



FCC / ISED & Test Report

For:

ITRON NETWORKED SOLUTIONS, INC.

Model Name:

NIC 511-SV1-0312

Product Description:

The MicroAP 5 is a unique product with cellular connectivity that supports both cellular and RF Mesh communications simultaneously.

Applied Rules and Standards:

47 CFR Parts 24, and 27

RSS: 132 Issue 3, 133 Issue 6, 139 Issue 3

FCC ID: OWS-NIC511-LTE

IC ID: 5975A-NIC511LTE

REPORT #: EMC_ITRO1_049_21001_FCC_24_27_VzW

DATE: 2021-09-30



A2LA Accredited

IC recognized #
3462B

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 24, 27 and Industry Canada Standards RSS-GEN issue 3, RSS-133 issue 6 and RSS-139 issue 3.

No deficiencies were ascertained.

Company	Description	Model #
ITRON NETWORKED SOLUTIONS, INC.	The MicroAP 5 is a unique product with cellular connectivity that supports both cellular and RF Mesh communications simultaneously.	NIC 511-SV1-0312

Responsible for Testing Laboratory:

2021-09-30	Compliance	Kevin Wang (EMC Lab Manager)	Kevin. wang@cetecom.com	Digitally signed by: Kevin. wang@cetecom.com DN: CN = Kevin. wang@cetecom.com Date: 2021.09.30 19:29: 48 -07'00'
Date	Section	Name	Signature	

Responsible for the Report:

2021-09-30	Compliance	Issa W Ghanma (Sr. EMC Engineer)		Digitally signed by: Issa W Ghanma DN: CN = Issa W Ghanma email = issa. ghanma@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2021.09.30 14:06:45 -07'00'
Date	Section	Name	Signature	

The test results of this test report relate exclusively to the test item specified in Section 3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 **Administrative Data**

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Kevin Wang
Responsible Project Leader:	Rami Saman

2.2 Identification of the Client

Client's Name:	ITRON NETWORKED SOLUTIONS, INC.
Street Address:	230 W Tasman Avenue
City/Zip Code	San Jose, CA 95134
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No	NIC 511-SV1-0312
HW Version	08
SW Version	5.2.0
FCC-ID	OWS-NIC511-LTE
IC-ID :	5975A-NIC511LTE
Product Description	The MicroAP 5 is a unique product with cellular connectivity that supports both cellular and RF Mesh communications simultaneously. It leverages cellular communications for backhaul connectivity and uses RF Mesh communications to connect with other nearby Itron Networked Solutions, Inc. devices.
Transceiver Technology / Type(s) of Modulation	Cellular: • (4G) 2, 4, 13
Max. declared antenna gain	Omni-Directional Antenna Max Gain: -4.4 dBi
Other Radios included in the device:	900MHz Mesh: • Nominal band: 902.3 – 926.9 MHz • Center to center: 902.3 MHz (ch 0) – 926.9 MHz (ch 82), 83 Channels
Power Supply/ Rated Operating Voltage Range	Streetlight controller(Luminator): 120V (Low) / 277V (Max) AC Luminator output to EUT: 3.6V (Low) / 4.4V (Max) DC
Operating Temperature Range	-40°C ~ +65°C
Sample Revision	☐ Prototype ☒ Production ☐ Pre-Production

3.2 EUT Sample details

EUT #	Model Number	HW Version	SW Version	MAC Address
1	NIC 511-SV1-0312	08	5.2.0	00:13:50:05:01:40:FE:24

3.3 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	LTE + 900MHz Mesh Ch 0	ISM radio was configured to: • Mode : FSK • Data Rate: : 100 kb/s • Max Power settings : 27 dBm • Transmit mode : Continuous TX • Hopping : No • Channel(s) : CH0(902.3MHz)

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1	-

4 **Subject of Investigation**

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 22, 24, 27 and ISSED Standards RSS-133 issue 6, and RSS-139 issue 3.

4.1 **Dates of Testing:**

6/7/2021 – 6/22/2021

4.2 **Measurement Uncertainty**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30MHz	± 2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	± 2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	± 2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	± 0.7 dB (LISN)
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RF conducted measurement	± 0.5 dB
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4.3 **Environmental Conditions during Testing:**

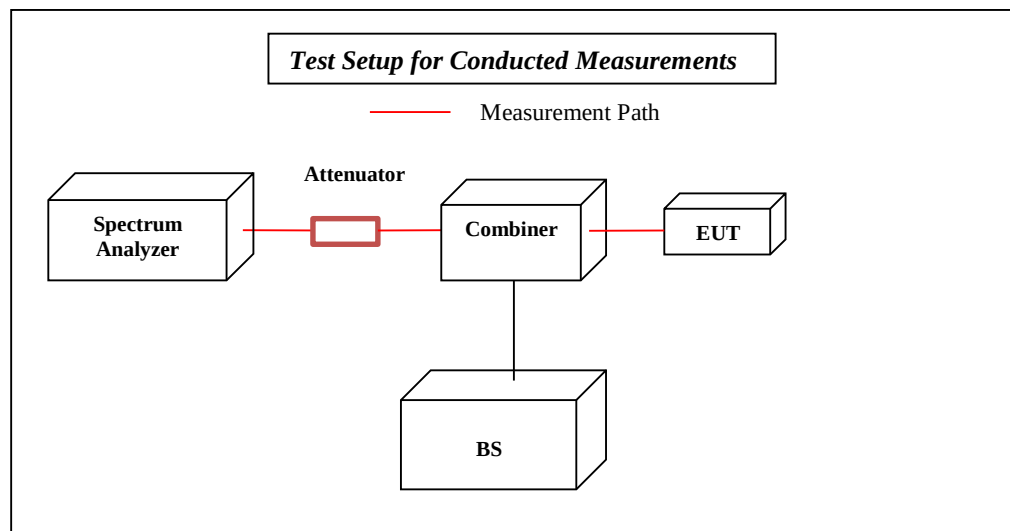
The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

Deviating test conditions are indicated at individual test description where applicable.

5 Measurement Procedures

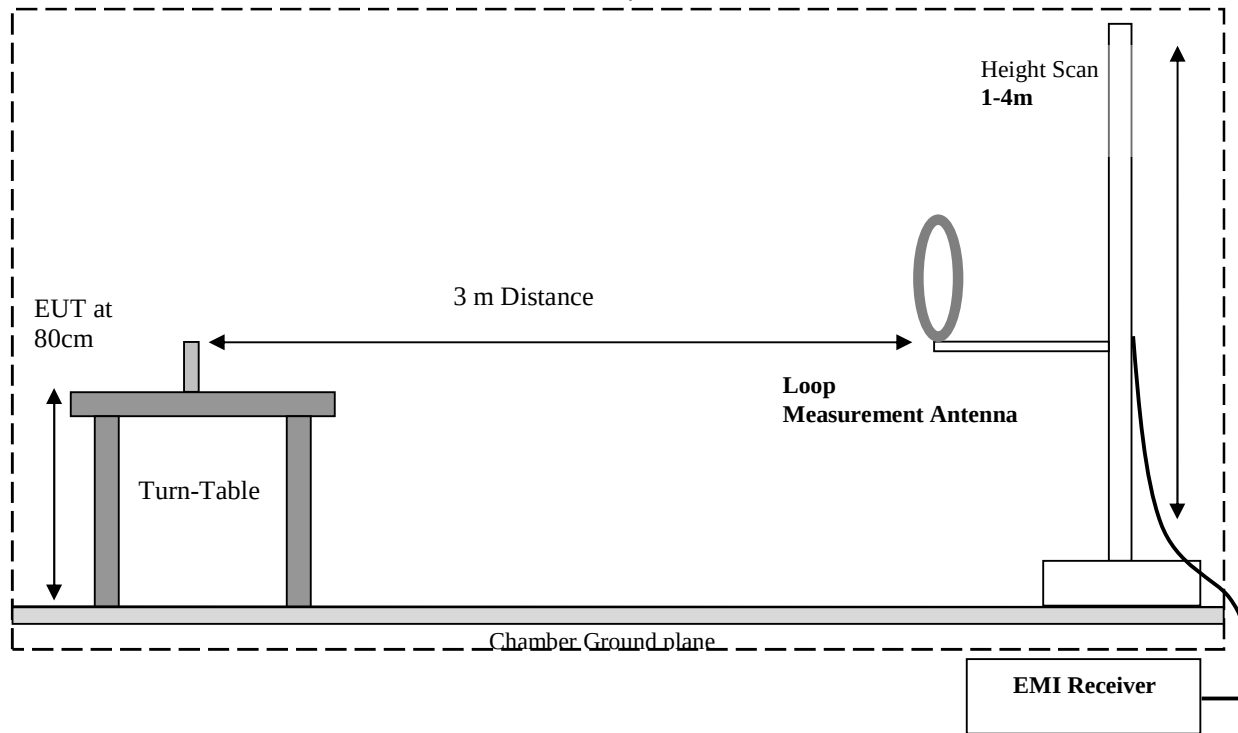
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v03r01 – “Measurement Guidance for Certification of Licensed Digital Transmitters” and according to relevant parts of ANSI/TIA-603-D-2010 as detailed below.



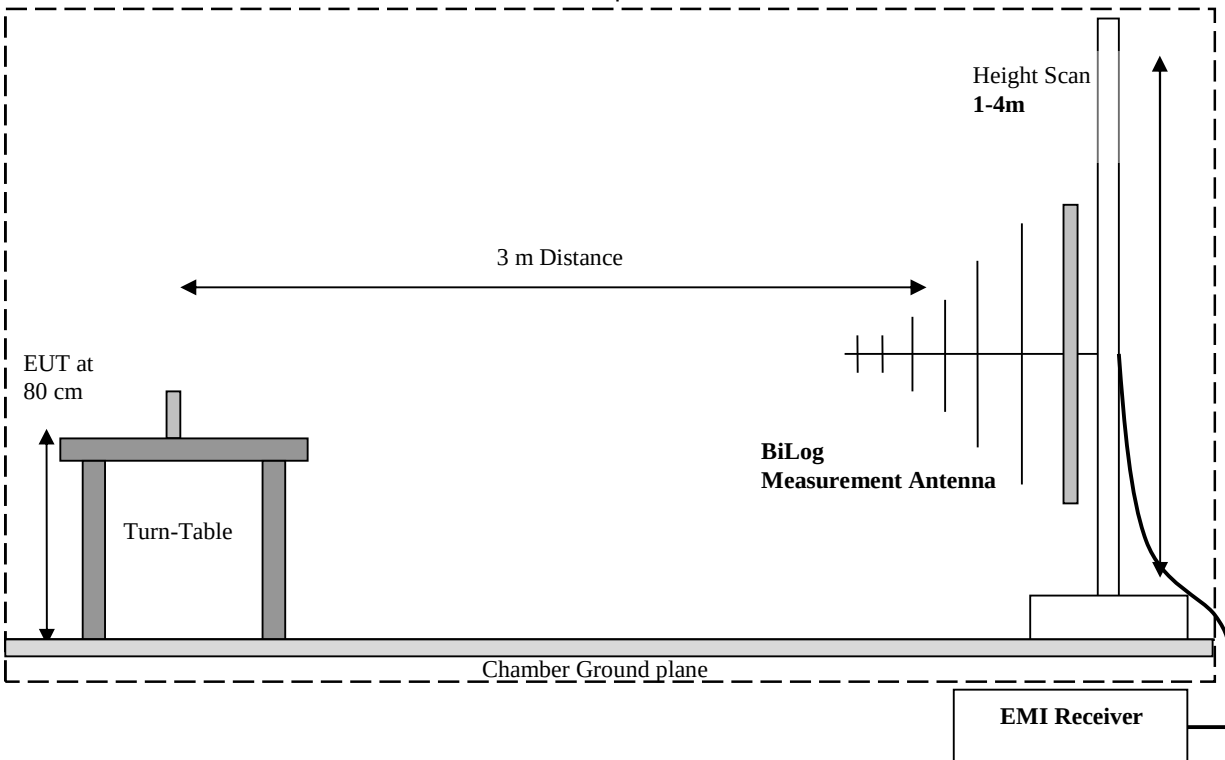
5.1 Radiated Measurement

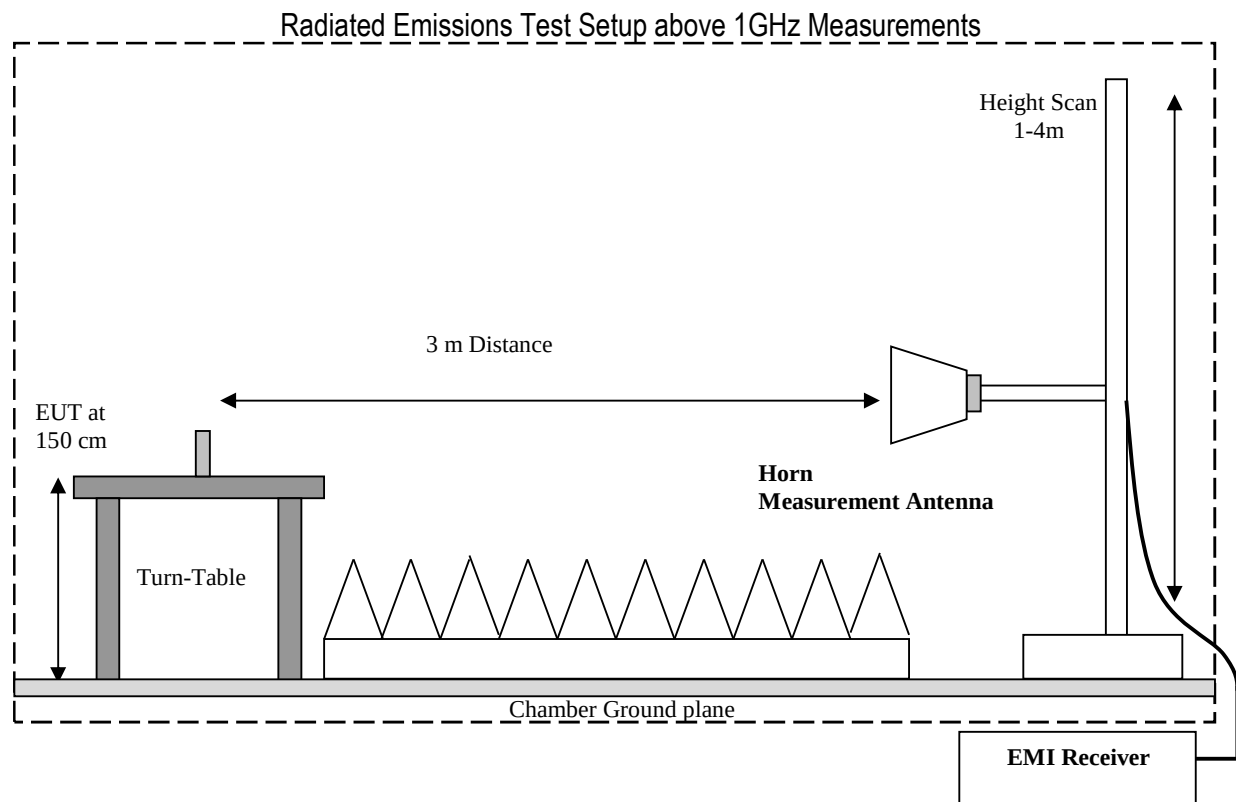
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements





5.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dB μ V
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

6 Measurement Results Summary

6.1 Part 24 / RSS-133

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §24.232 (a)	RF Output Power	Nominal	LTE 2	☐	☐	☐	■	Note 2
§2.1055; §24.235	Frequency Stability	Extreme Temperature and Voltage	LTE 2	☐	☐	☐	■	Note 2
§2.1049; §24.238	Occupied Bandwidth	Nominal	LTE 2	☐	☐	☐	■	Note 2
§2.1051; §24.238	Band Edge Compliance	Nominal	LTE 2	☐	☐	☐	■	Note 2
§2.1051; §24.238	Conducted Spurious Emissions	Nominal	LTE 2	☐	☐	☐	■	Note 2
§2.1053; §24.238	Radiated Spurious Emissions	Nominal	LTE 2	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: Leveraged from Report No. 1506FR26-01 issued by A Test Lab Techno Corp.

