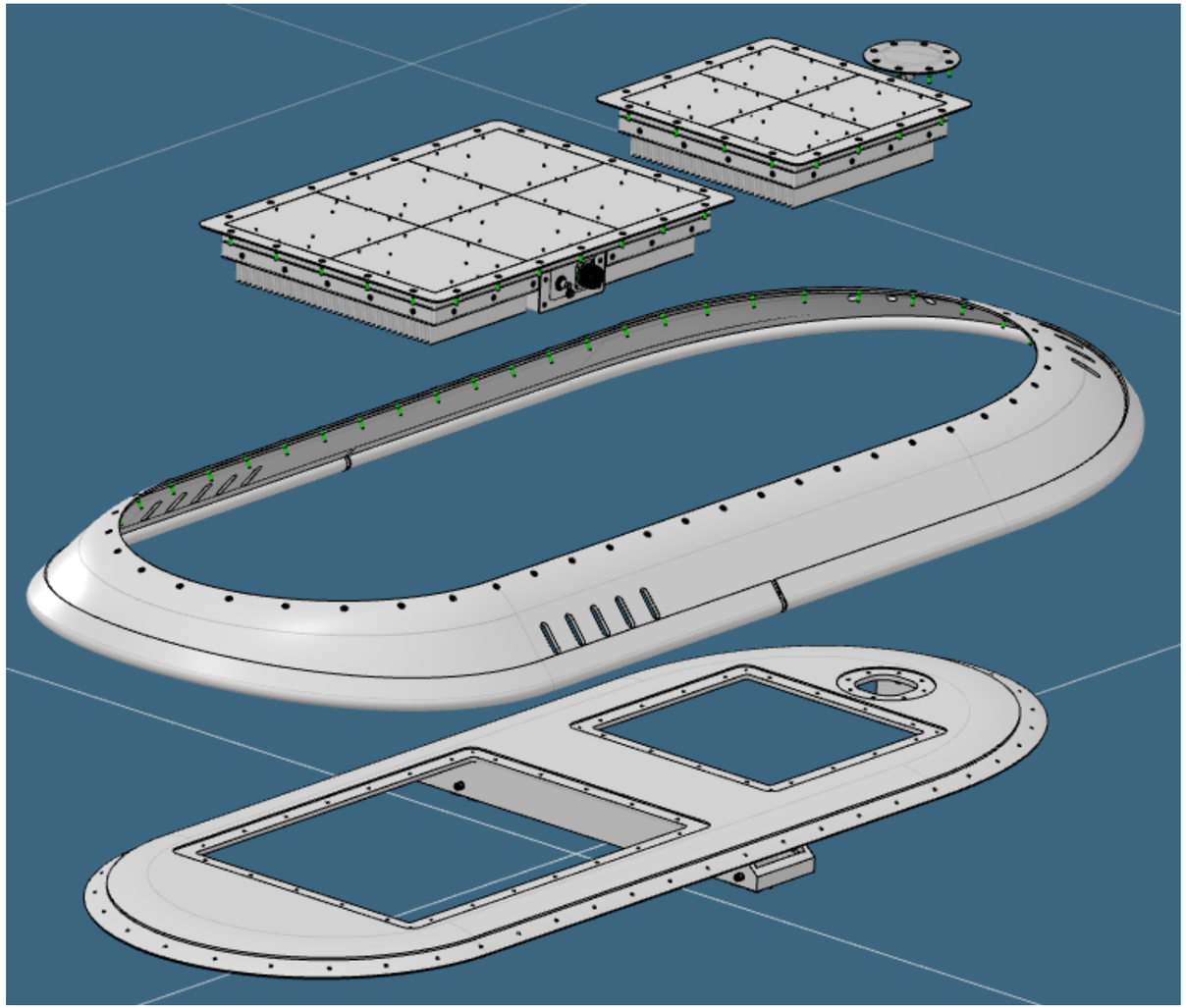

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RX-6Ku Antenna Assy

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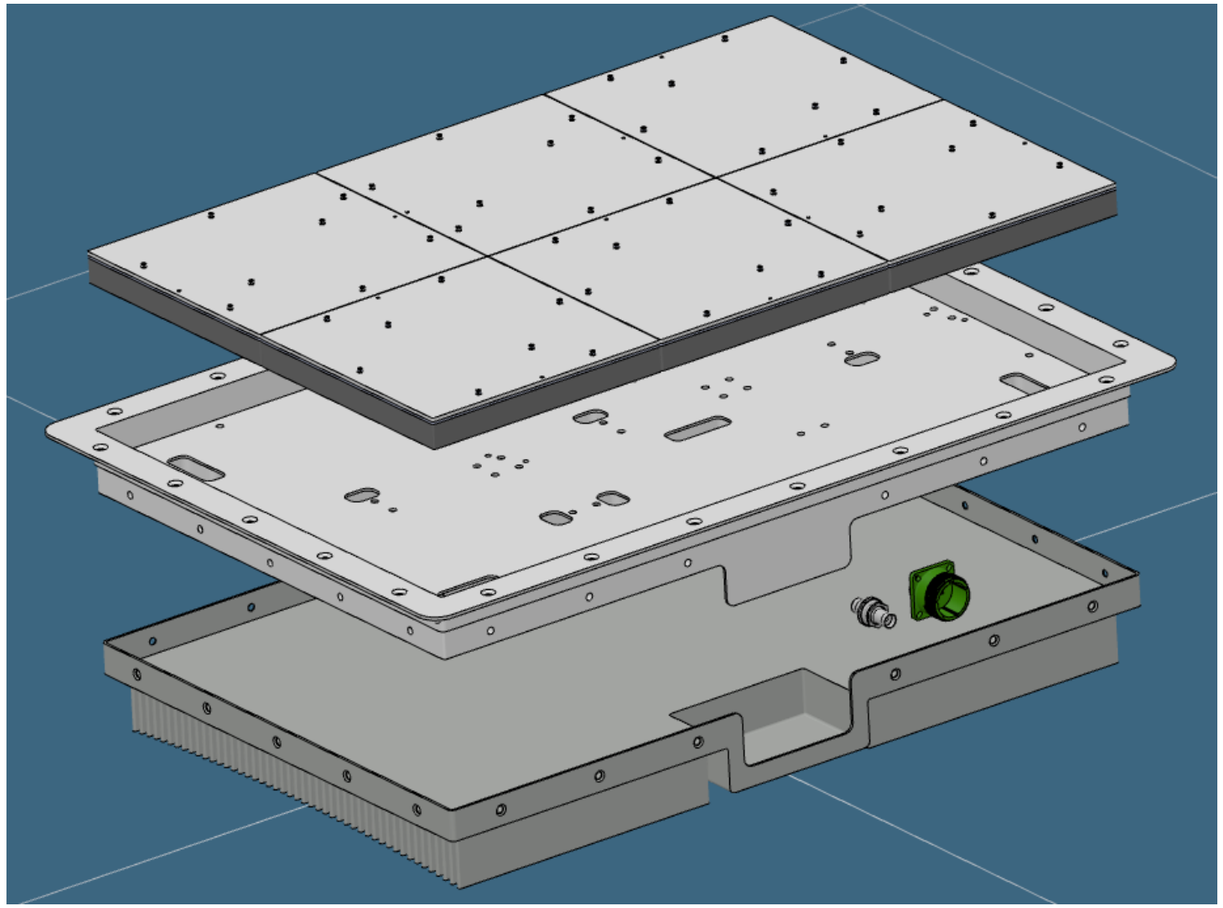

