

M3000A M3000D M3100 Wi-Fi Antenna Specifications

1. Inseego Custom Antenna Part#'s:

- WiFi Ant #0 Part Number: 12023299
- WiFi Ant #1 Part Number: 12023300

2. Construction:

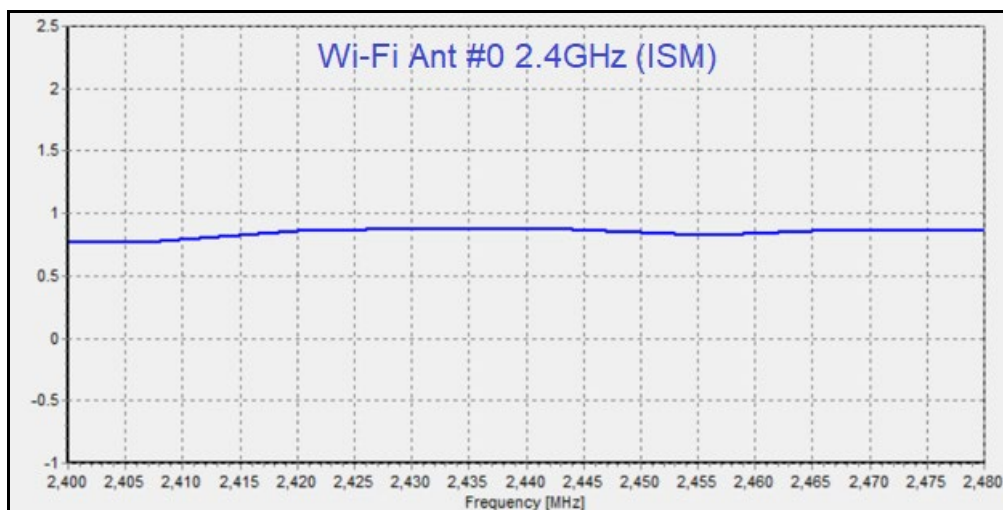
- Flexible Printed Circuit (FPC) Design consisting of Copper, Polyimide, and Adhesive
- Type: Planar Inverted-F Antenna (PIFA)