6.2 FCC 27 / RSS-139

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §27.50	RF Output Power	Nominal	LTE 4 / LTE 12 / LTE 13	☐	☐	☐	■	Note 2
§2.1055; §27.54	Frequency Stability	Extreme Temperature and Voltage	LTE 4 / LTE 12 / LTE 13	☐	☐	☐	■	Note 2
§2.1049; §27.53	Occupied Bandwidth	Nominal	LTE 4 / LTE 12 / LTE 13	☐	☐	☐	■	Note 2
§2.1051; §27.53	Band Edge Compliance	Nominal	LTE 4 / LTE 12 / LTE 13	☐	☐	☐	■	Note 2
§2.1051; §27.53	Conducted Spurious Emissions	Nominal	LTE 4 / LTE 12 / LTE 13	☐	☐	☐	■	Note 2
§2.1053; §27.53	Radiated Spurious Emissions	Nominal	LTE 4 / LTE 12 / LTE 13	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: Leveraged from Report No. 1506FR26-01 issued by A Test Lab Techno Corp.

7 Test Result Data

7.1 Radiated Spurious Emissions

7.1.1 Measurement utilizing KDB 971168 D01 Power Meas License Digital Systems v03r01, and according to ANSI/TIA-603-D-2010

Spectrum Analyzer Settings for FCC 22

Frequency Range	30MHz – 1 GHz	1 – 1.58 GHz	1.58 – 9 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto

Spectrum Analyzer Settings for FCC 24

Frequency Range	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 GHz	18 – 19.1 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

7.1.2 Limits:

7.1.2.1 FCC Part 22.917 (a); FCC Part 24.238 (a); FCC Part 27.53 (h)

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

7.1.2.2 RSS-132 Part 5.5; RSS-133 Part 6.5; RSS-139 Part 6.6 Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts).

ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

Note: The limit calculation result is a constant of -13 dBm.

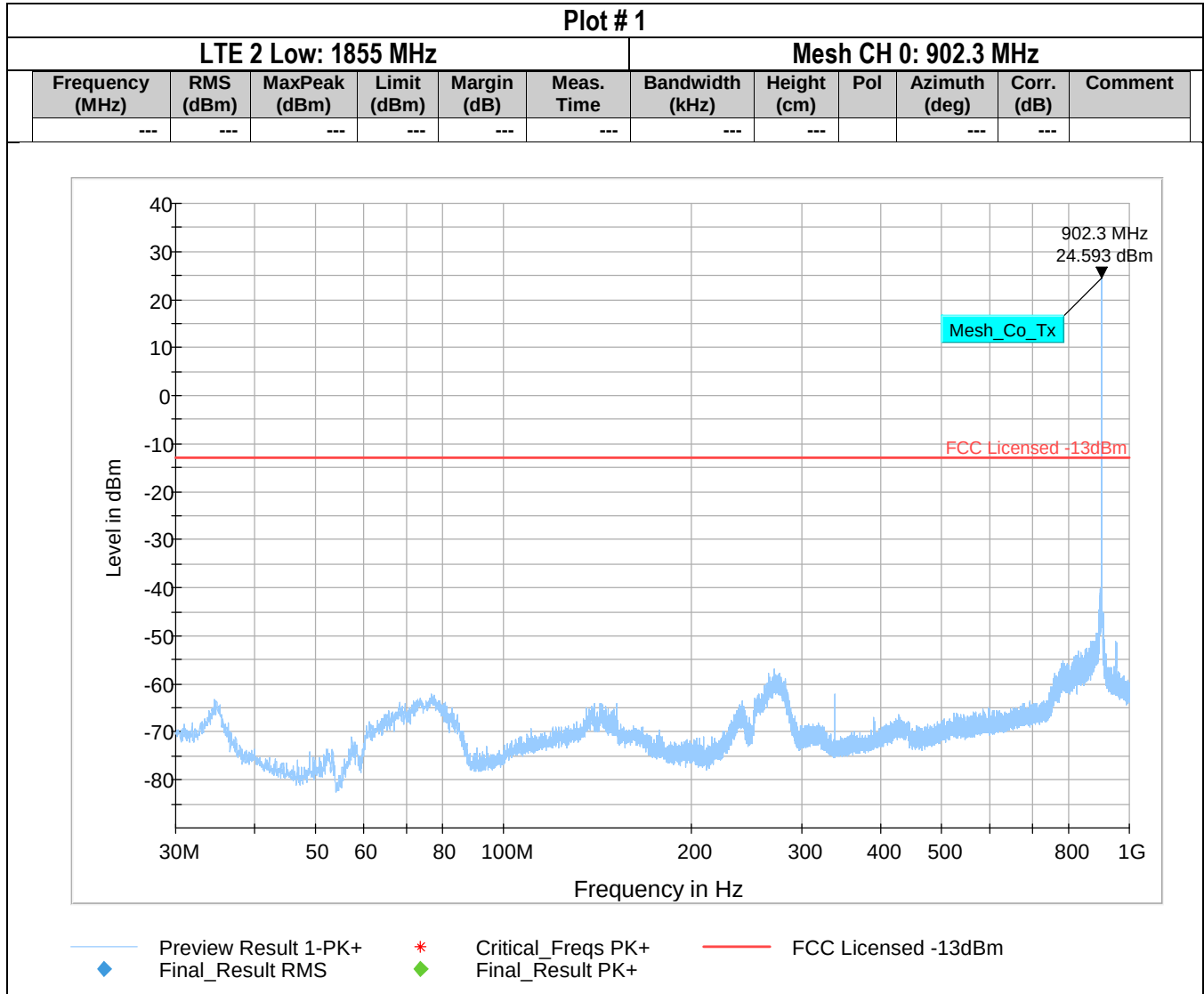
7.1.3 Test conditions and setup:

Ambient Temperature (C)	EUT Set-Up #	EUT operating mode	Power Input
22	1	LTE 2 / LTE 4 / LTE 13 + Mesh FHSS CH0	120 VAC

7.1.4 Measurement result:

Plot #	EUT Set-up #	Channel	EUT operating mode	Scan Frequency	Limit (dBm)	Result
1-3	2	Low	LTE 2 + Mesh	30 MHz – 18 GHz	-13	Pass
4-8	2	Mid	LTE 2 + Mesh	9 kHz – 22 GHz	-13	Pass
9-11	2	High	LTE 2 + Mesh	30 MHz – 18 GHz	-13	Pass
12-14	2	Low	LTE 4 + Mesh	30 MHz – 18 GHz	-13	Pass
15-18	2	Mid	LTE 4 + Mesh	9 kHz – 22 GHz	-13	Pass
19-21	2	High	LTE 4 + Mesh	30 MHz – 18 GHz	-13	Pass
22-24	2	Low	LTE 13 + Mesh	30 MHz – 18 GHz	-13	Pass
25	2	Mid	LTE 13 + Mesh	9 kHz – 30 MHz	-13	Pass
26-28	2	High	LTE 13 + Mesh	30 MHz – 18 GHz	-13	Pass

7.1.5 Measurement Plots:

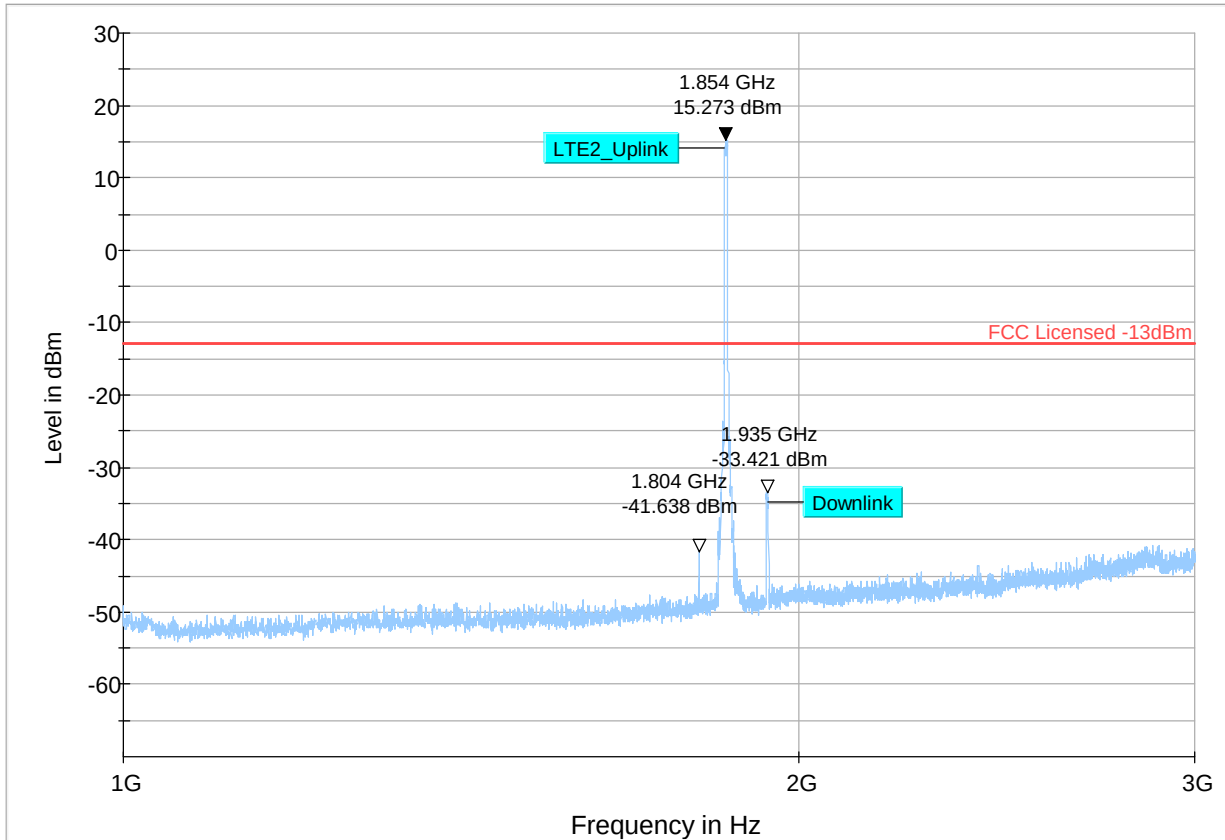


Plot # 2

LTE 2 Low: 1855 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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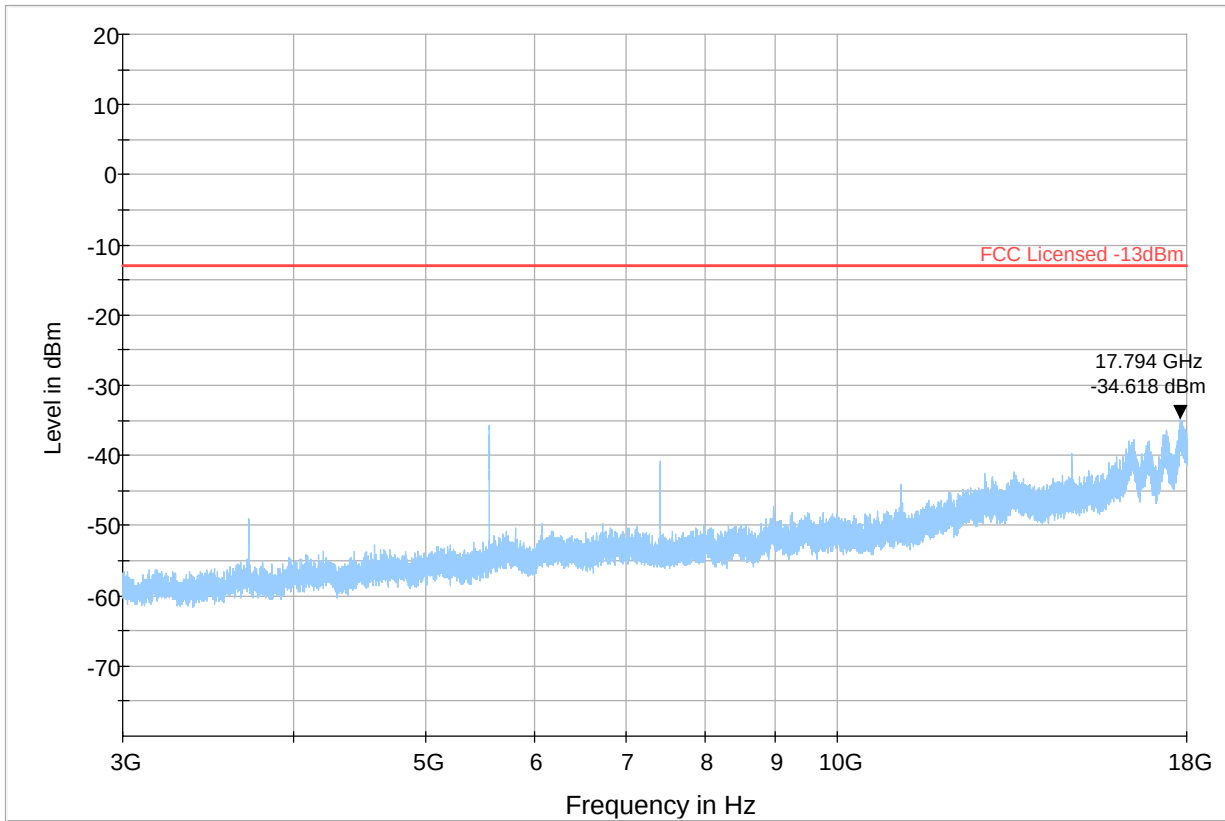
— Preview Result 1-PK+
 — FCC Licensed -13dBm
 ◆ Final_Result RMS
 ◆ Final_Result PK

