



FCC / ISED Test Report

For:

Honeywell International Inc.

Model:

NXCMR200

Product Description:

900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology

FCC ID: QZC-NXCMR200

IC ID: 4577A-NXCMR200

Applied Rules and Standards:

47 CFR Part 15.247 (DSS)

RSS-247 Issue 2 (FHSs) & RSS-Gen Issue 5

REPORT #: EMC_HONEY-225-22001_FCC_15.247

DATE: 2022-04-12



A2LA Accredited

IC recognized #
3462B-2

CABID: US0187

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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	Description	Model #
Honeywell International Inc.	900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology	NXCMR200

Responsible for Testing Laboratory:

2022-04-12	Compliance	Kevin Wang (EMC Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

2022-04-12	Compliance	Cheng Song (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:	Cathy Palacios

2.2 Identification of the Client

Client's Name:	Honeywell International Inc.
Street Address:	208 South Rogers Lane
City/Zip Code	Raleigh, NC 27610
Country	USA

2.3 Identification of the Manufacturer

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

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	NXCMR200
HW Version :	1.0
SW Version :	1.10
FCC-ID :	QZC-NXCMR200
IC-ID:	4577A-NXCMR200
PMN:	Next Generation Cellular Module
Product Description:	900MHz ISM radio, LTE Cat-M1 MODEM, gas & water metering metrology
Frequency Range / number of channels:	902 – 928 MHz, 25 channels frequency hopping Data rate: 35.5 kbps or 142.2 kbps
Radios included in device	ISM: • SiLabs EFR32FG1 SoC • FSK modulation • 25 channels frequency hopping Cellular: • Quectel BG95-M2 (CAT-M1) • FCC ID: XMR2020BG95M2; IC ID: 10224A-2020BG95M2
Modes of Operation:	Hopping
Antenna Information as declared:	Printed monopole, max gain 1.38 dBi
Max. declared output Powers:	7.25 dBm
Power Supply/ Rated Operating Voltage Range:	3.2 VDC – 3.6 VDC
Operating Temperature Range	-40° to 85° C
Sample Revision	☐ Prototype Unit; ☐ Production Unit; ☒ Pre-Production
EUT Dimensions	17.5 x 11.7 x 8.0 cm

3.2 EUT Sample details

EUT #	Model Number	HW Version	SW Version	Notes/Comments
1	NXCMR200	1.0	1.10	

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	-----	-----	-----	-----

3.4 Test Sample Configuration

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

3.5 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 maximum 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.

For conducted measurements, the EUT was tested with transmitter sets on frequency hopping mode with 35.5 kbps data rate and FSK modulation.

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 Issue 2 of ISED Canada.

This test report is to support a request for new equipment authorization under the:

- FCC ID: QZC-NXCMR200
- IC ID: 4577A-NXCMR200

Testing procedures are based on ANSI C63.10:2013 including section 7.8 for FHSS systems.

4 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(b)(2) RSS-247 5.4(a)	Maximum Peak Conducted Output Power	Nominal	FSK	■	□	□	Complies
§15.247(d) RSS-247 5.5 RSS-Gen 8.10	Band Edge Compliance	Nominal	FSK	■	□	□	Complies
§15.247(a)(1) RSS-247 5.1(c)	Spectrum Bandwidth	Nominal	FSK	■	□	□	Complies
§15.247(a)(1) RSS-247 5.1(c)	Carrier Frequency Separation	Nominal	FSK	■	□	□	Complies
§15.247(a)(1) RSS-247 5.1(c)	Number of Hopping Channels	Nominal	FSK	■	□	□	Complies
§15.247(a)(1) RSS-247 5.1(c)	Time of occupancy	Nominal	FSK	■	□	□	Complies
§15.247(d) §15.209 (a) RSS-Gen 6.13	TX Spurious emissions-Radiated	Nominal	FSK	■	□	□	Complies
§15.207(a) RSS-Gen 8.8	AC Conducted Emissions	Nominal	FSK	□	□	■	Note 2

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

Note 2: EUT on battery power

5 **Measurements**

5.1 **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 – 1 GHz)	3.17 dB	3.34 dB
(1 GHz – 3 GHz)	5.01 dB	4.45 dB
(> 3 GHz)	4.0 dB	4.79 dB

5.2 **Environmental Conditions During Testing:**

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

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

5.3 **Dates of Testing:**

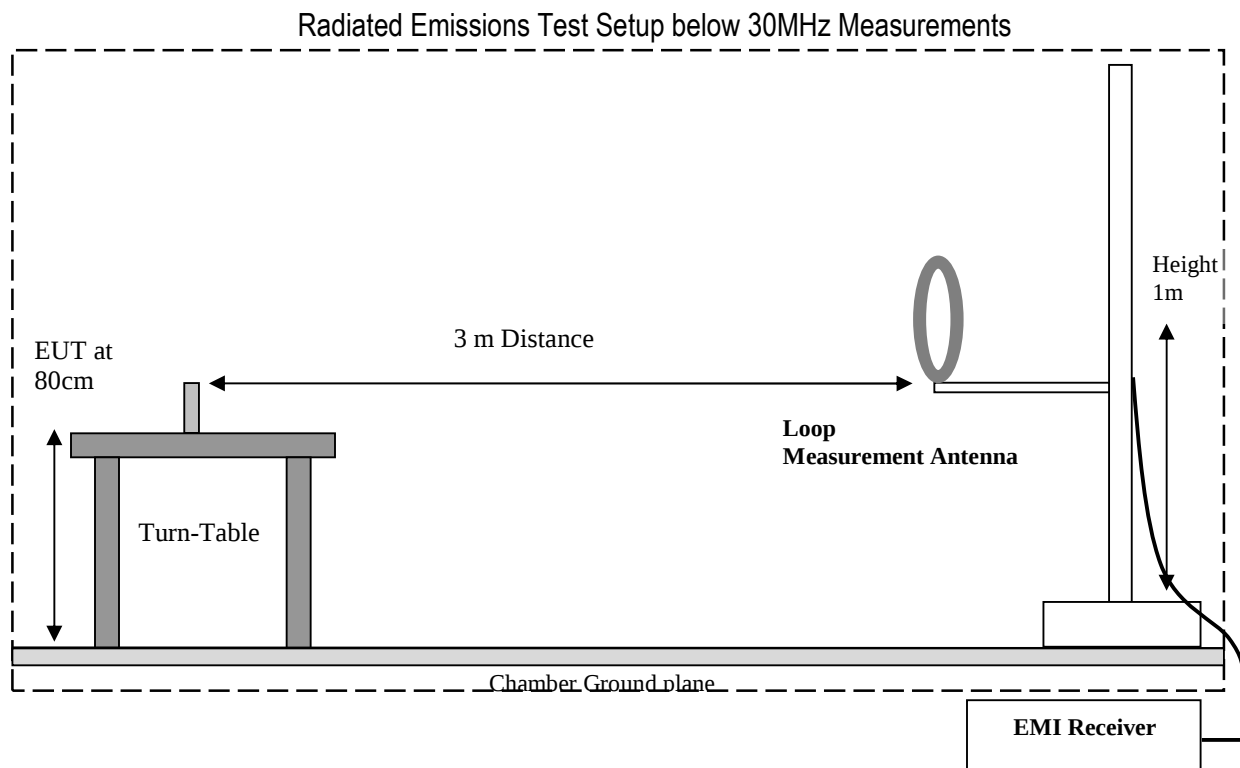
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6 Measurement Procedures

