FCC Test Report

ResMed Ltd.

Model Number: 28323

Product Description: Continuous Positive Airway Pressure (CPAP) Device

FCC ID: 2ACHL-A10STA3G
IC ID: 9103A-A10STA3G

47 CFR Part 2, 22, 24, 27
RSS-GEN Issue 4, RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3

TEST REPORT #: EMC_CONNE-045-15001_FCC 22_24_27_WWAN_v1.0
DATE: 01/20/2016

FCC Recognized
A2LA Accredited
IC recognized # 3462E-1

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules parts 2, 22, 24 and 27 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS-Gen, RSS-132, RSS-133 and RSS -139.

No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
ResMed Ltd.	Continuous Positive Airway Pressure (CPAP) Device	28323

Responsible for Testing Laboratory:

Date	Section	Name	Signature
01/20/2016	Compliance	Milton Ponce de Leon (Test Lab Manager)	Milton Ponce de Leon Digitally signed by Milton Ponce de Leon DN: cn=Milton Ponce de Leon, c=US, o=Cetecom Inc., ou=OTA, email=milton.deleon@cetecom.com Date: 2016.01.20 15:00:55 -08'00'

Responsible for the Report:

Date	Section	Name	Signature
01/20/2016	Compliance	Anthony Planinac (EMC Engineer)	Anthony Planinac Digitally signed by Anthony Planinac DN: cn=Anthony Planinac, c=US, o=CETECOM, ou=EMC SD, email=anthony.planinac@cetecom.com Reason: release Date: 2016.01.20 15:28:36 -08'00'

The test results of this test report relate exclusively to the test item specified in Section3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	6370 Nancy Ridge Drive, Suite 101 San Diego, CA 92121 U.S.A.
Telephone:	+1 (858) 362 2400
Fax:	+1 (858) 587 4809
Test Lab Manager:	Milton Ponce de Leon
Responsible Project Leader	Anthony Planinac

2.2 Identification of the Client

Applicant's Name:	ResMed Ltd.
Street Address:	1 Elizabeth Macarthur Drive
City/Zip Code	Bella Vista, NWS, 2153
Country	Australia
Contact Person:	Gerry O'Connor
Phone No.	+612-8884-2165
e-mail:	Gerry.O'Connor@resmed.com.au

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 Specification of the Equipment under Test

Marketing Name / Description:	AirCurve 10 ST-A
Model Number:	28323
FCC-ID :	2ACHL-A10STA3G
IC-ID:	ID ID:9103A-A10STA3G; HVIN: 28323; PMN: AirCurve 10 ST-A
Product Description:	Continuous Positive Airway Pressure (CPAP) Device
Technology / Type(s) of Modulation:	GPRS&EDGE(MCS-1-4): GMSK/850/900/1800/1900MHz EDGE&EPGRS(MCS-5-8): 8PSK/850/900/1800/1900MHz WCDMA / HSPA+ 850/900/1700/1900/2100 MHz
Operating Frequency Ranges (MHz) / Channels:	GSM 850: 824.2-848.8; 125 channels GSM 1900: 1850.2-1909.8; 300 channels FDD II: 826.4 - 846.6; 278 channels FDD IV: 1712.4 -1752.5; 203 channels FDD V: 1852.4 -1907.6; 103 channels
Max. declared conducted power + tune up	GMSK 850MHz = 32.5dBm +/-1dB GMSK 1900MHz = 29.5dBm +/-1dB FDDII, FDDIV and FDDV =23dBm +1dB/-1.5dB
Antenna gasin info:	Taoglas PA.25a, 850MHz =1.49dBi, 1700MHz=2.53dBi, 1850MHz=2.30dBi
Rated Operating Voltage Range:	Vmin: 23V – Vmax: 25V
Rated Operating Temperature Range:	5ºC to 35ºC
Test Sample Status:	Prototype
Radios contained in the device:	Telit HE910-D, FCC ID: RI7HE910, ID: 5131A-HE910

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	Model	SAMPLE	HW Version	SW Version
1	22151827458	28323	RADIATED	BOM 28323	SX558
2	22151827445	28323	CONDUCTED	BOM 28323	SX558

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Part Number
1	AC Adapter	Resmed	370002	NA

3.4 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:
Ambient Temperature: 20-25^{o}C
Relative humidity: 40-60%

3.5 Dates of Testing:

11/01/2015 – 11/16/2015

4 Subject of Investigation

The objective of the measurements applied by CETECOM Inc. was to establish compliance of the EUT as described under Ch. 3 of this Test Report, with the applicable criteria specified in

- 47 CFR Part 2: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission Frequency allocations and radio treaty matters; general rules and regulations.
- 47 CFR Part 22: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 22- Public mobile services
- 47 CFR Part 24: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 24- Personal communication services
- 47 CFR Part 27: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 27- Miscellaneous wireless communication services
- RSS-GEN- Issue 4: General Requirements and Information for the Certification of Radio Apparatus
- RSS-132- Issue 3: Spectrum management and telecommunication policy- Radio Standards Specifications Cellular telephones employing new technologies operating in the bands 824-849MHz and 869-894MHz
- RSS-133- Issue 6: Spectrum management and telecommunication policy- Radio Standards Specifications- 2GHz personal communication services
- RSS-139- Issue 3: Spectrum management and telecommunication policy- Radio Standards Specifications- Advance wireless services equipment operating in the bands 1710-1755MHz and 2110-2155MHz

This test report is to support a request for new equipment authorization under the FCC ID: **2ACHL-A10STA3G** and IC ID: **9103A-A10STA3G**
All testing was performed on the product referred to in Section 3 as EUT.

This product integrates the precertified WWAN module : Telit HE910-D.

Per guidelines from KDB 996369, conducted signal test results from module certification is re-used for this certification as the output power has been verified to be within the specified production tolerances and measurement uncertainities.

The module test data can be obtained under the FCC Filing ID: **RI7HE910** and IC Filling: **5131A-HE910.**

5 Summary of Measurement Results

GSM and UMTS 850 MHz Band:

Specifications	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (b) RSS-GEN, 6.12 RSS-132, 5.4	RF Output Power	Nominal	GSM 850	■	☐	☐	☐	Complies
			UMTS Band V	■	☐	☐	☐	Complies
RSS-132(5.4)	Peak-to-average Ratio	Extreme	GSM 850	☐	☐	☐	■	Complies
			UMTS Band V	☐	☐	☐	■	Complies
§2.1055 §22.355 RSS-GEN, 6.11 RSS-132 5.3	Frequency Stability	Extreme	GSM 850	☐	☐	☐	■	Complies
			UMTS Band V	☐	☐	☐	■	Complies
§2.1049 §22.917(b) RSS-GEN, 6.6	Occupied Bandwidth	Nominal	GSM 850	☐	☐	☐	■	Complies
			UMTS Band V	☐	☐	☐	■	Complies
§2.1051 §22.917 RSS-GEN, 6.13 RSS-132, 5.5	Band Edge Compliance	Nominal	GSM 850	☐	☐	☐	■	Complies
			UMTS Band V	☐	☐	☐	■	Complies
§2.1053 §22.917 RSS-GEN, 6.13 RSS-132, 5.5	Unwanted Emissions	Nominal	GSM 850	■	☐	☐	☐	Complies
			UMTS Band V	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed (Leveraged from module certification).

GSM and UMTS 1900 MHz Band:

Specifications	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (c)(d) RSS-GEN, 6.12 RSS-133, 6.4	RF Output Power	Nominal	GSM 1900	■	☐	☐	☐	Complies
			UMTS Band II	■	☐	☐	☐	Complies
§24.232 (d) RSS-133(6.12)	Peak-to-average Ratio	Nominal	GSM 1900	☐	☐	☐	■	Complies
			UMTS Band II	☐	☐	☐	■	Complies
§2.1055 §24.235 RSS-GEN, 6.11 RSS-133, 6.3	Frequency Stability	Extreme	GSM 1900	☐	☐	☐	■	Complies
			UMTS Band II	☐	☐	☐	■	Complies
§2.1049 RSS-GEN, 6.6	Occupied Bandwidth	Nominal	GSM 1900	☐	☐	☐	■	Complies
			UMTS Band II	☐	☐	☐	■	Complies
§2.1051 §24.238 RSS-GEN, 6.13 RSS-133, 6.5	Band Edge Compliance	Nominal	GSM 1900	☐	☐	☐	■	Complies
			UMTS Band II	☐	☐	☐	■	Complies
§2.1053 §24.238 RSS-GEN, 6.13 RSS-133, 6.5	Unwanted Emissions	Nominal	GSM 1900	■	☐	☐	☐	Complies
			UMTS Band II	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed (Leveraged from module certification).

UMTS 1700 MHz Band:

Specifications	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §27.50(d)(4) RSS-GEN, 6.12 RSS-139(6.5)	RF Output Power	Nominal	UMTS Band IV	■	☐	☐	☐	Complies
§27.50(d)(5) RSS-GEN, 6.12 RSS-139(6.5)	Peak-to-average Ratio	Nominal	UMTS Band IV	☐	☐	☐	■	Complies
§2.1055 §27.54 RSS-GEN, 6.11 RSS-139(6.4)	Frequency Stability	Extreme	UMTS Band IV	☐	☐	☐	■	Complies
§2.1049 §27.53(g) RSS-Gen, 6.6	Occupied Bandwidth	Nominal	UMTS Band IV	☐	☐	☐	■	Complies
§2.1051 §27.53(g) RSS-GEN, 6.13 RSS-139 6.6	Band Edge Compliance	Nominal	UMTS Band IV	☐	☐	☐	■	Complies
§2.1053 §27.53(g) RSS-GEN, 6.13 RSS-139 6.6	Unwanted Emissions	Nominal	UMTS Band IV	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed (Leveraged from module certification).

6 Measurements

6.1 RF Power Output and Effective Radiated Power / Effective Isotropic Radiated Power

6.1.1 FCC 2.1046: RF power output

Power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on circuit elements as specified. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

6.1.2 RSS-Gen 6.12: RF power output.

Transmitter output power measurements shall be carried out before the unwanted emissions test. The transmitter output power value, obtained from this test, serves as the reference level used to determine the unwanted emissions.

6.1.3 References

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232, CFR Part 27.50
IC: RSS-Gen Section 6.12; RSS-132 Section 5.4; RSS-133 Section 6.4, RSS-139 Section 6.5

6.1.4 Limits:

ERP/EIRP (850 MHz Band)

FCC Part 22.913 (a) & RSS-132 Section 5.4

FCC: Peak ERP < 38.45 dBm (7W)
The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts.

IC: Average EIRP < 40.60 dBm (11.5W)
The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.

EIRP (1900 MHz Band)

FCC Part 24.232 (c) (e) & RSS-133 Section 6.4

FCC: Peak EIRP < 33 dBm (2W)
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).
(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement over the full bandwidth of the channel.

IC: Average EIRP < 33 dBm (2W)
The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 2 watts.

EIRP (1700 MHz Band)

FCC Part 27.50 (d) (4) (6) & RSS-139 Section 6.5

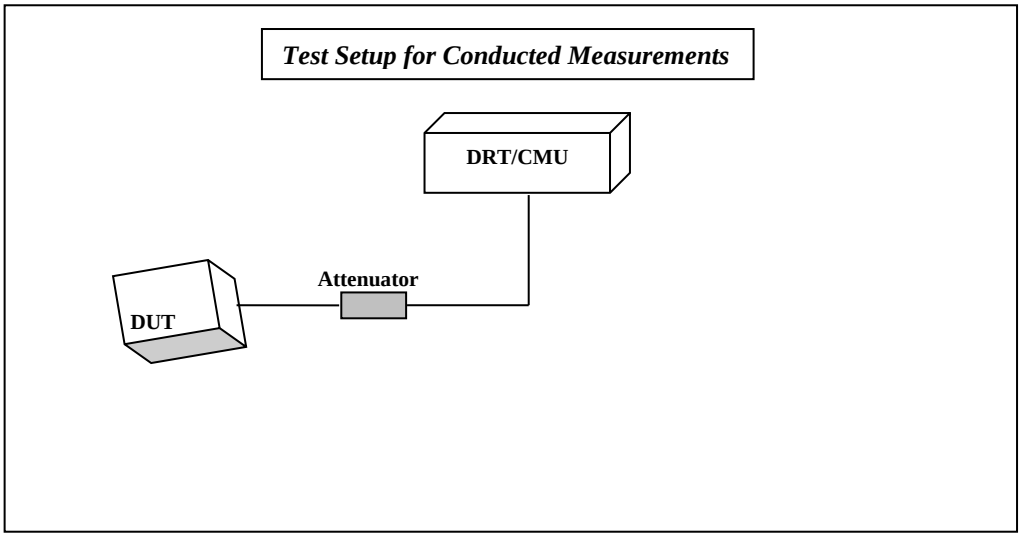
FCC: Peak EIRP < 30 dBm (1W)
Fixed, mobile and portable (handheld stations) operating in the 1710-1755 MHz band are limited to 1 watt EIRP
Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, *etc.*, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel

IC: Average EIRP < 30 dBm (1W)
The average equivalent isotropically radiated power (e.i.r.p.) for fixed, mobile and portable transmitters in the 1710-1755 MHz shall not exceed 1 watt.

6.1.5 Conducted Output Power Measurement

6.1.5.1 Measurement Procedure:

Measurement according to KDB 971168 D01v02r02 (Measurement guidance for certification of Licensed Digital Transmitters)
Section 5.1.1 for peak power
Section 5.2.2 for average power



1. Connect the equipment as shown in the above diagram. A Digital Radio Communication Tester (DRT: R&S CMU200 here) is used to enable the EUT to transmit and to measure the output power.
2. Adjust the settings of the CMU200 to set the EUT to its maximum power at the required channel.
3. Record the Peak and Average Output power level measured by the CMU200.
4. Correct the measured level for all losses in the RF path.
5. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band and for all types of modulation schemes.

6.1.5.2 Measurement Uncertainty

+/- 0.5 dB

6.1.5.3 Test Conditions:

Tnom: 20^{o}C; Vnom: 24 V

6.1.5.4 Measurement Results (Conducted Power Verification):

ERP/EIRP 850 MHz band

GPRS 850: GMSK Mode Antenna Gain = 1.49dBi FCC: Peak ERP < 38.45 dBm (7W) IC: Average EIRP < 40.60 dBm (11.5W)					
Frequency	**PEAK Conducted Output Power**	**Average Conducted Output Power**	**Calculated Peak EIRP** EIRP = Conducted + gain	**Calculated Peak ERP** (ERP = EIRP - 2.15 dB)	**Calculated Average EIRP** Avg EIRP = Conducted + gain
(MHz)	**(dBm)**	**(dBm)**	**(dBm)**	**(dBm)**	**(dBm)**
824.2(128)	32.3	32.2	33.8	31.7	33.7
836.6(190)	32.4	32.3	33.9	31.8	33.8
848.8(251)	32.4	32.3	33.9	31.8	33.8

EGPRS 850: 8PSK Mode Antenna Gain = 1.49dBi FCC: Peak ERP < 38.45 dBm (7W) IC: Average EIRP < 40.60 dBm (11.5W)					
Frequency	**PEAK Conducted Output Power**	**Average Conducted Output Power**	**Calculated Peak EIRP** EIRP = Conducted + gain	**Calculated Peak ERP** (ERP = EIRP - 2.15 dB)	**Calculated Average EIRP**
(MHz)	**(dBm)**	**(dBm)**	**(dBm)**	**(dBm)**	**(dBm)**
824.2	29.5	26.7	31.0	28.9	28.2
836.6	29.7	26.9	31.2	29.1	28.4
848.8	29.7	26.9	31.2	29.1	28.4

FDD V UMTS 850: QPSK Mode **Antenna Gain = 1.49dBi** FCC: Peak ERP < 38.45 dBm (7W) IC: Average EIRP < 40.60 dBm (11.5W)					
Frequency	**PEAK Conducted Output Power**	**Average Conducted Output Power**	**Calculated Peak EIRP** EIRP = Conducted + gain	**Calculated Peak ERP** (ERP = EIRP - 2.15 dB)	**Calculated Average EIRP**
(MHz)	**(dBm)**	**(dBm)**	**(dBm)**	**(dBm)**	**(dBm)**
826.4	25.8	22.9	27.3	25.2	24.4
836.6	25.9	22.9	27.4	25.3	24.4
846.6	25.6	22.7	27.1	25.0	24.2

EIRP 1900 MHz band

GPRS 1900: GMSK Mode Antenna Gain = 2.30dBi FCC: Peak EIRP < 33.0 dBm (2W) IC: Average EIRP < 33.0 dBm (2W)				
Frequency (MHz)	**PEAK Conducted Output Power (dBm)**	**Average Conducted Output Power (dBm)**	**Calculated Peak EIRP (dBm)**	**Calculated Average EIRP (dBm)**
1850.2 (512)	28.4	28.2	30.7	30.5
1880 (660)	28.5	28.3	30.8	30.6
1909.8 (810)	28.5	28.4	30.8	30.7

EGPRS 1900: 8PSK Mode Antenna Gain = 2.30dBi FCC: Peak EIRP < 33.0 dBm (2W) IC: Average EIRP < 33.0 dBm (2W)				
Frequency (MHz)	**PEAK Conducted Output Power (dBm)**	**Average Conducted Output Power (dBm)**	**Calculated Peak EIRP (dBm)**	**Calculated Average EIRP (dBm)**
1850.2	27.5	24.4	29.8	26.7
1880	27.6	24.5	29.9	26.8
1909.8	27.7	24.6	30.0	26.9

FDD II UMTS 1900: QPSK Mode Antenna Gain = 2.30dBi FCC: Peak EIRP < 33.0 dBm (2W) IC: Average EIRP < 33.0 dBm (2W)				
Frequency (MHz)	**PEAK Conducted Output Power (dBm)**	**Average Conducted Output Power (dBm)**	**Calculated Peak EIRP (dBm)**	**Calculated Average EIRP (dBm)**
1852.4	23.8	20.3	26.1	22.6
1880	24.3	20.9	26.6	23.2
1907.6	24.2	20.7	26.5	23.0

EIRP 1700 MHz band

FDD IV UMTS 1700: QPSK Mode Antenna Gain = 2.53dBi FCC: Peak EIRP < 30 dBm (1W) IC: Average EIRP < 30 dBm (1W)				
Frequency (MHz)	**PEAK Conducted Output Power (dBm)**	**Average Conducted Output Power (dBm)**	**Calculated Peak EIRP (dBm)**	**Calculated Average EIRP (dBm)**
1712.4	24.4	20.7	26.9	23.2
1732.6	24.5	20.9	27.0	23.4
1752.6	24.5	20.7	27.0	23.2

6.1.5.5 Verification Result

the measured conducted average powers are 0.5 to 1.2 dB lower than the declared module powers minus declared variation. This may be expected due to ohmic and mismatch losses by integrating the module. This verification supports leveraging of conducted results from module report for certification.

6.1.5.5.1 Test Verdict

Pass.

6.2 Spurious Emissions Radiated

6.2.1 References

FCC: CFR Part 2.1053, CFR Part 22.917, CFR Part 24.238, CFR Part 27.53

6.2.2 Measurement requirements:

FCC 2.1053: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

RSS-Gen 6.13: Transmitter unwanted spurious emissions
The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements.
The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 10th harmonic of the highest frequency generated without exceeding 40 GHz.

6.2.3 Limits:

(1) *Out of band emissions*. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

For all power levels +30dBm to 0dBm, this becomes a constant specification of -13dBm.

FCC 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.2.3.1 FCC 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.
(b) Measurement procedure. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.2.3.2 FCC27.53 (g)

(g) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.

(1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RSS-132 Section 5.5.1.1 and RSS-133 Section 6.5.1

In the first 1.0 MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB. After the first 1.0 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log_{10}(P)$, dB, in any 100 kHz bandwidth.
After the first 1.5 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log_{10}(P)$, dB, in any MHz of bandwidth.

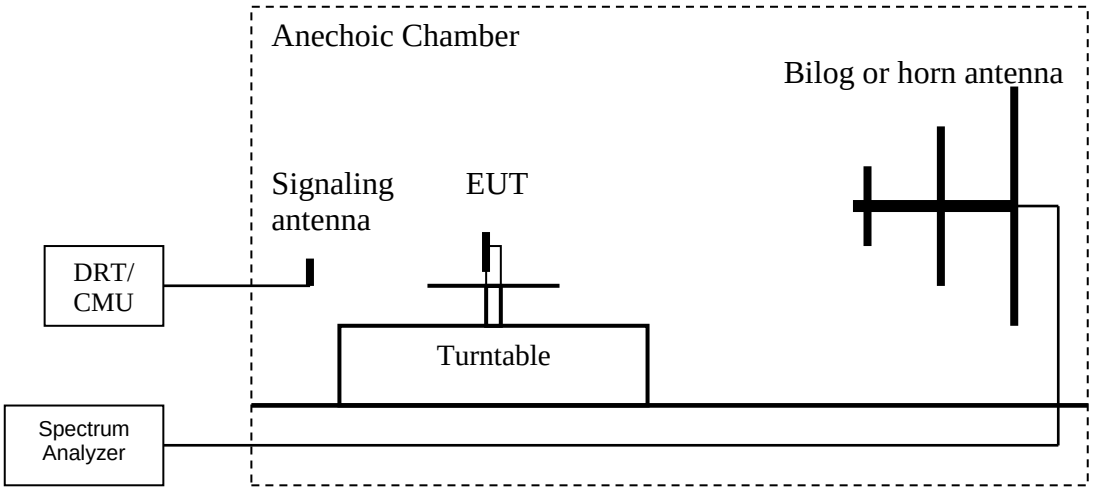
RSS-139 Section 6.6

In the first 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB.

After the first 1.0 MHz outside the equipment's operating frequency block, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB.

6.2.4 **Radiated out of band measurement procedure:**

Ref: TIA-603C 2004- 2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (**LVL**) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the level of spurious emissions using the following equation:
   Spurious (dBm) = **LVL** (dBm) + **LOSS** (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:
   Spurious (dBm) = **LVL** (dBm) + **LOSS** (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
    (N**ote:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

6.2.5 Sample Calculations for Radiated Measurements

6.2.5.1 Power Measurements using Substitution Procedure:

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure.
The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

EIRP (dBm)= Signal Generator setting (dBm)- Cable Loss (dB)+ Antenna Gain (dBi)

Example:

Frequency (MHz)	Measured SA (dBµV)	Signal Generator setting (dBm)	Antenna Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	EIRP (dBm)
1000	95.5	24.5	6.5	0	3.5	27.5

6.2.6 Measurement Survey:

The site is constructed in accordance with ANSI C63.4 requirements and is recognized by the FCC to be in compliance for a 3m site. The spectrum is scanned from 30MHz to the 10th harmonic of the highest frequency generated by the EUT.
Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the 850 MHz and 1900 MHz bands of operation.
It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the BC0-850 MHz and the BC1-1900 MHz band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

Radiated emission measurements were made in CDMA mode.
Additional spot checks in mid channel of operation for all modes were performed with the slimmer battery option of the device.

For radiated measurements, all data in this report shows the worst case emissions data between H/V antenna polarizations and for all 3 orthogonal orientations of the EUT.

