



FCC Test Report

FOR:
OpenTV

Model Name:
HW1872

Product Description:
Indoor Location Gateway

FCC ID: 2AYG4-HW1872-1

Applied Rules and Standards:
47 CFR Parts 22, 24, 27 and 90

REPORT #: EMC_LOOMA-005-21001_FCC_22_24_27_90

DATE: 2022-01-27



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3462B-1

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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 22, 24, 27 and 90.

No deficiencies were ascertained.

Company Name	Product Description	Model #
OpenTV	Indoor Location Gateway	HW1872

Responsible for Testing Laboratory:

2022-01-27	Compliance	Kevin Wang (EMC Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

2022-01-27	Compliance	Yuchan Lu (EMC Engineer)	
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:	Akanksha Baskaran

2.2 Identification of the Client

Client's Name:	OpenTV
Street Address:	5090 North 40th St, Suite 450
City/Zip Code	Phoenix, AZ 85018
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	OpenTV
Manufacturers Address:	5090 North 40th St, Suite 450
City/Zip Code	Phoenix, AZ 85018
Country	USA

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model Name:	HW1872
Marketing Name:	IZG
HW Version :	03-PVT
SW Version :	00.01.00
FCC-ID :	2AYG4-HW1872-1
Product Description:	Indoor Location Gateway
Transceiver Technology / Type(s) of Modulation	Module: NRF9160-SICA FCC ID: 2ANPO00NRF9160 4G: FDD LTE Bands 2, 4, 5, 12, 13, 25, 26, 66
Frequency Range	LTE Band 2: 1850 – 1910 MHz LTE Band 4: 1710 – 1755 MHz LTE Band 5: 824 – 849 MHz LTE Band 12: 699 – 716 MHz LTE Band 13: 777 – 787 MHz LTE Band 25: 1850 – 1915 MHz LTE Band 26: 814 – 849 MHz LTE Band 66: 1710 – 1780 MHz
Max. declared antenna gain	low bands (<1GHz) 2.2dBi peak gain High bands (>1GHz) 4.8dBi peak gain
Other Radios included in the device:	WiFi
Power Supply/ Rated Operating Voltage Range	Vmin: 4.5 VDC/ Vnom: 5 VDC / Vmax: 5.5 VDC
Operating Temperature Range	-20°C to 70 °C
Sample Revision	☐ Prototype Unit; ☐ Production Unit; ☒ Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Comments
1	KRG0077-15910283	03-PVT	00.01.00	Radiated

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	PoE Injector	TL-POE150S(UN)	tp-link	Y203033001272

3.4 Test Sample Configuration

Set-up #	EUT / AE used for set-up	Comments
1	EUT#1 + AE#1	Radiated RF measurements were performed with EUT configured via customer provided command line interface that will not be available to the end user.

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	Cellular	Cellular was tested on Low, Mid, High Channels at maximum power using command line interface provided by the client that will not be available to the end user.

3.6 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels at the maximum power.

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 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, 90.

4.1 Dates of Testing:

12/20/2021 - 01/06/2022

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.

Measurement System	EMC 1	EMC 2
Conducted emissions (mains port)	1.12 dB	0.46 dB
Radiated emissions		
(< 30 MHz)	3.66 dB	3.88 dB
(30 MHz – 1GHz)	3.17 dB	3.34 dB
(1 GHz – 3 GHz)	5.01 dB	4.45 dB
(>3 GHz)	4.0 dB	4.79 dB

4.3 Environmental Conditions during Testing:

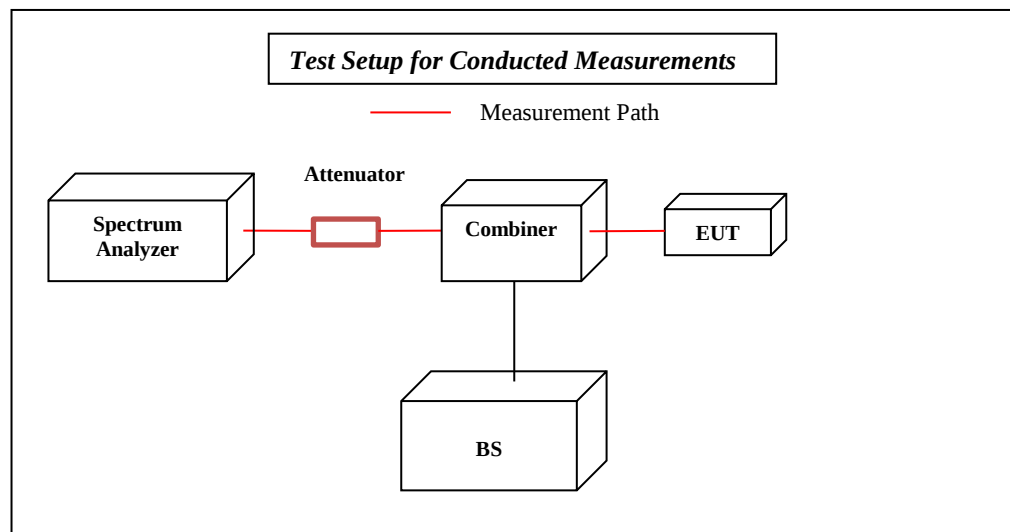
The following environmental conditions were maintained during the course of testing:

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

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

5 Measurement Procedures

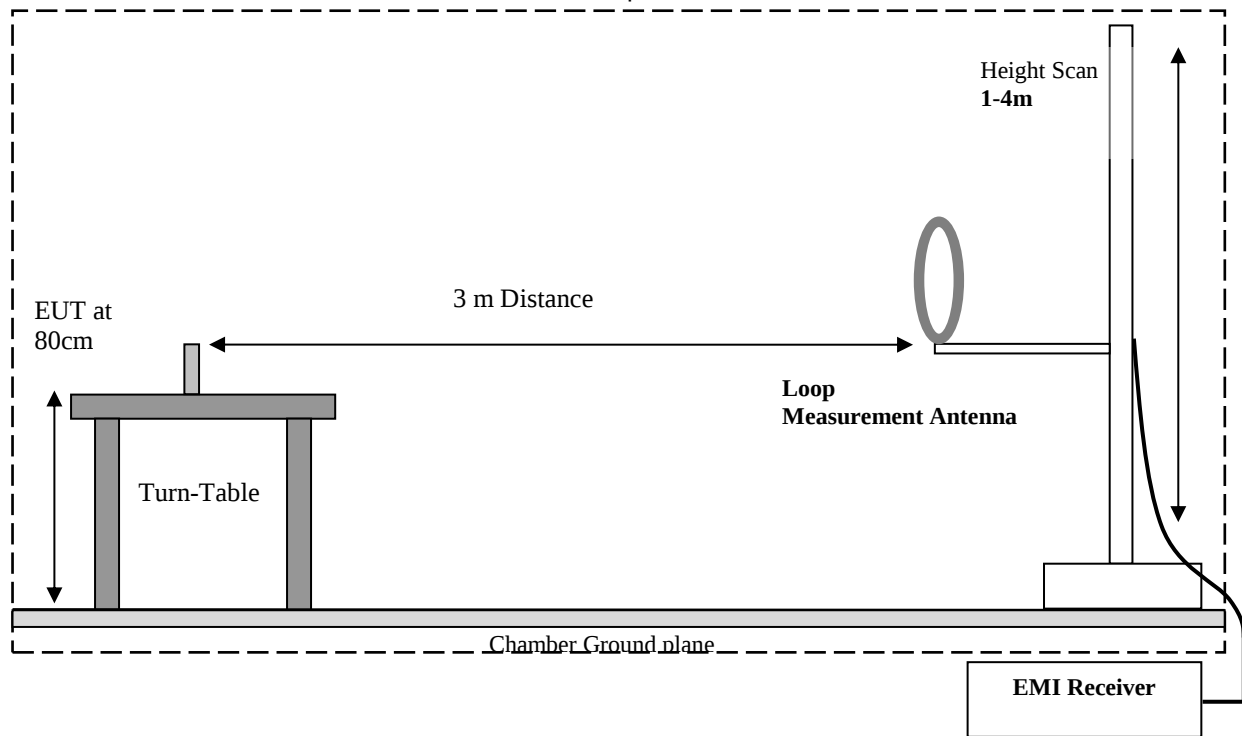
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v03r01 – “Measurement Guidance for Certification of Licensed Digital Transmitters” and according to relevant parts of ANSI/TIA-603-E (2016) as detailed below.



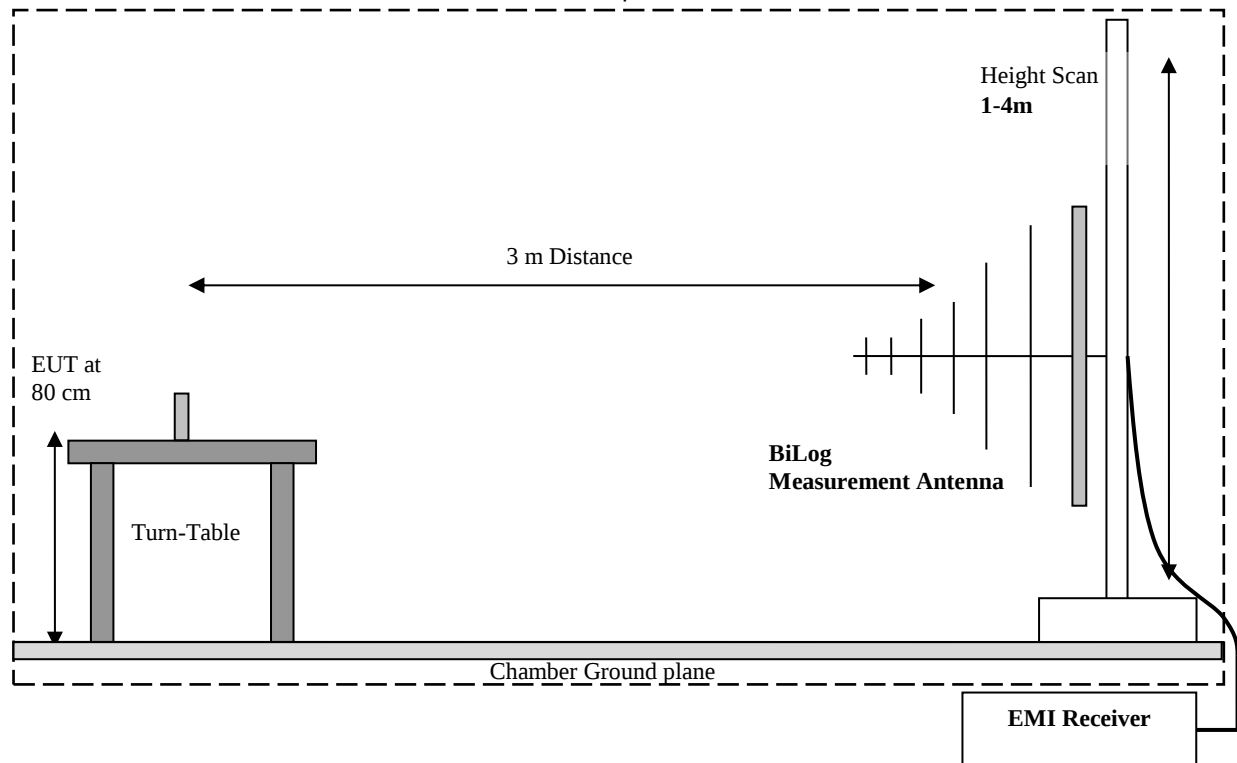
5.1 Radiated Measurement

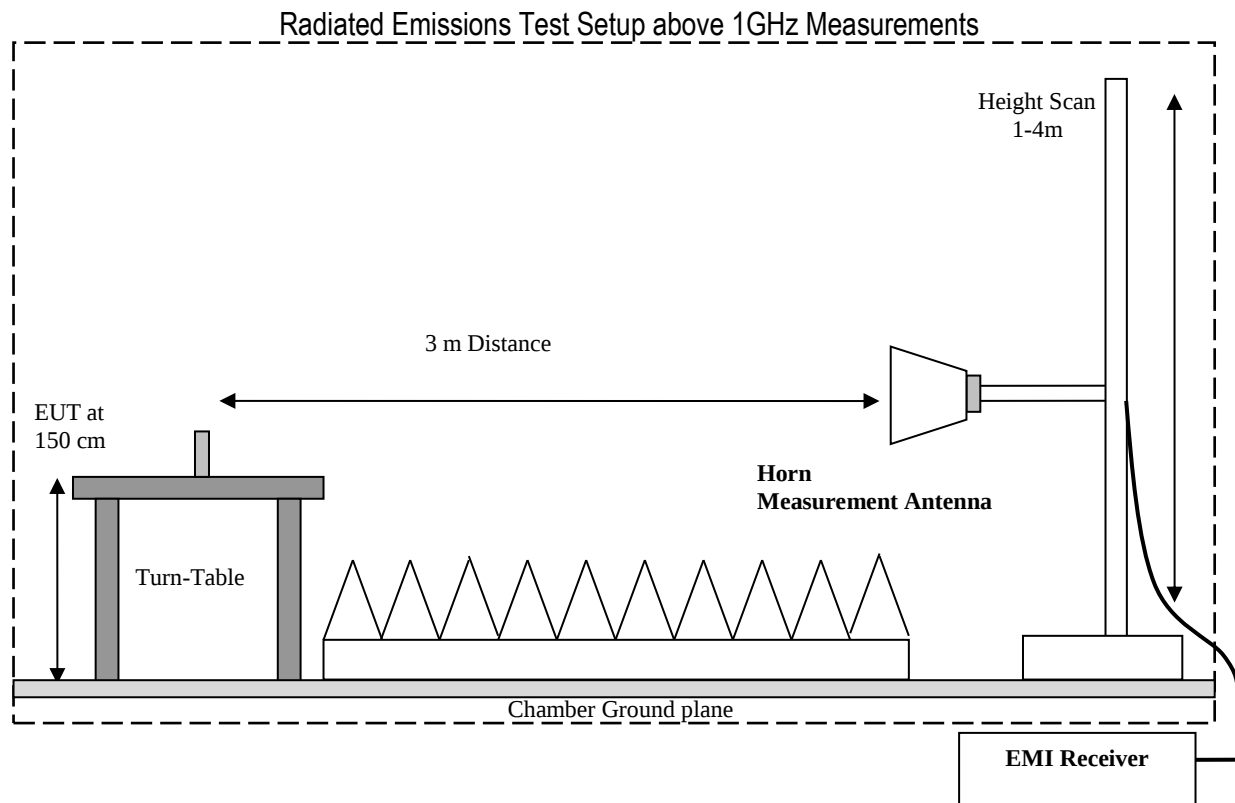
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to 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 22

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §22.913 (a)	RF Output Power	Nominal	-	☐	☐	☐	☒	Complies Note 1 Note 2
§2.1055; §22.355	Frequency Tolerance	Extreme Temperature and Voltage	-	☐	☐	☐	☒	Complies Note 1 Note 2
§2.1049; §22.917	Occupied Bandwidth	Nominal	-	☐	☐	☐	☒	Complies Note 1 Note 2
§2.1051; §22.917	Band Edge Compliance	Nominal	-	☐	☐	☐	☒	Complies Note 1 Note 2
§2.1051; §22.917	Conducted Spurious Emissions	Nominal	-	☐	☐	☐	☒	Complies Note 1 Note 2
§2.1053; §22.917	Radiated Spurious Emissions	Nominal	Op. 1	☒	☐	☐	☐	Complies

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

Note 2: Leveraged from module certification NRF9160-SICA (FCC ID: 2ANPO00NRF9160)

6.2 Part 24

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

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

Note 2: Leveraged from module certification NRF9160-SICA (FCC ID: 2ANPO00NRF9160)

6.3 FCC 27

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §27.50	RF Output Power	Nominal	-	☐	☐	☐	■	Complies Note 1 Note 2
§2.1055; §27.54	Frequency Stability	Extreme Temperature and Voltage	-	☐	☐	☐	■	Complies Note 1 Note 2
§2.1049; §27.53	Occupied Bandwidth	Nominal	-	☐	☐	☐	■	Complies Note 1 Note 2
§2.1051; §27.53	Band Edge Compliance	Nominal	-	☐	☐	☐	■	Complies Note 1 Note 2
§2.1051; §27.53	Conducted Spurious Emissions	Nominal	-	☐	☐	☐	■	Complies Note 1 Note 2
§2.1053; §27.53	Radiated Spurious Emissions	Nominal	Op. 1	■	☐	☐	☐	Complies

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

Note 2: Leveraged from module certification NRF9160-SICA (FCC ID: 2ANPO00NRF9160)

7 Test Result Data

7.1 ERP/EIRP

FCC Rule Parts	Band	Frequency Range (MHz)	Power Conducted (W) Note 1	Emission Designator	Gain (dBi)	Gain Linear	EIRP (W) Note 2	ERP (W) Note 2	Limit EIRP (W)	Limit ERP (W)
24E	LTE 25 (2)	1850 – 1915	0.19907	1M12G7W	4.8	3.020	0.601	-	2	-
24E	LTE 25 (2)	1850 – 1915	0.15812	956KD7W	4.8	3.020	0.478	-	2	-
27	LTE 66 (4)	1710 – 1780	0.20654	1M12G7W	4.8	3.020	0.624	-	1	-
27	LTE 66 (4)	1710 – 1780	0.17061	952KD7W	4.8	3.020	0.515	-	1	-
22	LTE 26 (5)	814 – 849	0.19907	1M12G7W	2.2	1.660	0.330	-	7	-
22	LTE 26 (5)	814 – 849	0.15453	966KD7W	2.2	1.660	0.256	-	7	-
27	LTE 12	699 – 716	0.18793	1M14G7W	2.2	1.660	0.312	0.190	-	3
27	LTE 12	699 – 716	0.14825	965KD7W	2.2	1.660	0.246	0.150	-	3
27	LTE 13	777 – 787	0.17947	1M11G7W	2.2	1.660	0.298	0.182	-	3
27	LTE 13	777 – 787	0.18281	947KD7W	2.2	1.660	0.303	0.185	-	3

Note 1: Power Conducted (dBm) leveraged from cellular module Quectel NRF9160-SICA (FCC ID: 2ANPO00NRF9160).

7.2 Radiated Spurious Emissions

7.2.1 Measurement utilizing KDB 971168 D01 Power Meas License Digital Systems v03r01, and according to ANSI/TIA-603-E (2016)

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 and 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 (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.

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

7.2.3 Test conditions and setup:

Ambient Temperature (°C)	EUT Set-Up #	EUT operating mode	Power Input
22.0	1	Op. 1	110 VAC

7.2.4 Measurement result:

Plot #	Channel	EUT Set-Up #	EUT operating mode	Scan Frequency	Limit (dBm)	Result
1-3	Low	1	LTE Band 2	30 MHz – 18 GHz	-13	Pass
4-8	Mid			9 kHz – 22 GHz	-13	Pass
9-11	High			30 MHz – 18 GHz	-13	Pass
12-14	Low	1	LTE Band 4	30 MHz – 18 GHz	-13	Pass
15-18	Mid			9 kHz – 18 GHz	-13	Pass
19-21	High			30 MHz – 18 GHz	-13	Pass
22-24	Low	1	LTE Band 5	30 MHz – 9 GHz	-13	Pass
25-28	Mid			9 kHz – 9 GHz	-13	Pass
29-31	High			30 MHz – 9 GHz	-13	Pass
32-34	Low	1	LTE Band 12	30 MHz – 9 GHz	-13	Pass
35-38	Mid			9 kHz – 9 GHz	-13	Pass
39-41	High			30 MHz – 9 GHz	-13	Pass
42-45	Mid	1	LTE Band 13	9 kHz – 18 GHz	-13	Pass
46-48	Low	1	LTE Band 25	30 MHz – 18 GHz	-13	Pass
49-53	Mid			9 kHz – 22 GHz	-13	Pass
54-56	High			30 MHz – 18 GHz	-13	Pass
57-60	Mid	1	LTE Band 26	9 kHz – 18 GHz	-13	Pass
61-63	Low	1	LTE Band 26	30 MHz – 18 GHz	-13	Pass
64-67	Mid			9 kHz – 18 GHz	-13	Pass
68-70	High			30 MHz – 18 GHz	-13	Pass
71-73	Low	1	LTE Band 66	30 MHz – 18 GHz	-13	Pass
74-77	Mid			9 kHz – 18 GHz	-13	Pass
78-80	High			30 MHz – 18 GHz	-13	Pass

7.2.5 Measurement Plots:

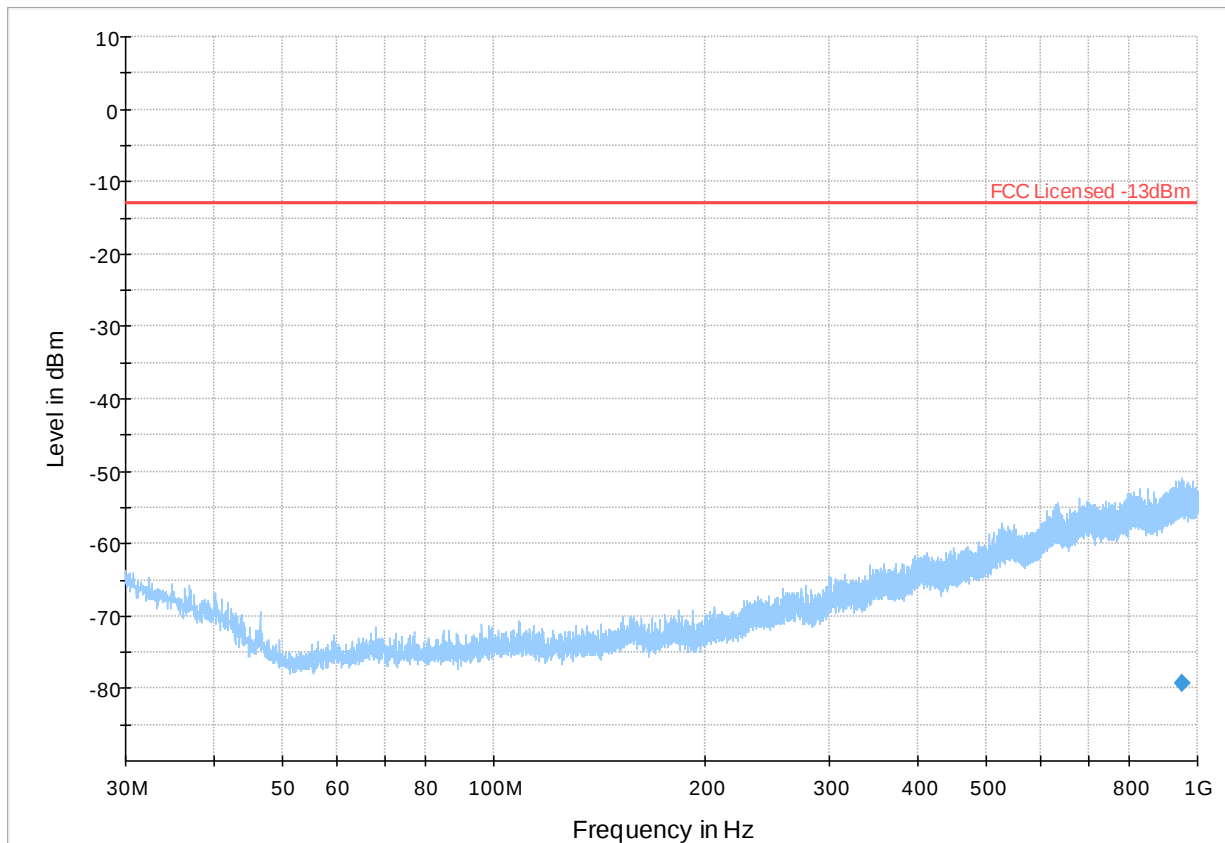
LTE Band 2

Plot #1 Radiated Emissions: 30 MHz – 1GHz

Channel: Low

Final Result

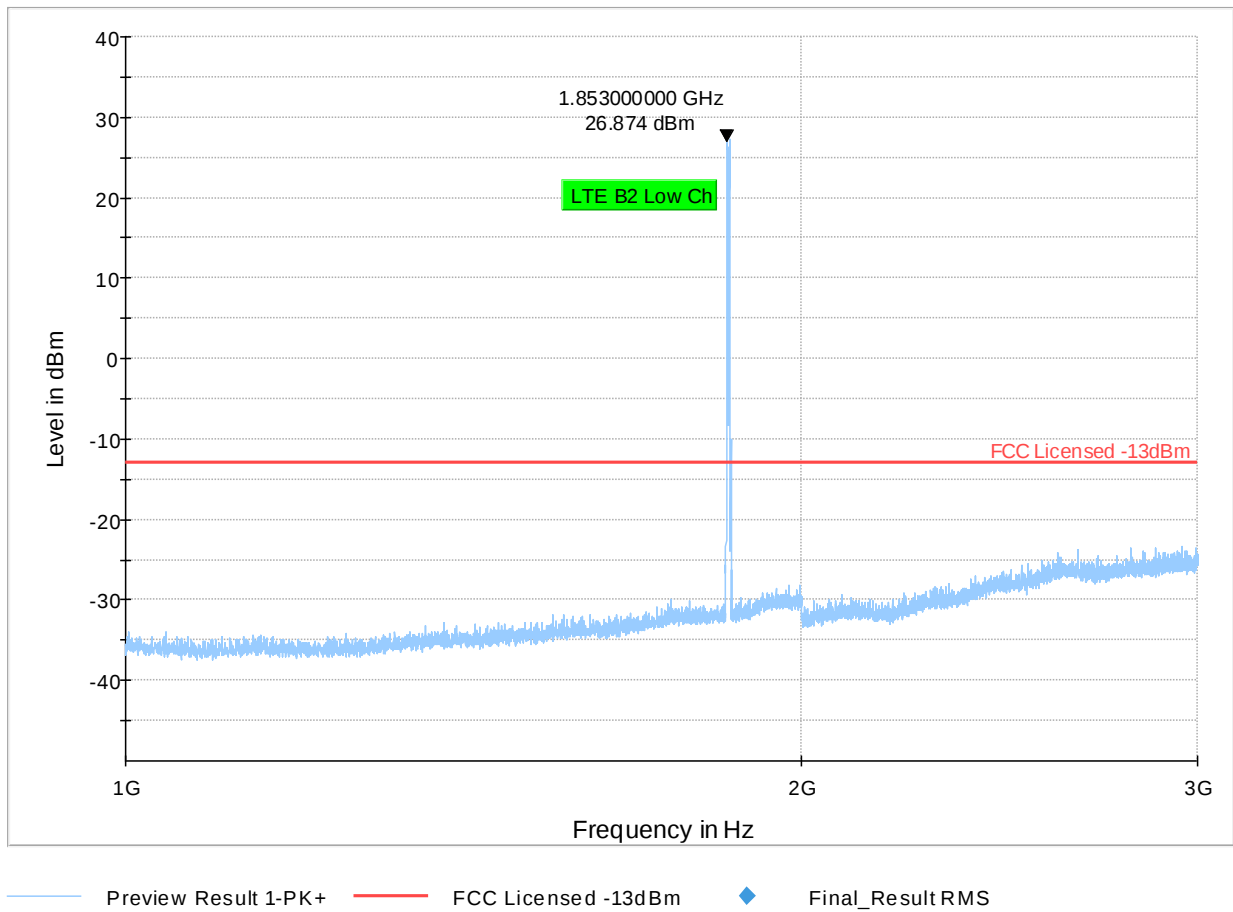
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
952.438	-79.26	-13.00	66.26	500.0	100.000	218.0	V	321.0	-72.5	



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

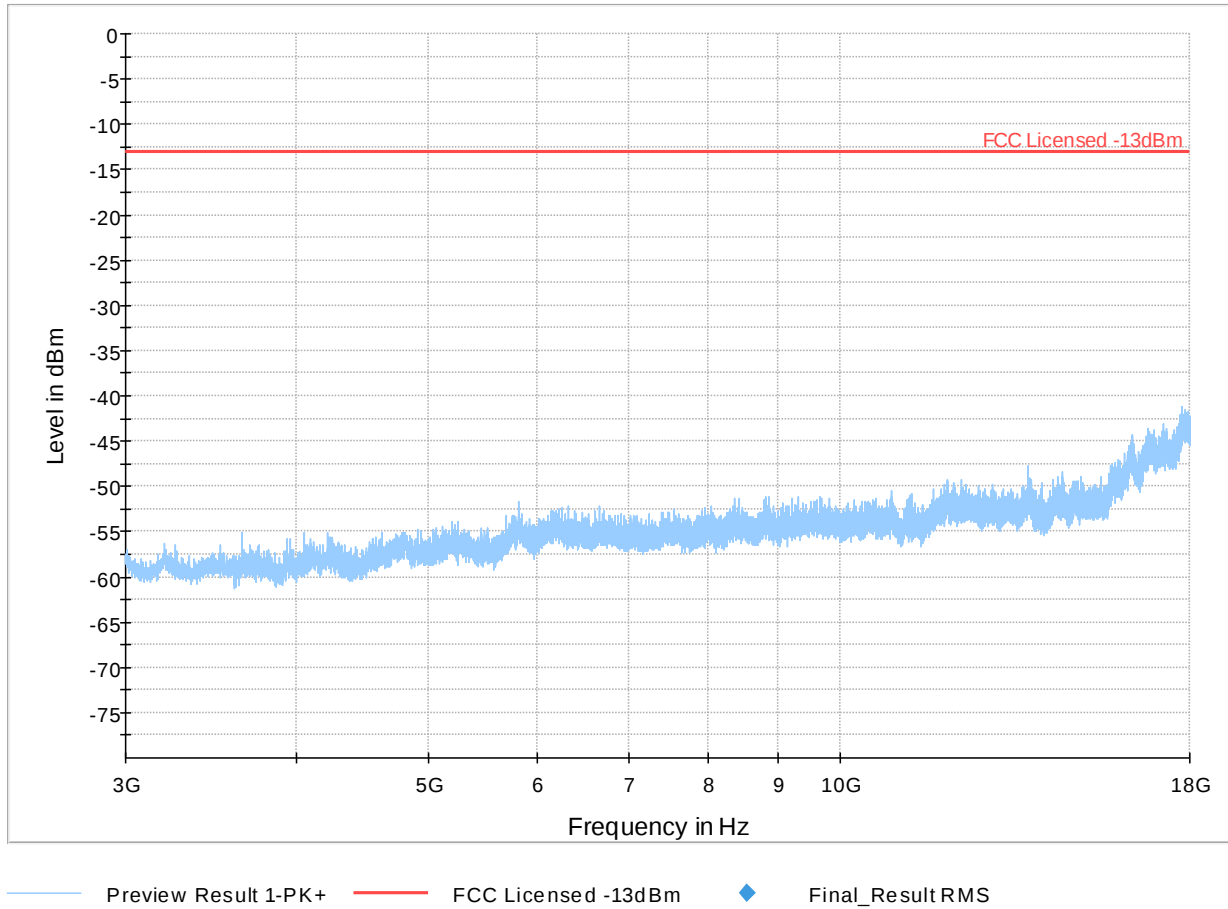
Plot # 2 Radiated Emissions: 1-3 GHz

Channel: Low



Plot # 3 Radiated Emissions: 3-18 GHz

Channel: Low

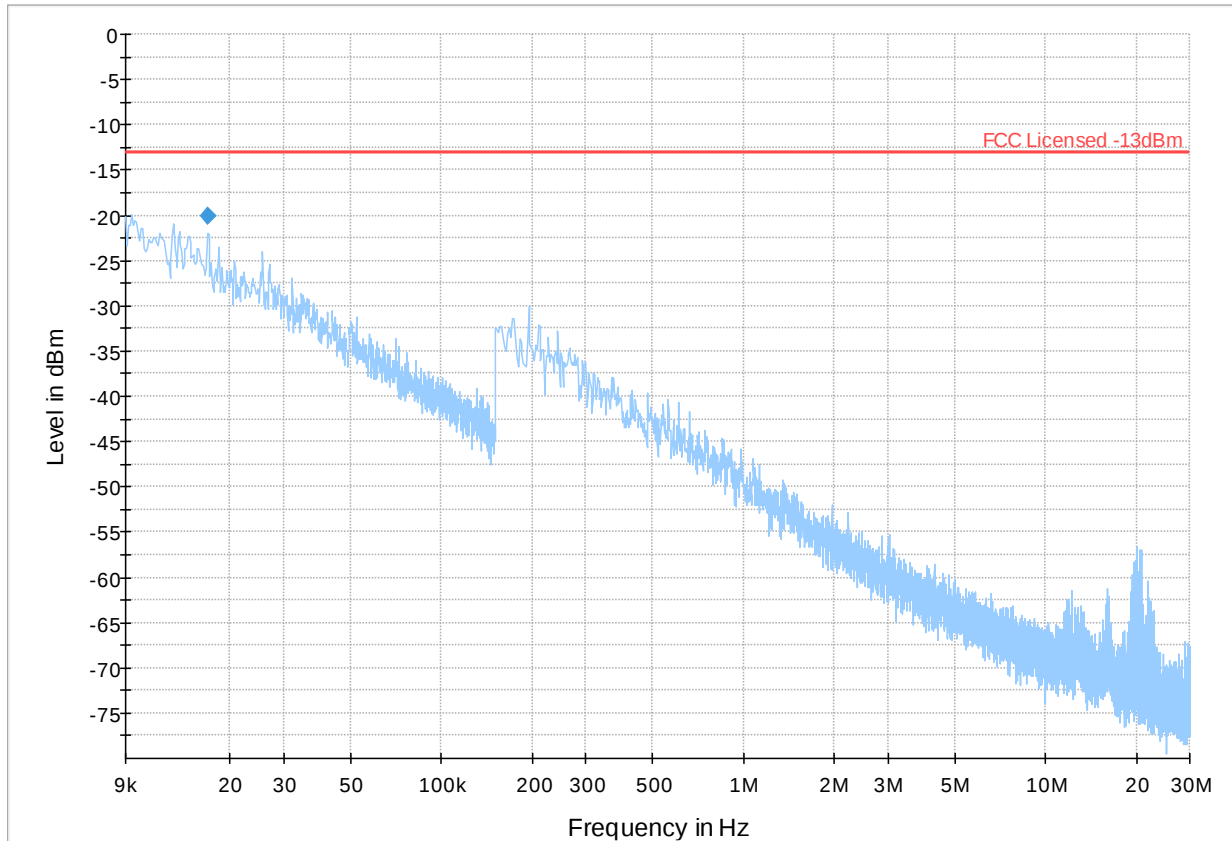


Plot #4 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final_Result

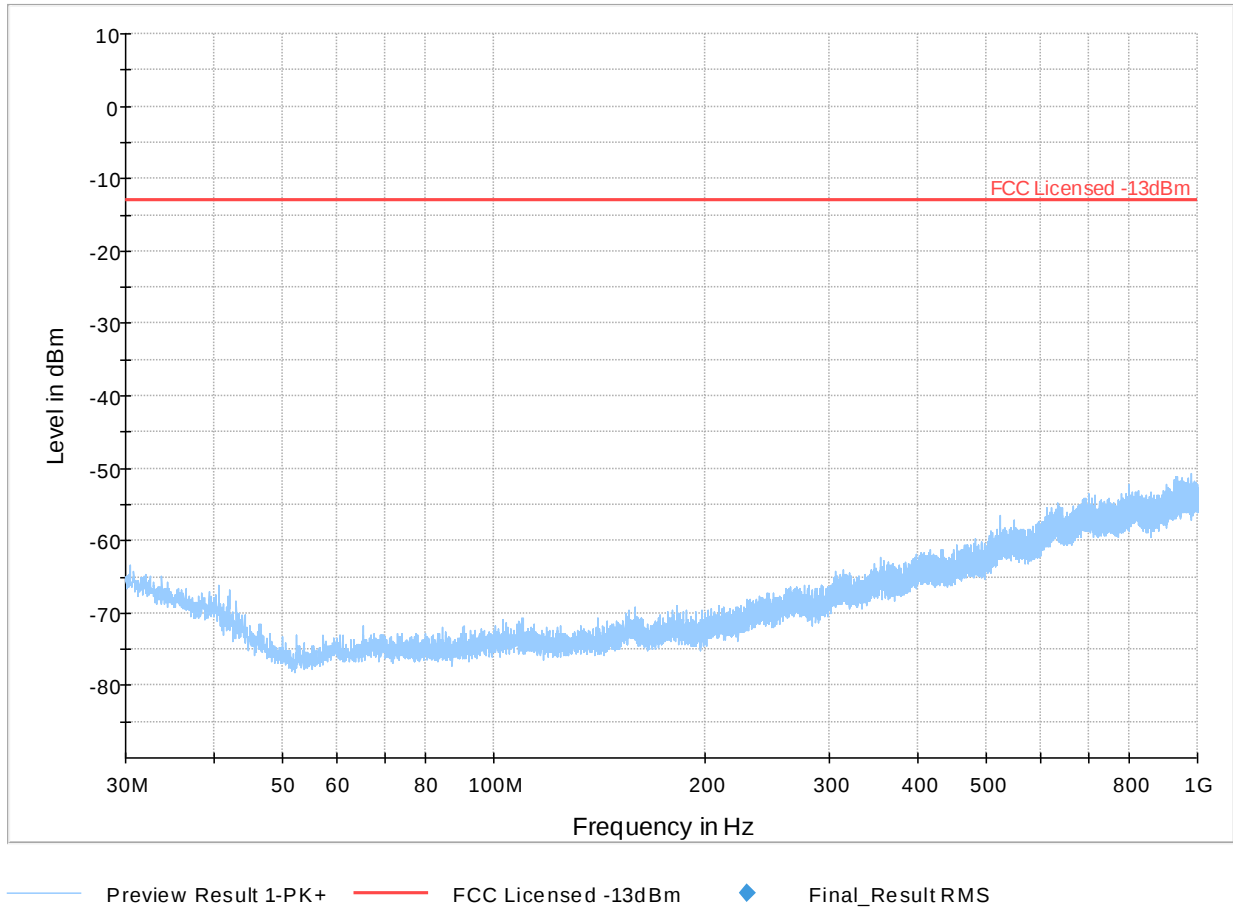
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.017	-20.15	-13.00	7.15	500.0	3.000	315.0	V	122.0	-68.9	



