TMYTEK

From Ground to Sky — Resilient Connectivity with Phased Array Solutions

The Global Pioneer in Millimeter-Wave Innovation and Solutions

Su-Wei Chang, *Founder & President, TMYTEK*

March, 2026

One Modem, One Antenna: Redefining the Architecture of Global Connectivity

MODEM

COMTECH

Software-Defined Modem

Focusing on the development of core algorithms for Software-Defined Modems (SDM) and Antenna Control Units (ACU)

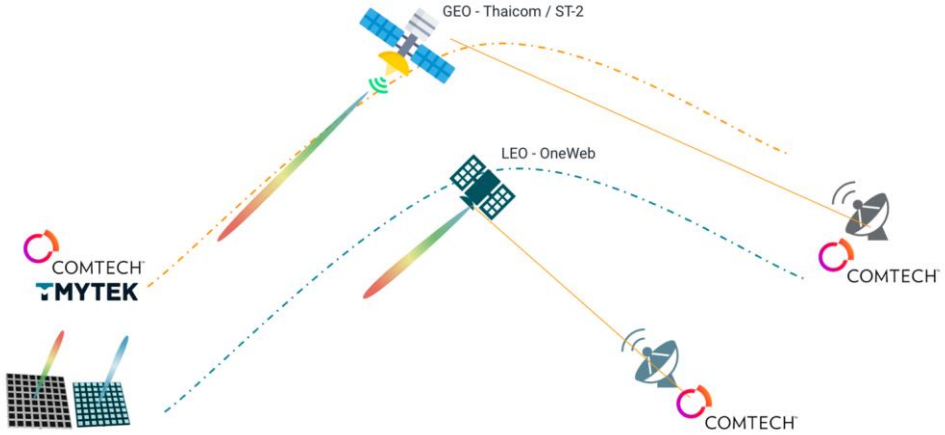
×

ESA

TMYTEK

Advanced ESA RF Front-end

Building Electronically Steerable Antennas (ESA) featuring an innovative "Tile-up" stacked architecture

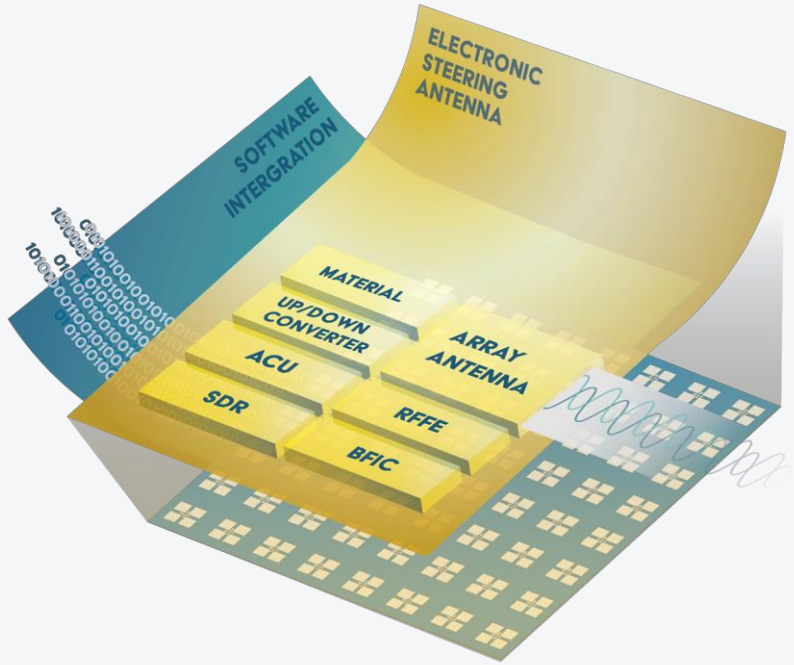


Strategic Alliance: TMYTEK x Comtech for next-gen multi-orbit solutions

TMYTEK: Leading the mmWave Phased Array Revolution

Summary

TMYTEK is the global pioneer in millimeter-wave (mmWave) phased-array technology, providing one-stop integration from design and materials to mass production testing. We are dedicated to mastering core RF challenges across 5G/B5G, 6G, multi-orbit satellite communications (SATCOM), automotive radar, and aerospace defense.



Key Fact

- 2014 founded by Su-Wei Chang & Ethan Lin
- 100s employees
- $53M funding to date, Debuted on the Taiwan Stock Exchange (TPEx) in 2025
- Offices: Taipei (HQ) / Hsinchu (R&D center)
- **123+/60+** global patents granted/pre-grant
- Partner with global tier-1 tech leaders
- Investors : NDF、EZConn(6442)、KENMEC(6125)、AmazingIC(6411)、Inventec(2356)

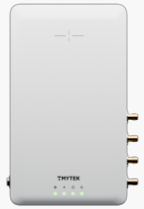
TMYTEK Market Segment & Product

	Standard Product	Customized Project Design			
Market Segment	**R&D**	**Defense**	**Automotive**	**5G/6G**	**SATCOM**
Solutions	**Testbed**	**AESA/ESA**	**Radar**	**Phased Array**	**ESA**
Applications	• FR2 & FR3 • mmW Beamforming • 6G NTN • MIMO, ISAC..etc	• AESA • Satcom UT • Customized	• Obstacle Sensor • Gesture Sensor • In-cabin Detection (CPD)	• 5G FR2 CPE/FWA • 5G/6G RUs	• Satcom UT • Satcom Payload • HAPS Payload
Target Audience	Academy/Institute/ R&D Lab	Defense SI/ Contractor/ Defense company	Automotive Tier-1 SI	ODM/OEM/MNOs	Operators/SI
End Customers	SIT, NCSU, UHM, CU Boulder, KDDI, ESA, Fraunhofer HHI	Tier-1 Defense Company	KSA Car Company	Tier-1 MNO	Satcom Operators

