



FCC / IC Test Report

FOR:
NetraDyne, Inc.

Model Name:
DRI-128

Product Description:
Intelligent Driving Monitoring System Smart Connected Dash Cam

FCC ID: 2AM8R-DRI128
IC ID: 23098-DRI128

Applied Rules and Standards:
47 CFR Part 15.407
RSS-247 Issue 2 & RSS-Gen Issue 4

REPORT #: EMC_NETRA_002_17001_15.407ISED_WLAN

DATE: 02/06/2018



A2LA Accredited

IC recognized #
3462B-2

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.....	3
2 ADMINISTRATIVE DATA.....	4
2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT	4
2.2 IDENTIFICATION OF THE CLIENT	4
2.3 IDENTIFICATION OF THE MANUFACTURER.....	4
3 EQUIPMENT UNDER TEST (EUT).....	5
3.1 EUT SPECIFICATIONS	5
3.2 EUT SAMPLE DETAILS.....	6
3.3 ACCESSORY EQUIPMENT (AE) DETAILS.....	6
3.4 TEST SAMPLE CONFIGURATION	6
3.5 MODE OF OPERATION DETAILS	6
3.6 JUSTIFICATION FOR WORST CASE MODE OF OPERATION.....	7
4 MEASUREMENT AND EVALUATION RESULTS SUMMARY.....	8
5 MEASUREMENT UNCERTAINTY.....	9
5.1 ENVIRONMENTAL CONDITIONS DURING TESTING:.....	9
5.2 DATES OF TESTING:.....	9
6 MEASUREMENT PROCEDURES.....	10
6.1 RADIATED MEASUREMENT.....	10
7 TEST RESULT DATA	13
7.1 RADIATED TRANSMITTER SPURIOUS EMISSIONS AND RESTRICTED BANDS	13
8 TEST SETUP PHOTOS.....	72
9 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTING	72
10 REVISION HISTORY	72

1 Assessment

This test report is to support a request for new equipment authorization for the device as described in section 3.

Measurements:

CETECOM Inc. has assessed the transmitter spurious emission of the EUT according to the relevant requirements specified in FCC rules Part 15.407 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-247 Issue 2 of ISED Canada for the case of simultaneous transmission which is not covered by the grants of the individual radio modules used.

Evaluation:

CETECOM Inc. has evaluated all other requirements specified in the above standard based on the reports on file for FCC ID: VOB-P2180 / IC ID: 7361A-P2180.

According to section 4 of this report the overall result is PASS.

Responsible for Testing Laboratory:

02/06/2018	Compliance	James Donnellan (Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

02/06/2018	Compliance	Issa Ghanma (EMC Engineer)	
Date	Section	Name	Signature

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
Director Radio Com. and EMC:	James Donnellan
Responsible Project Leader:	Josephine Mena

2.2 Identification of the Client

Applicant's Name:	NetraDyne, Inc.
Street Address:	4350 Executive DR., suite 150
City/Zip Code	San Diego, CA 92127
Country	USA
Contact Person:	Sandeep Pandya
Phone No.	8582455169
e-mail:	Sandeep.pandya@netradyne.com

2.3 Identification of the Manufacturer

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

3 Equipment under Test (EUT)

3.1 EUT Specifications

Model No	DRI-128
HW Version	RevD
SW Version	0.2.1
FCC-ID	2AM8R-DRI128
IC-ID:	23098-DRI128
FWIN:	0.2.1
HVIN:	RevD
PMN:	Driver i
Product Description	Intelligent Driving Monitoring System Smart Connected Dash Cam
Module Information	
Module Name:	Jetson TX-1
Module Number:	900-82180-0001-000
FCC ID:	VOB-P2180
IC ID:	7361A-P2180
Frequency Range:	Nominal band: UNII 1 5150 – 5250 MHz UNII 2 A 5250 – 5350 MHz UNII 2 C 5470 – 5725 MHz UNII 3 5725 – 5850 MHz
Type(s) of Modulation:	802.11a/n/ac
Modes of Operation:	Infrastructure mode and ad hoc mode.
Antenna type and gain as declared:	FXP831 Patch Antenna, Internal Frequency: 4.9 ~ 6.0GHz, Peak Gain: 4.5dBi(Free space) 5.0dBi(Plastic)
Max. declared output Powers from modular grant:	Conducted Power 0.085
Power Supply/ Rated Operating Voltage Range:	Low 10.5 VDC, Nominal 12 VDC, High 14.5 VDC

Operating Temperature Range	-20° to 55° C		
Other Radios included in the device:	Cellular, GPS, Bluetooth Classic, BLE 4.0, WLAN(Wi-Fi)2.4GHz		
Sample Revision	<input type="checkbox"/> Prototype Unit;	<input checked="" type="checkbox"/> Production Unit;	<input type="checkbox"/> Pre-Production
EUT Dimensions	20X8X8cm		
Weight	300 grams		
EUT Diameter	<input checked="" type="checkbox"/> < 60 cm	<input type="checkbox"/> Other _____	

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	16300054	RevD	0.2.1	Radiated Emissions

3.3 Accessory Equipment (AE) details

AE #	Comments
1	Superstar 12V Car Battery

3.4 Test Sample Configuration

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

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	802.11n	Tera Term tool used to configure the EUT to the highest power and maximum duty cycle. This test mode allows for settings and channels that may not be supported by the EUT when operating in real life mode. The internal antenna was connected.

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, and 98% duty cycle Co-Transmit with LTE band 2 (The highest conducted output power of Cellular radio from modular grant).

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 Measurement and evaluation results summary

Specification reference	Test Case	Temperature and Voltage Conditions	Mode	Result
§15.407(a) RSS-247 6.2.3.1 RSS-Gen 6.6	Emission Bandwidth	Nominal	-	Pass based on filing for integrated modules
§15.407(a) RSS-247 6.2.3.1	Power Spectral Density	Nominal	-	Pass based on filing for integrated modules
§15.407(a) RSS-247 6.2.3	Maximum Conducted Output Power and EIRP	Nominal	-	Pass based on filing for integrated modules
§15.407(b) §15.205 RSS-247 6.2.3 RSS-247 6.2.3.2 RSS-Gen 8.10	Band edge compliance	Nominal	-	Pass based on filing for integrated modules
§15.407(b) §15.209(a) RSS-247 6.2.3.1 RSS-Gen 8.9	TX Spurious emissions-Radiated	Nominal	802.11n	Pass
§15.207 §15.107 RSS-Gen 8.8	AC Conducted Emissions	Nominal	-	NA. No AC mains connection
RSS-247 6.2.3	For the band 5600-5650 MHz, no operation is permitted in Canada.		infrastructure	Pass. Client has disabled operation for this band according to declaration letter "IC Canada band declaration.pdf"
905462 D02 UNII DFS Compliance Procedures New Rules v02	Slave DFS		Infrastructure client, ad hoc client	Pass based on filing for integrated modules
905462 D02 UNII DFS Compliance Procedures New Rules v02	Master DFS		Infrastructure master, ad hoc master	Pass. Client has provided declaration for compliance "UNII Device Declaration Letter.pdf"
§15.407 (i) 594280 D02 U-NII Device Security DR05-41759	Device security			Pass. Client has provided declaration for compliance "UNII Device Declaration Letter.pdf"
RSS-247 6.2.1	Indoor only for UNII I in Canada			Pass. Client has provided declaration for compliance "UNII Device Declaration Letter.pdf"

5 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 30 MHz	±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)

5.1 Environmental Conditions During Testing:

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

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

5.2 Dates of Testing:

11/30/2017 – 12/18/2017

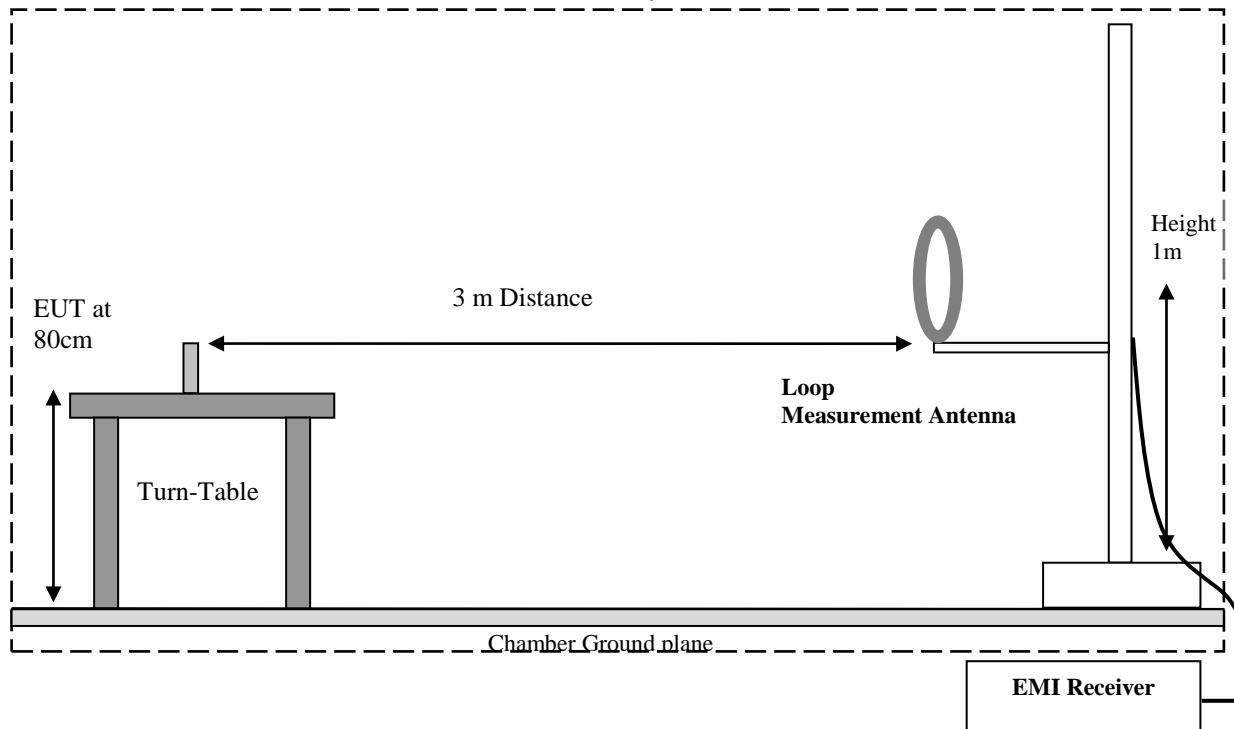
6 Measurement Procedures

6.1 Radiated Measurement

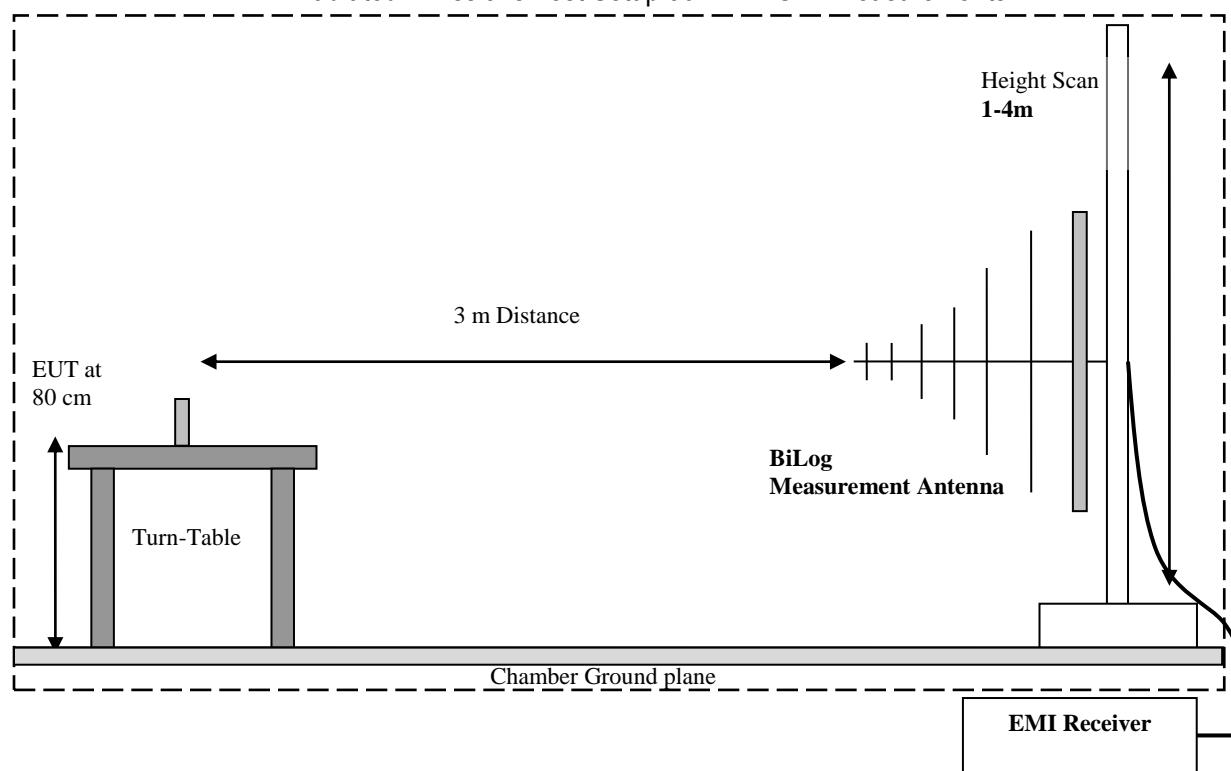
The radiated measurement is performed according to ANSI C63.10 (2013)

- 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.

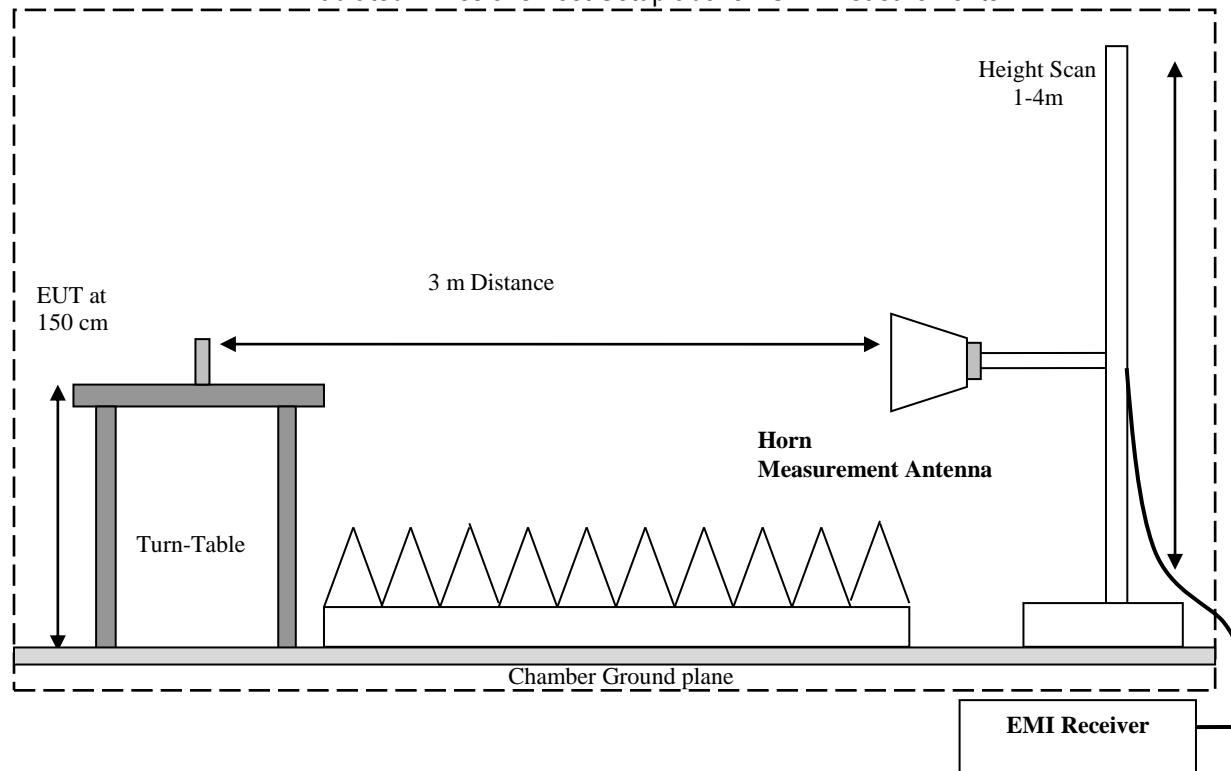
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



6.1.1 Sample Calculations for Field Strength Measurements

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

1. Measured reading in dB μ V
2. Cable Loss between the receiving antenna and SA in dB and
3. 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

7 Test Result Data

7.1 Radiated Transmitter Spurious Emissions and Restricted Bands

7.1.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) = 40 log (D/d) = 40 log (300m / 3m) = 80dB

7.1.2 Limits:

FCC §15.407(a)

- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247 6.2.3.1

- The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

FCC §15.209 & RSS-Gen 8.9

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (μ V/m)	Measurement Distance (m)	Field strength @ 3m (dB μ V/m)
0.009-0.490	2400/F(kHz) / -----	300	-
0.490-1.705	24000/F(kHz) / -----	30	-
1.705-30.0	30 / (29.5)	30	-
30-88	100	3	40 dB μ V/m
88-216	150	3	43.5 dB μ V/m
216-960	200	3	46 dB μ V/m
Above 960	500	3	54 dB μ V/m

FCC §15.205 & RSS-Gen 8.10

- Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

*PEAK LIMIT= 74 dB μ V/m

*AVG. LIMIT= 54 dB μ V/m

RSS-247 6.2.3

Until further notice, devices subject to this section shall not be capable of transmitting in the band 5600-5650 MHz. This restriction is for the protection of Environment Canada's weather radars operating in this band.

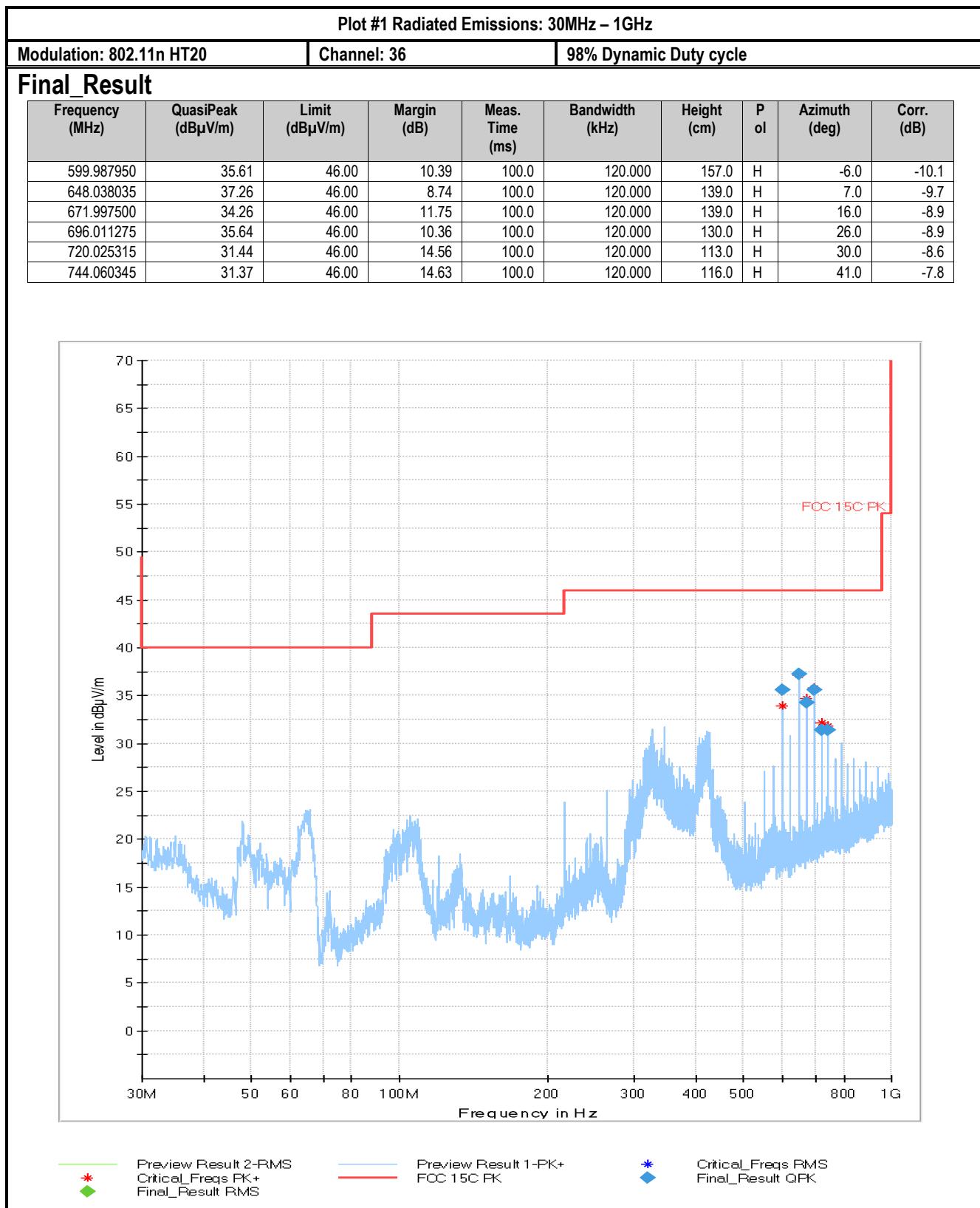
7.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	802.11n continuous fixed channel Co-Transmission with Cellular LTE2 Mid channel.	Vehicle 12 VDC

7.1.4 Measurement result:

Mode	Plot #	Channel #	Scan Frequency	Limit	Highest peak emission in dBuV/m @ 3m	Frequency of highest emission in MHz	Result
802.11n HT20	1 – 4	36	30 MHz – 18 GHz	See section 7.1.2	54.6	17787	Pass
	5 – 10	44	9 kHz – 40 GHz		53.9	15655	Pass
	11 – 14	48	30 MHz – 18 GHz		54.8	15715	Pass
	15 – 18	52	30 MHz – 18 GHz		53.9	15773	Pass
	19 – 24	60	9 kHz – 40 GHz		54.3	17773	Pass
	25 – 28	64	30 MHz – 18 GHz		54.2	16788	Pass
	29 – 32	100	30 MHz – 18 GHz		54.2	16647	Pass
	33 – 38	120	9 kHz – 40 GHz		57.5	37815	Pass
	39 – 42	140	30 MHz – 18 GHz		47	2880	Pass
	43 – 46	149	30 MHz – 18 GHz		51	16809	Pass
	47 – 52	157	9 kHz – 40 GHz		60	28920	Pass
	53 – 56	161	30 MHz – 18 GHz		55	16796	Pass

7.1.5 Measurement Plots:



Plot # 2 Radiated Emissions: 1 – 3GHz

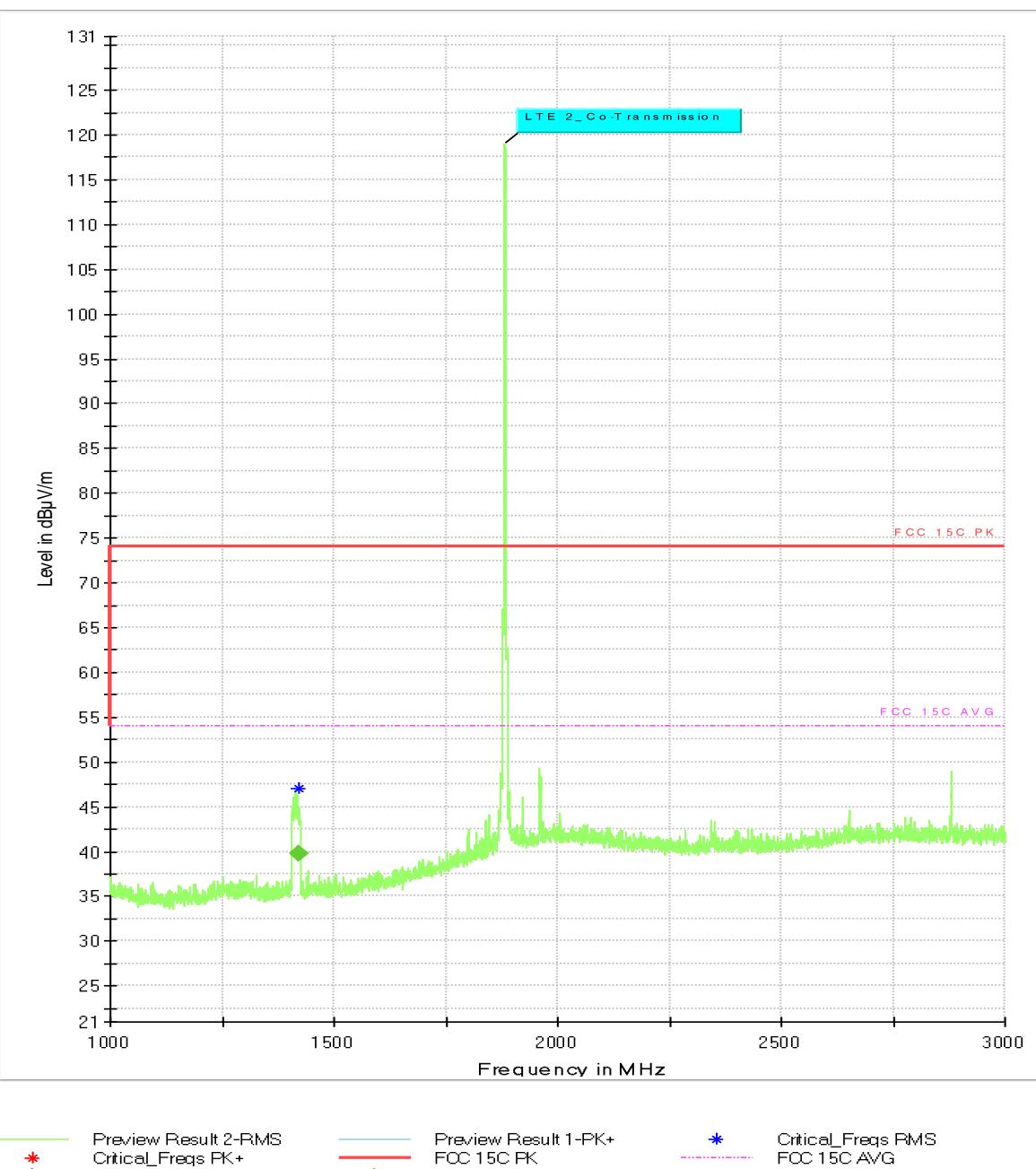
Modulation: 802.11n HT20

Channel: 36

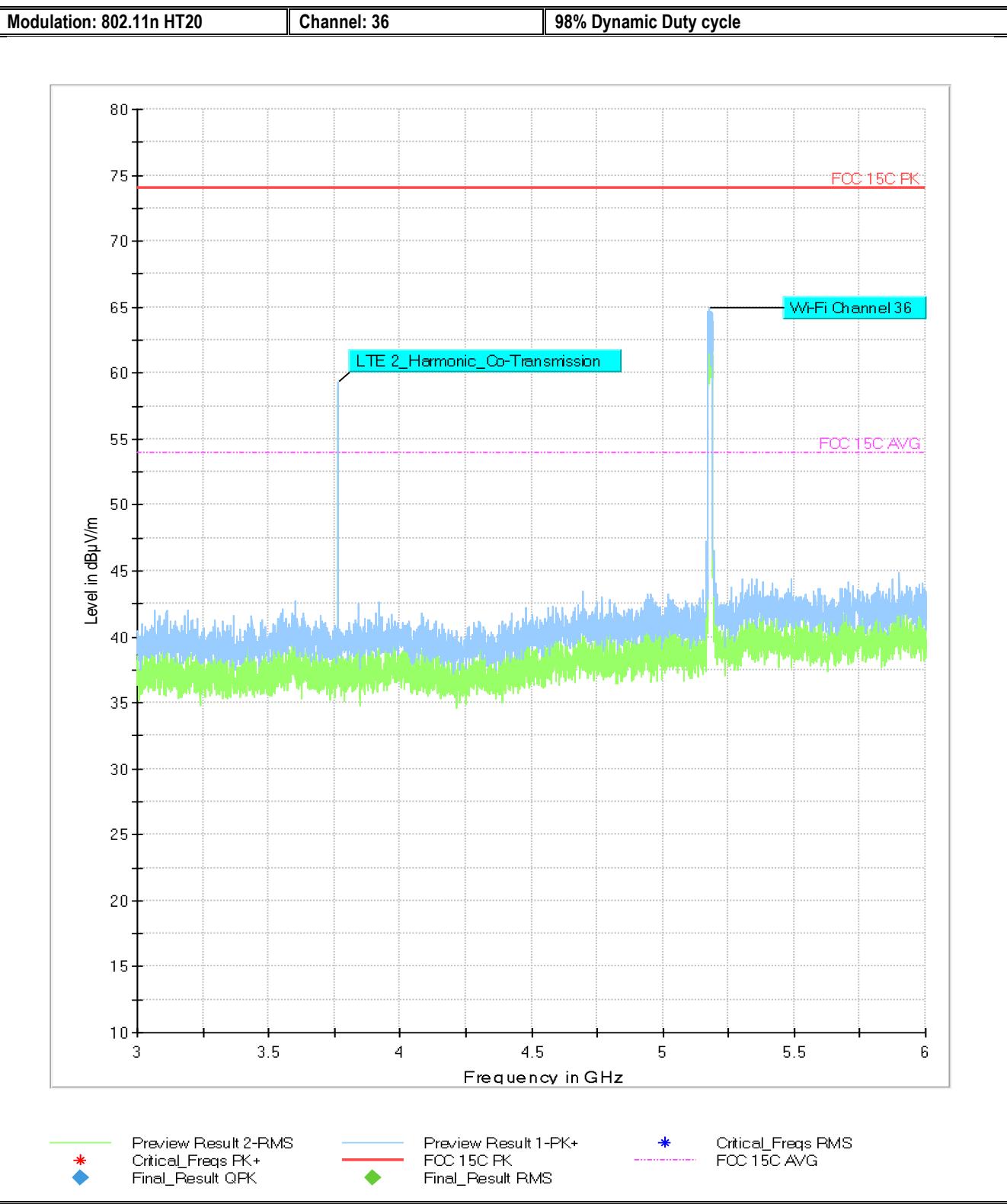
98% Dynamic Duty cycle

Final_Result

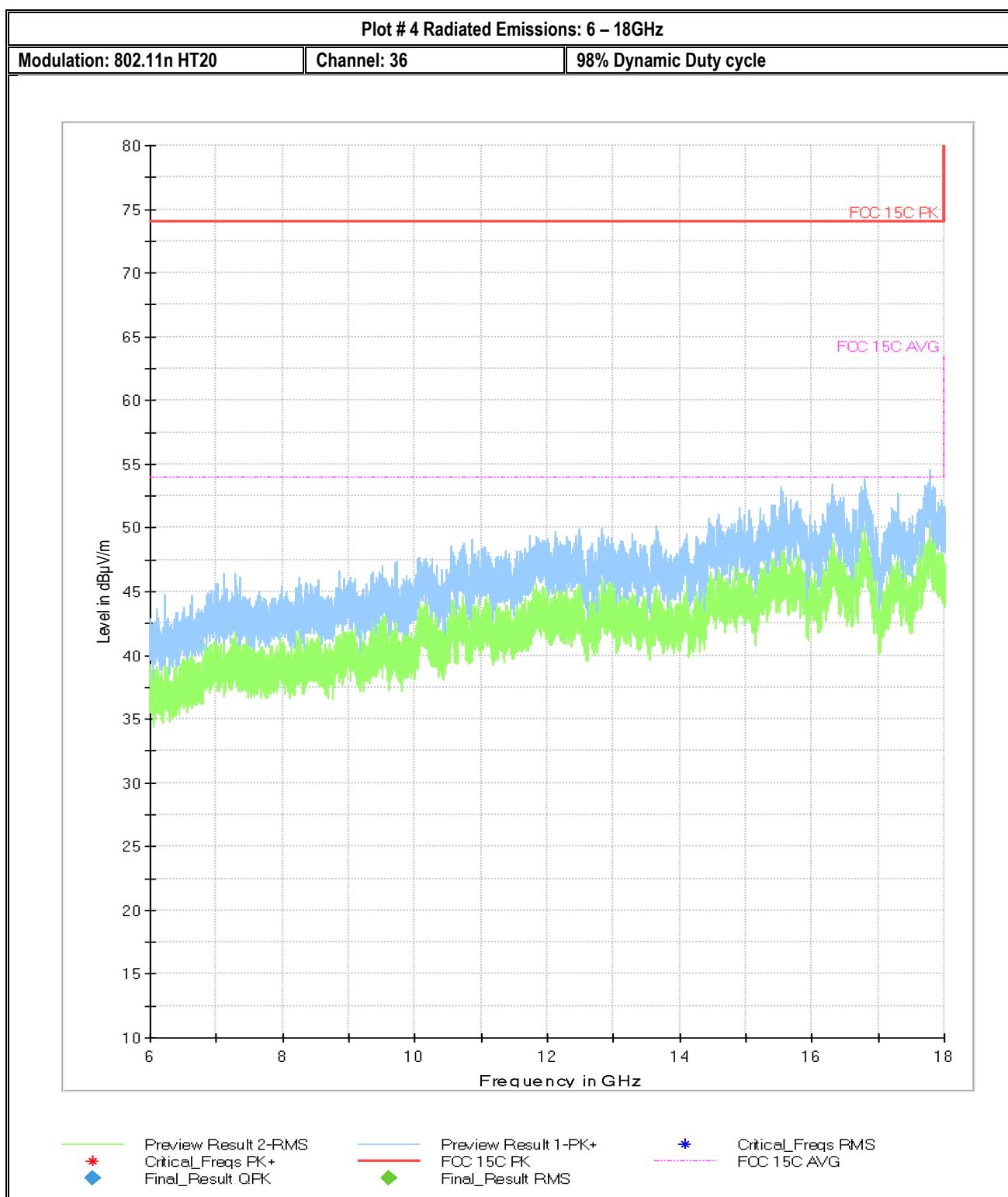
Frequency (MHz)	QuasiPeak (dB μ V/m)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	P ol	Corr. (dB)	Azimuth (deg)
1420.265000	---	39.81	53.98	14.16	100.0	1000.000	100.0	H	-12.0	140.0