Unless mentioned otherwise, the emission signals above the limit line in the plots are from the carrier

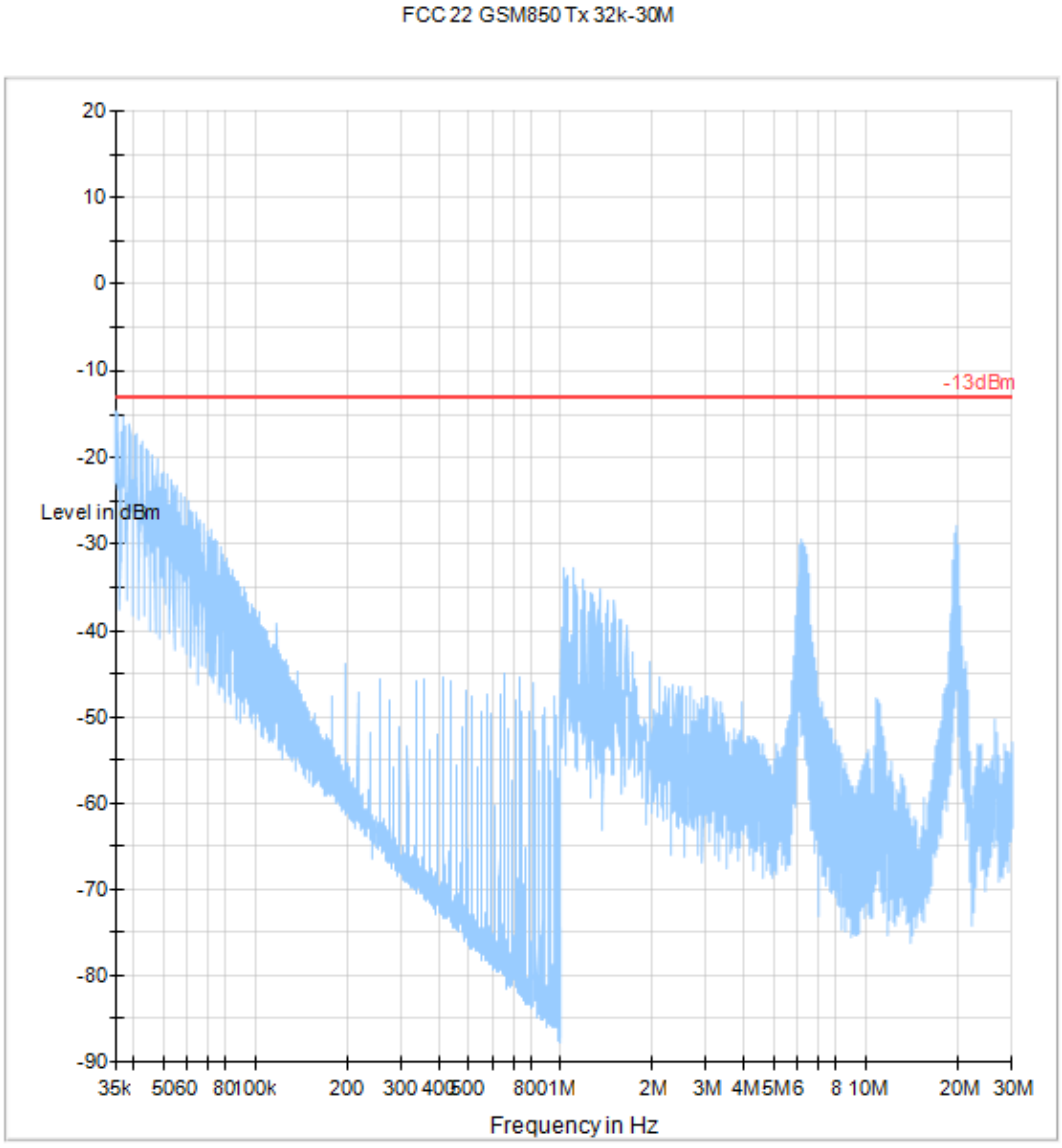
6.2.7 Test Conditions:

Tnom: 20^{o}C; Vnom: 24 V

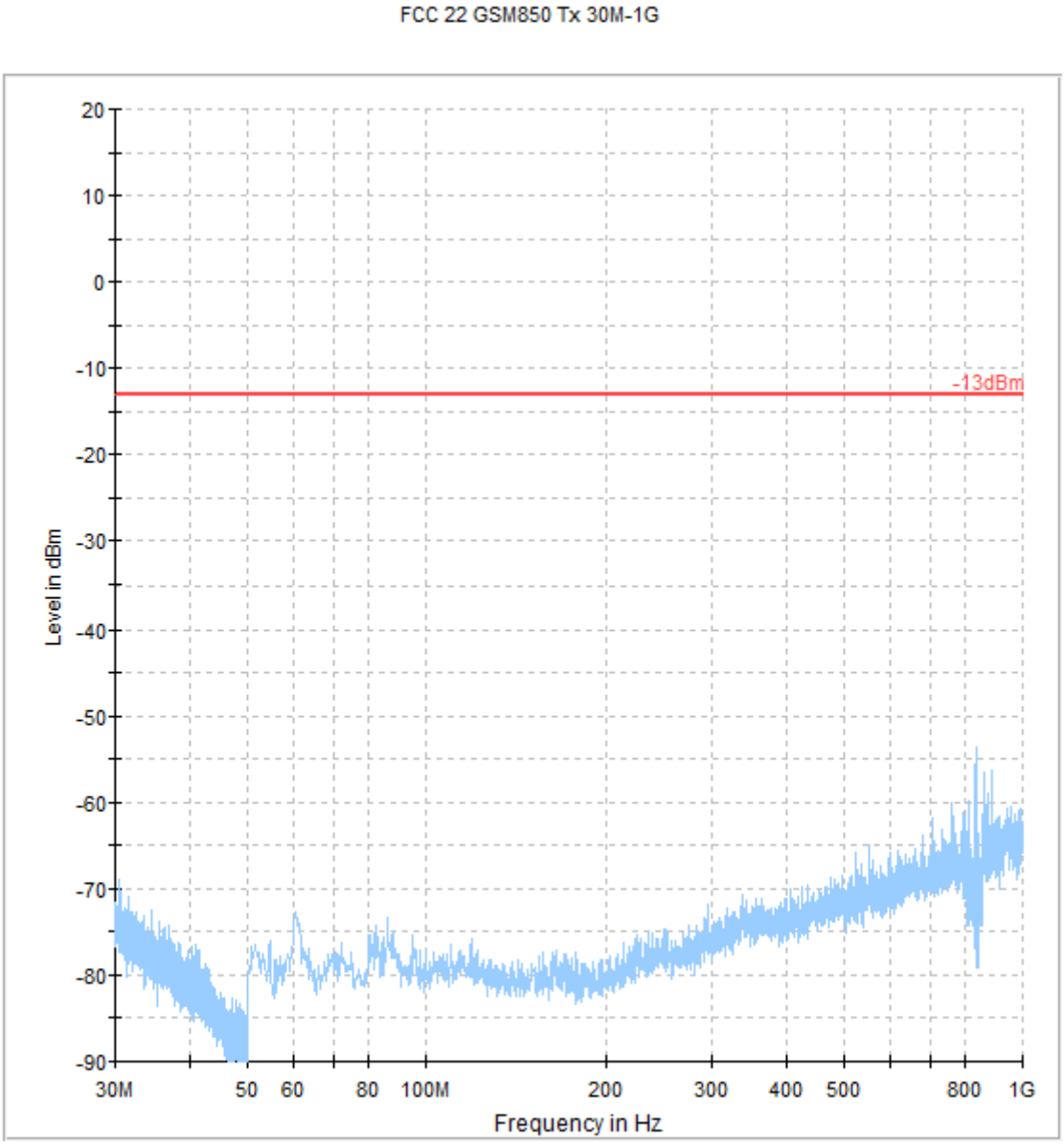
6.2.8 Test Results for Radiated Spurious Emissions:

Radiated Spurious Emissions GSM850 Tx:

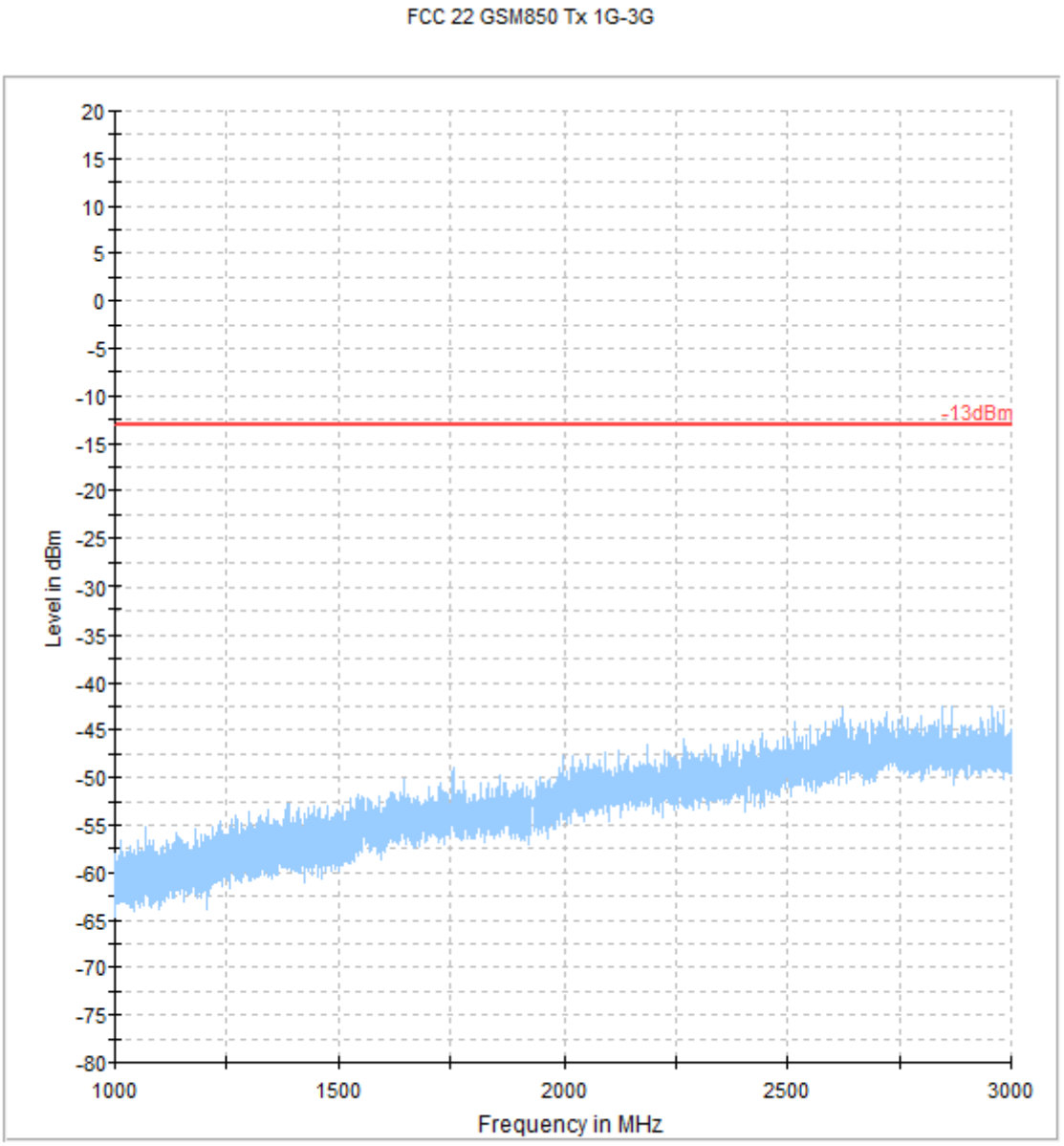
Test results: 30 kHz- 30 MHz – Mid Channel



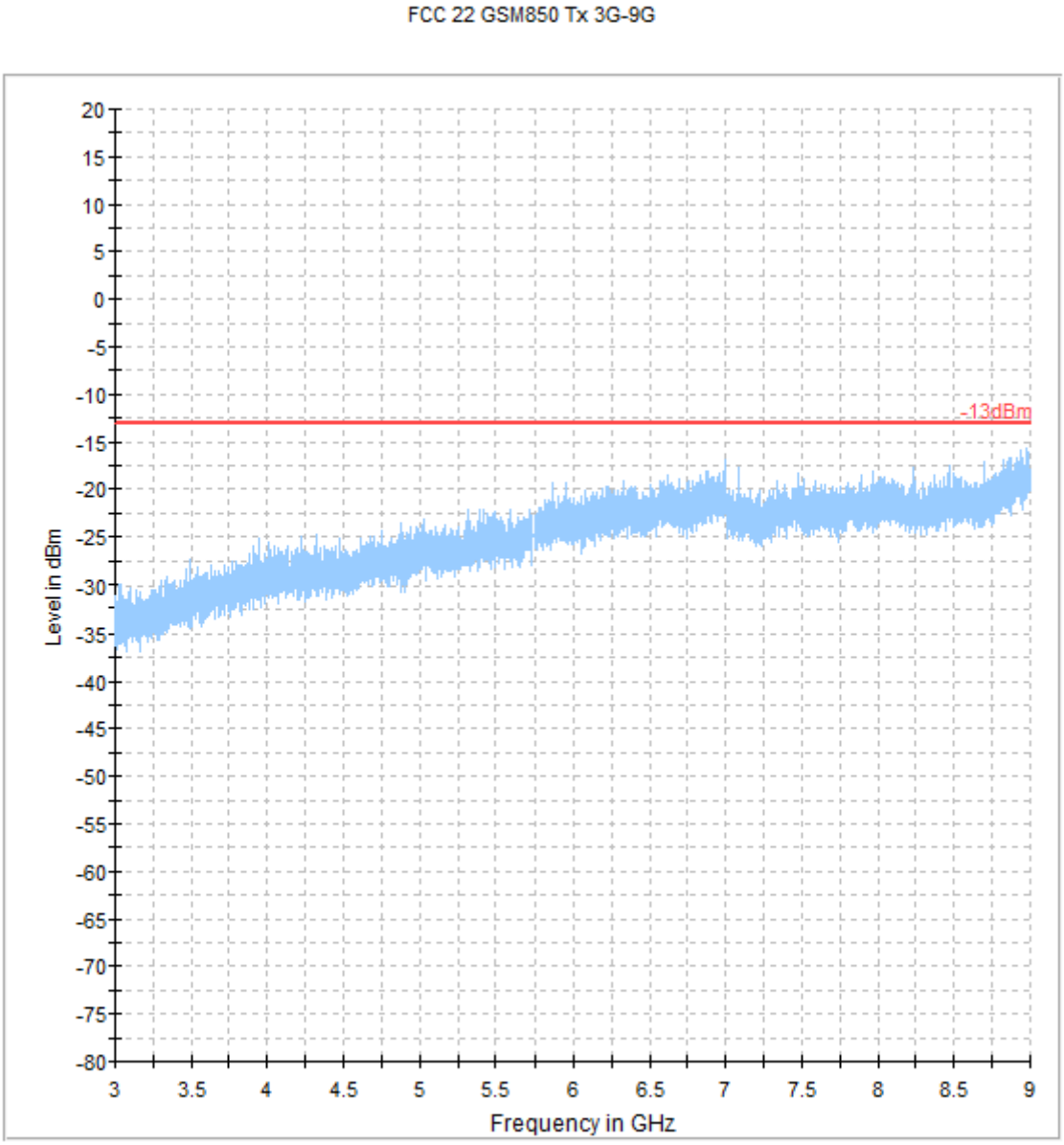
Test results: 30MHz- 1 GHz



Test results: 1GHz- 3GHz

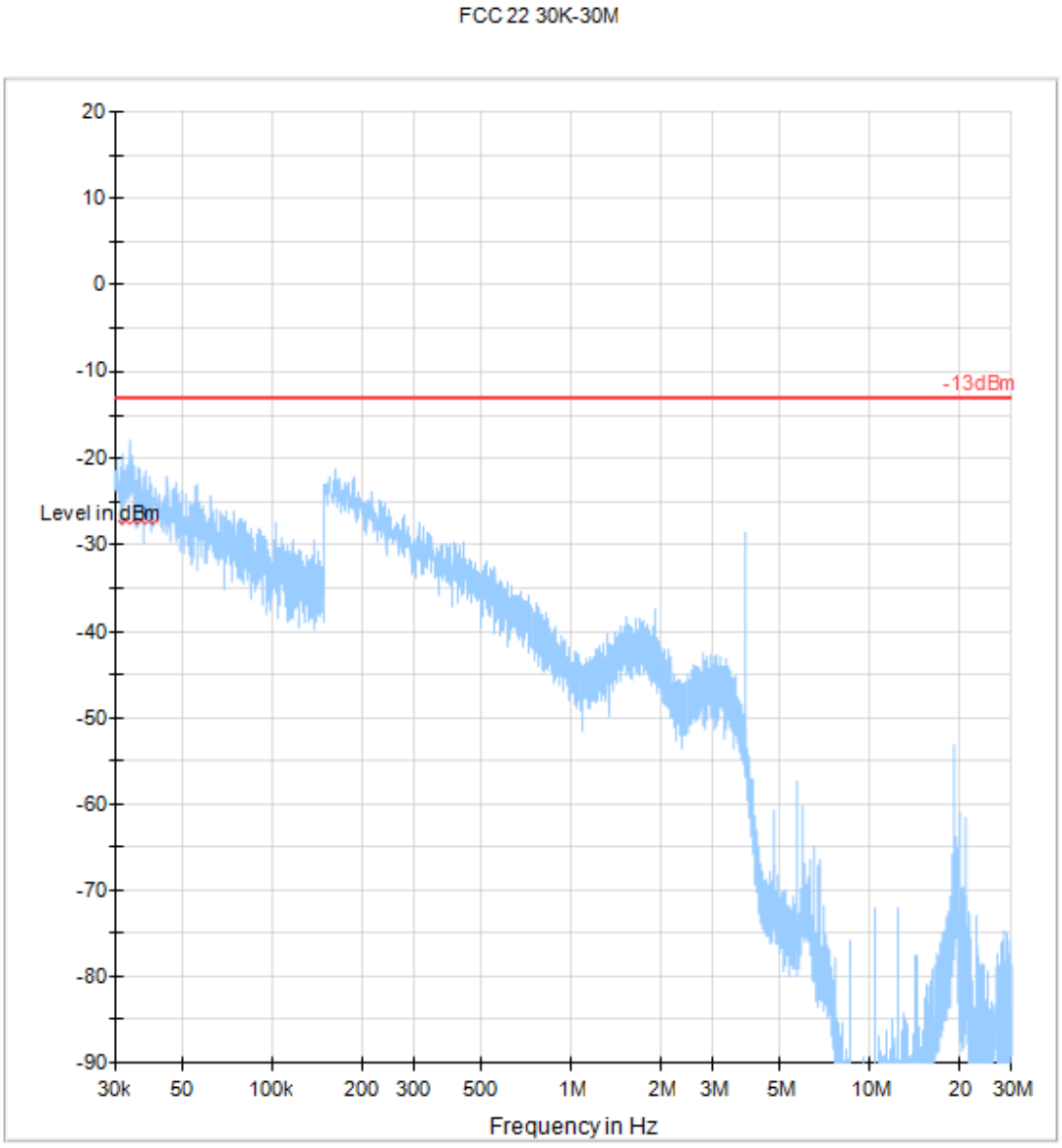


Test results – 3GHz – 9GHz

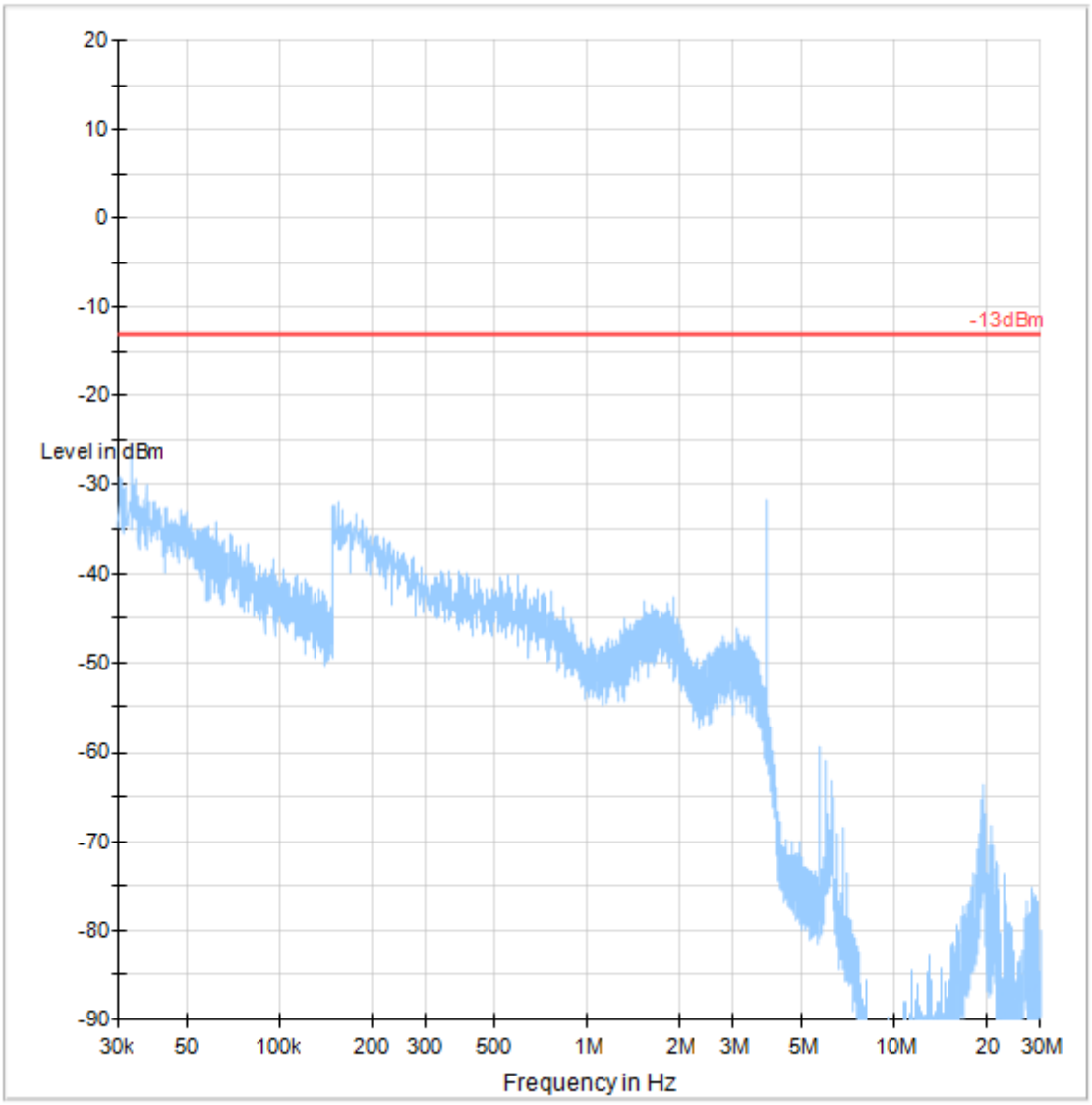


Radiated Spurious Emissions FDD Band 5 Tx:

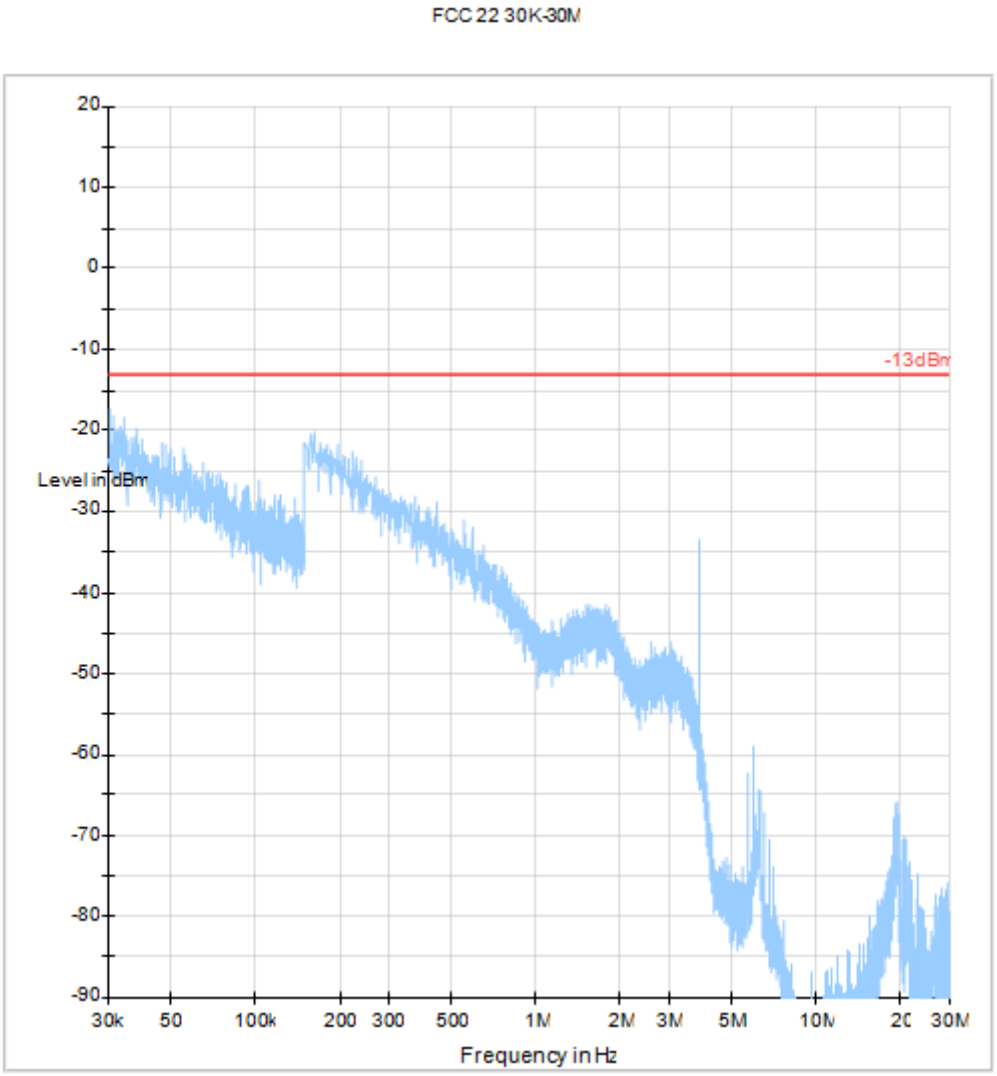
Test results – 30 KHz – 30MHz Low Channel