Plot # 3

LTE 2 Low: 1855 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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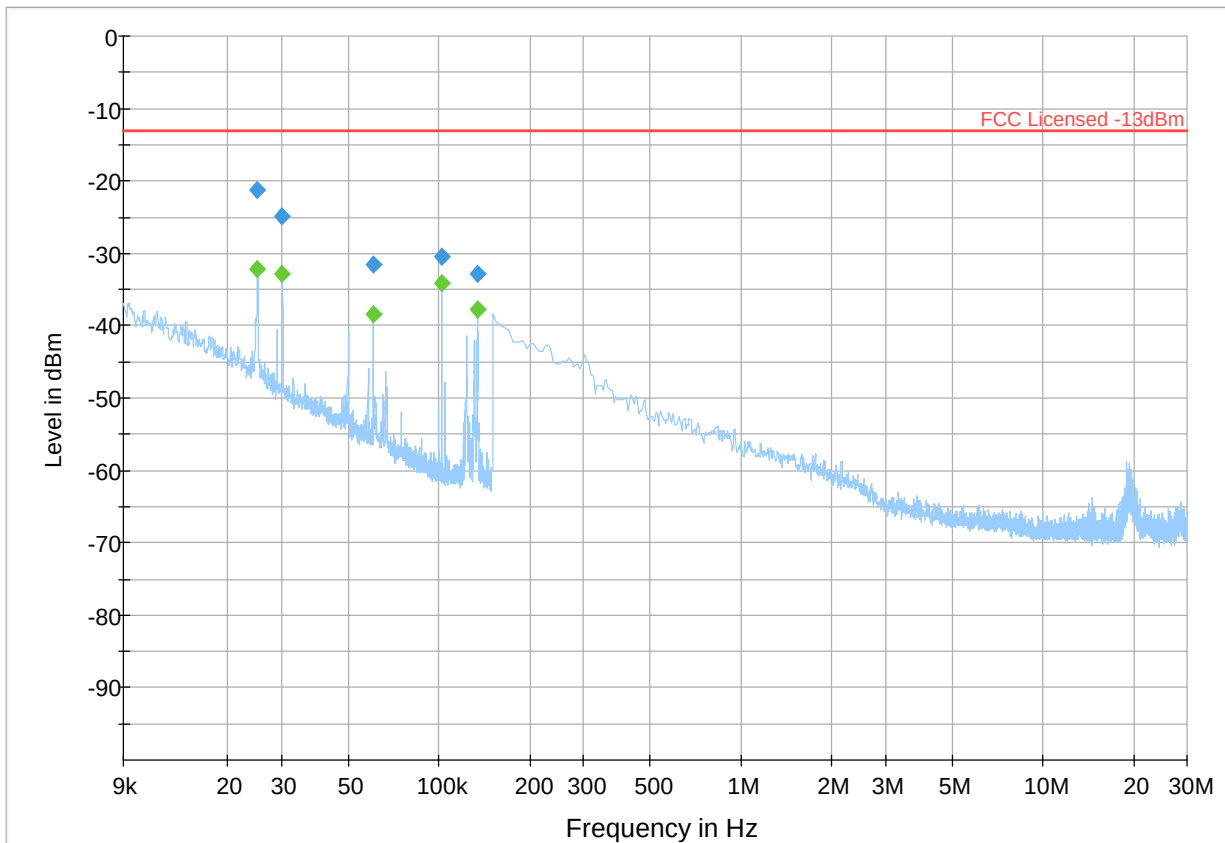
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+
 — FCC Licensed -13dBm

Plot # 4

LTE 2 Mid: 1880 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	MaxPeak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.025	---	-32.15	---	---	500.0	9.000	100.0	V	249.0	-18.0	
0.025	-21.32	---	-13.00	8.32	500.0	9.000	100.0	V	249.0	-18.0	
0.030	---	-32.89	---	---	500.0	9.000	100.0	H	287.0	-20.4	
0.030	-24.91	---	-13.00	11.91	500.0	9.000	100.0	H	287.0	-20.4	
0.061	---	-38.52	---	---	500.0	9.000	100.0	H	34.0	-25.9	
0.061	-31.45	---	-13.00	18.45	500.0	9.000	100.0	H	34.0	-25.9	
0.102	---	-34.20	---	---	500.0	9.000	100.0	H	187.0	-30.7	
0.102	-30.37	---	-13.00	17.37	500.0	9.000	100.0	H	187.0	-30.7	
0.134	---	-37.72	---	---	500.0	9.000	100.0	H	125.0	-32.2	
0.134	-32.86	---	-13.00	19.86	500.0	9.000	100.0	H	125.0	-32.2	



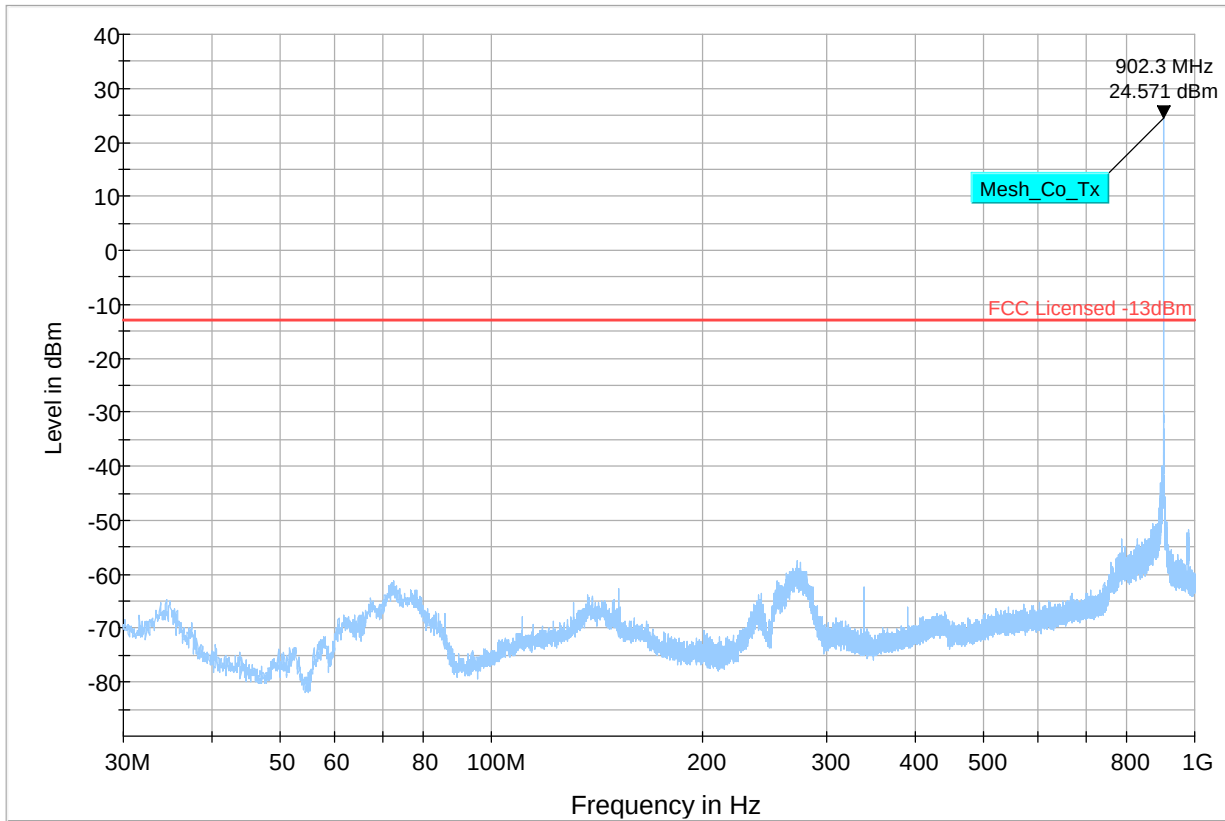
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result PK+ Final_Result RMS

Plot # 5

LTE 2 Mid: 1880 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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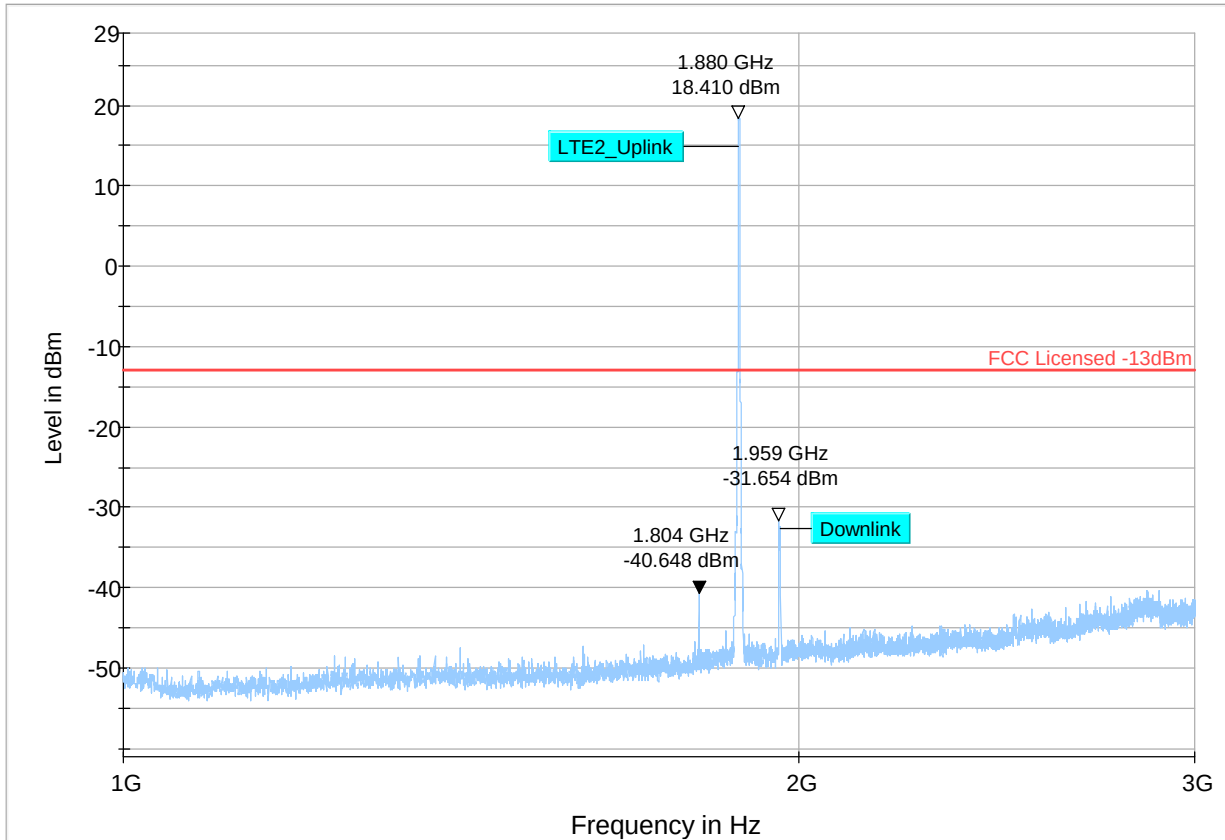
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+
 — FCC Licensed -13dBm
 ◆ Final_Result PK+

Plot # 6

LTE 2 Mid: 1880 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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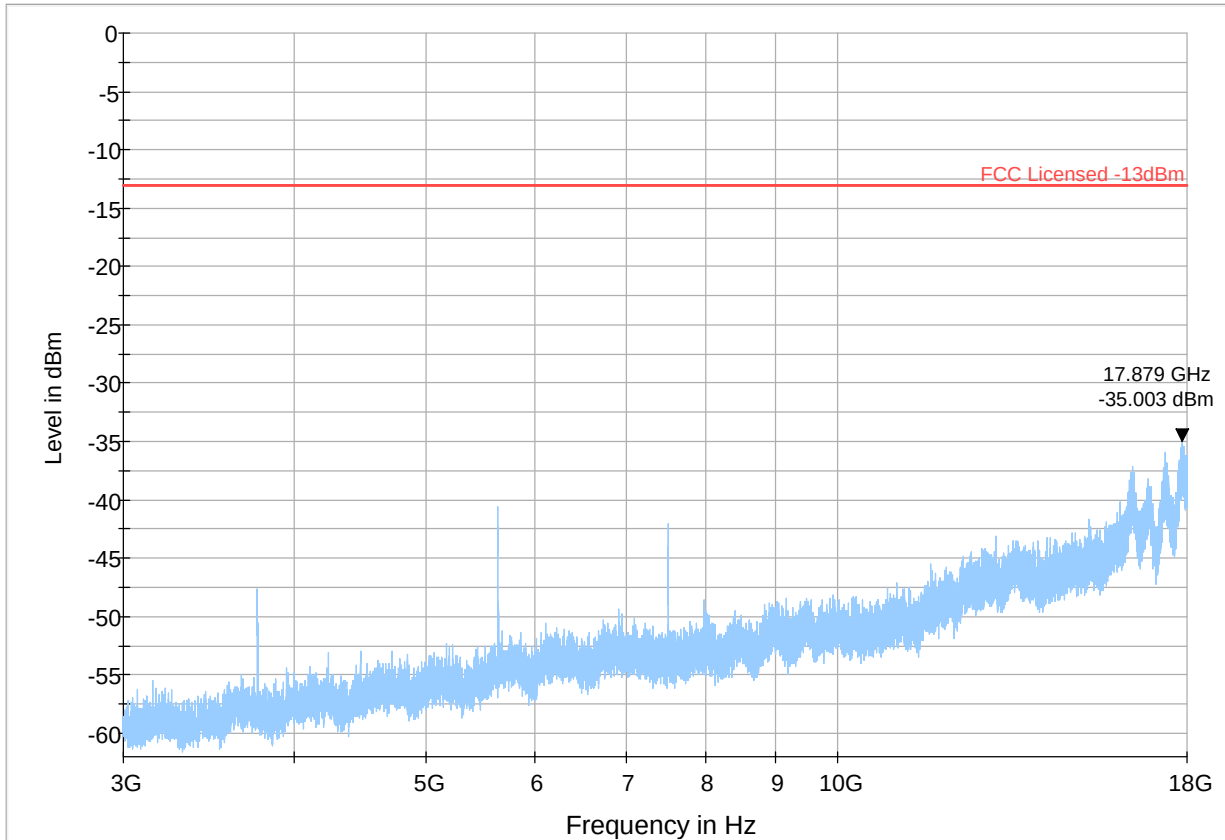
Preview Result 1-PK+ FCC Licensed -13dBm ◆ Final_Result RMS ◆ Final_Result PK

