



FCC / ISED Test Report

For:
Telular Corporation

Model Name:
ST100

Product Description:
Telematic gateway for communicating measurement data

FCC ID: MTFST1001
ISED: 2175D-ST1001

Applied Rules and Standards:
47 CFR Part 15.247 (DTS)
RSS-247 Issue 3 (DTS) & RSS-Gen Issue 5

REPORT: EMC_TELUL_118_23001_FCC_15_247_Rev1

DATE: 2025-04-28



A2LA Accredited

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3462B

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company Name	Product Description	Model No.
Telular Corporation	Telematic gateway for communicating measurement data	ST100

Responsible for Testing Laboratory:

Alvin Ilarina

(Senior Manager Regulatory

2025-04-28 Compliance

Services)

Date	Section	Name

Responsible for the Report:

Art Thammanavarat

(Senior EMC Engineer)

2025-04-28 Compliance

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
EMC Lab Manager:	Alvin Ilarina
Responsible Project Leader:	Ruby, Hall

2.2 Identification of the Client

Applicant's Name:	Telular Corporation
Street Address:	3225 Cumberland Blvd., Suite 300
City/Zip Code	Atlanta, GA 30339
Country	USA

2.3 Identification of the Manufacturer

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

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Product Description:	Telematic gateway for communicating measurement data
Marketing Name:	SkyTank
Model No:	ST100
HW Version:	X4
SW Version:	v2.60
FCC-ID:	MTFST1001
ISED:	2175D-ST1001
Radio Information as declared:	<p>Cellular</p> <ul style="list-style-type: none"> Module: Telit ME910G1-W1 LTE Cat-M Bands: 2, 4, 12, 13, 66 <p>Bluetooth 5.1 w/ BLE (1Mbps)</p> <p>ISM900</p> <p>LTE (KAVX P822601): 698-960MHz (2.6 dBi), 1710-2200MHz (4.4 dBi), 2500-2700MHz (3.4 dBi), 2300-2400MHz (1.8 dBi), 3300-3800MHz (2.8 dBi)</p> <p>BLE: (integrated on module)</p> <p>ISM900 (WLAN) (KAVX 1001011): 868-928MHz (1.0 dBi)</p>
Antenna Information as declared:	
Power Supply/ Rated Operating Voltage Range	Four 1.5V Lithium Cells (Energizer L91) in Series -- 4V min, 6V nom, 7.2V max.
Operating Temperature Range	-30 to 60 deg C
Sample Revision	<input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production
EUT Diameter	<input checked="" type="checkbox"/> < 60 cm <input type="checkbox"/> Other _____
Note 1: The EUT specifications listed in the table above were provided by the client.	
Note 2: The radios within the EUT do not operate simultaneously.	

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	0045	X4	v2.60	Radiated Emissions
2	0013	X4	v2.60	Conducted RF

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Pre-Production	ST131	Telular Corporation	001

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE #1	The internal antenna of the EUT was connected.
2	EUT#2	The measurement equipment was connected to the 50-ohm RF port of the EUT.

3.5 Mode of Operation details

Operating Mode	Description of Operating modes	Additional Information
Op. 1	ISM TX	The ISM radio in the EUT, operating in the 900 MHz band, was configured for fixed-channel transmission at the maximum achievable duty cycle using software inaccessible to the end user.

Note: The radios within the EUT do not operate simultaneously.

3.6 Justification for Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle. 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 assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Radio Standard Specification RSS-247 of ISED Canada.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1) RSS-247 5.2(a)	Emission Bandwidth	Nominal	Op. 1	■	□	□	Complies
§15.247(e) RSS-247 5.2(b)	Power Spectral Density	Nominal	Op. 1	■	□	□	Complies
§15.247(b)(1) RSS-247 5.4(d)	Maximum Conducted Output Power and EIRP	Nominal	Op. 1	■	□	□	Complies
§15.247(d) RSS-247 5.5	Band edge compliance Unrestricted Band Edges	Nominal	Op. 1	■	□	□	Complies
§15.247; 15.209; 15.205 RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	Op. 1	■	□	□	Complies
§15.247(d); §15.209 RSS-Gen 6.13	TX Radiated Spurious Emissions	Nominal	Op. 1	■	□	□	Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	-	□	■	□	Note 1 Note 2

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

Note 2: The EUT does not draw power from AC public mains; therefore, this test case is not applicable.

6 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=2.

Radiated measurement

Measurement System		EMC Lab 1	EMC Lab 2
Conducted emissions (mains port)	150 kHz – 30 MHz	2.47 dB	N/A
	9 kHz – 30 MHz	2.68 dB	2.53 dB
	30 – 100 MHz	4.39 dB	3.85 dB
	100 MHz – 1 GHz	5.65 dB	5.24 dB
	1 – 6 GHz	5.0 dB	4.88 dB
	6 – 18 GHz	4.76 dB	4.58 dB
	18 – 40 GHz	4.65 dB	4.61 dB

RF conducted measurement ± 0.5 dB

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: <http://physics.nist.gov/cuu/Uncertainty/typeb.html>. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3dB to the limit.

6.1 Environmental Conditions During Testing:

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

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

6.2 Dates of Testing:

12/10/2024 – 12/11/2024

6.3 Decision Rule:

Cetecom Inc follows ILAC G8:09/2019 chapter 4.2.1 (Simple Acceptance Rule).

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account – neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

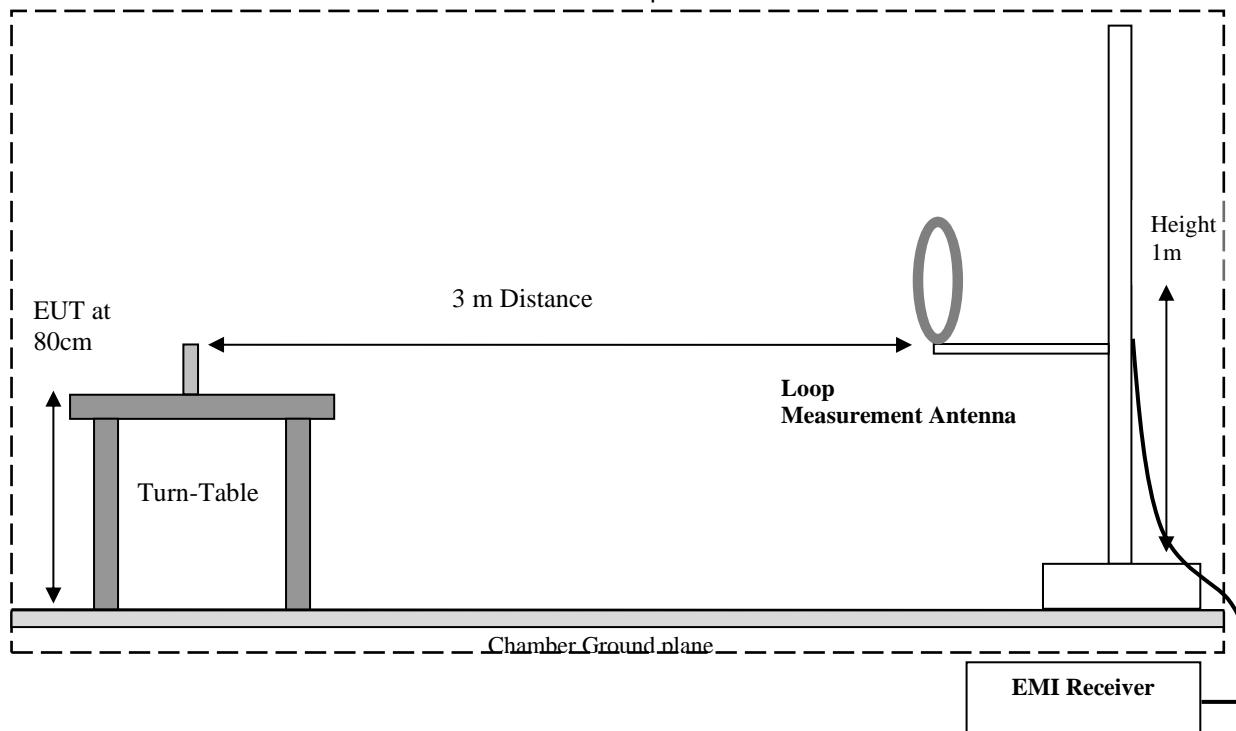
7 Measurement Procedures

7.1 Radiated Measurement

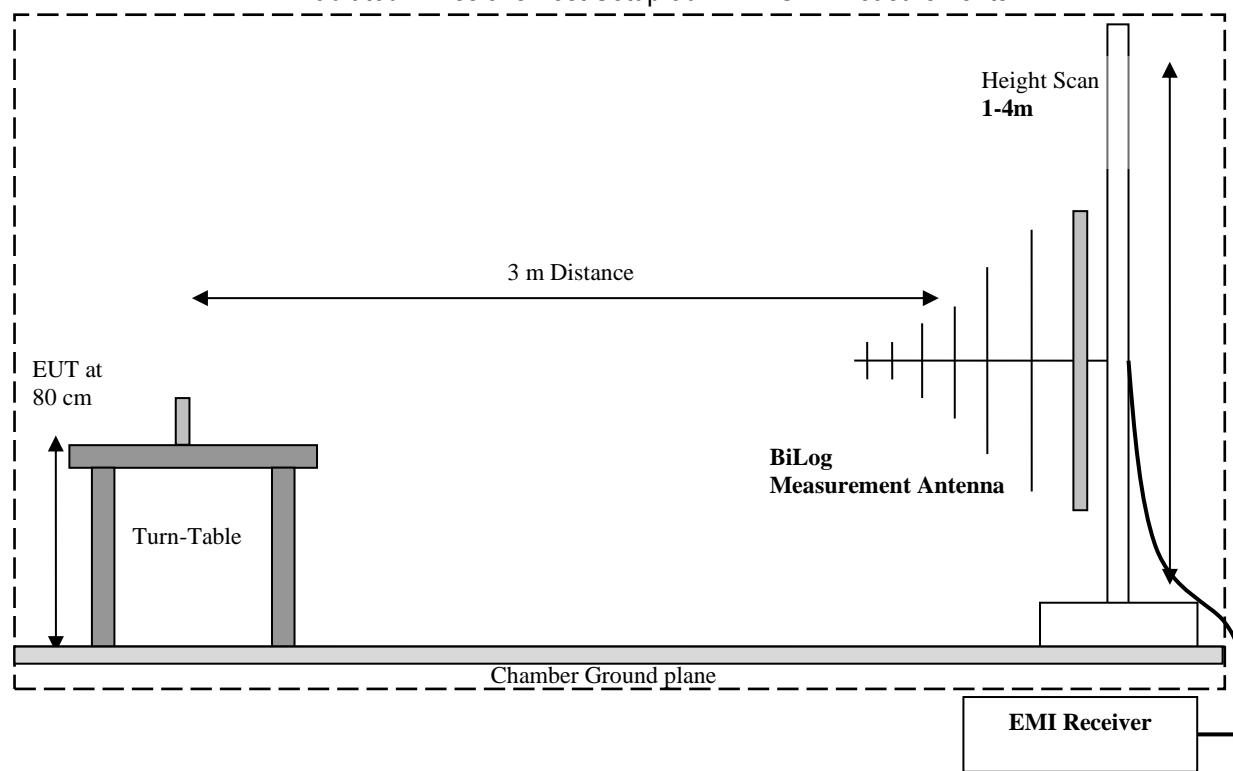
The radiated measurement is performed according to ANSI C63.10 (2013)

- 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.