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

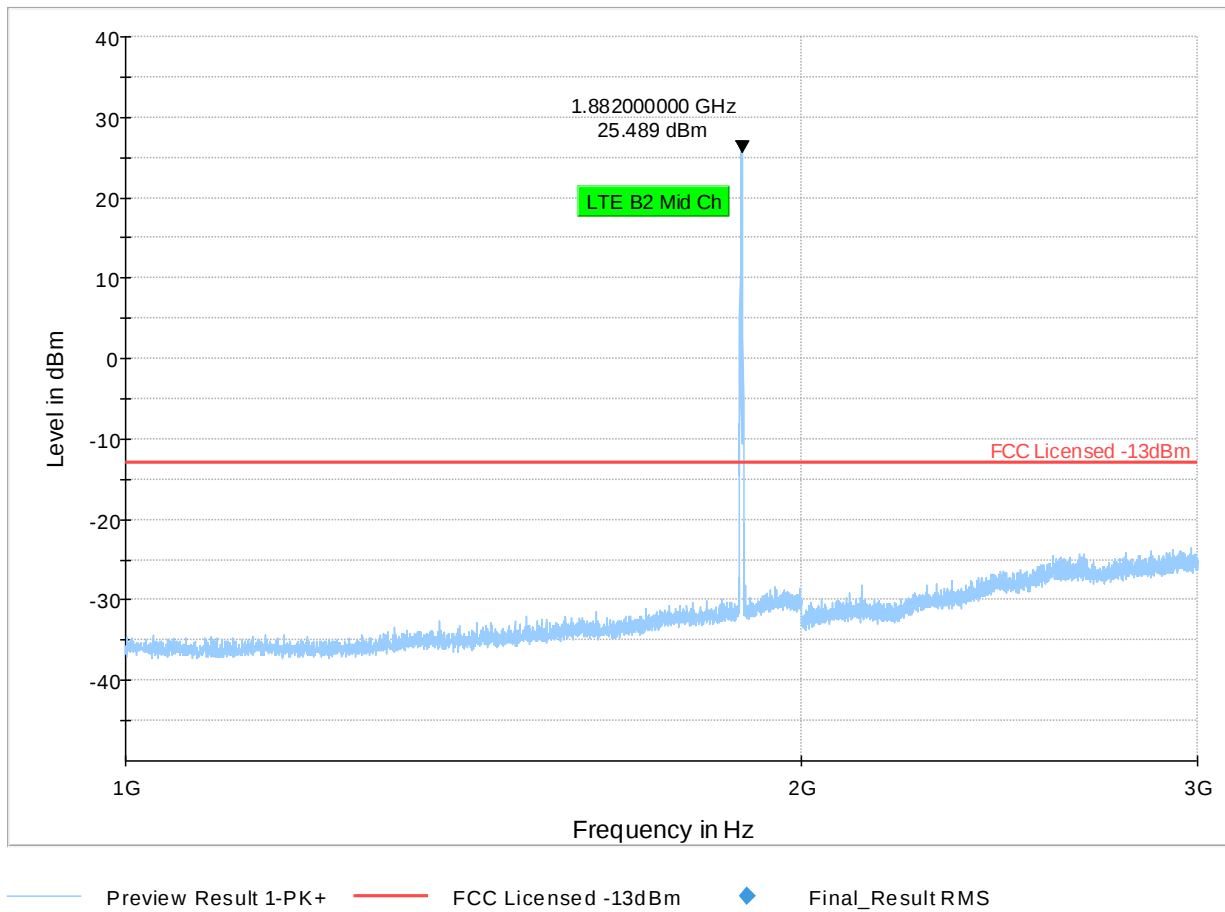
Plot #5 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



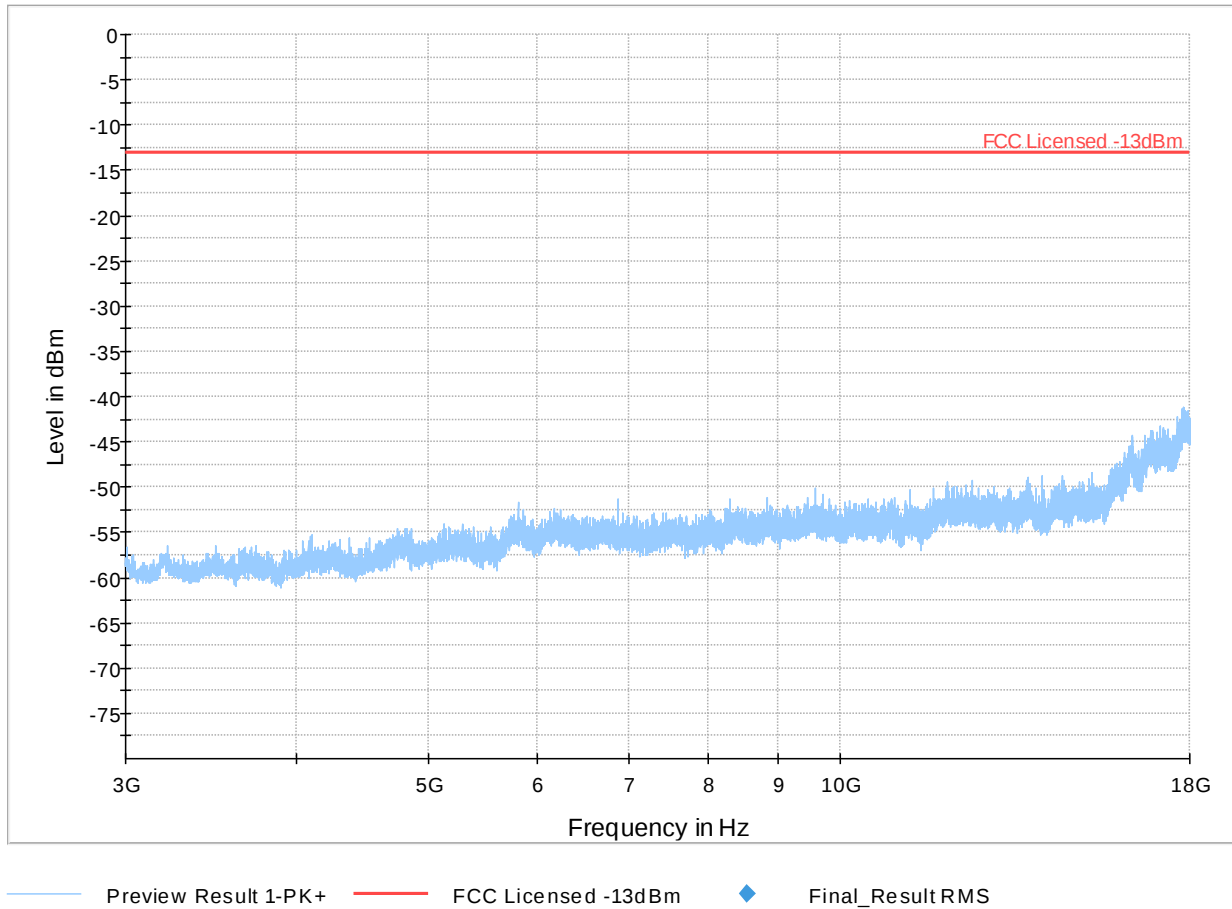
Plot #6 Radiated Emissions: 1-3 GHz

Channel: Mid



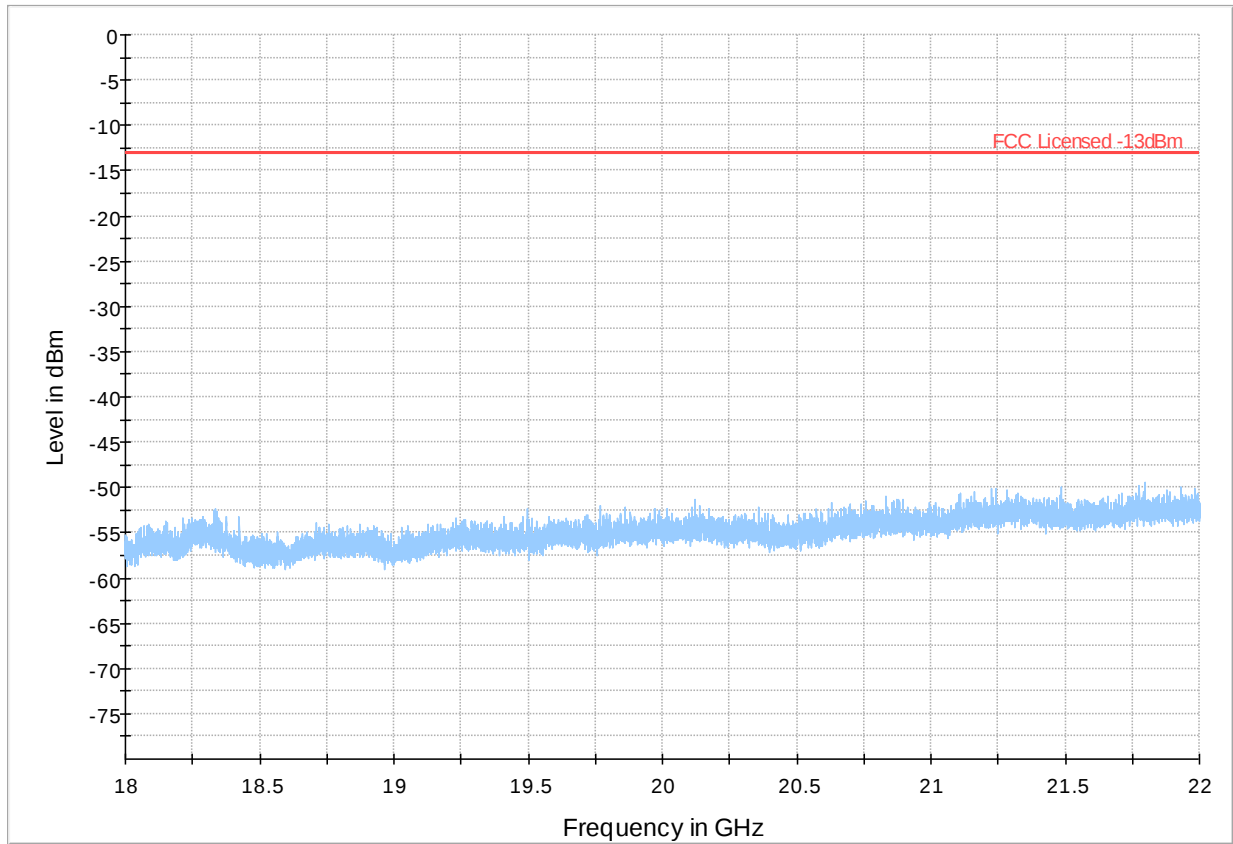
Plot #7 Radiated Emissions: 3-18 GHz

Channel: Mid



Plot #8 Radiated Emissions: 18-22 GHz

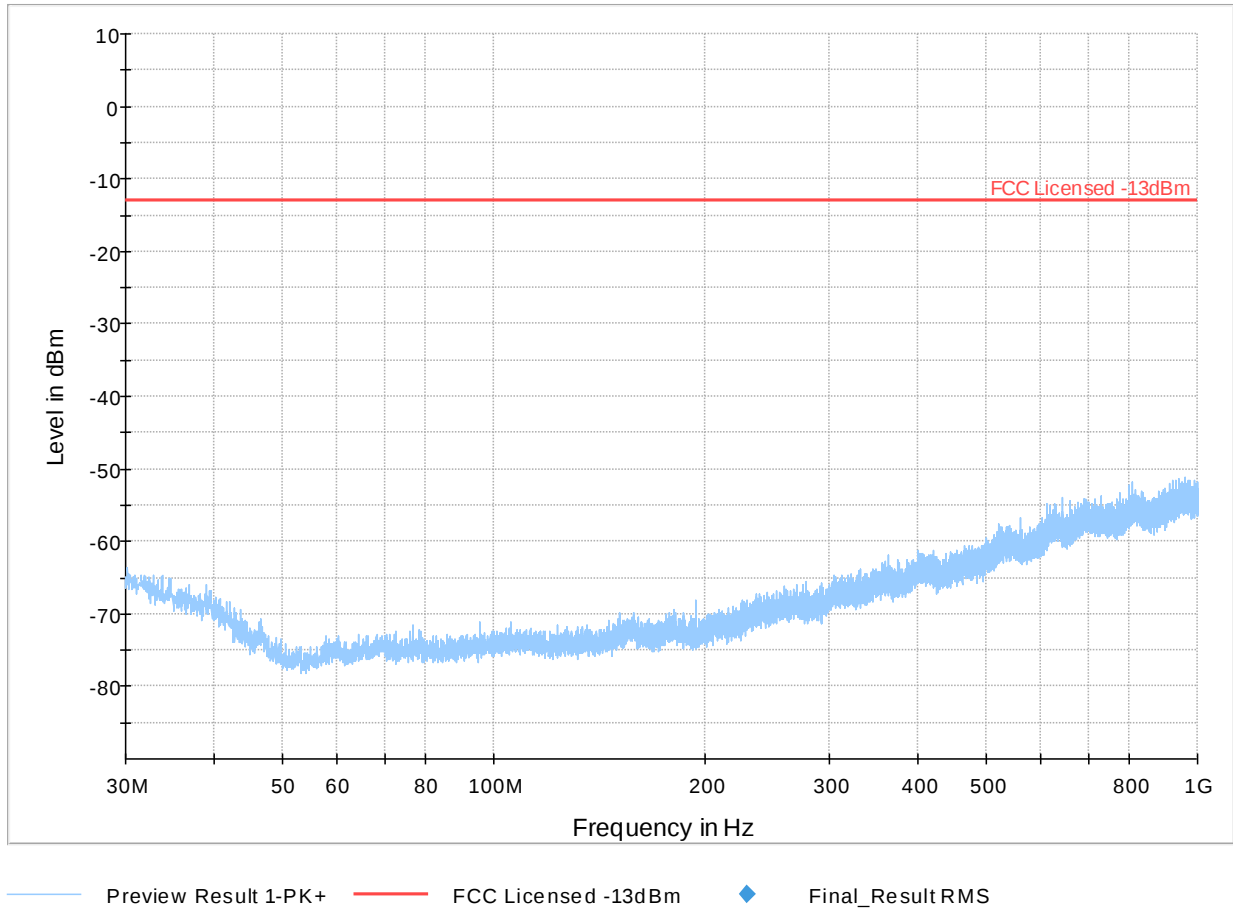
Channel: Mid



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

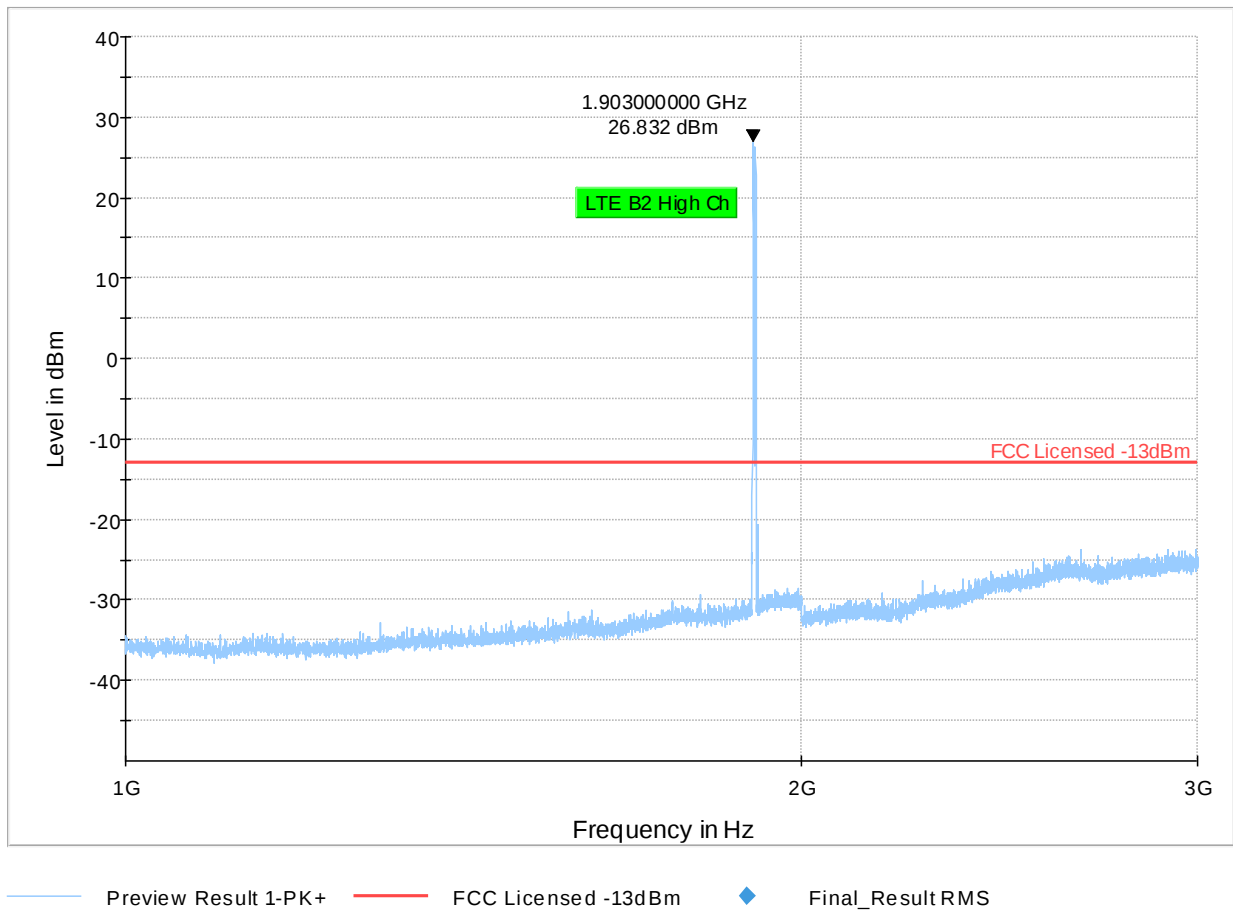
Plot #9 Radiated Emissions: 30 MHz – 1 GHz

Channel: High



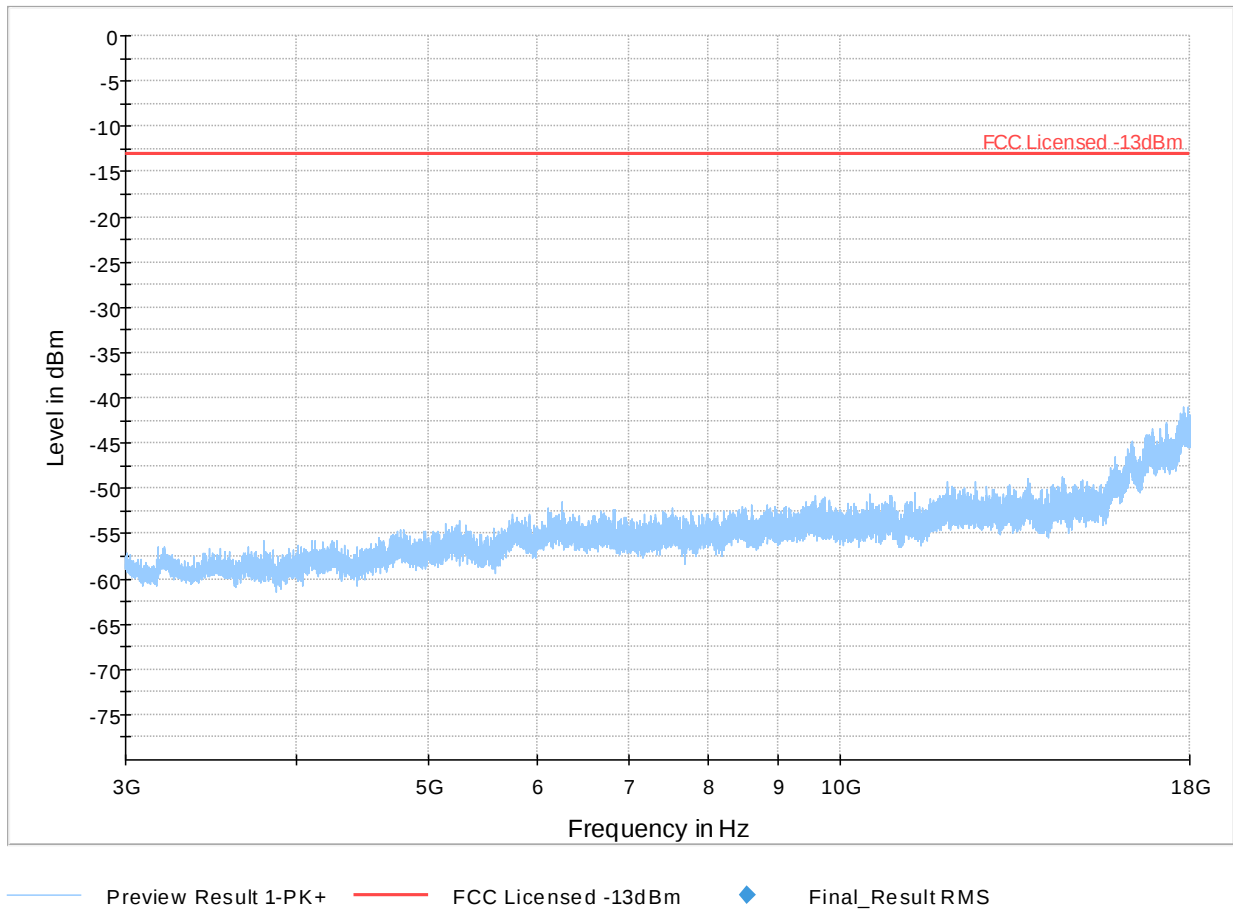
Plot #10 Radiated Emissions: 1-3 GHz

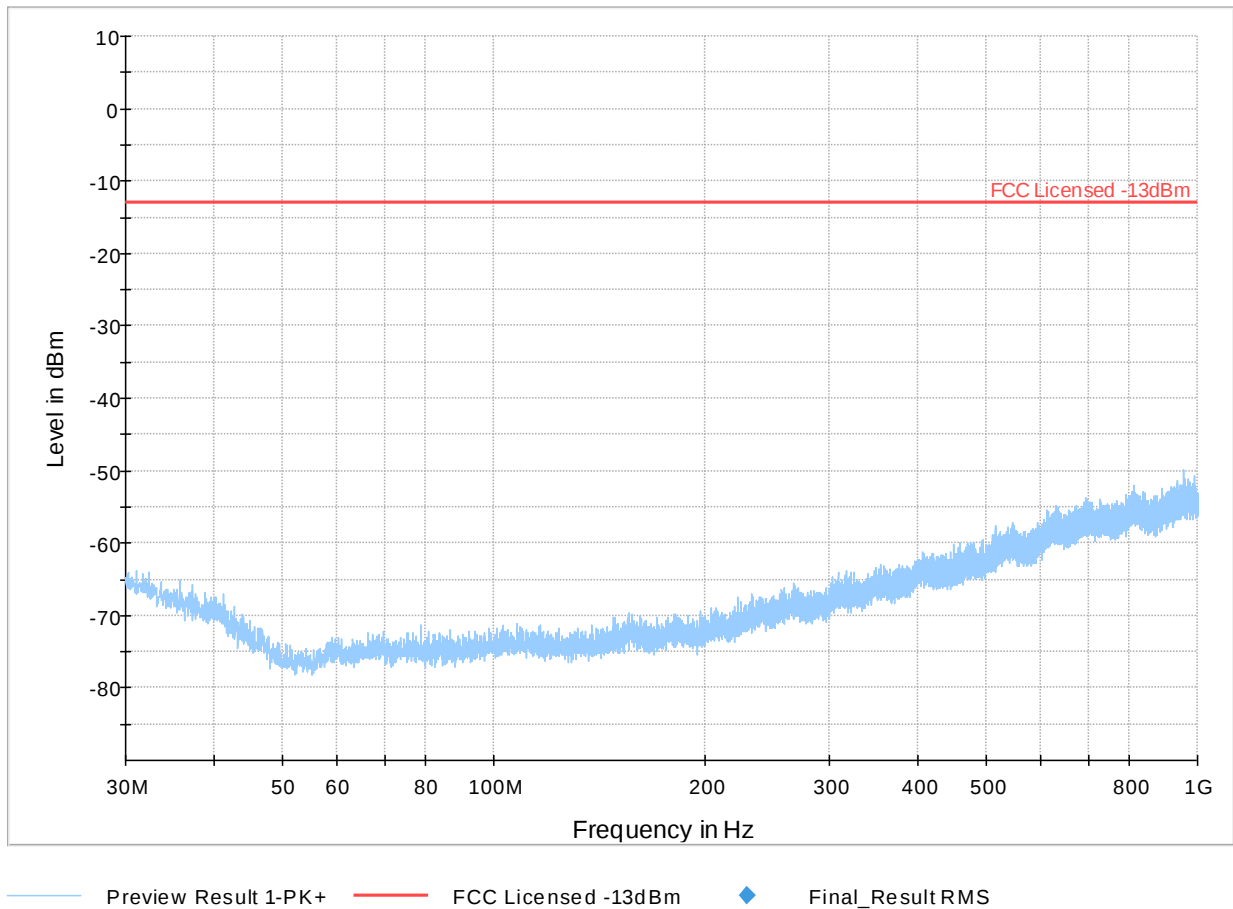
Channel: High



Plot #11 Radiated Emissions: 3-18 GHz

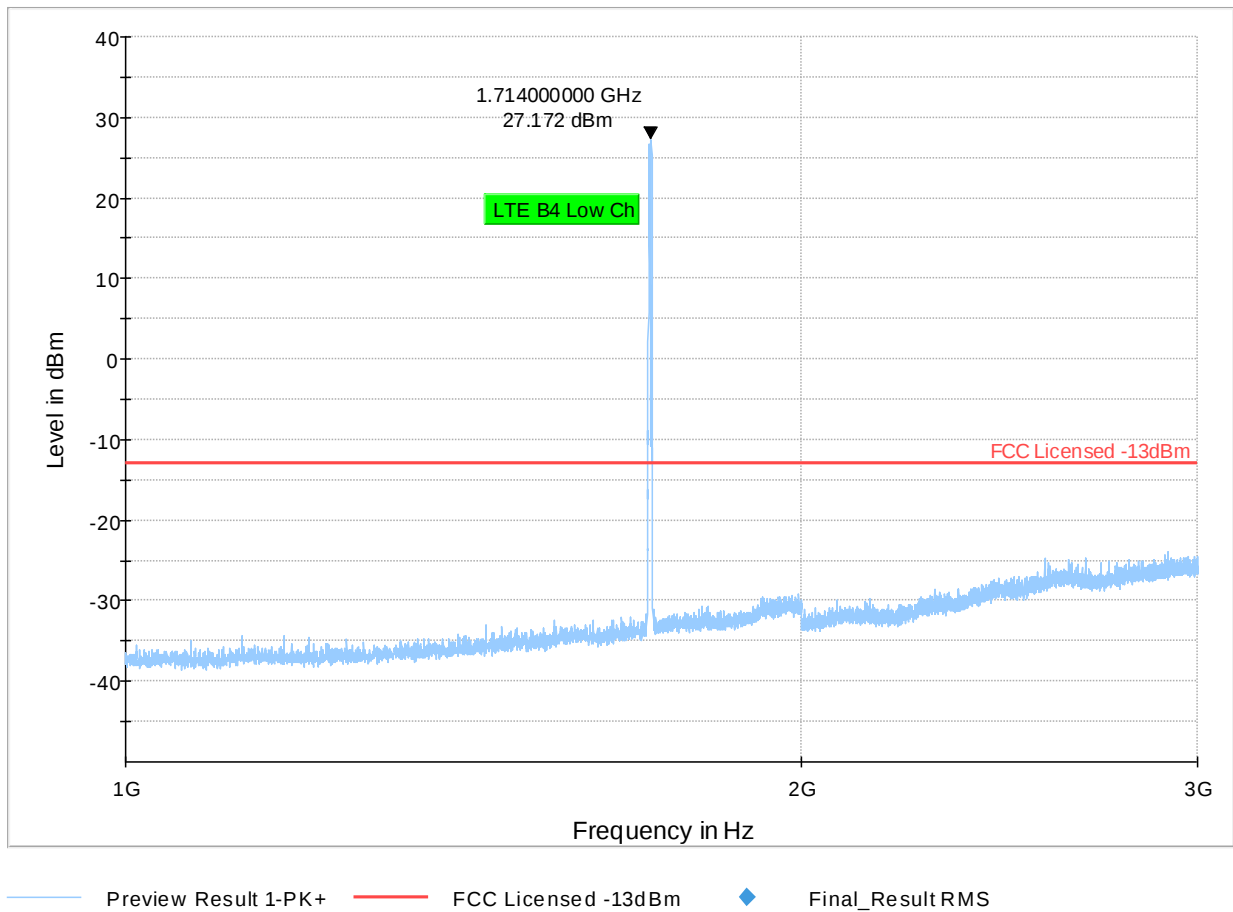
Channel: High



LTE Band 4**Plot #12 Radiated Emissions: 30 MHz – 1GHz****Channel: Low**

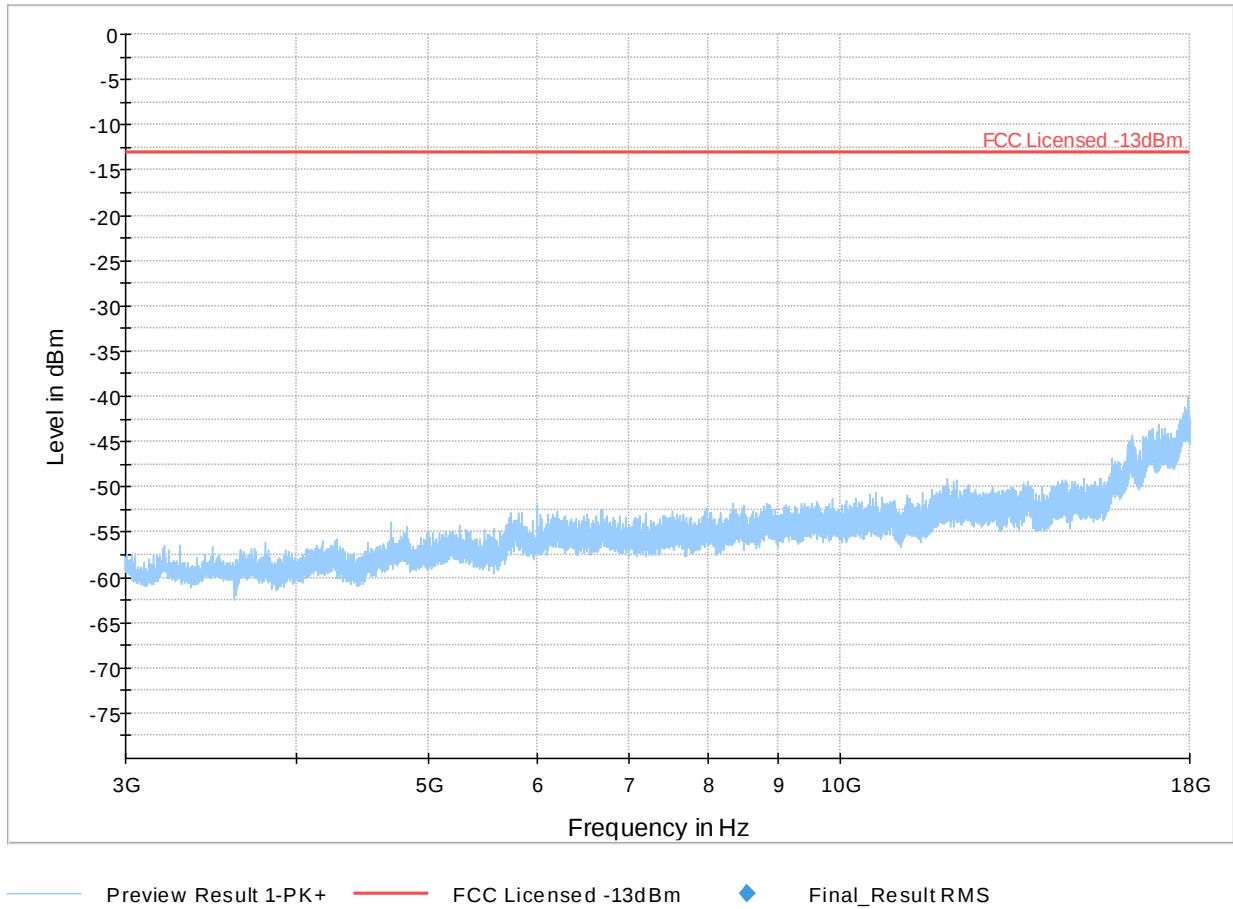
Plot # 13 Radiated Emissions: 1-3 GHz

Channel: Low



Plot # 14 Radiated Emissions: 3-18 GHz

Channel: Low

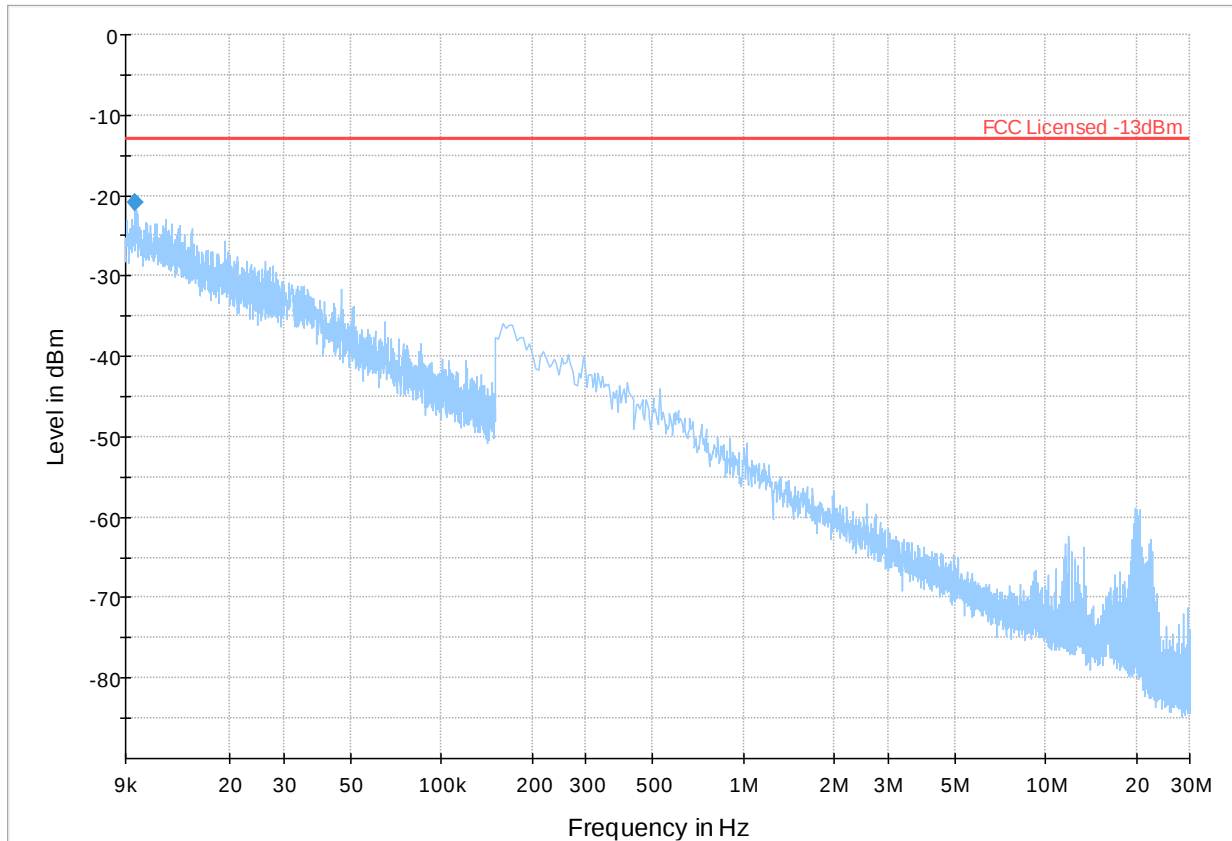


Plot #15 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final_Result

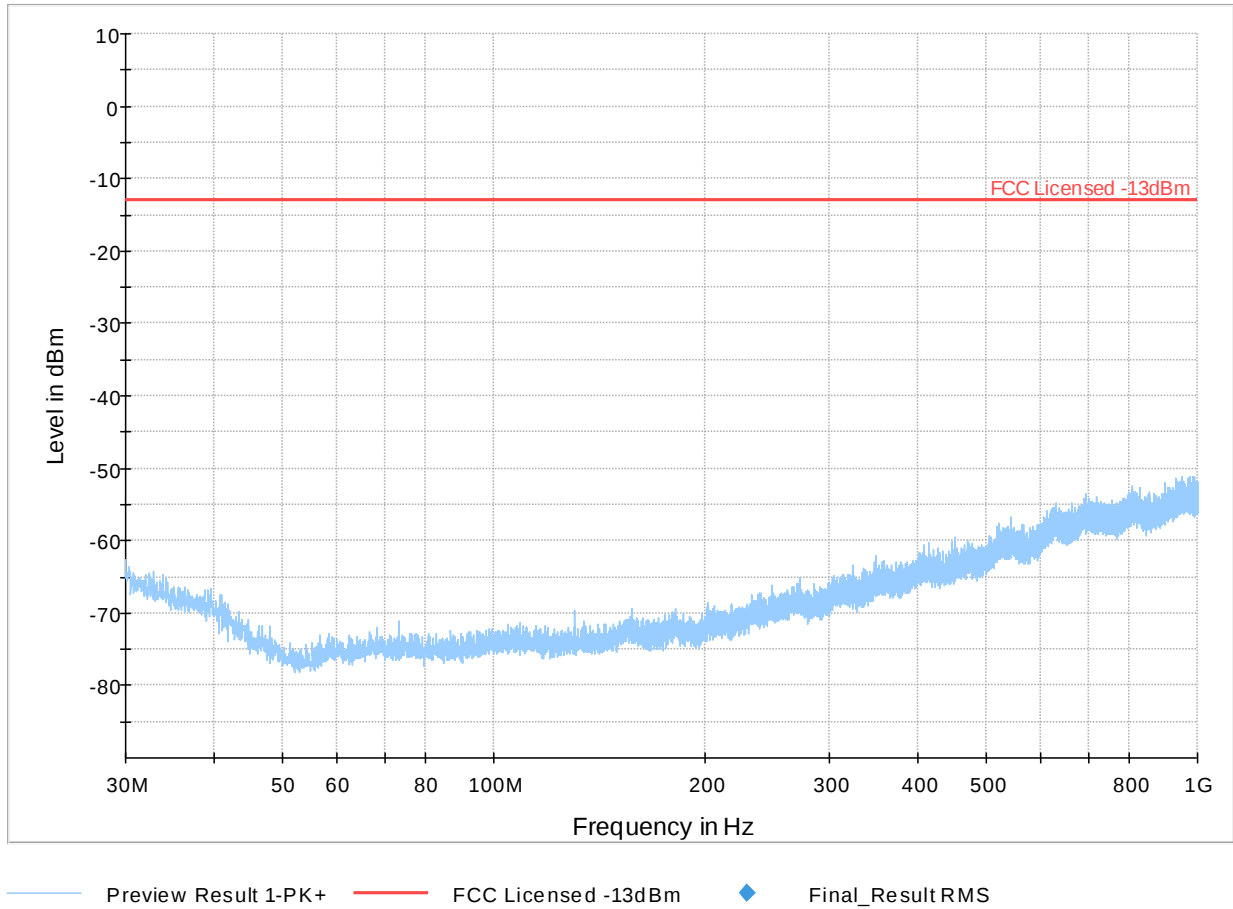
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.010	-20.83	-13.00	7.83	500.0	1.000	282.0	H	352.0	-64.9	