Plot # 7

LTE 2 Mid: 1880 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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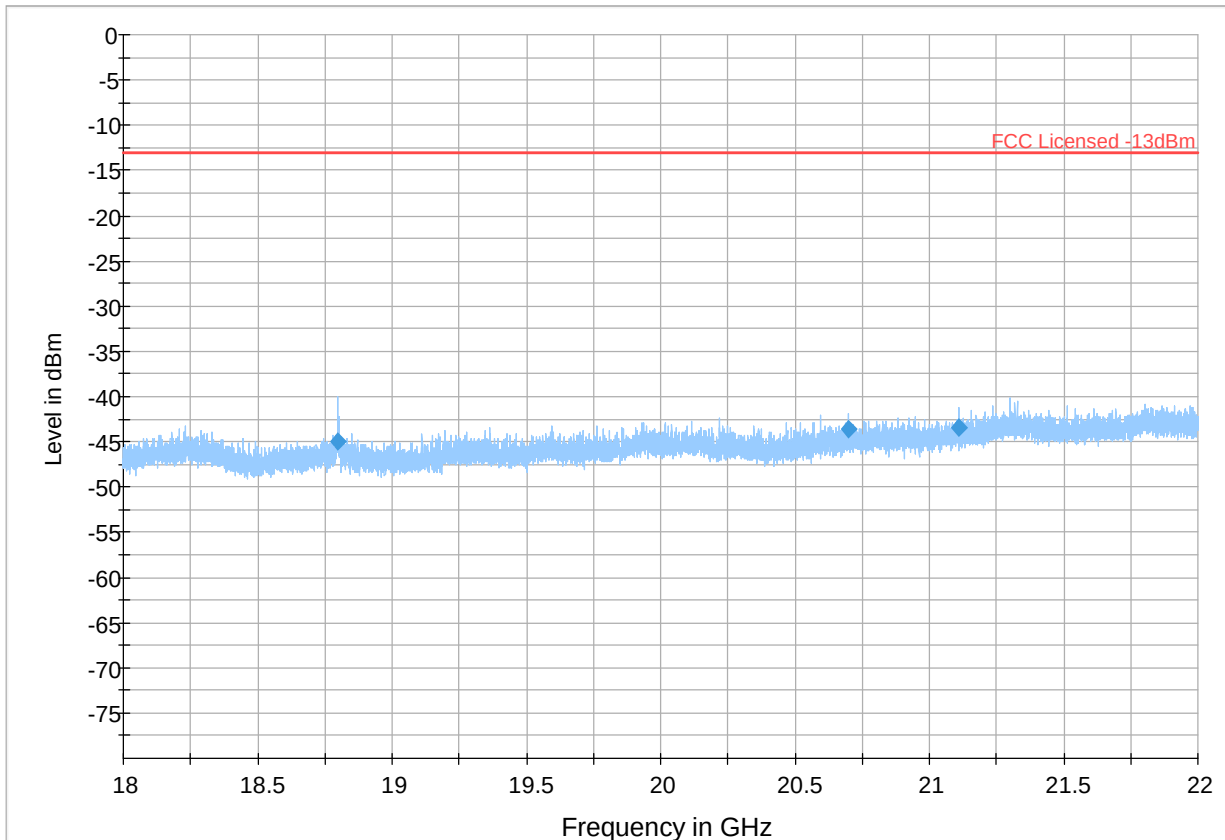
Preview Result 1-PK+ FCC Licensed -13dBm ◆ Final_Result RMS ◆ Final_Result PK

Plot # 8

LTE 2 Mid: 1880 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
18799.750	-45.01	---	-13.00	32.01	500.0	1000.000	150.0	V	29.0	-82.5	
20701.500	-43.57	---	-13.00	30.57	500.0	1000.000	150.0	V	115.0	-78.9	
21108.250	-43.36	---	-13.00	30.36	500.0	1000.000	150.0	H	-4.0	-78.0	



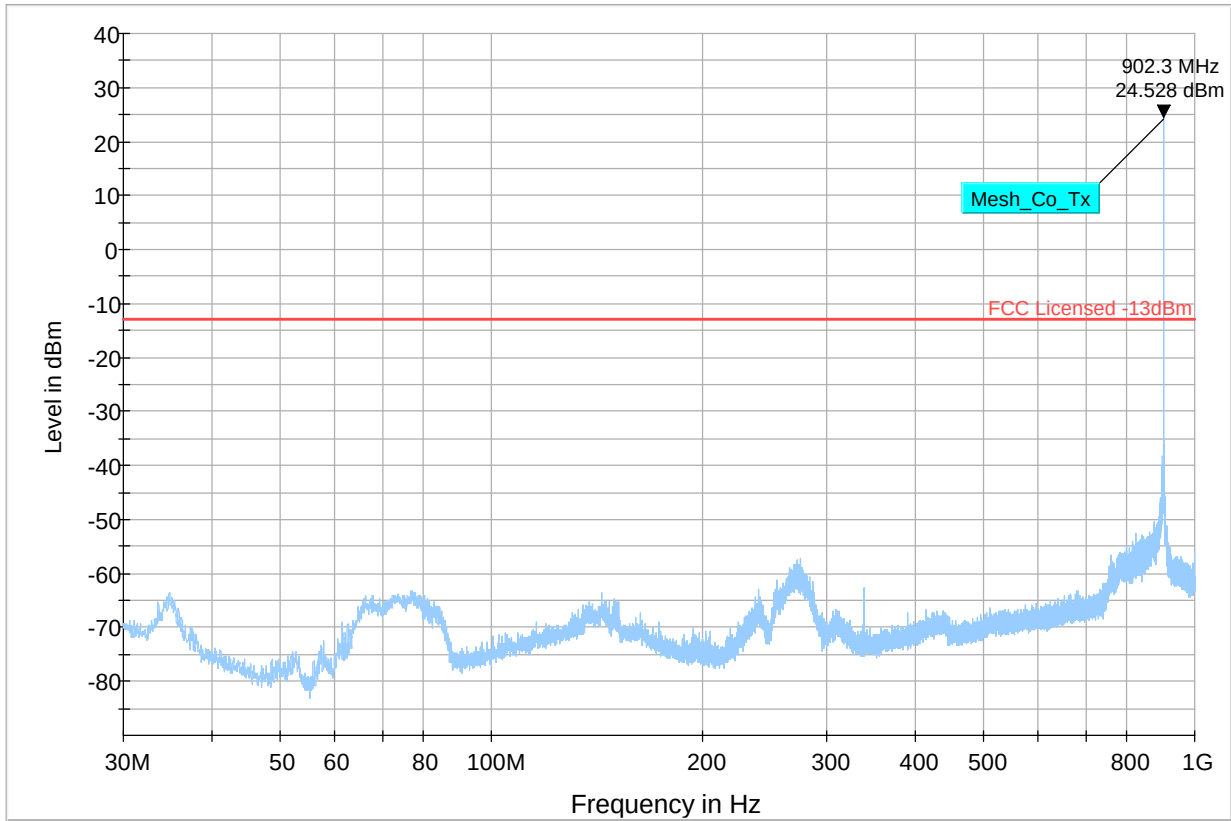
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 9

LTE 2 High: 1905 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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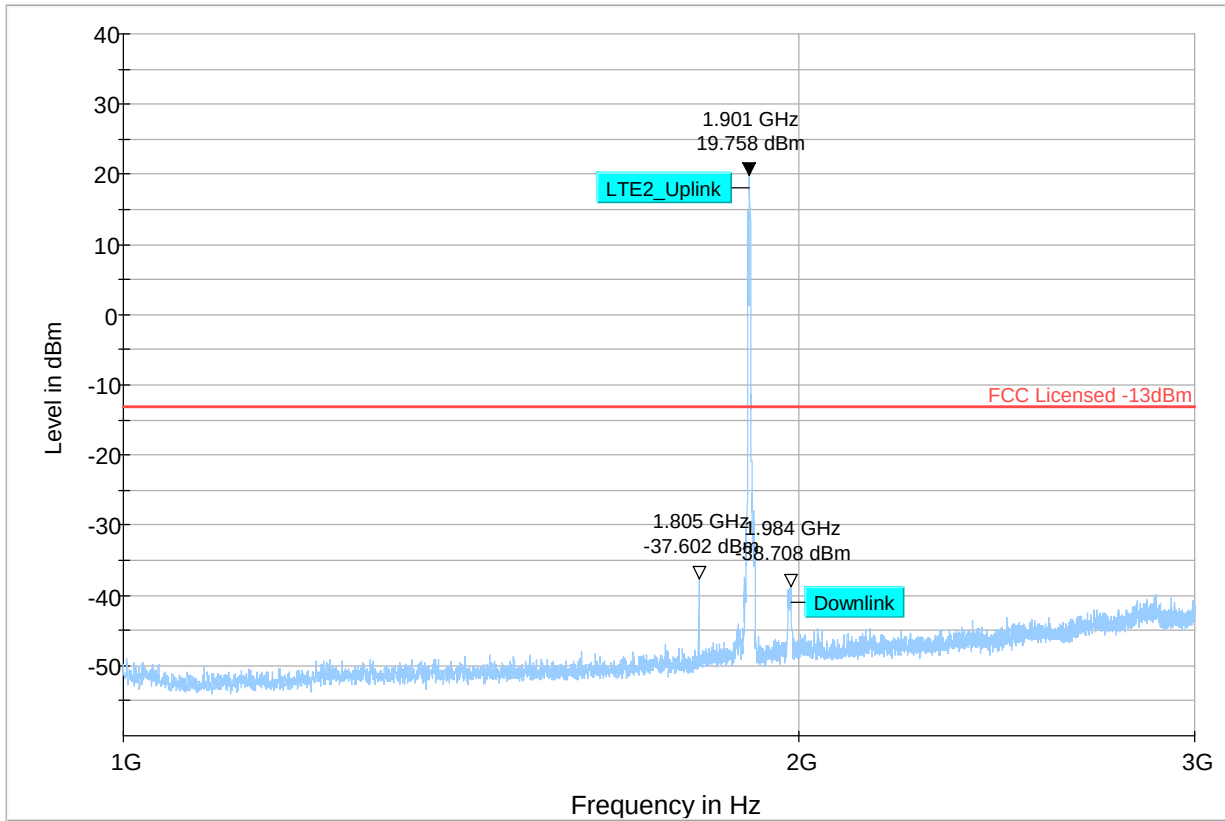
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+ Final_Result PK+
 — FCC Licensed -13dBm

Plot # 10

LTE 2 High: 1905 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+
 — FCC Licensed -13dBm

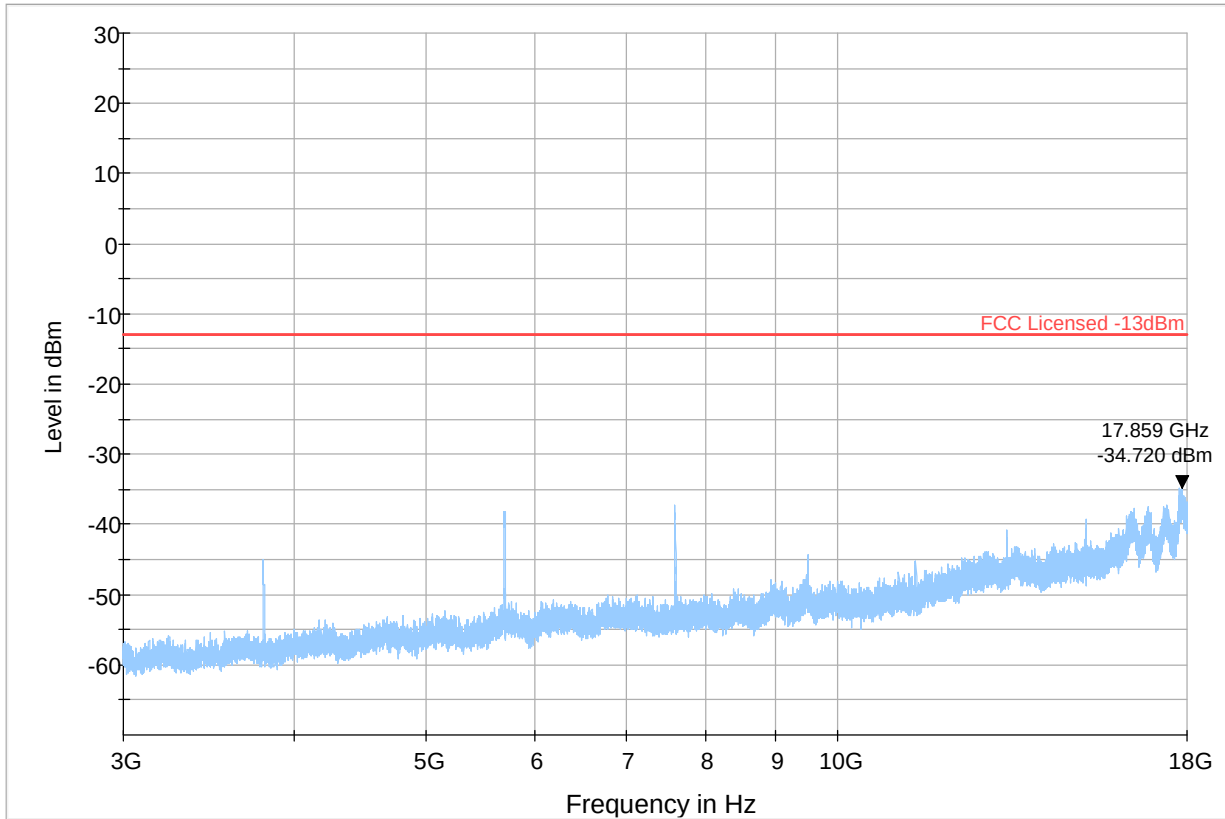
◆ Final_Result PK+

Plot # 11

LTE 2 High: 1905 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
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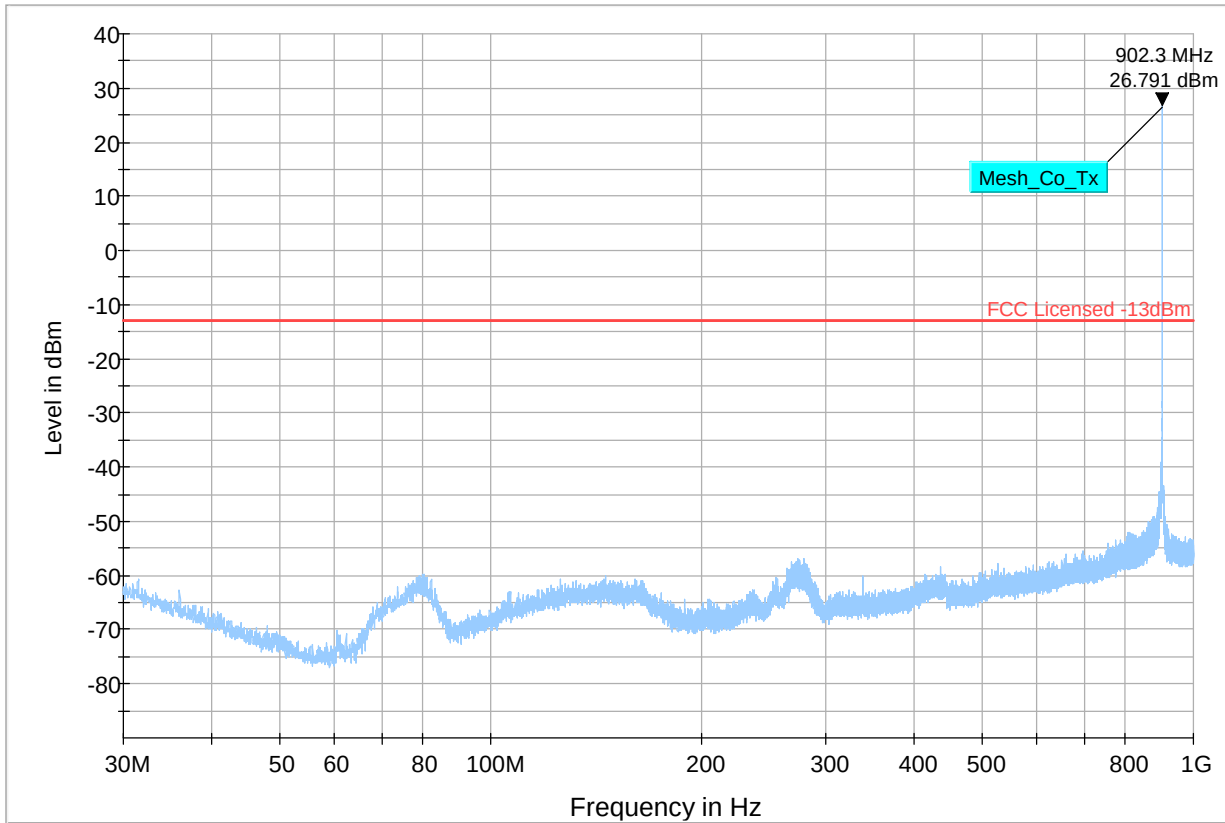
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+
 — FCC Licensed -13dBm