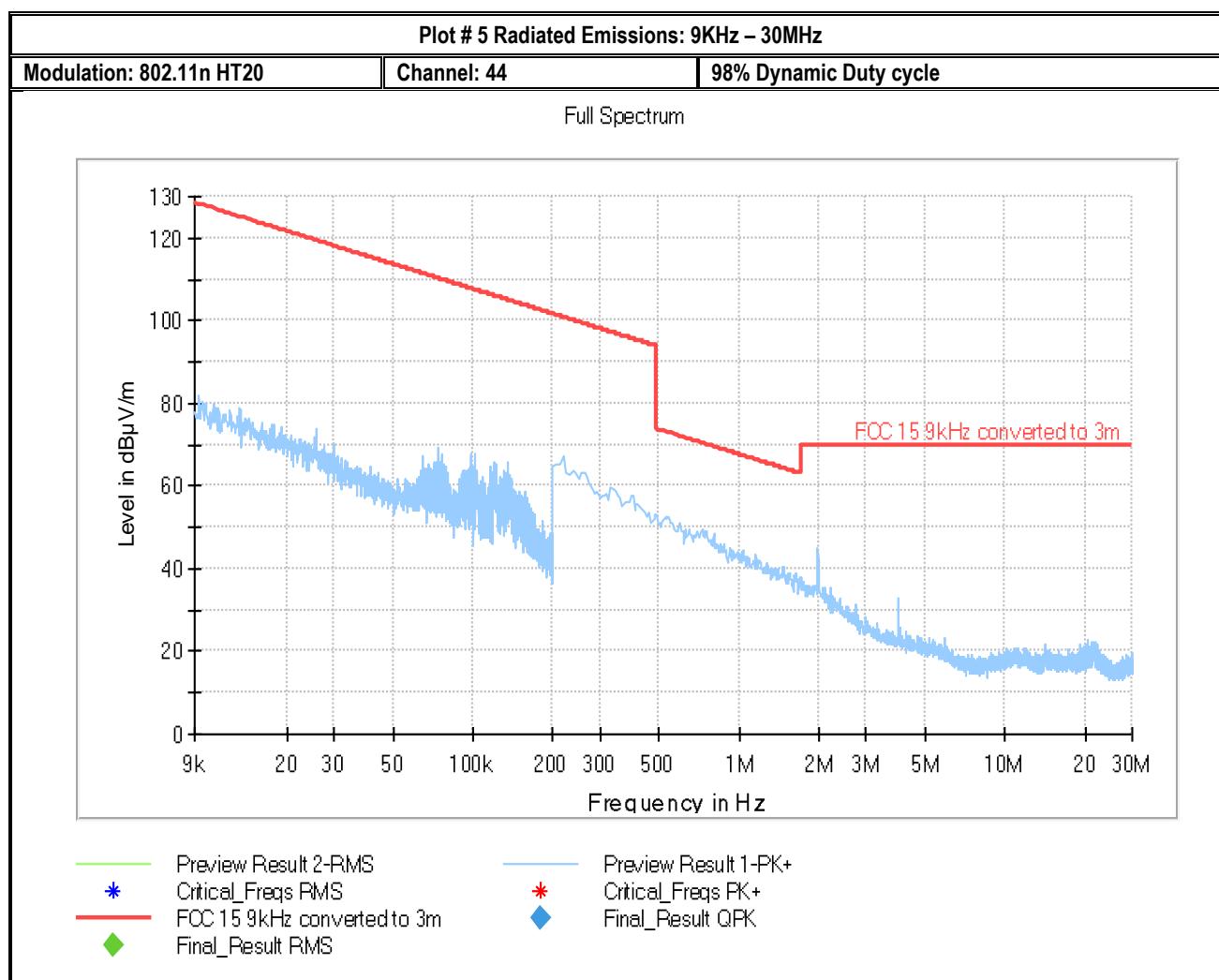


Plot # 3 Radiated Emissions: 3 – 6GHz



These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.





Plot #6 Radiated Emissions: 30MHz – 1GHz

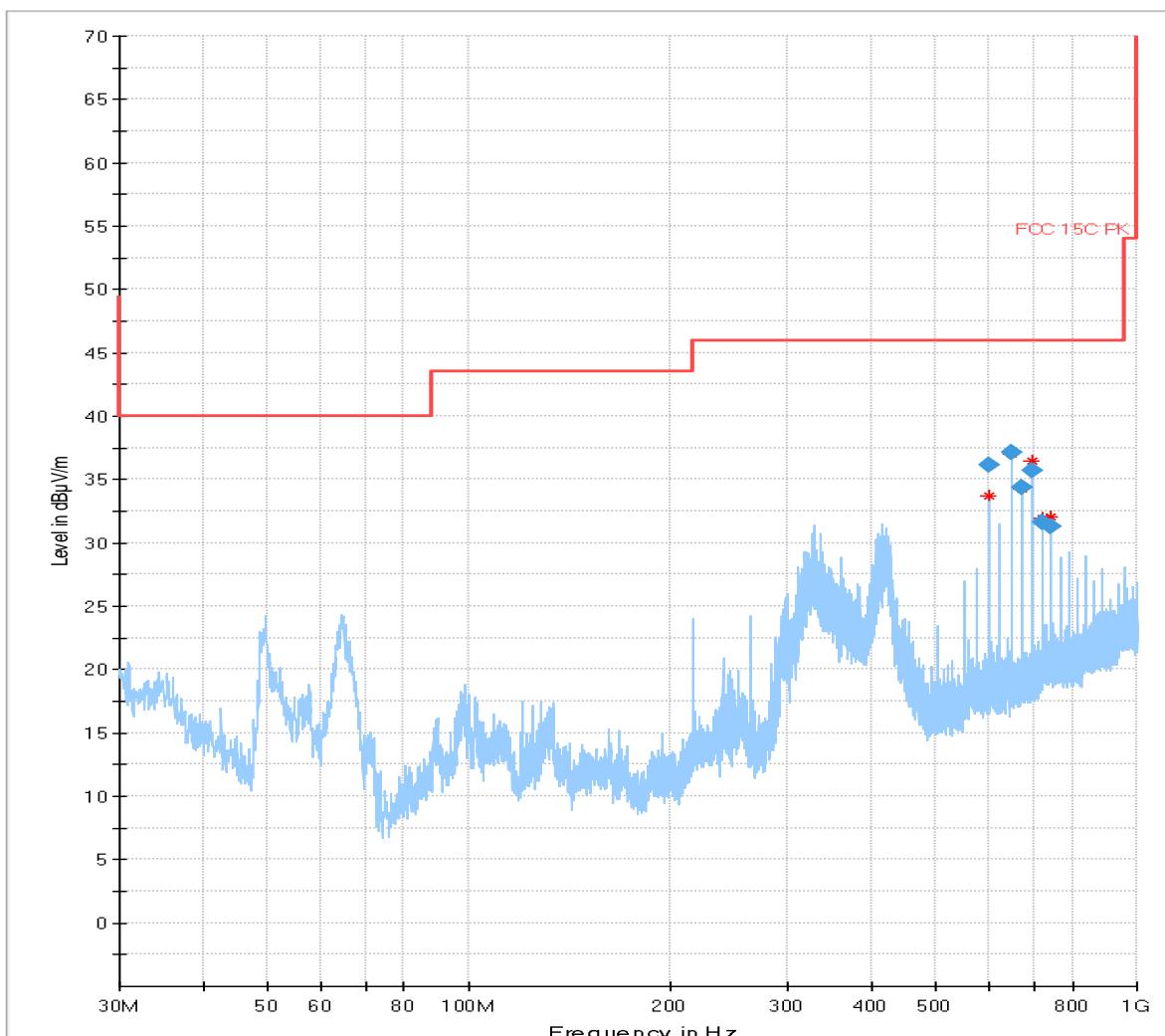
Modulation: 802.11n HT20

Channel: 44

98% Dynamic Duty cycle

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.038120	36.15	46.00	9.85	100.0	120.000	156.0	H	-8.0	-10.1
648.000985	37.09	46.00	8.91	100.0	120.000	140.0	H	4.0	-9.7
671.996580	34.35	46.00	11.65	100.0	120.000	134.0	H	15.0	-8.9
696.020395	35.71	46.00	10.29	100.0	120.000	129.0	H	26.0	-8.9
720.015540	31.65	46.00	14.35	100.0	120.000	113.0	H	31.0	-8.6
744.022880	31.33	46.00	14.67	100.0	120.000	107.0	H	39.0	-7.8



Preview Result 2-RMS
 Critical_Freqs PK+
 Final_Result RMS



Preview Result 1-PK+
 FOC 15C PK



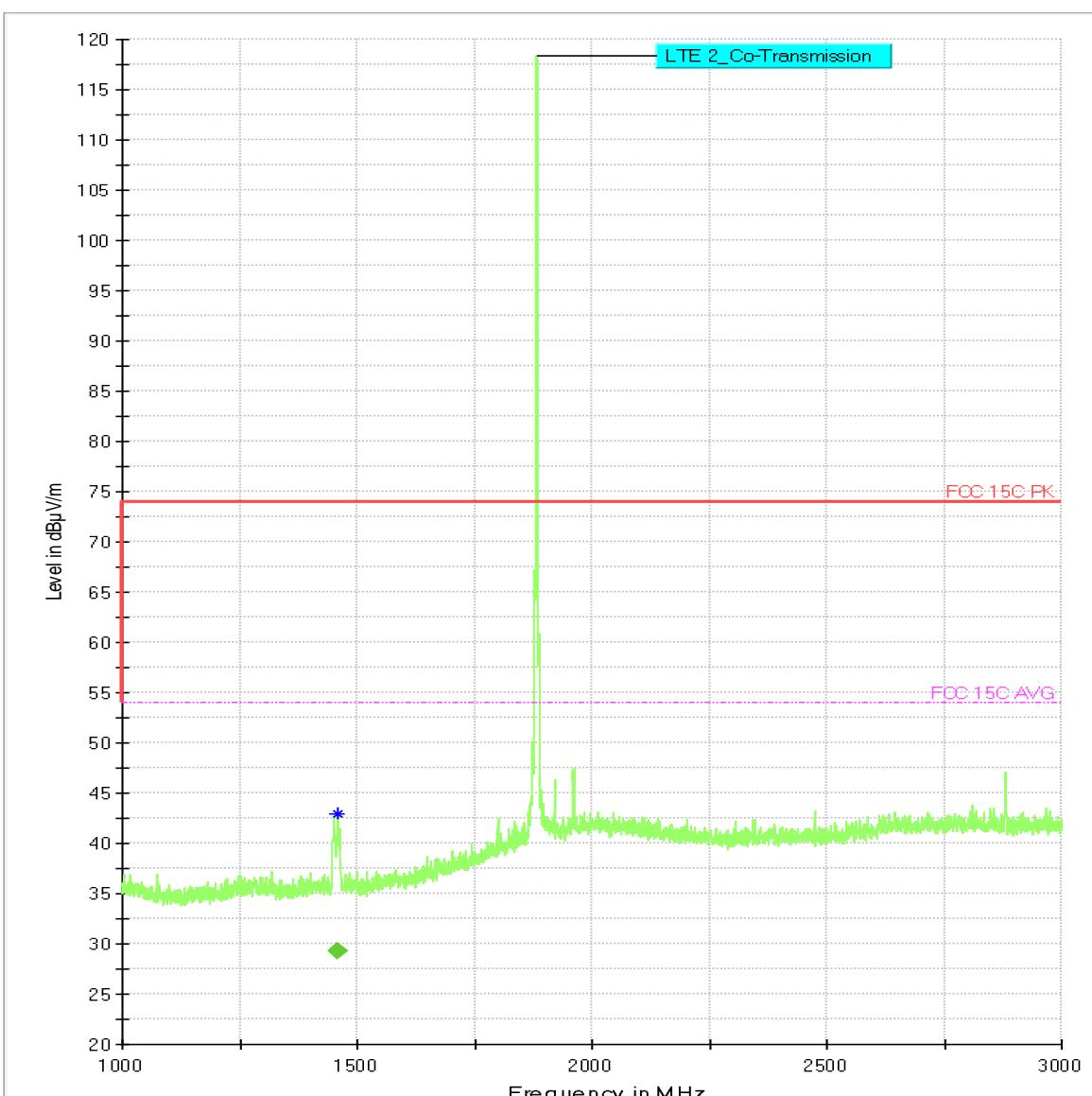
Critical_Freqs RMS
 Final_Result QPK

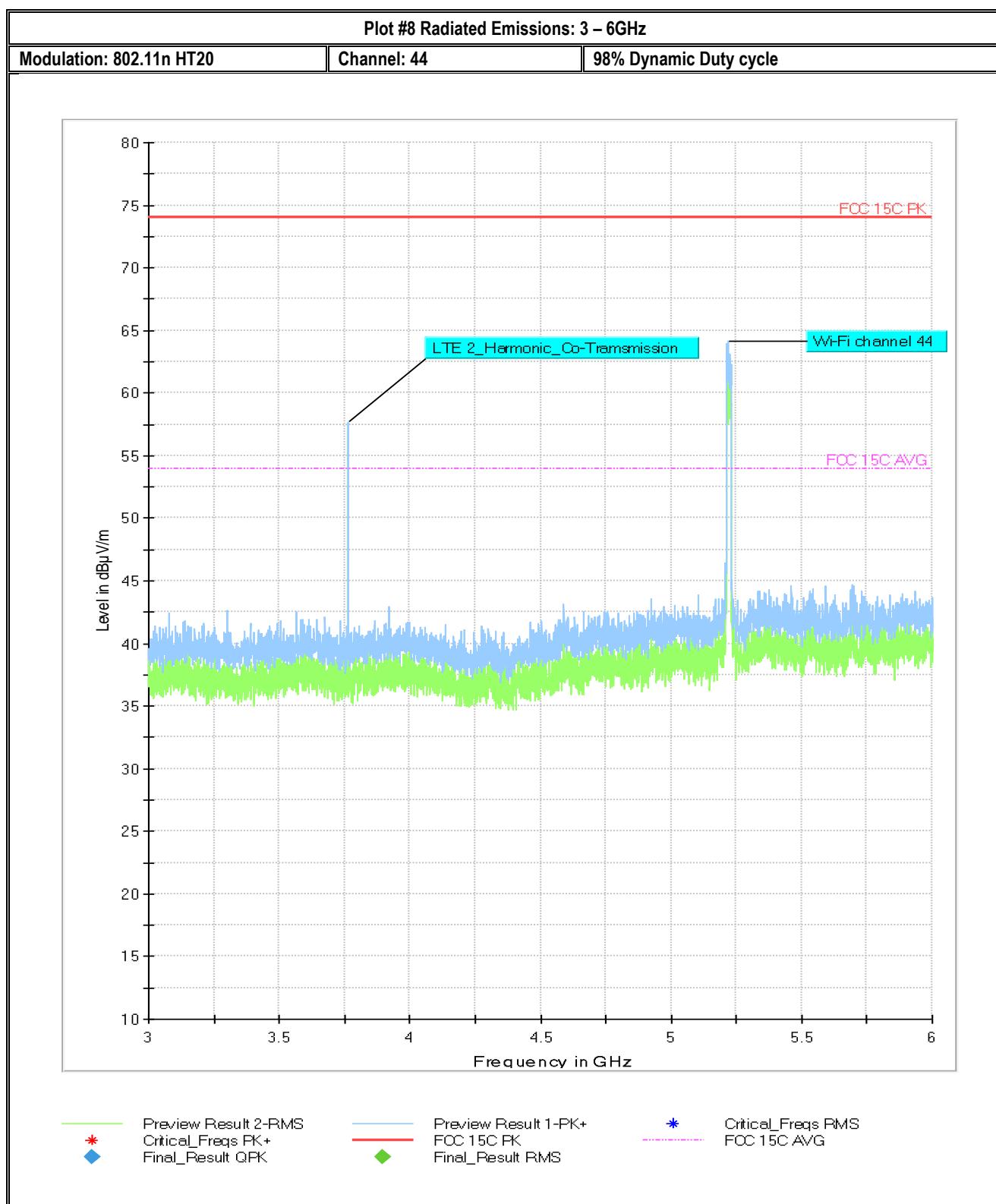
Plot #7 Radiated Emissions: 1 – 3GHz

Modulation: 802.11n HT20 Channel: 44 98% Dynamic Duty cycle

Final_Result

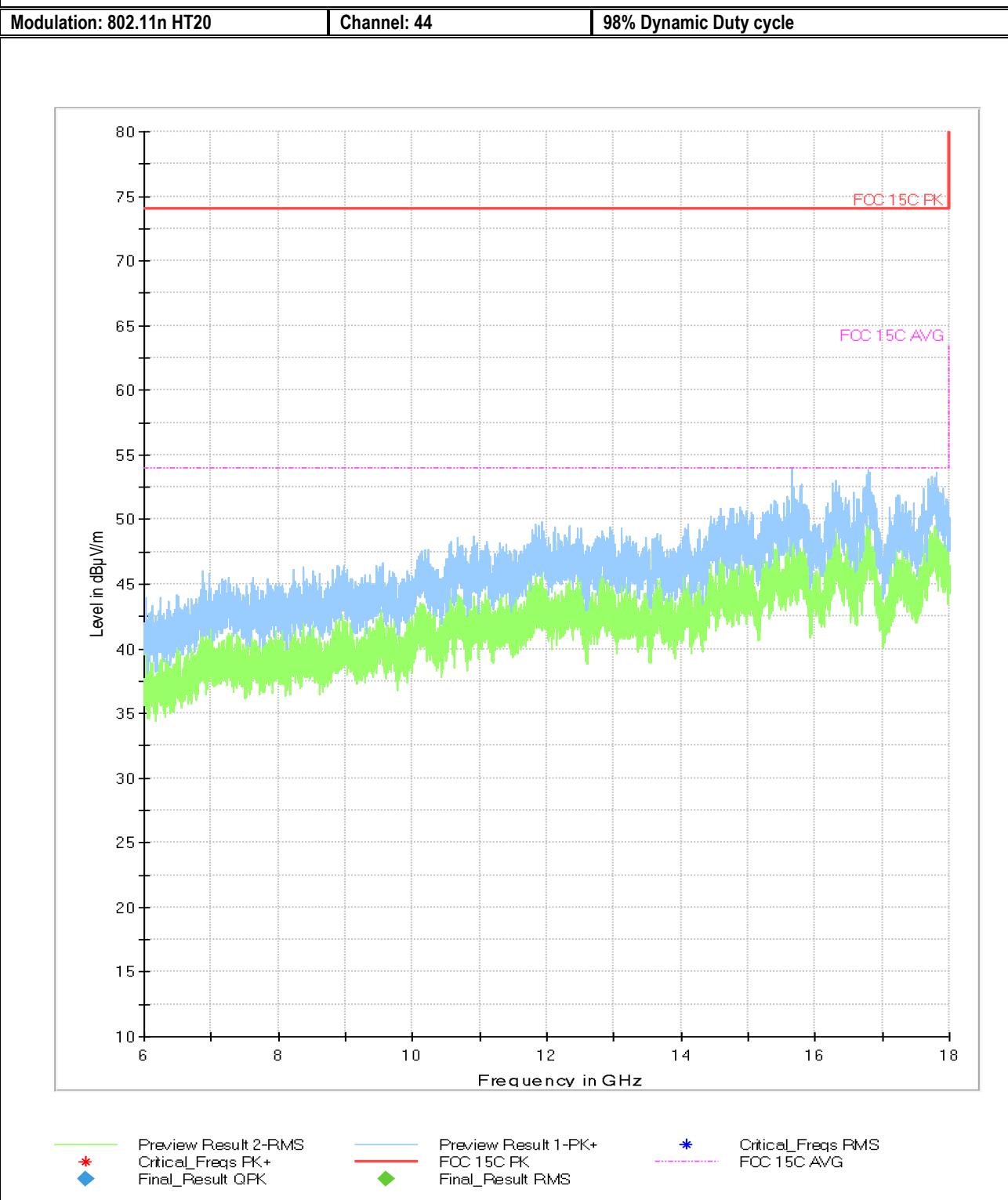
Frequency (MHz)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1458.680000	29.22	53.98	24.76	100.0	1000.000	100.0	V	186.0	-12.0



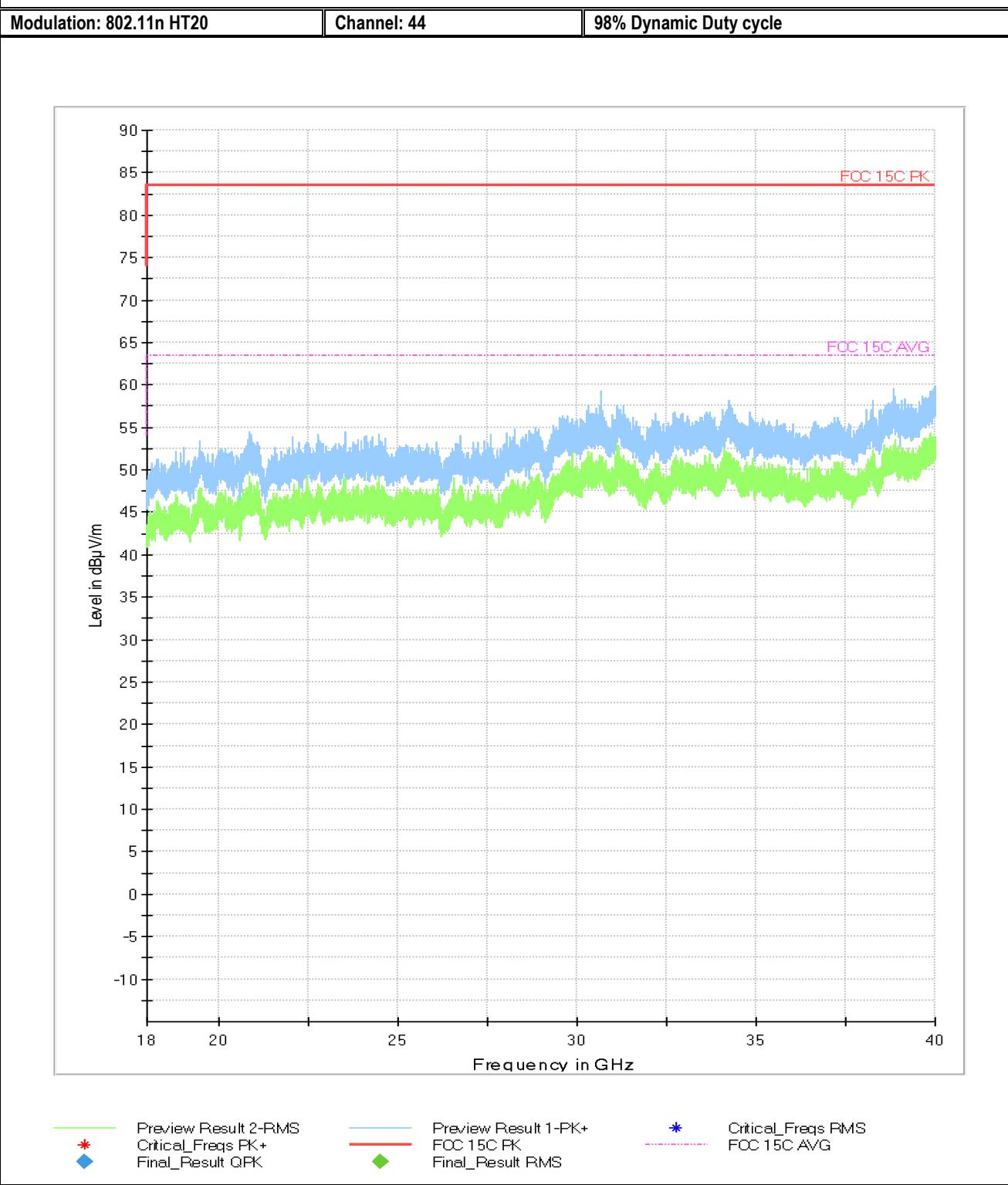


These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #9 Radiated Emissions: 6 – 18GHz