TMYTEK Product / Solution Portfolio

mmW Instruments

BBox



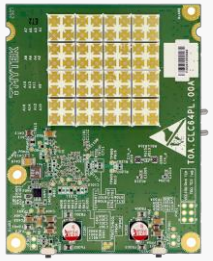
BBox 8x8 Duo

Development Kit

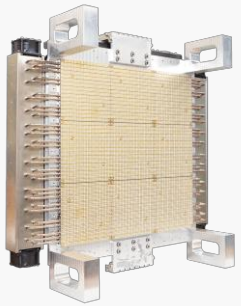
UD Box

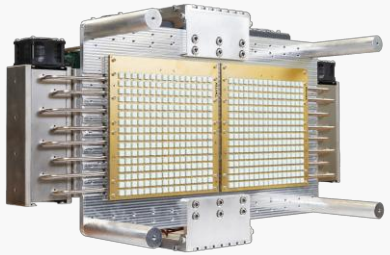
mmW-OAI

mmWave Phased-Array Modules



5G NR AiP

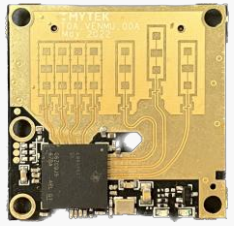




SATCOM ESA

SATCOM Waveguide

XRifle RIS/Reflector



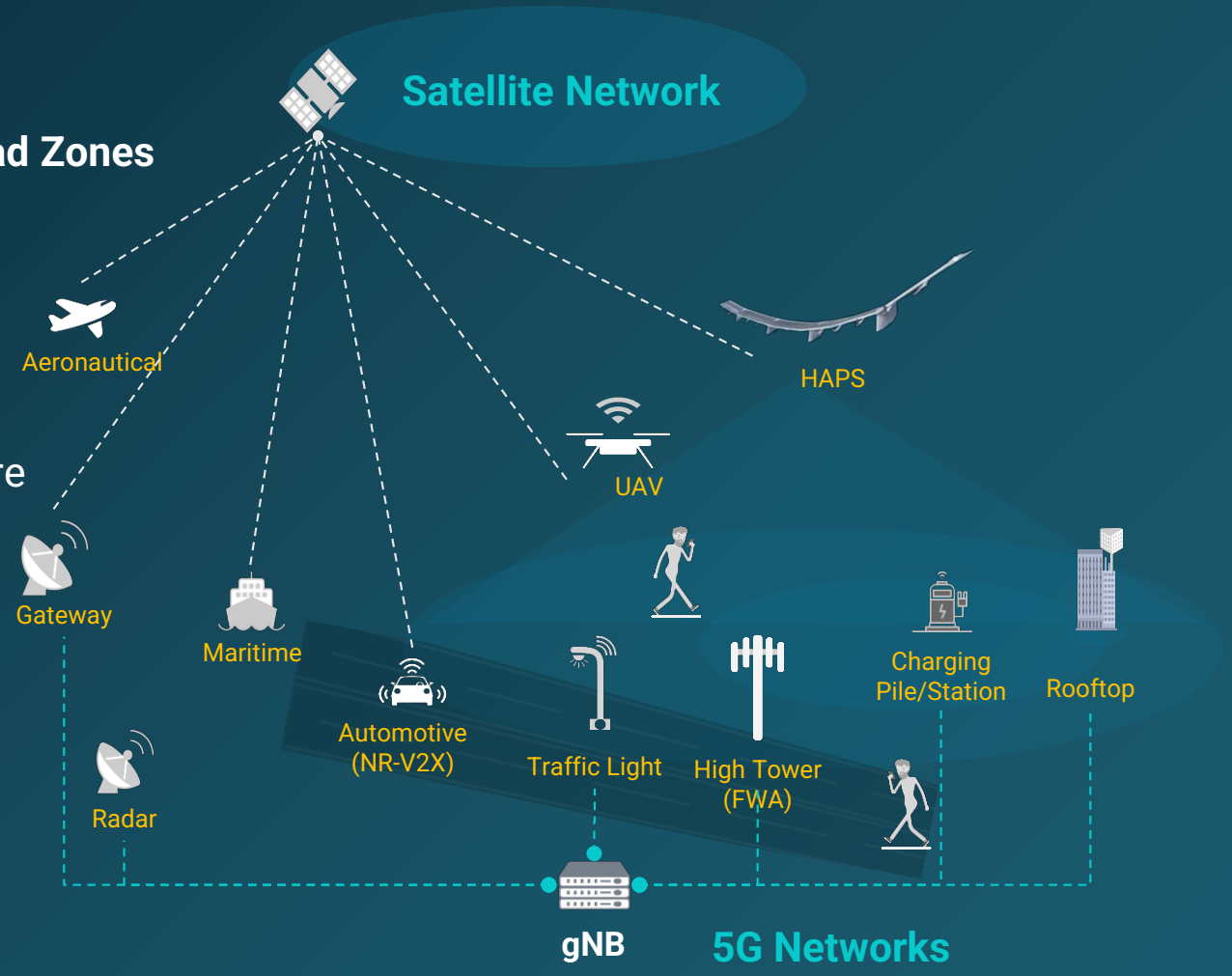
mmWave Radar

NON-TERRESTRIAL NETWORK

Core Technology: NTN Ubiquitous Coverage

- **Achieving Seamless 3D Connectivity Without Dead Zones**
- **Integrating LEO Satellites, HAPS, and Terrestrial Networks.**
- **Technical Requirements:** Dynamic beam management and high-gain flat-panel antennas are essential to overcome the challenges of high-speed satellite mobility

TMYTEK's Value：Providing advanced phased-array modules to support precise beam tracking for both satellite payloads and ground stations



Each Layer Has Its Own Value Proposition

EARTH SURFACE

LOW ATMOSPHERE

TERRESTRIAL & PLANES

Limited Scale
High Capacity
High OpEx
Local Coverage

STRATOSPHERE 20 KM

HAPS

Flexible
Scalable
Cost effective
Wide coverage
Direct to cell phone

LOW EARTH ORBIT 500+ KM

MEDIUM EARTH ORBIT 2,000 – 35,000 KM

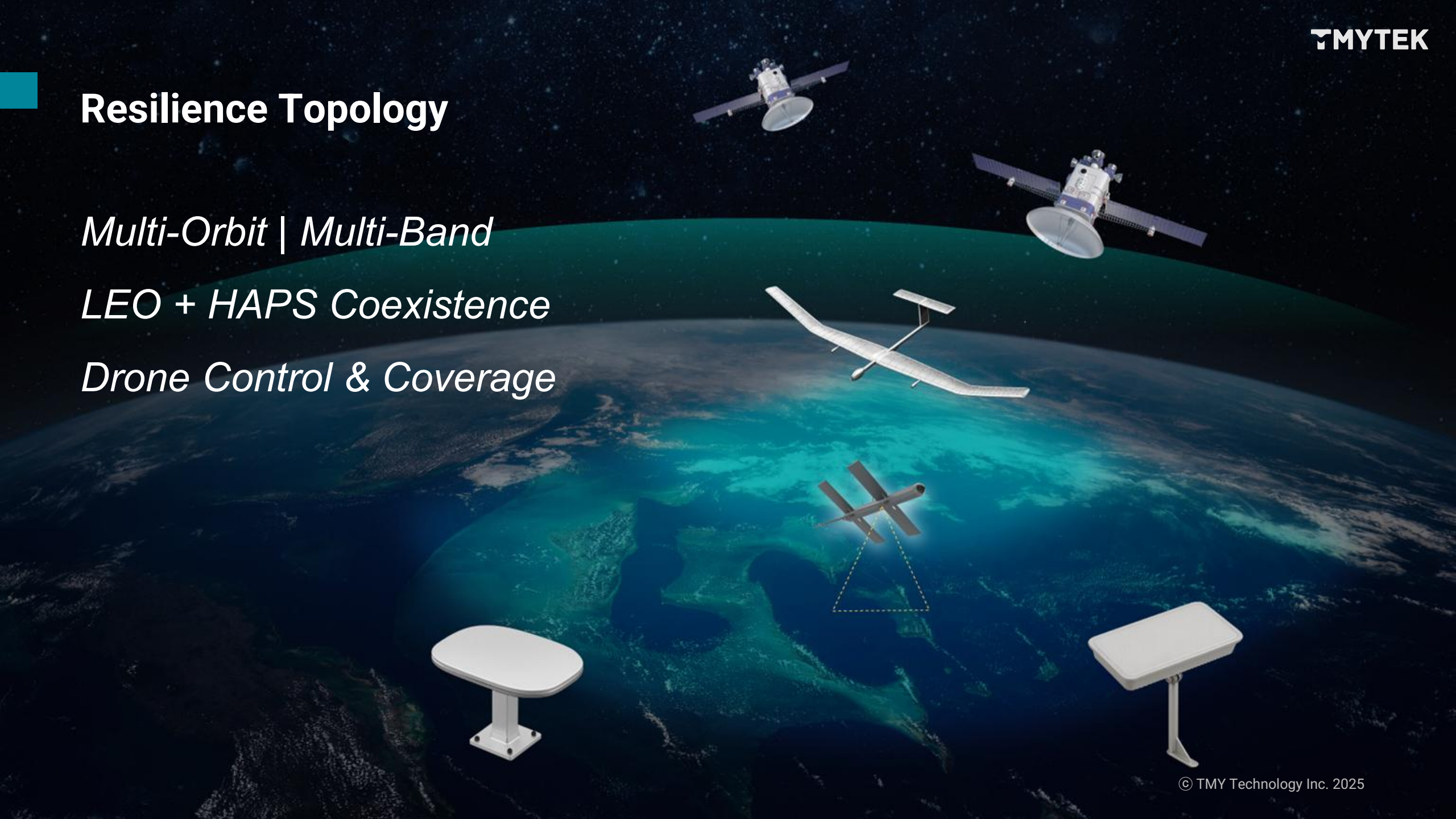
GEOSTATIONARY 35,786 KM

Resilience Topology

Multi-Orbit | Multi-Band

LEO + HAPS Coexistence

Drone Control & Coverage



Taiwan's Strategic Positioning and Opportunities in NTN and Satellite Communications

Antenna module design innovators like TMYTEK integrate Taiwan’s electronics manufacturing excellence to deliver **flexible designs, high quality, and system-level solutions**

ESA Technology

Electronically Steerable Arrays (ESA) effectively address the challenges of frequent beam switching necessitated by rapid satellite movement

AiP Module

The high integration of RFICs and antennas achieves miniaturization and low signal loss, making them ideal for the next generation of 6G mobile devices.

System Integration

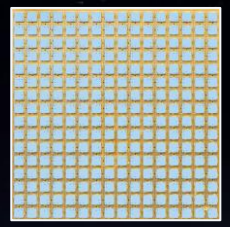
Modular architecture, configurable via software, provides versatile solutions that meet the diverse requirements across LEO, MEO, and GEO constellations

Satellite ESA Product Portfolio

Multi-Orbit Integrated UT Solution

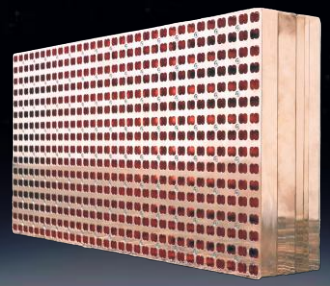
Tx AiM Unit Cell
13.75~14.5 GHz
16×16 Array

Rx AiM Unit Cell
10.7~12.75 GHz
16×16 Array



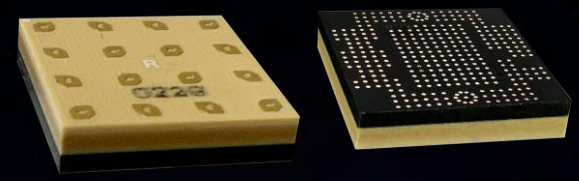
Fixed Beam SATCOM IoT Solution

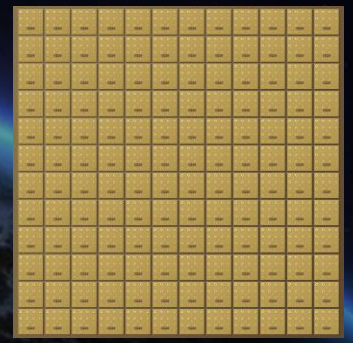
Waveguide array: 16×8
Dual Polarization for Tx and Rx modes
BUC | LNA | Modem Built-in