Plot # 12

LTE 4 Low: 1715 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
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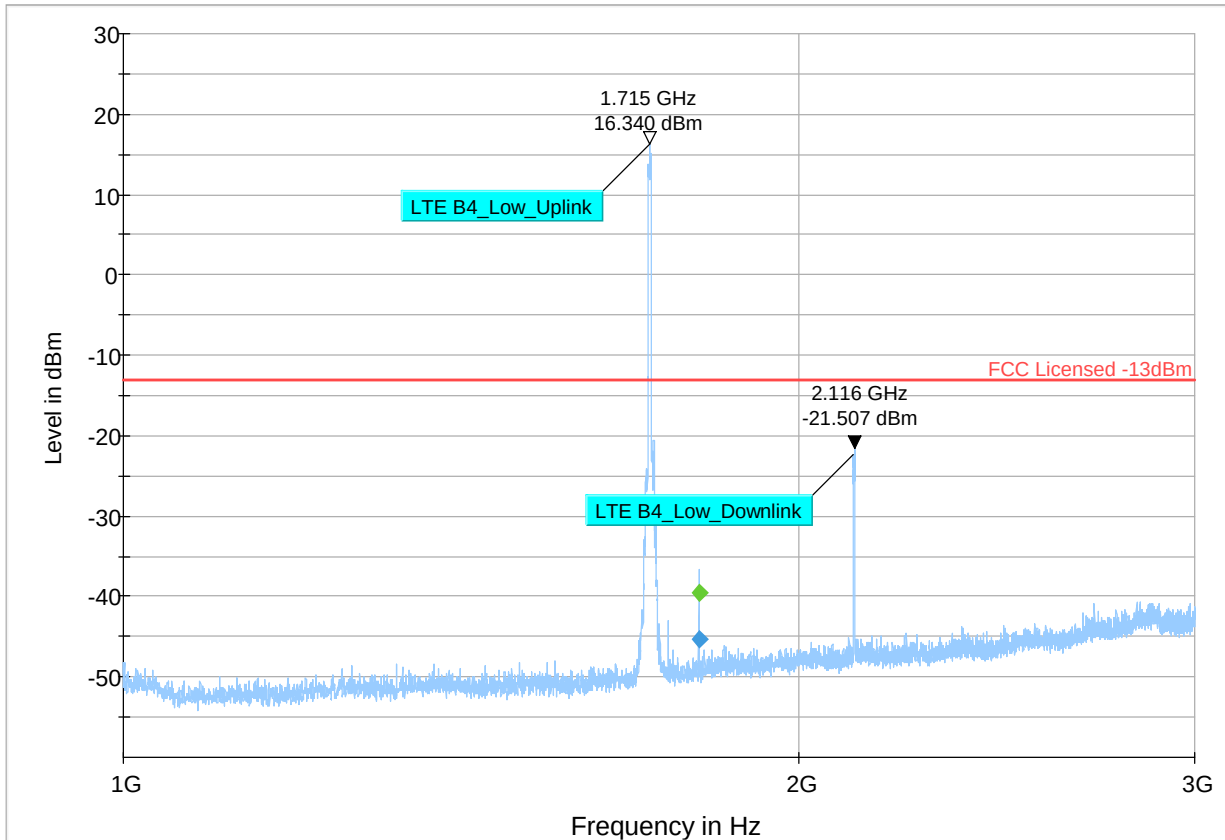
◆ Preview Result 1-PK+ Final_Result RMS * Critical_Freqs PK+ Final_Result PK+ — FCC Licensed -13dBm

Plot # 13

LTE 4 Low: 1715 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1804.500	---	-39.47	---	---	500.0	1000.000	107.0	H	141.0	-64.7
1804.500	-45.31	---	-13.00	32.31	500.0	1000.000	107.0	H	141.0	-64.7



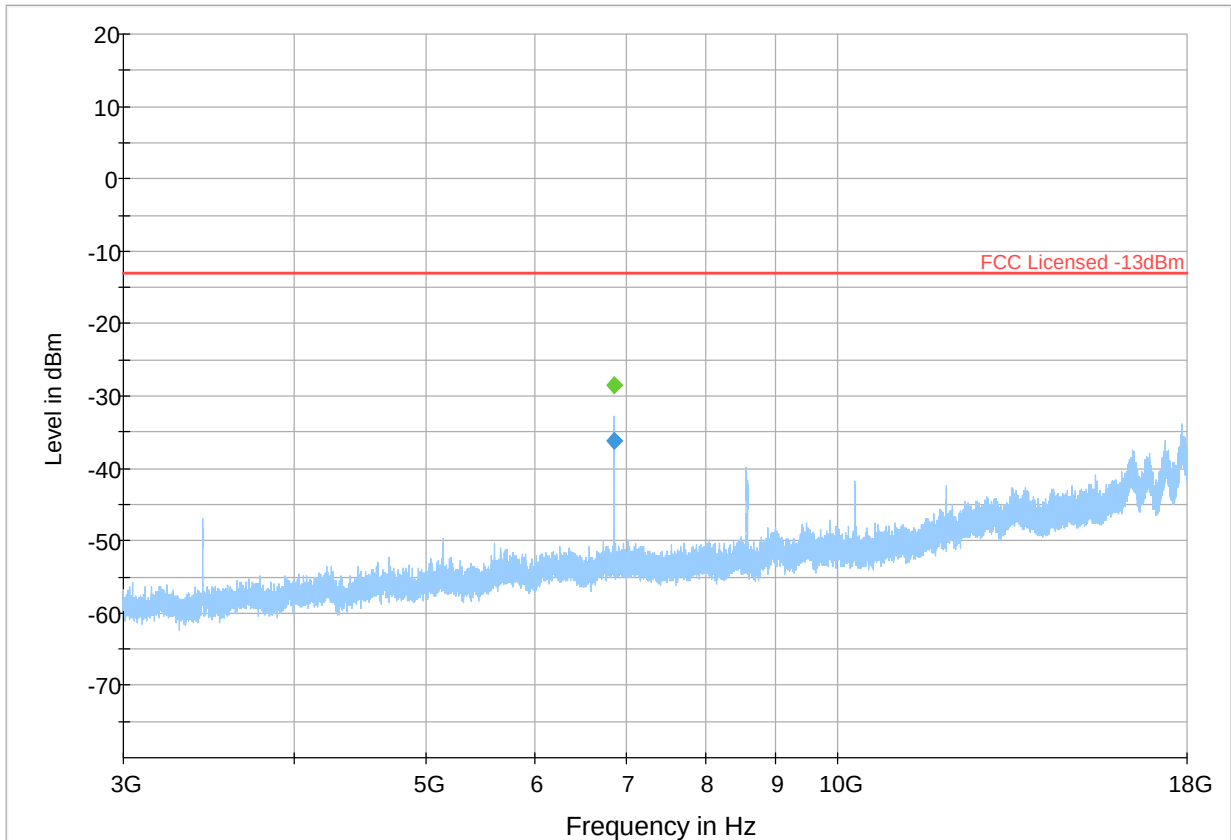
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 14

LTE 4 Low: 1715 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
6860.000	---	-28.51	---	---	500.0	1000.000	167.0	V	22.0	-95.4
6860.000	-36.20	---	-13.00	23.20	500.0	1000.000	167.0	V	22.0	-95.4



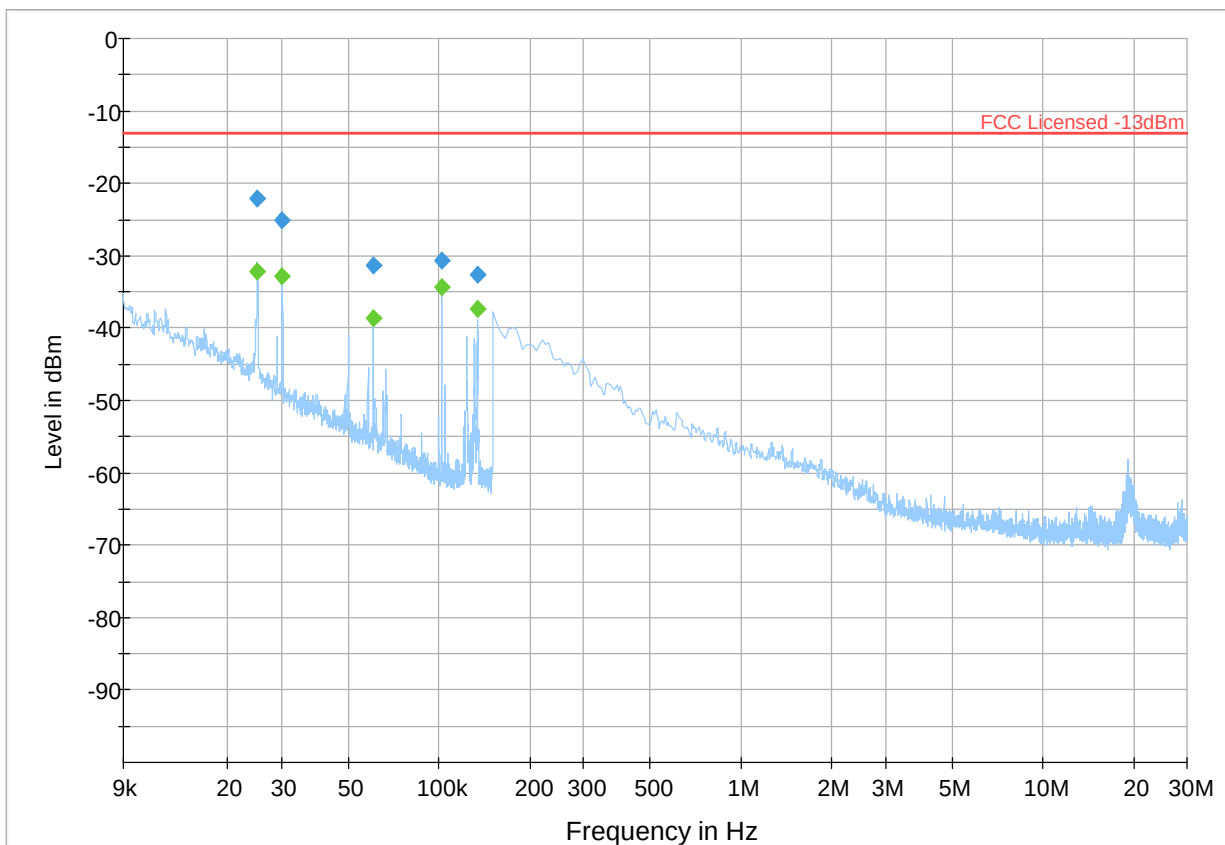
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 15

LTE 4 Mid: 1732.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	MaxPeak (dBm)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.025	---	-32.18	---	---	500.0	9.000	100.0	V	139.0	-18.0	
0.025	-22.00	---	-13.00	9.00	500.0	9.000	100.0	V	139.0	-18.0	
0.030	---	-32.93	---	---	500.0	9.000	100.0	H	297.0	-20.4	
0.030	-25.21	---	-13.00	12.21	500.0	9.000	100.0	H	297.0	-20.4	
0.061	-31.34	---	-13.00	18.34	500.0	9.000	100.0	H	194.0	-25.9	
0.061	---	-38.60	---	---	500.0	9.000	100.0	H	194.0	-25.9	
0.102	-30.59	---	-13.00	17.59	500.0	9.000	100.0	H	223.0	-30.7	
0.102	---	-34.25	---	---	500.0	9.000	100.0	H	223.0	-30.7	
0.134	---	-37.44	---	---	500.0	9.000	100.0	H	35.0	-32.2	
0.134	-32.52	---	-13.00	19.52	500.0	9.000	100.0	H	35.0	-32.2	



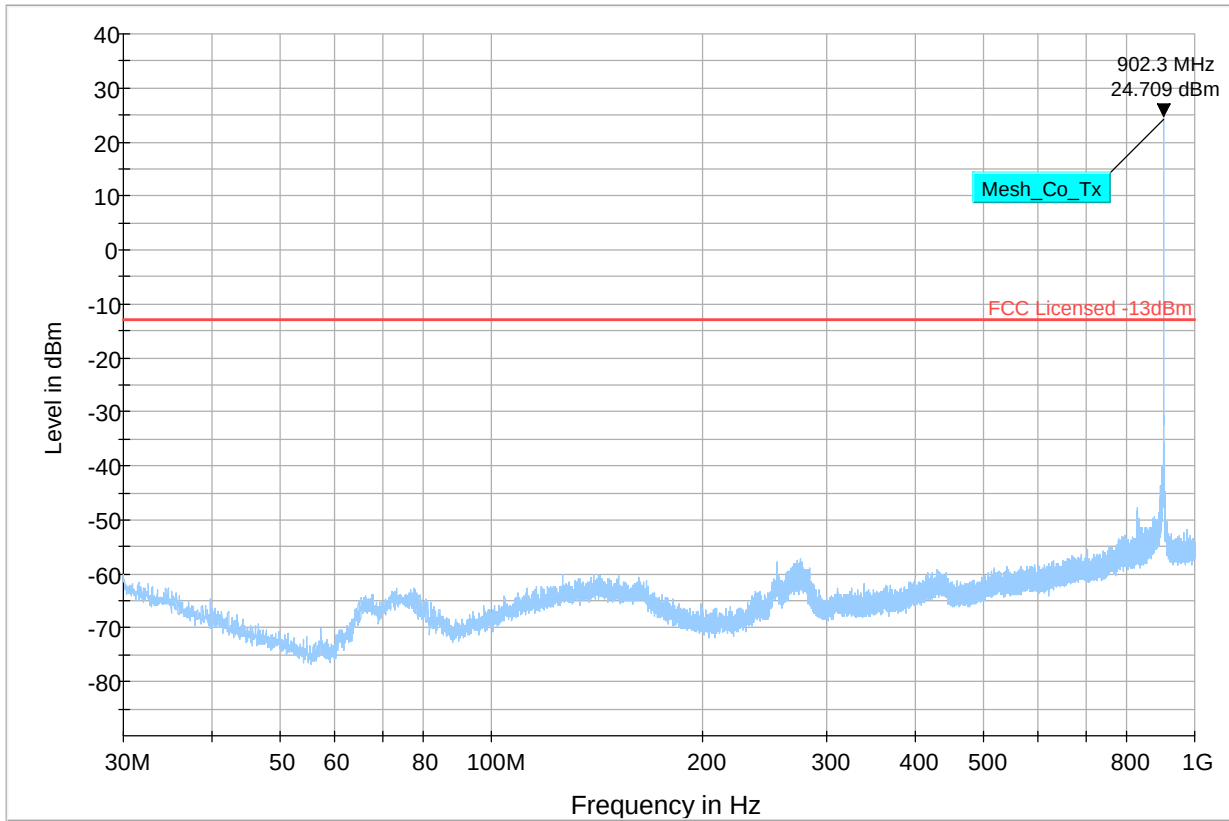
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result PK+ Final_Result RMS

