FCC/IC Test Report

For:

21NeT LTD

Model Name:

21NetBox v1

Product Description:

Mobile Access Router

FCC ID: 2AG5P-21NETBOXV1

Per:
47 CFR: Part 22, Part 24, Part 27, Part 90

Report #: EMC_21NET-002-15001_FCC_22_24_27_90_REV3
Date: August 10, 2016

***CETECOM* Inc.**
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1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 22, 24, 27, 90.
No deficiencies were ascertained.

Company Name	Product Description	Model #
21Net LTD	Mobile Access Router	21NetBox v1

Responsible for Testing Laboratory:

Date	Section	Name	Signature
August 10, 2016	Compliance	Franz Engert (Compliance Manager)	Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Complience, email=franz.engert@cetecom.com

Responsible for the Report:

Date	Section	Name	Signature
August 10, 2016	Compliance	James Donnellan (Sr. EMC Engineer)	James Donnellan Digitally signed by James Donnellan DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com Date: 2016.08.10 12:22:48 -07'00'

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 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
Compliance Manager:	Franz Engert
Project Engineer:	Yu-Chien Ho

2.2 Identification of the Client

Applicant's Name:	21Net LDT
Street Address:	Leuvensesteenweg 350
City/Zip Code	Boortmeerbeek, 3190
Country	Belgium
Contact Person:	Kurt Haegeman
Phone No.	+32-(0)15-61.88.70

2.3 Identification of the Manufacturer

Manufacturer's Name:	MEN Mikro Elektronik GmbH
Manufacturers Address:	Neuwieder Strasse 3-7
City/Zip Code	90411 Nuremberg
Country	Germany

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model #:	21NetBox v1
HW Version:	1.0
SW Version:	SWI9X15C_05.05.37.00
FCC-ID	2AG5P-21NETBOX V1
Product Description	Mobile Access Router
Module Information:	Module Sierra WirelessMC7354; FCC-ID: N7NMC7355; IC: 2417C-MC7355;
Transceiver Technology / Type(s) of Modulation	GPRS/EGPRS 850/1900MHz GMSK/8-PSK WCDMA/UMTS Band II, IV, V / QPSK / HPSK (CDMA2000) LTE 2, 4, 5, 13, 17, 25 / OFDM, OFDMA, SC-FDMA CDMA BC0/BC1/BC10 GPRS voice and circuit switched data are supported by the module but disabled in the host product
Operating Frequency Ranges (MHz):	GPRS/EGPRS 850: 824 - 849 MHz; GPRS/EGPRS 1900: 1850 - 1910 MHz; WCDMA/UMTS FDD BAND II: 1852 - 1908 MHz; WCDMA/UMTS FDD BAND IV: 1710 - 1755 MHz; WCDMA/UMTS FDD BAND V: 824 - 849 MHz; CDMA BC0: 815 – 849 MHz; CDMA BC1: 1850 – 1910 MHz; CDMA BC10: 806 – 901 MHz LTE Band 2: 1850 - 1910 MHz; LTE Band 4: 1710 - 1755 MHz; LTE Band 5: 824 – 849 MHz: LTE Band 13: 777 - 787 MHz; LTE Band 17: 704 - 716 MHz; LTE Band 25: 1805 – 1915 MHz;
Measured AVG Conducted Output Power:	31.6 dBm, GPRS 850
Antenna info:	N/A.
Rated Operating Voltage Range:	AC/DC PSU: AC 100-240V, 1500mA, 50Hz/60Hz Vmin: 10V DC / Vnom: 24V DC / Vmax: 50.4V DC
Operating Temperature Range:	Tlow: -40 ° C/ Tnom: 23 ° C/ Tmax: 70 ° C
Other Radios included in the device	N/A
Sample Revision	■Prototype ☐Production ☐ Pre-Production

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Comments
1	000033	1.0	SWI9X15C_05.05.37.00	Radiated Measurements

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	AC/DC Power Supply	09257-H	NORDIC POWER	05BC50M00

3.4 Test Sample Configuration

Set-up #	EUT / AE used for set-up	Comments
1	EUT #1+ AE #1	Radiated and Conducted Measurements

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 22, 24, 27, 90 to support the equipment certification under FCC-ID 2AG5P-21NETBOXV1.

Full conducted measurements according to the above standards are filed under the certification of the module FCC-ID: N7NMC7355 with a singular grant. Thus this report verifies the radiated performance that may be influenced by the colocation/transmission of the 4 modules of this type in the product described in 3.

5 Measurement

5.1 Dates of Testing:

December 1, 2015 – February 5, 2016

5.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

Conducted measurement

150 kHz to 30 MHz	±0.7 dB (LISN)
RF conducted measurement	±0.5 dB

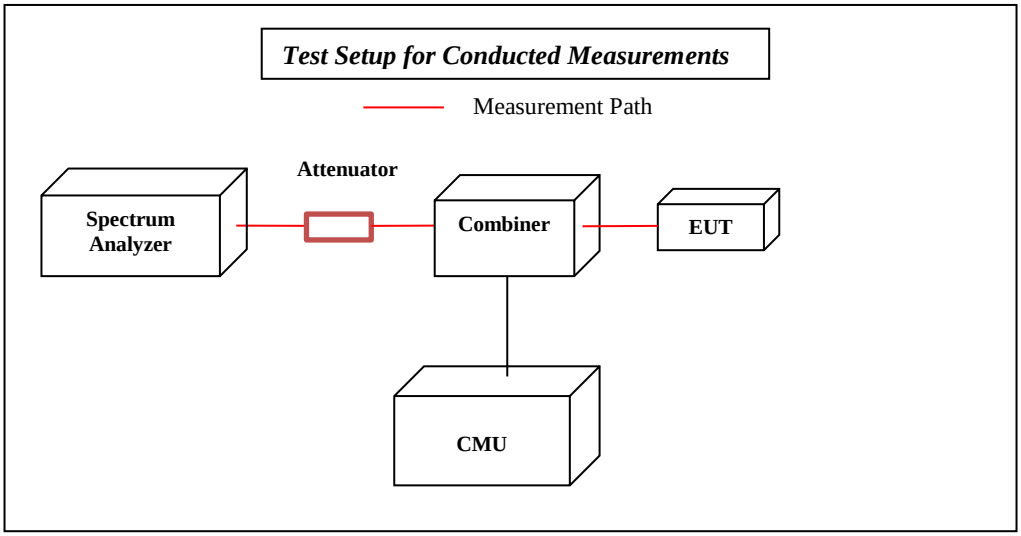
5.3 Environmental Conditions during Testing:

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

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

5.4 Conducted measurements

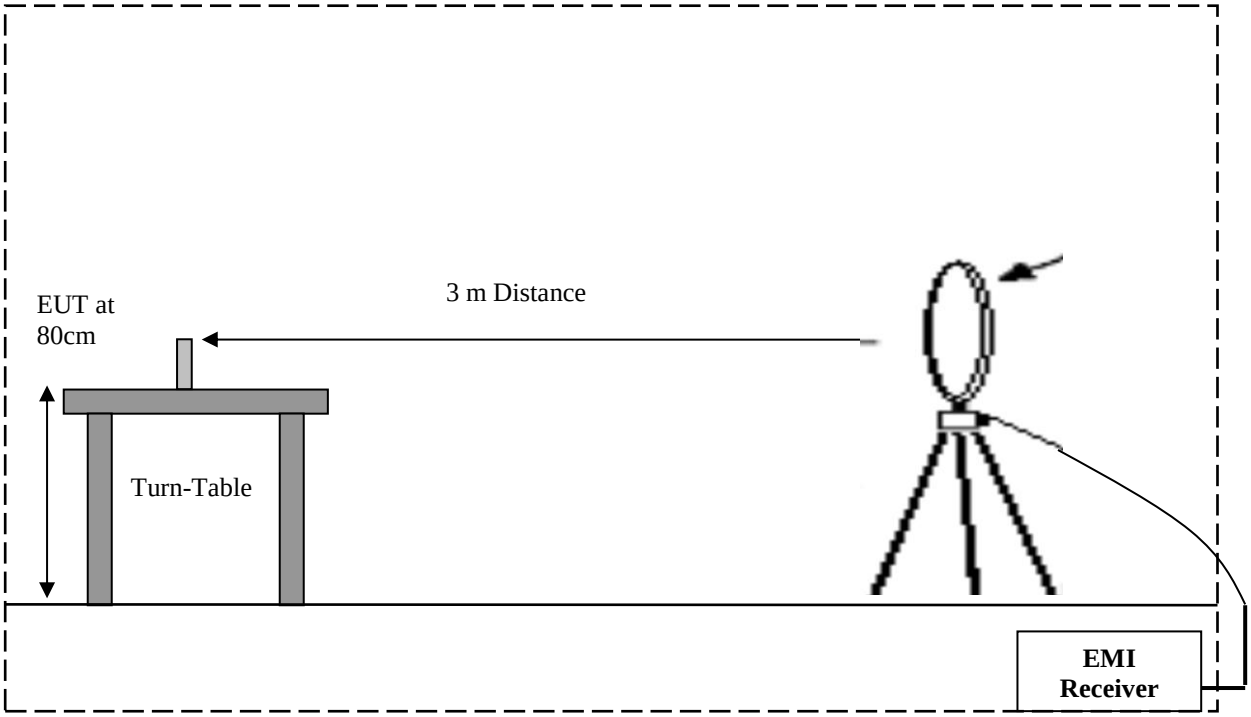
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v02r02 – "Measurement Guidance for Certification of Licensed Digital Transmitters" and according to relevant parts of TIA-603C 2004 as detailed below.



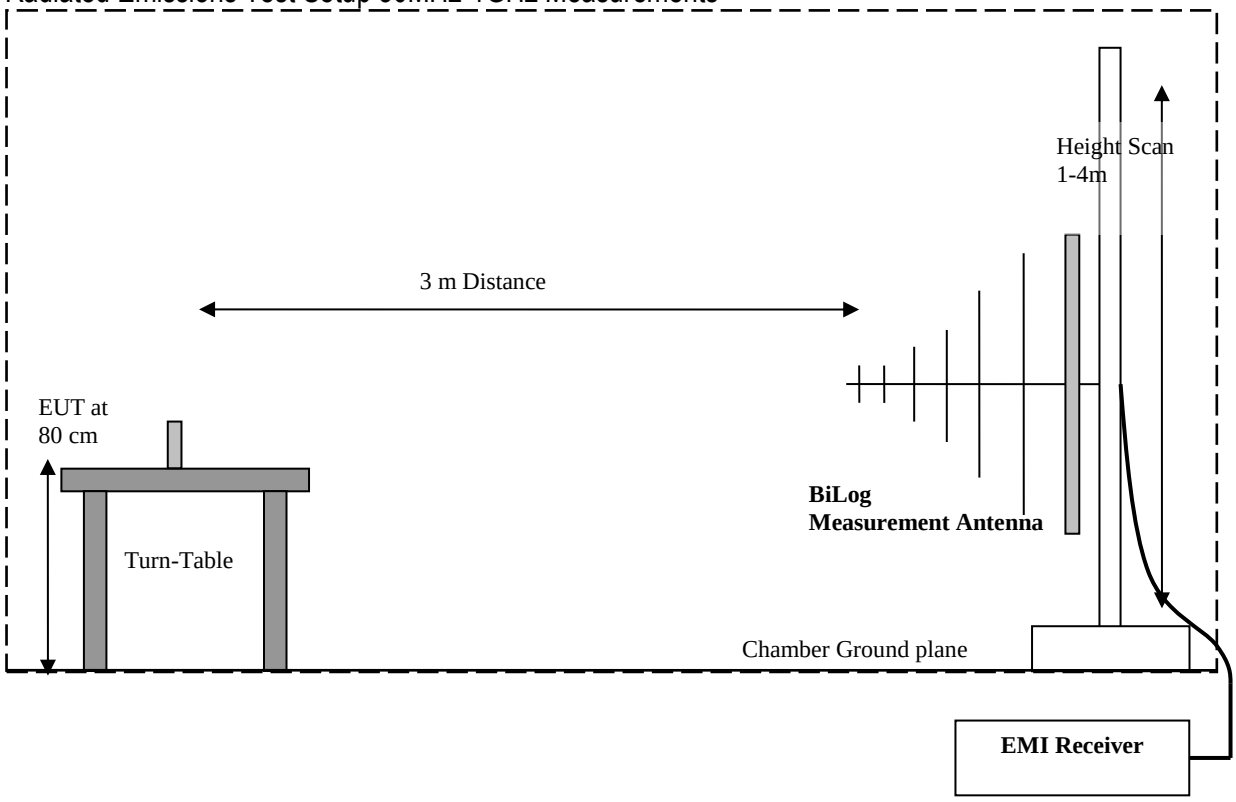
5.5 Radiated Measurement

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

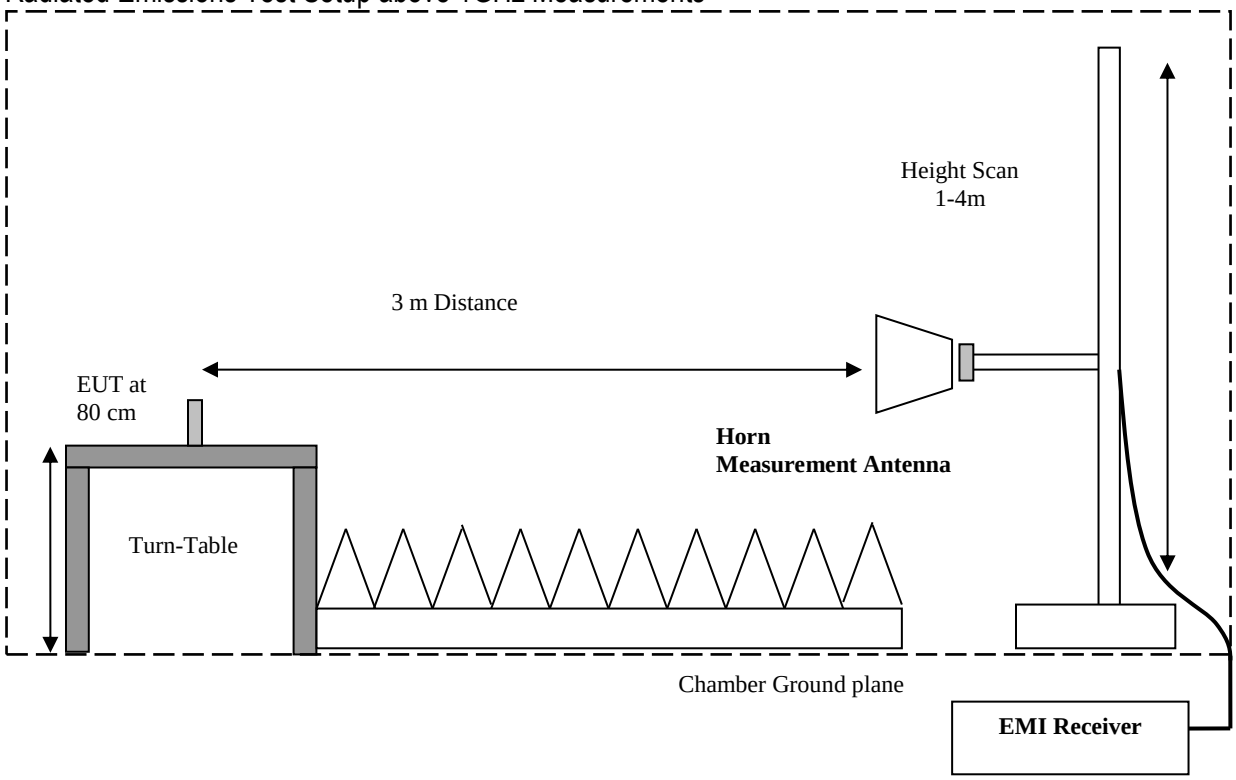
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



5.6 Sample Calculations for Field Strength Measurements

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

- Measured reading in dBµV
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV)- Cable Loss (dB)+ Antenna Factor (dB/m)

Example:

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

6 Measurement Results Summary

6.1 FCC 22:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §22.913 (a)	RF Output Power	Nominal	GPRS/ CDMA/WCDMA/LTE	■	☐	☐	☐	Complies
§2.1055; §22.355	Frequency Stability	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1049; §22.917	Occupied Bandwidth	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1051; §22.917	Band Edge Compliance	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1051; §22.917	Conducted Spurious Emissions	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1053; §22.917	Radiated Spurious Emissions	Nominal	GPRS/ CDMA/WCDMA/LTE	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from module certification.

6.2 FCC 24 & 27:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §24.232 (a); §27.50 (d)	RF Output Power	Nominal	GPRS/ CDMA/WCDMA/LTE	■	☐	☐	☐	Complies
§2.1055; §24.235; §27.54	Frequency Stability	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1049; §24.238; §27.53	Occupied Bandwidth	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1051; §24.238; §27.53	Band Edge Compliance	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1051; §24.238; §27.53	Conducted Spurious Emissions	Nominal	GPRS/ CDMA/WCDMA/LTE	☐	☐	☐	■	Note 2
§2.1053; §24.238; §27.53	Radiated Spurious Emissions	Nominal	GPRS/ CDMA/WCDMA/LTE	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from module certification.

7 RF Output Power verification

7.1 Reference:

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232

7.2 Limits:

7.2.1 FCC Part 22.913 (a)

(a) The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts (38.45dBm).

7.2.2 FCC Part 24.232 (c),(d),(e)

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(e) 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.

7.2.3 FCC Part 27.50 (d) (4)

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

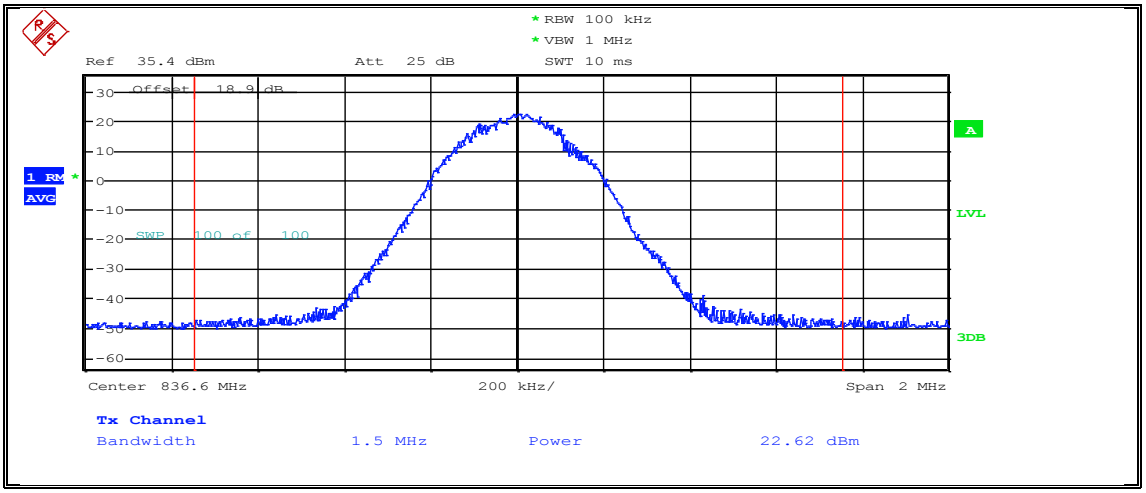
7.3 Summary Measurement Result:

Band	Frequency (MHz)	Measured AVG Conducted Output Power (dBm)	Duty Cycle Correction (dB)	Measured AVG Conducted Output Power during Burst (dBm)	Maximum AVG Conducted Output Power + tune-up as declared for the module	Delta (dB)	Result
GPRS 850	836.6	22.62	9	31.62	33	1.38	Note 1
GPRS 1900	1880	19.42	9	28.42	30	1.58	Note 1
LTE BAND 2 NO. RB: 1 / RB START: 0	1880	22.25	0	22.25	24	1.75	Note 1
LTE BAND 2 NO. RB: 1 / RB START: 49	1880	22.38	0	22.38	24	1.62	Note 1
LTE BAND 2 NO. RB: 50 / RB START: 0	1880	22.28	0	22.28	24	1.72	Note 1
LTE BAND 4 NO. RB: 1 / RB START: 0	1732.5	21.92	0	21.92	24	2.08	Note 1
LTE BAND 4 NO. RB: 1 / RB START: 49	1732.5	22.08	0	22.08	24	1.92	Note 1
LTE BAND 4 NO. RB: 50 / RB START: 0	1732.5	20.80	0	20.80	24	3.2	Note 1
LTE Band 5 NO. RB: 1 / RB START: 0	836.5	23.71	0	23.71	24	0.29	Note 1
LTE Band 5 NO. RB: 1 / RB START: 49	836.5	23.6	0	23.6	24	0.4	Note 1
LTE Band 5 NO. RB: 50 / RB START: 0	836.5	22.8	0	22.8	24	1.2	Note 1
LTE BAND 13 NO. RB: 1 / RB START: 0	782	23.0	0	23.0	24	1	Note 1
LTE BAND 13 NO. RB: 1 / RB START: 49	782	22.9	0	22.9	24	1.1	Note 1
LTE BAND 13 NO. RB: 50 / RB START: 0	782	22.6	0	22.6	24	1.4	Note 1
LTE BAND 17 NO. RB: 1 / RB START: 0	710	22.31	0	22.31	24	1.69	Note 1
LTE BAND 17 NO. RB: 1 / RB START: 49	710	22.17	0	22.17	24	1.83	Note 1
LTE BAND 17 NO. RB: 50 / RB START: 0	710	21.26	0	21.26	24	2.74	Note 1
UMTS FDD II	1880	22.33	0	22.33	24	1.67	Note 1
UMTS FDD IV	1732.5	23.05	0	23.05	24	0.95	Note 1
UMTS FDD V	836.6	22.42	0	22.42	24	1.58	Note 1
CDMA BC0	836.6	23.0	0	23.0	24.5	1.5	Note 1
CDMA BC1	1908.75	23.0	0	23.0	24.5	1.5	Note 1

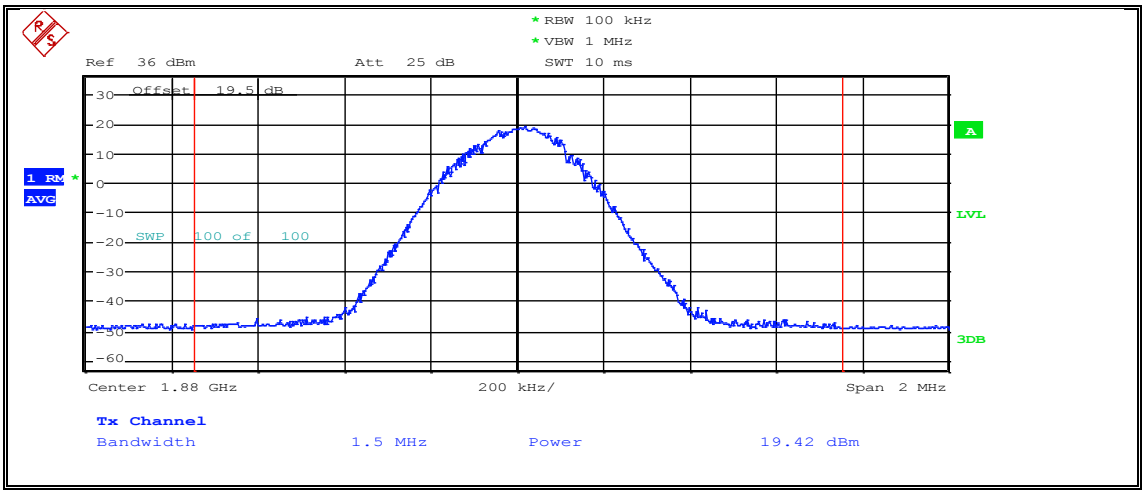
Note 1: The measured avg output power values are lower than the maximum declared value of the module output power + tune-up tolerance. This shows that the module has not been altered from its state during modular approval. The fact that the powers are not significantly lower than the declared value of the module output power + tune-up tolerance is considered proof that testing has been performed at worst case conditions.

7.4 Measurement Plots:

7.4.1 GPRS 850, Ch. Mid



7.4.2 GPRS 1900, Ch. Mid



7.4.3 LTE BAND 2, Ch. Mid

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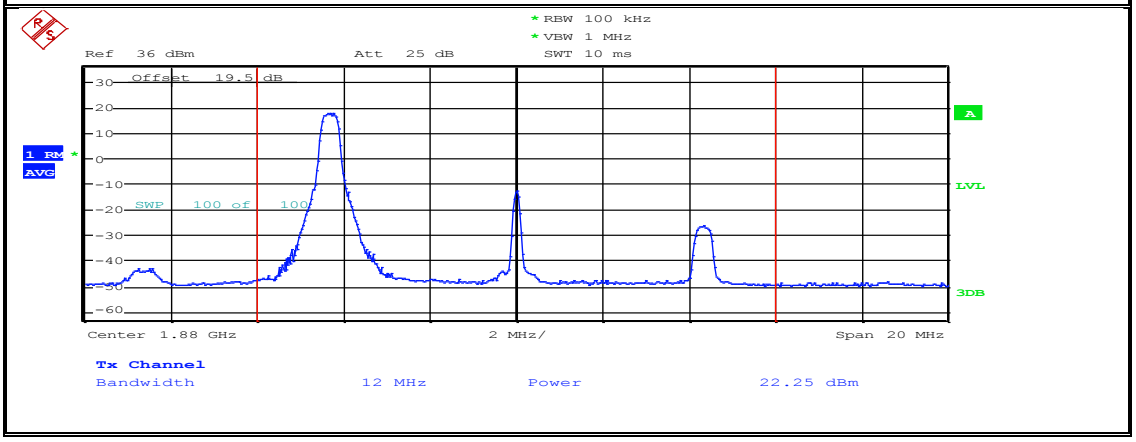

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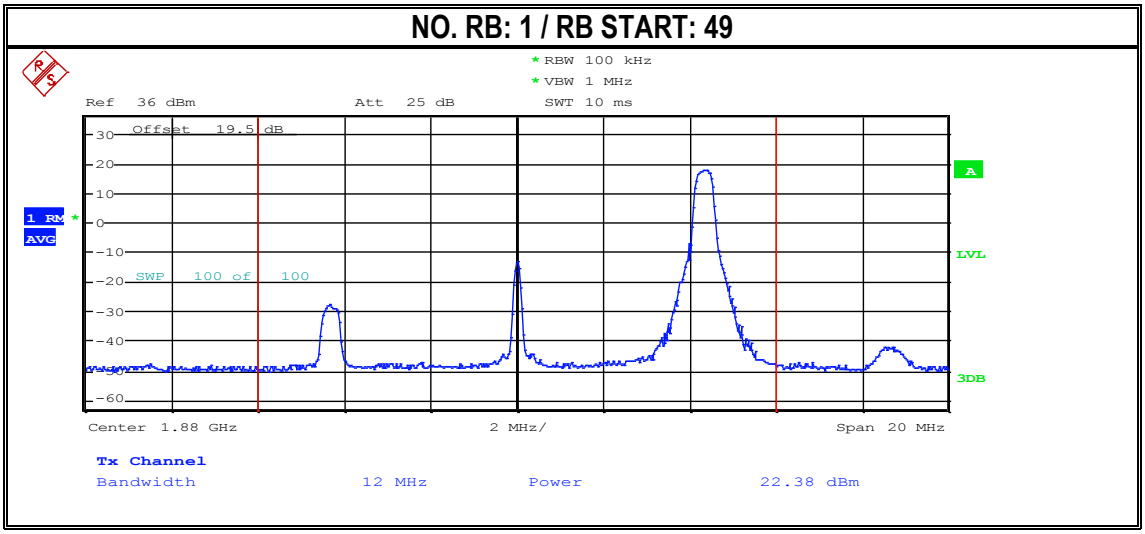

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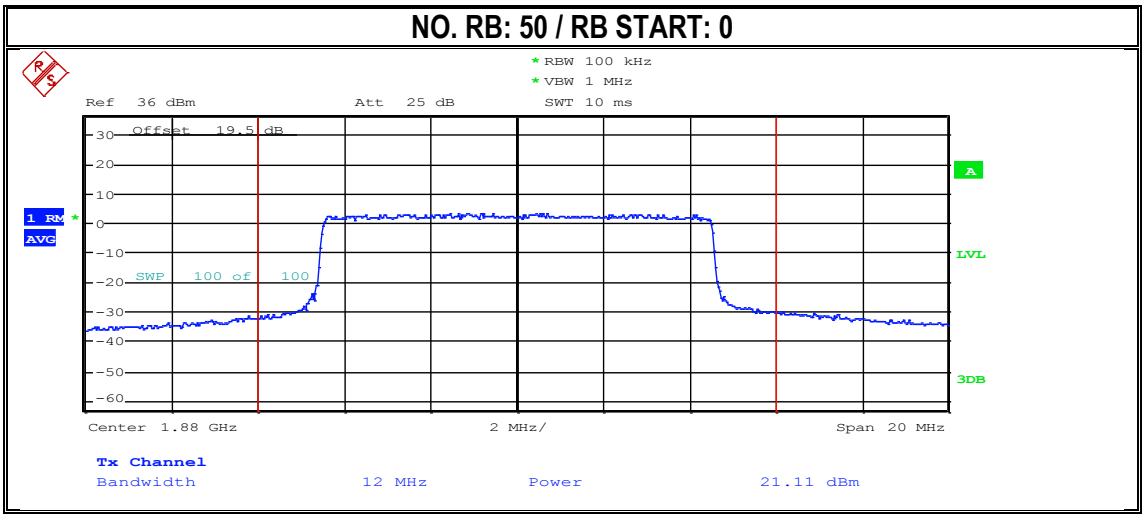

7.4.4 LTE BAND 4, Ch. Mid

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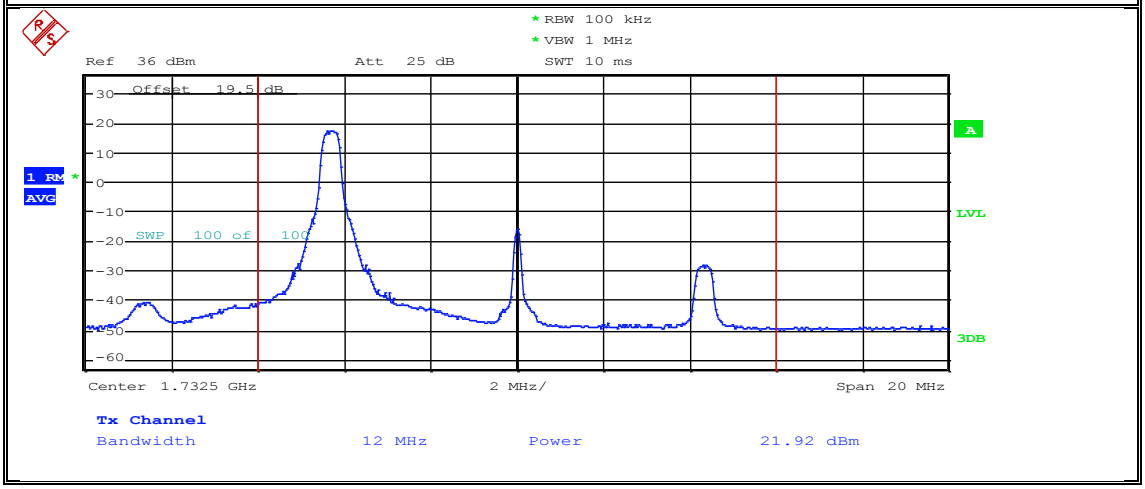

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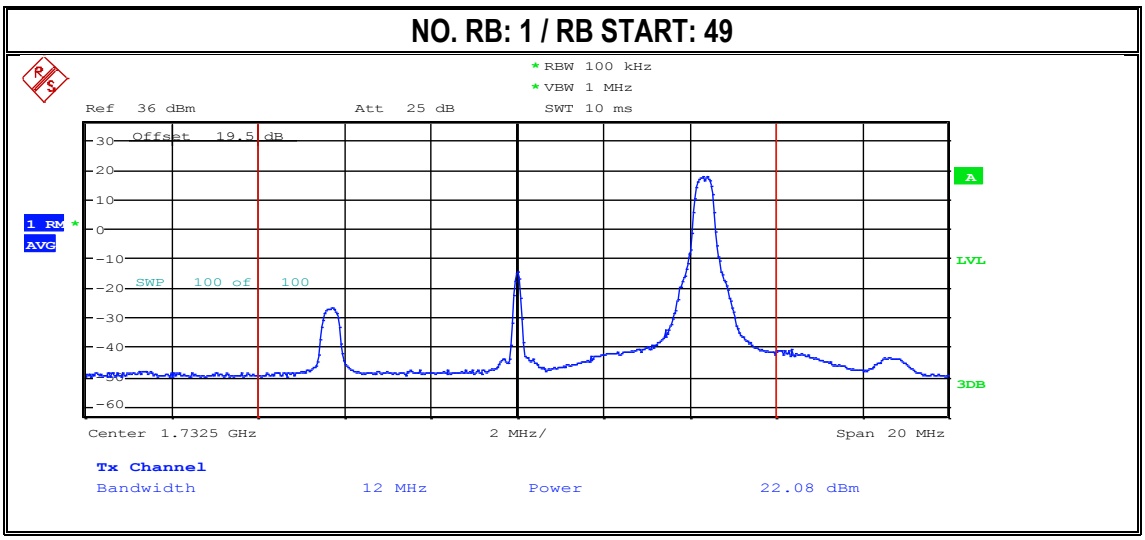

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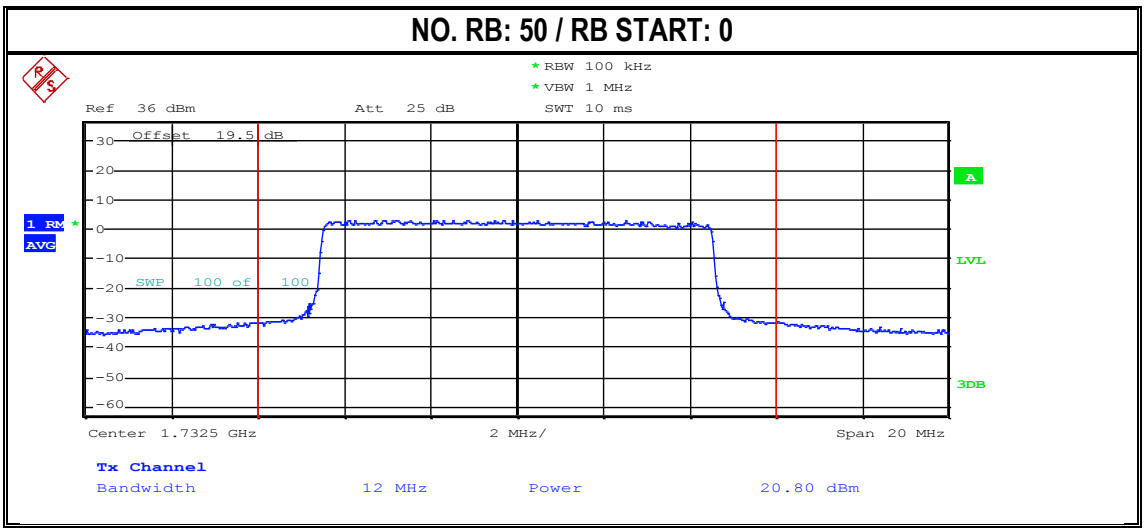

7.4.5 LTE BAND 5, Ch. Mid

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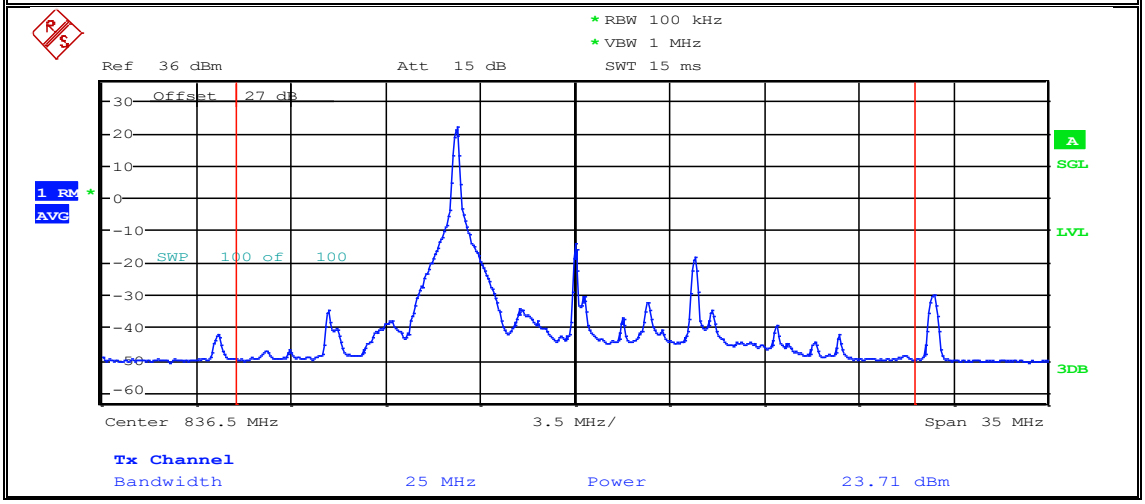

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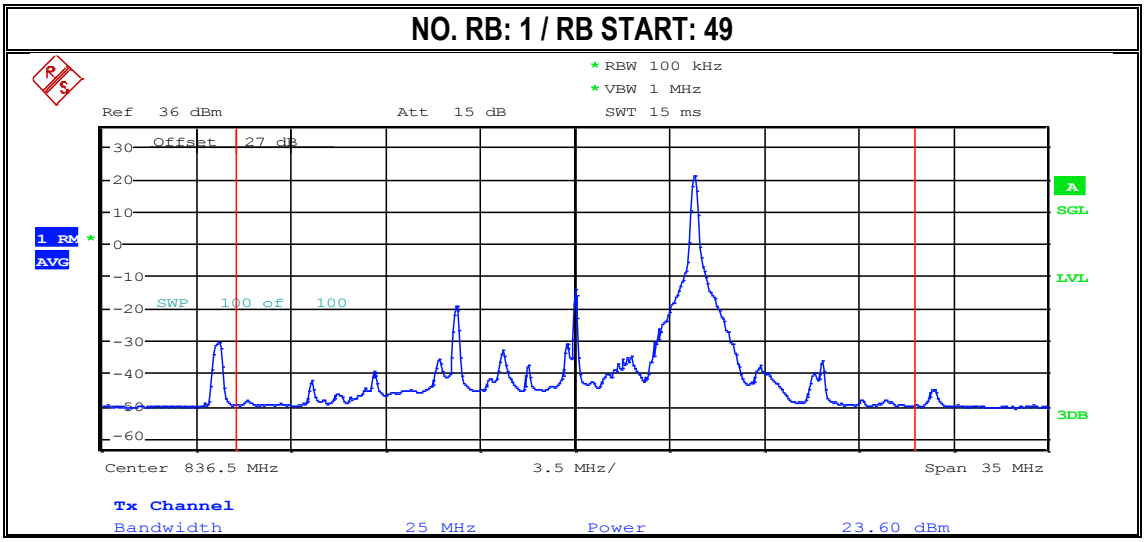

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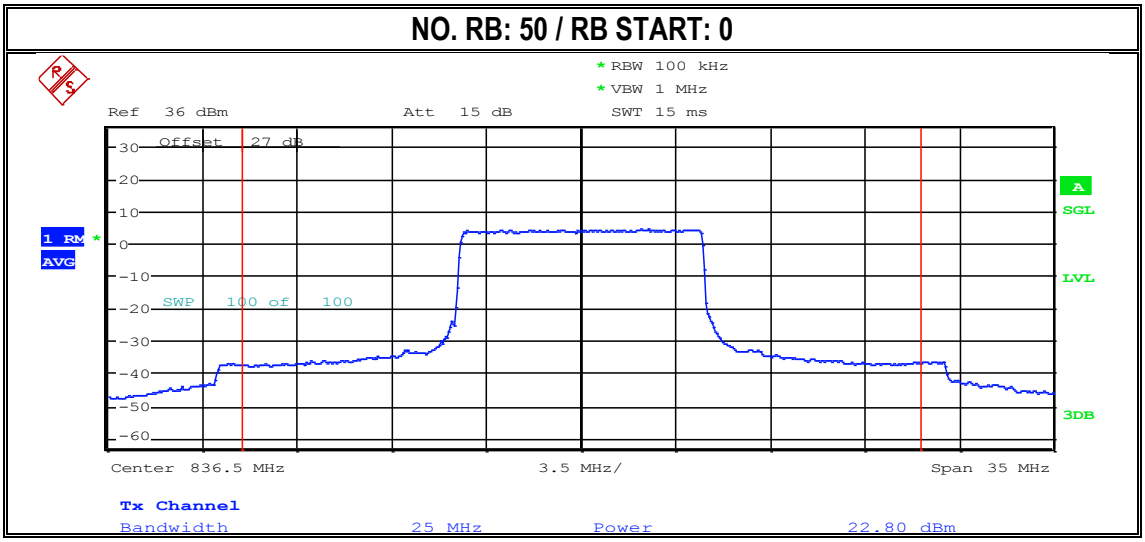