HAPS Gateway ESA Solution

Q-band AiP Unit Cell: 4×4
Wafer Level Package Technology
Circular | Linear Polarization





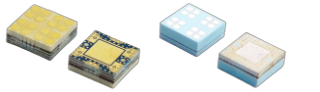
Defining Phased Arrays with Next-Gen Semiconductor Packaging

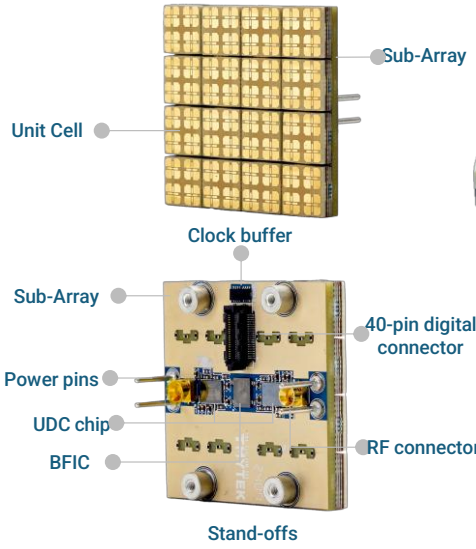
Global IC Vendors

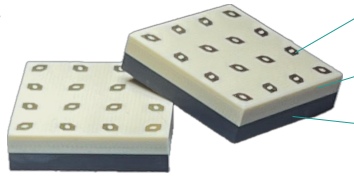
ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™
qorvo
AMD
RENESAS
Infineon technologies
Texas Instruments
LATTICE SEMICONDUCTOR
SKYWORKS

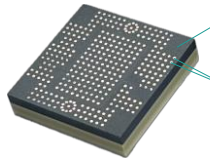
Realizing LEGO-style modular designs for mmWave phased arrays through strategic semiconductor supply chain integration

CloverCell™









USI

TMYTEK Intelligent RF System

With Taiwan's world-class OSAT capacity, we reduce military-grade antenna costs to consumer levels—a critical catalyst for the widespread adoption of 6G and satellite terminals

5G NTN & HAPS Highlight

Osaka Expo 2025 5G NTN

Exhibited at EXPO, Osaka for transnational terrestrial and space connectivity with 5G NTN ESA & HAPS technology between Singapore and Japan, between ground and GEO satellites.

Tier- 1 Partner: SUTD, SKY Perfect JSAT（JSAT）, TMYTEK, Rohde & Schwarz, VIAVI Solutions（VIAVI）, MediaTek

News: https://theme-weeks.expo2025.or.jp/en/program/detail/67ca9fbb51270.html

Osaka Expo 2025 5G NTN & HAPS

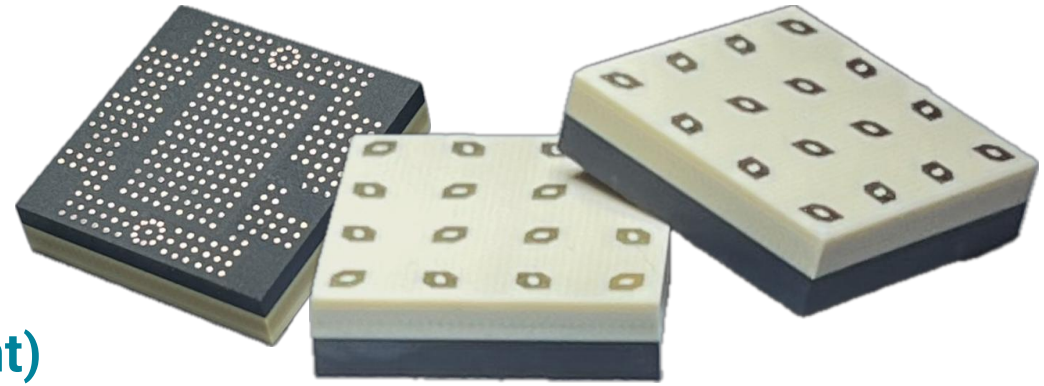
NTT docomo: Experience the “Future Norm”! The HAPS Technology and Vision We Presented at the Osaka–Kansai Expo

This gateway adopts state-of-the-art electronically steered antenna (ESA) technology developed by TMYTEK.
Using the positional data of the HAPS, it can electronically steer the communication beam to establish connectivity.

News: https://nttdocomo-developers.jp/entry/2025/07/10/090000

Q-Band AiP Transceiver

- Antenna transceiver module : 4X4 antenna array
- Supports Circular Polarization ,RHCP/LHCP
- Semiconductor Level Packaging.
- Frequency : Q band, 37GHz~43.5GHz
- EIRP : 48.5 dBm (84 dBm on 48X48 ant element)
- G/T : -14 dB/K (6.6 dB/K on 48X48 ant element)



Q-Band Gateway for HAPS

TMXLAB KIT

Dashboard | Configuration

HAPS - HAPS00000000001

Tracking Mode: Auto / Manual

Ref. 10MHz Source: Internal / External

Control Mode: Standby / TX

Theta: 0 (Max 45°)

Phi: 0 (Max 359°)

Gain (dB): 12 (Range 00~00)

Tx EIRP: N/A dBm

Control Mode: Standby / RX

Theta: 0 (Max 45°)

Phi: 0 (Max 359°)

Gain (dB): 12 (Range 00~00)

Overview

Updated 1s ago

HAPS Flight Position

Latitude	25.294°
Longitude	121.701°
Altitude	17700 m
Speed	XXX km/h

GW Location

GNSS		IMU	
Latitude	25.294°	Roll	N/A
Longitude	121.701°	Pitch	N/A
Altitude	100 m	Yaw	N/A

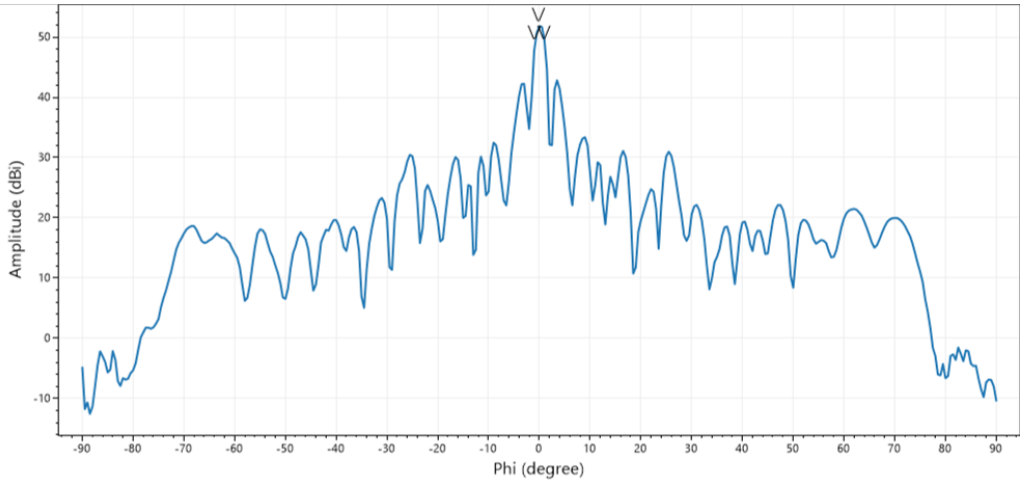
Input Signal

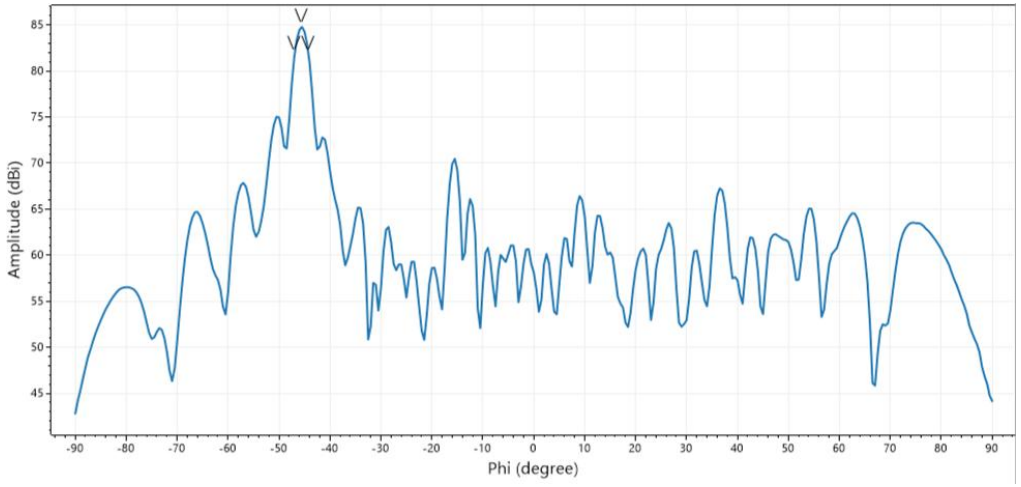
DS 1	
Status	ON
TX Freq.	AA GHz
RX Freq.	BB GHz
DS 2	
Status	ON
TX Freq.	CC GHz
RX Freq.	DD GHz
DS 3	
Status	ON
TX Freq.	EE GHz
RX Freq.	FF GHz
DS 4	
Status	ON
TX Freq.	GG GHz
RX Freq.	HH GHz