Plot # 16

LTE 4 Mid: 1732.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
---	---	---	---	---	---	---	---	---	---	---



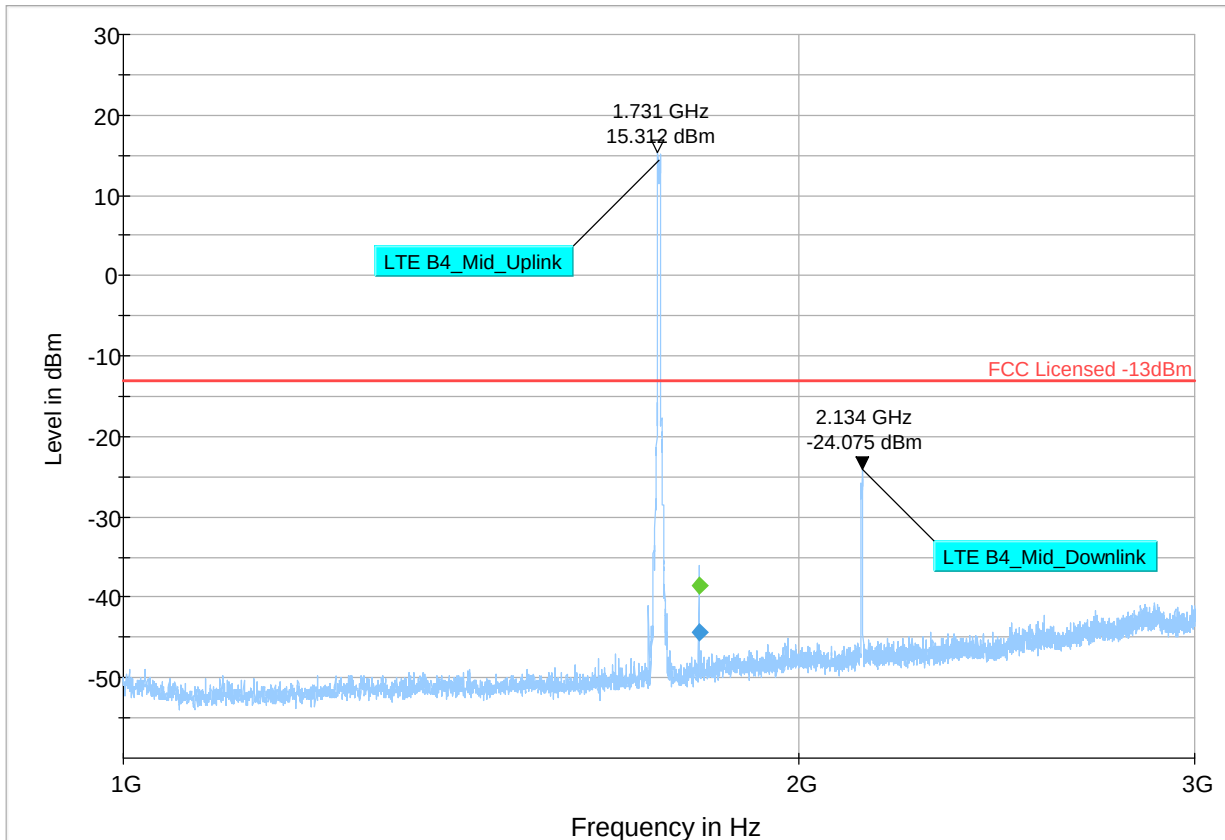
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+ Final_Result PK+
 — FCC Licensed -13dBm

Plot # 17

LTE 4 Mid: 1732.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1804.500	---	-38.53	---	---	500.0	1000.000	107.0	H	145.0	-64.7
1804.500	-44.29	---	-13.00	31.29	500.0	1000.000	107.0	H	145.0	-64.7



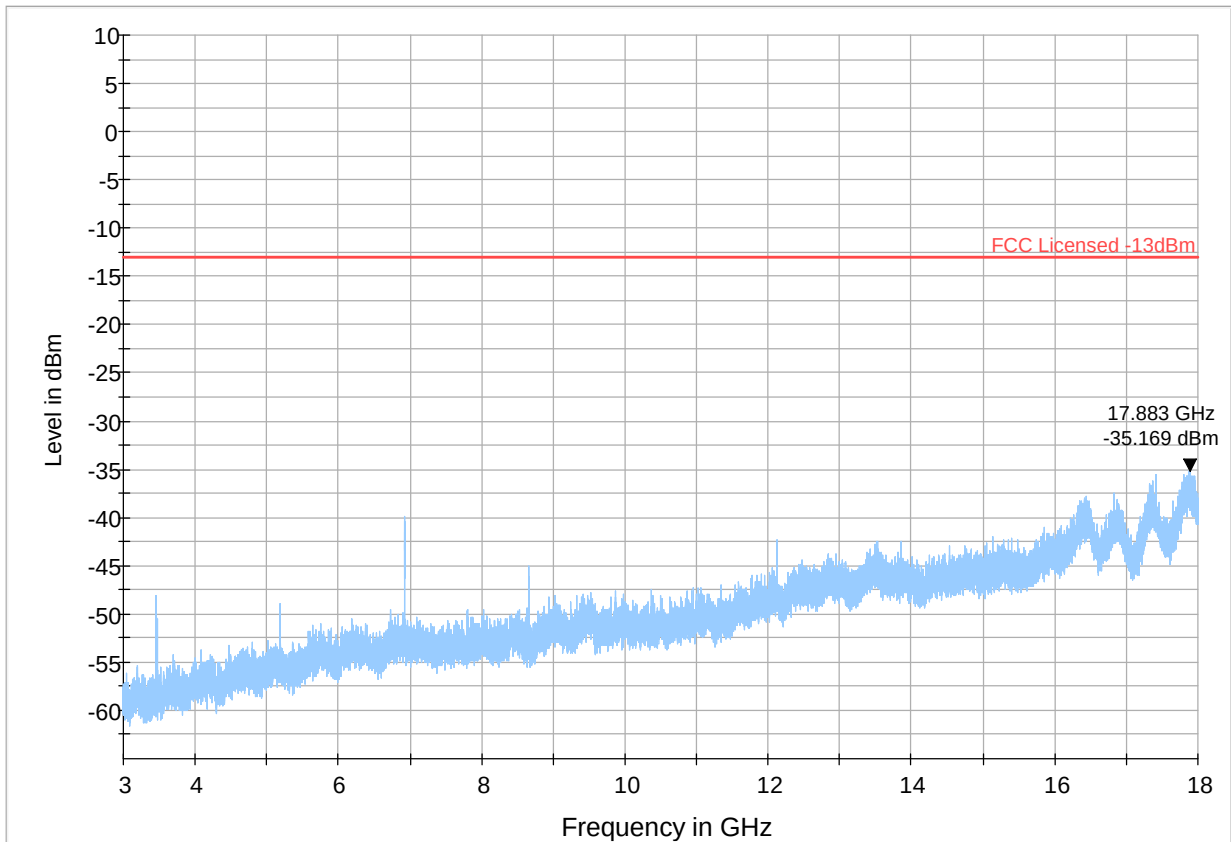
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 18

LTE 4 Mid: 1732.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
---	---	---	---	---	---	---	---	---	---	---



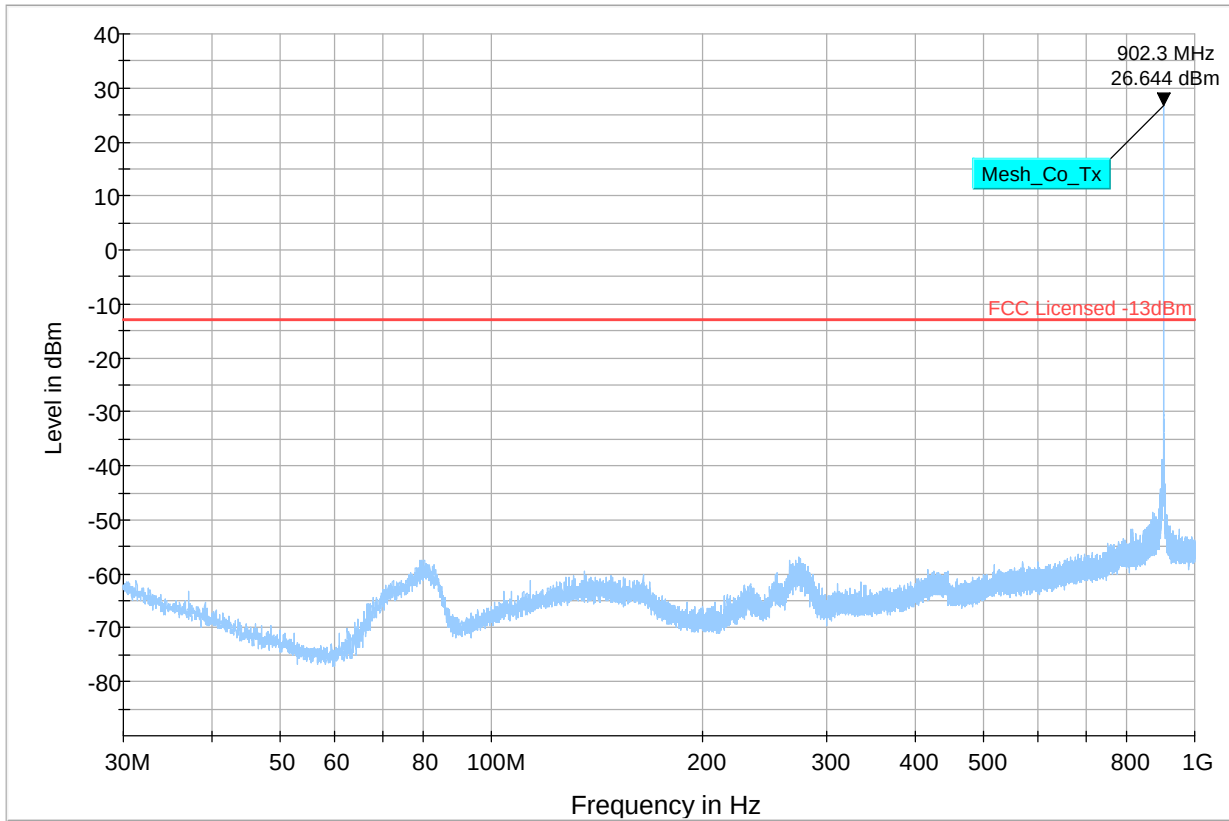
Preview Result 1-PK+ FCC Licensed -13dBm ◆ Final_Result RMS ◆ Final_Result PK

Plot # 19

LTE 4 High: 1750 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
---	---	---	---	---	---	---	---	---	---	---



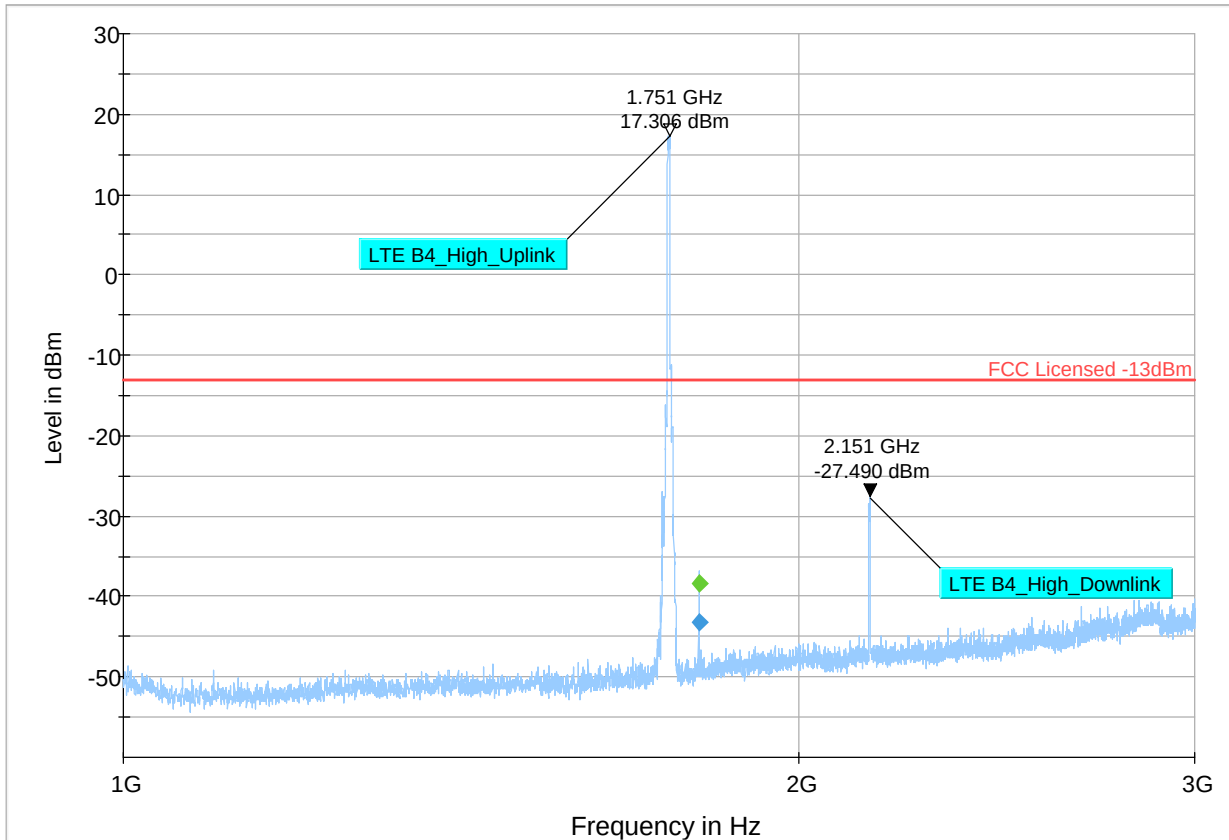
Preview Result 1-PK+ Final_Result RMS * Critical_Freqs PK+ Final_Result PK+ FCC Licensed -13dBm

Plot # 20

LTE 4 High: 1750 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1804.500	---	-38.38	---	---	500.0	1000.000	107.0	H	155.0	-64.7
1804.500	-43.26	---	-13.00	30.26	500.0	1000.000	107.0	H	155.0	-64.7



