FCC Test Report

FOR:
Rivian Automotive, LLC

Model #:
Telematics Control Module

Product Description:
The Telematics Control Module (TCM) is a connectivity module integrated into a vehicular application.

FCC ID: 2AW3A-1NAT20TCM
Per:
Title 47 CFR: Part 22, Part 24, Part 27;

REPORT #: EMC_RIVIA-008-21001_FCC_22_24_27_REV1

DATE: 5/19/2021

A2LA Accredited

IC recognized # 3462B

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecom.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

TABLE OF CONTENTS

1 Assessment

The following device as further described in section 3 of this report was evaluated for radiated spurious emissions in simultaneous transmission of cellular and Wi-Fi 2.4 GHz radio according to criteria specified in the Code of Federal Regulations Title 47 CFR: Part 22, Part 24, Part 27;

No deficiencies were ascertained.

According to section 6 of this report, the overall result is PASS.

Company	Description	Model #
Rivian Automotive, LLC	The Telematics Control Module (TCM) is a connectivity module integrated into a vehicular application.	Telematics Control Module

Responsible for Testing Laboratory:

Date	Section	Name	Signature
5/19/2021	Compliance	Wang, Kevin (Lab Manager)	kevin.wang@cetecom.com Digitally signed by: kevin.wang@cetecom.com DN: CN = kevin.wang@cetecom.com Date: 2021.05.28 10:28:14 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
5/19/2021	Compliance	Ghanma, Issa (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: 2021.05.28 10:21:37 -07'00'

The test results of this test report relate exclusively to the test item specified in Section3.
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
Lab Manager:	Wang, Kevin
Responsible Project Leader:	Saman, Rami

2.1 Identification of the Client

Applicant's Name:	Rivian Automotive, LLC
Street Address:	607 Hansen Way
City/Zip Code	Palo Alto, CA 94304
Country	USA

2.2 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 #:	Telematics Control Module
FCC ID:	2AW3A-1NAT20TCM
Product Description:	The Telematics Control Module (TCM) is a connectivity module integrated into a vehicular application.
Transceiver Technology / Type(s) of Modulation:	❖ Cellular Module: • Name / Number : ALAS5-AM • FCC : QIPALAS5-AM ▪ 4G – LTE: Bands 2, 4, 5, 7, 12, 13, 66 ▪ 3G – UMTS/WCDMA: Bands II, IV, V ▪ 2G – GSM: 850, 1900
Frequency Range:	❖ 2G-GSM: • GSM 850 : 824.2 ~ 848.8 MHz • GSM 1900 : 1852.2 ~ 1909.8 MHz ❖ 3G-UMTS/WCDMA: • UMTS Band II : 1852.4 ~ 1907.6 MHz • UMTS Band IV : 1712.4 ~ 1752.6 MHz • UMTS Band V : 826.4 ~ 846.6 MHz ❖ 4G-LTE: • LTE Band 2 : 1855.0 ~ 1905.0 MHz • LTE Band 4 : 1715.0 ~ 1750.0 MHz • LTE Band 5 : 829.0 ~ 844.0 MHz • LTE Band 7 : 2505.0 ~ 2565.0 MHz • LTE Band 12 : 704.0 ~ 711.0 MHz • LTE Band 13 : 782.0 MHz • LTE Band 66 : 1715.0 ~ 1775.0 MHz
Max. declared antenna gain:	❖ External: LTE Main • Rivian Part Number : PT00039249 • TE Part Number : 955-922-501 • Maximum Gain: ▪ 738 MHz (Low band) : 7.0 dBi ▪ 2315 MHz (High band) : 3.7 dBi ❖ External: LTE Diversity (Rx only) • Rivian Part Number : PT00039250 • TE Part Number : 955-922-401 • Maximum Gain: ▪ 663 MHz (Low band) : 2.5 dBi ▪ 2710 MHz (High band) : 6.1 dBi
Power Supply/ Rated Operating Voltage Range:	Low 9.9 V DC, Nominal 13.5 V DC, High 16.0 V DC
Operating Temperature Range:	Low -40º C, Nominal 20º C, High 85º C

Other Radios included in the device:	❖ Bluetooth BR/EDR (Disabled) ❖ Bluetooth Low Energy 4.2 (Disabled) ❖ Wi-Fi 5 GHz a/g/n/ac ❖ GPS/GNSS: • UBLOX NEO - M8L - 04A Standalone GNSS receiver • GEMALTO AIAS5 – GNSS receiver module integrated with the cellular modem
Sample Revision	☐ Prototype Unit; ☐ Production Unit; ■ Pre-Production
EUT Dimensions	13.5“ x 7.1“ x 1.1“

3.2 EUT Sample details

EUT #	IMEI	HW Version	SW Version	Notes/Comments
1	35959910000118	Rev. F	2.23	Radiated

3.3 Accessory Equipment (AE) details

AE #	Type	Rivian Part Number	TE Part Number	Manufacturer
1	External antenna LTE Main	PT00039249	955-922-501	TE
2	External antenna LTE Diversity	PT00039250	955-922-401	TE
3	External antenna Wi-Fi/BT	PT00039248	955-012-201	TE
4	External antenna Wi-Fi/BT	PT00014349	956-012-001	TE
5	External antenna Aux GNSS	PT00014353	956-514-201	TE

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE # 1, 2, 3, 4, 5	-

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	Cellular & Wi-Fi Co-TX	Cellular was tested on Low, Mid and High Channels at the maximum power, simultaneous transmission with Wi-Fi 5 GHz. Cellular and Wi-Fi radio(s) were configured using AT commands, through TeraTerm terminal. Wi-Fi was configured to: ▪ Mode: **n**-HT40 ▪ Transmit mode: Continuous **TX MIMO** ▪ Hopping: **No** ▪ Channel: **159** ▪ Data rate: **MCS 0**

3.6 Justification for Worst Case Mode of Operation

During the testing process the cellular radio was tested with transmitter sets to low, mid and high channel at the maximum power in simultaneous transmission mode with the highest output power of radios included in the device (Wi-Fi 5 GHz), as it is described in section 3.5 of this document; representing the worst case mode of operation.

For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the evaluation conducted by CETECOM Inc. is to perform and check radiated spurious emissions against the limits per Code of Federal Regulations Title 47 CFR: Part 22, Part 24, Part 27; in simultaneous transmission mode of Cellular ALAS5-AM FCC: QIPALAS5-AM and Wi-Fi 5 GHz (UBLOXJODY-W1) Radios.

4.1 Dates of Testing:

1/14/2020 – 3/10/2020

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)

4.3 Environmental Conditions during Testing:

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

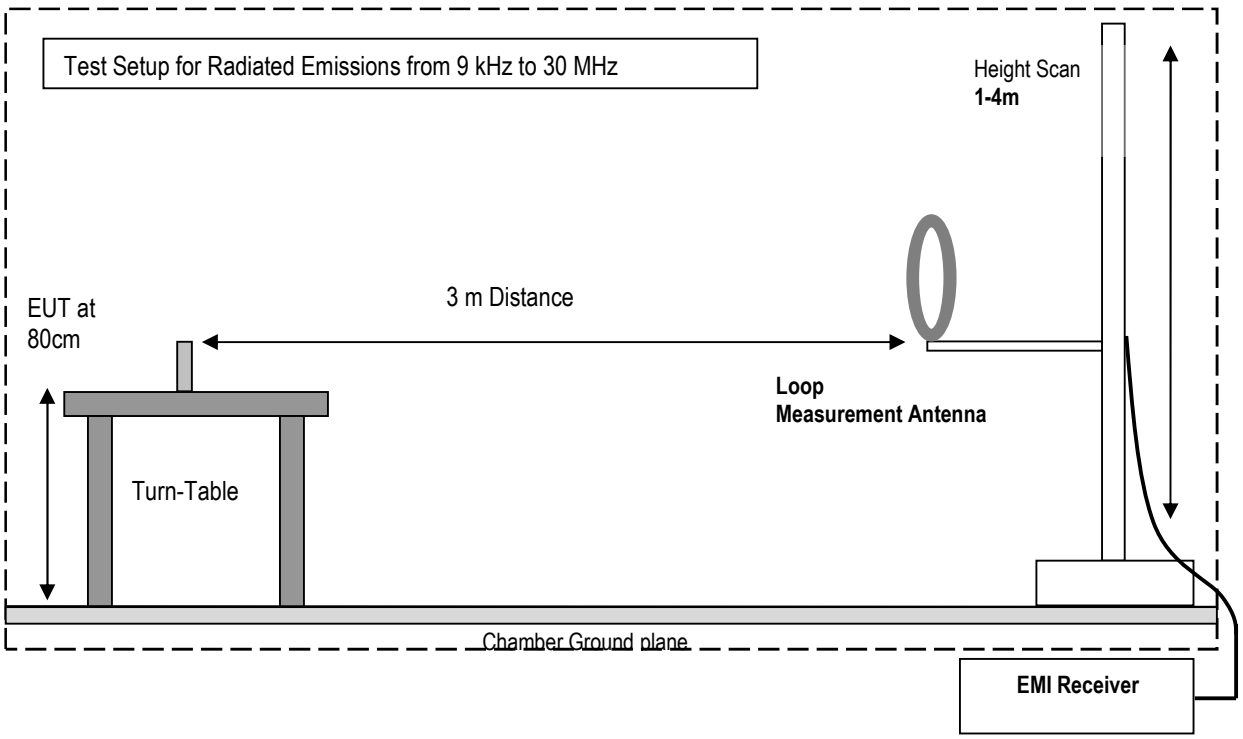
- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

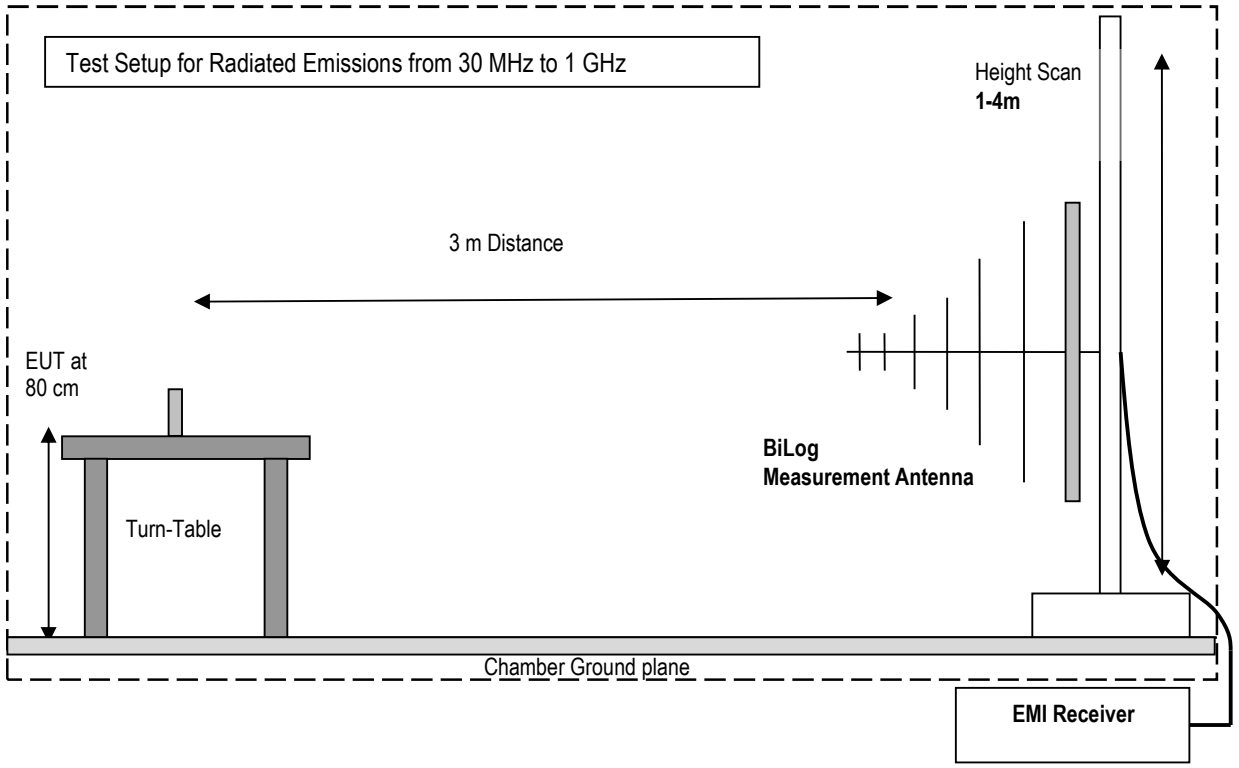
Deviating test conditions are indicated at individual test description where applicable.

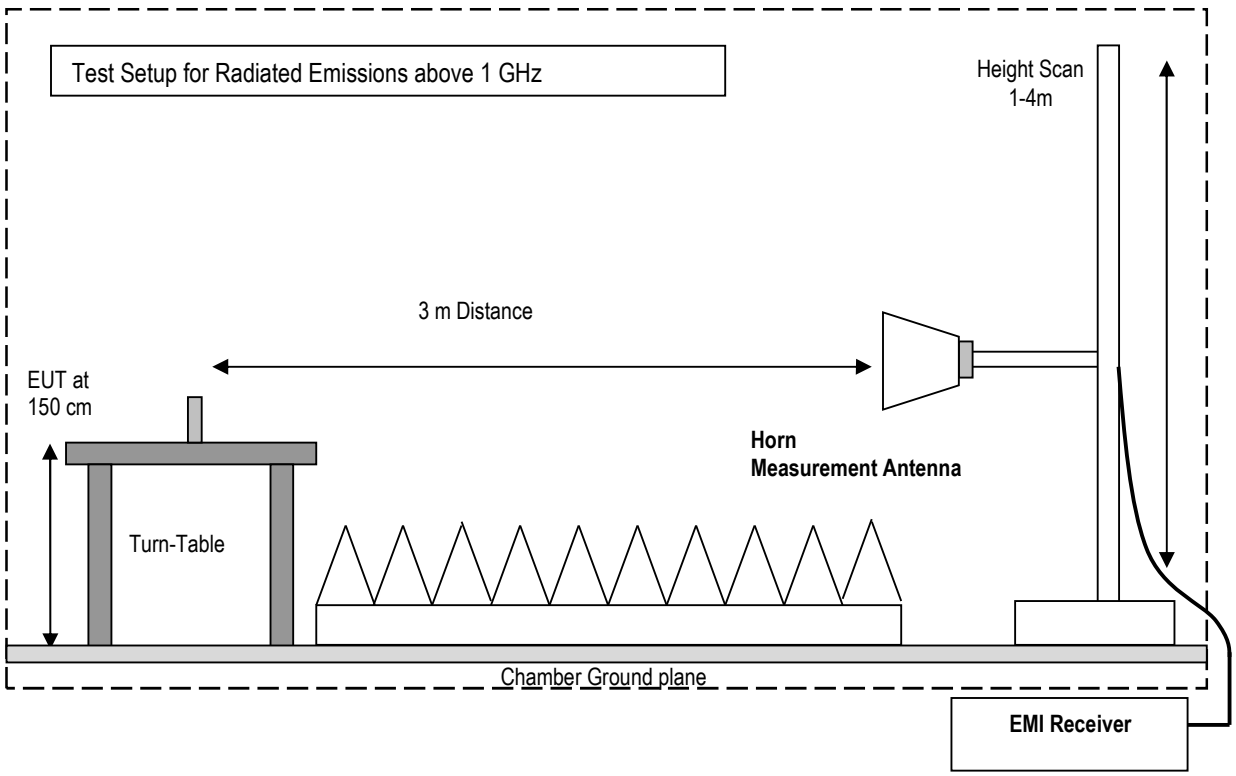
5 Measurement Procedures

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.




Test Setup for Radiated Emissions from 30 MHz to 1 GHz
Height Scan
1-4m
3 m Distance
EUT at
80 cm
BiLog
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver


Test Setup for Radiated Emissions above 1 GHz
Height Scan
1-4m
3 m Distance
EUT at
150 cm
Horn
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver

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 dBµV
- 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 (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

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

6 Measurement Results Summary

6.1 FCC 22:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §22.913 (a)	RF Output Power	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1055; §22.355	Frequency Stability	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1049; §22.917	Occupied Bandwidth	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §22.917	Band Edge Compliance	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §22.917	Conducted Spurious Emissions	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1053; §22.917(a);	Radiated Spurious Emissions	Nominal	GSM 850, UMTS V, LTE 5	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from ALAS5-AM module certification report(s) # 2456ERM.011 under FCC ID: QIPALAS5-AM/ IC ID: 7830A-ALAS5-AM;

6.2 FCC 24:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §24.232 (a)	RF Output Power	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1055; §24.235	Frequency Stability	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1049; §24.238	Occupied Bandwidth	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §24.238	Band Edge Compliance	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §24.238	Conducted Spurious Emissions	-	-	☐	☐	☐	■	Note 1 Note 2
§2.1053; §24.238(a);	Radiated Spurious Emissions	Nominal	GSM 1900, UMTS II, LTE 2	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from ALAS5-AM module certification report(s) # 2456ERM.012 under FCC ID: QIPALAS5-AM/ IC ID: 7830A-ALAS5-AM;

6.3 FCC 27:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §27.50 (d)	RF Output Power	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1055; §27.54	Frequency Stability	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1049; §27.53	Occupied Bandwidth	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §27.53	Band Edge Compliance	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §27.53	Conducted Spurious Emissions	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1053; §27.53(h); §27.53(m) 4); §27.53(g); §27.53(c);	Radiated Spurious Emissions	Nominal	LTE 4, 7, 12, 13, 66	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from ALAS5-AM module certification report(s) # 2456ERM.013A1 under FCC ID: QIPALAS5-AM/ IC ID: 7830A-ALAS5-AM;

7 Test Result Data

7.1 ERP / EIRP

Module Name:	ALAS5-AM				
Model Number:	EM7565				
FCC ID:	QIPALAS5-AM				
Band	**Frequency range (MHz)**	**Power (Watts)**	**ERP*1 (Watts)**	**EIRP*1 (Watts)**	**Limit (Watts)**
GSM 850	824.2 ~ 848.8	0.216	5.284	-	7
GSM 1900	1850.2 ~ 1909.8	0.115	-	1.377*2	2
UMTS II	1852.4 ~ 1907.6	0.279	-	0.653	2
UMTS IV	1712.4 ~ 1752.6	0.272	-	0.638	1
UMTS V	826.4 ~ 846.6	0.276	0.843	-	7
LTE 2	1860.0 ~ 1900.0	0.210	-	0.492	2
LTE 4	1720.0 ~ 1745.0	0.203	-	0.475	1
LTE 5	825.5 ~ 847.5	0.208	0.637	-	7
LTE 5	829.0 ~ 844.0	0.202	0.618	-	7
LTE 7	2507.5 ~ 2562.5	0.213	-	0.500	
LTE 7	2510.0 ~ 2560.0	0.267	-	0.627	
LTE 12	699.7 ~ 715.0	0.219	0.670	-	3
LTE 12	700.5 ~714.5	0.219	0.670	-	3
LTE 12	704.0 ~ 711.0	0.217	0.662	-	3
LTE 13	779.5 ~ 784.5	0.208	0.635	-	
LTE 13	782.0	0.207	0.634	-	
LTE 66	1720.0 ~ 1770.0	0.207	-	0.485	1

*1: ERP / EIRP are calculated from maximum power in cellular module certification reports, adding known maximum gain of the utilized cellular antenna.
*2: GSM1900 measured EIRP

7.2 Radiated Spurious Emissions

7.2.1 Measurement according to FCC: CFR 47 Part 2.1053; CFR Part 22.917; CFR Part 24.238, Part 27.53 utilizing KDB 971168 D01 Power Meas License Digital Systems v03r01, and according to ANSI C63.26 2015

Spectrum Analyzer Settings for FCC 22

Frequency Range	30 MHz – 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, 27

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

7.2.2 Limits:

7.2.2.1 FCC Part 22.917 (a); FCC Part 24.238 (a); FCC Part 27.53 (c), (g), (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.

7.2.2.2 FCC Part 27.53 (m); -25 dBm

(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

7.2.3 Test conditions and setup:

Ambient Temperature (C)	EUT operating mode	Power Input
23	Op. 1	12V DC

7.2.4 Measurement result:

Plot #	Channel	EUT operating mode	Scan Frequency	Lowest margin emission (dBm)	Limit (dBm)	Result
1 – 3	Low	GSM 850	30 MHz – 9 GHz	-28.33	-13	Pass
4 – 7	Mid		9 kHz – 9 GHz		-13	Pass
8 – 10	High		30 MHz – 9 GHz		-13	Pass
11 – 13	Low	GSM 1900	30 MHz – 18 GHz	-17.02	-13	Pass
14 – 18	Mid		9 kHz – 26 GHz		-13	Pass
19 – 21	High		30 MHz – 18 GHz		-13	Pass
22 - 24	Low	UMTS Band II	30 MHz – 18 GHz	-18.73	-13	Pass
25 – 29	Mid		9 kHz – 26 GHz		-13	Pass
30 – 32	High		30 MHz – 18 GHz		-13	Pass
33 – 35	Low	UMTS Band IV	30 MHz – 18 GHz	-18.03	-13	Pass
36 – 39	Mid		9 kHz – 18 GHz		-13	Pass
40 – 42	High		30 MHz – 18 GHz		-13	Pass
43 – 45	Low	UMTS Band V	30 MHz – 9 GHz	-27.78	-13	Pass
46 – 49	Mid		9 kHz – 9 GHz		-13	Pass
50 – 52	High		30 MHz – 9 GHz		-13	Pass
53 – 55	Low	LTE Band 2	30 MHz – 18 GHz	-18.71	-13	Pass
56 – 60	Mid		9 kHz – 26 GHz		-13	Pass
61 – 63	High		30 MHz – 18 GHz		-13	Pass
64 – 66	Low	LTE Band 4	30 MHz – 18 GHz	-20.03	-13	Pass
67 – 70	Mid		9 kHz – 18 GHz		-13	Pass
71 – 73	High		30 MHz – 18 GHz		-13	Pass
74 – 76	Low	LTE Band 5	30 MHz – 9 GHz	-27.39	-13	Pass
77 – 80	Mid		9 kHz – 9 GHz		-13	Pass
81 - 83	High		30 MHz – 9 GHz		-13	Pass

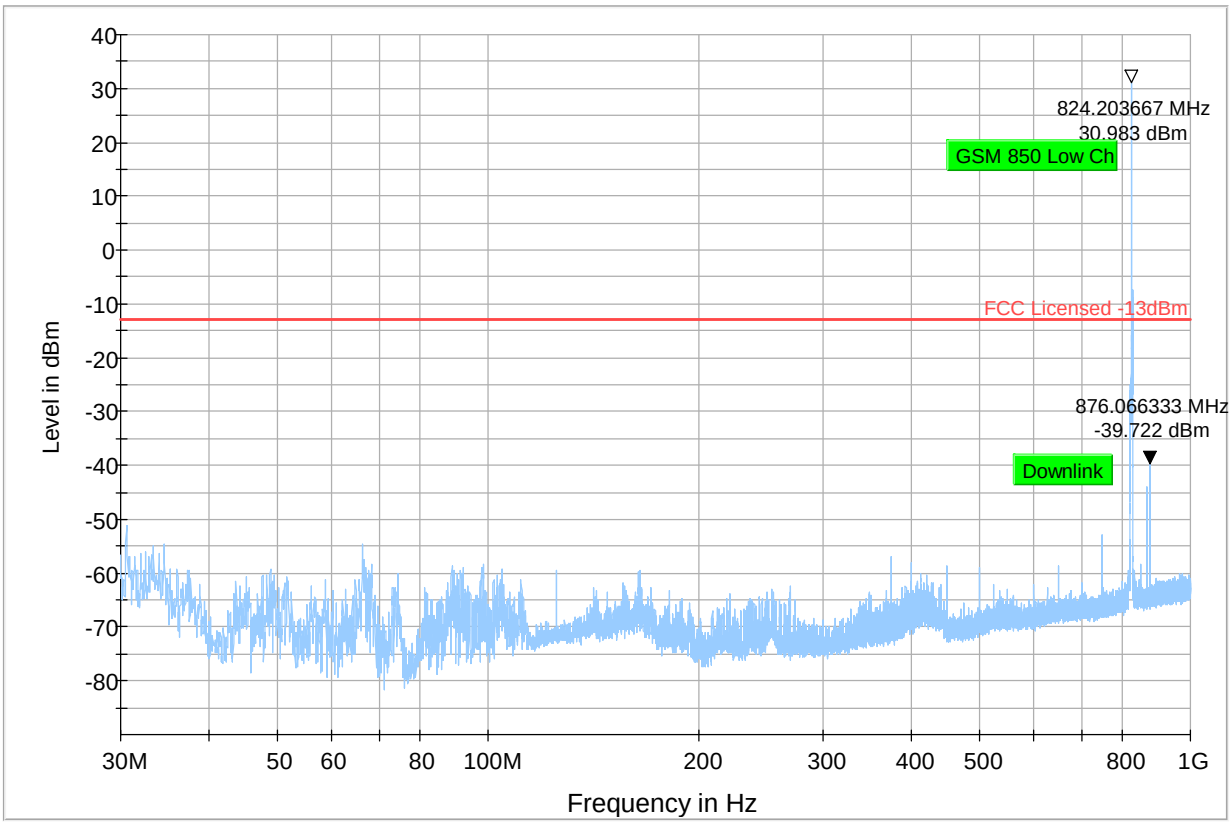
84 – 86	Low	LTE Band 12	30 MHz – 9 GHz	-28.16	-13	Pass
87 – 90	Mid		9 kHz – 9 GHz		-13	Pass
91 – 93	High		30 MHz – 9 GHz		-13	Pass
94 - 96	Low	LTE Band 66	30 MHz – 18 GHz	-18.80	-13	Pass
97 – 100	Mid		9 kHz – 26 GHz		-13	Pass
101 – 103	High		30 MHz – 18 GHz		-13	Pass
104 – 106	Low	LTE Band 13	30 MHz – 9 GHz	-27.04	-13	Pass
107	Mid		9 kHz – 9 GHz		-13	Pass
108 – 110	High		30 MHz – 9 GHz		-13	Pass
111 – 114	Low	LTE Band 7	30 MHz – 18 GHz	-27.23	-25	Pass
115 – 120	Mid		9 kHz – 26 GHz		-25	Pass
121 – 124	High		30 MHz – 18 GHz		-25	Pass