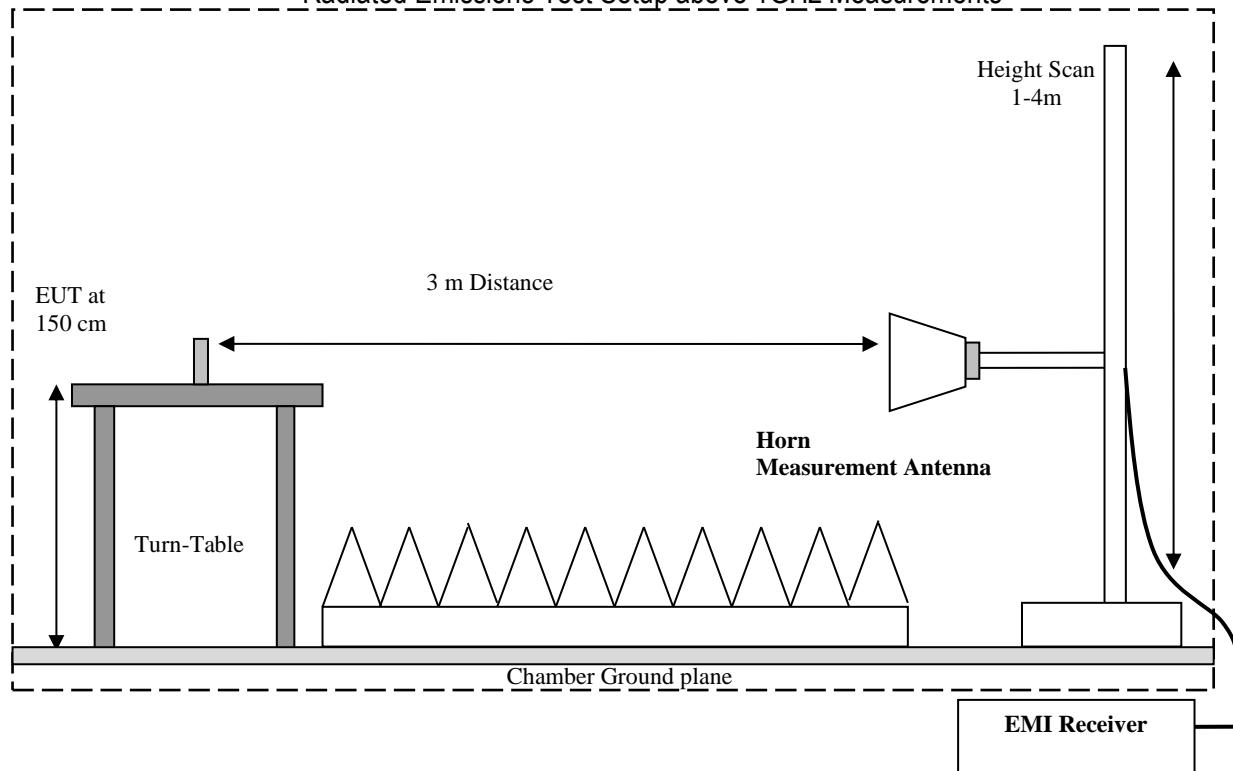
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 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:

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

Example:

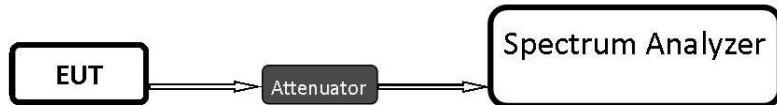
Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.4 (2014)

7.3 RF Conducted Measurement Procedure

Testing procedures are based on 558074 D01 15.247 Meas Guidance v05r02 – “GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES” - April 2, 2019, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.



- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle and high channels and for worst case modulation schemes.

8 Test Result Data

8.1 Maximum Peak Conducted Output Power

8.1.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.11.9

Spectrum Analyzer settings:

- RBW \geq DTS bandwidth
- VBW $\geq 3 \times$ RBW
- Span $\geq 3 \times$ RBW
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold
- Use peak marker function to determine the peak amplitude level

8.1.2 Limits:

Maximum Peak Output Power:

- FCC §15.247 (b)(1): 1 W
- IC RSS-247: 1 W

8.1.3 Test conditions and setup:

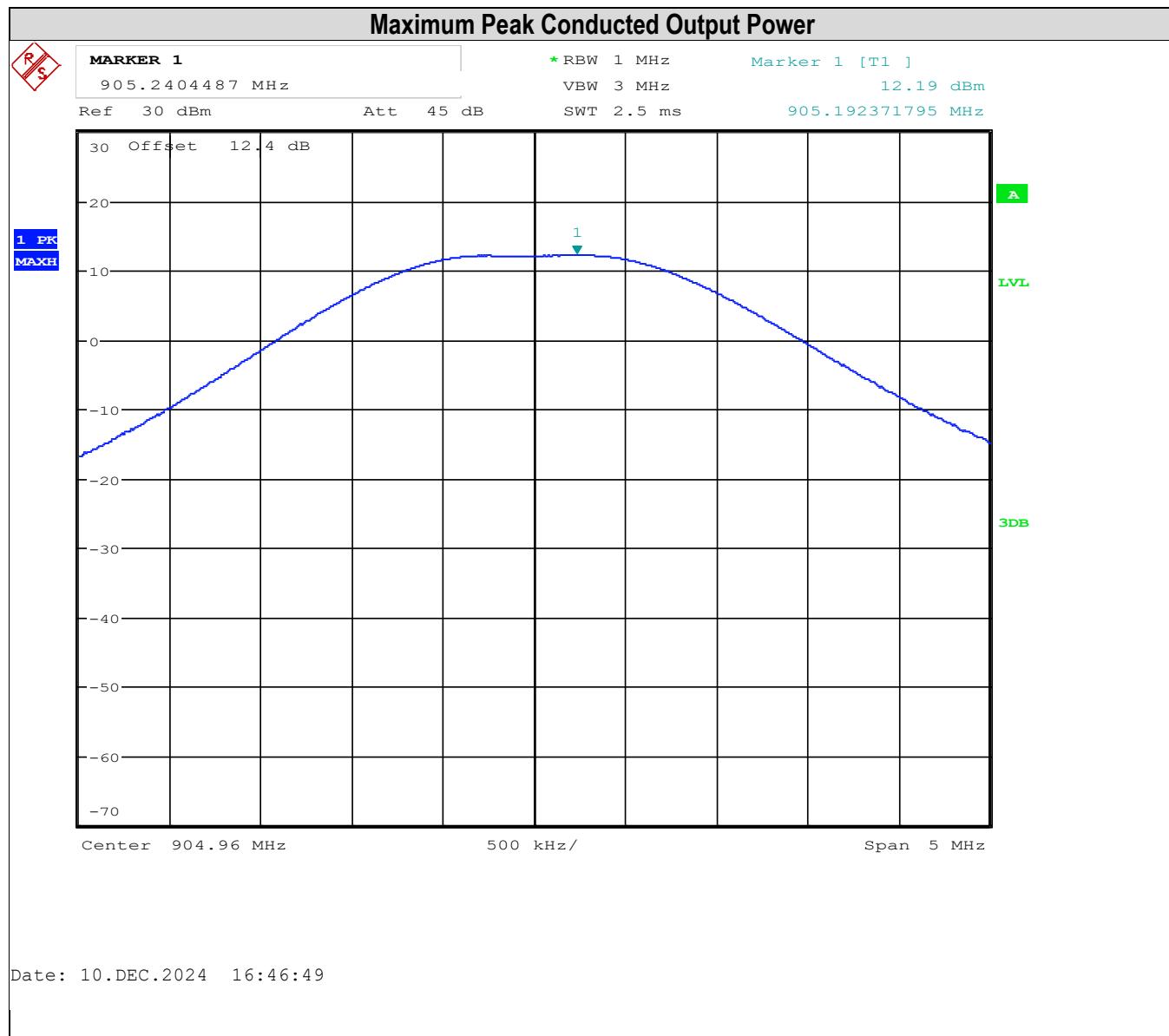
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	2	Op. 1	Battery	1 dBi

8.1.4 Measurement result:

Plot #	Channel	Maximum Peak Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
1	Low	12.19	13.19	30 (Pk) / 36 (EIRP)	Pass
2	Mid	12.10	13.10	30 (Pk) / 36 (EIRP)	Pass
3	High	11.62	12.62	30 (Pk) / 36 (EIRP)	Pass

Note: The plots presented in the section below represent the worst-case results from the measurements.

8.1.5 Measurement Plots:



8.2 Power Spectral Density

8.2.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02

Spectrum Analyzer settings for Peak PSD method:

- Set analyzer center frequency to DTS channel center frequency
- Set the span to 1.5 x DTS bandwidth
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- Set the VBW $\geq 3 \times \text{RBW}$
- Detector = Peak
- Sweep time = Auto couple
- Trace mode = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level within the RBW
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

8.2.2 Limits:

FCC§15.247(e) & RSS-247 5.2(b)

- For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.2.3 Test conditions and setup:

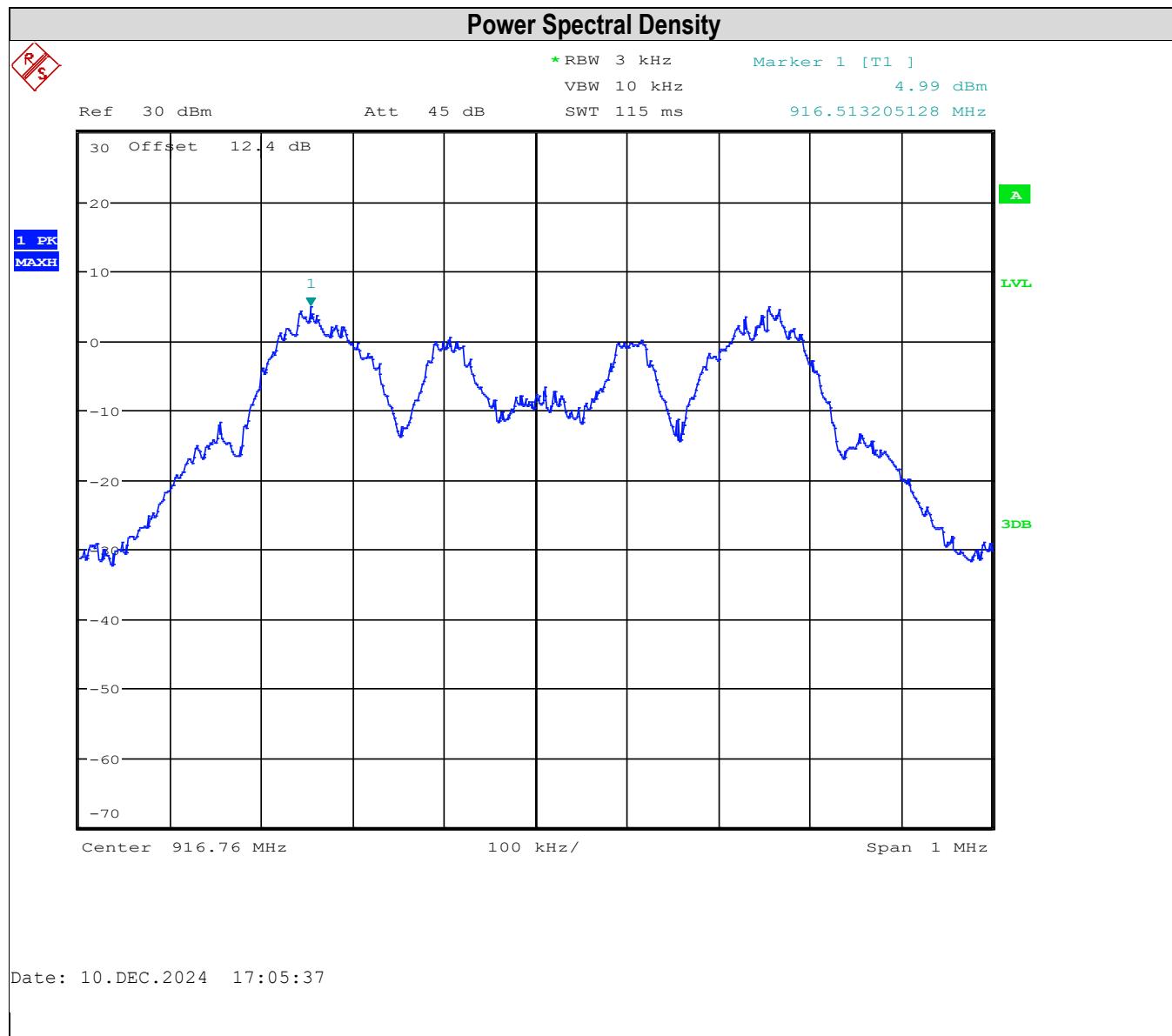
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	2	Op. 1	Battery	1 dBi

8.2.4 Measurement result:

Plot #	Channel	Maximum Power Spectral Density (dBm/3 kHz)	Limit (dBm / 3 kHz)	Result
1	Low	4.74	8	Pass
2	Mid	4.99	8	Pass
3	High	4.47	8	Pass

Note: The plots presented in the section below represent the worst-case results from the measurements.

8.2.5 Measurement Plots:



8.3 Band Edge Compliance

8.3.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02

Spectrum Analyzer settings for band edge:

- Set the center frequency and span to encompass frequency range to be measured
- RBW = 100 kHz
- VBW $\geq 3 \times$ RBW
- Sweep Time: Auto couple
- Detector = Peak
- Trace = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level
- Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge

8.3.2 Limits non restricted band:

FCC§15.247 (d)

- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

RSS-247 5/5

- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB.