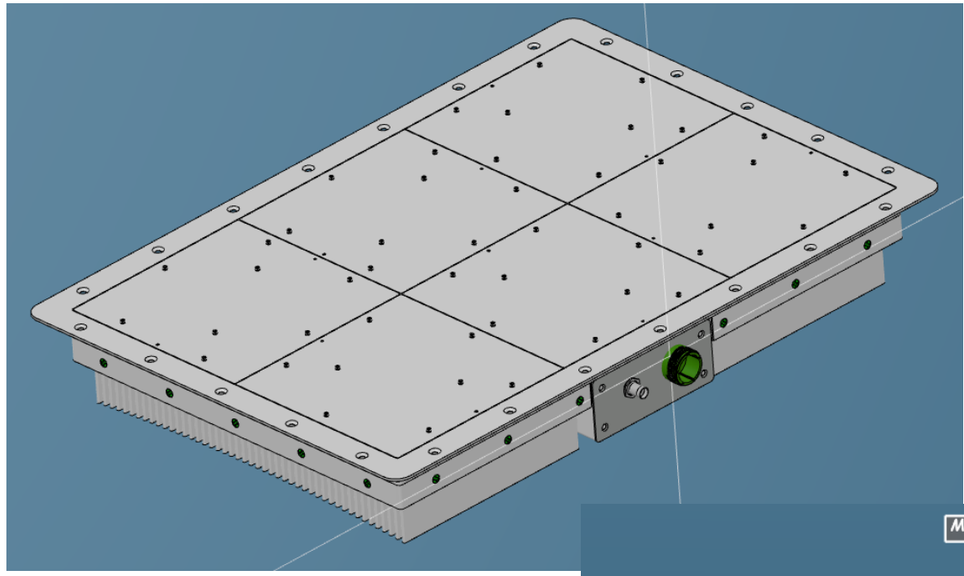

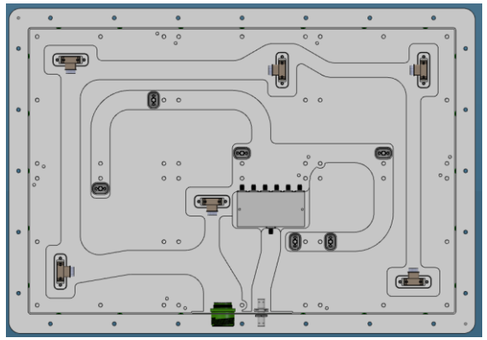

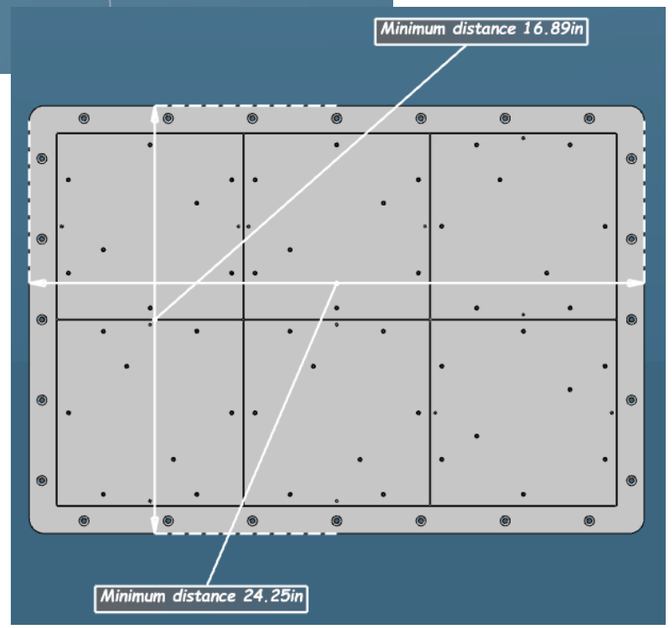

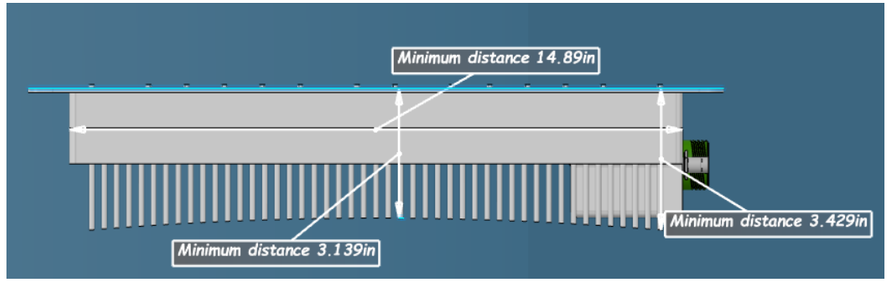

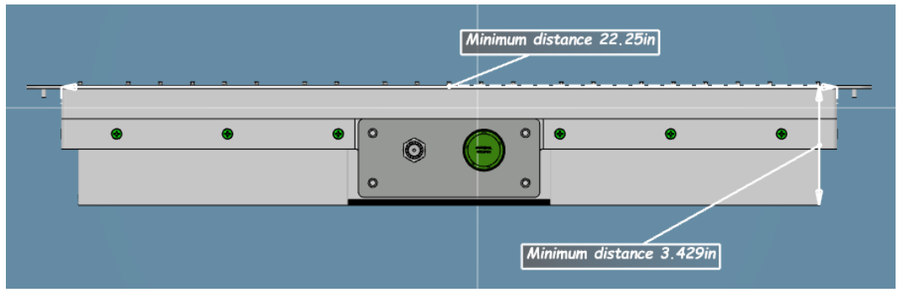