Plot #10 Radiated Emissions: 18 – 40GHz



Plot #11 Radiated Emissions: 30MHz – 1GHz

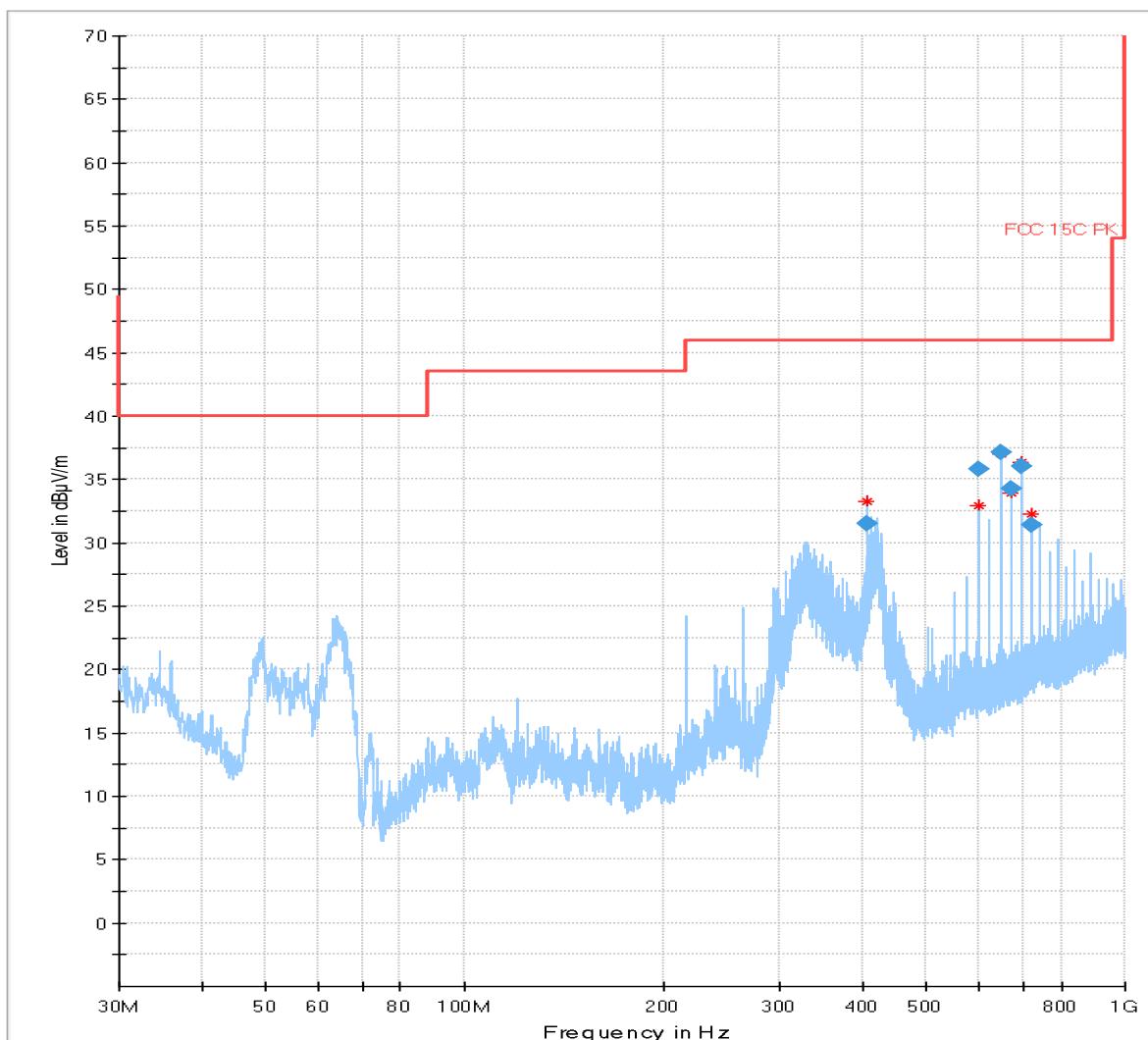
Modulation: 802.11n HT20

Channel: 48

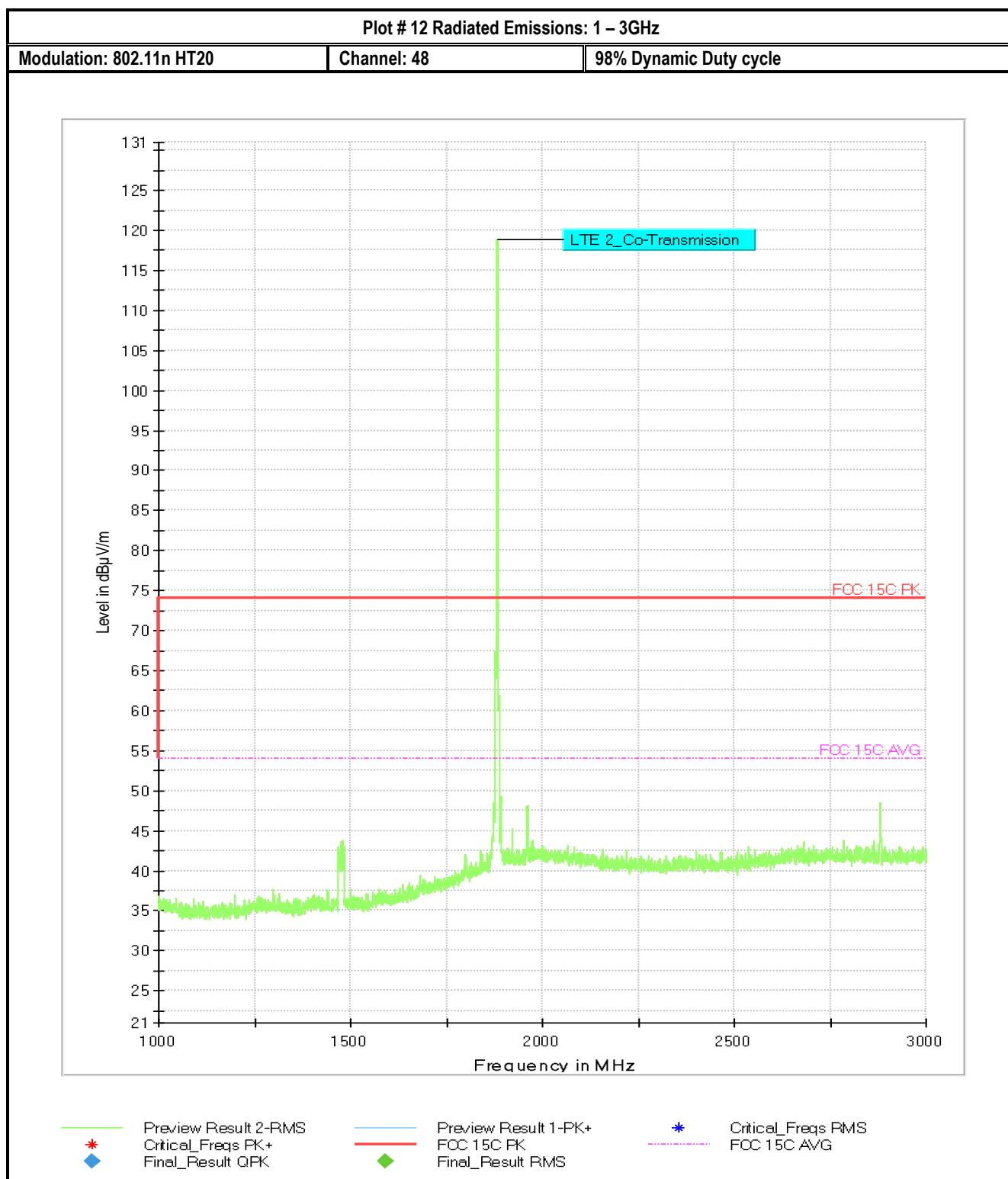
98% Dynamic Duty cycle

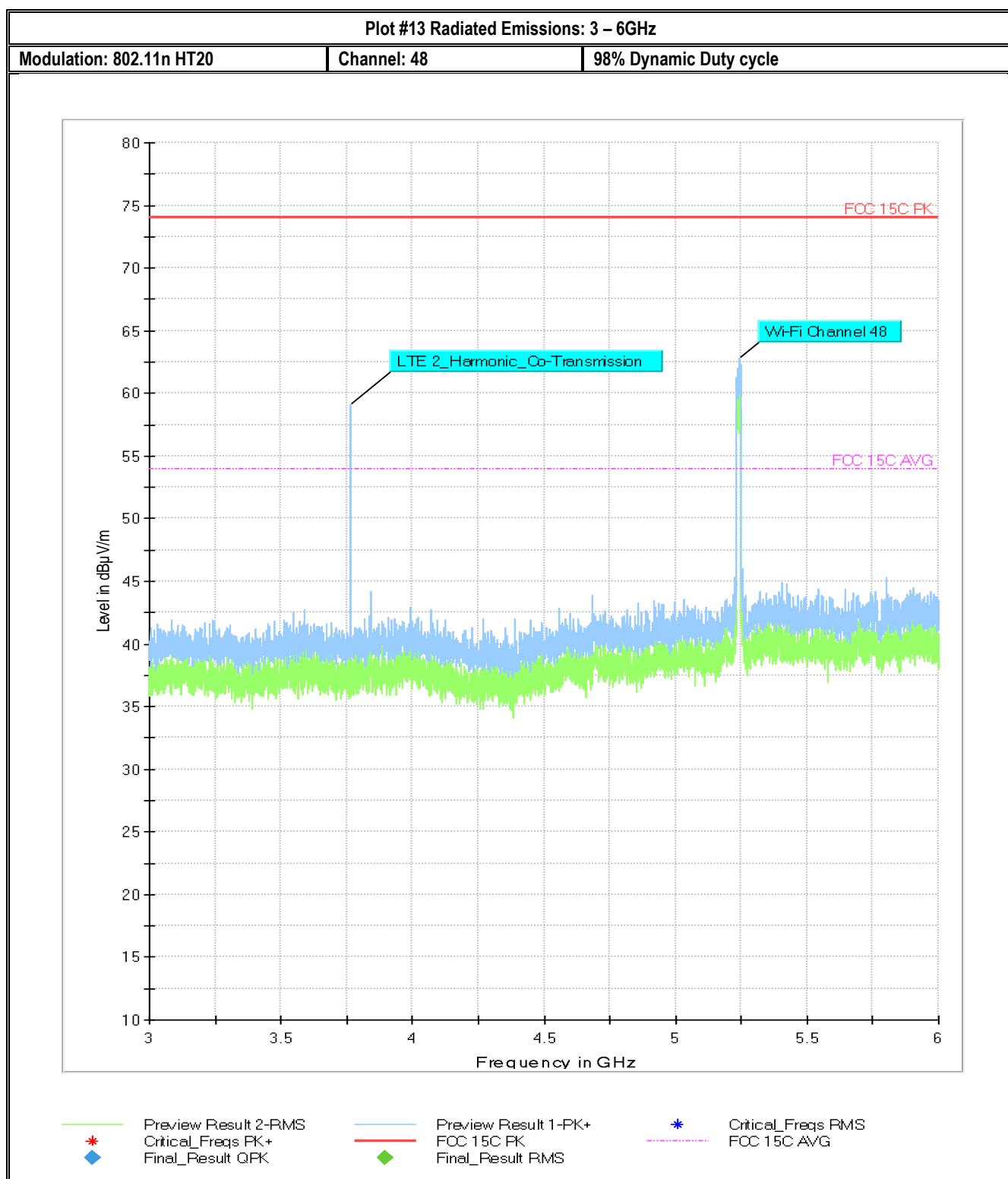
Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
408.022445	31.55	46.00	14.45	100.0	120.000	107.0	H	120.0	-14.1
600.034265	35.77	46.00	10.23	100.0	120.000	158.0	H	-4.0	-10.1
648.027325	37.14	46.00	8.86	100.0	120.000	139.0	H	6.0	-9.7
672.015475	34.31	46.00	11.69	100.0	120.000	135.0	H	17.0	-8.9
696.049395	36.07	46.00	9.93	100.0	120.000	130.0	H	25.0	-8.9
719.981660	31.40	46.00	14.60	100.0	120.000	123.0	H	33.0	-8.6



Preview Result 2-RMS	Preview Result 1-PK+	Critical_Freqs RMS
Critical_Freqs PK+	FCC 15C PK	Final_Result QPK
Final_Result RMS		

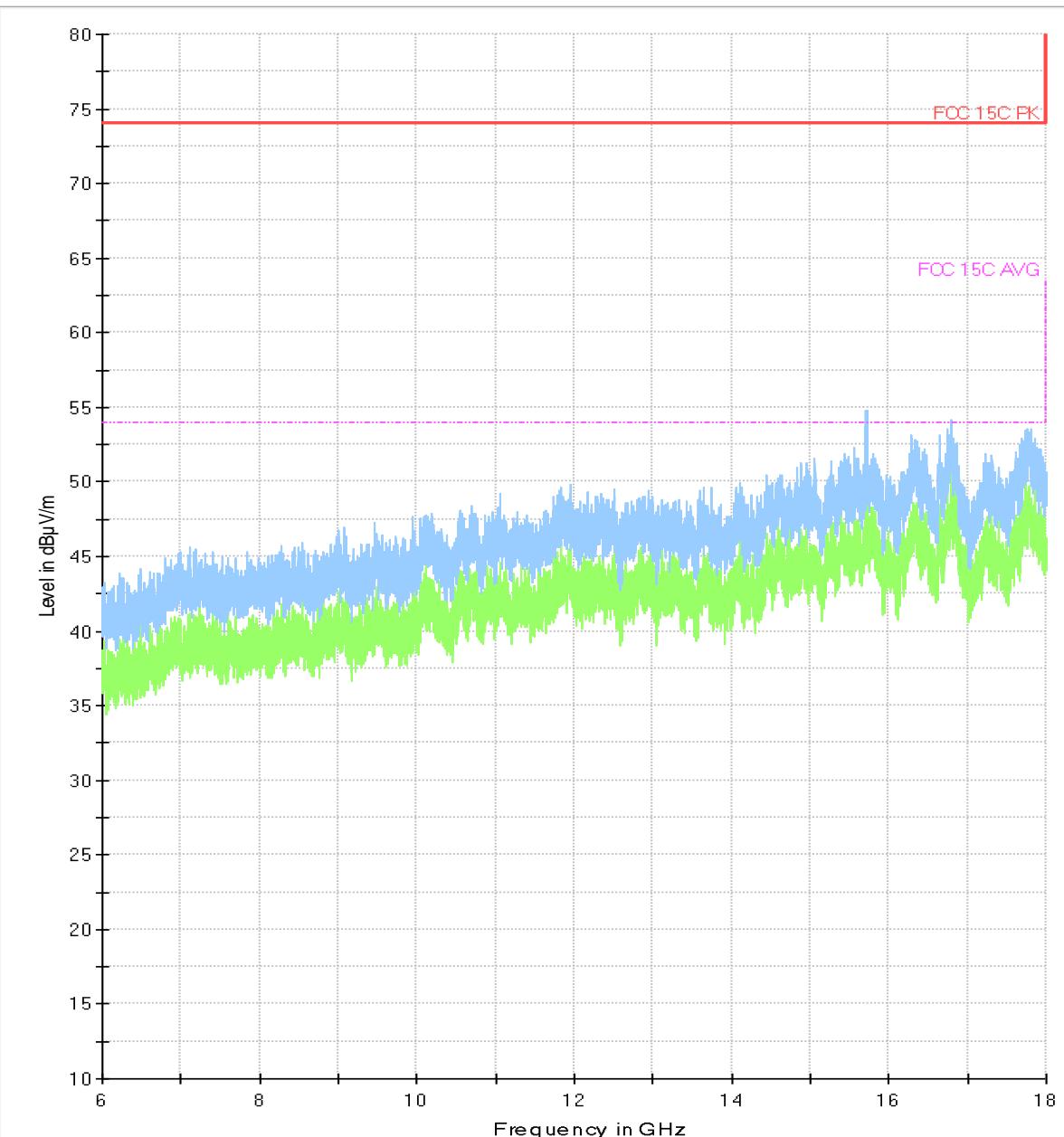




These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #14 Radiated Emissions: 6 – 18GHz

Modulation: 802.11n HT20	Channel: 48	98% Dynamic Duty cycle
--------------------------	-------------	------------------------



* Preview Result 2-RMS ♦ Critical_Freqs PK+ ♦ Final_Result QPK	Preview Result 1-PK+ FOC 15C PK ♦ Final_Result RMS	* Critical_Freqs RMS FOC 15C AVG
--	--	-------------------------------------

Plot #15 Radiated Emissions: 30MHz – 1GHz

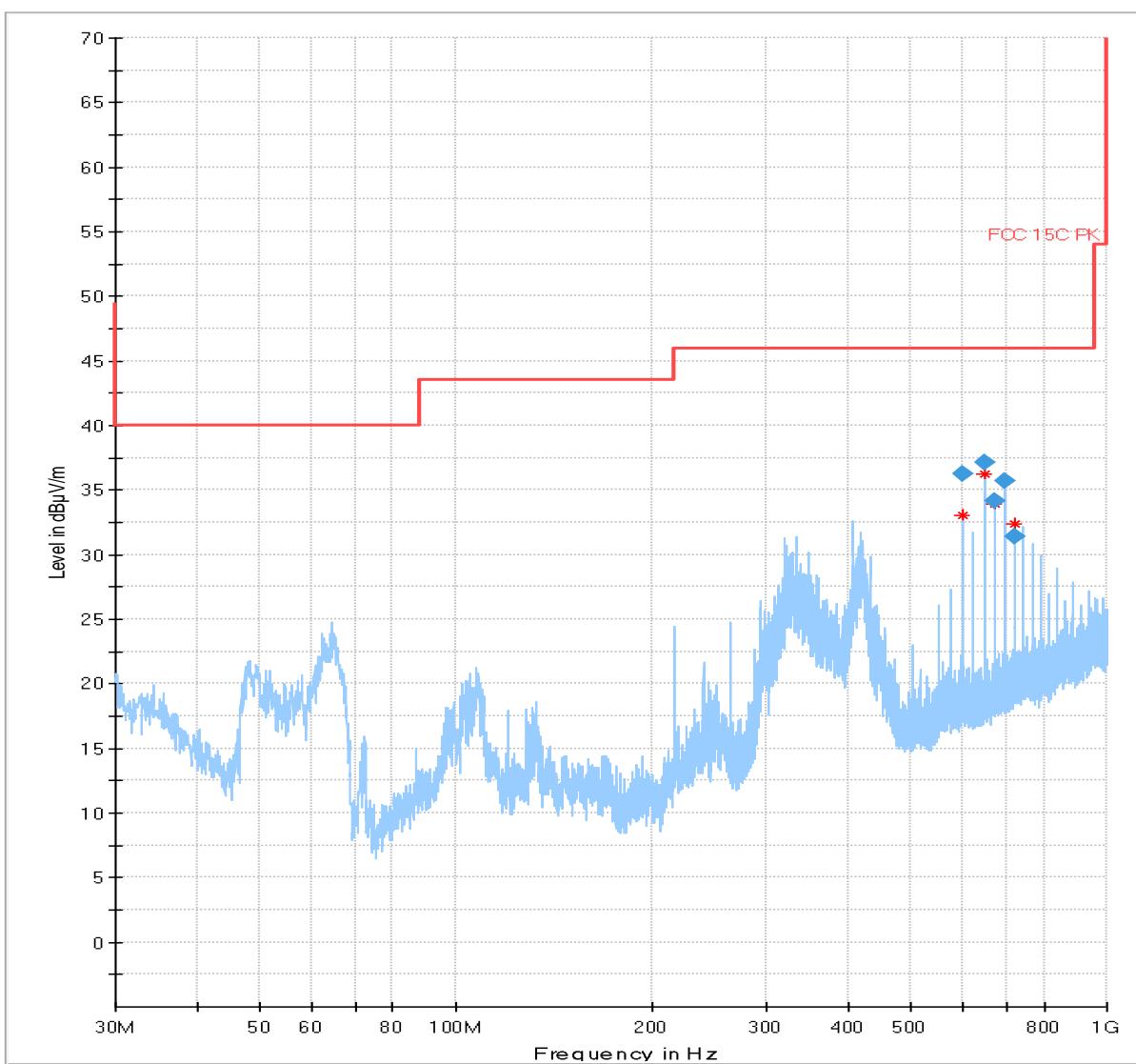
Modulation: 802.11n HT20

Channel: 52

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.028730	36.20	46.00	9.80	100.0	120.000	156.0	H	0.0	-10.1
648.036690	37.18	46.00	8.82	100.0	120.000	152.0	H	9.0	-9.7
671.999925	34.15	46.00	11.85	100.0	120.000	140.0	H	18.0	-8.9
696.055965	35.68	46.00	10.32	100.0	120.000	127.0	H	26.0	-8.9
719.997165	31.39	46.00	14.61	100.0	120.000	123.0	H	33.0	-8.6

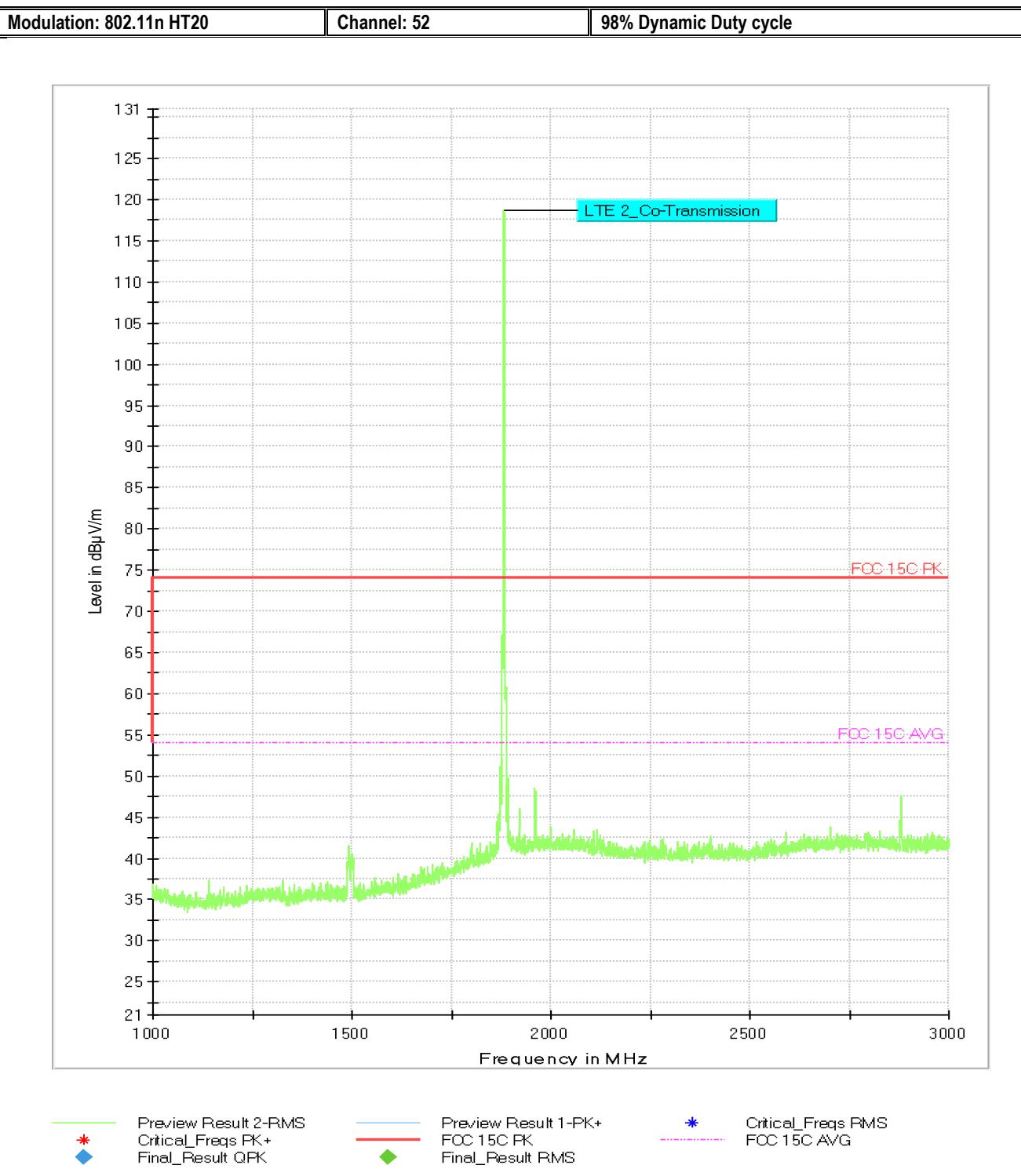


Preview Result 2-RMS
 Critical_Freqs PK+
 Final_Result RMS

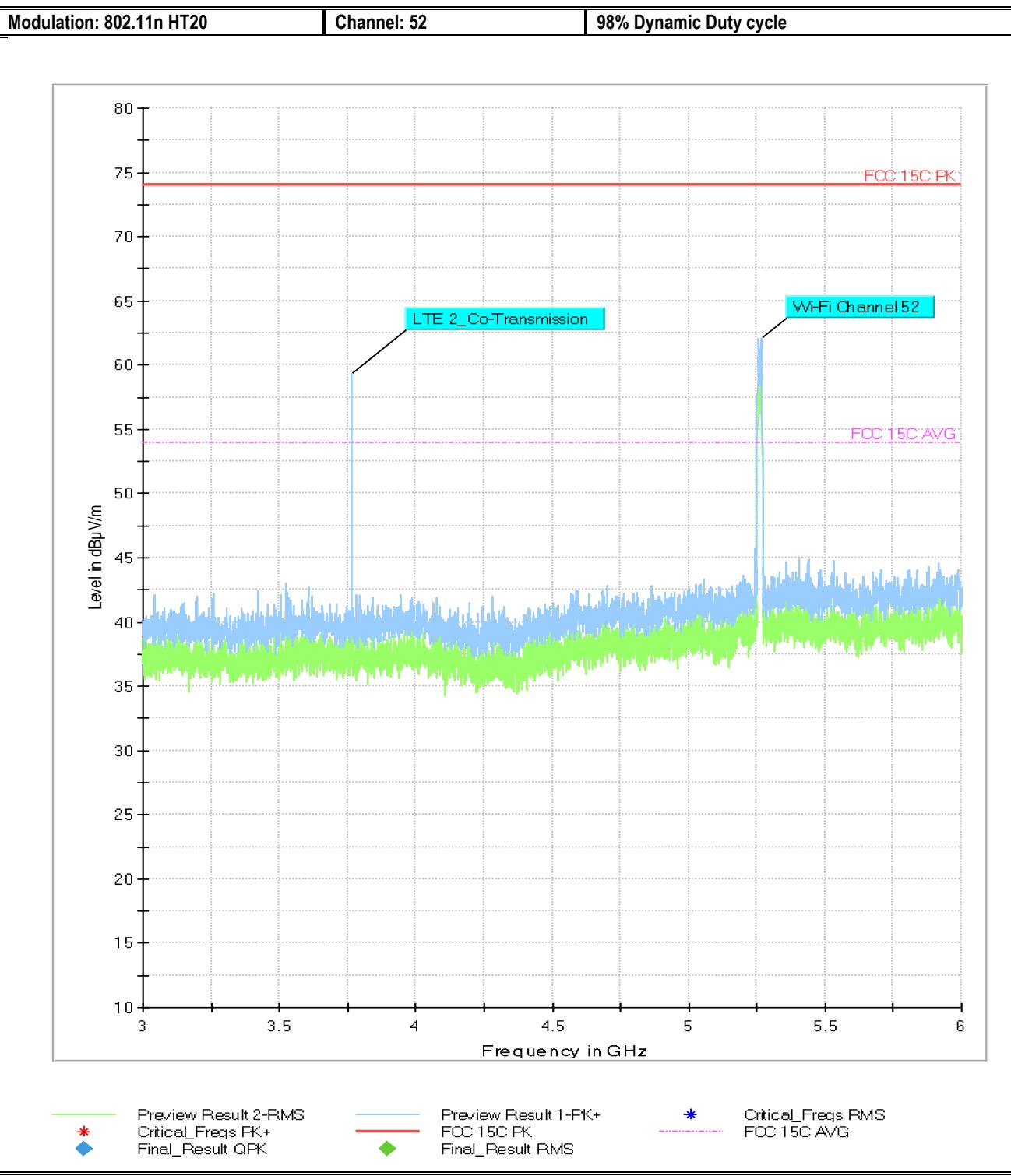
Preview Result 1-PK+
 FOC 15C PK

* Critical_Freqs RMS
 Final_Result QPK

Plot #16 Radiated Emissions: 1 – 3GHz



Plot #17 Radiated Emissions: 3 – 6GHz



These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #18 Radiated Emissions: 6 – 18GHz

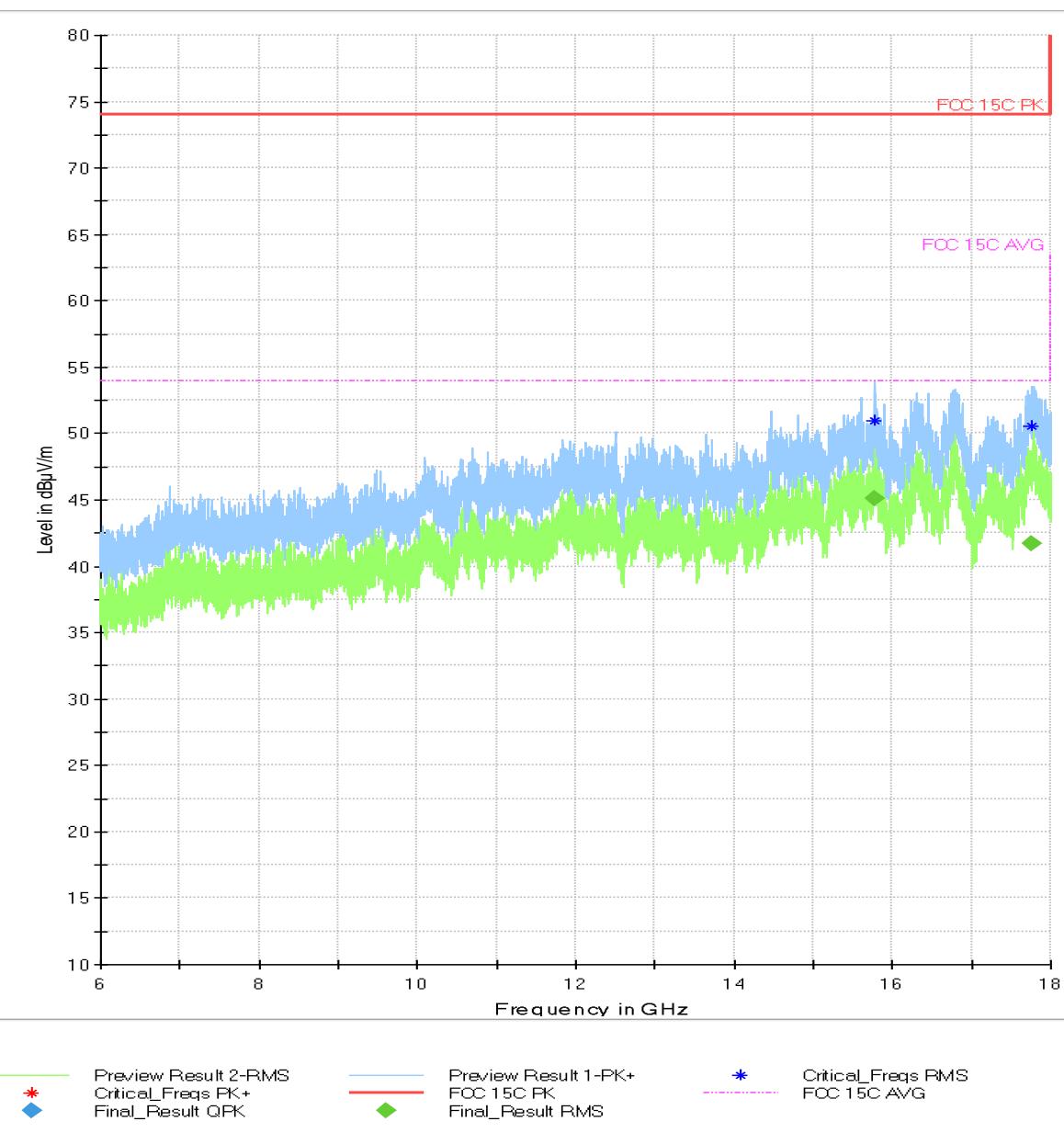
Modulation: 802.11n HT20

Channel: 52

98% Dynamic Duty cycle

Final_Result

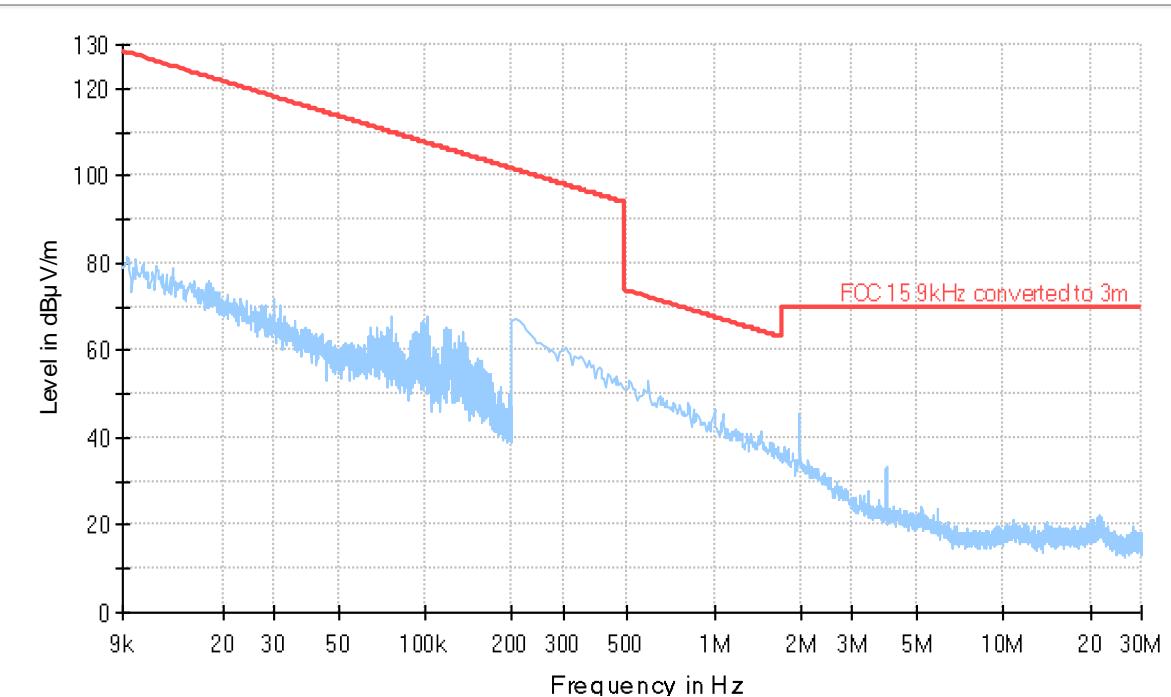
Frequency (MHz)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
15773.055833	45.09	53.98	8.89	100.0	1000.000	173.0	H	132.0	-14.6
17760.715833	41.71	53.98	12.27	100.0	1000.000	180.0	H	22.0	-9.7