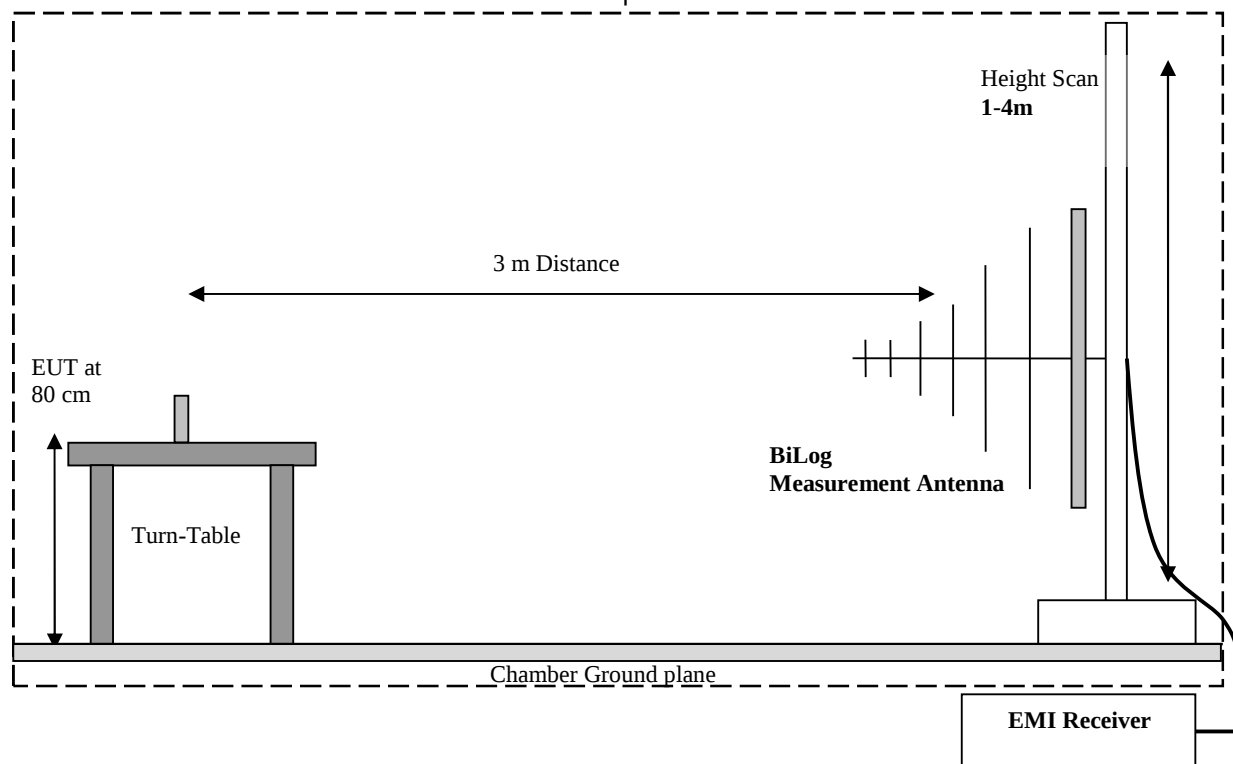
6.1 Radiated Measurement

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

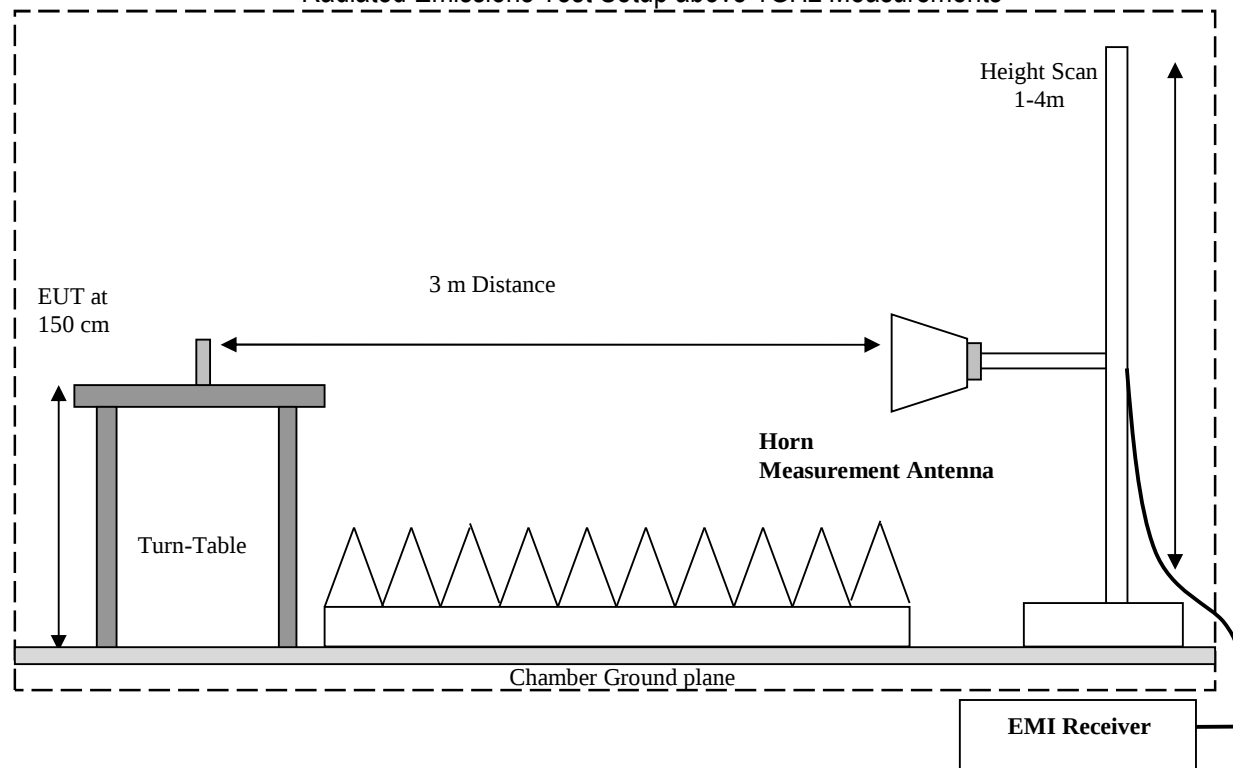
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to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

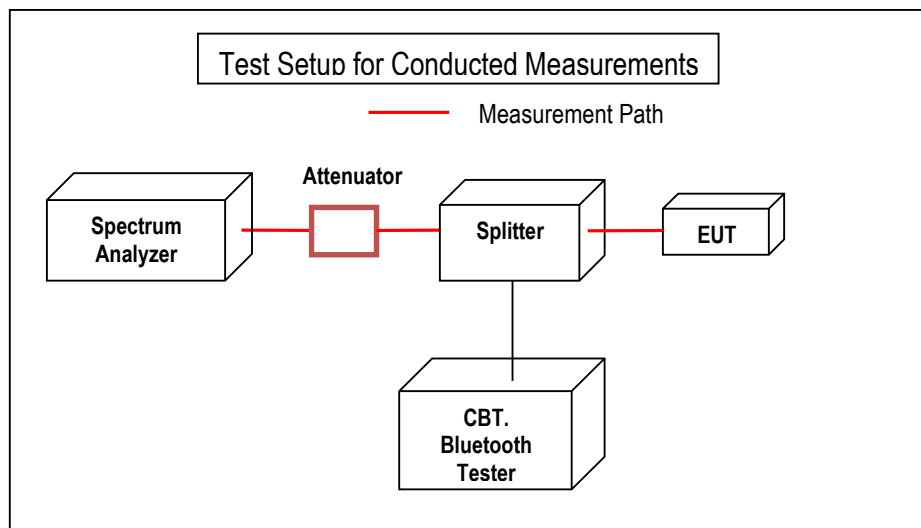
Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

6.2 Power Line Conducted Measurement Procedure

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

6.3 RF Conducted Measurement Procedure

Reference: ANSI C63.10 (2013) Section 6.9, 6.10, and 7.8



- 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.

7 Test Result Data

7.1 Maximum Peak Conducted Output Power

7.1.1 Measurement according to ANSI C63.10 Section 7.8.5

Spectrum Analyzer settings:

- Span = approximately 5 times the 20 dB bandwidth
- RBW > the 20 dB bandwidth of the emission being measured
- VBW $\geq$ RBW
- Sweep = Auto Couple
- Detector function = Peak
- Trace = Max hold
- Use the marker-peak function to set the marker to the peak of the emission.

7.1.2 Limits:

Maximum Peak Output Power:

FCC §15.247: (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

- (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

IC RSS-247 5.4:

- (a) For FHSs operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

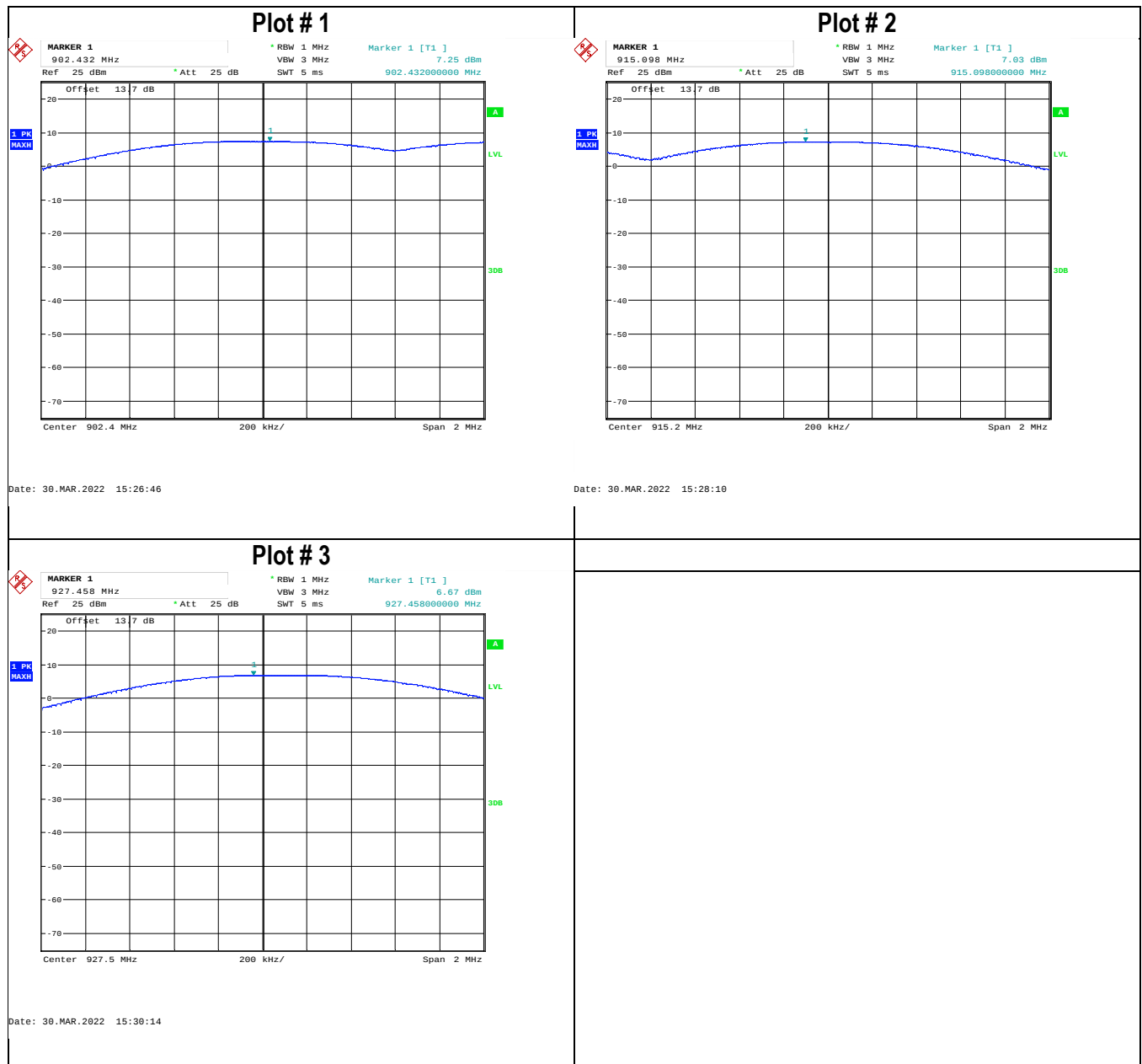
7.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23° C	1	Hopping	3.6 VDC	1.38 dBi

7.1.4 Measurement result:

Plot #	Frequency (MHz)	EUT operating mode	Maximum Peak Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
1	902.4	FSK	7.25	8.63	24(Pk) / 30(EIRP)	Pass
2	915.2	FSK	7.03	8.41	24(Pk) / 30(EIRP)	Pass
3	927.5	FSK	6.67	8.05	24(Pk) / 30(EIRP)	Pass

7.1.5 Measurement Plots:



7.2 Band Edge Compliance

7.2.1 Measurement according to ANSI C63.10 Section 6.10

Spectrum Analyzer settings for non-restricted band edge:

- Span: wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
- RBW $\geq$ 1% of the span
- VBW $\geq$ RBW
- Sweep Time: Auto couple
- Detector = Peak
- Trace = Max hold
- Allow the trace to stabilize. 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.
- Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.
- Now, using the same instrument settings, enable the hopping function of the EUT.
- Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

Spectrum Analyzer settings for restricted band:

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

7.2.2 Limits: Restricted Band FCC 15.209 and RSS-Gen 8.10

- PEAK LIMIT= 74 dB μ V/m @3 m =-21.23 dBm
- AVG. LIMIT= 54 dB μ V/m @3 m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205

Restricted bands of operation:

- Except as shown in CFR 47 Part 15.205 paragraph (d), 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			

7.2.3 Limits: Non-restricted Band §15.247 and RSS-247 5.5

FCC15.247 (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 device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

7.2.4 Test conditions and setup:

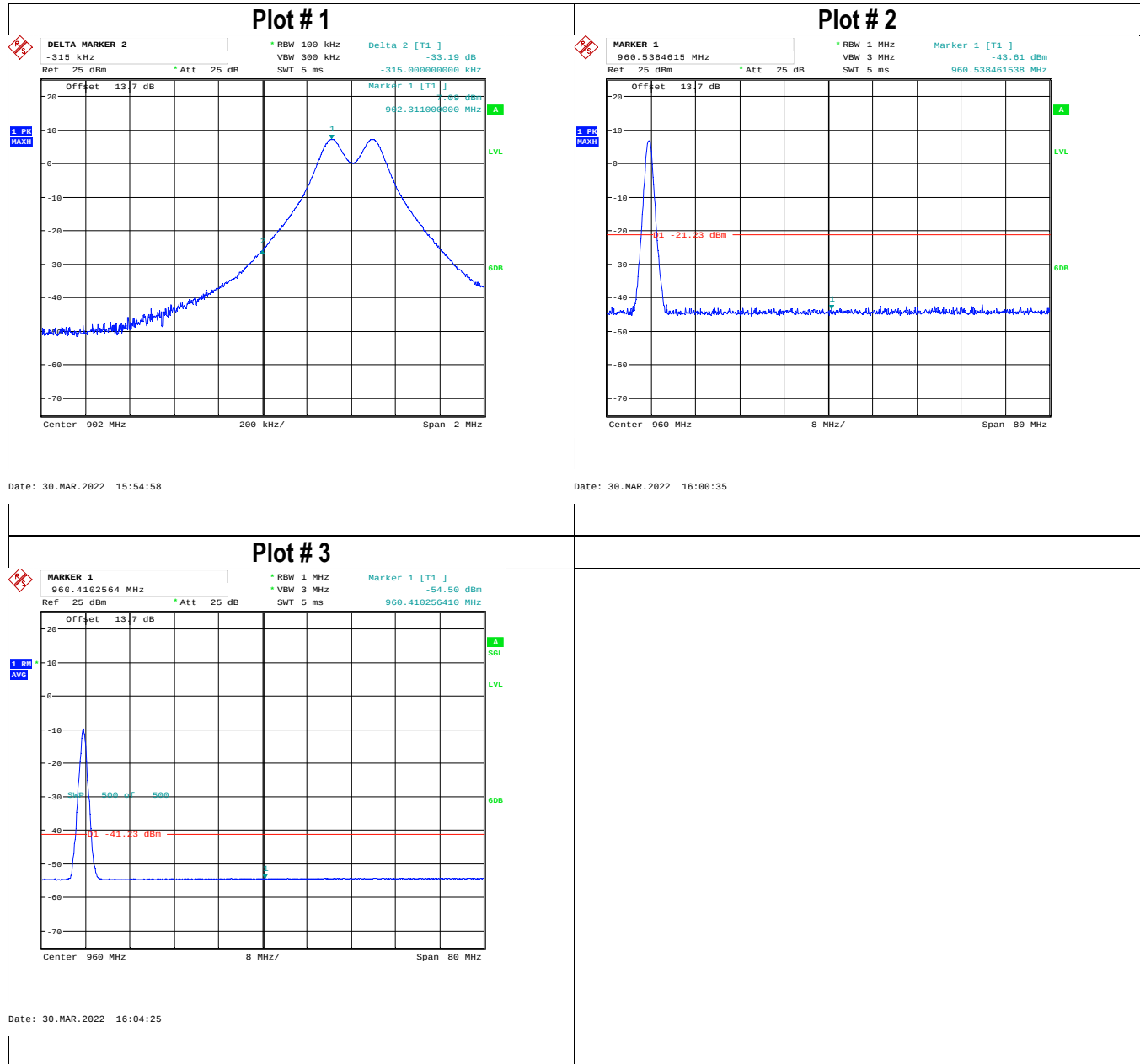
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna gain
23° C	1	Hopping	3.6 VDC	1.38 dBi

7.2.5 Measurement result:

Plot #	EUT operating mode	Band Edge	Band Edge Delta (dBc)	Limit (dBc)	Result
1	FSK	Lower, non-restricted	33.19	> 20	Pass

Plot #	EUT operating mode	Band Edge	Measured value	Corrected by Antenna gain	Limit (dBm)	Result
2	FSK	Upper restricted Peak	-43.61	-42.23	-21.23 Peak	Pass
3	FSK	Upper restricted AVG	-54.50	-53.12	-41.23 AVG	Pass

7.2.6 Measurement Plots:



7.3 20dB Bandwidth

7.3.1 Measurement according to ANSI C63.10 Section 6.9.2

Spectrum Analyzer settings:

- Span: approximately 2 to 5 times the 20 dB bandwidth, centered on the hopping channel
- RBW = 1% to 5% of the 20 dB bandwidth
- VBW = 3 x RBW
- Sweep Time = Auto couple
- Detector = Peak
- Trace = Max hold

7.3.2 Limits: FCC §15.247(a)(1), RSS-247 5.1(c)

FCC §15.247(a)(1):

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

RSS-247 5.1(c):

For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

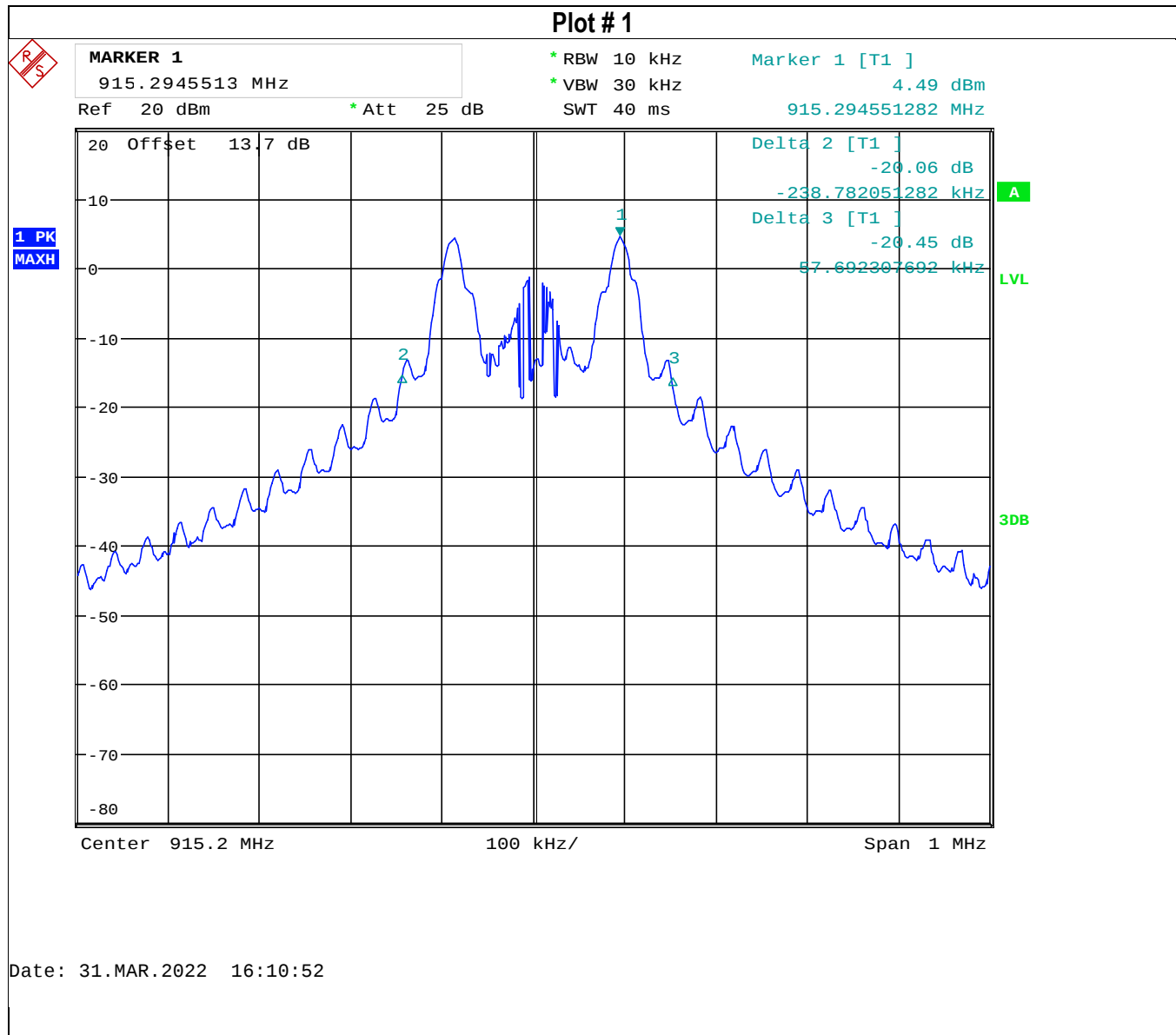
7.3.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	Hopping	3.6 VDC

7.3.4 Measurement result:

Plot #	EUT operating mode	20 dB Bandwidth (MHz)
1	FSK	0.296

7.3.5 Measurement Plots:



7.4 Carrier Frequency Separation

7.4.1 Measurement according to ANSI C63.10 Section 7.8.2

Spectrum Analyzer settings:

- Span = Wide enough to capture the peaks of the two adjacent channels
- RBW $\geq$ 1% of the span
- VBW $\geq$ RBW or 3 x
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold
- Use marker-delta function to determine the separation between the peaks of the two adjacent channels.