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TX-4Ku Antenna Assy

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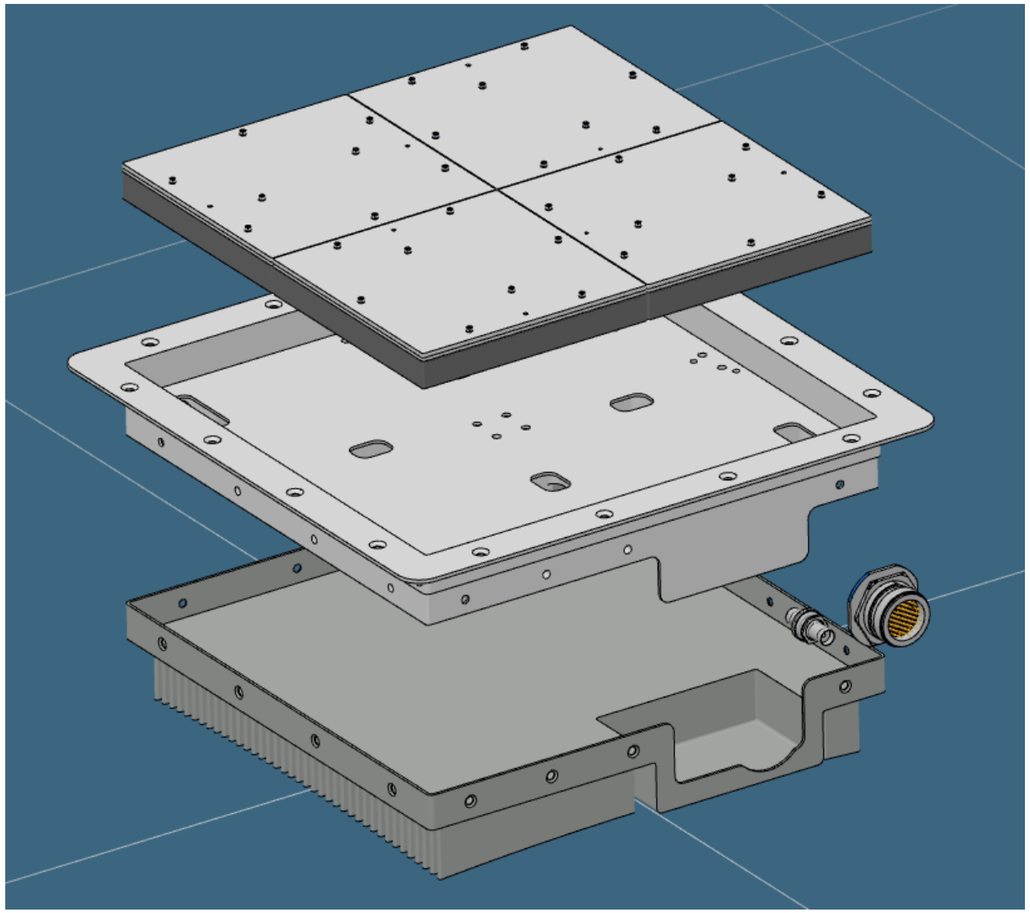