7.4.6 LTE BAND 13, Ch. Mid

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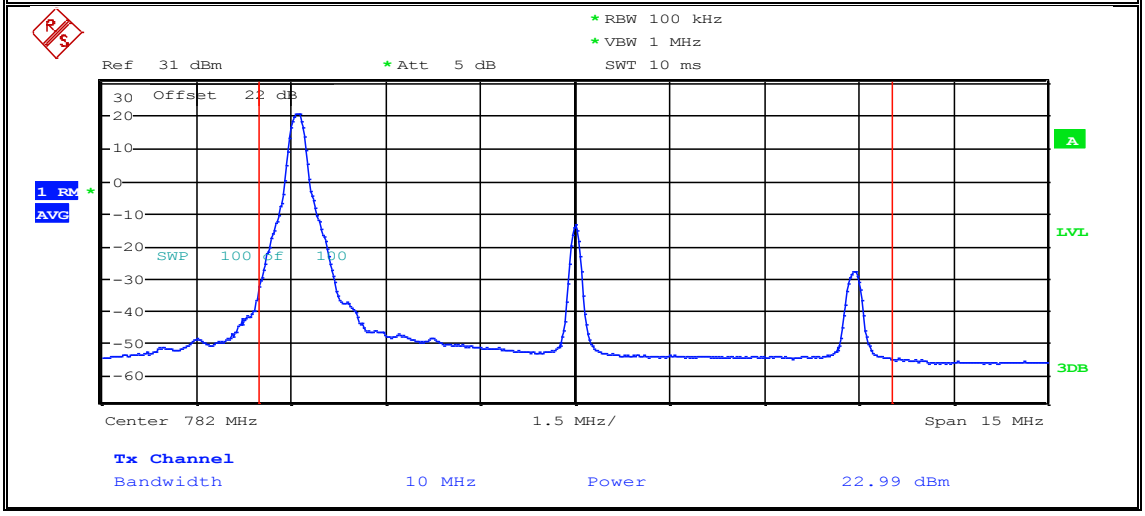

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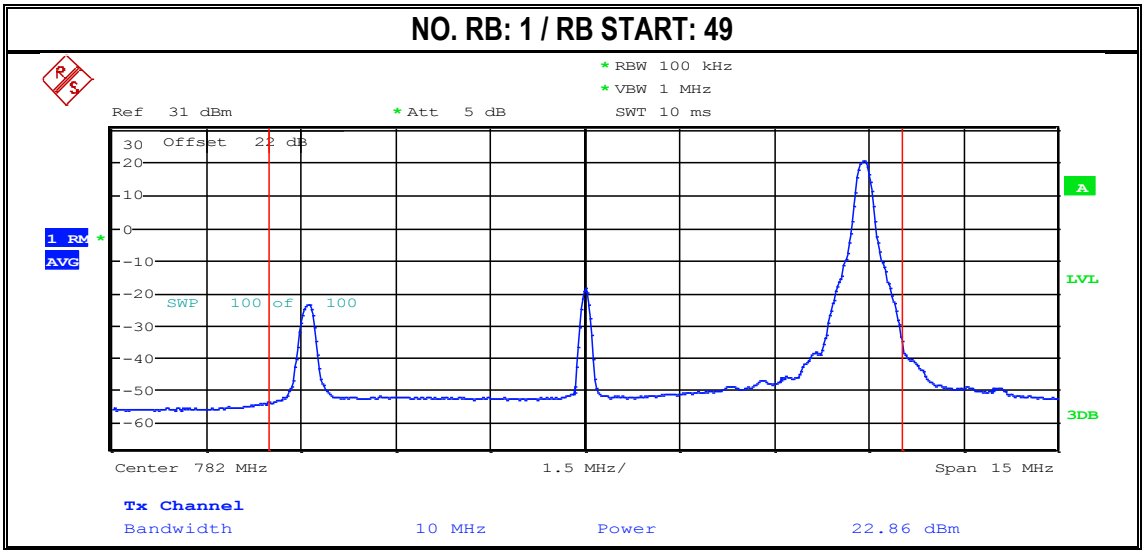

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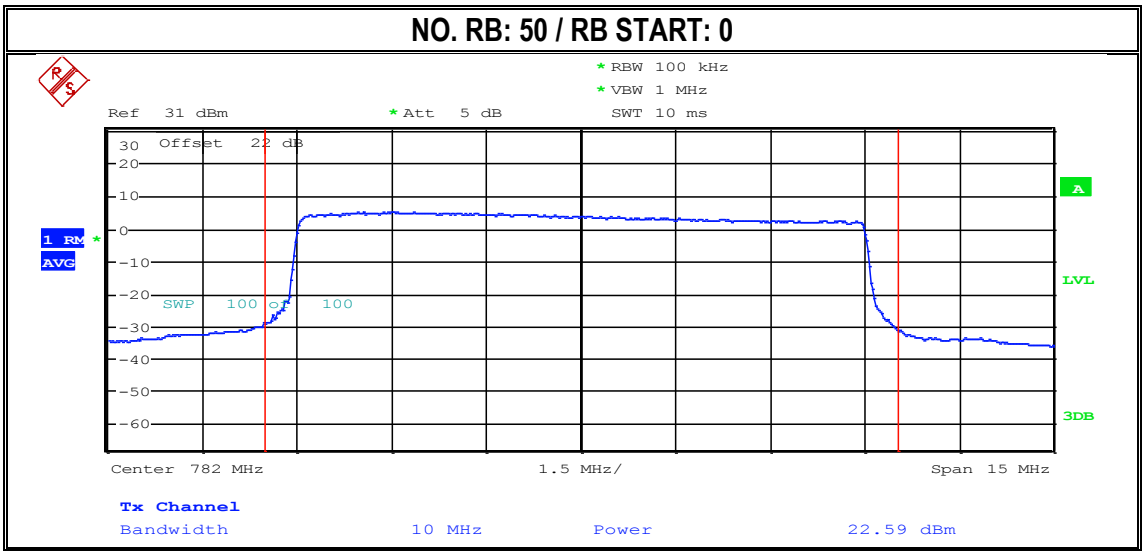

7.4.7 LTE BAND 17, Ch. Mid

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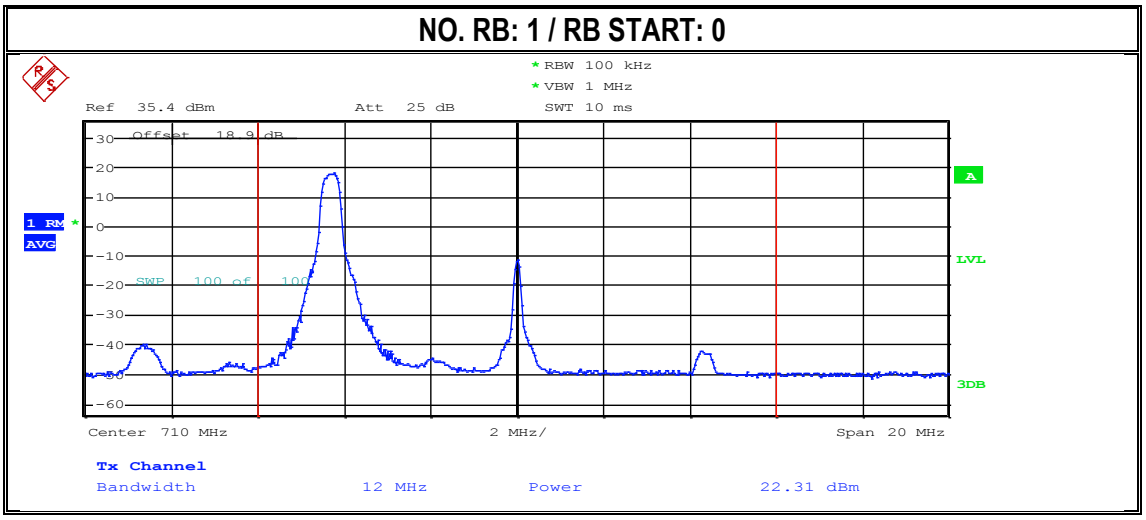

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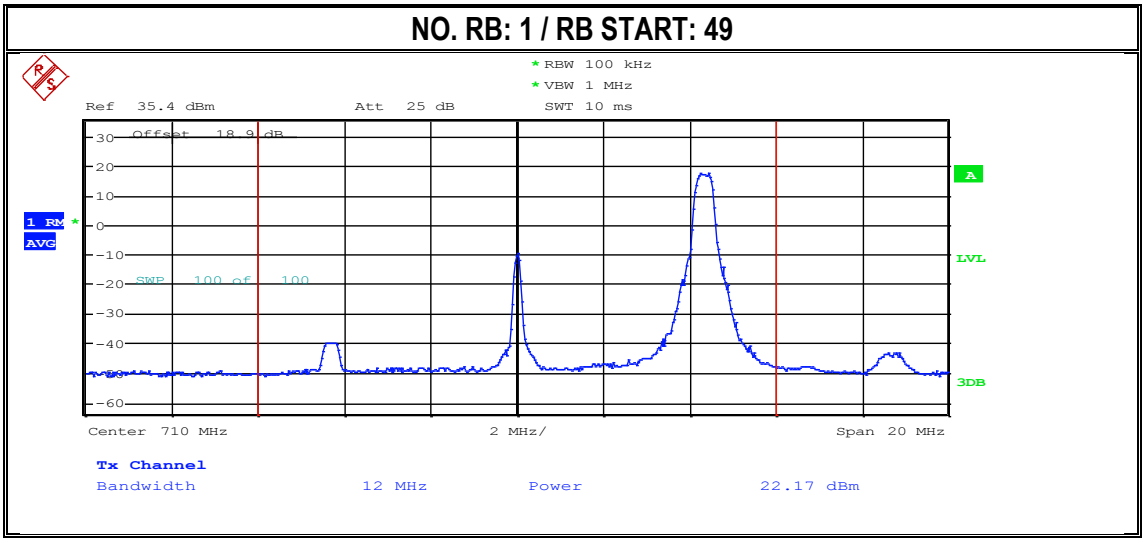

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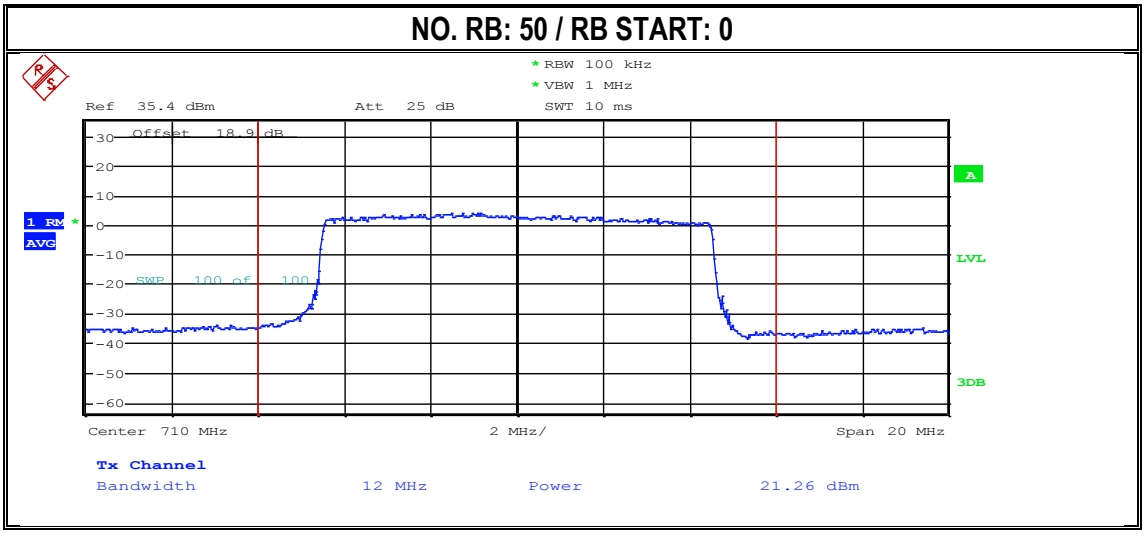
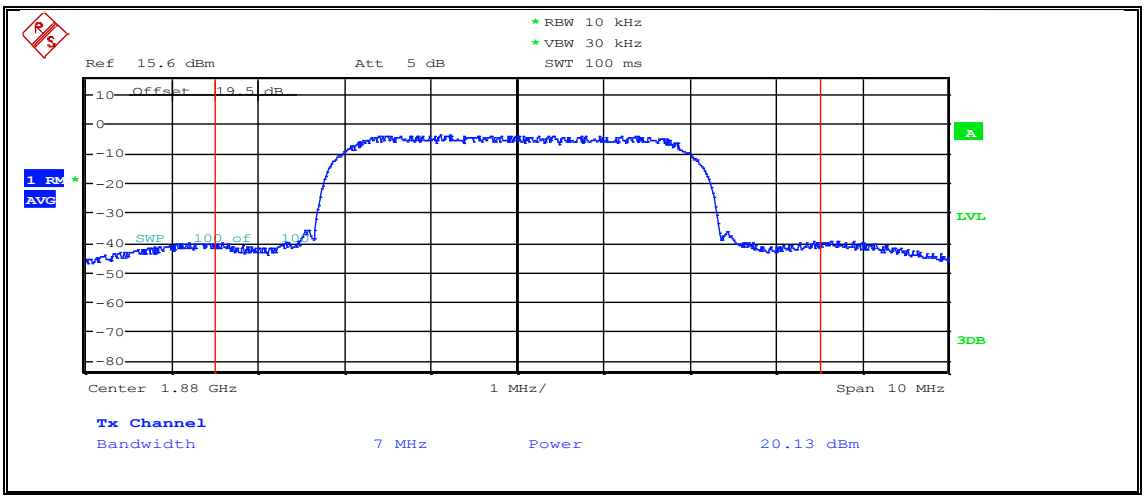
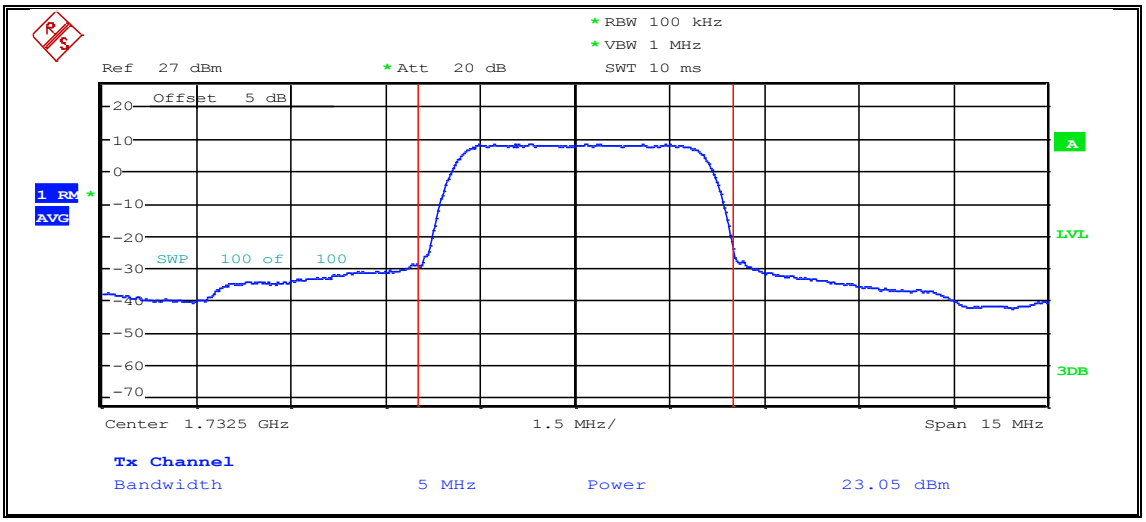


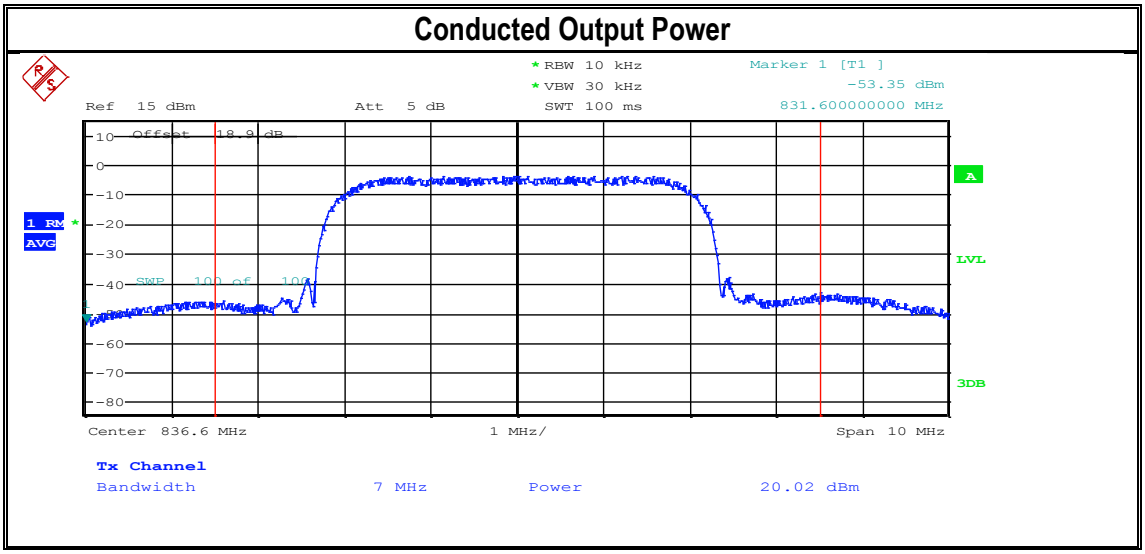
7.4.8 UMTS FDD II, Ch. Mid



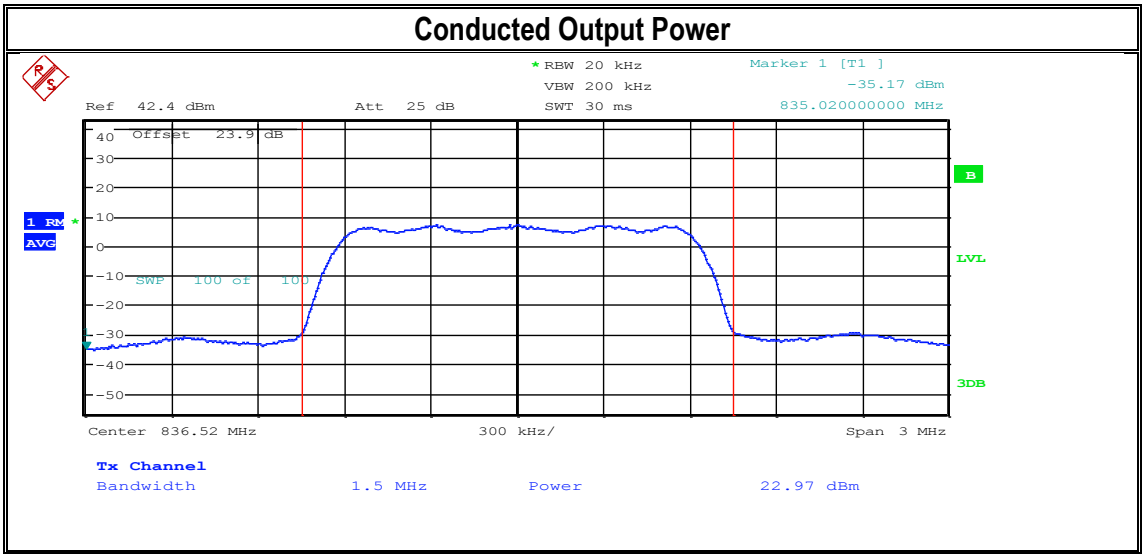
7.4.9 UMTS FDD IV, Ch. Mid



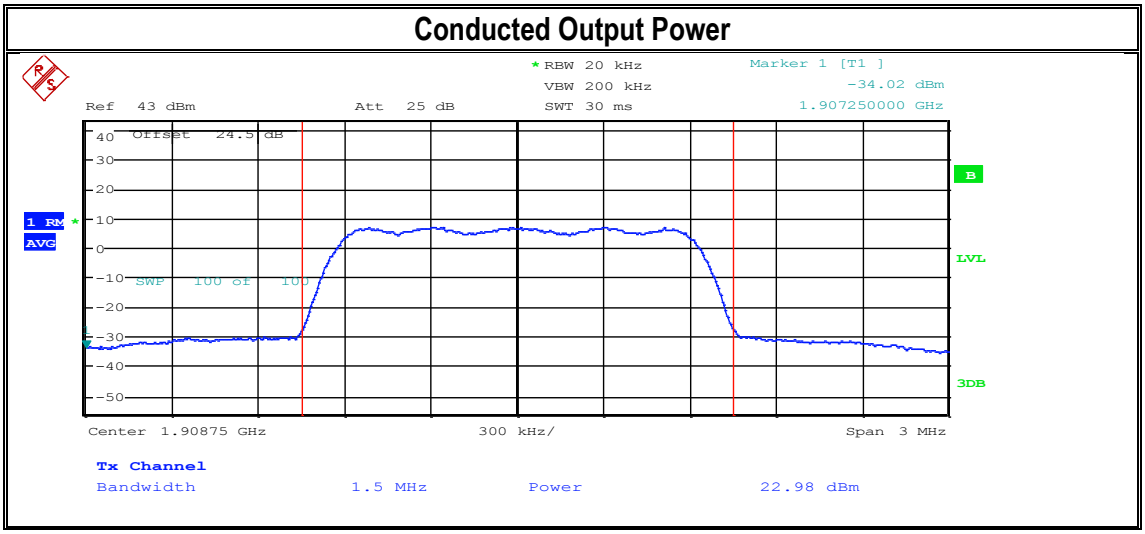
7.4.10 UMTS BAND V, Ch. Mid



7.4.12 CDMA BC0, Ch. Mid



7.4.13 CDMA BC1, Ch. Mid



8 Radiated Spurious Emissions

8.1 Reference

Measurement according to FCC: CFR 47 Part 2.1053; CFR Part 22.917; Part 24.238; Part 27.53; RSS-132 5.5; RSS-133 6.5; RSS-139 6.6, utilizing KDB 971168 D01 Power Meas License Digital Systems v02r02, and according to TIA-603C 2004- 2.2.12

Spectrum Analyzer Settings for FCC 22

Frequency Range	30MHz – 1 GHz	1 – 1.58 GHz	1.58 – 9 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto

Spectrum Analyzer Settings for FCC 24 and 27

Frequency Range	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 GHz	18 – 19.1 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

8.2 Limits:

8.2.1 FCC Part 22.917 (a), Part 24.238 (a), and Part 27.53 (h)

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 = (-13dBm)

8.3 Test conditions and setup:

Ambient Temperature (C)	EUT Set-Up #	EUT Operating Mode	Power Input
22	1	GPRS / LTE / CDMA	120V AC

8.4 Test plan

GPRS: The modular report for Sierra WirelessMC7354 report shows that GMSK modulation with 1 timeslot delivers the highest output power as compared to more timeslots and the 8PSK modulation. Thus radiated emissions have been tested for GMSK with 1 timeslot.

CDMA: Both US CDMA bands have been tested

UMTS: UMTS power is about 2 dB lower than CDMA power with CDMA having less than half the UMTS bandwidth. That makes CDMA the worst case for the power densities measured in radiated emissions and thus only CDMA is tested for the supported bands for radiated emissions.

LTE: All LTE Bands have been tested with the worst case configuration.

Frequencies below 30MHz and frequencies above 18GHz have only been investigated for mid channel. For the frequency range between 1GHz and 18GHz the mid channel has not been investigated in case low and high channel were showing more than 10dB margin to the limit.

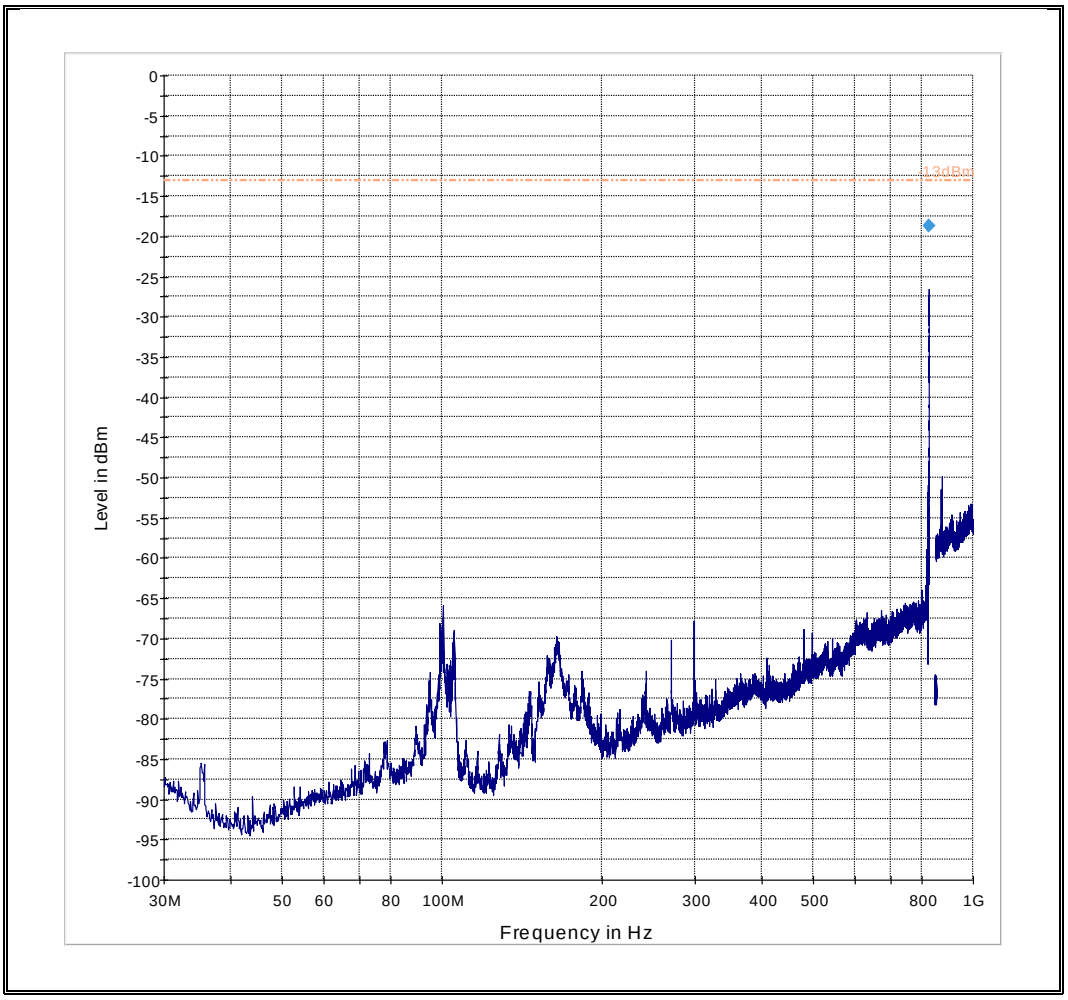
8.5 Summary Measurement result:

Channel	EUT Operating Mode	Scan Frequency	Limit (dBm)	Result	Note
Low	UMTS FDD II	30 MHz – 18 GHz	-13	Pass	
Mid	UMTS FDD II	9 kHz – 22 GHz	-13	Pass	
High	UMTS FDD II	30 MHz – 18 GHz	-13	Pass	
Low	UMTS FDD IV	30 MHz – 18 GHz	-13	Pass	
Mid	UMTS FDD IV	9 kHz – 22 GHz	-13	Pass	
High	UMTS FDD IV	30 MHz – 18 GHz	-13	Pass	
Low	UMTS FDD V	30 MHz – 9 GHz	-13	Pass	
Mid	UMTS FDD V	9 kHz – 9 GHz	-13	Pass	
High	UMTS FDD V	30 MHz – 9 GHz	-13	Pass	
Low	LTE Band 2, 25	30 MHz – 18 GHz	-13	Pass	
Mid	LTE Band 2, 25	9 kHz – 22 GHz	-13	Pass	
High	LTE Band 2, 25	30 MHz – 18 GHz	-13	Pass	
Low	LTE Band 4	30 MHz – 18 GHz	-13	Pass	
Mid	LTE Band 4	9 KHz – 30 MHz 18 – 22 GHz	-13	Pass	
High	LTE Band 4	30 MHz – 18 GHz	-13	Pass	
-	LTE Band 5	-	-	-	Note 1
Low	LTE Band 13	30 MHz – 9 GHz	-13	Pass	
Mid	LTE Band I3	9 kHz – 30 MHz	-13	Pass	
High	LTE Band I3	30 MHz – 9 GHz	-13	Pass	
Low	LTE Band 17	30 MHz – 9 GHz	-13	Pass	
Mid	LTE Band I7	9 kHz – 30 MHz	-13	Pass	
High	LTE Band I7	30 MHz – 9 GHz	-13	Pass	
-	UMTS FDD II	-	-	-	Note 1
-	UMTS FDD IV	-	-	-	Note 1
-	UMTS FDD V	-	-	-	Note 1

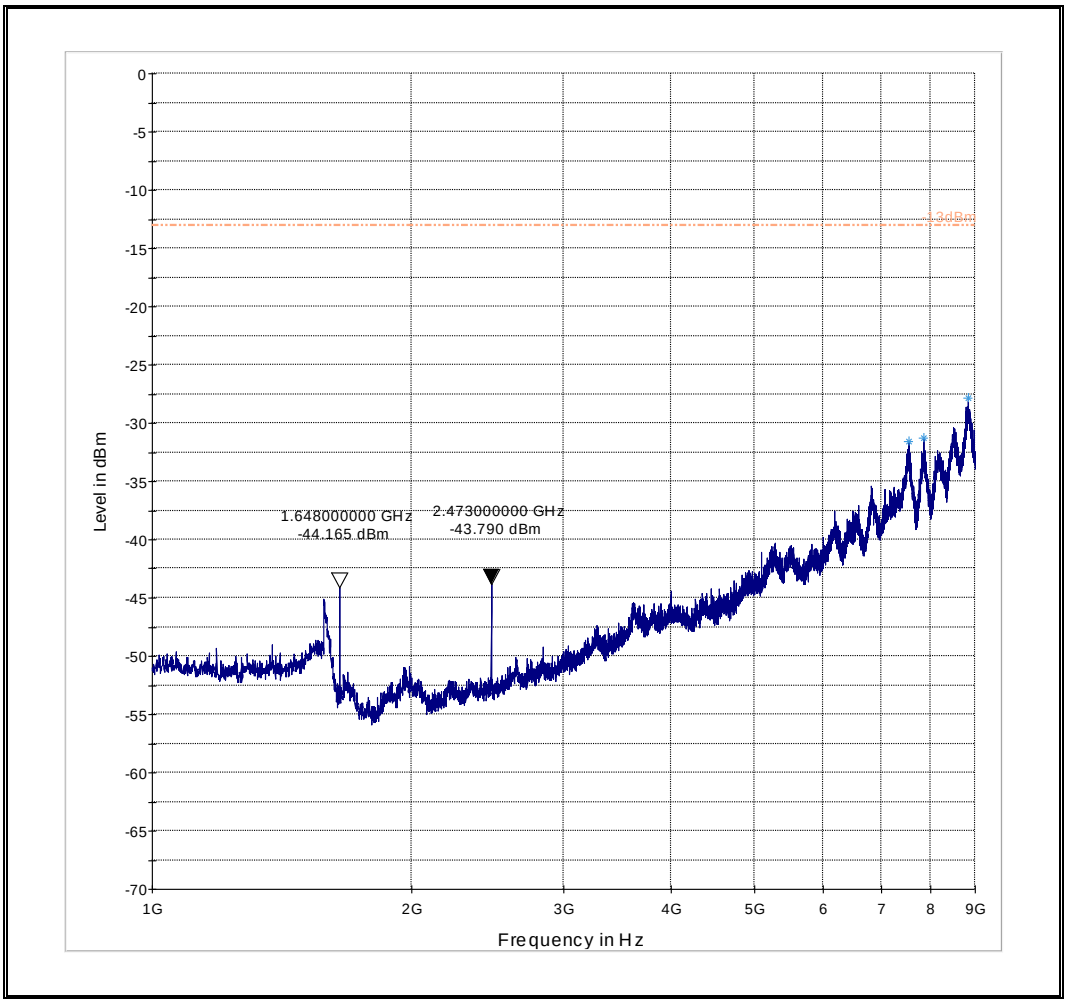
Note 1: This band was not tested due to EUT's limited functionality and capability: A link to CMU or CMW could not be established.