7.4.2 Limits: FCC §15.247(a)(1) & RSS-247 5.1(b)

FCC §15.247(a)(1):

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

RSS-247 5.1(c):

For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

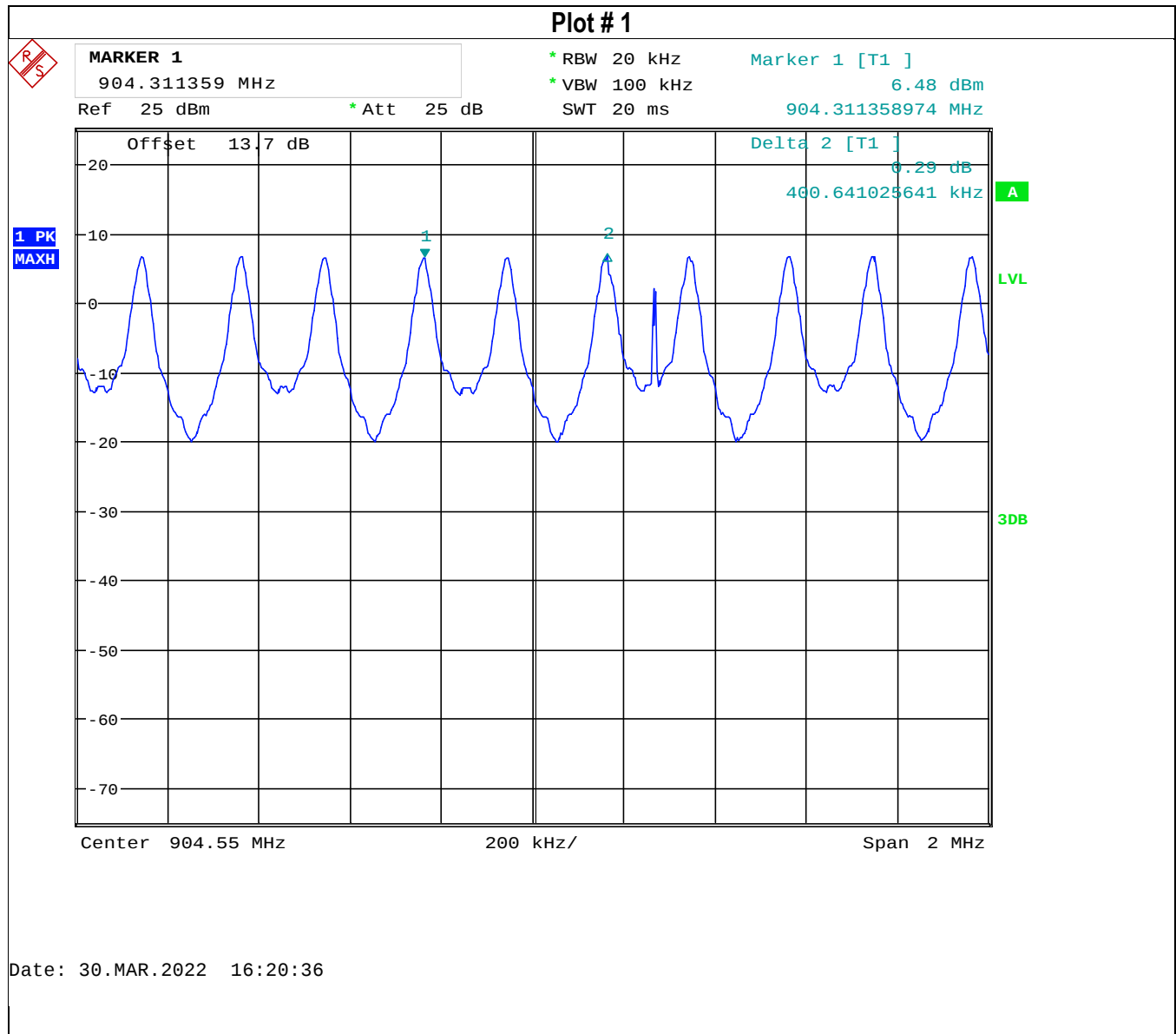
7.4.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	Hopping	3.6 VDC

7.4.4 Measurement result:

Plot #	Carrier Frequency Separation (MHz)	Limit (MHz)	Result
1	0.401	$\Delta f \geq \text{MAX} \{ 25 \text{ kHz}, \text{BW}_{20\text{dB}} \} = 0.296$	Pass

7.4.5 Measurement Plots:



7.5 Number of hopping channels

7.5.1 Measurement according to ANSI C63.10 Section 7.8.3

Spectrum Analyzer settings:

- Span = the entire frequency band of operation
- RBW $\geq$ 50 KHz
- VBW $\geq$ RBW or 3X
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold

7.5.2 Limits: FCC §15.247(a)(1)(i) & RSS-247 5.1(c)

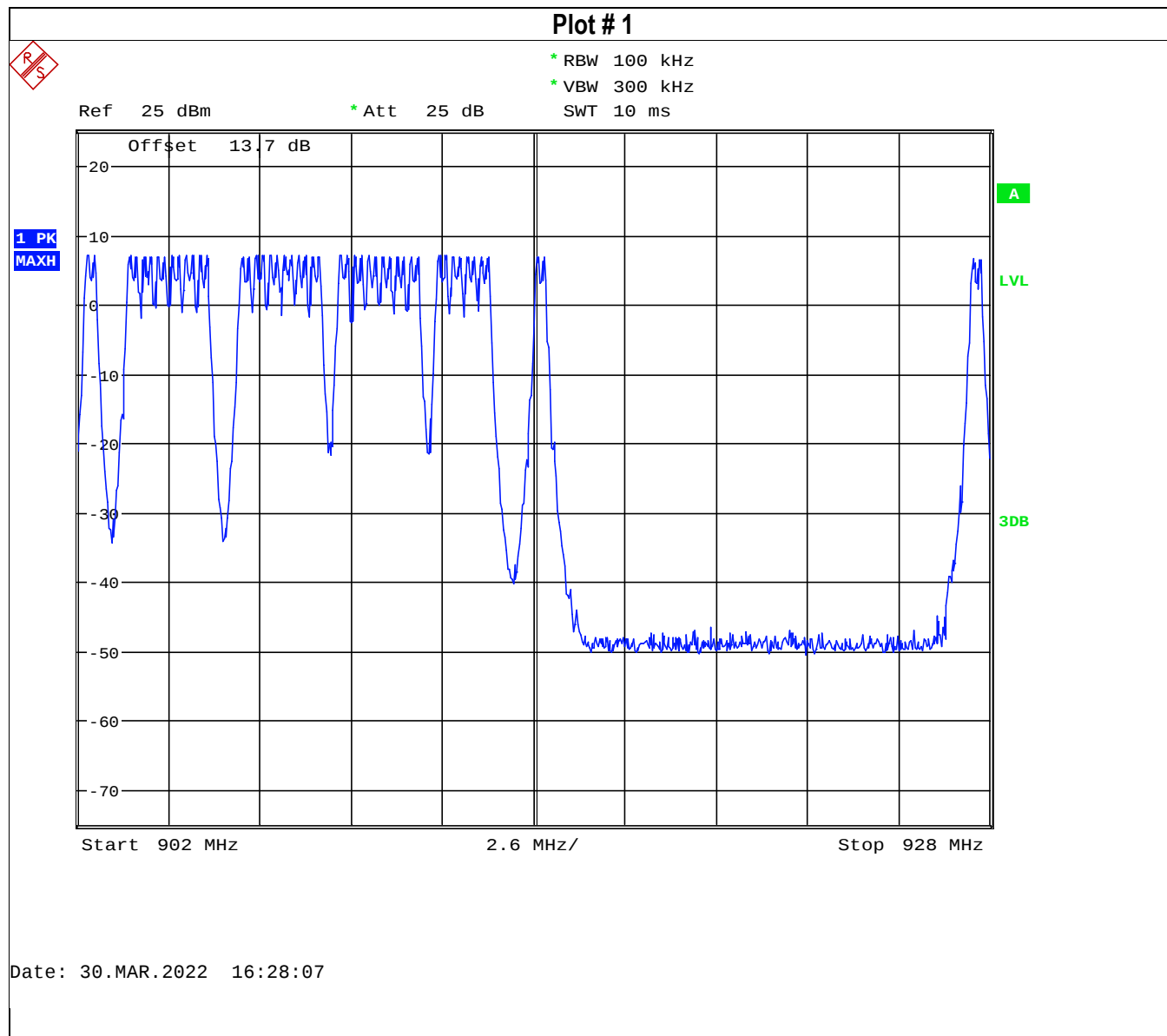
At least 25 hopping frequencies

7.5.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	Hopping	3.6 VDC

7.5.4 Measurement result:

Plot #	Number of Hopping Frequencies	Limit	Result
1	25	$25 \leq N_{ch} < 50$	Pass



7.6 Time of Occupancy (Dwell Time)

7.6.1 Measurement according to ANSI C63.10 Section 7.8.4

Spectrum Analyzer settings:

Duration of Pulse Measurement

- RBW = 1 MHz
- VBW = 3 MHz
- Span = Zero Span
- Sweep Time = 10 ms
- Sweep Mode = Single
- Detector = Peak
- Trigger = Video

Observation Period

- RBW = 1 MHz
- VBW = 3 MHz
- Span = Zero Span
- Sweep Time = 31.6 s
- Sweep Mode = Single
- Detector = Peak
- Trigger = Free Run

7.6.2 Limits: FCC §15.247(a)(1)(i) & RSS-247 5.1(c)

FCC §15.247(a)(1)(i):

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

RSS-247 5.1(c):