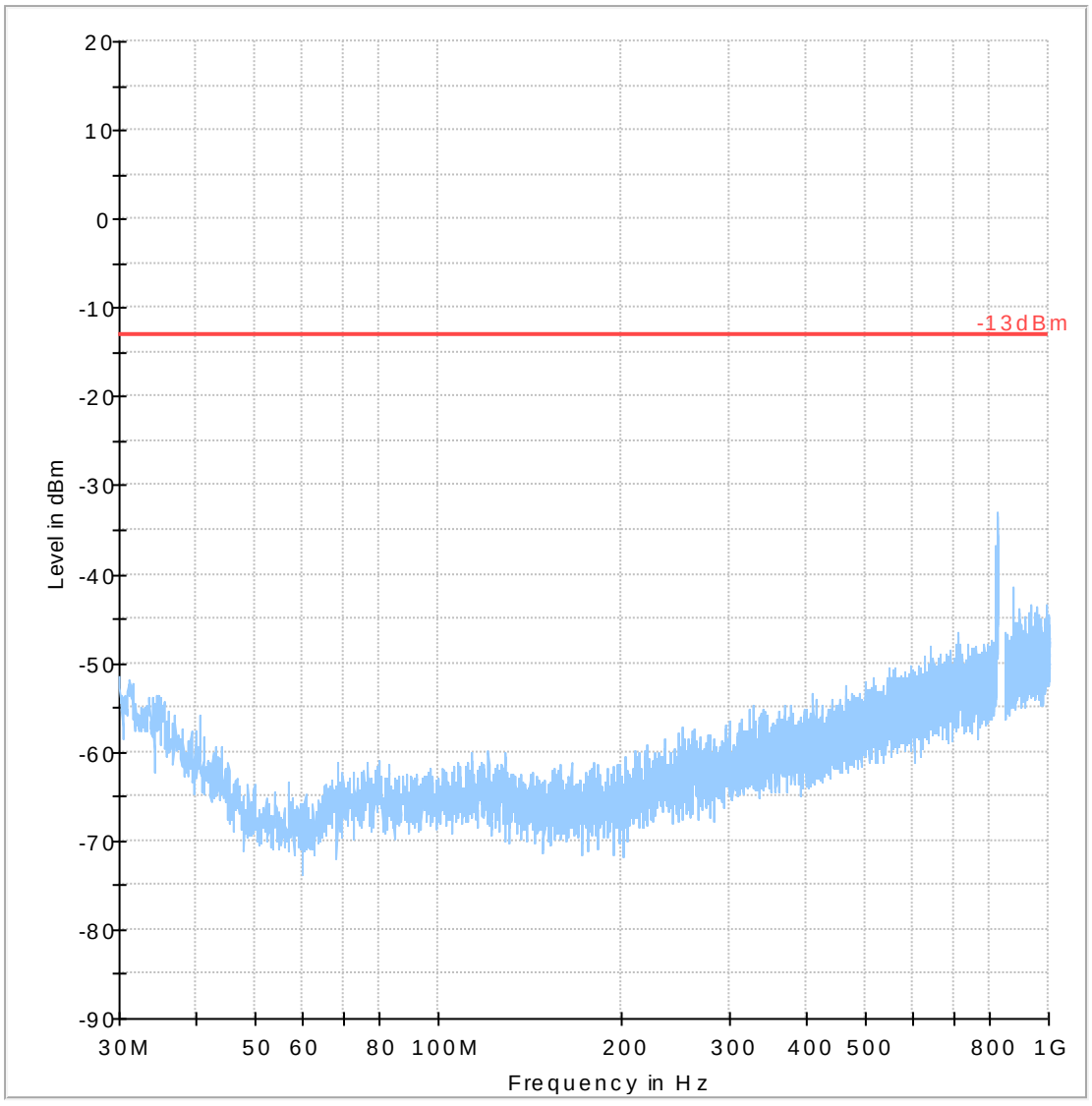
Test results – 30 KHz – 30MHz Mid Channel



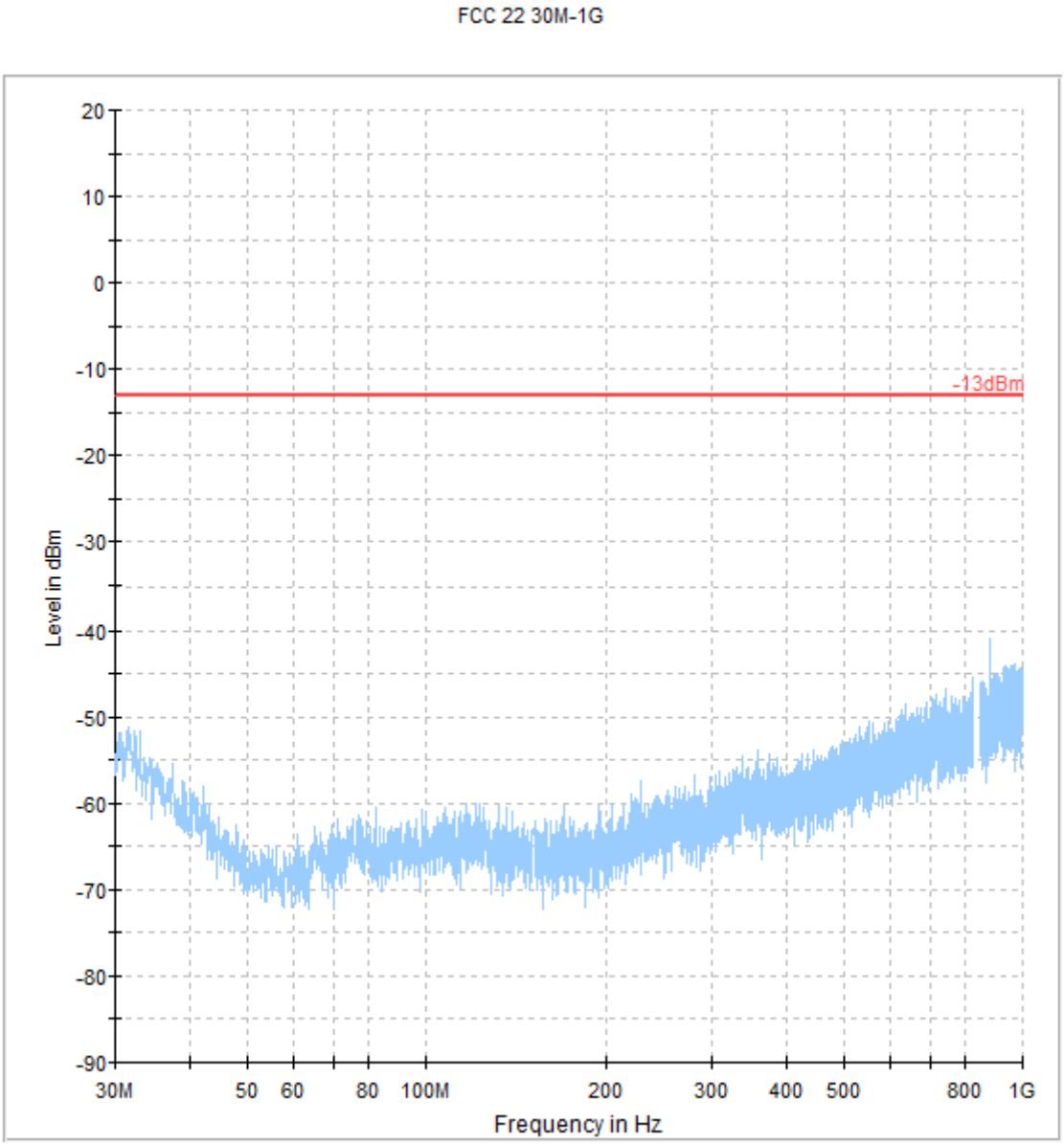
Test results – 30 KHz – 30MHz High Channel



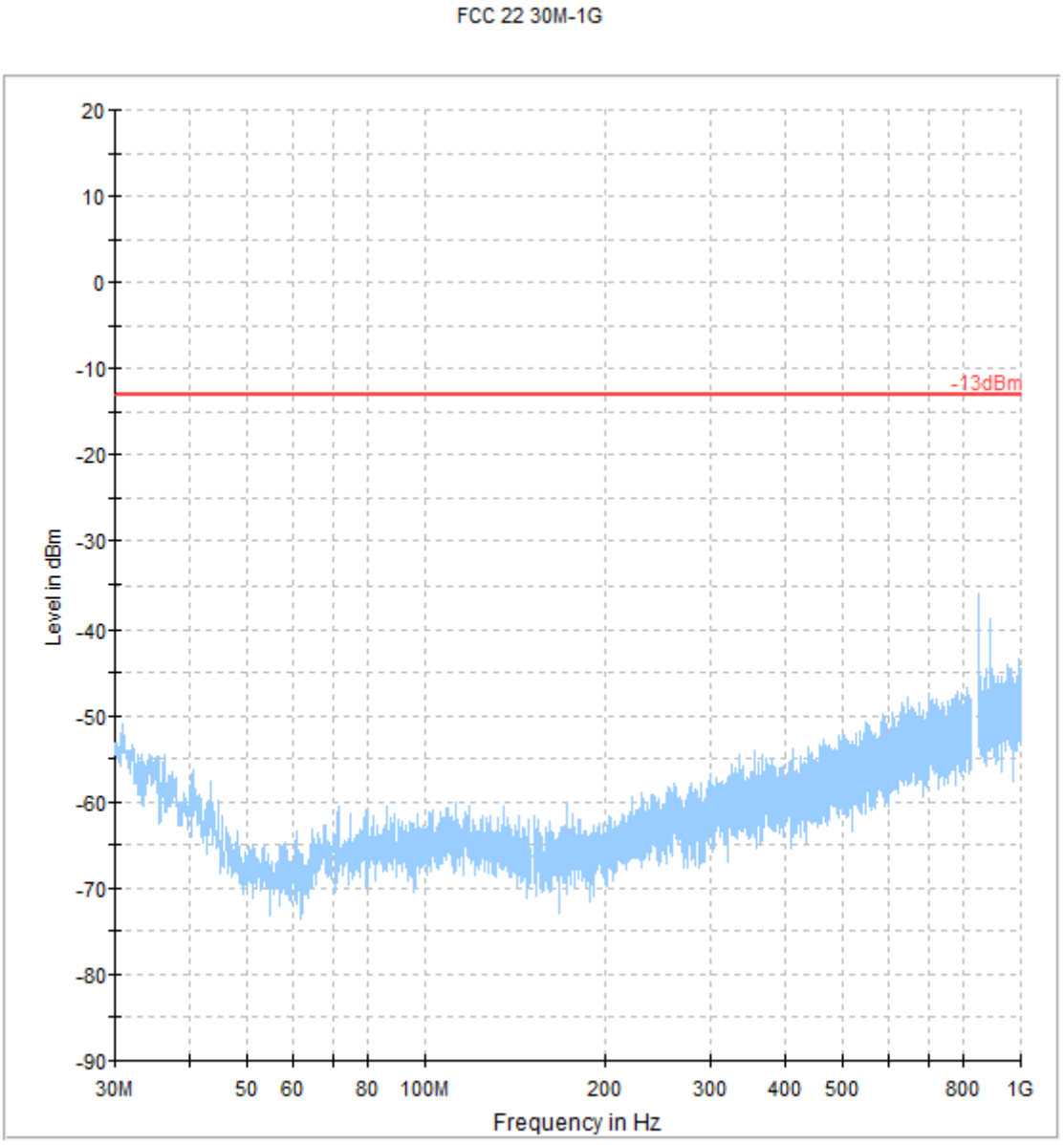
Test results – 30MHz – 1GHz – Low Channel



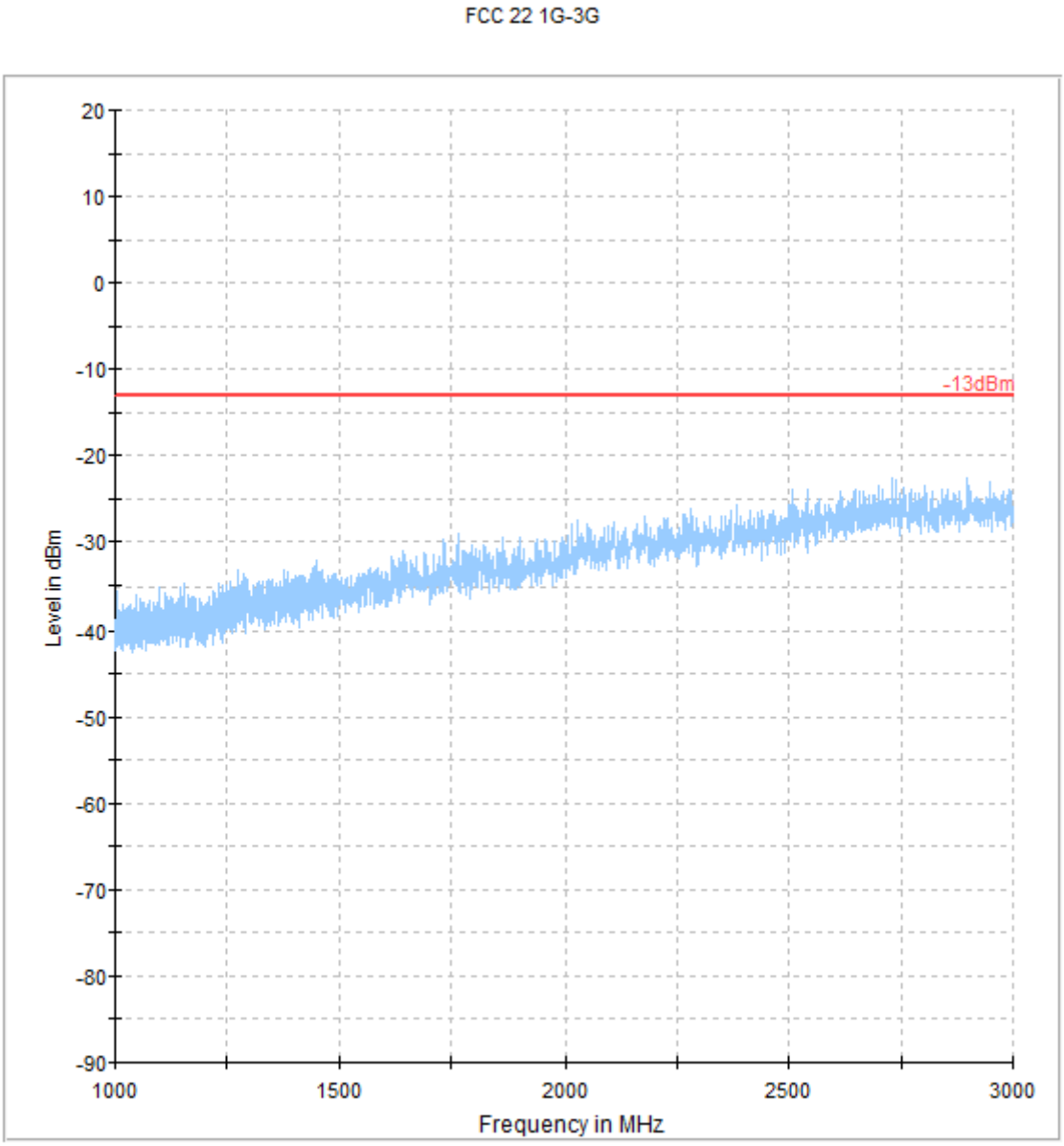
Test results – 30MHz – 1GHz –Mid Channel