Plot #19 Radiated Emissions: 9KHz – 30MHz

Modulation: 802.11n HT20	Channel: 60	98% Dynamic Duty cycle
--------------------------	-------------	------------------------

Full Spectrum



- | | |
|--|--|
| — Preview Result 2-RMS | — Preview Result 1-PK+ |
| * Critical_Freqs RMS | * Critical_Freqs PK+ |
| — FOC 15.9kHz converted to 3m | ◆ Final_Result QPK |
| ◆ Final_Result RMS | |

Plot #20 Radiated Emissions: 30MHz – 1GHz

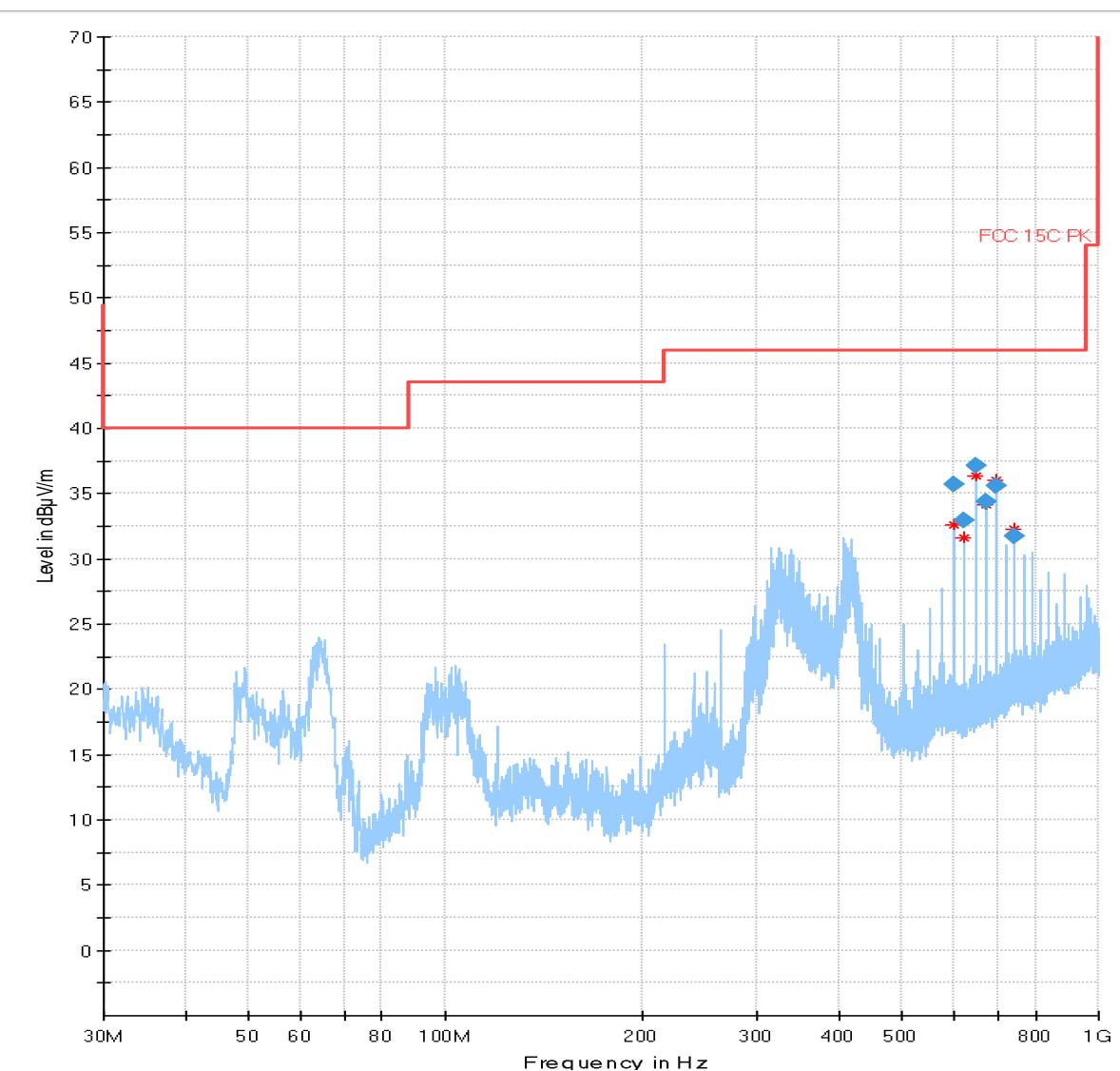
Modulation: 802.11n HT20

Channel: 60

98% Dynamic Duty cycle

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.022015	35.67	46.00	10.33	100.0	120.000	155.0	H	22.0	-10.1
623.987490	32.92	46.00	13.08	100.0	120.000	144.0	H	19.0	-10.4
648.031390	37.11	46.00	8.89	100.0	120.000	139.0	H	23.0	-9.7
672.003515	34.40	46.00	11.60	100.0	120.000	140.0	H	29.0	-8.9
696.002830	35.63	46.00	10.37	100.0	120.000	129.0	H	34.0	-8.9
744.023965	31.77	46.00	14.23	100.0	120.000	118.0	H	48.0	-7.8



Preview Result 2-RMS
 Critical_Freqs PK+
 Final_Result RMS

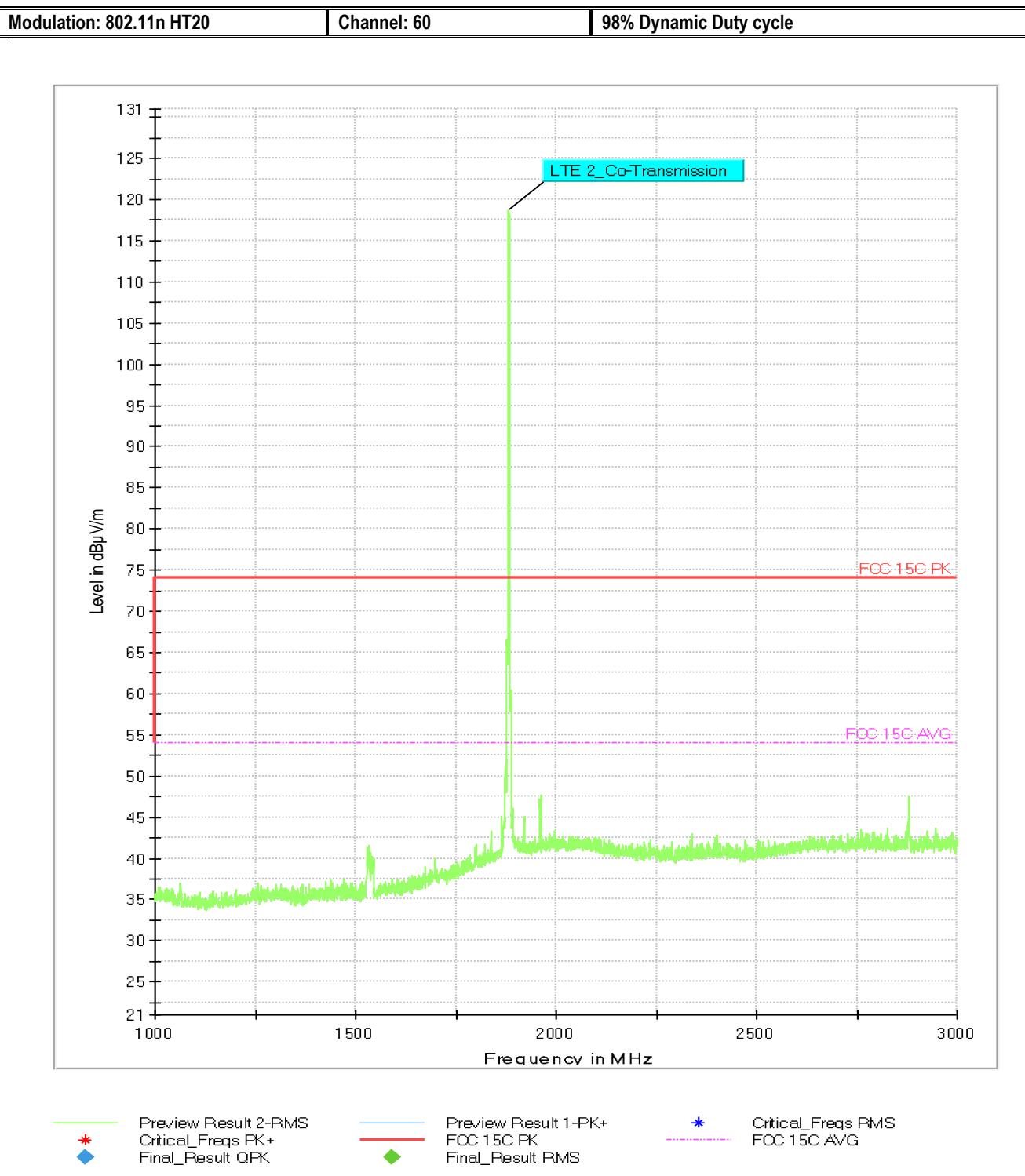


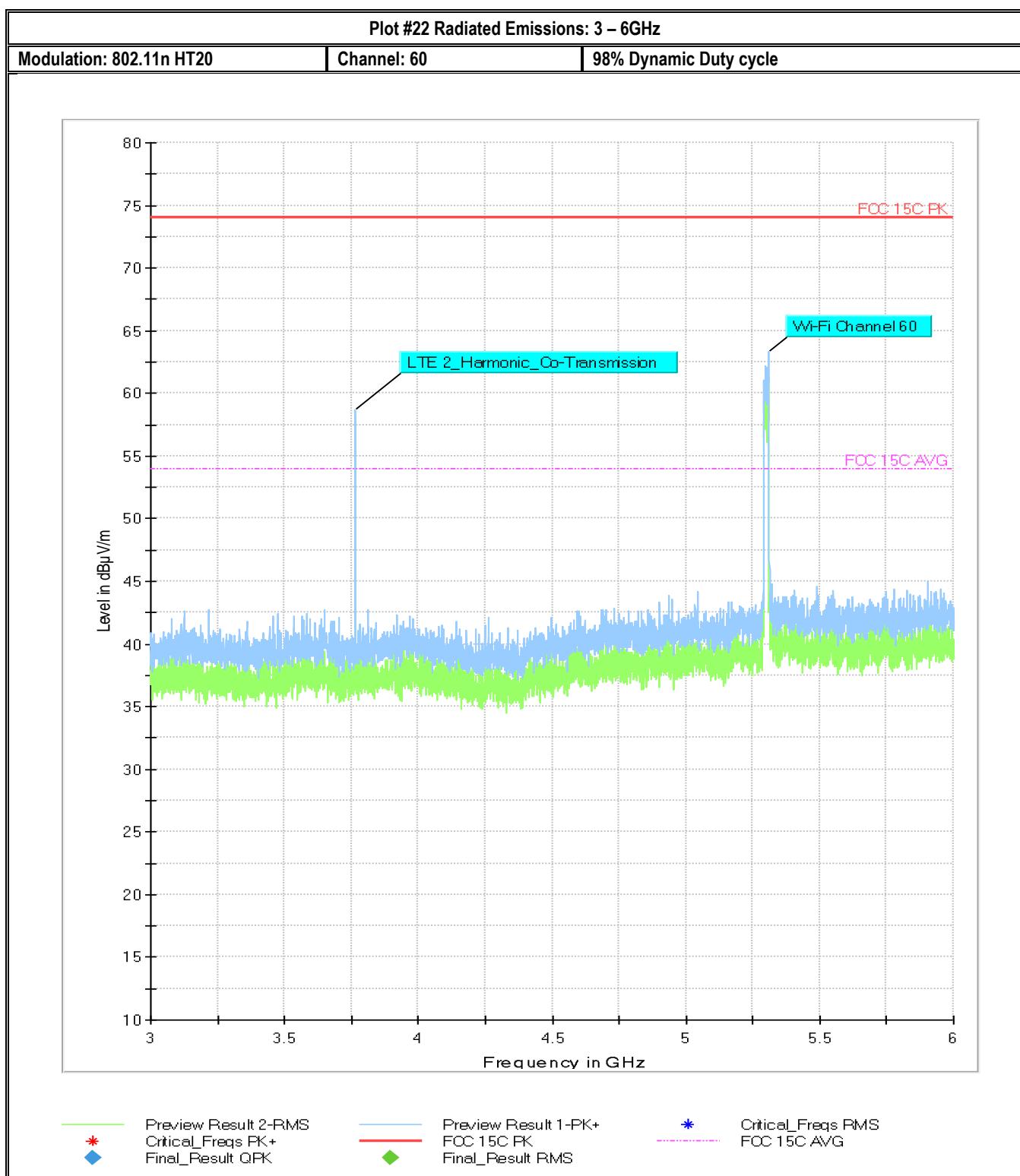
Preview Result 1-PK+
 FCC 15C PK



Critical_Freqs RMS
 Final_Result QPK

Plot #21 Radiated Emissions: 1 – 3GHz

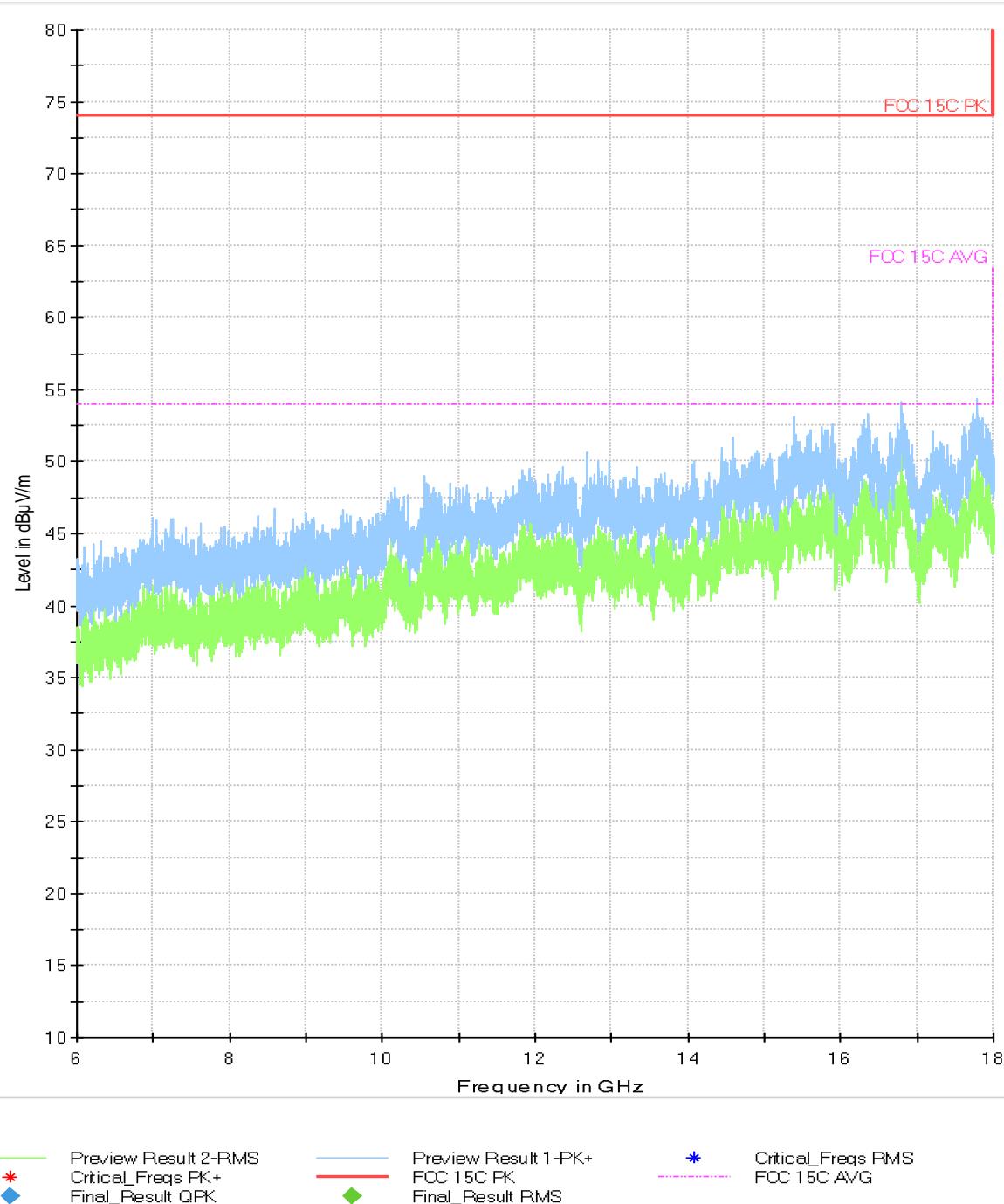


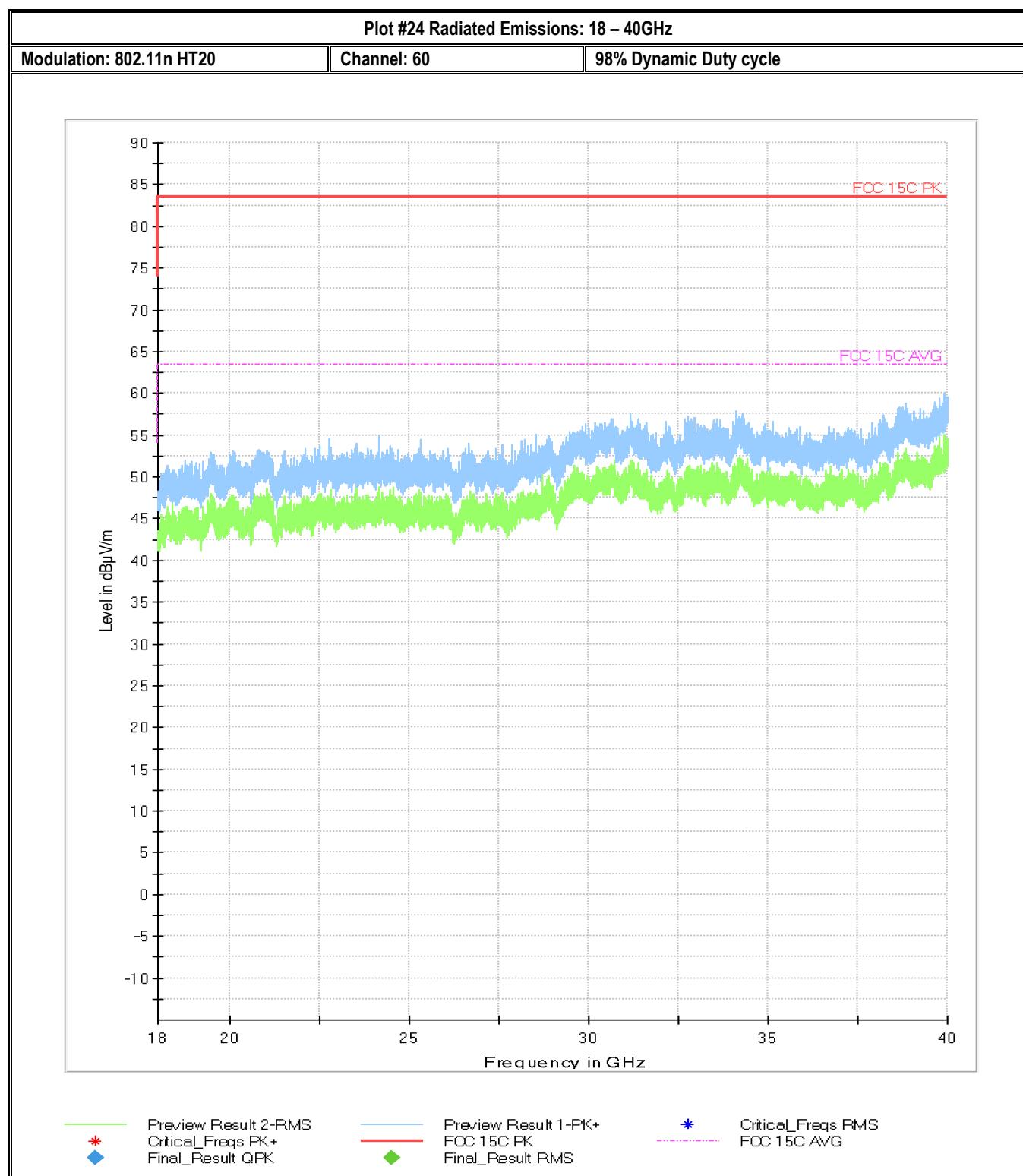


These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #23 Radiated Emissions: 6 – 18GHz

Modulation: 802.11n HT20 | Channel: 60 | 98% Dynamic Duty cycle





Plot #25 Radiated Emissions: 30MHz – 1GHz

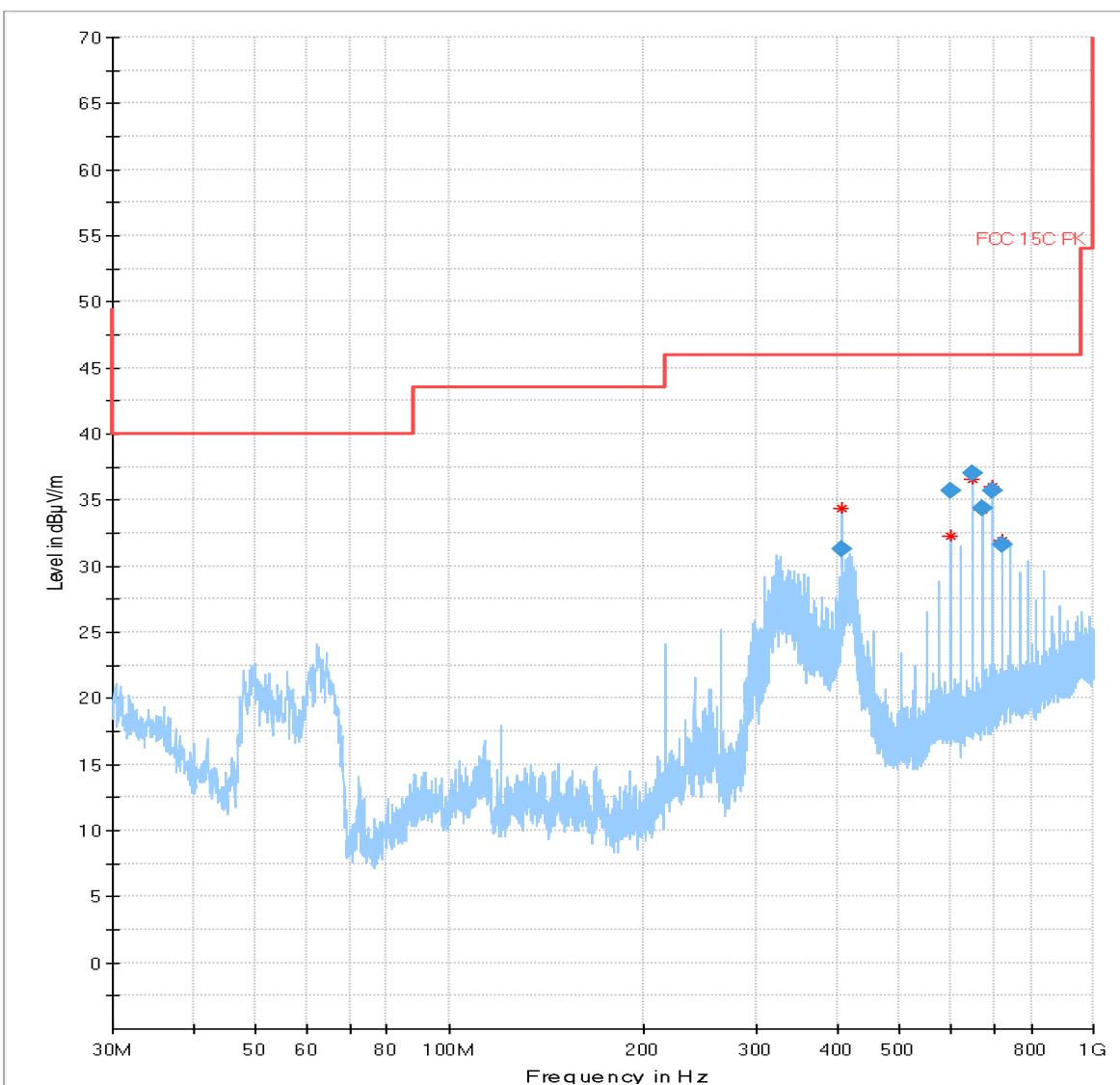
Modulation: 802.11n HT20

Channel: 64

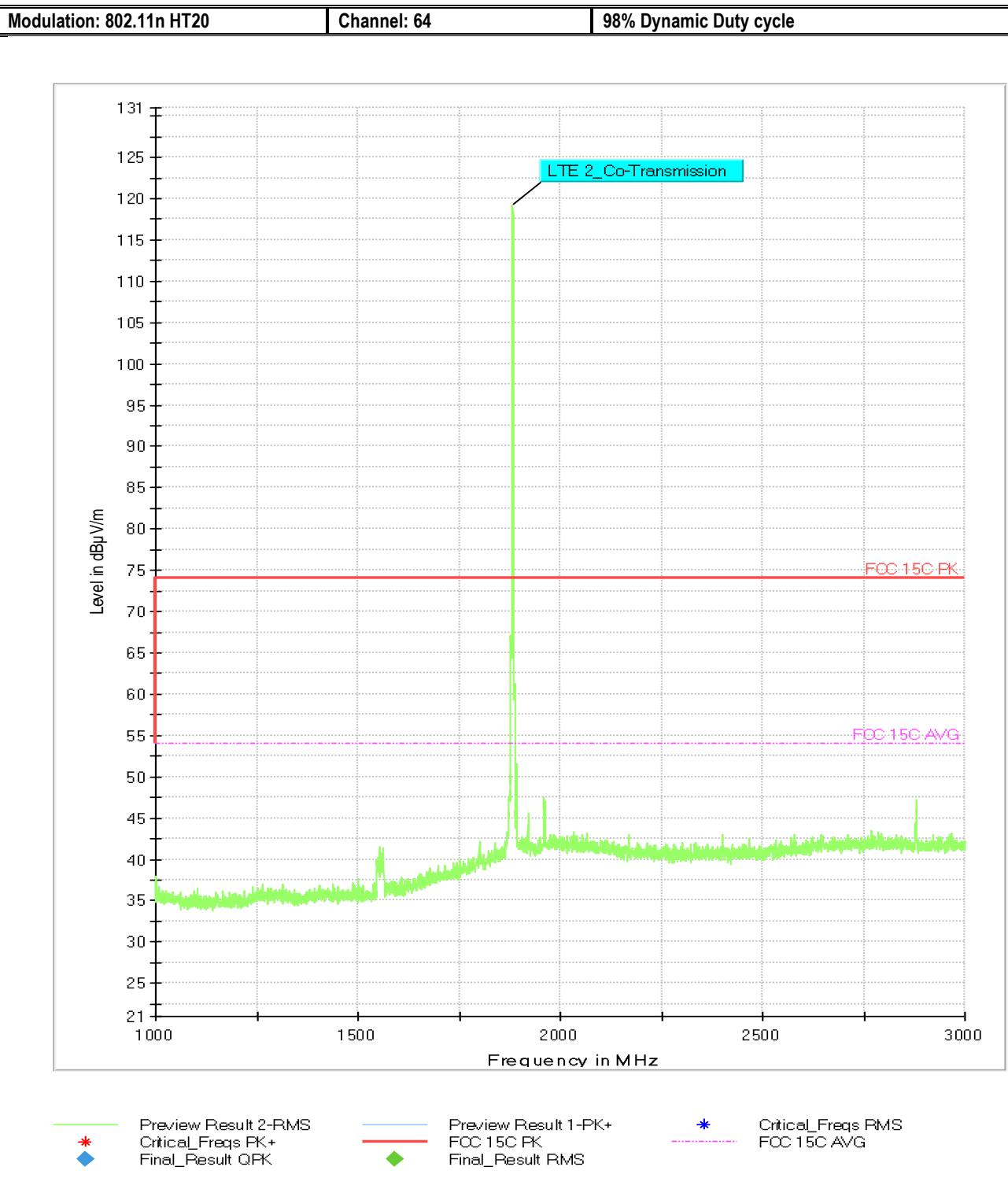
98% Dynamic Duty cycle

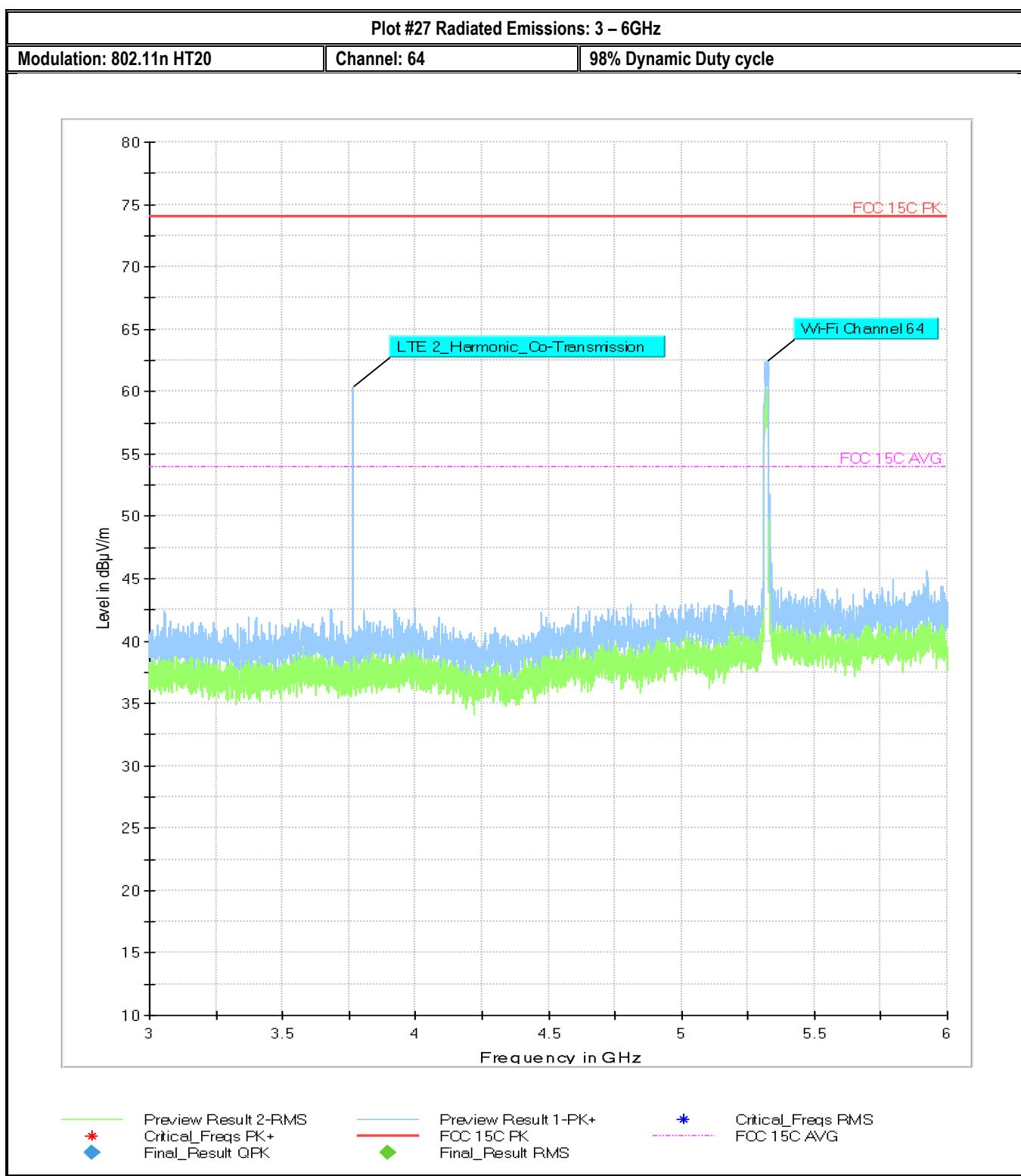
Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
408.045400	31.29	46.00	14.71	100.0	120.000	100.0	H	126.0	-14.1
600.003835	35.69	46.00	10.31	100.0	120.000	158.0	H	3.0	-10.1
648.006280	37.07	46.00	8.93	100.0	120.000	140.0	H	18.0	-9.7
671.996190	34.36	46.00	11.64	100.0	120.000	139.0	H	25.0	-8.9
696.033945	35.73	46.00	10.27	100.0	120.000	129.0	H	33.0	-8.9
720.011795	31.60	46.00	14.40	100.0	120.000	124.0	H	37.0	-8.6