8.6 Measurement Plots GPRS 850

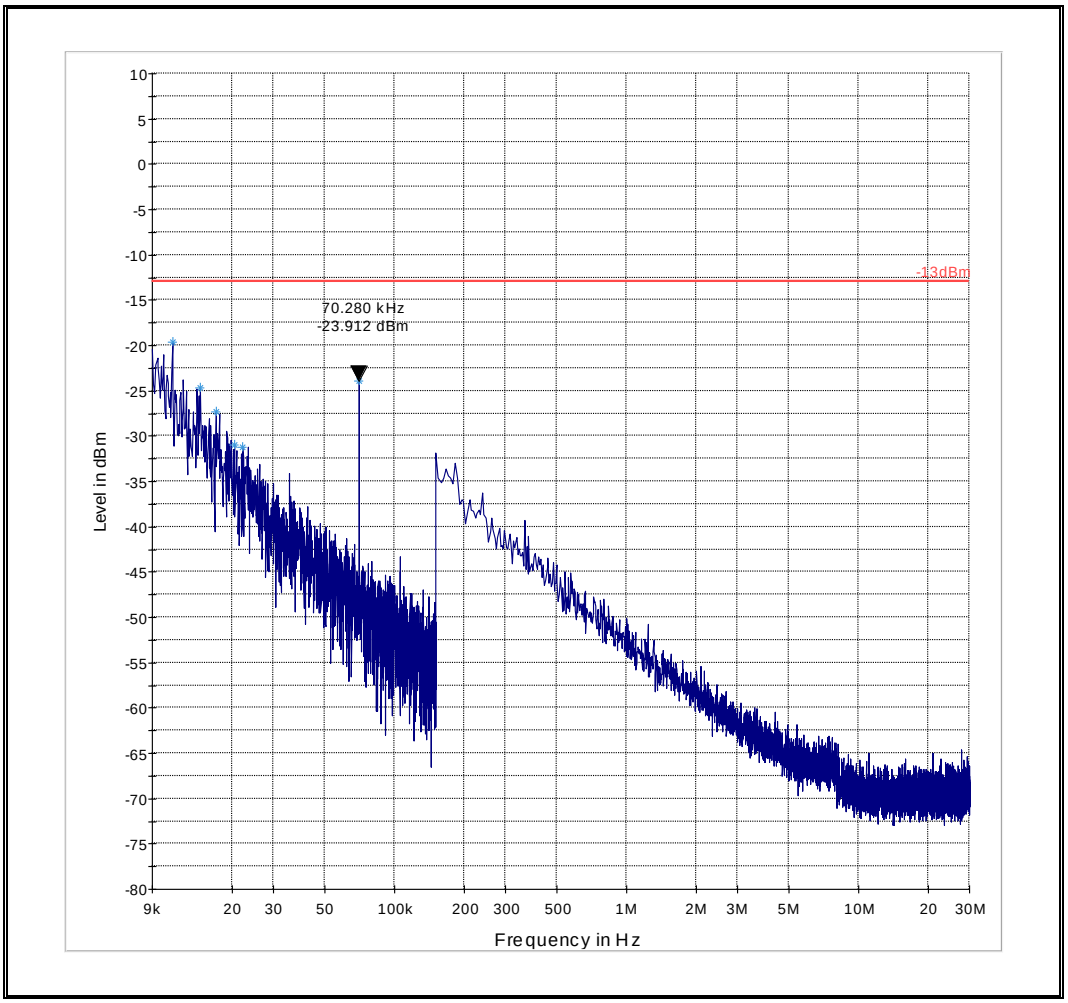
8.6.1 30 MHz – 1 GHz, Ch. Low



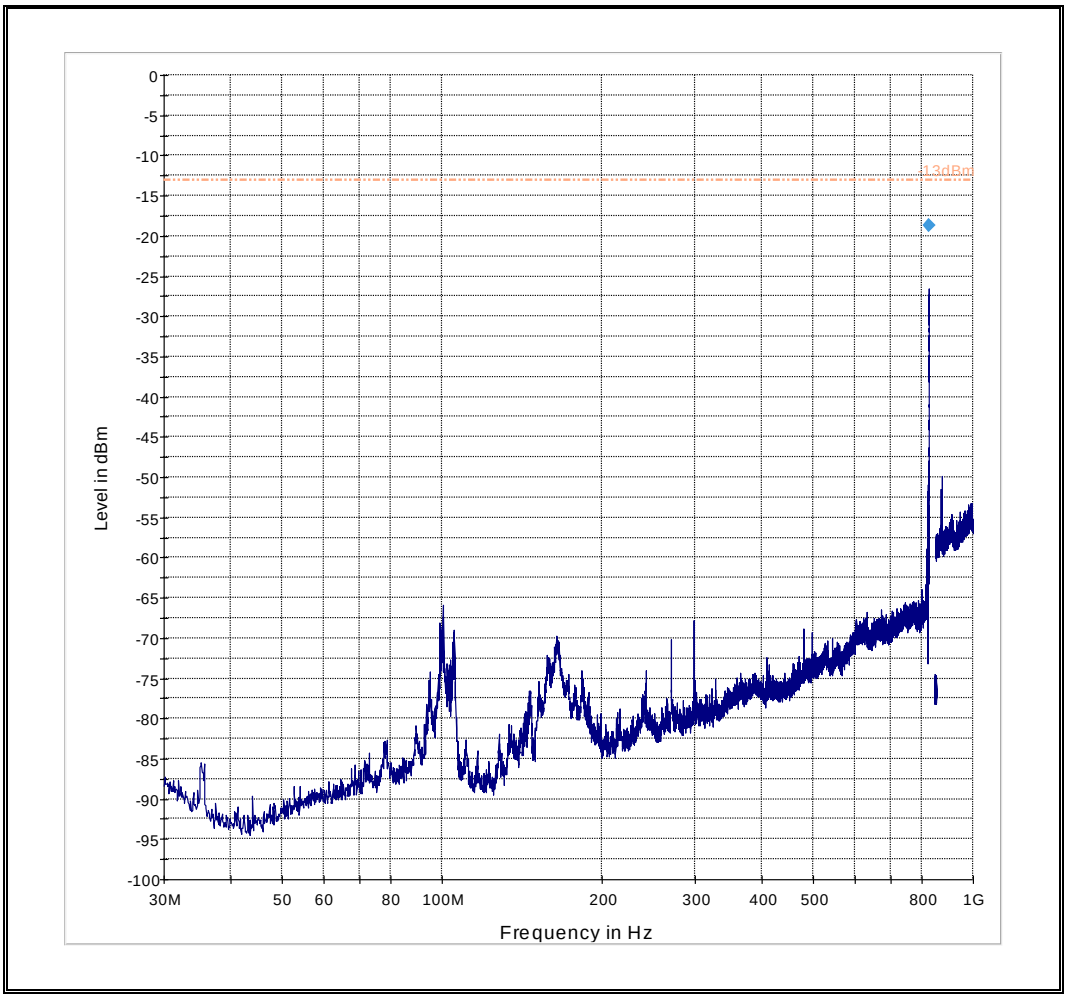
8.6.2 1 – 9 GHz, Ch. Low



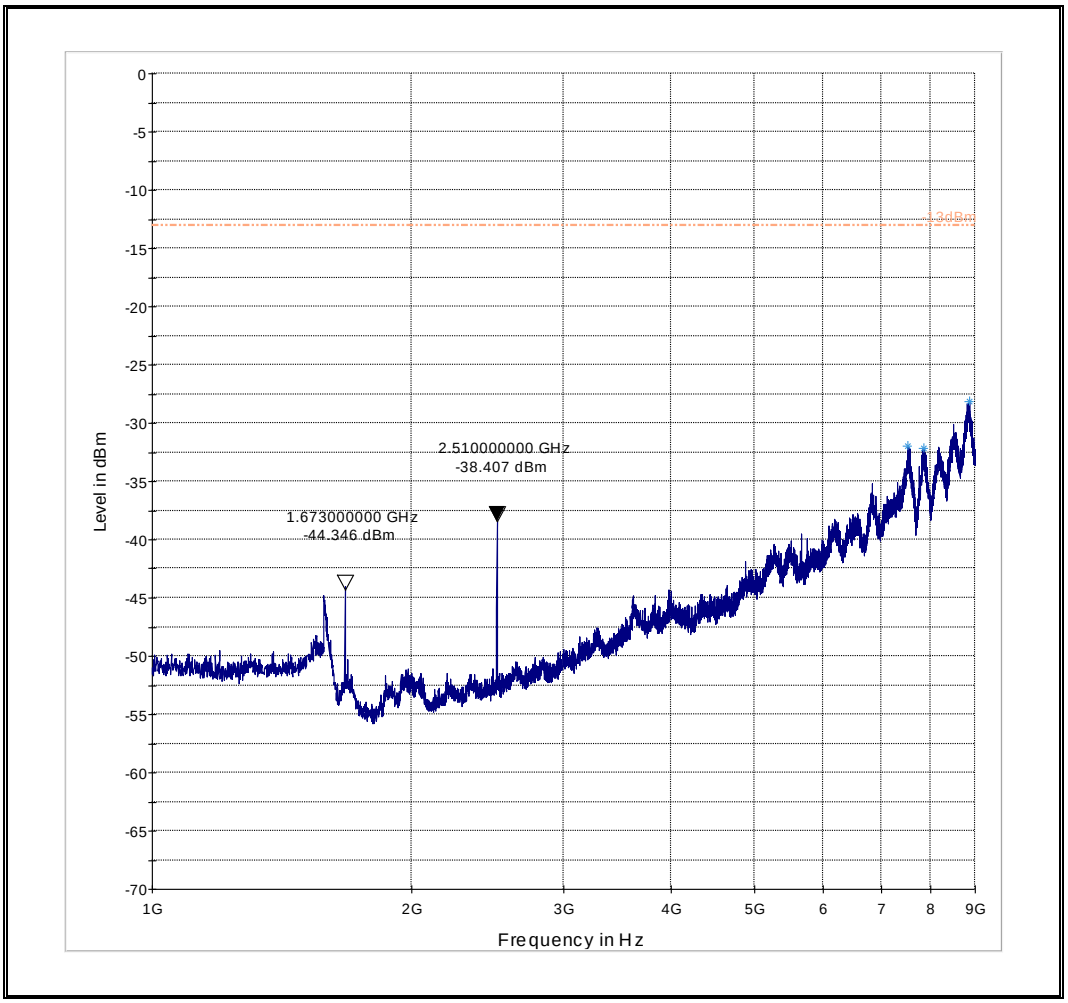
8.6.3 9 KHz – 30 MHz, Ch. Mid



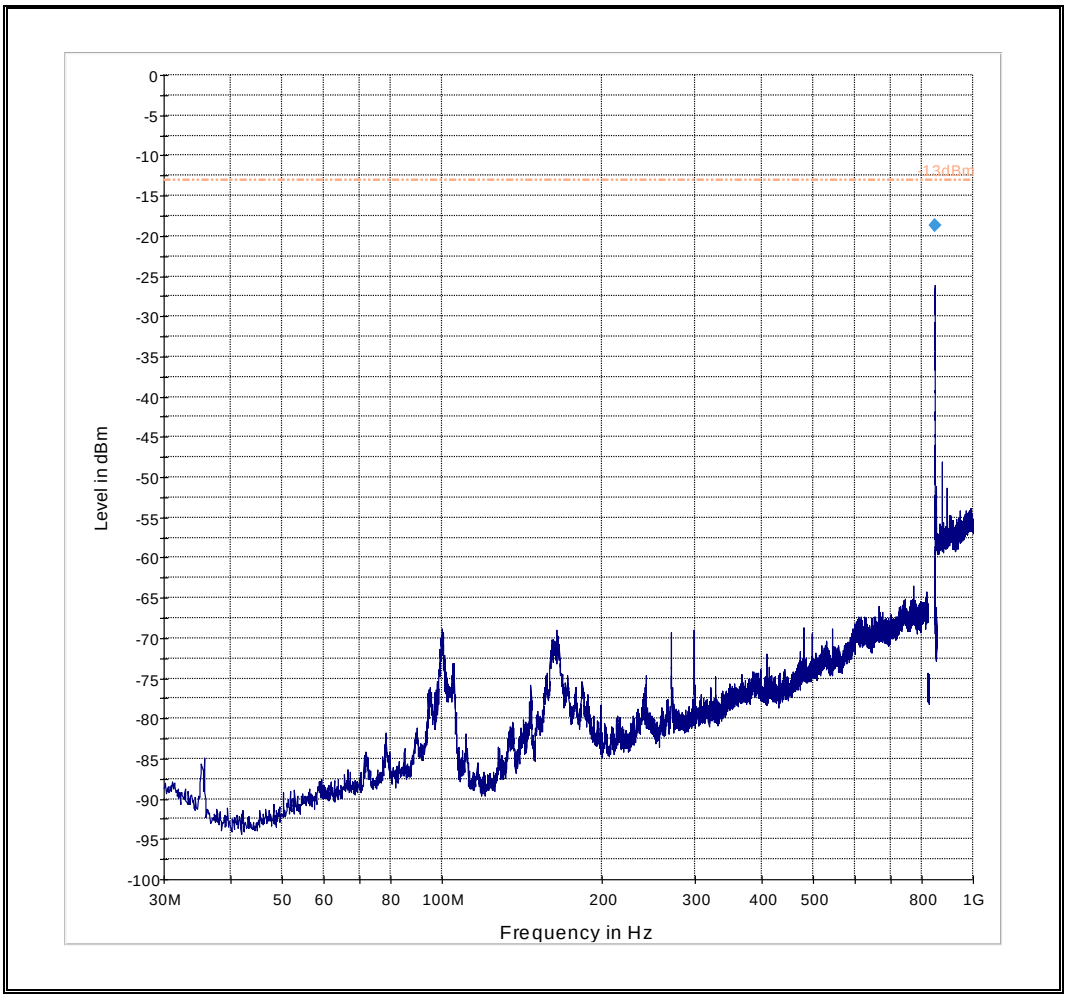
8.6.4 30 MHz – 1 GHz, Ch. Mid



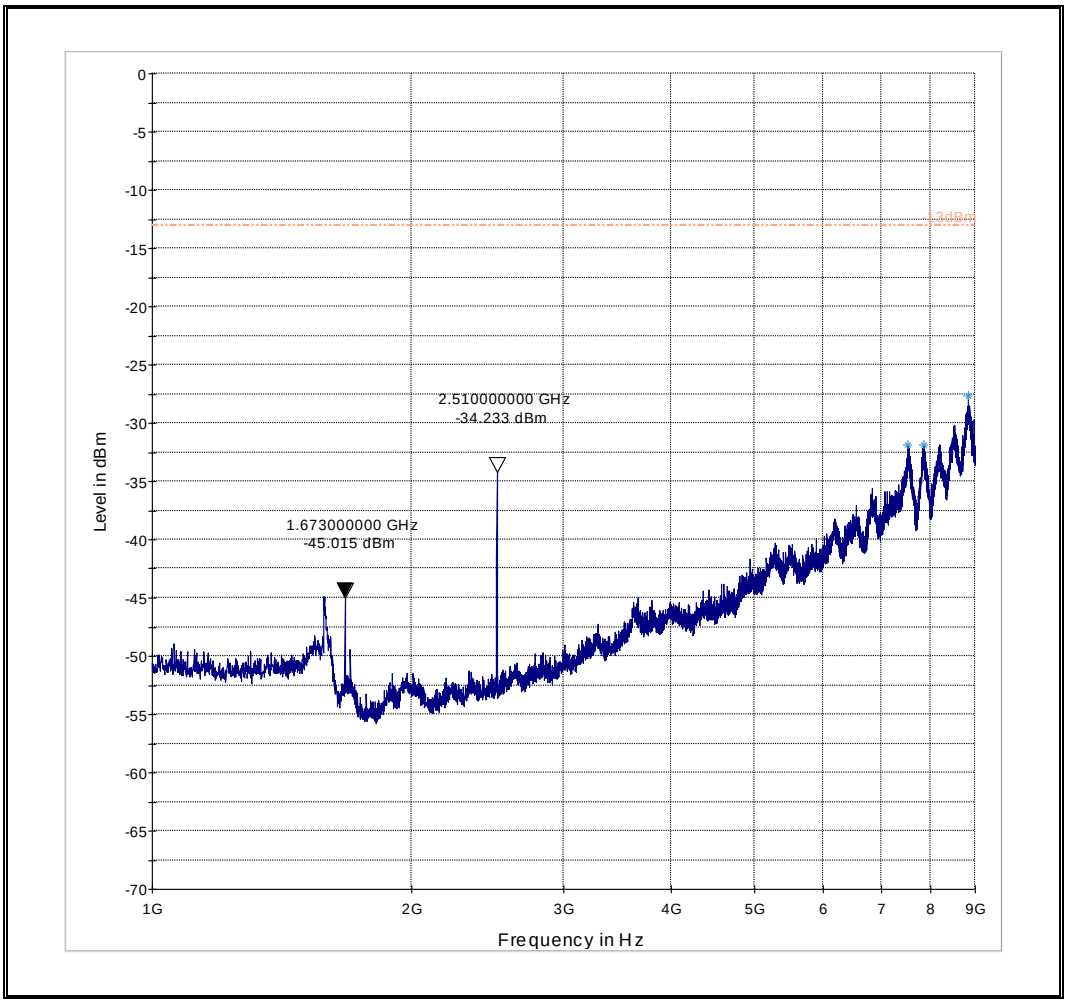
8.6.5 1 GHz – 9 GHz, Ch. Mid



8.6.6 30 MHz – 1 GHz, Ch. High

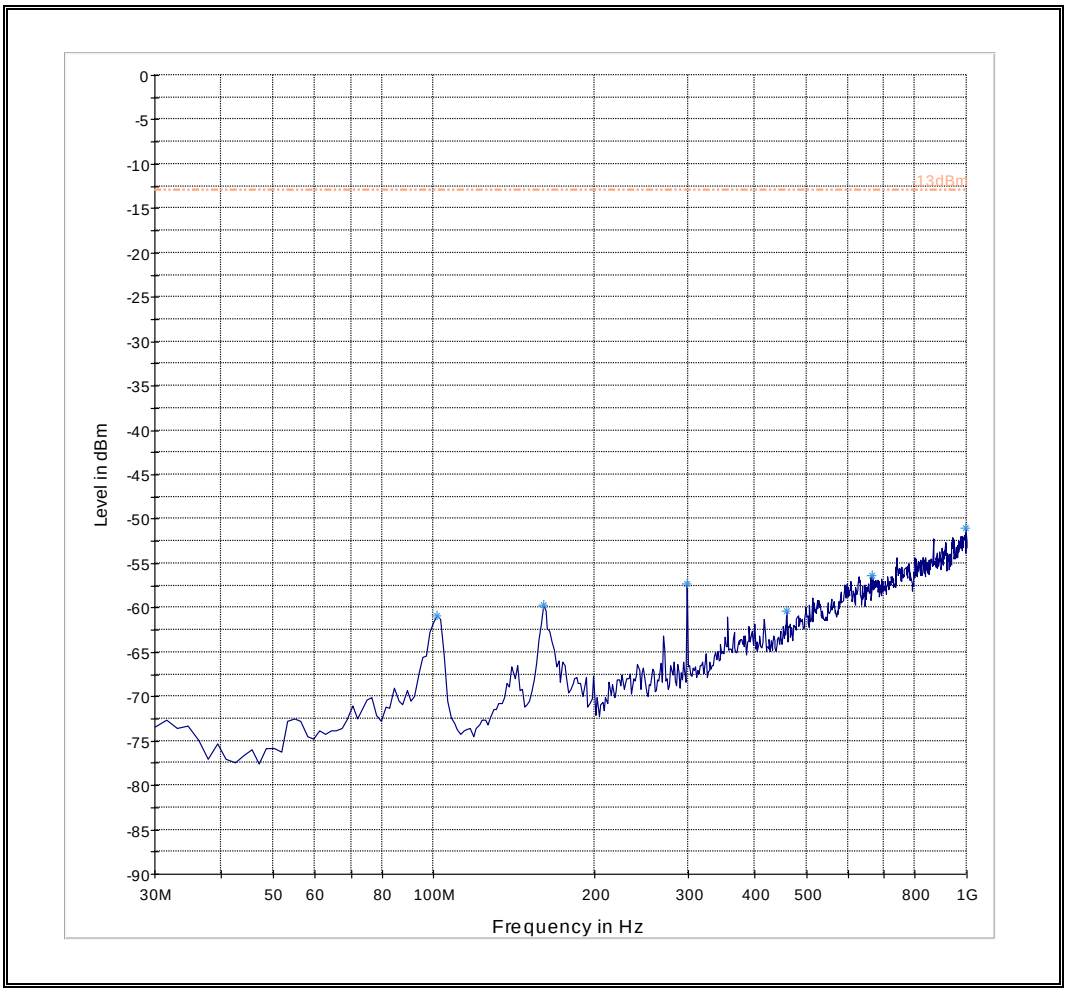


8.6.7 1 - 9 GHz, Ch. High

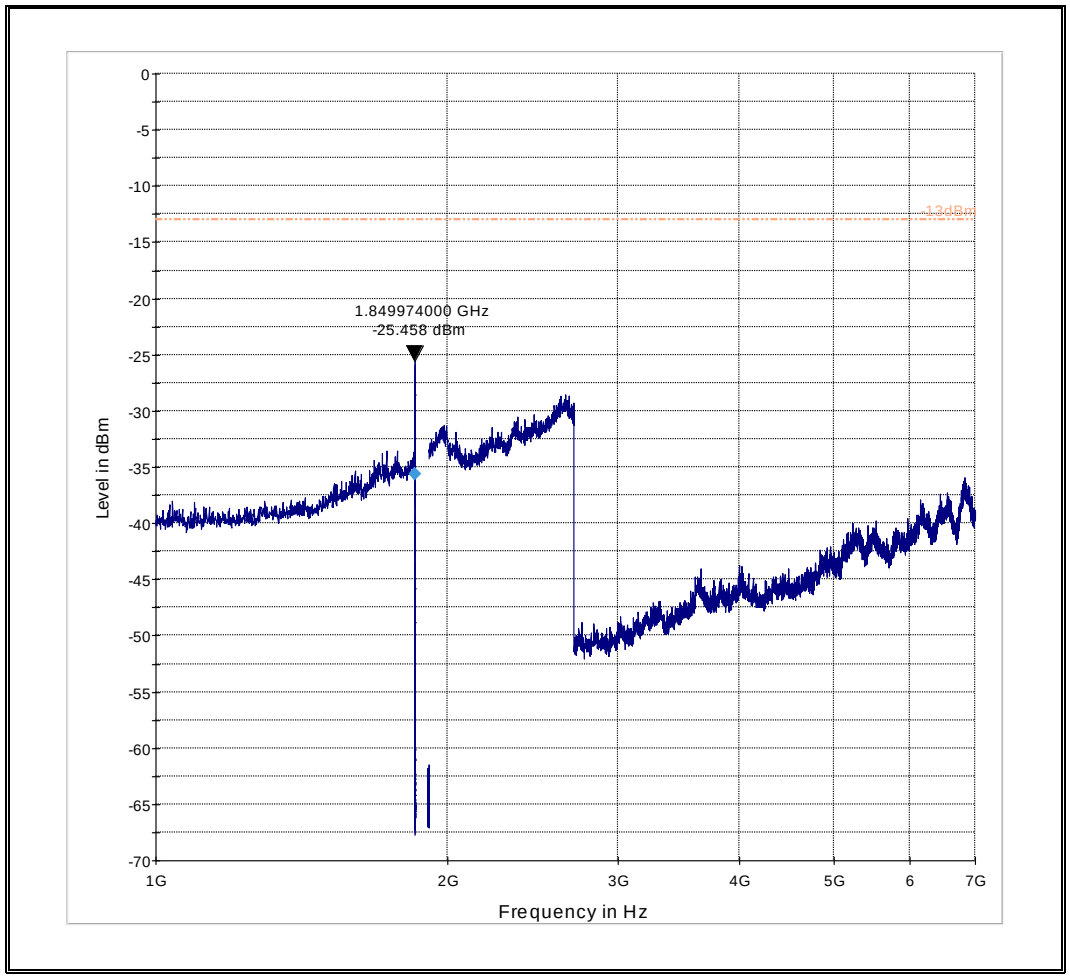


8.7 Measurement Plots GPRS 1900

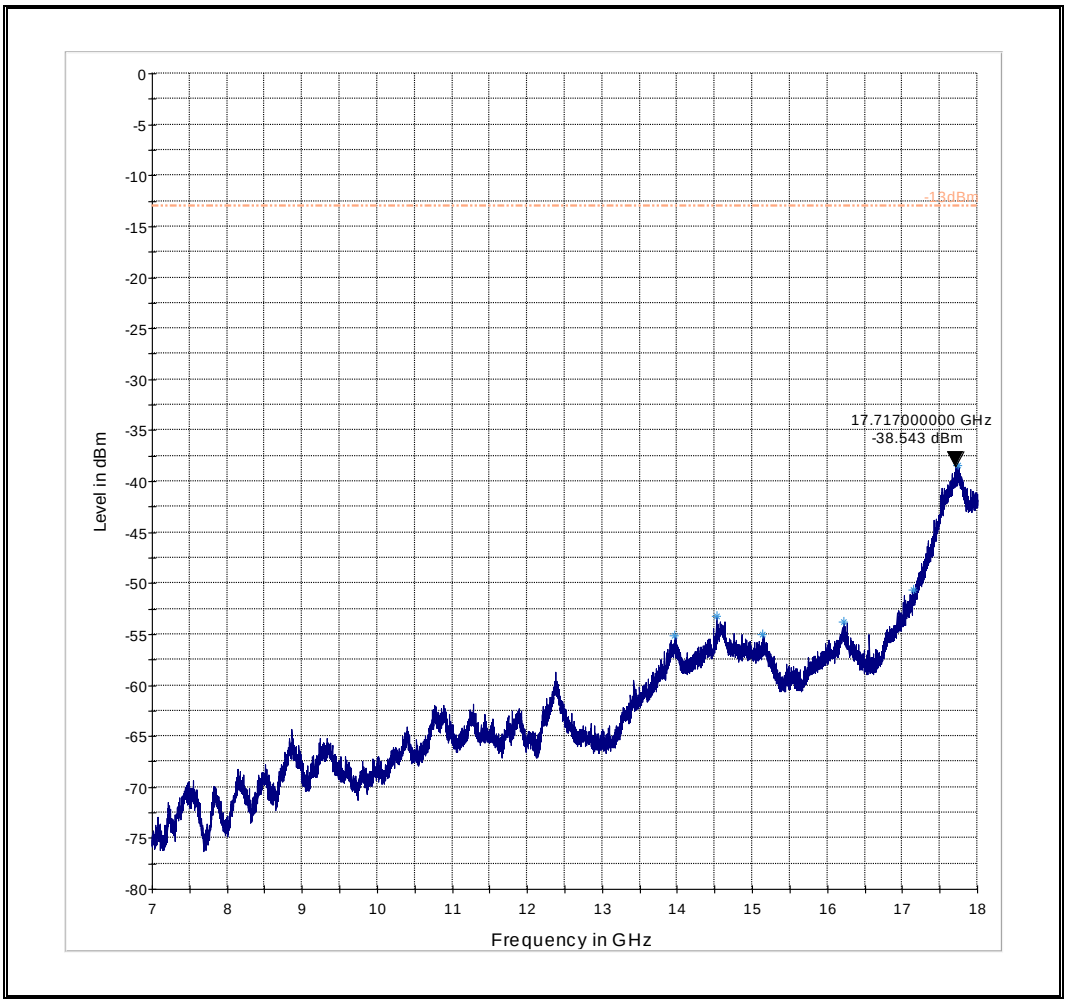
8.7.1 30 MHz - 1 GHz, Ch. Low



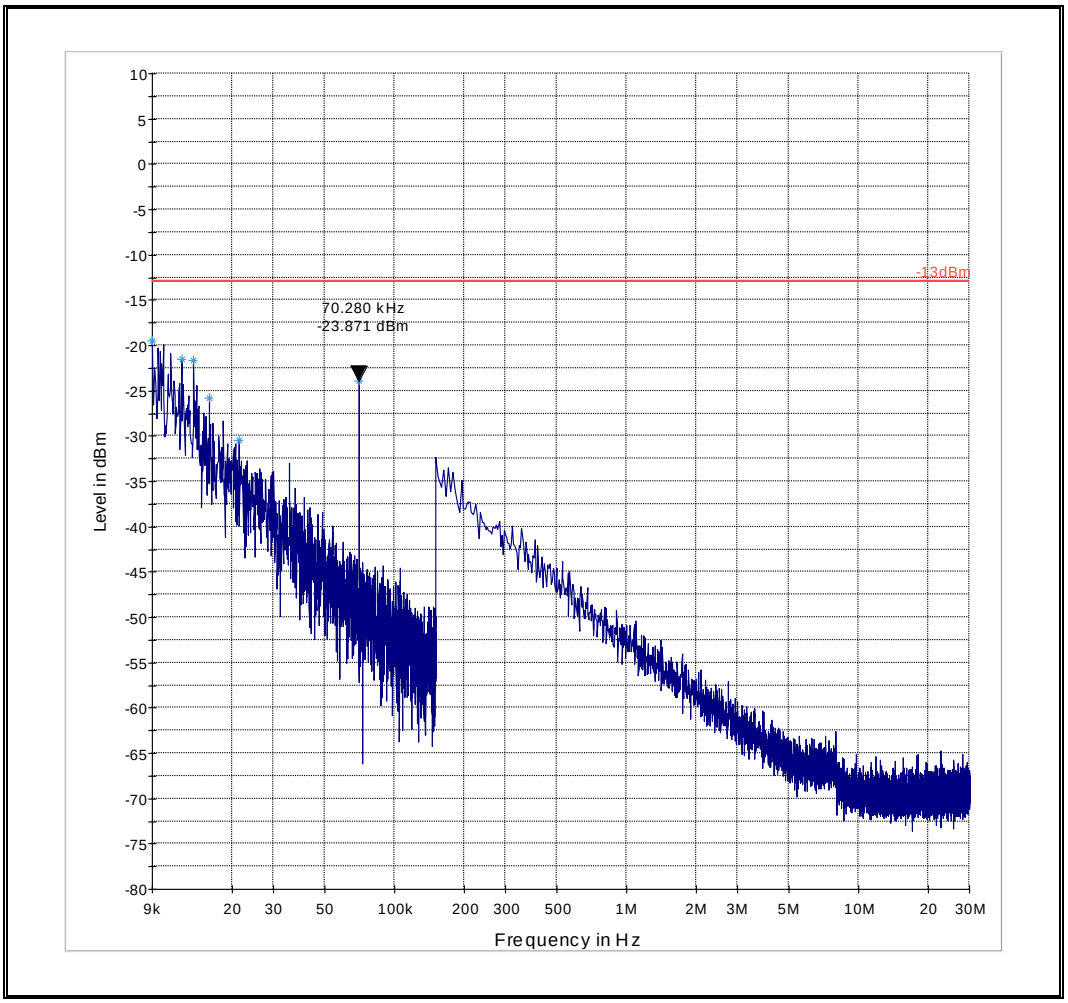
8.7.2 1 - 7 GHz, Ch. Low



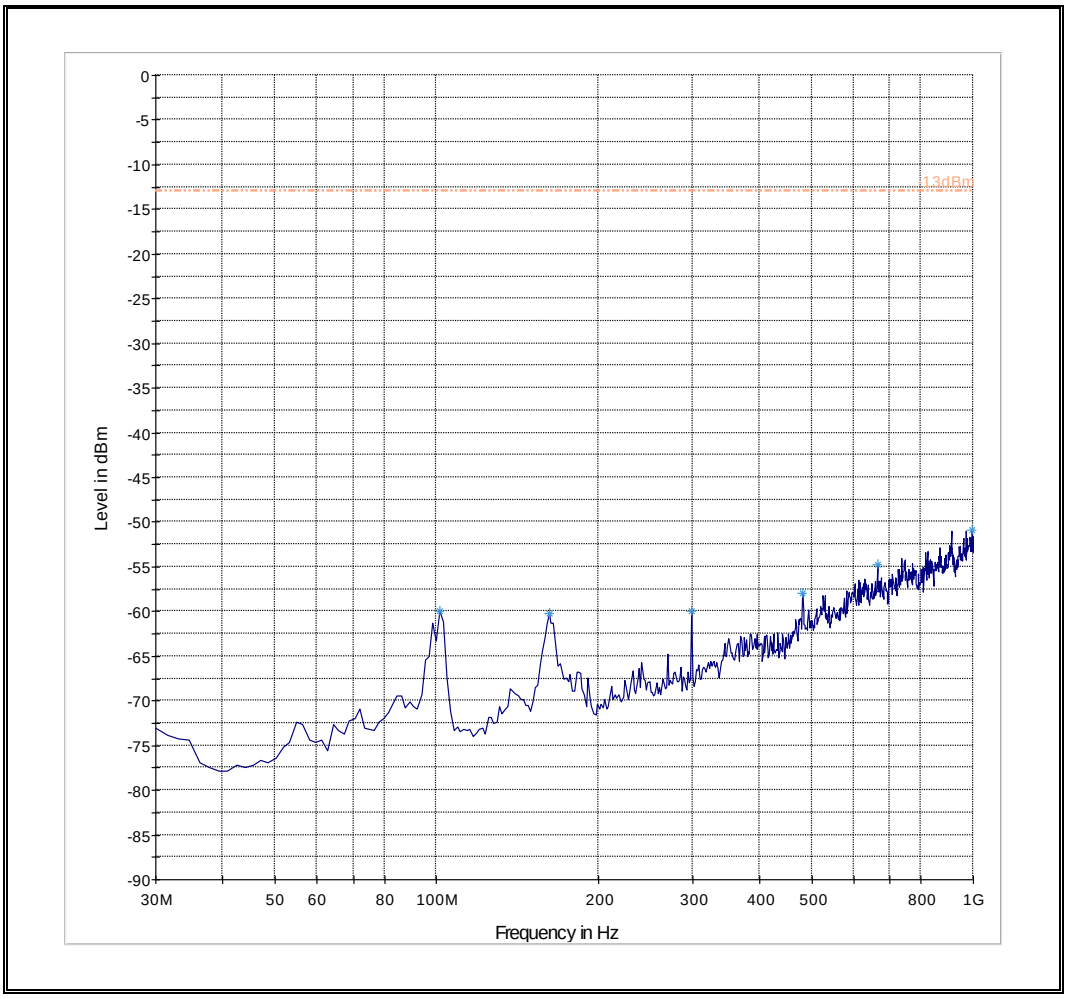
8.7.3 7 - 18 GHz, Ch. Low



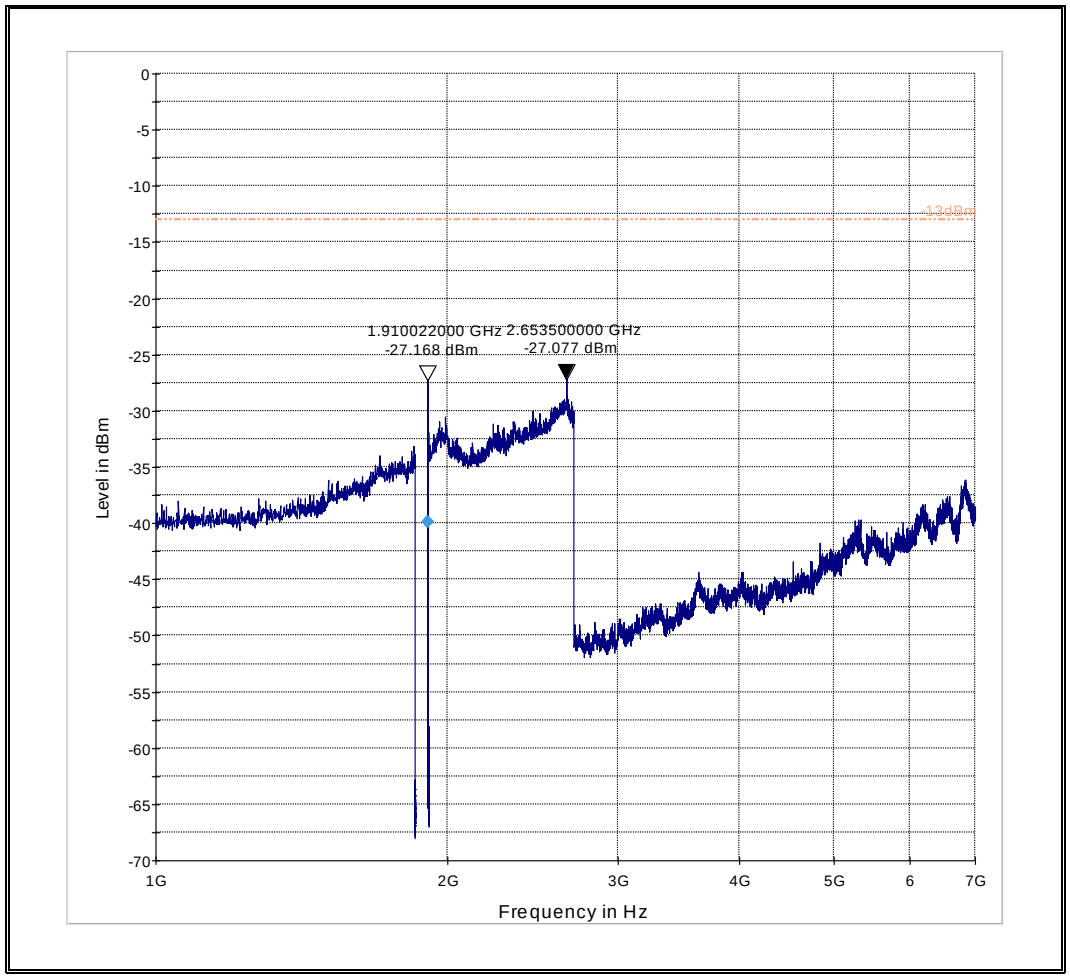
8.7.4 9 KHz - 30 MHz, Ch. Mid



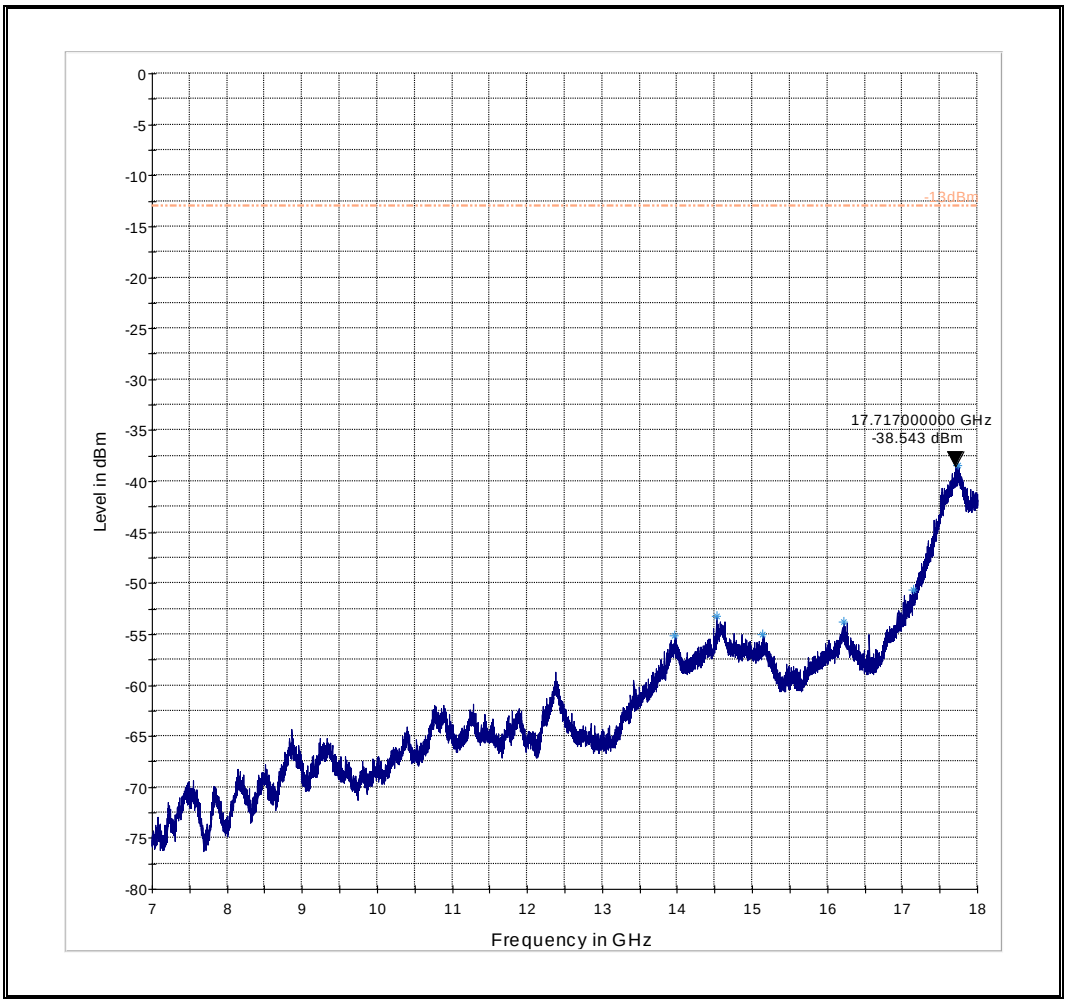
8.7.5 30 MHz - 1 GHz, Ch. Mid



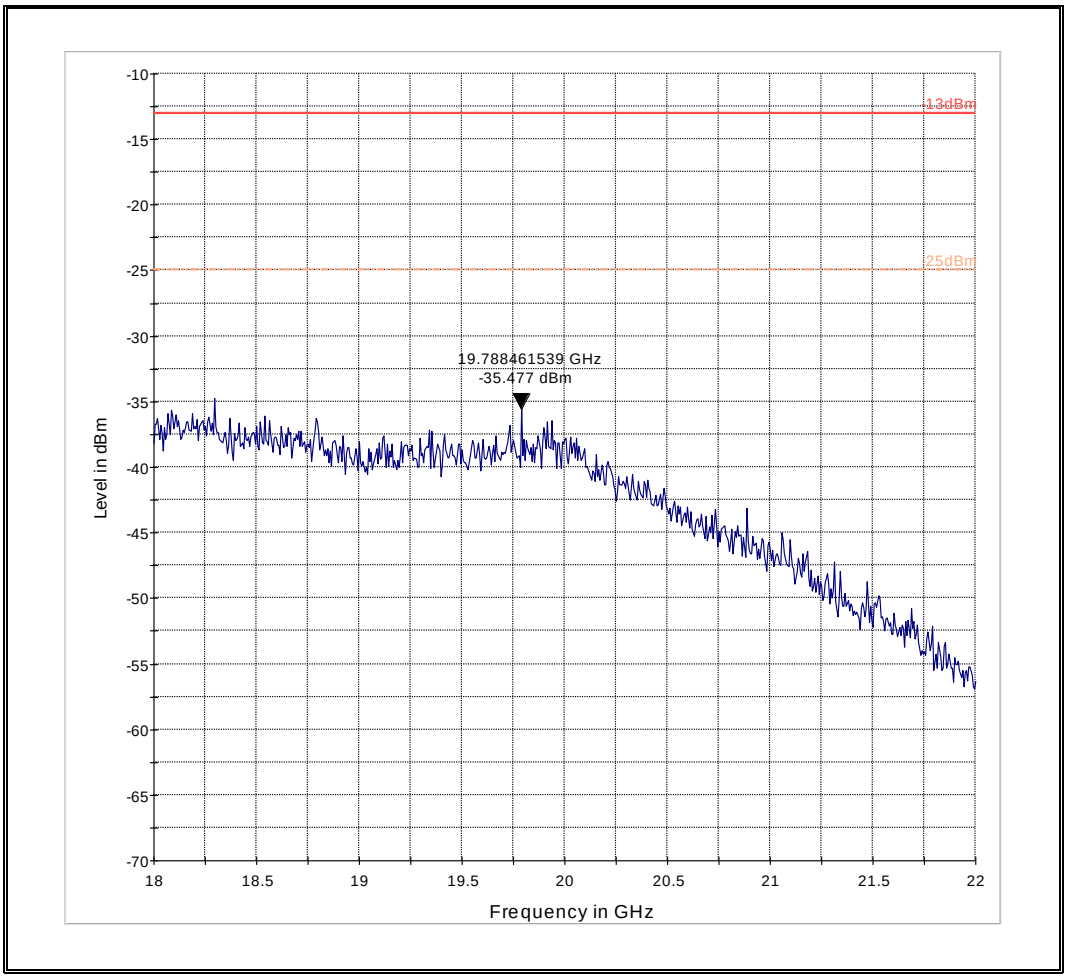