7.2.5 Measurement plots:

GSM 850

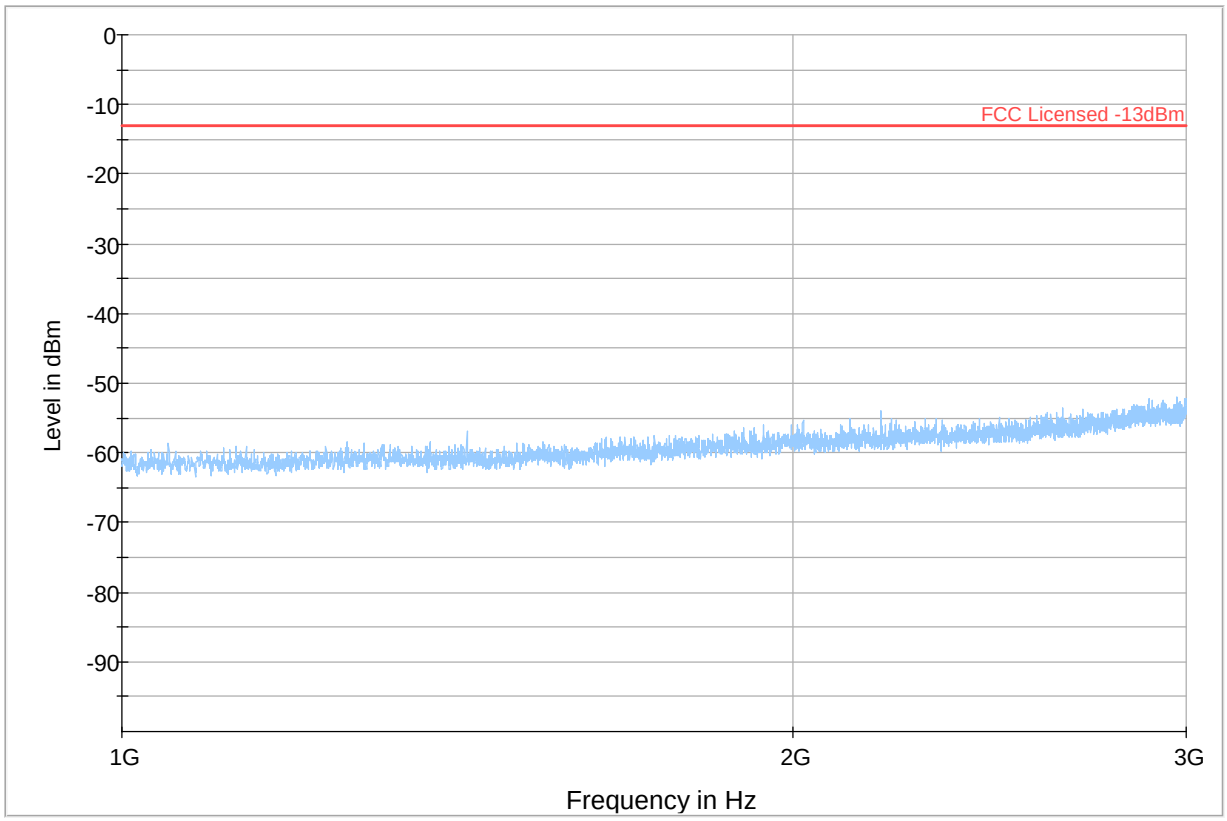
Plot # 1 Radiated Emissions: 30 MHz – 1GHz

Channel: Low



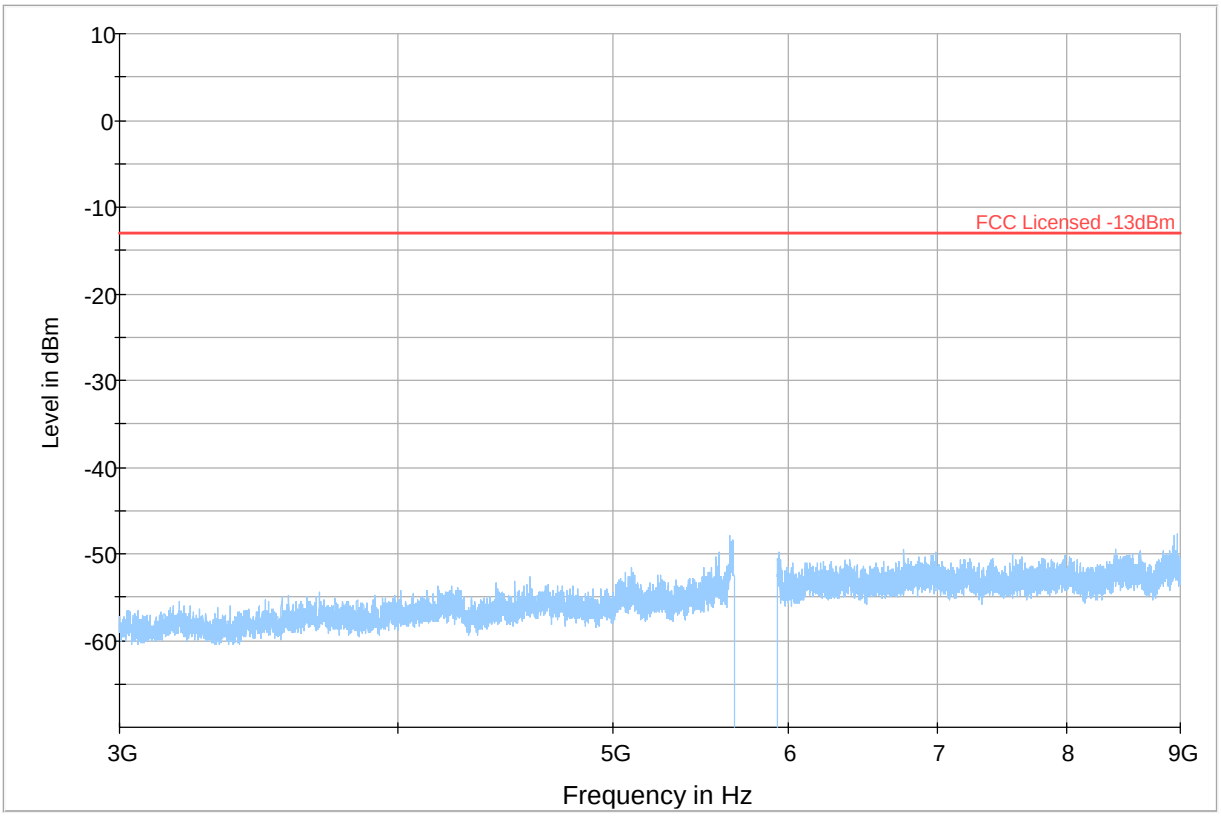
Plot # 2 Radiated Emissions: 1 GHz - 3 GHz

Channel: Low



Plot # 3 Radiated Emissions: 3 GHz – 9 GHz

Channel: Low

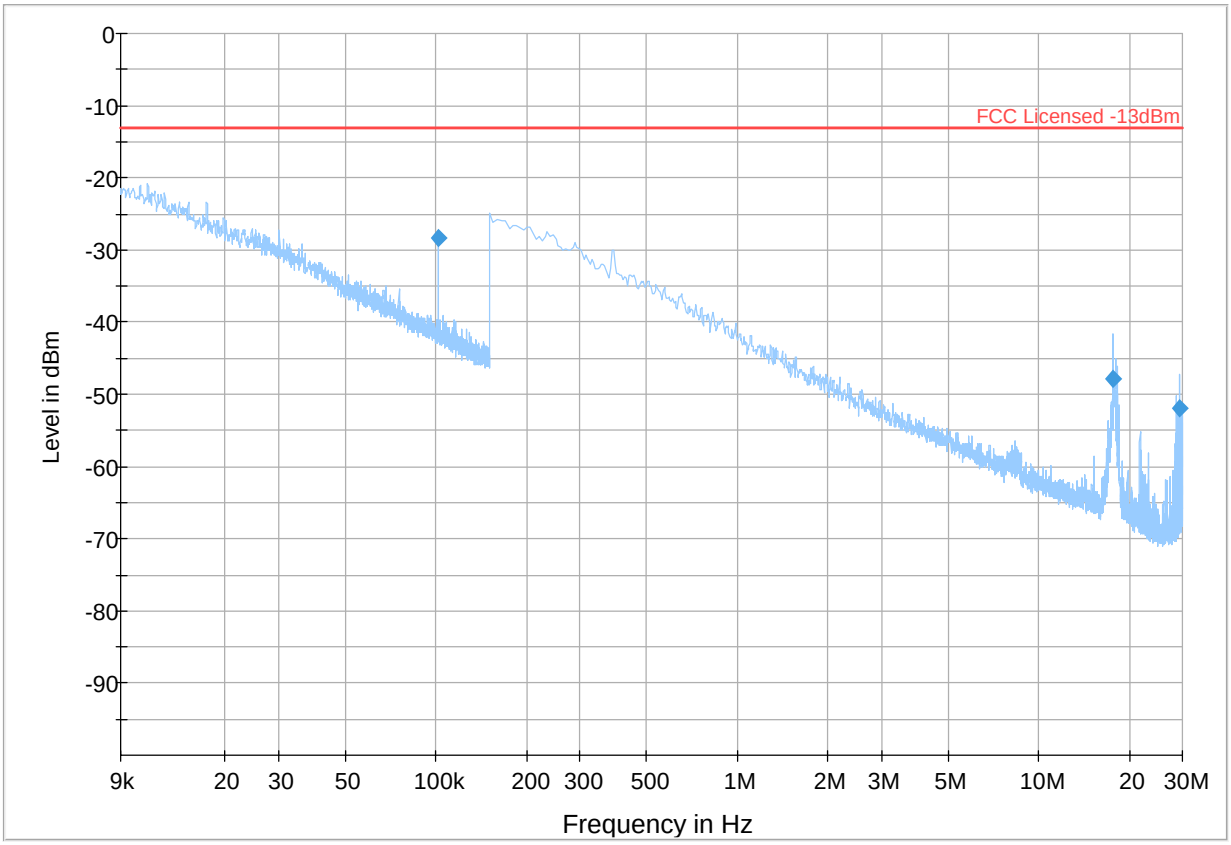


Plot # 4 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
0.102	-28.33	-13.00	15.33	500.0	9.000	107.0	V	13.0	-76.3
17.692	-47.80	-13.00	34.80	500.0	9.000	145.0	V	-38.0	-78.3
29.239	-51.86	-13.00	38.86	500.0	9.000	167.0	V	7.0	-79.0

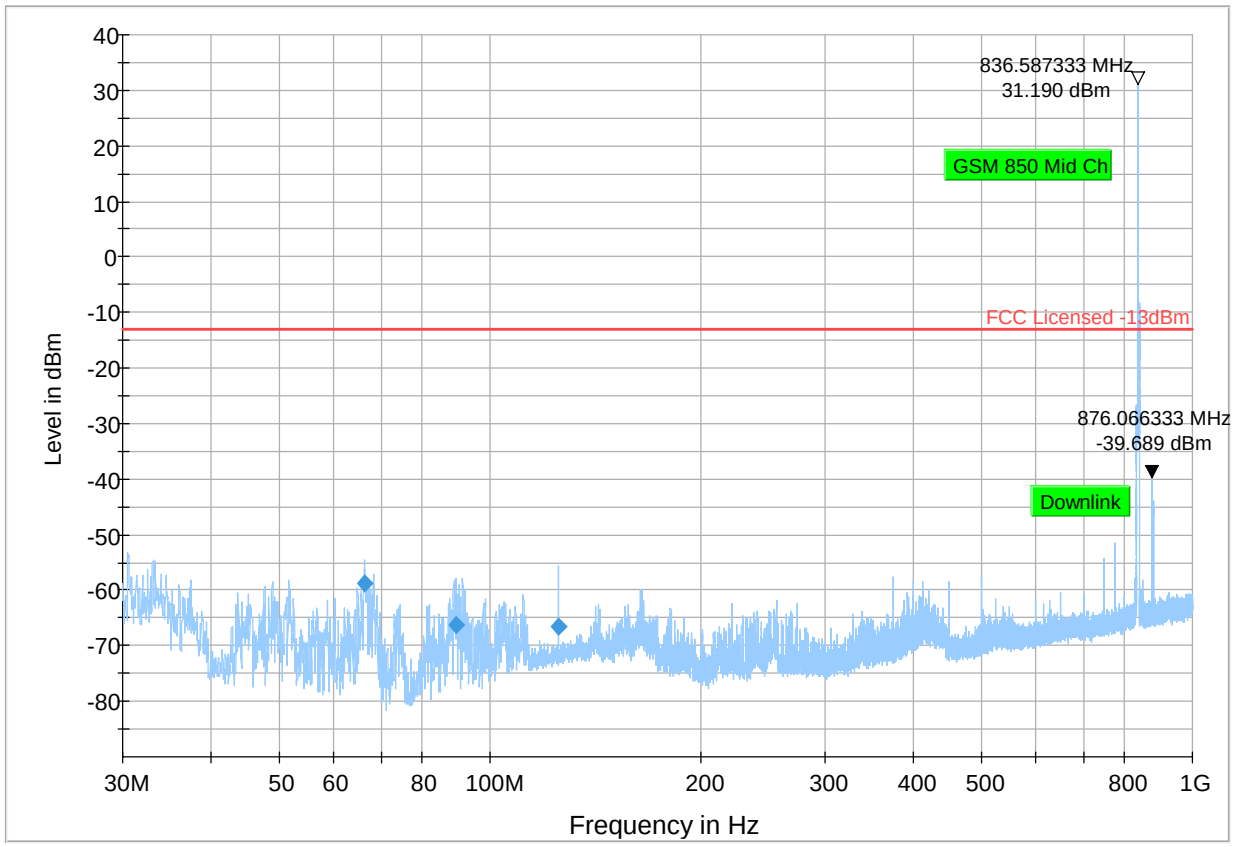


Plot # 5 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid

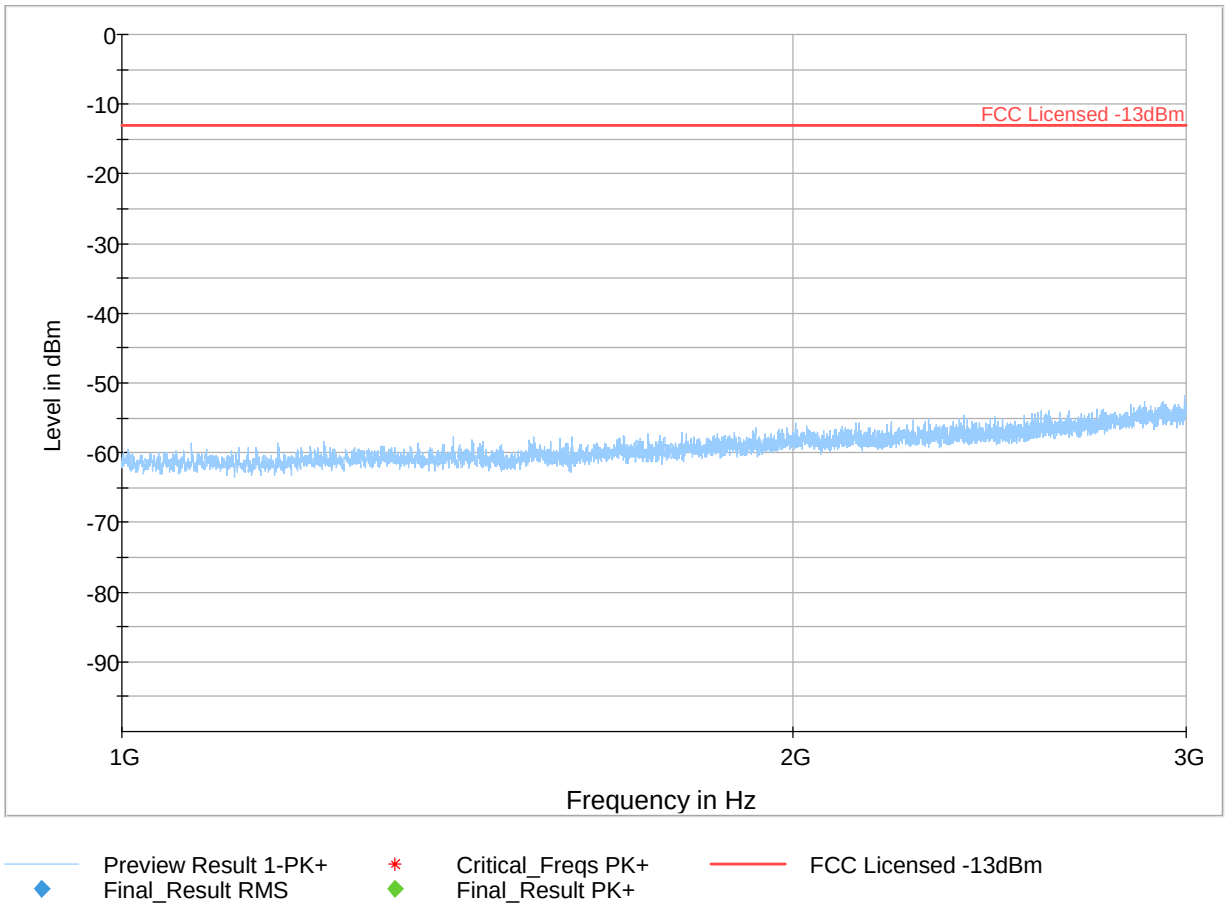
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
66.246	-58.78	-13.00	45.78	500.0	100.000	275.0	V	-7.0	-88.2
89.623	-66.41	-13.00	53.41	500.0	100.000	107.0	V	53.0	-83.4
124.963	-66.44	-13.00	53.44	500.0	100.000	107.0	V	105.0	-77.4



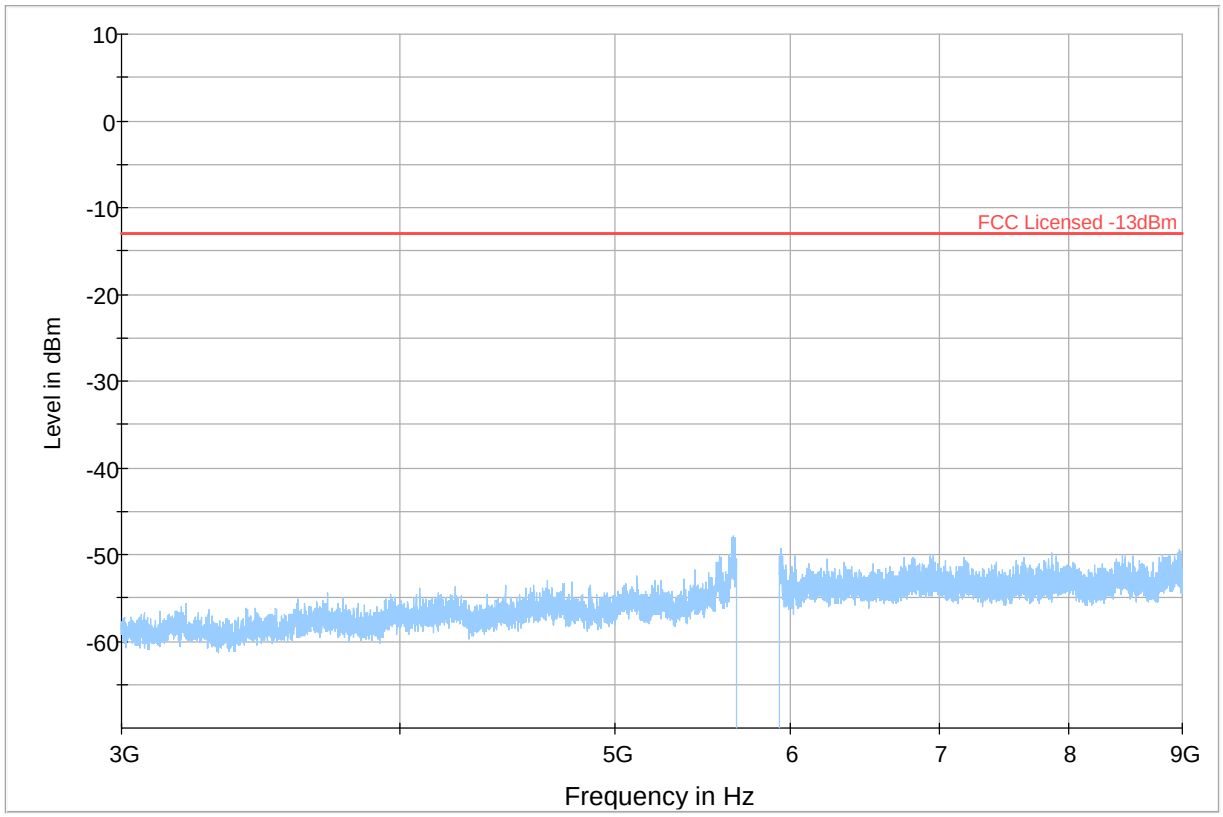
Plot # 6 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid



Plot # 7 Radiated Emissions: 3 GHz – 9 GHz

Channel: Mid

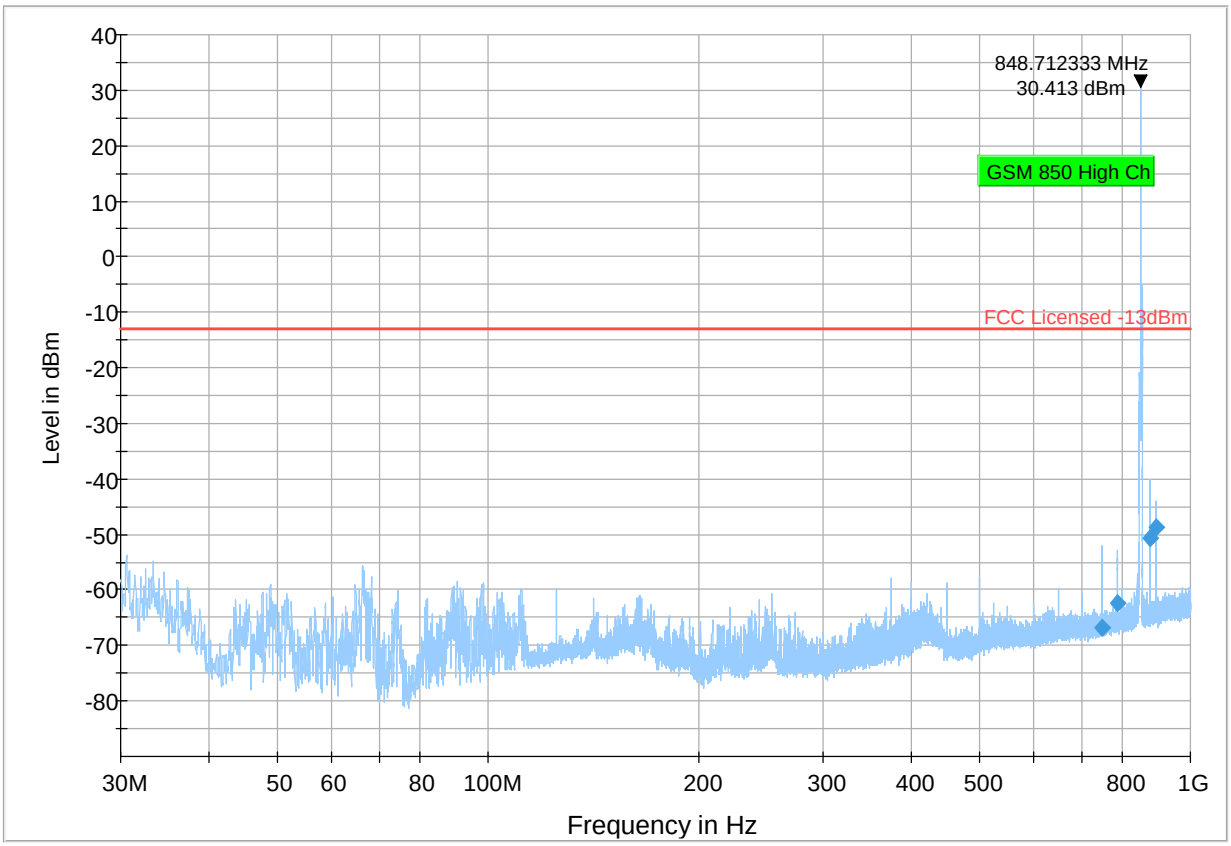


Plot # 8 Radiated Emissions: 30 MHz – 1GHz

Channel: High

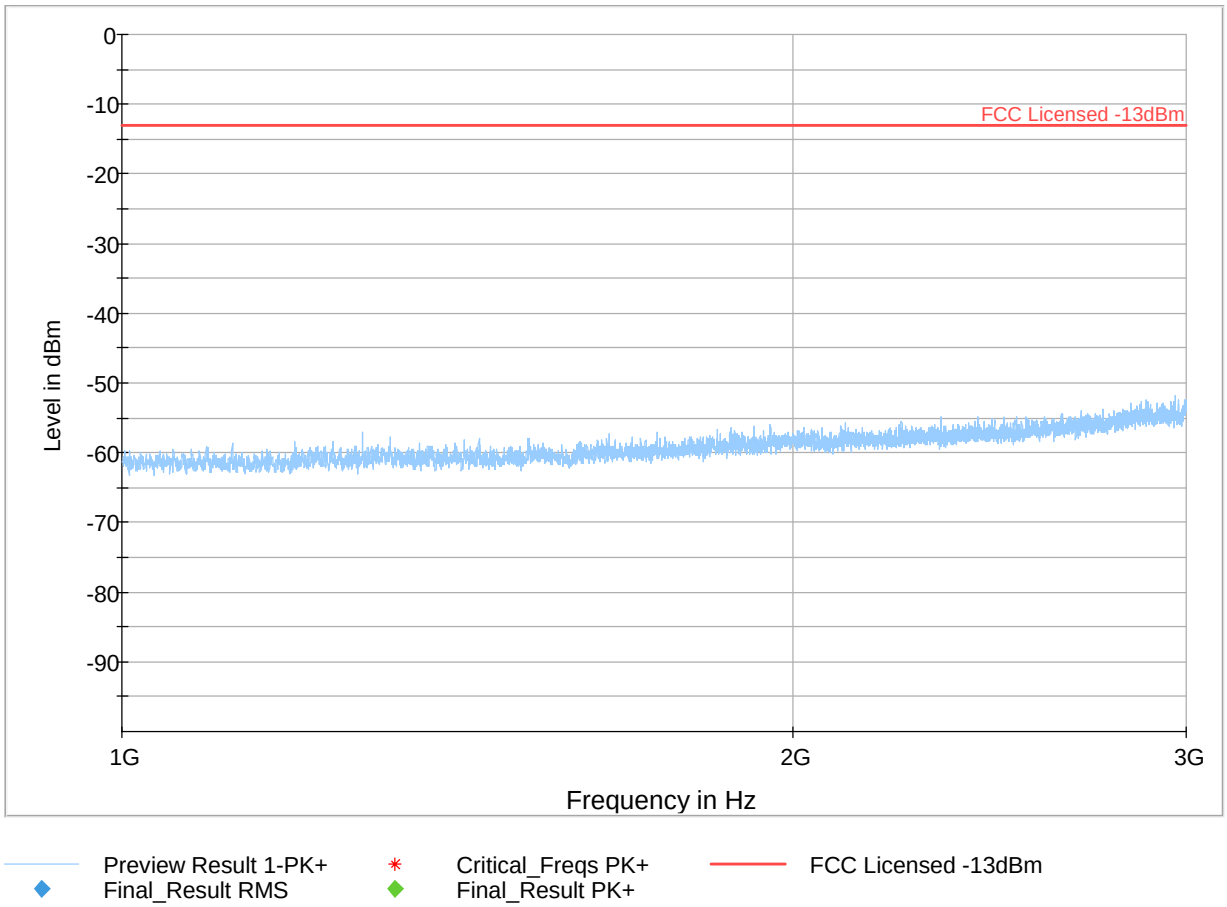
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
749.999	-66.86	-13.00	53.86	500.0	100.000	117.0	H	167.0	-71.4
788.766	-62.39	-13.00	49.39	500.0	100.000	202.0	V	-5.0	-71.1
876.066	-50.71	-13.00	37.71	500.0	100.000	100.0	V	17.0	-70.3
893.785	-48.74	-13.00	35.74	500.0	100.000	133.0	H	85.0	-69.7



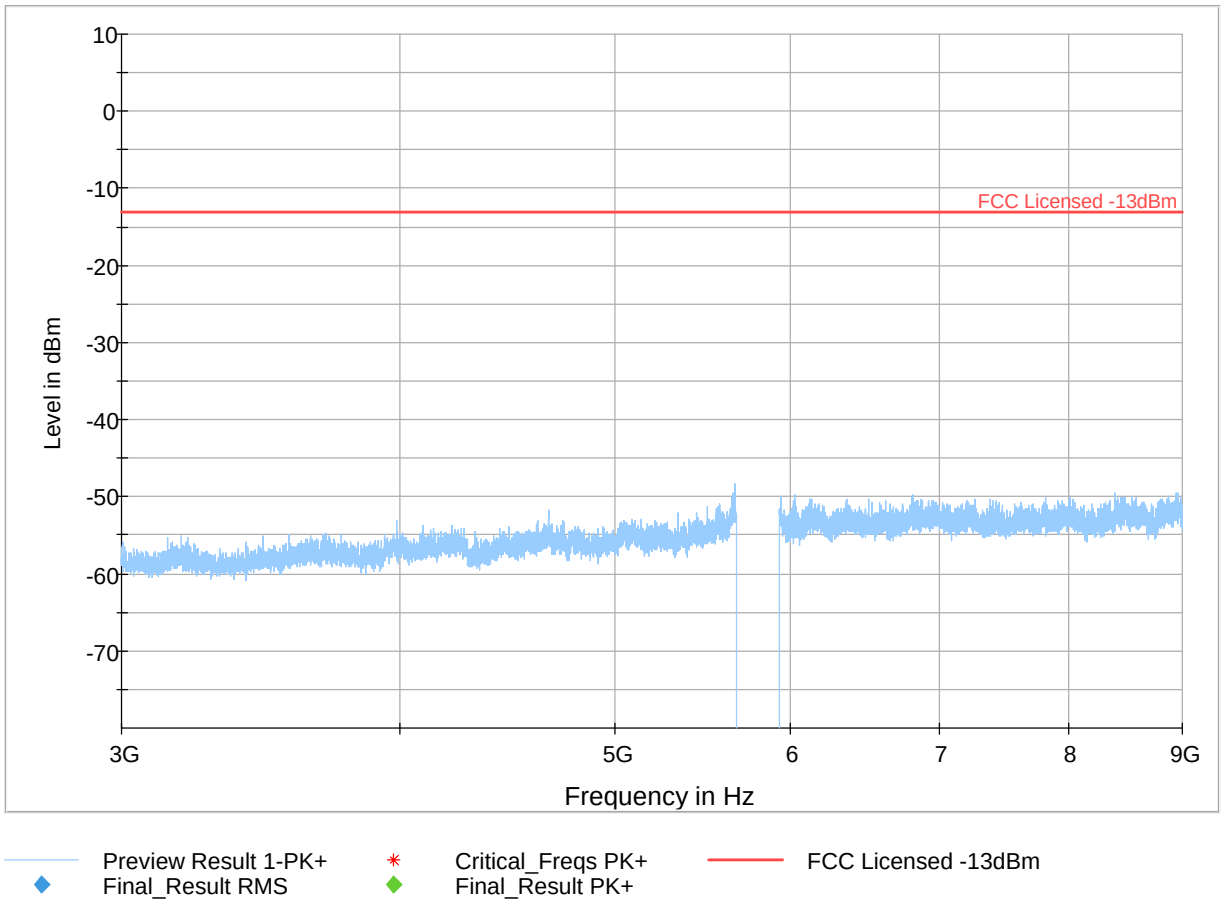
Plot # 9 Radiated Emissions: 1 GHz - 3 GHz

Channel: High



Plot # 10 Radiated Emissions: 3 GHz – 9 GHz

Channel: High



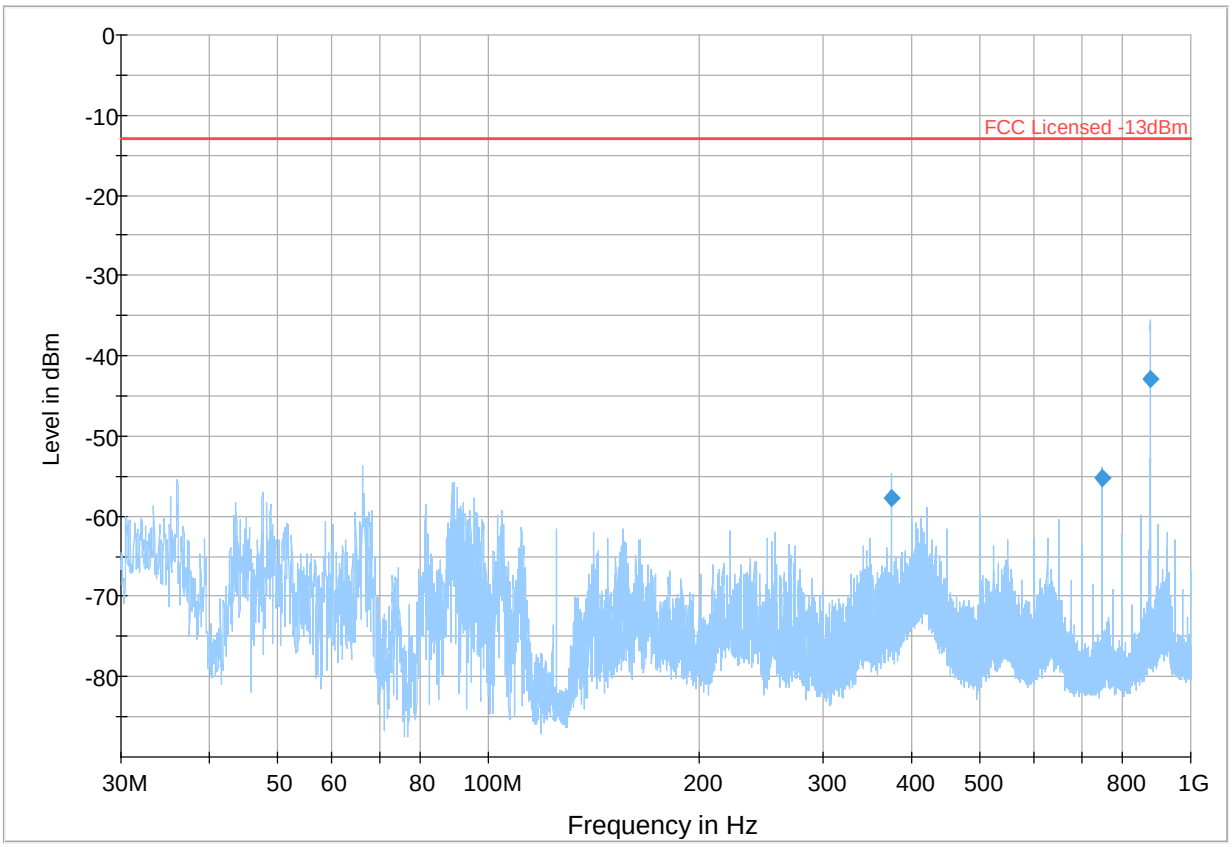
GSM 1900

Plot # 11 Radiated Emissions: 30 MHz – 1GHz

Channel: Low

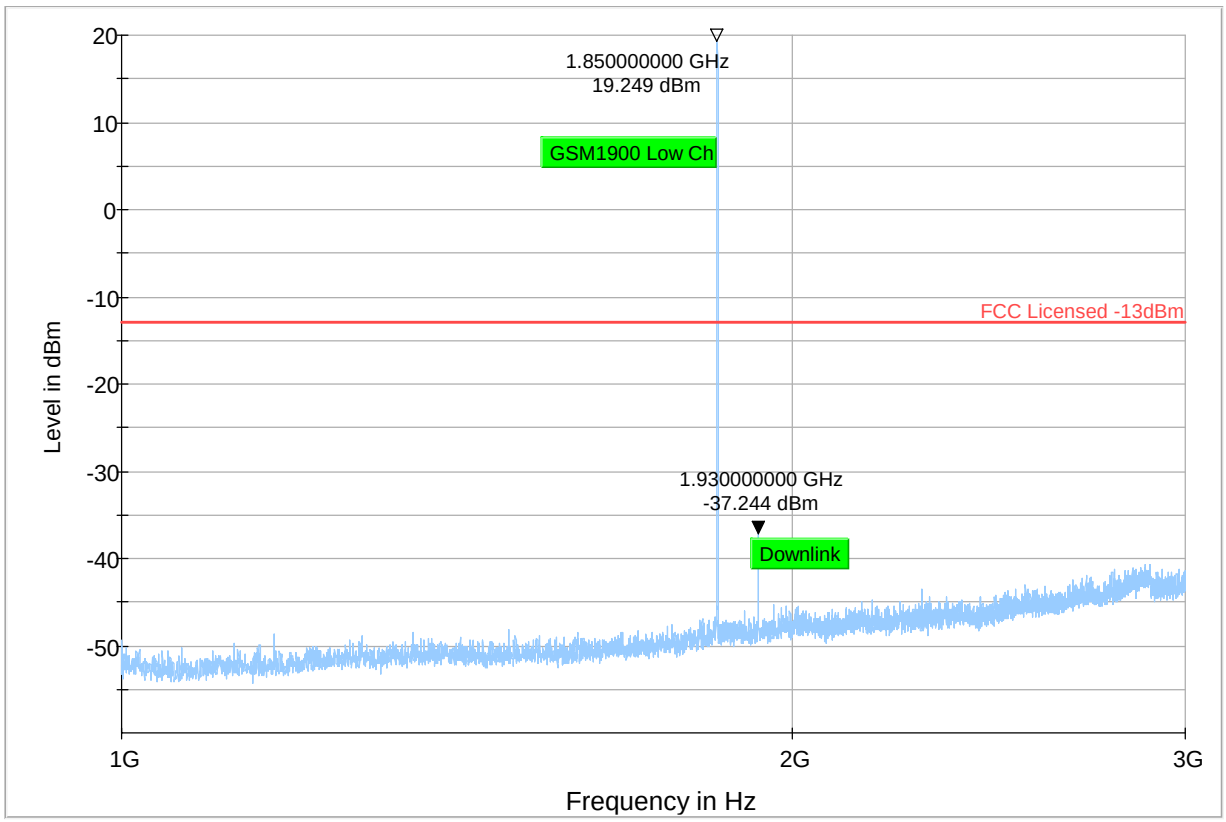
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
374.981	-57.72	-13.00	44.72	500.0	120.000	100.0	H	174.0	-113.4
749.983	-55.31	-13.00	42.31	500.0	120.000	117.0	H	211.0	-106.3
875.937	-42.89	-13.00	29.89	500.0	120.000	214.0	H	296.0	-104.8



Plot # 12 Radiated Emissions: 1 GHz - 3 GHz

Channel: Low

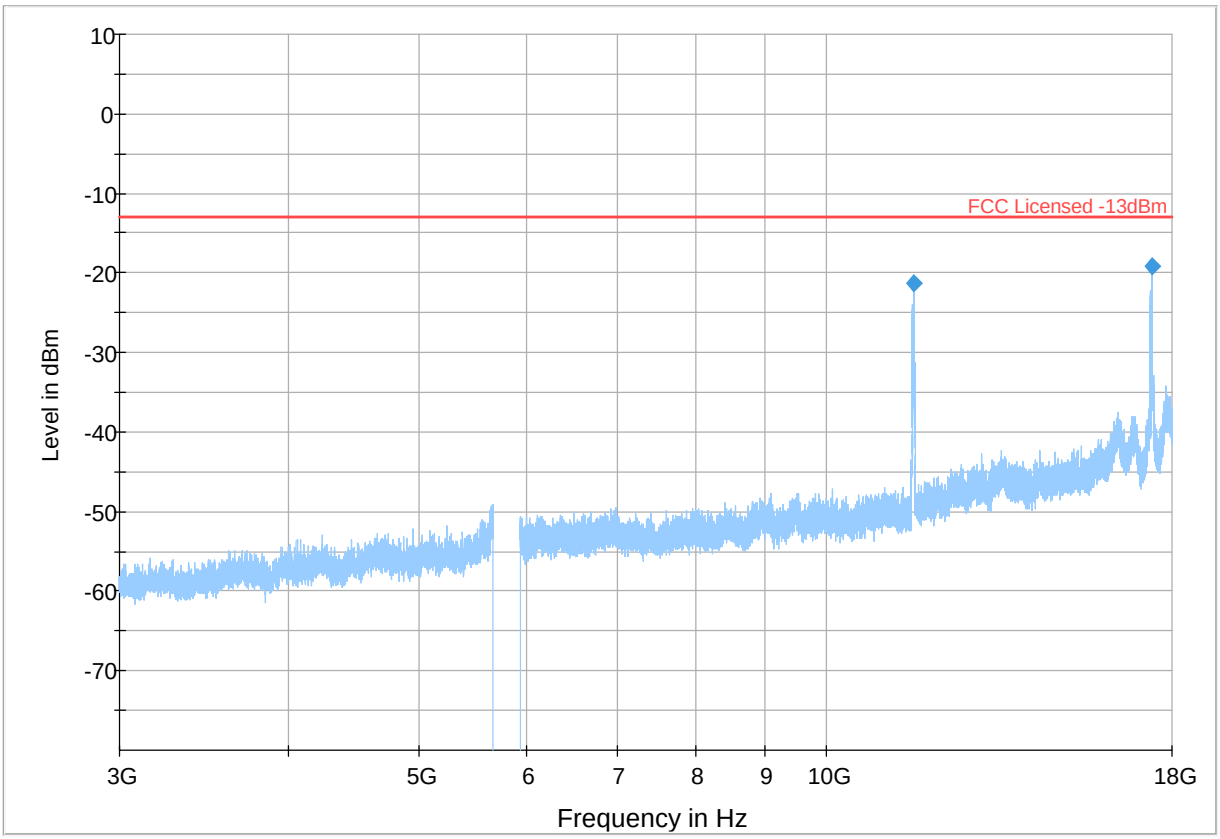


Plot # 13 Radiated Emissions: 3 GHz – 18 GHz

Channel: Low

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11591.250	-21.38	-13.00	8.38	500.0	1000.000	233.0	V	22.0	-91.0
17389.750	-19.24	-13.00	6.24	500.0	1000.000	266.0	V	326.0	-79.2

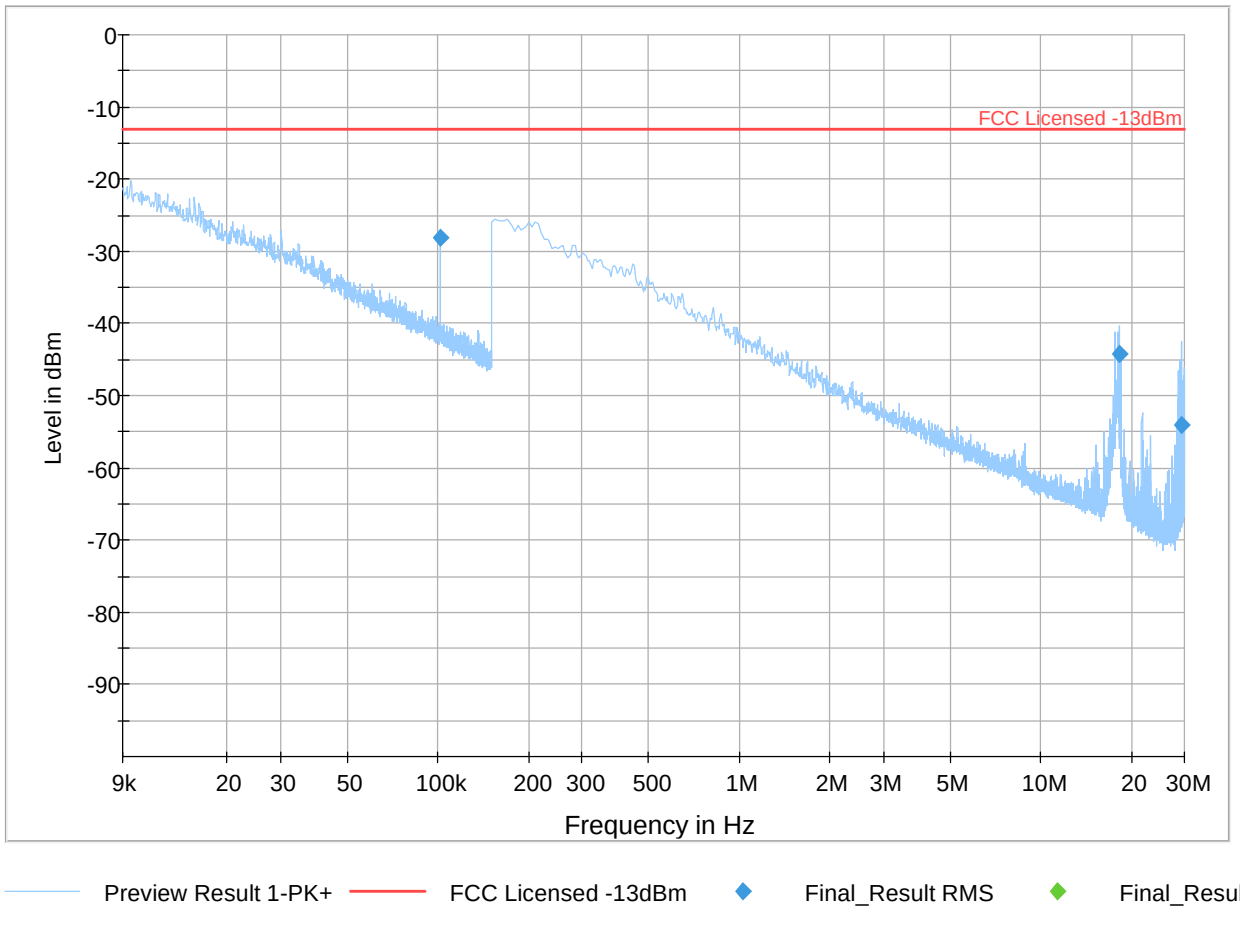


Plot # 14 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
0.102	-28.04	-13.00	15.04	500.0	9.000	100.0	V	3.0	-76.3
18.244	-44.21	-13.00	31.21	500.0	9.000	100.0	V	338.0	-78.3
29.239	-54.09	-13.00	41.09	500.0	9.000	100.0	V	-8.0	-79.0