Plot #26 Radiated Emissions: 1 – 3GHz

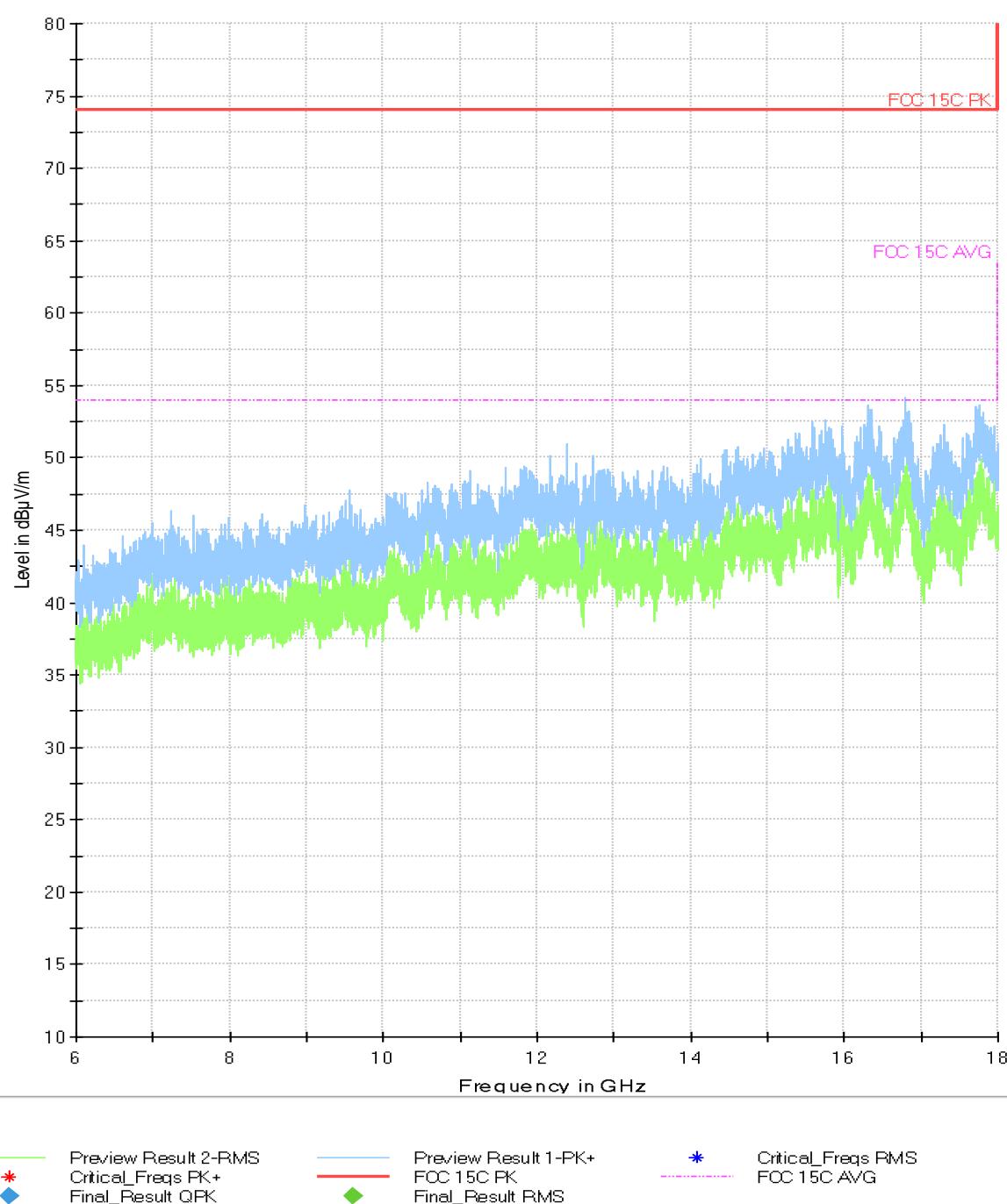




These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #28 Radiated Emissions: 6 – 18GHz

Modulation: 802.11n HT20 | Channel: 64 | 98% Dynamic Duty cycle



Plot #29 Radiated Emissions: 30MHz – 1GHz

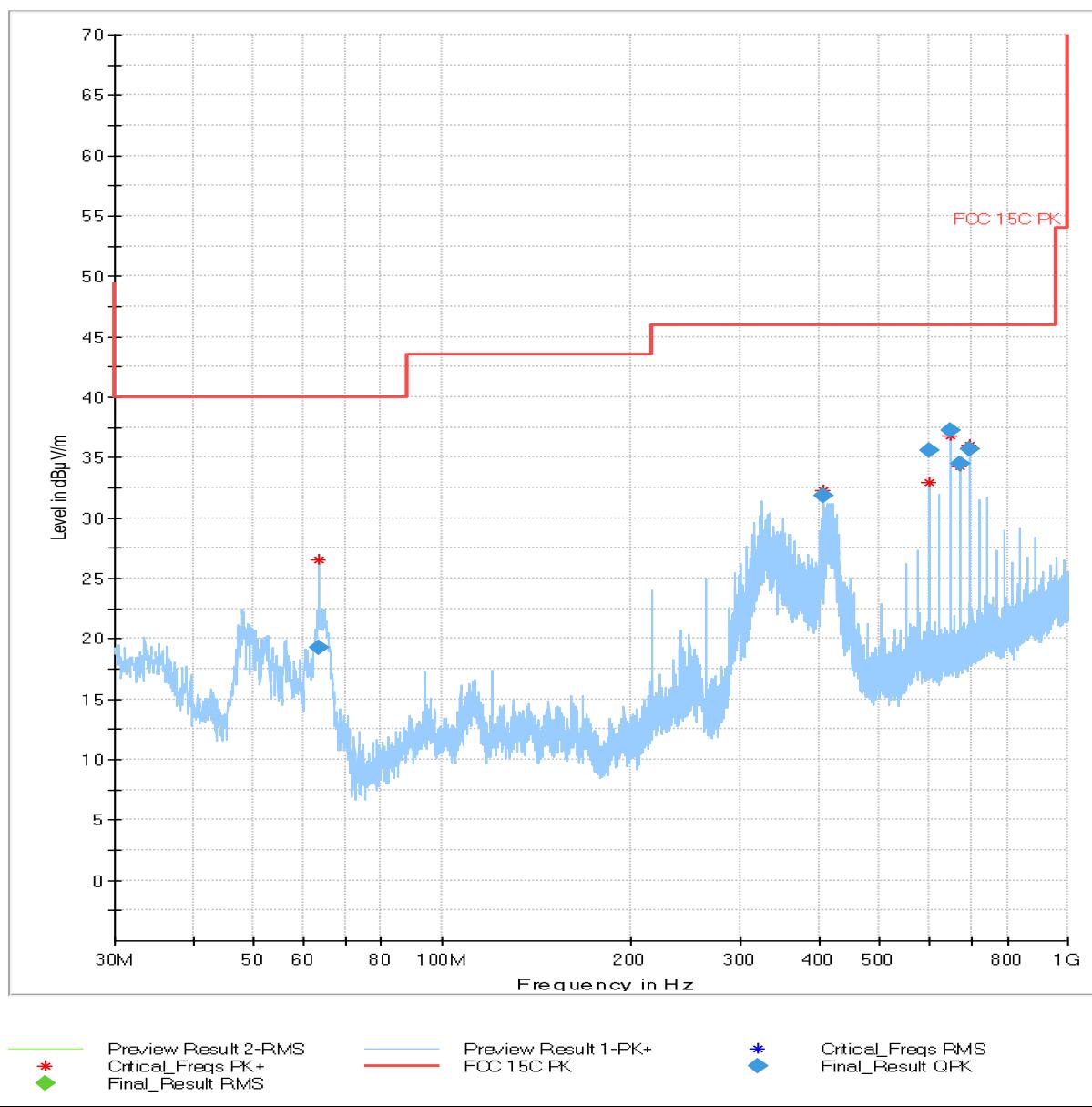
Modulation: 802.11n HT20

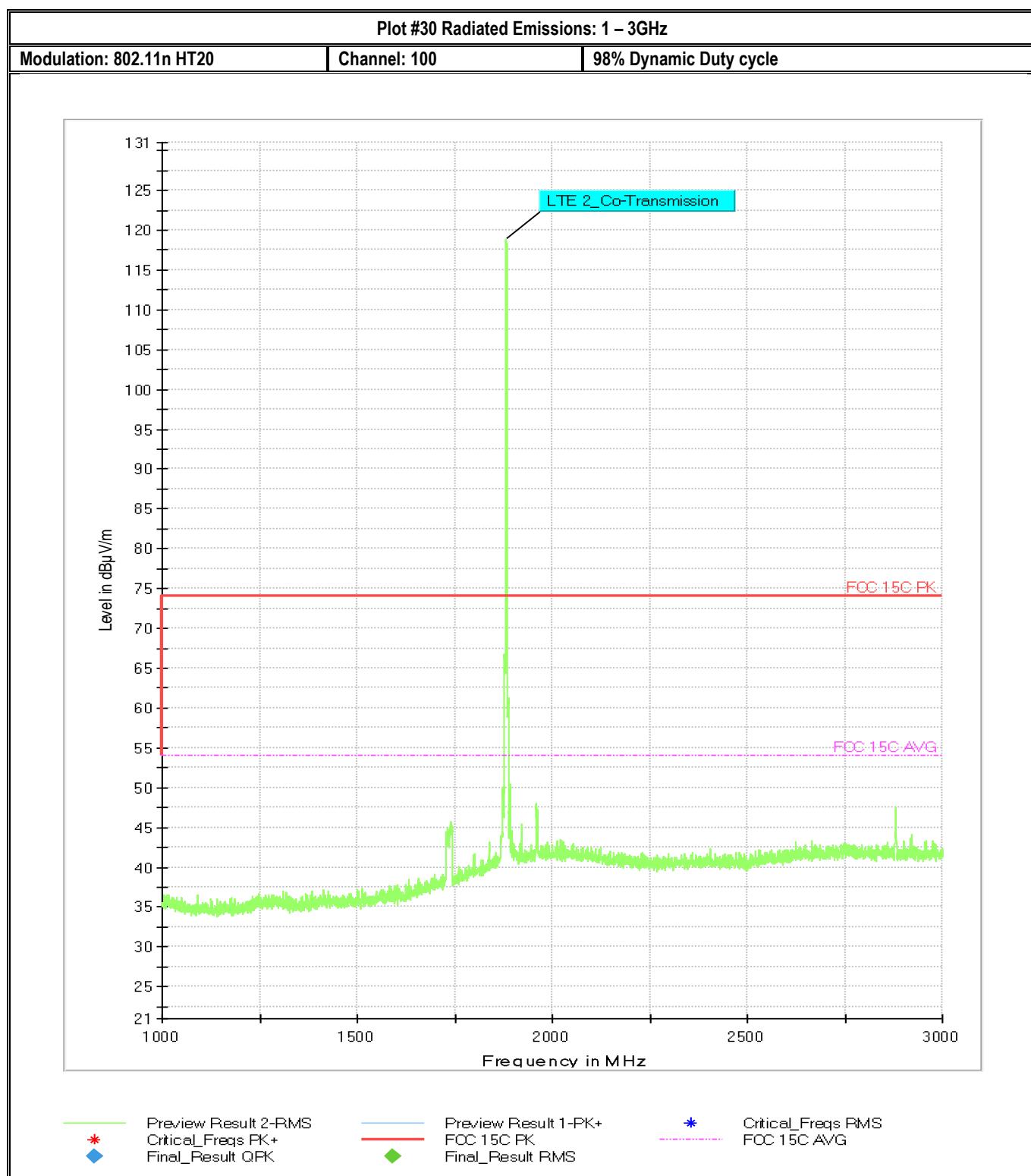
Channel: 100

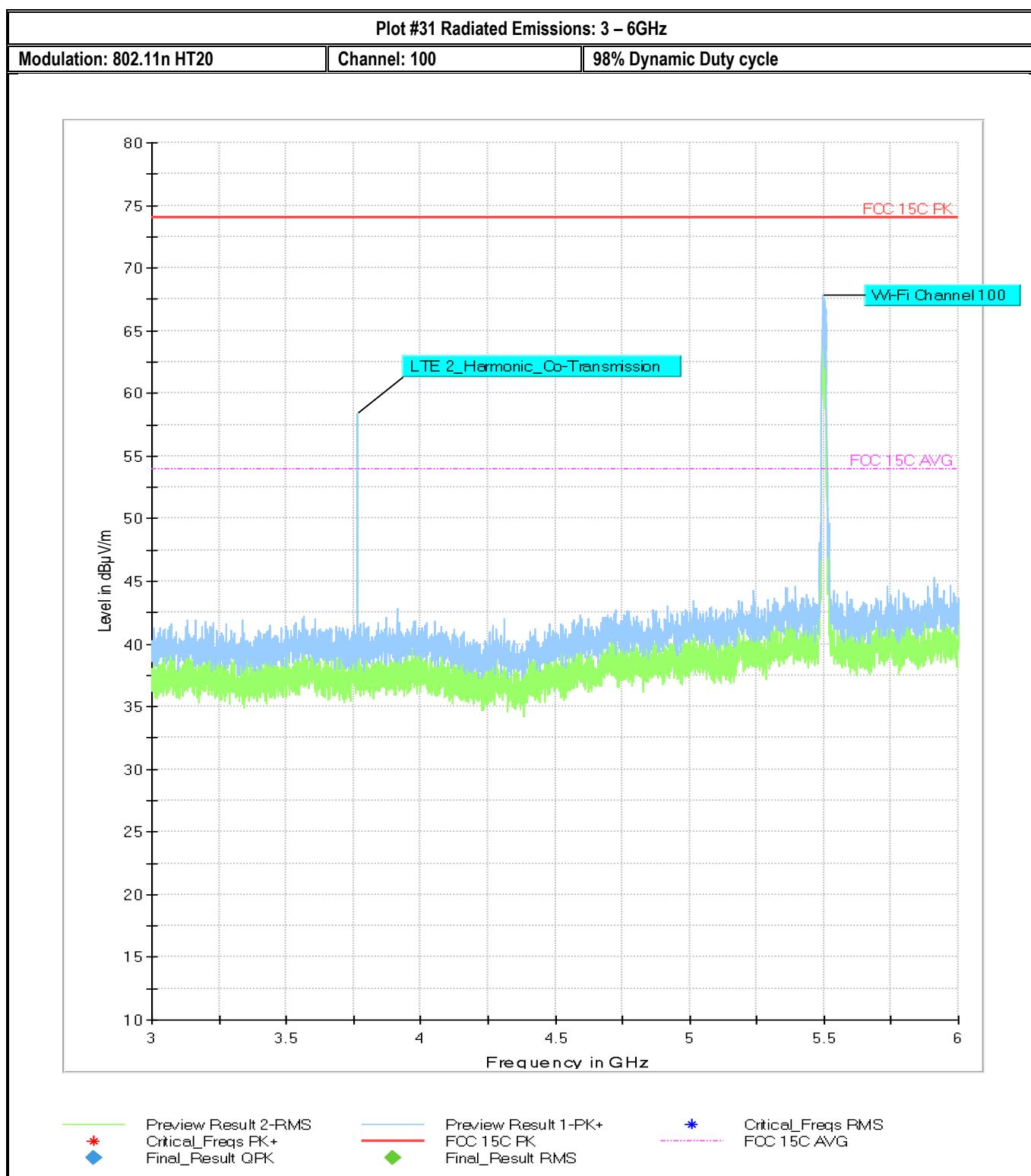
98% Dynamic Duty cycle

Final_Result

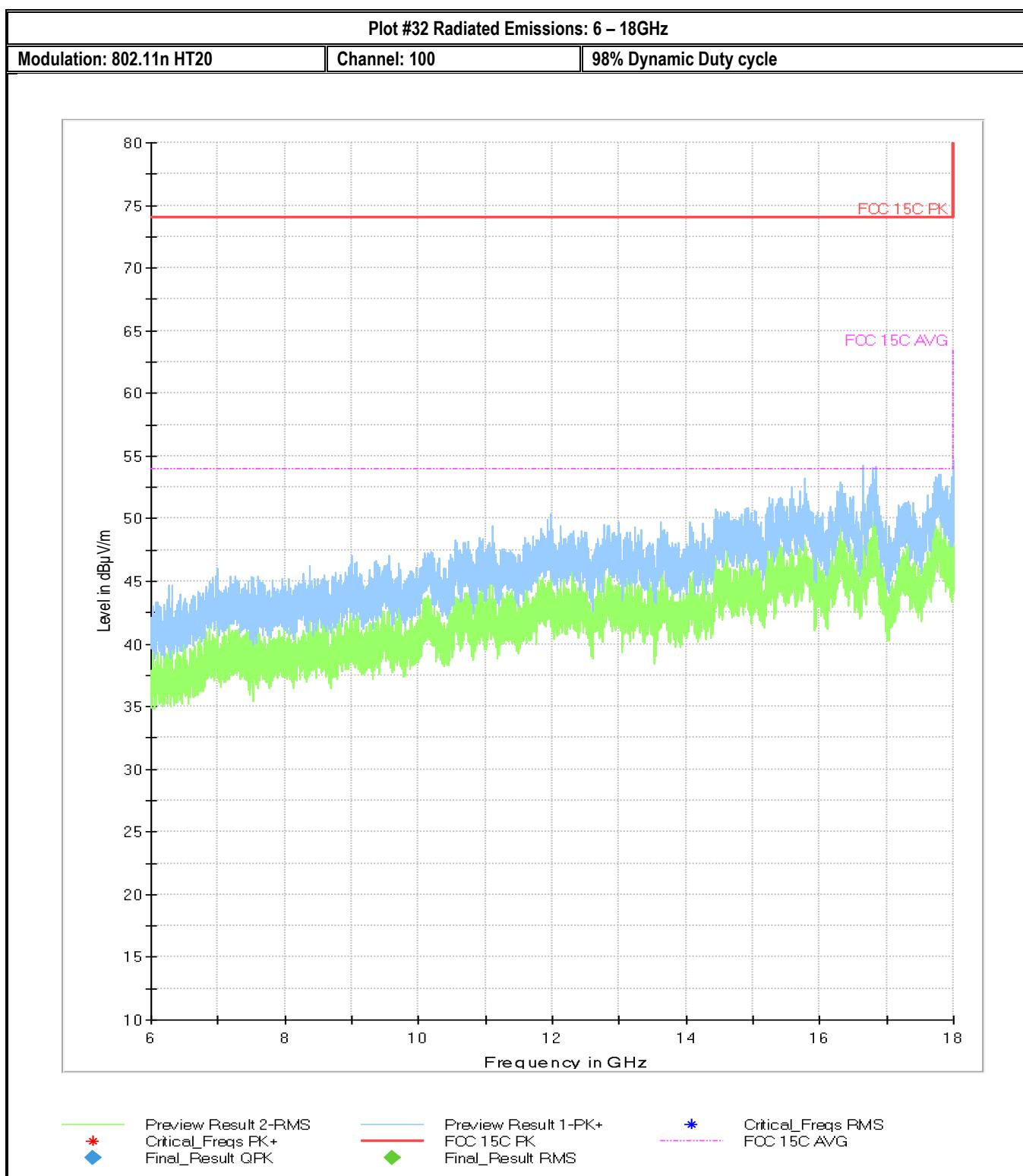
Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
63.584250	19.31	40.00	20.69	100.0	120.000	107.0	V	156.0	-24.1
408.020505	31.85	46.00	14.15	100.0	120.000	100.0	H	128.0	-14.1
600.058955	35.57	46.00	10.43	100.0	120.000	155.0	H	6.0	-10.1
648.044120	37.21	46.00	8.79	100.0	120.000	138.0	H	14.0	-9.7
672.005800	34.44	46.00	11.56	100.0	120.000	129.0	H	24.0	-8.9
696.024080	35.67	46.00	10.33	100.0	120.000	124.0	H	30.0	-8.9







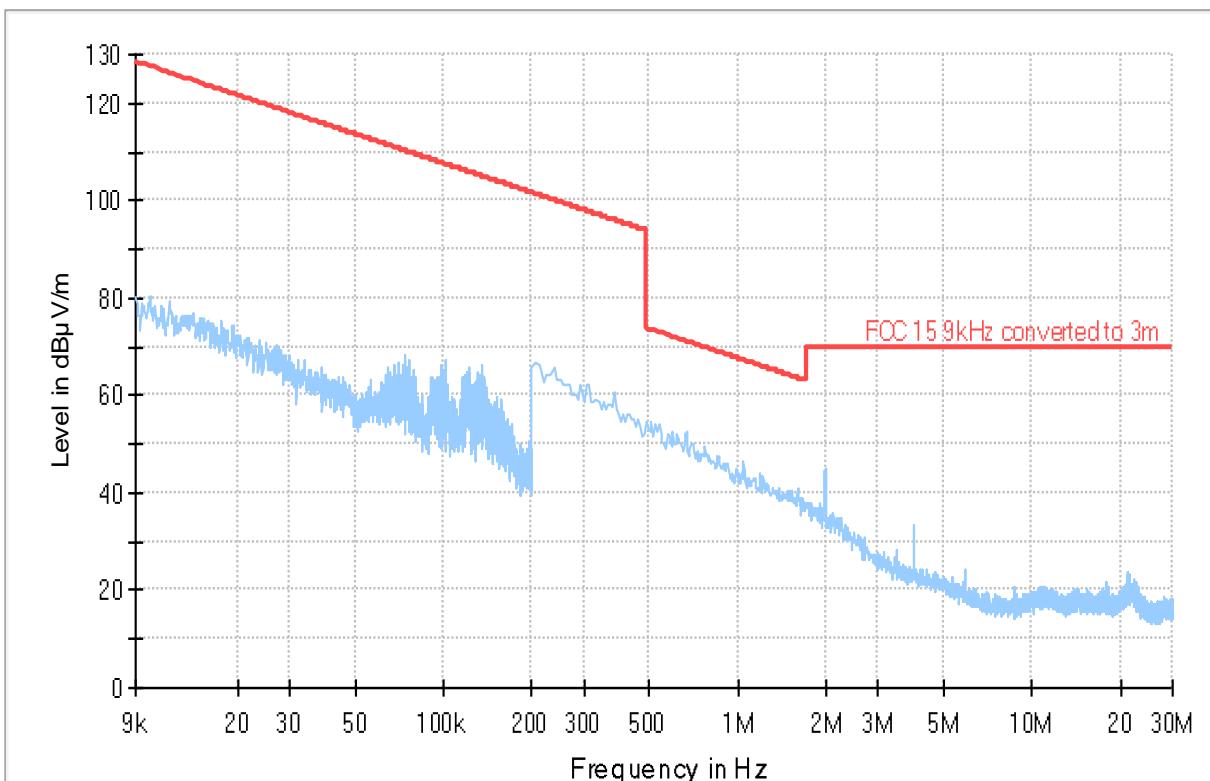
These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.