8.7.6 1 - 7 GHz, Ch. Mid



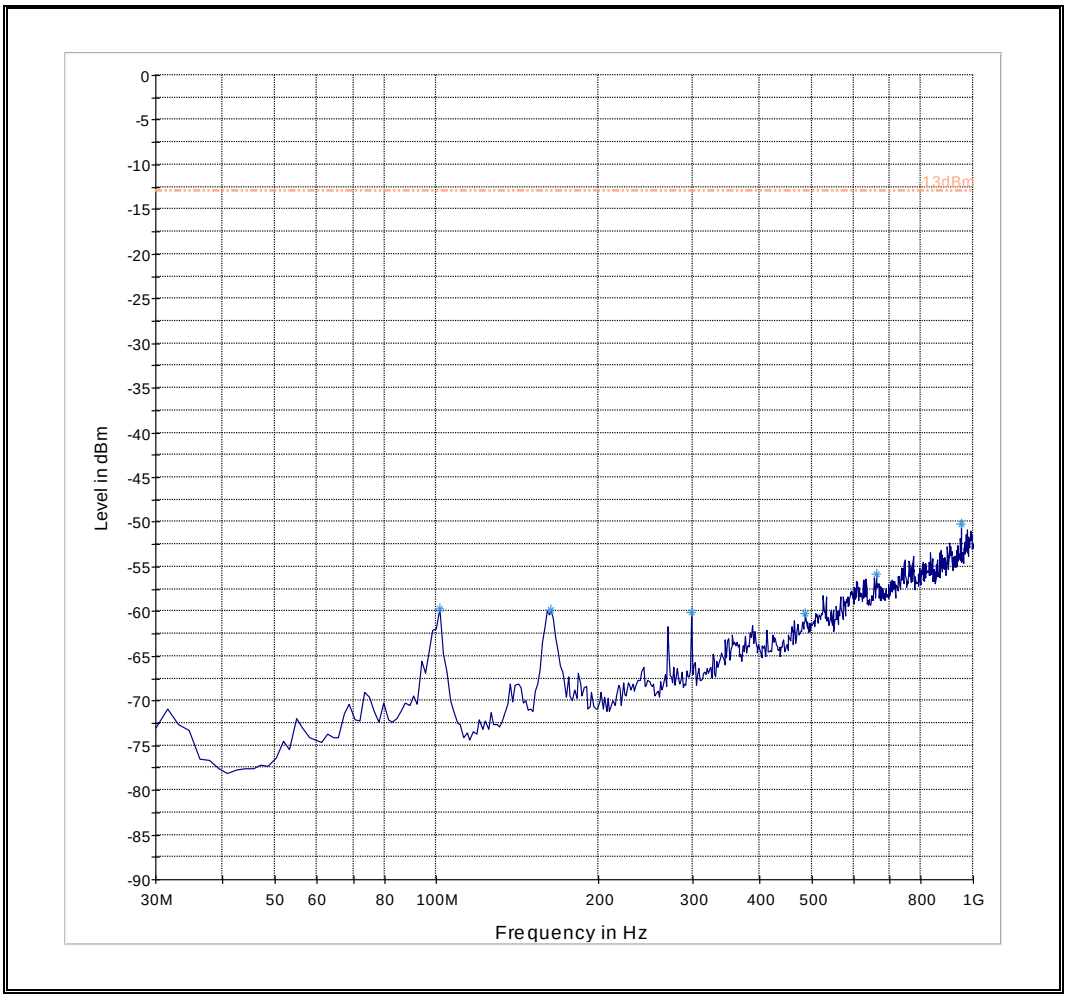
8.7.7 7 GHz - 18 GHz, Ch. Mid



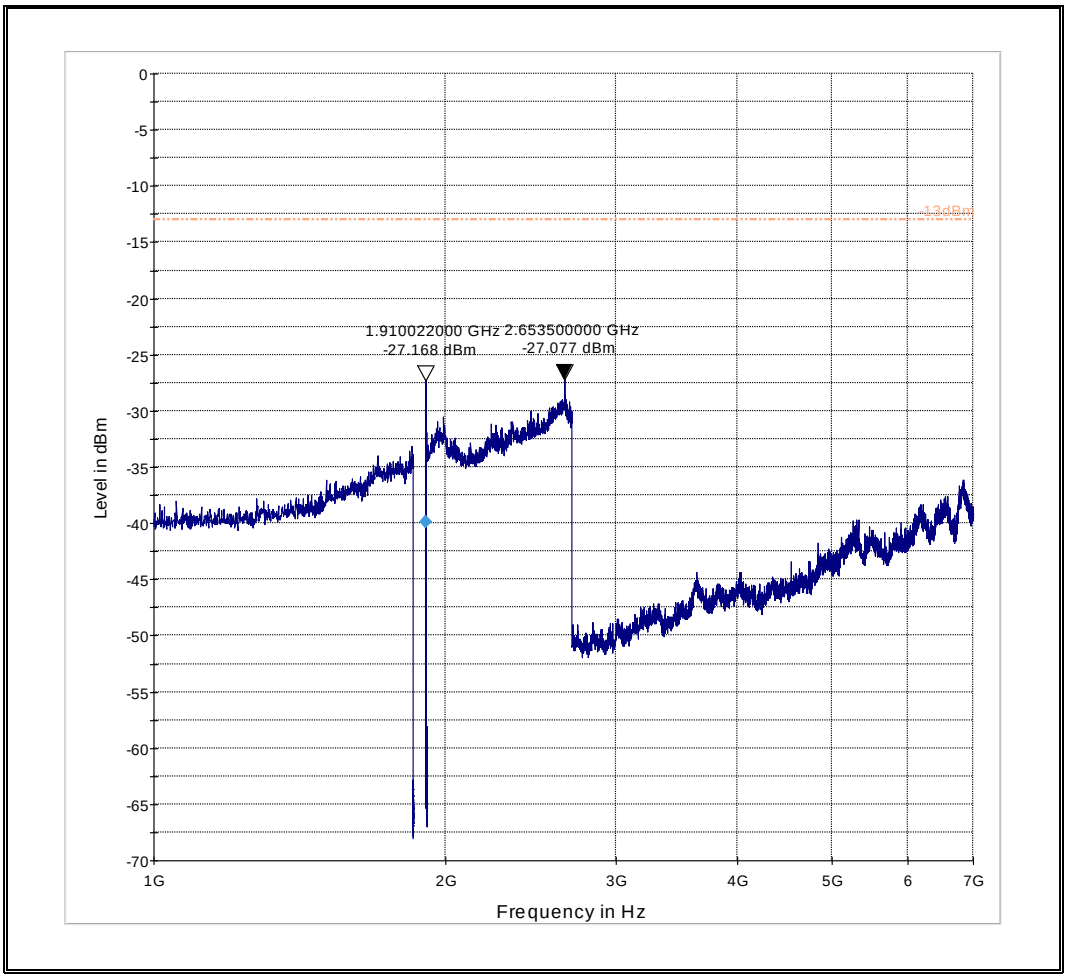
8.7.8 18 - 22 GHz, Ch. Mid



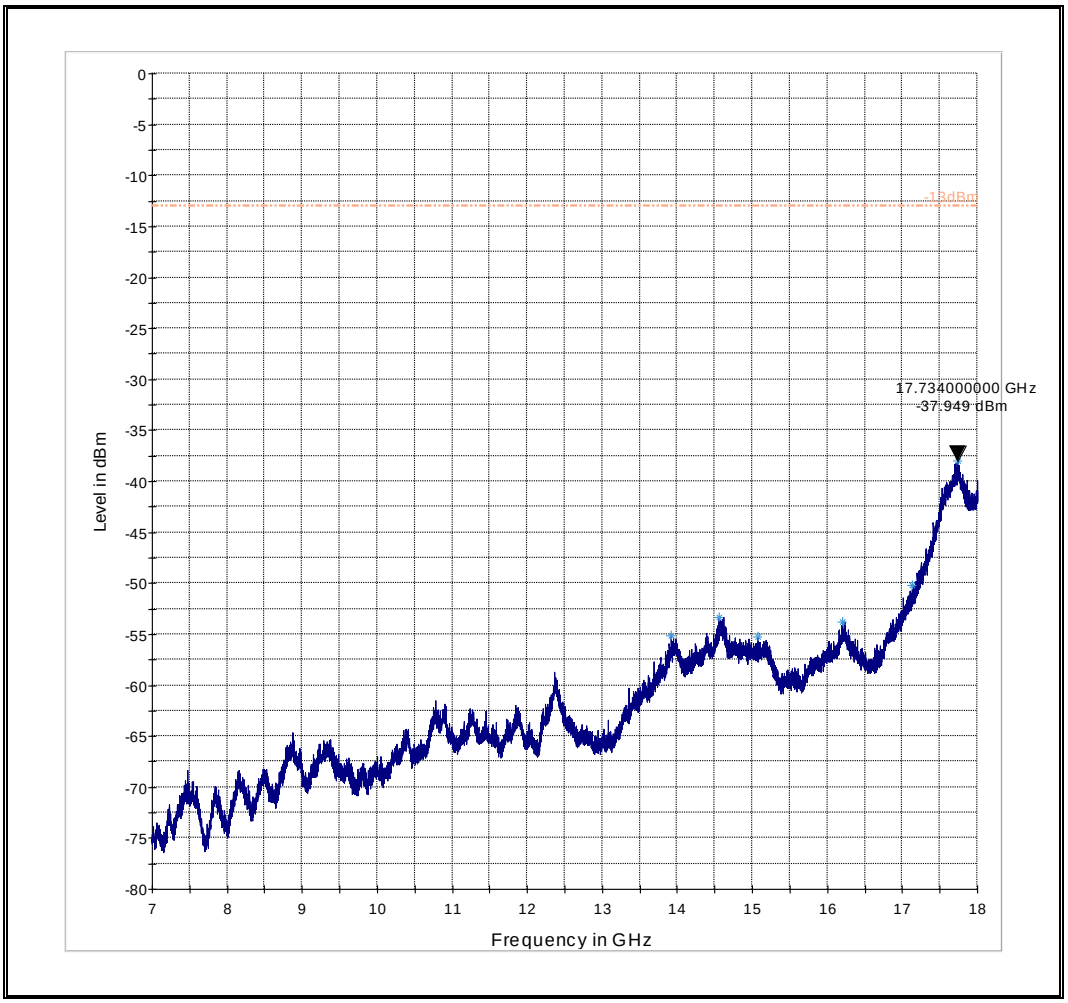
8.7.9 30 MHz - 1 GHz, Ch. High



8.7.10 1 - 7 GHz, Ch. High

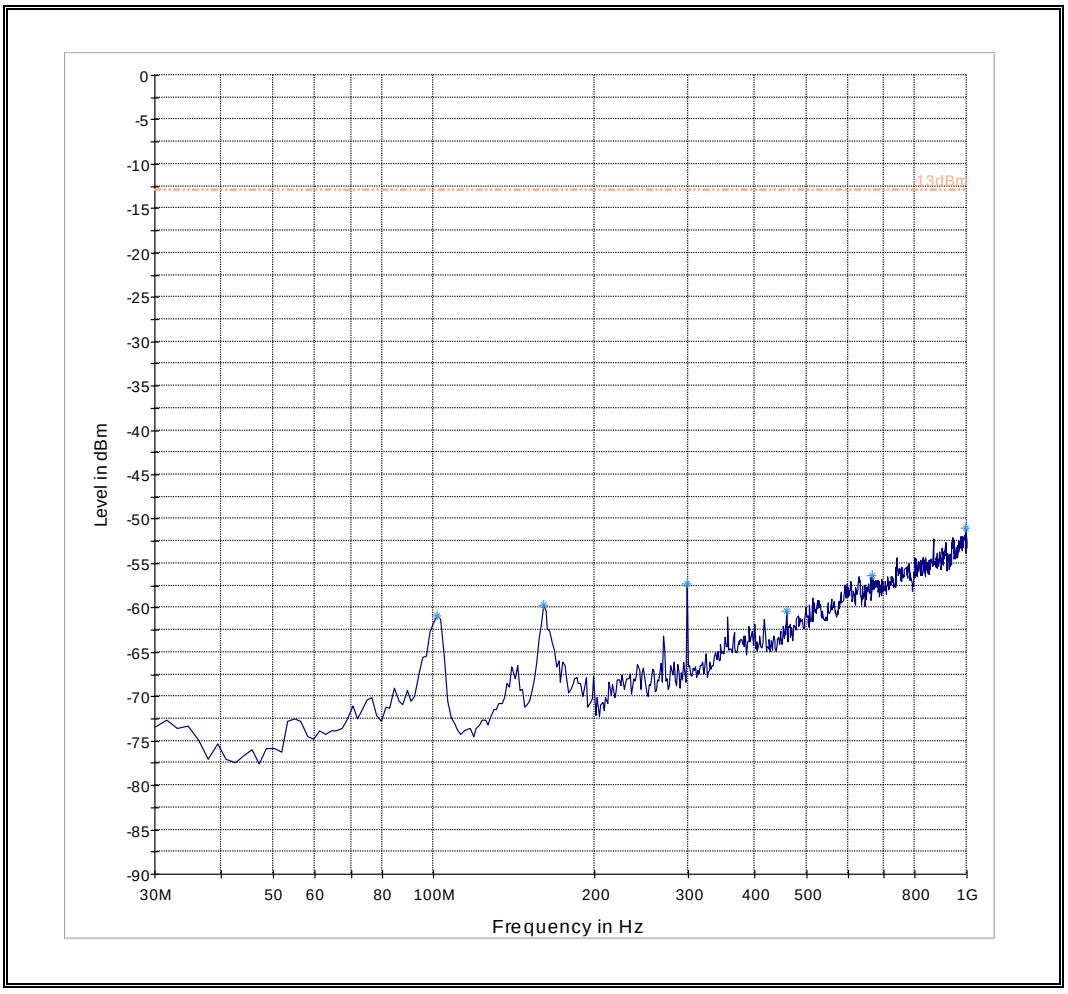


8.7.11 7 - 18 GHz, Ch. High

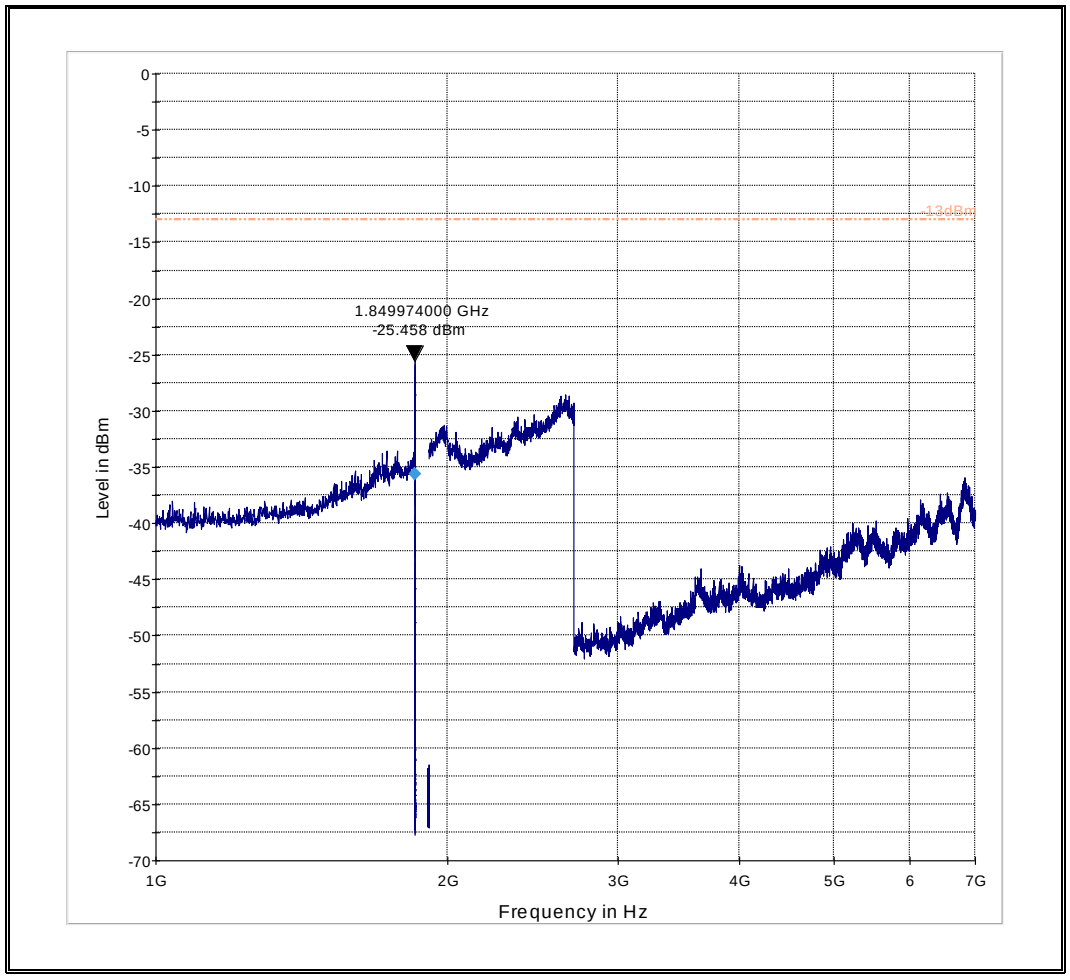


8.8 Measurement Plots WCDMA/UMTS FDD II

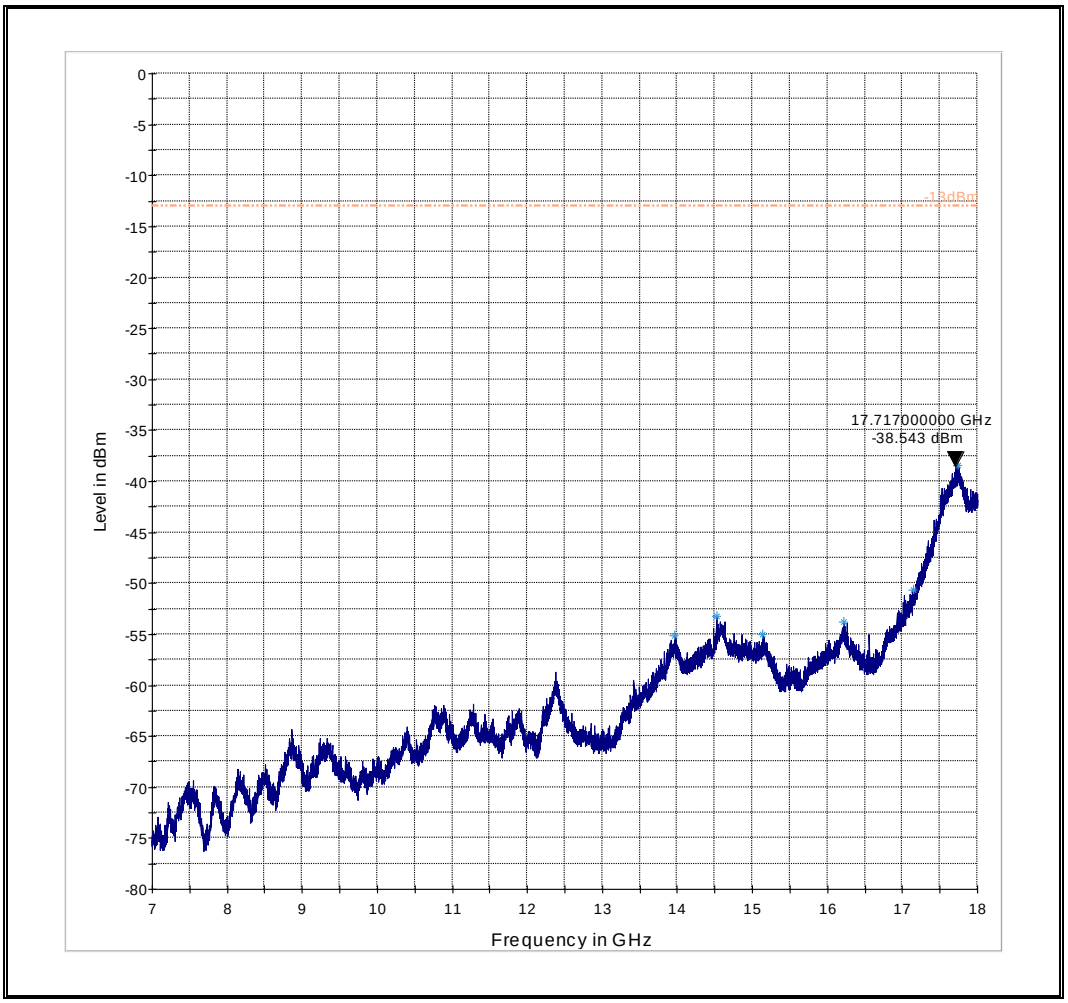
8.8.1 30 MHz - 1 GHz, Ch. Low



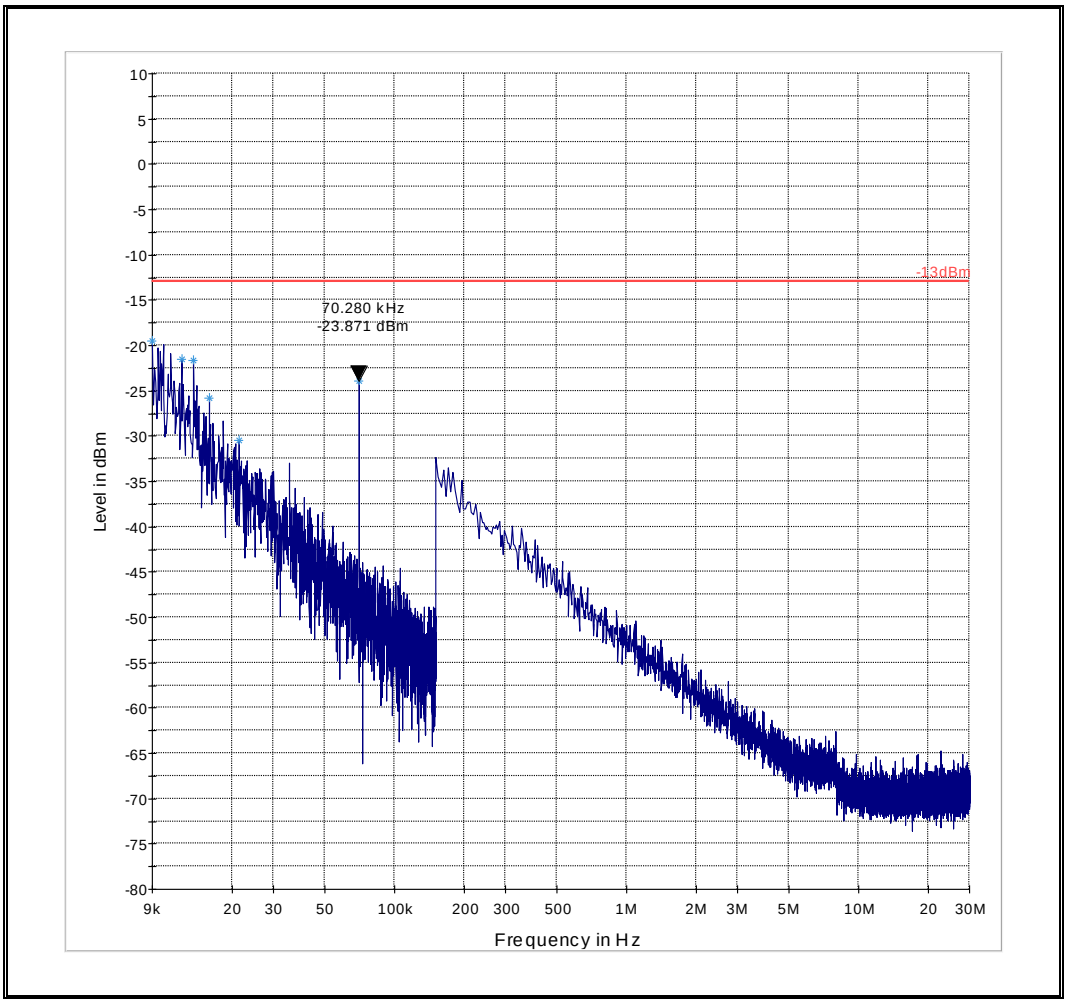
8.8.2 1 - 7 GHz, Ch. Low



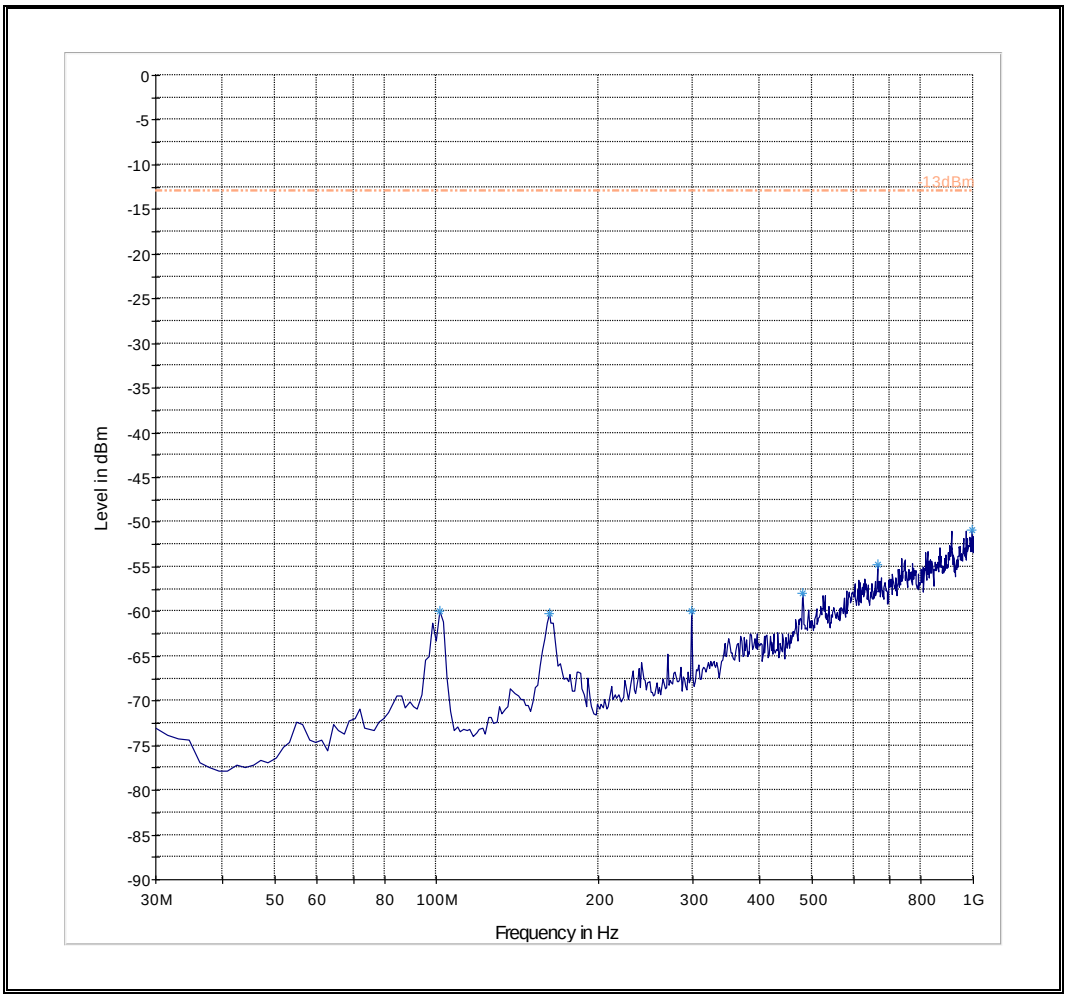
8.8.3 7 - 18 GHz, Ch. Low



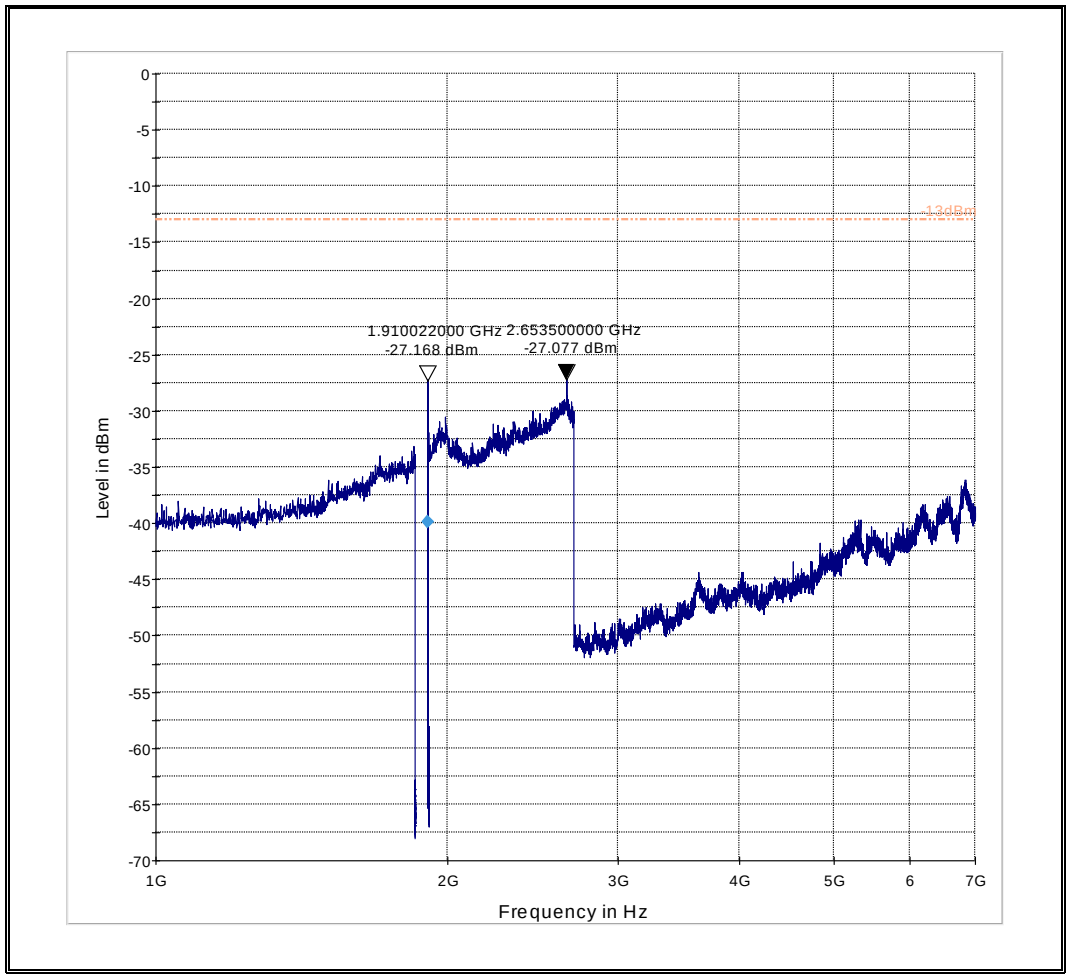
8.8.4 9 KHz - 30 MHz, Ch. Mid



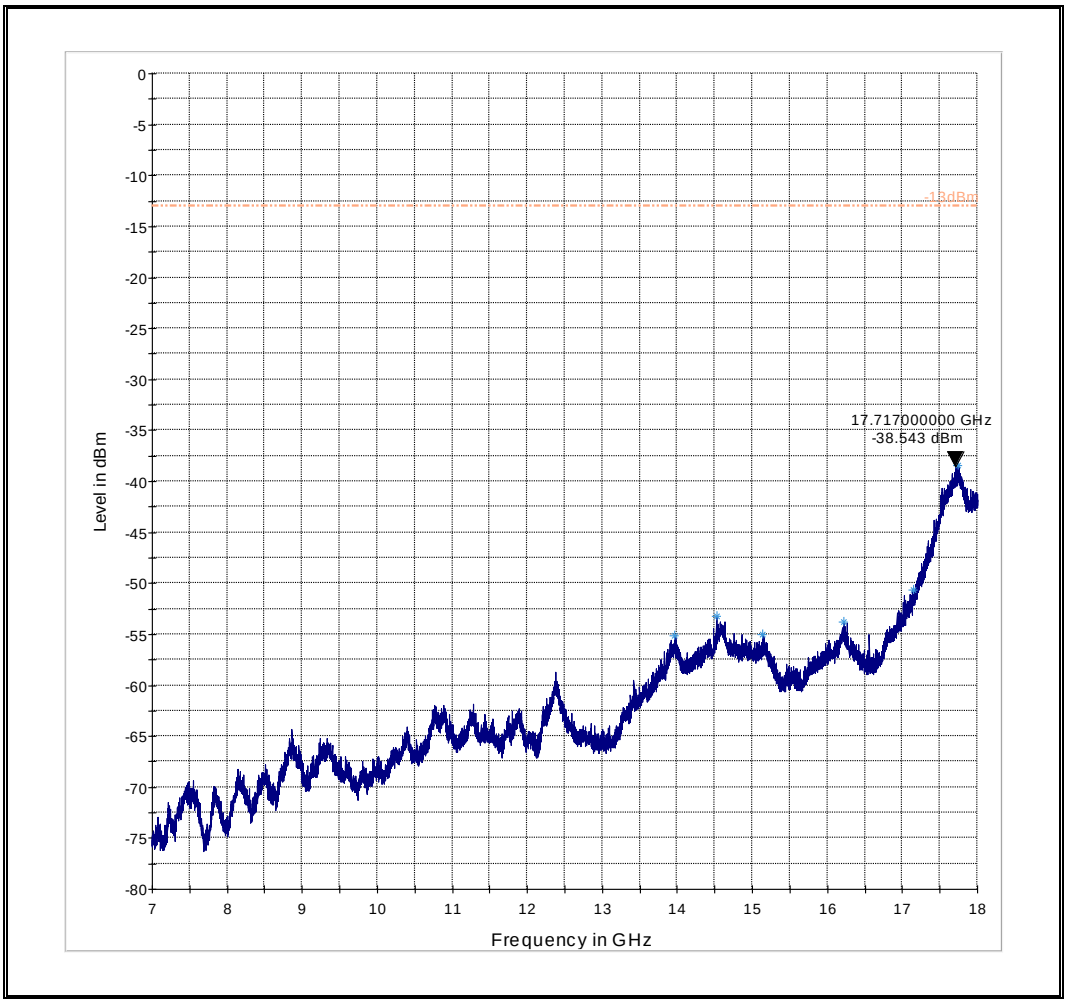
8.8.5 30 MHz - 1 GHz, Ch. Mid



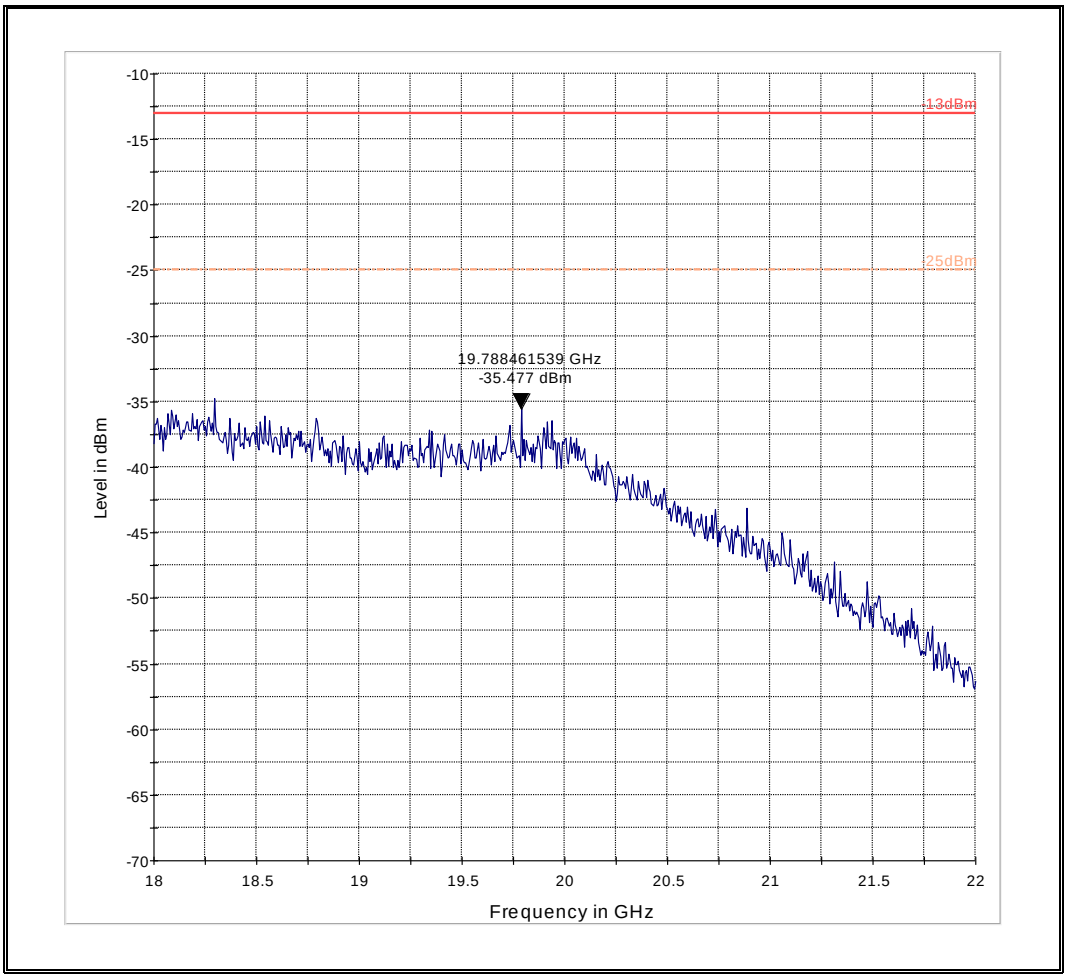
8.8.6 1 - 7 GHz, Ch. Mid



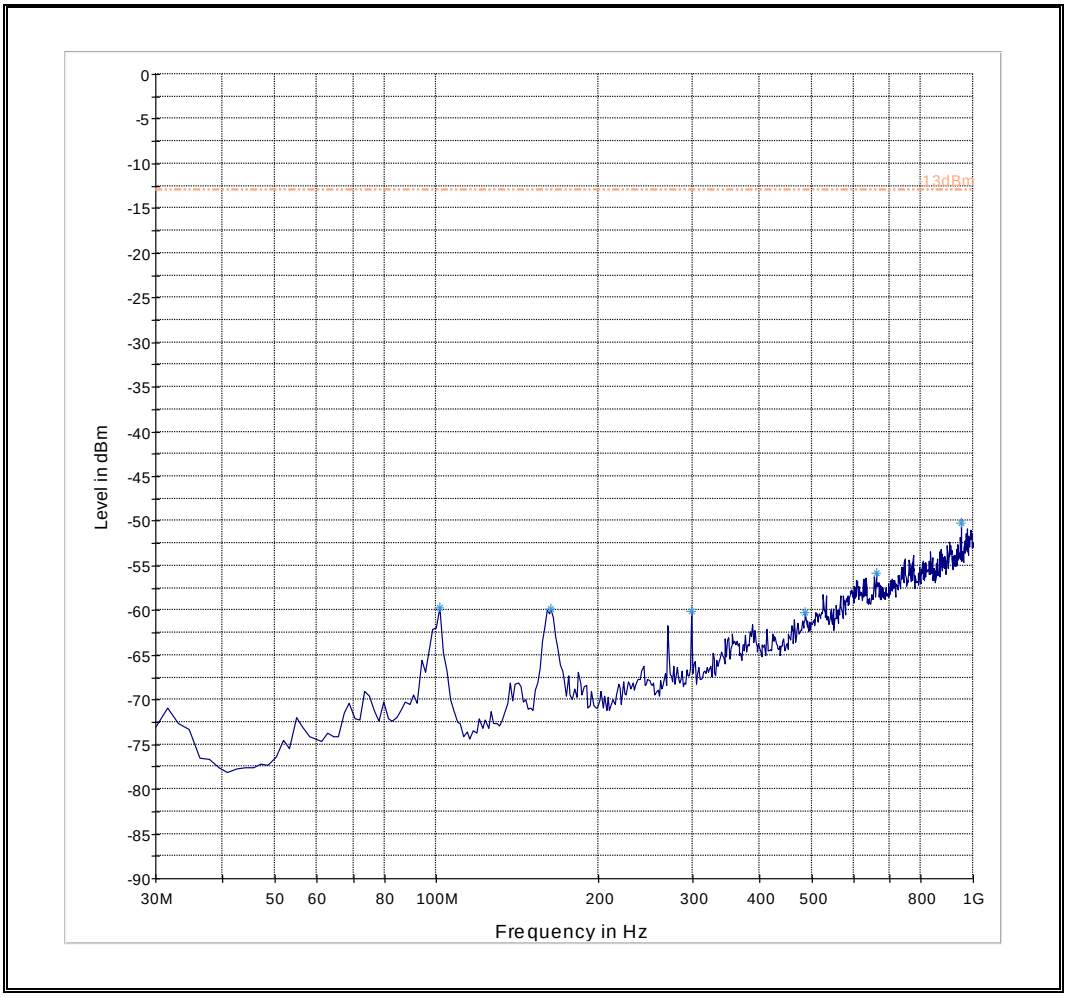
8.8.7 7 GHz - 18 GHz, Ch. Mid