Performance

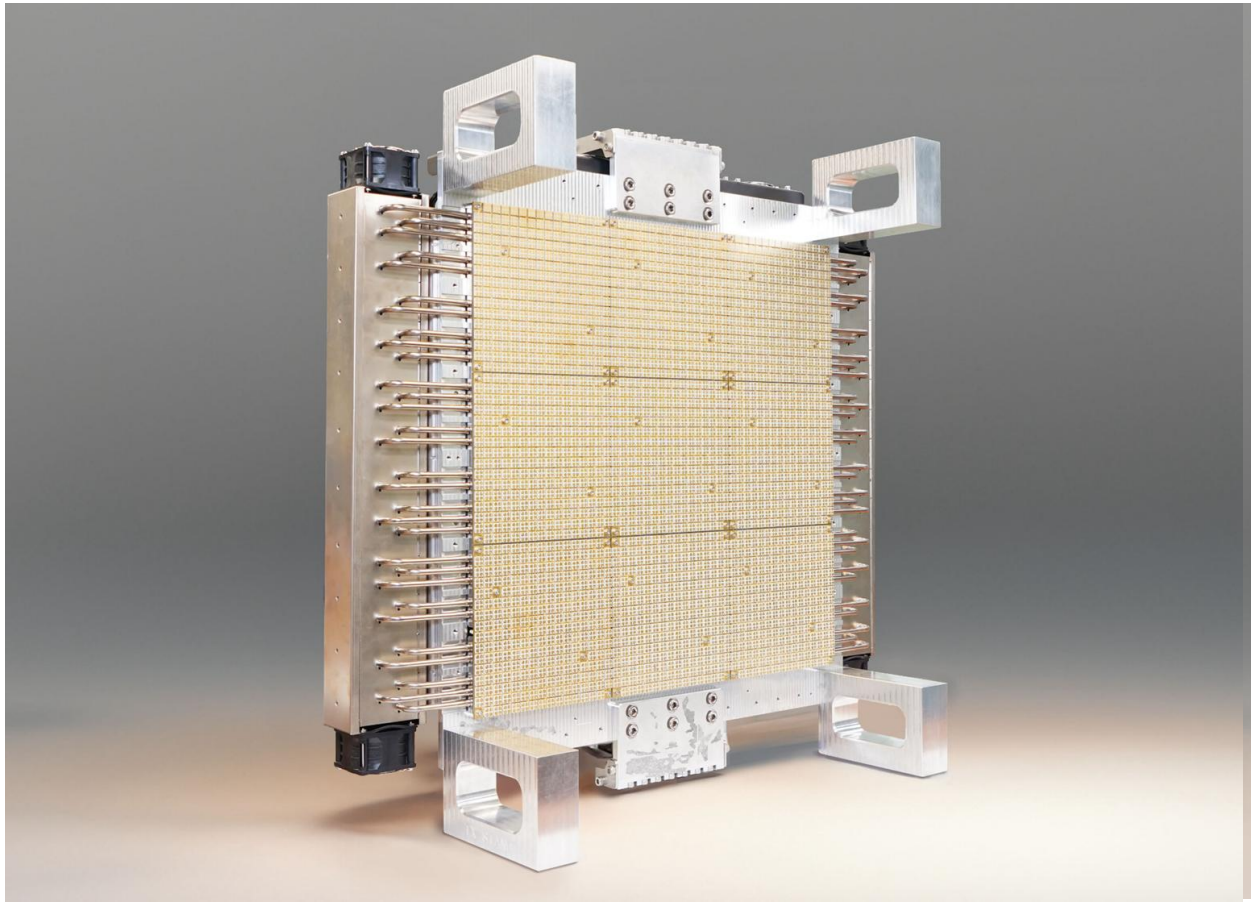
Communication	
Bandwidth utilization	N/A
Throughput	N/A
Latency	N/A
Jitter	N/A
Packet loss rate	N/A
System Resource Usage	
CPU Utilization	N/A
Memory Usage	N/A