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

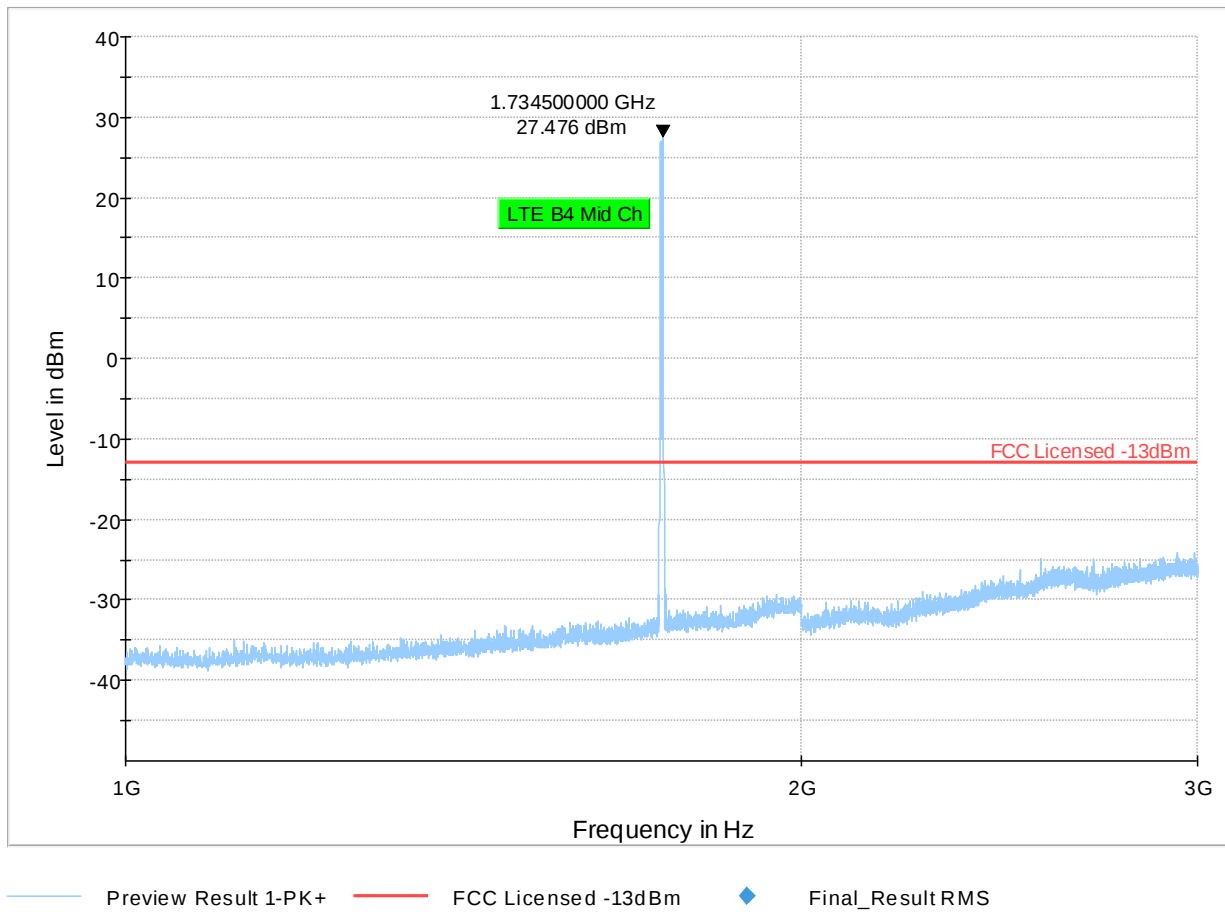
Plot #16 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



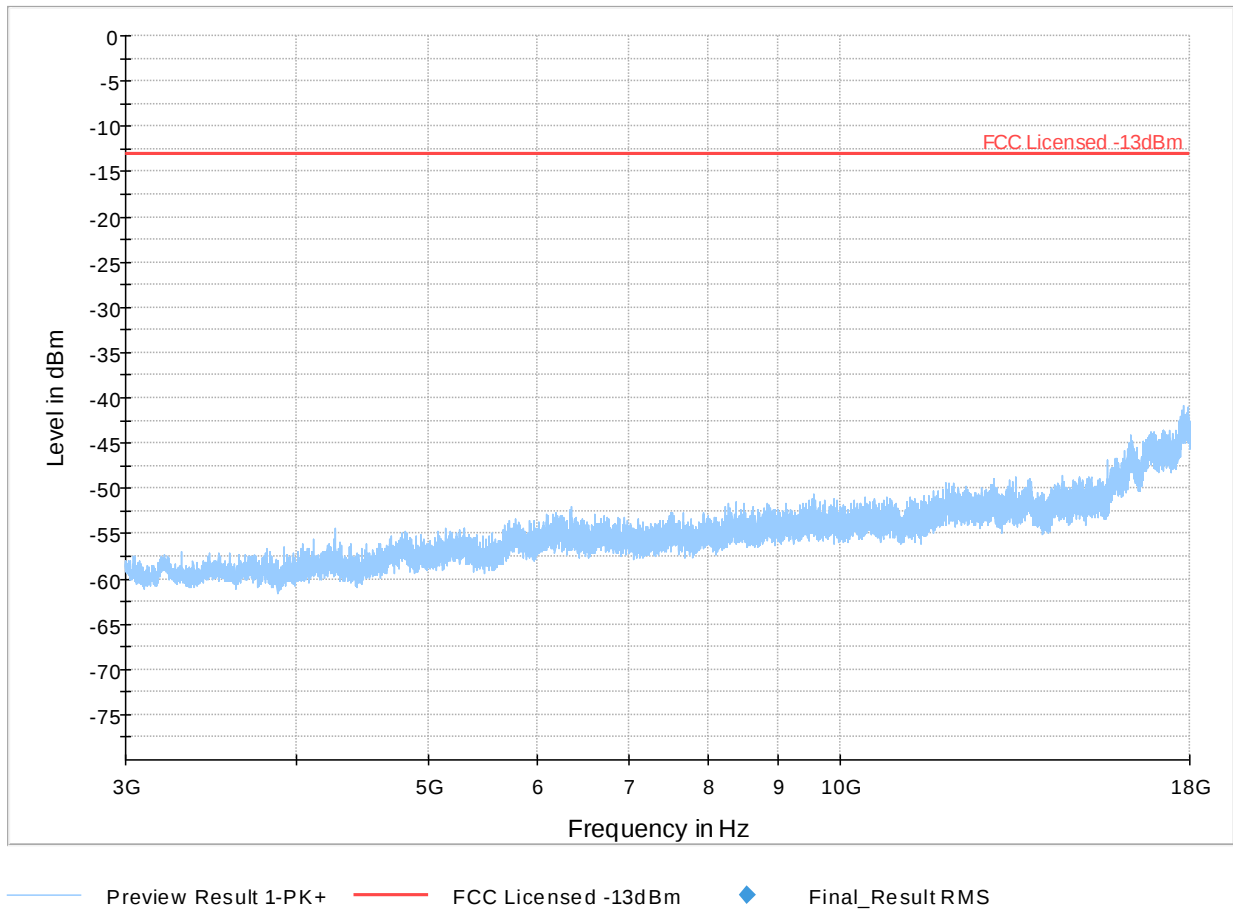
Plot #17 Radiated Emissions: 1-3 GHz

Channel: Mid



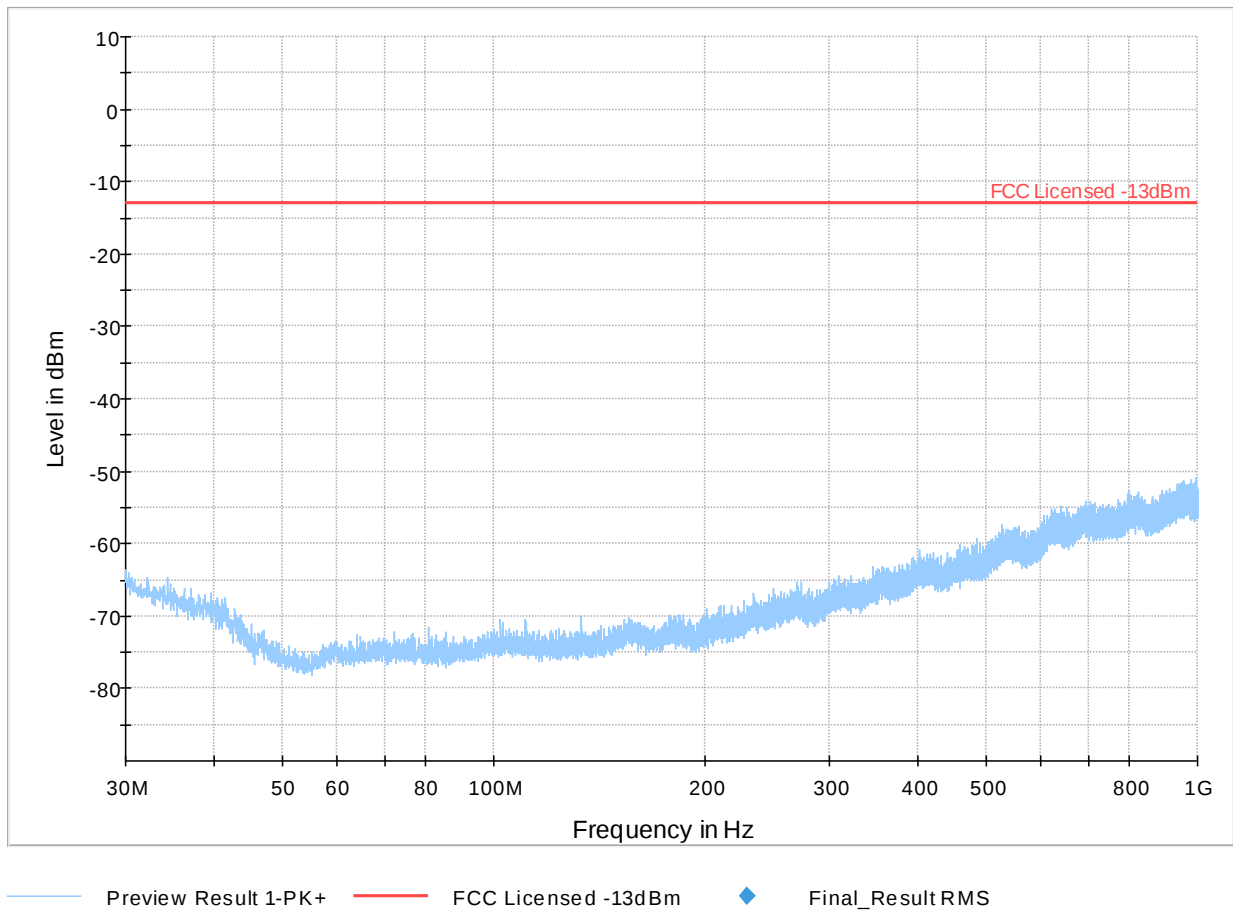
Plot #18 Radiated Emissions: 3-18 GHz

Channel: Mid



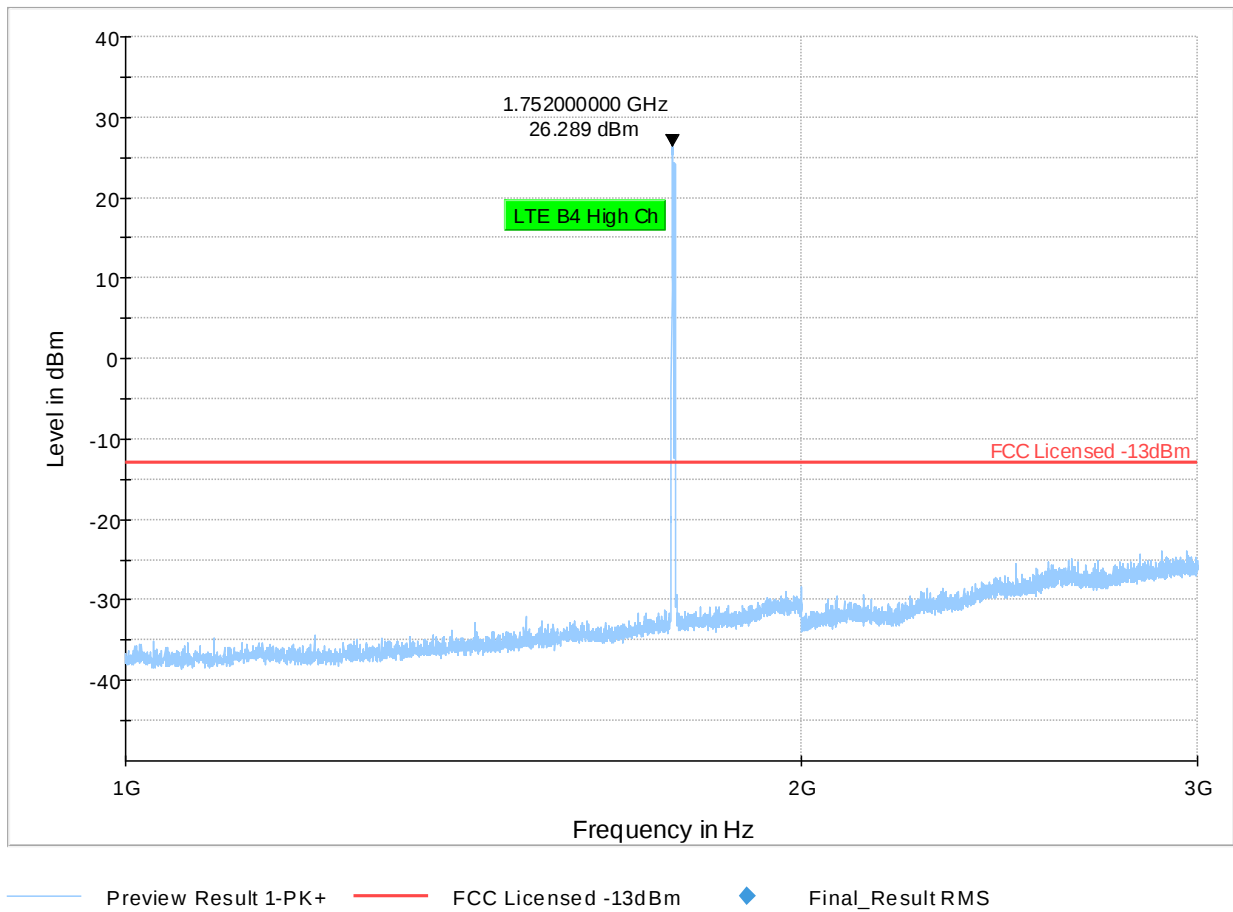
Plot #19 Radiated Emissions: 30 MHz – 1 GHz

Channel: High



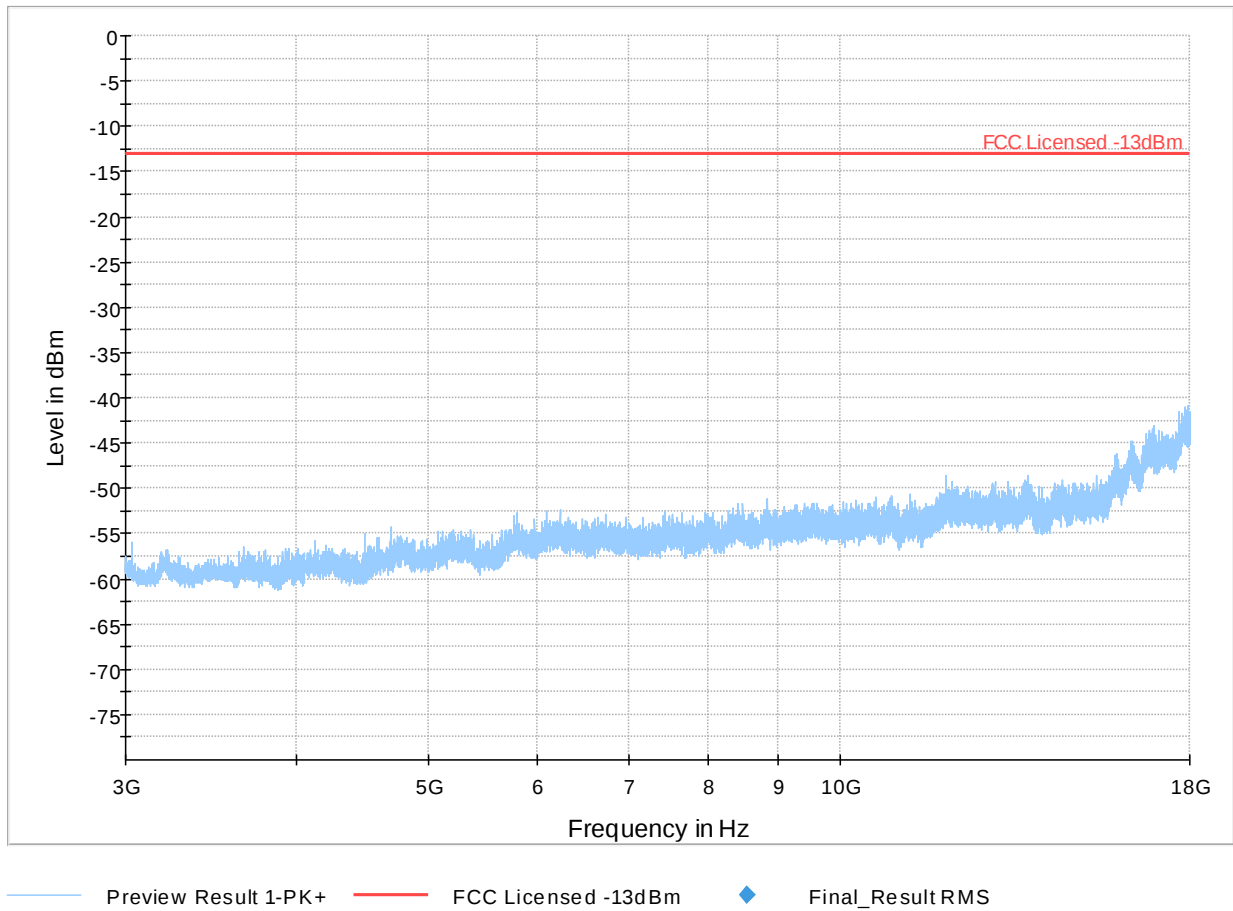
Plot #20 Radiated Emissions: 1-3 GHz

Channel: High



Plot #21 Radiated Emissions: 3-18 GHz

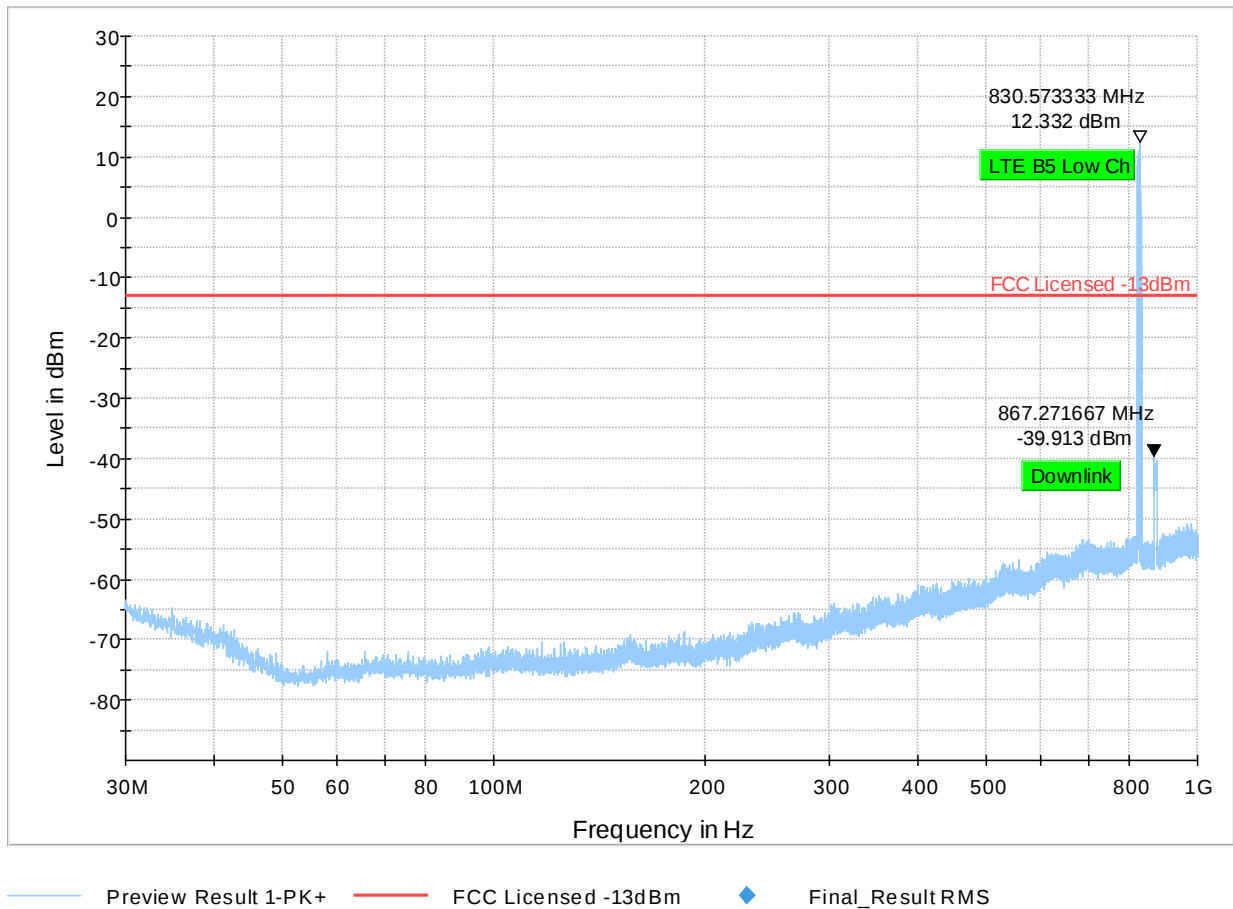
Channel: High



LTE Band 5

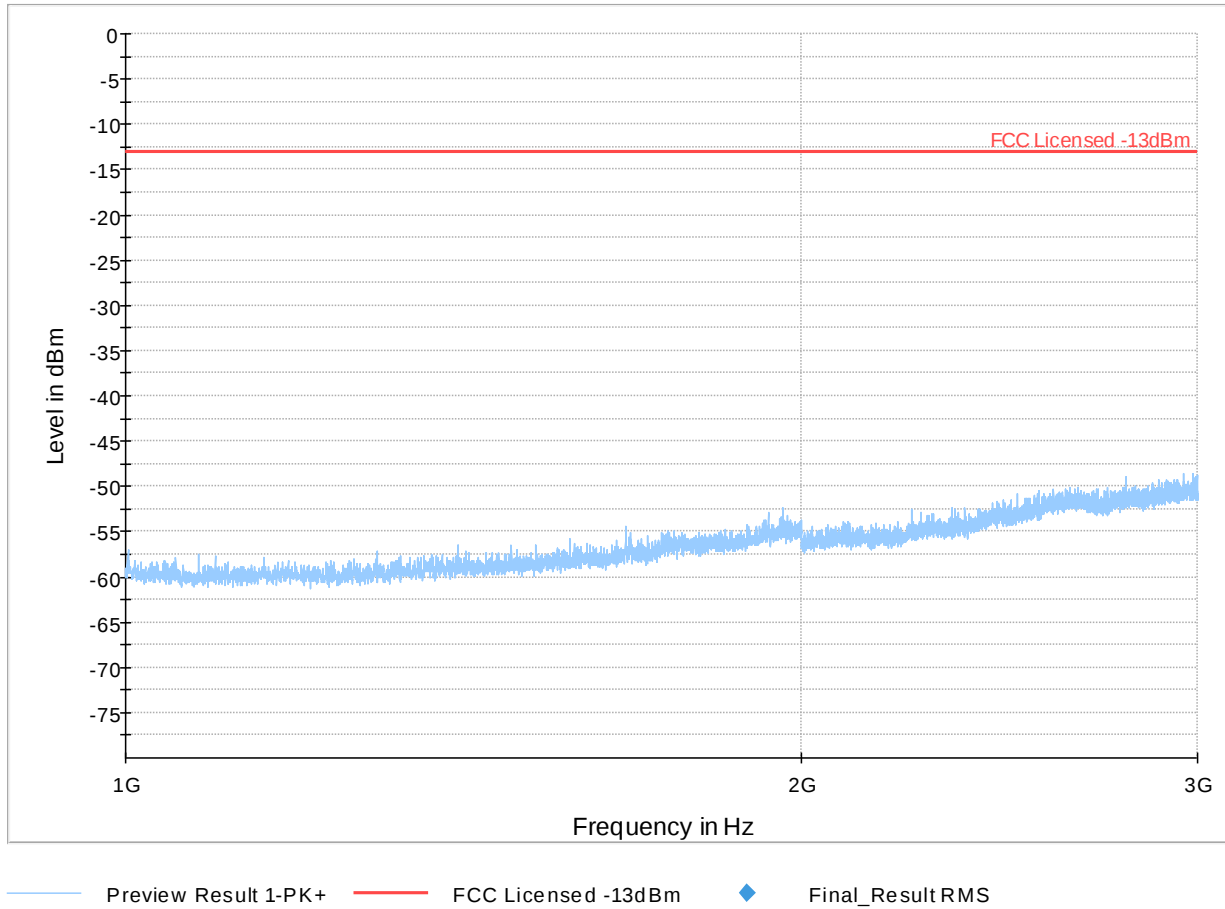
Plot #22 Radiated Emissions: 30 MHz – 1GHz

Channel: Low



Plot # 23 Radiated Emissions: 1-3 GHz

Channel: Low

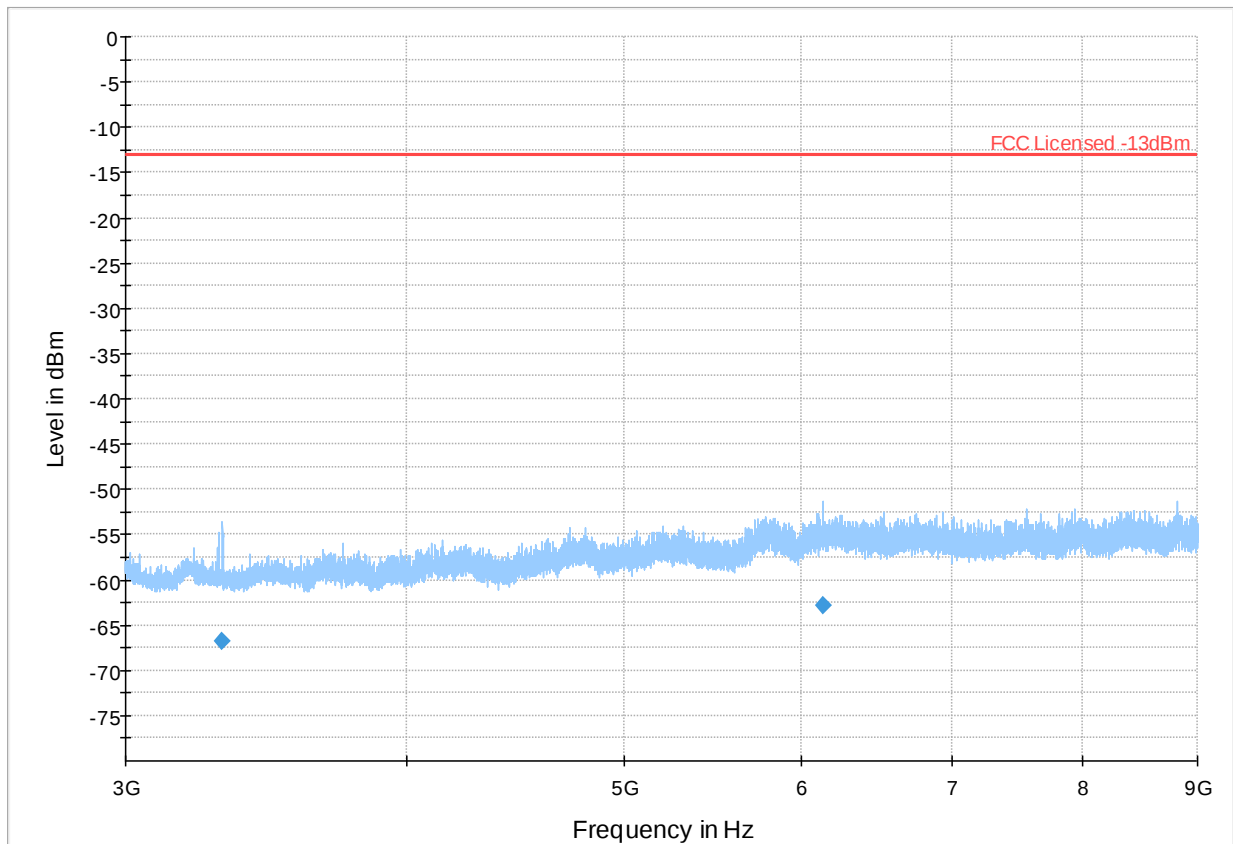


Plot # 24 Radiated Emissions: 3-9 GHz

Channel: Low

Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3313.750	-66.85	-13.00	53.85	500.0	1000.000	150.0	H	222.0	-103.5	
6131.000	-62.87	-13.00	49.87	500.0	1000.000	240.0	H	93.0	-94.2	



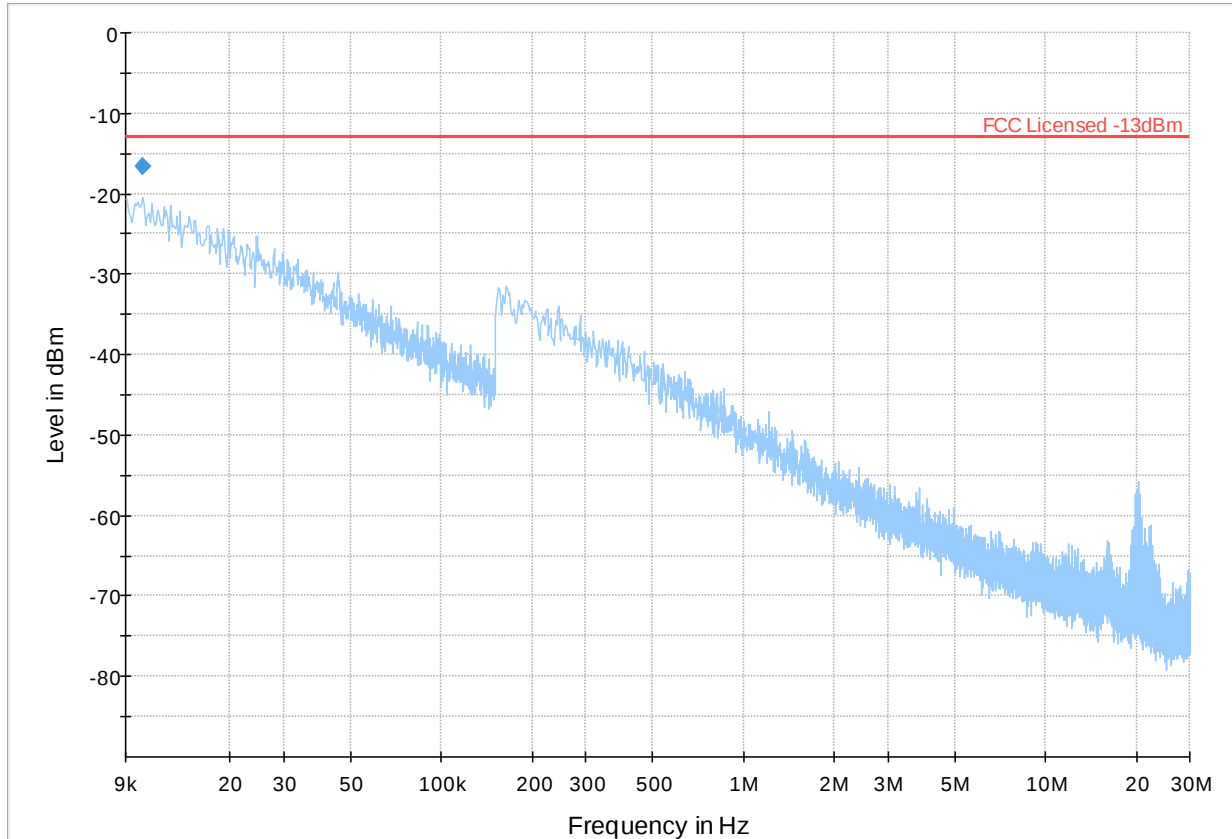
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS

Plot #25 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final Result

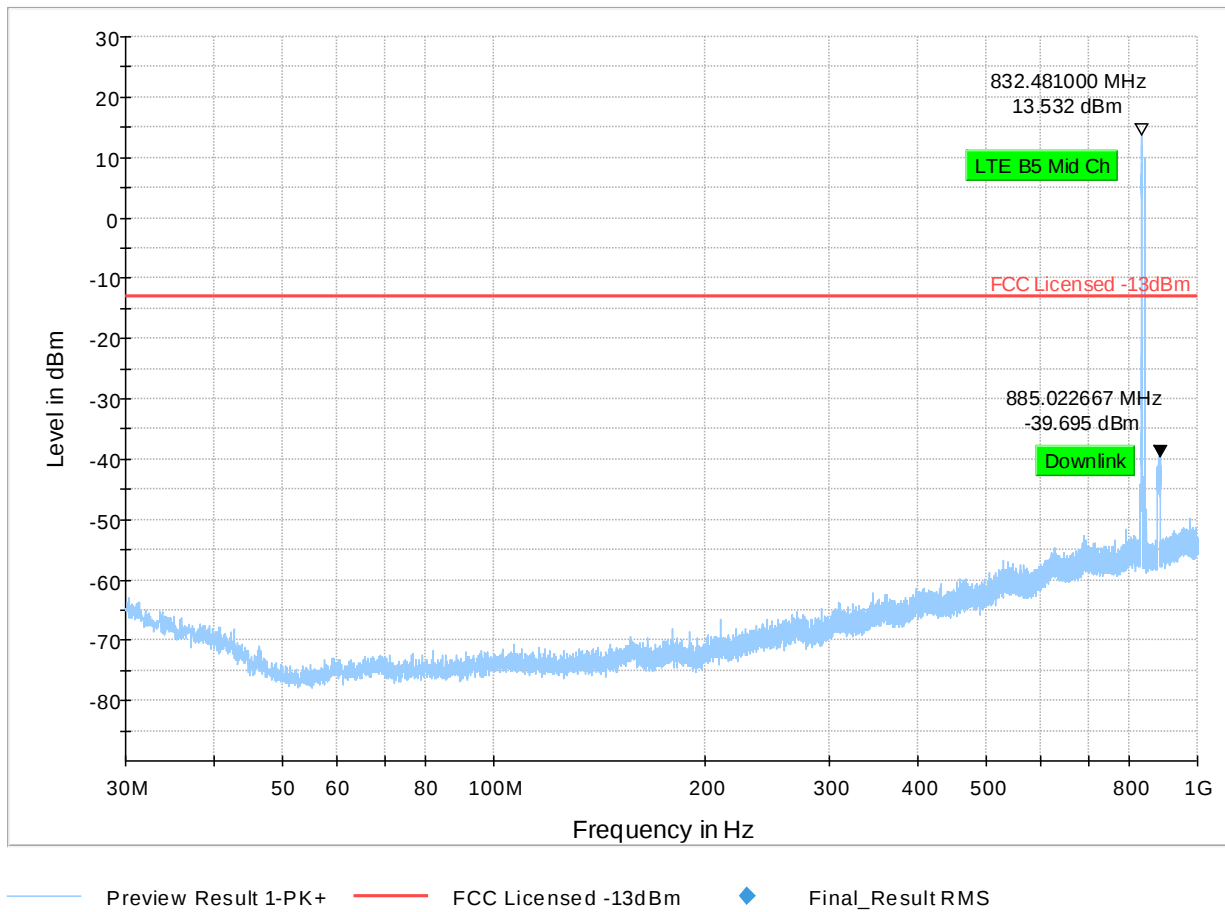
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.010	-16.57	-13.00	3.57	500.0	3.000	315.0	H	186.0	-65.4	



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

Plot #26 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid

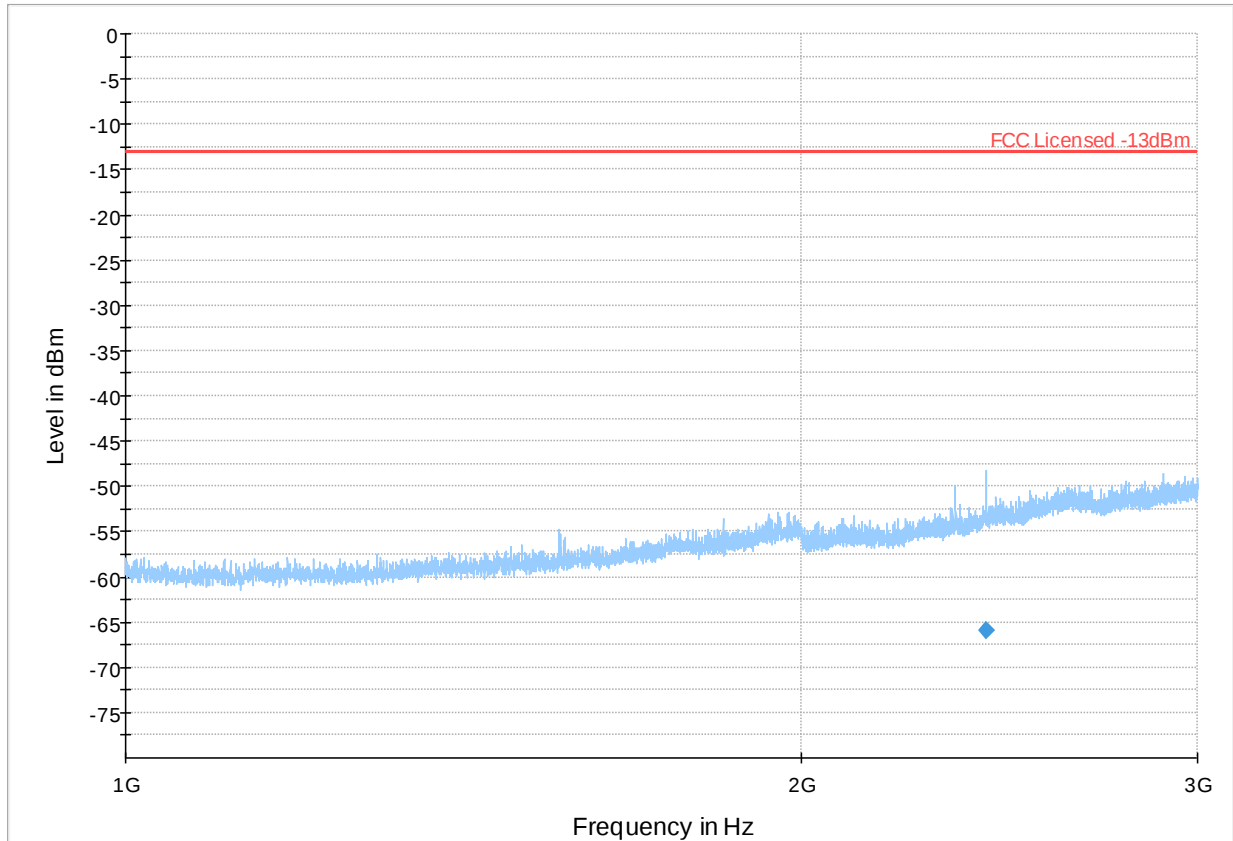


Plot #27 Radiated Emissions: 1-3 GHz

Channel: Mid

Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
2416.250	-65.91	-13.00	52.91	500.0	1000.000	219.0	V	189.0	-86.6	