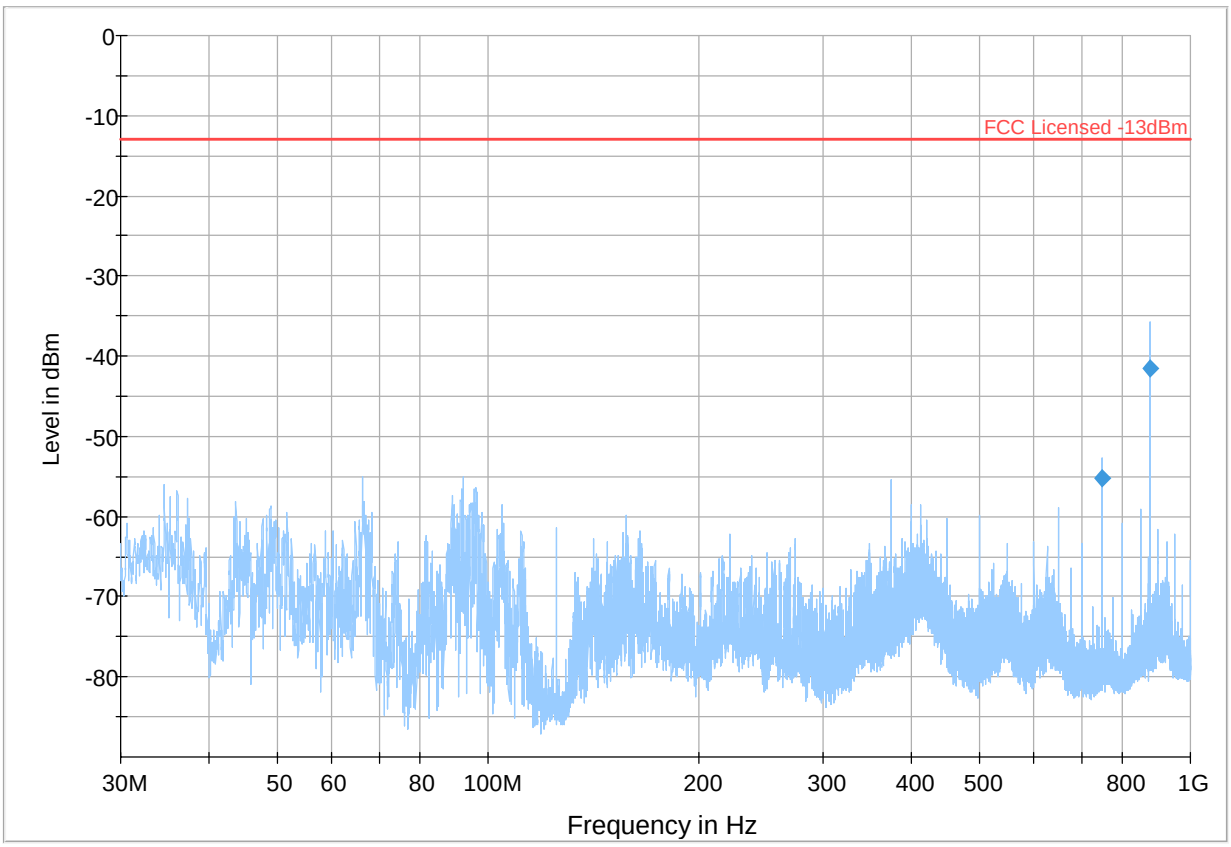


Plot # 15 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid

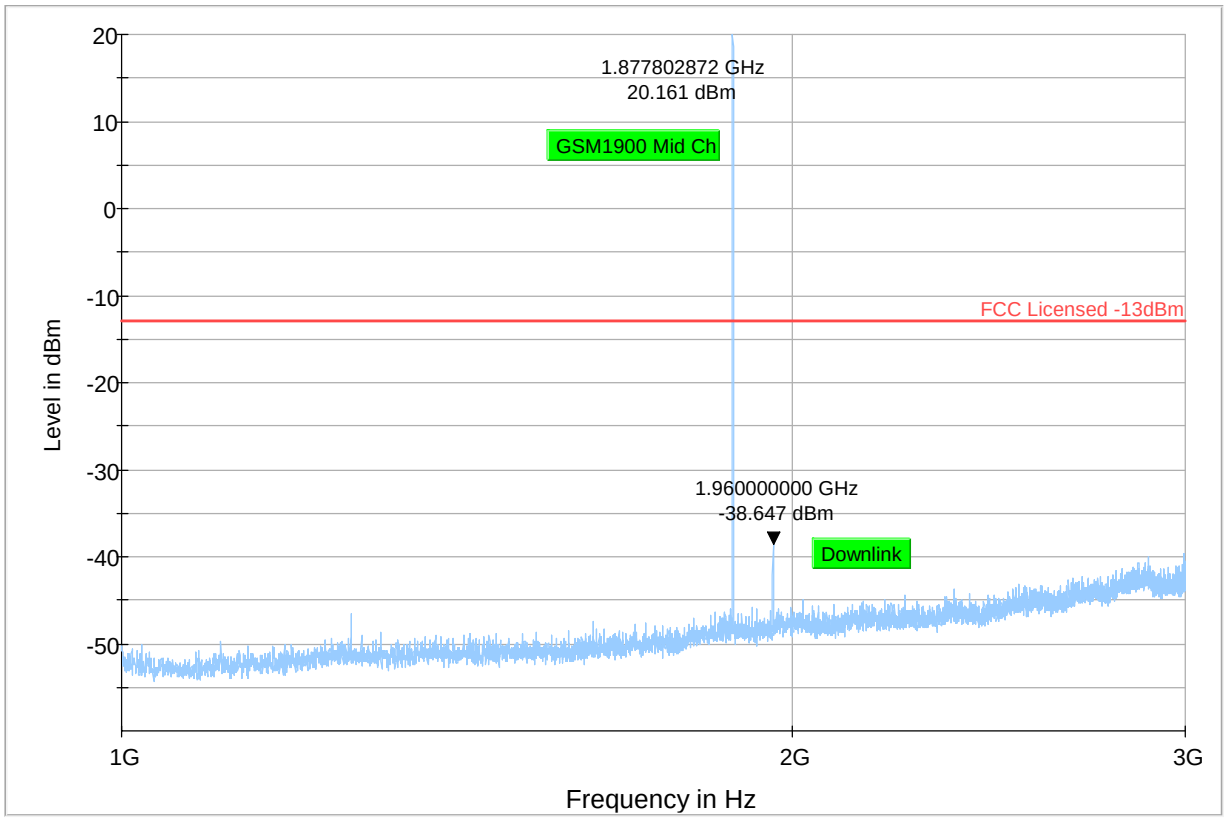
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
749.983	-55.18	-13.00	42.18	500.0	120.000	116.0	H	215.0	-106.3
876.058	-41.53	-13.00	28.53	500.0	120.000	213.0	H	296.0	-104.8



Plot # 16 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid

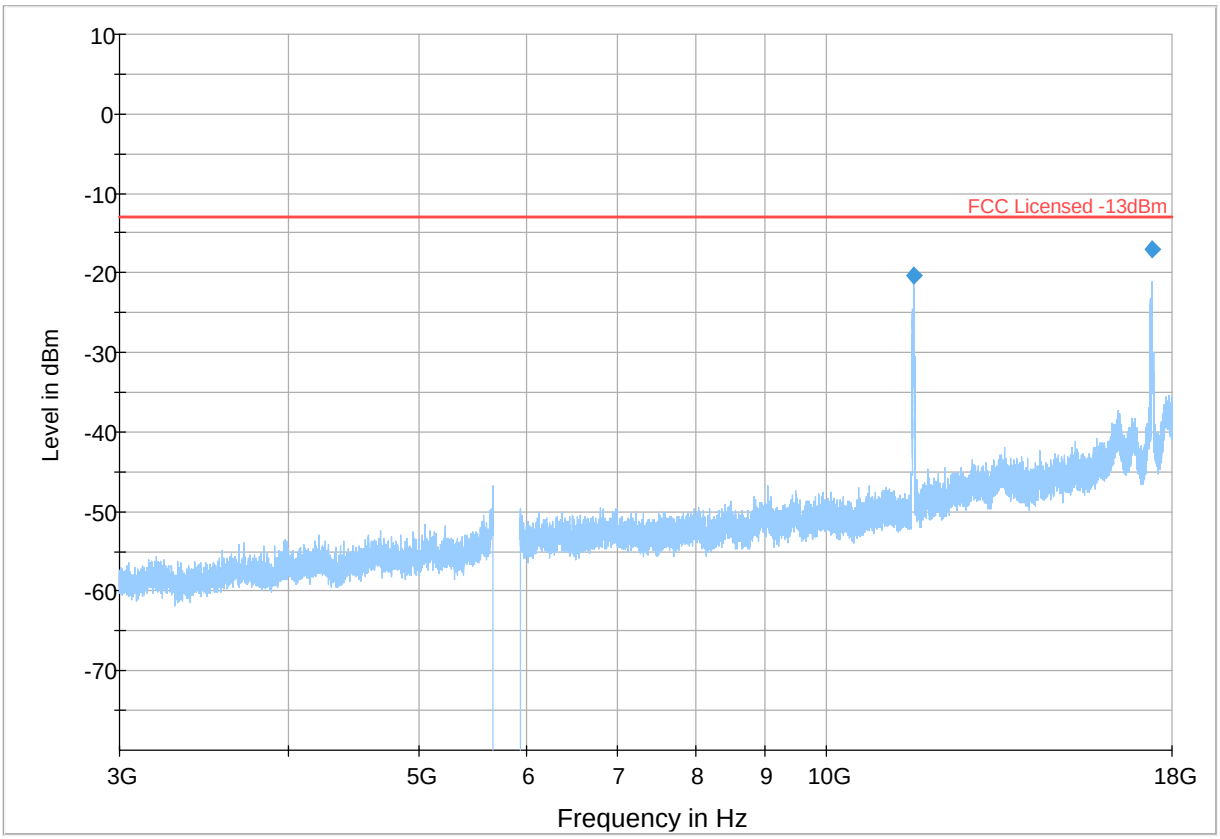


Plot # 17 Radiated Emissions: 3 GHz – 18 GHz

Channel: Mid

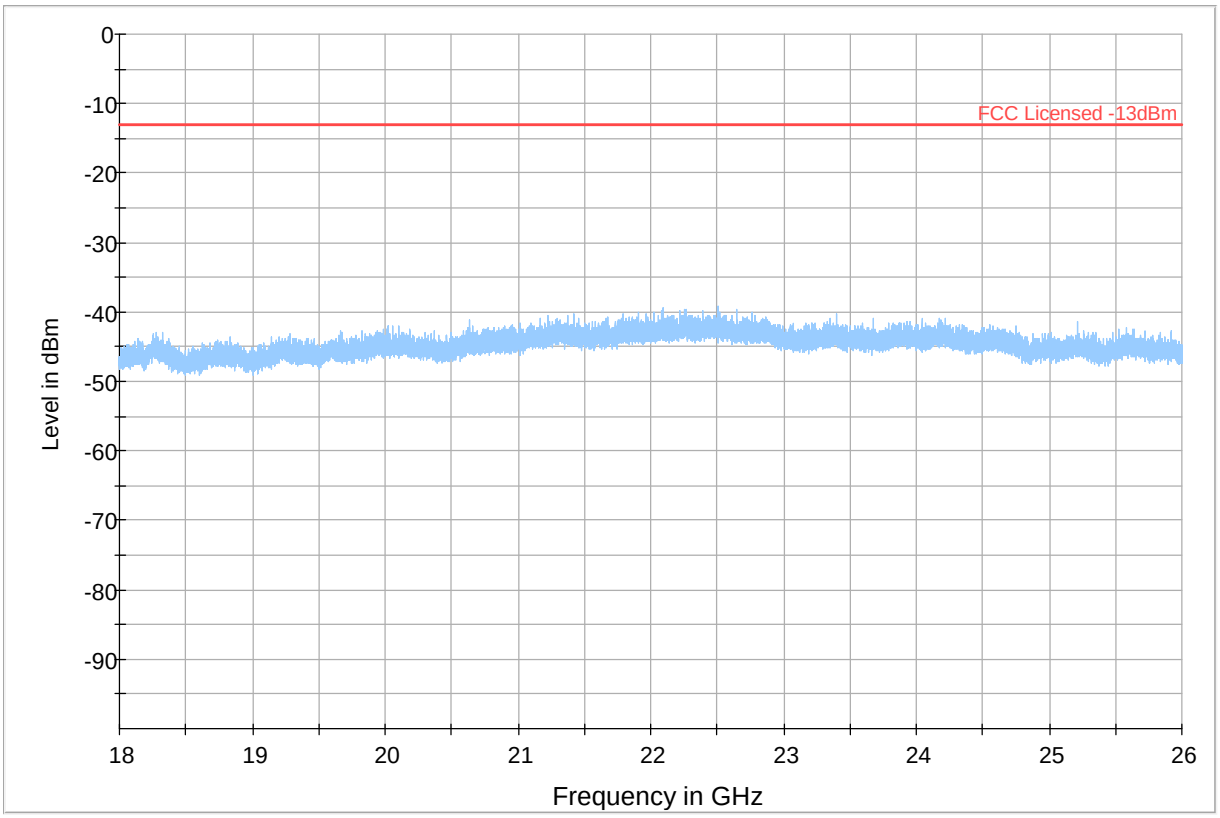
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11588.750	-20.39	-13.00	7.39	500.0	1000.000	276.0	V	-52.0	-91.1
17389.750	-17.02	-13.00	4.02	500.0	1000.000	288.0	V	311.0	-79.2



Plot # 18 Radiated Emissions: 18 GHz – 26 GHz

Channel: Mid

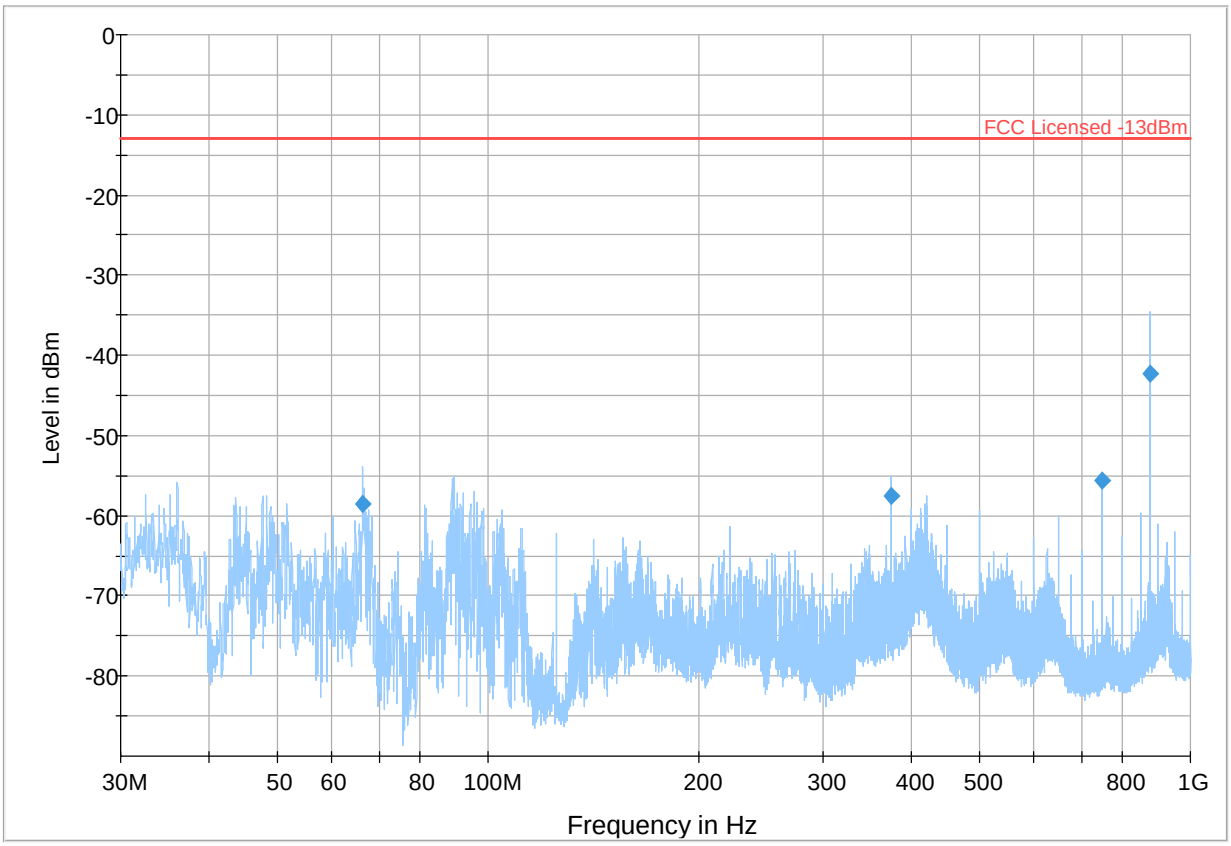


Plot # 19 Radiated Emissions: 30 MHz – 1GHz

Channel: High

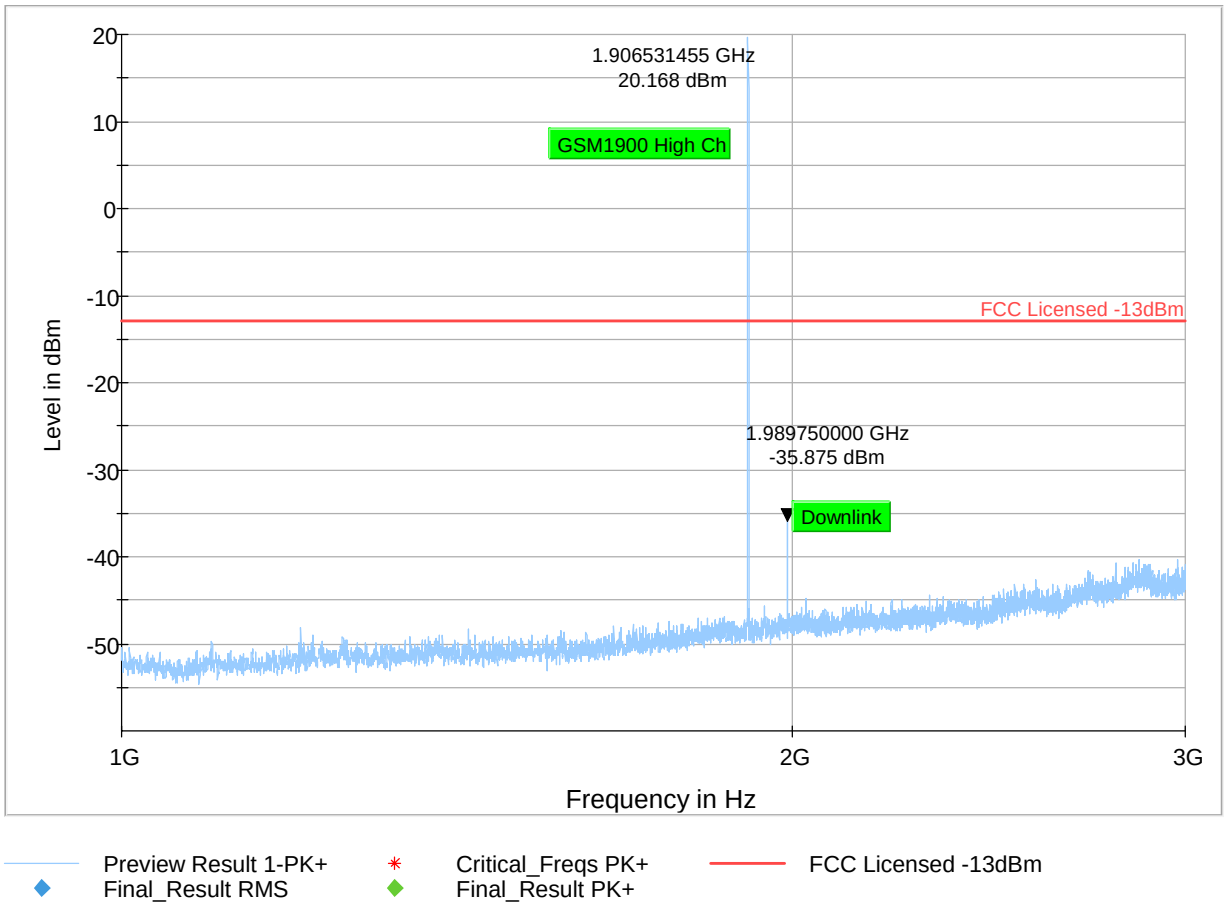
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
66.254	-58.51	-13.00	45.51	500.0	120.000	200.0	V	36.0	-123.9
374.981	-57.56	-13.00	44.56	500.0	120.000	100.0	H	179.0	-113.4
749.983	-55.71	-13.00	42.71	500.0	120.000	107.0	H	216.0	-106.3
875.961	-42.24	-13.00	29.24	500.0	120.000	210.0	H	298.0	-104.8



Plot # 20 Radiated Emissions: 1 GHz - 3 GHz

Channel: High

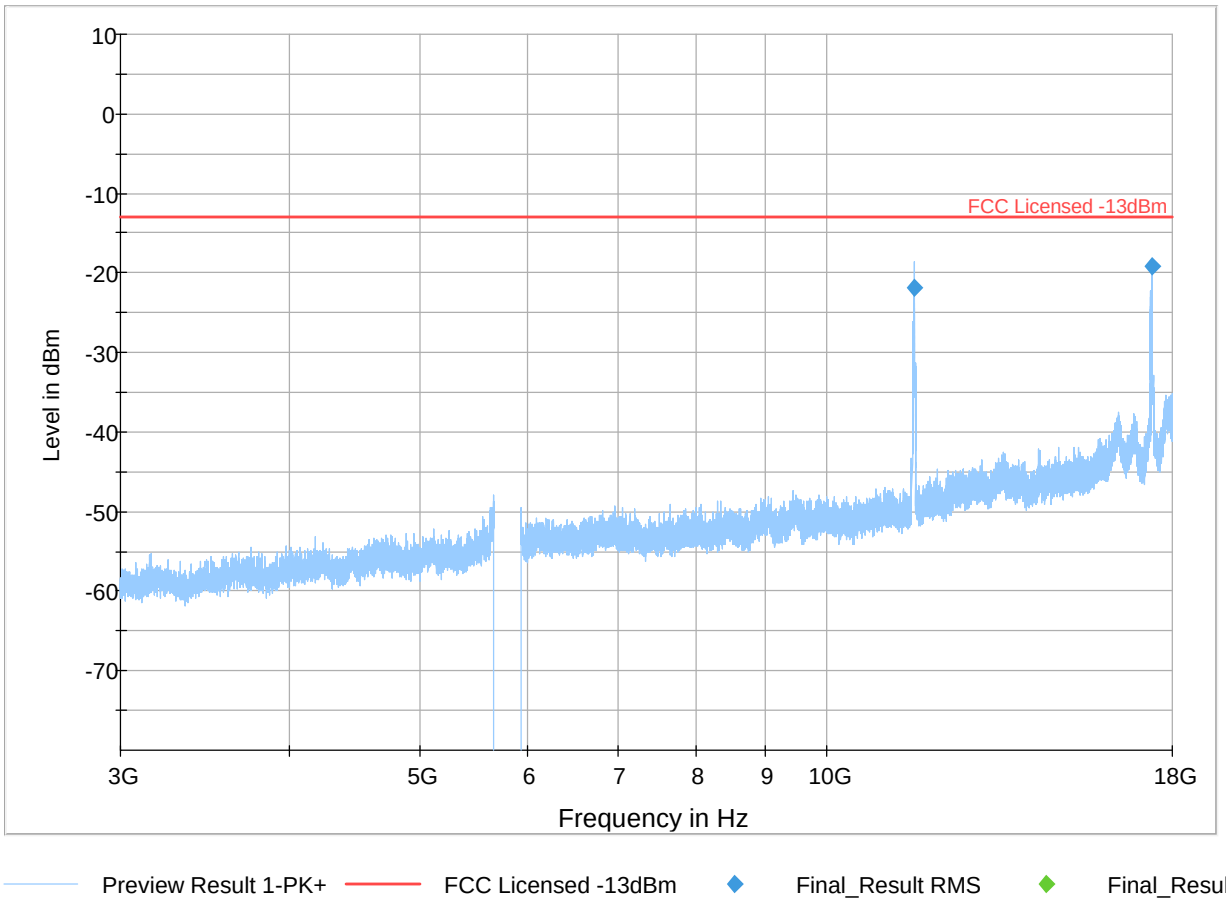


Plot # 21 Radiated Emissions: 3 GHz – 18 GHz

Channel: High

Final_Result

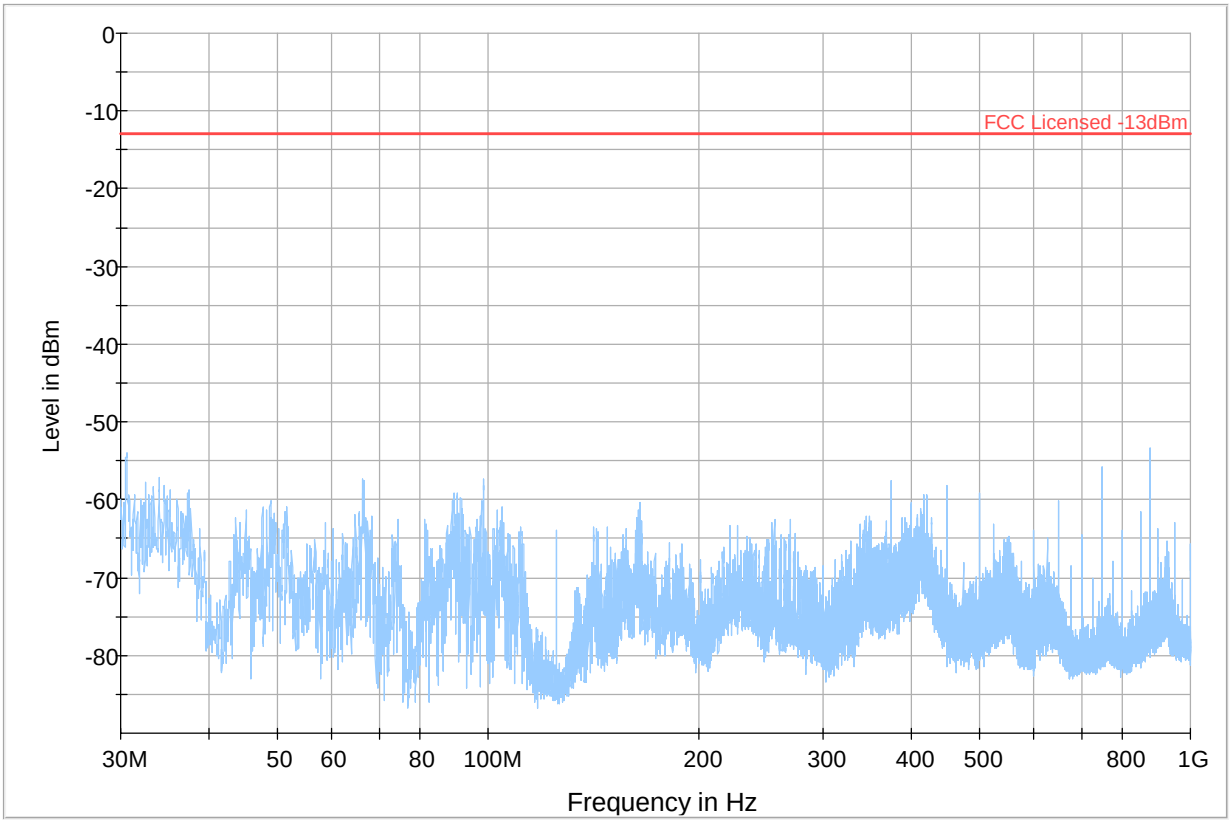
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11589.750	-21.93	-13.00	8.93	500.0	1000.000	250.0	V	-34.0	-91.1
17386.250	-19.17	-13.00	6.17	500.0	1000.000	262.0	V	310.0	-79.2