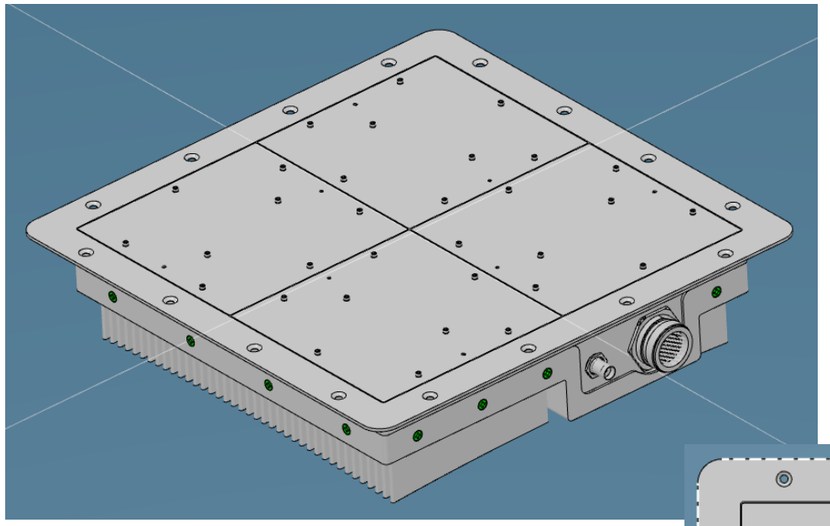

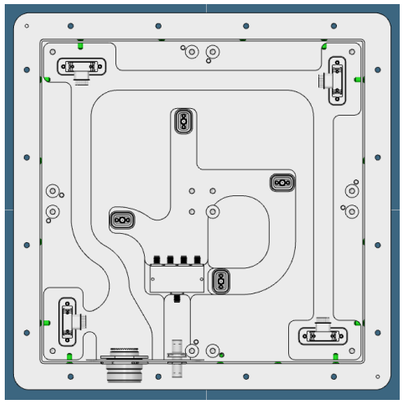

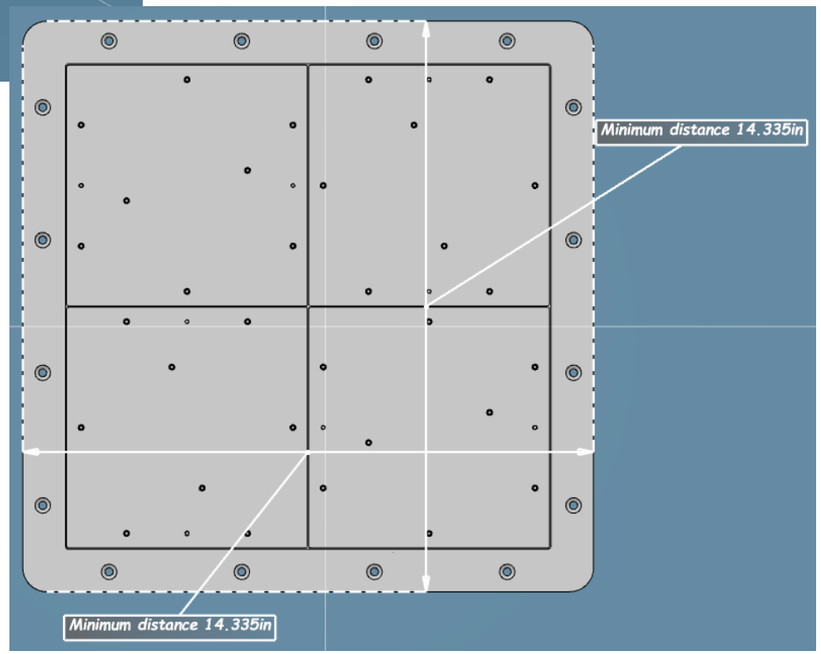

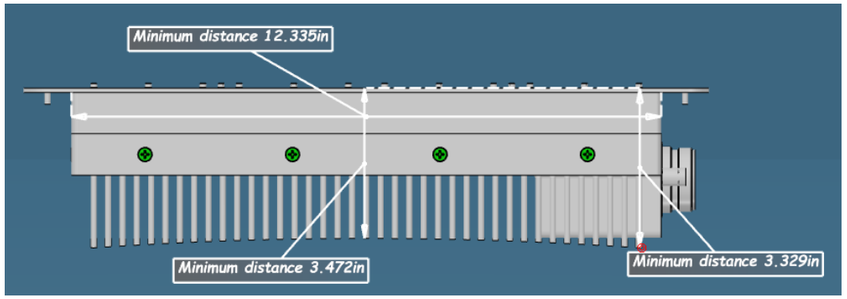

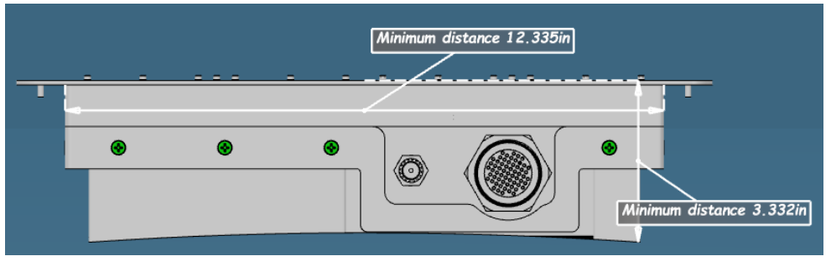

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ATTACHMENT B

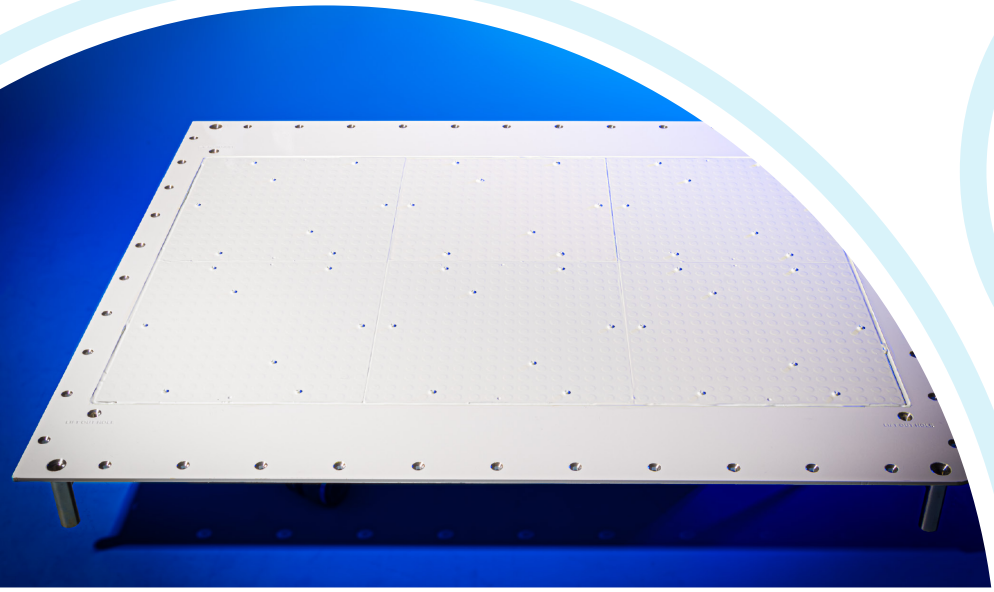
ANTENNA SUPPLIER SPECIFICATION SHEET

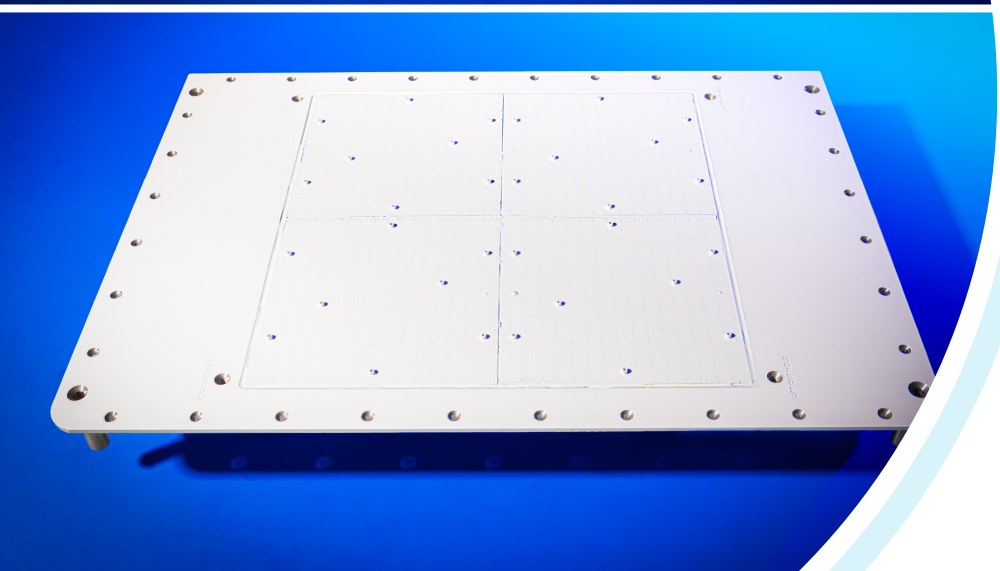
Ku-BAND SATCOM

Phased Array Terminals

Ball Aerospace's industry-leading line of electronically steerable antennas (ESAs) provide reliable, secure and high-speed communications across networks, frequencies and platforms. Our antenna solutions deliver unmatched flexibility to meet any use case, enabling fully customizable and affordable ESAs in Ku frequency bands for government, military and commercial markets.

ESA technology will transform how we connect and share information across the world. With our scale, experience and resources along with our global manufacturing partners, we are bringing the promise of ESA technology to the market today.





Top Left Image: Rx array;
Bottom Left Image: Tx array.

GO BEYOND WITH BALL.®

Architecture Overview

Ball's electronically steered Ku-Band phased array antennas feature our innovative subarray antenna architecture. The subarray is an environmentally-sealed ESA building block, assembled in volume to minimize cost and optimize flexibility for larger terminals. A terminal's transmit and receive antenna sizes are independently optimized by tiling multiple subarrays to meet the use case requirements. The subarrays support both military and commercial use cases, including in-flight connectivity (IFC), communications on the move (COTM) and enterprise.