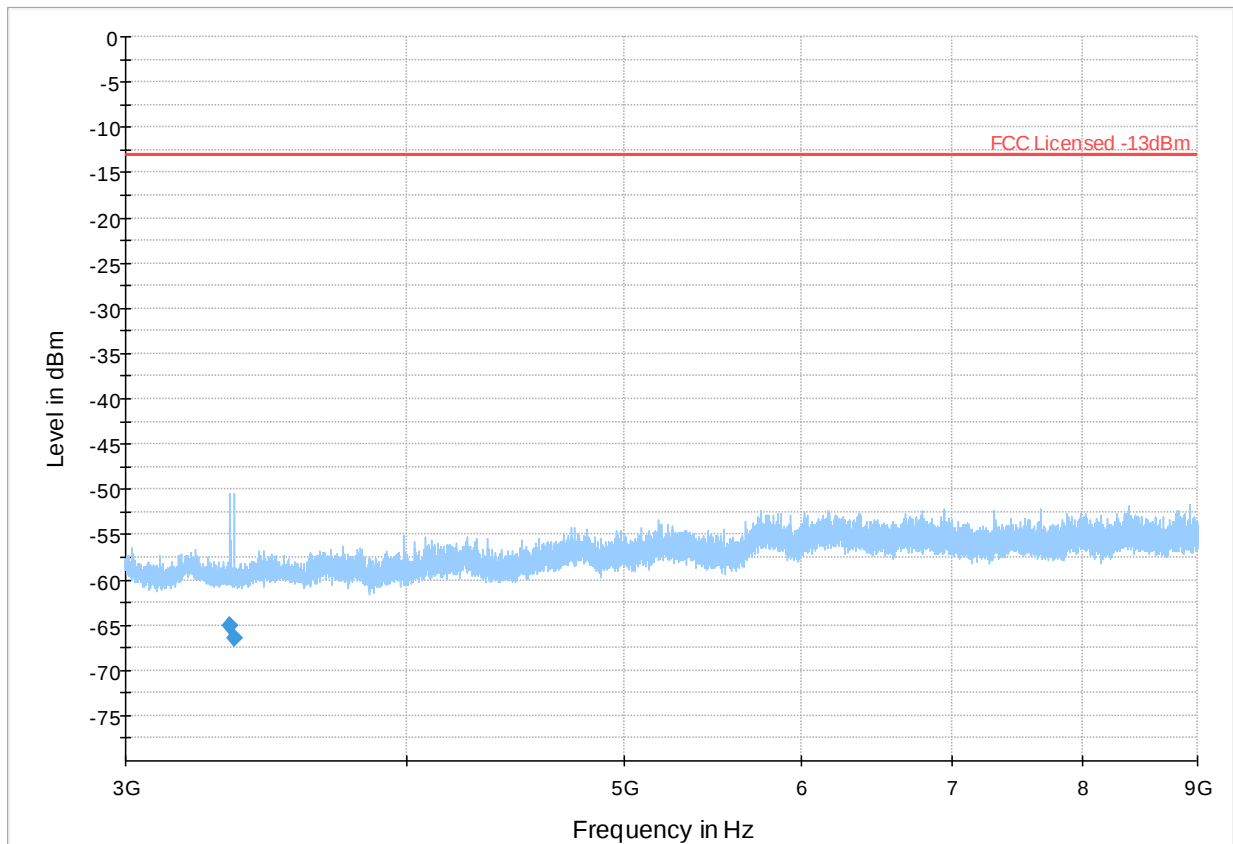
Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS

Plot #28 Radiated Emissions: 3-9 GHz

Channel: Mid

Final Result

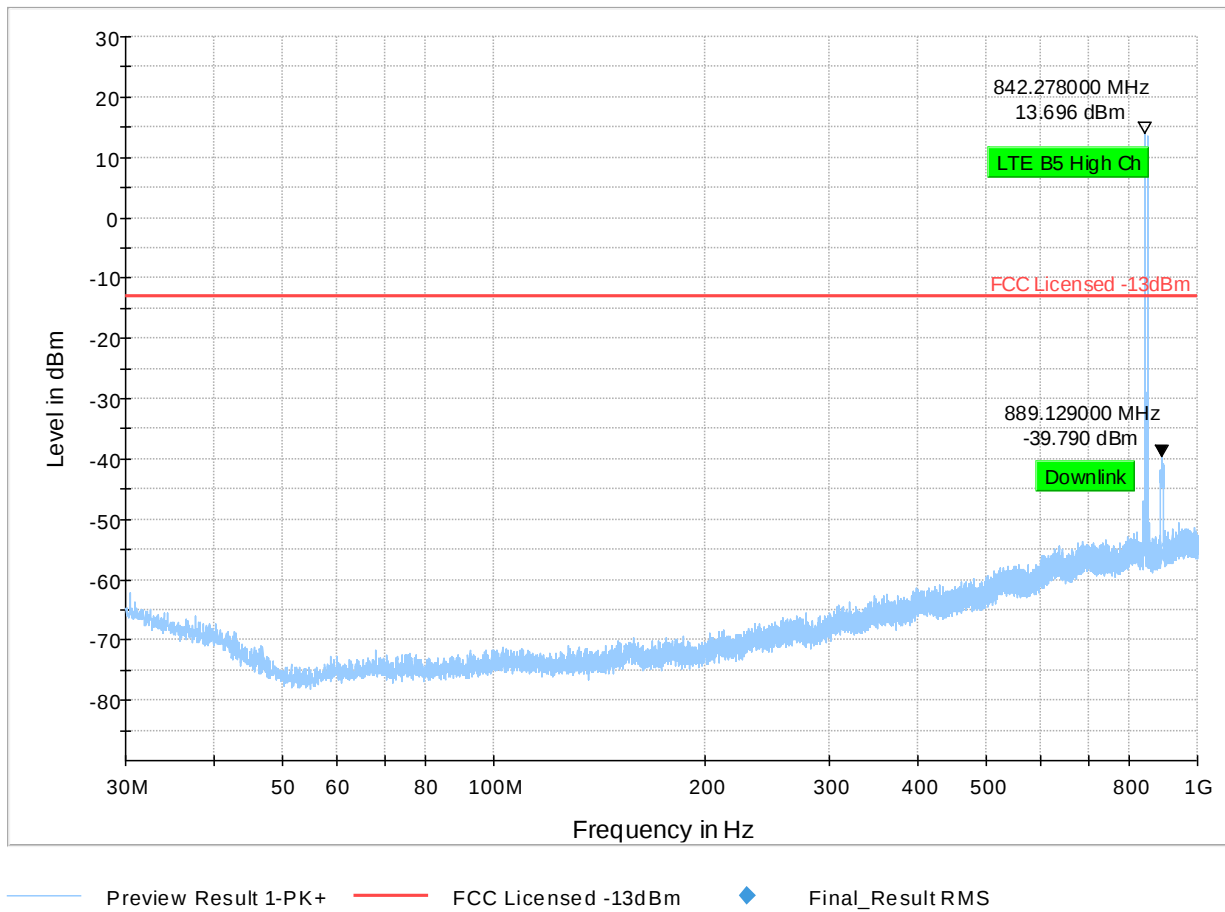
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3338.250	-65.10	-13.00	52.10	500.0	1000.000	150.0	H	142.0	-103.5	
3353.750	-66.39	-13.00	53.39	500.0	1000.000	150.0	H	42.0	-103.5	



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

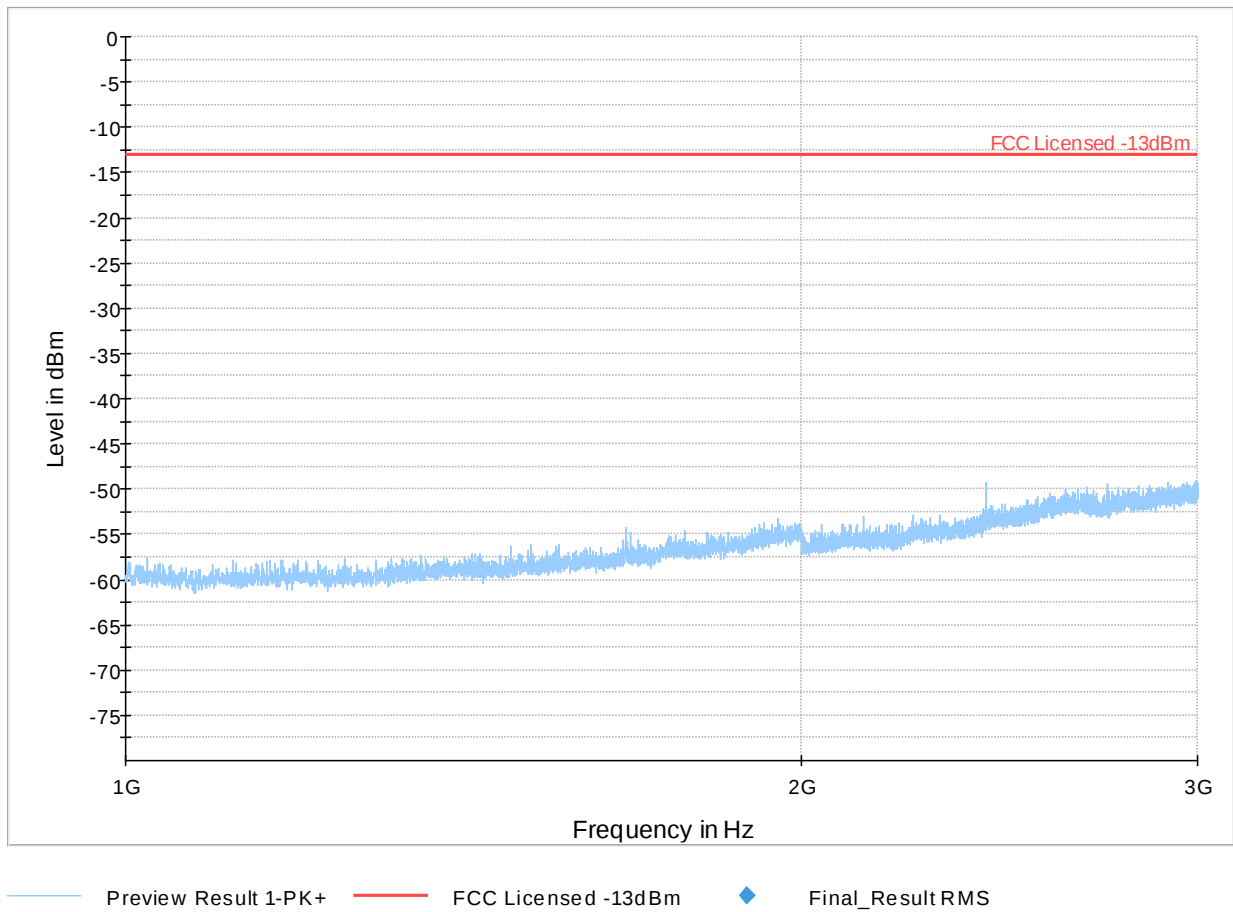
Plot #29 Radiated Emissions: 30 MHz – 1 GHz

Channel: High



Plot #30 Radiated Emissions: 1-3 GHz

Channel: High

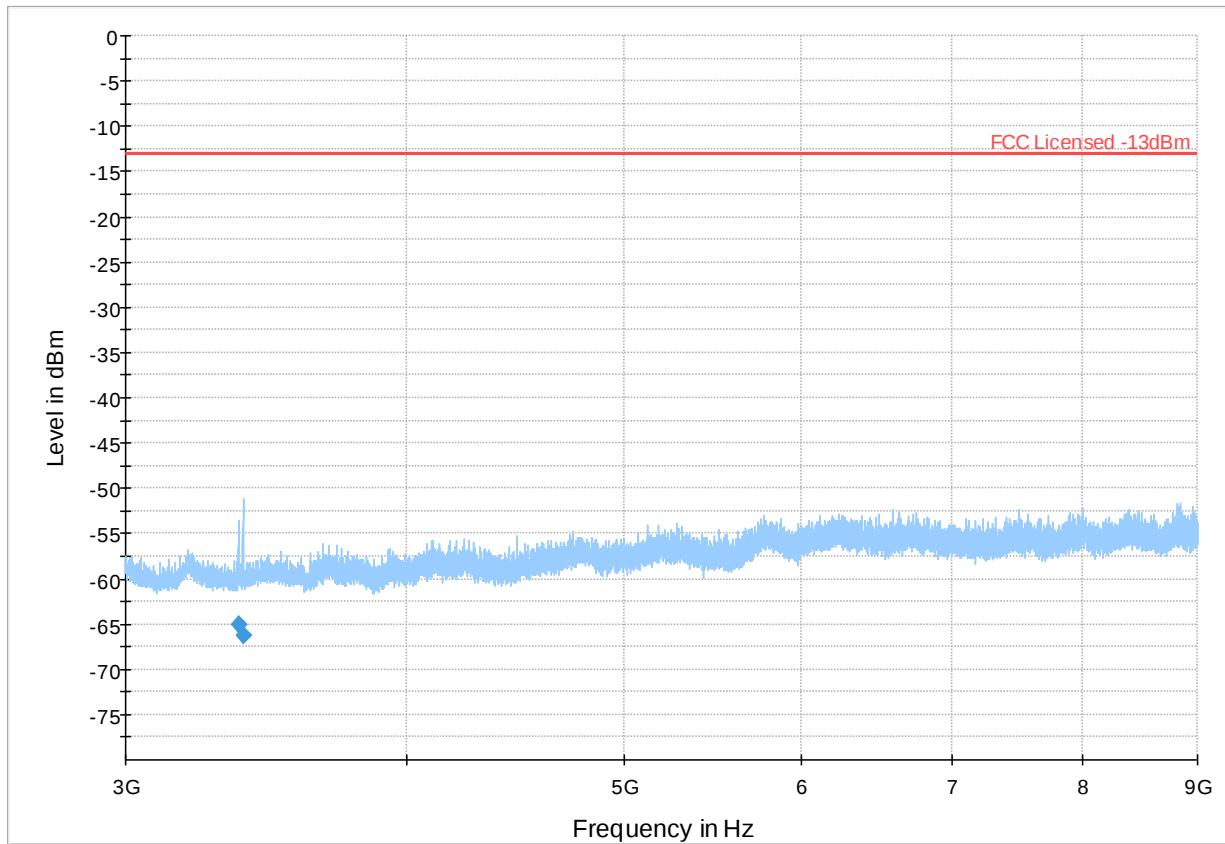


Plot #31 Radiated Emissions: 3-9 GHz

Channel: High

Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3368.750	-65.01	-13.00	52.01	500.0	1000.000	229.0	H	45.0	-103.4	
3383.750	-66.22	-13.00	53.22	500.0	1000.000	150.0	H	215.0	-103.3	

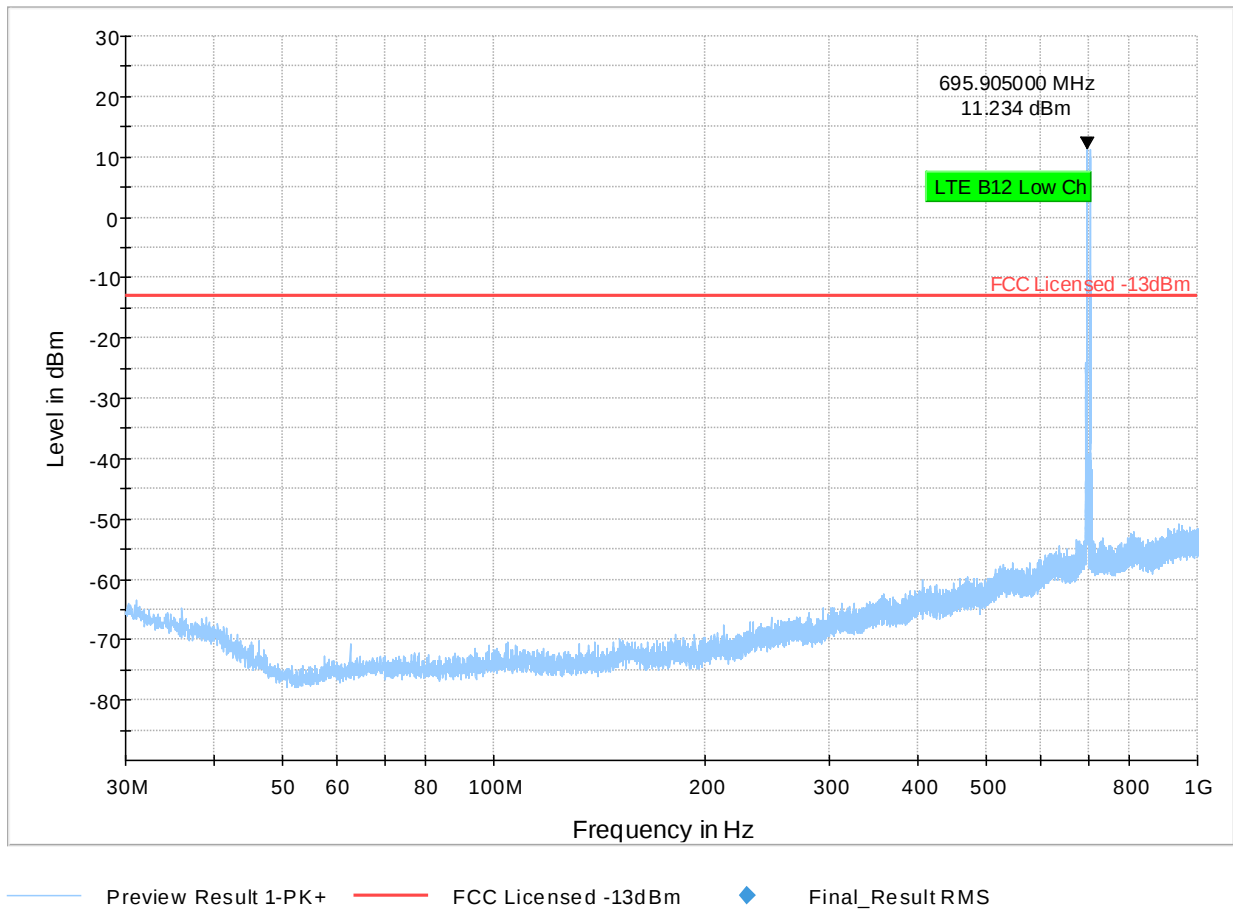


Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS

LTE Band 12

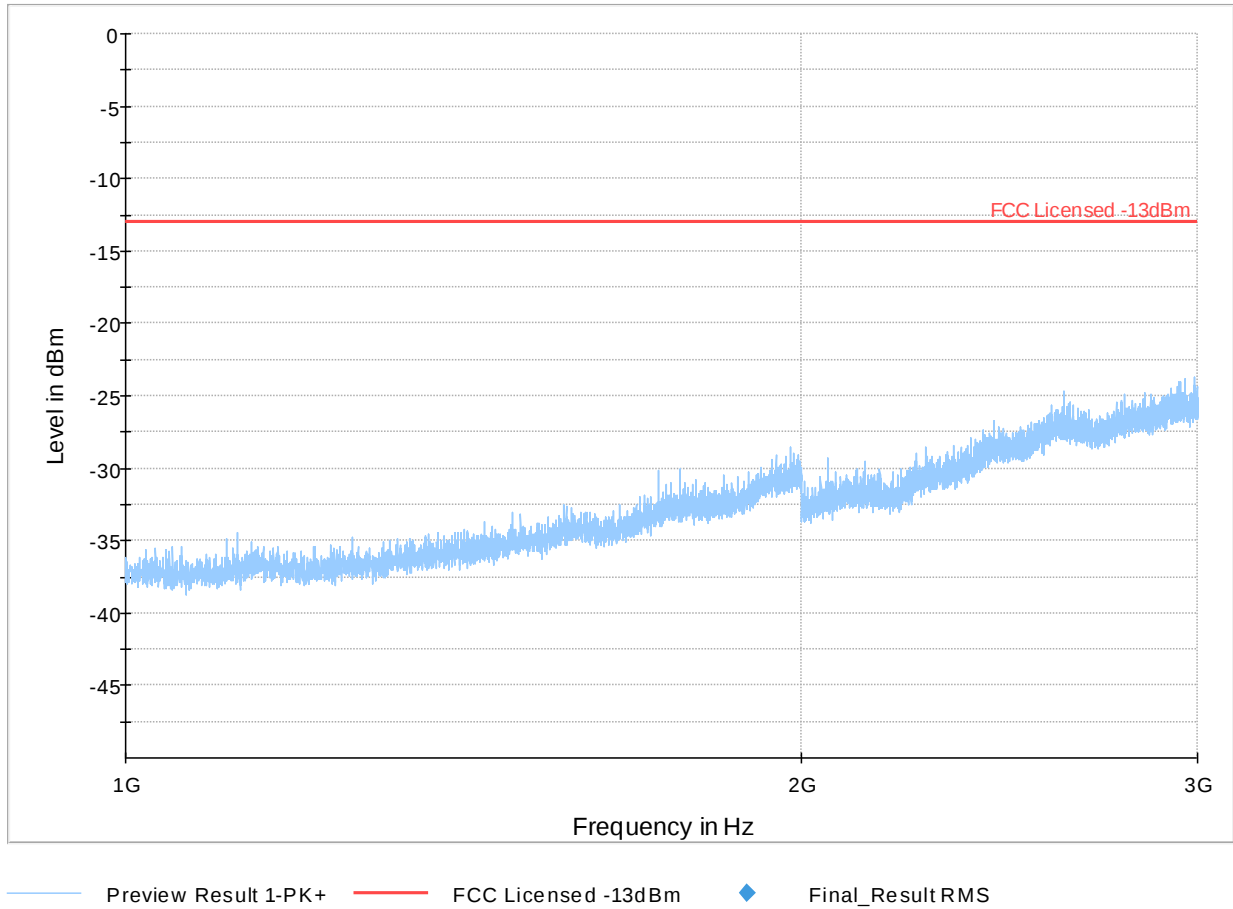
Plot #32 Radiated Emissions: 30 MHz – 1GHz

Channel: Low



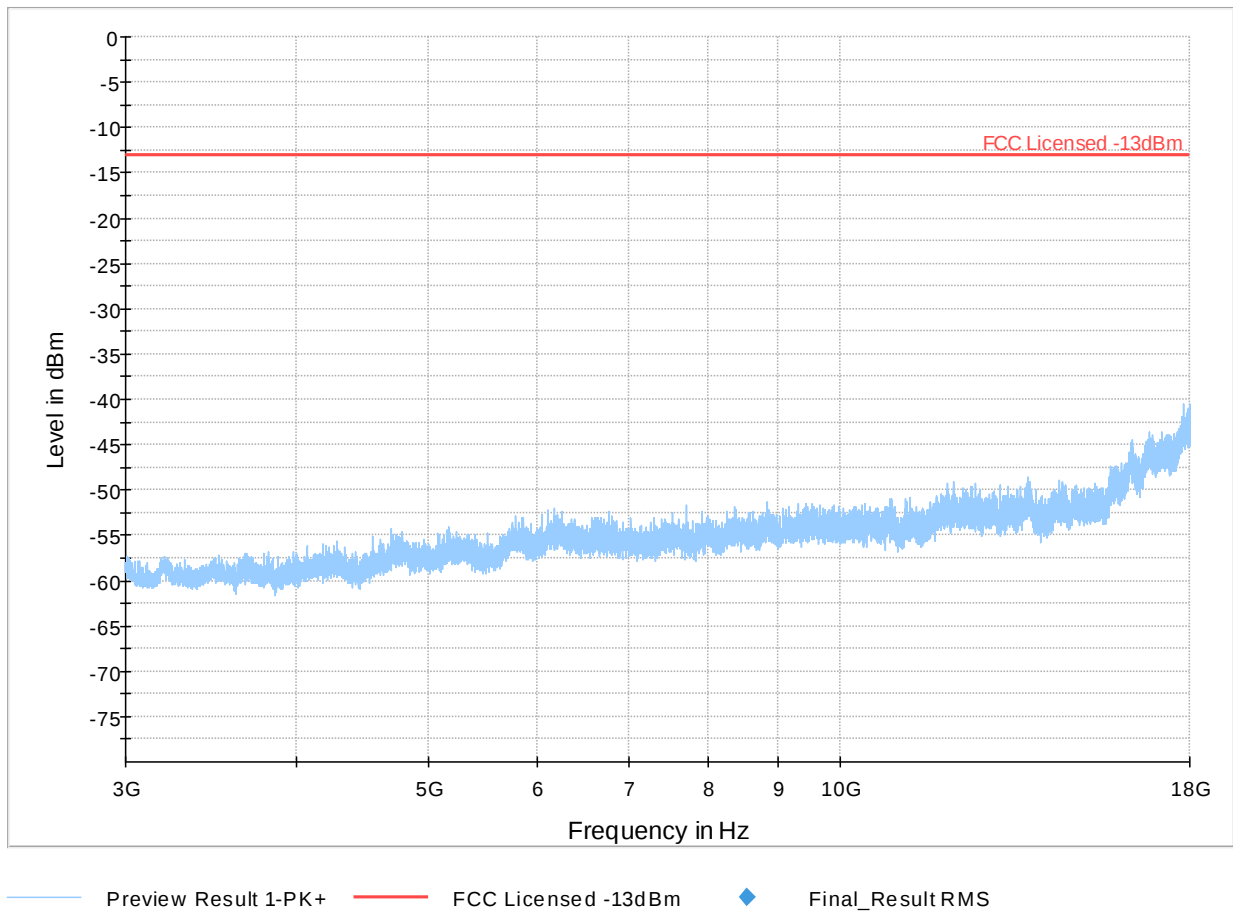
Plot # 33 Radiated Emissions: 1-3 GHz

Channel: Low



Plot # 34 Radiated Emissions: 3-18GHz

Channel: Low

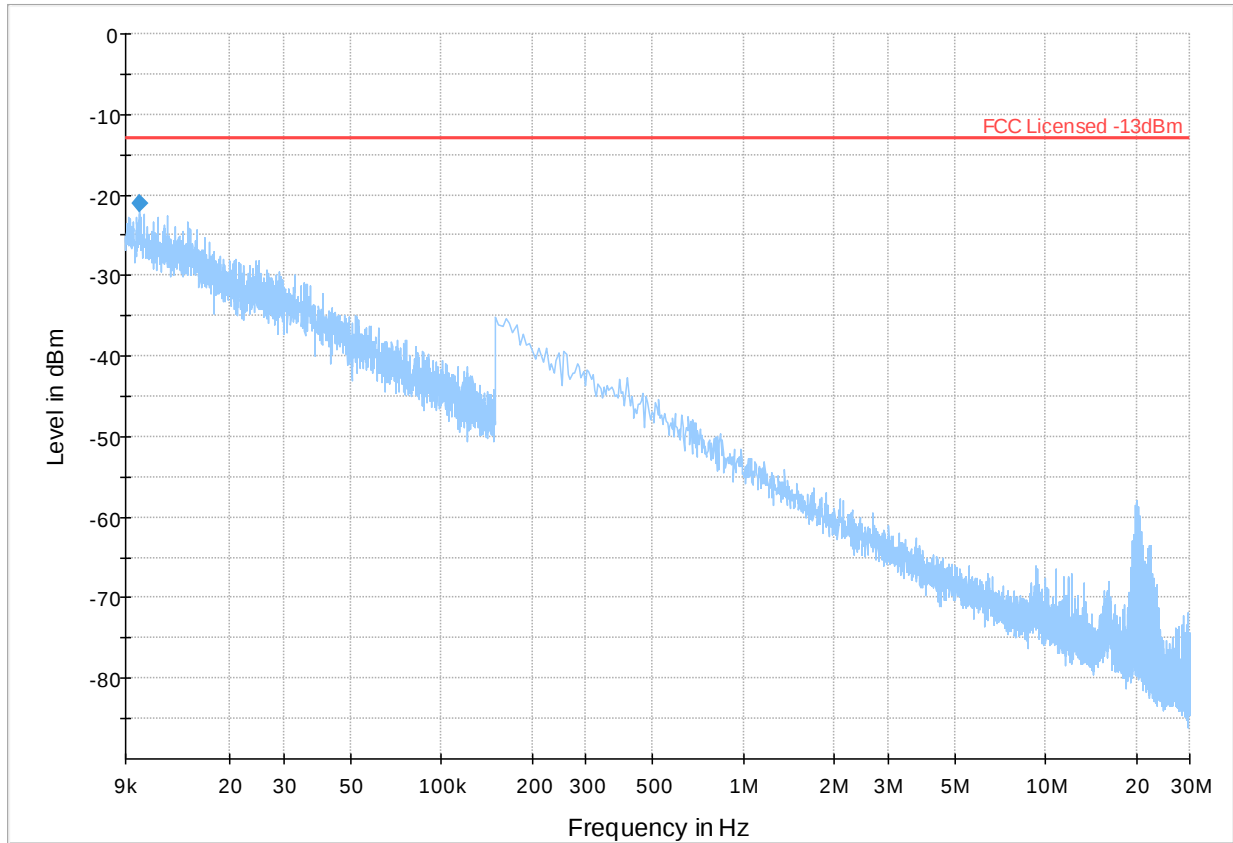


Plot #35 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final Result

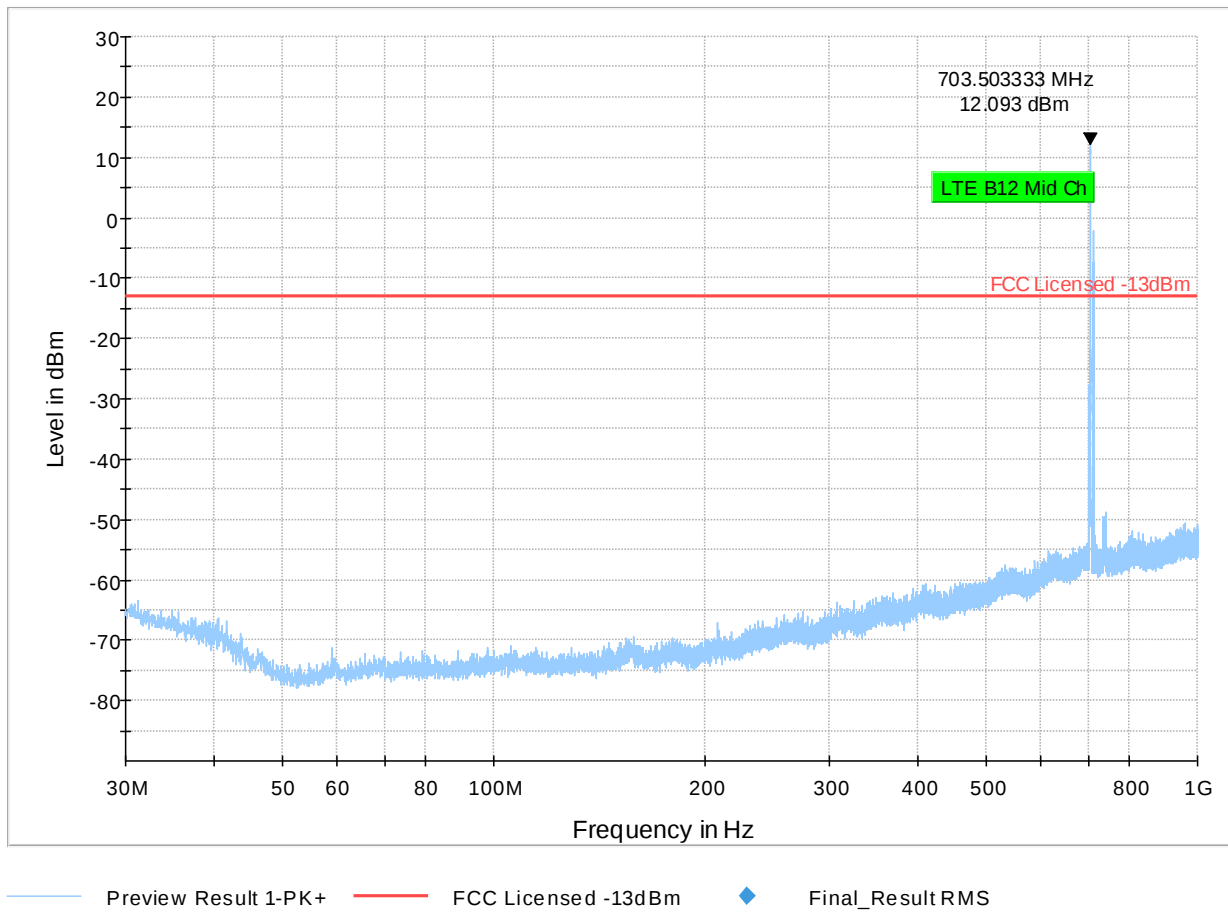
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.010	-21.04	-13.00	8.04	500.0	1.000	311.0	H	-42.0	-65.2	



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

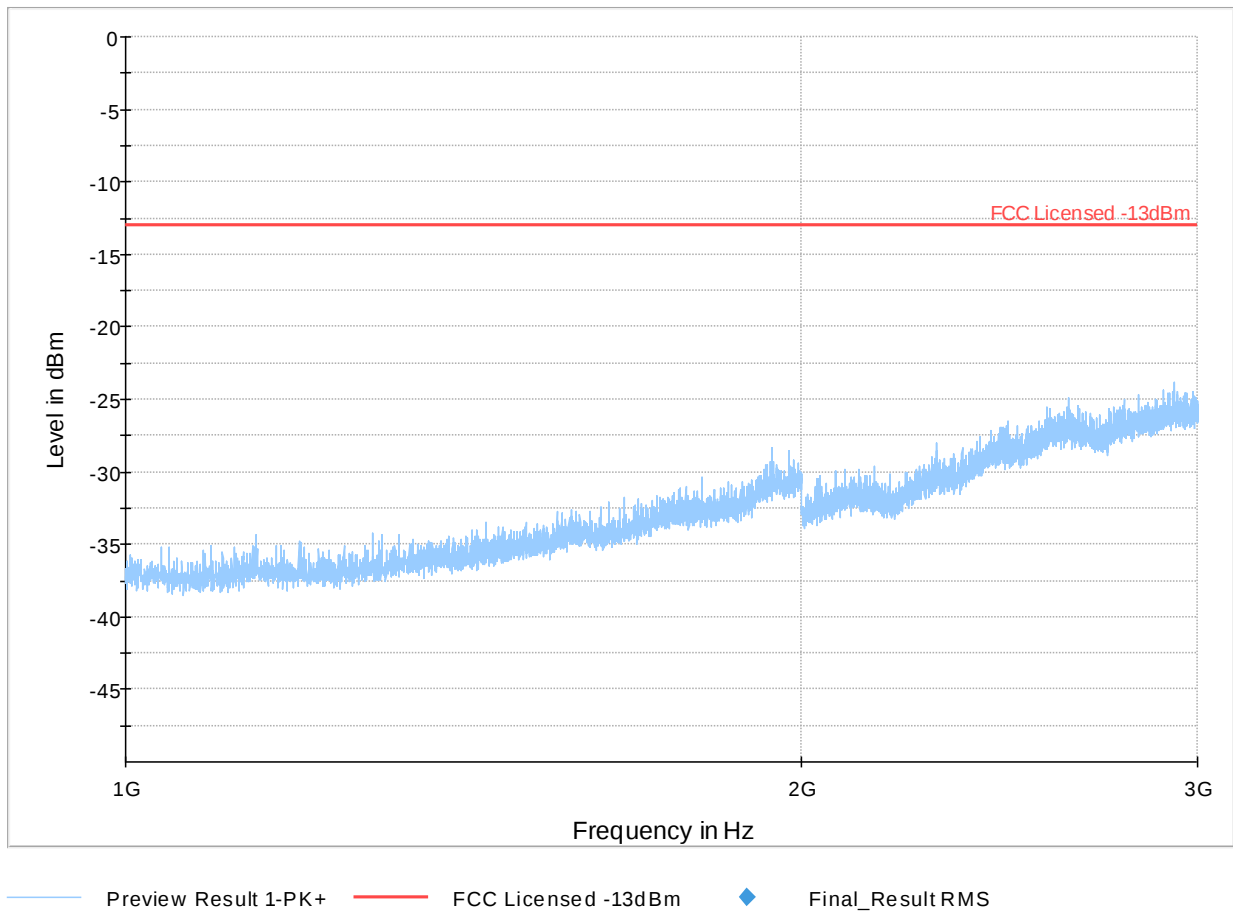
Plot #36 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