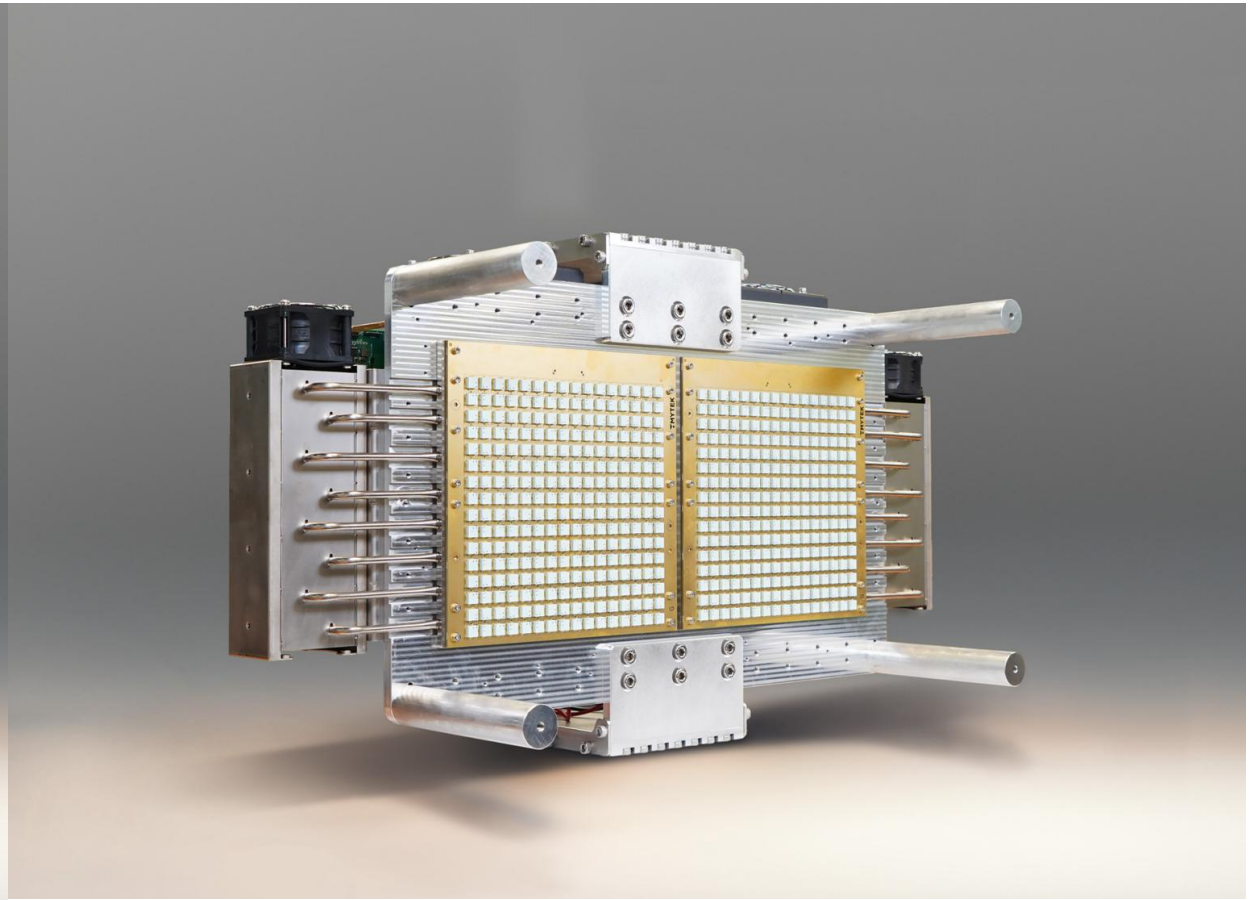
Export Log File



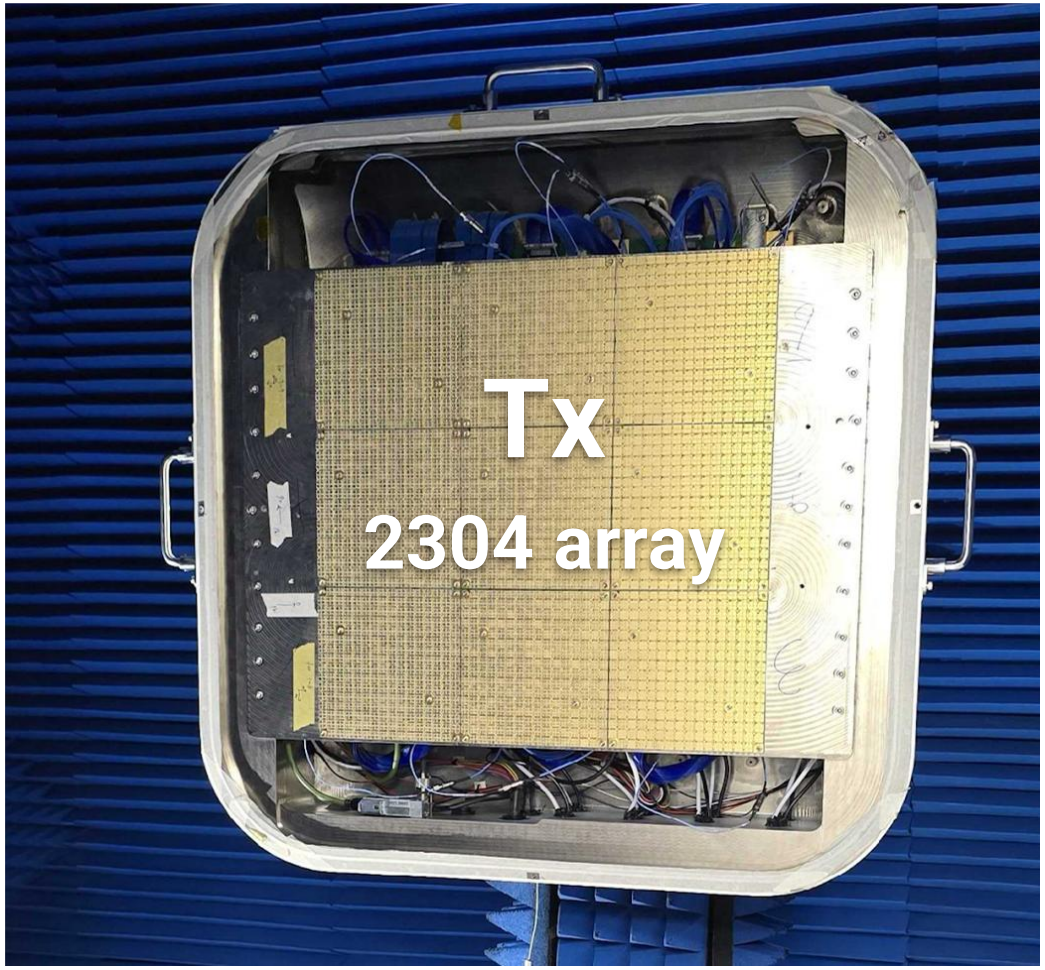


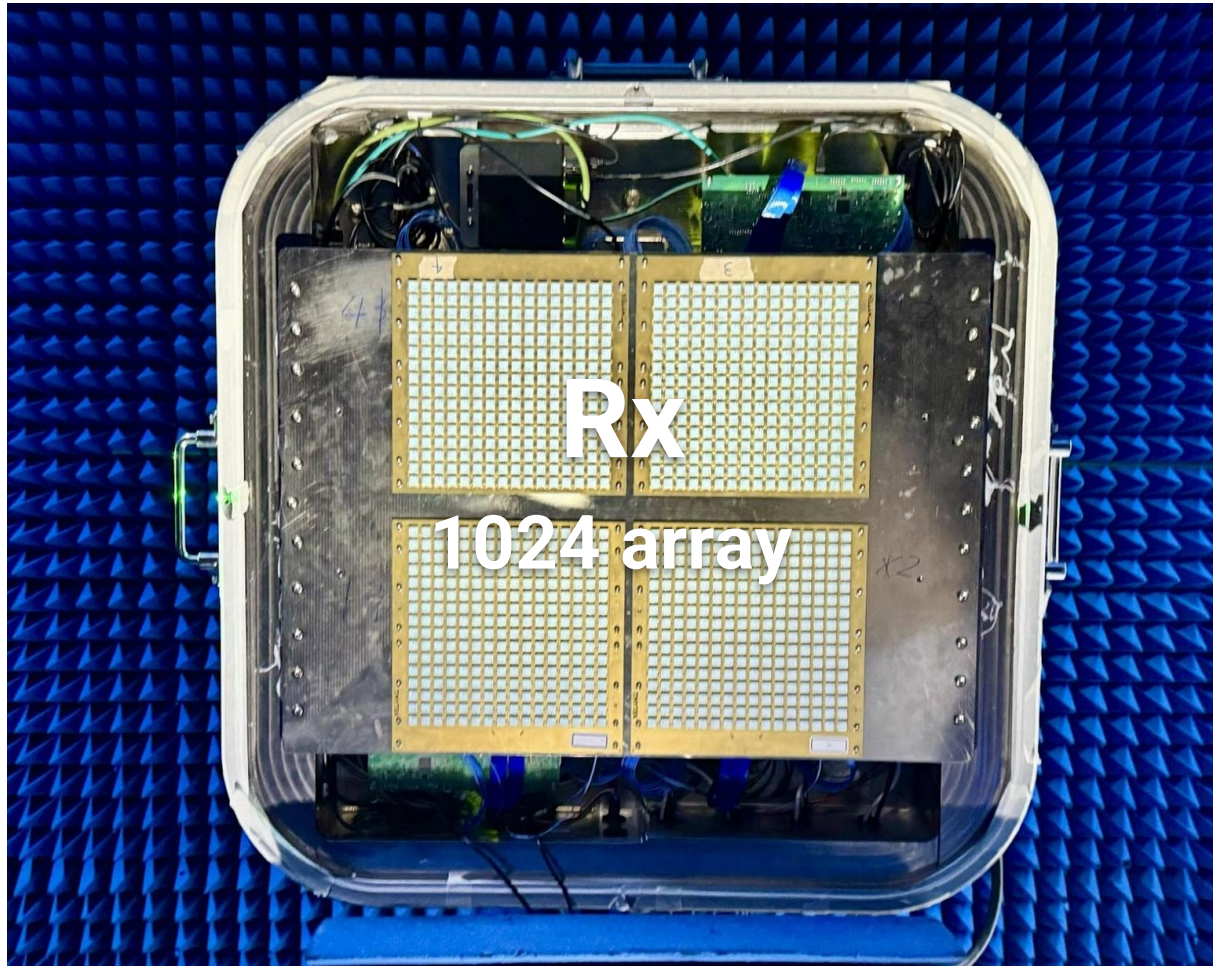
NTN Ku-Band ESA



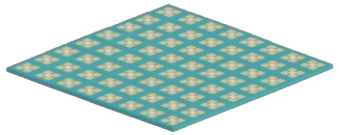


Tx/Rx Electronic Steering Array (ESA) Antenna





48x48 Tx ESA Performance: Boresight



Tx AoC

Tx ESA

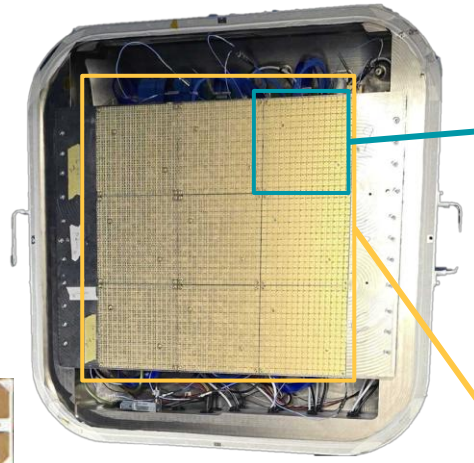
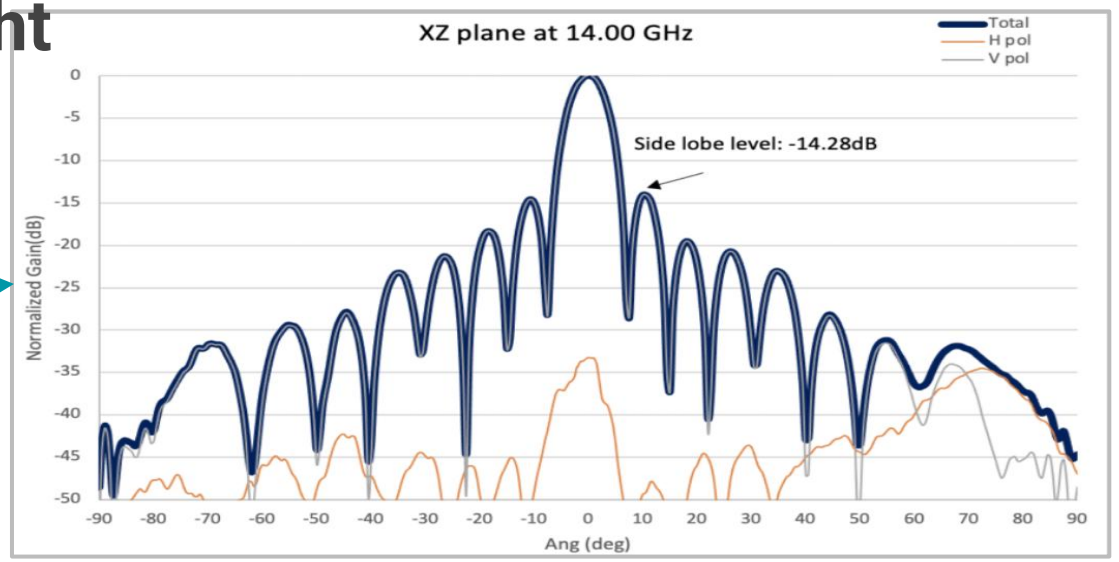