Durable & Dependable

- Subarrays are an environmentally-sealed assembly, protecting all electronics

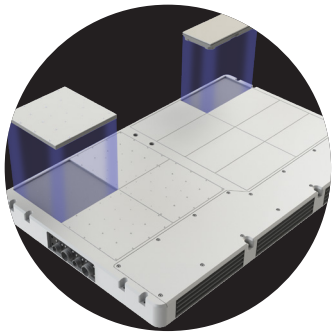
Affordable

- Designed for existing high-volume manufacturing processes
- Use highly-integrated commercial semiconductor devices and circuit boards
- Designed with integrated radome to reduce system cost and improve performance

Interoperable / Future-Proof

- Antenna terminals are network and modem agnostic to support access to multiple networks
- ESA fast beam update rates easily support LEO satellite tracking
- Software-defined antenna enables our architecture to meet the network needs of today and tomorrow

COTM Terminal: 4Tx + 8Rx Subarrays



ESA: Proven & Ready

Ball has assembled and tested multiple ESA terminals, demonstrating the performance and scalability of the subarray design. Terminals have been demonstrated on geostationary orbit (GEO) and low-Earth orbit (LEO) networks, showcasing the flexibility and robust communication capabilities of our terminals to maintain links under highly dynamic maneuvers.

Ball ESA terminals are ready today to meet your SATCOM needs. The company is actively ramping up our production of subarrays. We offer a flexible partnership model that capitalizes on each organizations' expertise, whether delivering full terminal solutions or just the antenna.

ESA CAPABILITIES	
Frequency	Transmit: 13.75* – 14.50 GHz Receive: 10.70 – 12.75 GHz
Polarization	V/H/RHCP/LHCP (software switchable)
Axial Ratio	< 2.0 dB (software controlled)
Coverage	Azimuth: 360° Elevation: 10° to 90°
Beam Update Rate	< 1ms (any position, any polarization)
Interfaces	Open AMIP / Custom
Dual Beam	Receive capable

**Extendable down to 12.75*

ANTENNA CONFIGURATION (SUBARRAYS)		ESTIMATE ANTENNA PERFORMANCE		APERTURE SIZE		WEIGHT (SUBARRAYS ONLY)
Tx	**Rx**	**EIRP (dBW)**	**G/T (dB/K)**	**Tx (in)**	**Rx (in)**	**(lbs)**
2	4	40.5	9	13×7	15×15	18
4	6	46.5	10.8	13×13	15×23	30
9	9	53.6	12.5	19×19	23×23	50

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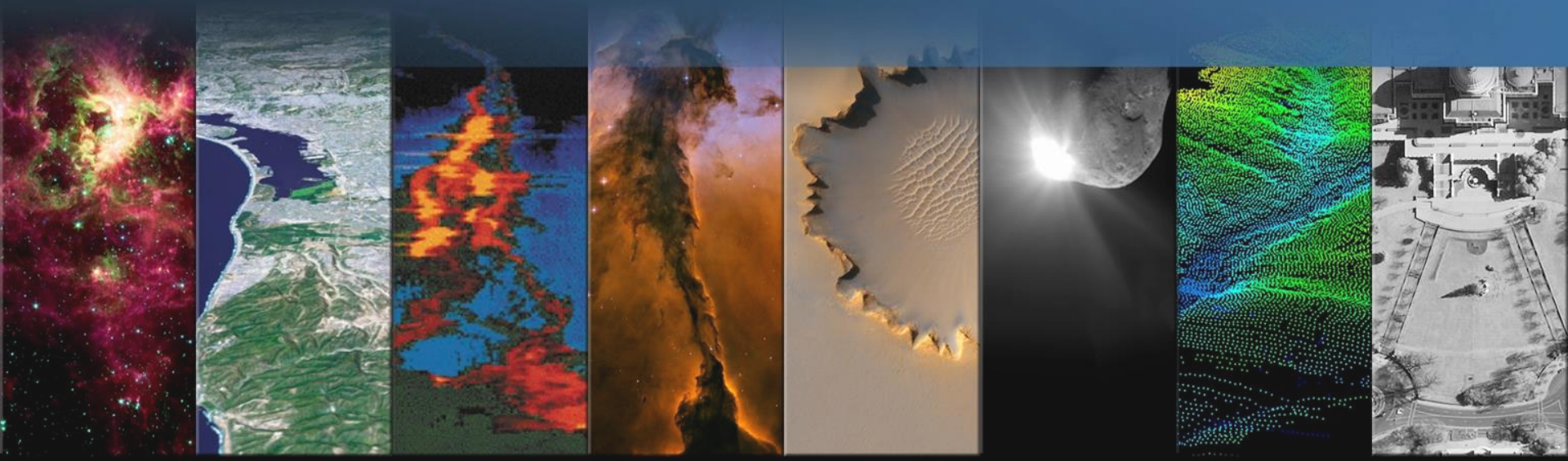
ATTACHMENT C