Test results – 30MHz – 1GHz –High Channel

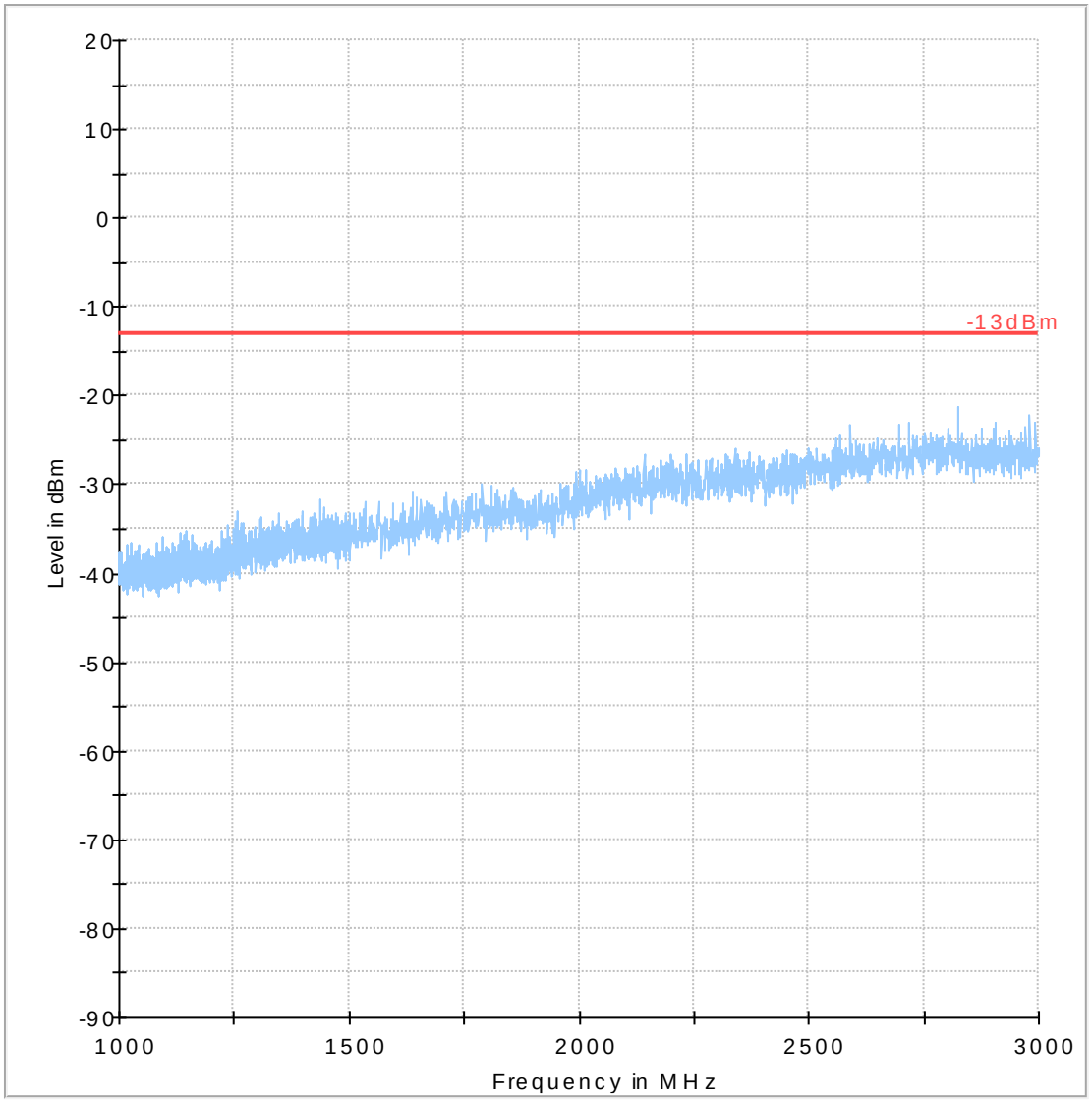


Test results – 1GHz – 3GHz –Low Channel



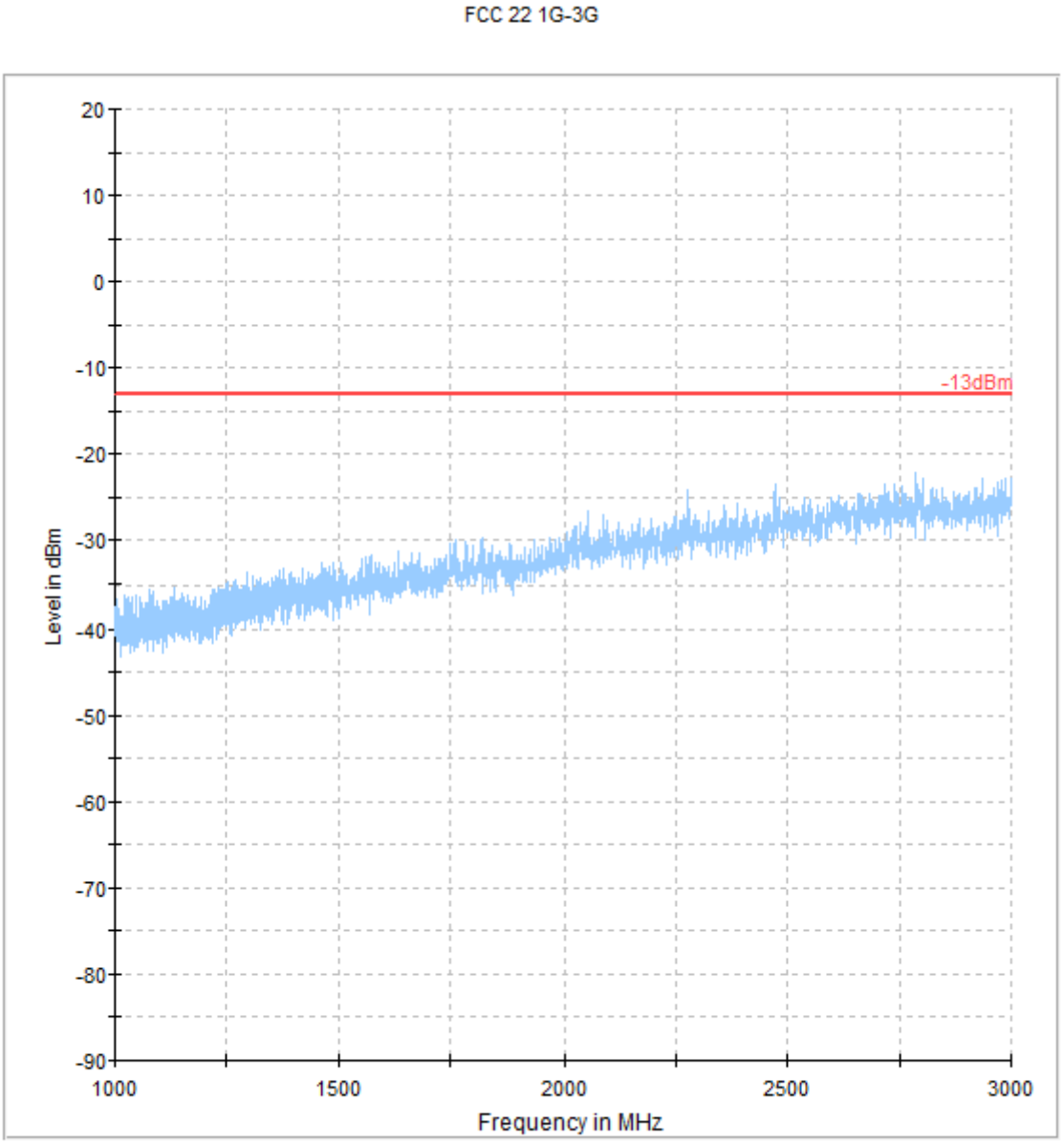
Test results – 1GHz – 3GHz –Mid Channel

FCC 22 1G-3G

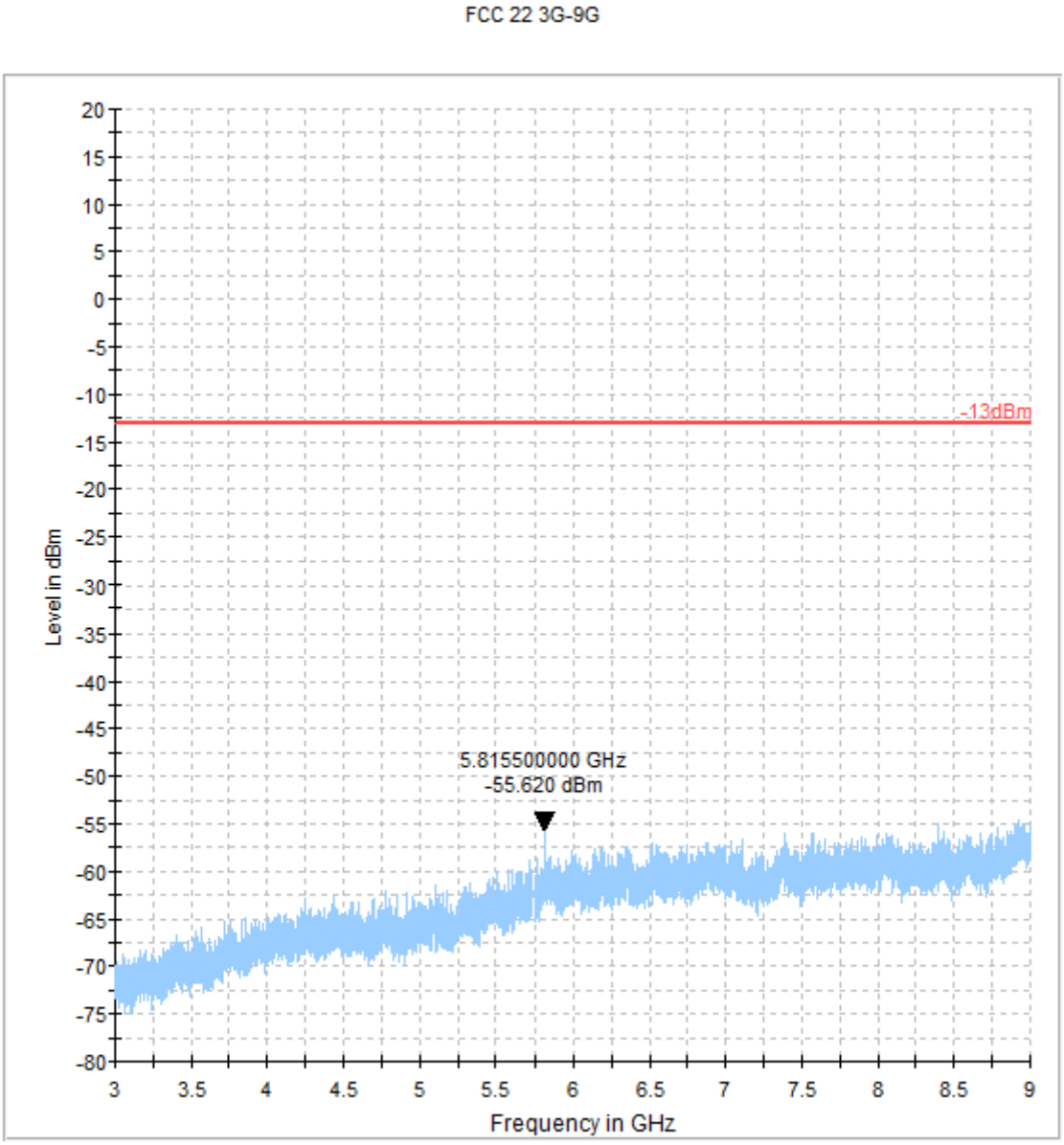


RMS

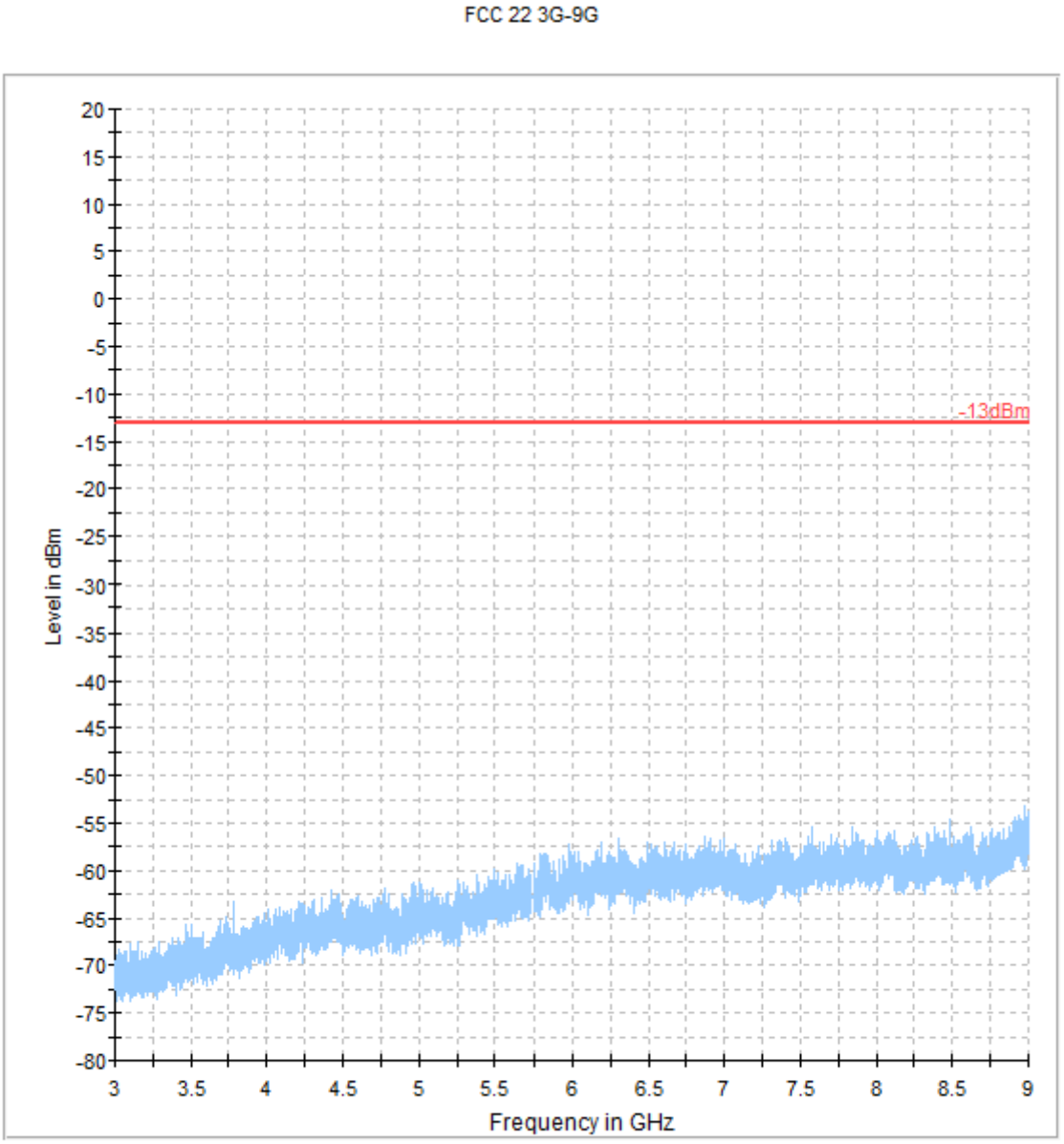
Test results – 1GHz – 3GHz –High Channel



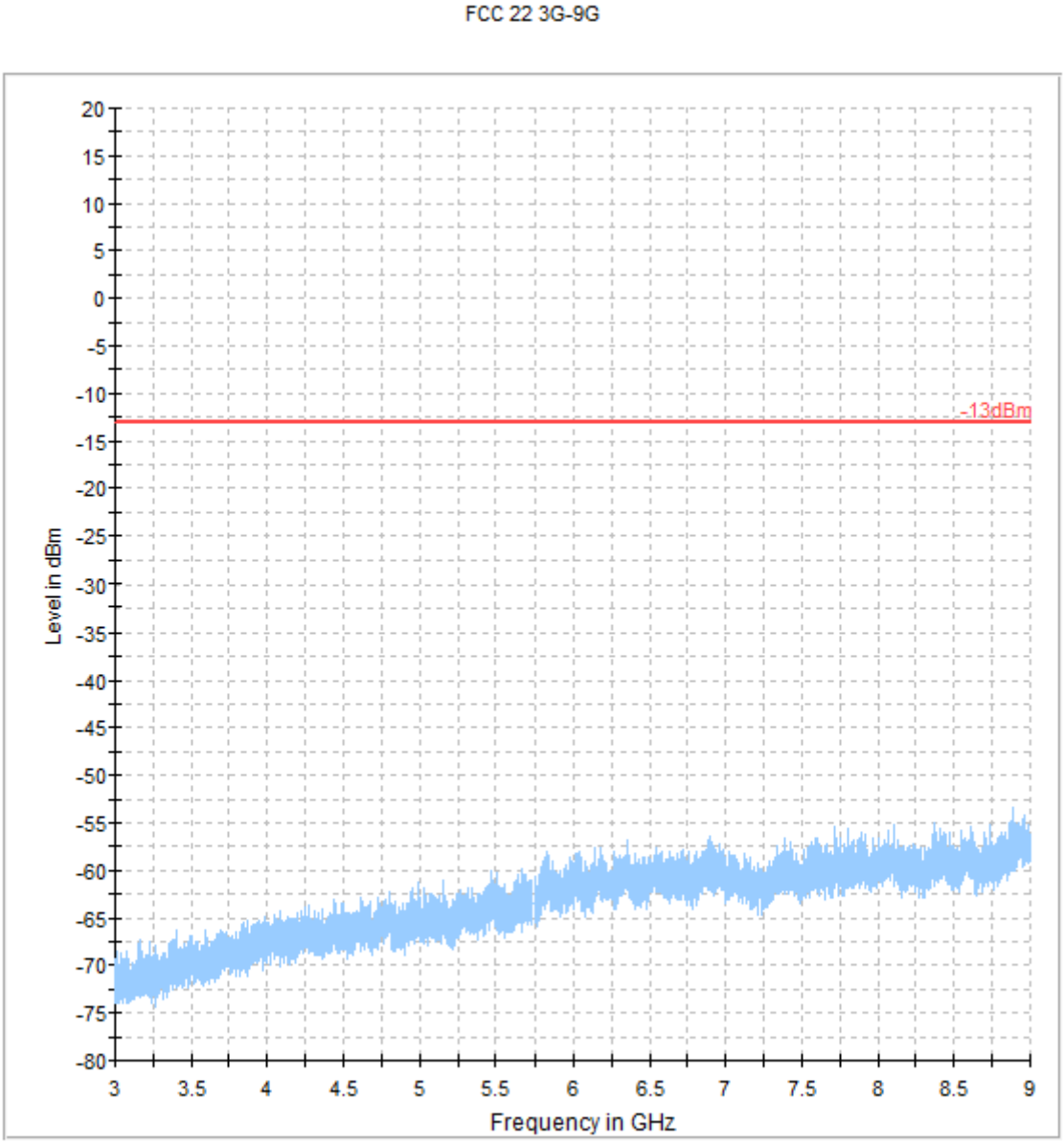
Test results – 3GHz – 9GHz –Low Channel



Test results – 3GHz – 9GHz –Mid Channel

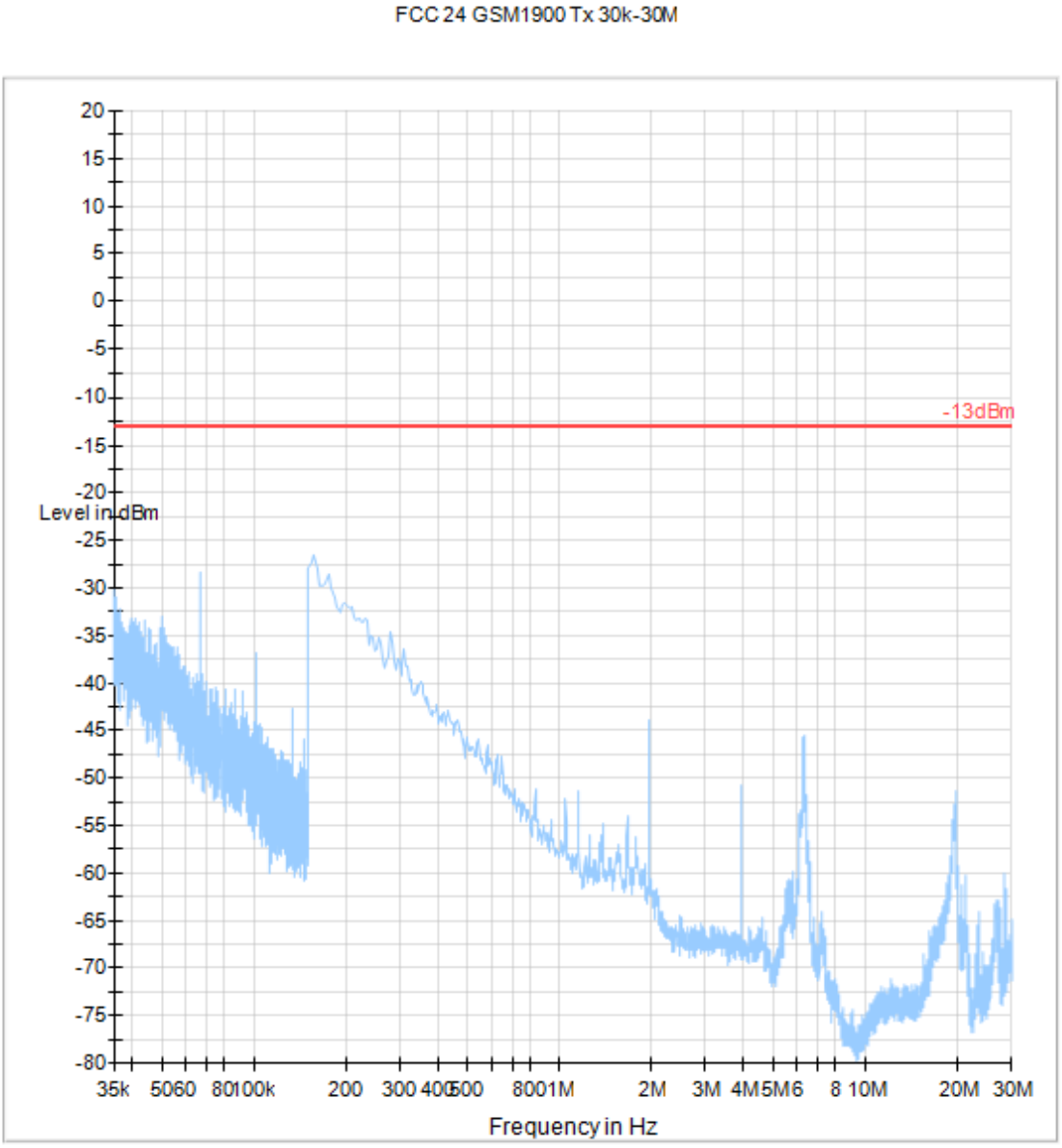


Test results – 3GHz – 9GHz –High Channel

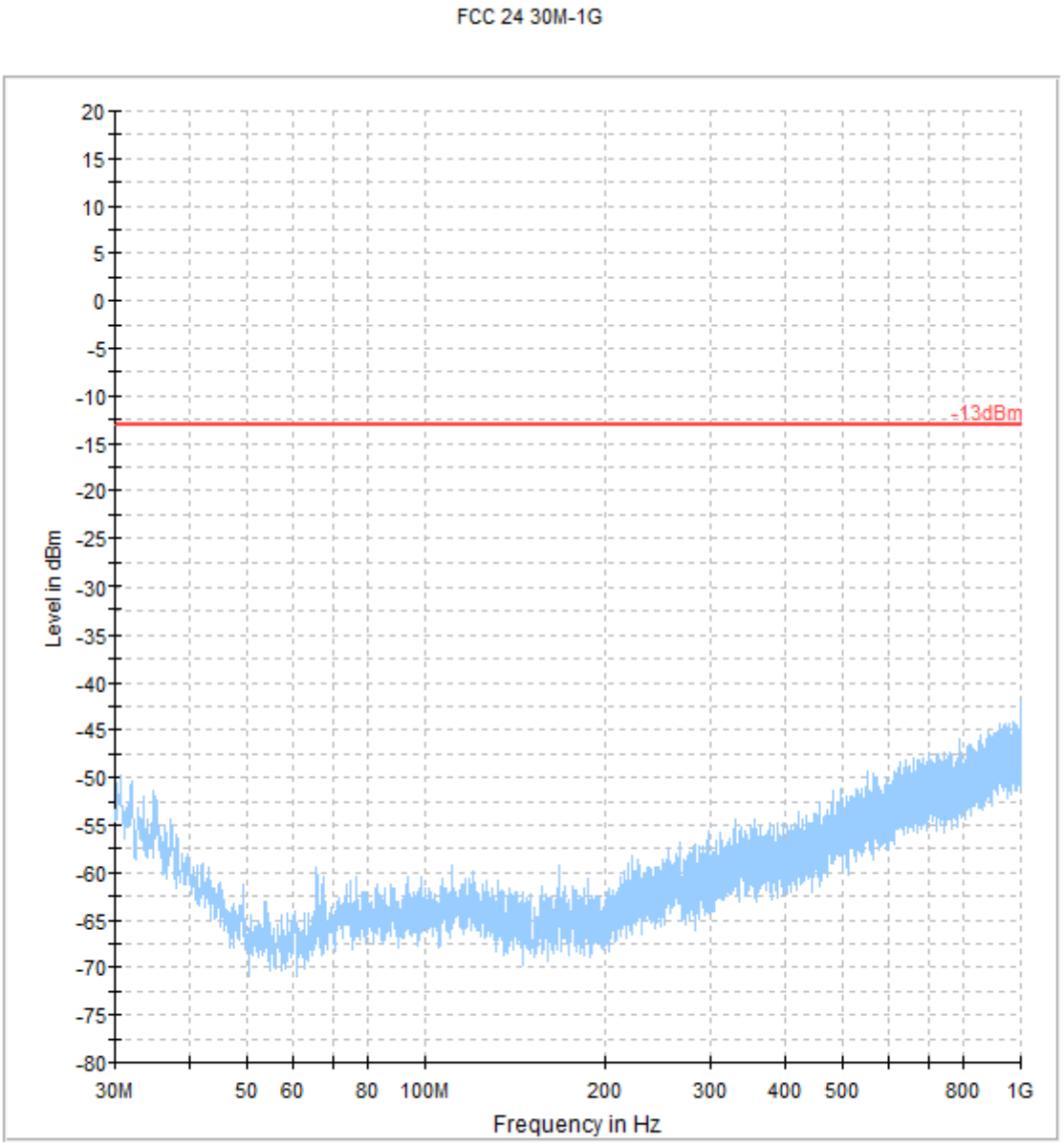


Radiated Spurious Emissions GSM1900 Tx:

Test results 30 kHz- 30 MHz

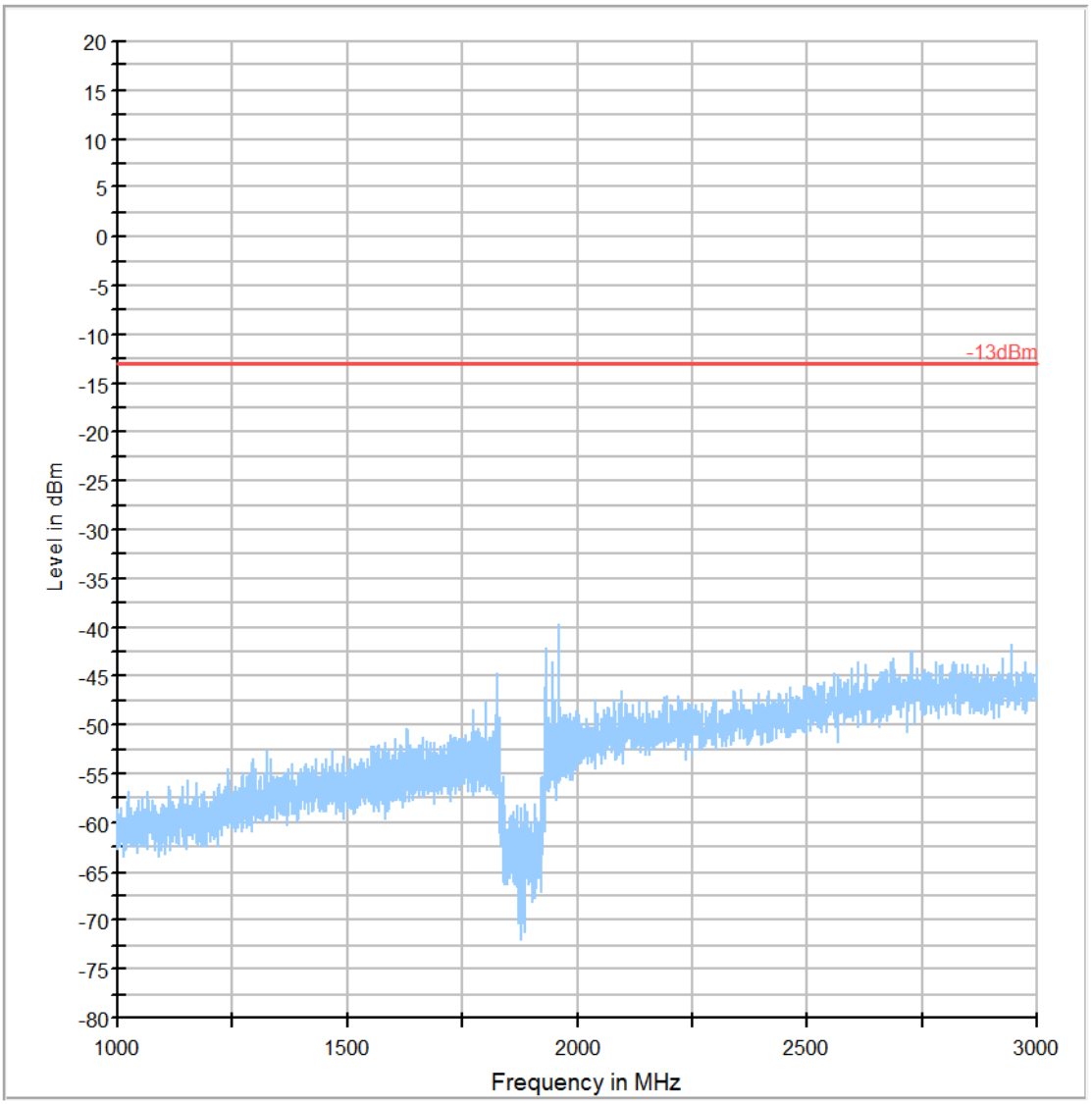


Test results 30MHz- 1GHz

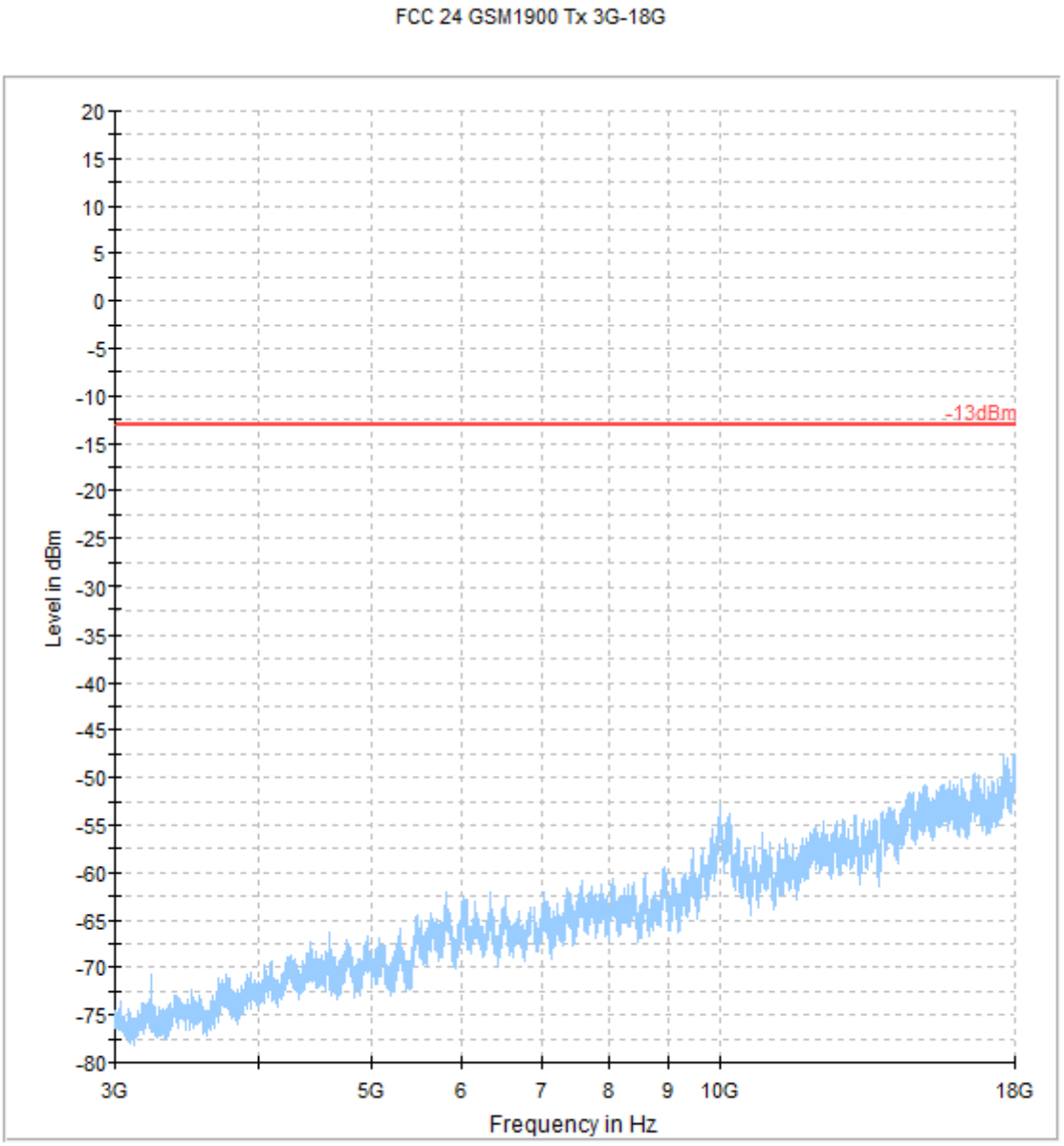


Test results 1GHz- 3GHz

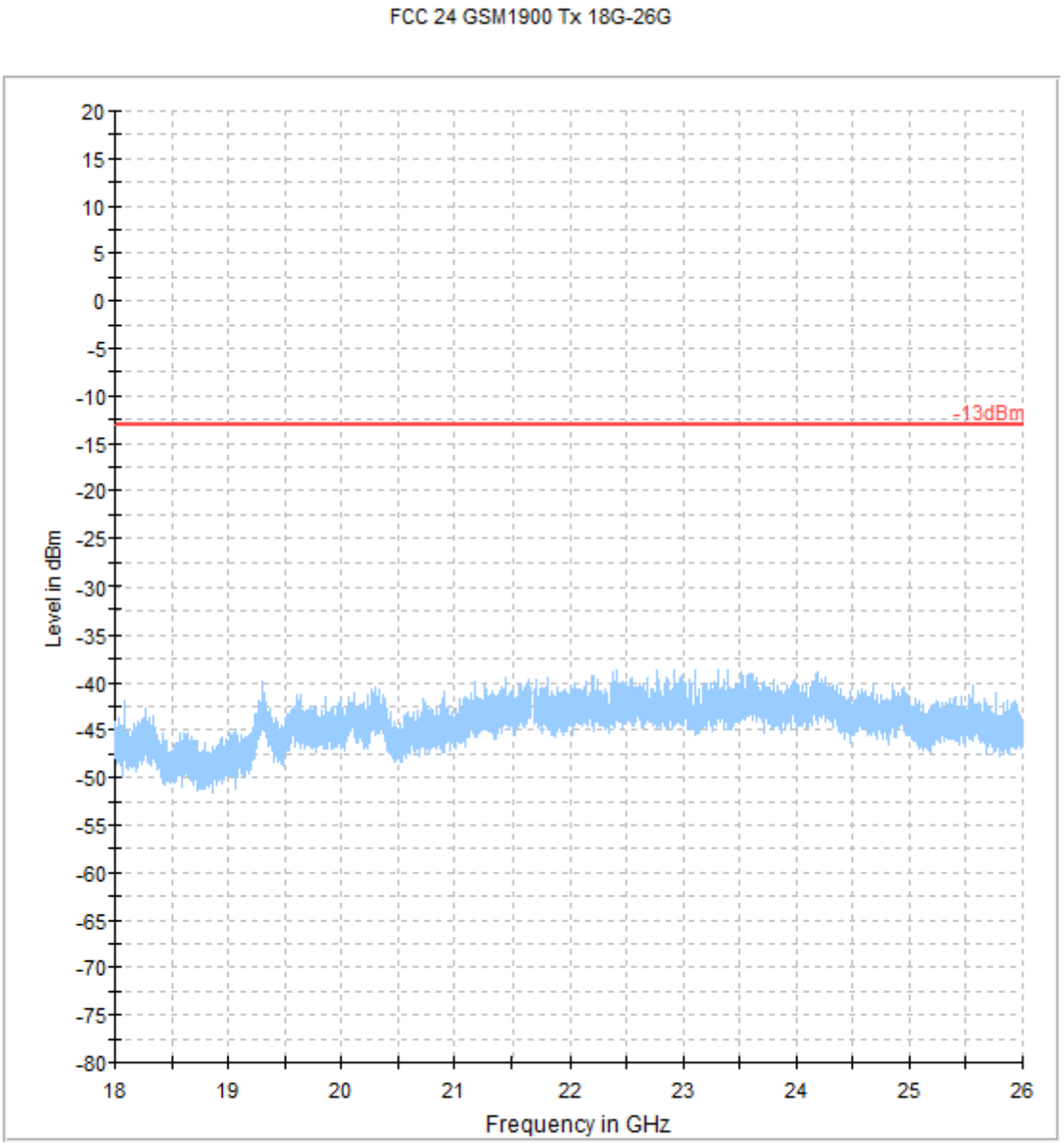
FCC 24 GSM1900 Tx 1G-3G



Test results 3GHz- 18GHz

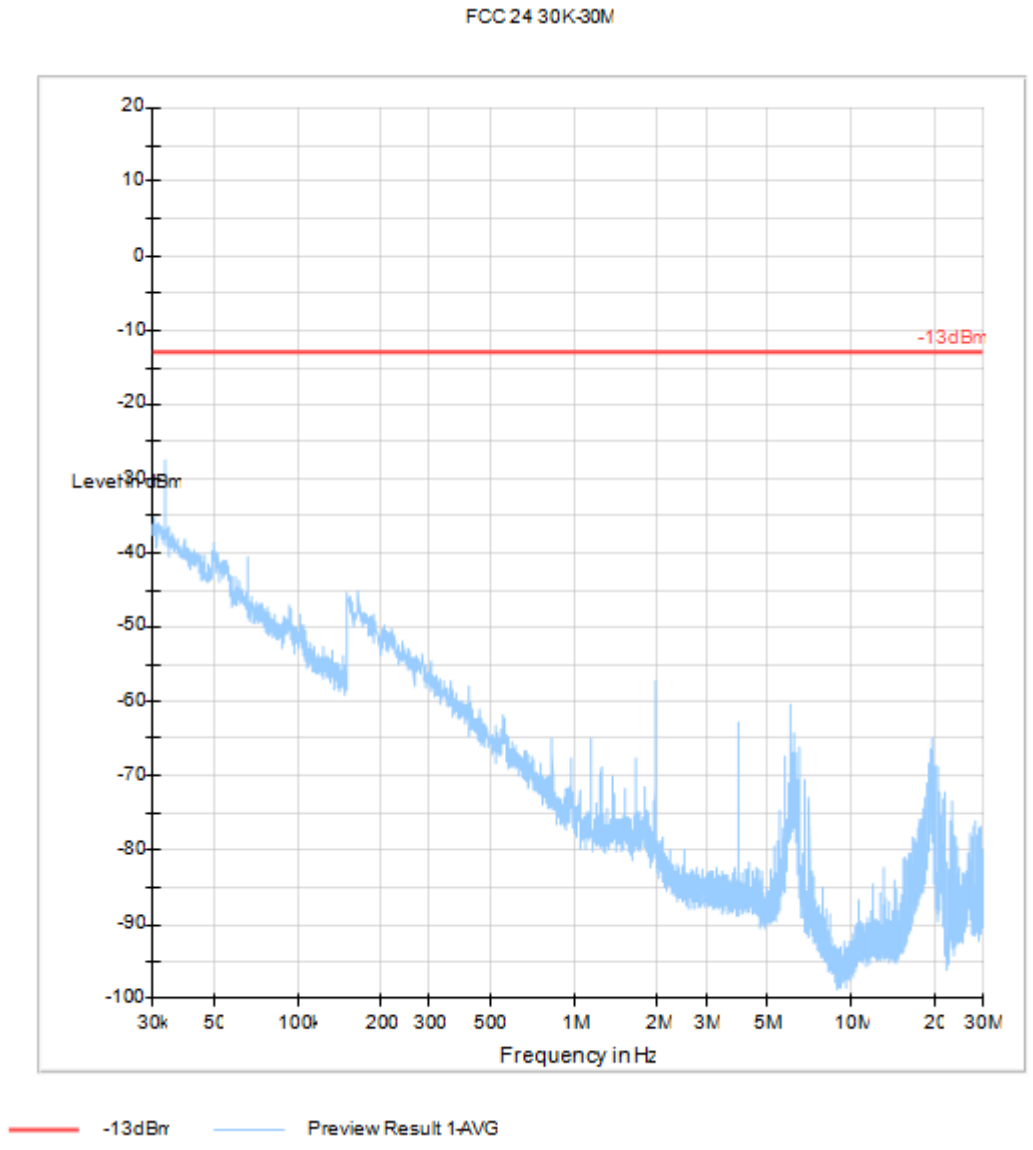


Test results 18GHz- 26GHz

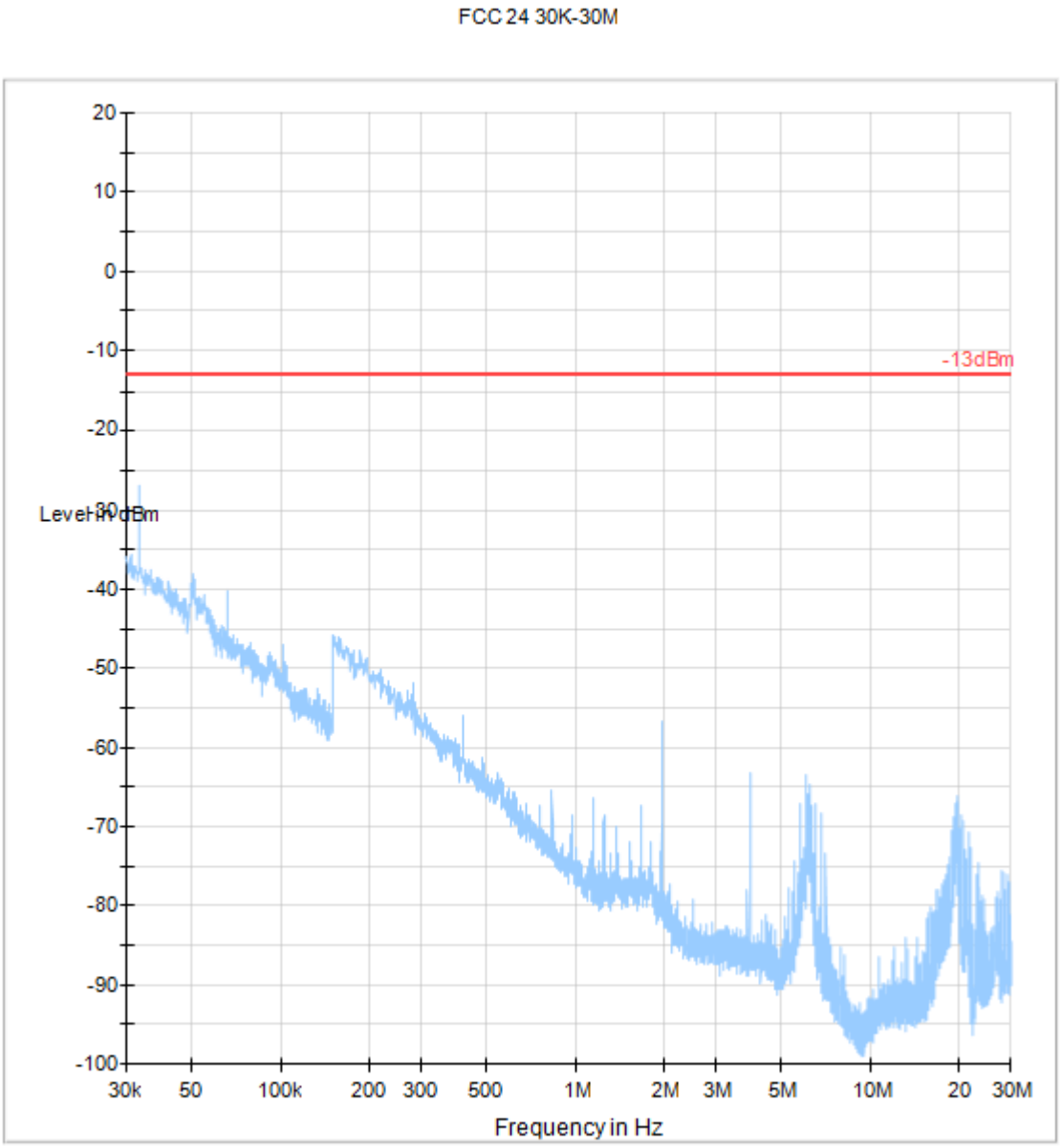


Radiated Spurious Emissions FDD Band 2 Tx:

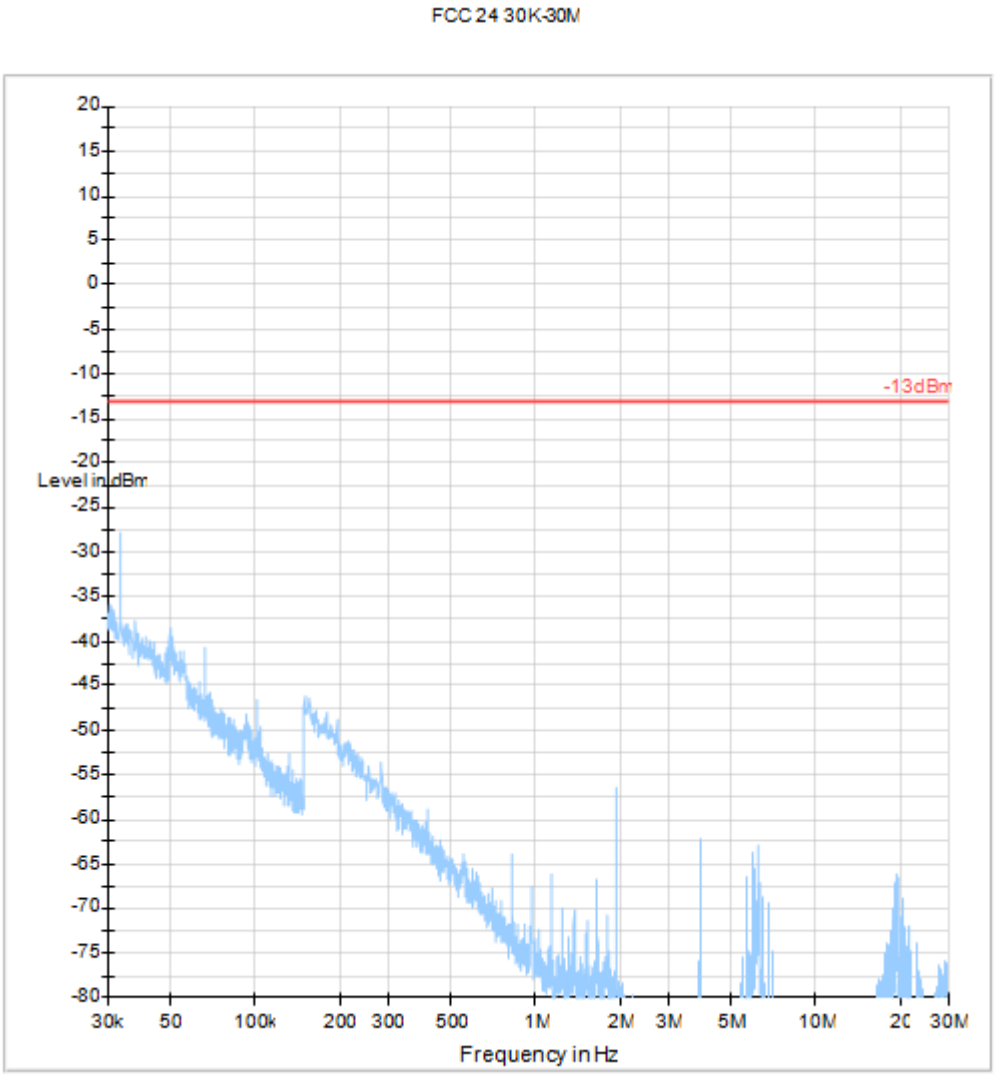
Test results 30 KHz- 30 MHz – Low Channel



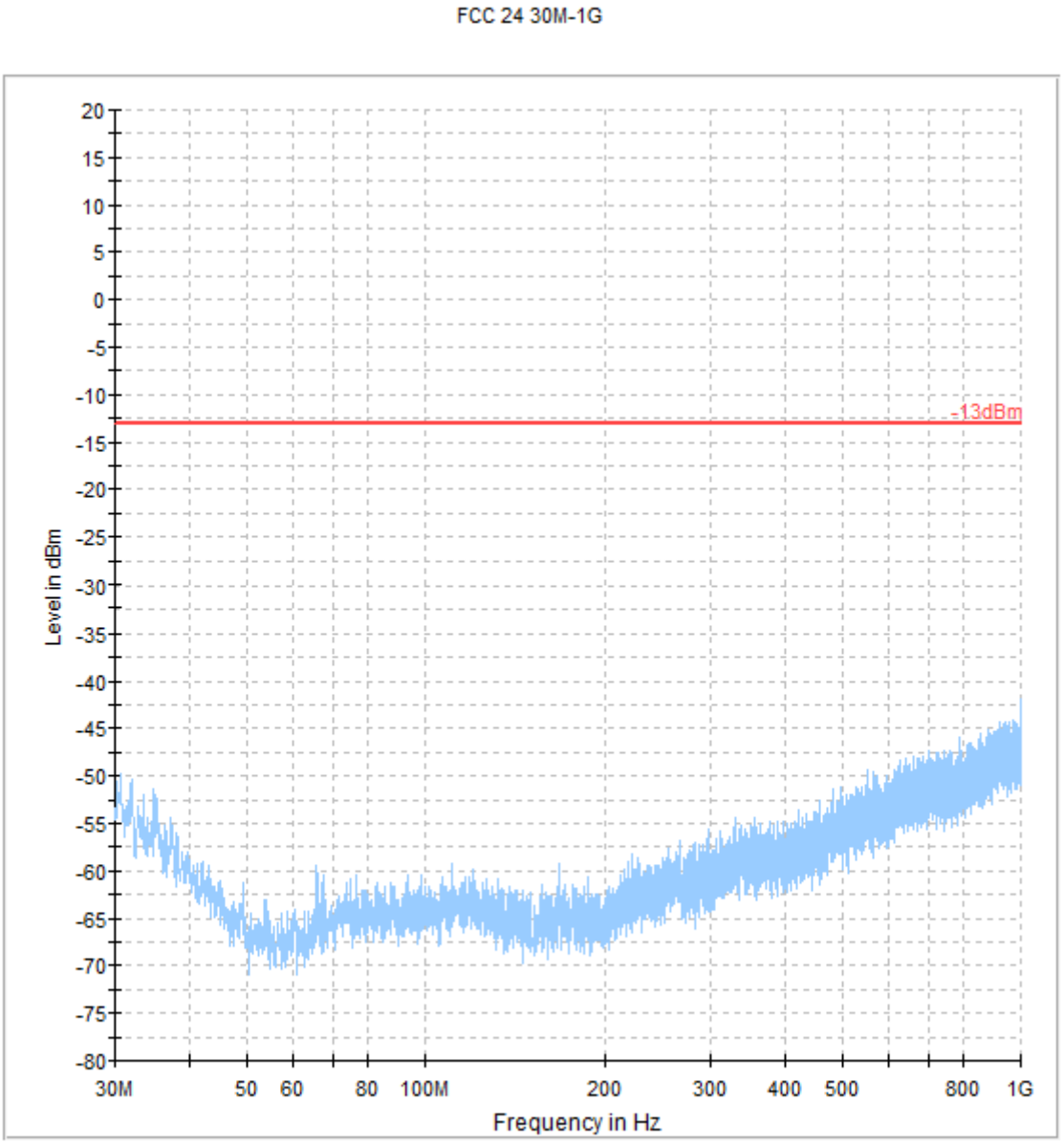
Test results 30 KHz- 30 MHz – Mid Channel



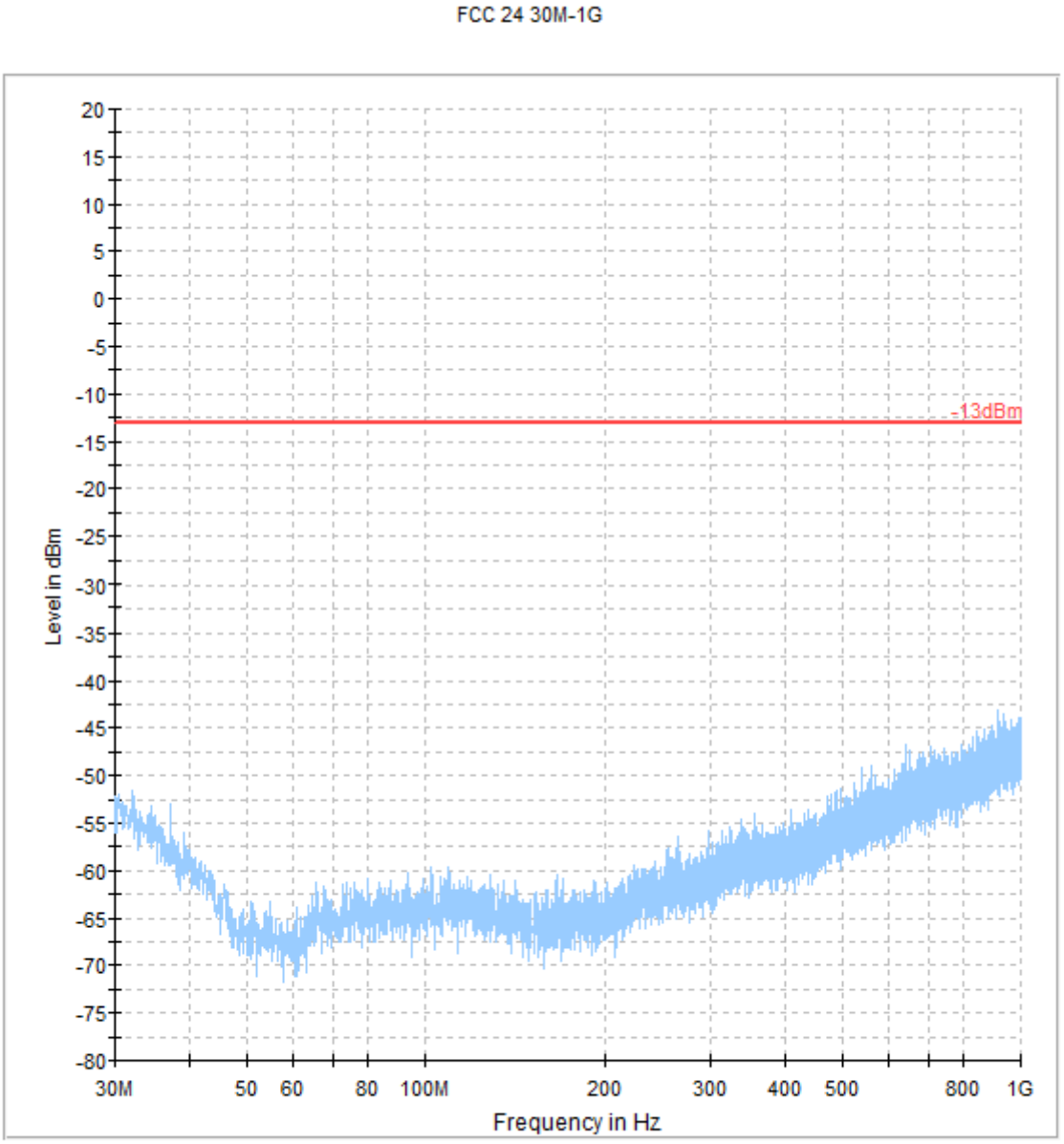
Test results 30 KHz- 30 MHz – High Channel