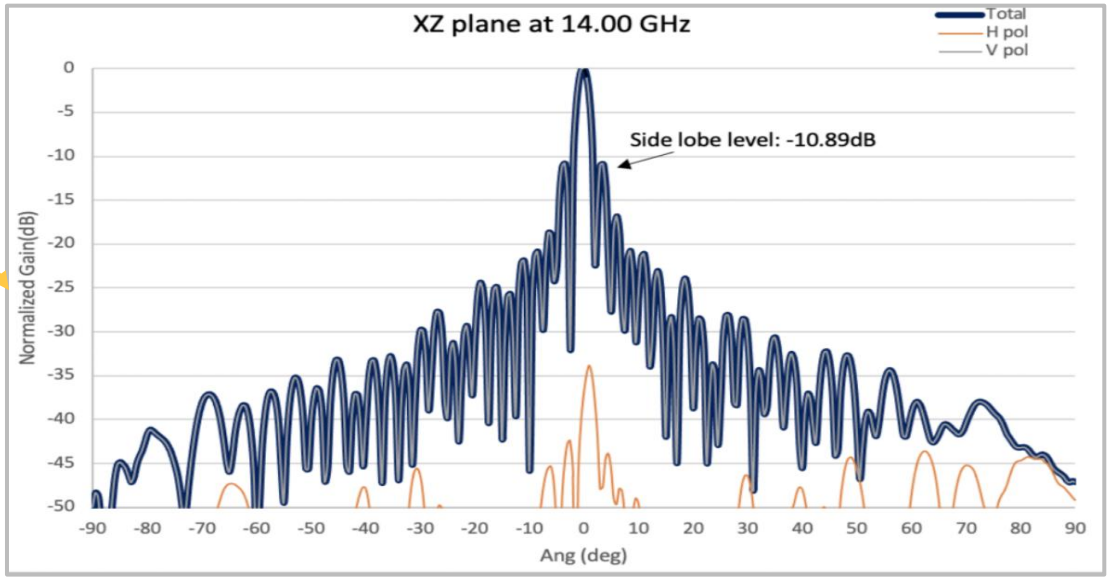
Table 1 Specification of Tx ESA at 14GHz

Number of Element	16x16	48x48
EIRP at 0deg (dBm)	61.9	78.0
EIRP at 20/-20deg (dBm)	61.4/60.8	76.8/77.1
EIRP at 40/-40deg (dBm)	59.2/58.5	76.2/76.7
EIRP at 60/-60deg (dBm)	57.1/57.9	72.8/74.1
3dB Beamwidth at 0deg (deg)	7	2.5
3dB Beamwidth at 20/-20deg (deg)	7.5/8	2.5/3
3dB Beamwidth at 40/-40deg (deg)	9/9	3/3
3dB Beamwidth at 60/-60deg (deg)	12.5/12.5	5.5/5

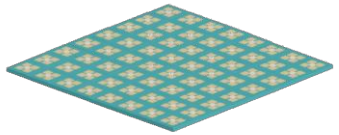
- 16X16 Sub AiP

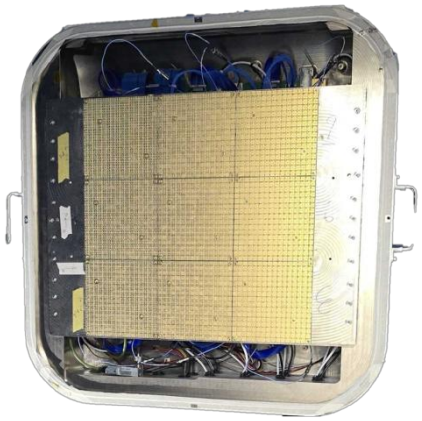


- 48X48 AiP



48x48 Tx ESA Performance: Beam Steering





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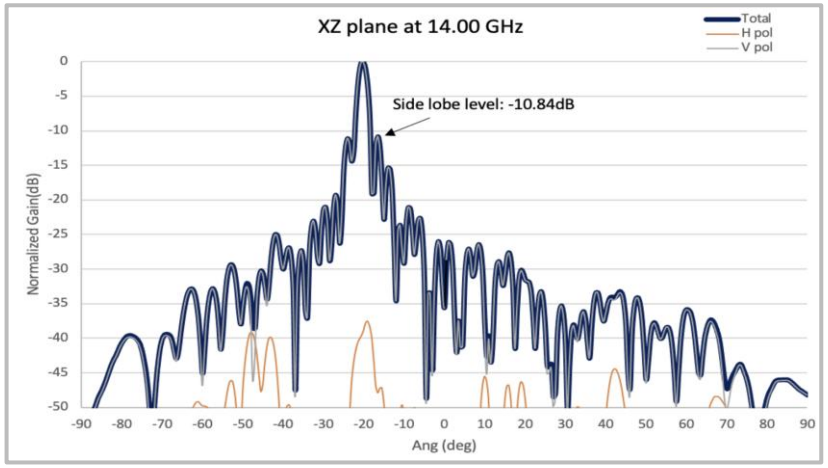
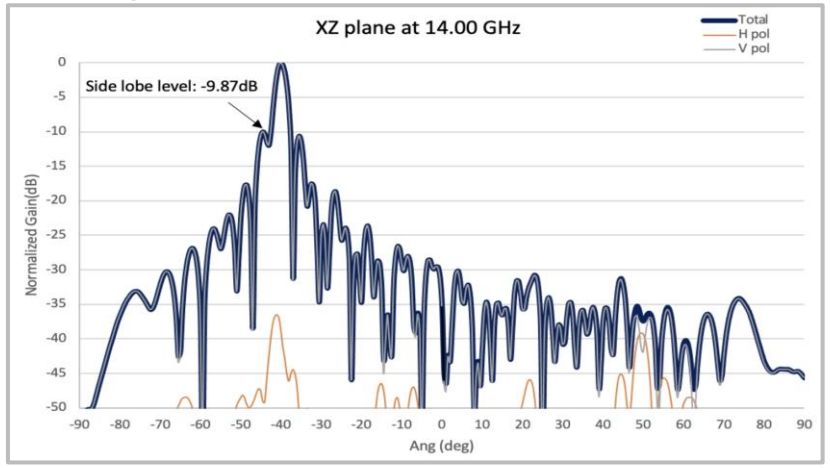
3dB Beamwidth at 0deg (deg)	7	2.5
3dB Beamwidth at 20/-20deg (deg)	7.5/8	2.5/3
3dB Beamwidth at 40/-40deg (deg)	9/9	3/3
3dB Beamwidth at 60/-60deg (deg)	12.5/12.5	5.5/5

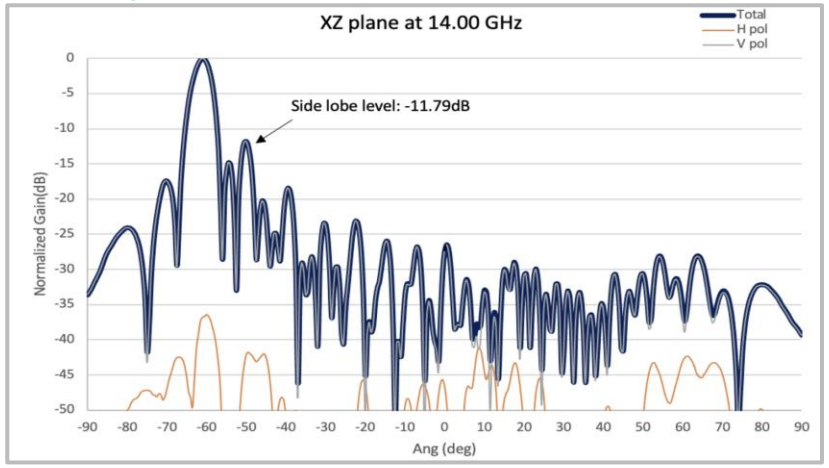
20 deg



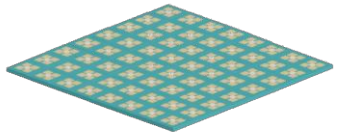
40 deg



60 deg



32x32 Rx ESA Performance: Boresight



Rx AoC (LTCC)