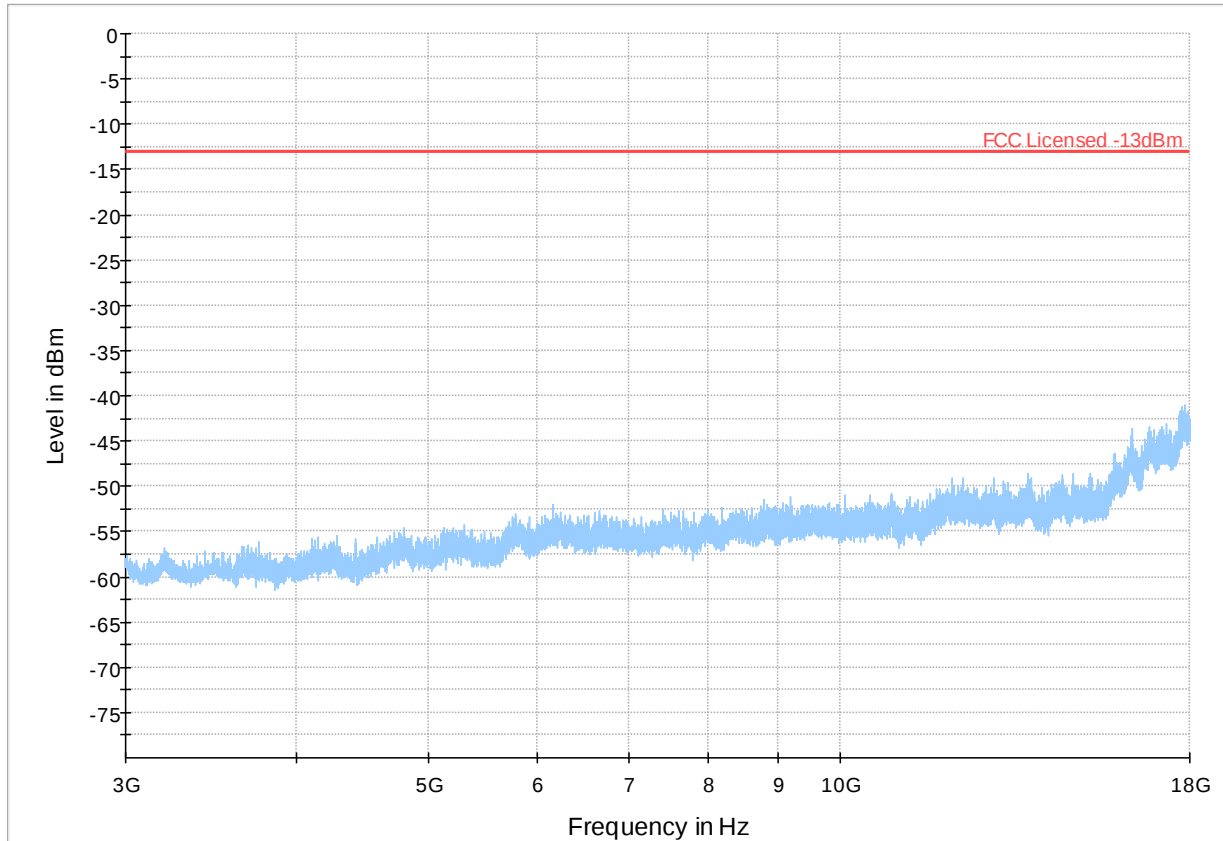
Plot #37 Radiated Emissions: 1-3 GHz

Channel: Mid



Plot #38 Radiated Emissions: 3-18 GHz

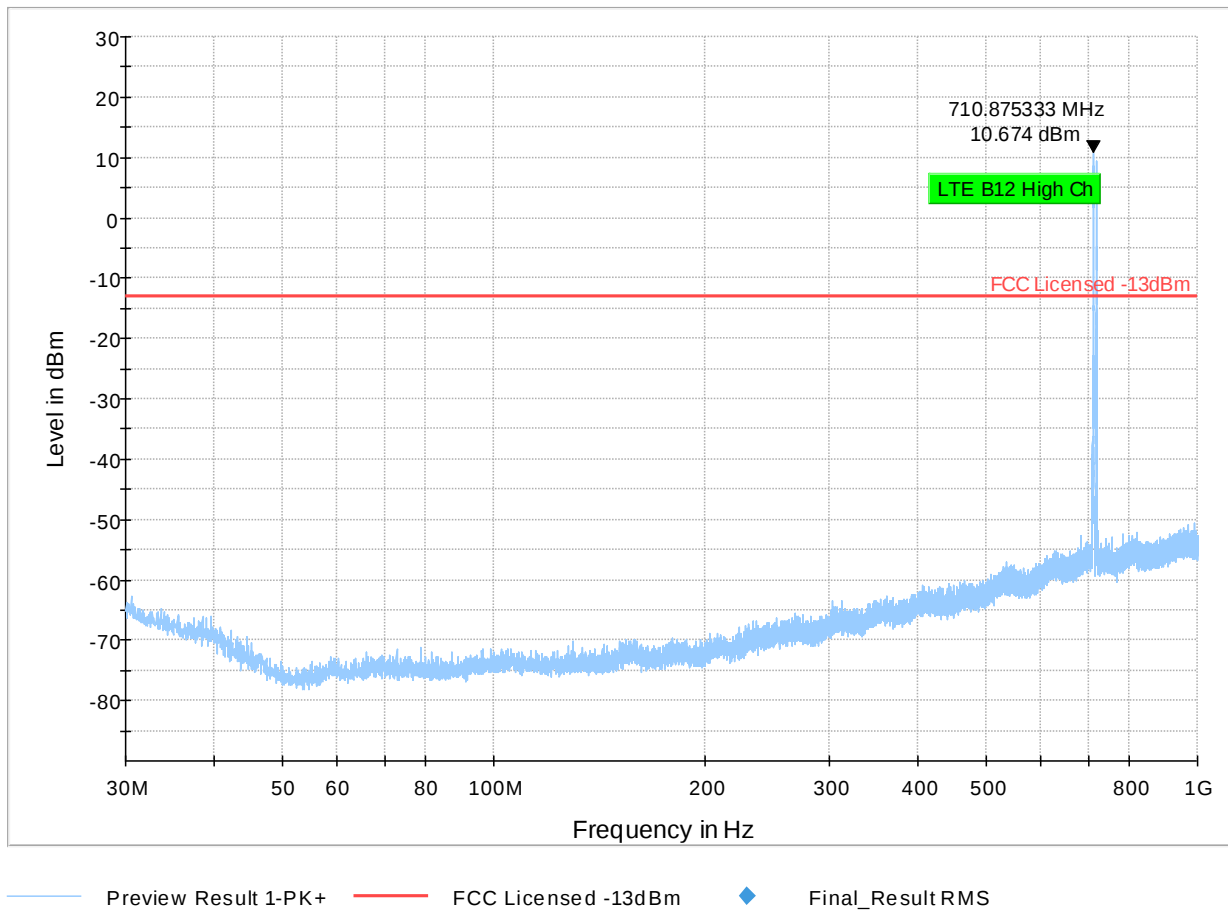
Channel: Mid



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

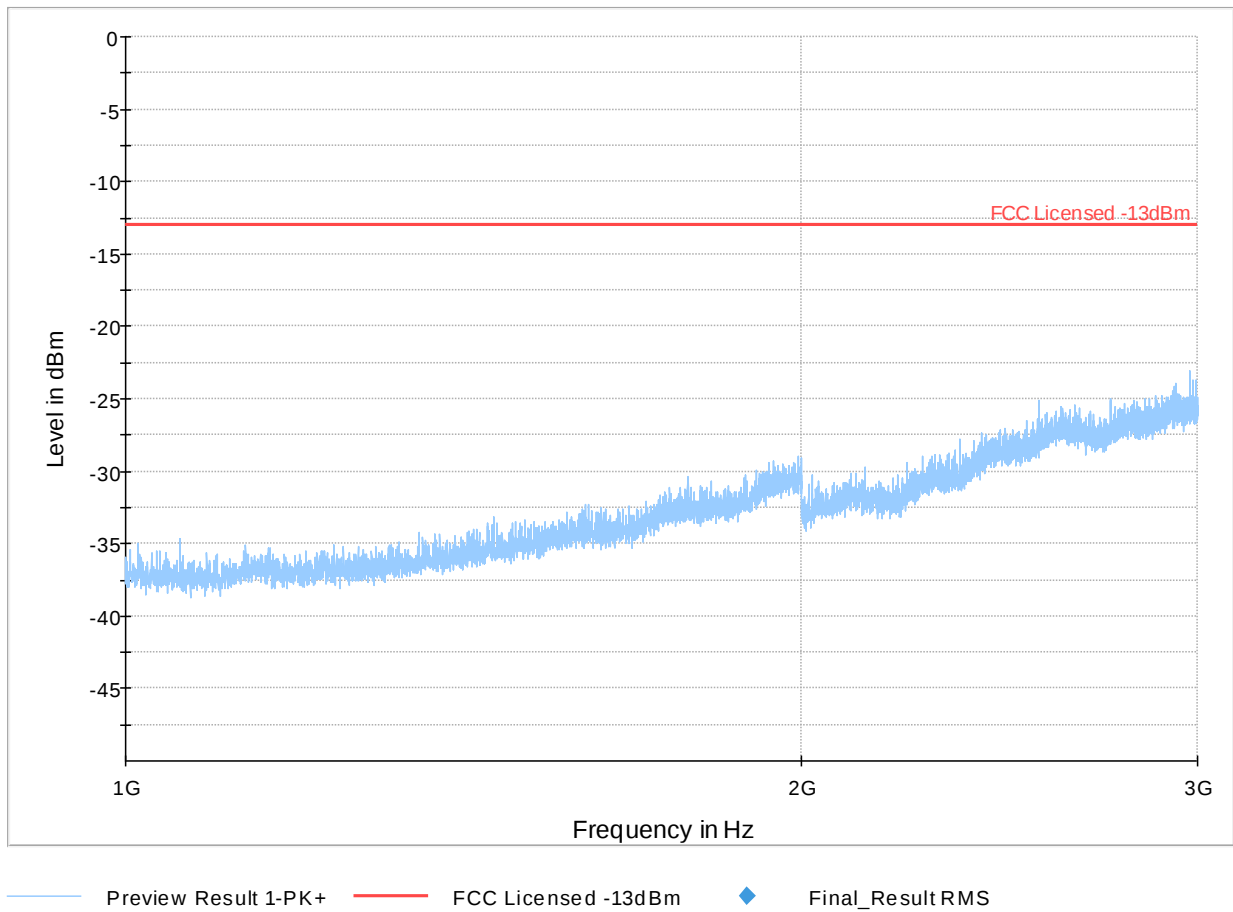
Plot #39 Radiated Emissions: 30 MHz – 1 GHz

Channel: High



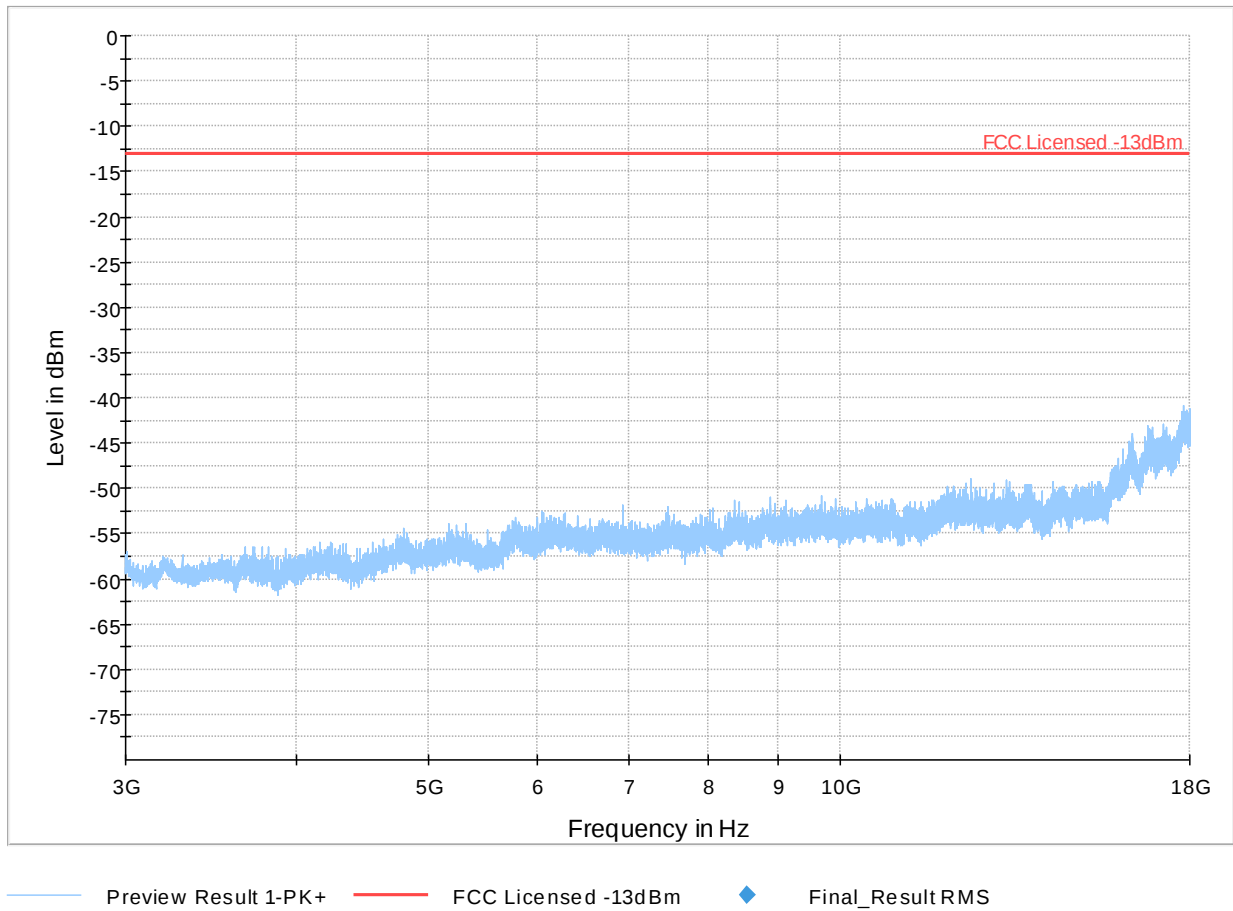
Plot #40 Radiated Emissions: 1-3 GHz

Channel: High



Plot #41 Radiated Emissions: 3-18 GHz

Channel: High



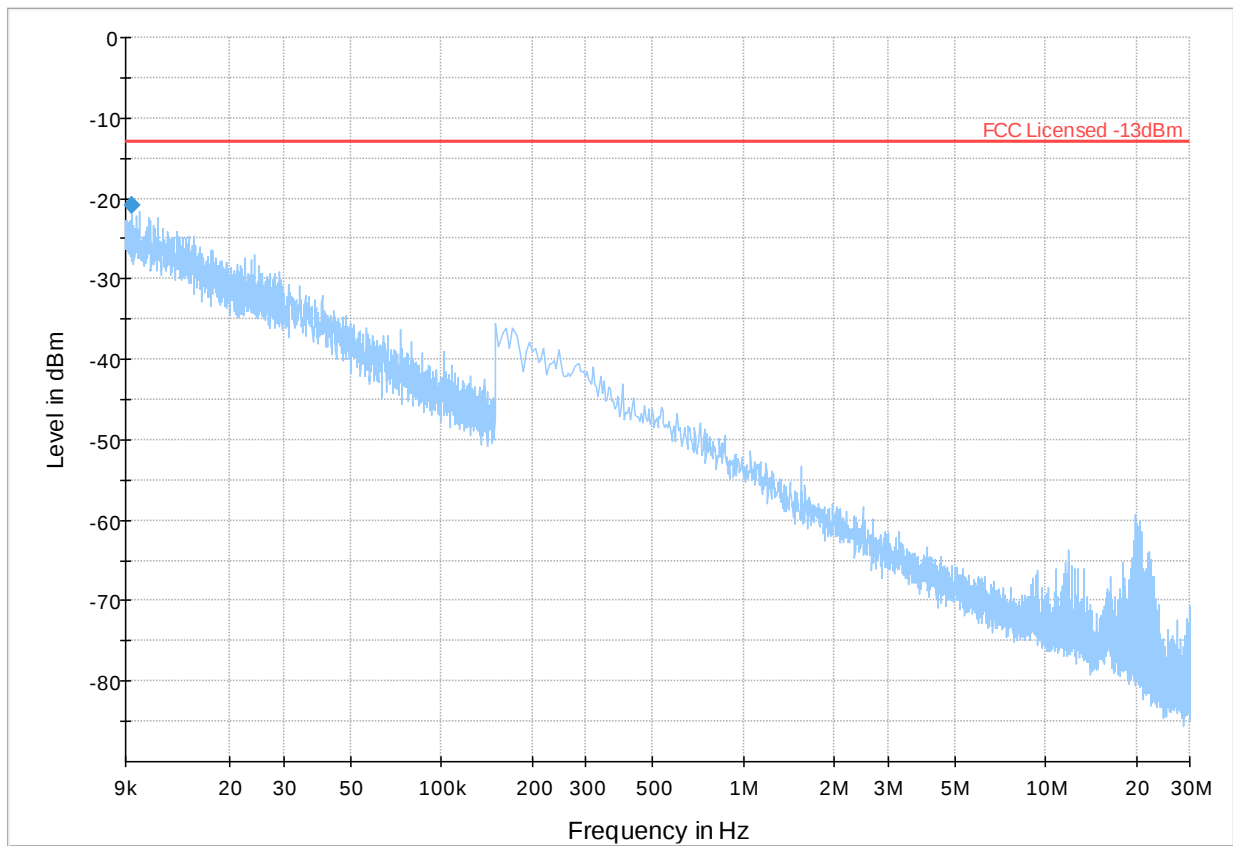
LTE Band 13

Plot #42 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final_Result

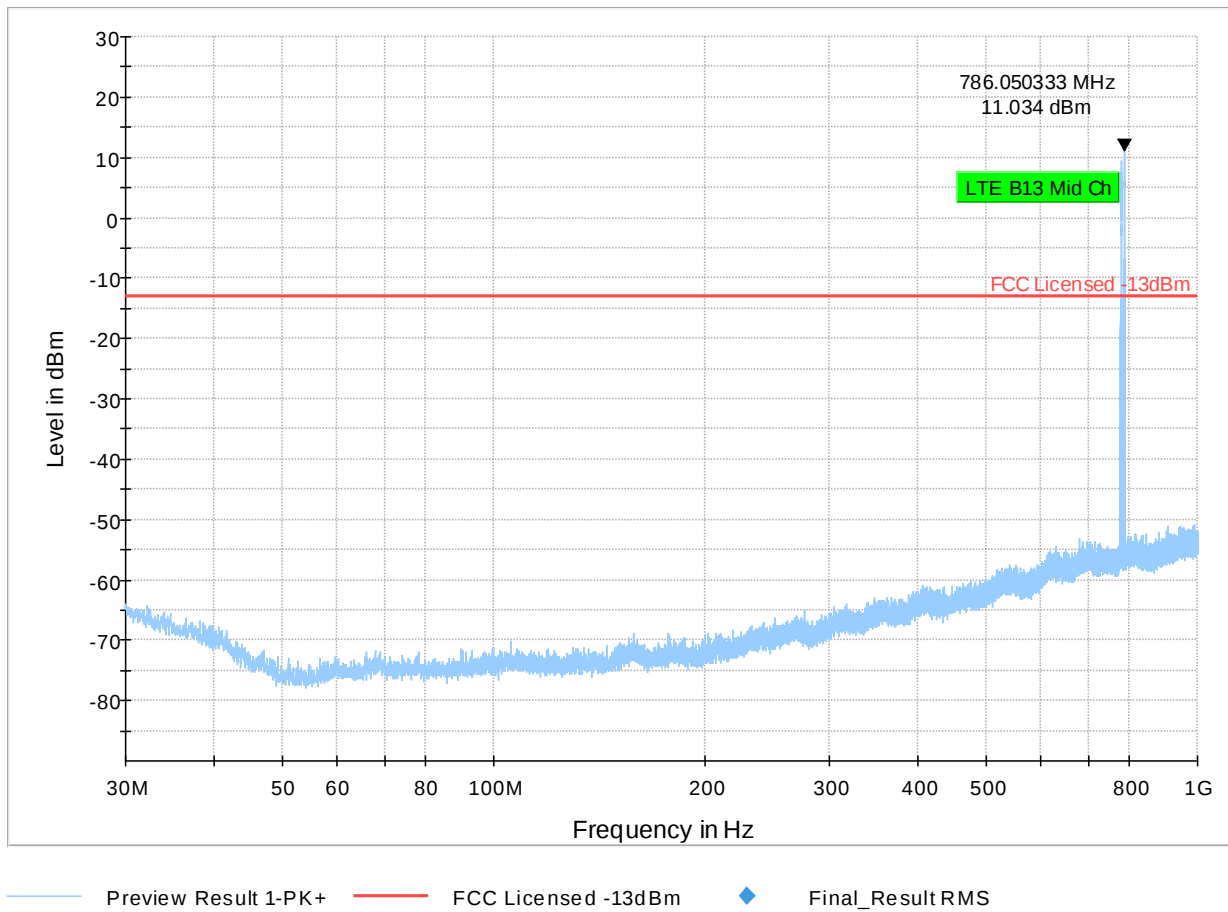
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.009	-20.82	-13.00	7.82	500.0	1.000	315.0	V	87.0	-64.7	



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

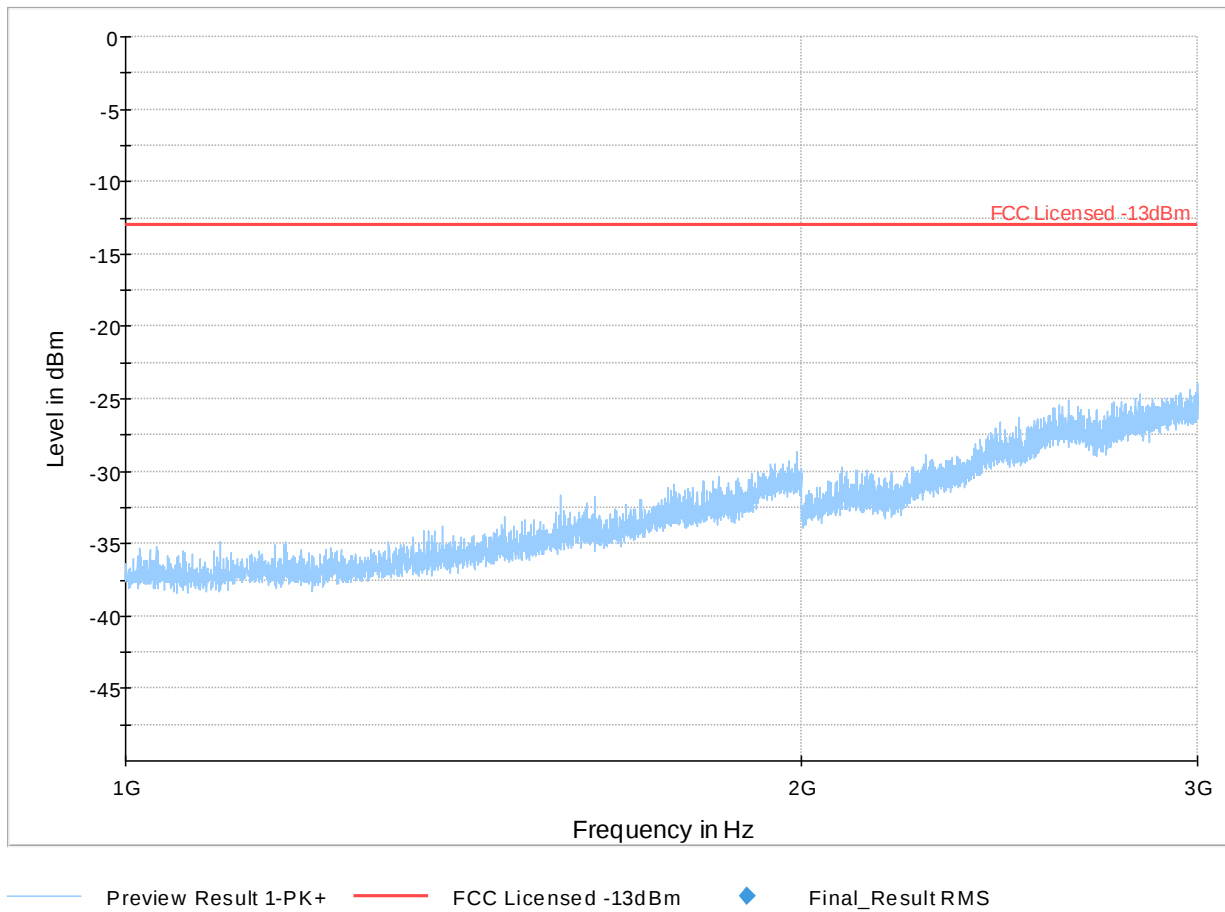
Plot #43 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



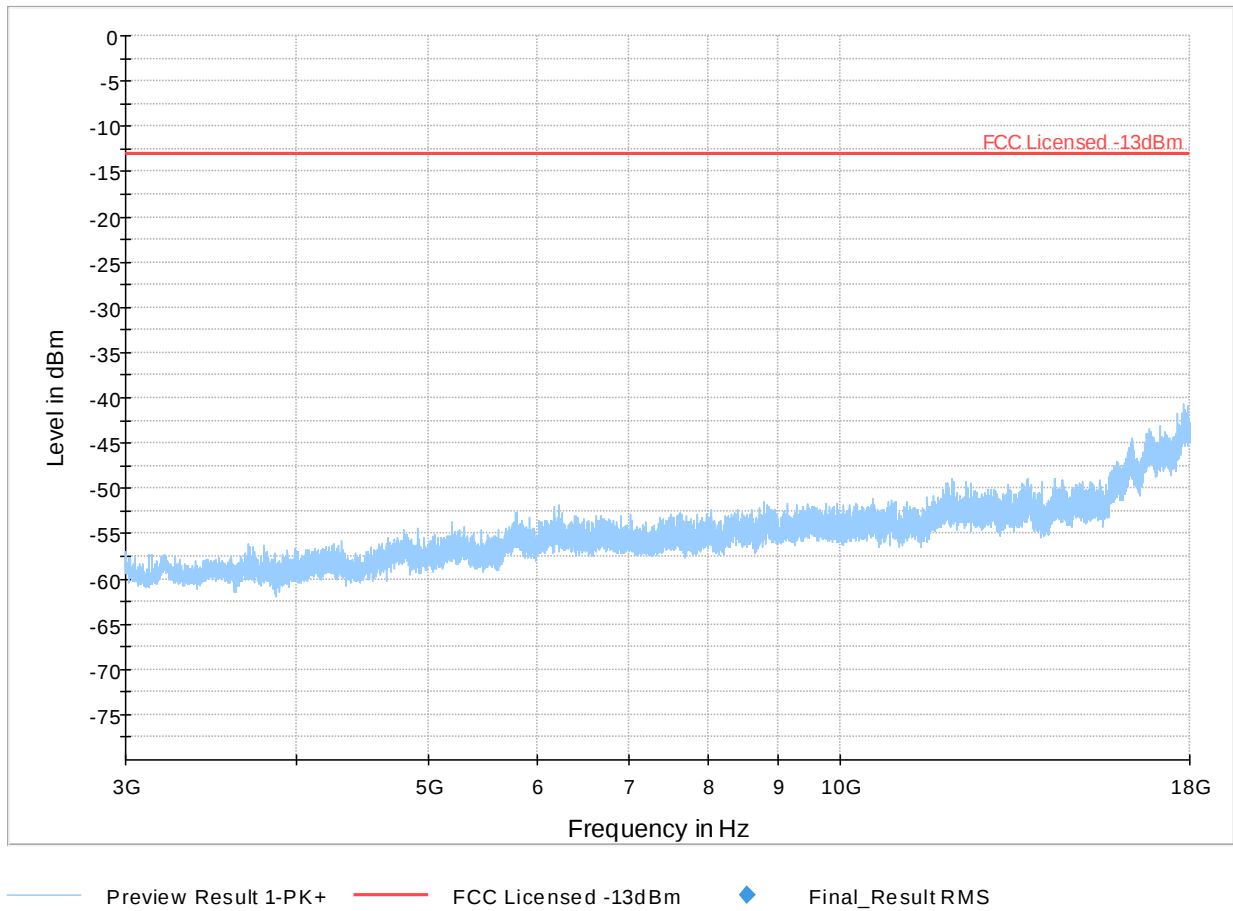
Plot #44 Radiated Emissions: 1-3 GHz

Channel: Mid



Plot #45 Radiated Emissions: 3-18 GHz

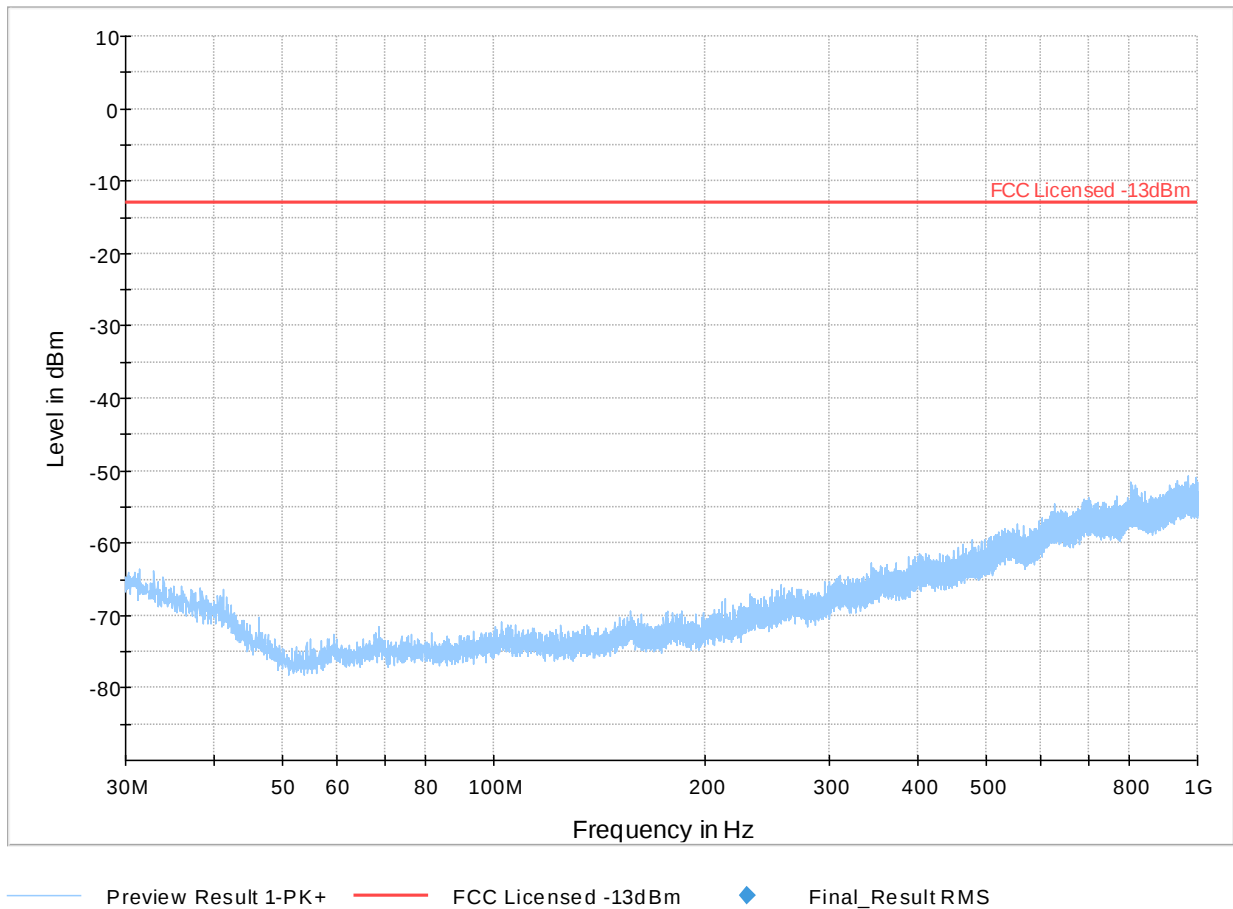
Channel: Mid



LTE Band 25

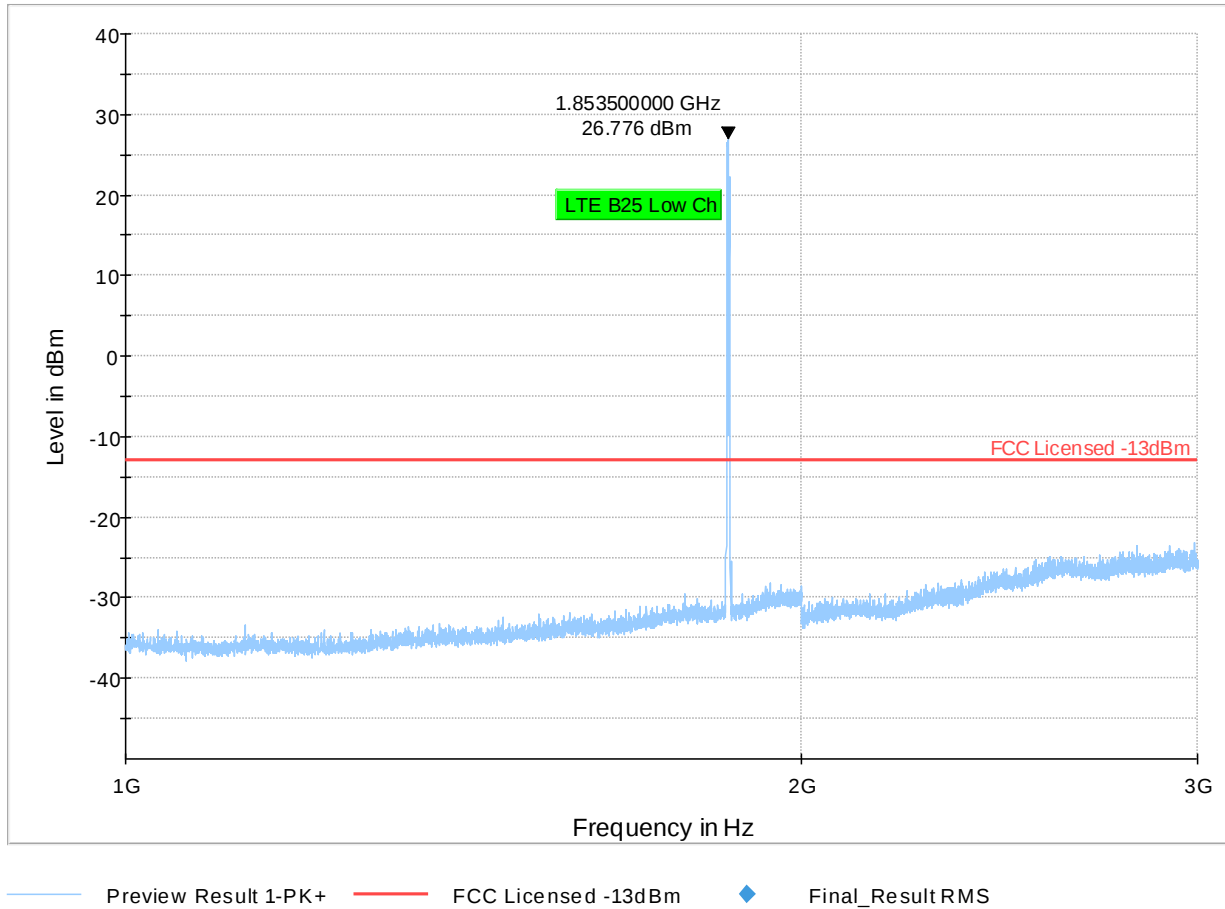
Plot #46 Radiated Emissions: 30 MHz – 1GHz