UMTS II

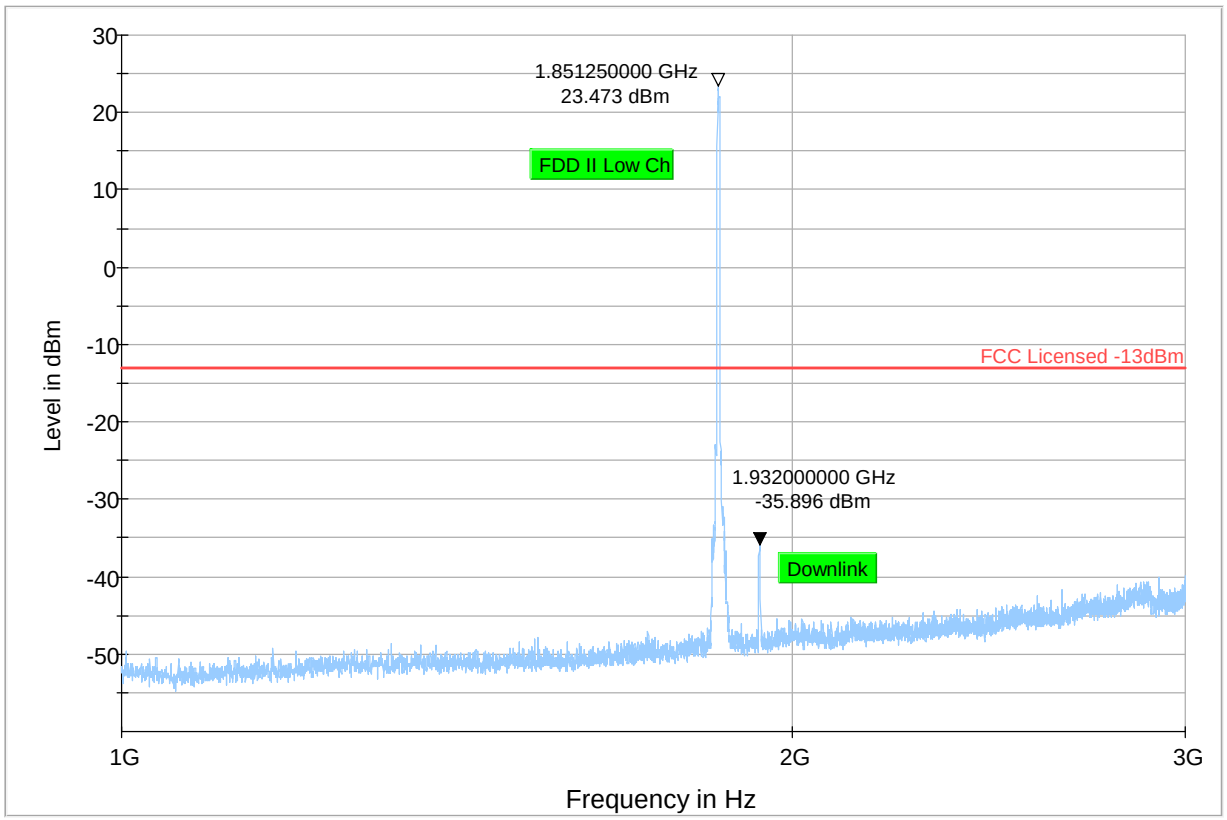
Plot # 22 Radiated Emissions: 30 MHz – 1GHz

Channel: Low



Plot # 23 Radiated Emissions: 1 GHz - 3 GHz

Channel: Low

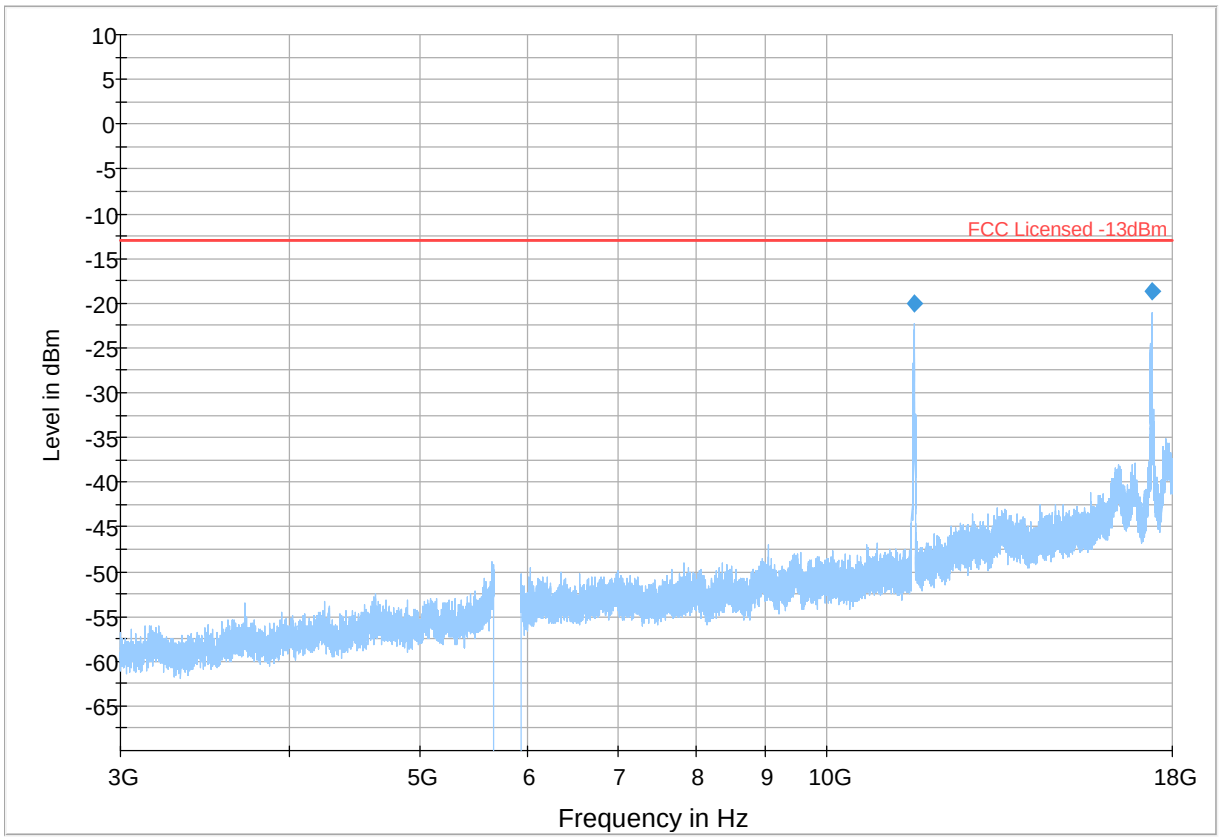


Plot # 24 Radiated Emissions: 3 GHz – 18 GHz

Channel: Low

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11590.000	-20.01	-13.00	7.01	500.0	1000.000	283.0	V	308.0	-91.1
17389.000	-18.73	-13.00	5.73	500.0	1000.000	283.0	V	309.0	-79.2

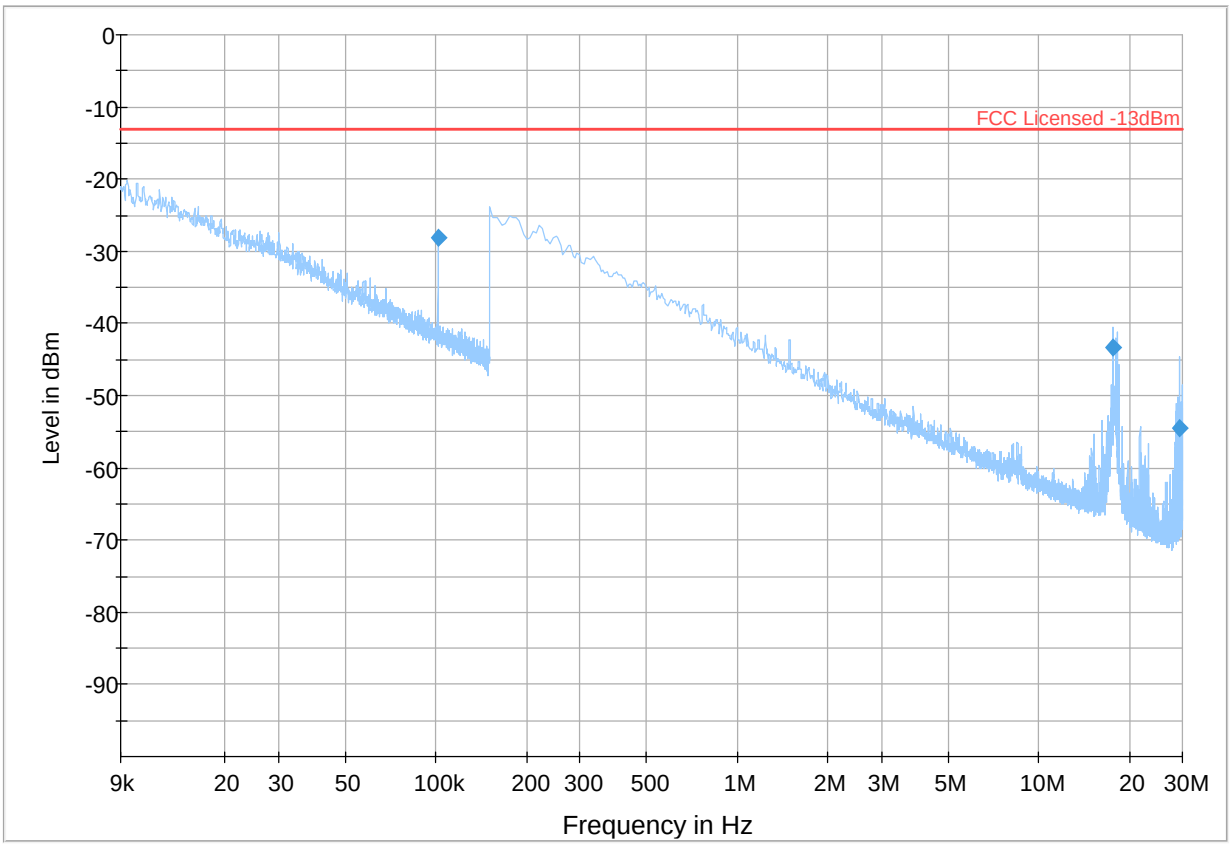


Plot # 25 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid

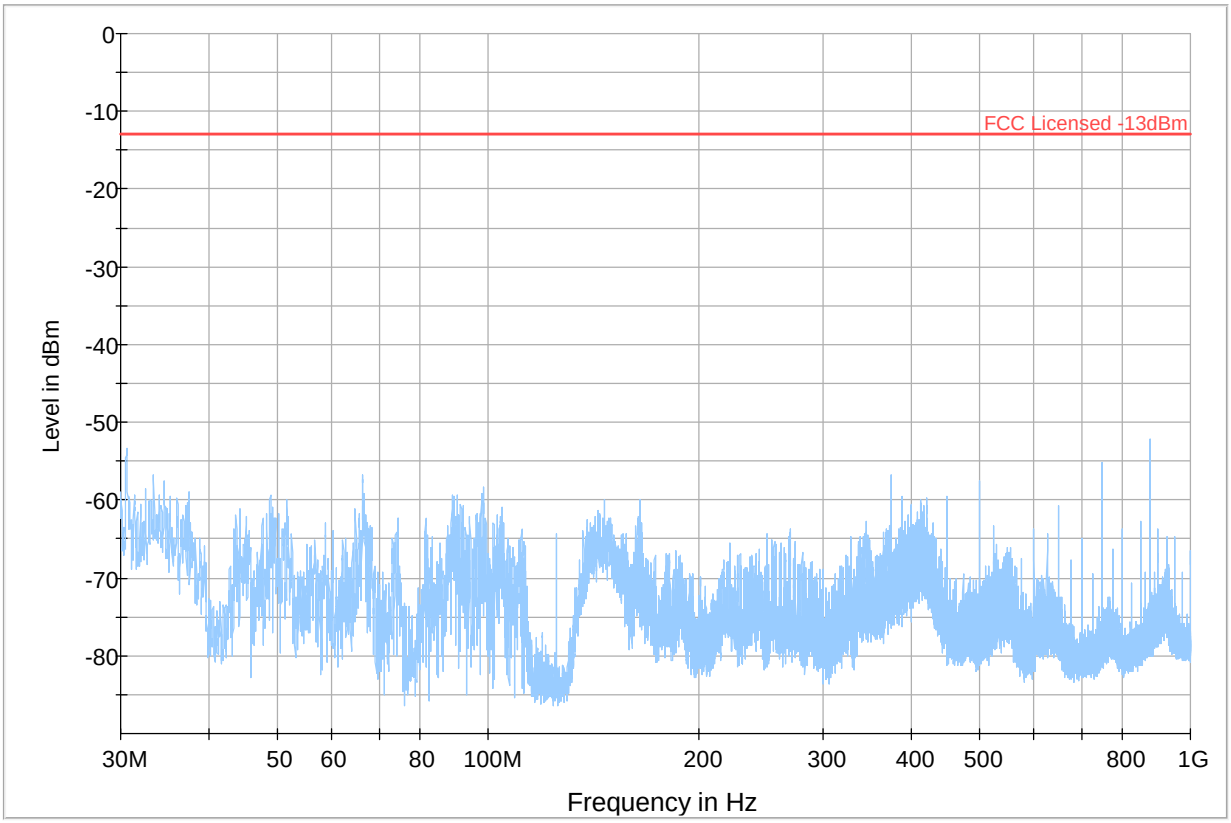
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
0.101	-28.13	-13.00	15.13	500.0	9.000	100.0	V	290.0	-76.3
17.692	-43.40	-13.00	30.40	500.0	9.000	125.0	V	17.0	-78.3
29.239	-54.57	-13.00	41.57	500.0	9.000	275.0	V	58.0	-79.0



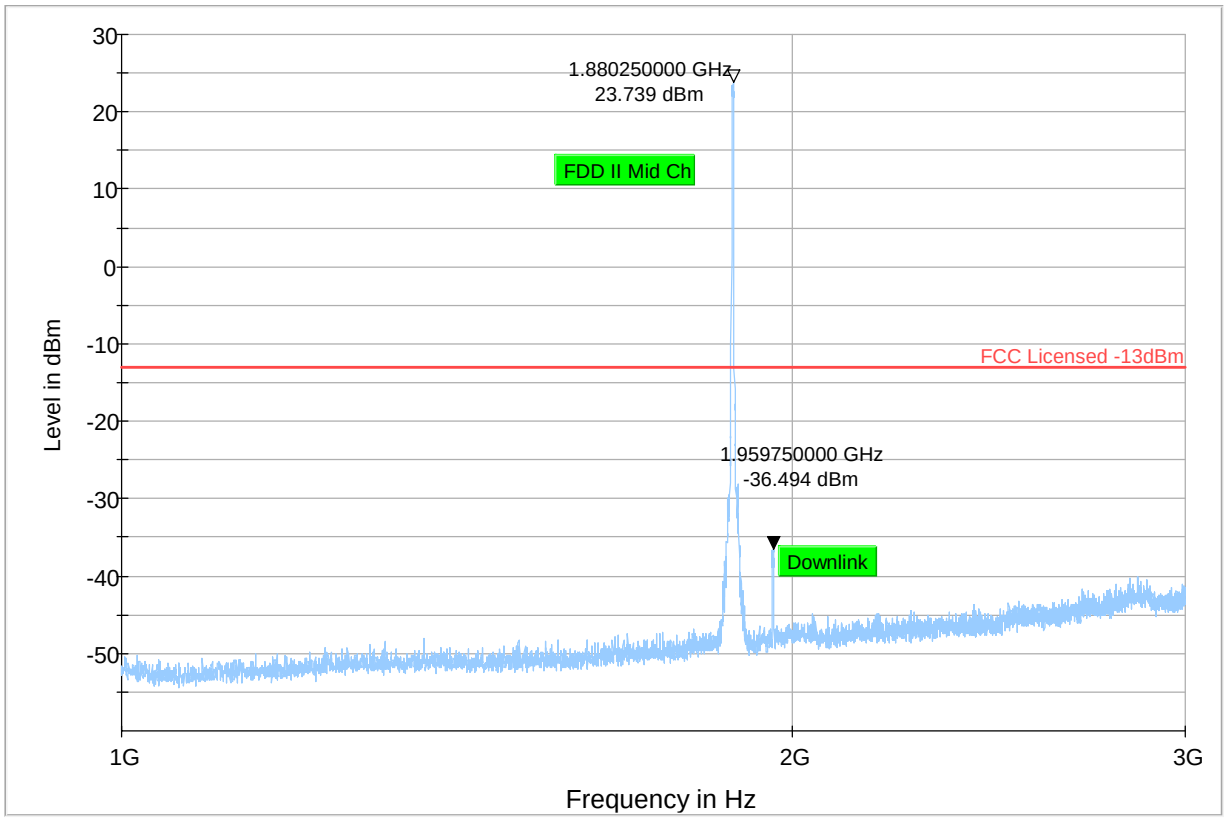
Plot # 26 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid



Plot # 27 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid

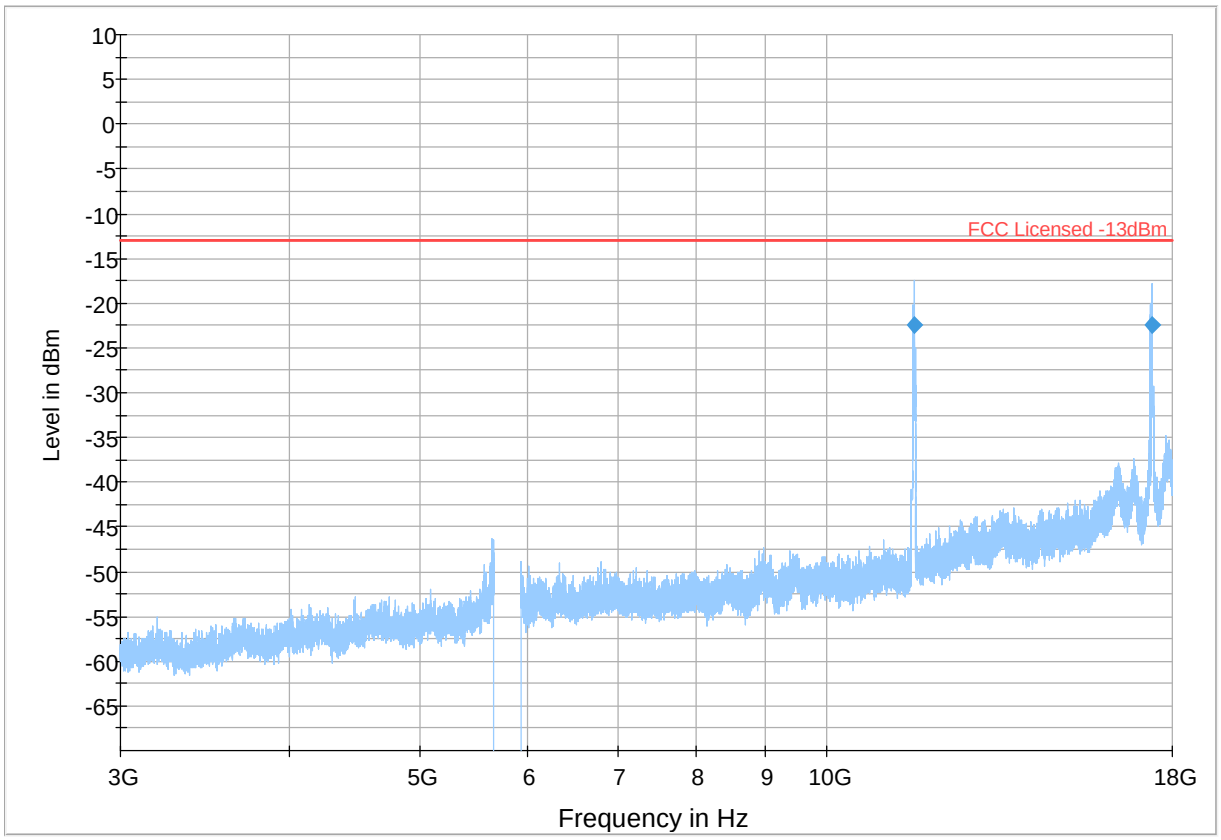


Plot # 28 Radiated Emissions: 3 GHz – 18 GHz

Channel: Mid

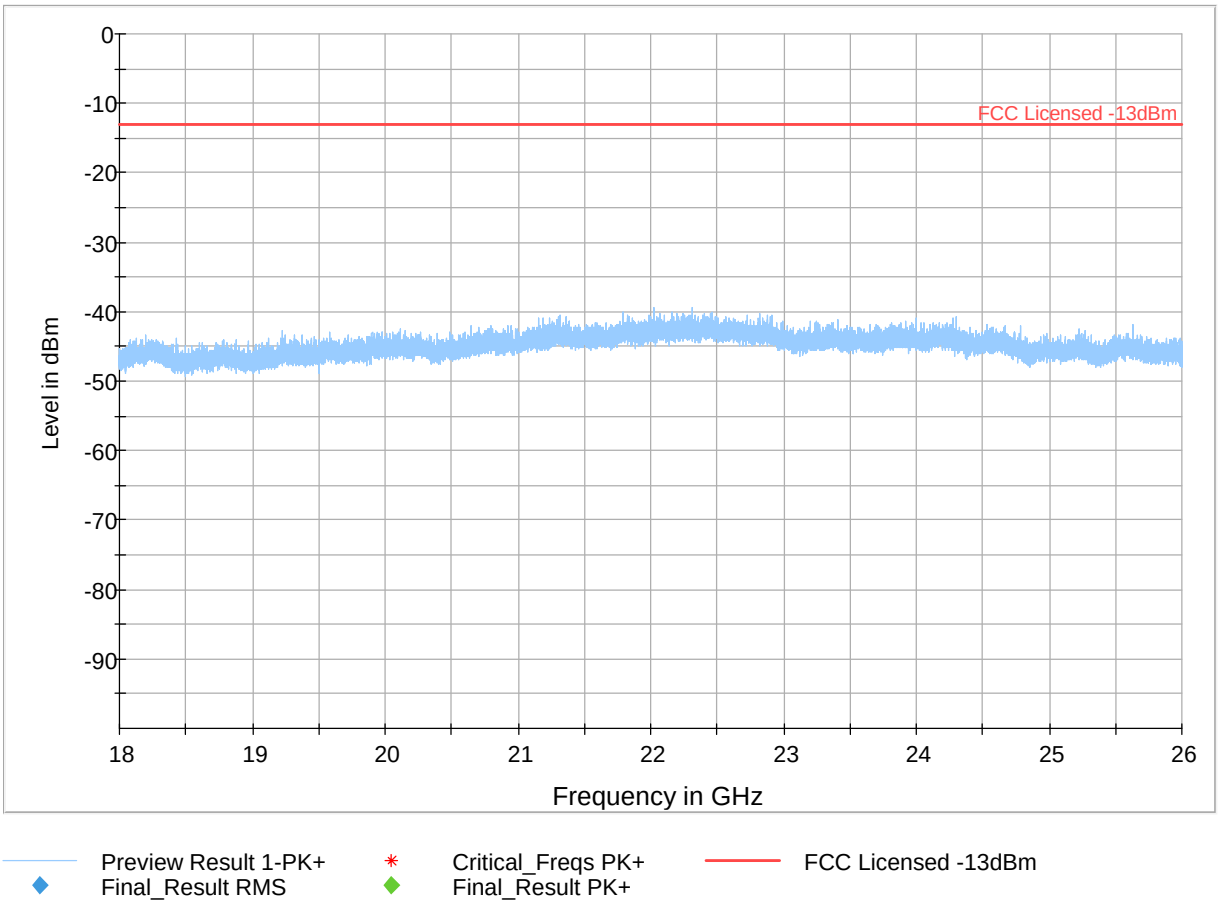
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11588.750	-22.38	-13.00	9.38	500.0	1000.000	253.0	V	307.0	-91.1
17400.000	-22.46	-13.00	9.46	500.0	1000.000	267.0	V	326.0	-79.1