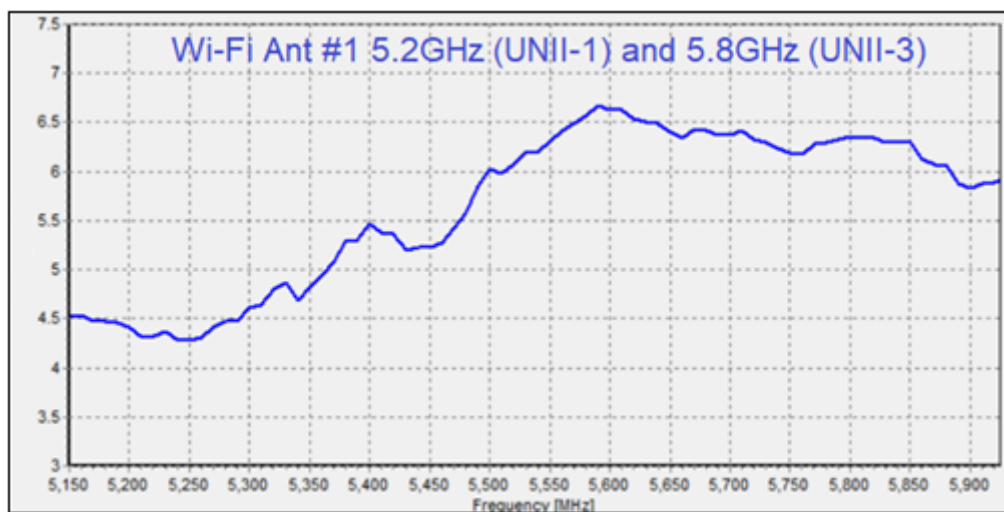
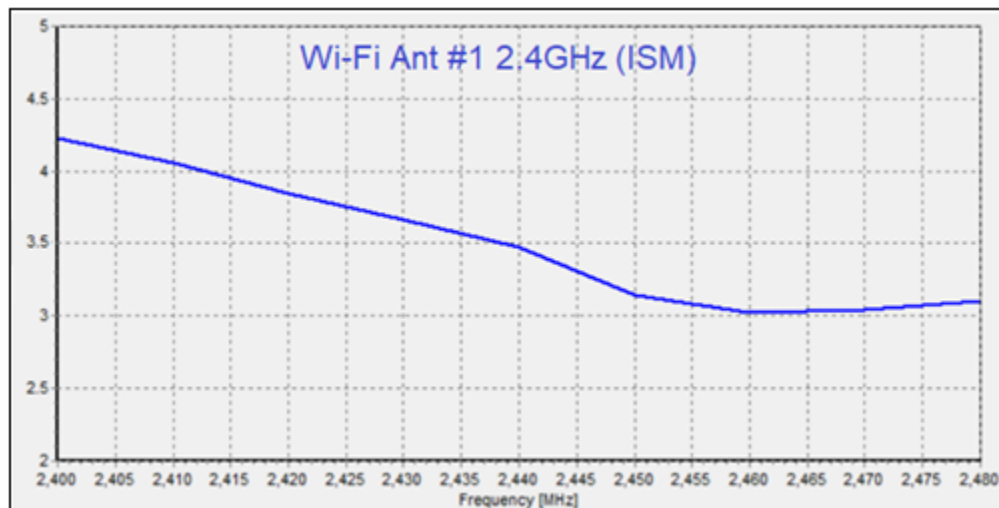
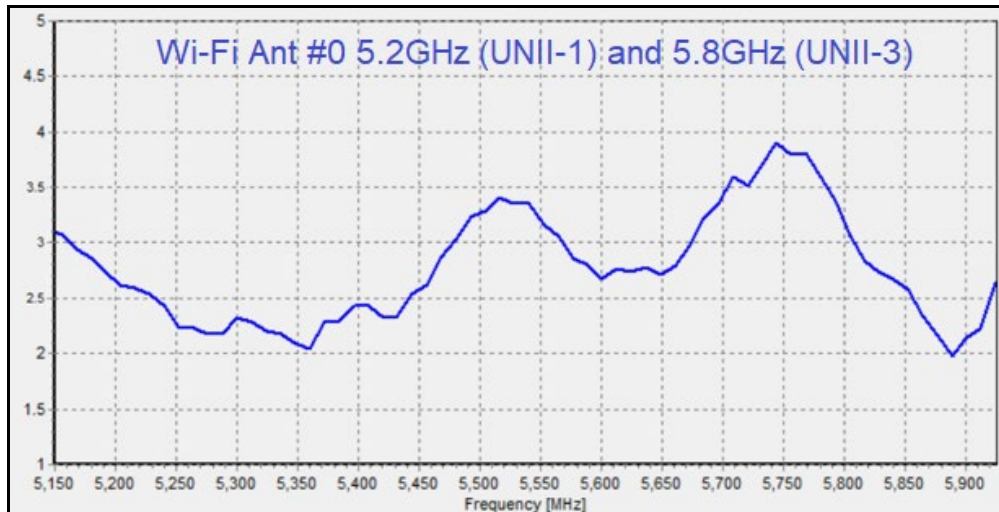
3. Antenna Passive Pk Gain Results Table:

Wi-Fi Ant #0	Frequency Range	Pk Gain
ISM	2440MHz (2412MHz to 2462MHz)	0.9 dBi
UNI-1	5200MHz (5170MHz to 5250MHz)	3.1 dBi
UNI-3	5700MHz (5735MHz to 5835MHz)	3.9 dBi
Wi-Fi Ant #1	Frequency Range	Pk Gain
ISM	2440MHz (2412MHz to 2462MHz)	4.3 dBi
UNI-1	5200MHz (5170MHz to 5250MHz)	4.5 dBi
UNI-3	5700MHz (5735MHz to 5835MHz)	6.4 dBi