Tx ESA

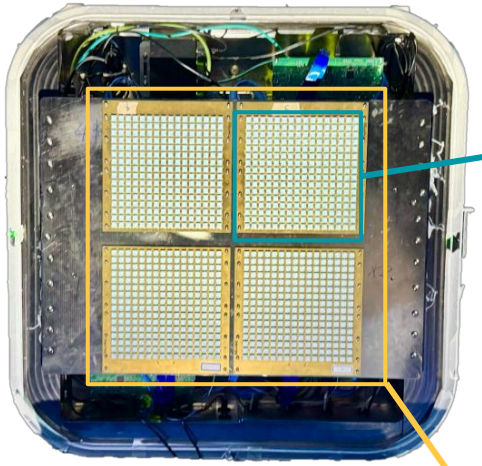
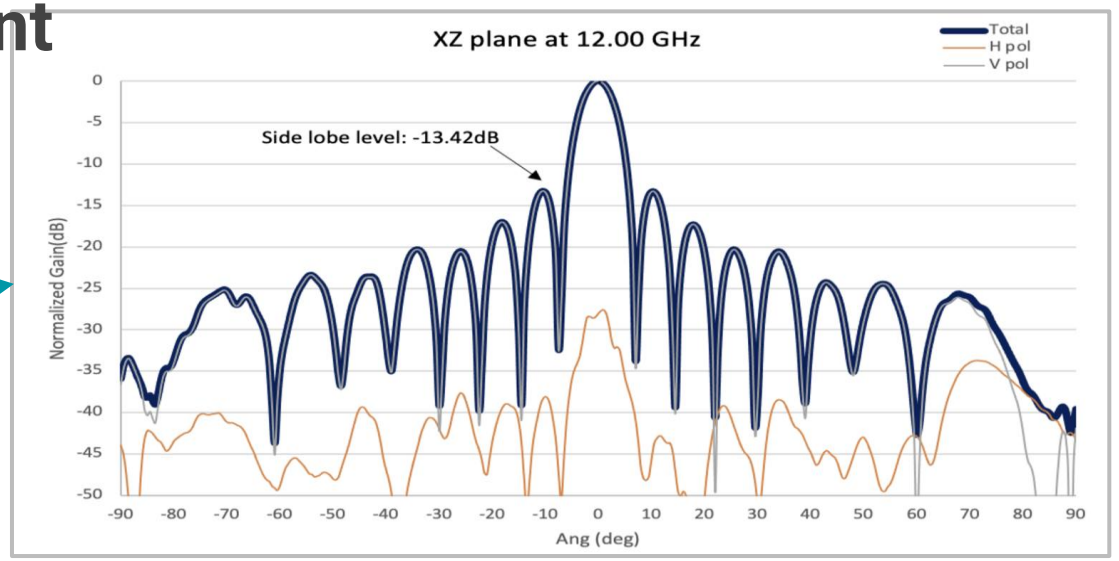


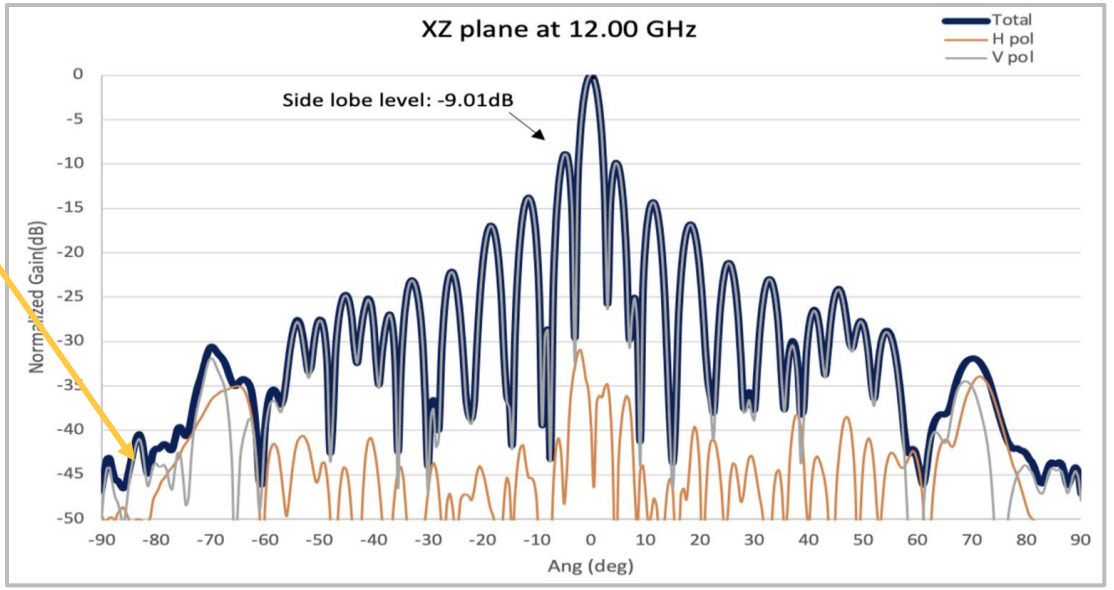
Table 02 Specification of Rx ESA at 12GHz

Number of Element	16x16	32x32
G/T at 0deg (dB/K)	2.39	8.06
G/T at 20/-20deg (dB/K)	2.58/2.32	7.71/7.57
G/T at 40/-40deg (dB/K)	0.56/0.49	6.48/6.36
G/T at 60/-60deg (dB/K)	-1.67/-1.74	3.62/3.25
3dB Beamwidth at 0deg (deg)	7	3
3dB Beamwidth at 20/-20deg (deg)	7/7	3
3dB Beamwidth at 40/-40deg (deg)	8.5/8.5	3.5
3dB Beamwidth at 60/-60deg (deg)	12/12.5	5.5

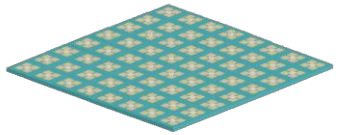
- 16X16 Sub AiP



- 32X32 AiP



32x32 Rx ESA Performance: Beam Steering



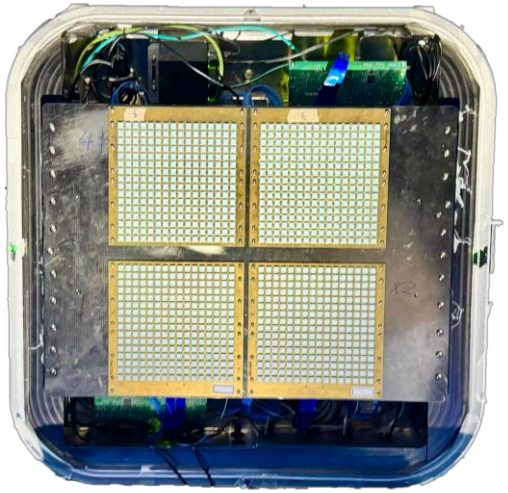
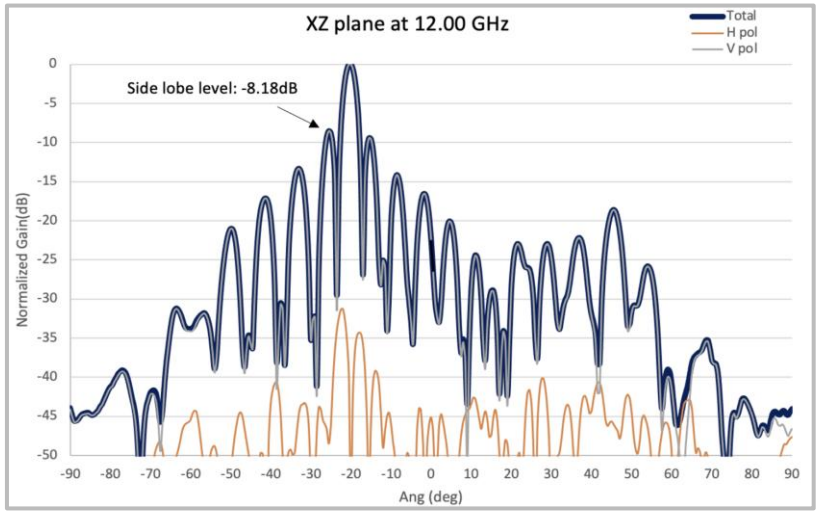


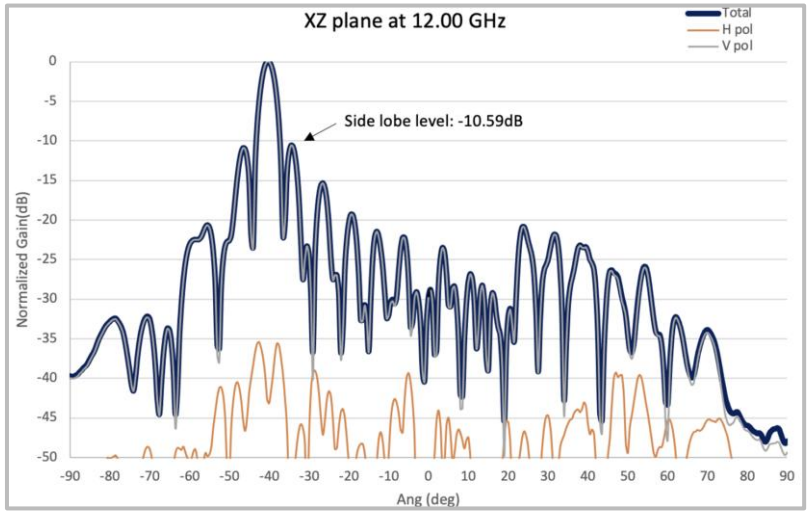
Table 02 Specification of Rx ESA at 12GHz

Number of Element	16x16	32x32
G/T at 0deg (dB/K)	2.39	8.06
G/T at 20/-20deg (dB/K)	2.58/2.32	7.71/7.57
G/T at 40/-40deg (dB/K)	0.56/0.49	6.48/6.36
G/T at 60/-60deg (dB/K)	-1.67/-1.74	3.62/3.25
3dB Beamwidth at 0deg (deg)	7	3
3dB Beamwidth at 20/-20deg (deg)	7/7	3
3dB Beamwidth at 40/-40deg (deg)	8.5/8.5	3.5
3dB Beamwidth at 60/-60deg (deg)	12/12.5	5.5