Spectrum Analyzer settings for restricted band:

- Peak measurements are made using a peak detector and RBW=1 MHz

8.3.3 Limits restricted band §15.247/15.209/15.205 and RSS-Gen 8.9/8.10

- *PEAK LIMIT= 74 dB μ V/m @3m =-21.23 dBm
- *AVG. LIMIT= 54 dB μ V/m @3m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205 & RSS-Gen 8.10
- Measurements with a peak detector were used to show compliance to average limits, thus showing compliance to both peak and average limits.

(a) 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			

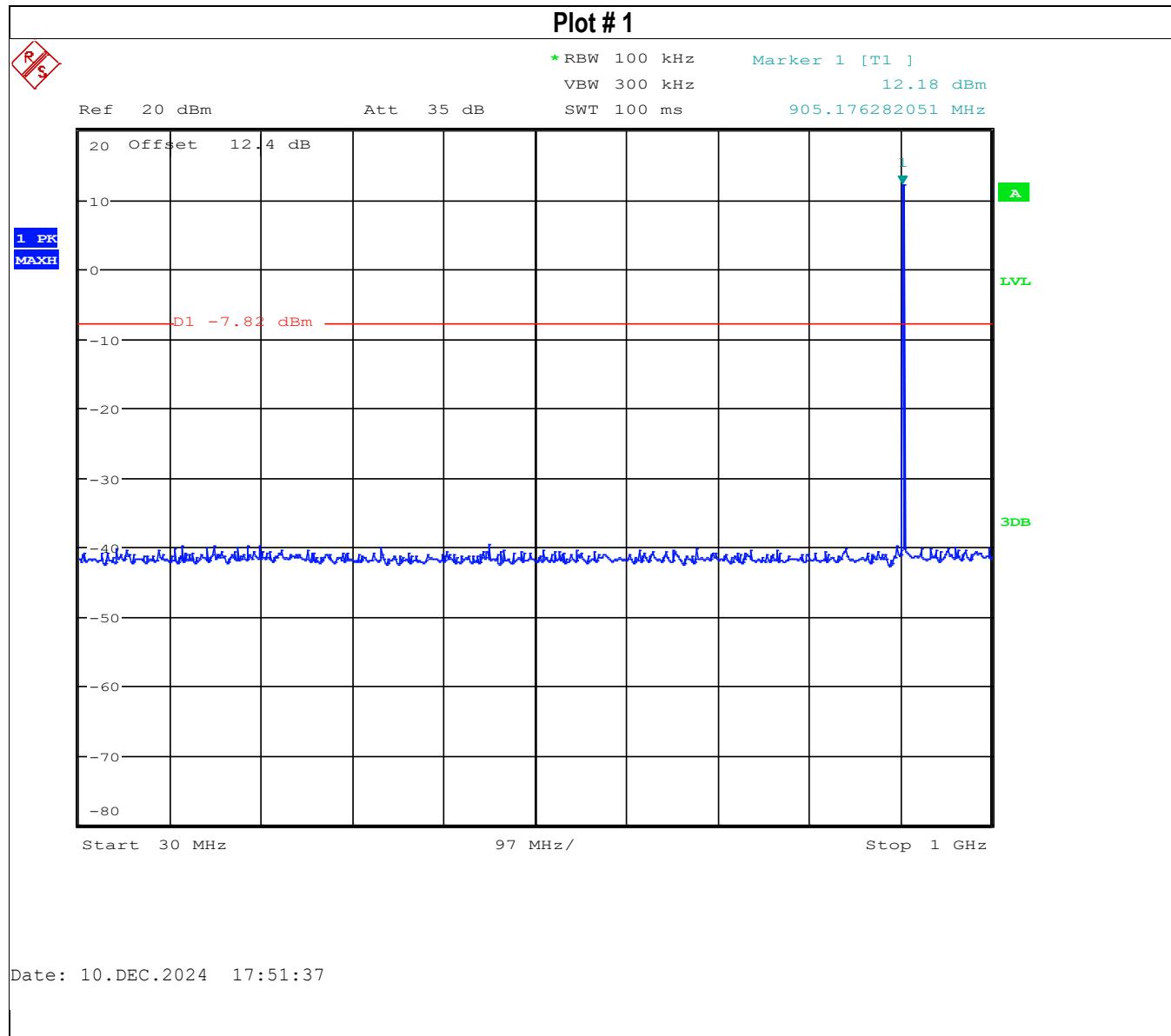
8.3.4 Test conditions and setup:

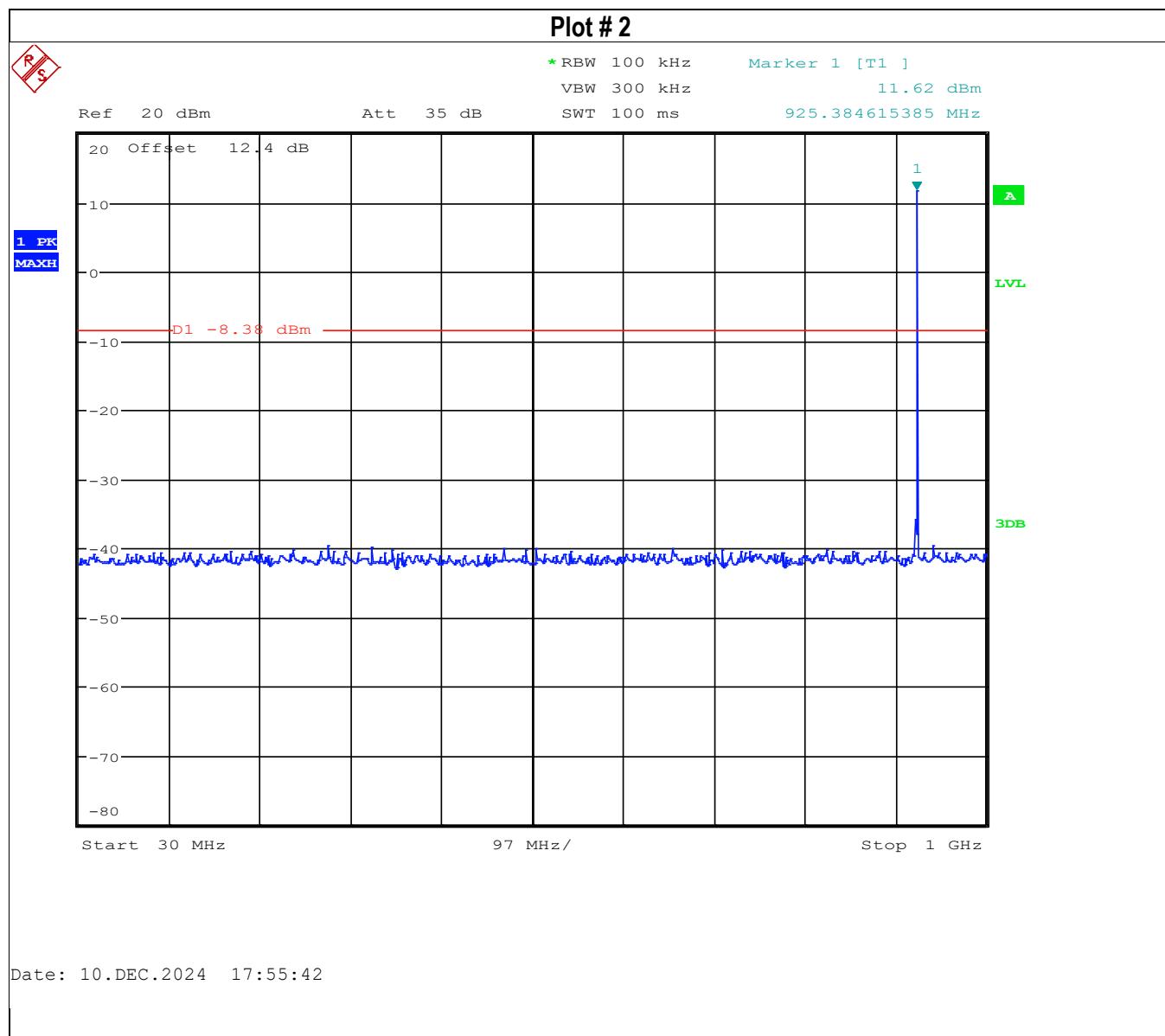
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	2	Op. 1	Battery	1 dBi

8.3.5 Measurement result:

Plot #	EUT Set-Up #	Band Edge	Limit (dBc)	Result
1	2	Lower, non-restricted	> 20	Pass
2	2	Upper, non-restricted	> 20	Pass

8.3.6 Measurement Plots:





8.4 Emission Bandwidth 6dB and 99% Occupied Bandwidth

8.4.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02

Spectrum Analyzer settings:

6dB (DTS) Bandwidth:

- Set RBW = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

99% Occupied Bandwidth:

- Set frequency = nominal EUT channel center frequency
- Set Span = 1.5 x to 5.0 x OBW
- Set RBW = 1% to 5% of OBW
- Set the video bandwidth (VBW) $\approx 3 \times$ RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth
- If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

8.4.2 Limits:

FCC §15.247(a)(2) and RSS-247 5.2(a)

- Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.4.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	2	Op. 1	Battery

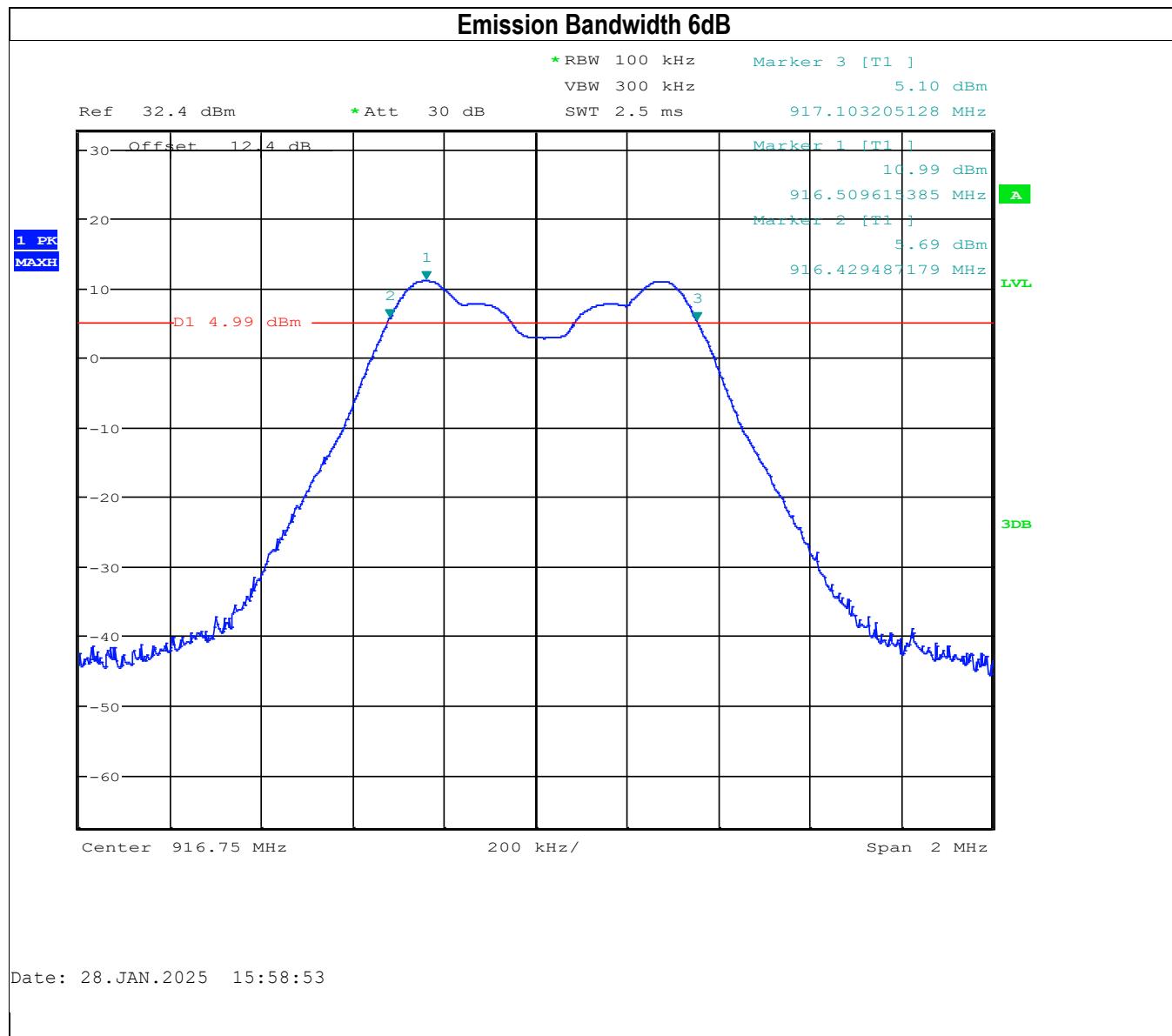
8.4.4 Measurement result:

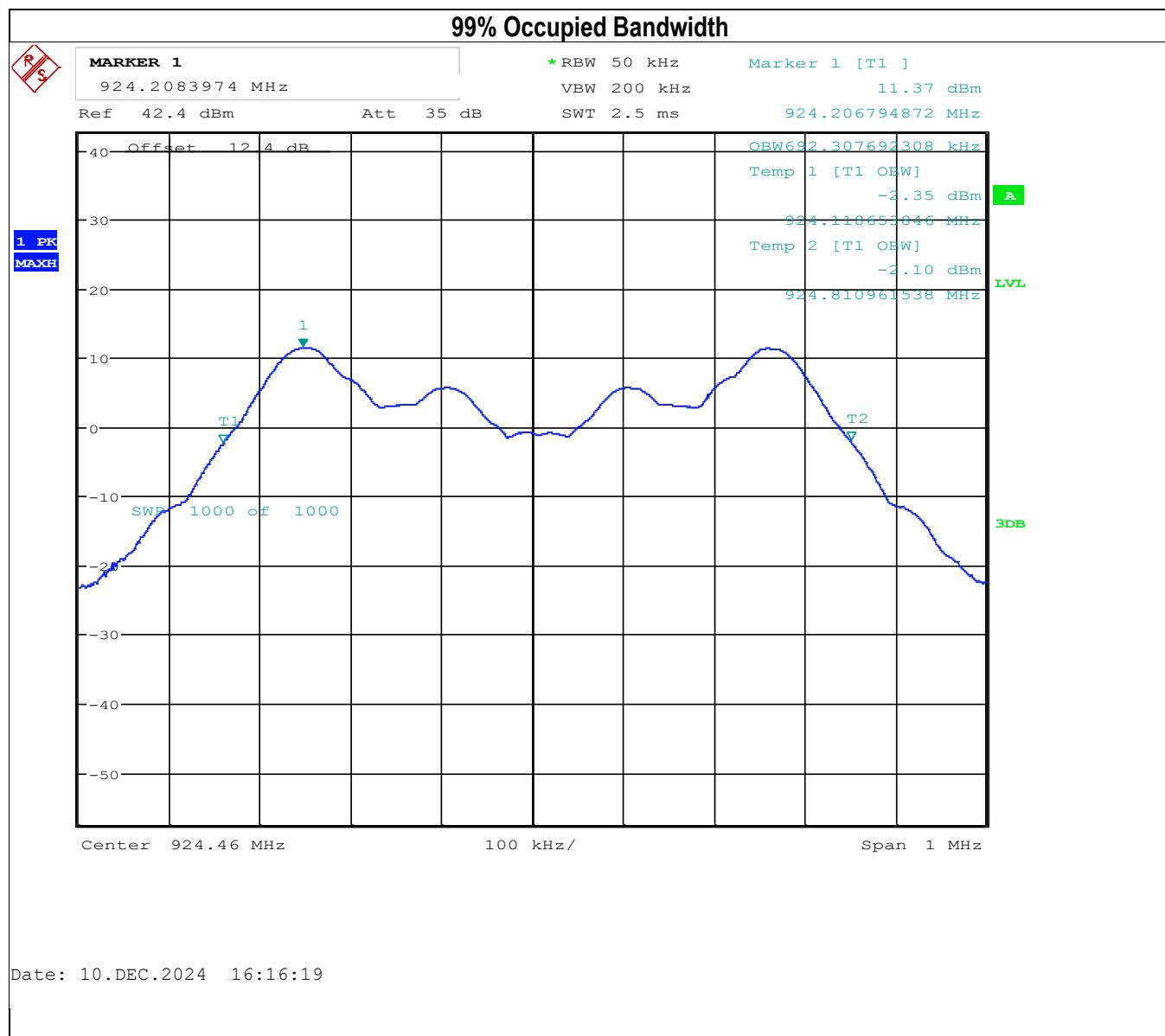
Plot #	Channel	6dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
1	Low	0.689	> 0.5	Pass
2	Mid	0.674	> 0.5	Pass
3	High	0.684	> 0.5	Pass

Plot #	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
4	Low	0.691	NA	Pass
5	Mid	0.691	NA	Pass
6	High	0.692	NA	Pass

Note: The plots presented in the section below represent the worst-case results from the measurements.

8.4.5 Measurement Plots:





8.5 Radiated Transmitter Spurious Emissions and Restricted Bands

8.5.1 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 frequencies below 30 MHz at distance other than the specified in the standard, the limit conversion is calculated by using the FCC materials for the ANSI 63 committee issued on January, 27 1991.

8.5.2 Limits:

FCC §15.247

- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

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

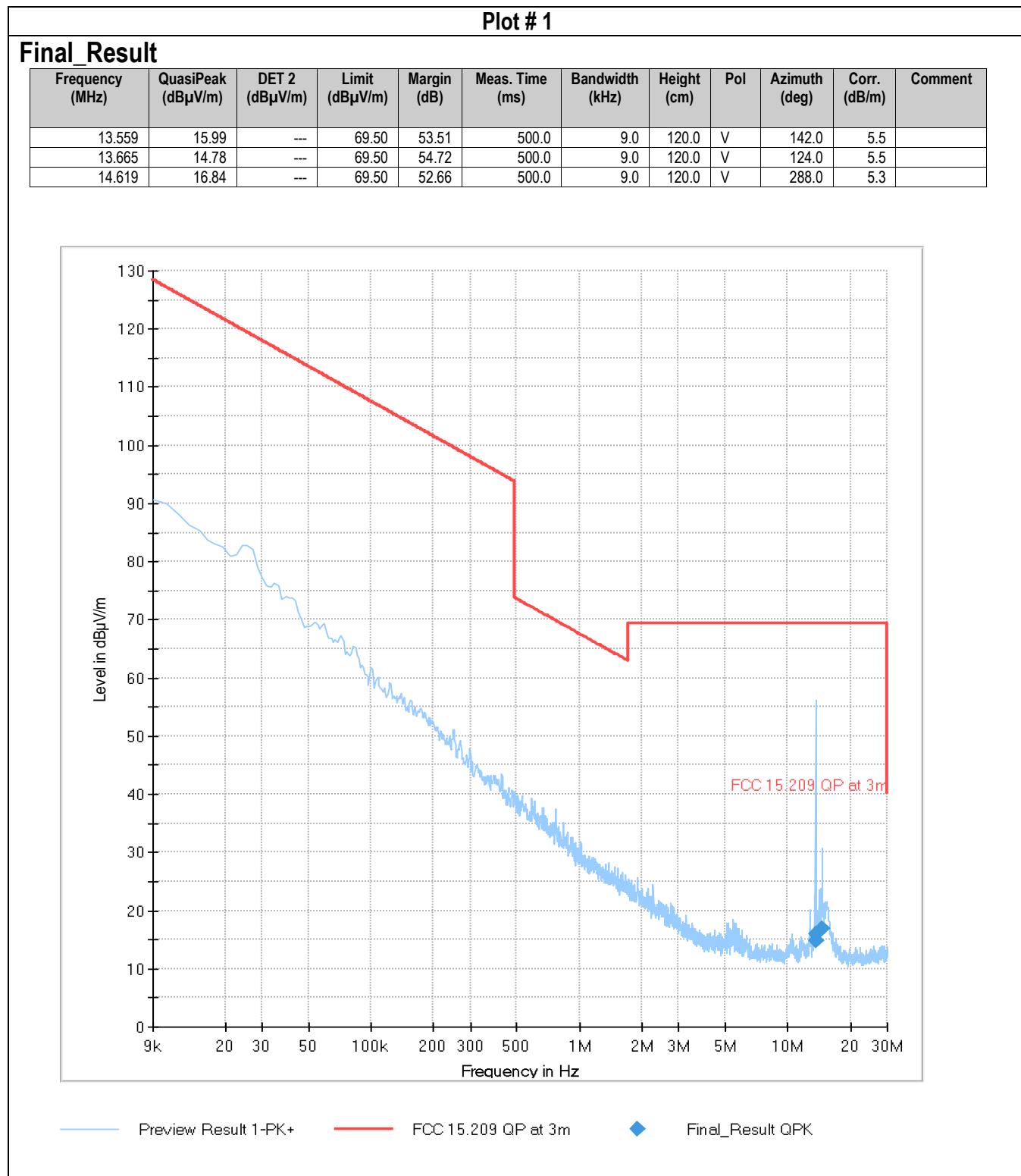
8.5.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	Op. 1	Battery

8.5.4 Measurement result:

Plot #	Channel #	Scan Frequency	Limit	Result
1-4	Low	9 kHz – 18 GHz	See section 8.5.2	Pass
5-8	Mid	9 kHz – 18 GHz	See section 8.5.2	Pass
9-12	High	9 kHz – 18 GHz	See section 8.5.2	Pass
13	High	Upper Restricted Band Edge	See section 8.5.2	Pass

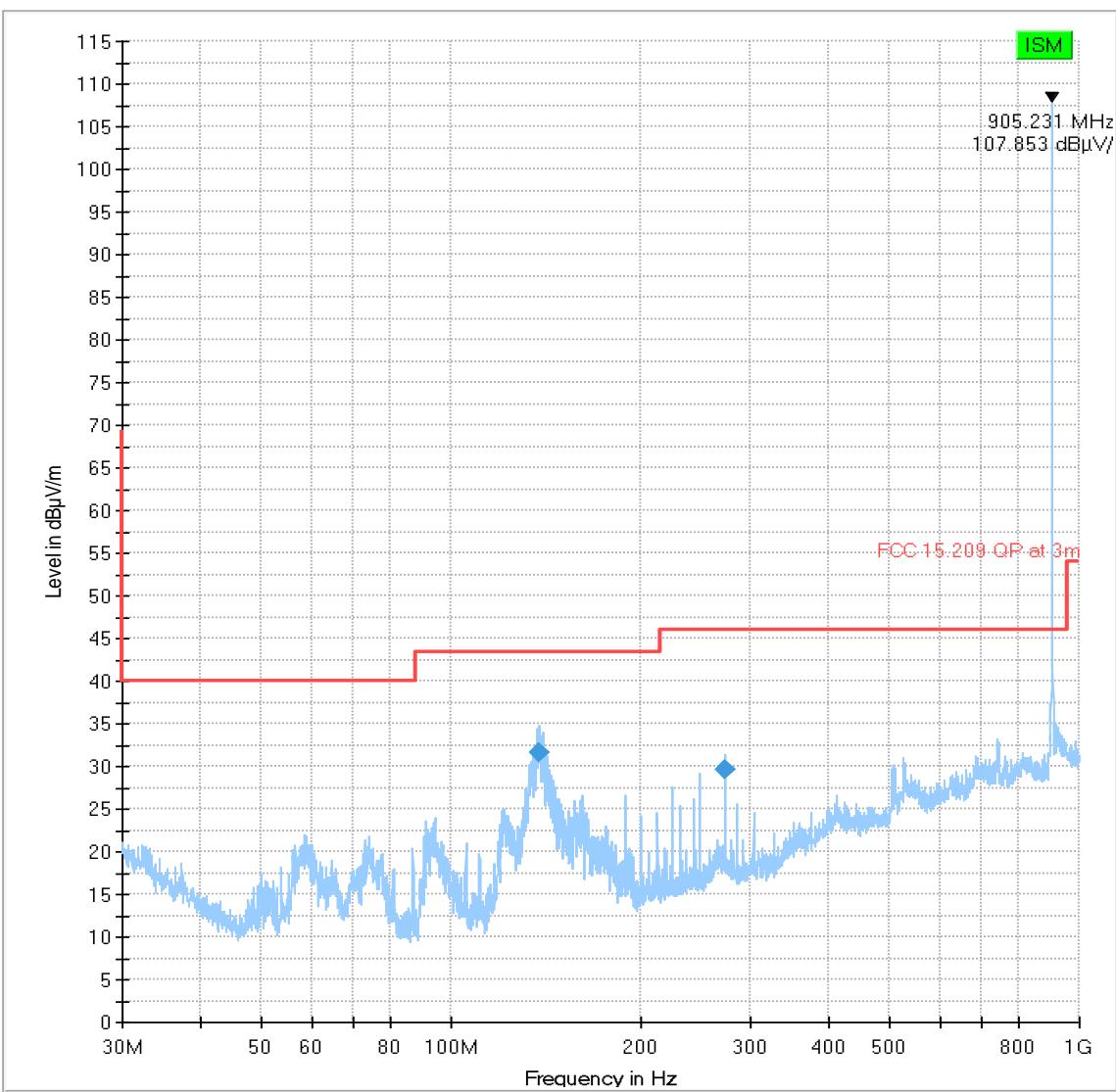
8.5.5 Measurement Plots:



Plot # 2

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
138.228	31.57	---	43.50	11.93	500.0	120.0	100.0	V	180.0	-19.6	
273.009	29.51	---	46.02	16.51	500.0	120.0	100.0	H	64.0	-13.9	

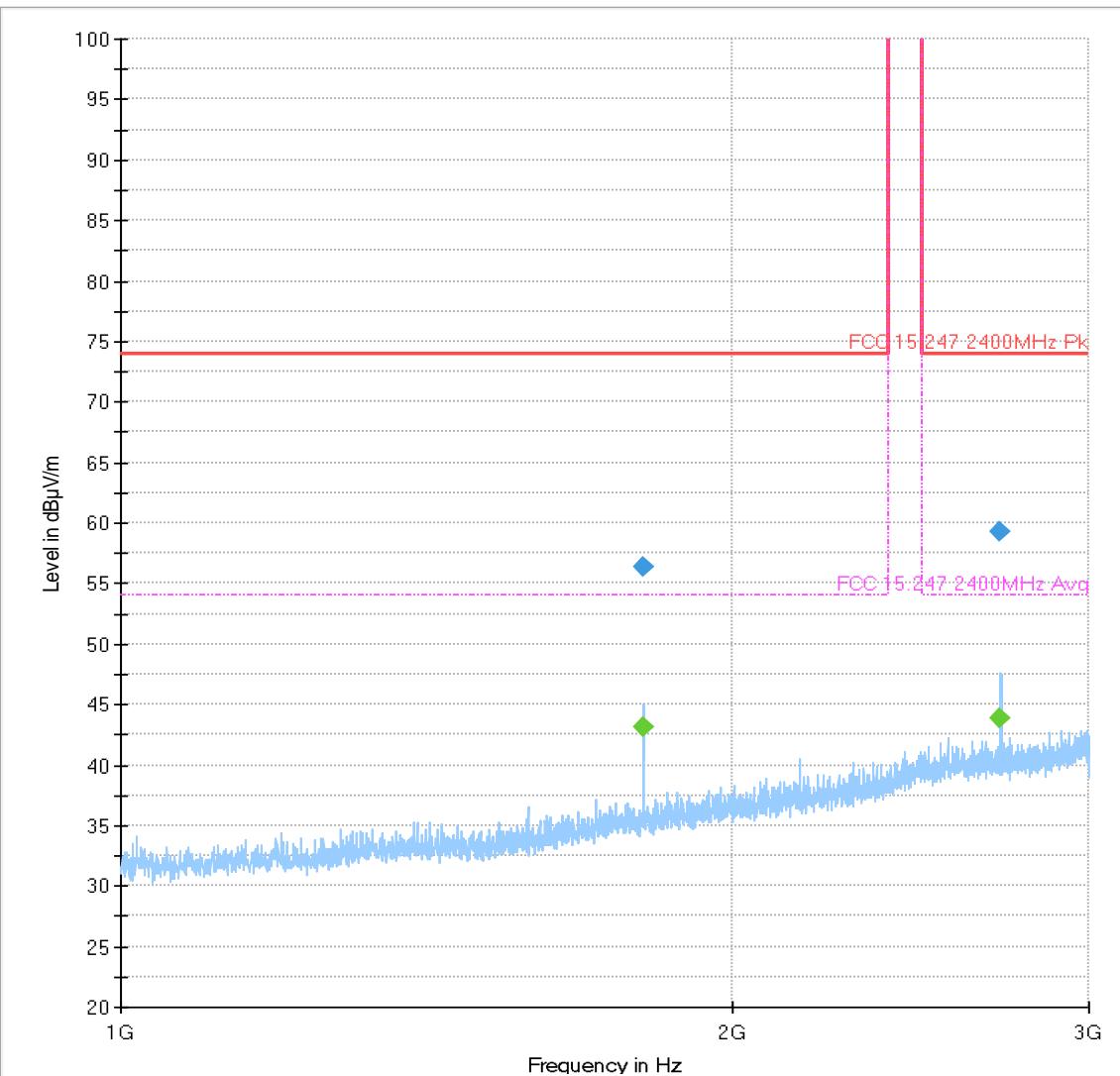


— Preview Result 1-PK+ — FCC 15.208 QP at 3m ♦ Final_Result QPK

Plot # 3

Final Result

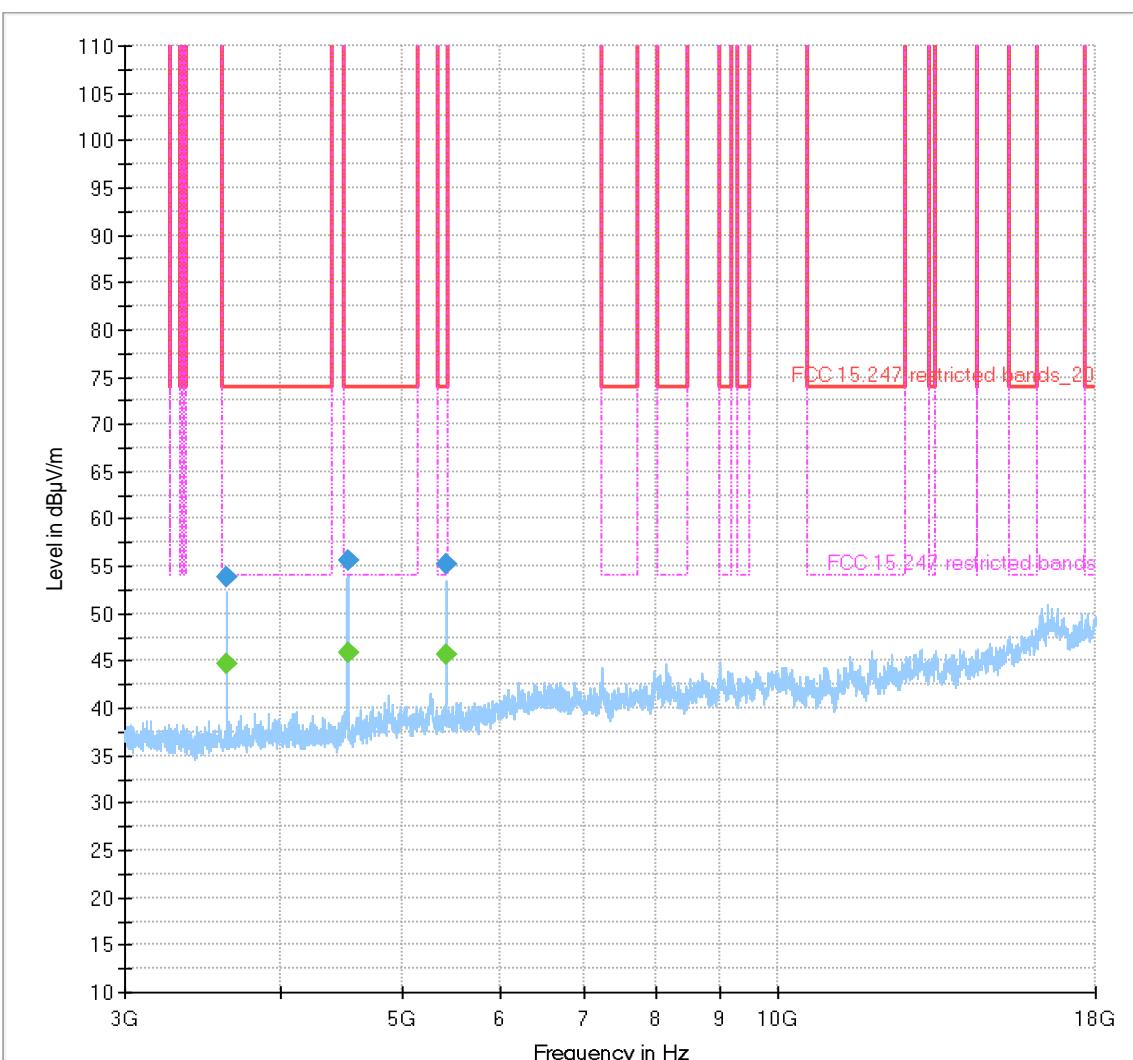
Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
1810.500	---	43.06	54.00	10.94	500.0	1000.0	164.0	V	242.0	31.5	
1810.500	56.30	---	74.00	17.70	500.0	1000.0	164.0	V	242.0	31.5	
2714.500	---	43.83	54.00	10.17	500.0	1000.0	166.0	V	342.0	35.4	
2714.500	59.22	---	74.00	14.78	500.0	1000.0	166.0	V	342.0	35.4	



Plot # 4

Final Result

Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
3618.750	---	44.63	53.98	9.35	500.0	1000.0	236.0	V	18.0	-5.2	
3618.750	53.85	---	73.98	20.13	500.0	1000.0	236.0	V	18.0	-5.2	
4526.250	---	45.78	53.98	8.20	500.0	1000.0	183.0	V	345.0	-3.1	
4526.250	55.61	---	73.98	18.37	500.0	1000.0	183.0	V	345.0	-3.1	
5428.250	---	45.58	53.98	8.40	500.0	1000.0	202.0	V	3.0	-1.9	
5428.250	55.30	---	73.98	18.68	500.0	1000.0	202.0	V	3.0	-1.9	

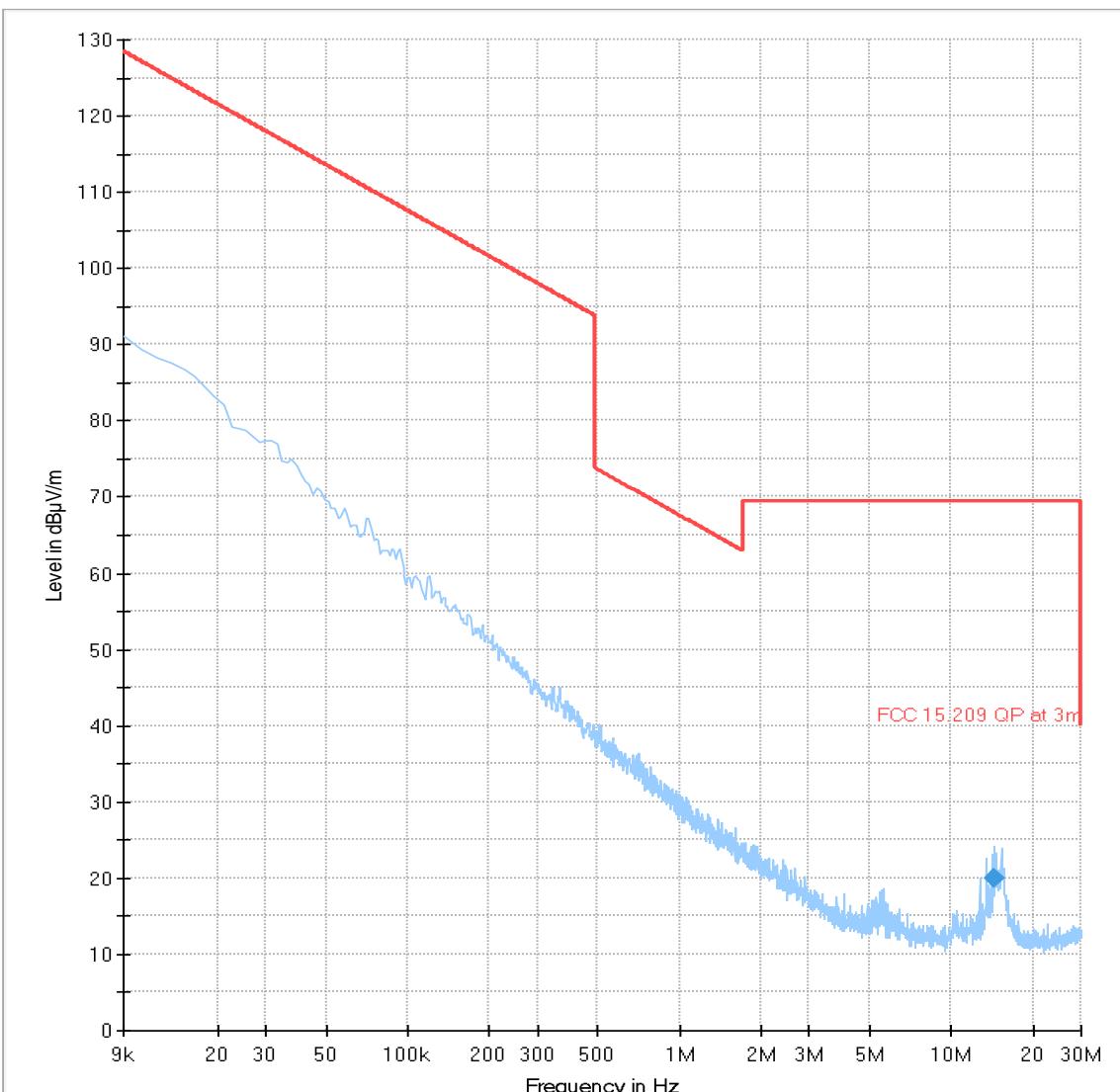


- Preview Result 1-PK+
- FCC 15.247 restricted bands
- ◆ Final_Result CAV
- FCC 15.247 restricted bands_20
- ◆ Final_Result PK+