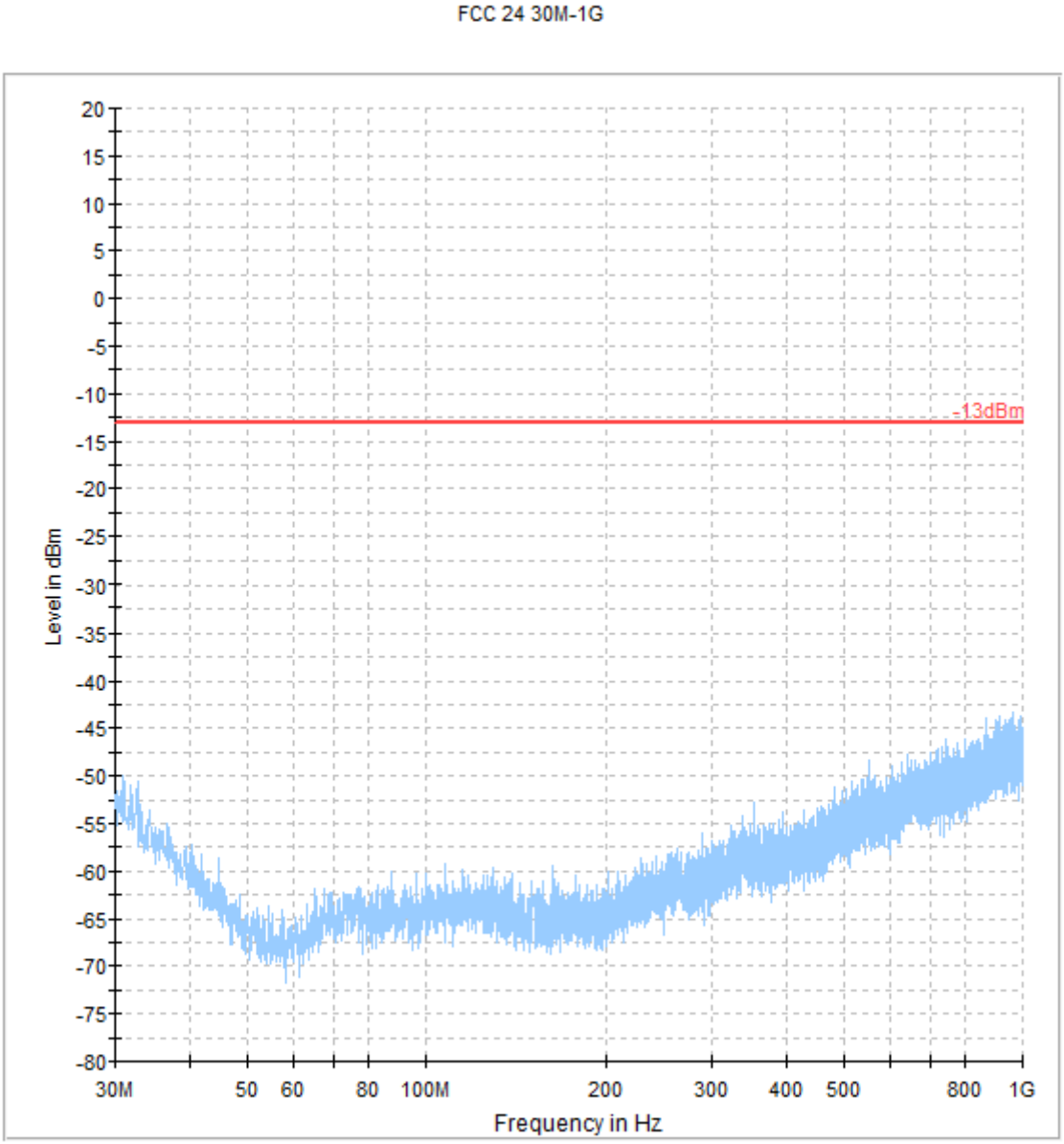
Test results 30 MHz- 1 GHz – Low Channel



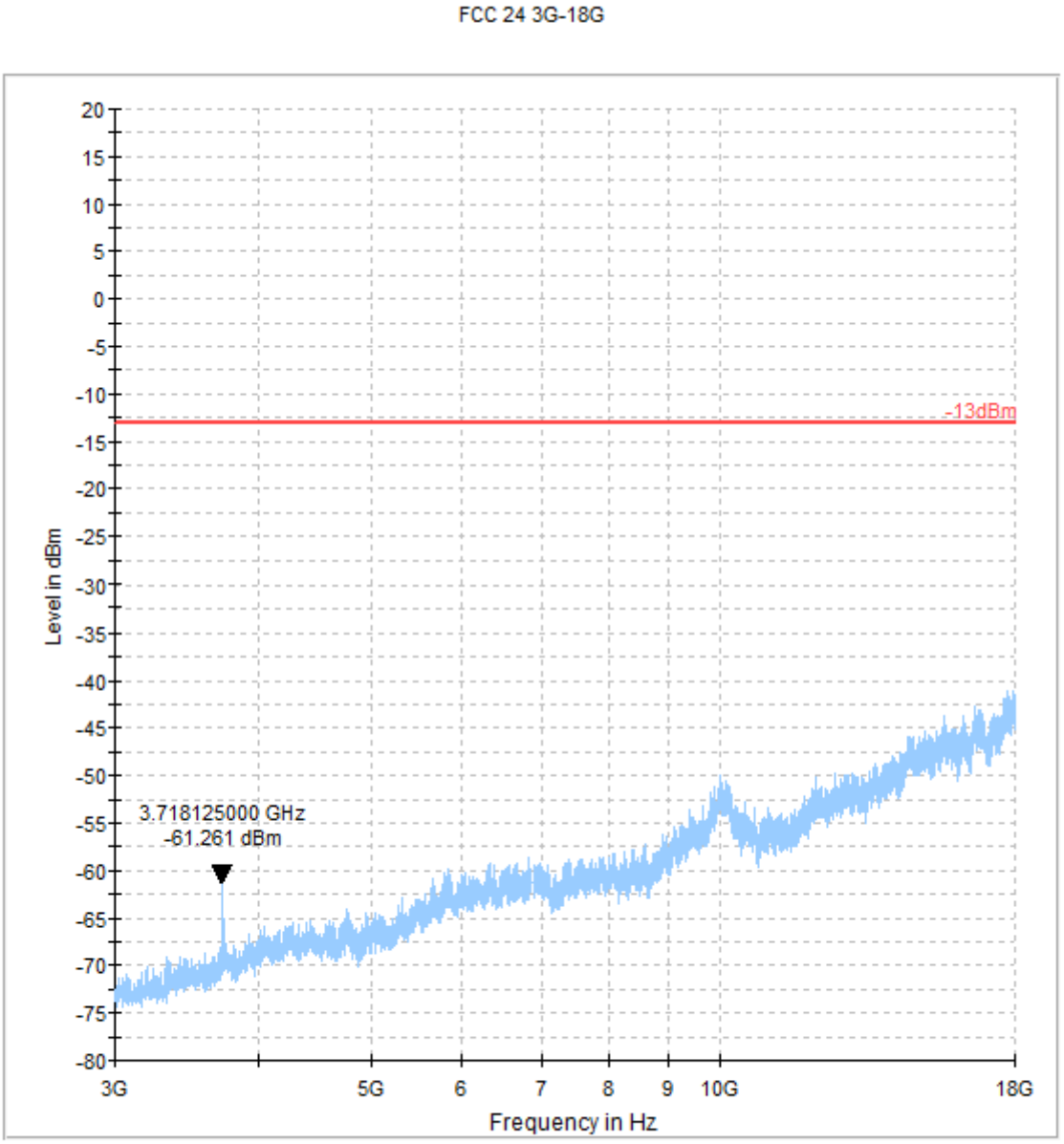
Test results 30 MHz- 1 GHz – Mid Channel



Test results 30 MHz- 1 GHz – High Channel

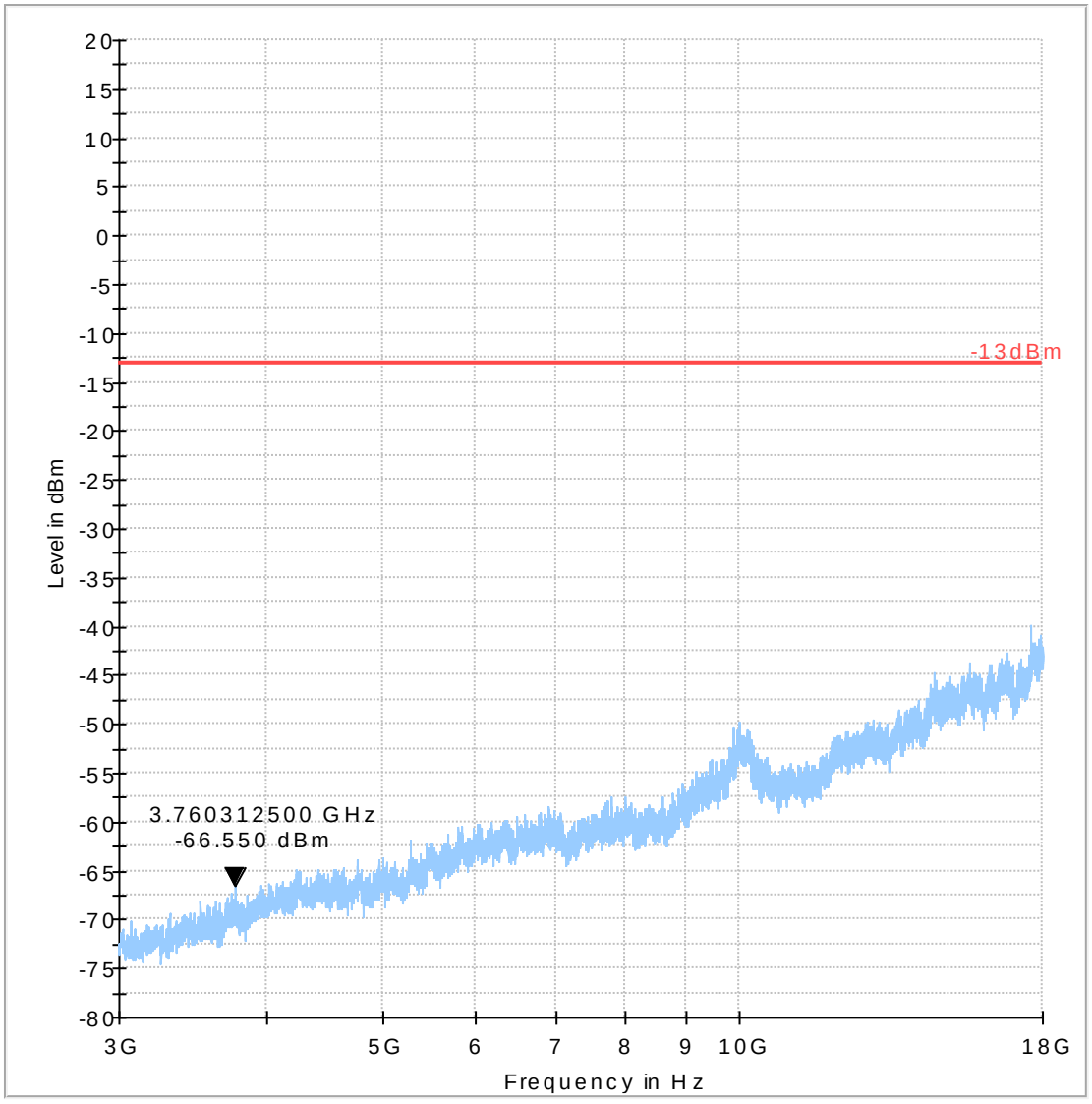


Test results 3 GHz- 18 GHz – Low Channel



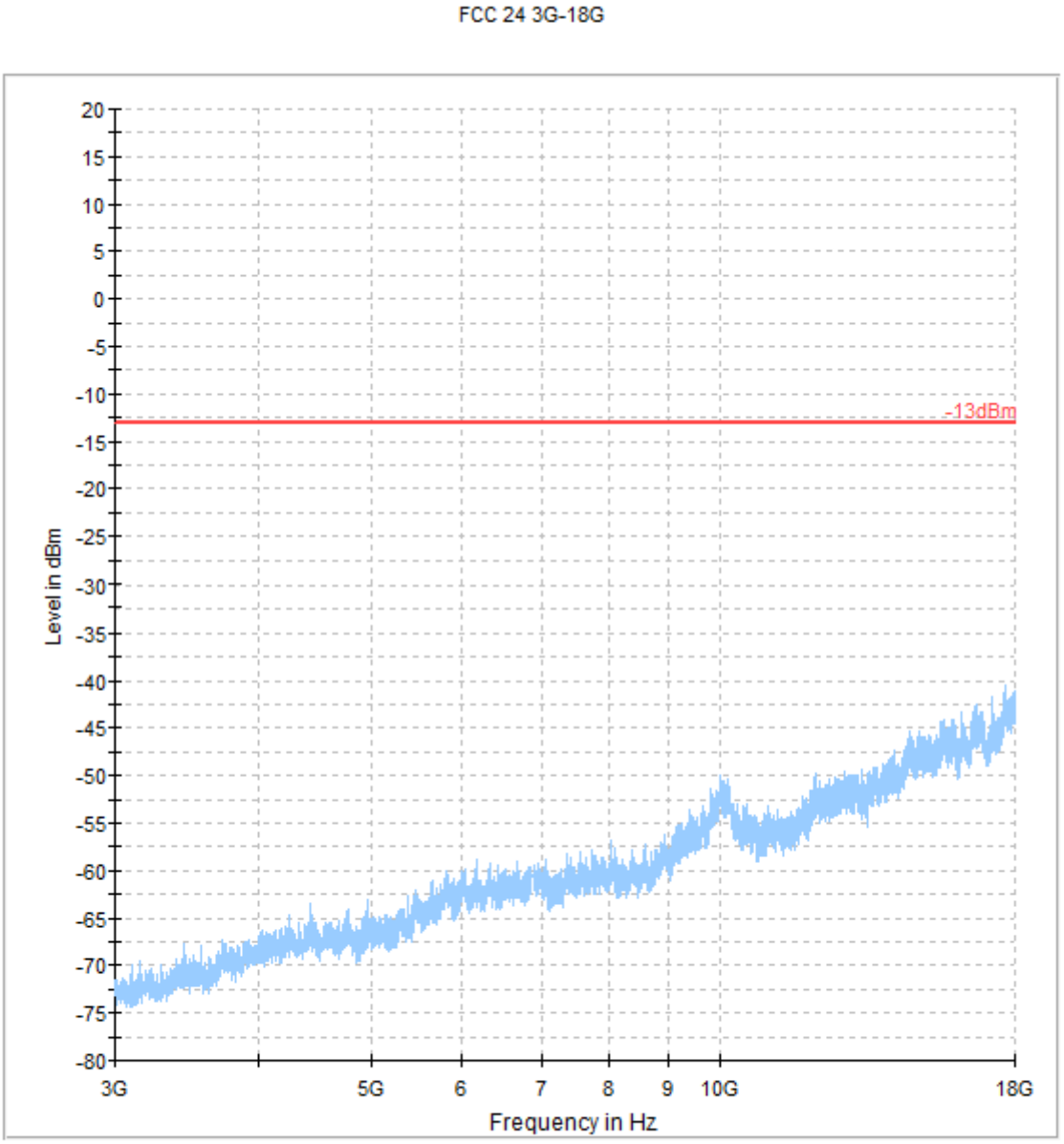
Test results 3 GHz- 18 GHz – Mid Channel

FCC 24 3G-18G

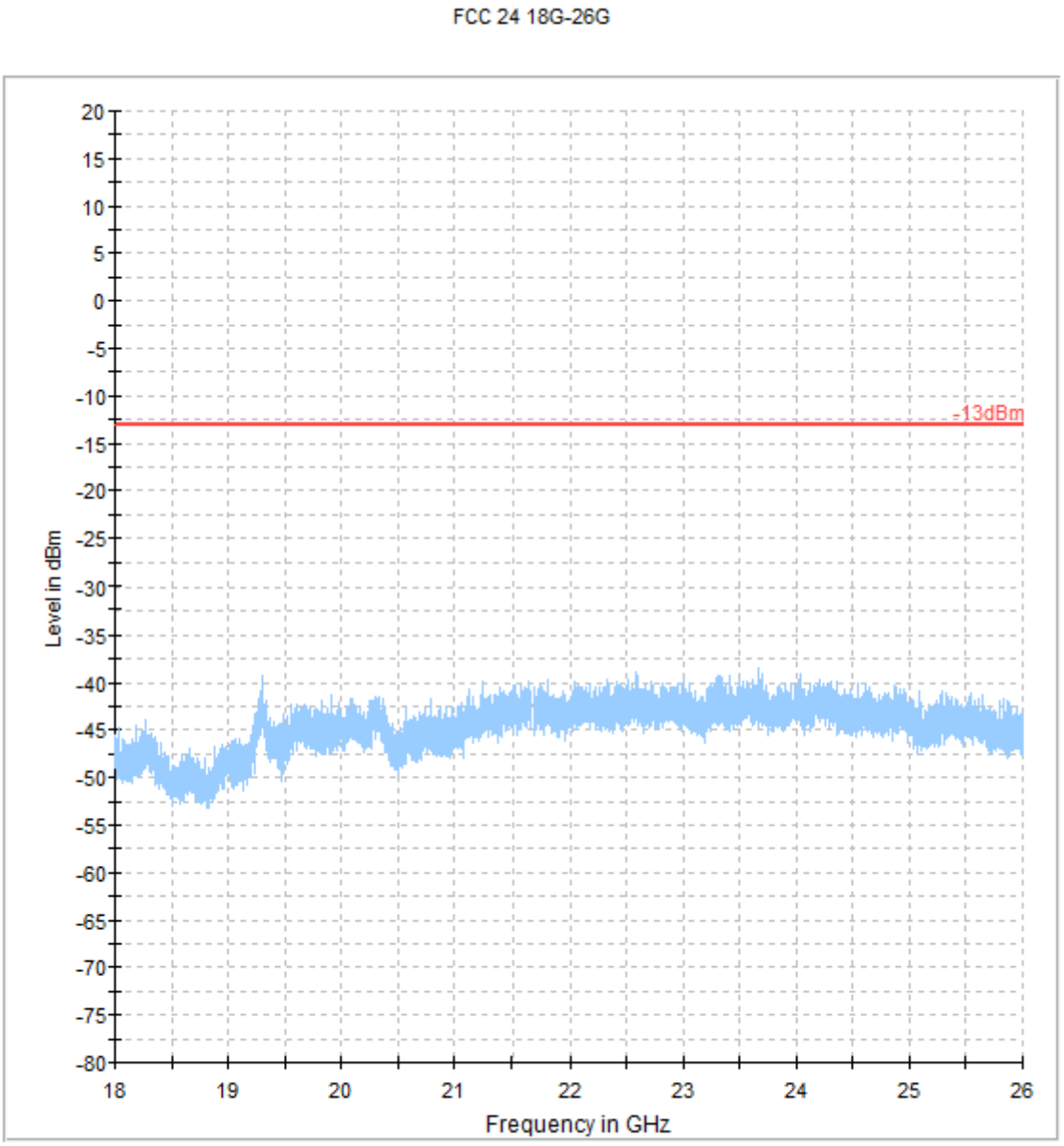


RMS

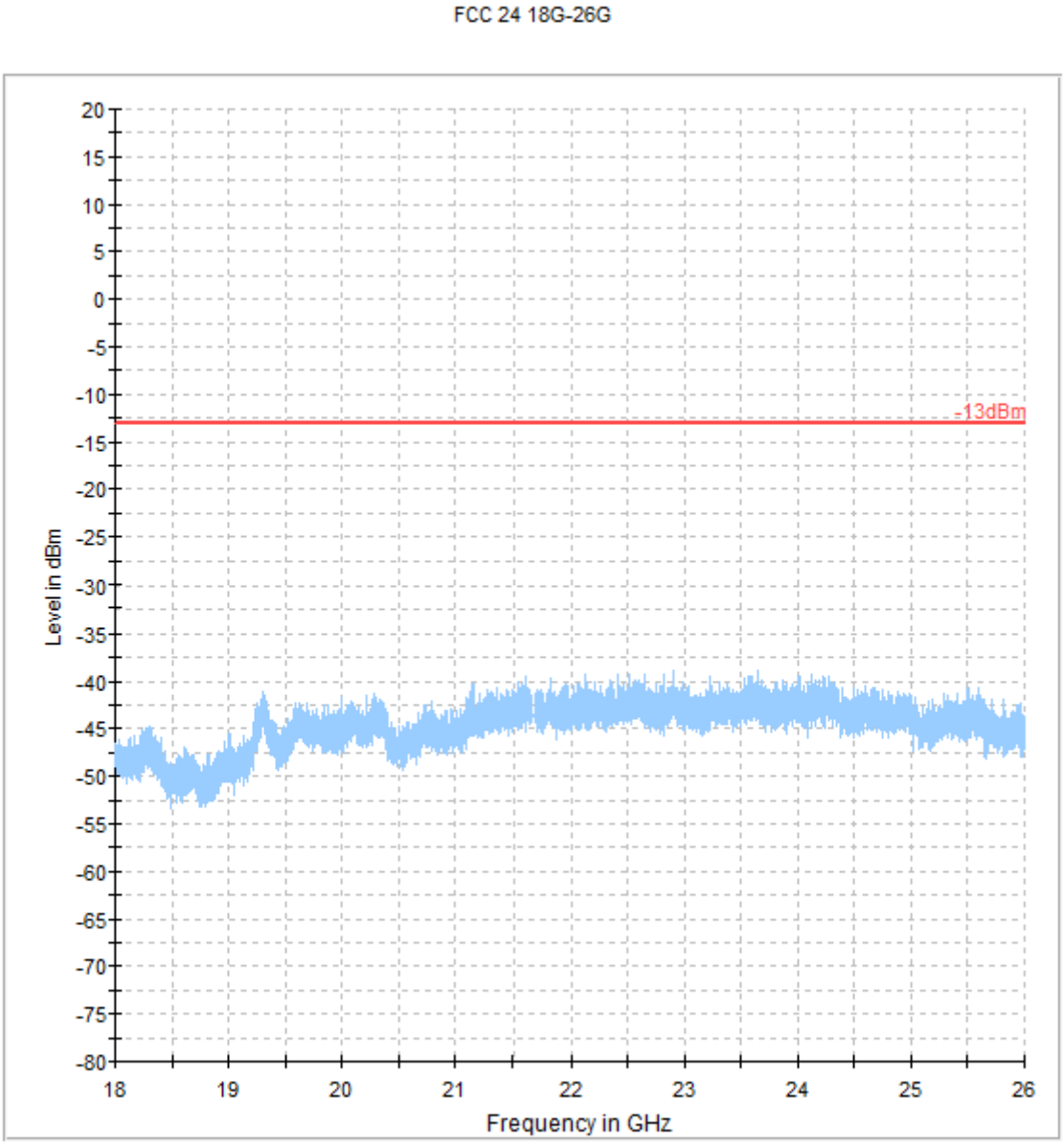
Test results 3 GHz- 18 GHz – High Channel