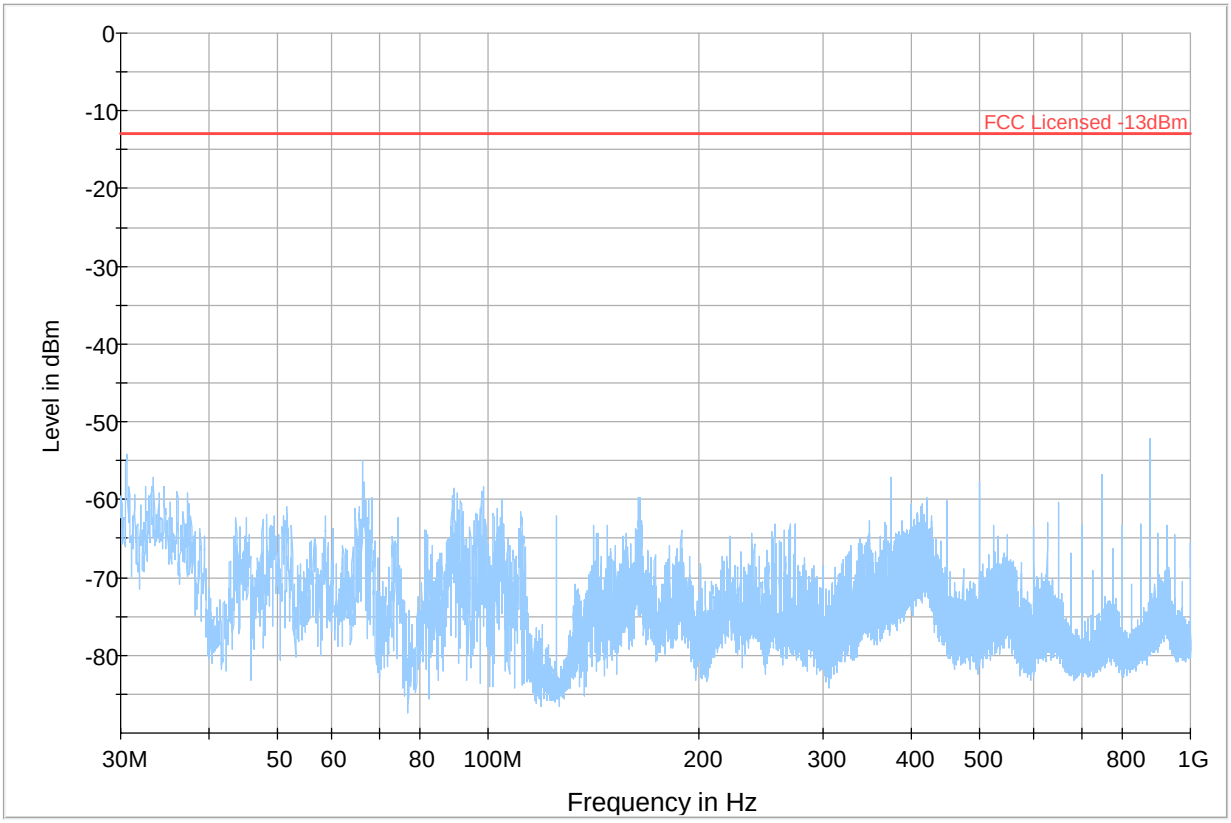
Plot # 29 Radiated Emissions: 18 GHz – 26 GHz

Channel: Mid



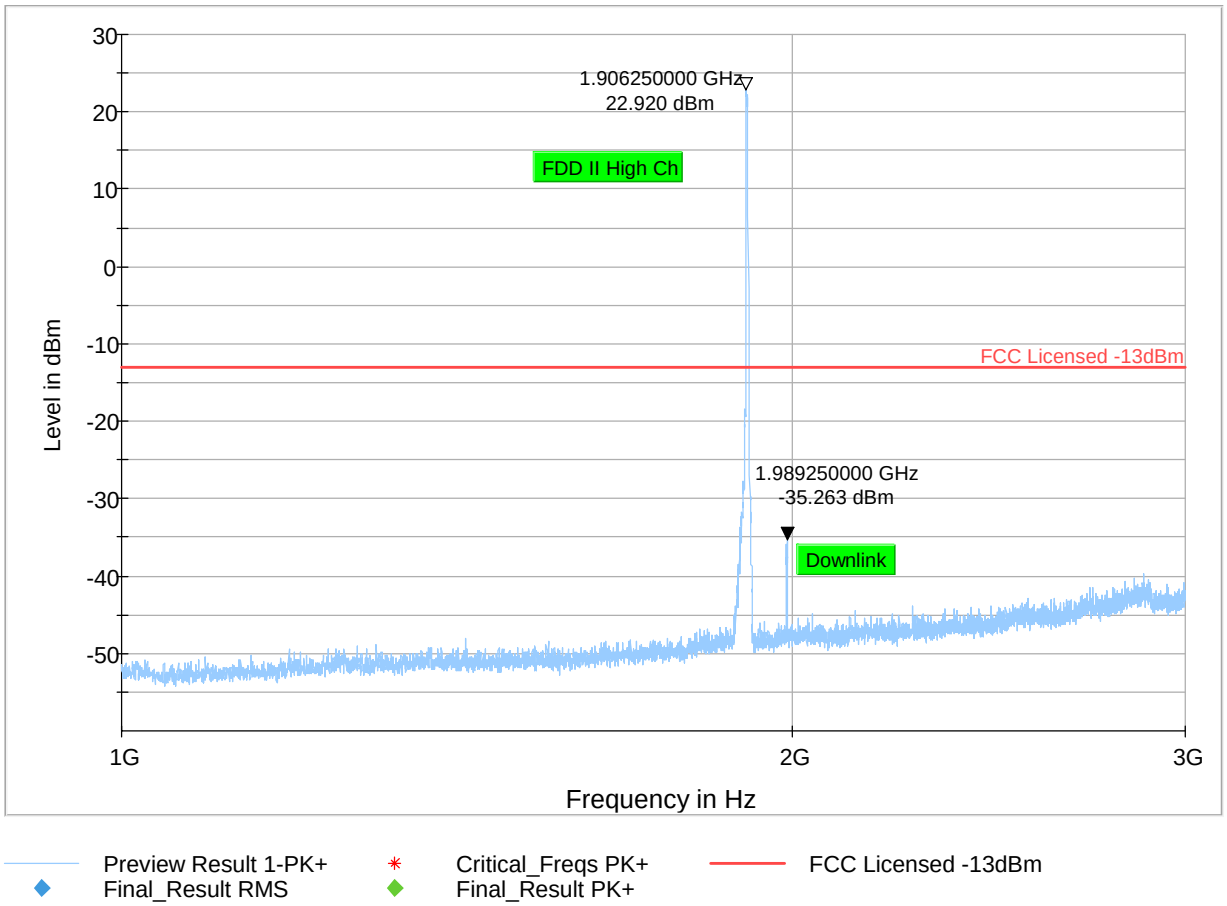
Plot # 30 Radiated Emissions: 30 MHz – 1GHz

Channel: High



Plot # 31 Radiated Emissions: 1 GHz - 3 GHz

Channel: High

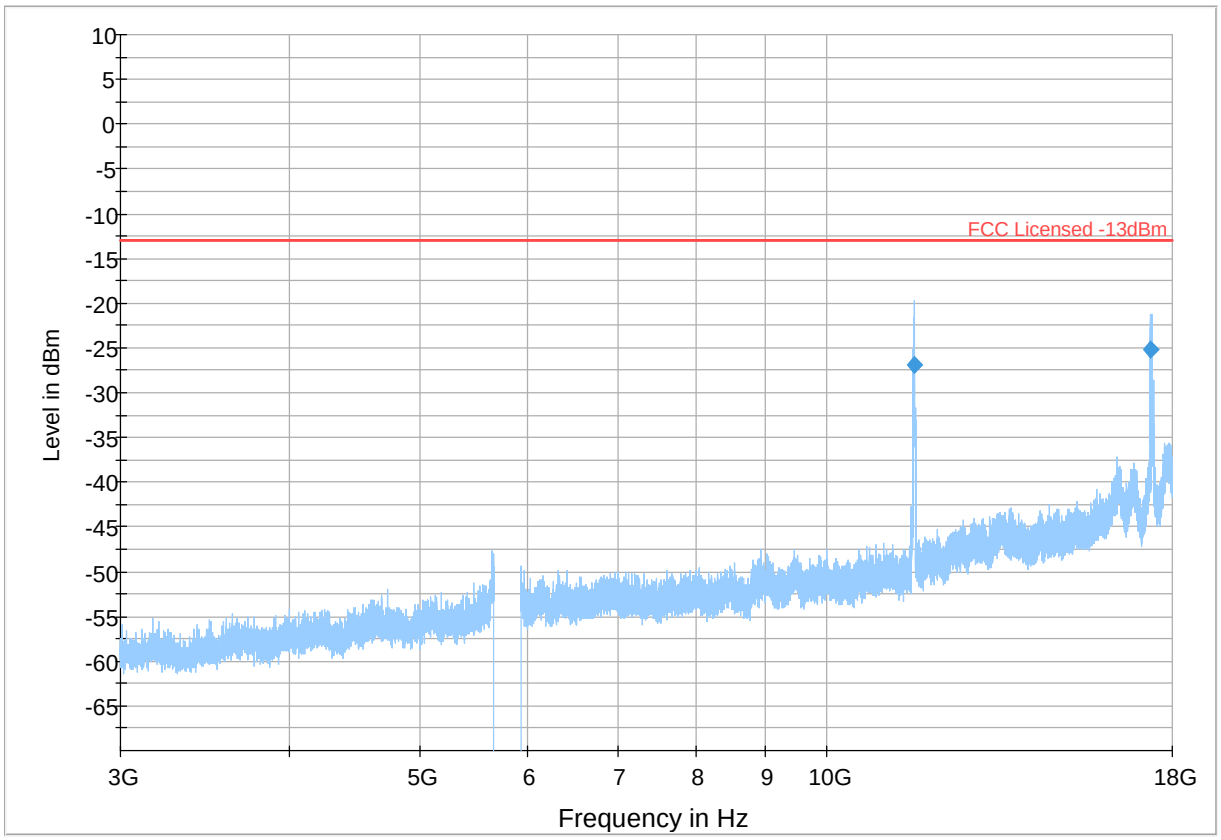


Plot # 32 Radiated Emissions: 3 GHz – 18 GHz

Channel: High

Final_Result

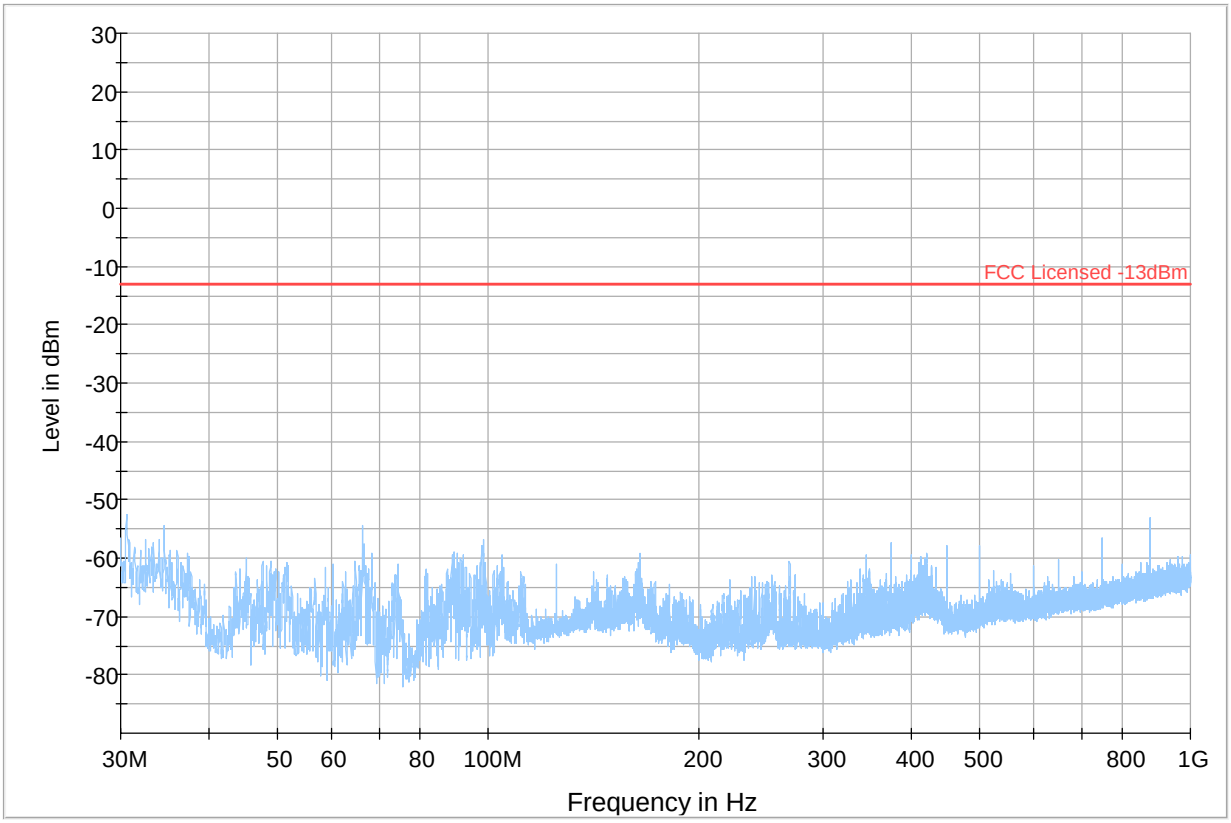
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11590.000	-26.96	-13.00	13.96	500.0	1000.000	217.0	V	112.0	-91.1
17361.250	-25.20	-13.00	12.20	500.0	1000.000	210.0	V	22.0	-79.3



UMTS IV

Plot # 33 Radiated Emissions: 30 MHz – 1GHz

Channel: Low

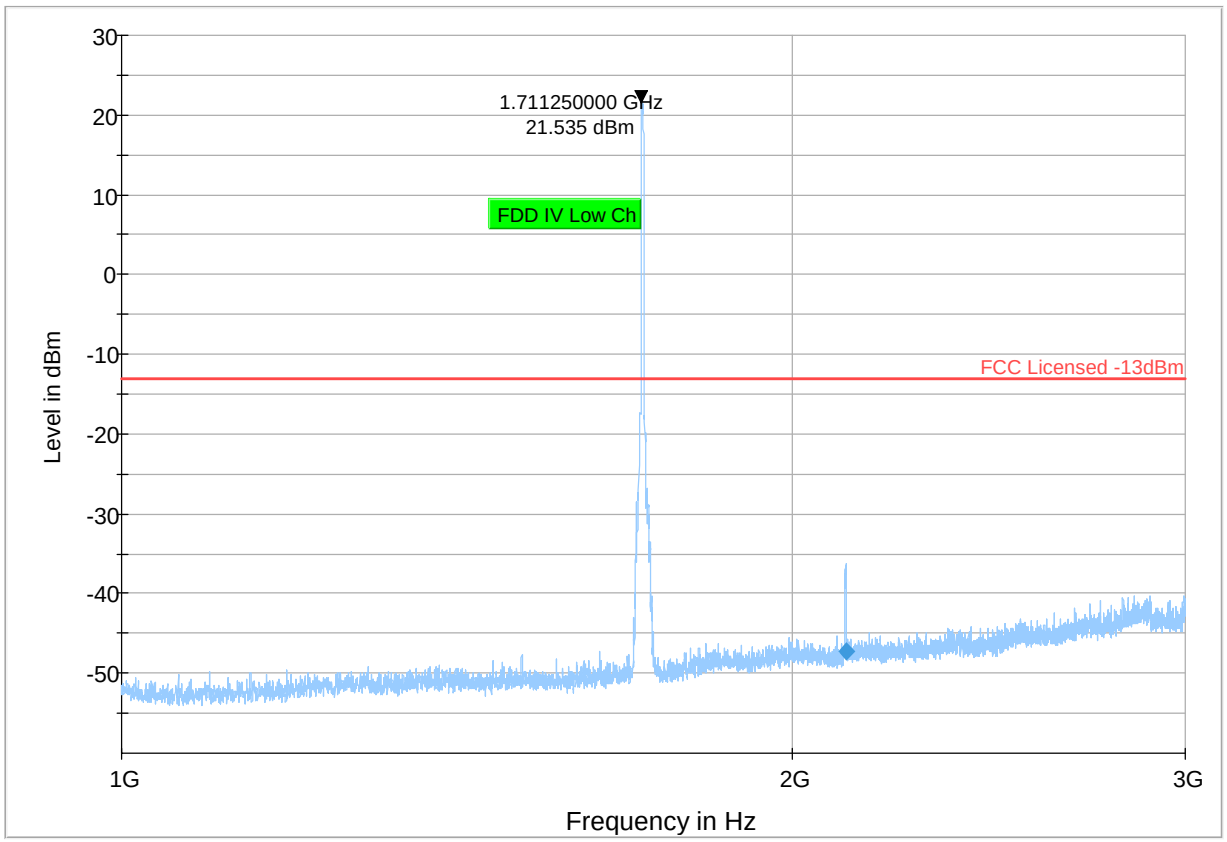


Plot # 34 Radiated Emissions: 1 GHz - 3 GHz

Channel: Low

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2112.000	-47.32	-13.00	34.32	500.0	1000.000	175.0	H	297.0	-63.6

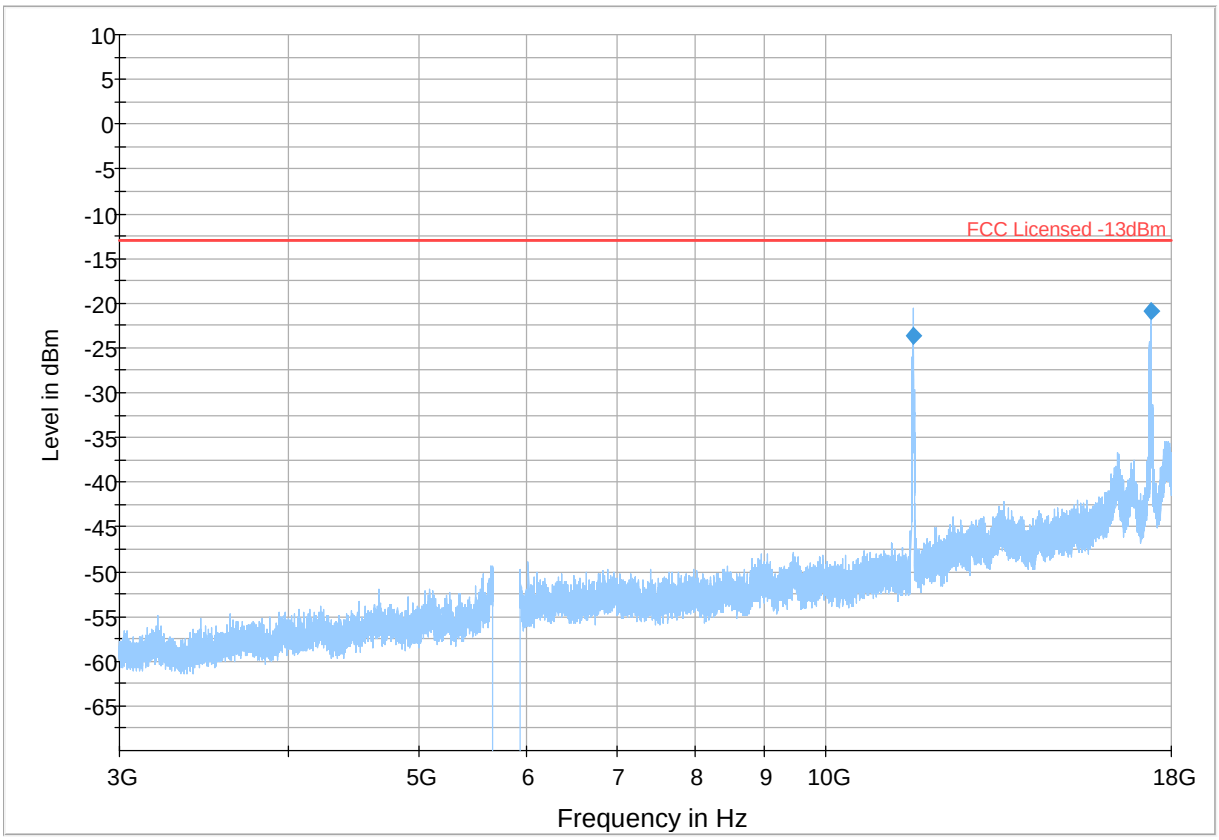


Plot # 35 Radiated Emissions: 3 GHz – 18 GHz

Channel: Low

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11591.250	-23.67	-13.00	10.67	500.0	1000.000	229.0	V	19.0	-91.0
17378.250	-20.95	-13.00	7.95	500.0	1000.000	254.0	V	-25.0	-79.2

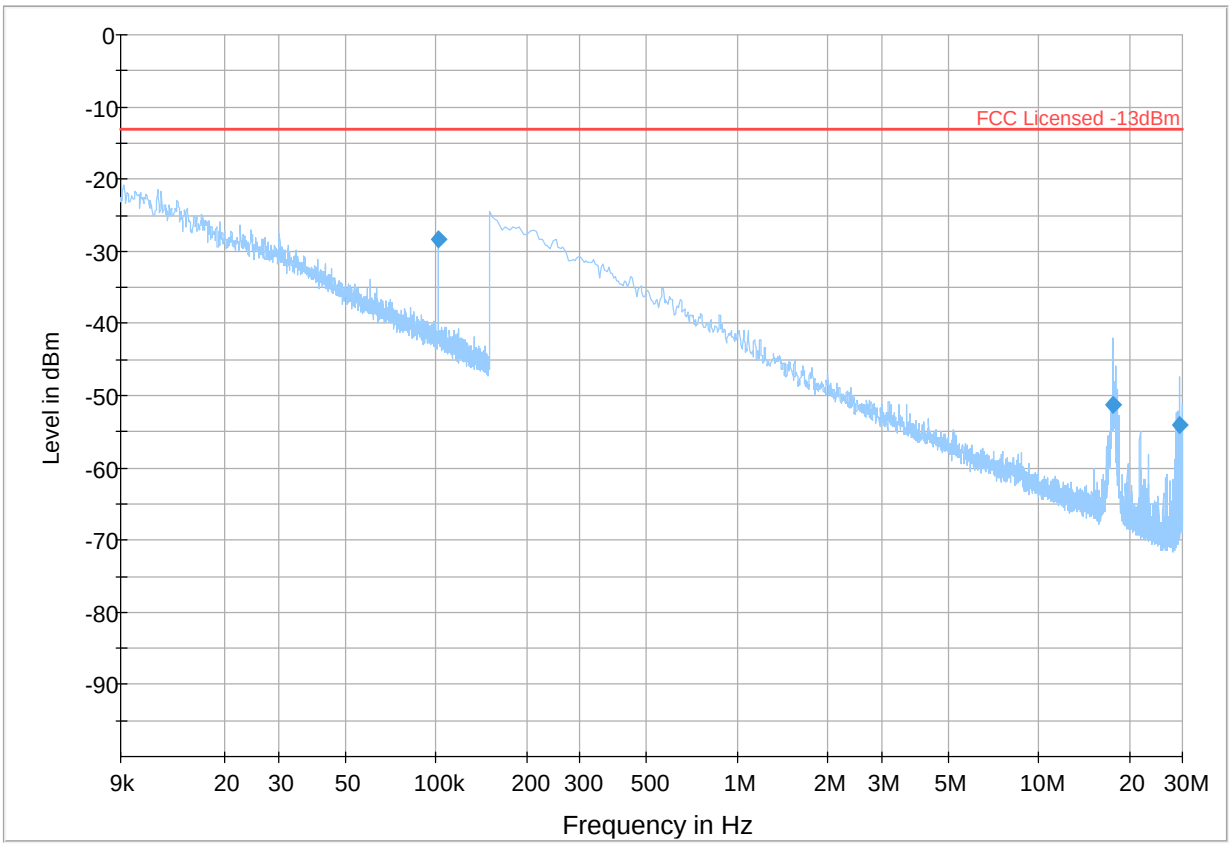


Plot # 36 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid

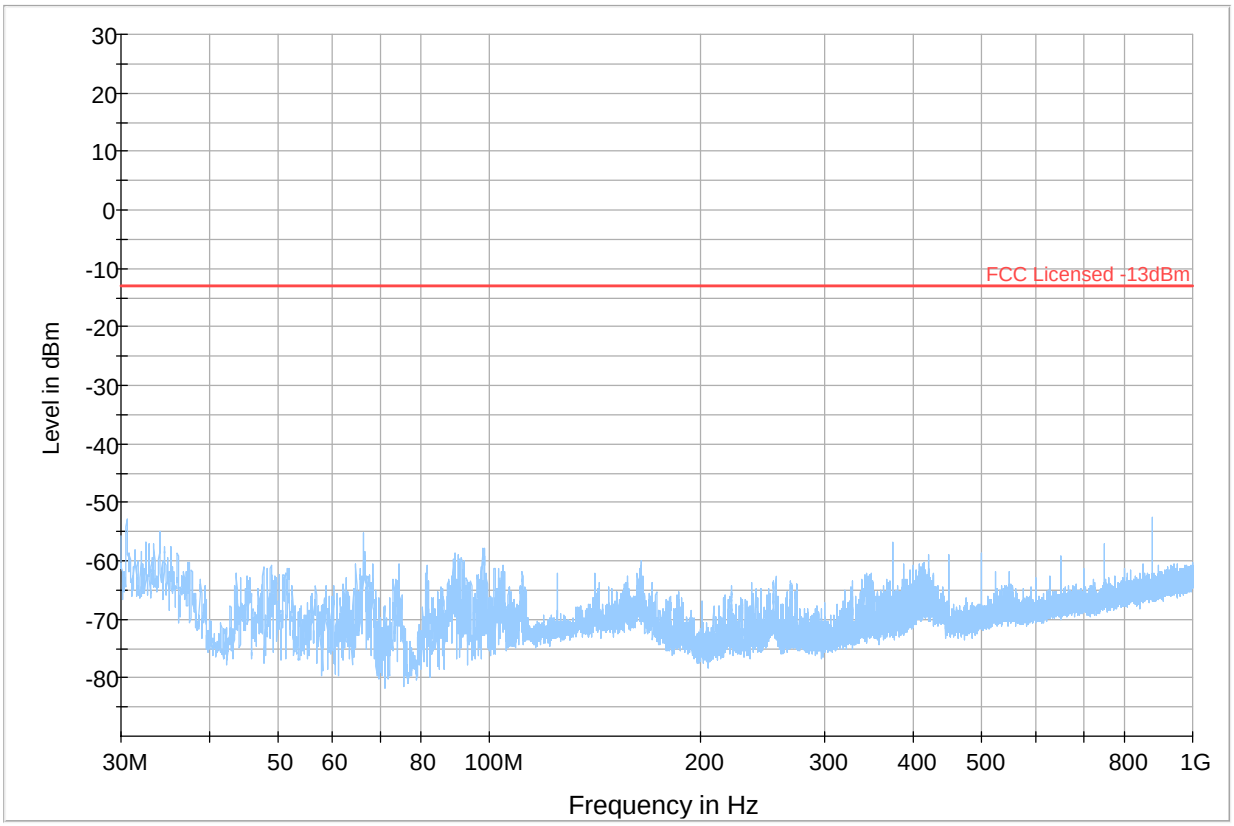
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
0.102	-28.33	-13.00	15.33	500.0	9.000	100.0	V	108.0	-76.3
17.692	-51.28	-13.00	38.28	500.0	9.000	167.0	V	-27.0	-78.3
29.239	-54.07	-13.00	41.07	500.0	9.000	159.0	V	14.0	-79.0