4. Antenna Passive Gain (dBi) Charts:

- Antenna Engineer: Matt Salvino
- Passive Measurement Date: 03-22-2022





5. Measurement Setup Illustration:

Passive Performance Test System components and diagram:

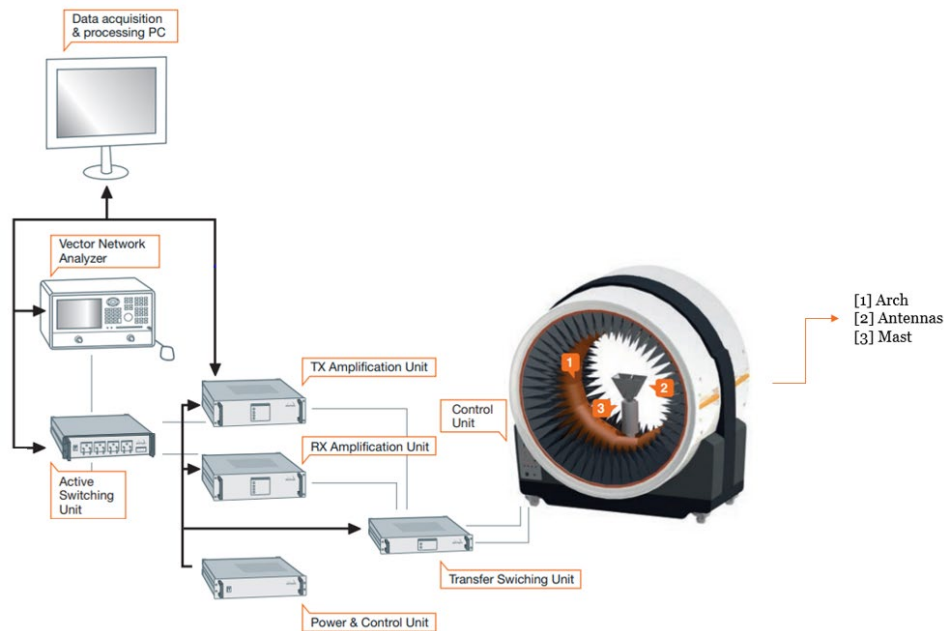
Frequency Bands: 600 MHz to 10 GHz

Max. Size of DUT: 450mm for spherical set-up

Max. Weight of DUT: 10 kgs

The system is capable of the following measurements:

- Gain
- Directivity
- Beamwidth
- Cross polar discrimination
- Sidelobe levels
- 3D radiation pattern
- Radiation pattern in any polarization (linear or circular)
- Antenna efficiency test



Inseego Corp.

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Toll Free: 888.888.9231 • Main 858.812.3400

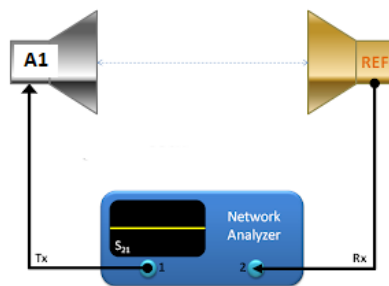
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Gain Measurement method Explained:

- a) **Calibration:** Use Two Antennas (one has to have a known gain [In this case Ref]) to measure and record the S parameter S_{21} which is the input/output relation ship between the ports on the Network analyzer
 - a. Normalize the calibration to produce 0 DB reference on the network Analyzer.
 - b. All cable loss factors are accounted for in the system

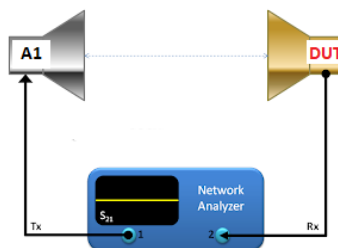
Notes : A1 represents Arch antennas in system

The software instructs the VNA to produce a sweep signal over the frequency range specified. The it will generate the signal is a swept CW between the start and end frequency and pausing at predetermined points long enough to collect measurement.