Plot #33 Radiated Emissions: 9KHz – 30MHz

Modulation: 802.11n HT20 | Channel: 120 | 98% Dynamic Duty cycle

Full Spectrum



- | | | | |
|--------------------------------------|-----------------------------|-------------------------------------|----------------------|
| — | Preview Result 2-RMS | — | Preview Result 1-PK+ |
| * | Critical_Freqs RMS | * | Critical_Freqs PK+ |
| — | FOC 15 9kHz converted to 3m | ◆ | Final_Result QPK |
| ◆ | Final_Result RMS | | |

Plot #34 Radiated Emissions: 30MHz – 1GHz

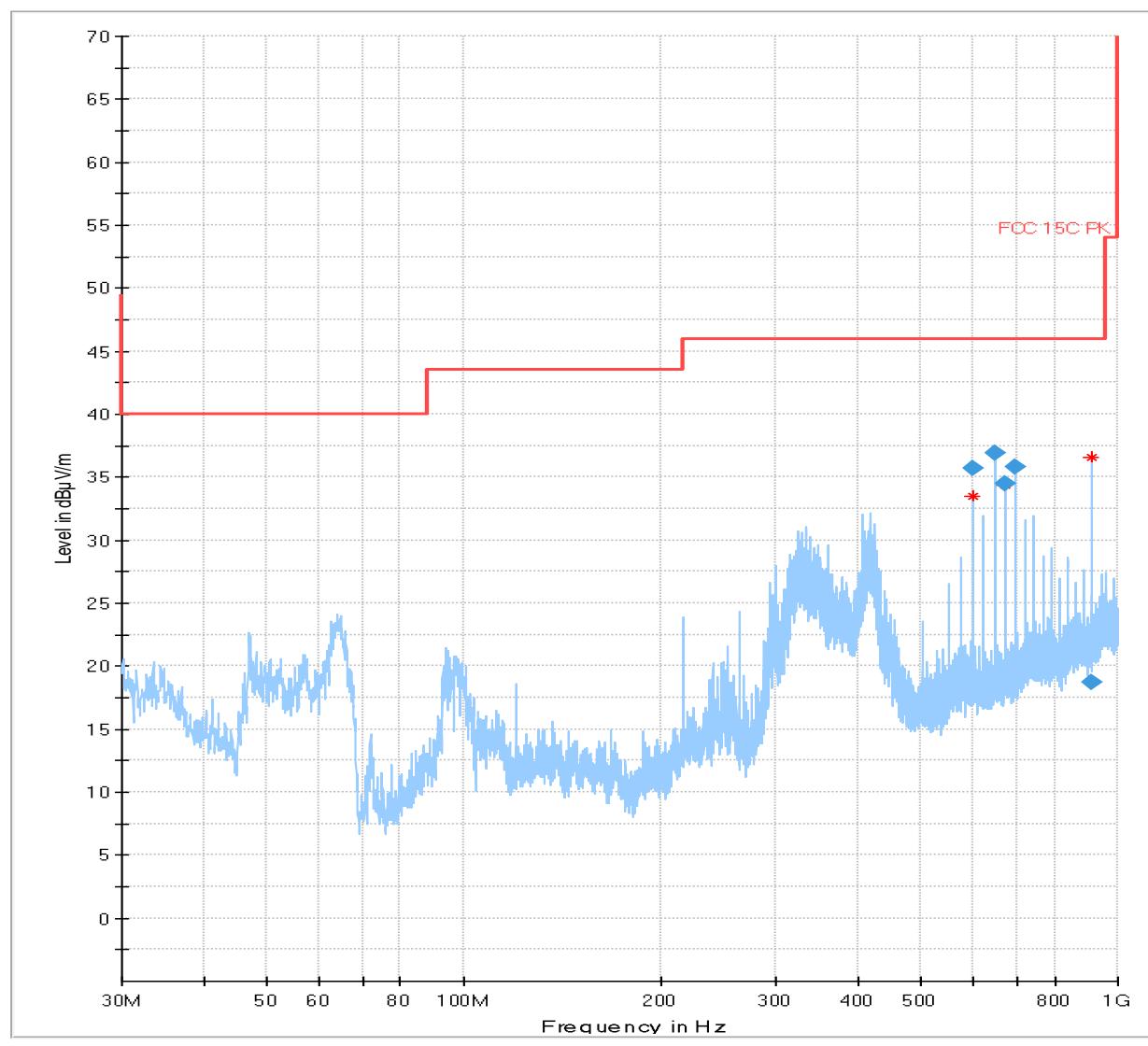
Modulation: 802.11n HT20

Channel: 120

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.002305	35.73	46.00	10.27	100.0	120.000	156.0	H	1.0	-10.1
647.993195	36.91	46.00	9.09	100.0	120.000	145.0	H	12.0	-9.7
672.002395	34.52	46.00	11.48	100.0	120.000	137.0	H	22.0	-8.9
696.035215	35.86	46.00	10.14	100.0	120.000	130.0	H	30.0	-8.9
913.701415	18.68	46.00	27.32	100.0	120.000	254.0	V	196.0	-6.0



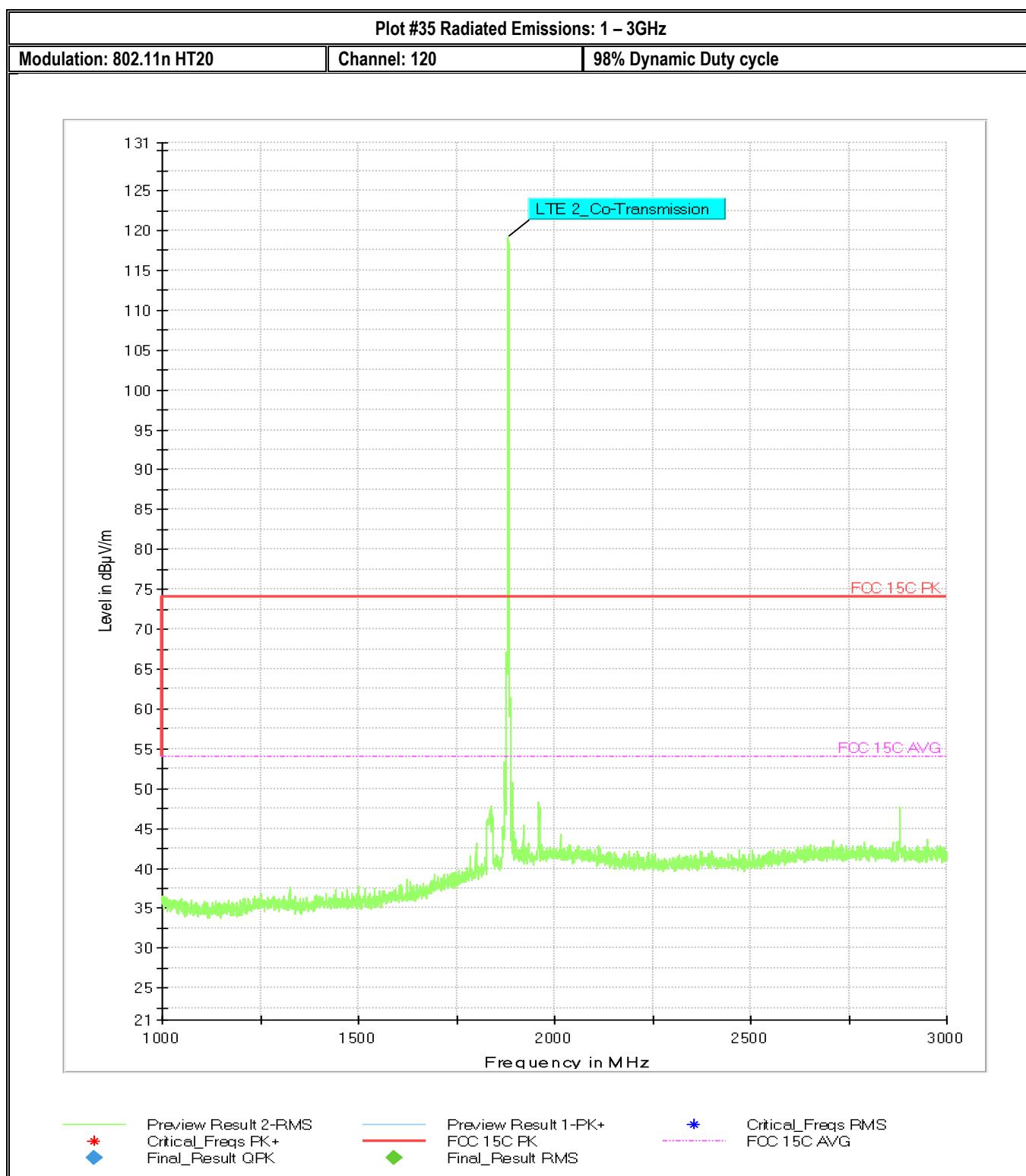
Preview Result 2-RMS
 Critical_Freqs PK+
 Final_Result RMS

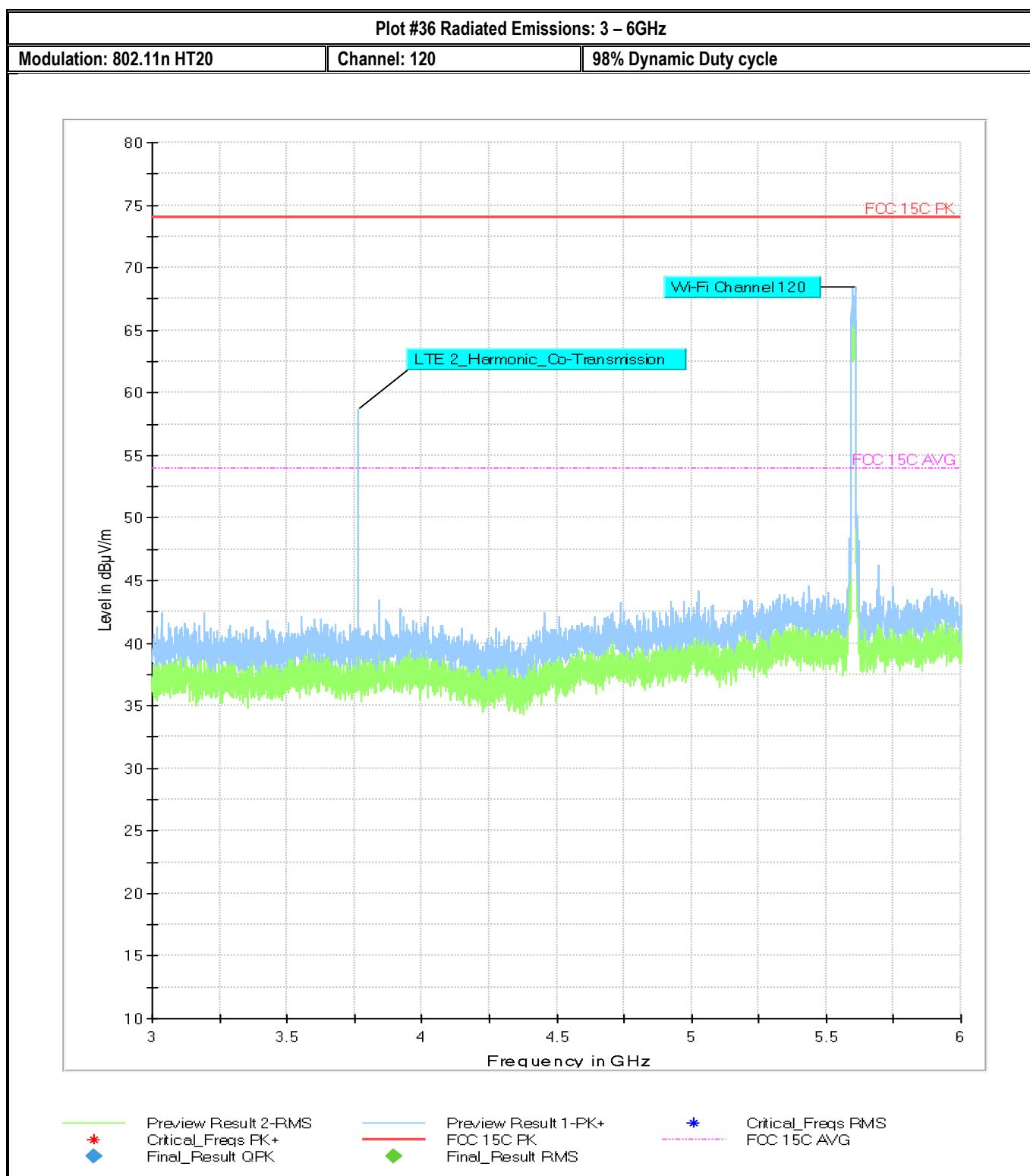


Preview Result 1-PK+
 FOC 15C PK



Critical_Freqs RMS
 Final_Result QPK





These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #37 Radiated Emissions: 6 – 18GHz

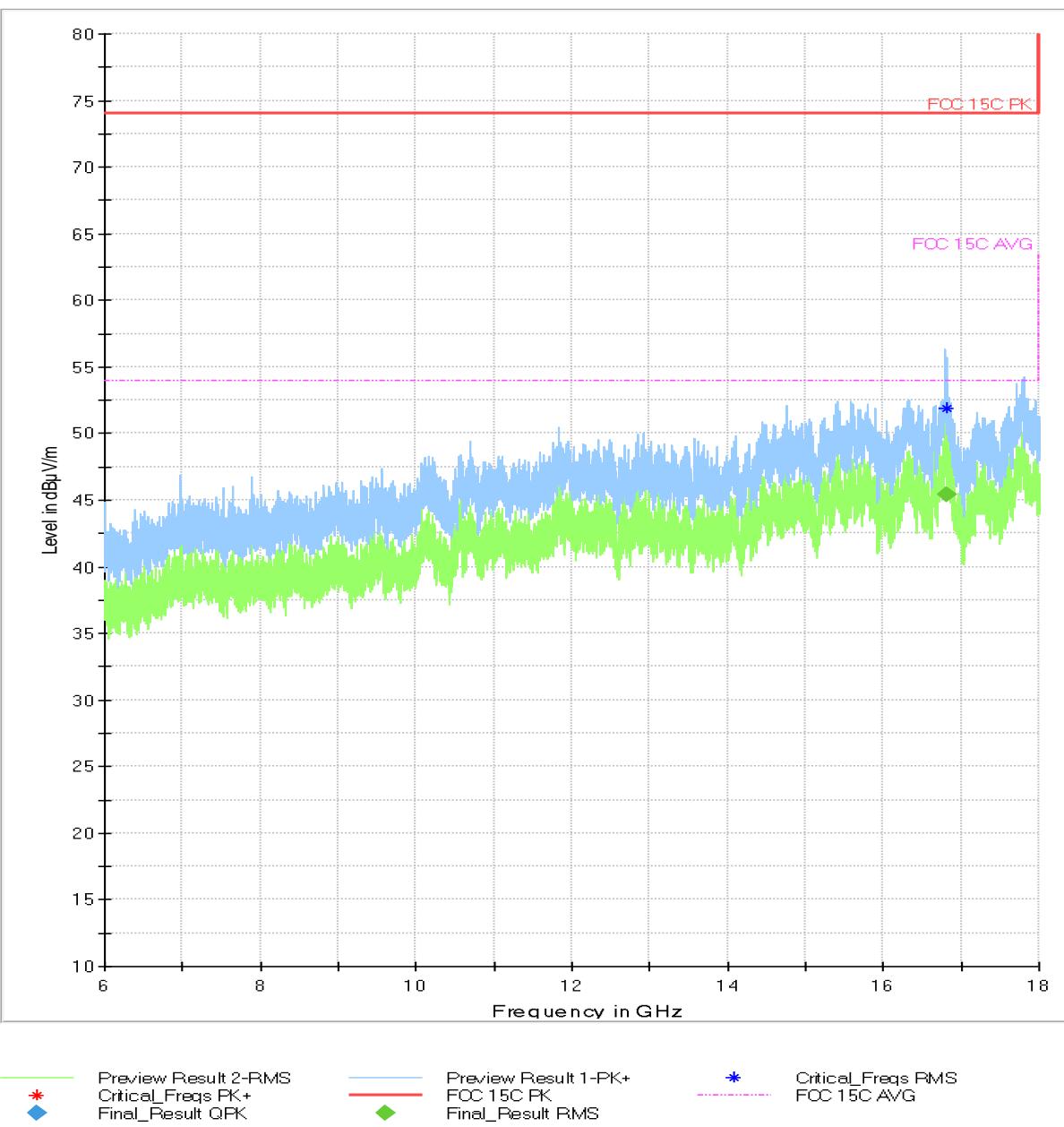
Modulation: 802.11n HT20

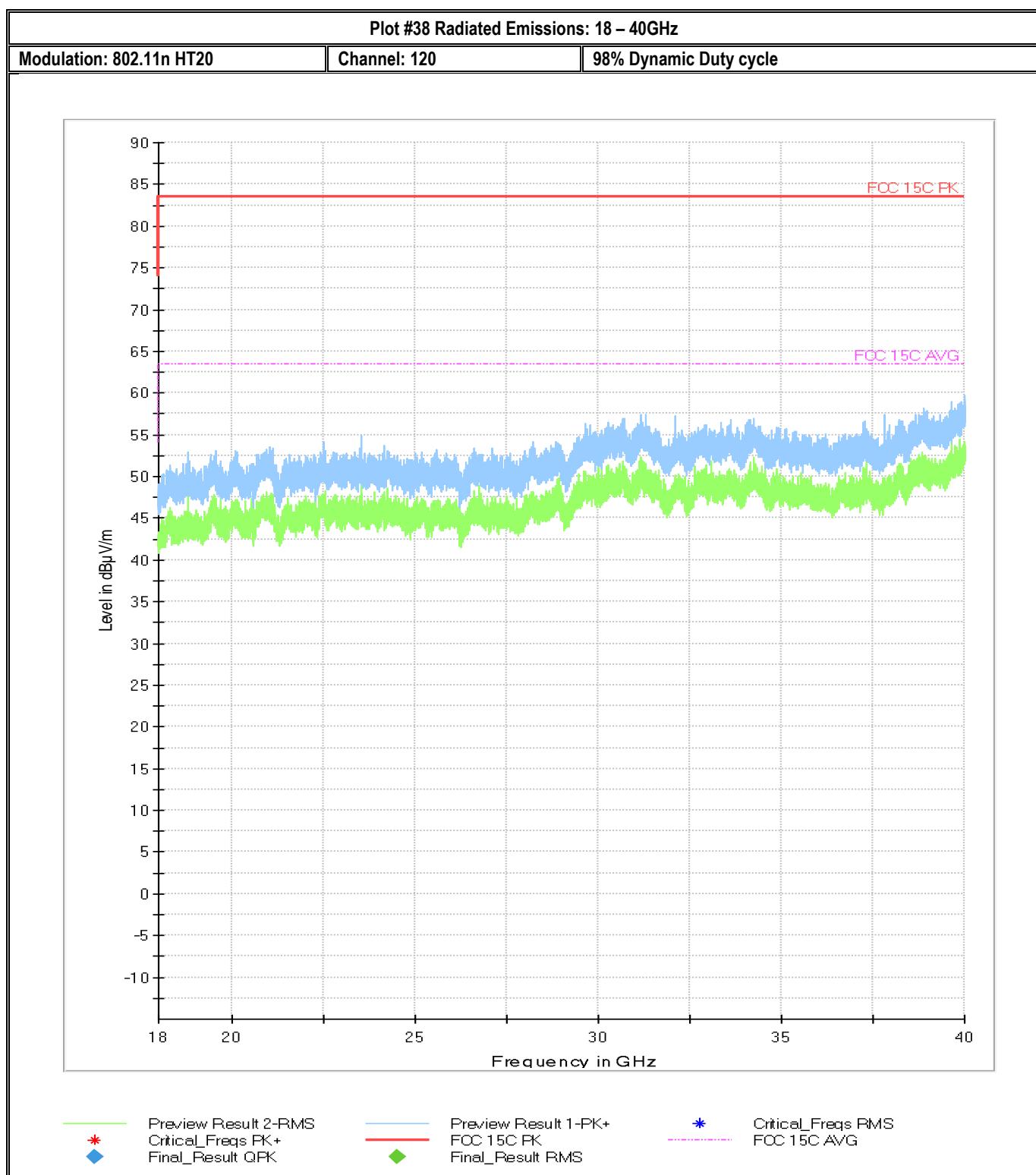
Channel: 120

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
16803.526667	45.36	53.98	8.62	100.0	1000.000	136.0	H	209.0	-11.4





Plot #39 Radiated Emissions: 30MHz – 1GHz

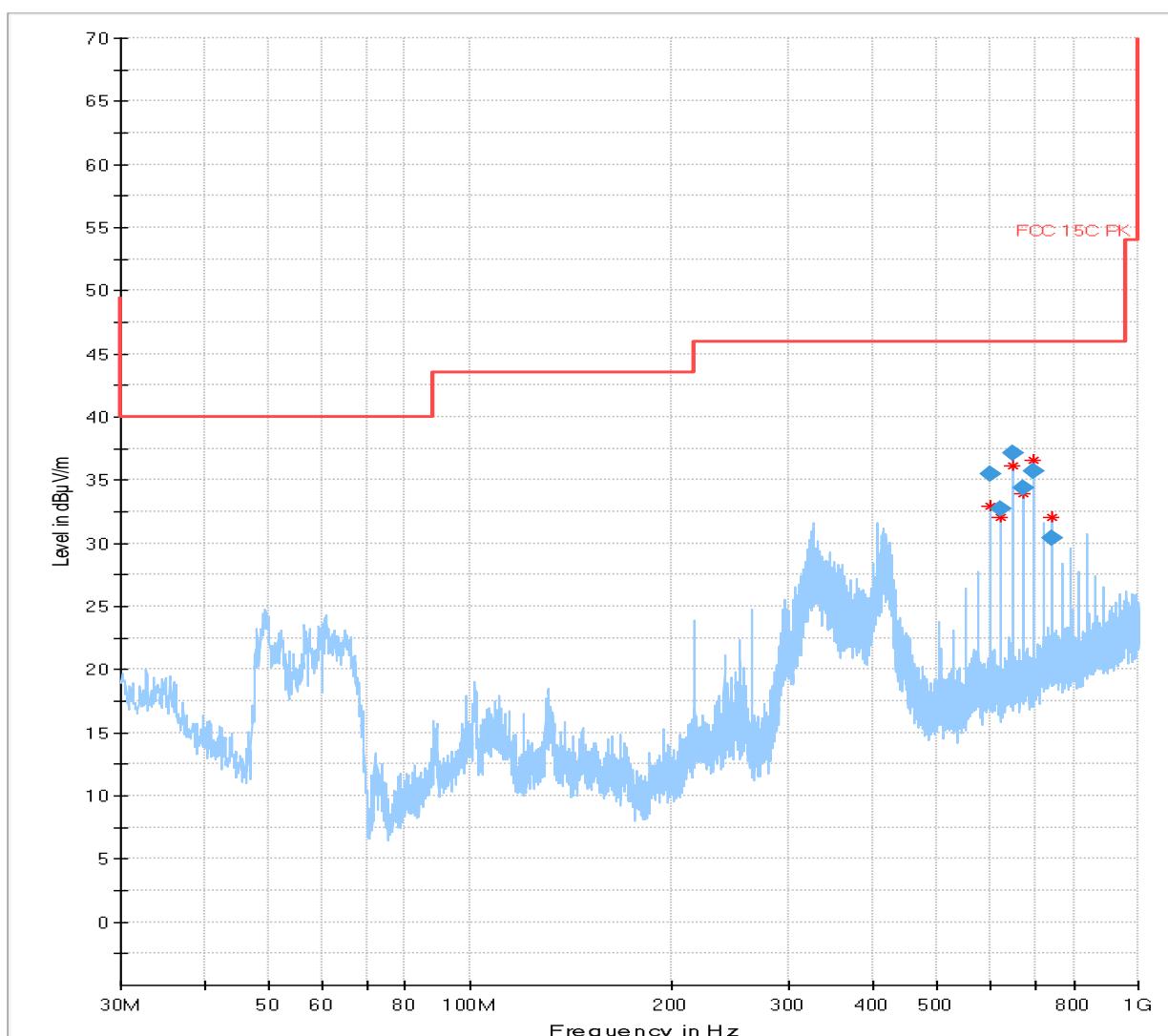
Modulation: 802.11n HT20

Channel: 140

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.053870	35.53	46.00	10.47	100.0	120.000	155.0	H	7.0	-10.1
623.981340	32.76	46.00	13.24	100.0	120.000	145.0	H	11.0	-10.4
648.033760	37.15	46.00	8.85	100.0	120.000	143.0	H	16.0	-9.7
672.006980	34.42	46.00	11.58	100.0	120.000	137.0	H	25.0	-8.9
696.023310	35.73	46.00	10.27	100.0	120.000	129.0	H	27.0	-8.9
744.083970	30.36	46.00	15.64	100.0	120.000	118.0	H	47.0	-7.8



Preview Result 2-RMS
 Critical_Freqs PK+
 Final_Result RMS



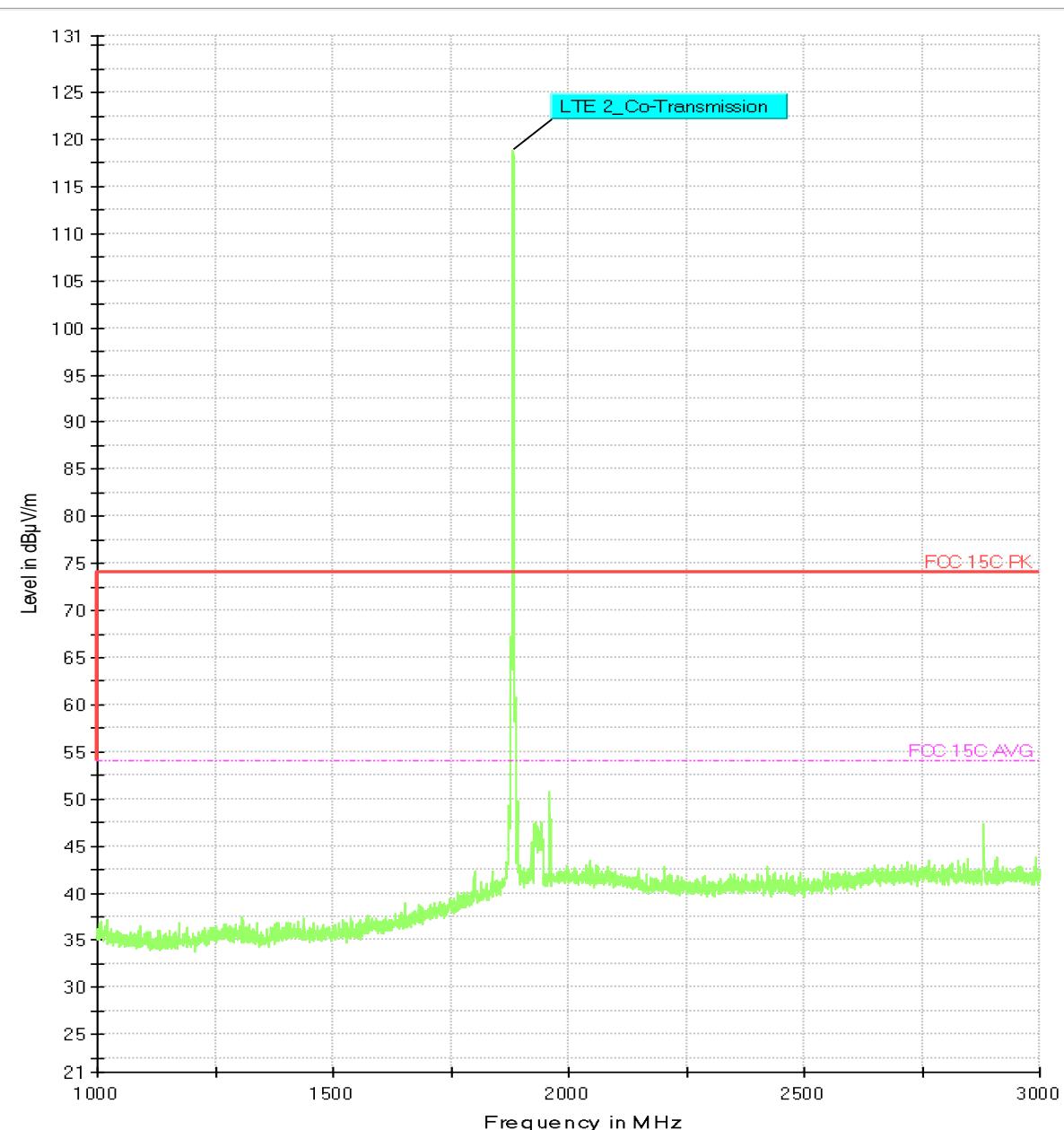
Preview Result 1-PK+
 FCC 15C PK



Critical_Freqs RMS
 Final_Result QPK

Plot #40 Radiated Emissions: 1 – 3GHz

Modulation: 802.11n HT20 | Channel: 140 | 98% Dynamic Duty cycle



* Preview Result 2-RMS
Critical_Freqs PK+
Final_Result QPK

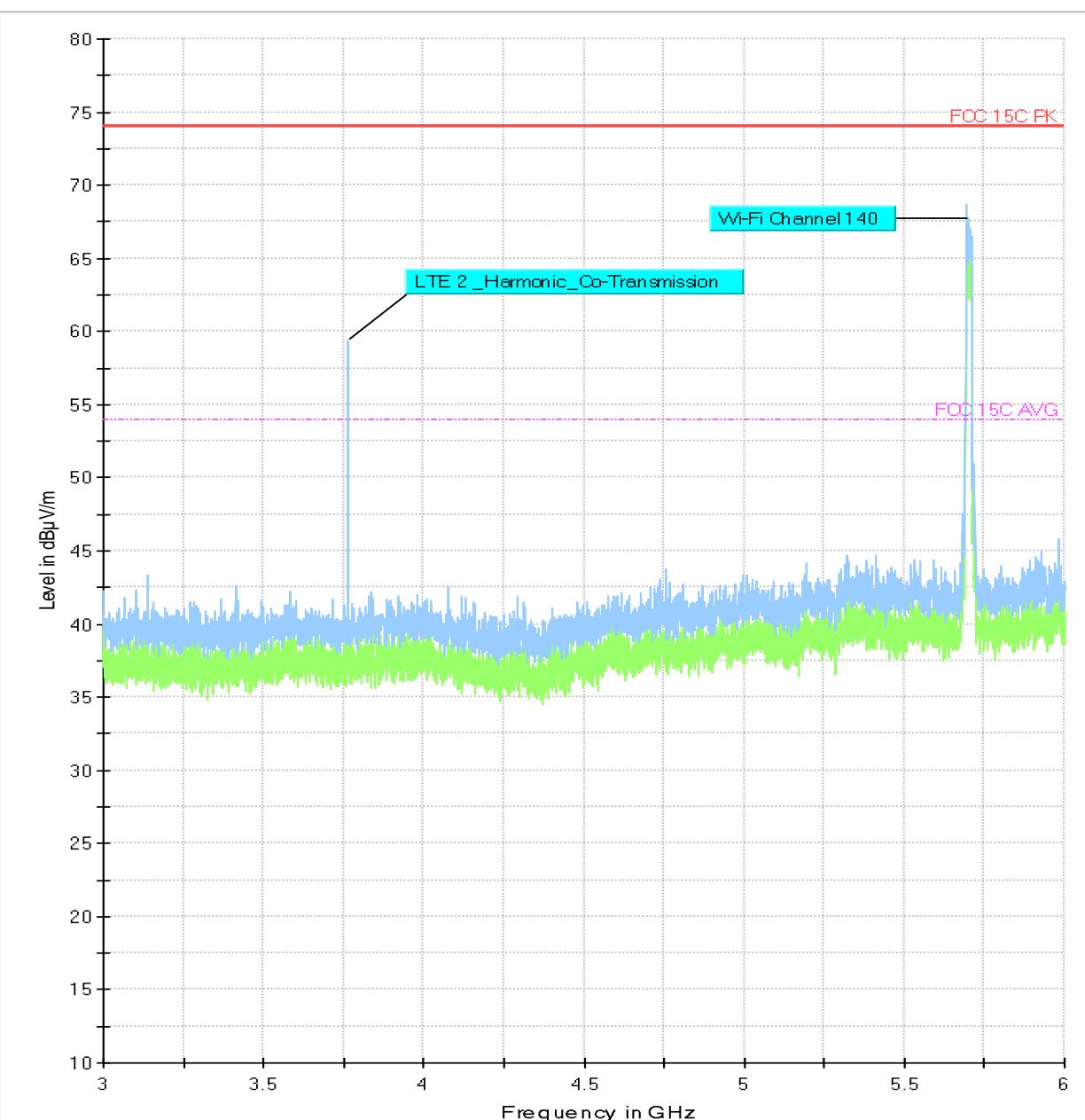
Preview Result 1-PK+
FOC 15C PK

Final_Result RMS

* Critical_Freqs RMS
FOC 15C AVG

Plot #41 Radiated Emissions: 3 – 6GHz

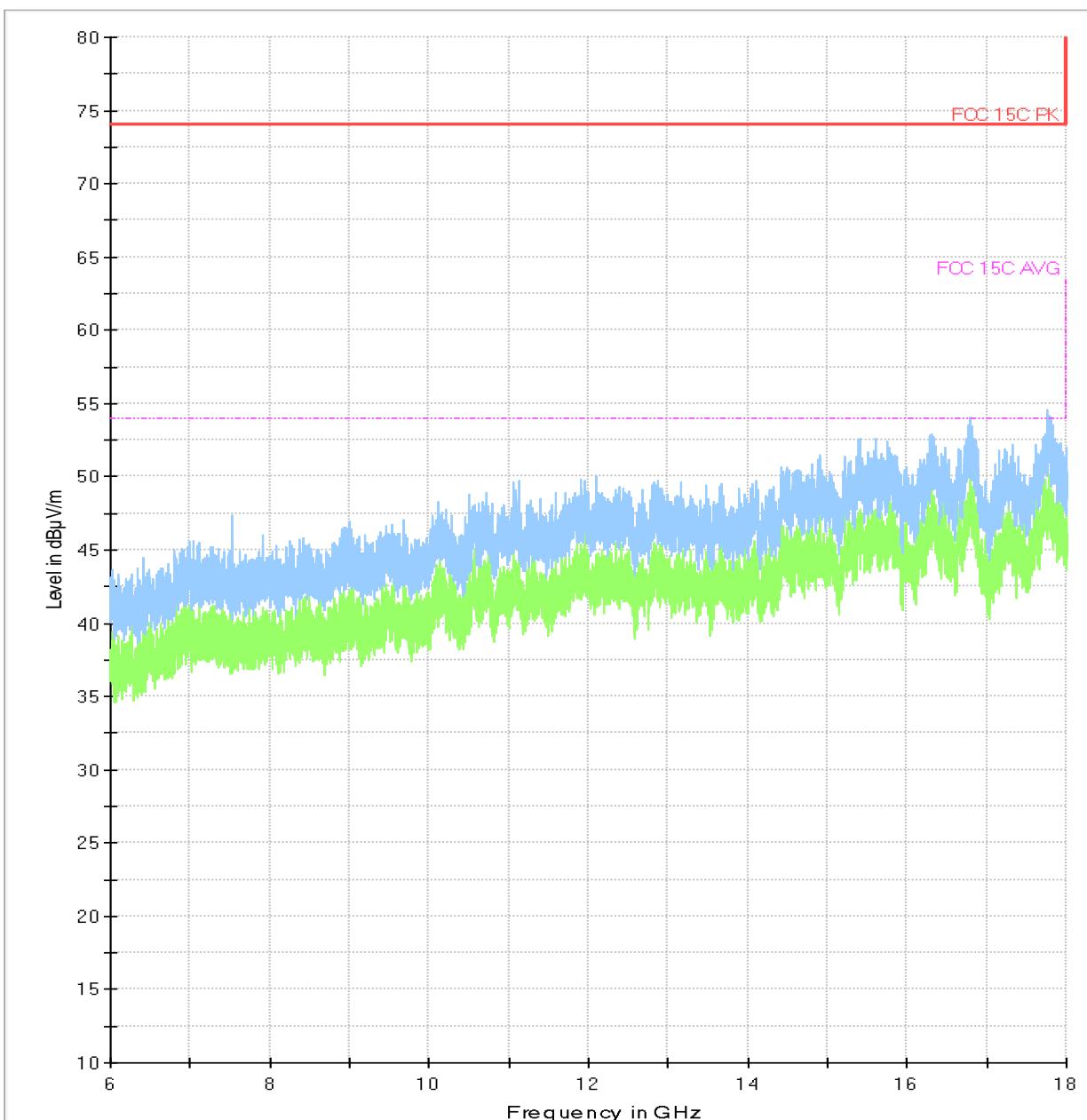
Modulation: 802.11n HT20 | Channel: 140 | 98% Dynamic Duty cycle