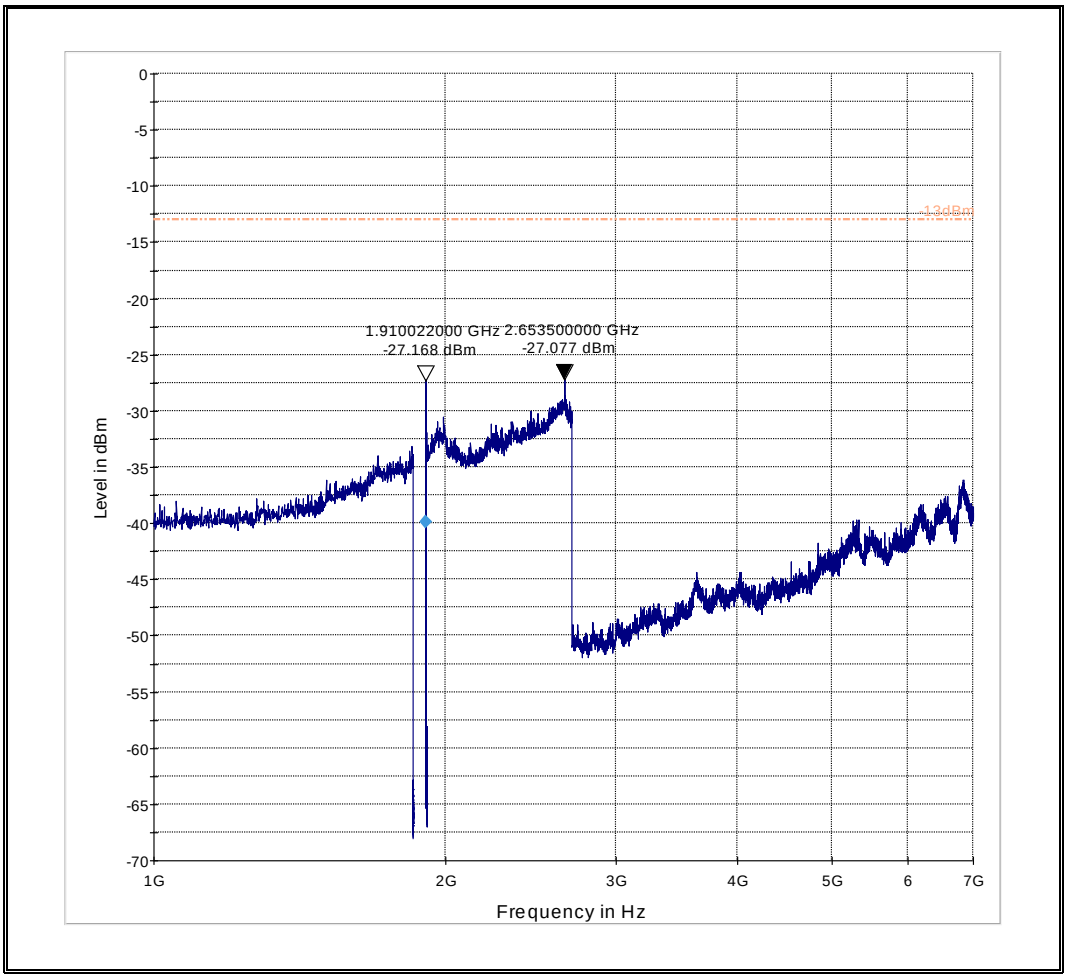
8.8.8 18 - 22 GHz, Ch. Mid



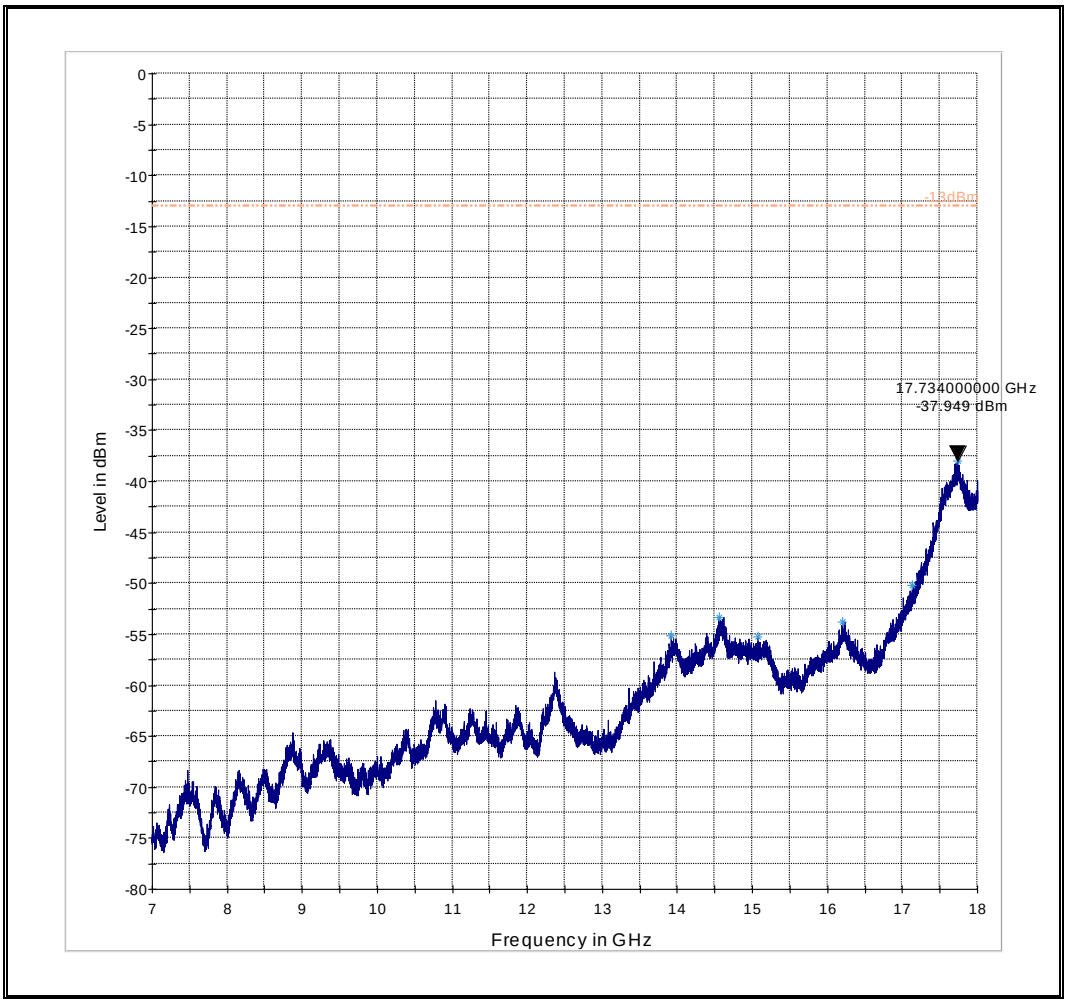
8.8.9 30 MHz - 1 GHz, Ch. High



8.8.10 1 - 7 GHz, Ch. High

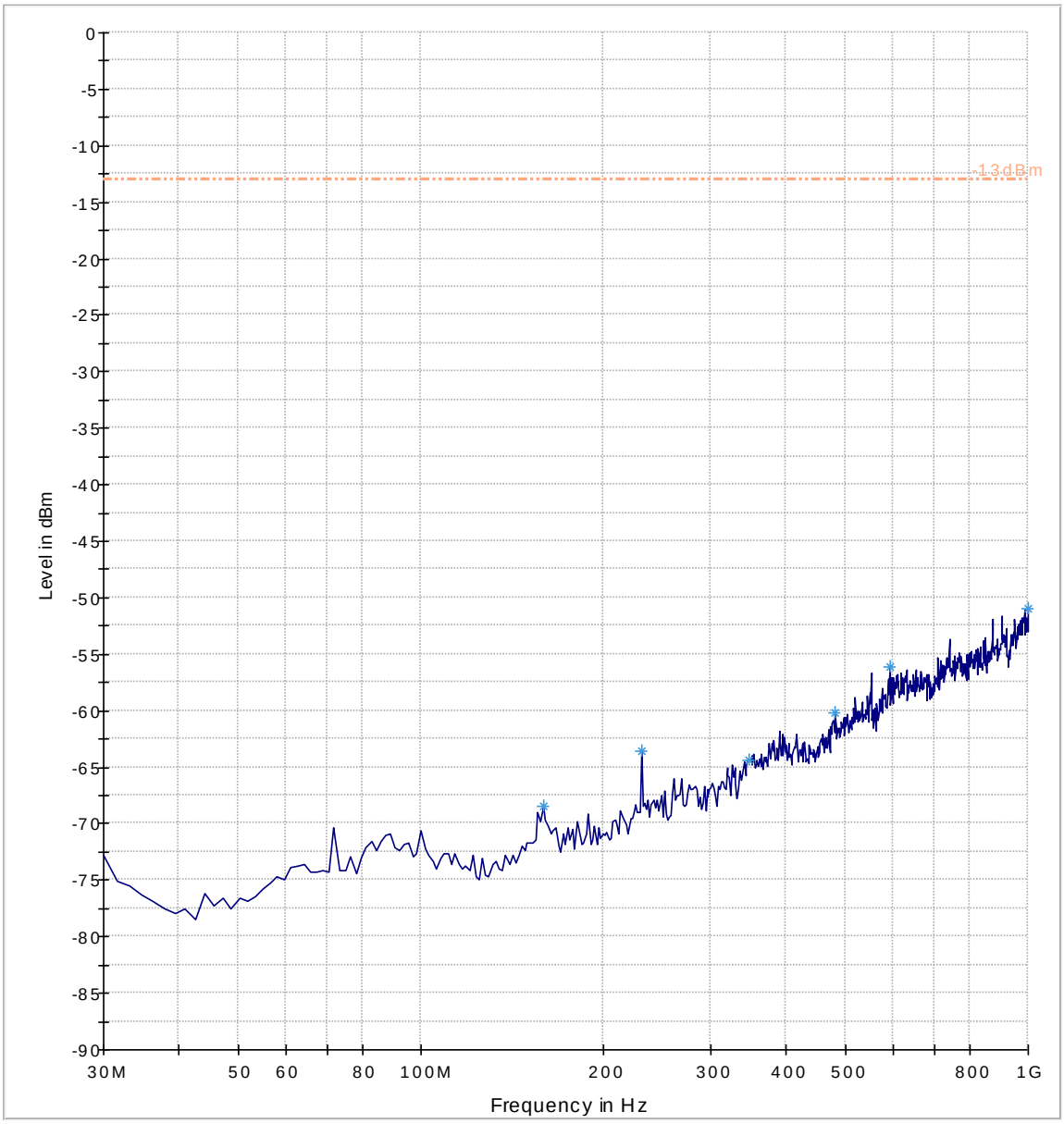


8.8.11 7 - 18 GHz, Ch. High

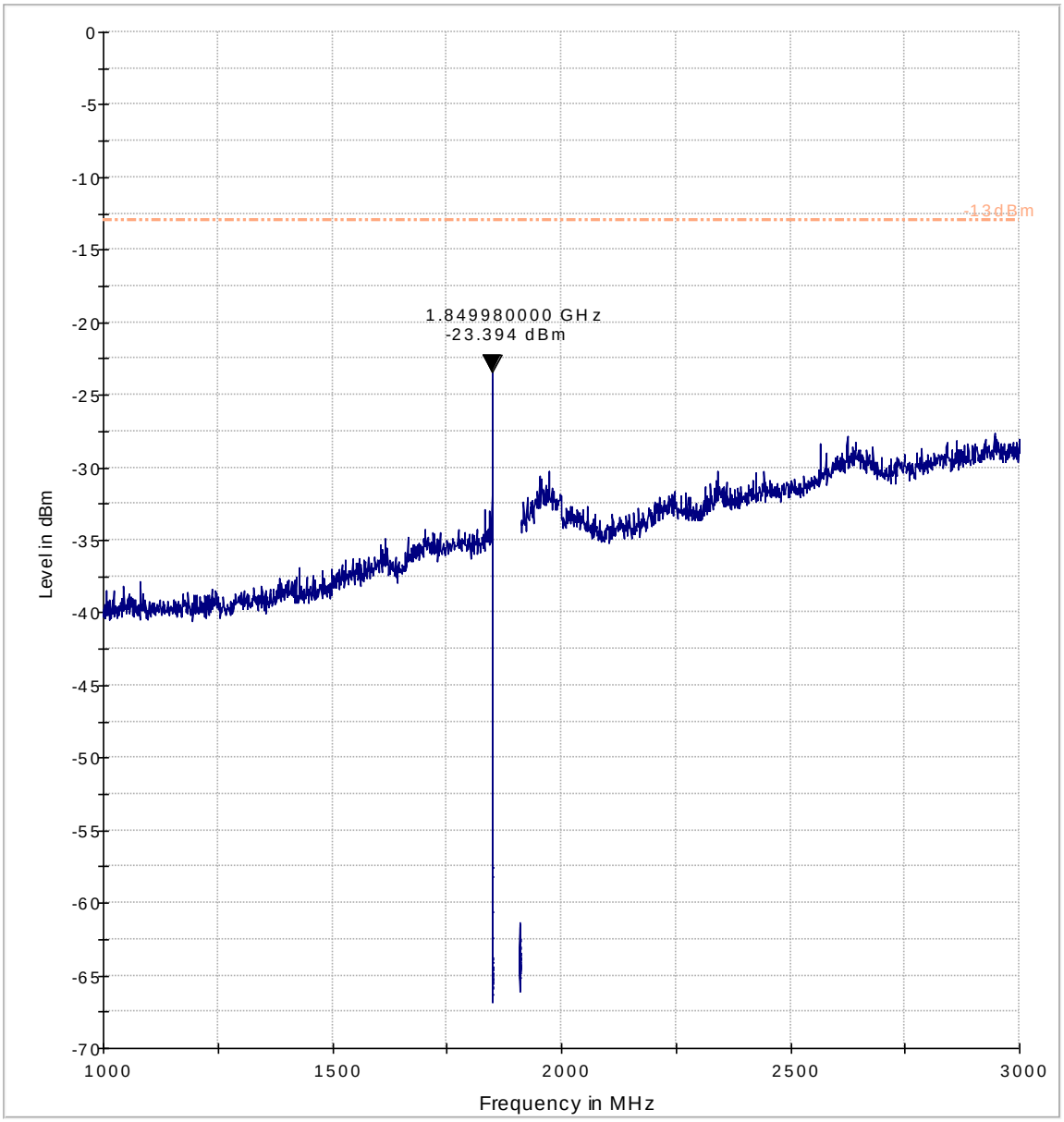


8.9 Measurement Plots WCDMA/UMTS FDD IV

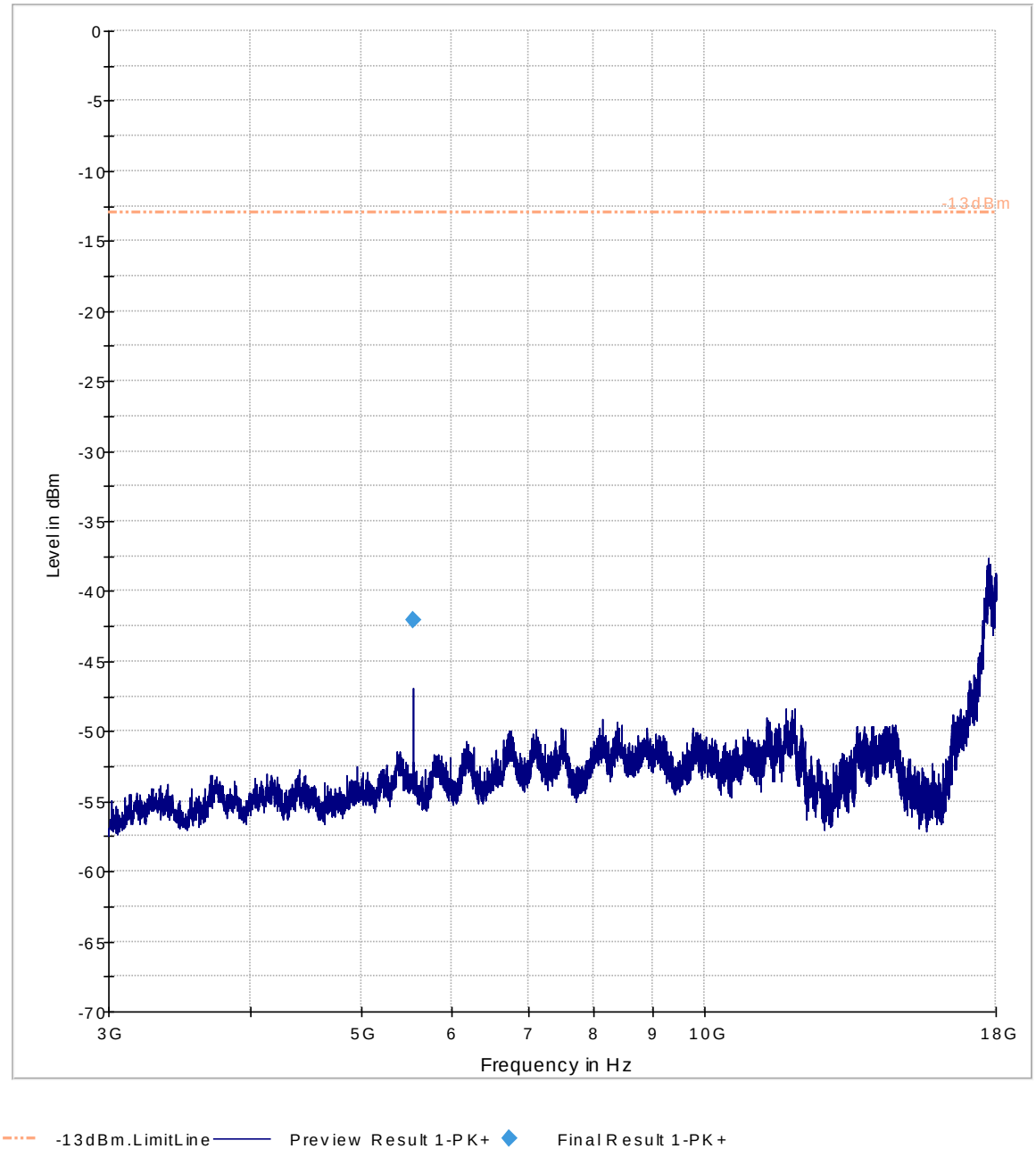
8.9.1 30 MHz – 1 GHz, Ch. Low



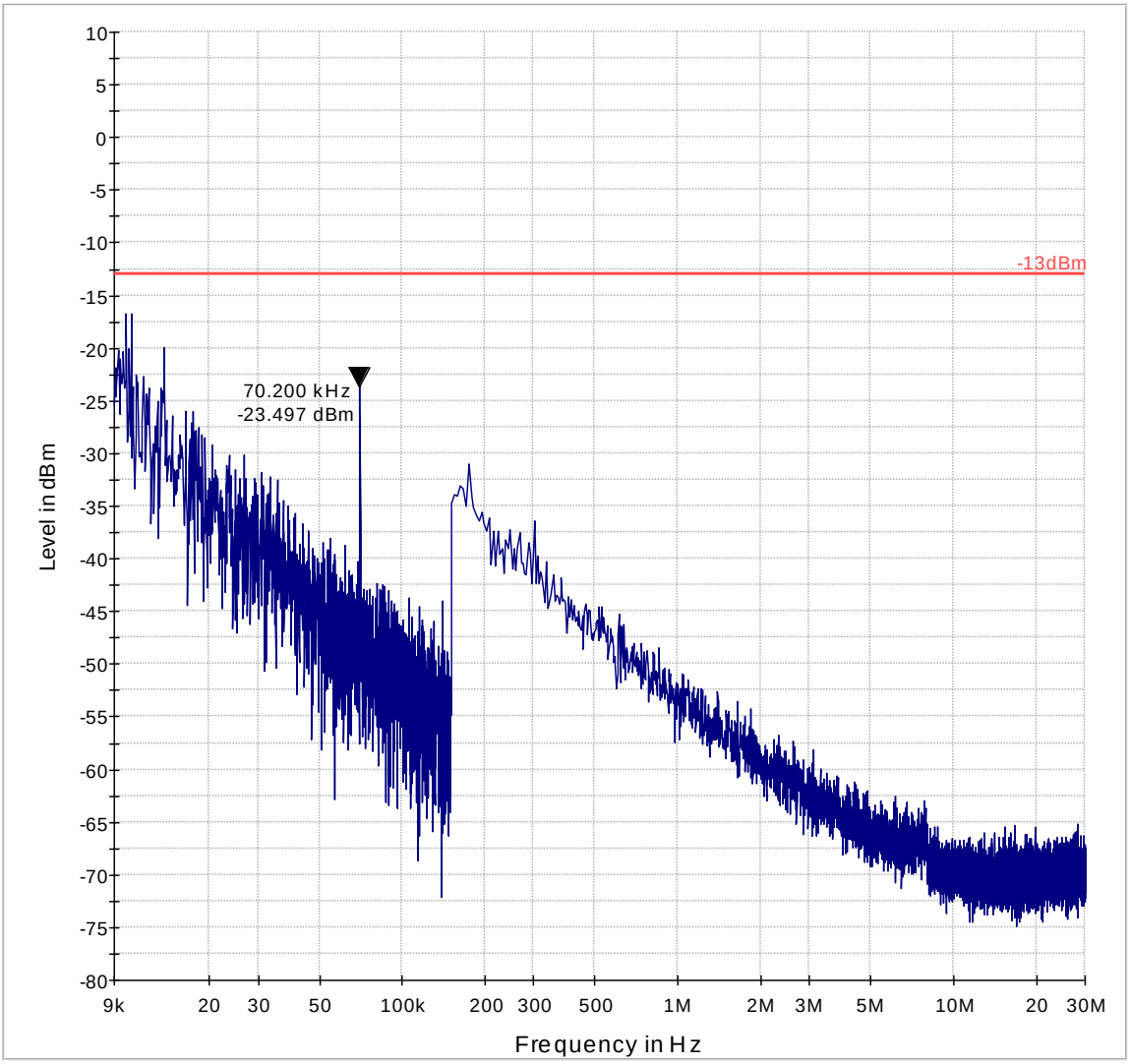
8.9.2 1 GHz – 3 GHz, Ch. Low



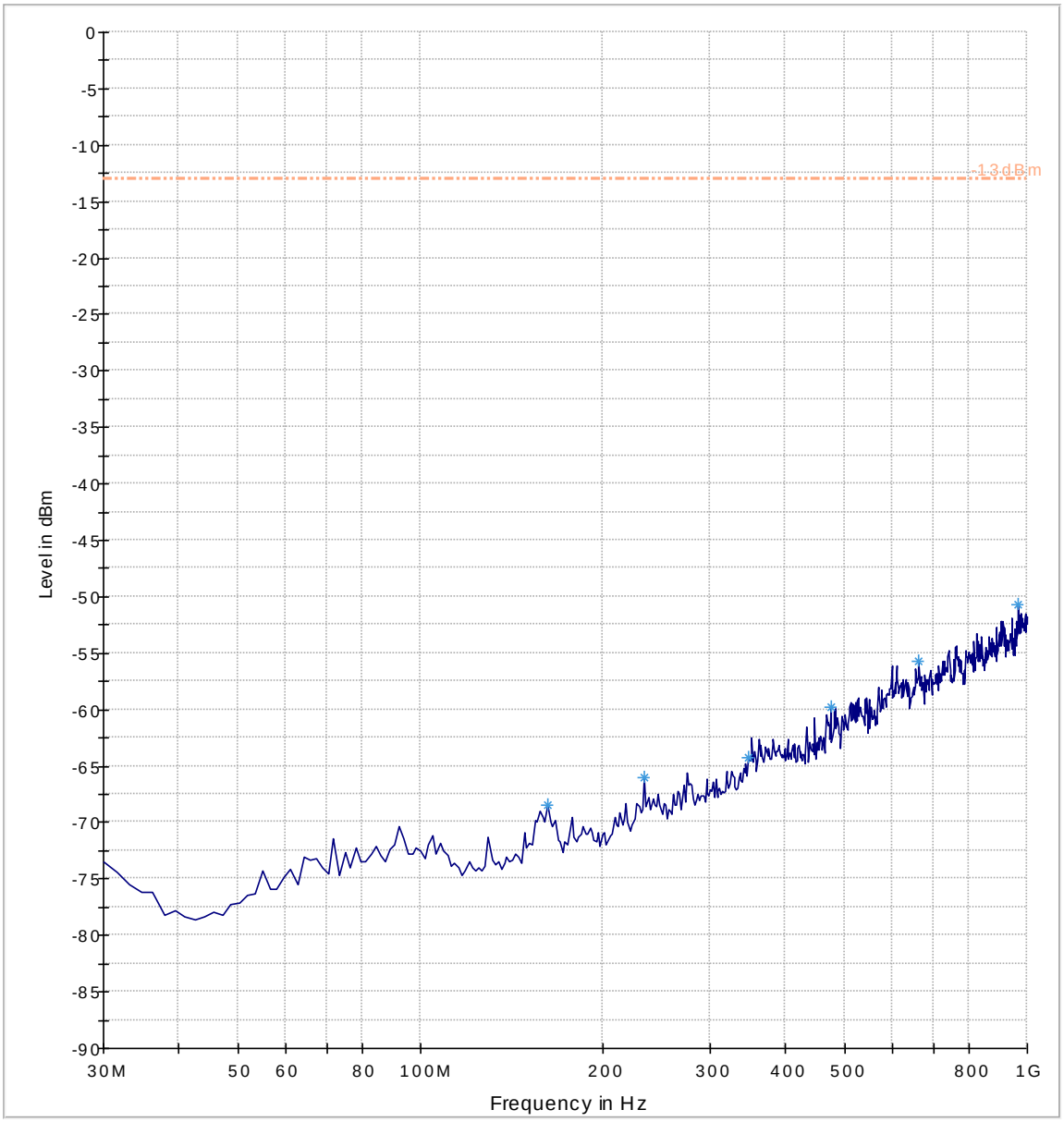
8.9.3 3 GHz – 18 GHz, Ch. Low



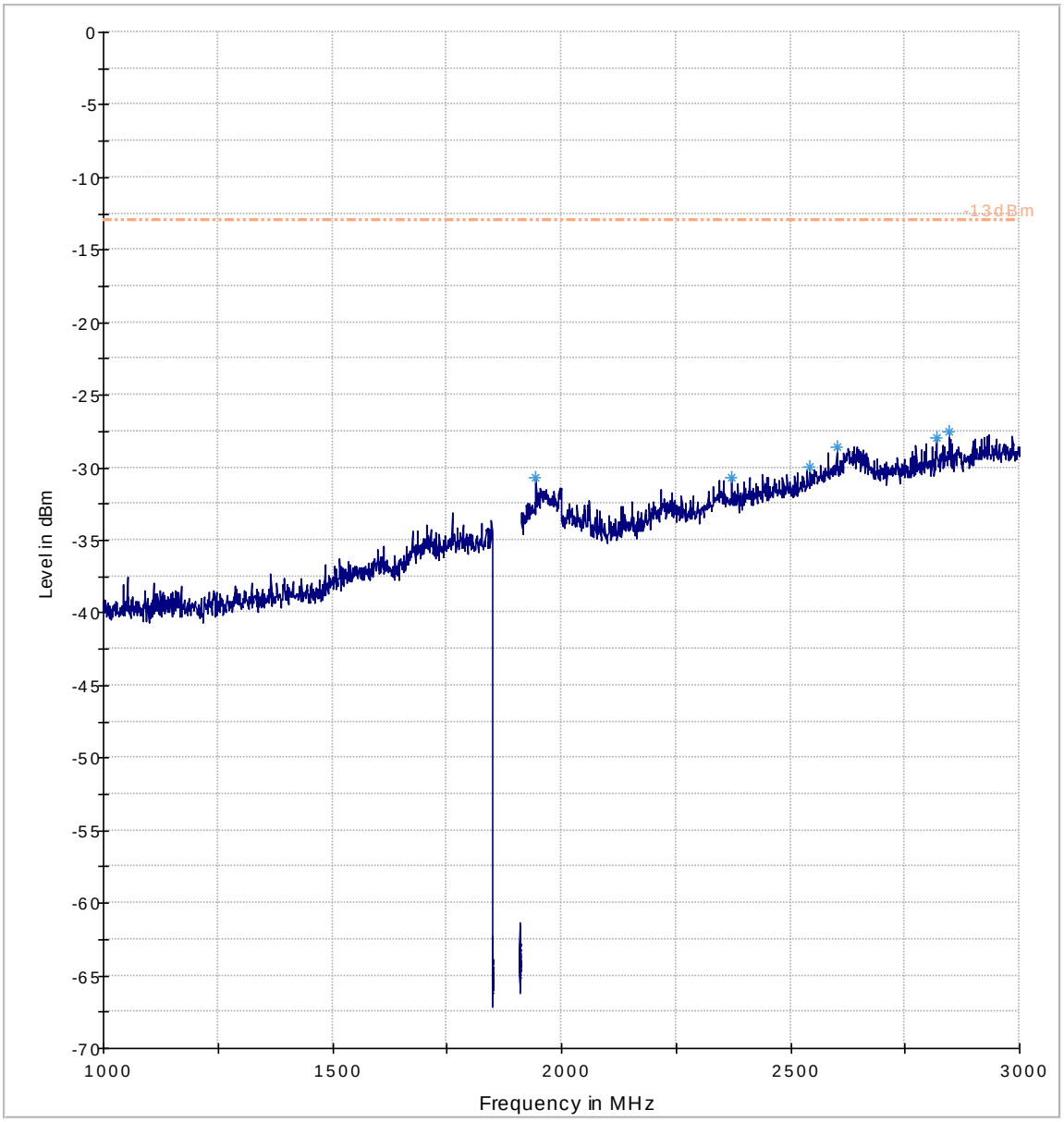
8.9.4 9 KHz – 30 MHz, Ch. Mid



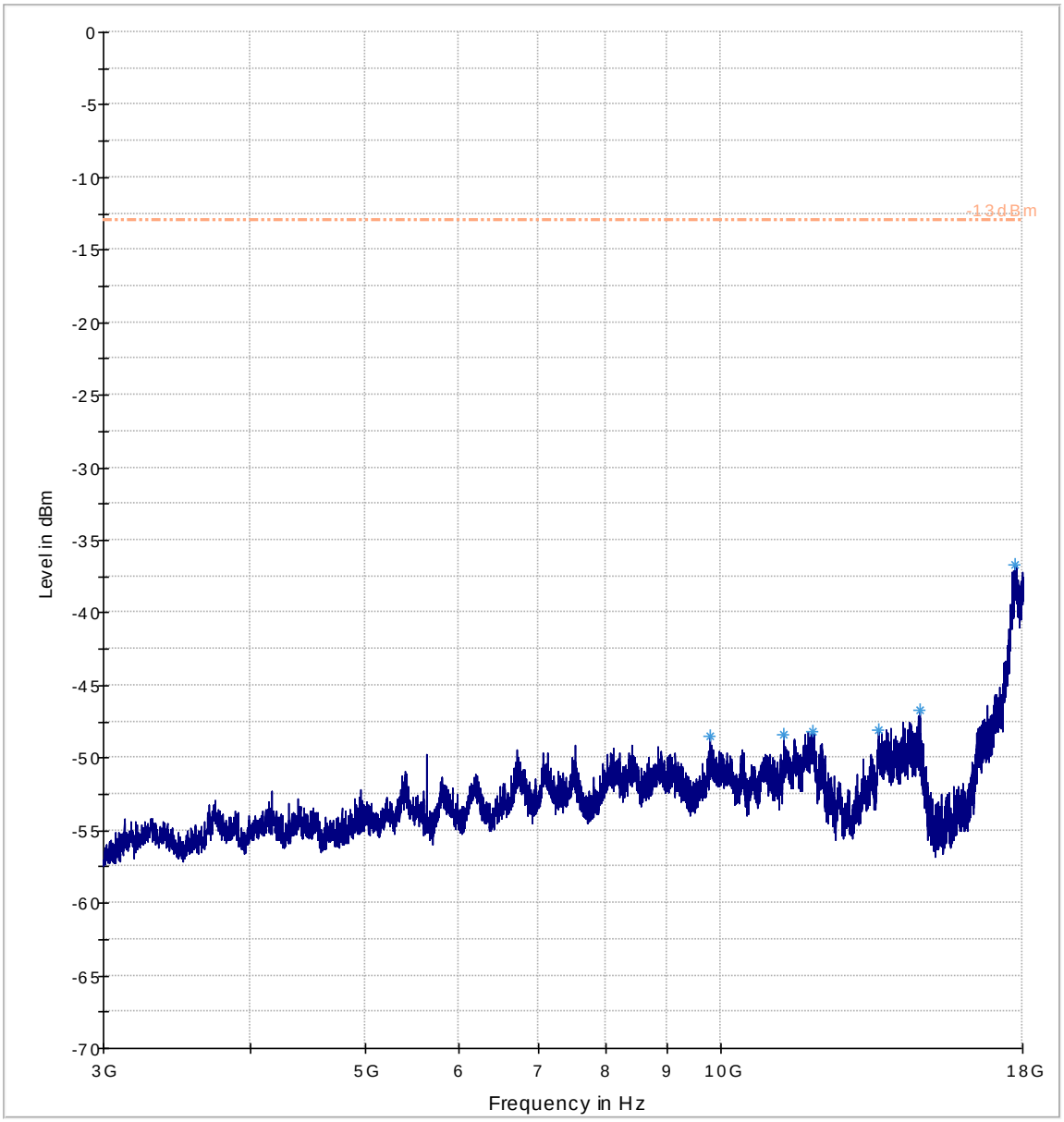
8.9.5 30 MHz – 1 GHz, Ch. Mid



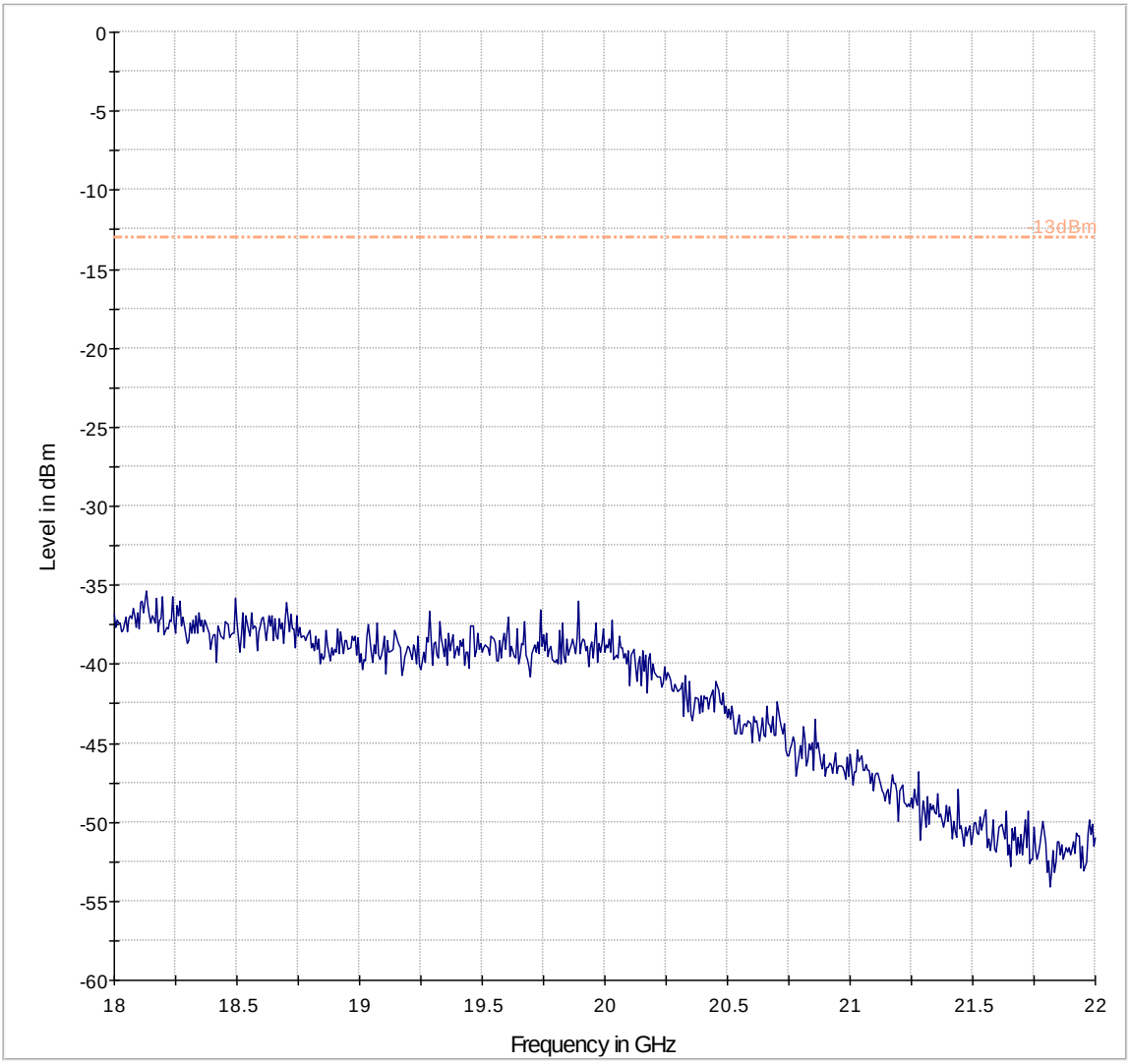
8.9.6 1 GHz – 3 GHz, Ch. Mid



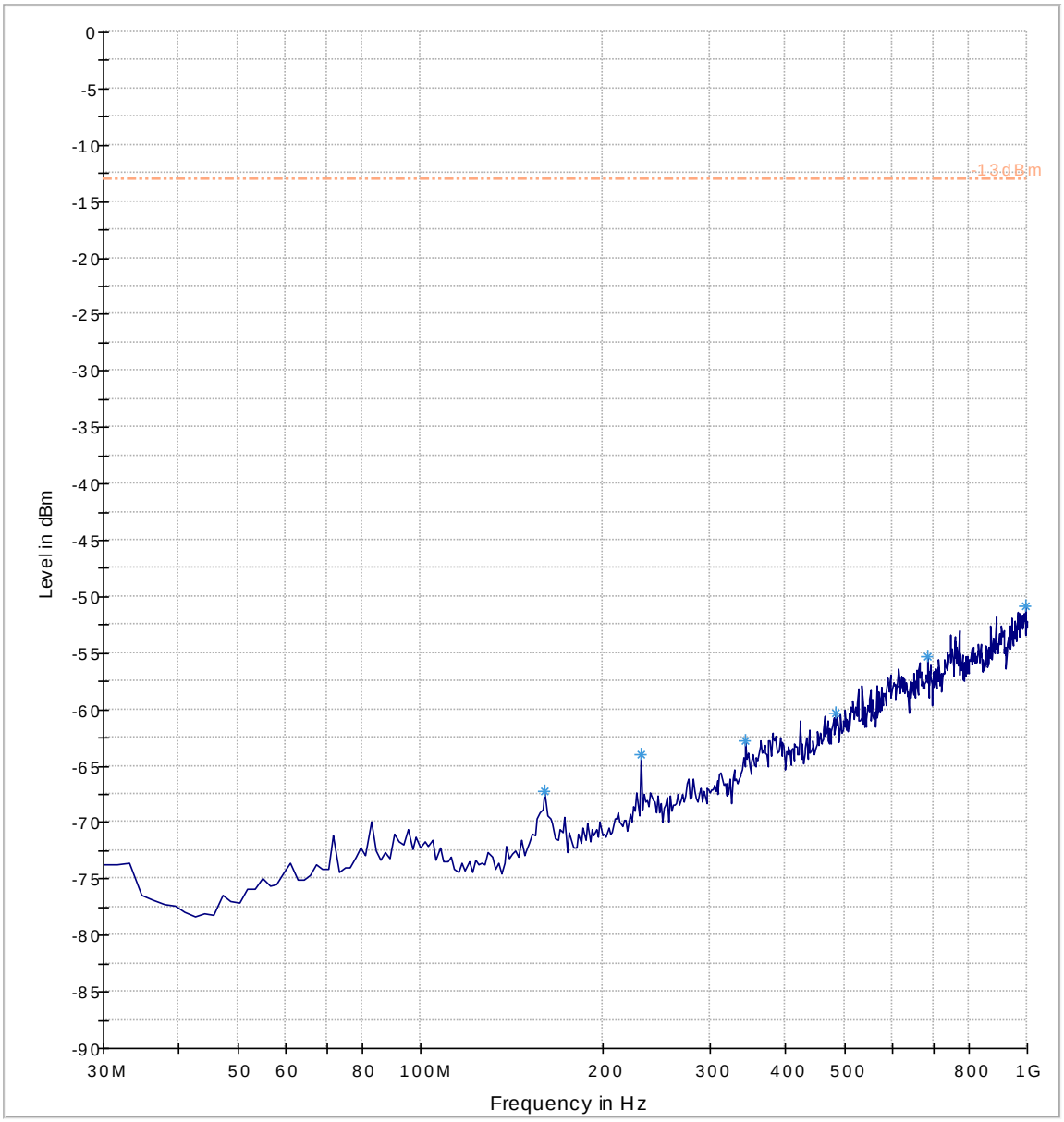
8.9.7 3 GHz – 18 GHz, Ch. Mid



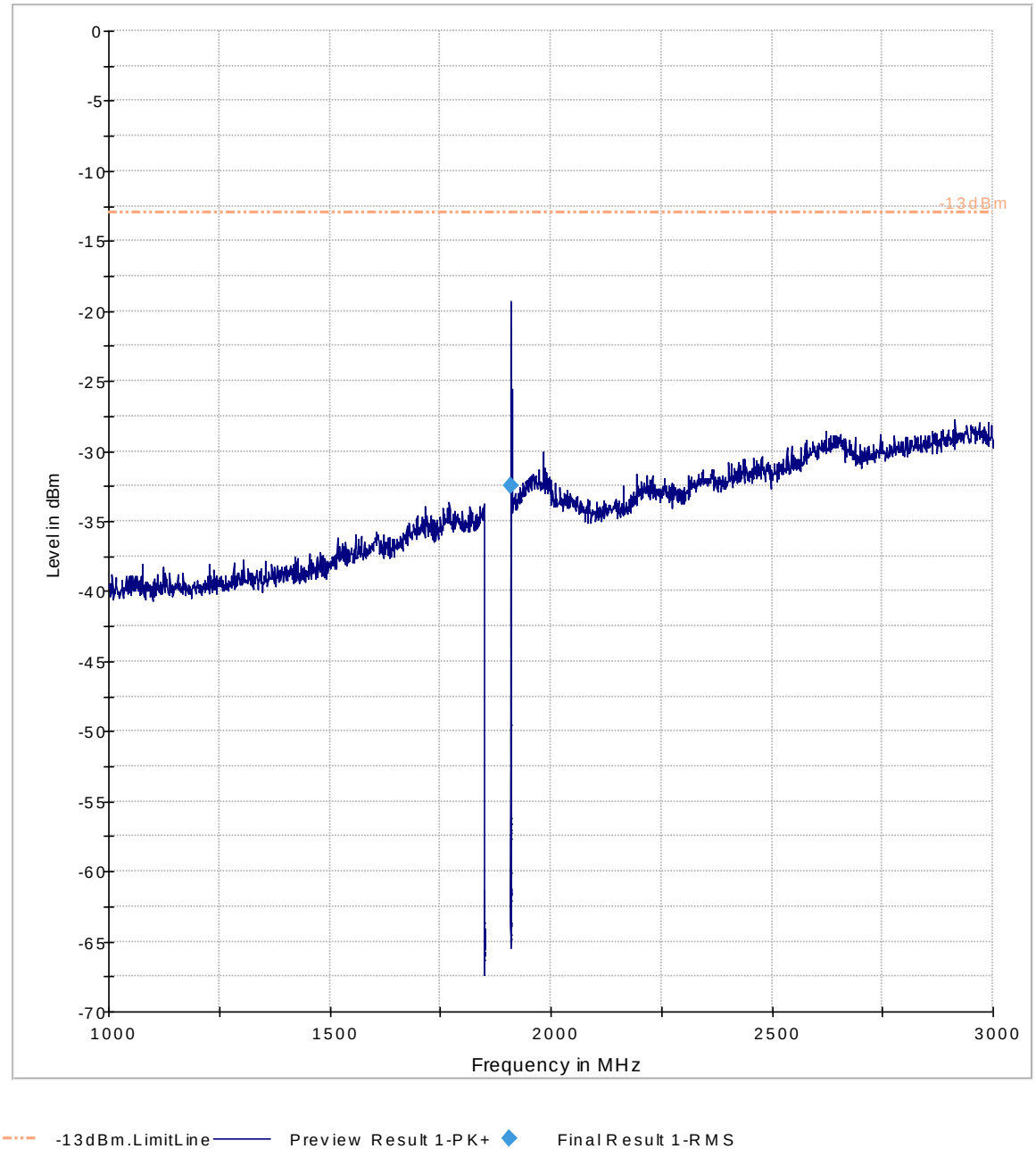
8.9.8 18 GHz – 22 GHz, Ch. Mid



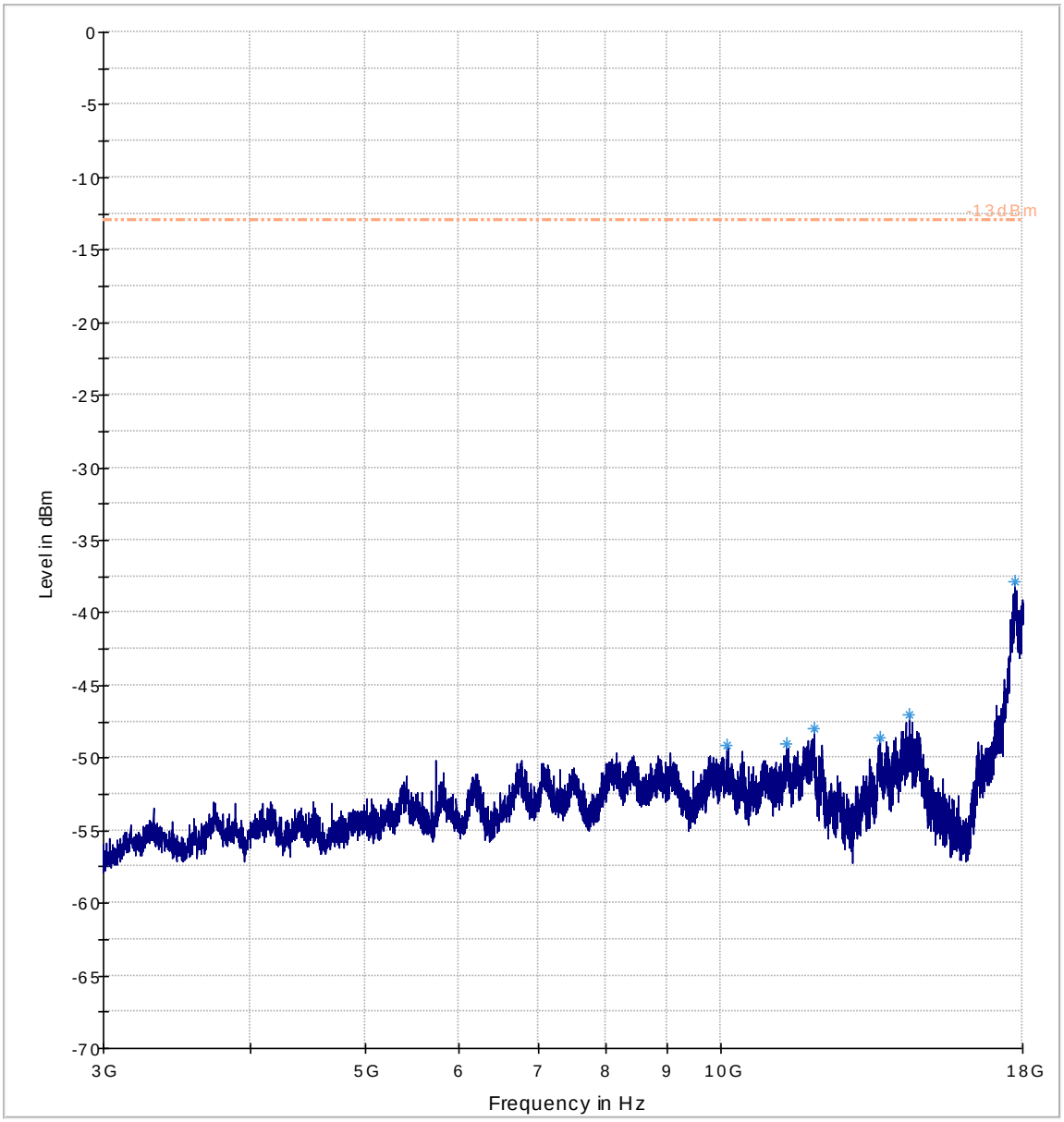