Calibration diagram

- b) **DUT Measurements:** Replace reference Antenna with DUT Antenna (maintaining the same conditions) distance etc.

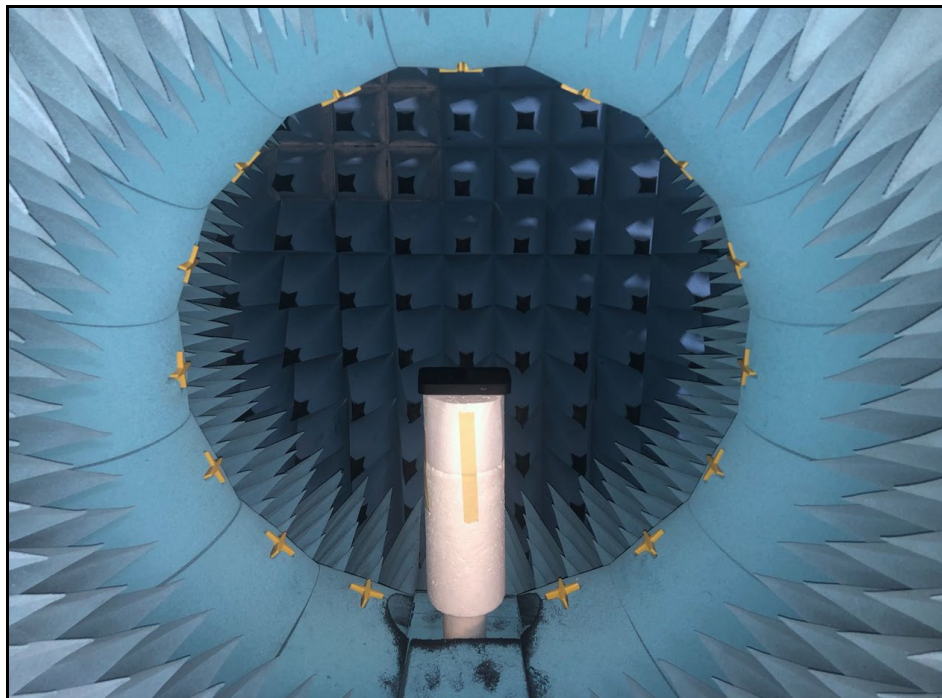
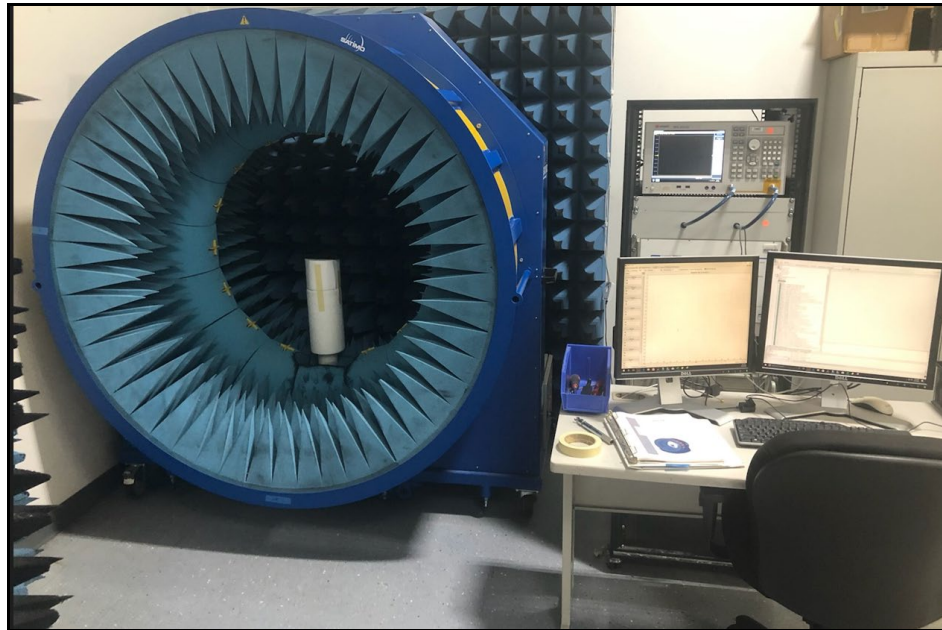