These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #42 Radiated Emissions: 6 – 18GHz

Modulation: 802.11n HT20 | Channel: 140 | 98% Dynamic Duty cycle



* Preview Result 2-RMS
Critical_Freqs PK+
Final_Result QPK

◆ Preview Result 1-PK+
FOC 15C PK
Final_Result RMS

* Critical_Freqs RMS
FOC 15C AVG

Plot #43 Radiated Emissions: 30MHz – 1GHz

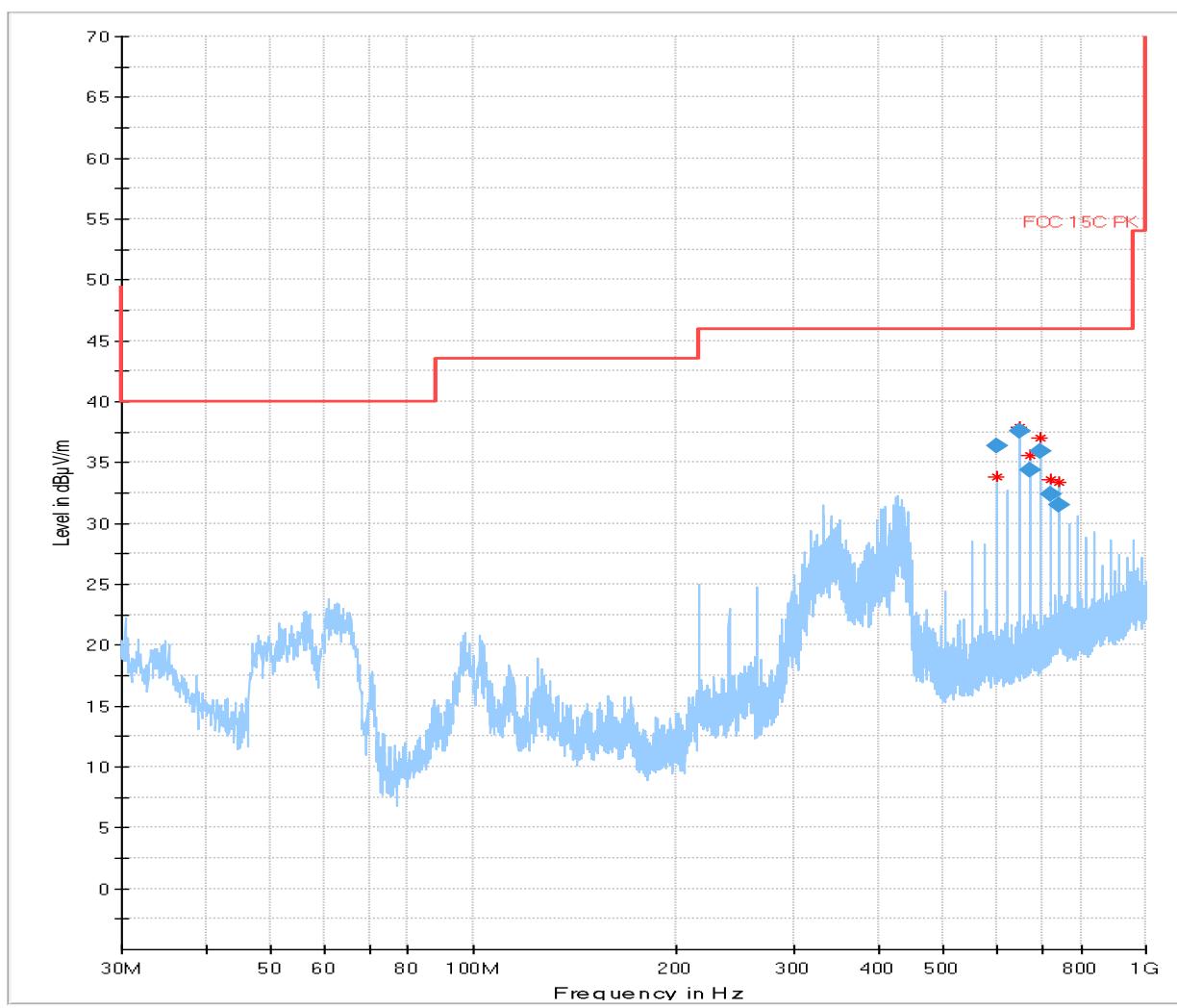
Modulation: 802.11n HT20

Channel: 149

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.041795	36.32	46.00	9.68	100.0	120.000	156.0	H	-5.0	-10.1
648.027050	37.56	46.00	8.44	100.0	120.000	145.0	H	-2.0	-9.7
671.999955	34.40	46.00	11.60	100.0	120.000	139.0	H	12.0	-8.9
696.041375	35.91	46.00	10.09	100.0	120.000	129.0	H	23.0	-8.9
720.023250	32.35	46.00	13.65	100.0	120.000	113.0	H	28.0	-8.6
744.042910	31.51	46.00	14.49	100.0	120.000	100.0	H	36.0	-7.8



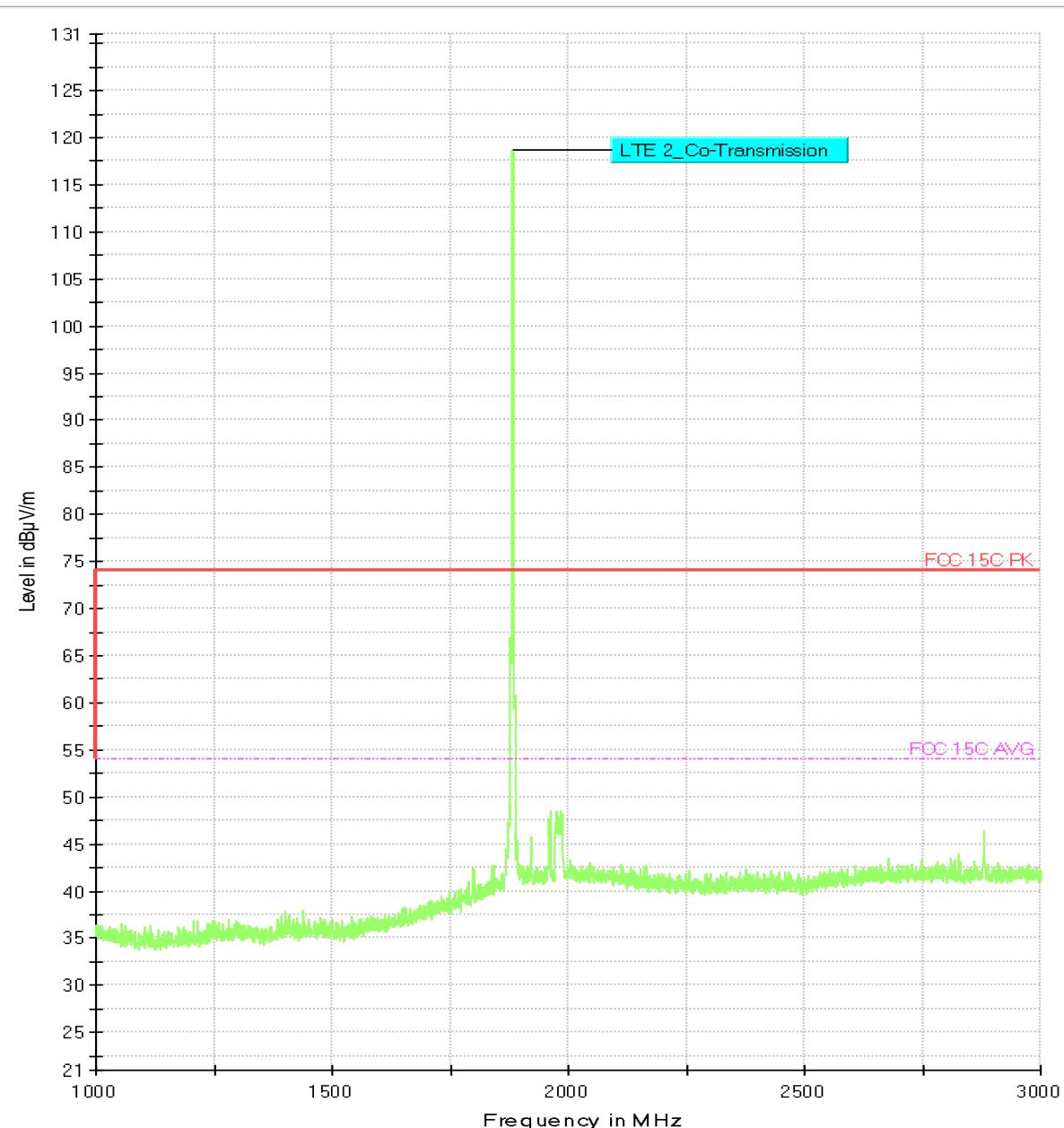
* Critical_Freqs PK+
 ♦ Final_Result RMS

Preview Result 2-RMS
 Preview Result 1-PK+
 FCC 15C PK

* Critical_Freqs RMS
 Final_Result QPK

Plot #44 Radiated Emissions: 1 – 3GHz

Modulation: 802.11n HT20 | Channel: 149 | 98% Dynamic Duty cycle



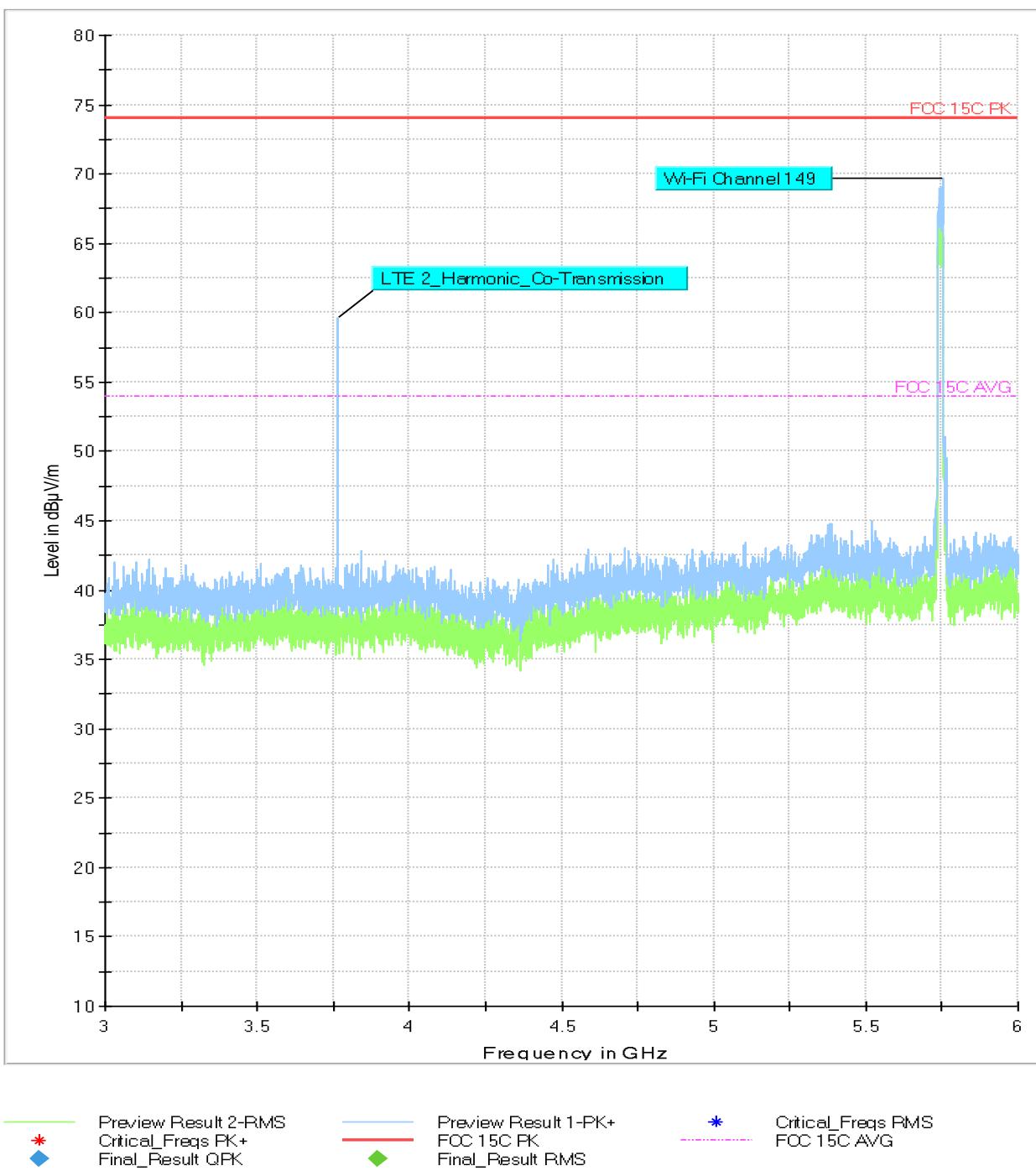
* Preview Result 2-RMS
Critical_Freqs PK+
Final_Result QPK

◆ Preview Result 1-PK+
FOC 15C PK
Final_Result RMS

* Critical_Freqs RMS
FOC 15C AVG

Plot #45 Radiated Emissions: 3 – 6GHz

Modulation: 802.11n HT20 | Channel: 149 | 98% Dynamic Duty cycle



These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #46 Radiated Emissions: 6 – 18GHz

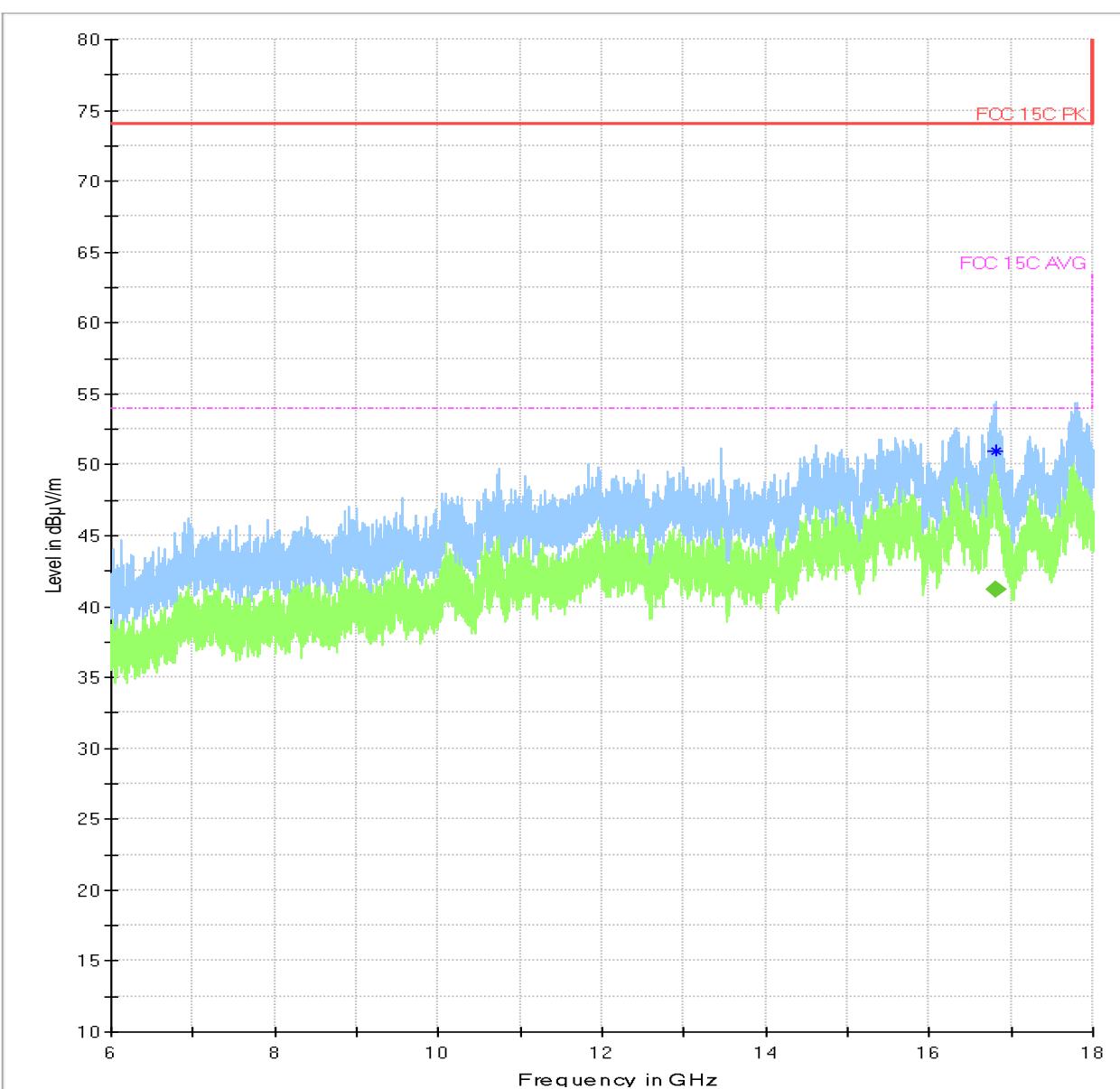
Modulation: 802.11n HT20

Channel: 149

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
16809.395000	41.21	53.98	12.77	100.0	1000.000	100.0	V	295.0	-11.5



* Preview Result 2-RMS
Critical_Freqs PK+
Final_Result QPK

Preview Result 1-PK+
FCC 15C PK
Final_Result RMS

* Critical_Freqs RMS
FCC 15C AVG

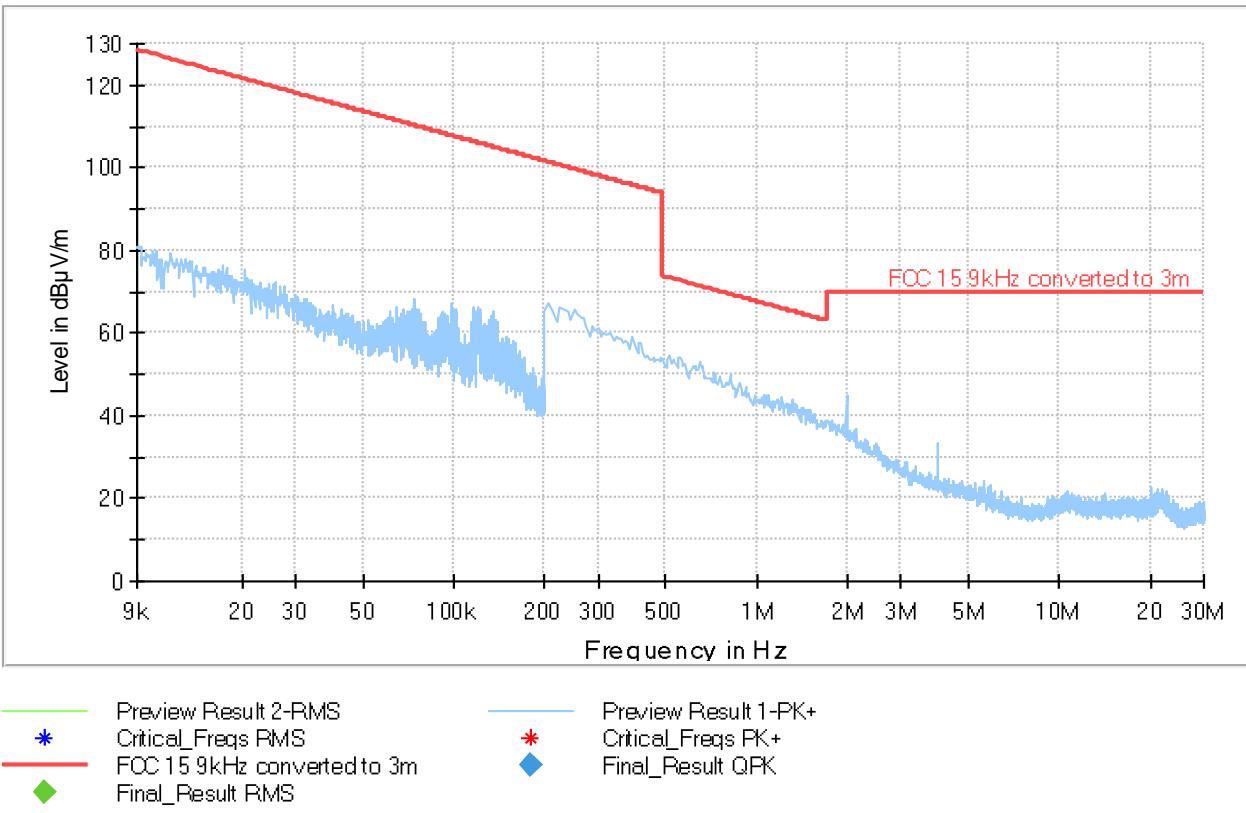
Plot #47 Radiated Emissions: 9KHz – 30MHz

Modulation: 802.11n HT20

Channel: 157

98% Dynamic Duty cycle

Full Spectrum



Plot #48 Radiated Emissions: 30MHz – 1GHz

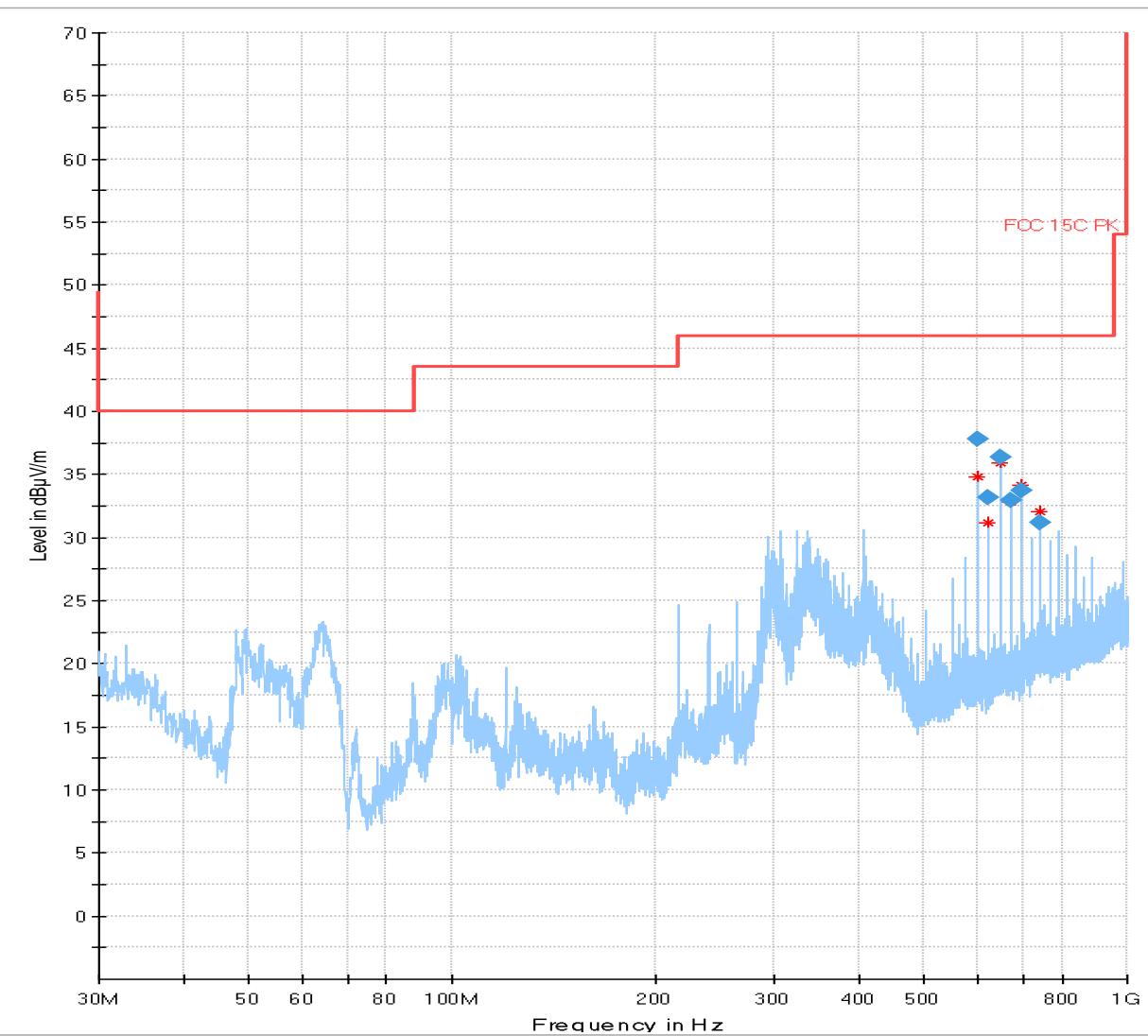
Modulation: 802.11n HT20

Channel: 157

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
599.986645	37.80	46.00	8.20	100.0	120.000	158.0	H	-4.0	-10.1
624.024600	33.13	46.00	12.87	100.0	120.000	161.0	H	12.0	-10.4
648.060660	36.39	46.00	9.61	100.0	120.000	150.0	H	2.0	-9.7
671.993005	32.93	46.00	13.07	100.0	120.000	134.0	H	40.0	-8.9
696.017420	33.69	46.00	12.31	100.0	120.000	129.0	H	49.0	-8.9
744.066630	31.23	46.00	14.77	100.0	120.000	118.0	H	352.0	-7.8