Plot # 37 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid

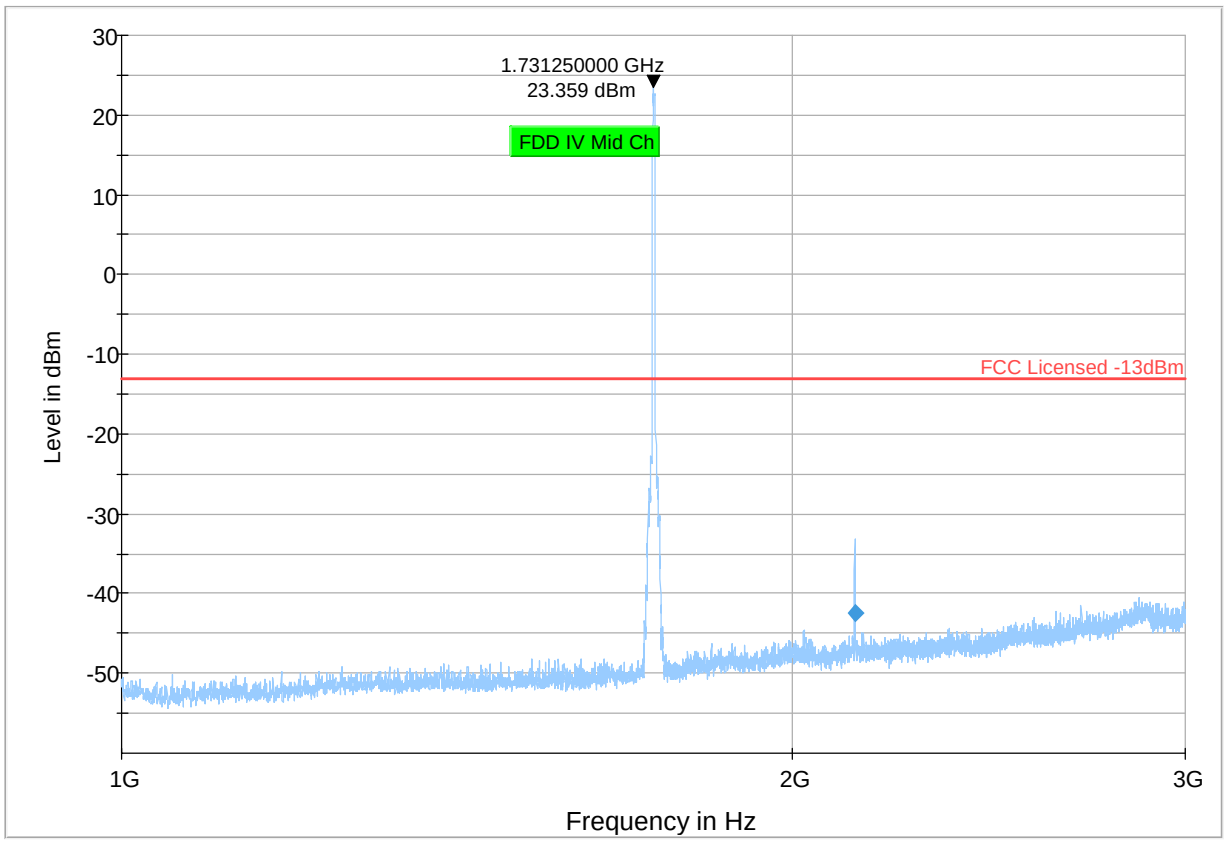


Plot # 38 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2132.500	-42.47	-13.00	29.47	500.0	1000.000	141.0	V	84.0	-63.5

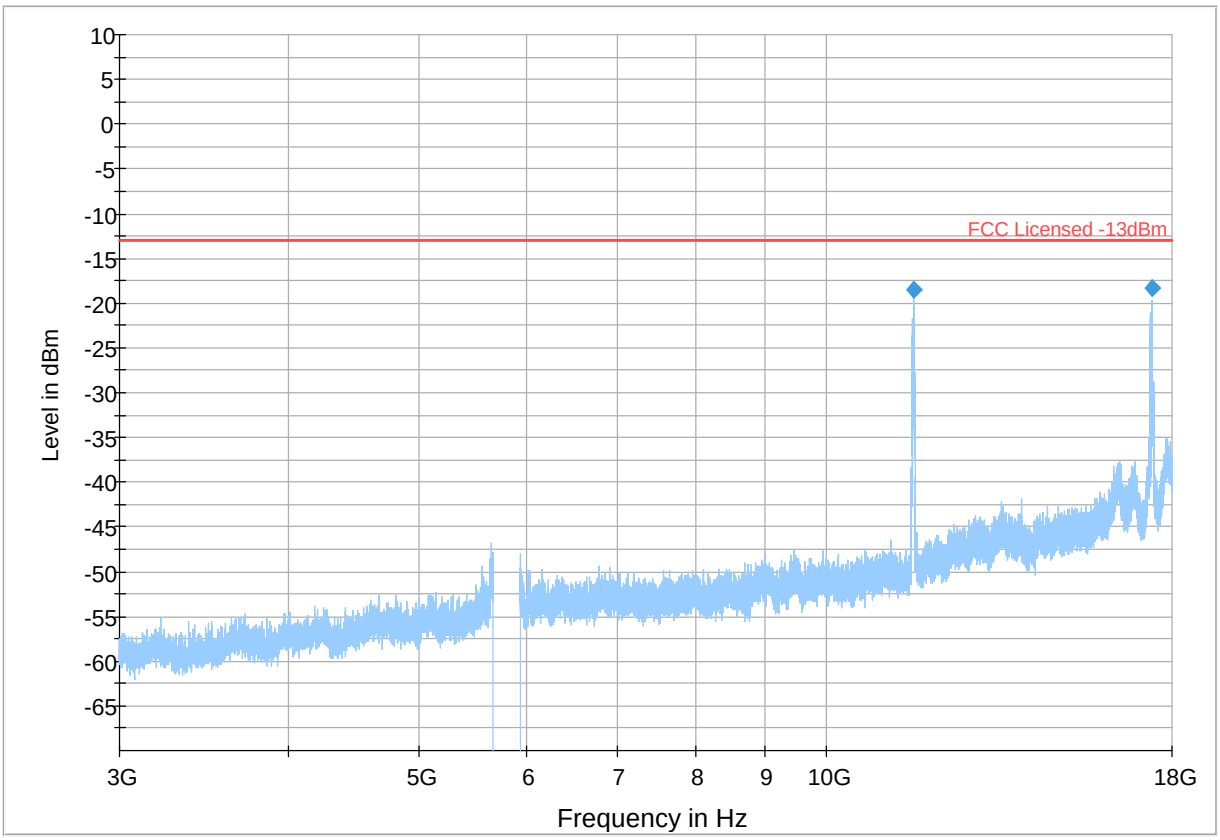


Plot # 39 Radiated Emissions: 3 GHz – 18 GHz

Channel: Mid

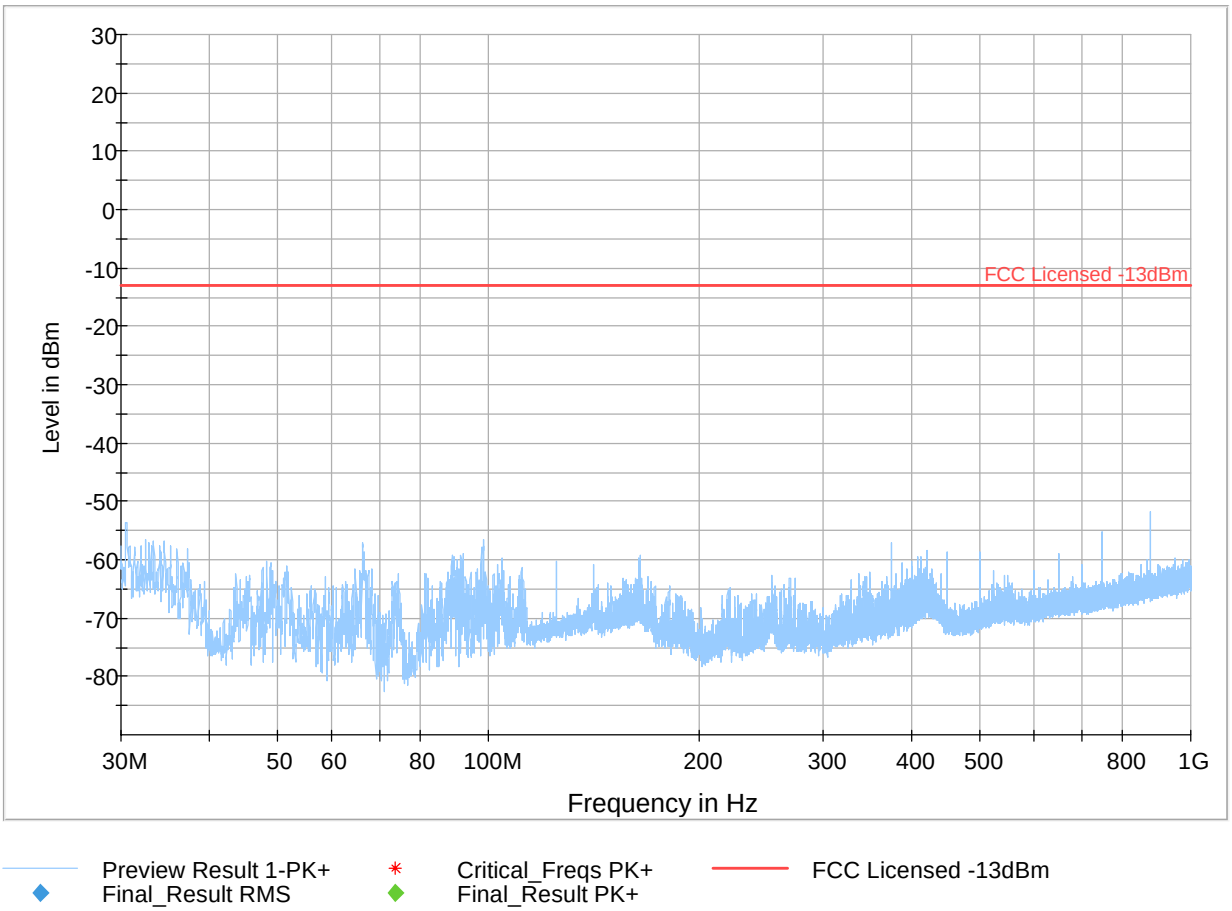
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11591.250	-18.47	-13.00	5.47	500.0	1000.000	233.0	V	22.0	-91.0
17392.500	-18.37	-13.00	5.37	500.0	1000.000	266.0	V	327.0	-79.2



Plot # 40 Radiated Emissions: 30 MHz – 1GHz

Channel: High

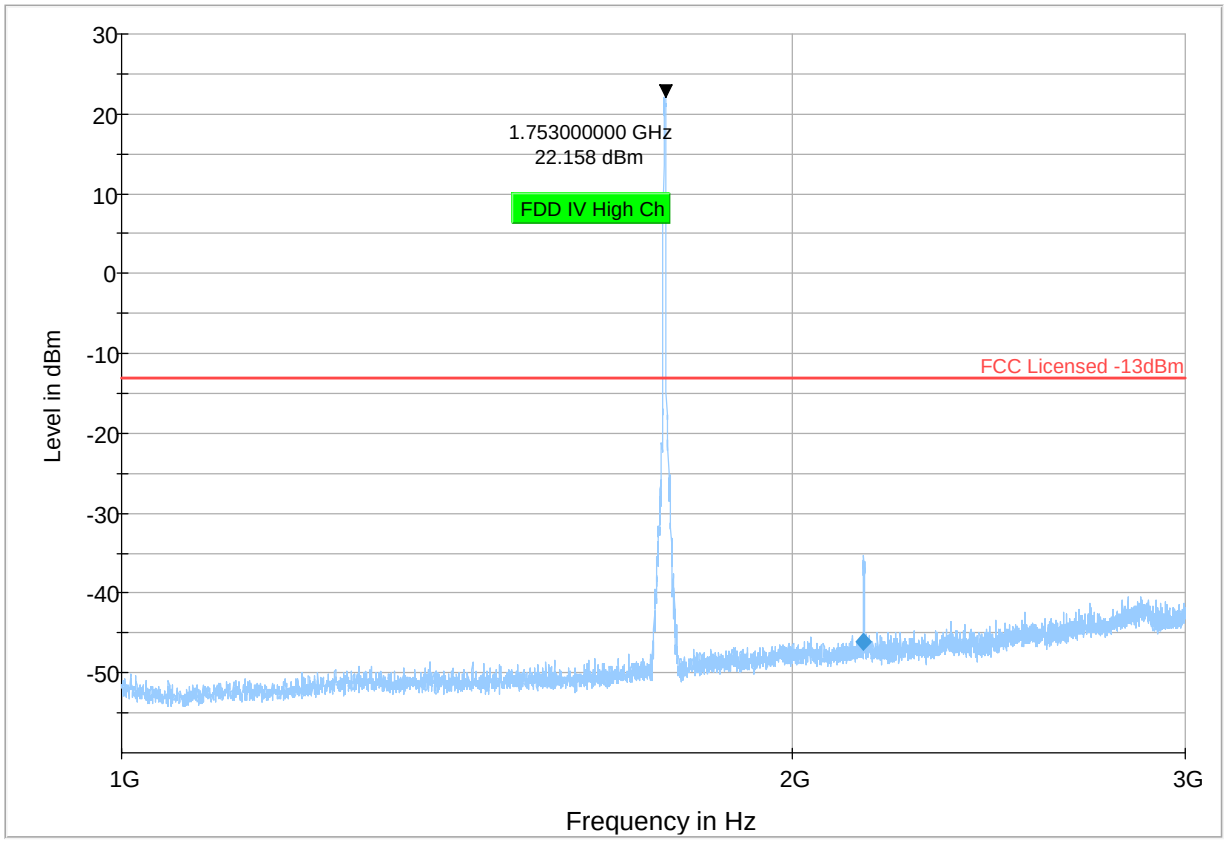


Plot # 41 Radiated Emissions: 1 GHz - 3 GHz

Channel: High

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2152.500	-46.16	-13.00	33.16	500.0	1000.000	141.0	V	251.0	-63.4

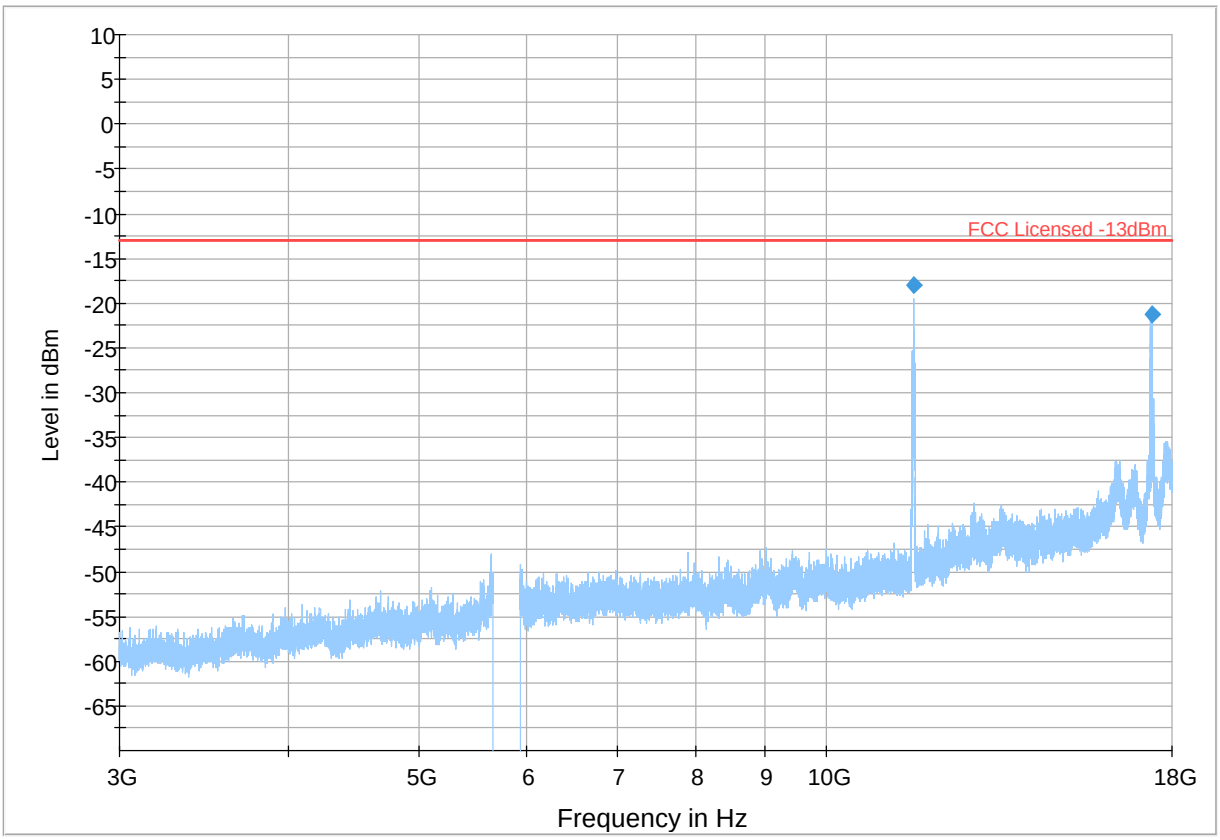


Plot # 42 Radiated Emissions: 3 GHz – 18 GHz

Channel: High

Final_Result

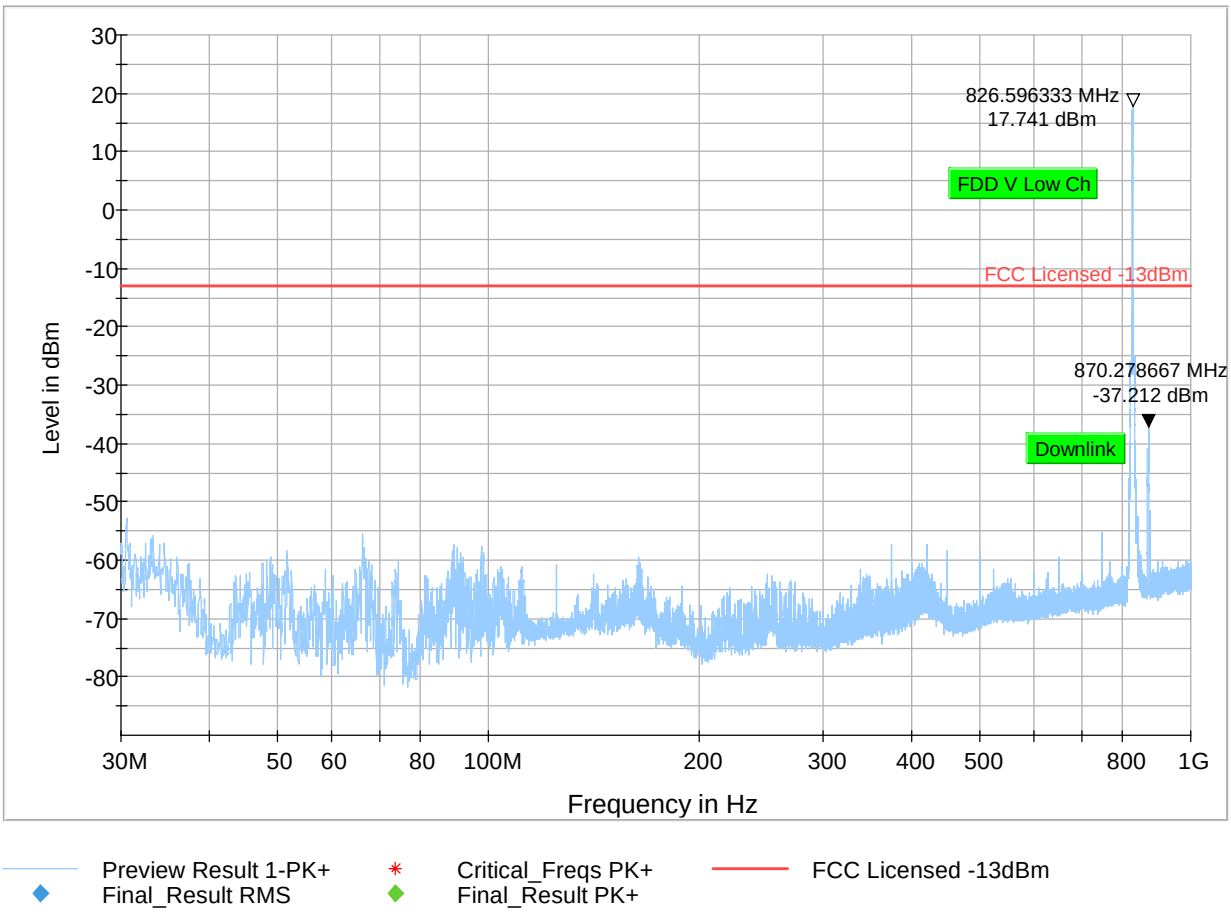
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
11590.000	-18.03	-13.00	5.03	500.0	1000.000	268.0	V	310.0	-91.1
17391.000	-21.24	-13.00	8.24	500.0	1000.000	292.0	V	308.0	-79.2



UMTS V

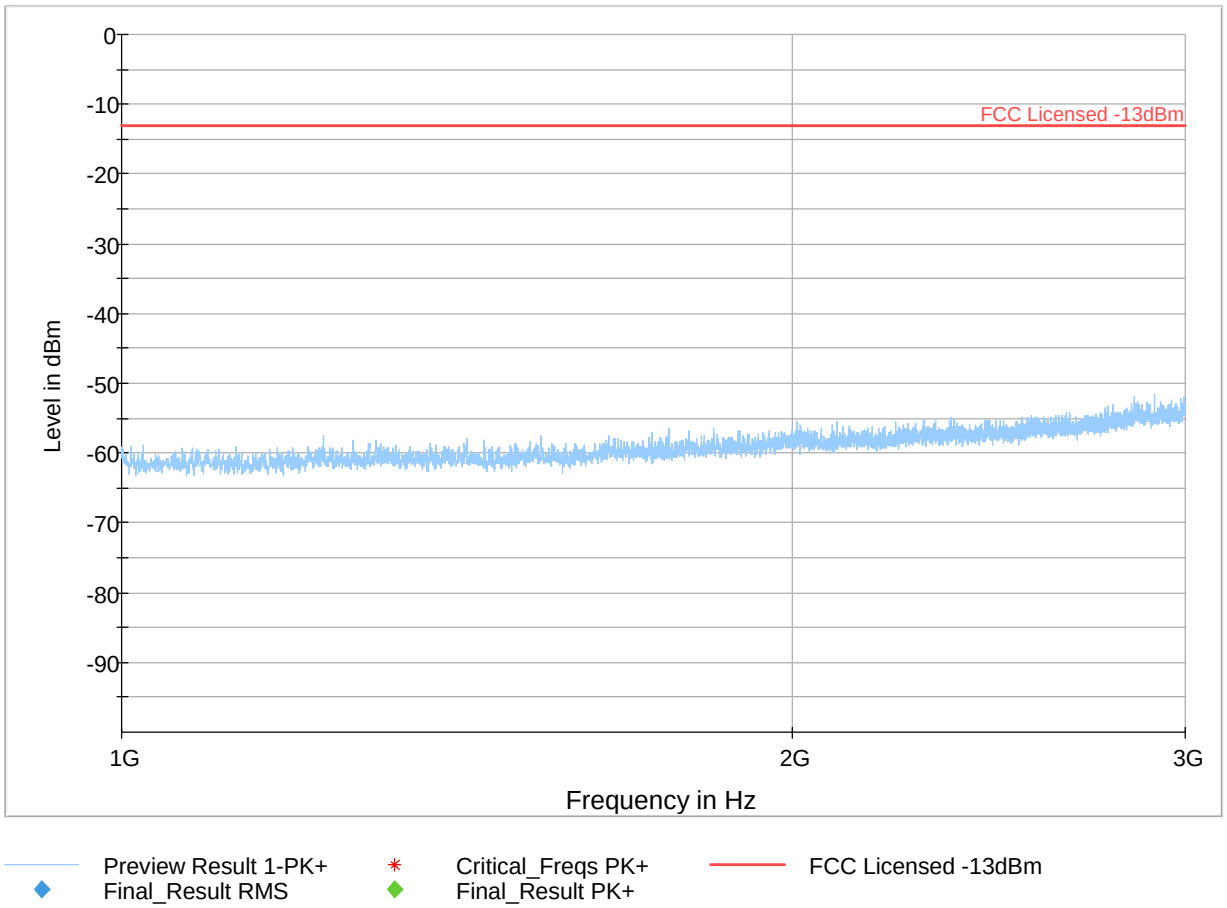
Plot # 43 Radiated Emissions: 30 MHz – 1GHz