DUT Measurement diagram

- c) Remeasure S_{21} response which now represents the gain relative to reference antenna. Collect $G(\text{Rel})$.

d) Calculate $G(Dut)=G(ref)+ G(rel)$

Note that the system used in the chamber is automated. (the measurement is taken at multiple locations by rotating the DUT and the arch)

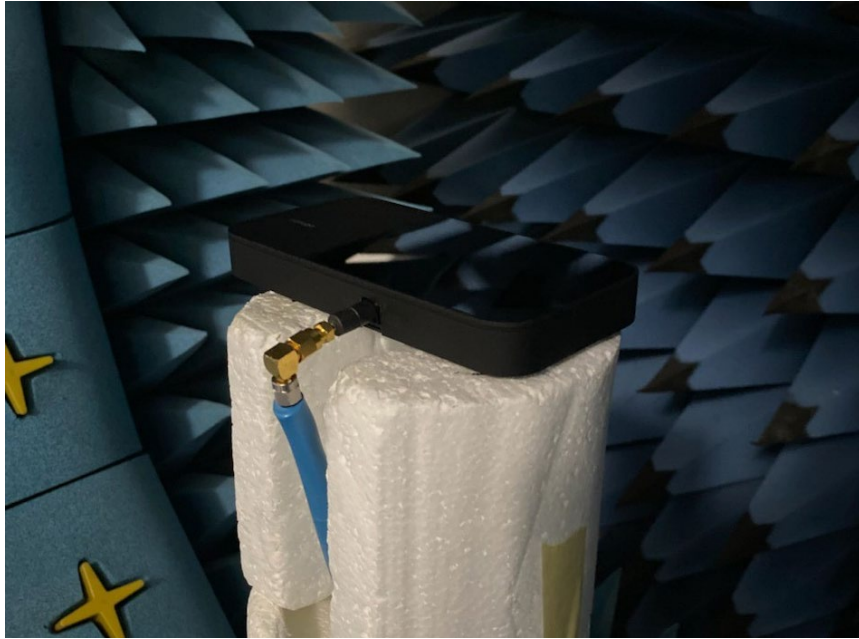


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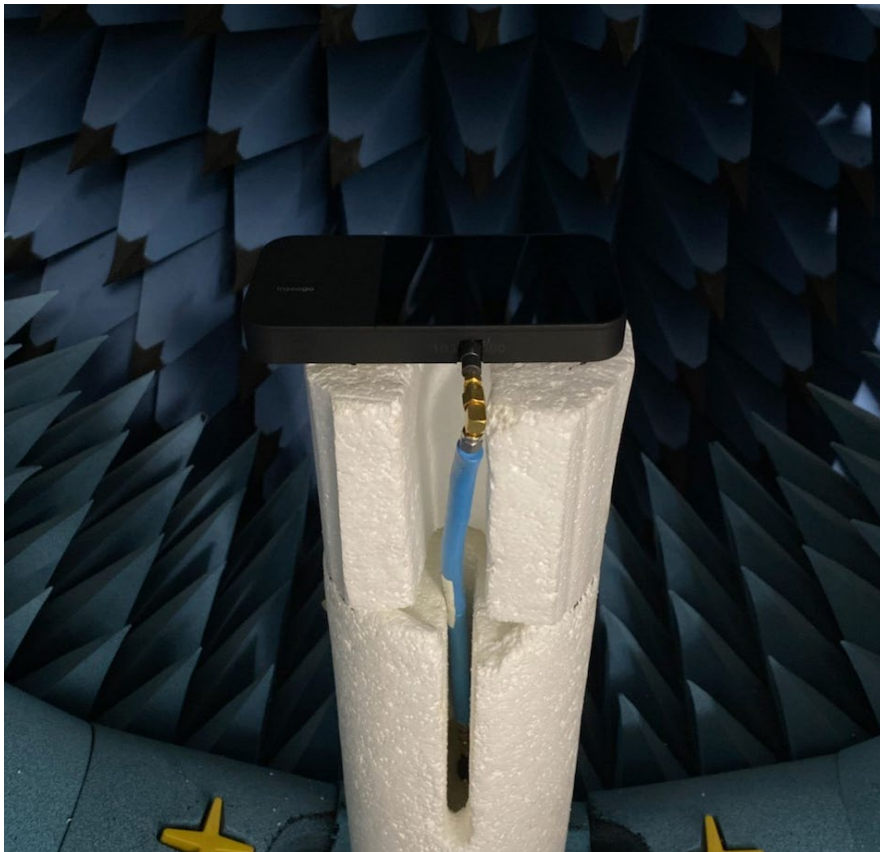
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DUT connection Photo 1



DUT connection Photo 2

6. Measurement Equipment calibration:

- MVG StarLab Multi-Probe Compact Passive Antenna Measurement Chamber Calibration Certificate:

													
<h3>Calibration Certificate</h3>													
Manufacturer's Name :	MVG Industries												
Manufacturer's Address :	13, rue du Zéphir Parc d'Activité de l'Océane 91140 Villejust FRANCE												
Declares that product													
Customer name :	INSEEGO												
Product Name:	SL v1												
Serial Number :	C253												
Calibration date	19/02/2022												
Has been calibrated according MVG procedure and \ Or according ISO 9001 requirements.													
19 February, 2022	MVG Quality Manager												
													