For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

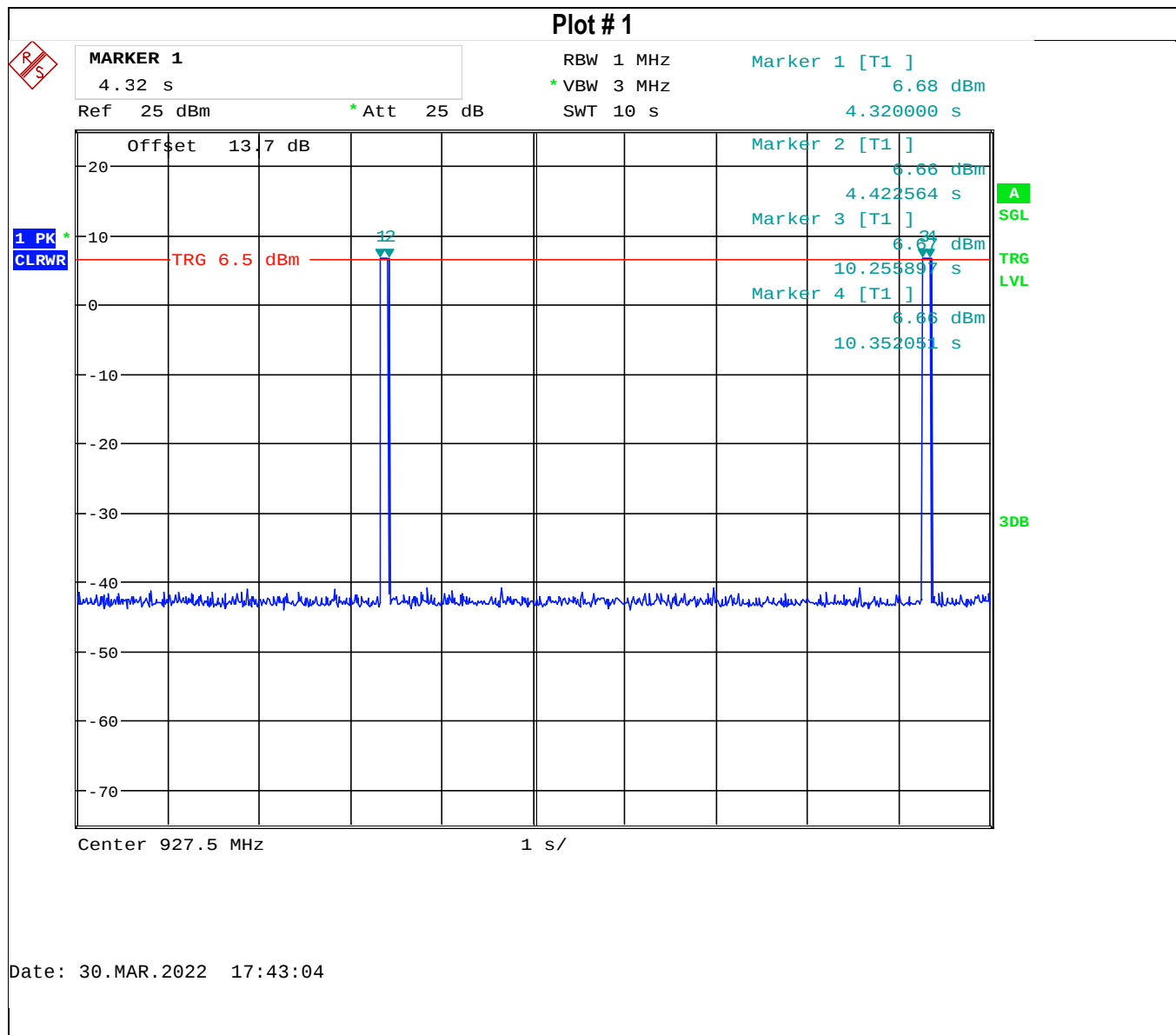
7.6.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	Hopping	3.6 VDC

7.6.4 Measurement result:

Plot #	Modulation	Total Dwell Time in 10s (ms)	Limit (ms)	Result
1	FSK	199	< 400 in 10s	Pass

7.6.5 Measurement Plots:



7.7 Transmitter Spurious Emissions and Restricted Bands

7.7.1 Measurement according to ANSI C63.10

Analyzer Settings:

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

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

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

- 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.

7.7.2 Limits: FCC 15.247(d)/15.209(a) /RSS-Gen 6.13

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= 74dB μ V/m
- AVG. LIMIT= 54dB μ V/m
- Except as shown in CFR 47 Part 15.205 paragraph (d), only spurious emissions are permitted in any of the frequency bands listed below

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

7.7.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23° C	1	Fixed channel	3.6 VDC

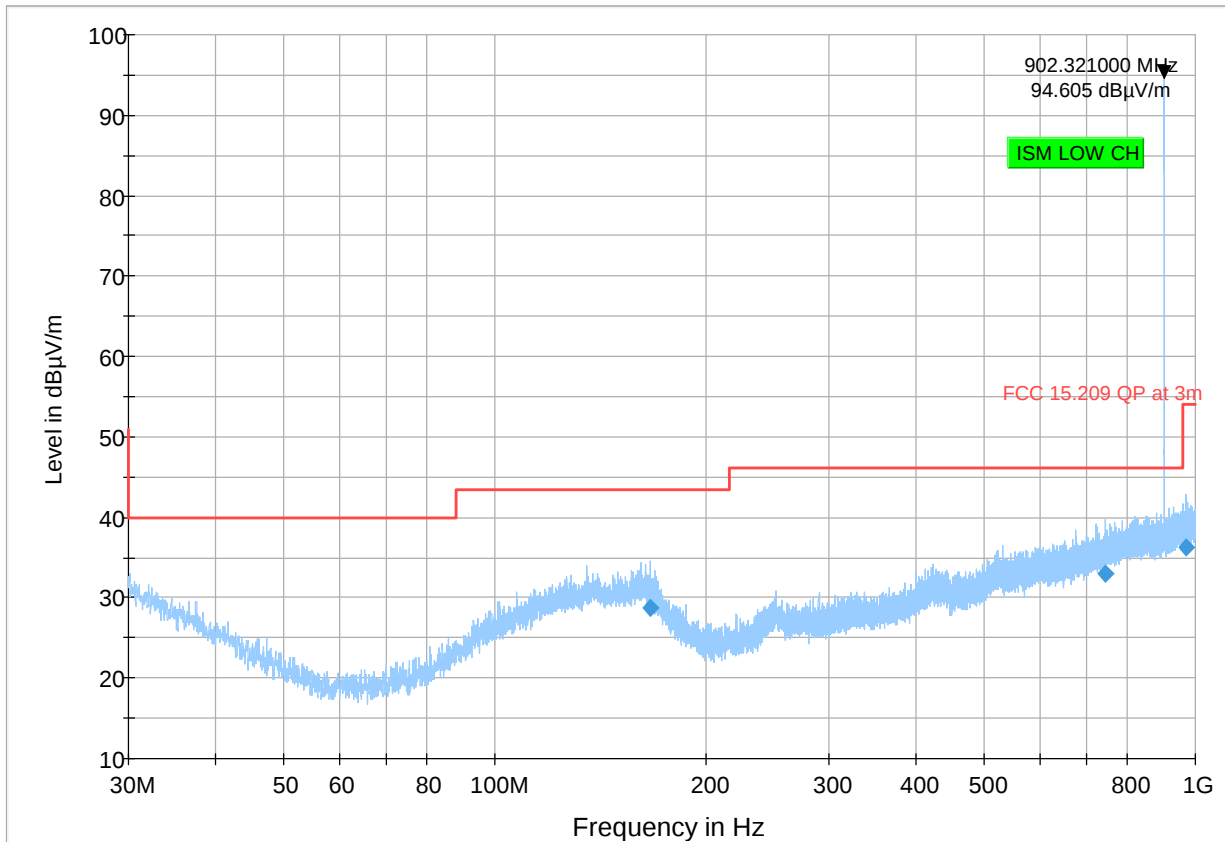
7.7.4 Measurement result:

Plot #	Channel #	Scan Frequency	Limit	Result
1-3	Low	30 MHz – 18 GHz	See section 7.7.2	Pass
4-7	Mid	9 kHz – 18 GHz	See section 7.7.2	Pass
8-10	High	30 MHz – 18 GHz	See section 7.7.2	Pass

7.7.5 Measurement Plots:

Plot # 1

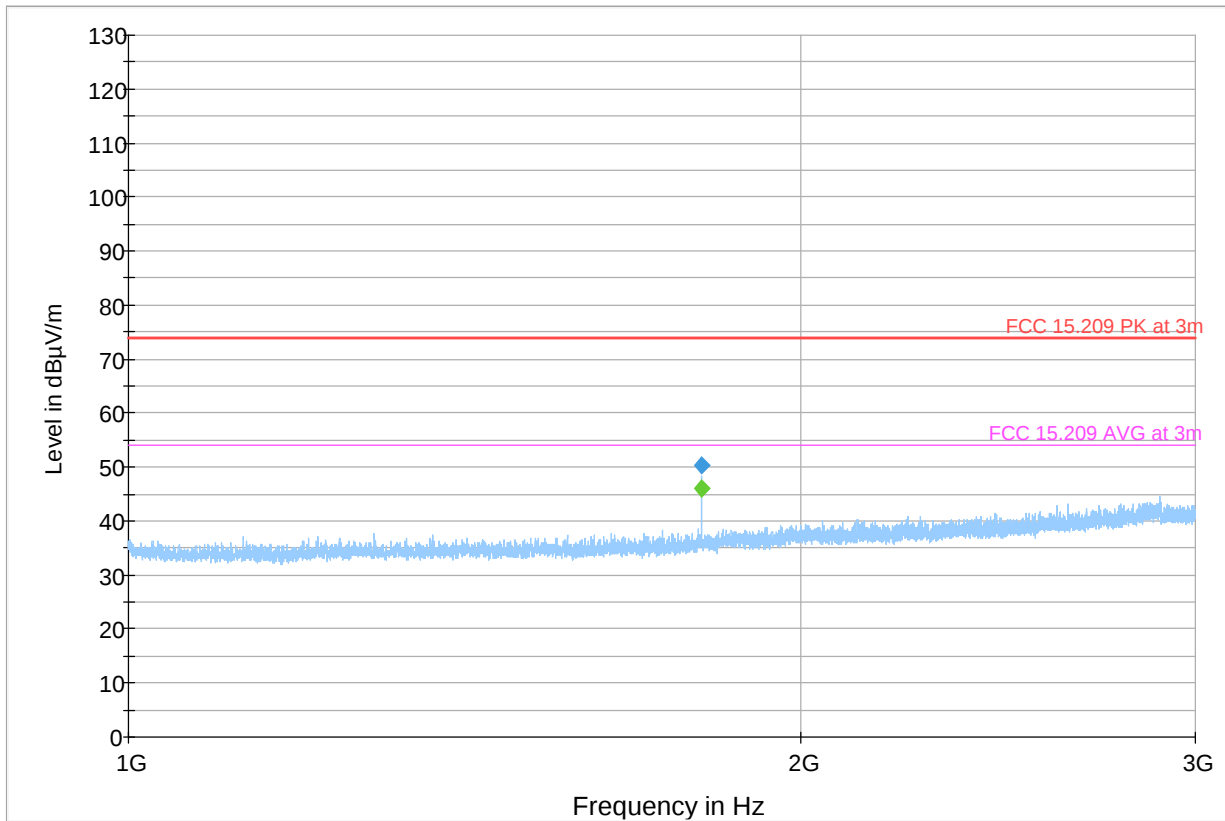
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
166.41	28.67	43.50	14.83	500.0	120.0	262.0	V	68.0	25.7
742.89	33.01	46.02	13.01	500.0	120.0	151.0	V	88.0	29.8
970.19	36.28	53.98	17.70	500.0	120.0	204.0	V	215.0	32.8



Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 QP at 3m Final_Result C

Plot # 2

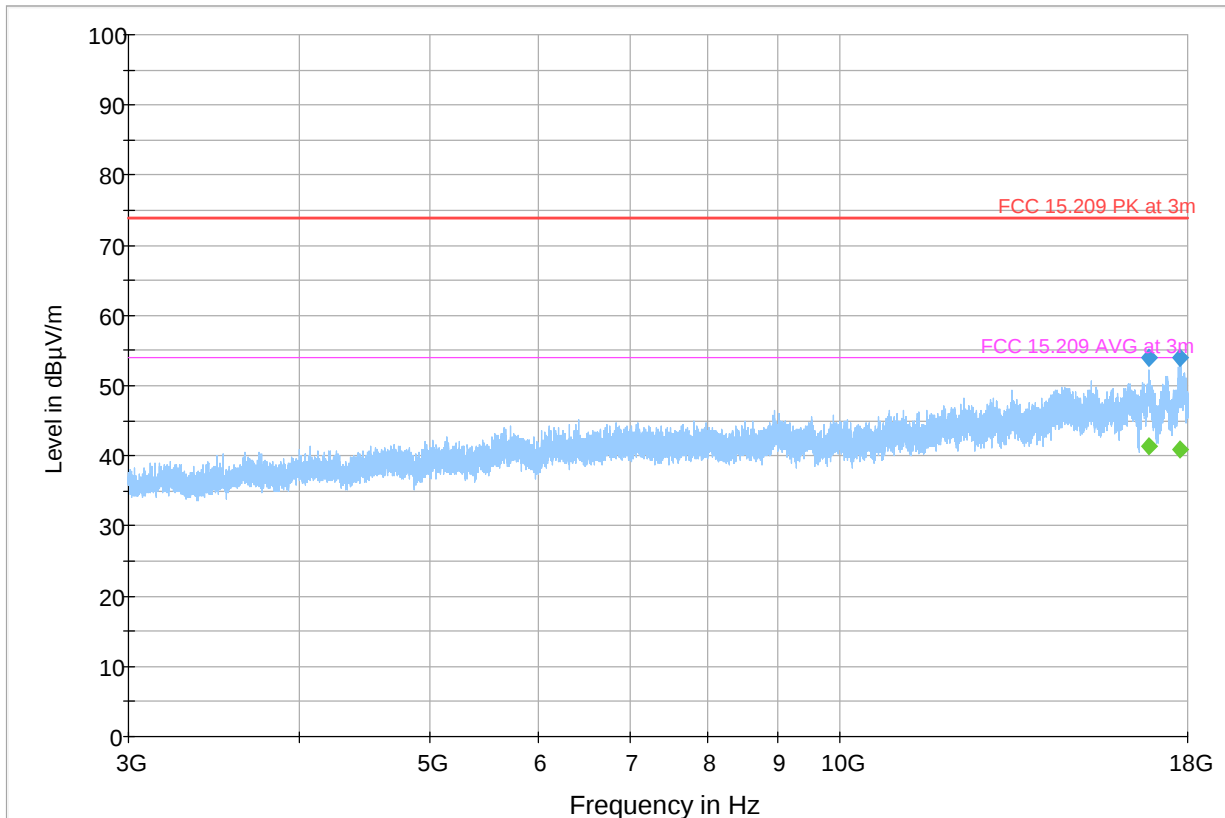
Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1804.57	---	46.10	53.98	7.88	500.0	1000.0	209.0	H	110.0	4.2
1804.57	50.35	---	73.98	23.63	500.0	1000.0	209.0	H	110.0	4.2



Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

Plot # 3

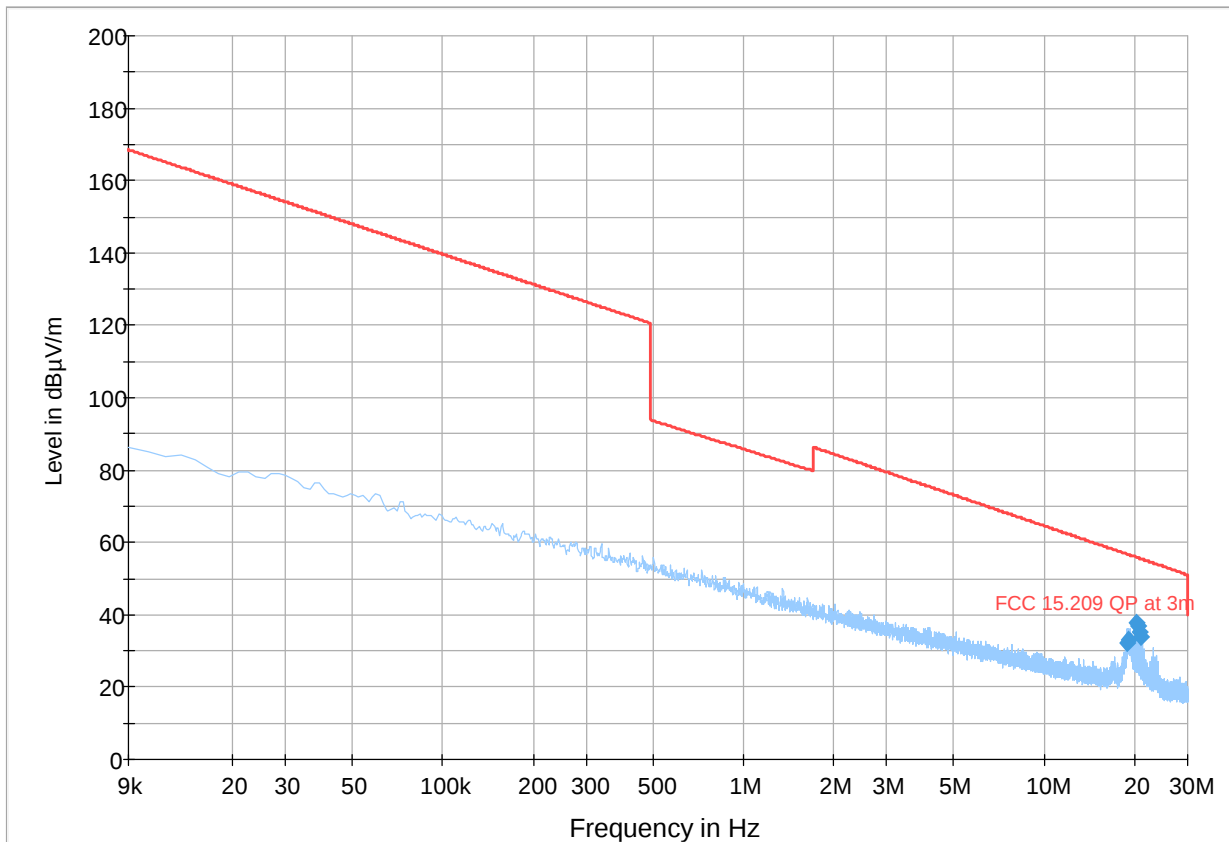
Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
16837.50	---	41.40	53.98	12.58	500.0	1000.0	251.0	V	-22.0	14.4
16837.50	53.89	---	73.98	20.09	500.0	1000.0	251.0	V	-22.0	14.4
17785.00	---	40.92	53.98	13.06	500.0	1000.0	204.0	V	212.0	17.4
17785.00	54.05	---	73.98	19.93	500.0	1000.0	204.0	V	212.0	17.4



Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

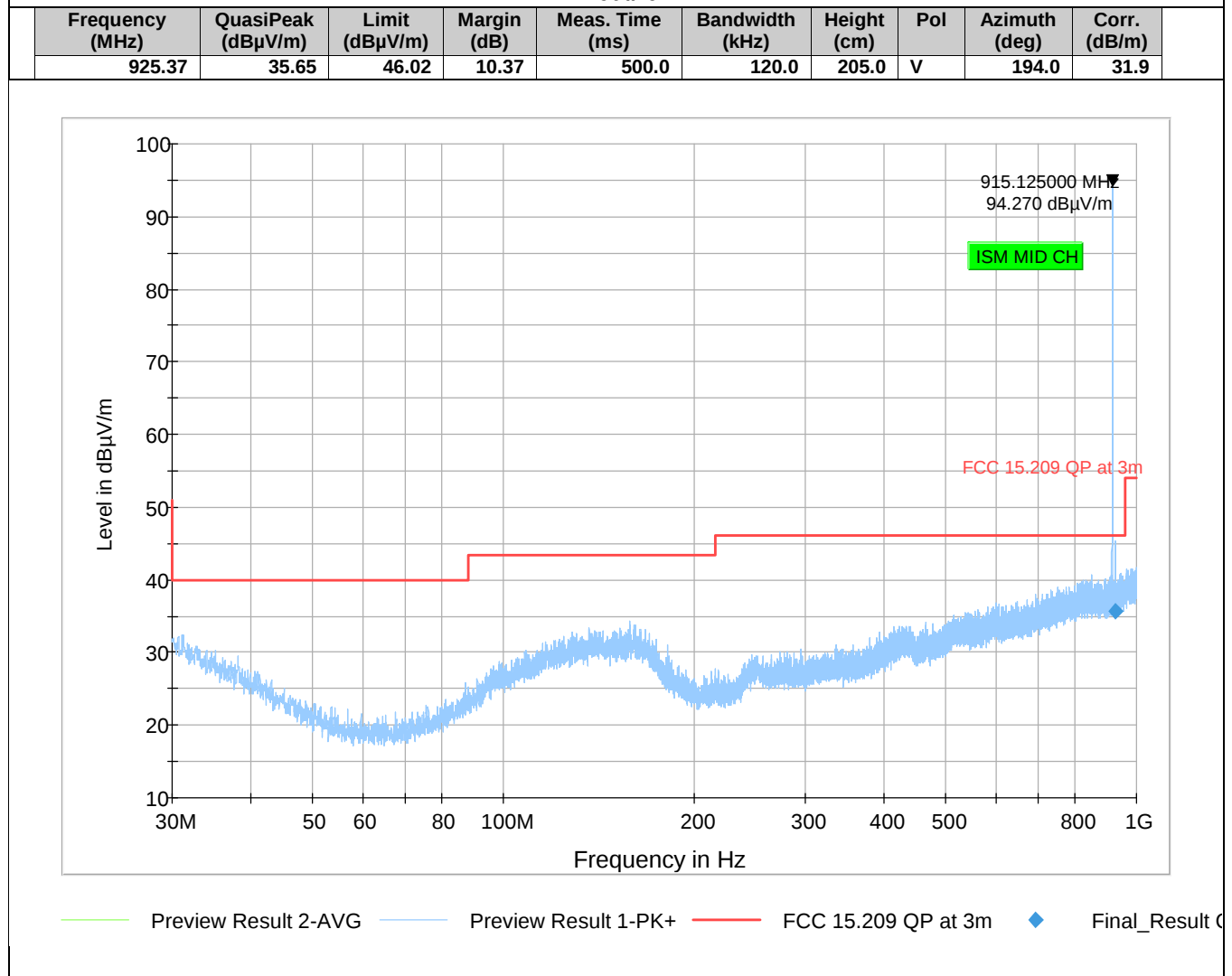
Plot # 4

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18.93	32.05	56.71	24.65	500.0	9.0	100.0	H	141.0	16.5
19.07	32.96	56.62	23.66	500.0	9.0	100.0	H	157.0	16.5
20.22	37.83	55.90	18.07	500.0	9.0	100.0	H	5.0	16.5
20.49	36.78	55.74	18.95	500.0	9.0	100.0	H	13.0	16.4
20.75	35.30	55.58	20.28	500.0	9.0	100.0	H	186.0	16.4
21.01	34.05	55.42	21.37	500.0	9.0	100.0	H	191.0	16.4