Channel: Low



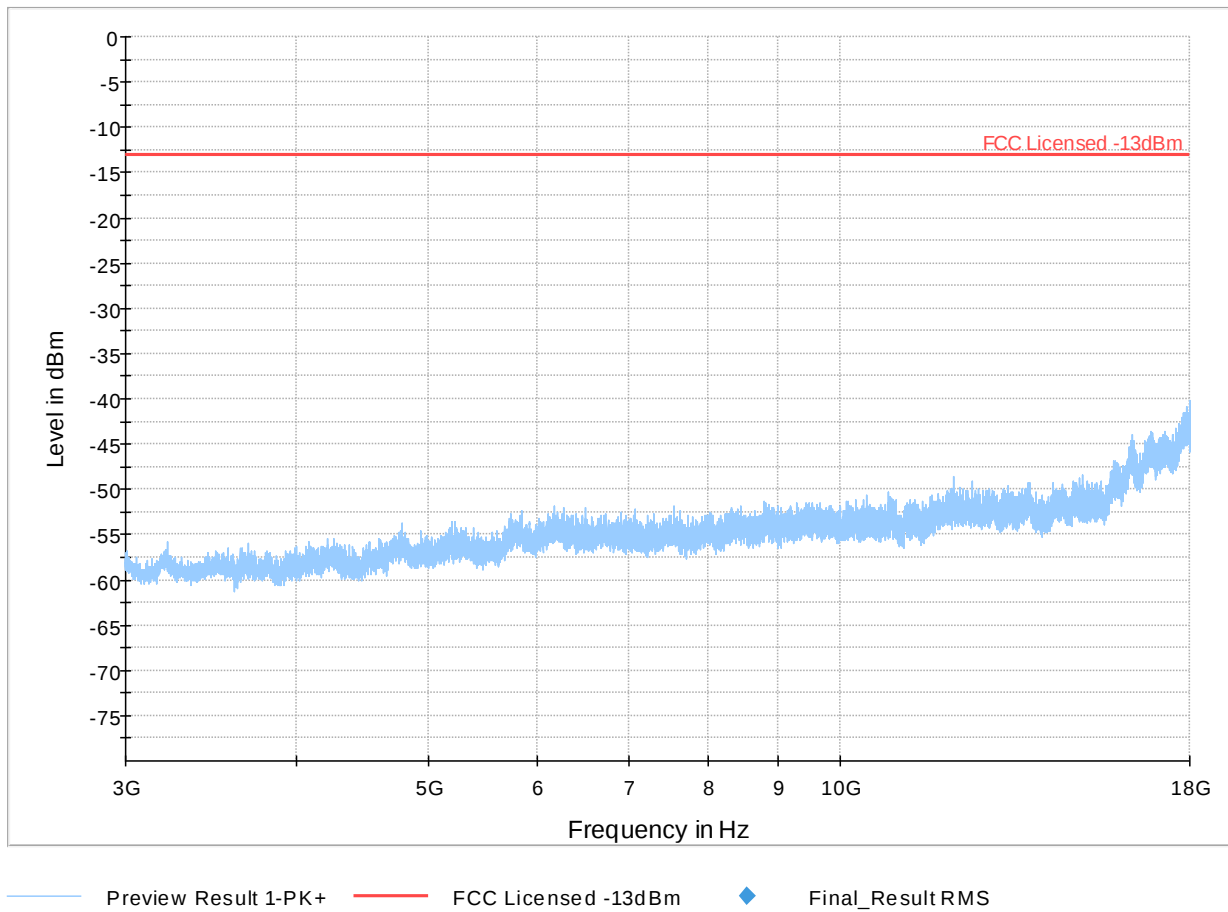
Plot # 47 Radiated Emissions: 1-3 GHz

Channel: Low



Plot # 48 Radiated Emissions: 3-18 GHz

Channel: Low

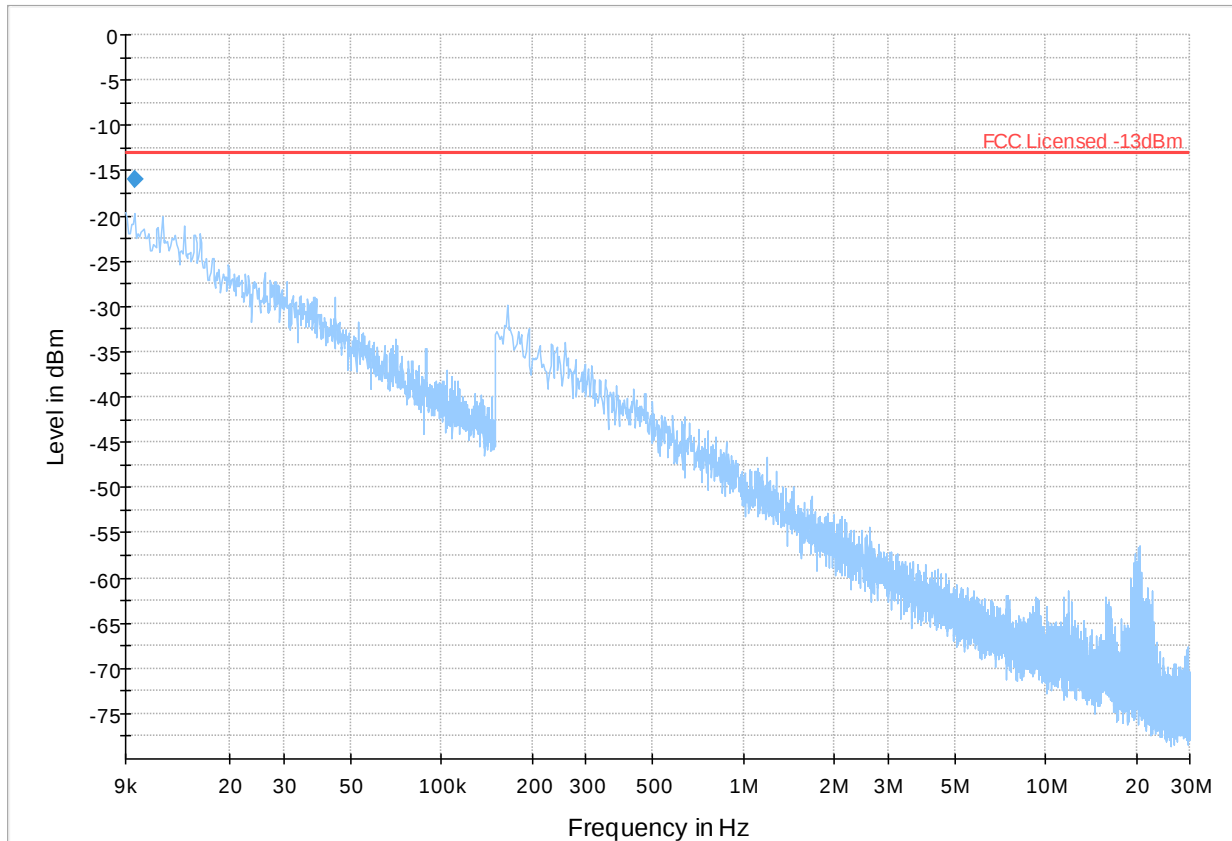


Plot #49 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final Result

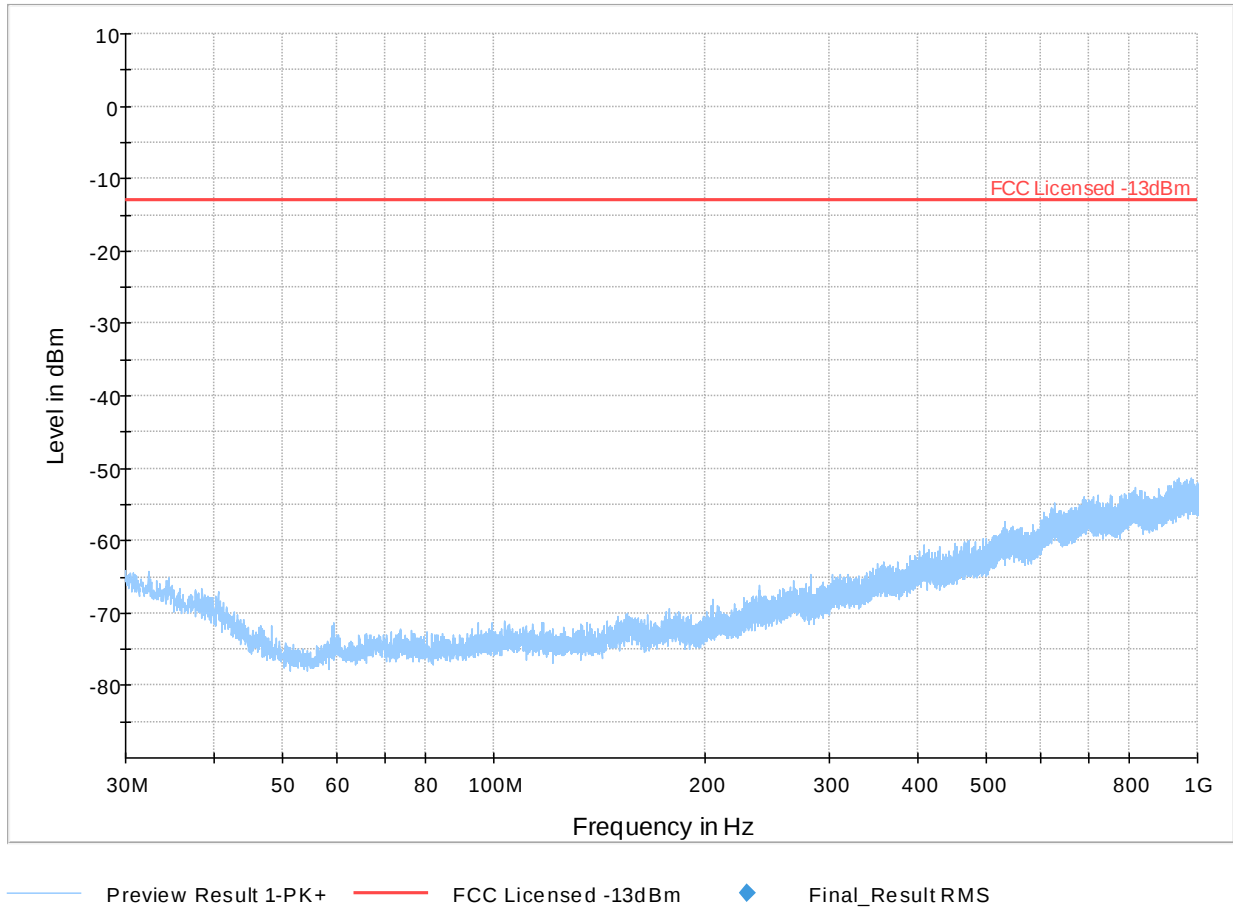
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.010	-16.01	-13.00	3.01	500.0	3.000	218.0	H	176.0	-65.0	



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

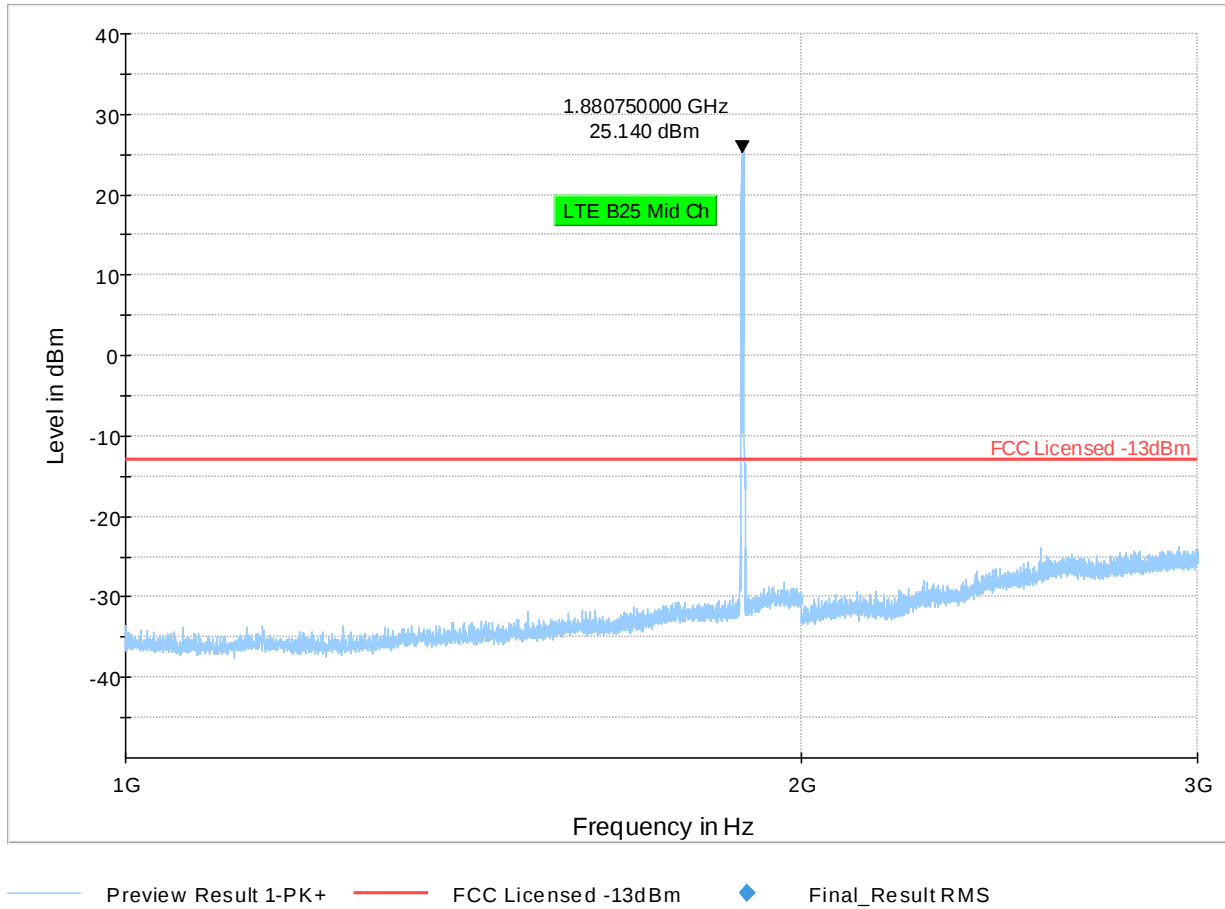
Plot #50 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



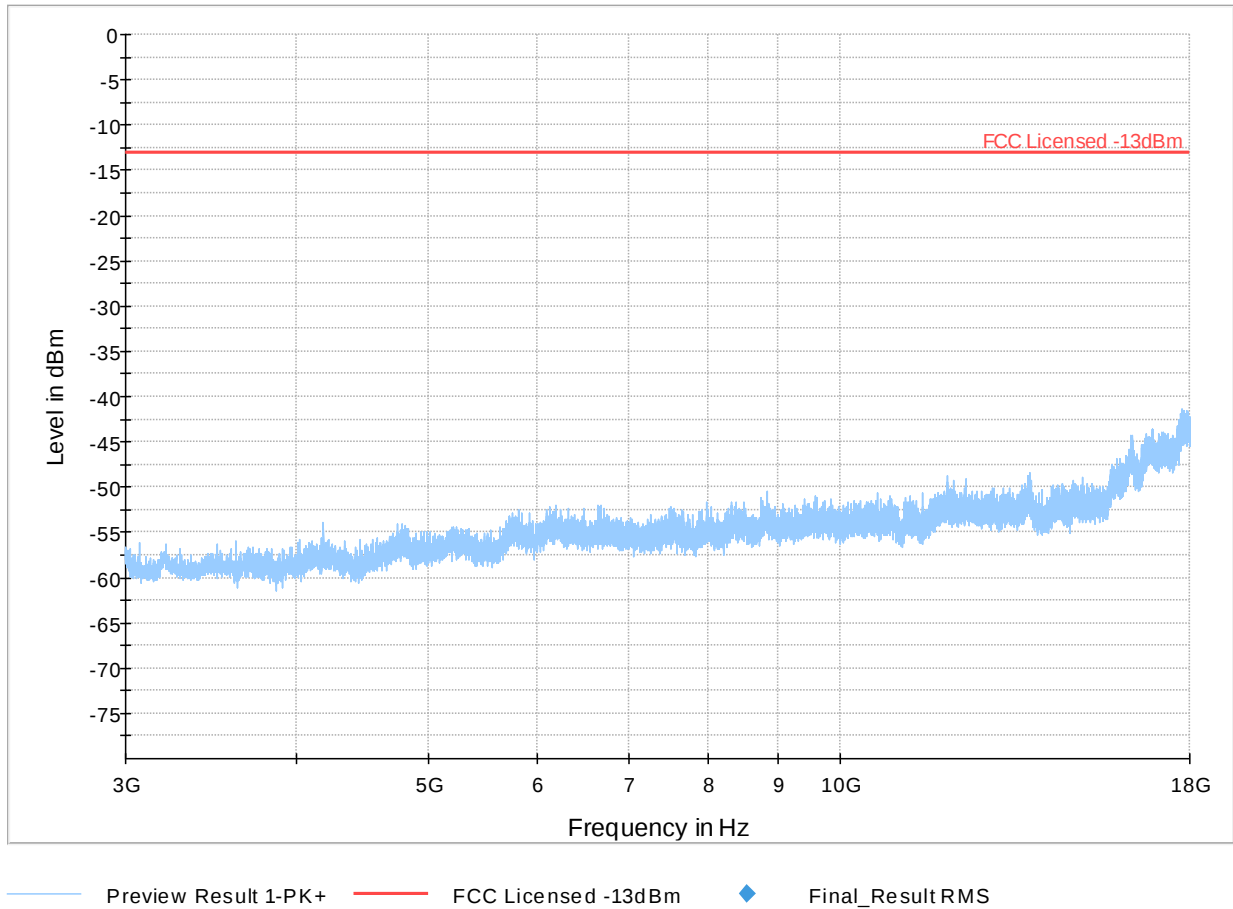
Plot #51 Radiated Emissions: 1-3 GHz

Channel: Mid



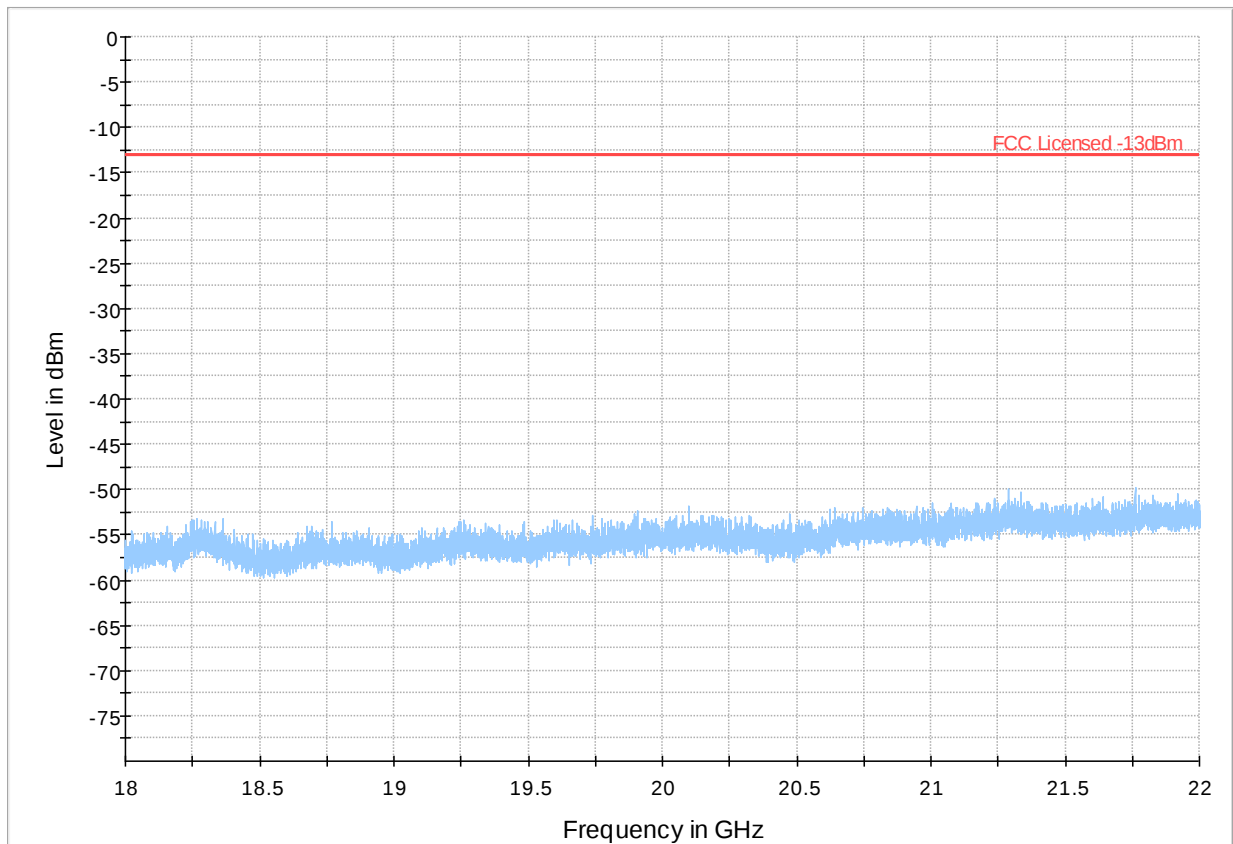
Plot #52 Radiated Emissions: 3-18 GHz

Channel: Mid



Plot #53 Radiated Emissions: 18-22 GHz

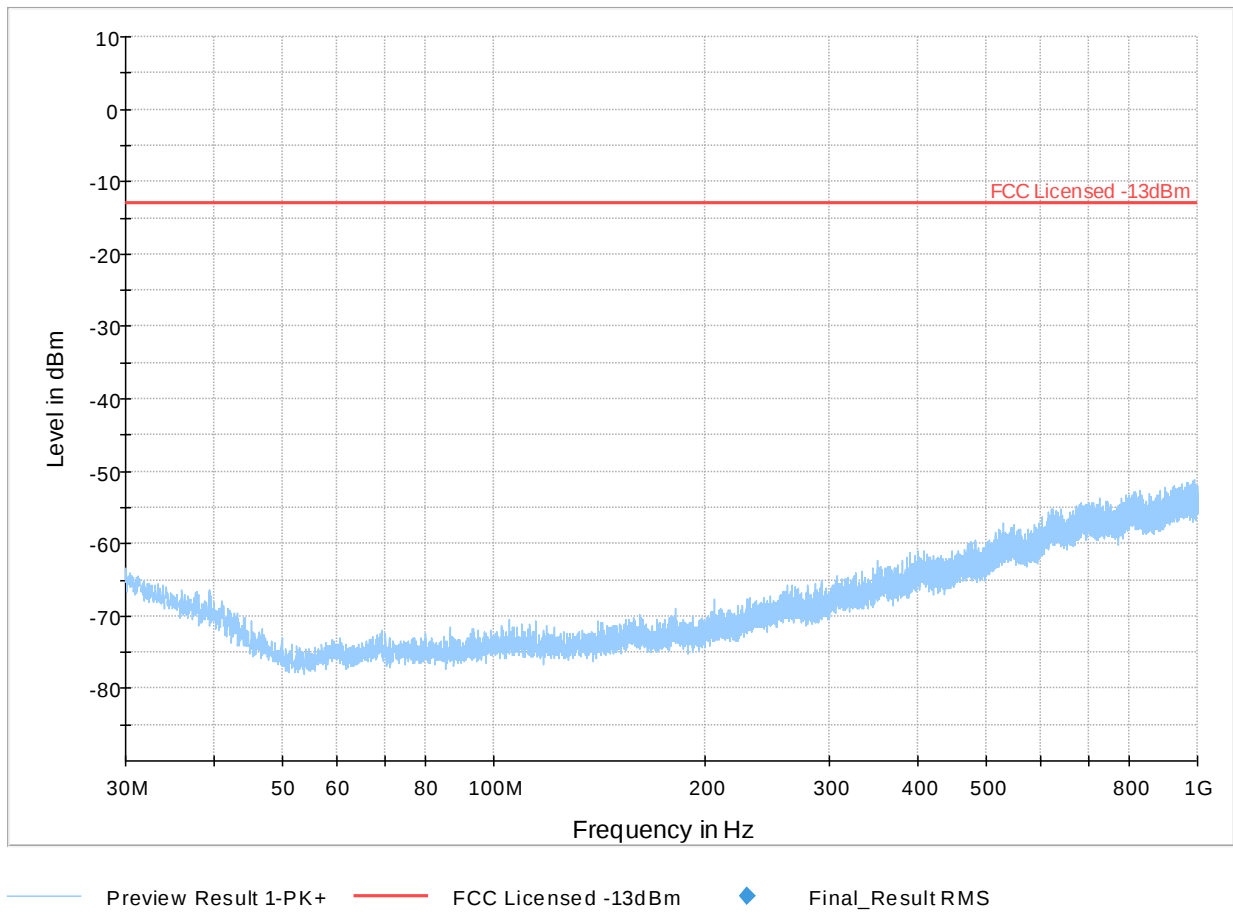
Channel: Mid



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

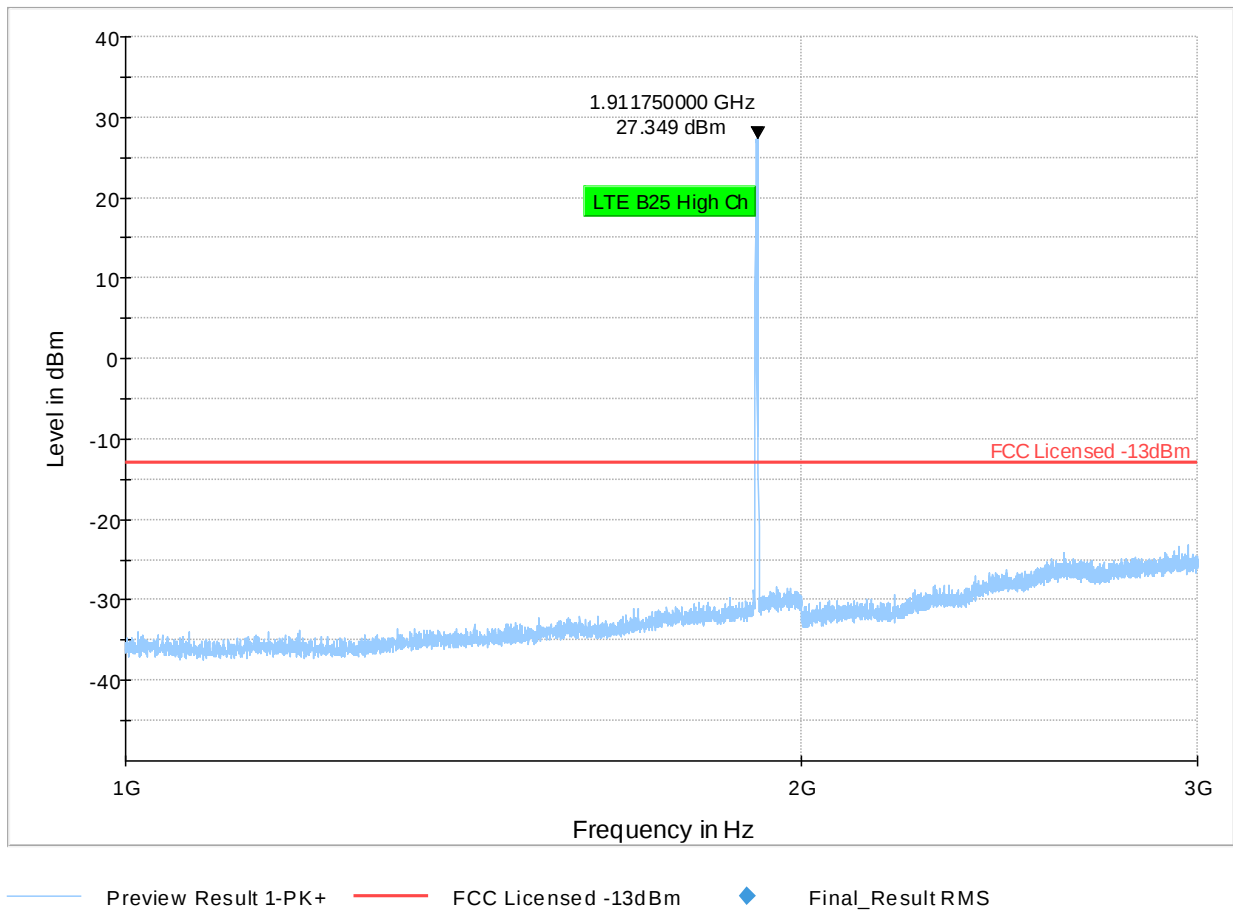
Plot #54 Radiated Emissions: 30 MHz – 1 GHz

Channel: High



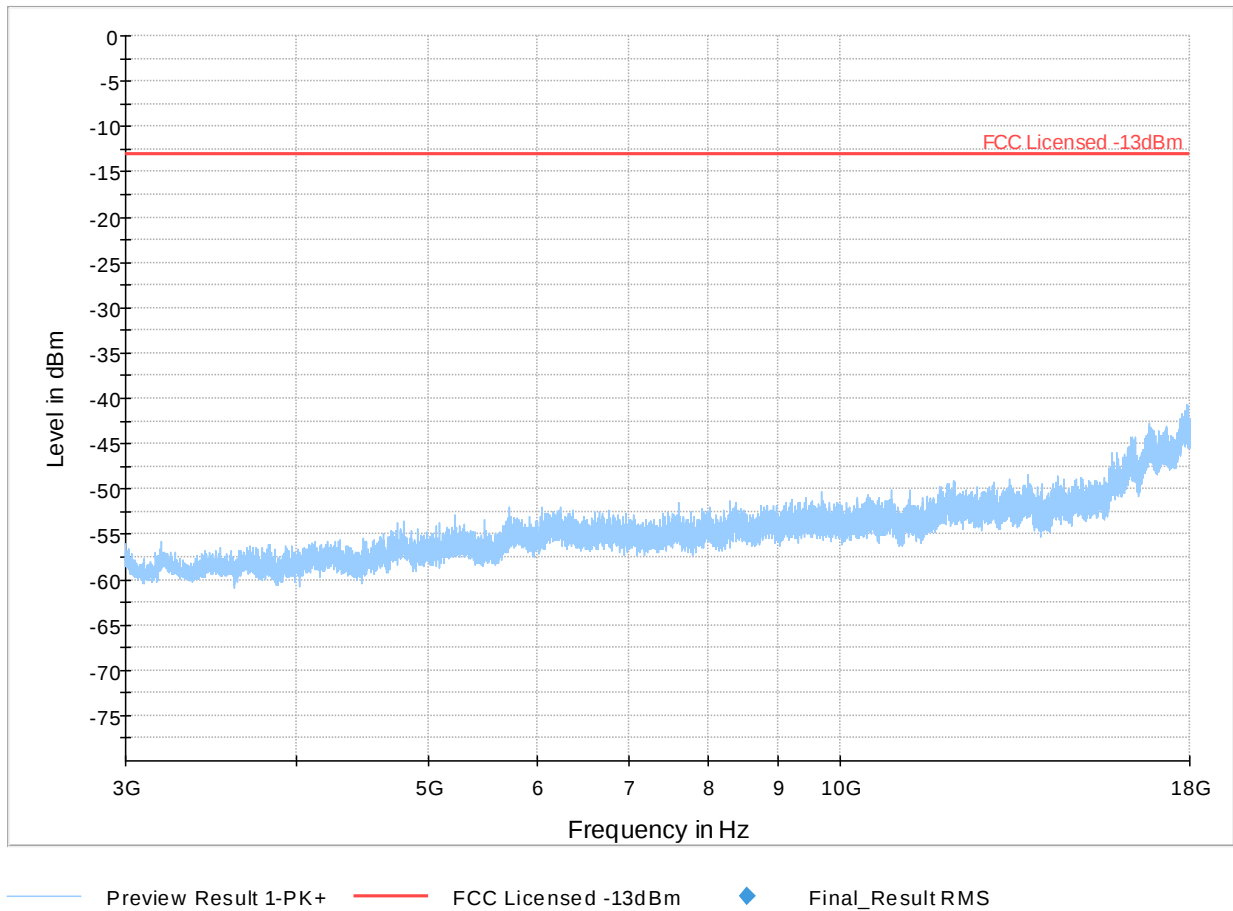
Plot #55 Radiated Emissions: 1-3 GHz

Channel: High



Plot #56 Radiated Emissions: 3-18 GHz

Channel: High



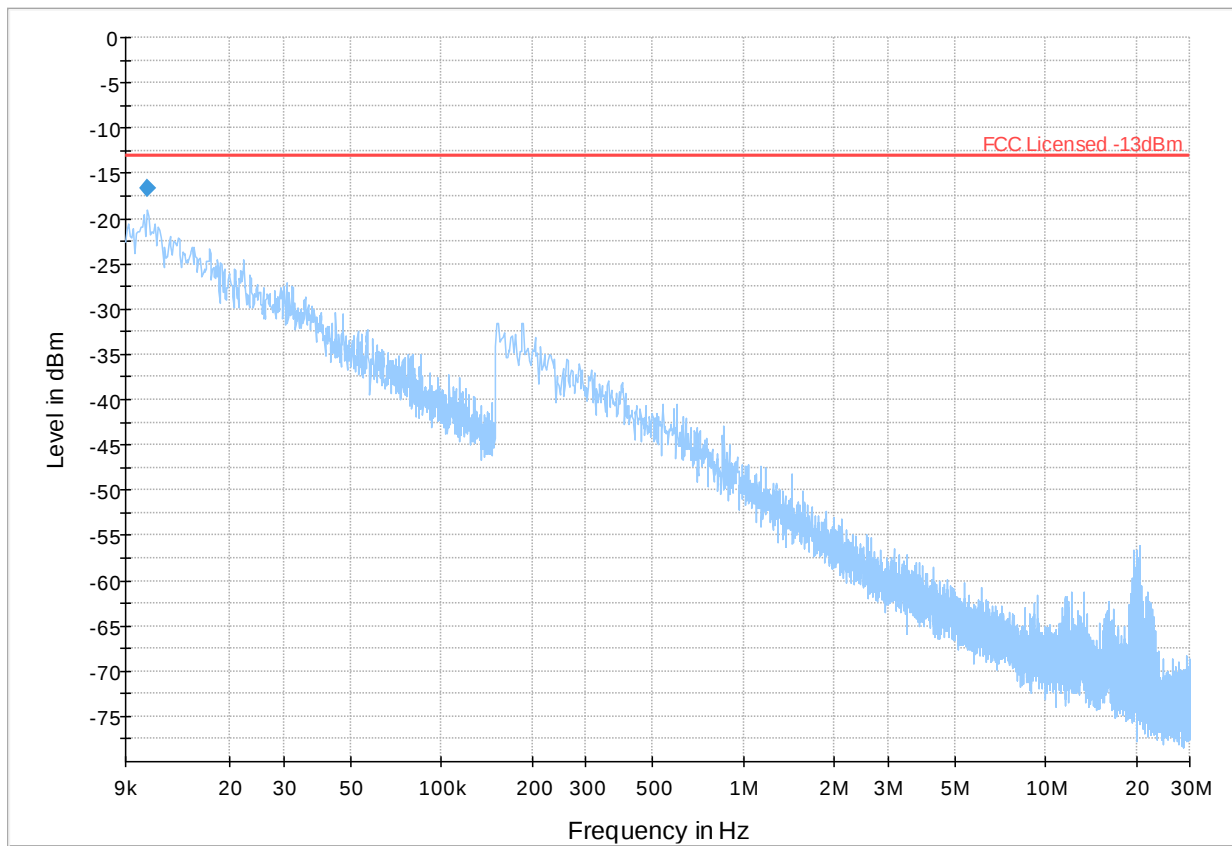
FCC 90-LTE Band 26

Plot #57 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final Result

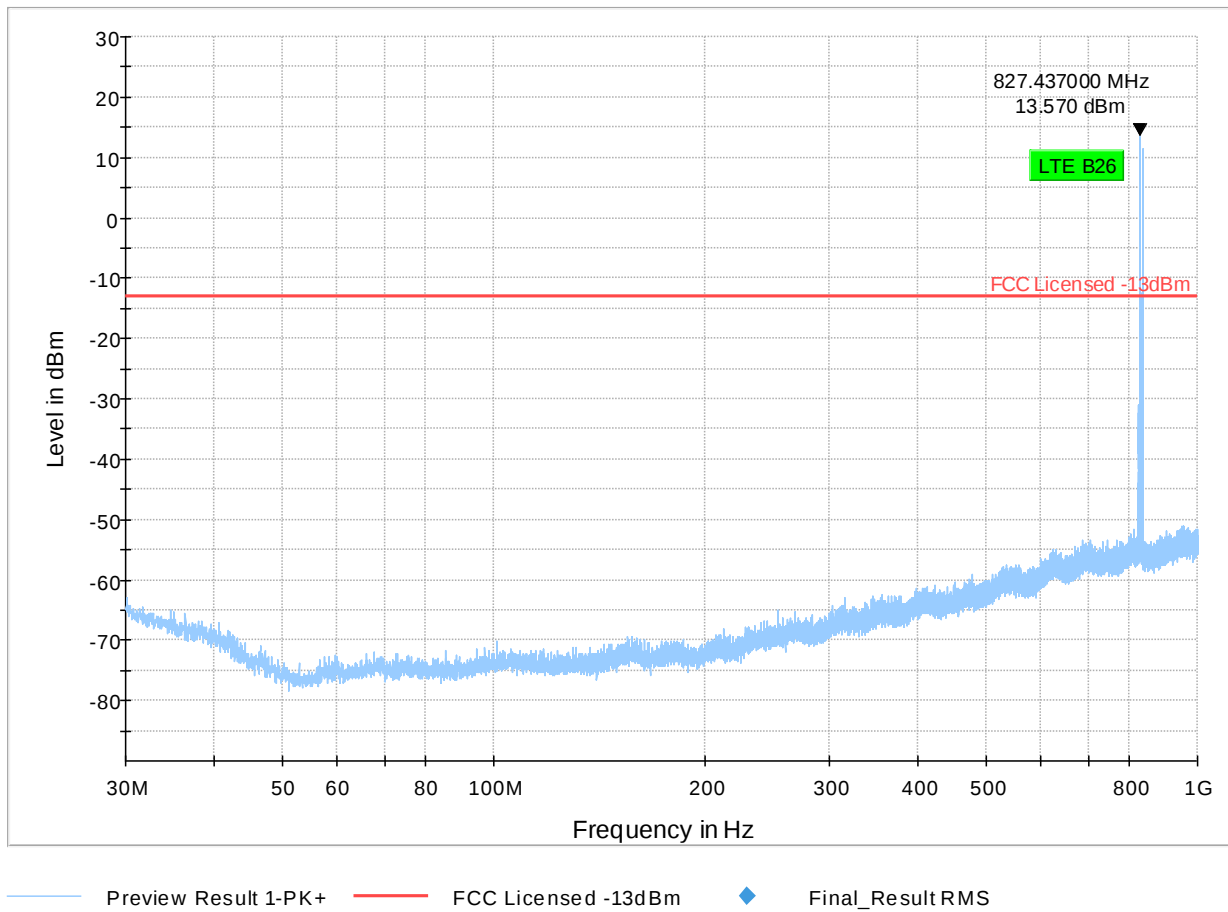
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.011	-16.63	-13.00	3.63	500.0	3.000	251.0	V	224.0	-65.6	



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

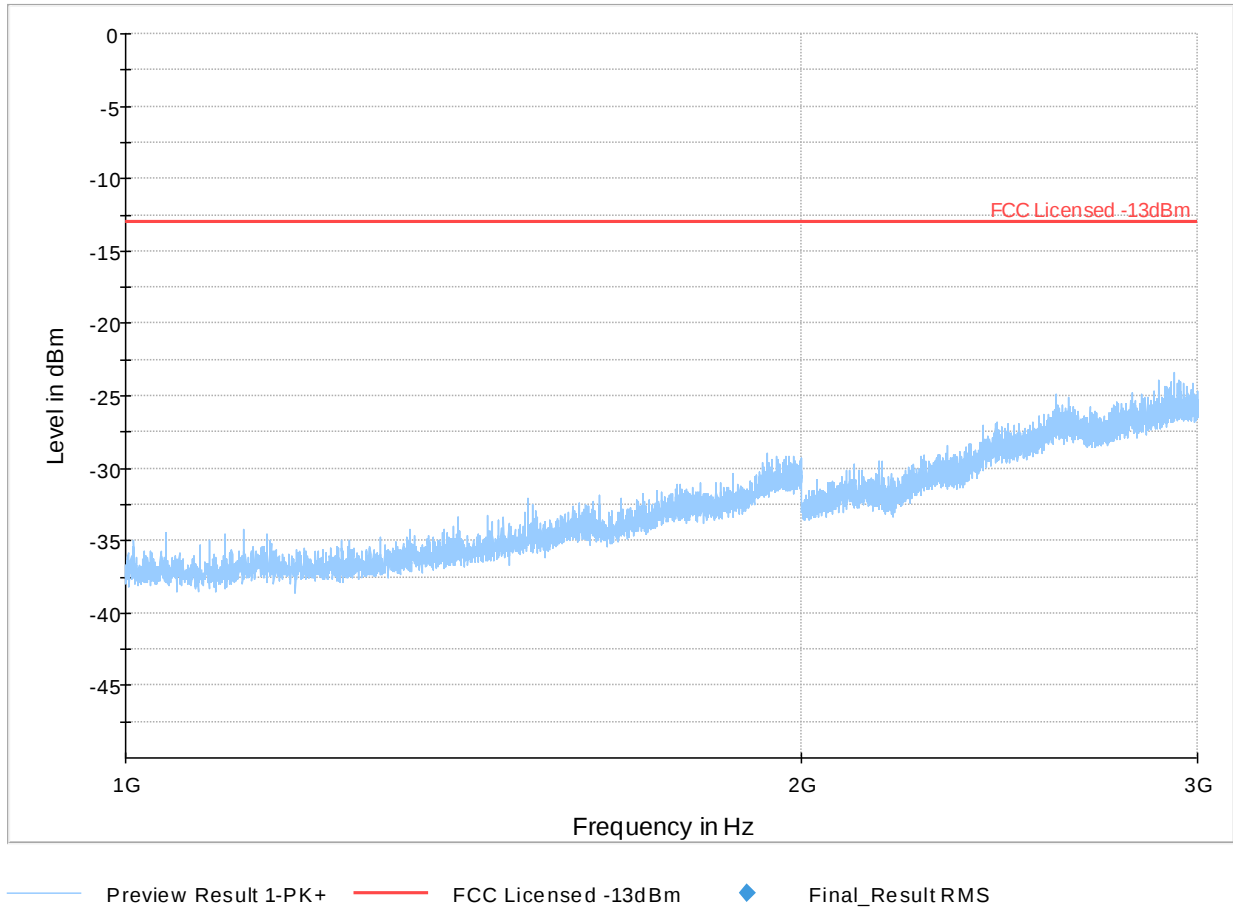
Plot #58 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