<table border="1"><tr><td>MICROWAVE VISION</td><td>Société Anonyme</td><td>47, Blvd St Michel</td></tr><tr><td>www.microwavevision.com</td><td>Capital Social: 691 041€</td><td>75005 Paris, FRANCE</td></tr><tr><td></td><td>RCS Evry B 340 342 163</td><td>Tel. : +33 (0)1 75 77 58 60</td></tr><tr><td></td><td>Numéro SIREN : 340 342 153</td><td>Fax : +33 (0)1 48 33 39 02</td></tr></table>		MICROWAVE VISION	Société Anonyme	47, Blvd St Michel	www.microwavevision.com	Capital Social: 691 041€	75005 Paris, FRANCE		RCS Evry B 340 342 163	Tel. : +33 (0)1 75 77 58 60		Numéro SIREN : 340 342 153	Fax : +33 (0)1 48 33 39 02
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- E5071C Network Analyzer Calibration Certificate:

Certificate of Calibration



ISO/IEC 17025:2017 and ANSI/NCSL Z540.1-1994

Certificate Number 1-13571508236-1



Model Number E5071C
Manufacturer Keysight Technologies Inc
Description ENA Series Network analyzer
Serial Number MY46103762

Date of Calibration 17 Dec 2020
Procedure STE-50114528-C.06.06
Temperature (23 ± 5) °C
Humidity (50 ± 30) %RH

Customer
Inseego Corp
9710 Scranton Rd Ste 200
SAN DIEGO CA 92121-1744
United States

Location of Calibration
Keysight Technologies Inc
10090 Foothills Blvd.
Roseville CA 95747-7102
UNITED STATES

This certifies that the equipment has been calibrated using applicable Keysight Technologies procedures and in compliance with ISO/IEC 17025:2017 and ANSI/NCSL Z540.1-1994 (R2002). The quality management system is registered to ISO 9001:2015.