ONEWEB FLIGHT DEMO ANTENNA PATTERNS

OneWeb Flight Demo Antenna Patterns



Agility to Innovate, Strength to Deliver

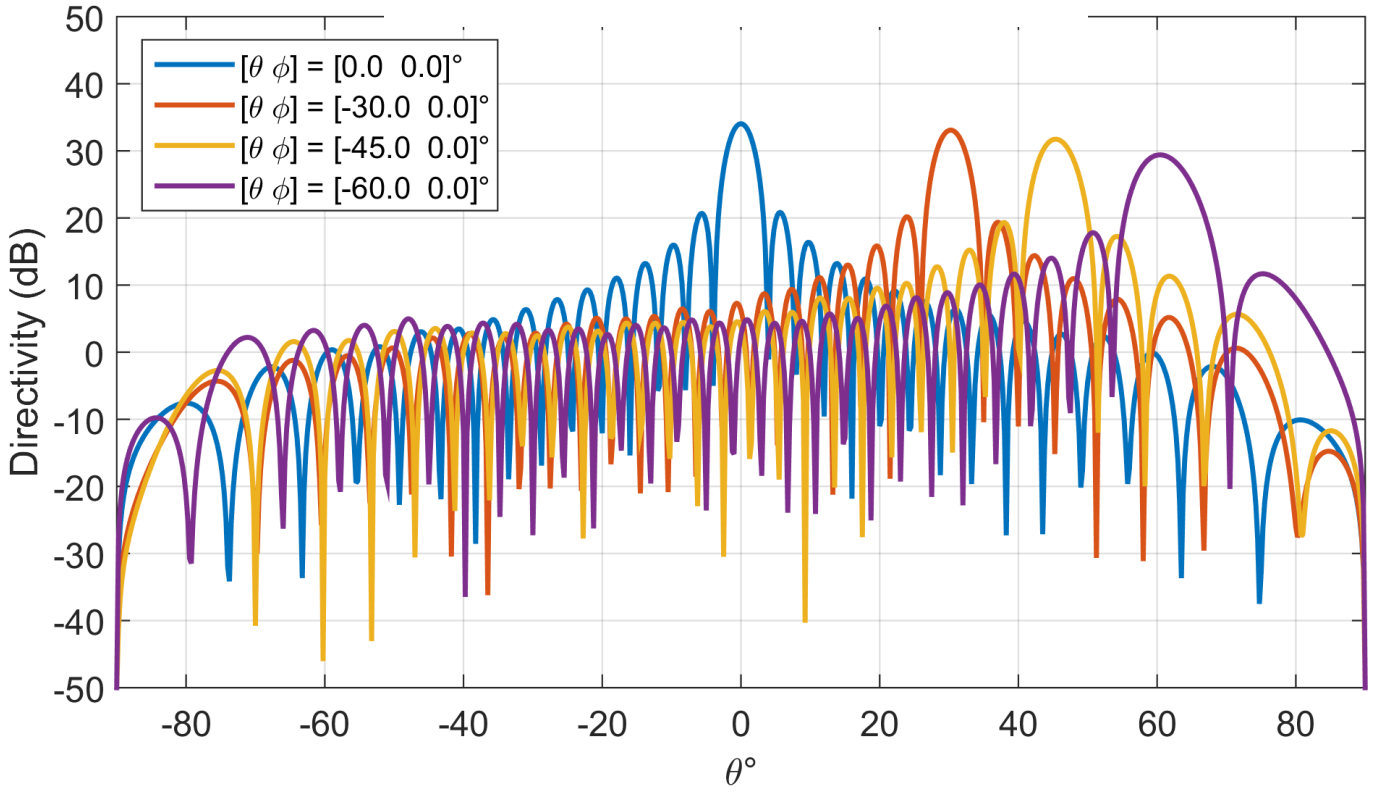
Ball Aerospace
& Technologies Corp.

OneWeb Flight Demo FCC License Info

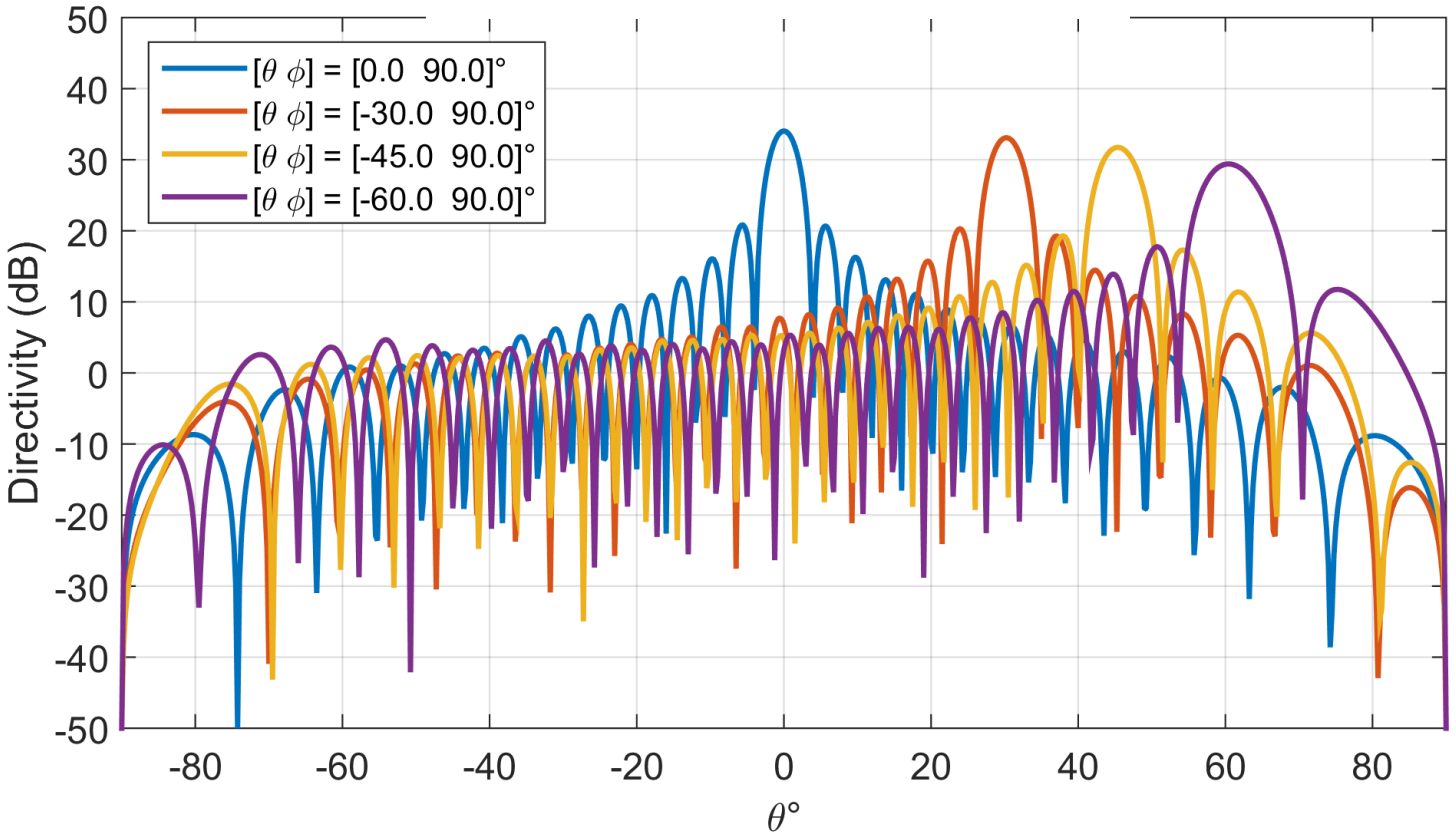
Tx Antenna Boresight Characteristics	
Diameter (m) *	N/A
Antenna Gain (dBi)	34.1dB
Antenna Full Beamwidth (deg)	3.5°
TX Power max (W)	15.5 W
TX ERP max (kW)	39.8 kW
TX EIRP max (dBW)	46 dBW
TX Power nominal (W)	7.7 W
TX ERP nominal (kW)	19.9 kW
TX EIRP nominal (dBW)	43 dBW