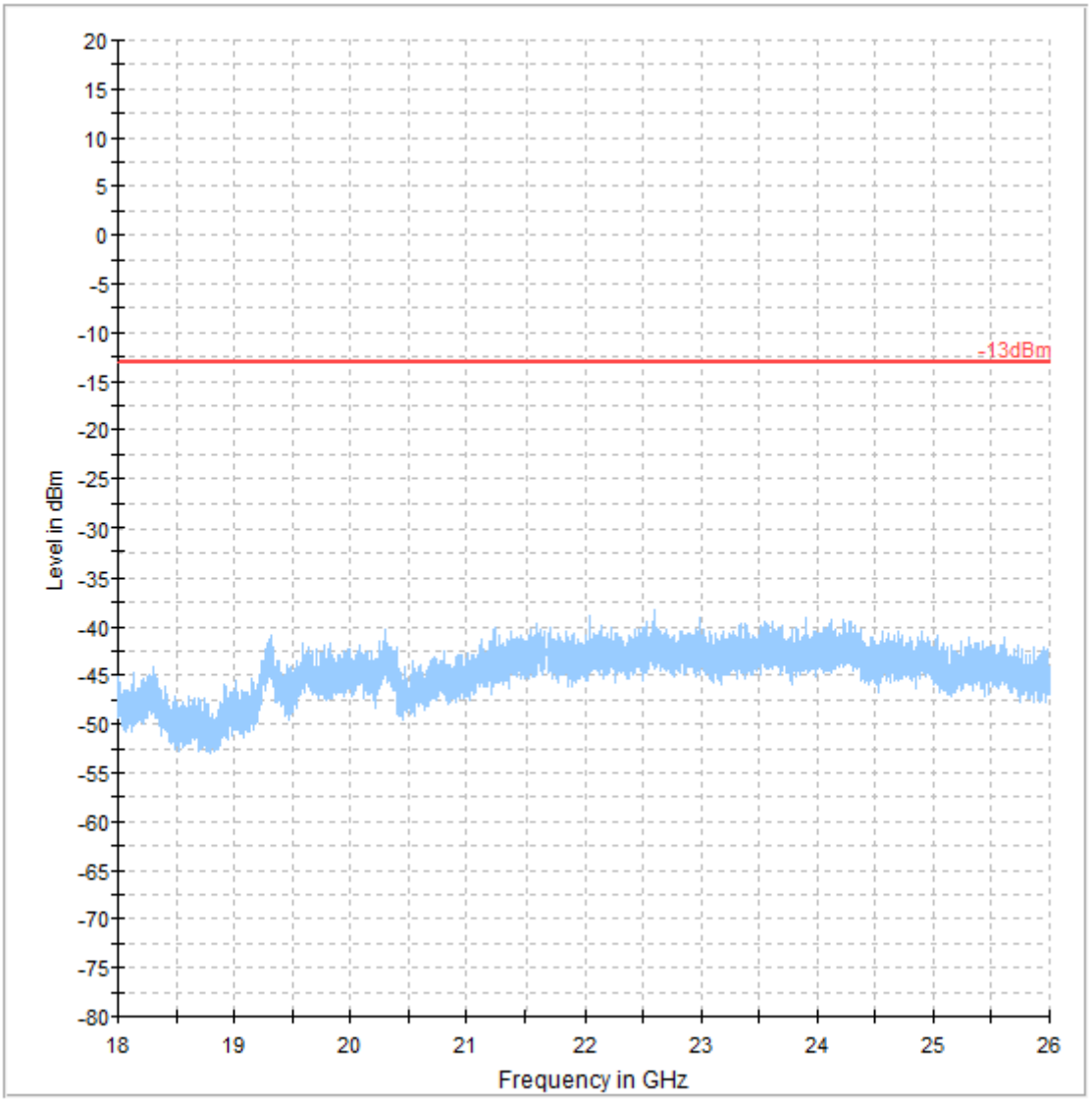
Test results 18 GHz- 26 GHz – Low Channel



Test results 18 GHz- 26 GHz – Mid Channel

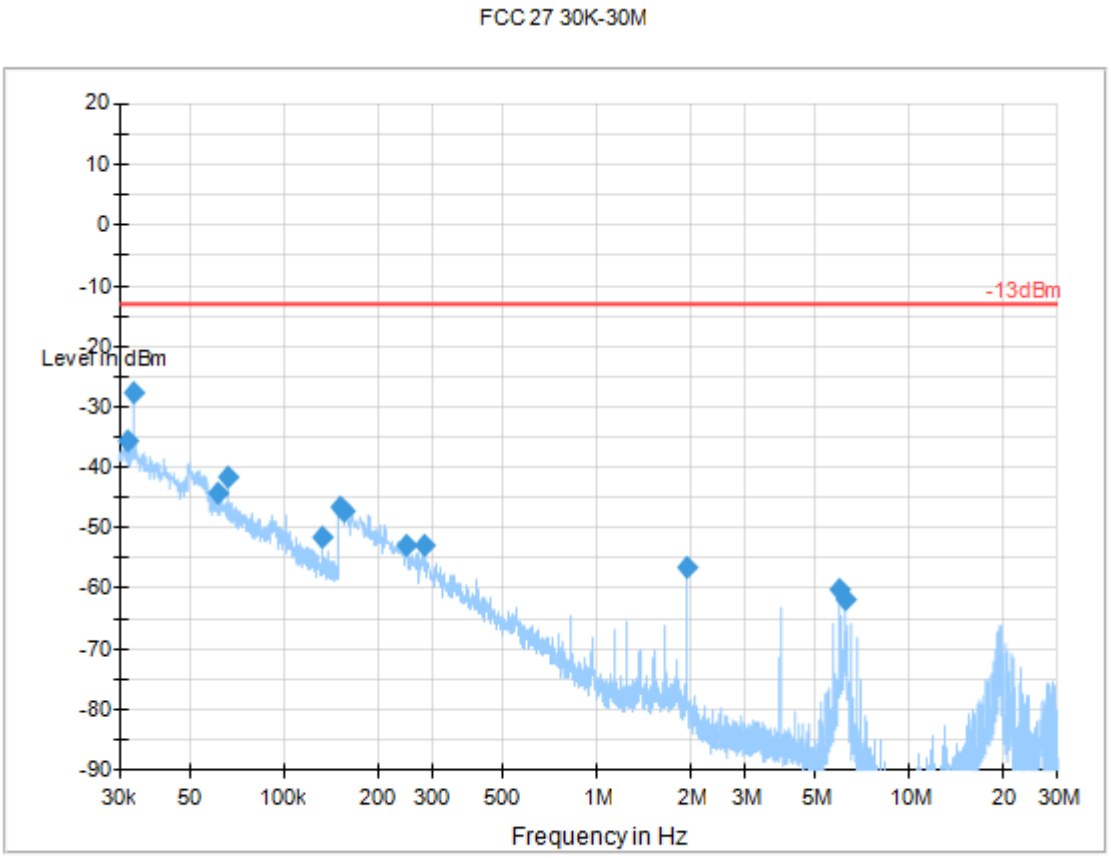


Test results 18 GHz- 26 GHz – High Channel

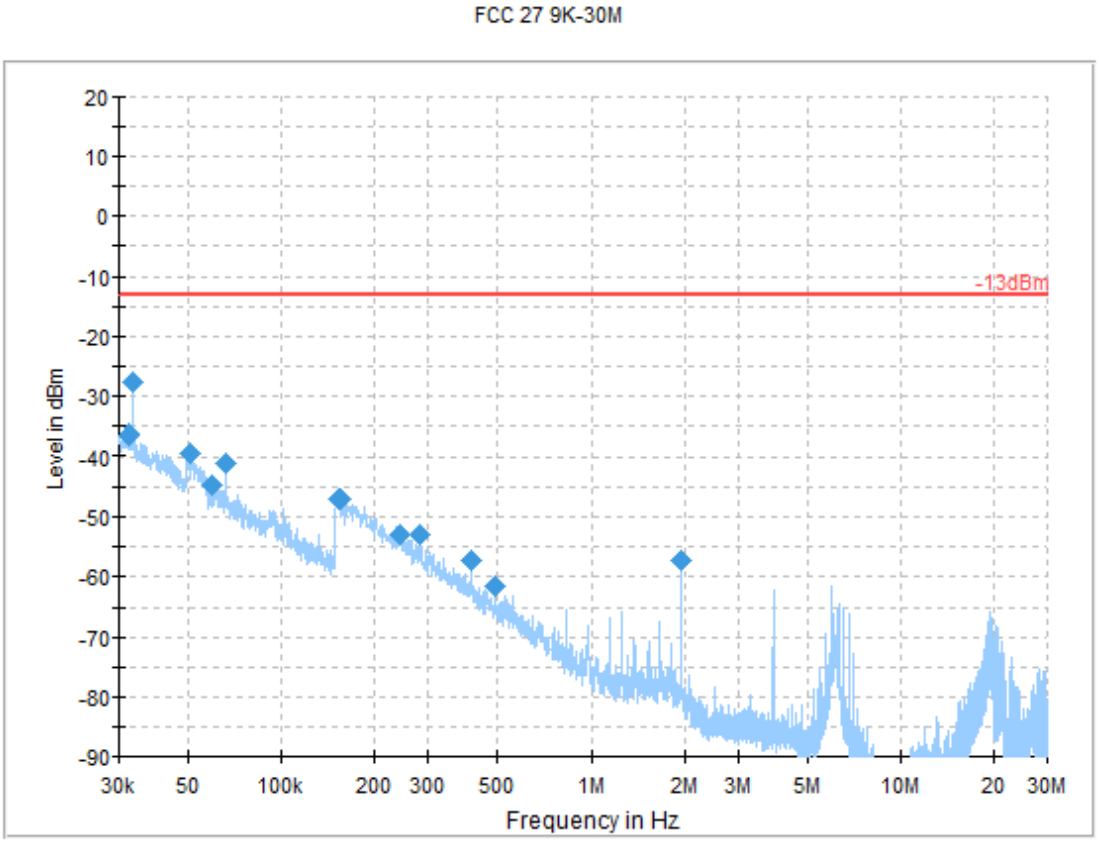


Radiated Spurious Emissions FDD Band 4 Tx:

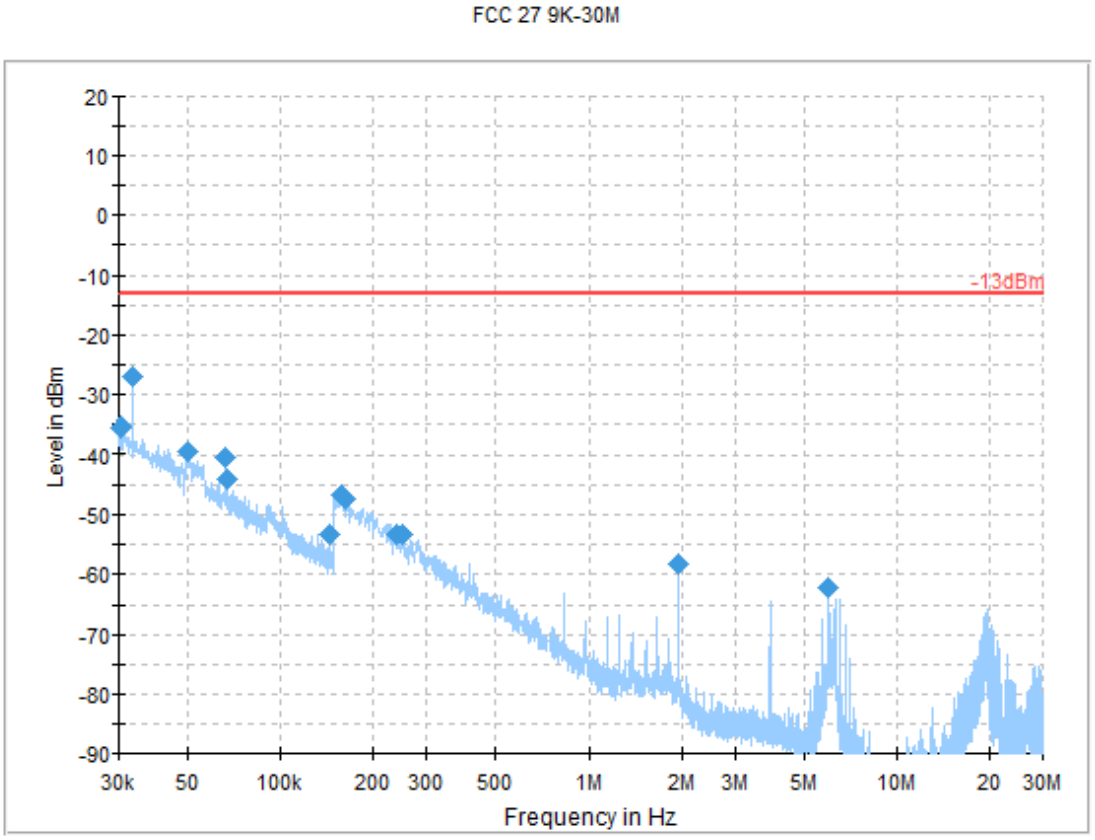
Test results 30 KHz- 30 MHz – Low Channel



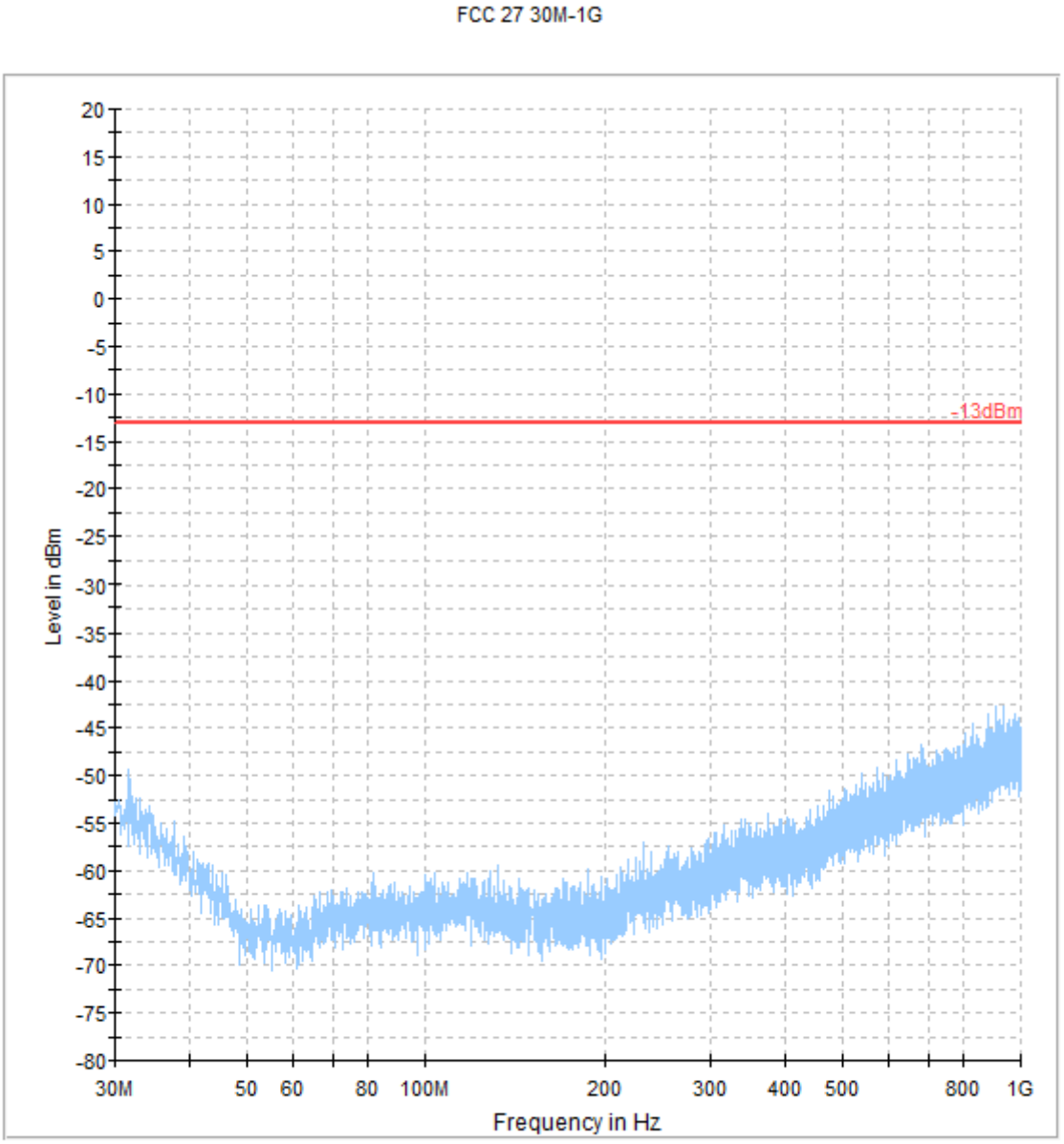
Test results 30 KHz- 30 MHz – Mid Channel



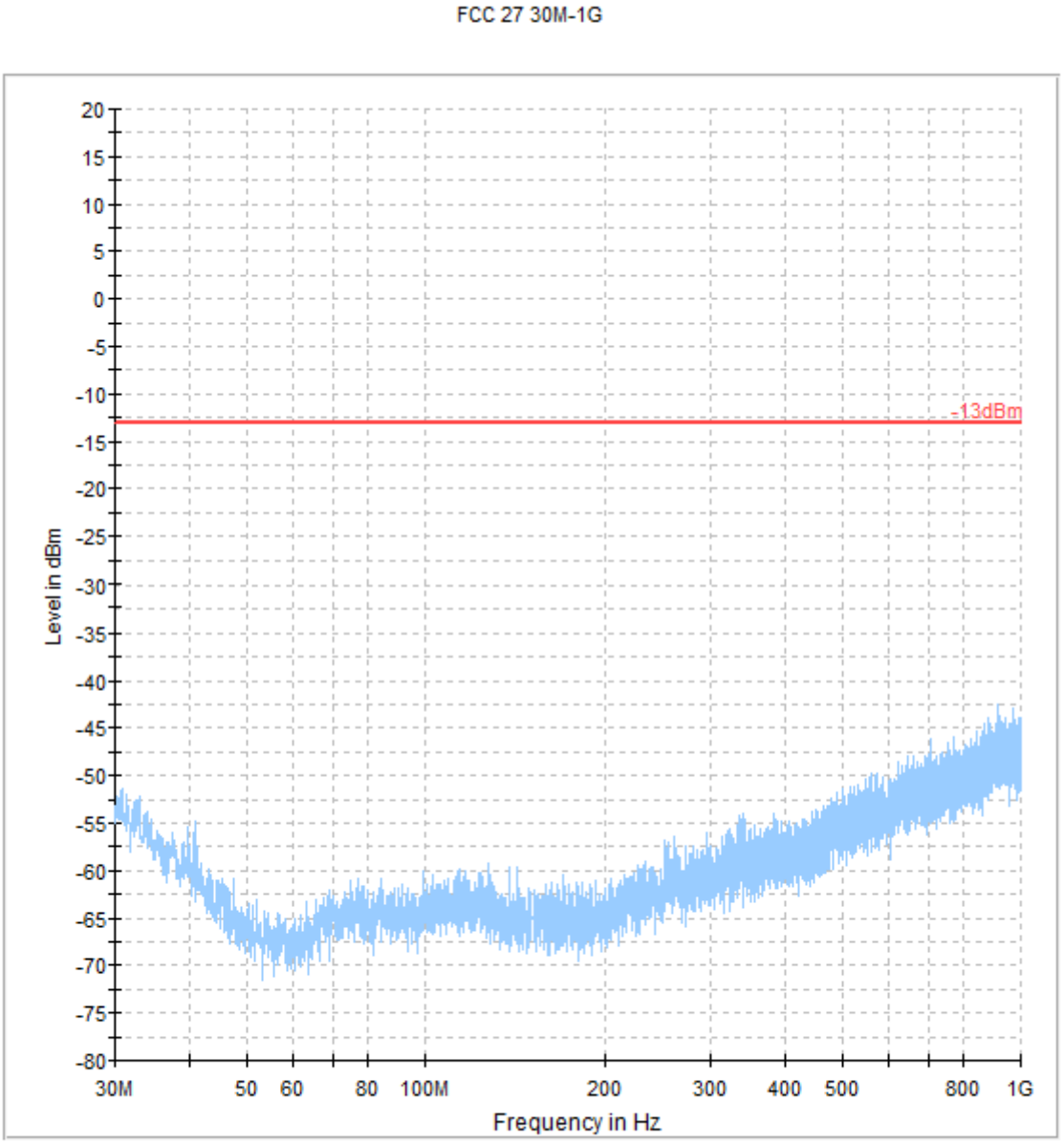
Test results 30 KHz- 30 MHz – High Channel



Test results 30 MHz- 1 GHz – Low Channel

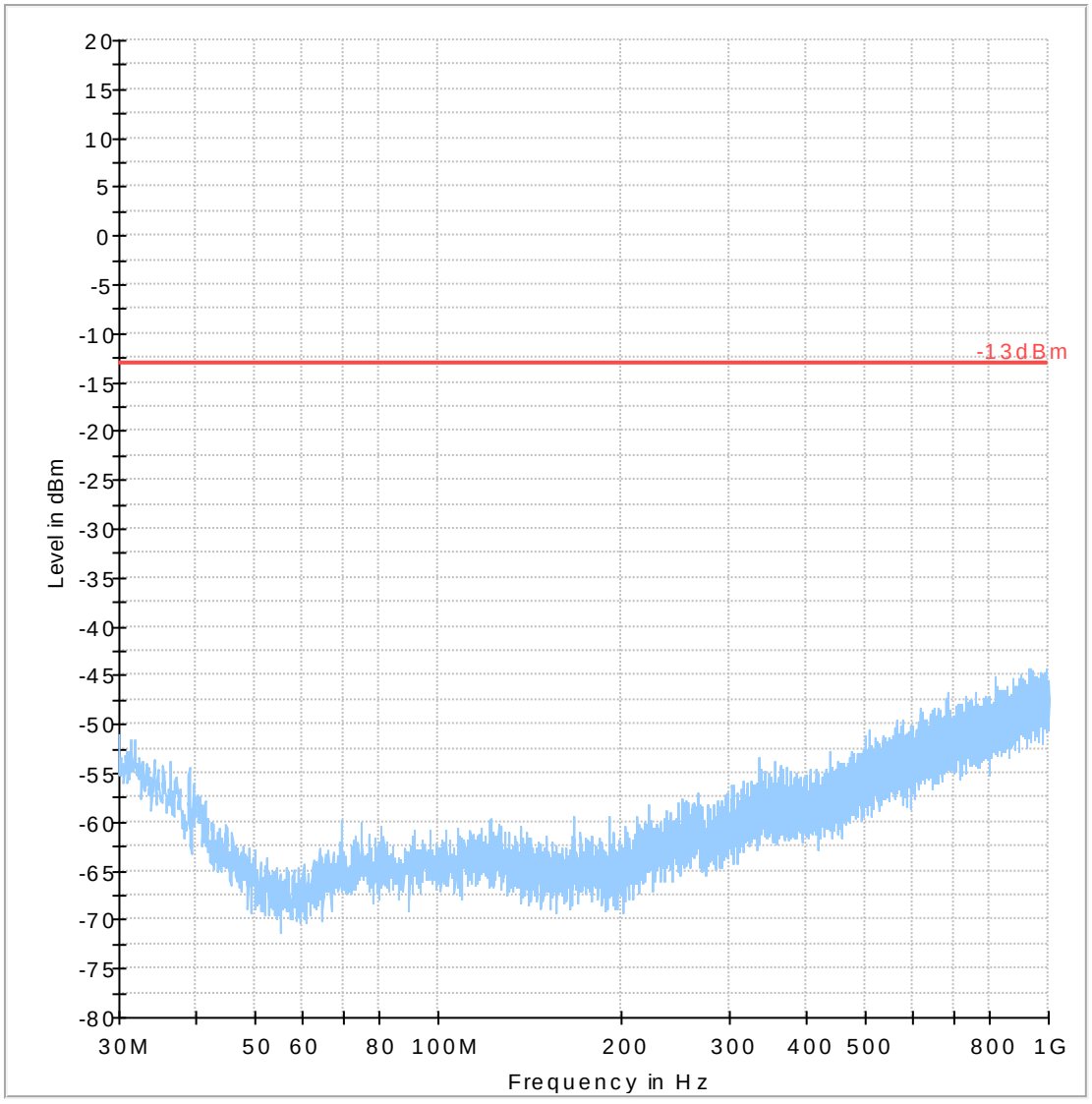


Test results 30 MHz- 1 GHz – Mid Channel



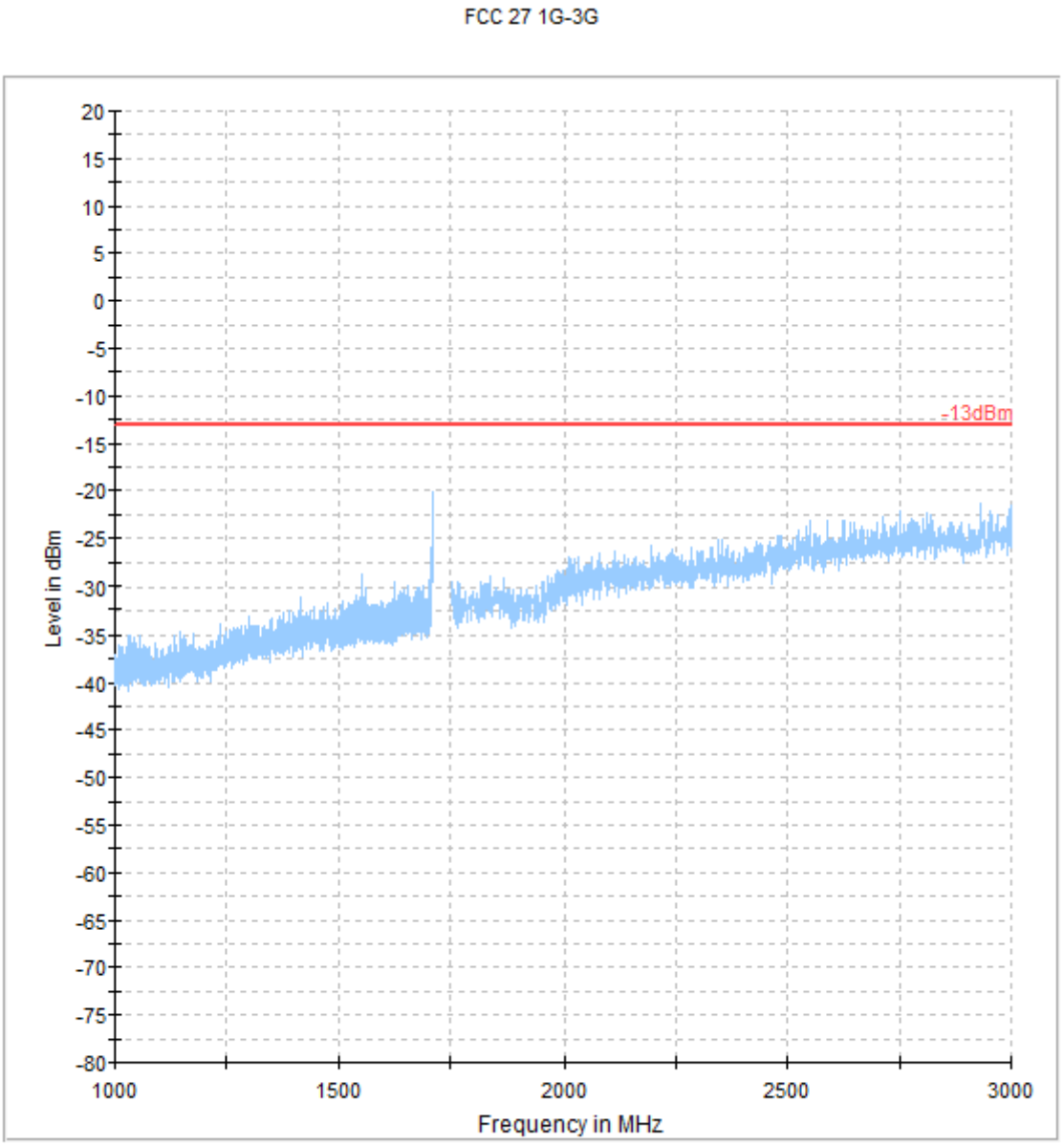
Test results 30 MHz- 1 GHz – High Channel