8.9.9 30 MHz – 1 GHz, Ch. High



8.9.10 1 GHz – 3 GHz, Ch. High

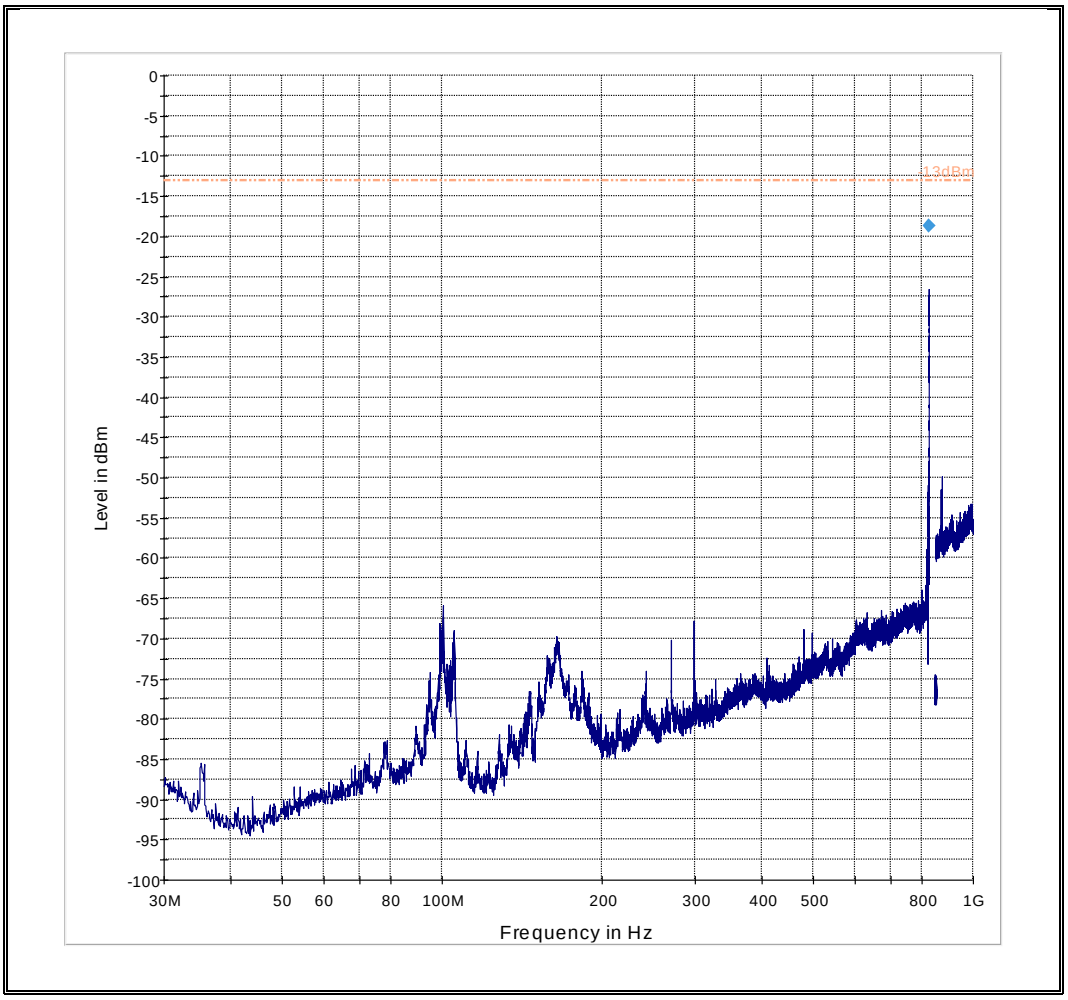


8.9.11 3 GHz – 18 GHz, Ch. High

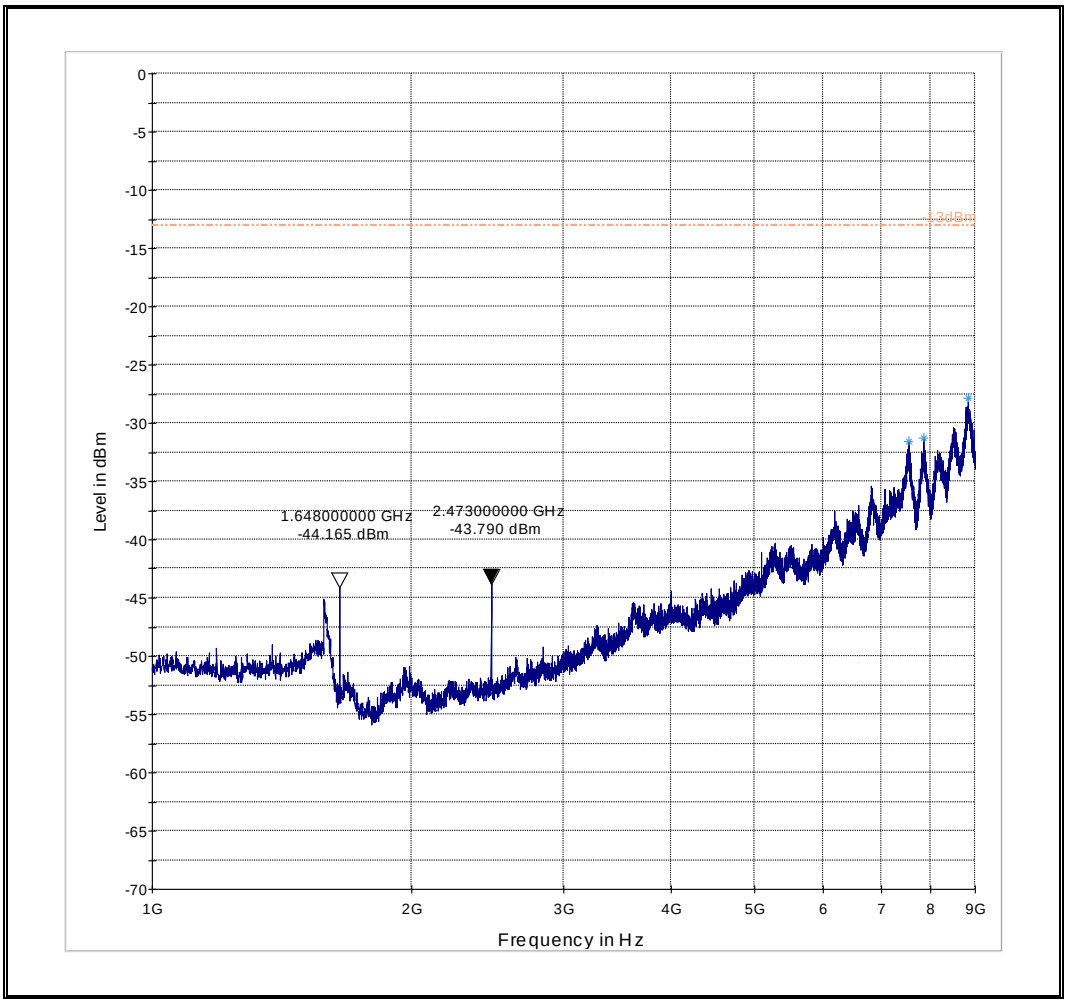


8.10 Measurement Plots WCDMA/UMTS FDD V:

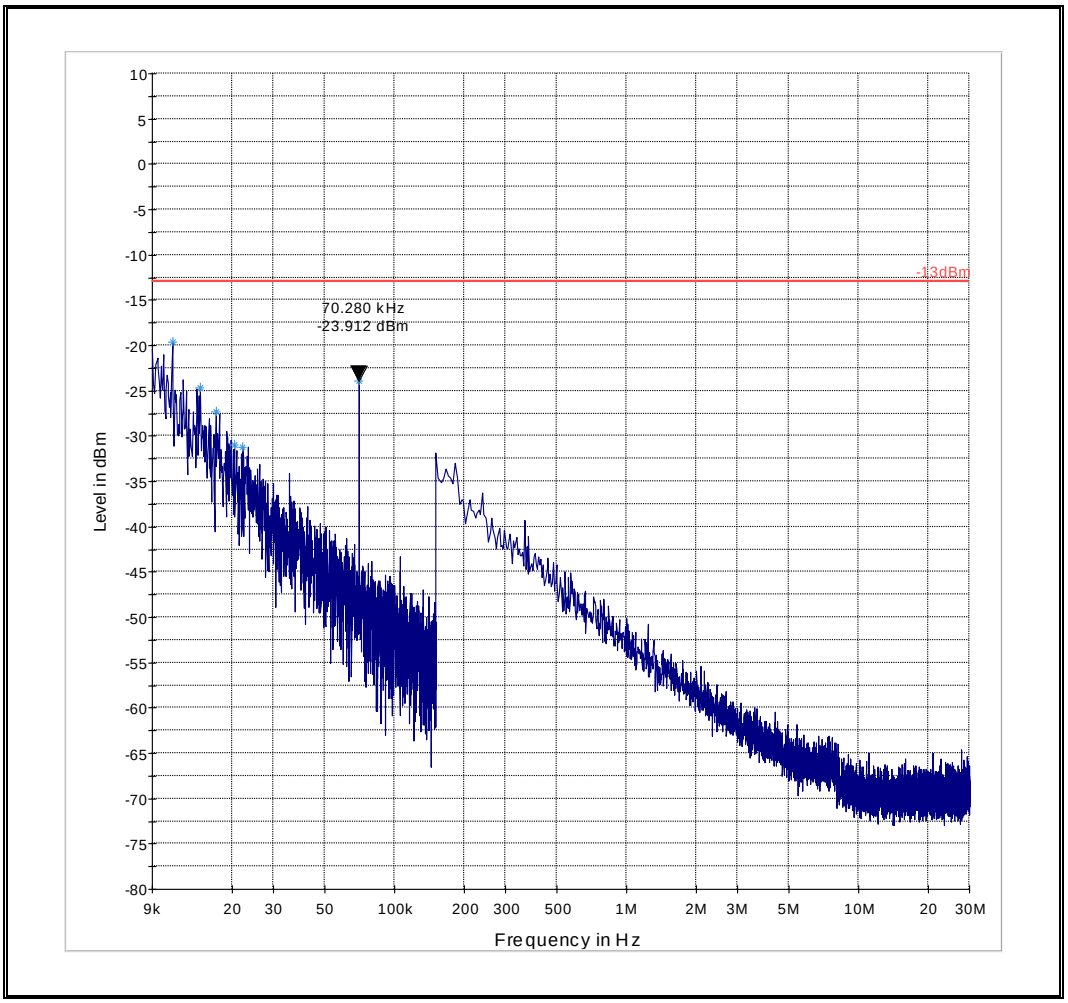
8.10.1 30 MHz – 1 GHz, Ch. Low



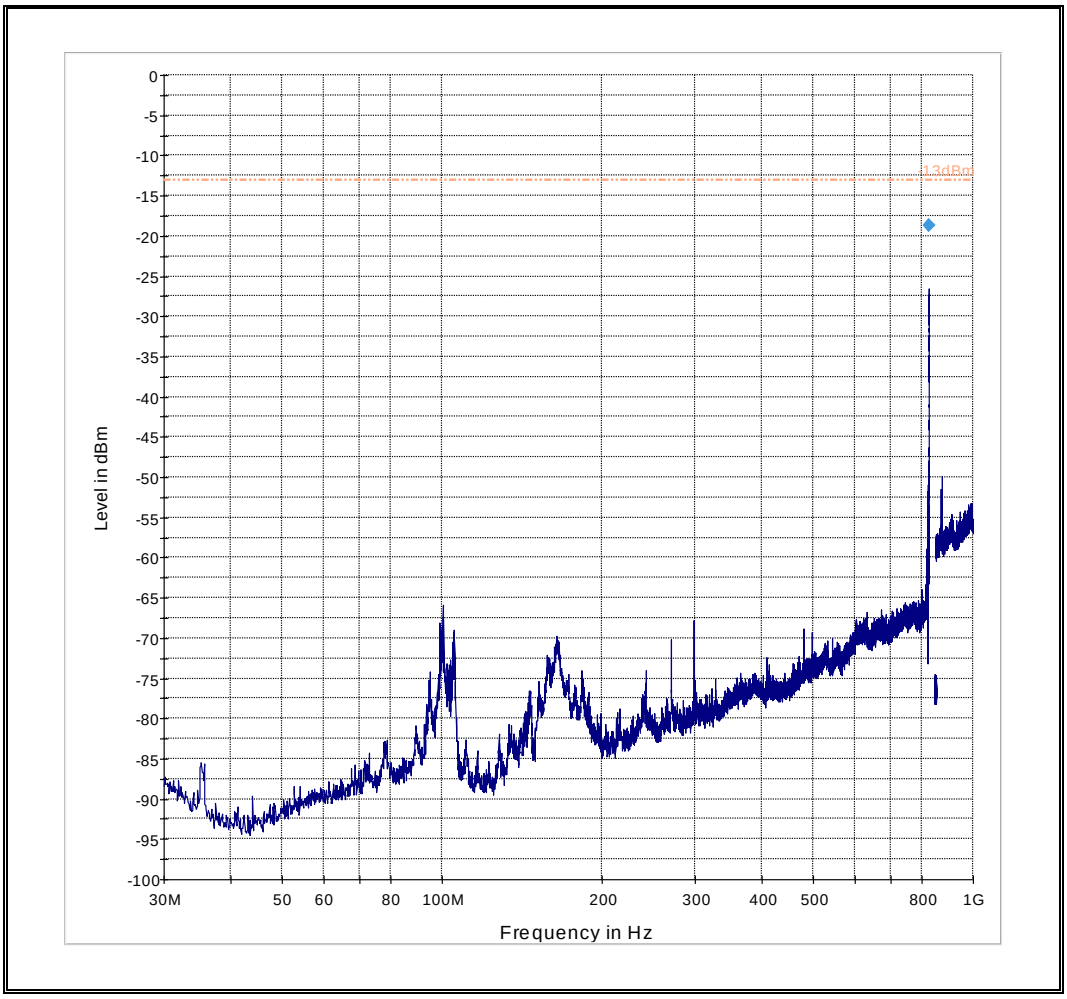
8.10.2 1 – 9 GHz, Ch. Low



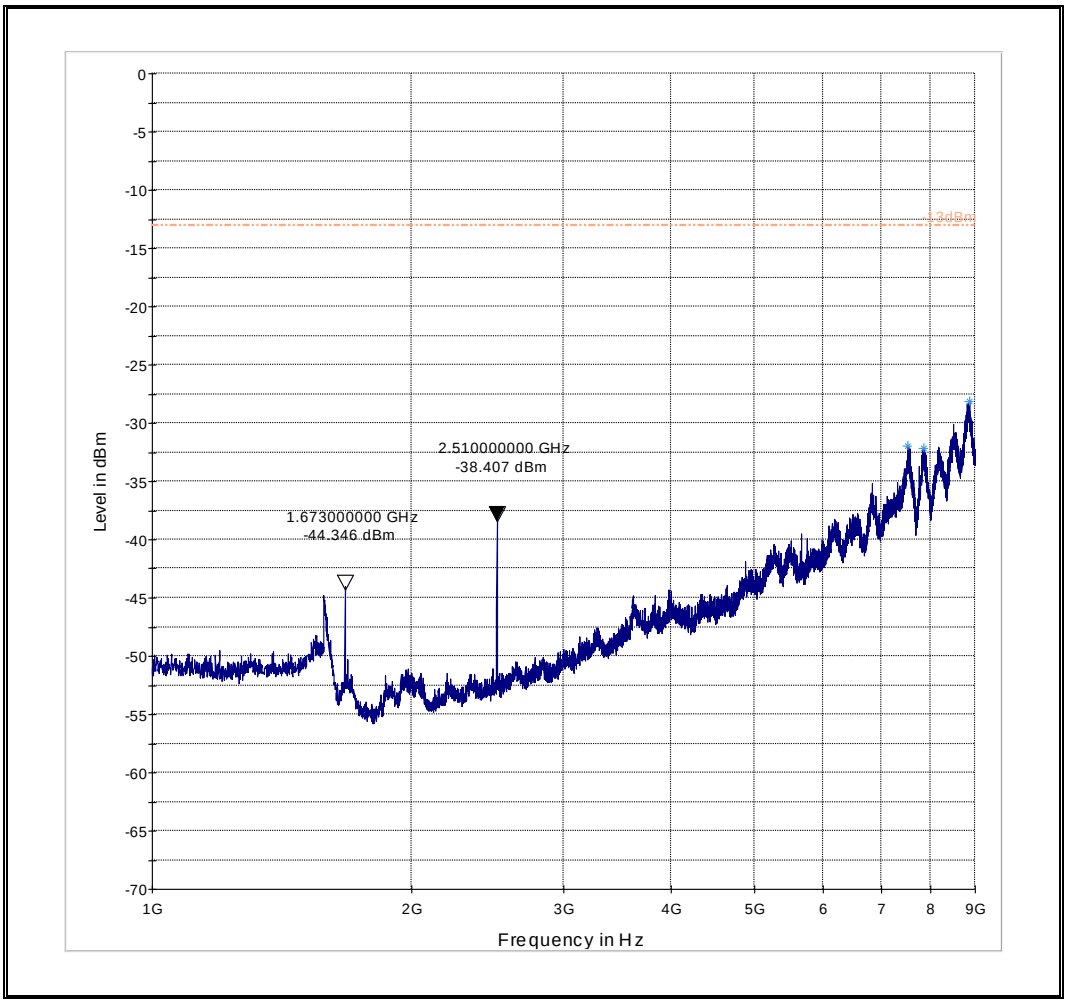
8.10.3 9 KHz – 30 MHz, Ch. Mid



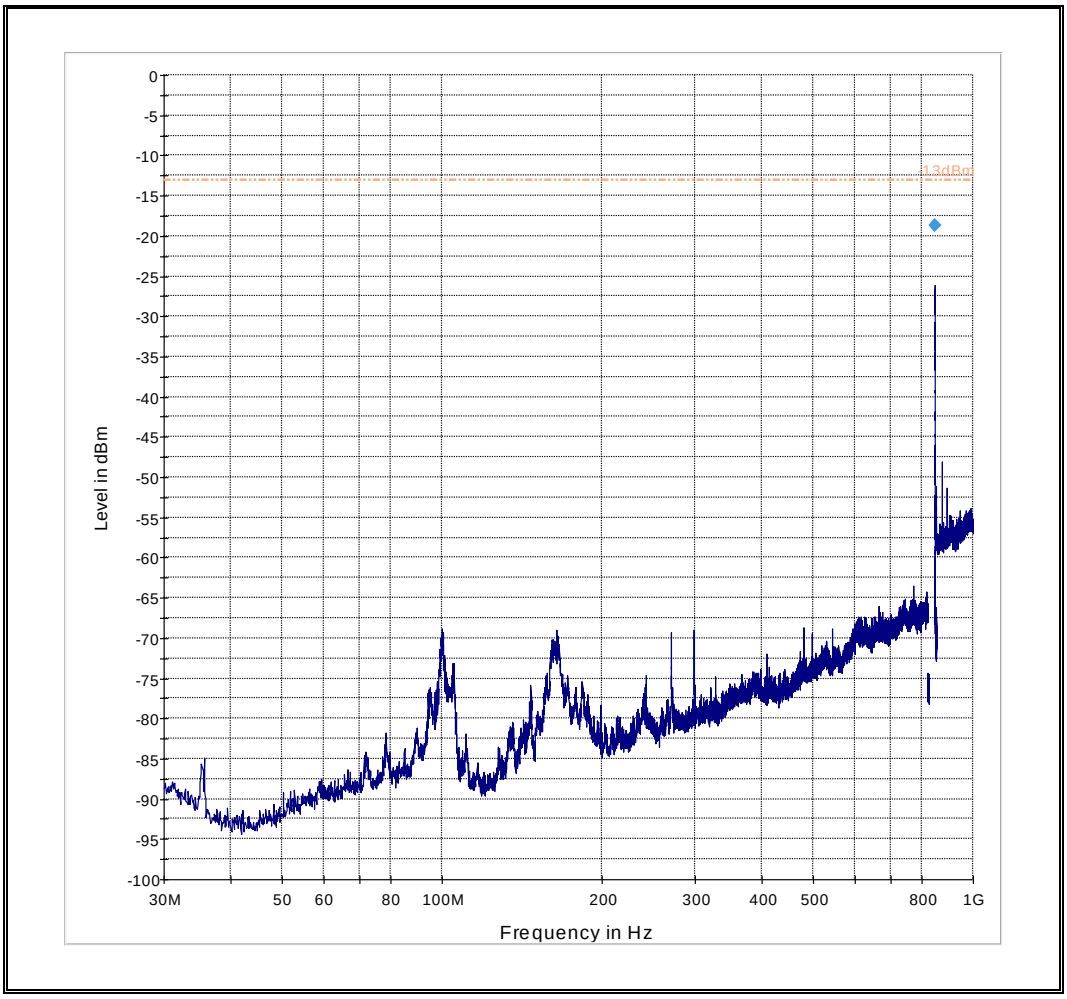
8.10.4 30 MHz – 1 GHz, Ch. Mid



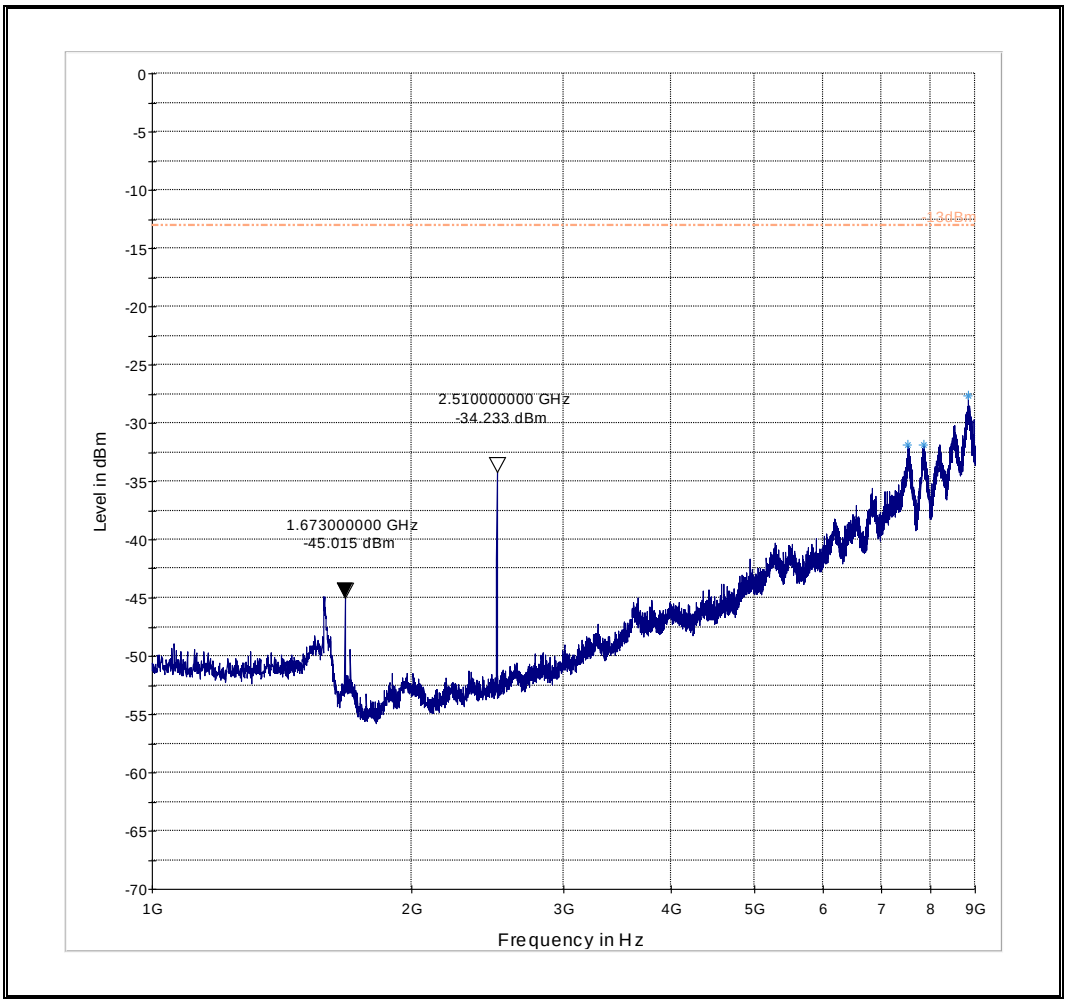
8.10.5 1 GHz – 9 GHz, Ch. Mid



8.10.6 30 MHz – 1 GHz, Ch. High

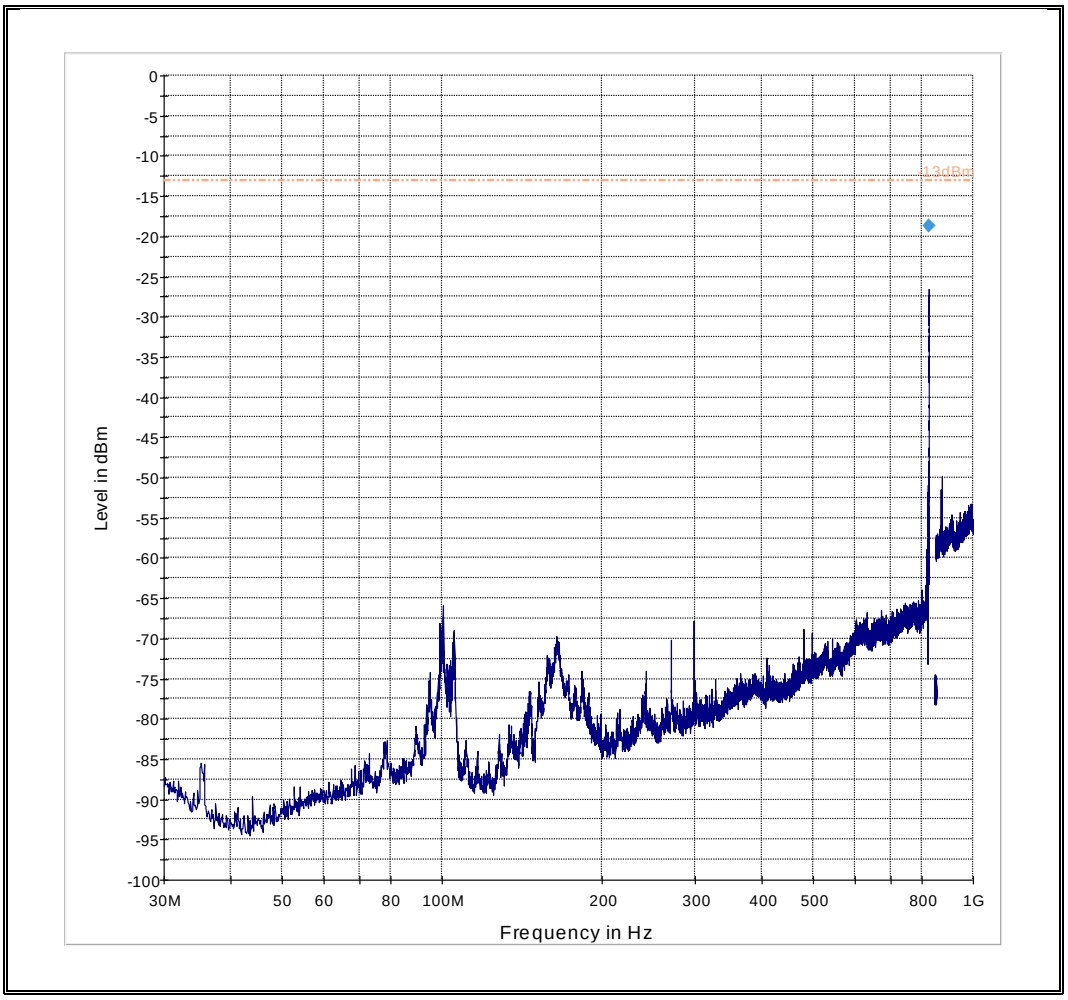


8.10.7 1 - 9 GHz, Ch. High

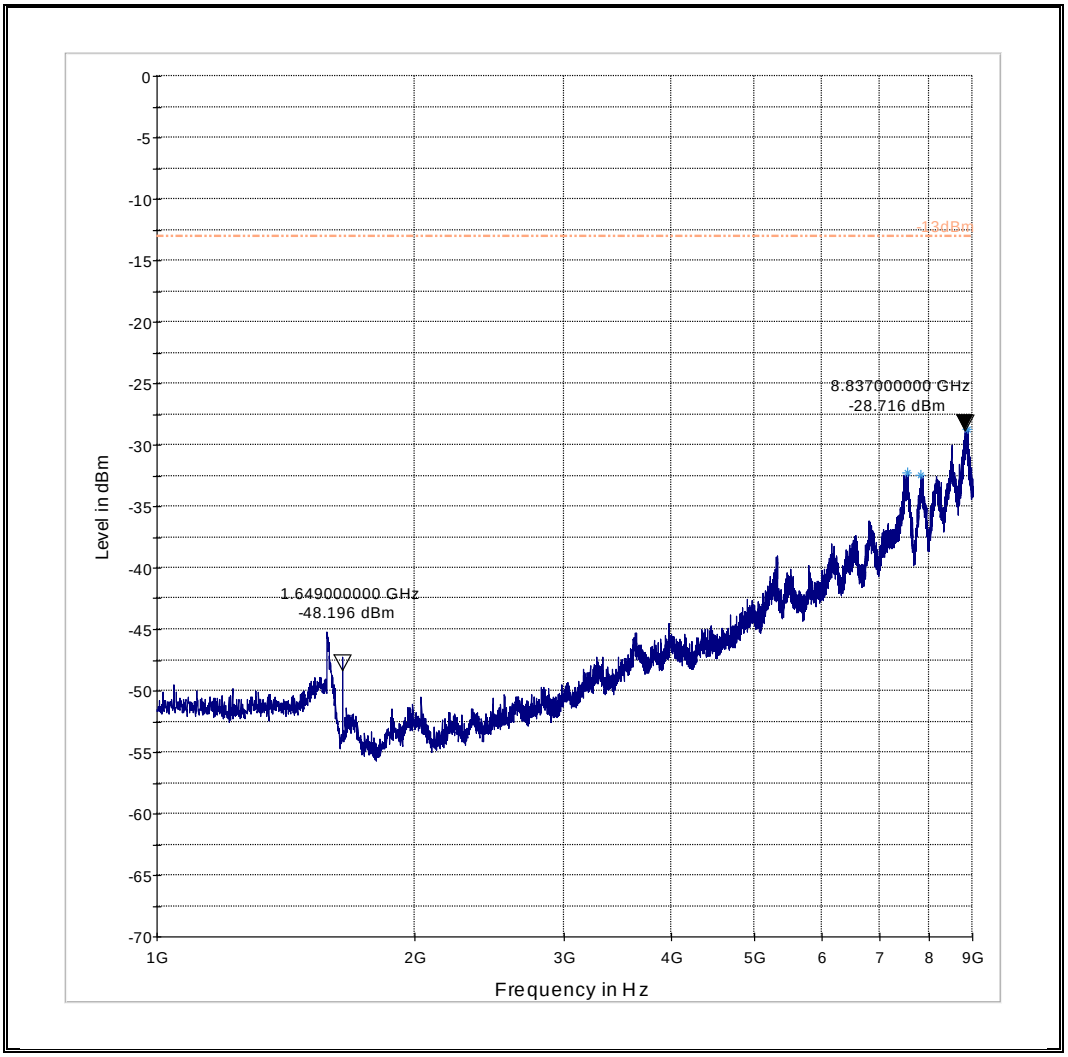


8.11 Measurement Plots CDMA BC0 850

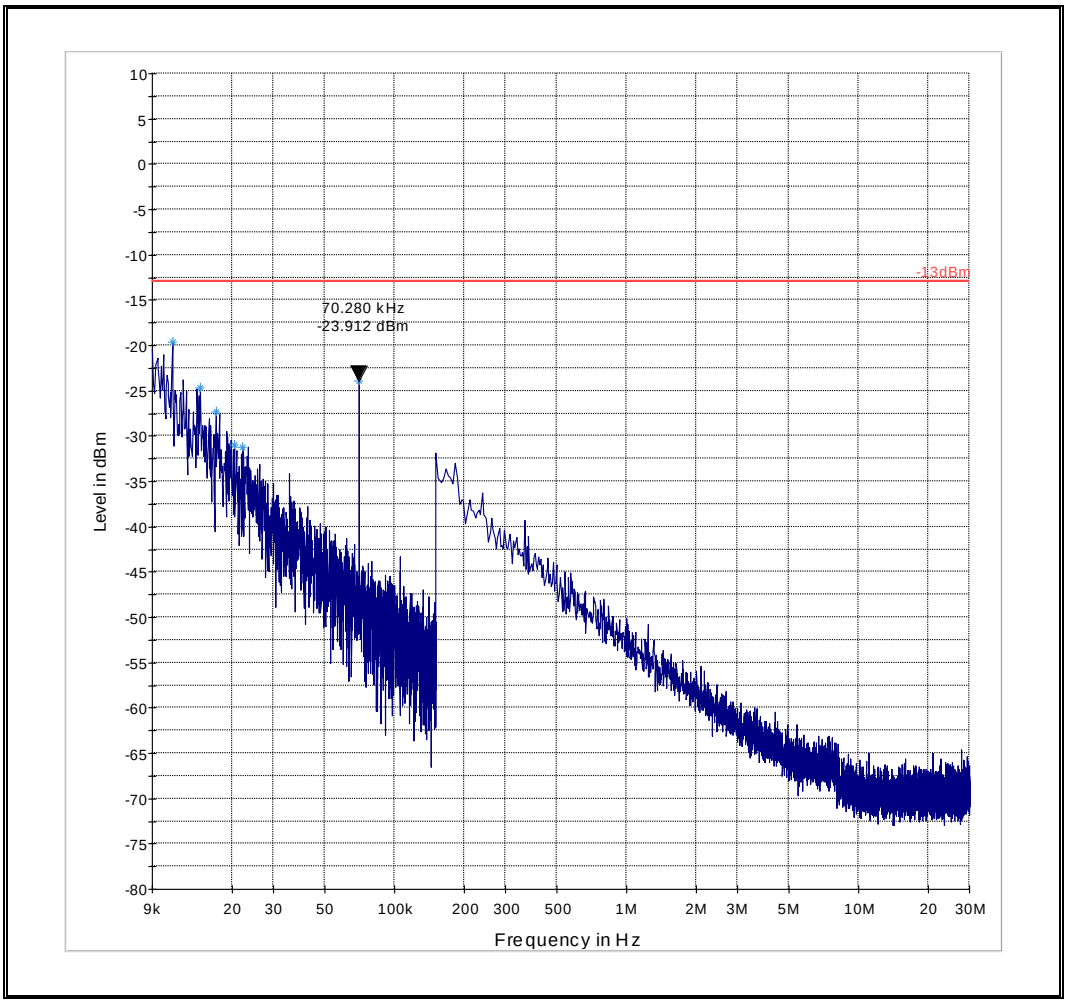
8.11.1 30 MHz - 1 GHz, Ch. Low



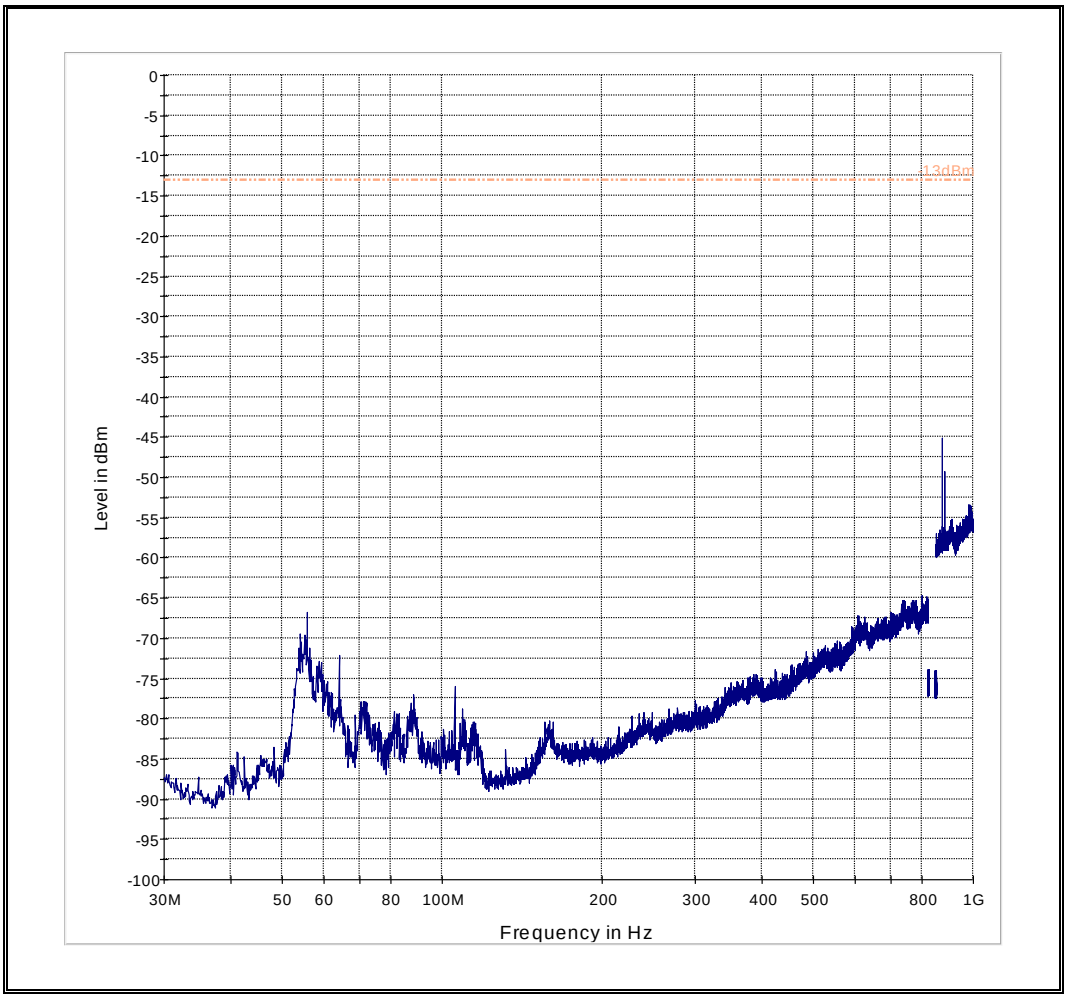
8.11.2 1 - 9 GHz, Ch. Low



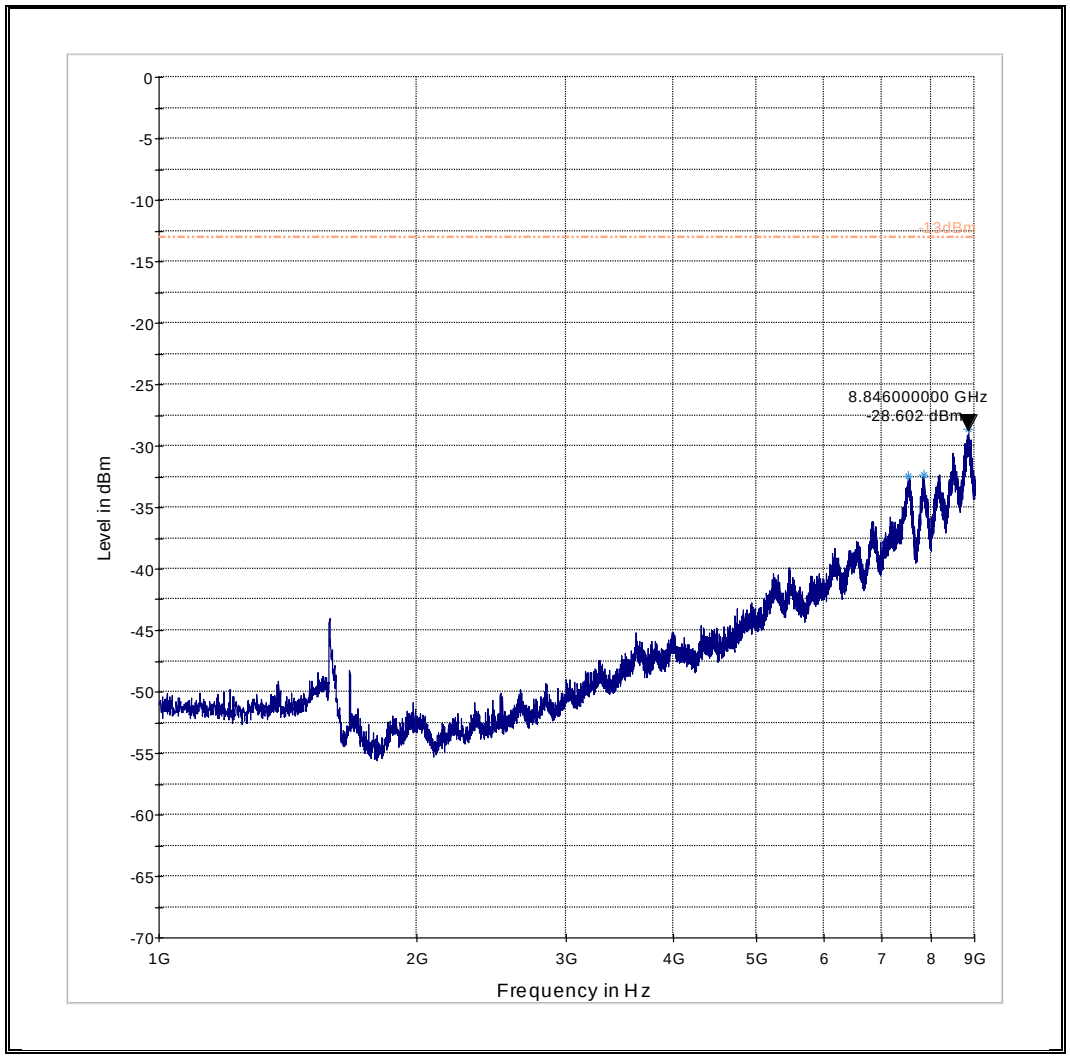