Channel: Low



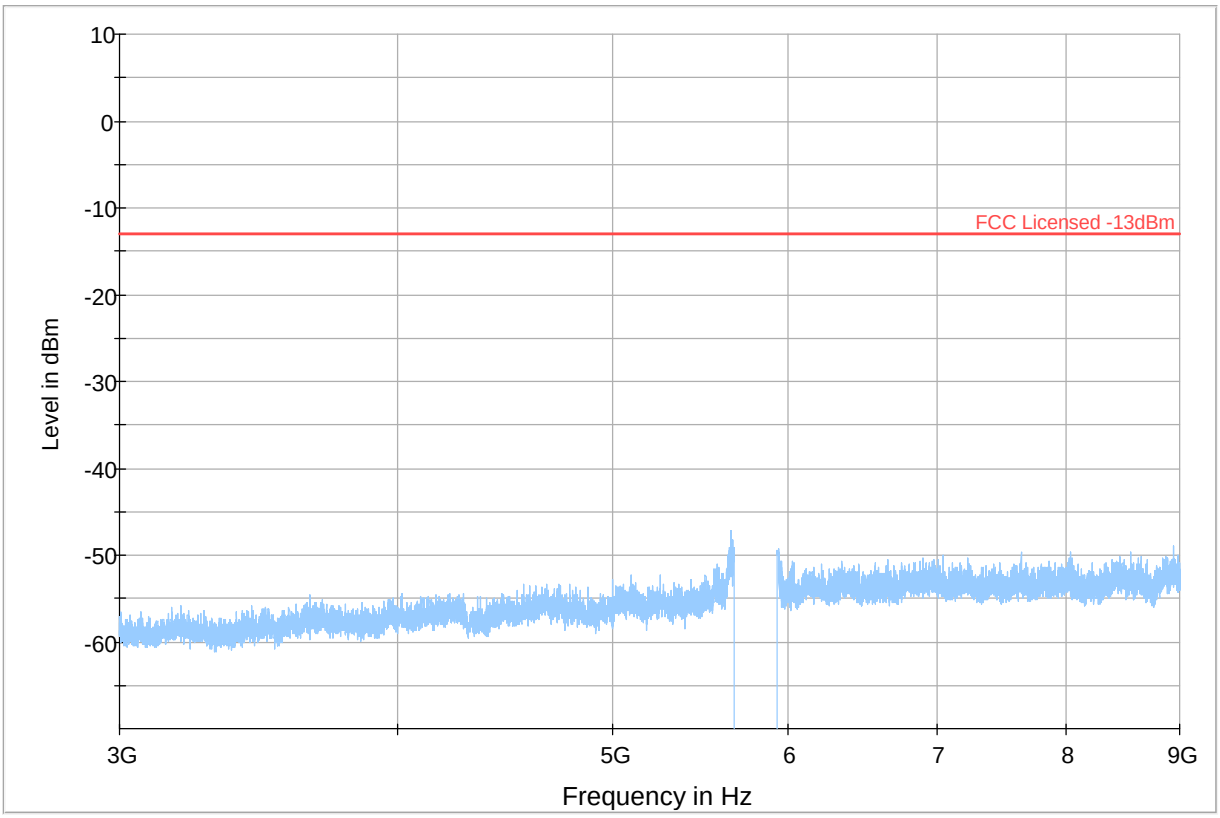
Plot # 44 Radiated Emissions: 1 GHz - 3 GHz

Channel: Low



Plot # 45 Radiated Emissions: 3 GHz – 9 GHz

Channel: Low

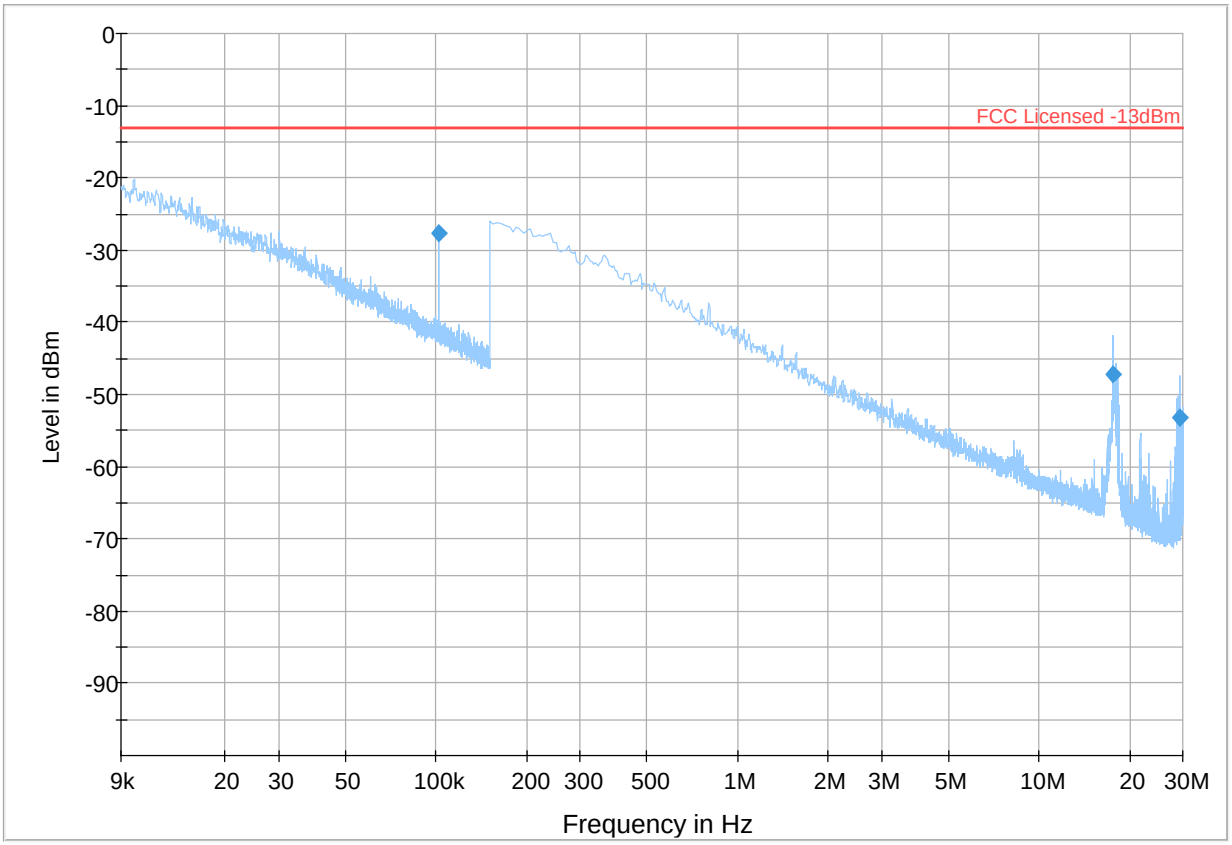


Plot # 46 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
0.102	-27.78	-13.00	14.78	500.0	9.000	100.0	V	278.0	-76.3
17.692	-47.20	-13.00	34.20	500.0	9.000	107.0	V	34.0	-78.3
29.234	-53.23	-13.00	40.23	500.0	9.000	134.0	V	78.0	-79.0

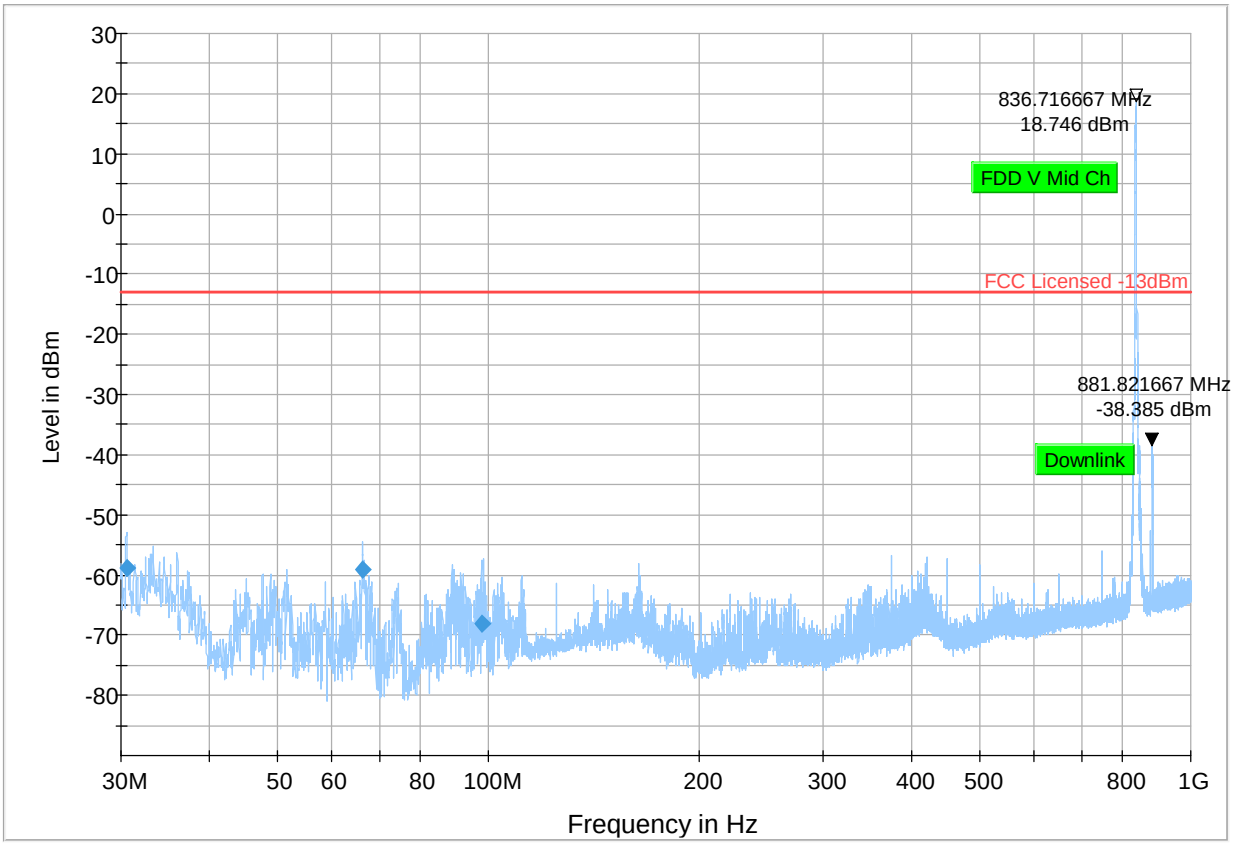


Plot # 47 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid

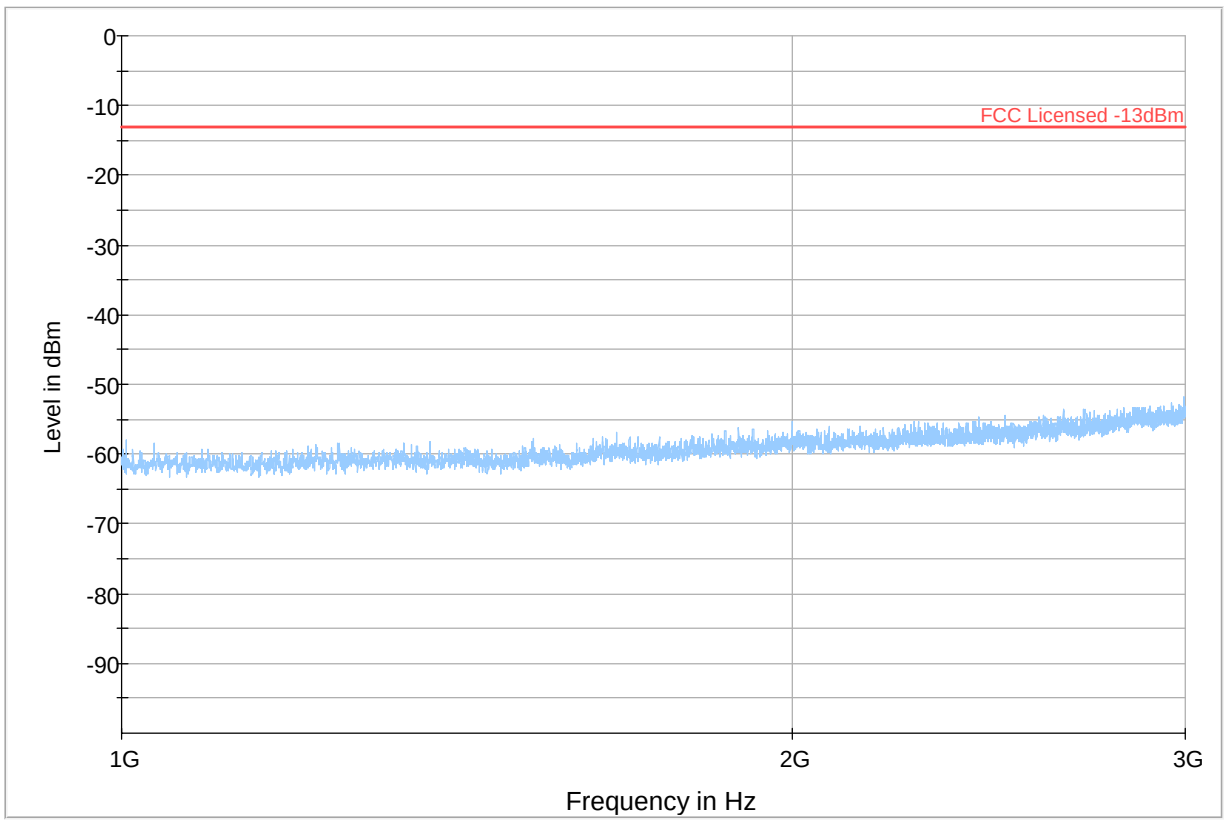
Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.582	-58.74	-13.00	45.74	500.0	100.000	100.0	V	337.0	-77.3
66.246	-59.16	-13.00	46.16	500.0	100.000	141.0	V	-29.0	-88.2
97.835	-68.13	-13.00	55.13	500.0	100.000	107.0	V	48.0	-81.7



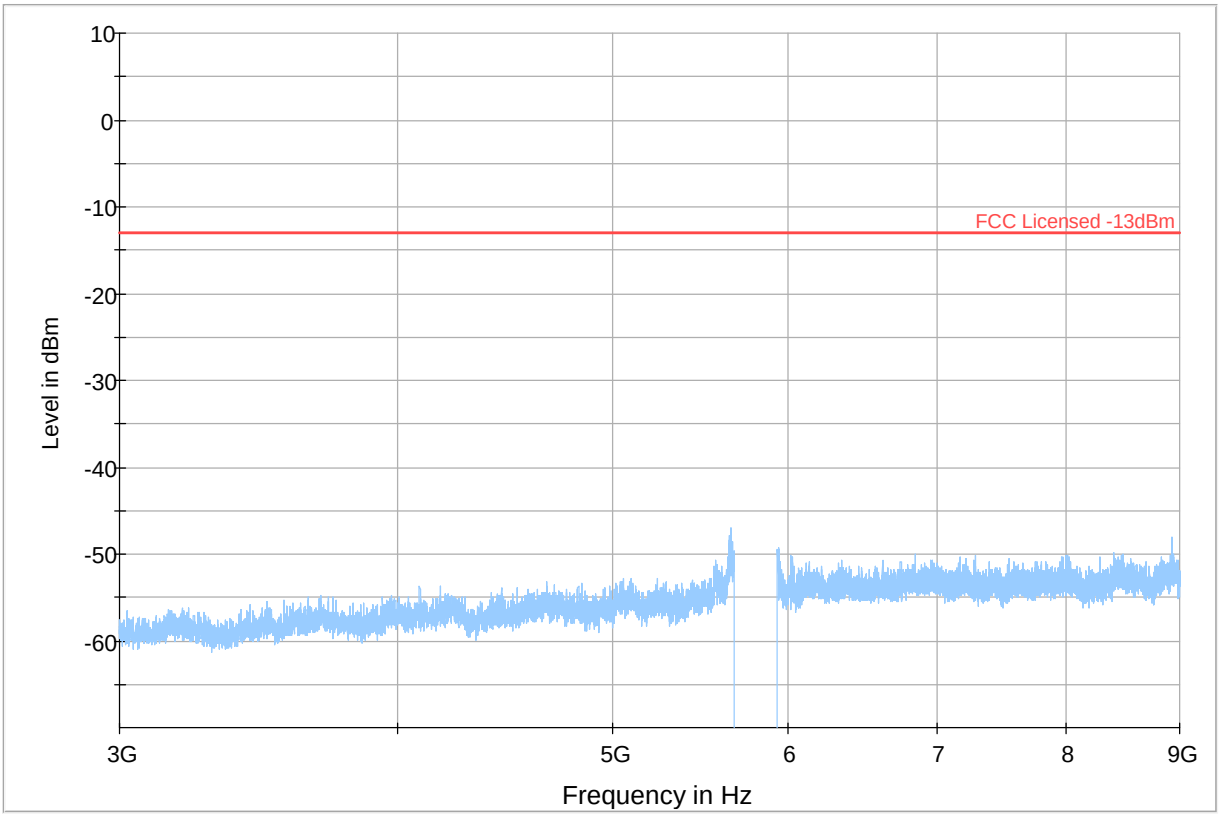
Plot # 48 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid



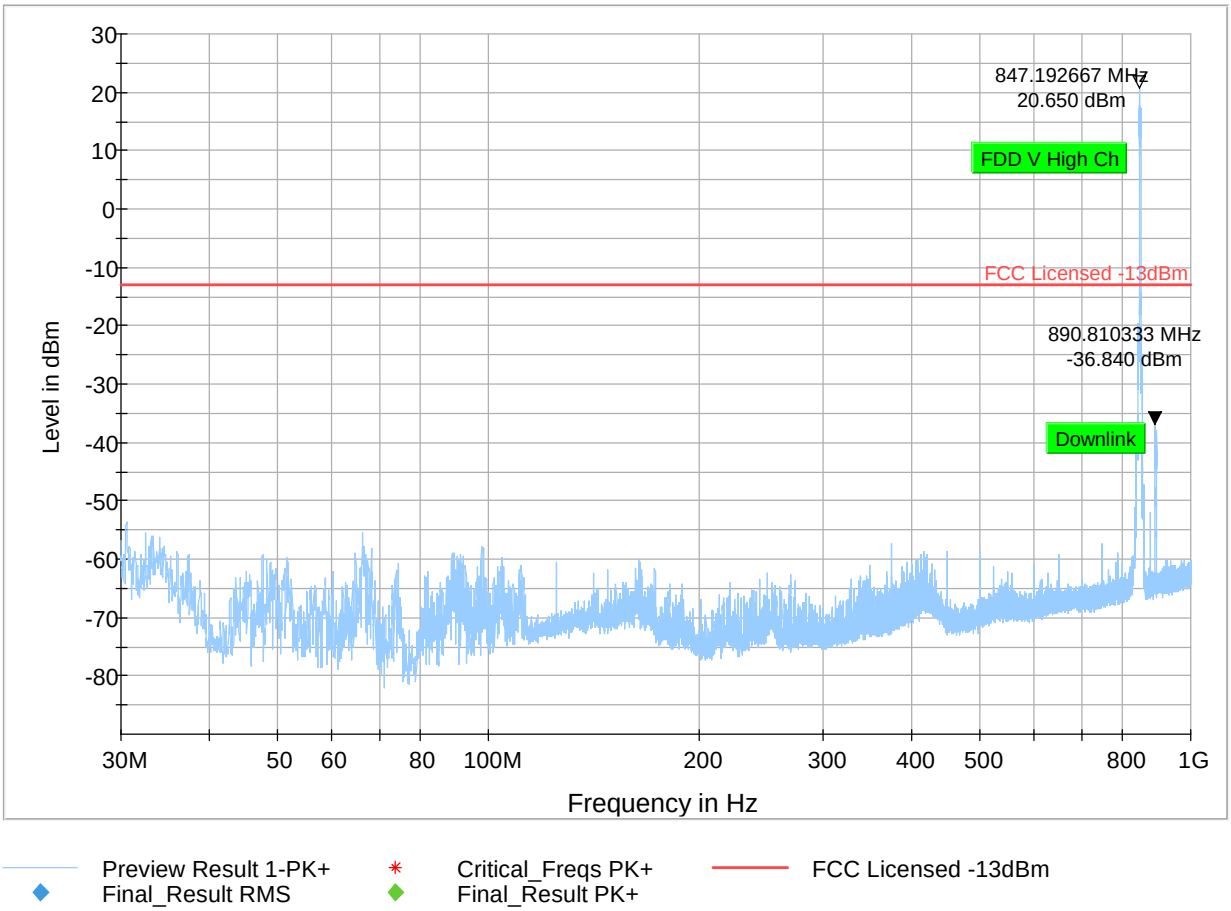
Plot # 49 Radiated Emissions: 3 GHz – 9 GHz

Channel: Mid



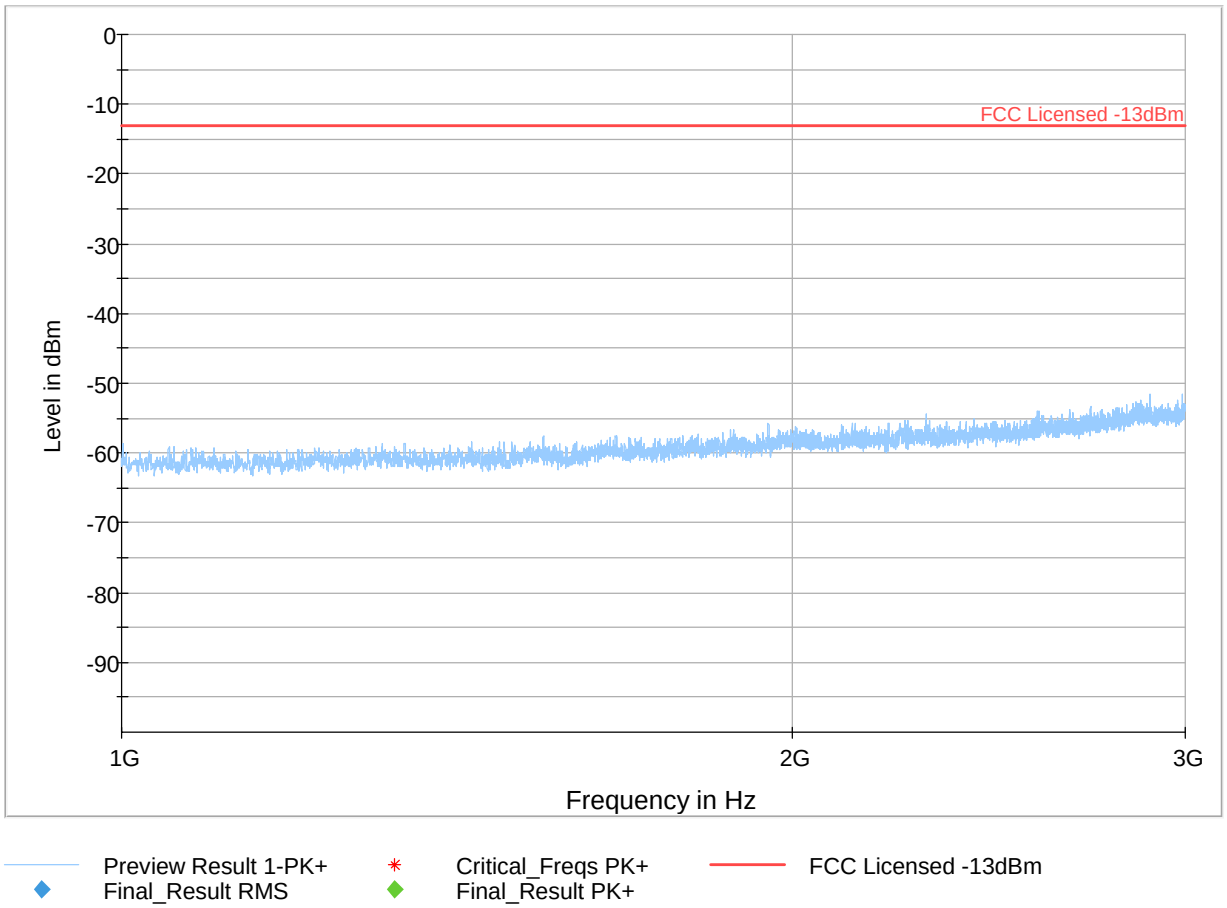
Plot # 50 Radiated Emissions: 30 MHz – 1GHz

Channel: High



Plot # 51 Radiated Emissions: 1 GHz - 3 GHz

Channel: High



Plot # 52 Radiated Emissions: 3 GHz – 9 GHz

Channel: High