Plot # 5

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
14.334	20.04	---	69.50	49.46	500.0	9.0	120.0	H	263.0	5.4	



— Preview Result 1-PK+

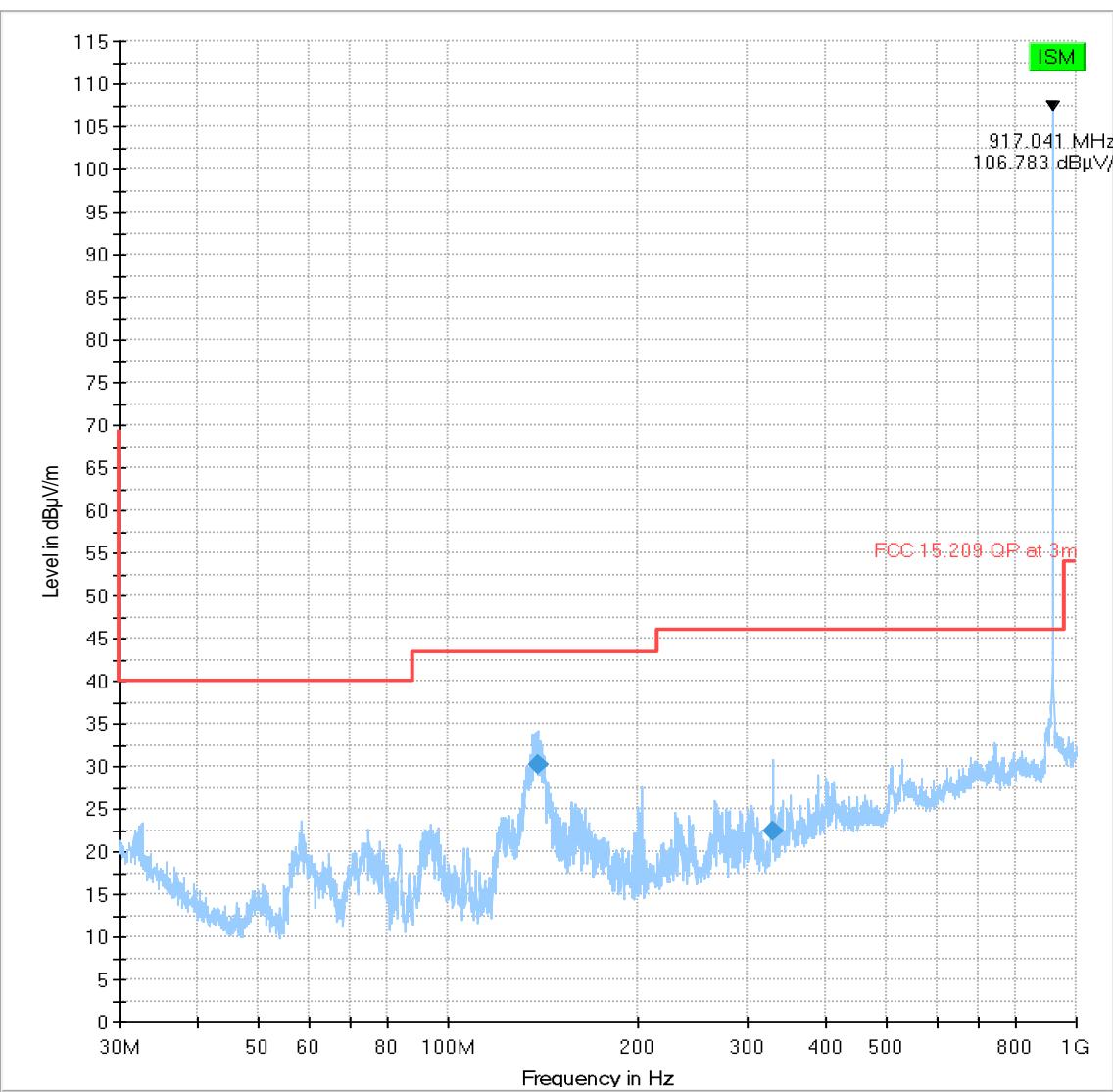
— FCC 15.209 QP at 3m

◆ Final_Result QPK

Plot # 6

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
138.761	30.11	---	43.50	13.39	500.0	120.0	100.0	V	186.0	-19.6	
328.833	22.32	---	46.02	23.70	500.0	120.0	117.0	H	345.0	-13.5	

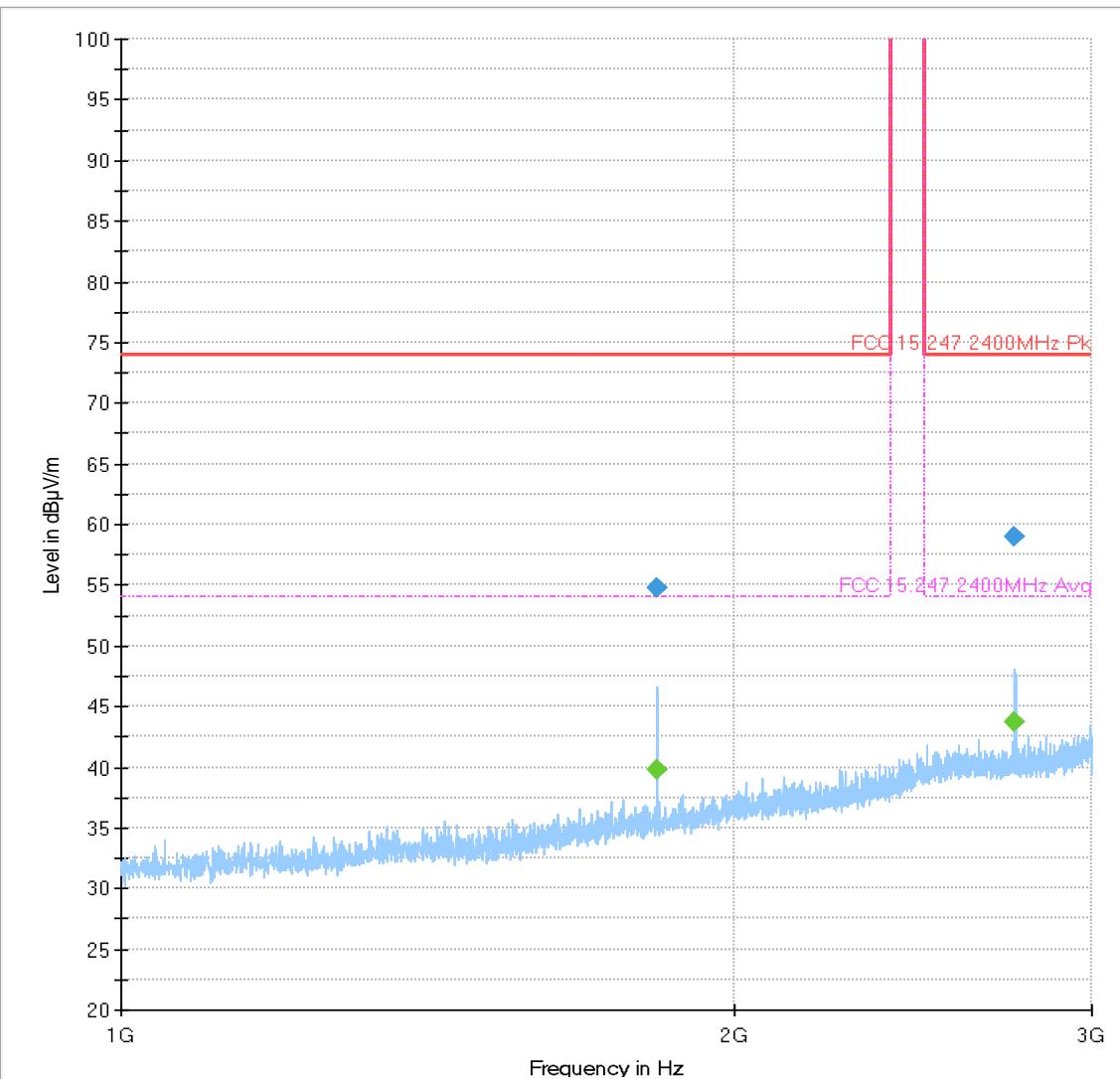


— Preview Result 1-PK+ — FCC 15.208 QP at 3m ◆ Final_Result QPK

Plot # 7

Final Result

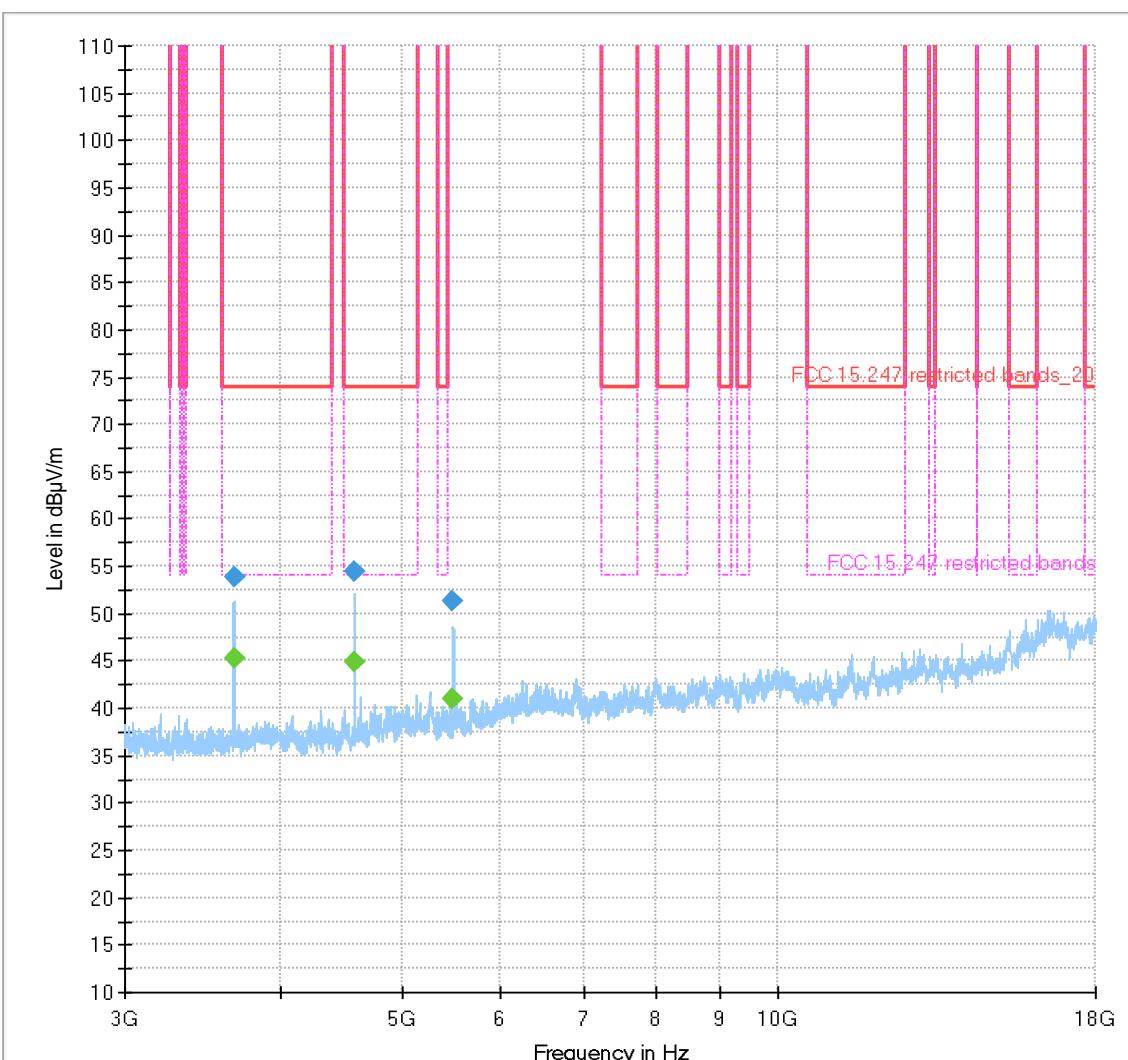
Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
1833.000	54.69	---	74.00	19.31	500.0	1000.0	142.0	V	228.0	31.6	
1833.000	---	39.76	54.00	14.24	500.0	1000.0	142.0	V	228.0	31.6	
2749.500	59.01	---	74.00	14.99	500.0	1000.0	118.0	V	61.0	35.5	
2749.500	---	43.73	54.00	10.27	500.0	1000.0	118.0	V	61.0	35.5	