8.11.3 9 KHz - 30 MHz, Ch. Mid



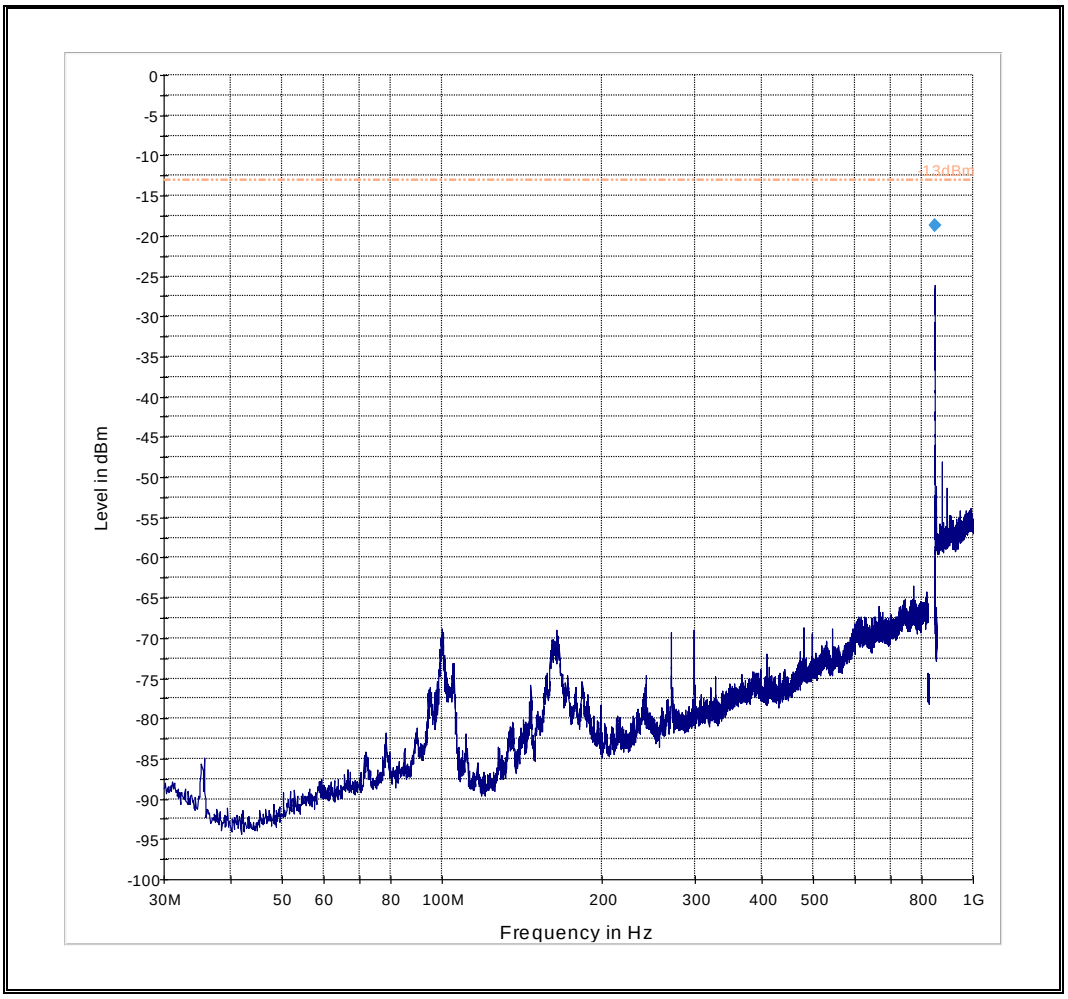
8.11.4 30 MHz – 1 GHz, Ch. Mid



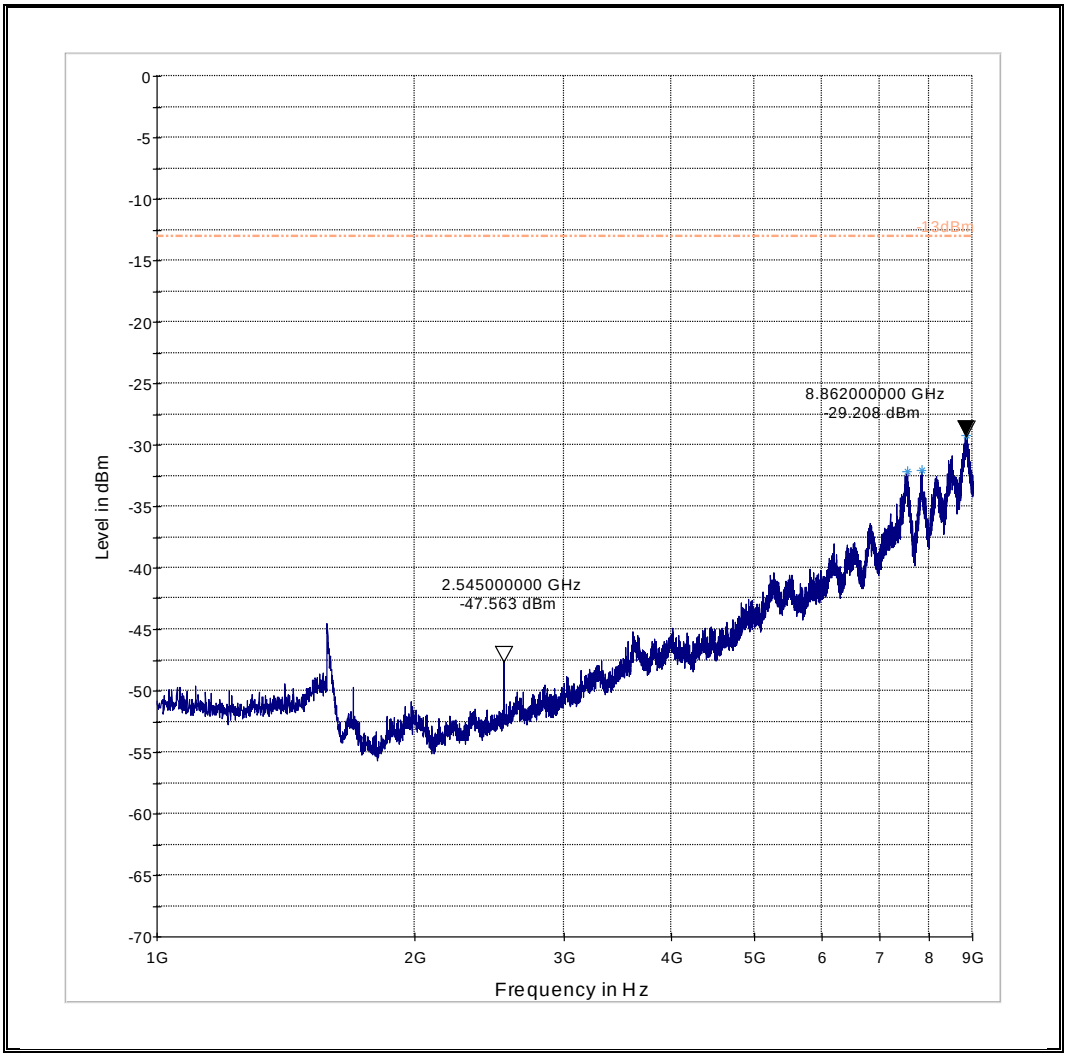
8.11.5 1 - 9 GHz, Ch. Mid



8.11.6 30 MHz - 1 GHz, Ch. High

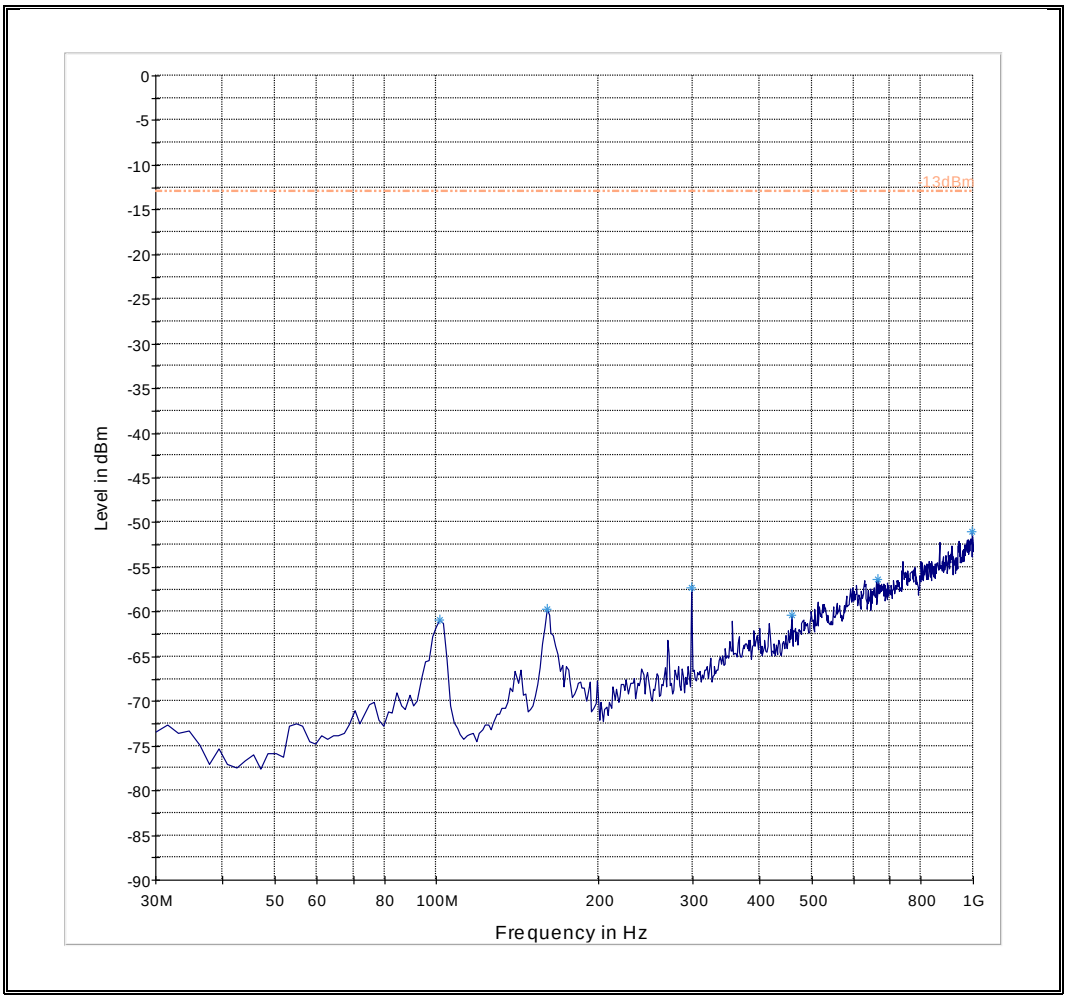


8.11.7 1 - 9 GHz, Ch. High

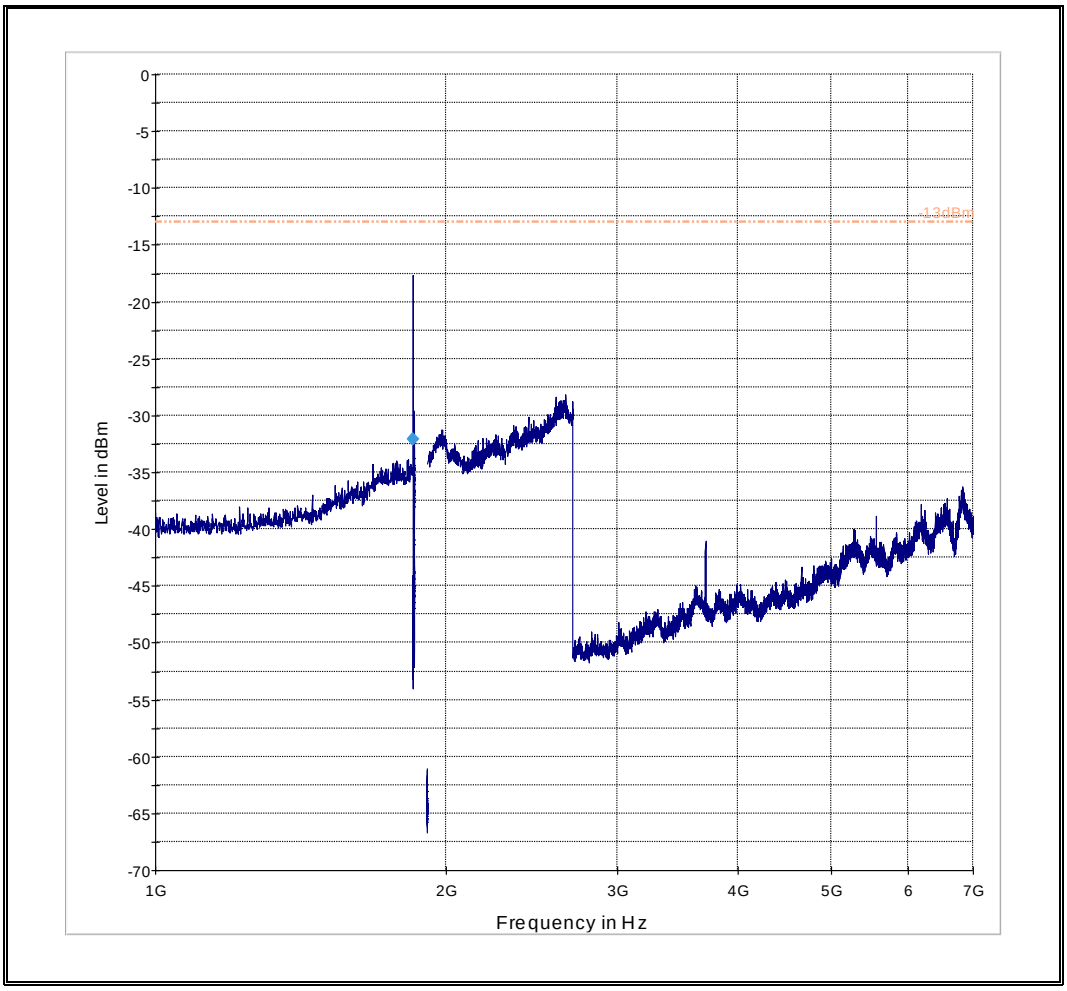


8.12 Measurement Plots CDMA BC1 1900

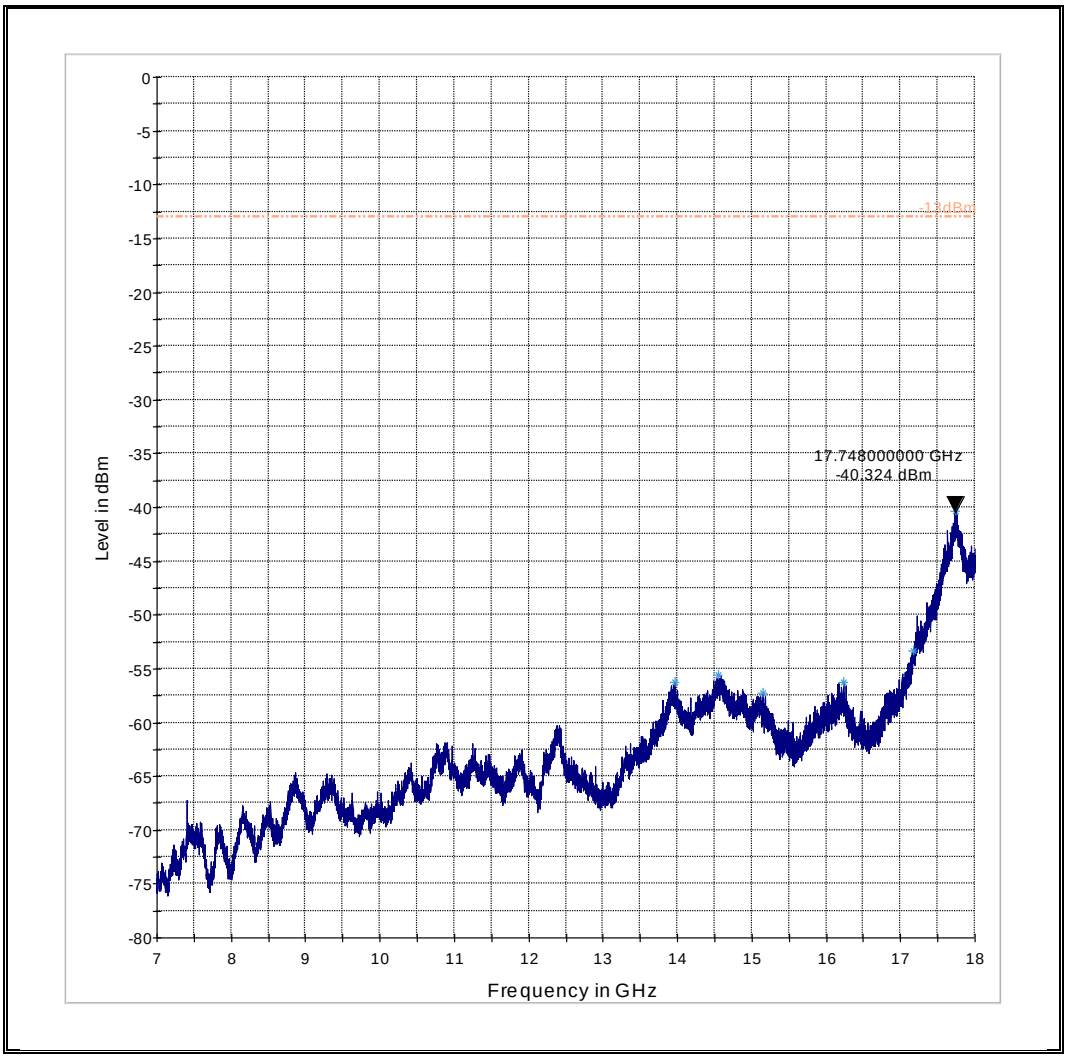
8.12.1 30 MHz - 1 GHz, Ch. Low



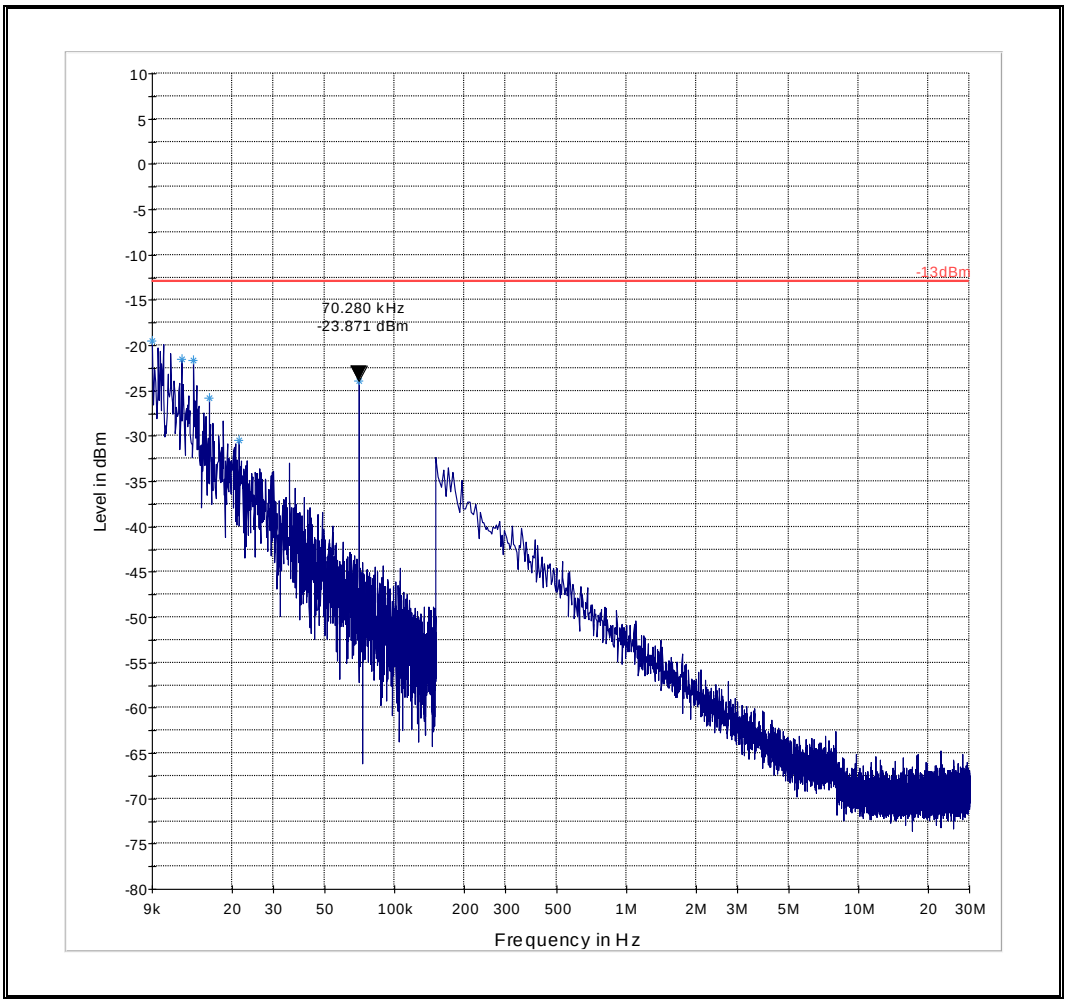
8.12.2 1 - 7 GHz, Ch. Low



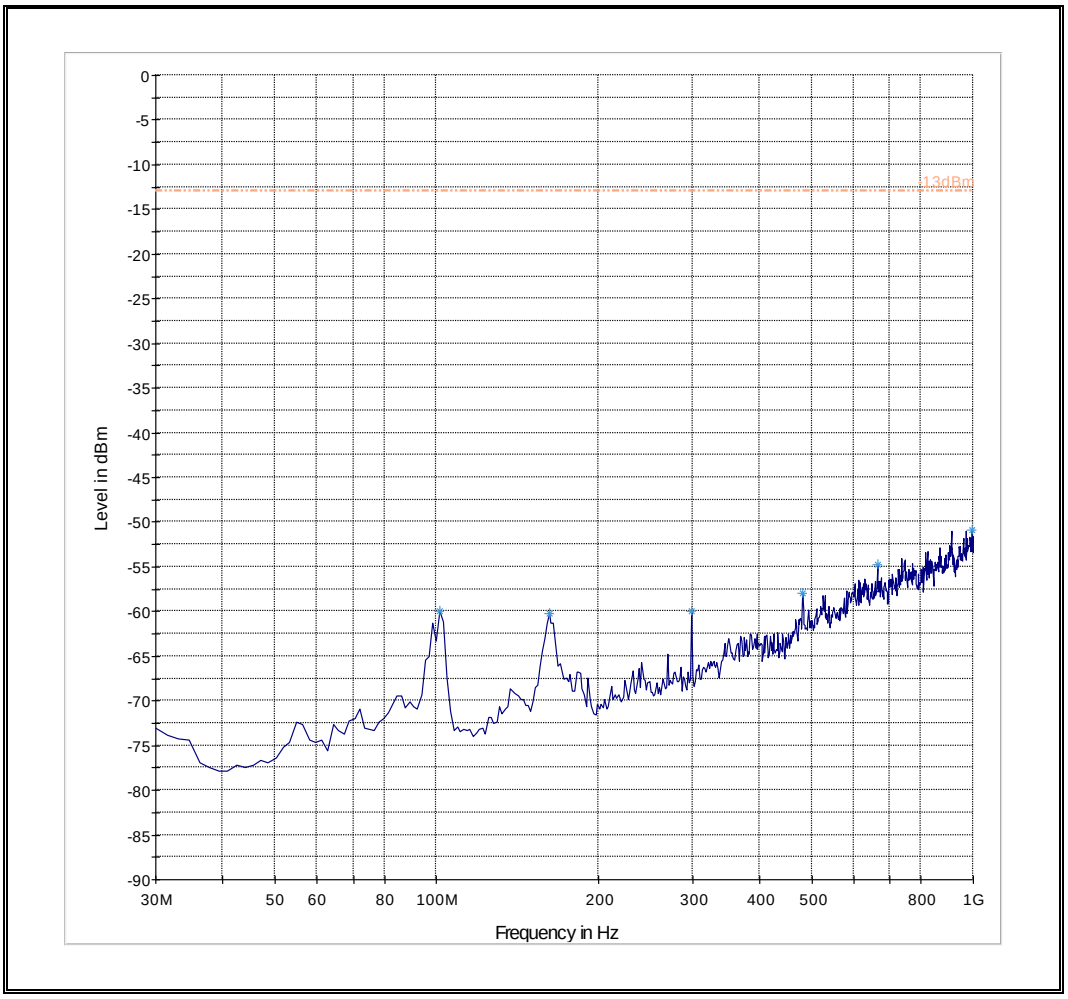
8.12.3 7 GHz - 18 GHz, Ch. Low



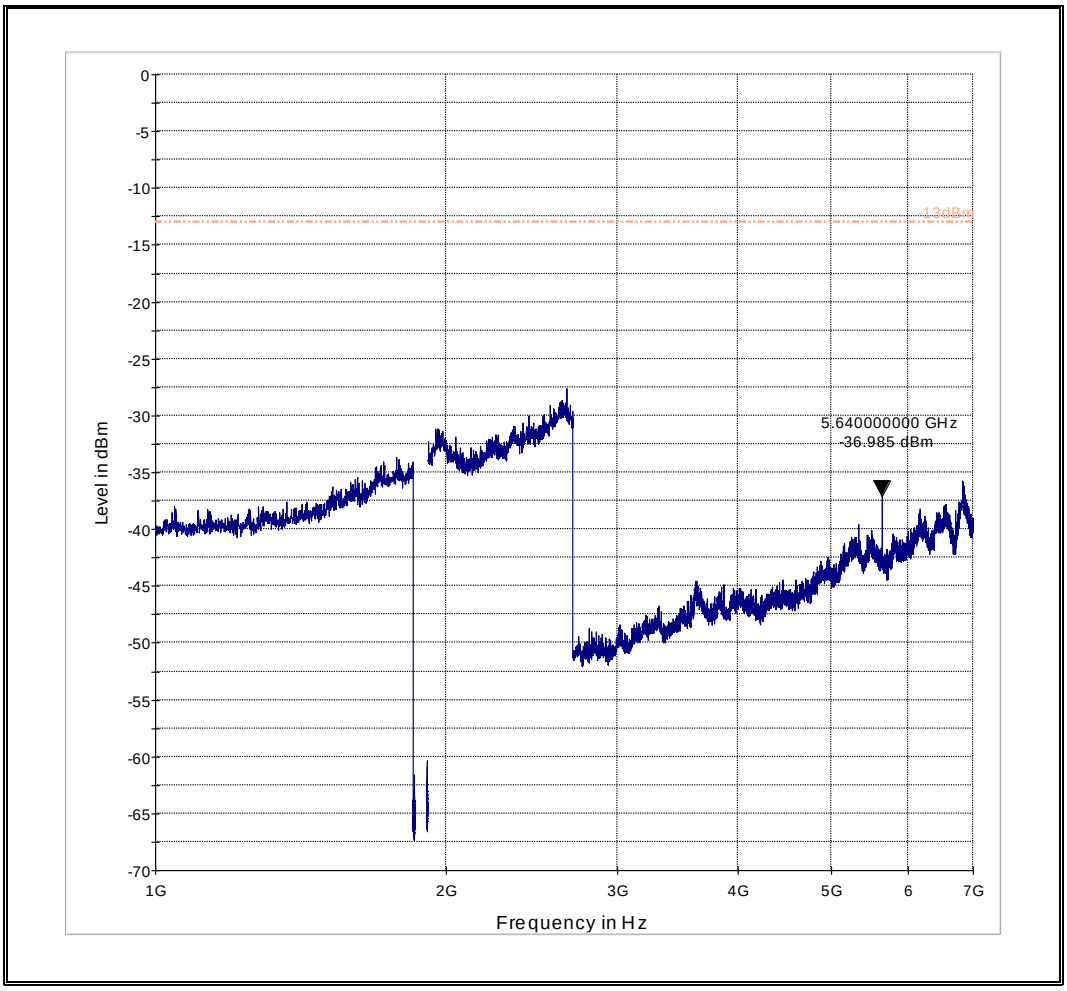
8.12.4 RE, 9 KHz - 30 MHz, Ch. Mid



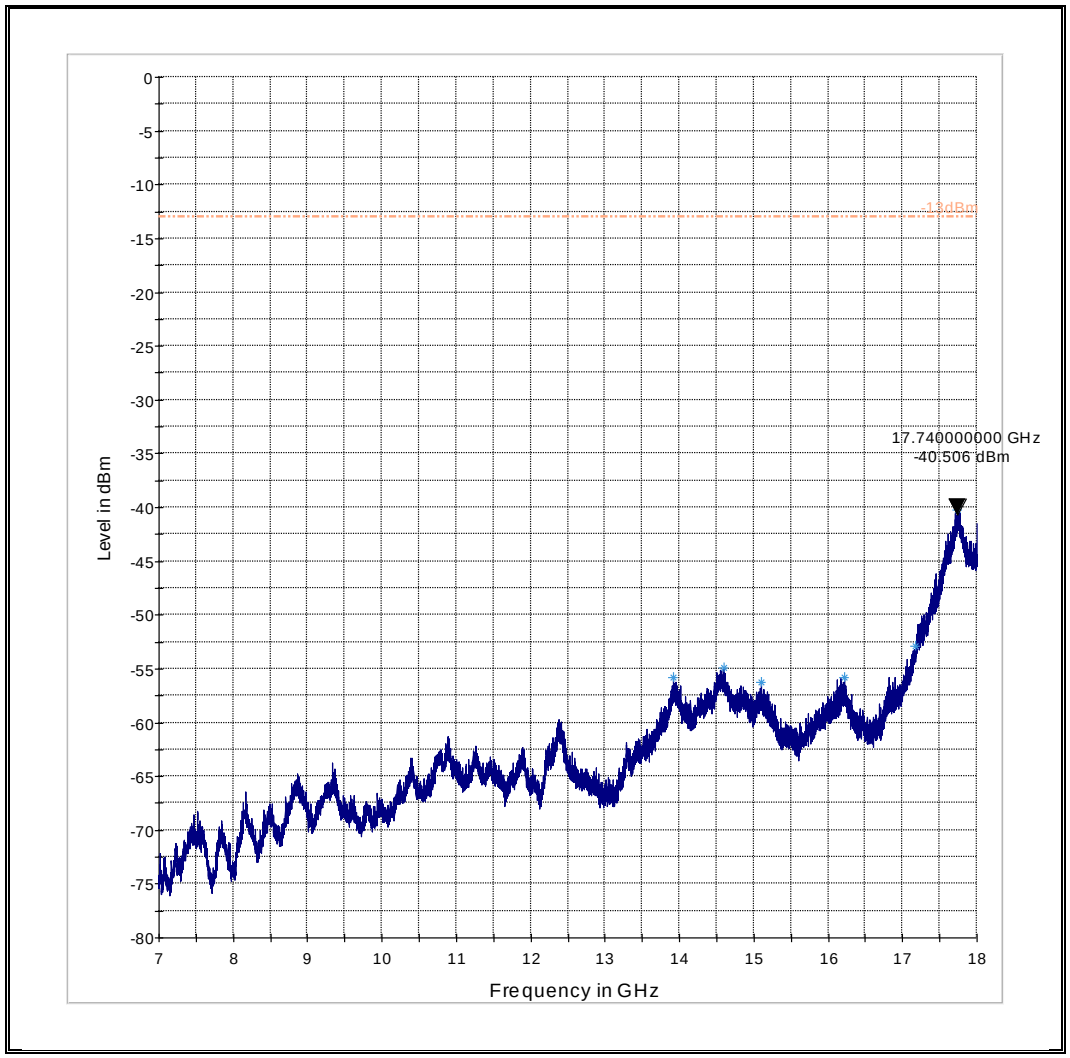
8.12.5 30 MHz - 1 GHz, Ch. Mid



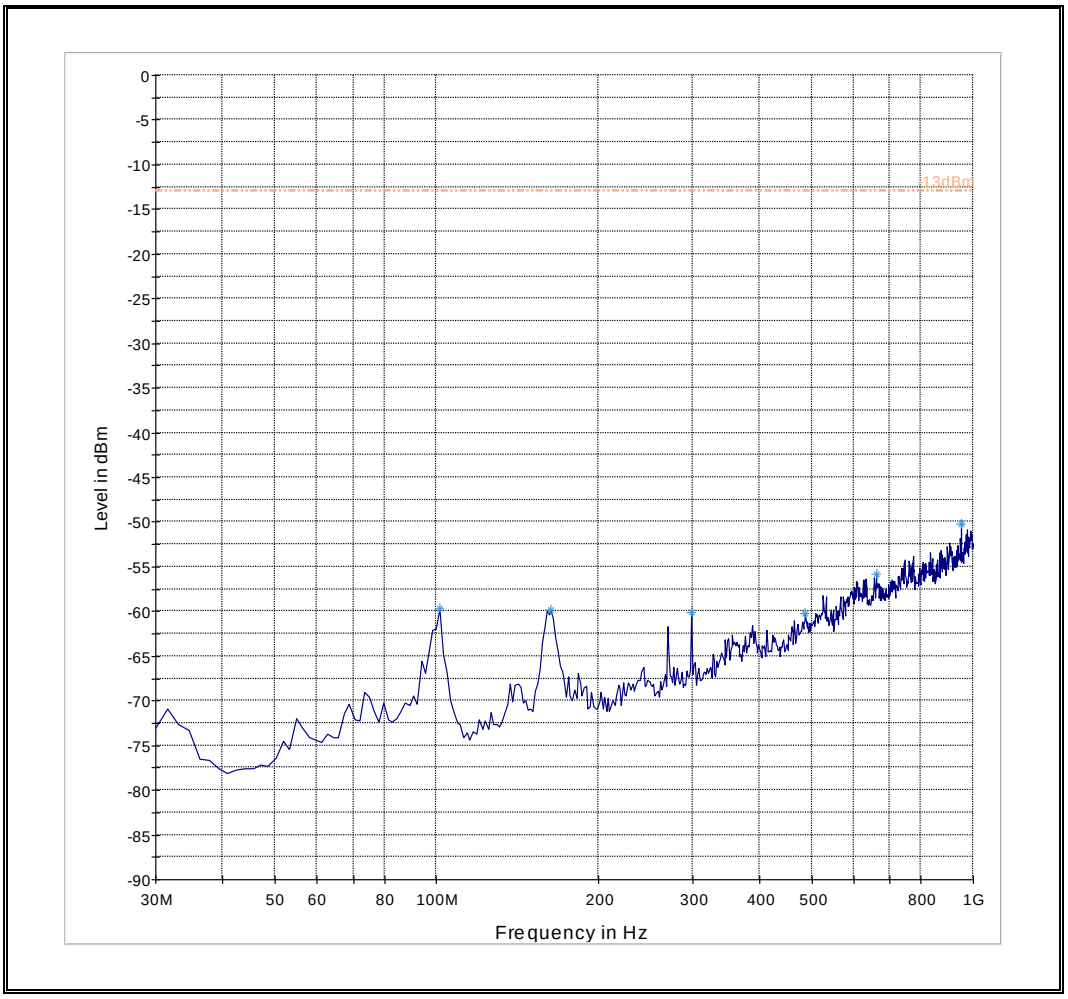
8.12.6 1 GHz - 7 GHz, Ch. Mid



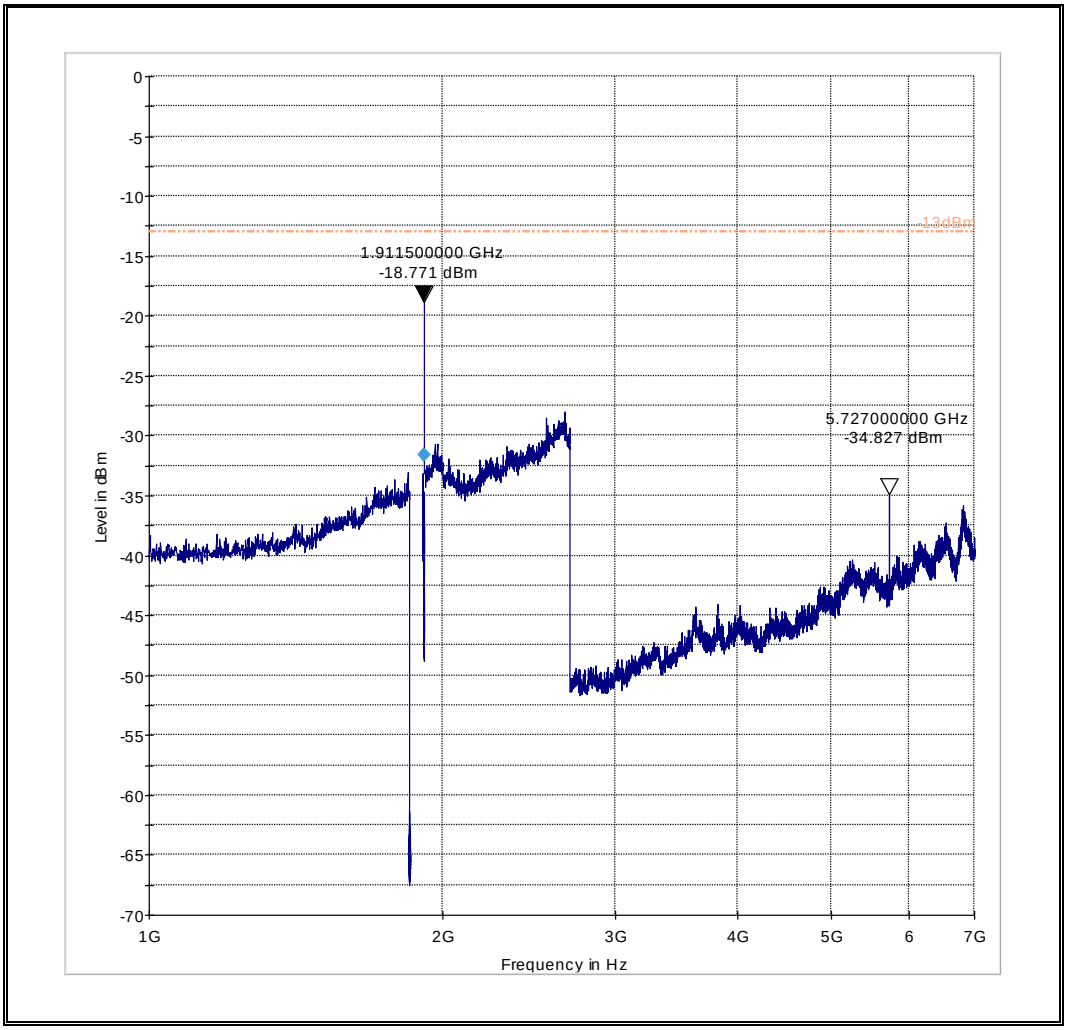
8.12.7 7 GHz - 18 GHz, Ch. Mid



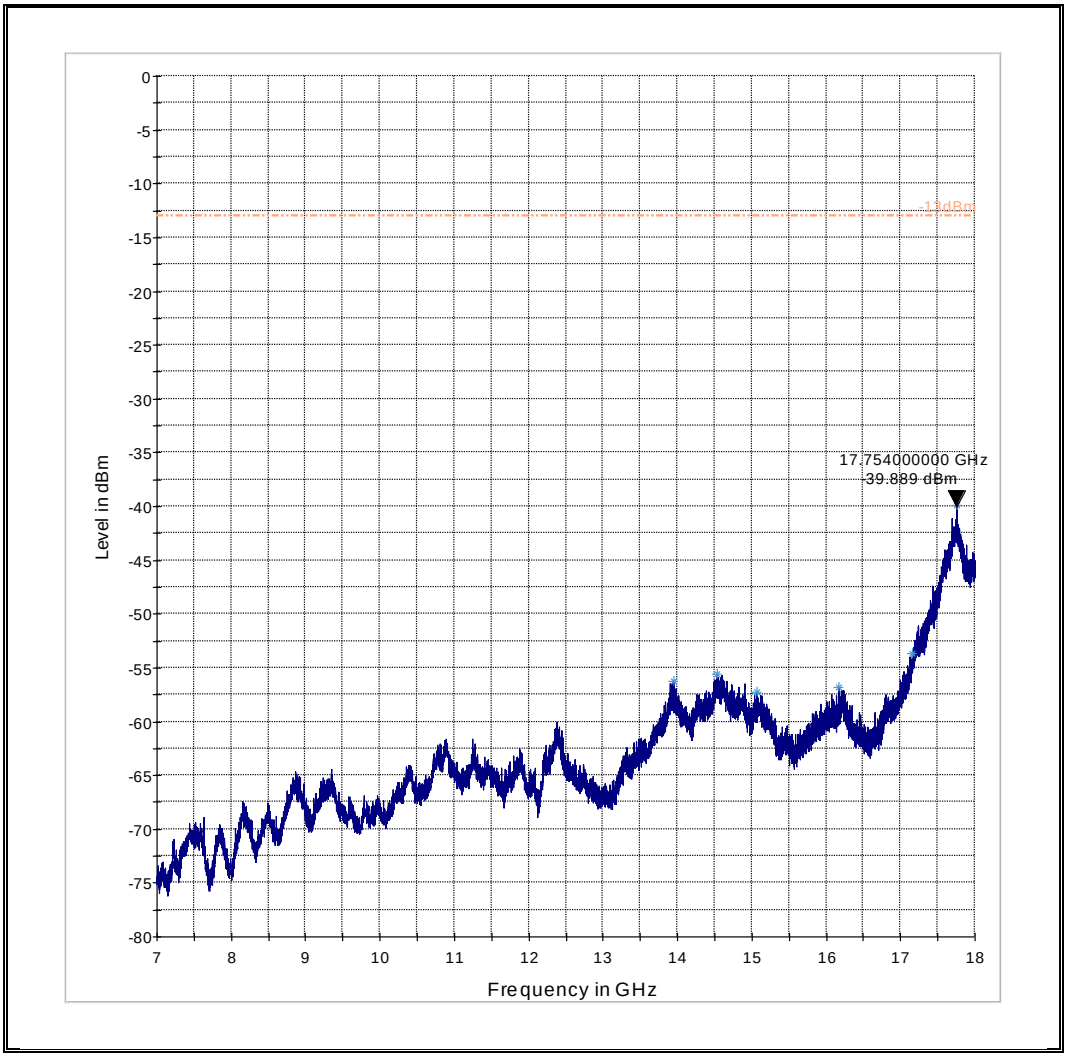
8.12.8 30 MHz - 1 GHz, Ch. High