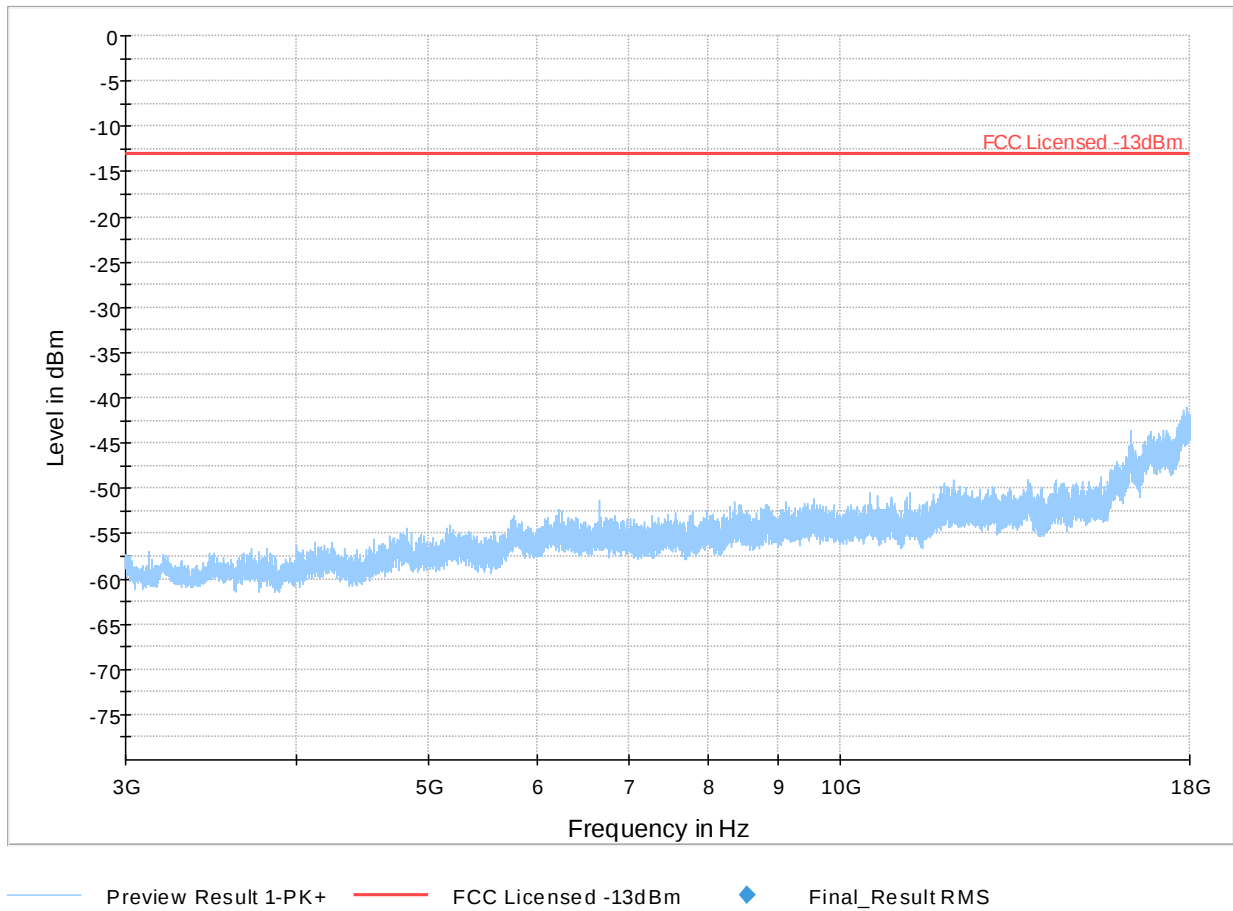
Plot #59 Radiated Emissions: 1-3 GHz

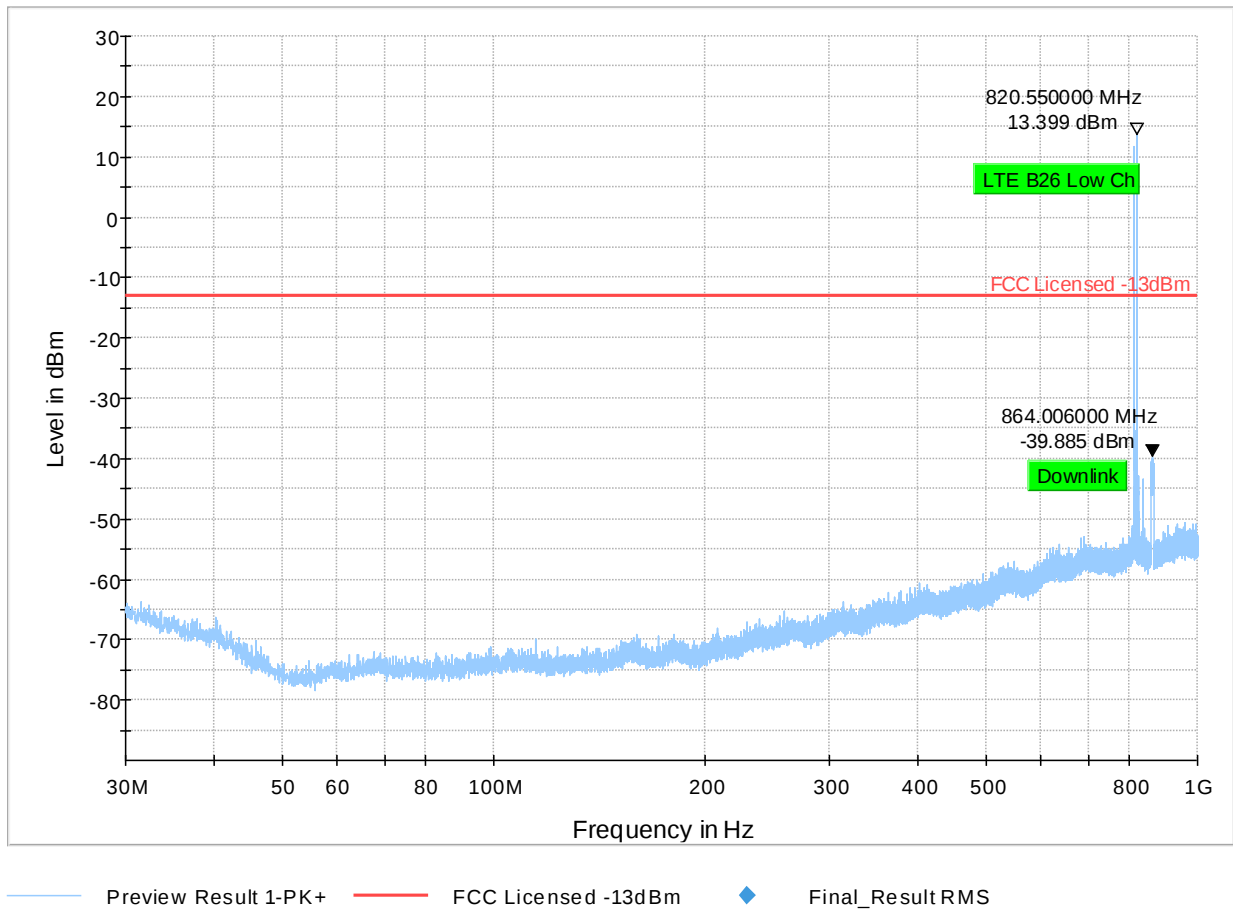
Channel: Mid



Plot #60 Radiated Emissions: 3-18 GHz

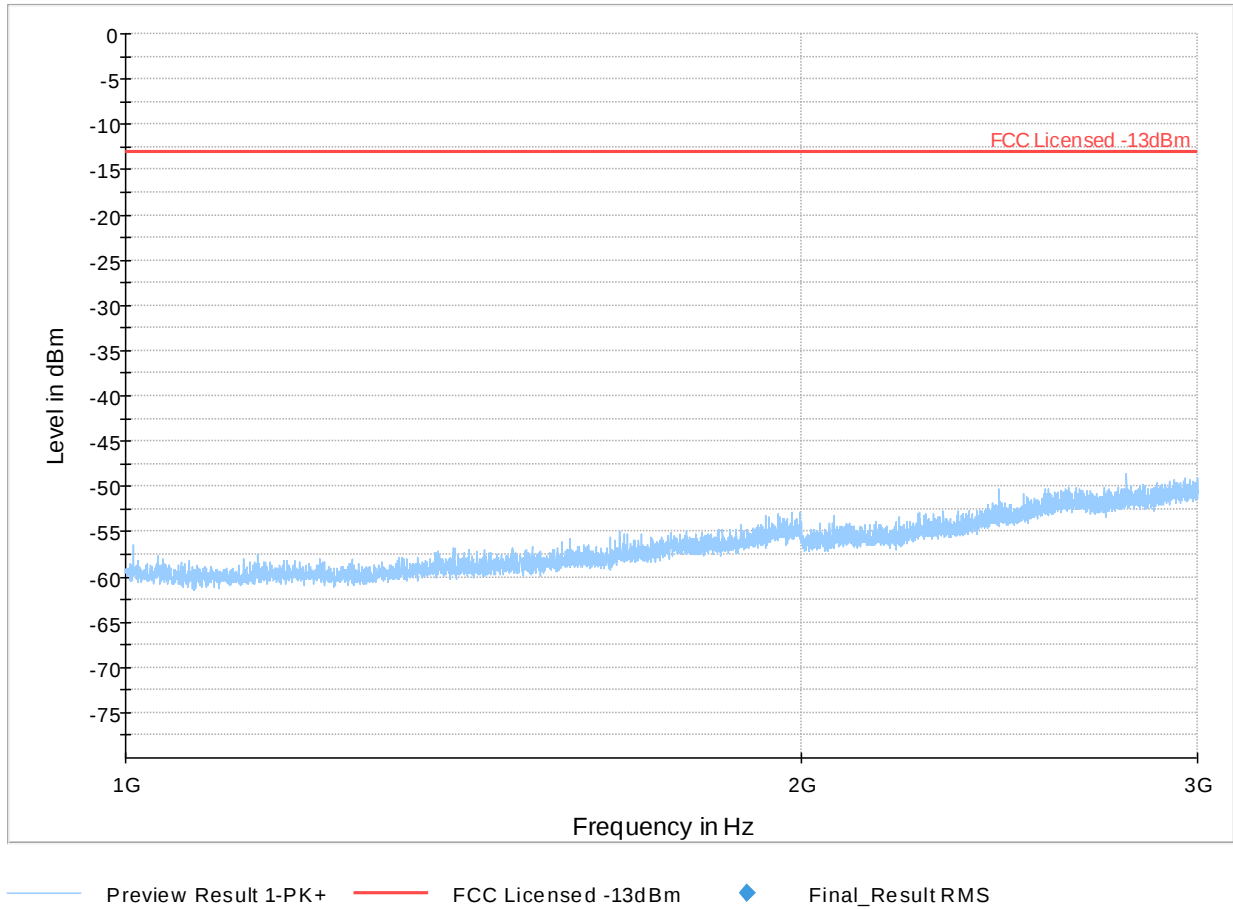
Channel: Mid



FCC 22 -LTE Band 26**Plot # 61 Radiated Emissions: 30 MHz – 1GHz****Channel: Low**

Plot # 62 Radiated Emissions: 1-3 GHz

Channel: Low

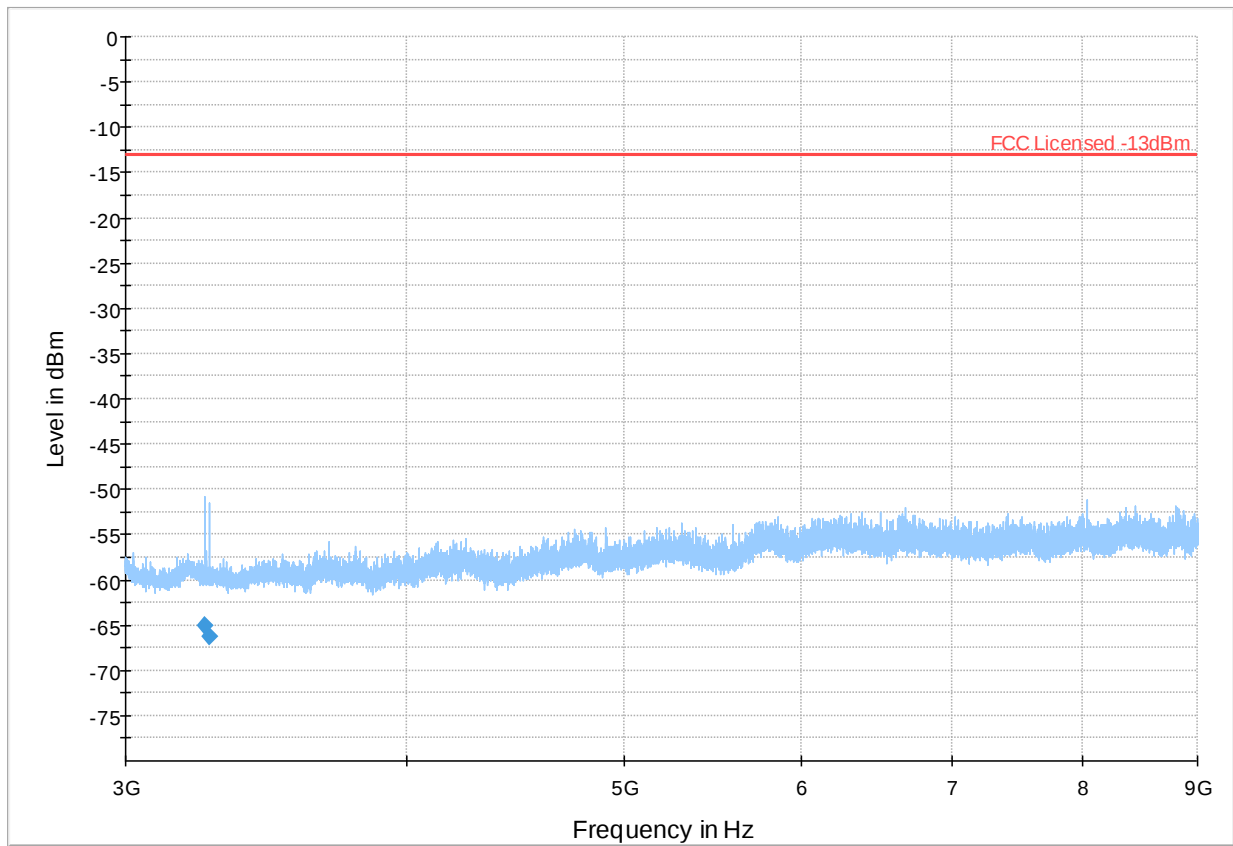


Plot # 63 Radiated Emissions: 3-9 GHz

Channel: Low

Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3254.250	-65.00	-13.00	52.00	500.0	1000.000	150.0	H	230.0	-103.1	
3269.750	-66.23	-13.00	53.23	500.0	1000.000	150.0	H	65.0	-103.2	



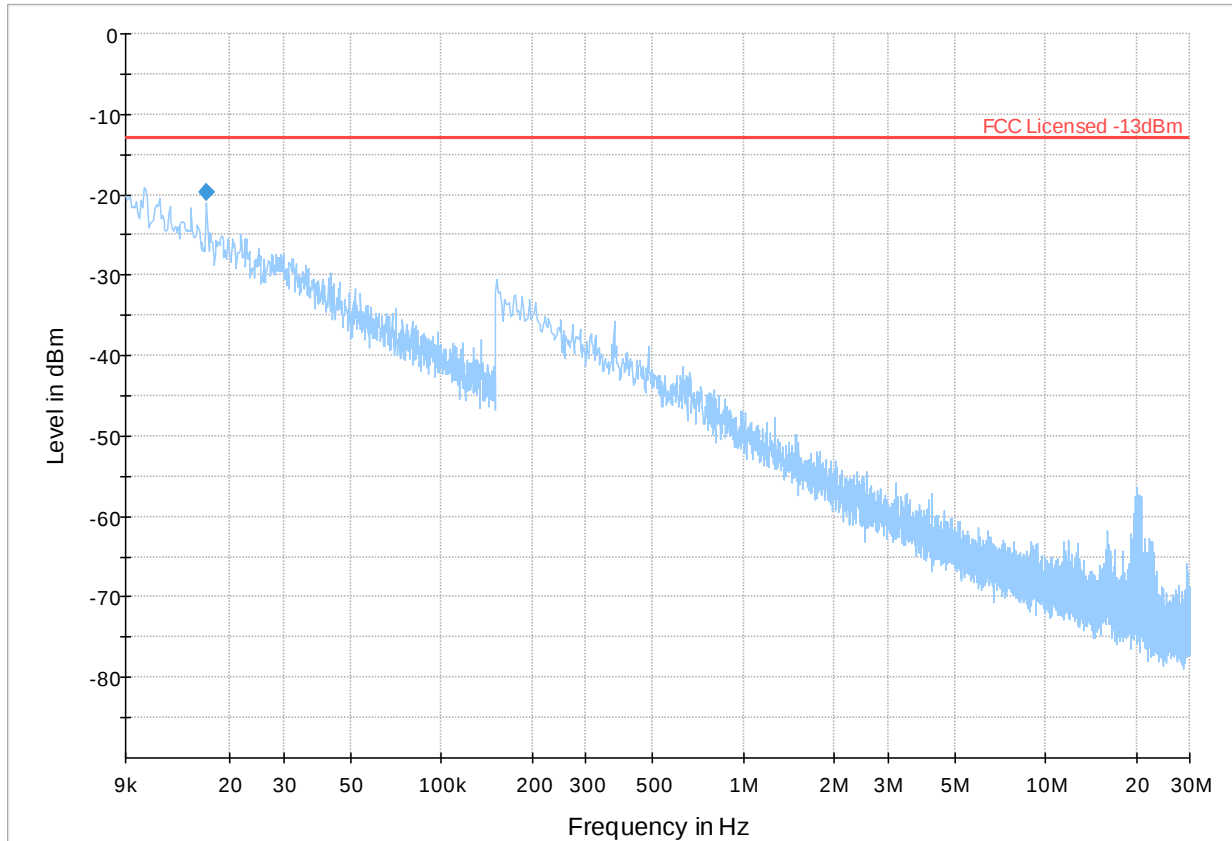
Preview Result 1-PK+ FCC Licensed -13dBm Final Result RMS

Plot # 64 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

Final Result

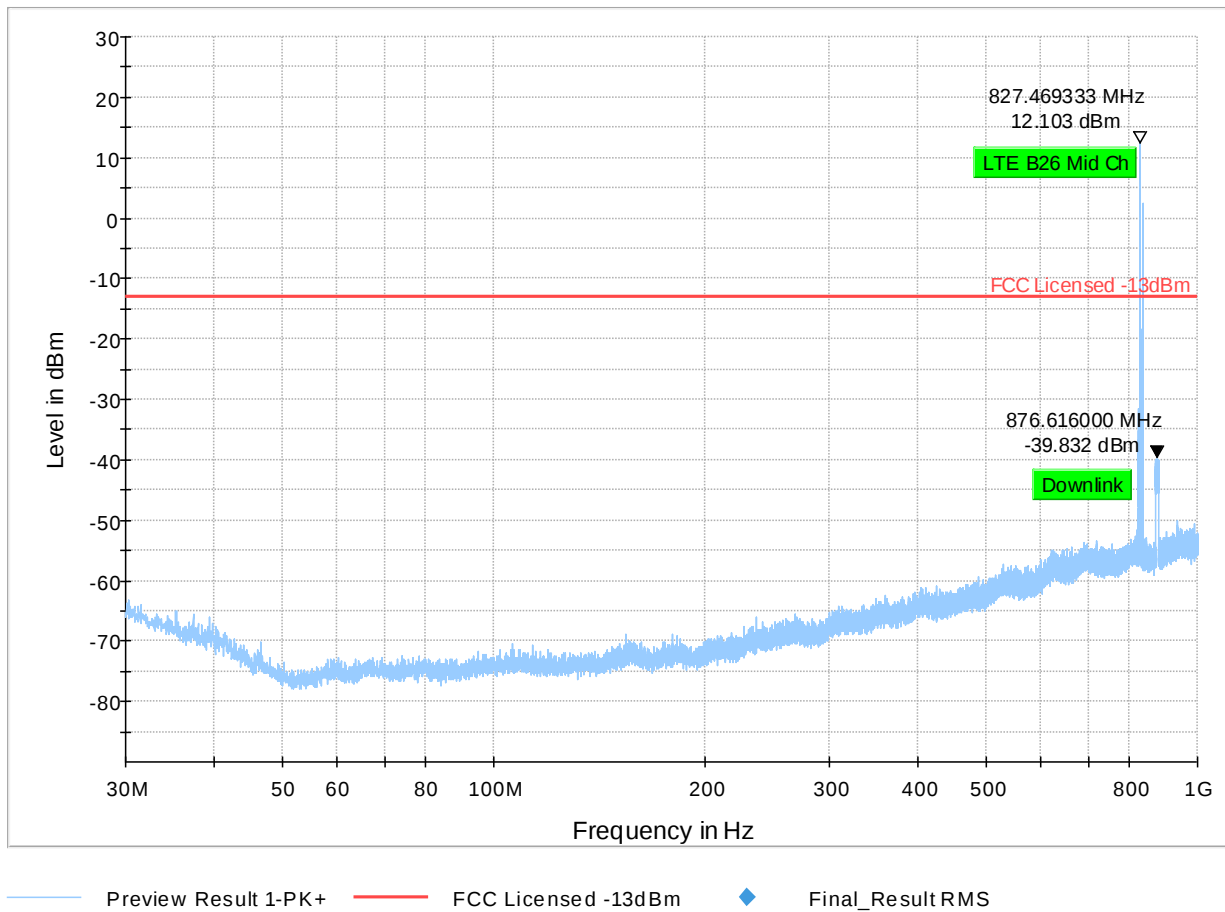
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.017	-19.72	-13.00	6.72	500.0	3.000	315.0	V	146.0	-68.8	



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

Plot # 65 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid

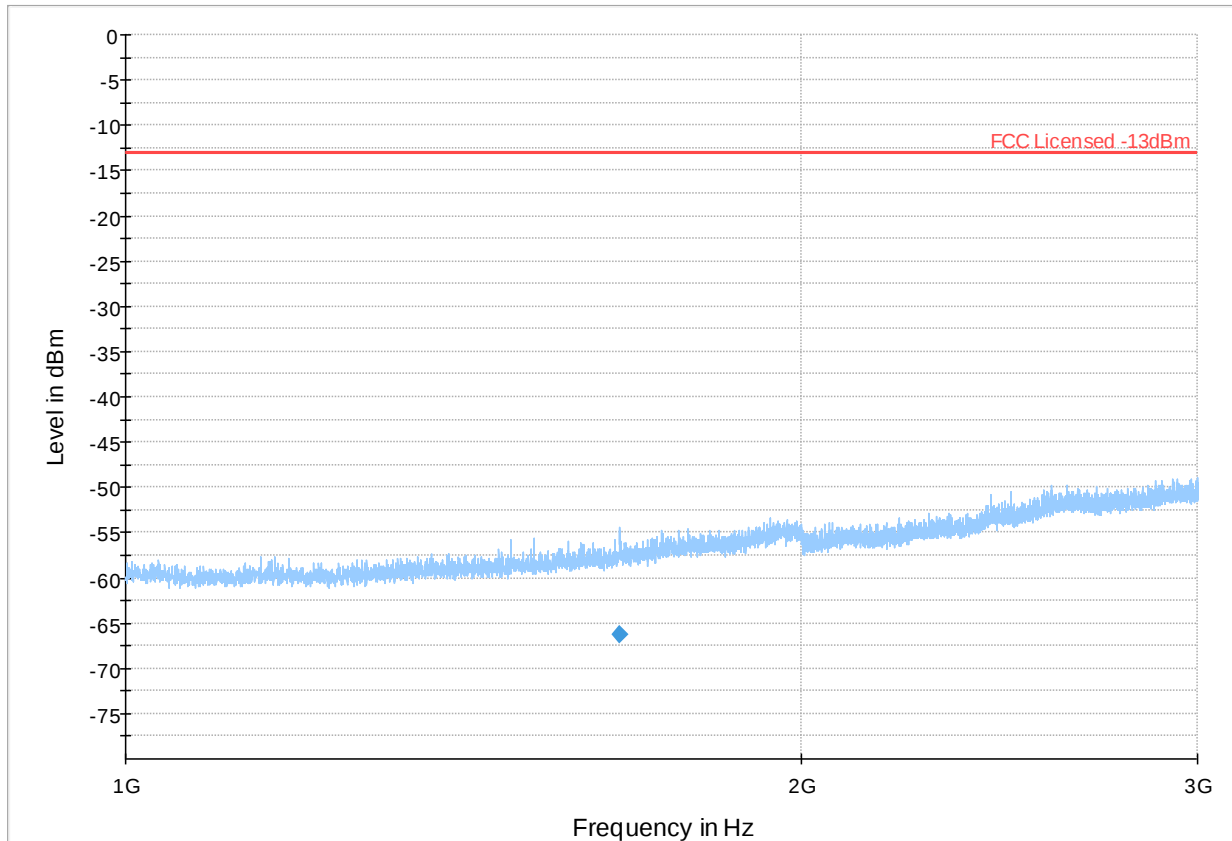


Plot # 66 Radiated Emissions: 1-3 GHz

Channel: Mid

Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
1659.250	-66.22	-13.00	53.22	500.0	1000.000	276.0	H	288.0	-89.4	



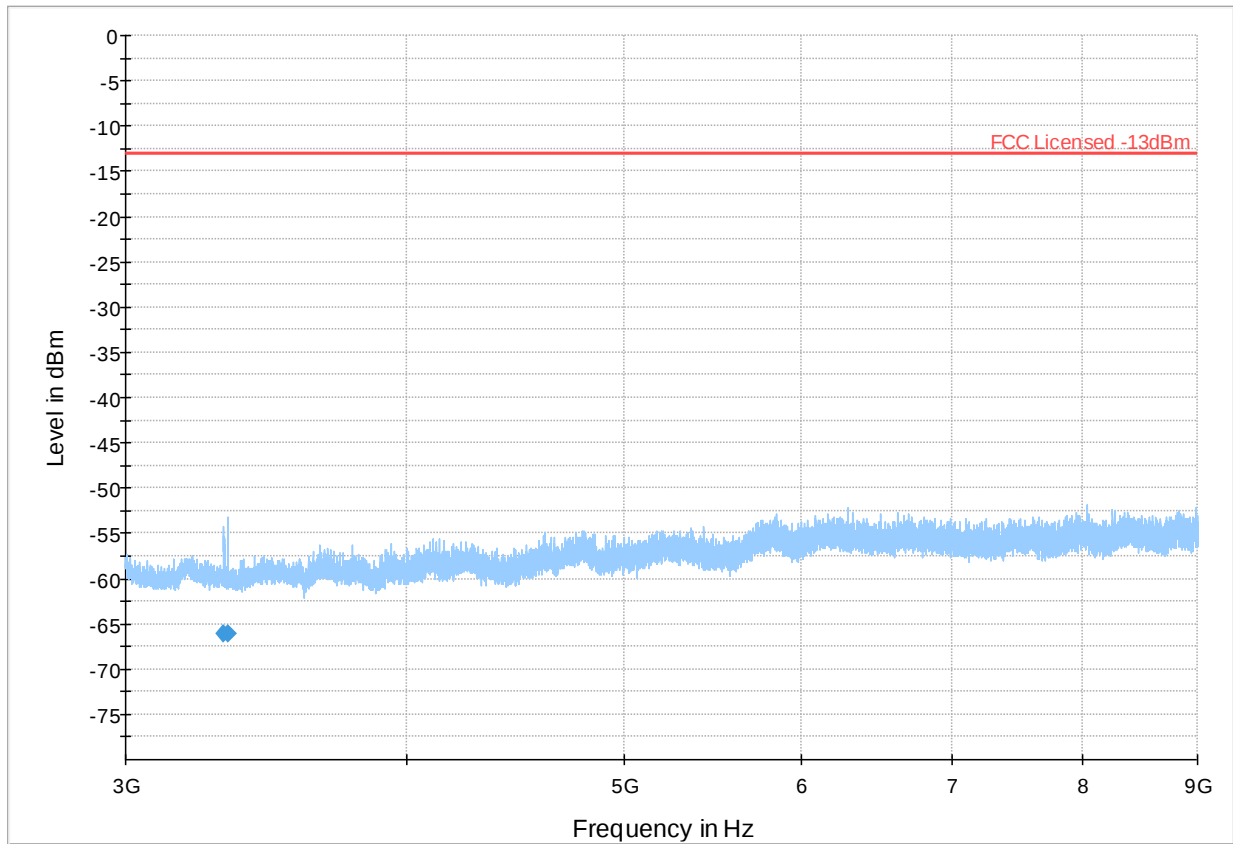
— Preview Result 1-PK+ — FCC Licensed -13dBm ◆ Final Result RMS

Plot # 67 Radiated Emissions: 3-9 GHz

Channel: Mid

Final Result

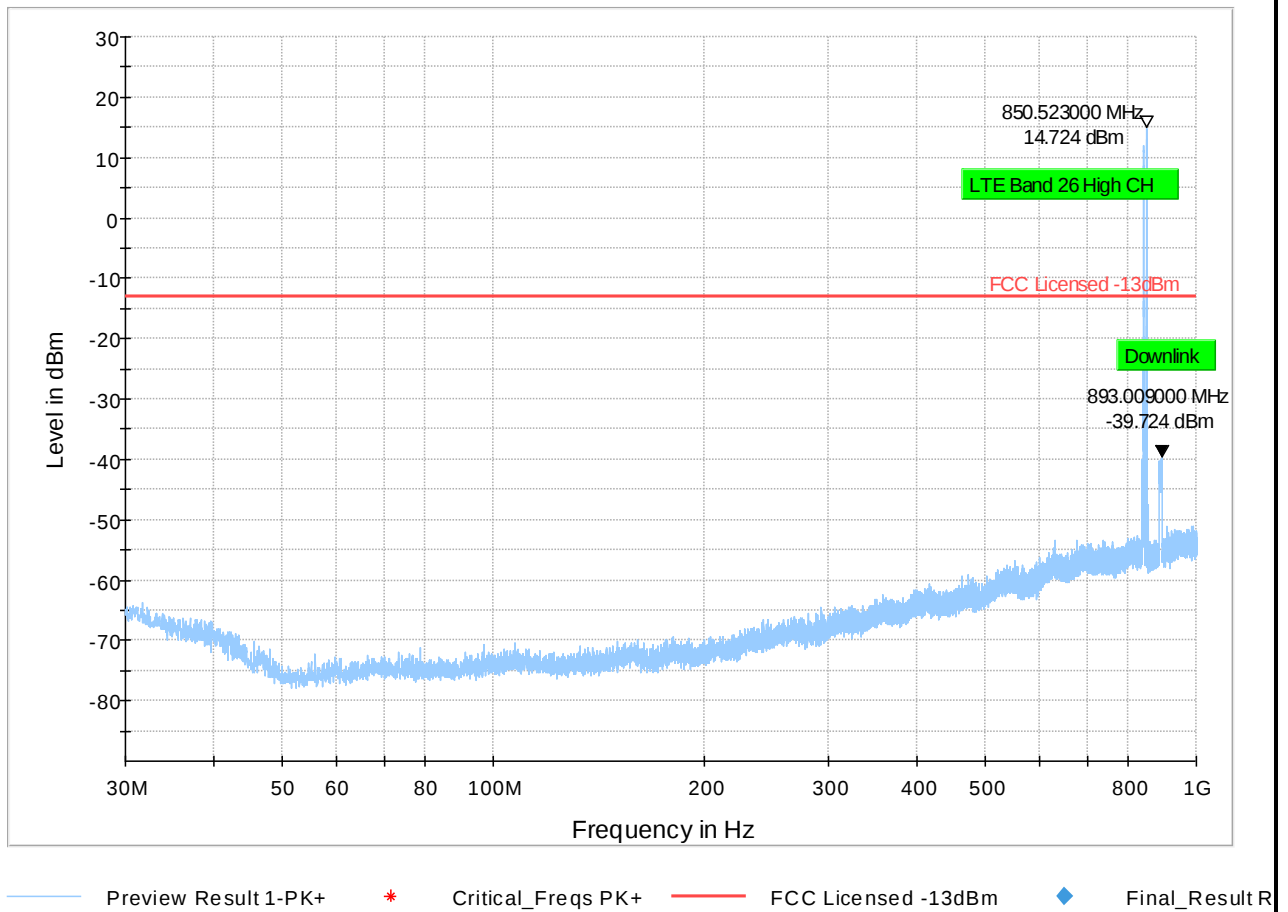
Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3317.750	-66.16	-13.00	53.16	500.0	1000.000	251.0	H	58.0	-103.5	
3334.000	-66.14	-13.00	53.14	500.0	1000.000	266.0	H	229.0	-103.5	



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

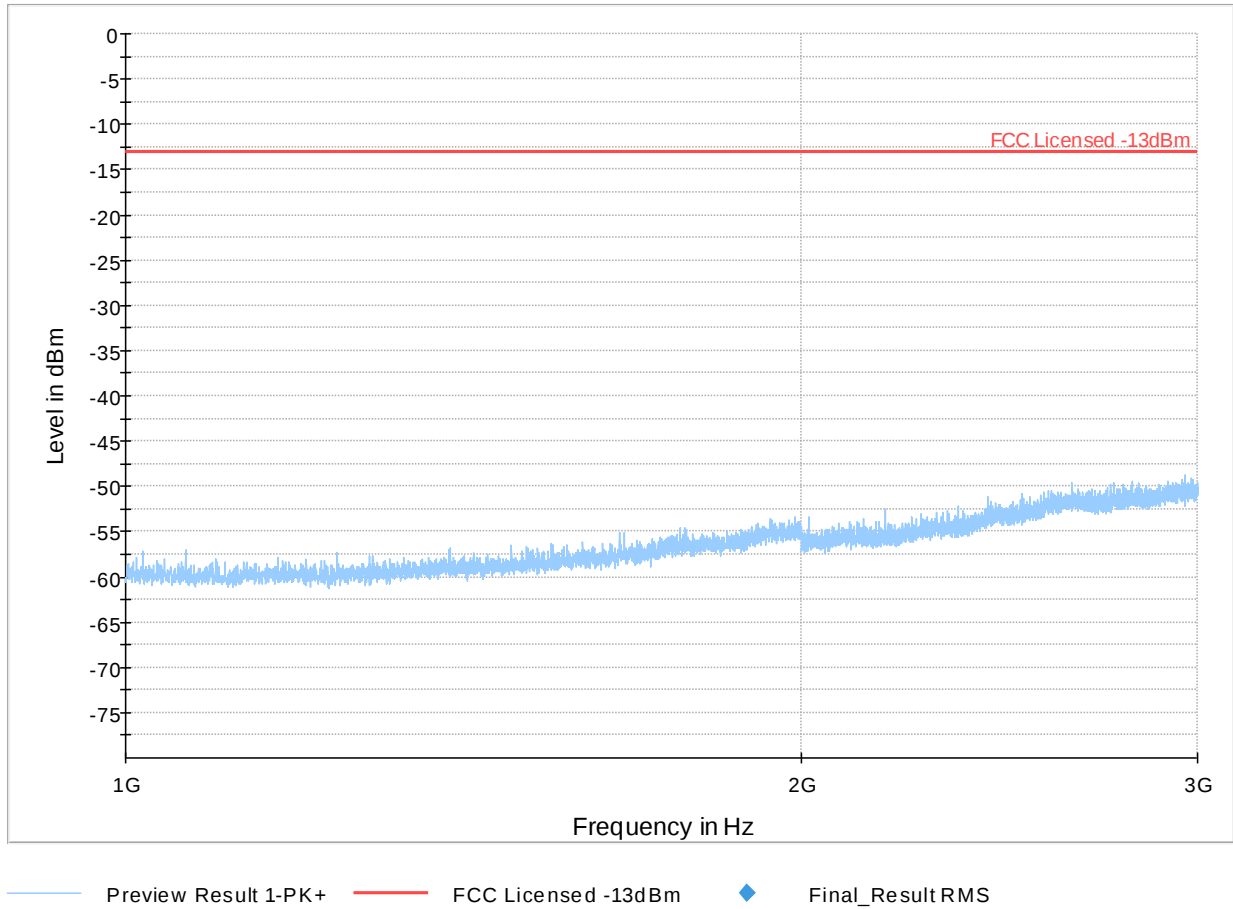
Plot # 68 Radiated Emissions: 30 MHz – 1 GHz