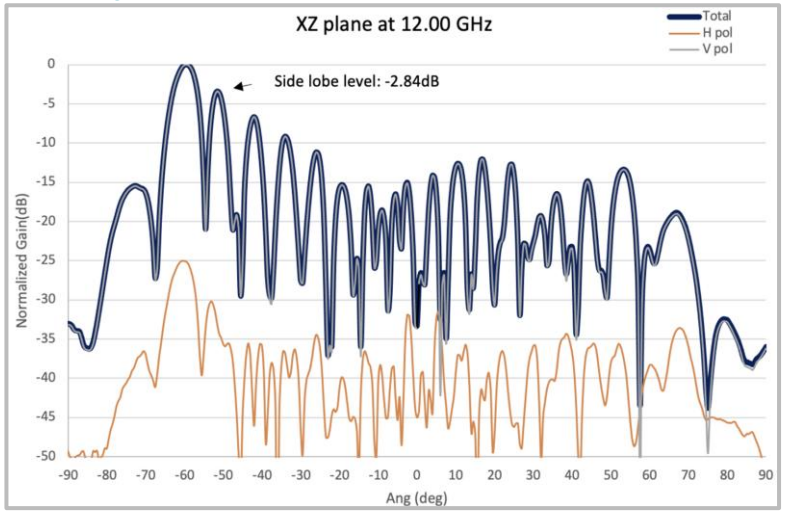
20 deg



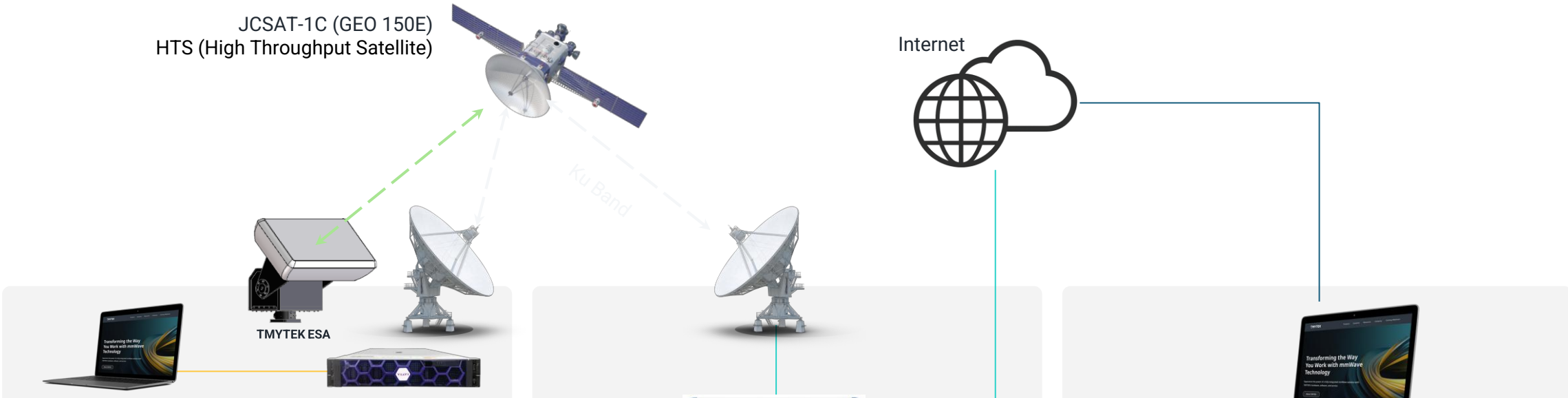
40 deg



60 deg



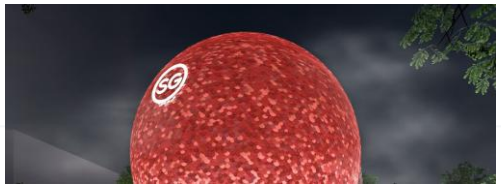
Topology of The Live Video Call Over 5G NTN Technology



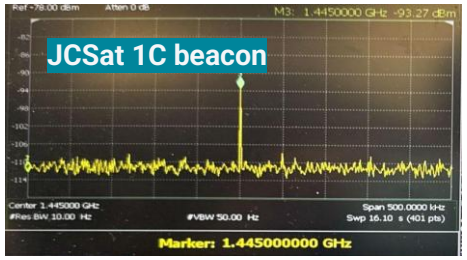
SUTD campus / Maritime Ship@Singapore

YSCC: Yokohama Satellite Control Center

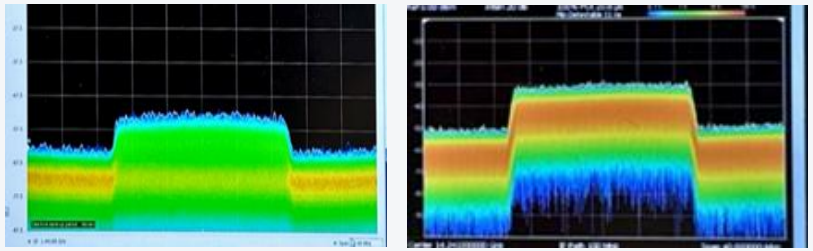
Singapore Pavilion @ Osaka Expo



Actual Satellite Signal Reception Results



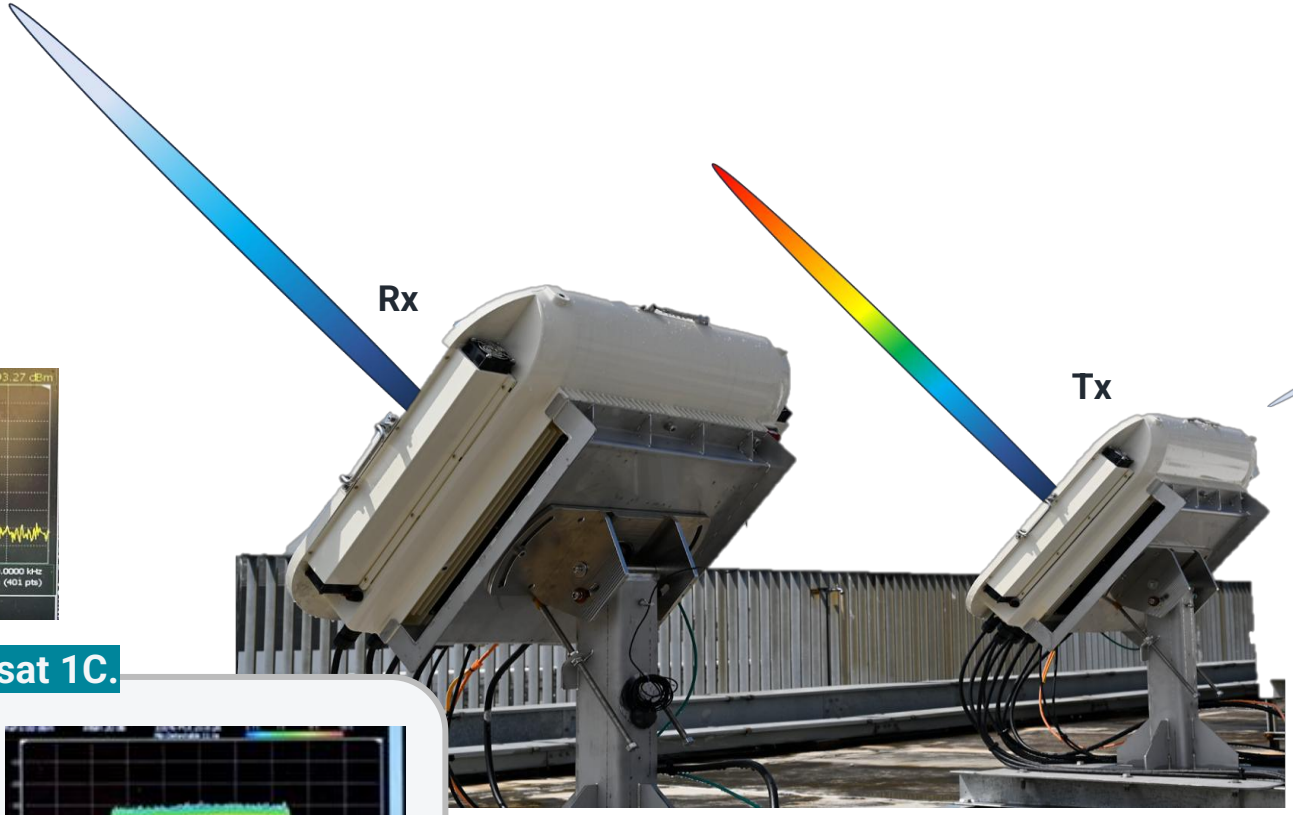
Receiving signal from JCsat 1C.



Rx RF signal

Down convert

Rx IF signal



Monitor Tx RF signal

THANK YOU !

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