* Preview Result 2-RMS
 Critical_Freqs PK+
 Final_Result RMS

Preview Result 1-PK+
 FCC 15C PK

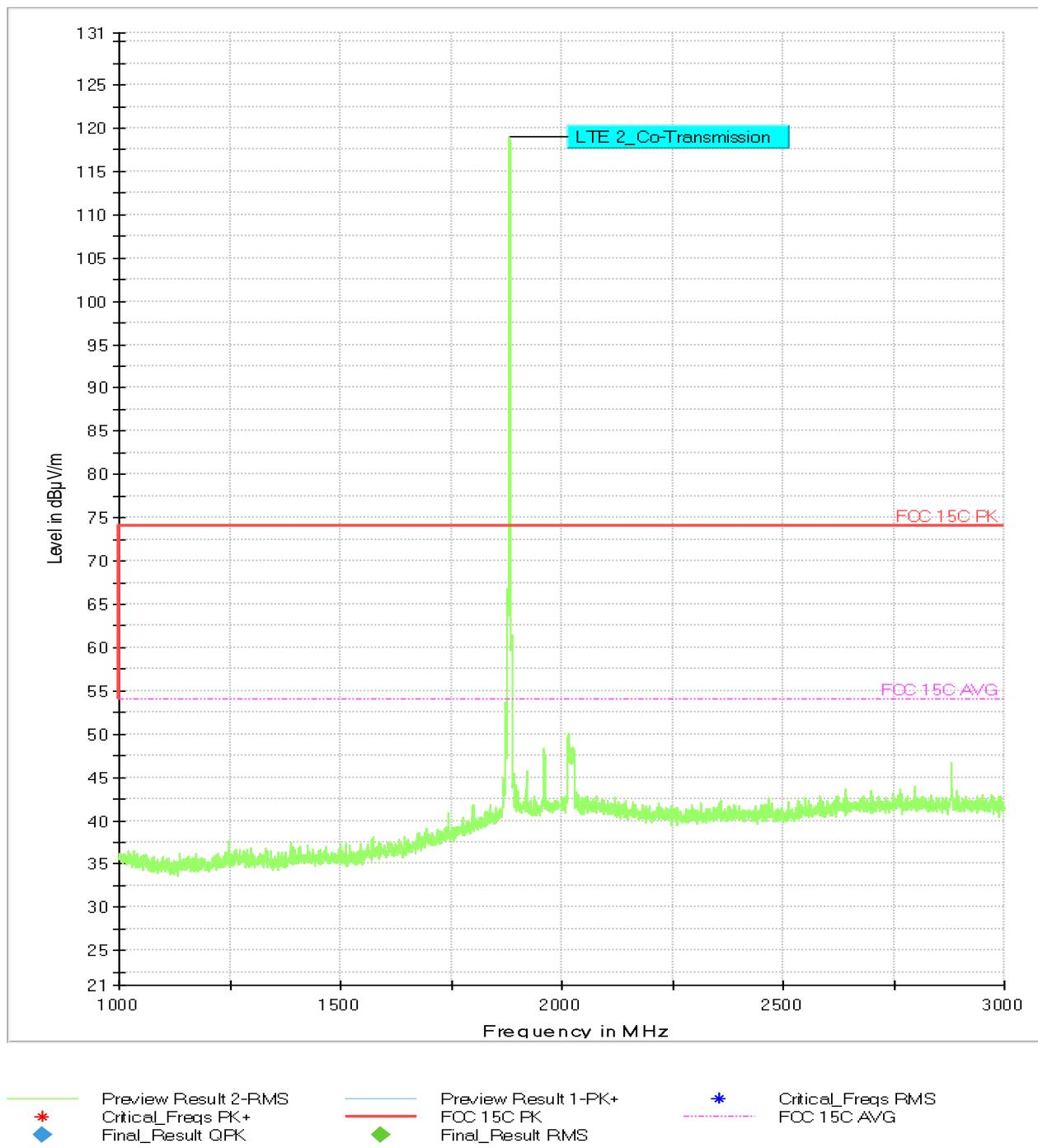
* Critical_Freqs RMS
 Final_Result QPK

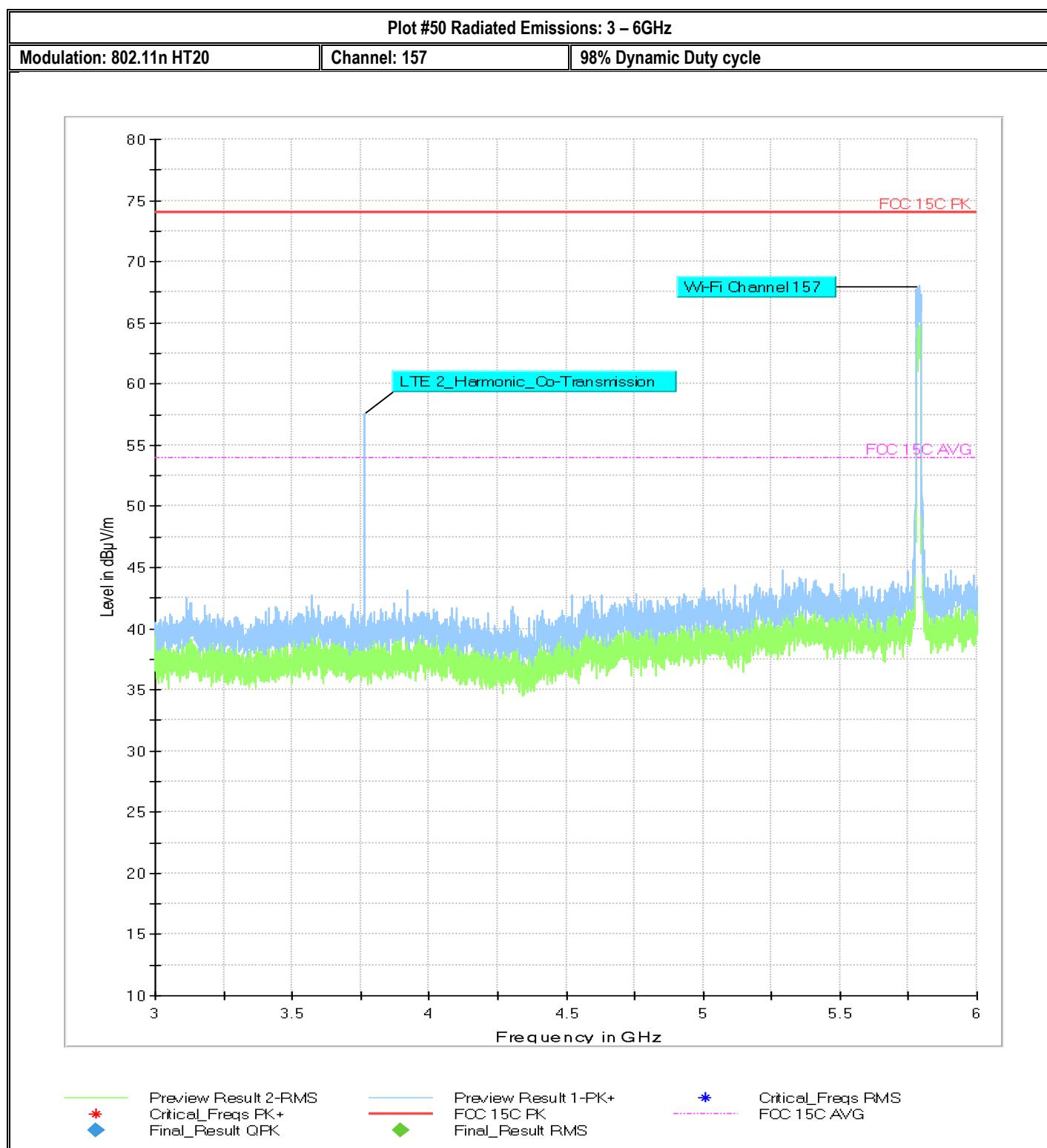
Plot #49 Radiated Emissions: 1 – 3GHz

Modulation: 802.11n HT20

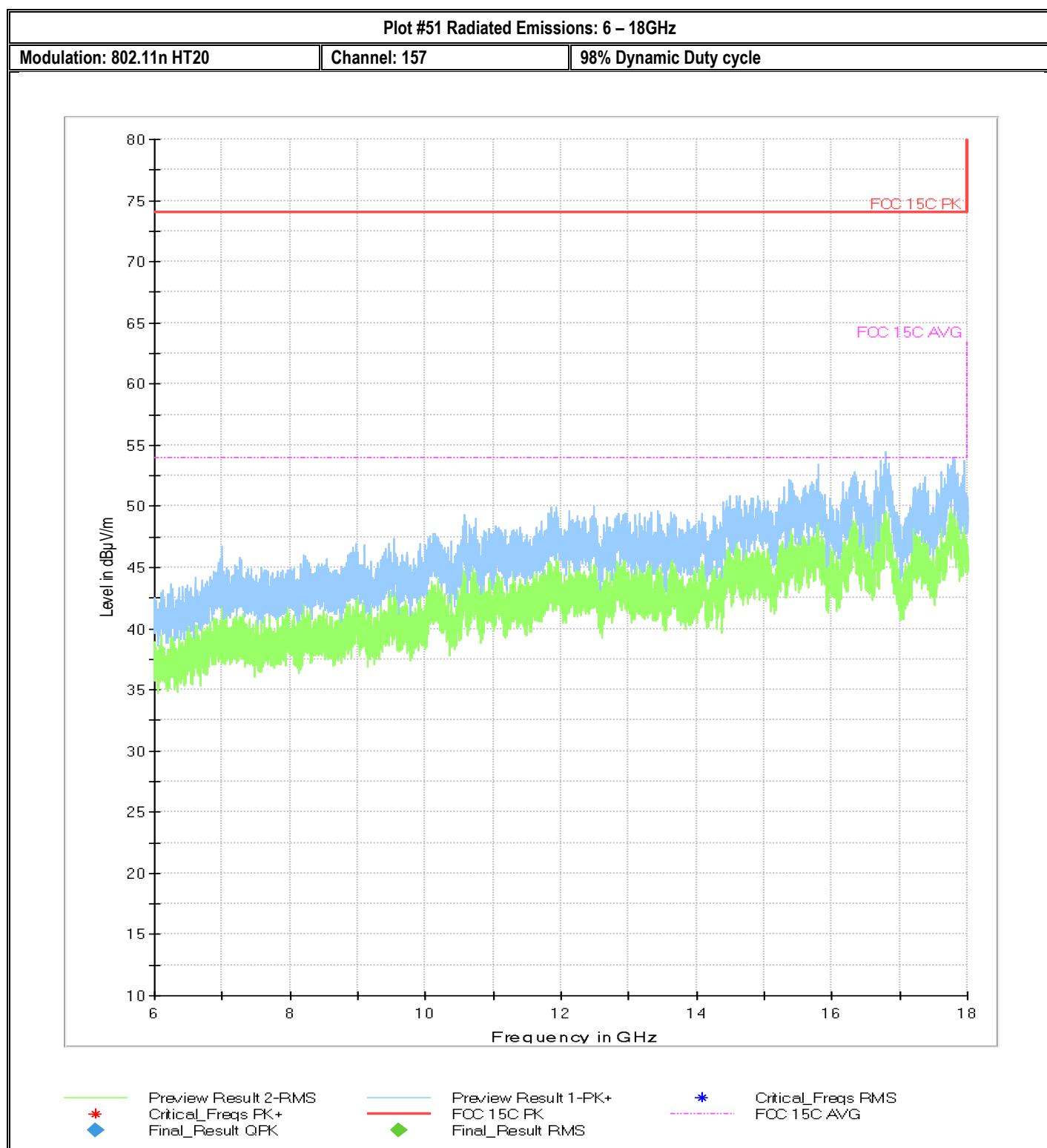
Channel: 157

98% Dynamic Duty cycle





These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

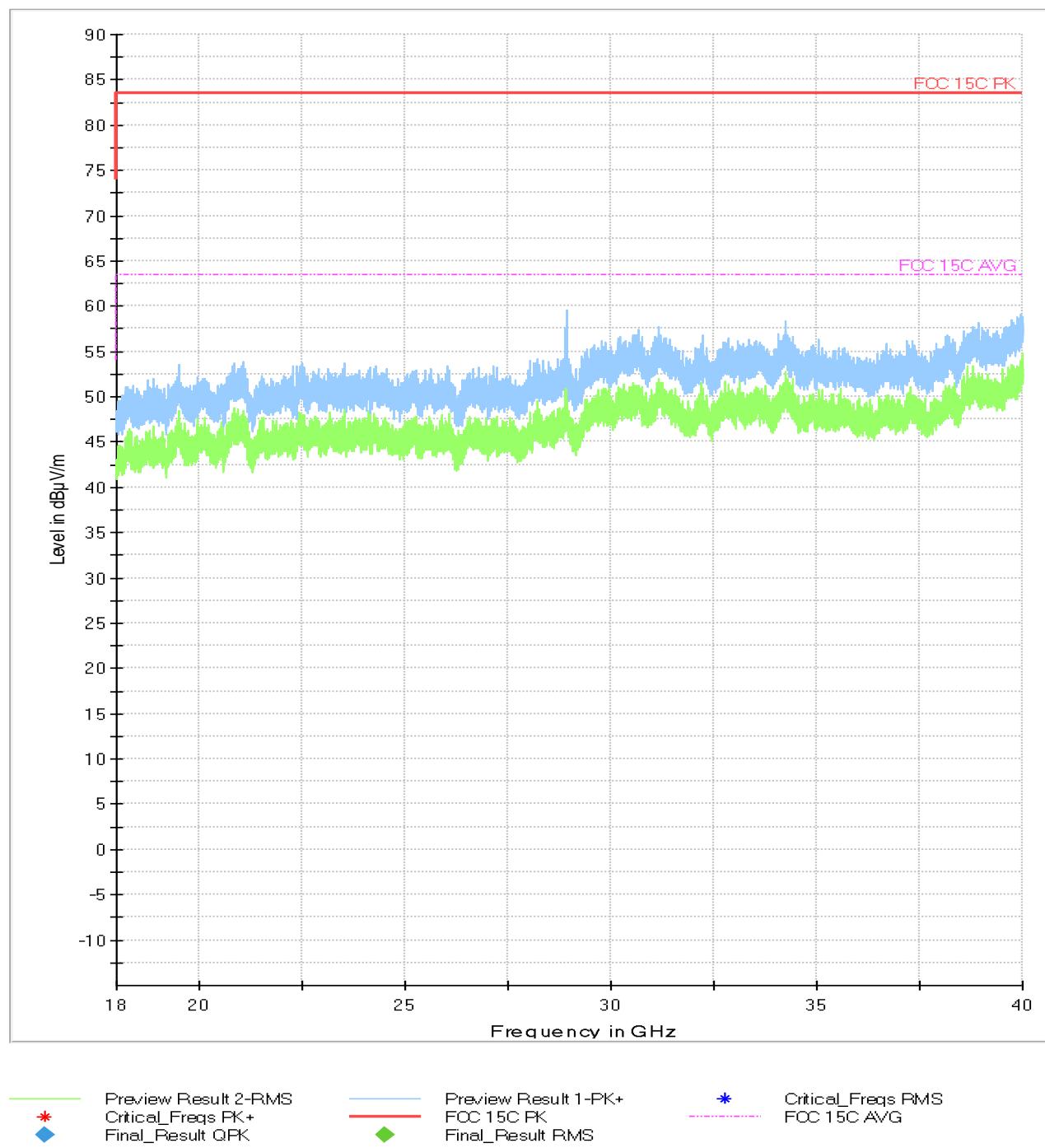


Plot #52 Radiated Emissions: 18 – 40GHz

Modulation: 802.11n HT20

Channel: 157

98% Dynamic Duty cycle



Plot #53 Radiated Emissions: 30MHz – 1GHz

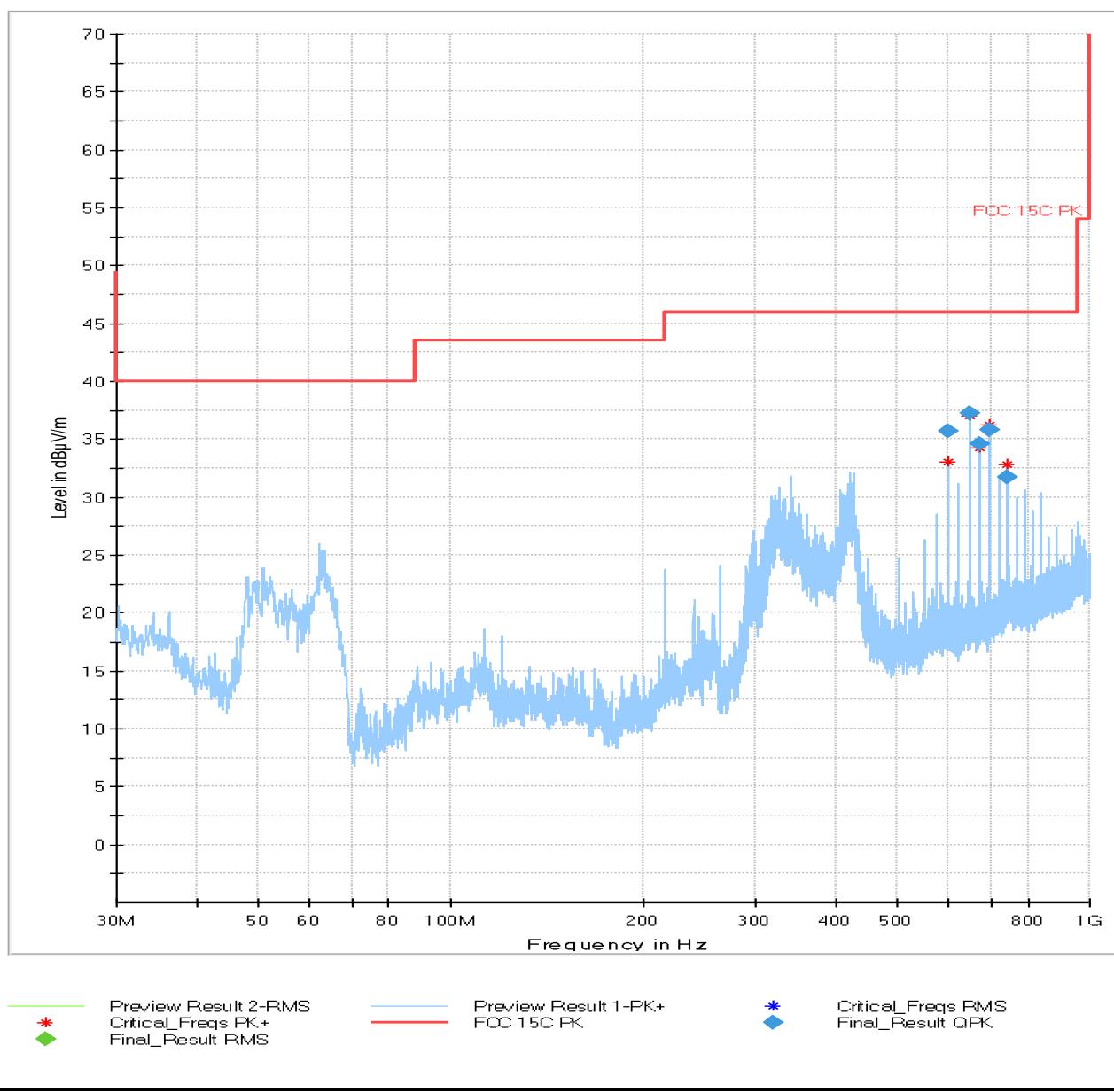
Modulation: 802.11n HT20

Channel: 161

98% Dynamic Duty cycle

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
600.021365	35.73	46.00	10.27	100.0	120.000	156.0	H	0.0	-10.1
648.040200	37.21	46.00	8.79	100.0	120.000	145.0	H	13.0	-9.7
671.996345	34.63	46.00	11.37	100.0	120.000	134.0	H	21.0	-8.9
696.030890	35.75	46.00	10.25	100.0	120.000	132.0	H	30.0	-8.9
744.027860	31.73	46.00	14.27	100.0	120.000	118.0	H	45.0	-7.8

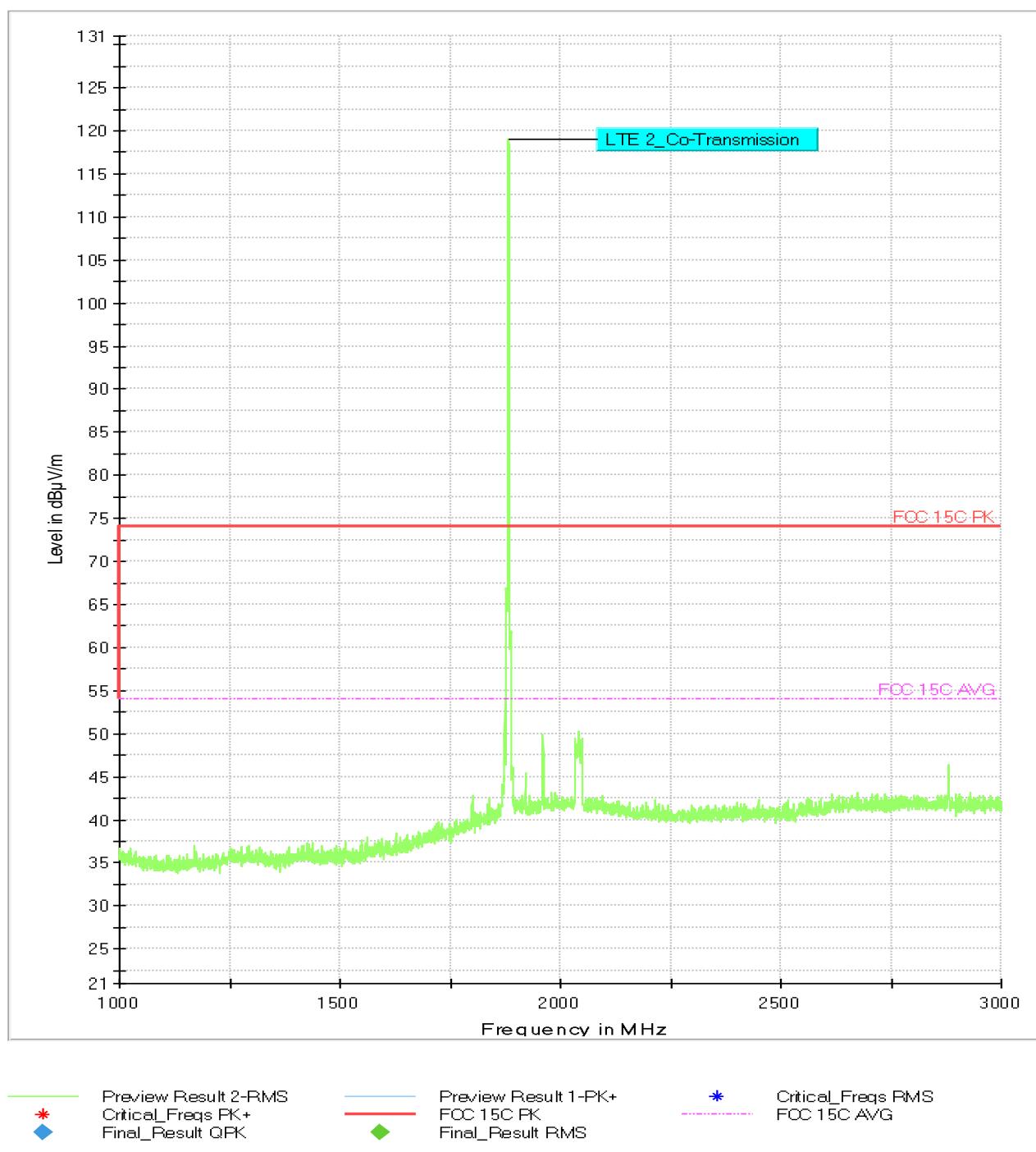


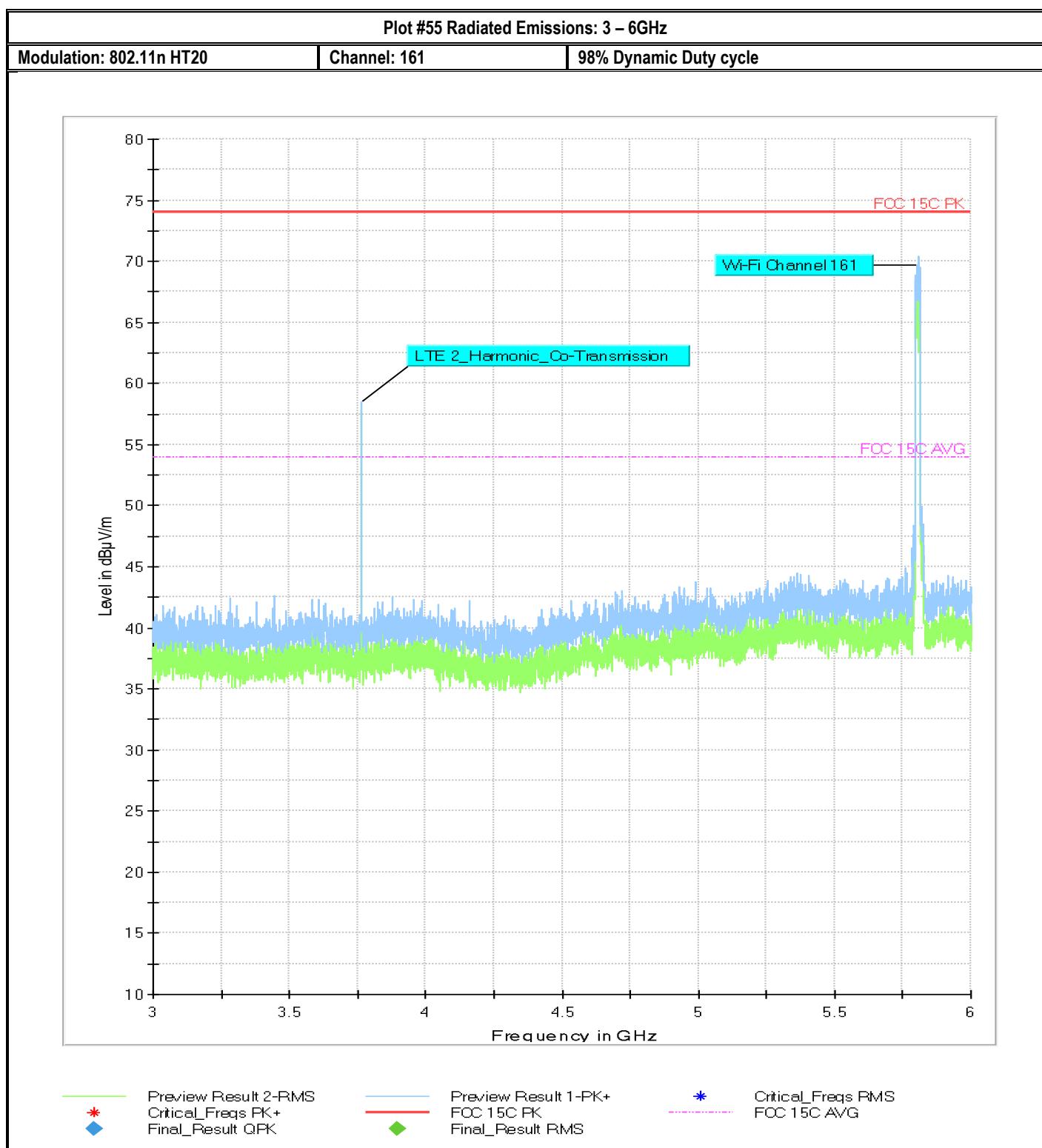
Plot #54 Radiated Emissions: 1 – 3GHz

Modulation: 802.11n HT20

Channel: 161

98% Dynamic Duty cycle





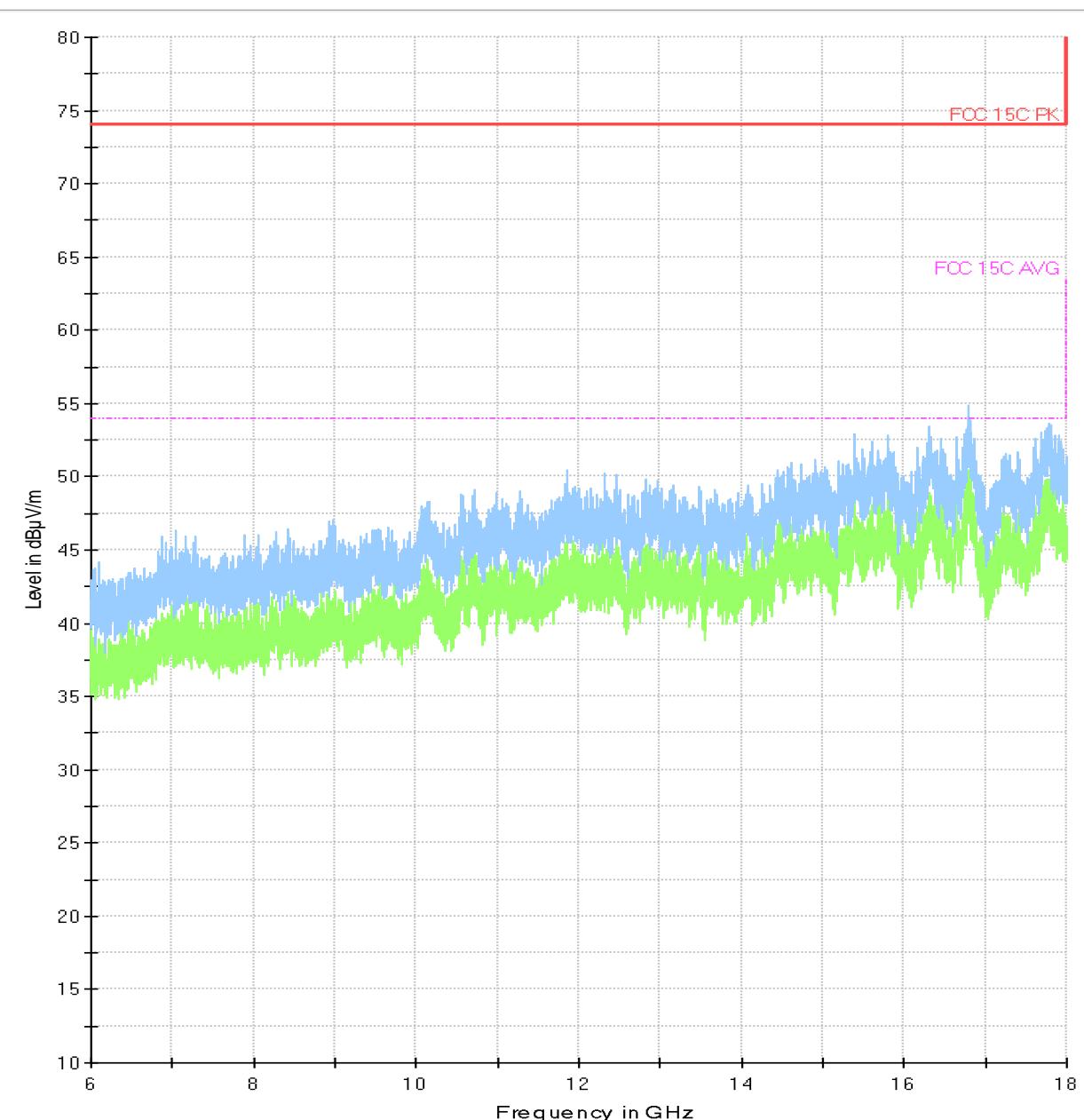
These emissions stem from the cellular radio. Based on the frequencies they are not intermodulation products caused by simultaneous transmission.

Plot #56 Radiated Emissions: 6 – 18GHz

Modulation: 802.11n HT20

Channel: 161

98% Dynamic Duty cycle



* Preview Result 2-RMS
Critical_Freqs PK+
Final_Result QPK * Preview Result 1-PK+
 FCC 15C PK
 Final_Result RMS * Critical_Freqs RMS
 FCC 15C AVG

8 Test setup photos

Setup photos are included in supporting file name: "EMC_NETRA_002_17001_FCC_ISED_Setup_Photos.pdf"

9 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
PASSIVE LOOP ANTENNA	ETS LINDGREN	6512	00164698	3 YEARS	08/08/2017
BILOG ANTENNA	TESEO	CBL 6141B	41106	3 YEARS	11/01/2017
HORN ANTENNA	ETS LINDGREN	3117	00167061	3 YEARS	08/08/2017
HORN ANTENNA	ETS LINDGREN	3116C	00166821	3 YEARS	09/24/2017
SIGNAL ANALYZER	R&S	FSU26	200065	2 YEARS	03/07/2017
UNIVERSAL RADIO COMMUNICATION	R&S	CMU200	121673	2 YEARS	06/07/2017
WIDEBAND RADIO COMMUNICATION	R&S	CMW500	125231	2 YEARS	10/07/2017
SIGNAL ANALYZER	R&S	FSV 40	101022	2 YEARS	07/05/2017
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	35519-055	91119547	1 YEARS	06/05/2017
THRMOMETER HUMIDIY	DICKSON	TM320	16253639	1 YEARS	11/02/2017

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
02/06/2018	EMC_NETRA_002_17001_15.407_ISED_WLAN	Initial Version	Issa Ghanma