Plot # 8

Final Result

Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
3668.000	53.83	---	73.98	20.15	500.0	1000.0	205.0	V	4.0	-5.0	
3668.000	---	45.21	53.98	8.77	500.0	1000.0	205.0	V	4.0	-5.0	
4582.500	54.41	---	73.98	19.57	500.0	1000.0	184.0	V	3.0	-2.9	
4582.500	---	44.95	53.98	9.03	500.0	1000.0	184.0	V	3.0	-2.9	
5499.000	---	41.09	500.00	458.91	500.0	1000.0	228.0	V	11.0	-2.4	
5499.000	51.38	---	520.00	468.62	500.0	1000.0	228.0	V	11.0	-2.4	



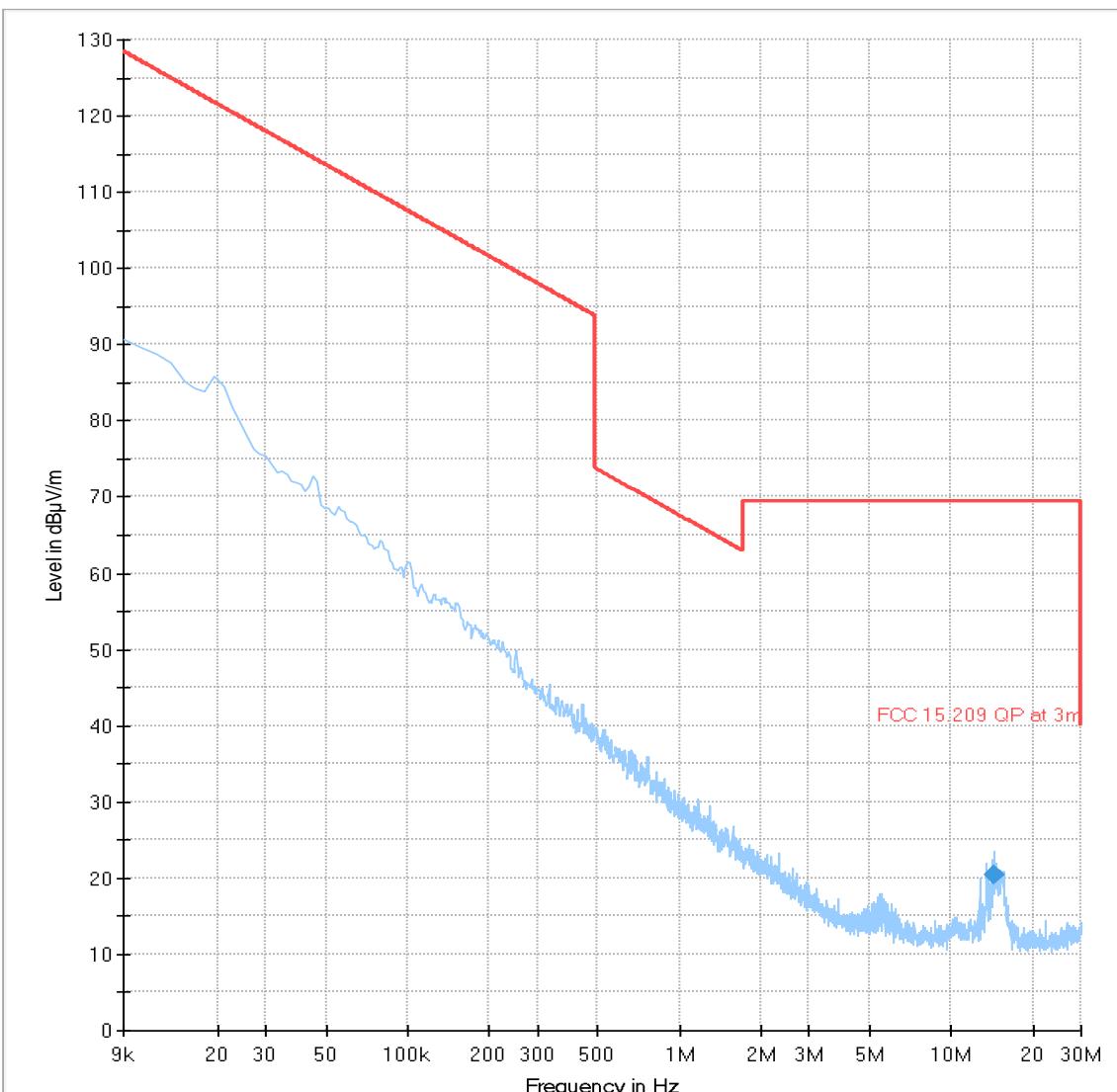
Legend:

- Preview Result 1-PK+ (Blue line)
- FCC 15.247 restricted bands (Magenta lines)
- Final_Result CAV (Green diamond)
- Final_Result PK+ (Blue diamond)

Plot # 9

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
14.274	20.38	---	69.50	49.12	500.0	9.0	120.0	V	47.0	5.4	



Preview Result 1-PK+

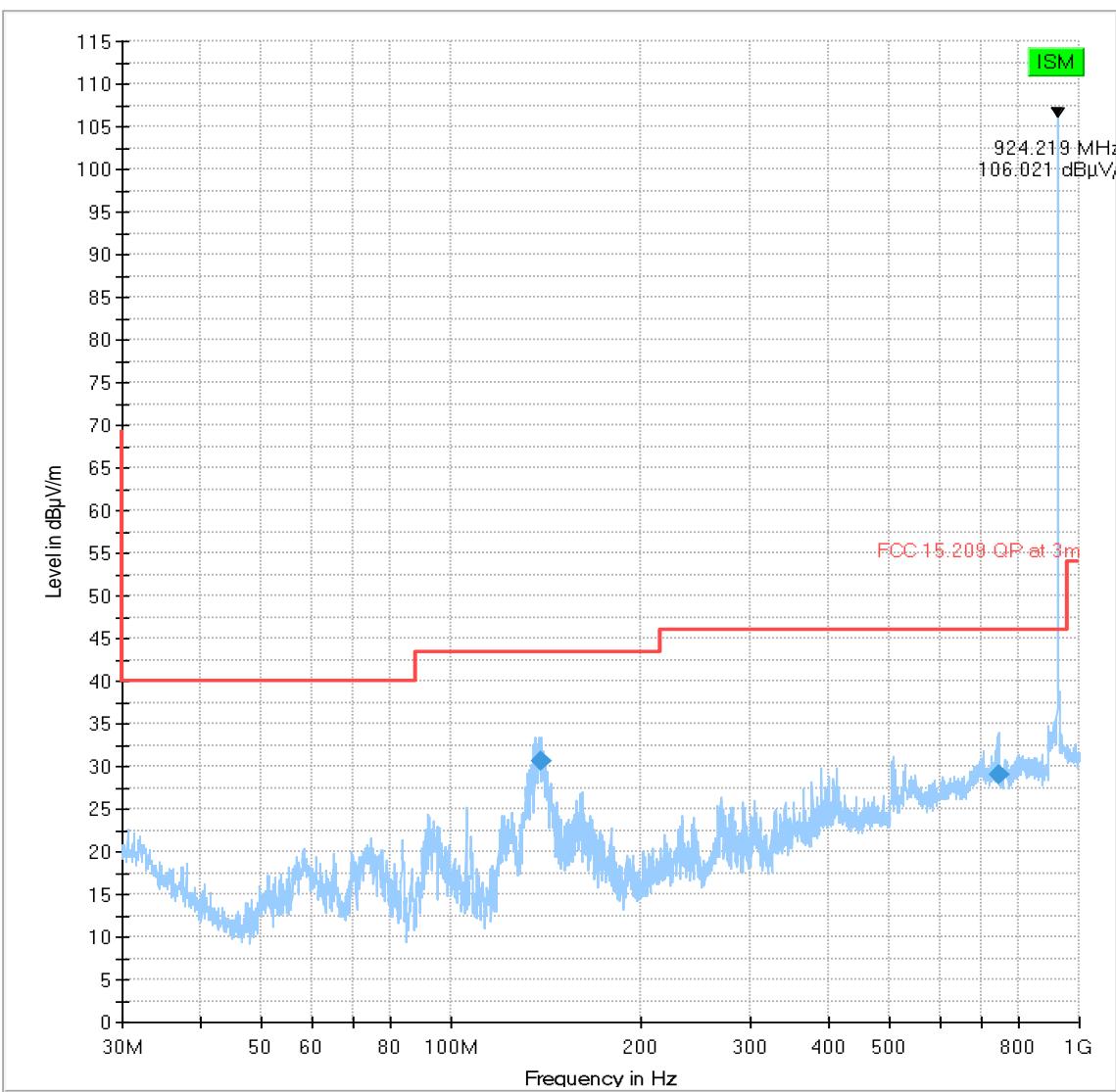
FCC 15.209 QP at 3m

Final_Result QPK

Plot # 10

Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
139.101	30.51	---	43.50	12.99	500.0	120.0	100.0	V	167.0	-19.7	
743.241	28.98	---	46.02	17.05	500.0	120.0	254.0	H	17.0	-3.3	