FCC 27 30M-1G

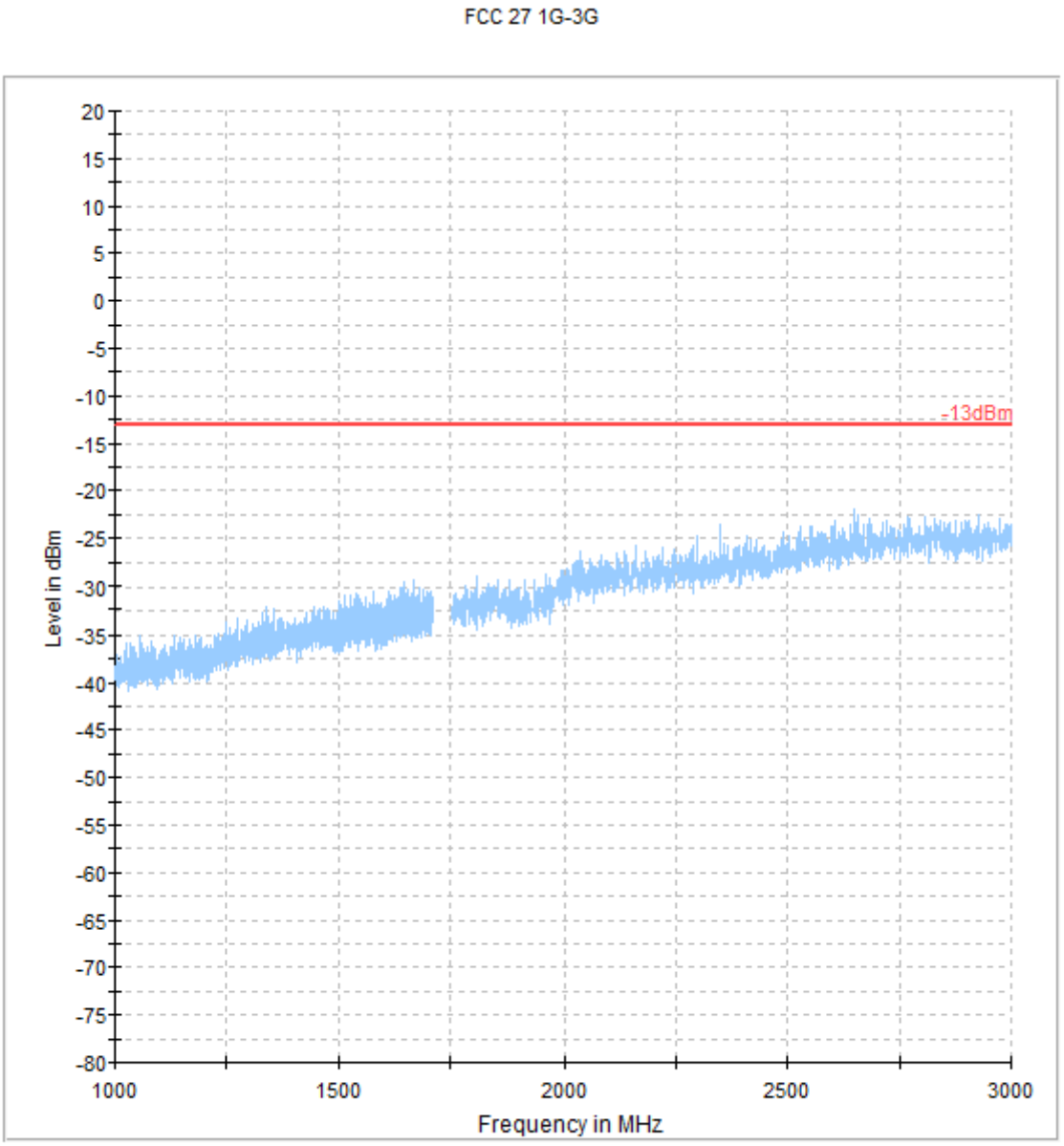


RMS

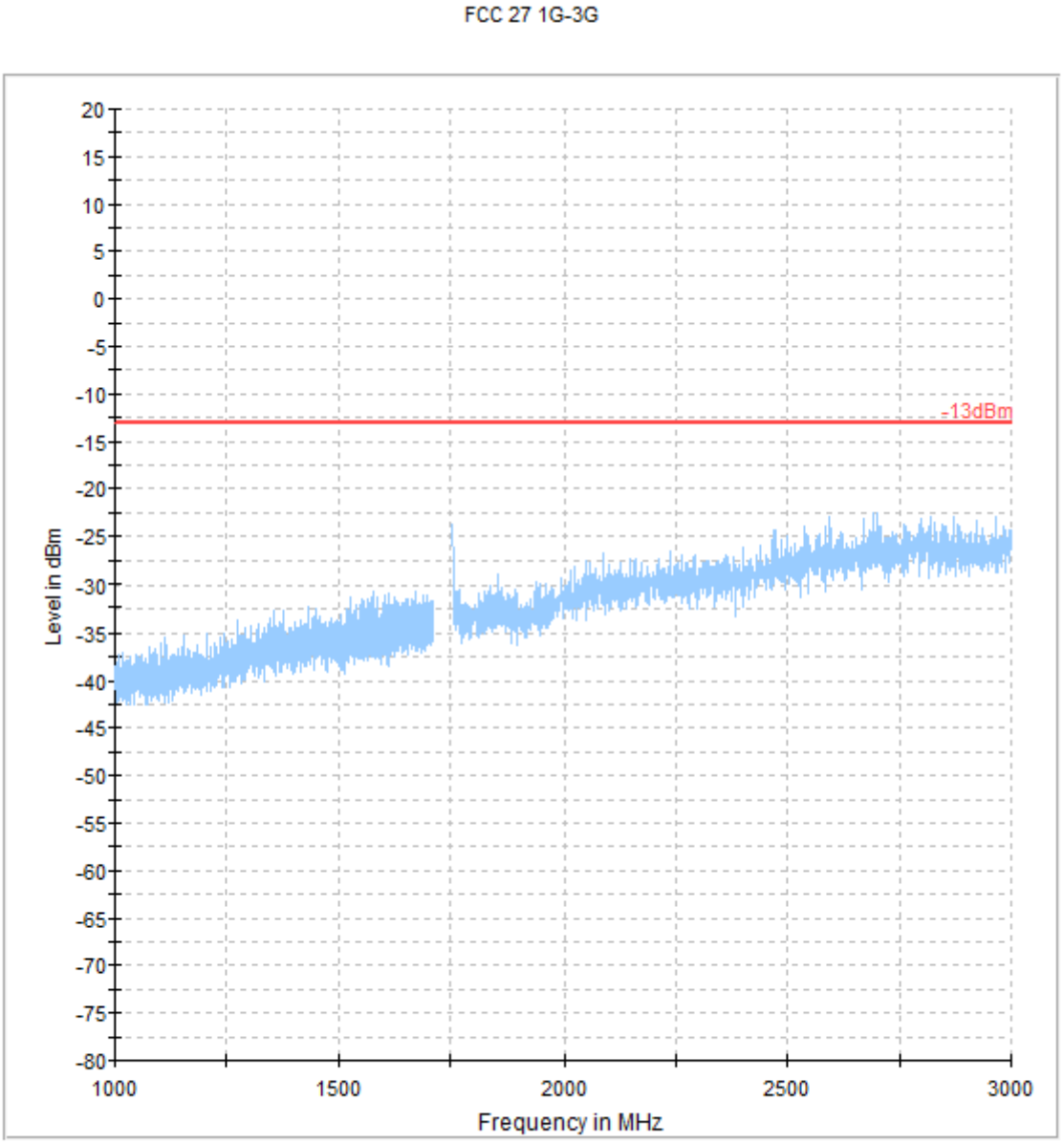
Test results 1 GHz- 3 GHz – Low Channel



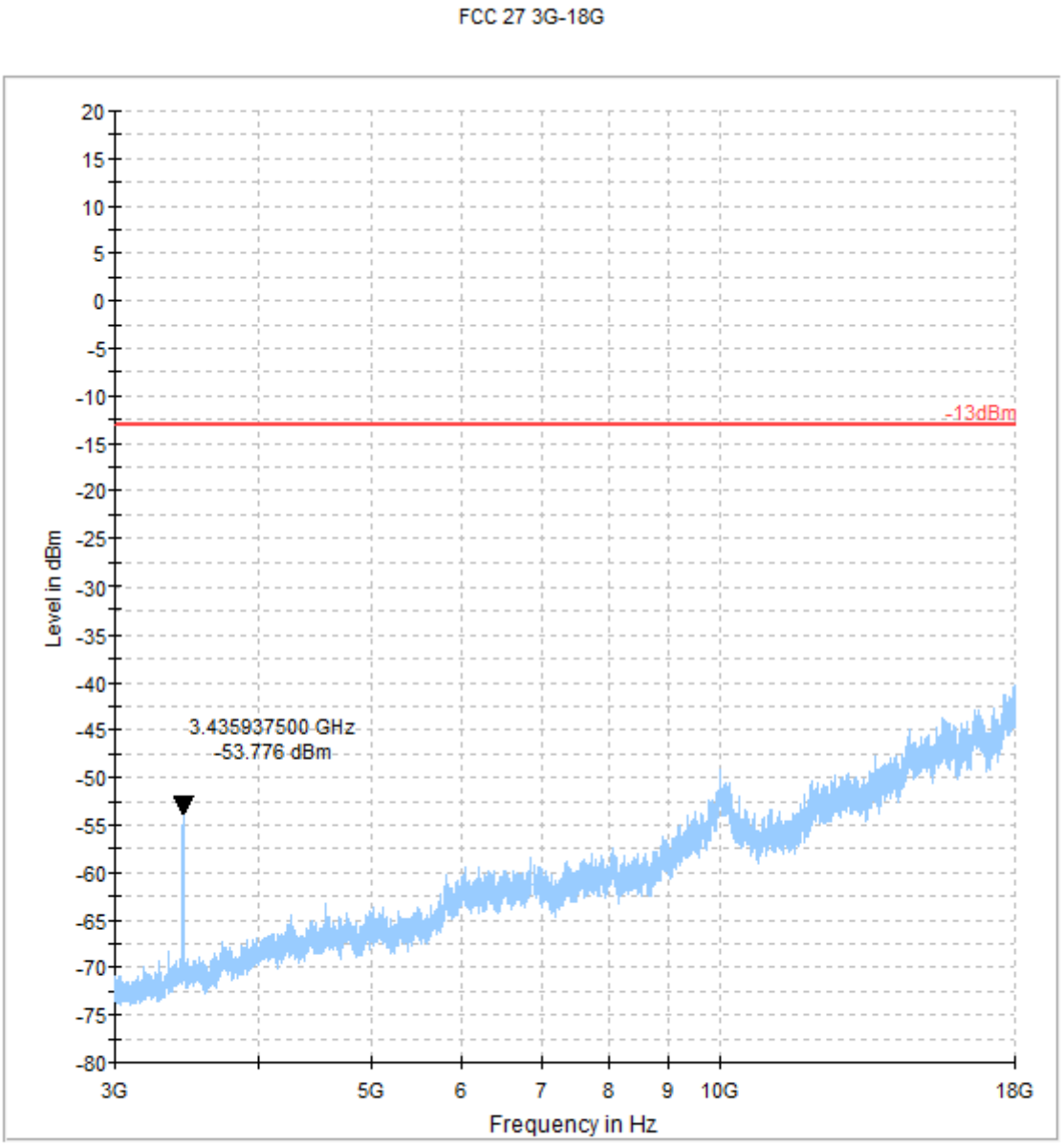
Test results 1 GHz- 3 GHz – Mid Channel



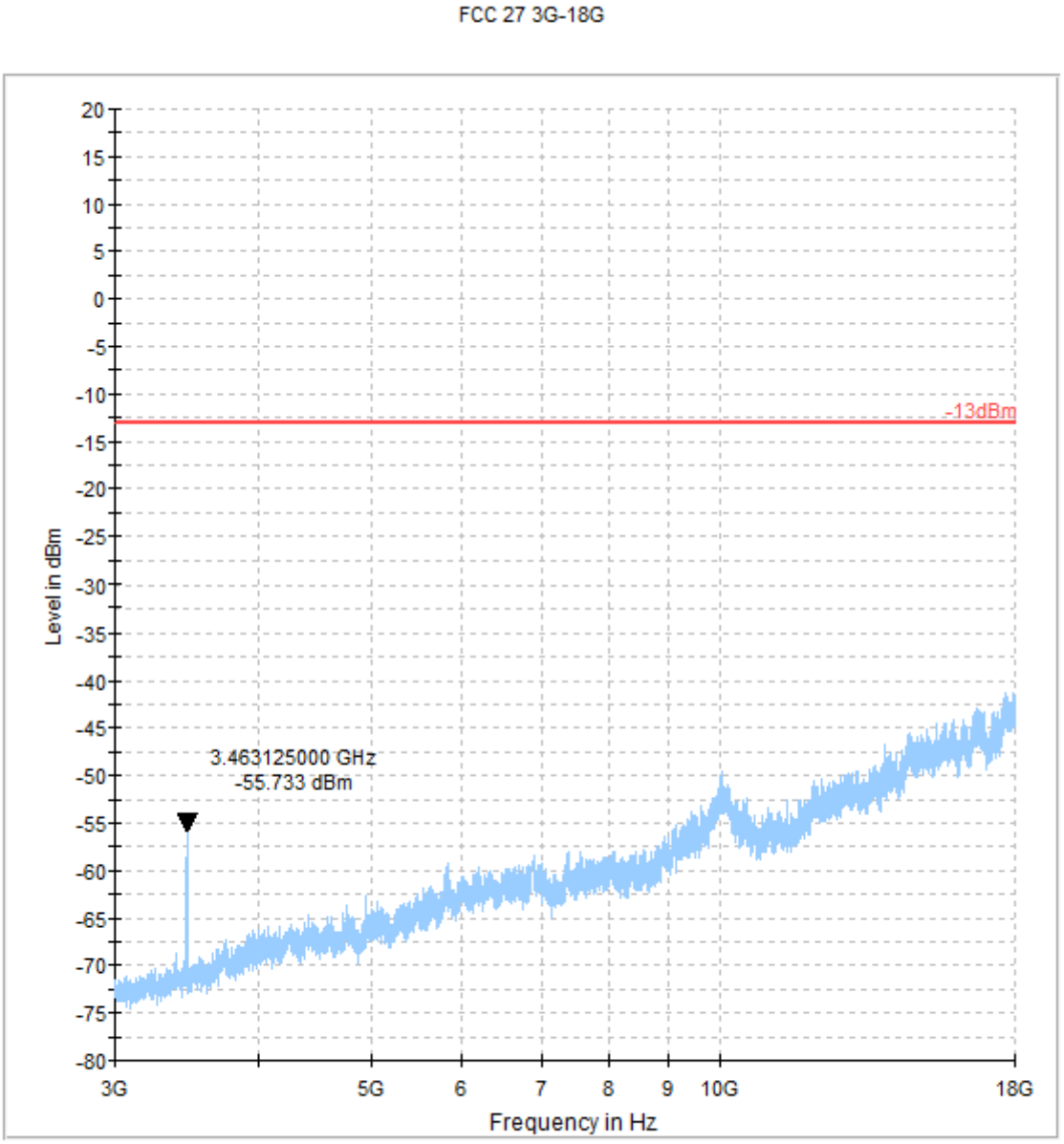
Test results 1 GHz- 3 GHz – High Channel



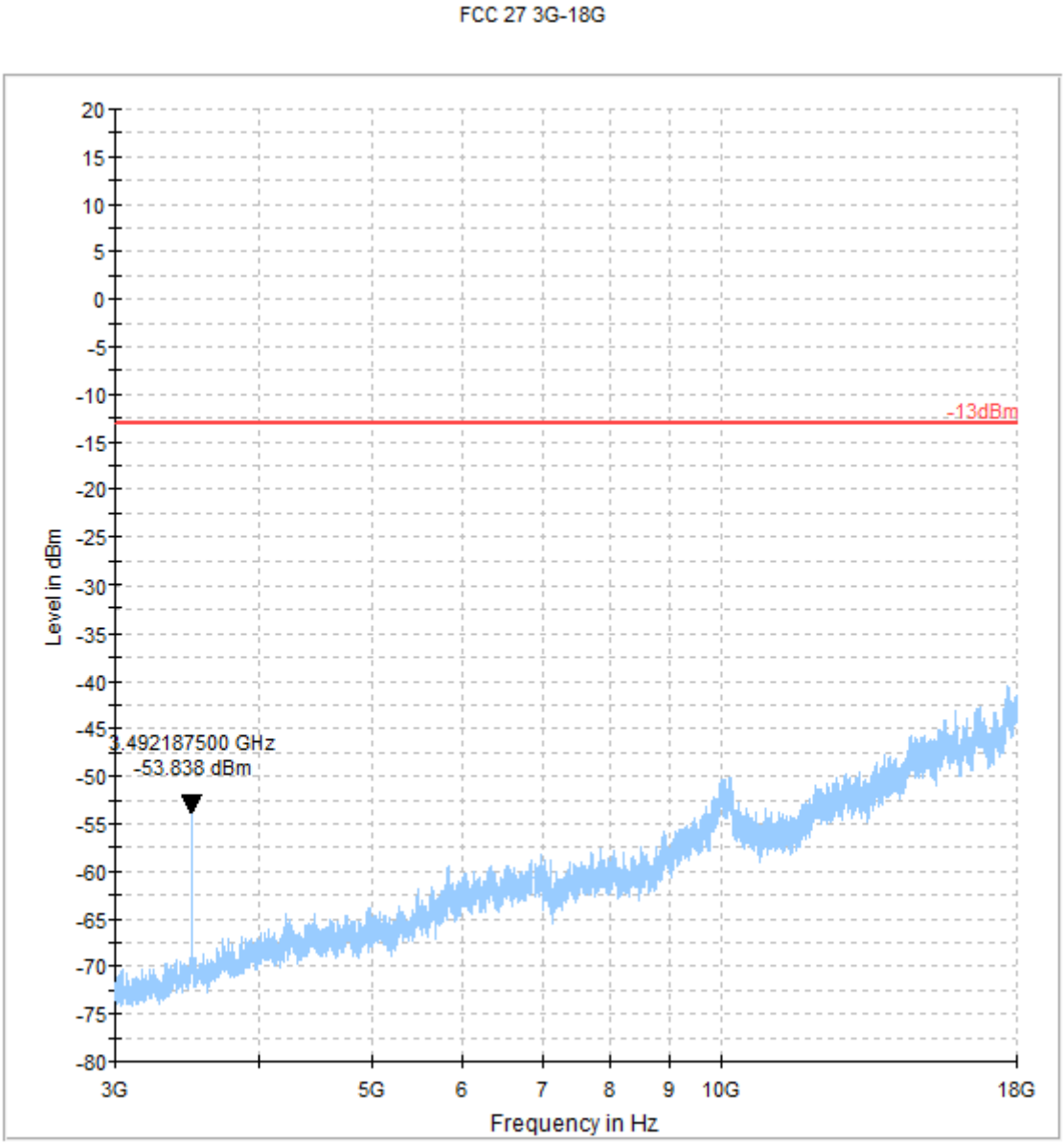
Test results 3 GHz- 18 GHz – Low Channel



Test results 3 GHz- 18 GHz – Mid Channel



Test results 3 GHz- 18 GHz – High Channel



7 Test Equipment and Ancillaries used for tests

Equipment Name	Manufacturer	Type/Model	Serial No.	Cal Date	Cal Interval	Next cal date
3m Semi- Anechoic Chamber and Ground Plane:						
Spectrum Analyzer	Rohde und Schwarz	FSV 40	101022	7/2014	3 years	7/2017
Receiver	Rohde und Schwarz	ESR3	101663	7/2015	3 years	7/2018
LISN	Rohde und Schwarz	ESV 216	101129	7/2015	3 years	7/2018
Radio Communications Tester	Rohde and Schwarz	CMU 200	121672	7/2015	3 years	7/2018
Log Periodic Antenna	Rohde and Schwarz	HL 050	100515	4/2013	3 year	4/2016
Ultralog Antenna	Rohde and Schwarz	HL 562	100495	5/2015	3 year	5/2018
Double-ridge Horn Antenna (1G-18G)	ETS-Lindgren	3117-PA	00167061	7/2014	3 year	7/2017
Double-ridge Horn Antenna (18G-40G)	ETS-Lindgren	3116C-PA	00166821	7/2014	3 year	7/2017
Loop Antenna	ETS-Lindgren	6512	00164698	7/2014	3 year	7/2017
Open Switch Control Unit	Rohde and Schwarz	OPS 130	10085	n/a		
Extention Unit Open Switch Control Unit	Rohde and Schwarz	OSP 150	10086	n/a		
Turn Table TT	Maturo	1.5 SI	TT 1.5SI/204/6070 910	n/a		
Compact antenna Mast	Maturo	BAM 4.0-P	078/16550515	n/a		
Multiple Control Unit	Maturo	MCU	214/0000915	n/a		
Multiple Control Unit	Maturo	NCD	169/16550515			
Pre-Amplifier	Rohde and Schwarz	TS-PR 18	100072	Part of the system calibration		

8 Revision History

Date	Report Name	Changes to report	Report prepared by
01/20/2016	EMC_CONN-045-15001_FCC_22_24_27_WWAN_v1.0	First Revision	MPDL