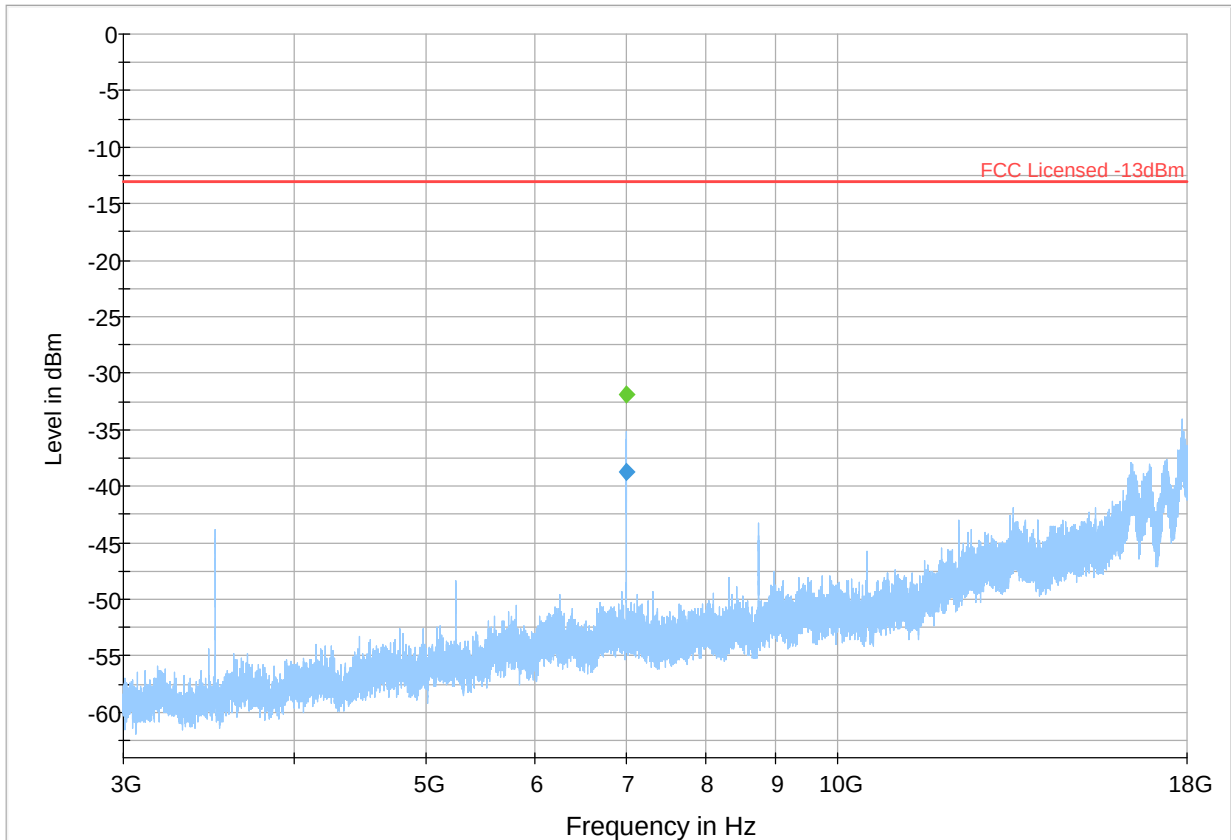
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 21

LTE 4 High: 1750 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
7000.000	-38.77	---	-13.00	25.77	500.0	1000.000	169.0	V	126.0	-95.3
7000.000	---	-31.89	---	---	500.0	1000.000	169.0	V	126.0	-95.3



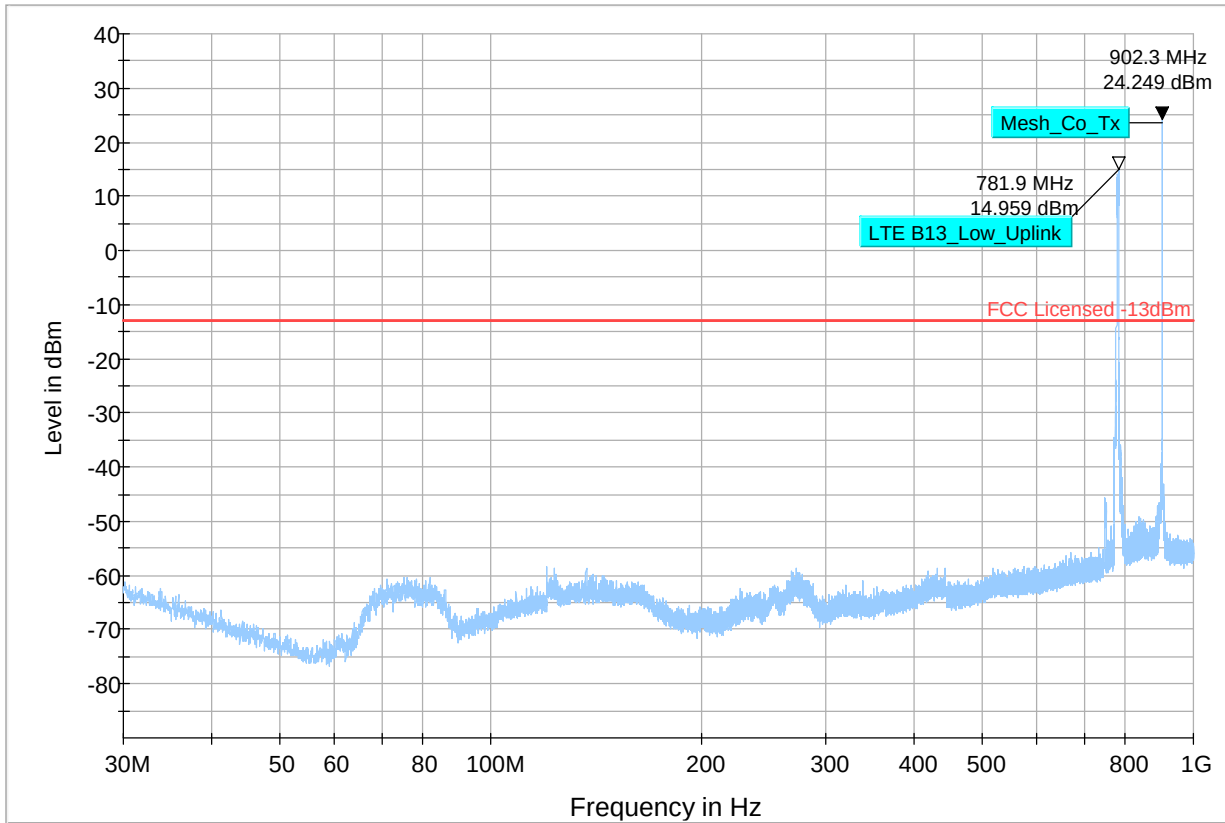
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 22

LTE 13 Low: 779.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
---	---	---	---	---	---	---	---	---	---	---



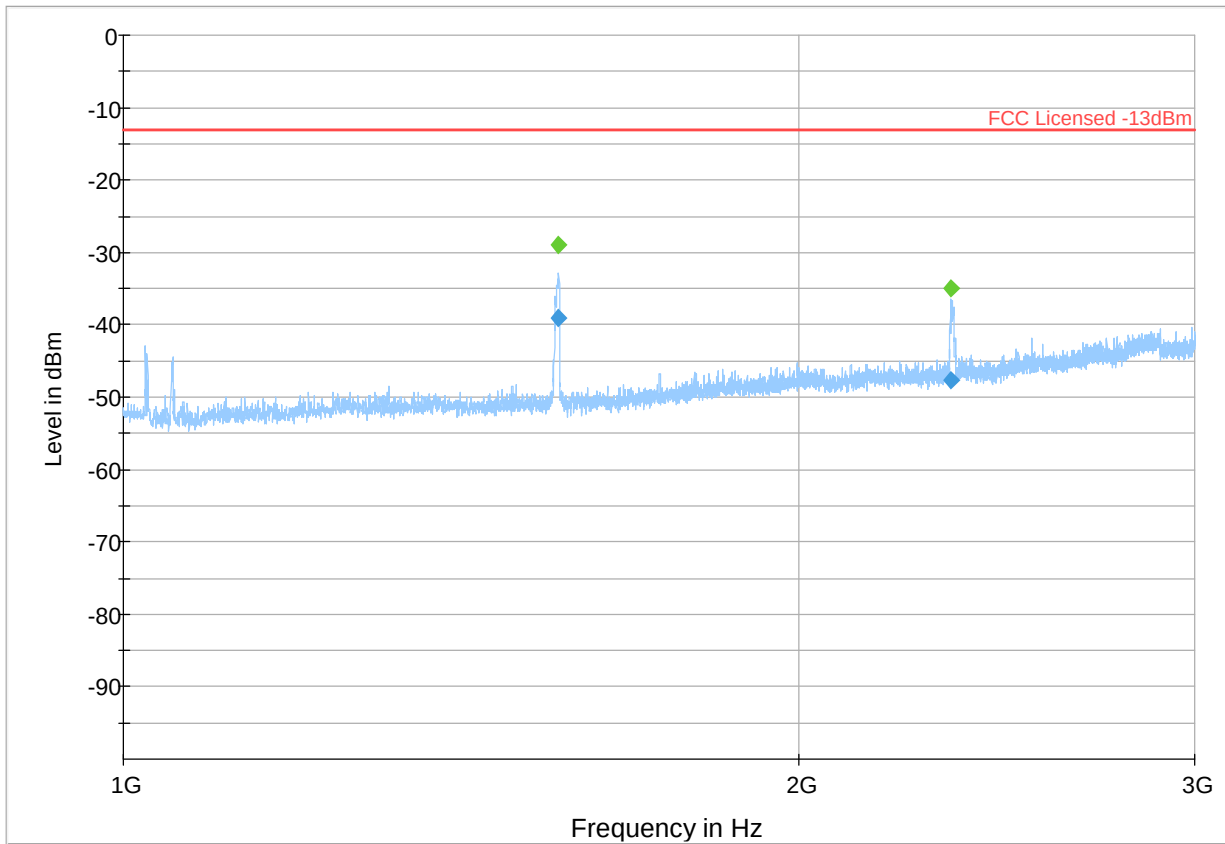
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+
 ◆ Final_Result PK+
 — FCC Licensed -13dBm

Plot # 23

LTE 13 Low: 779.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1562.750	---	-29.06	---	---	500.0	1000.000	142.0	H	86.0	-66.0
1562.750	-39.11	---	-13.00	26.11	500.0	1000.000	142.0	H	86.0	-66.0
2336.500	---	-34.88	---	---	500.0	1000.000	107.0	V	7.0	-62.8
2336.500	-47.65	---	-13.00	34.65	500.0	1000.000	107.0	V	7.0	-62.8



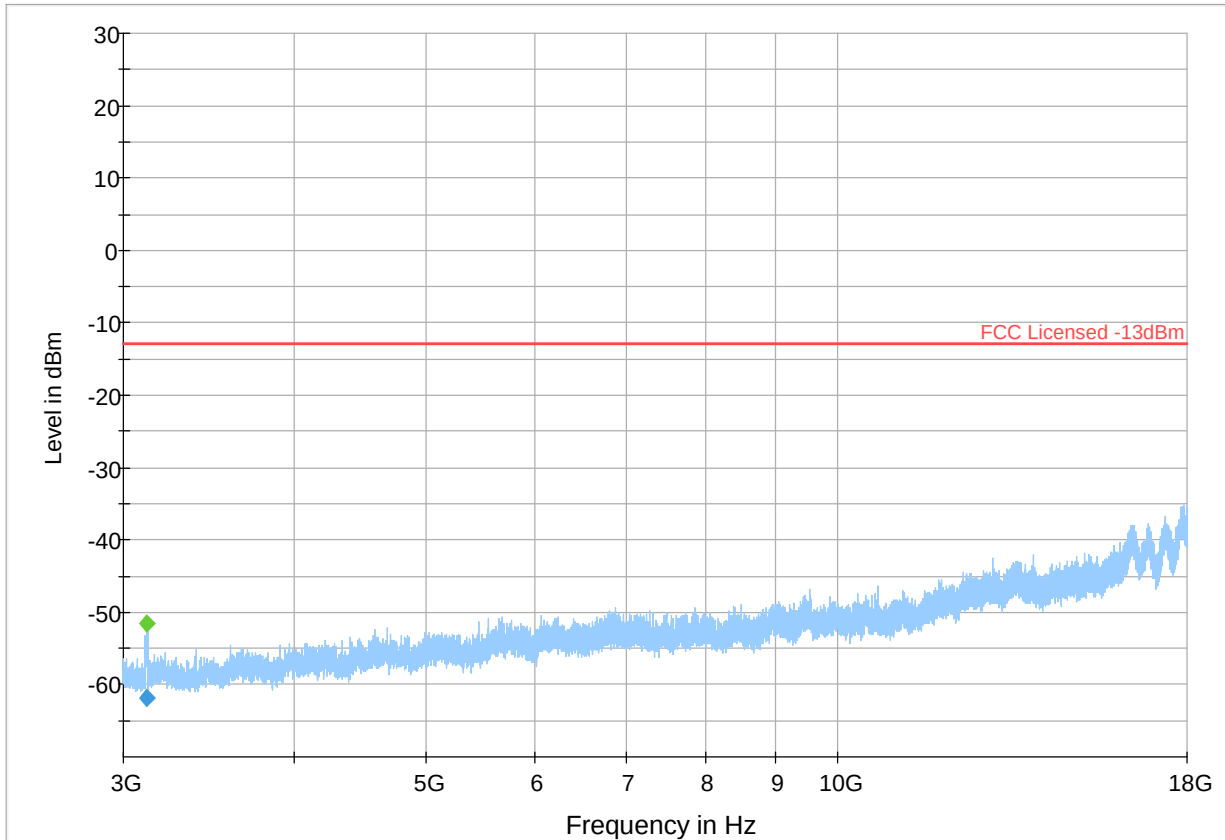
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 24

LTE 13 Low: 779.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3119.750	---	-51.63	---	---	500.0	1000.000	295.0	V	26.0	-103.4
3119.750	-61.88	---	-13.00	48.88	500.0	1000.000	295.0	V	26.0	-103.4