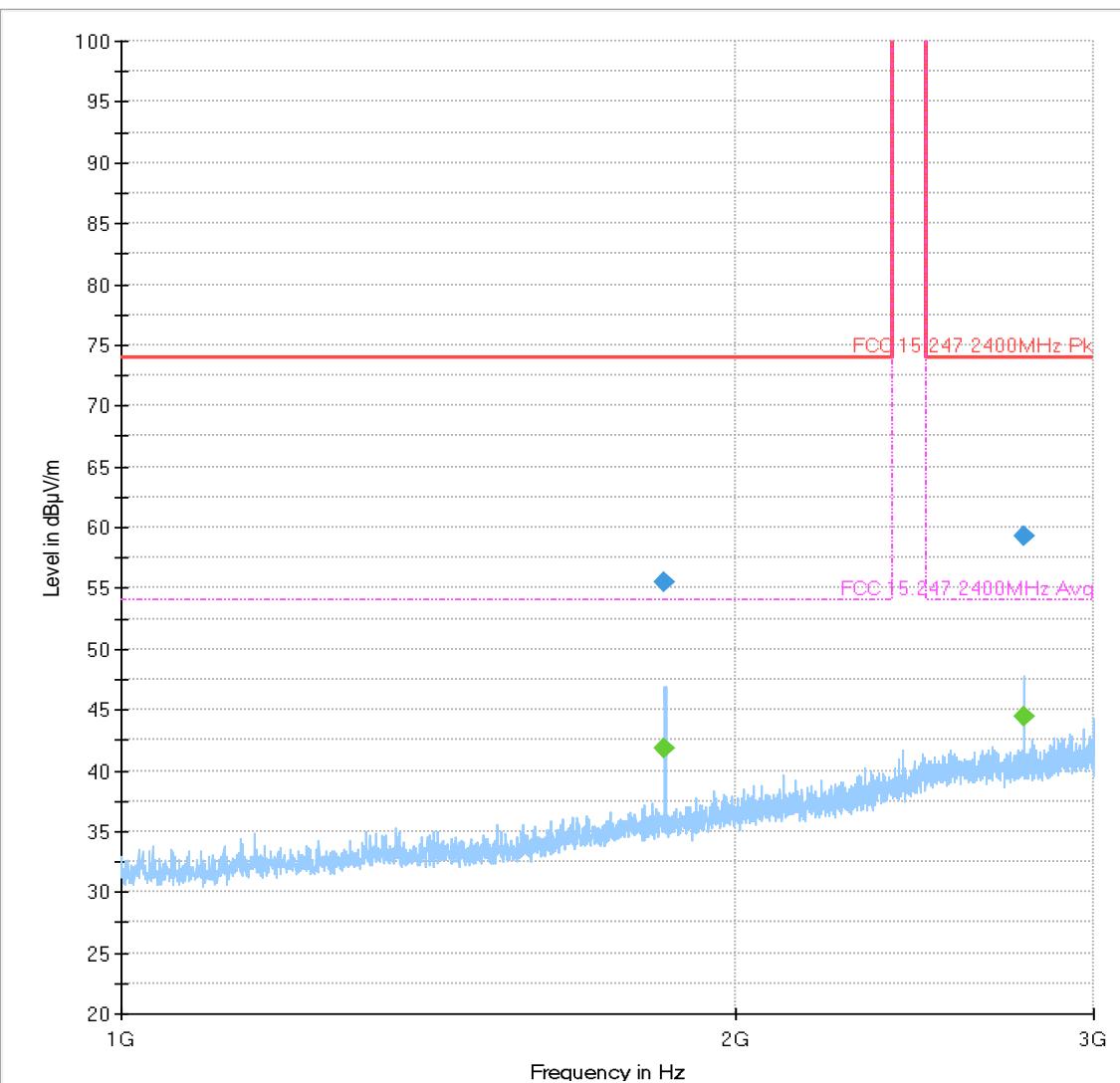


— Preview Result 1-PK+ — FCC 15.209 QP at 3m ♦ Final_Result QPK

Plot # 11

Final Result

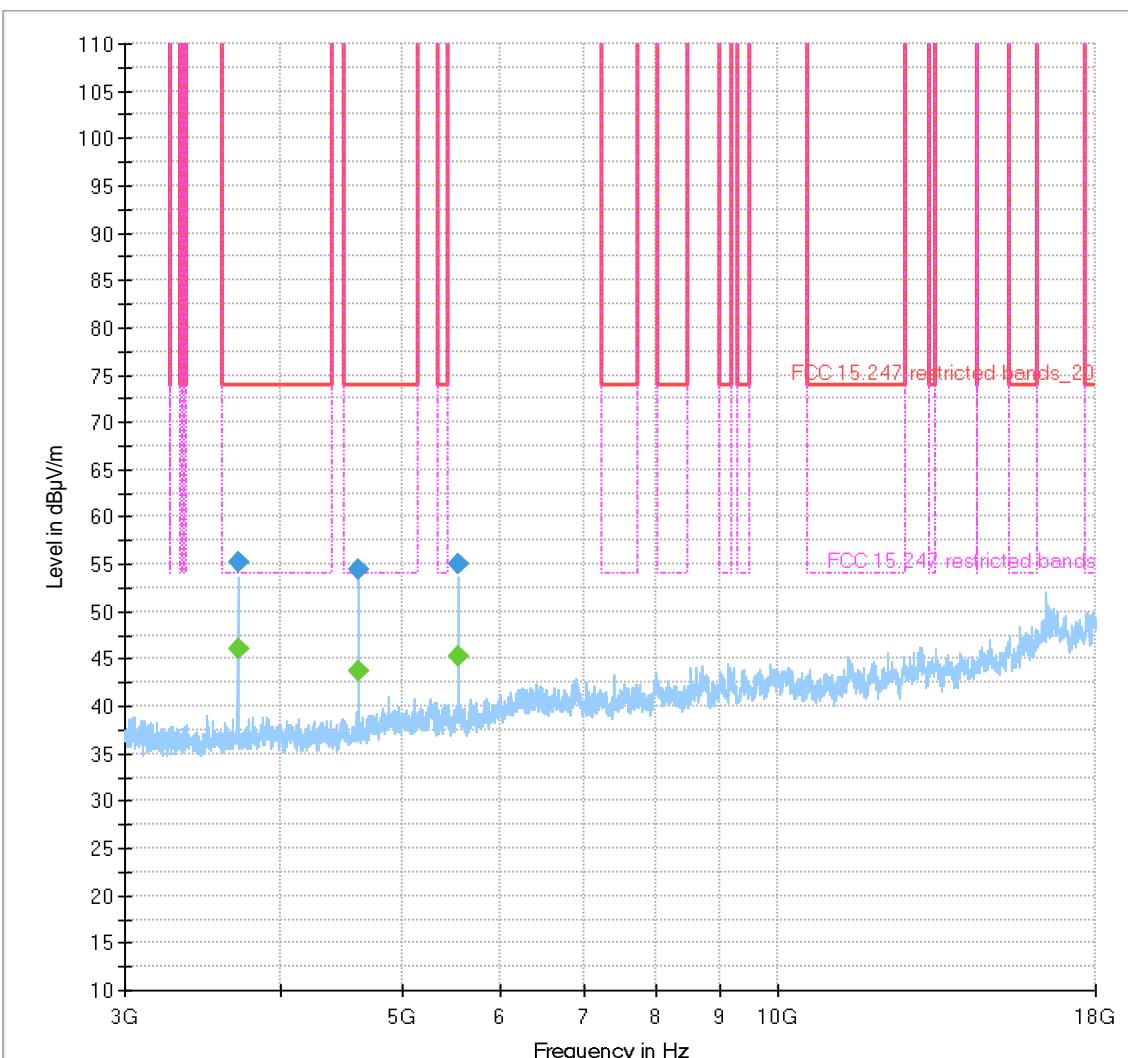
Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
1848.500	55.43	---	74.00	18.57	500.0	1000.0	130.0	V	268.0	31.7	
1848.500	---	41.82	54.00	12.18	500.0	1000.0	130.0	V	268.0	31.7	
2773.000	59.33	---	74.00	14.67	500.0	1000.0	235.0	V	10.0	35.5	
2773.000	---	44.42	54.00	9.58	500.0	1000.0	235.0	V	10.0	35.5	



Plot # 12

Final Result

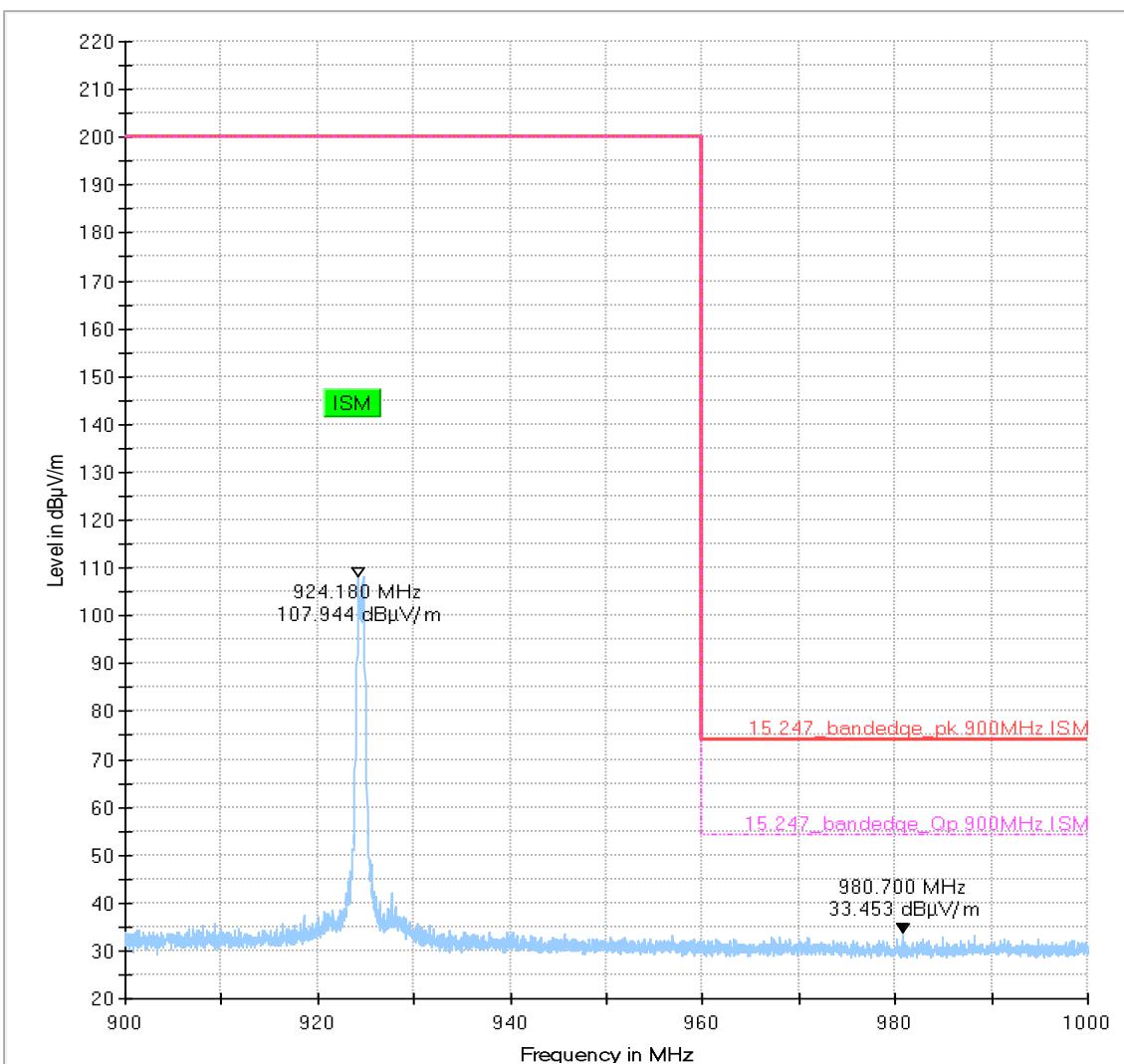
Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
3696.750	---	46.12	53.98	7.86	500.0	1000.0	201.0	V	5.0	-4.9	
3696.750	55.15	---	73.98	18.83	500.0	1000.0	201.0	V	5.0	-4.9	
4620.750	54.46	---	73.98	19.52	500.0	1000.0	164.0	V	-7.0	-3.1	
4620.750	---	43.69	53.98	10.29	500.0	1000.0	164.0	V	-7.0	-3.1	
5545.250	54.93	---	520.00	465.07	500.0	1000.0	215.0	V	0.0	-1.7	
5545.250	---	45.33	500.00	454.67	500.0	1000.0	215.0	V	0.0	-1.7	



— Preview Result 1-PK+
 - - - FCC 15.247 restricted bands
 ♦ Final_Result CAV

— Final_Result PK+
 FCC 15.247 restricted bands_20

Plot # 13



Preview Result 1-PK+
15.247_bandedge_pk 900MHz ISM

Final_Result QPK

* Critical_Freqs PK+
15.247_bandedge_Qp 900MHz ISM

9 Test setup photos

Setup photos are included in supporting file name: "EMC_TELUL_118_23001_FCC_15_247_Setup_Photos"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 Years	08/13/2024
BILOG ANTENNA	ETS.LINDGREN	3142E	00166067	3 Years	08/01/2024
HORN ANTENNA	EMCO	3115	00035114	3 Years	09/13/2023
HORN ANTENNA	ETS.LINDGREN	3117	00215984	3 Years	10/26/2023
TEST RECEIVER	R&S	ESW44	103143	2 Years	09/12/2024
DIGITAL THERMOMETER	CONTROL COMPANY	4410,90080-03	230713059	3 Years	10/18/2023
Multimeter	Fluke	115	56090717MV	3 Years	09/26/2023
Software	EMC32	Version 11.40.00	-	-	-
Spectrum Analyzer	ROHDE & SCHWARZ	FSU	200302	3 Years	01/25/2024

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.

11 History

Date	Report Name	Changes to report	Prepared by
2025-02-20	EMC_TELUL_118_23001_FCC_15_247	Initial Version	Art Thammanavarat
2025-04-28	EMC_TELUL_118_23001_FCC_15_247_Rev1	<u>Report Revised</u> 1. Section 10: Added Equipment 2. Updated FCC ID & ISED	Art Thammanavarat

<<< The End >>>