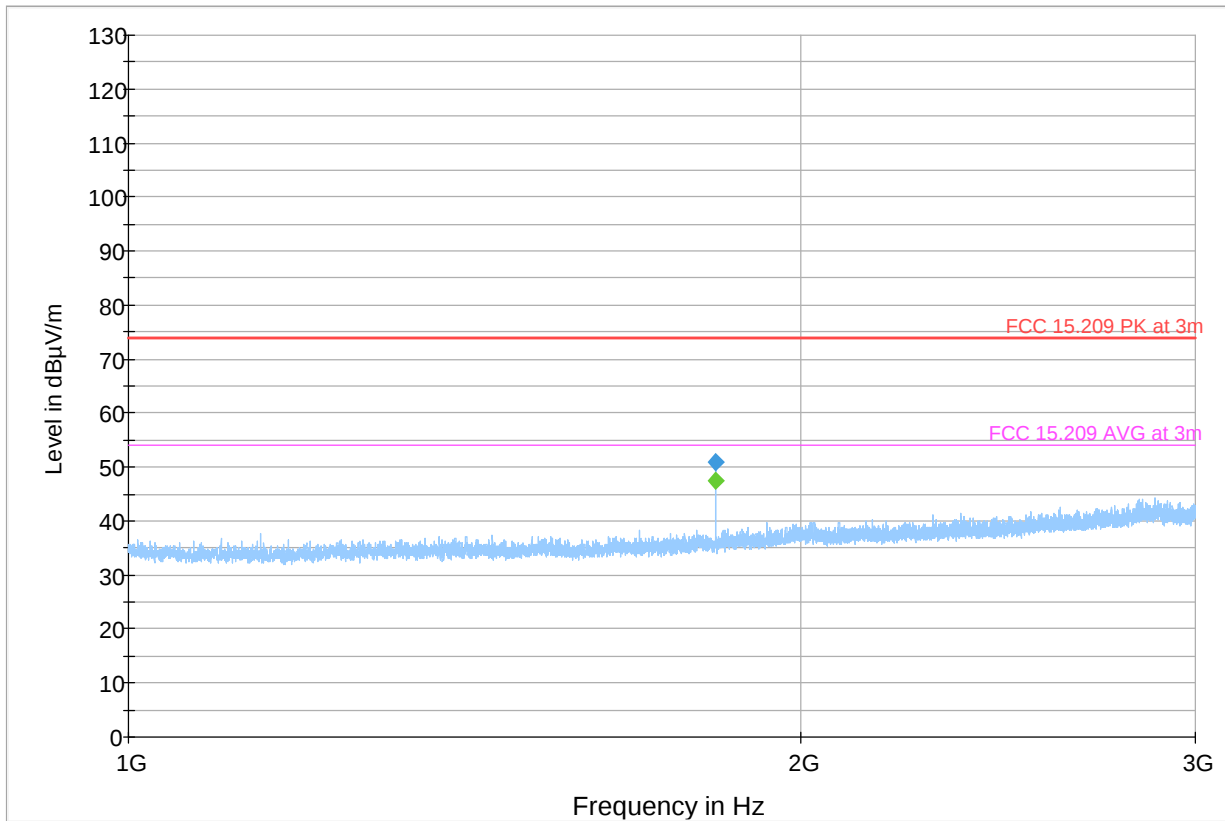
Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 QP at 3m Final_Result C

Plot # 5



Plot # 6

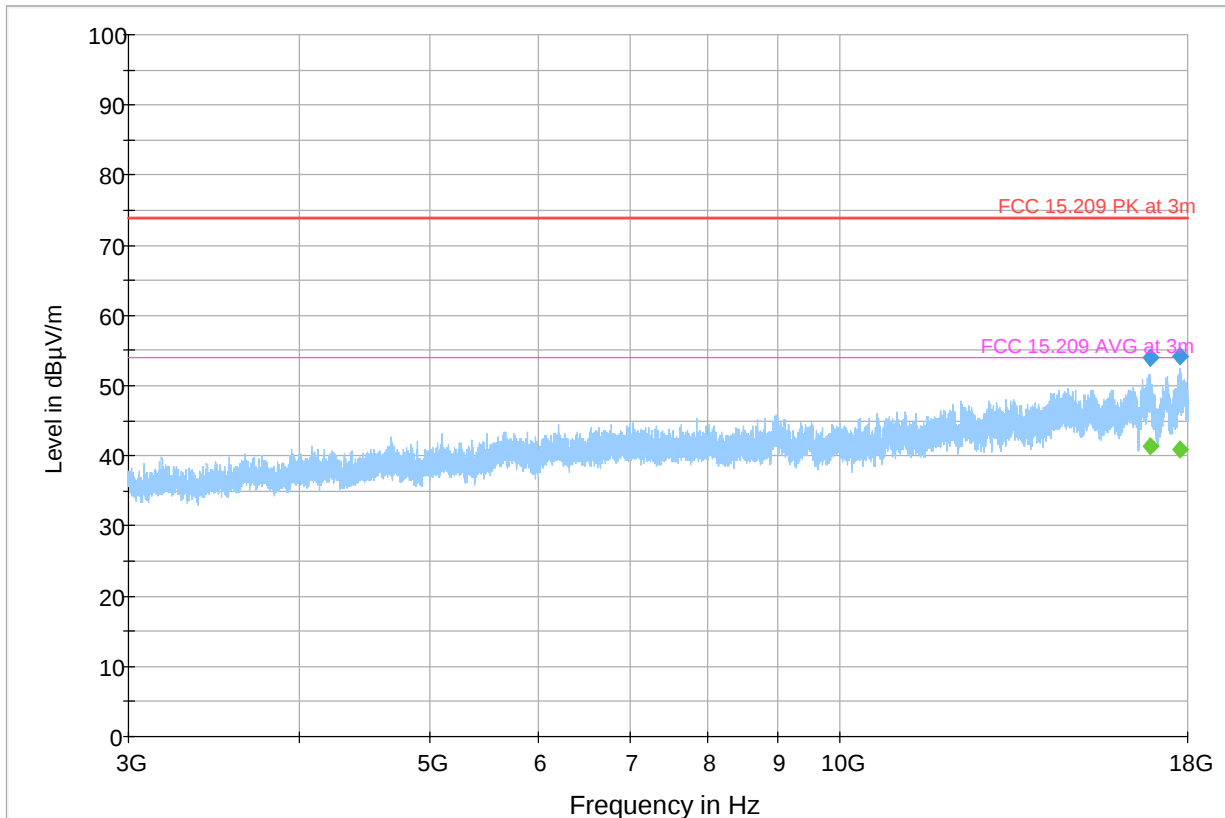
Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1830.57	---	47.53	53.98	6.45	500.0	1000.0	150.0	H	93.0	4.4
1830.57	51.03	---	73.98	22.95	500.0	1000.0	150.0	H	93.0	4.4



Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

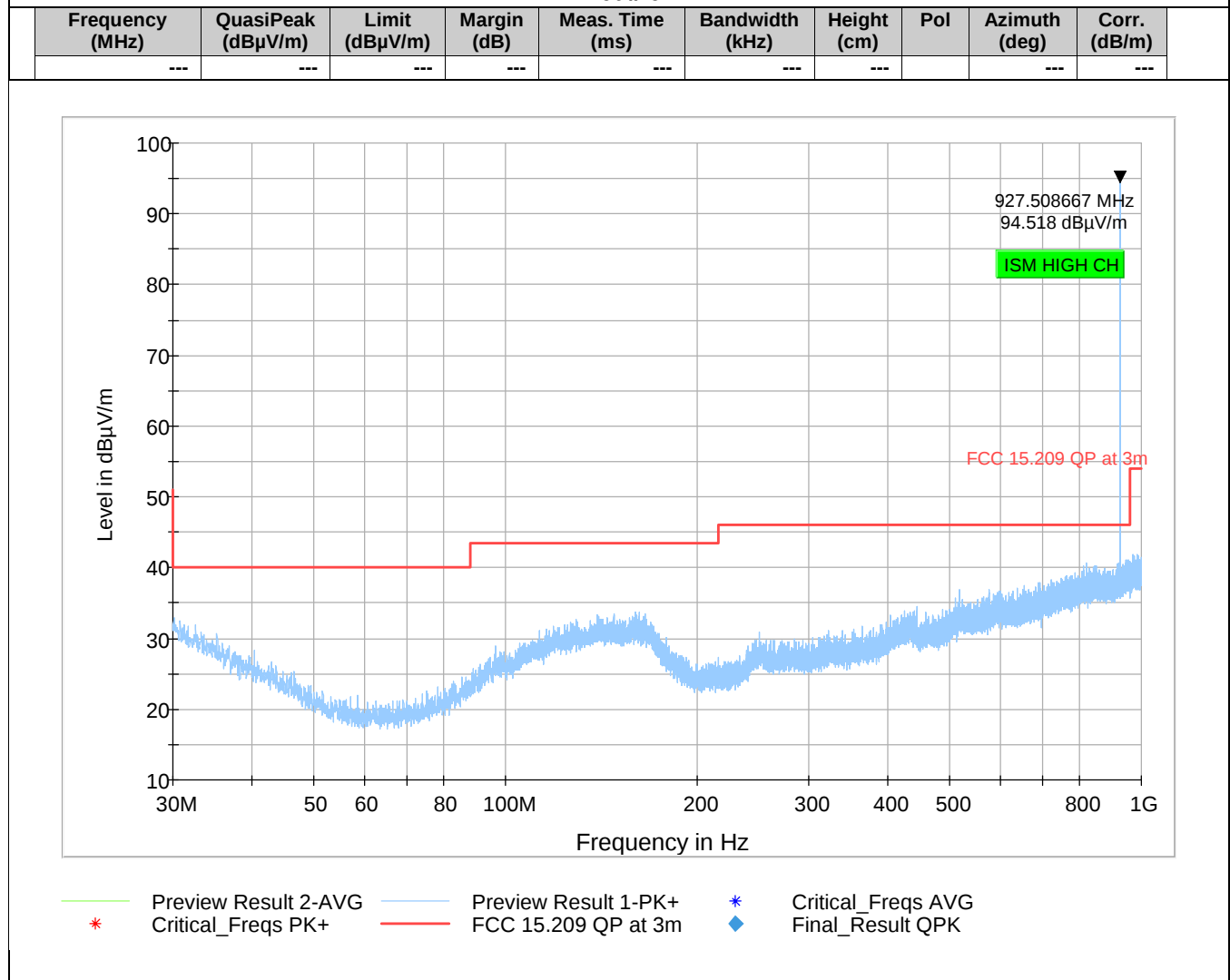
Plot # 7

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
16879.25	54.03	---	73.98	19.95	500.0	1000.0	275.0	V	132.0	14.3
16879.25	---	41.45	53.98	12.53	500.0	1000.0	275.0	V	132.0	14.3
17787.25	54.27	---	73.98	19.71	500.0	1000.0	247.0	H	-38.0	17.5
17787.25	---	40.96	53.98	13.02	500.0	1000.0	247.0	H	-38.0	17.5



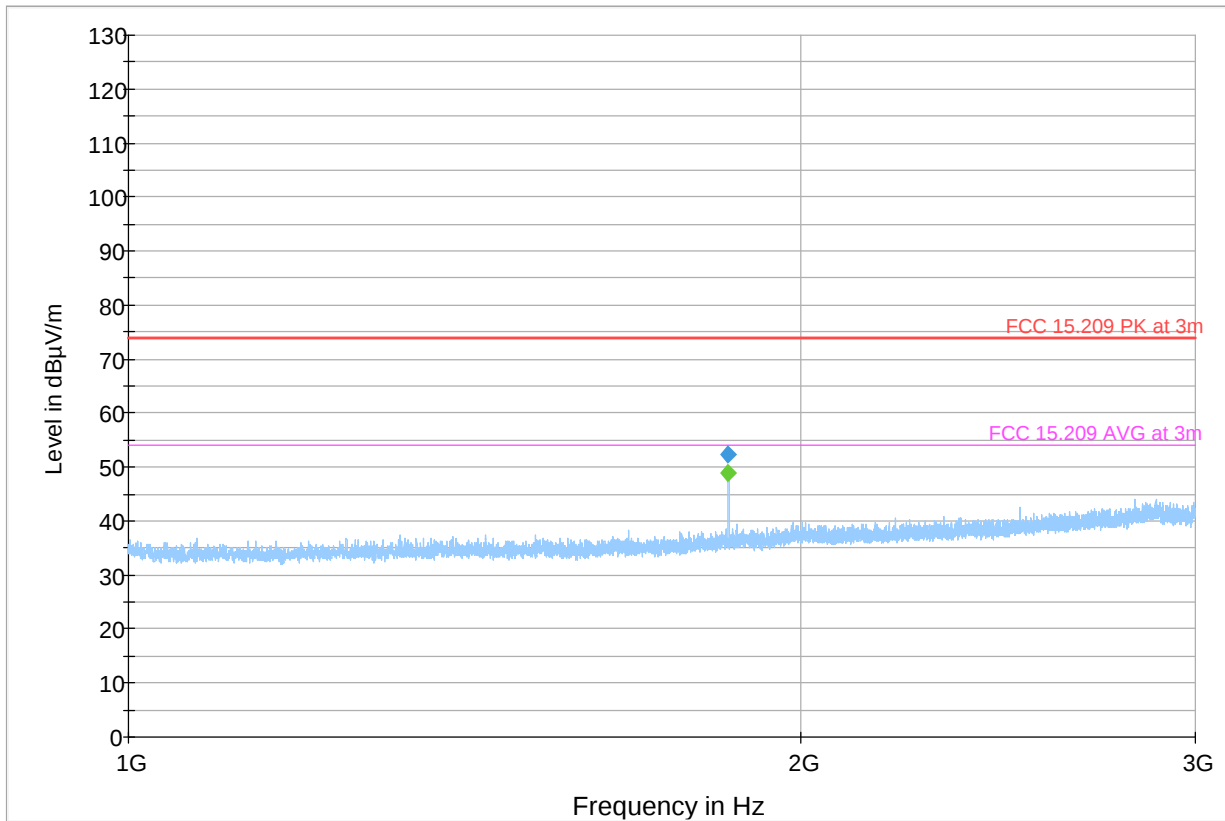
Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

Plot # 8



Plot # 9

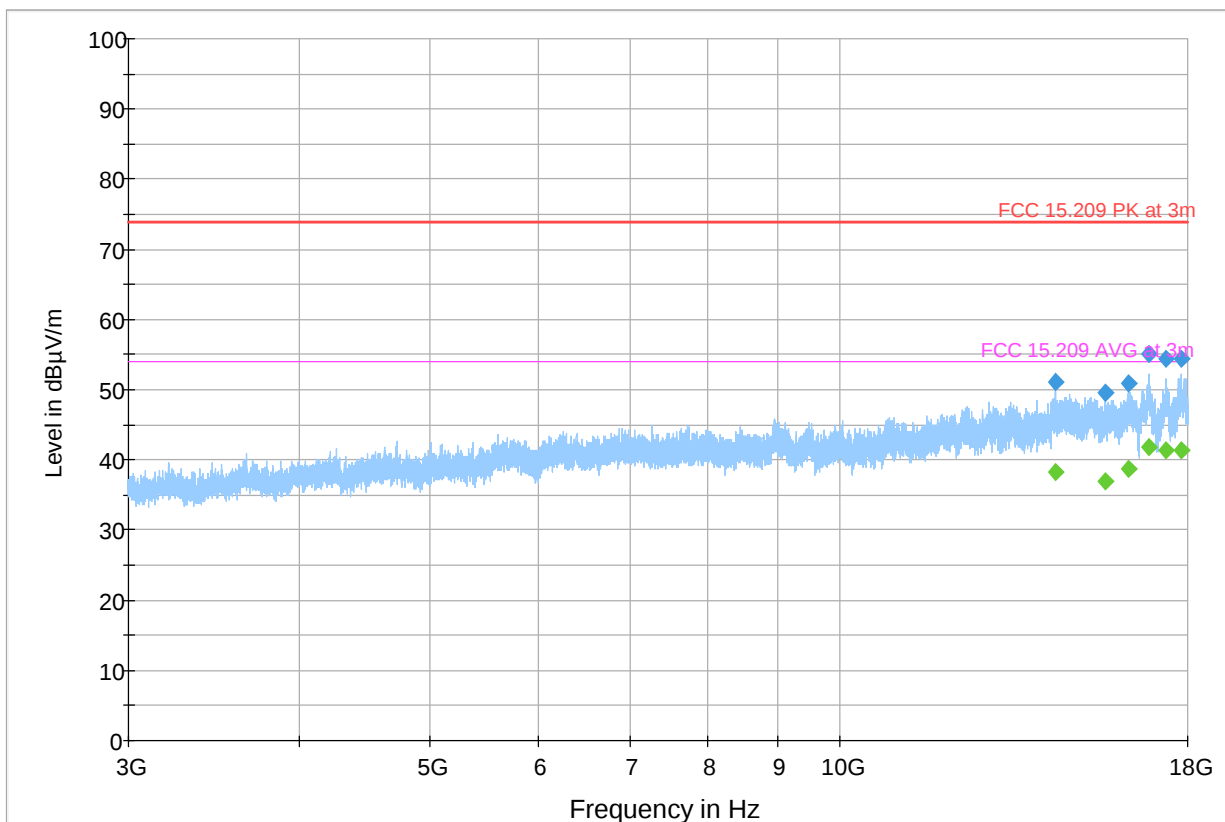
Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1855.00	---	48.96	53.98	5.02	500.0	1000.0	159.0	H	100.0	4.5
1855.00	52.35	---	73.98	21.63	500.0	1000.0	159.0	H	100.0	4.5



Preview Result 2-AVG Preview Result 1-PK+ FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

Plot # 10

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
14382.75	51.04	---	73.98	22.94	500.0	1000.0	107.0	H	110.0	9.2
14382.75	---	38.33	53.98	15.65	500.0	1000.0	107.0	H	110.0	9.2
15674.25	---	36.99	53.98	16.99	500.0	1000.0	128.0	H	110.0	10.5
15674.25	49.54	---	73.98	24.44	500.0	1000.0	128.0	H	110.0	10.5
16284.25	50.99	---	73.98	22.99	500.0	1000.0	100.0	H	-34.0	13.6
16284.25	---	38.67	53.98	15.31	500.0	1000.0	100.0	H	-34.0	13.6
16860.00	55.08	---	73.98	18.90	500.0	1000.0	107.0	V	288.0	14.3
16860.00	---	41.71	53.98	12.26	500.0	1000.0	107.0	V	288.0	14.3
17363.50	---	41.34	53.98	12.64	500.0	1000.0	198.0	V	242.0	15.9
17363.50	54.41	---	73.98	19.57	500.0	1000.0	198.0	V	242.0	15.9
17793.00	54.47	---	73.98	19.51	500.0	1000.0	100.0	V	238.0	17.6
17793.00	---	41.27	53.98	12.71	500.0	1000.0	100.0	V	238.0	17.6



— Preview Result 2-AVG
 — Preview Result 1-PK+
 — FCC 15.209 PK at 3m
— FCC 15.209 AVG at 3m
 ◆ Final_Result PK+
 ◆ Final_Result CAV

8 Test setup photos

Setup photos are included in supporting file name: "EMC_HONEY-225-22001_FCC_Setup_Photos"

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
TEST RECEIVER	R&S	ESU40	100251	2 YEARS	09/13/2021
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	Prepared by
2022-04-12	EMC_HONEY-225-22001_FCC_15.247	Initial Version	Cheng Song

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