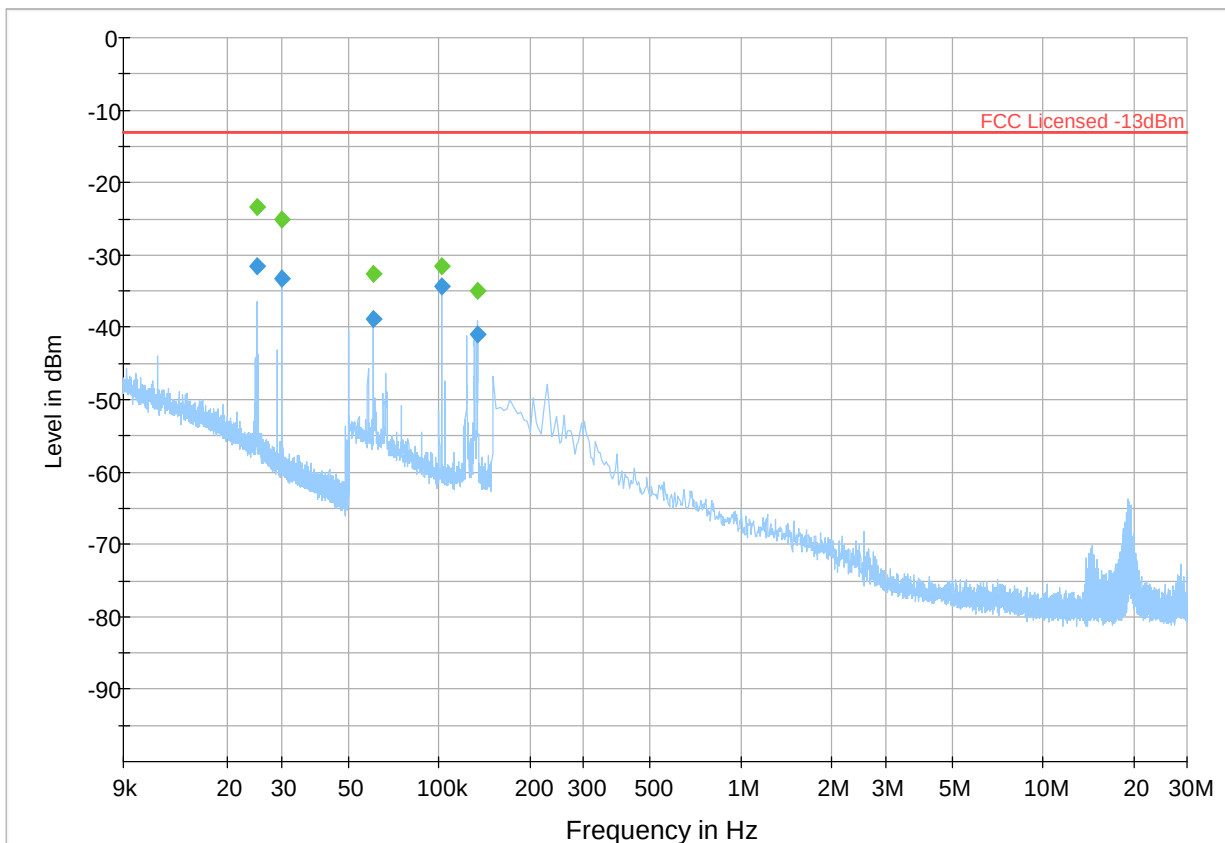
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 25

LTE 13 Mid: 782 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
0.025	-31.56	---	-13.00	18.56	500.0	1.000	100.0	V	10.0	-18.0
0.025	---	-23.40	---	---	500.0	1.000	100.0	V	10.0	-18.0
0.030	---	-25.20	---	---	500.0	1.000	100.0	H	314.0	-20.4
0.030	-33.32	---	-13.00	20.32	500.0	1.000	100.0	H	314.0	-20.4
0.061	-38.90	---	-13.00	25.90	500.0	1.000	100.0	H	269.0	-25.9
0.061	---	-32.68	---	---	500.0	1.000	100.0	H	269.0	-25.9
0.102	-34.29	---	-13.00	21.29	500.0	1.000	100.0	H	300.0	-30.7
0.102	---	-31.53	---	---	500.0	1.000	100.0	H	300.0	-30.7
0.134	-40.90	---	-13.00	27.90	500.0	1.000	100.0	H	-10.0	-32.2
0.134	---	-35.03	---	---	500.0	1.000	100.0	H	-10.0	-32.2



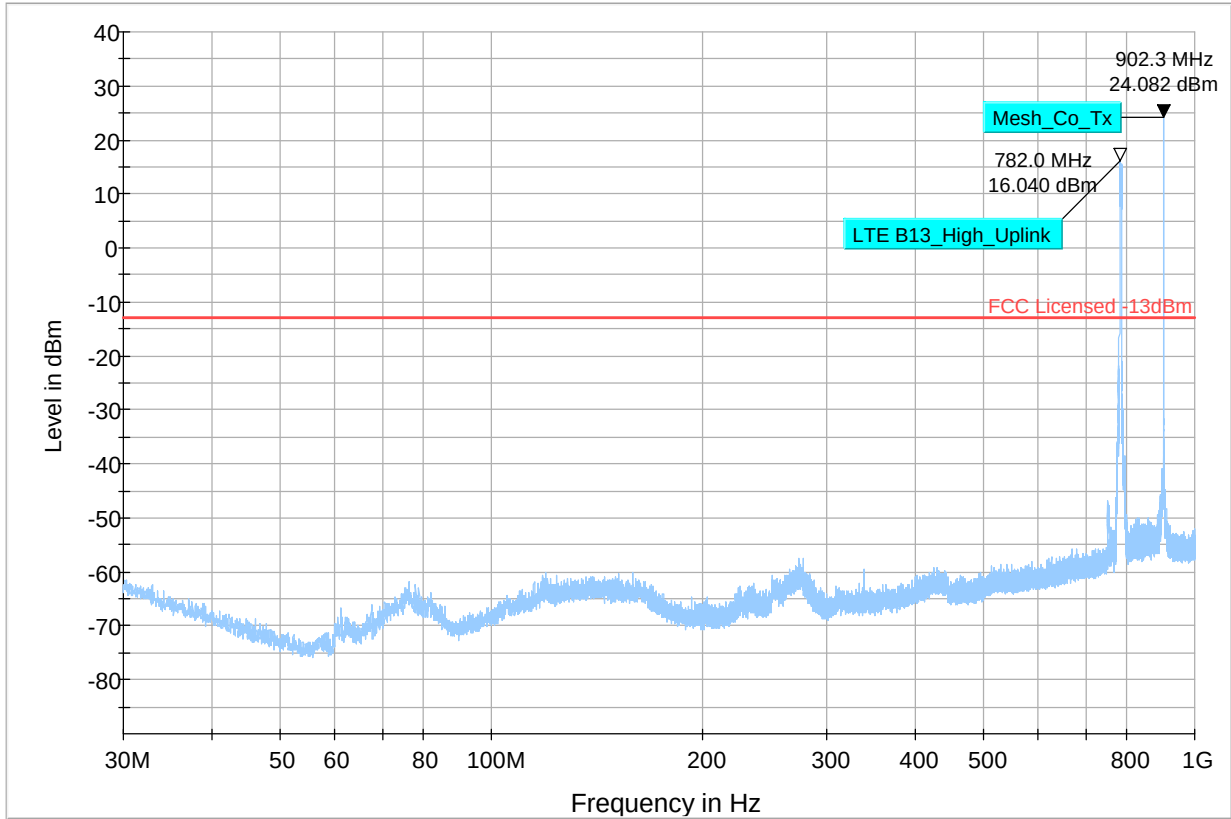
— Preview Result 1-PK+
 — FCC Licensed -13dBm
 ◆ Final_Result RMS
 ◆ Final_Result PK

Plot # 26

LTE 13 High: 784.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
---	---	---	---	---	---	---	---	---	---	---



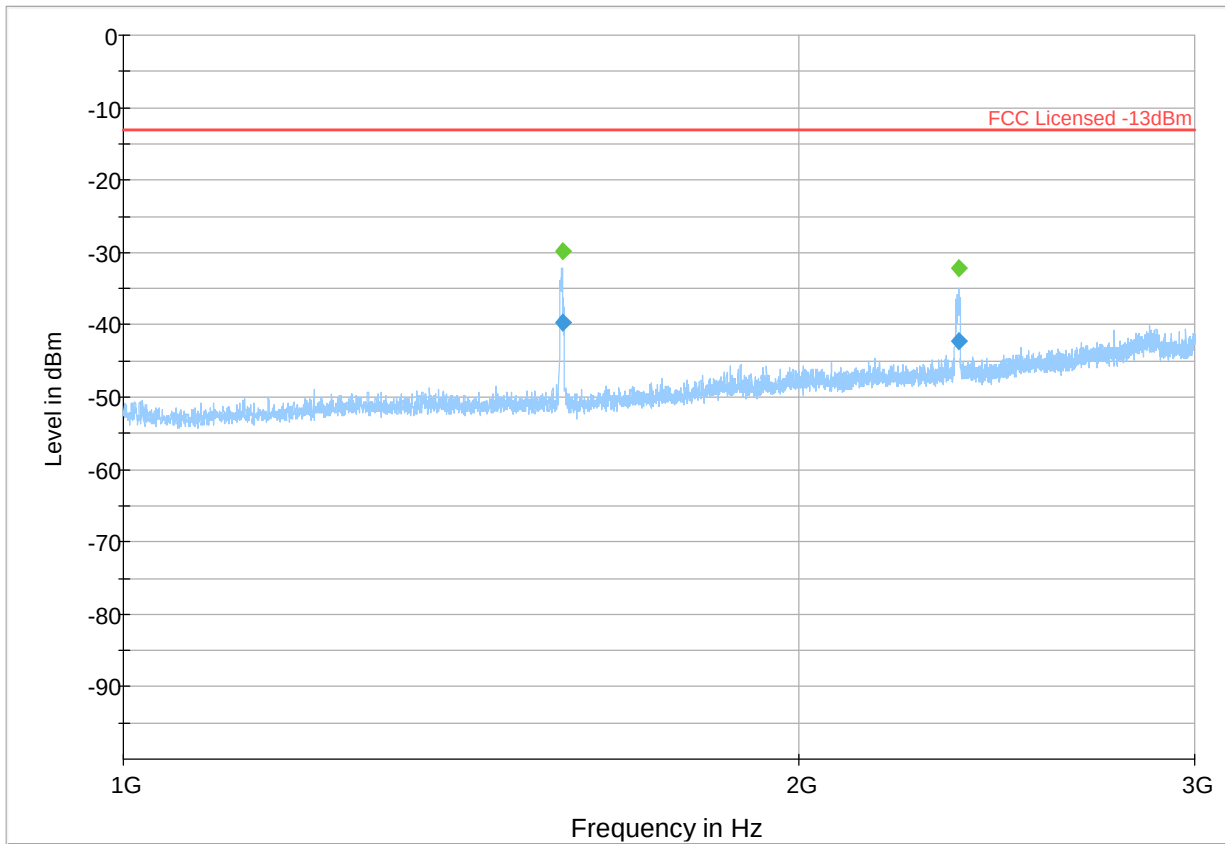
◆ Preview Result 1-PK+ Final_Result RMS
 * Critical_Freqs PK+
 — FCC Licensed -13dBm
 ◆ Final_Result PK+

Plot # 27

LTE 13 High: 784.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1568.000	---	-29.78	---	---	500.0	1000.000	100.0	V	209.0	-66.0
1568.000	-39.76	---	-13.00	26.76	500.0	1000.000	100.0	V	209.0	-66.0
2355.000	---	-32.09	---	---	500.0	1000.000	107.0	H	276.0	-62.8
2355.000	-42.21	---	-13.00	29.21	500.0	1000.000	107.0	H	276.0	-62.8



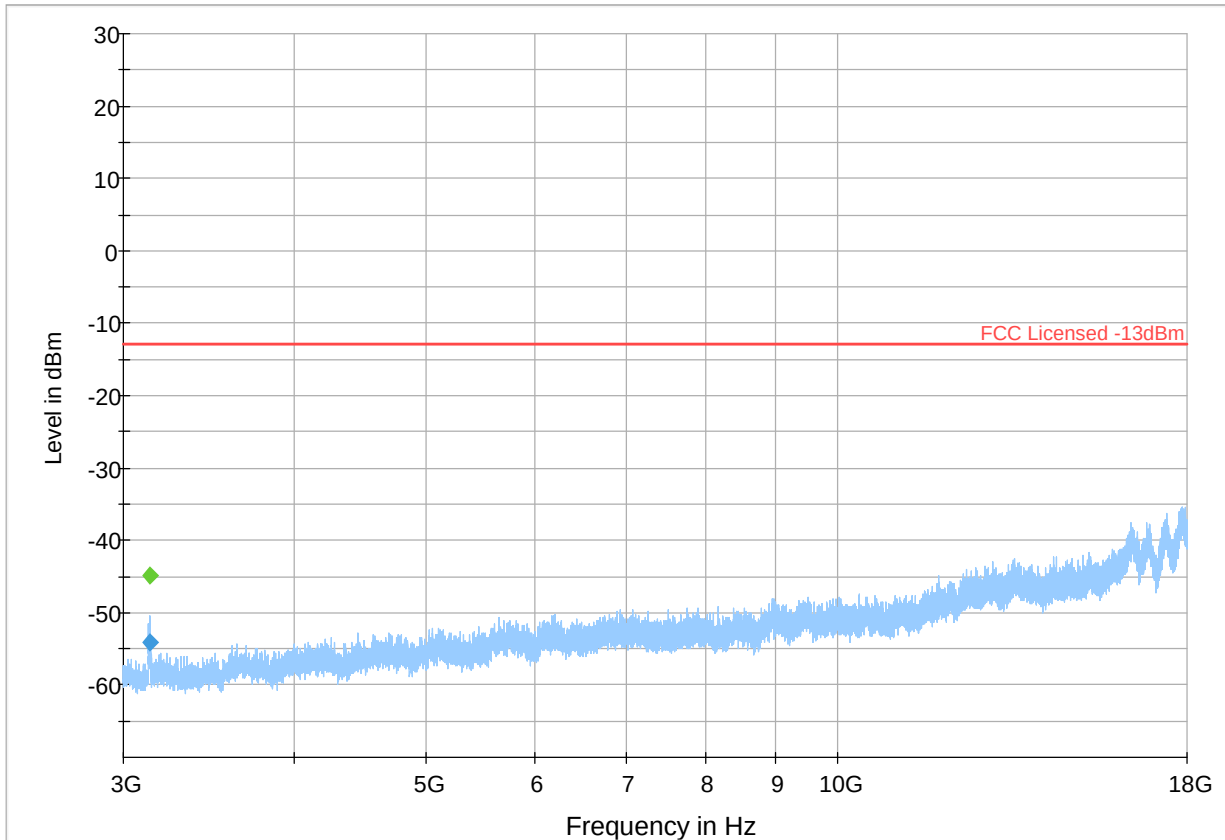
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

Plot # 28

LTE 13 High: 784.5 MHz

Mesh CH 0: 902.3 MHz

Frequency (MHz)	RMS (dBm)	MaxPeak (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3136.000	---	-44.96	---	---	500.0	1000.000	150.0	V	284.0	-103.2
3136.000	-54.13	---	-13.00	41.13	500.0	1000.000	150.0	V	284.0	-103.2



Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS Final_Result PK

8 Test setup photos

Setup photos are included in supporting file name: "EMC_ITRO1_049_21001_FCC_ISSED_Setup_Photos.pdf"

9 Test Equipment And Ancillaries Used For Testing

Equipment Name/Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Active Loop Antenna	ETS Lindgren	6507	161344	3 years	10/30/2020
Biconilog Antenna	ETS Lindgren	3142E	166067	3 years	03/12/2020
Horn Antenna	ETS Lindgren	3115	35114	3 years	10/10/2020
Horn Antenna	ETS Lindgren	3117-PA	215984	3 years	01/31/2021
Horn Antenna	ETS Lindgren	3116	00070497	3 years	11/23/2020
Spectrum Analyzer	R&S	ESU40	100251	3 years	07/16/2019
LISN	FCC	FCC-LISN-50-25-2-08	08014	3 years	07/19/2019
Thermometer Humidity Monitor	Dickson	TM320	5280063	3 years	11/02/2020

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

10 Revision History

Date	Template Revision	Changes to report	Prepared by
2021-09-30	EMC_ITRO1_049_21001_FCC_22_24_27_VzW	Initial Version	Issa W Ghanma

<<< The End >>>