Channel: High



Plot # 69 Radiated Emissions: 1-3 GHz

Channel: High

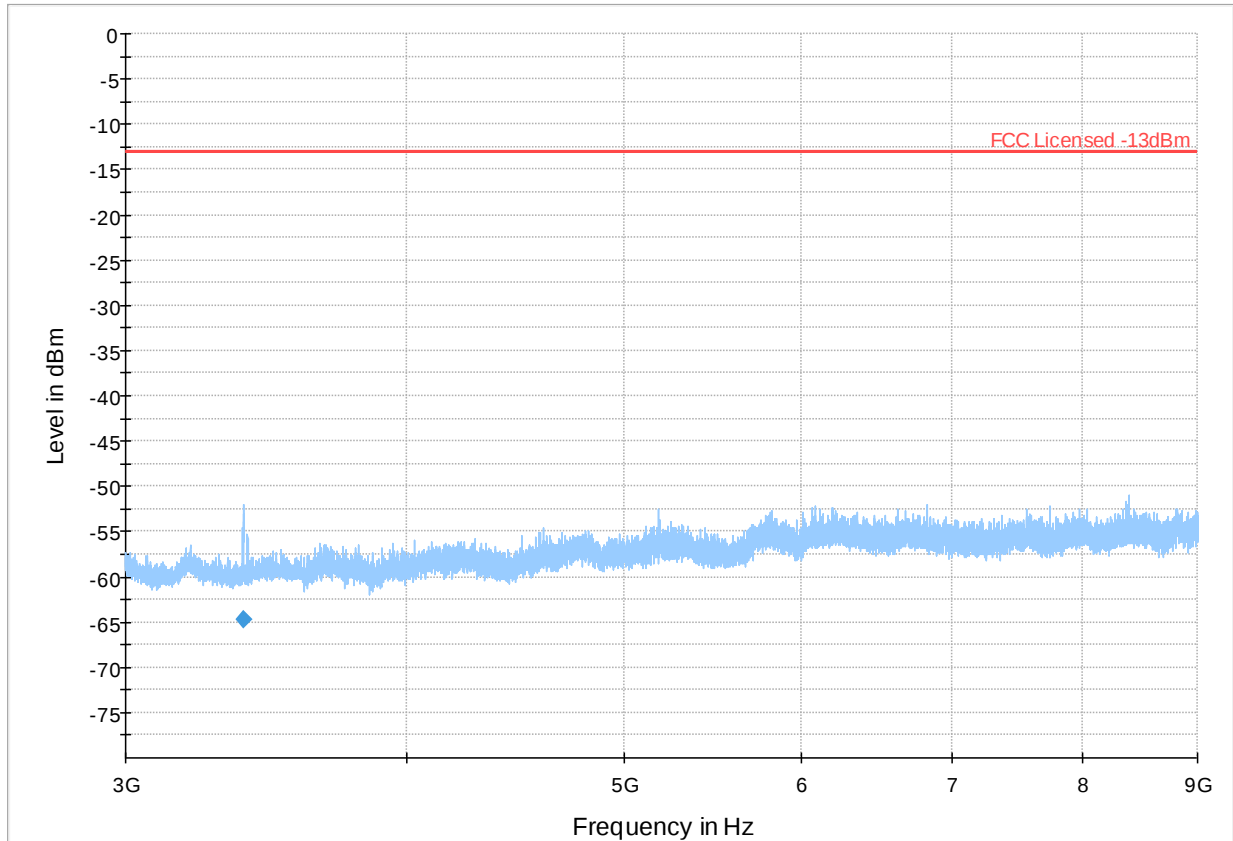


Plot # 70 Radiated Emissions: 3-9 GHz

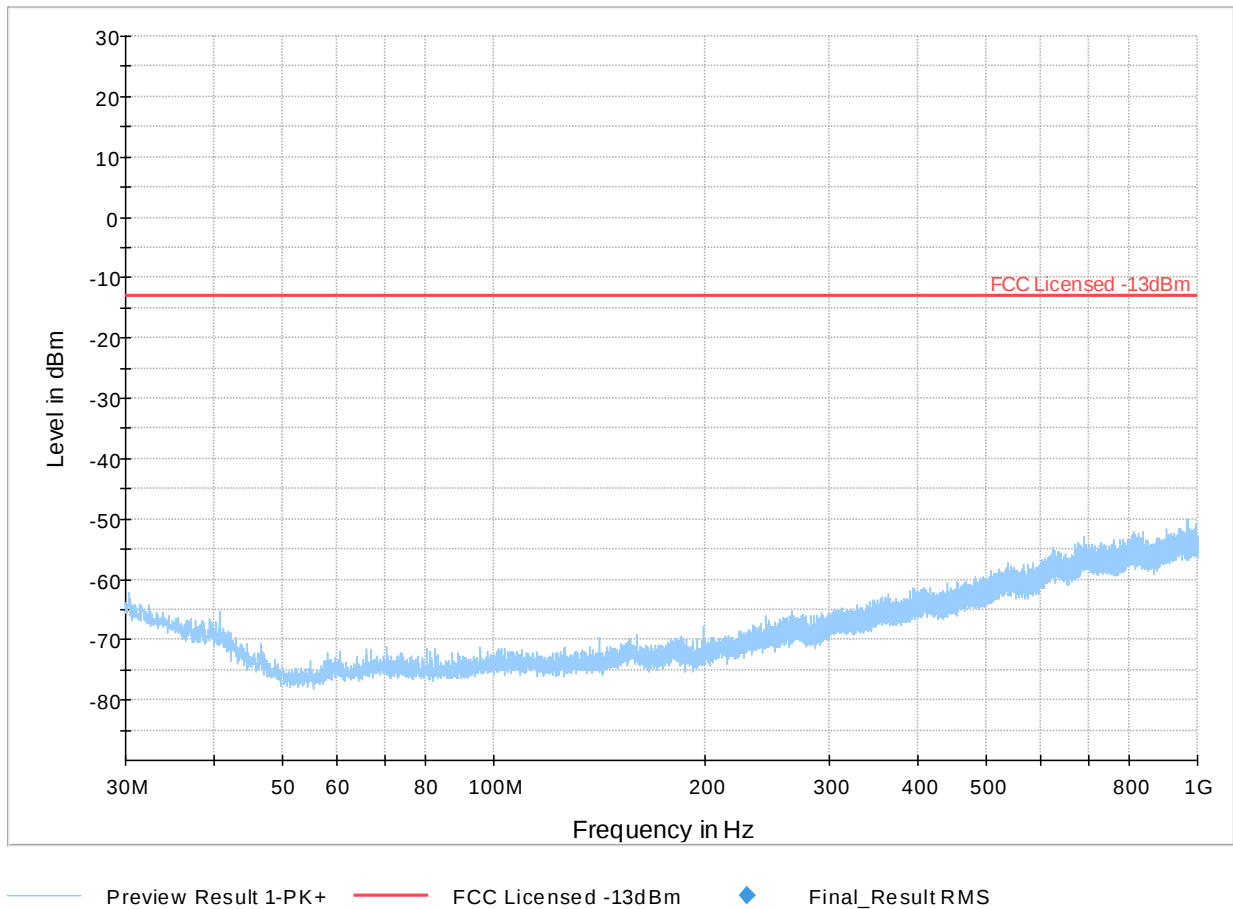
Channel: High

Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3383.500	-64.67	-13.00	51.67	500.0	1000.000	207.0	H	57.0	-103.3	

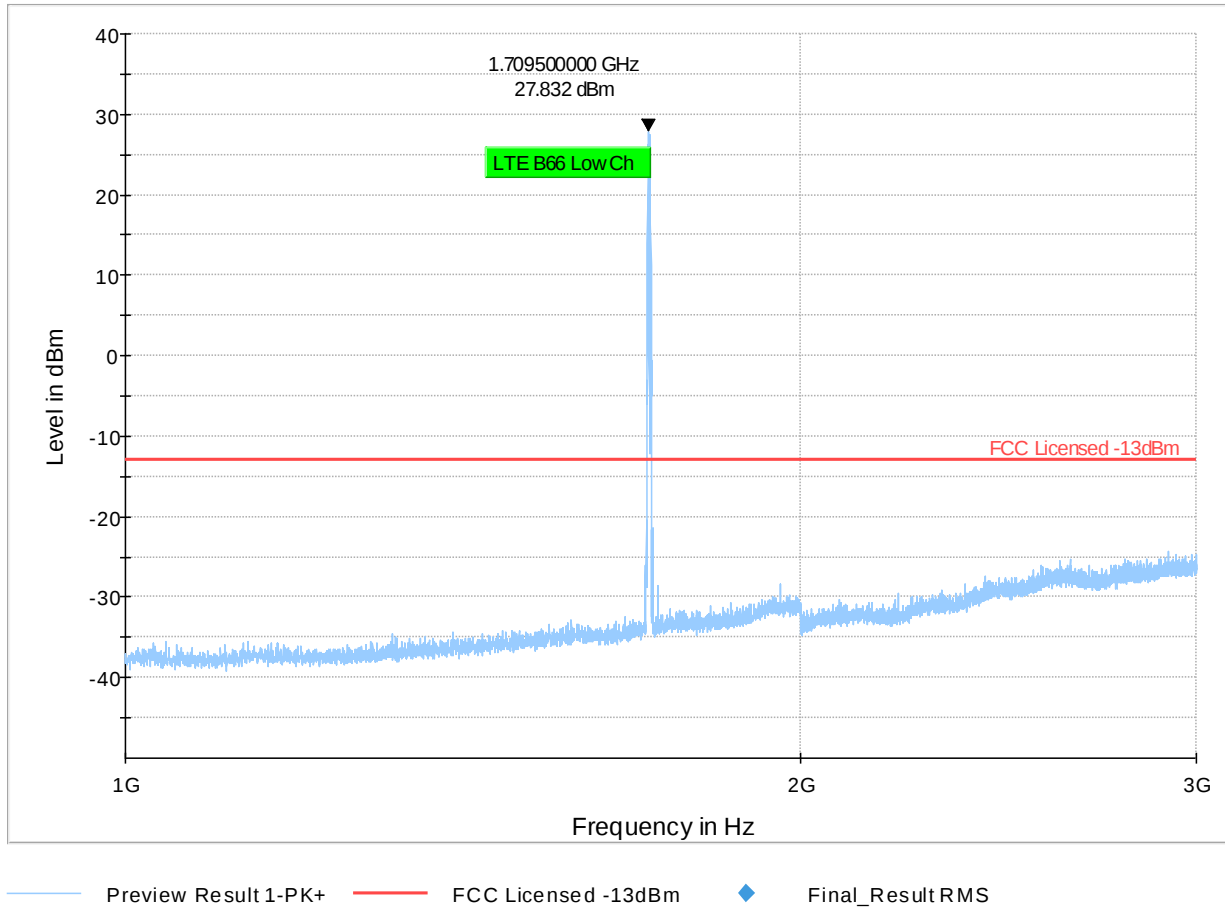


Preview Result 1-PK+ FCC Licensed -13dBm Final_Result RMS

LTE Band 66**Plot # 71 Radiated Emissions: 30 MHz – 1GHz****Channel: Low**

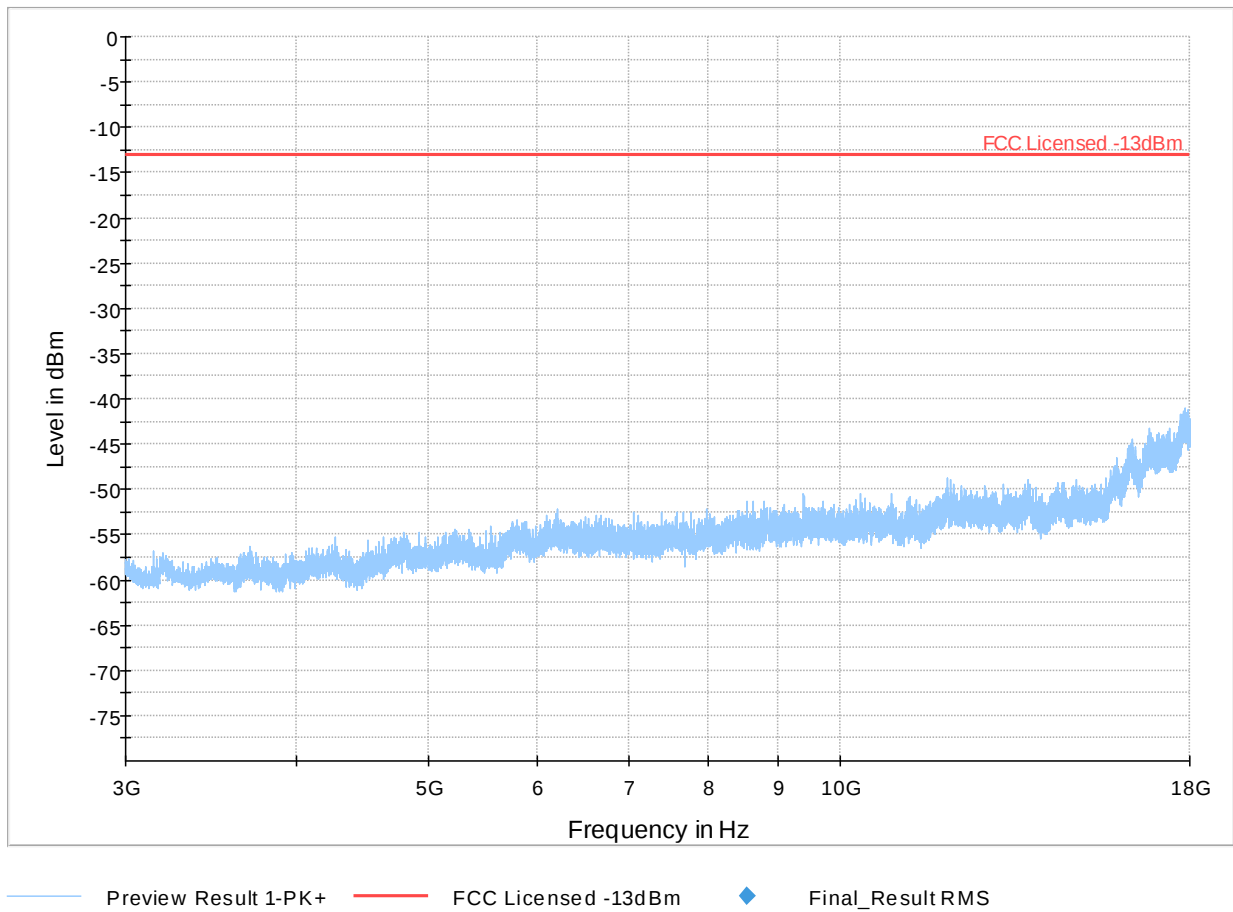
Plot # 72 Radiated Emissions: 1-3 GHz

Channel: Low



Plot # 73 Radiated Emissions: 3-18 GHz

Channel: Low

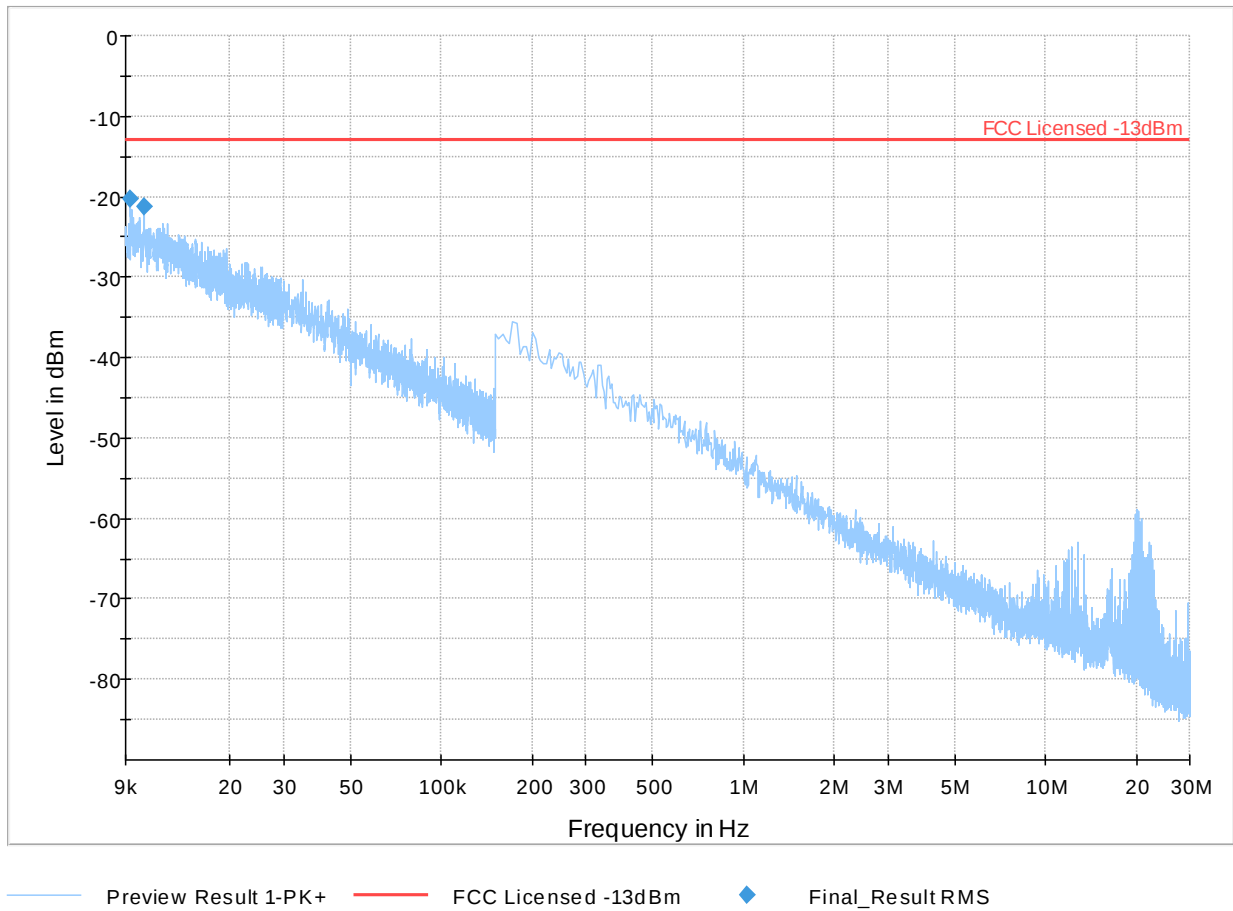


Plot # 74 Radiated Emissions: 9 kHz – 30 MHz

Channel: Mid

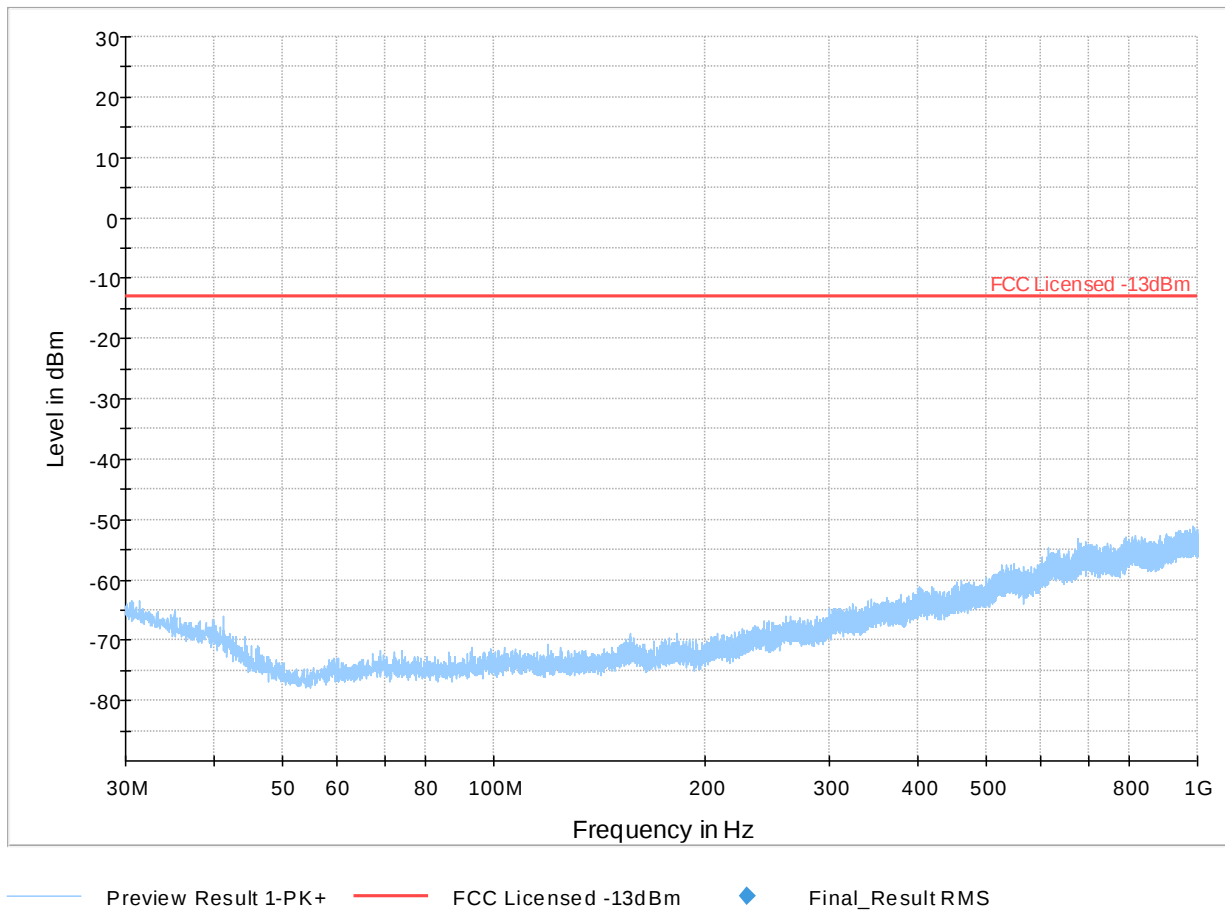
Final Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
0.009	-20.34	-13.00	7.34	500.0	1.000	279.0	V	133.0	-64.7	
0.010	-21.25	-13.00	8.25	500.0	1.000	157.0	H	-35.0	-65.4	



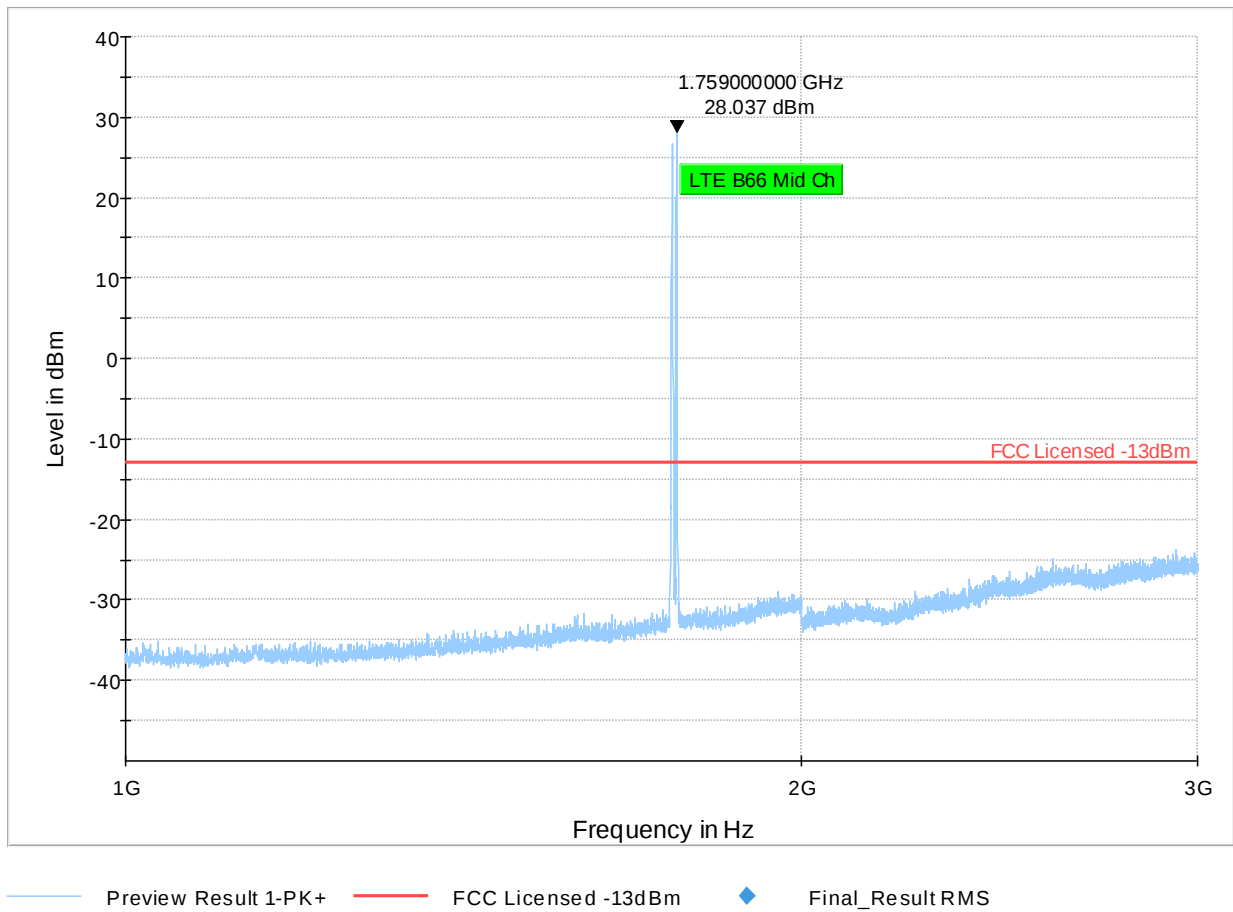
Plot # 75 Radiated Emissions: 30 MHz – 1 GHz

Channel: Mid



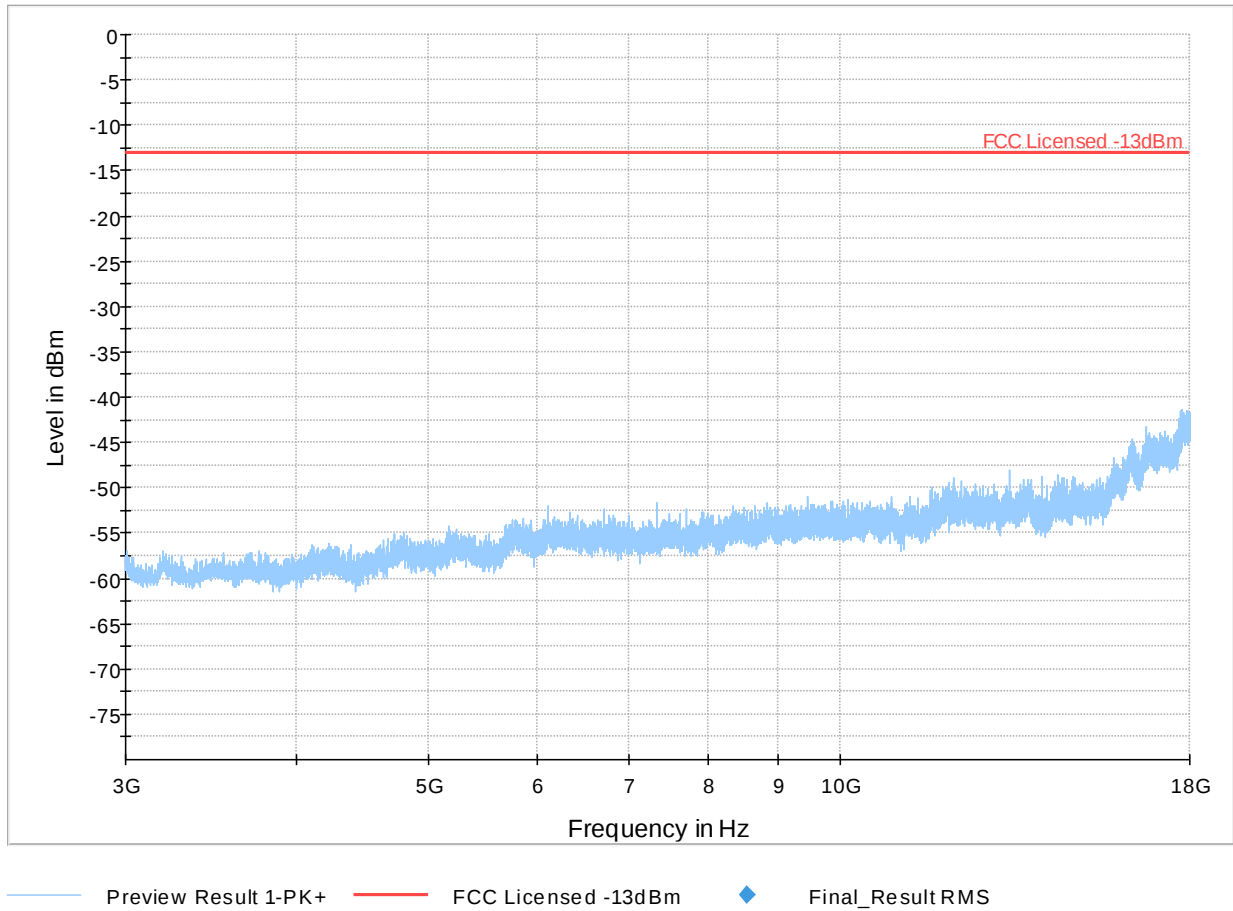
Plot # 76 Radiated Emissions: 1-3 GHz

Channel: Mid



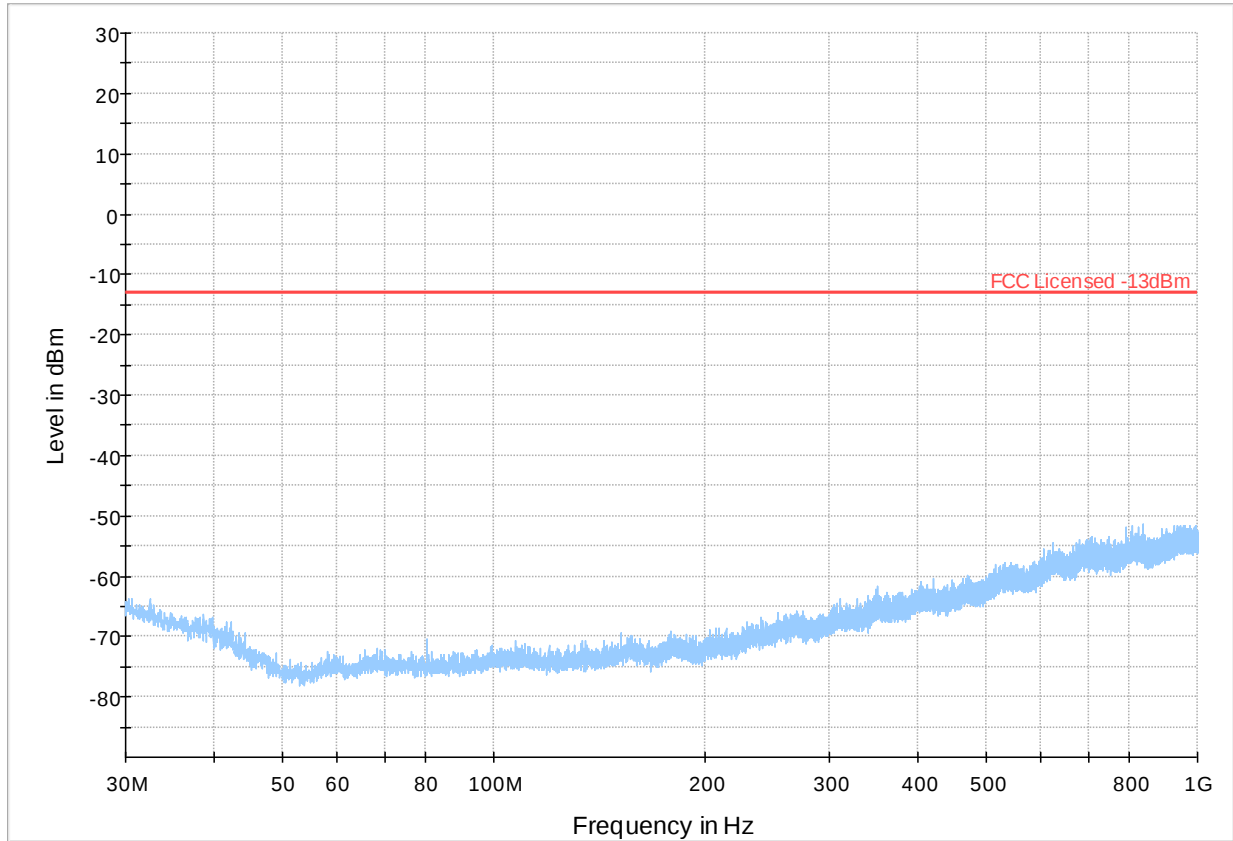
Plot # 77 Radiated Emissions: 3-18 GHz

Channel: Mid



Plot # 78 Radiated Emissions: 30 MHz – 1 GHz

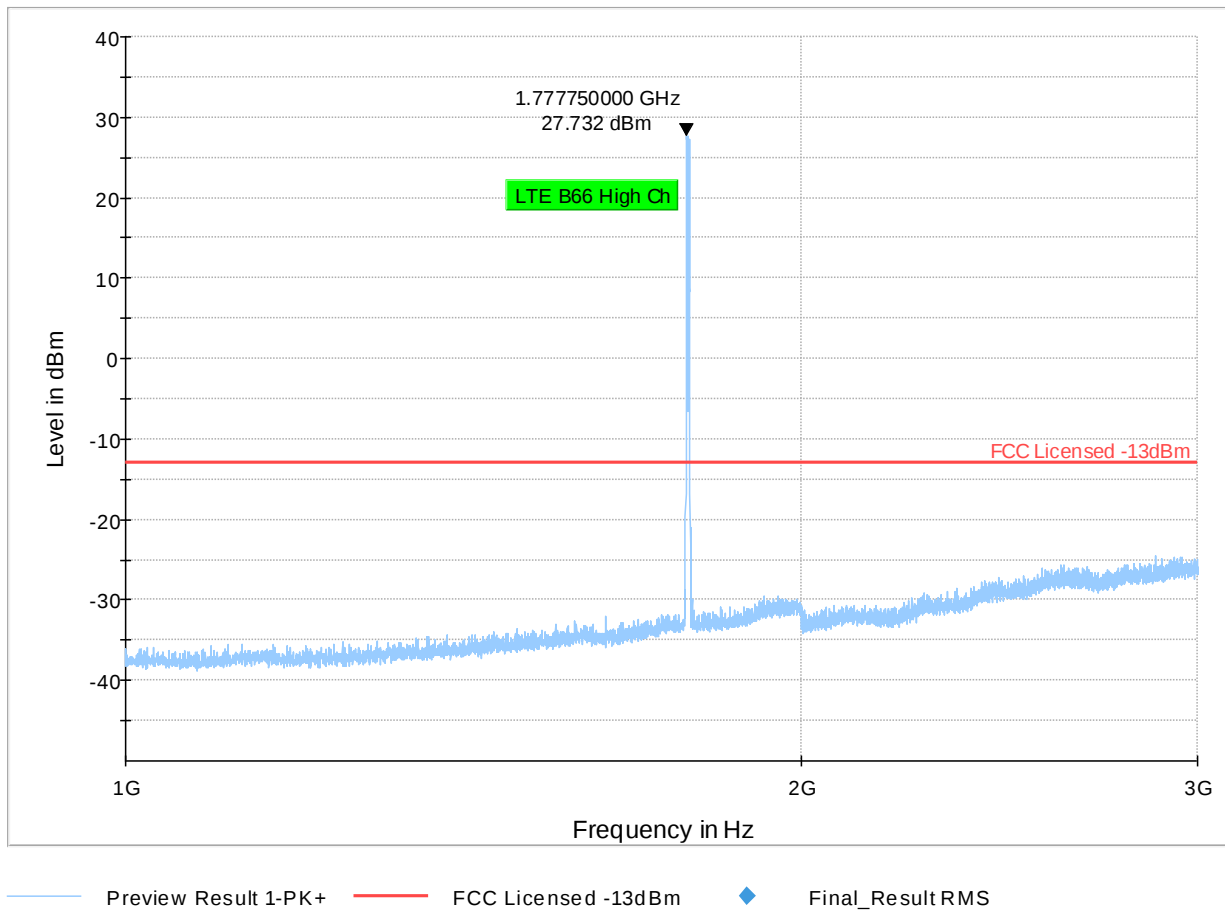
Channel: High



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

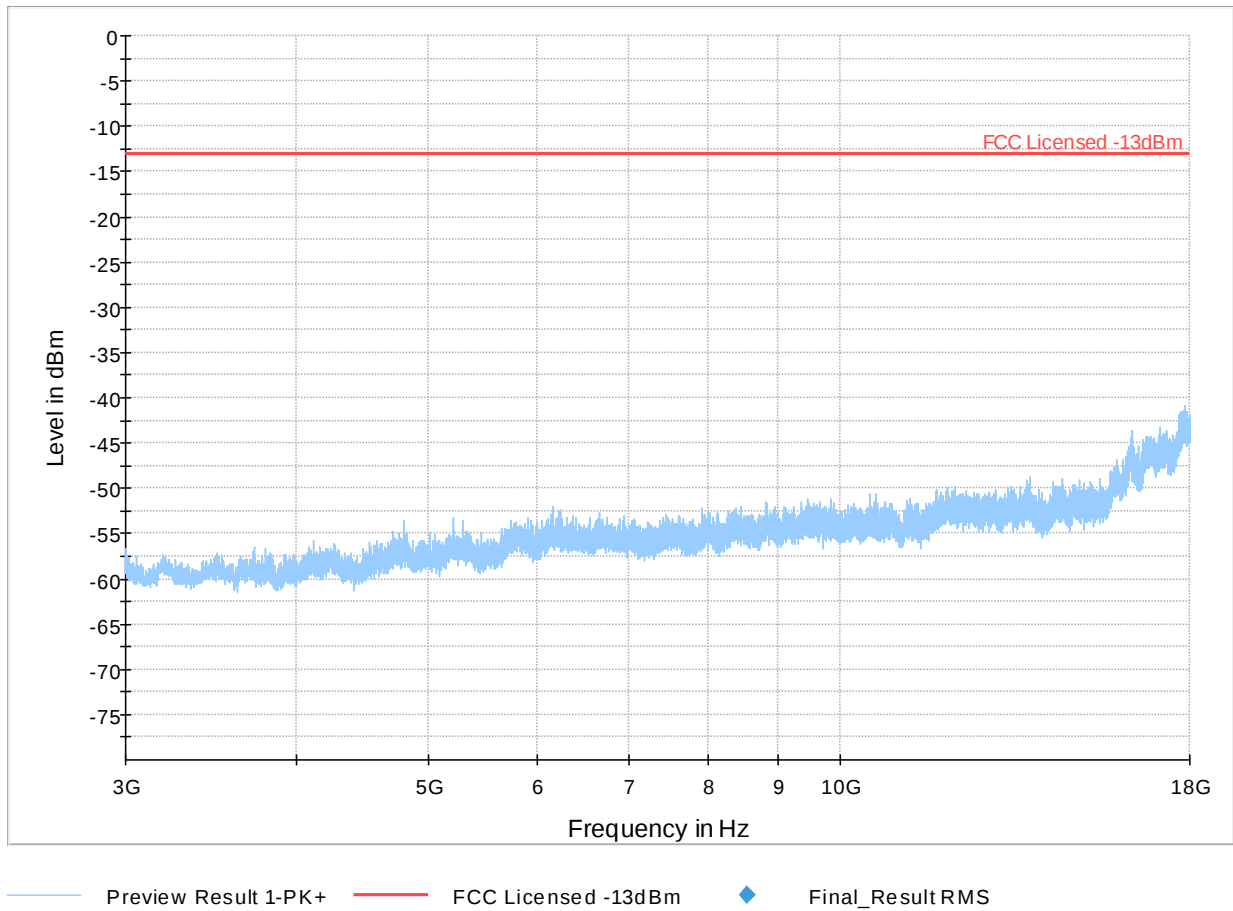
Plot # 79 Radiated Emissions: 1-3 GHz

Channel: High



Plot # 80 Radiated Emissions: 3-18 GHz

Channel: High



8 Test setup photos

Setup photos are included in supporting file name: "EMC_LOOMA-005-21001_FCC_Setup_photos.pdf"

9 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	2 YEARS	10/30/2020
BILOG ANTENNA	ETS.LINDGREN	3142E	00166067	2 YEARS	03/12/2020
HORN ANTENNA	EMCO	3115	00035114	2 YEARS	08/10/2020
HORN ANTENNA	ETS.LINDGREN	3117	00215984	2 YEARS	01/31/2021
HORN ANTENNA	ETS.LINDGREN	3116	00070497	2 YEARS	11/23/2020
TEST RECEIVER	R&S	ESU40	100251	2 YEARS	09/13/2021
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	10510-922	200236891	2 YEARS	04/13/2020
DIGITAL THRMOMETER	CONTROL COMPANY	36934-164	181230565	3 YEARS	01/10/2019

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	Report Name	Changes to report	Report prepared by
2022-01-27	EMC_LOOMA-005-21001_FCC_22_24_27_90	Initial Version	Yuchan Lu

<<< The End >>>