All parameters reported at broadside. Beamwidth is maximum HPBW.

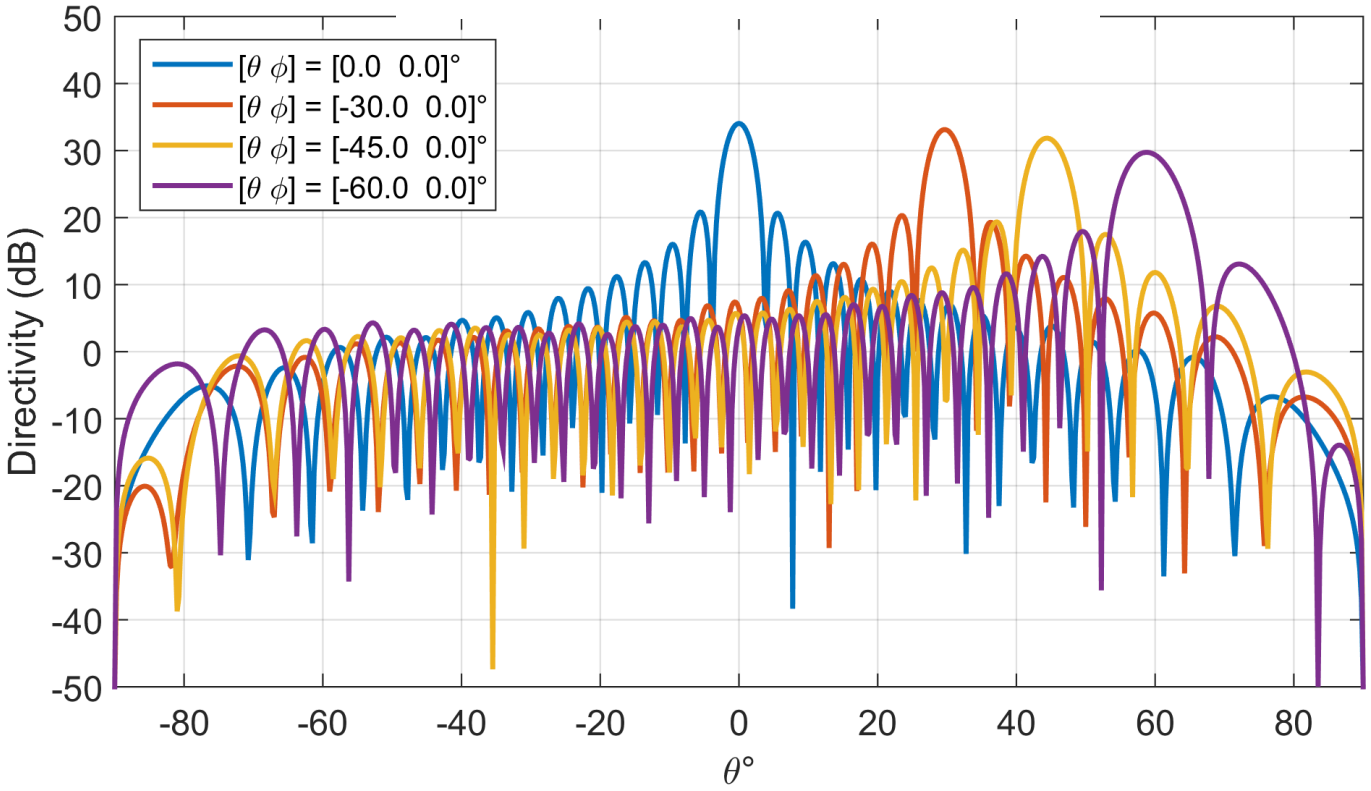
Tx Antenna Patterns @ 14.125GHz, ϕ=0°



Tx Antenna Patterns @ 14.125GHz, ϕ=90°



Tx Antenna Patterns @ 14.375GHz, ϕ=0°



Tx Antenna Patterns @ 14.375GHz, ϕ=90°