8.12.9 1 GHz - 9 GHz, Ch. High

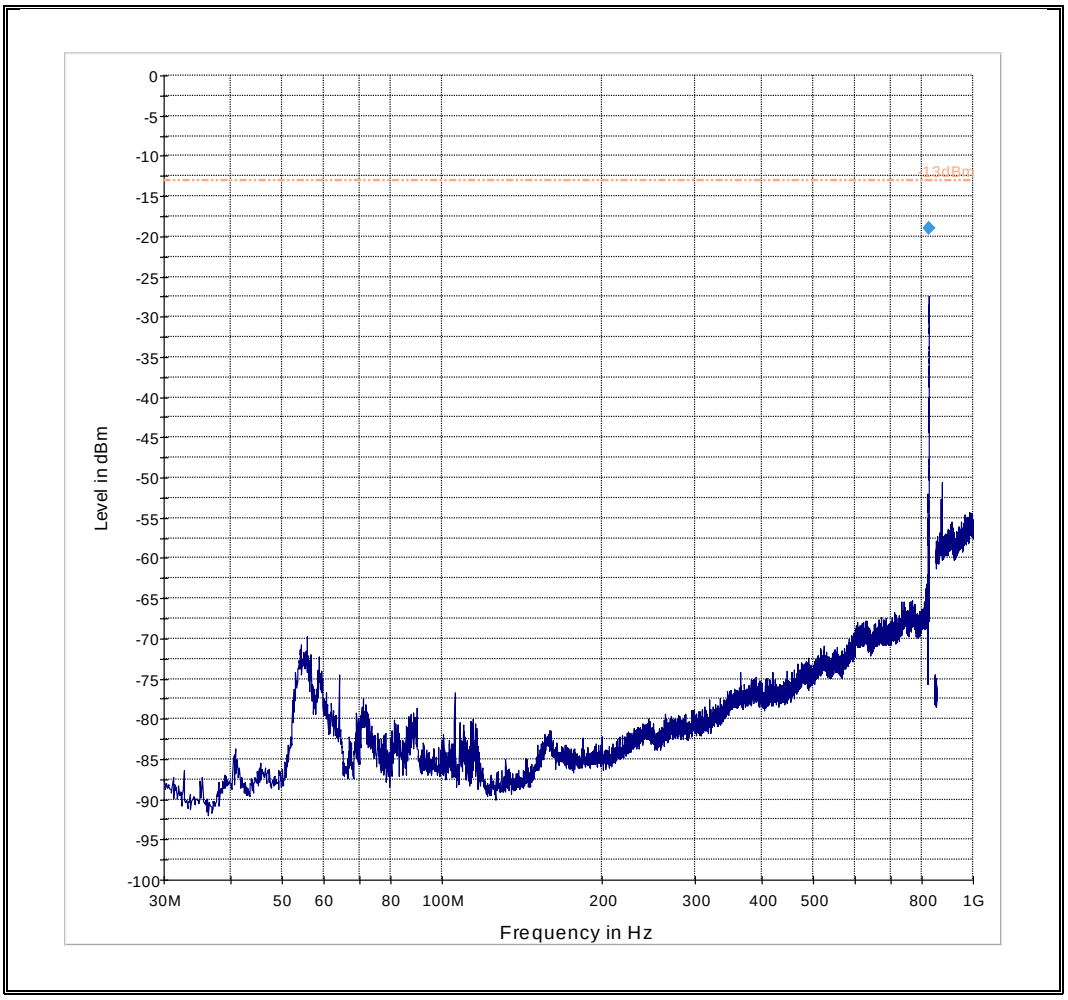


8.12.10 7 - 18 GHz, Ch. High

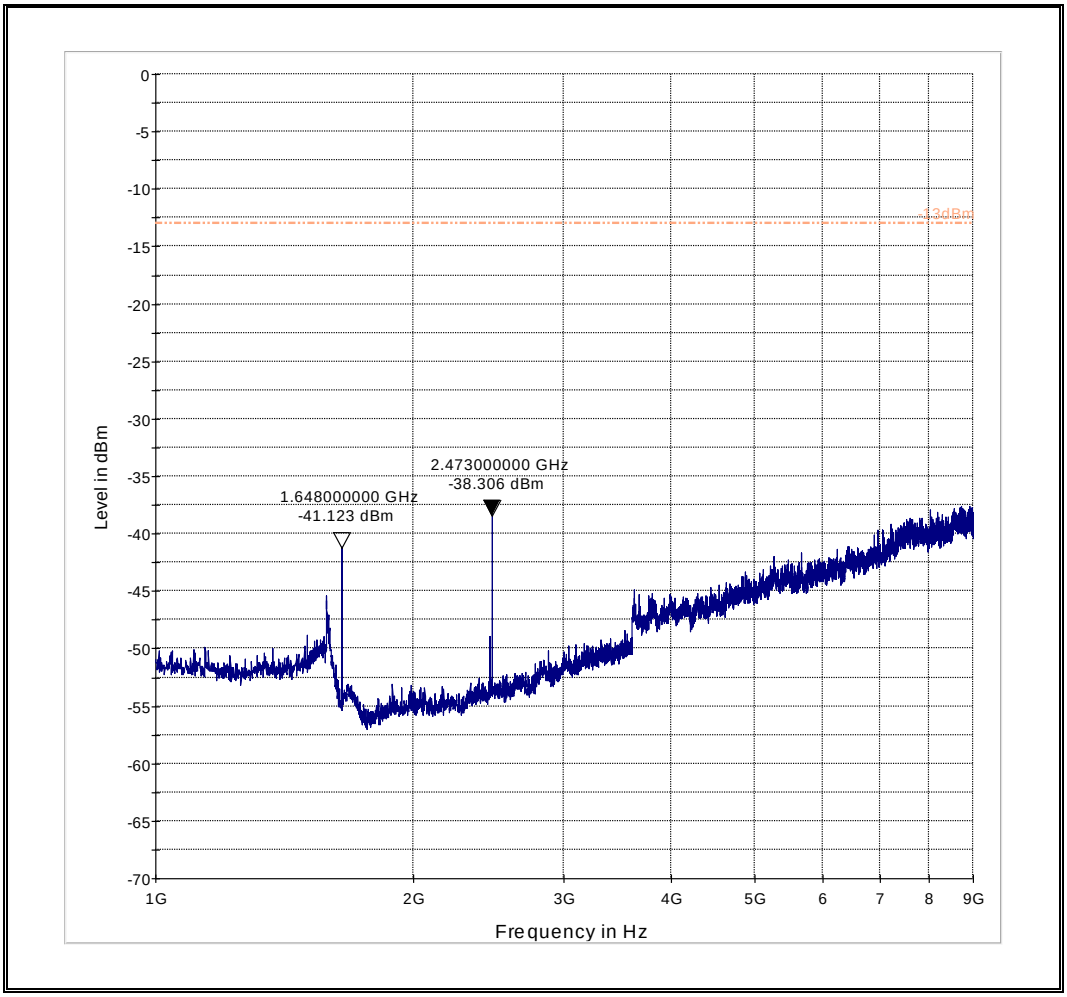


8.13 Measurement Plots CDMA BC10

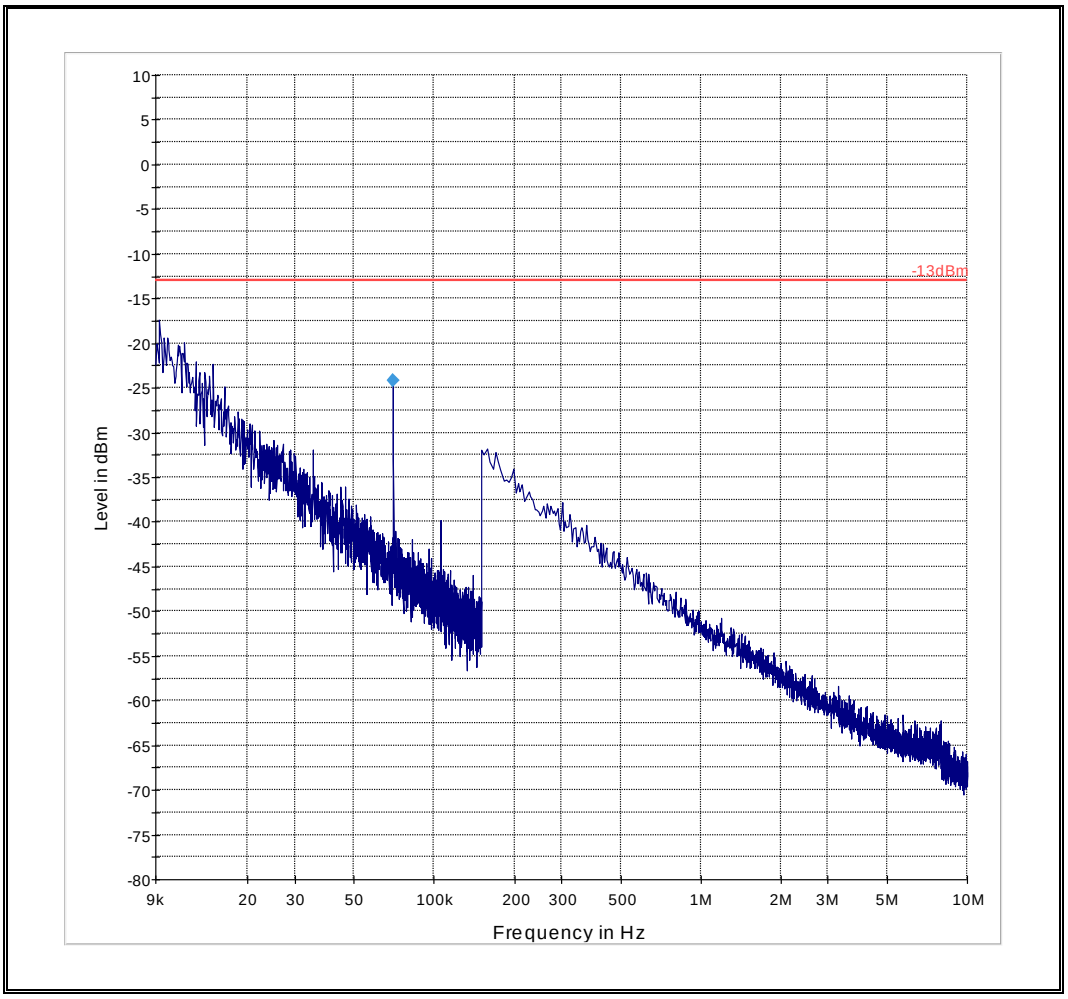
8.13.1 30 MHz - 1 GHz, Ch. Low



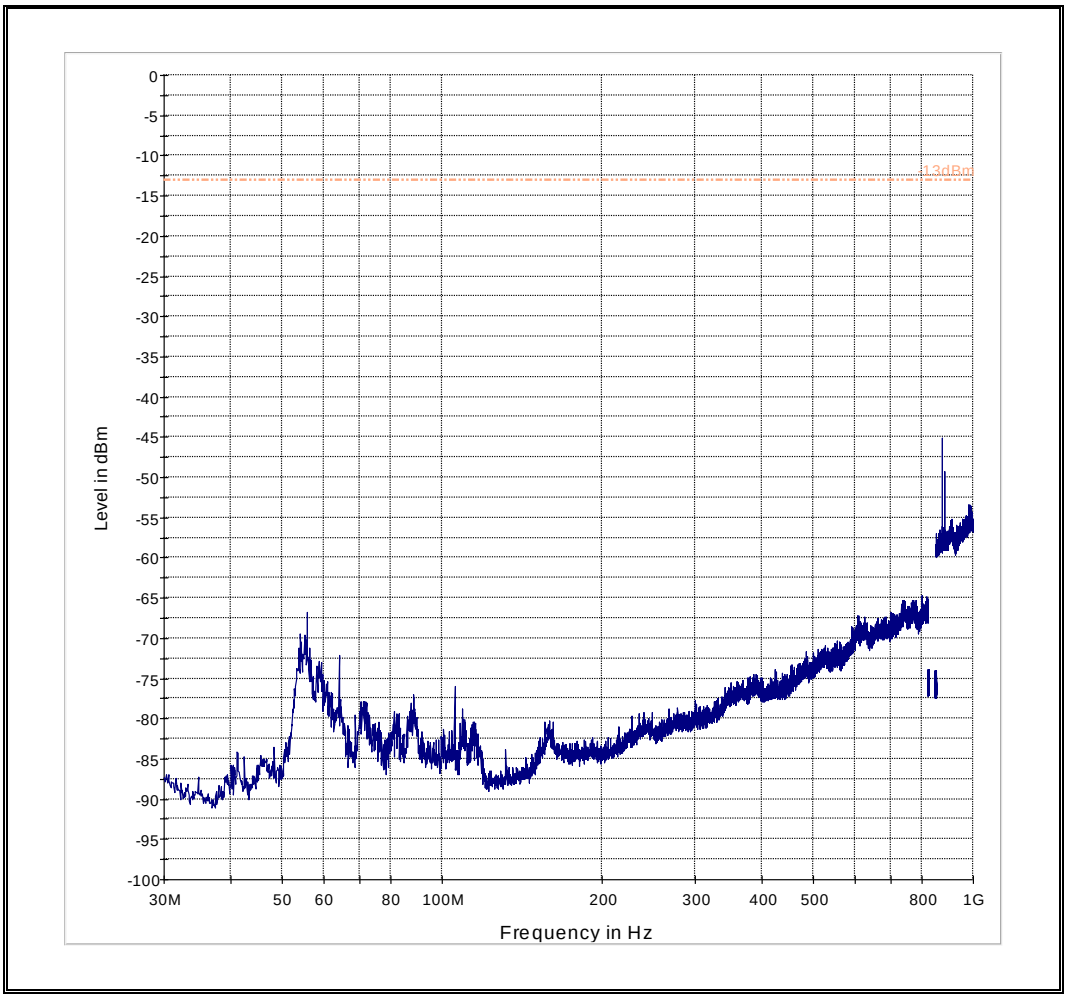
8.13.2 1 - 9 GHz, Ch. Low



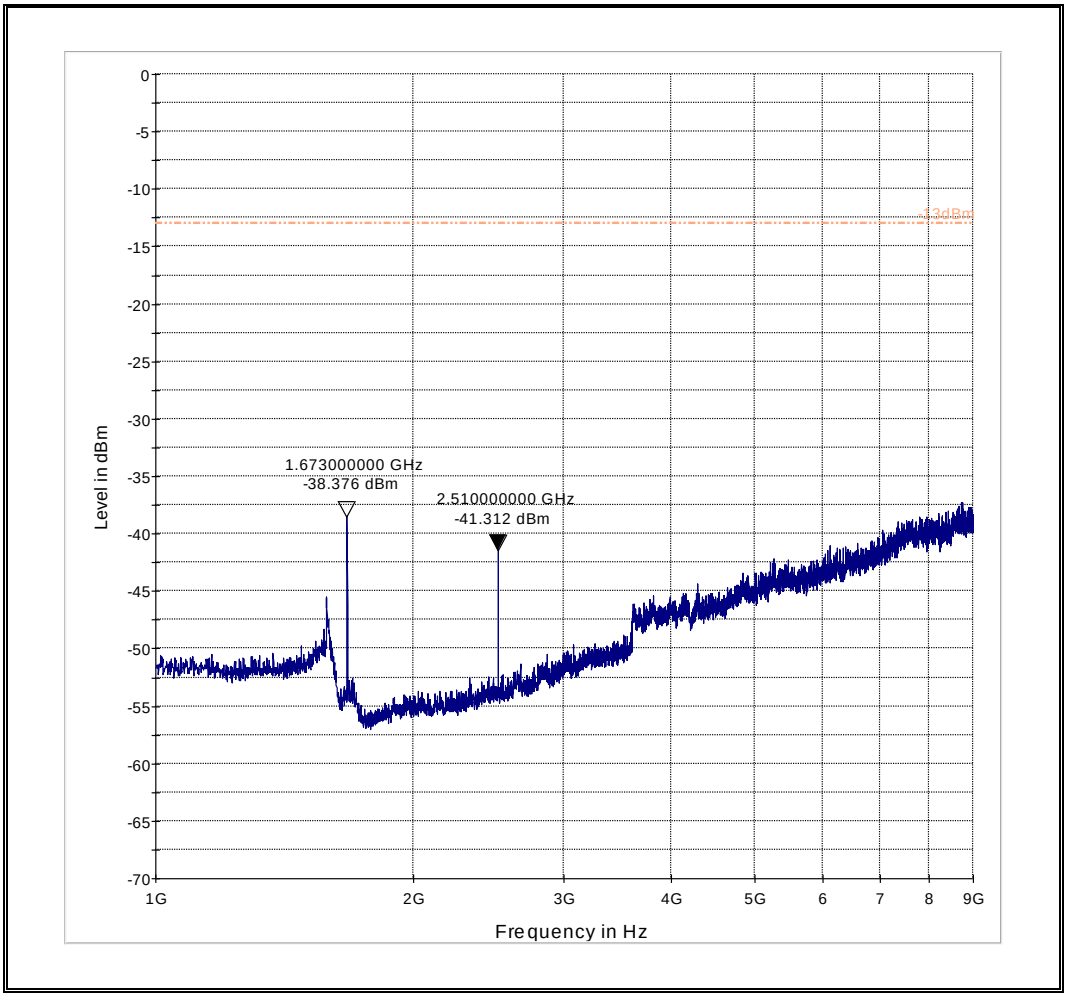
8.13.3 9 KHz - 30 MHz, Ch. Mid



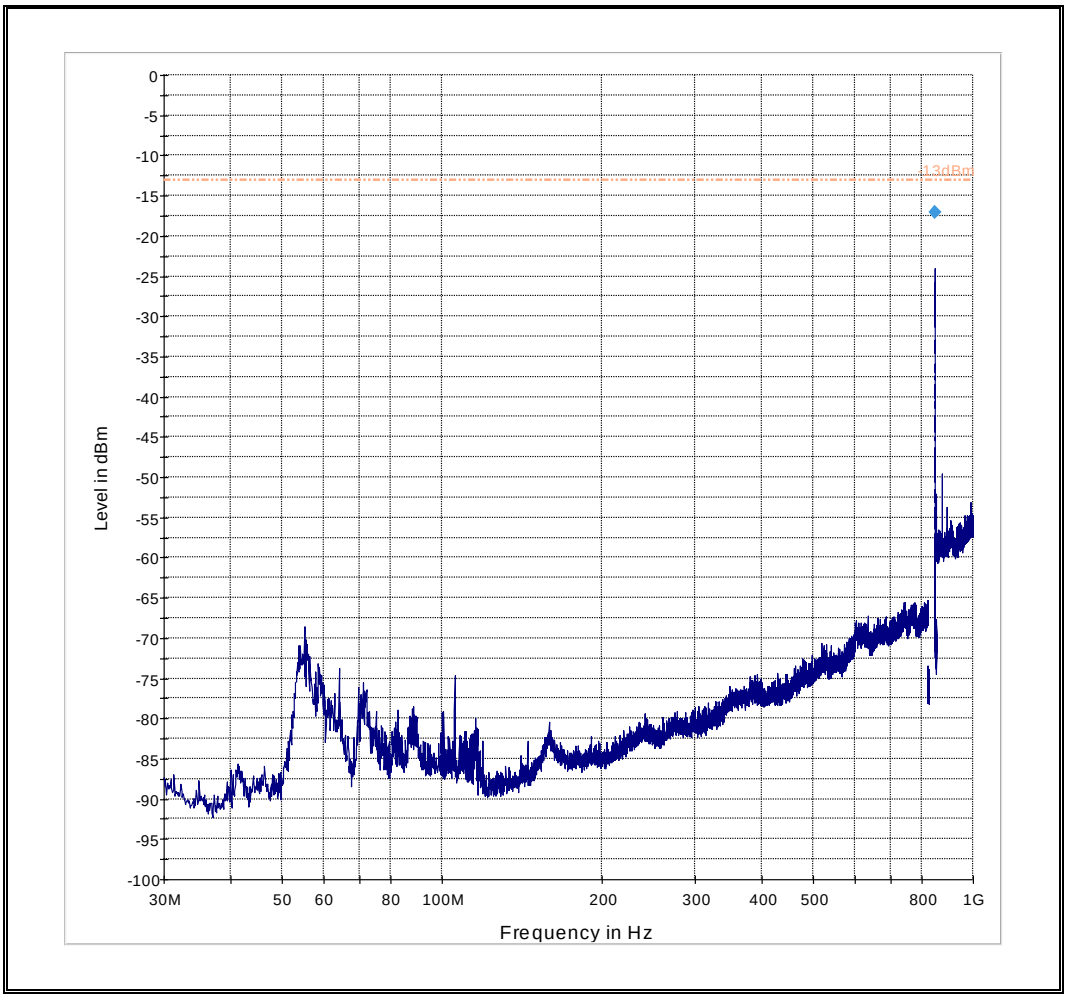
8.13.4 30 MHz – 1 GHz, Ch. Mid



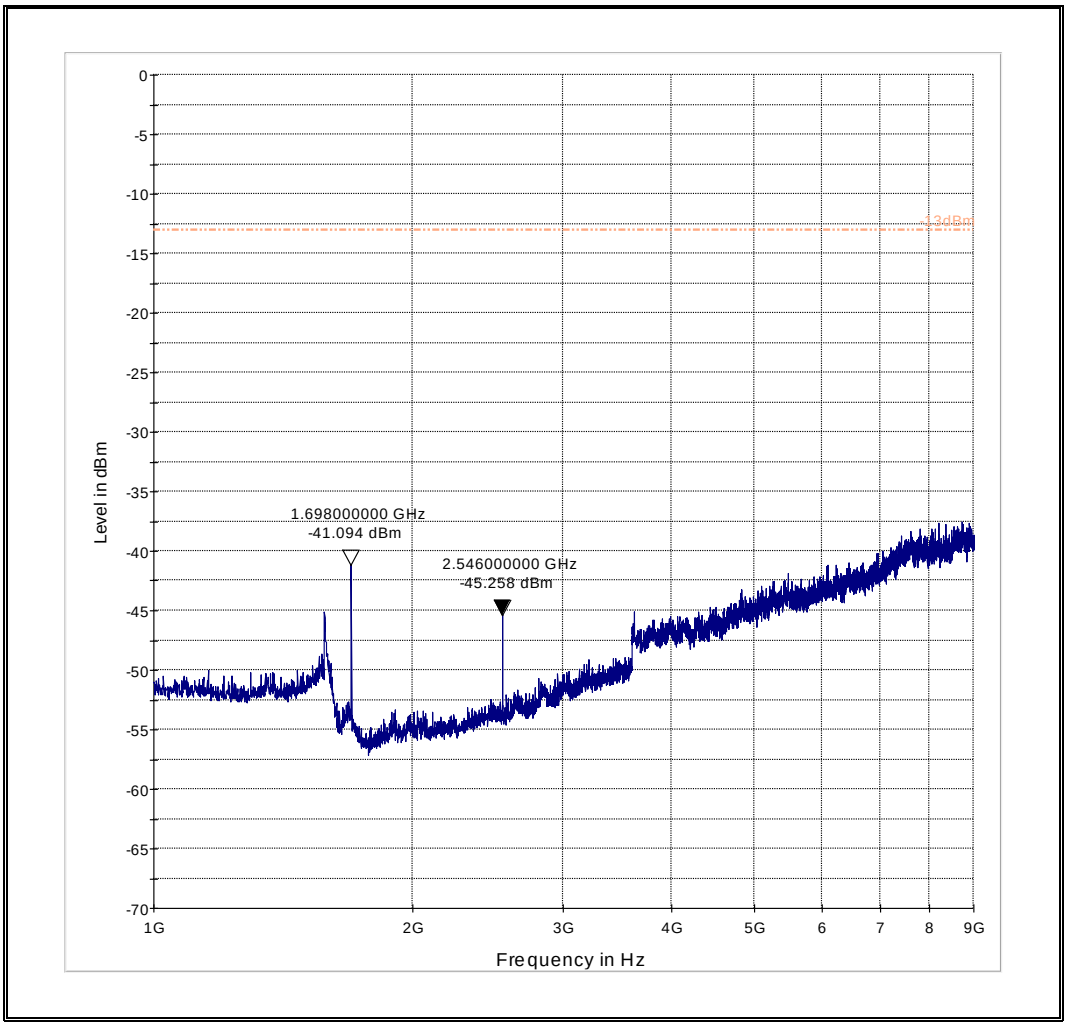
8.13.5 1 - 9 GHz, Ch. Mid



8.13.6 30 MHz - 1 GHz, Ch. High

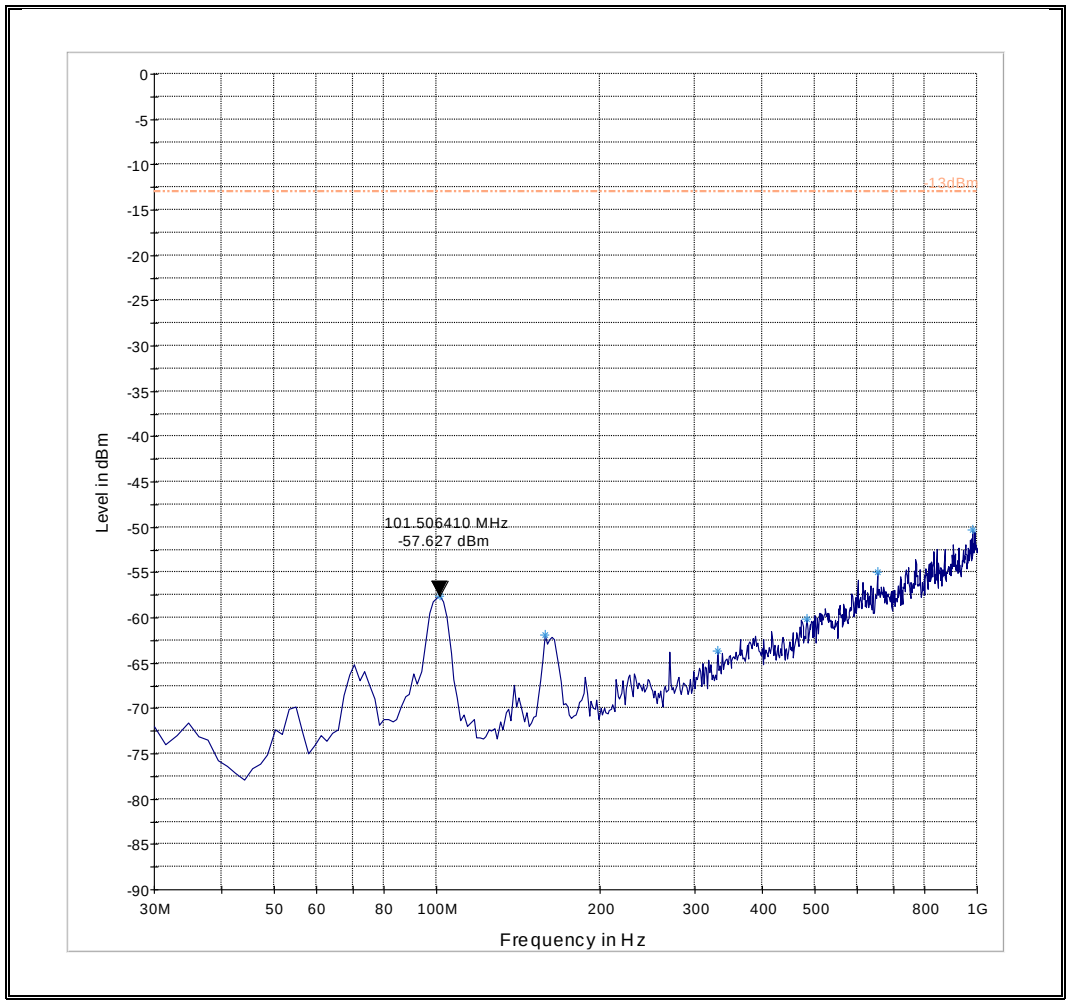


8.13.7 1 - 9 GHz, Ch. High

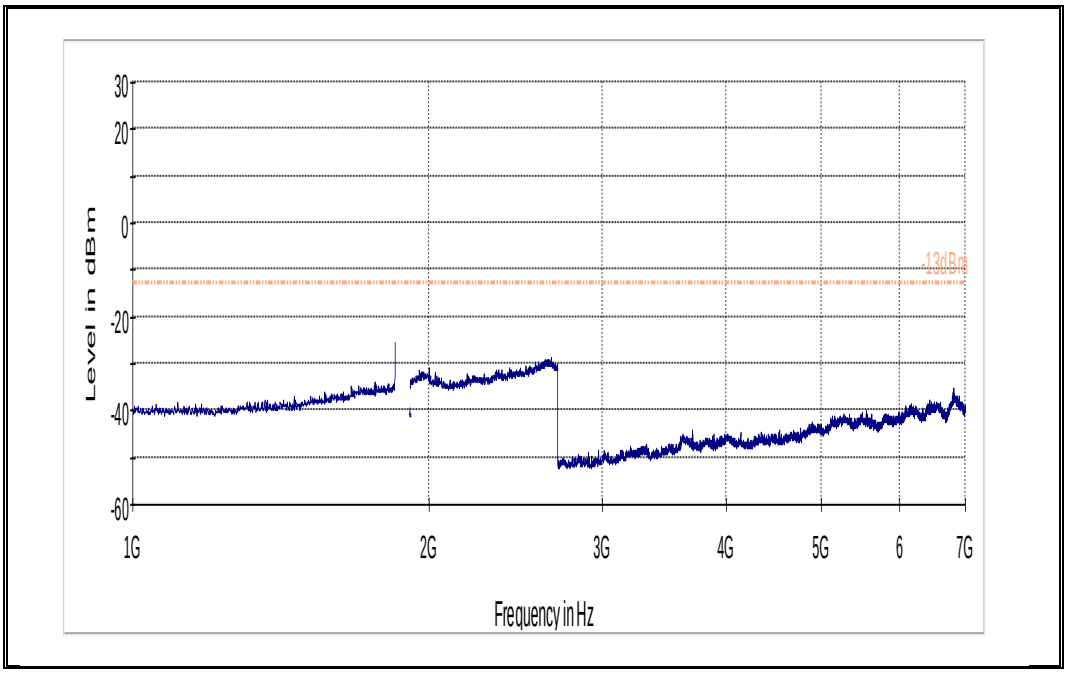


8.14 Measurement Plots LTE 2/25

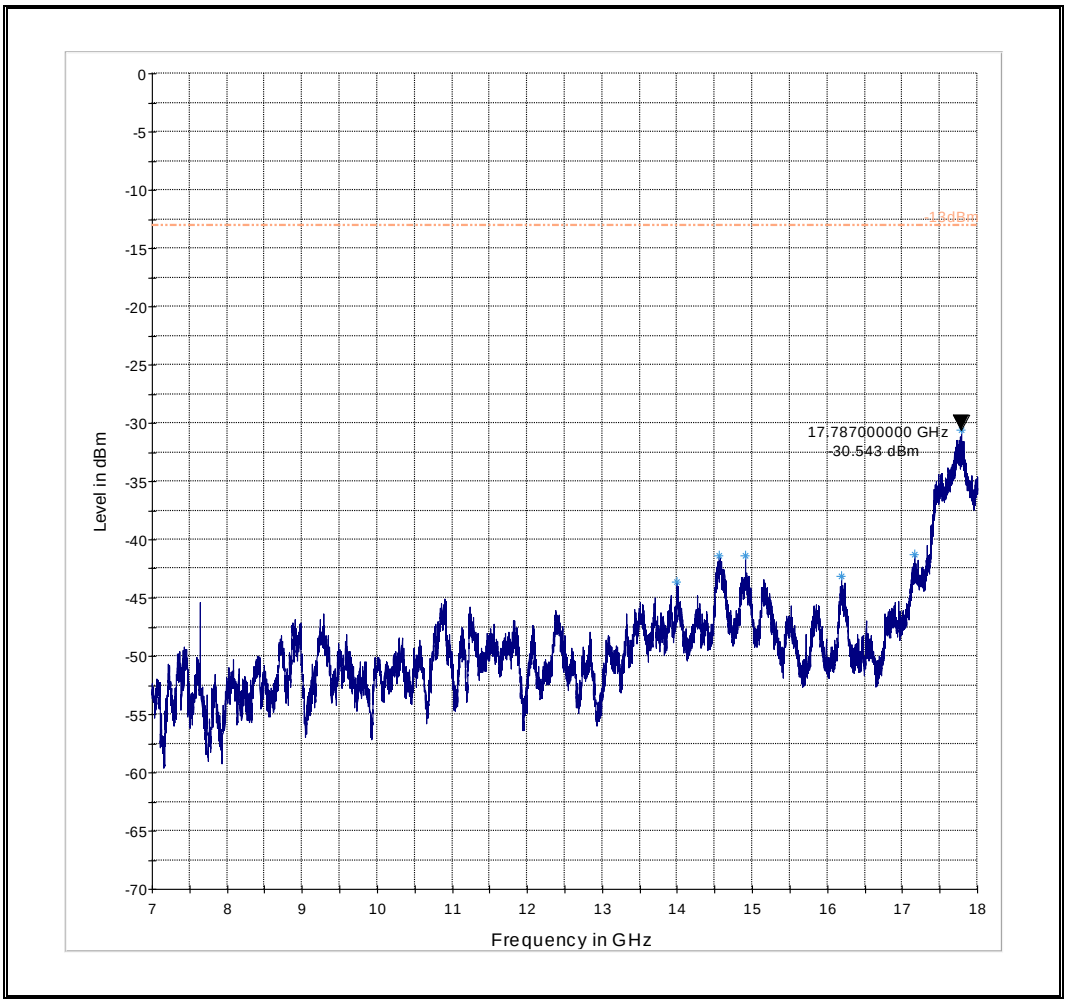
8.14.1 30 MHz - 1 GHz, Ch. Low



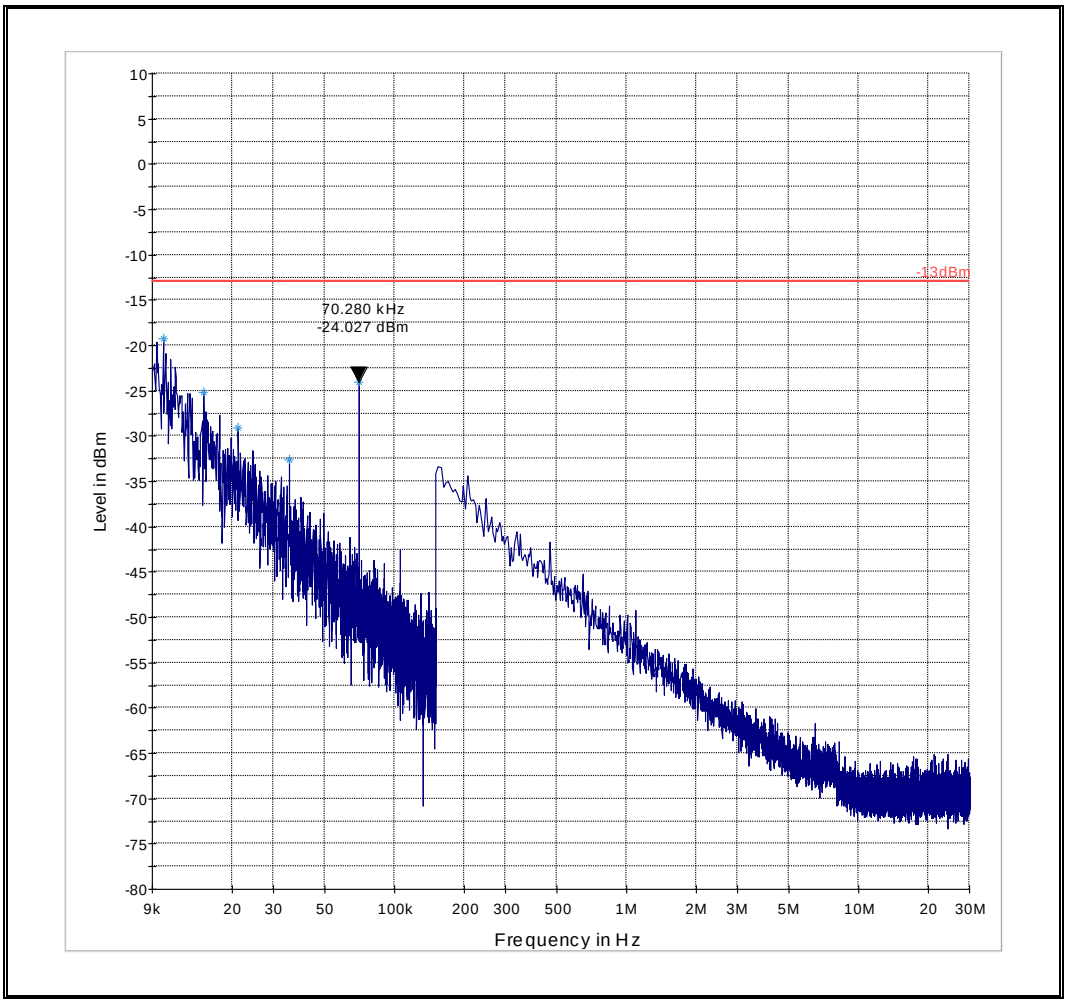
8.14.2 1 GHz - 7 GHz, Ch. Low



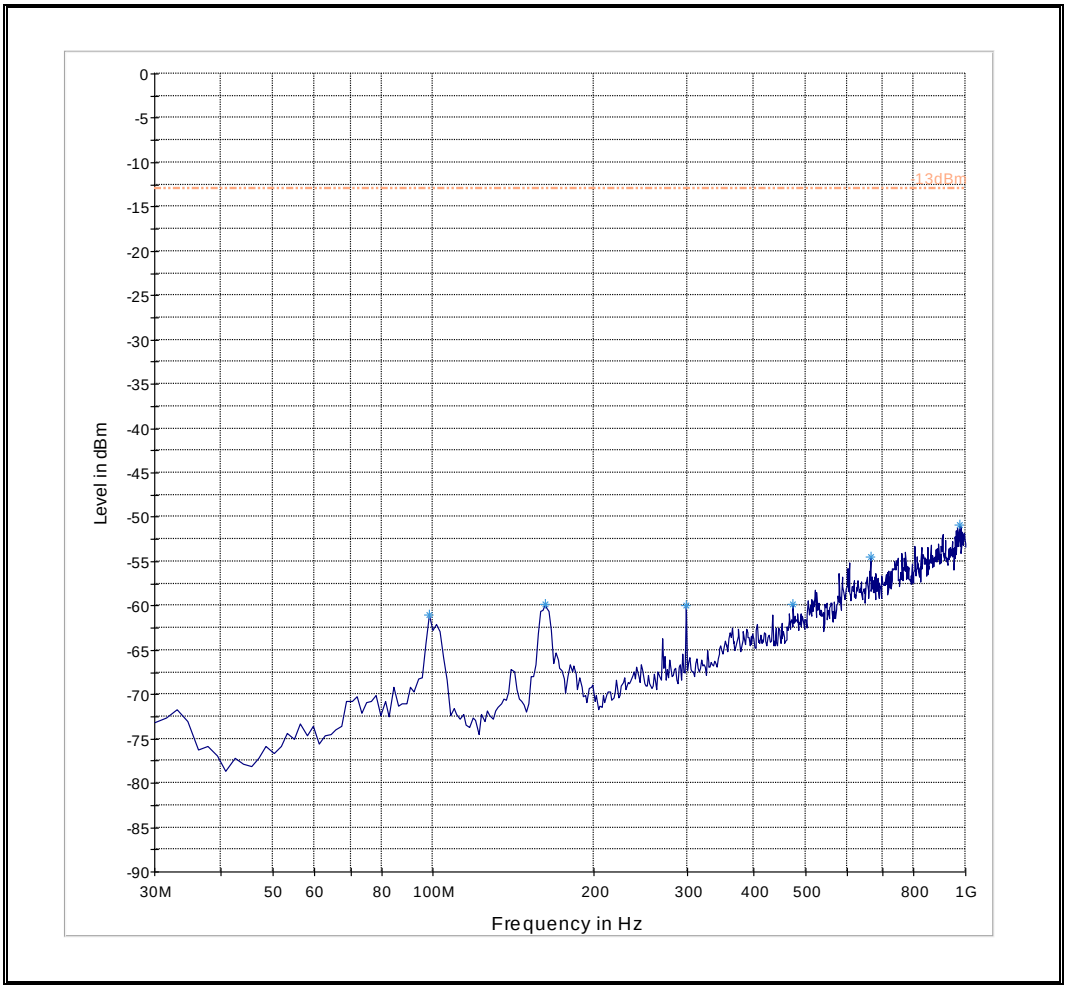
8.14.3 7 - 18 GHz, Ch. Low



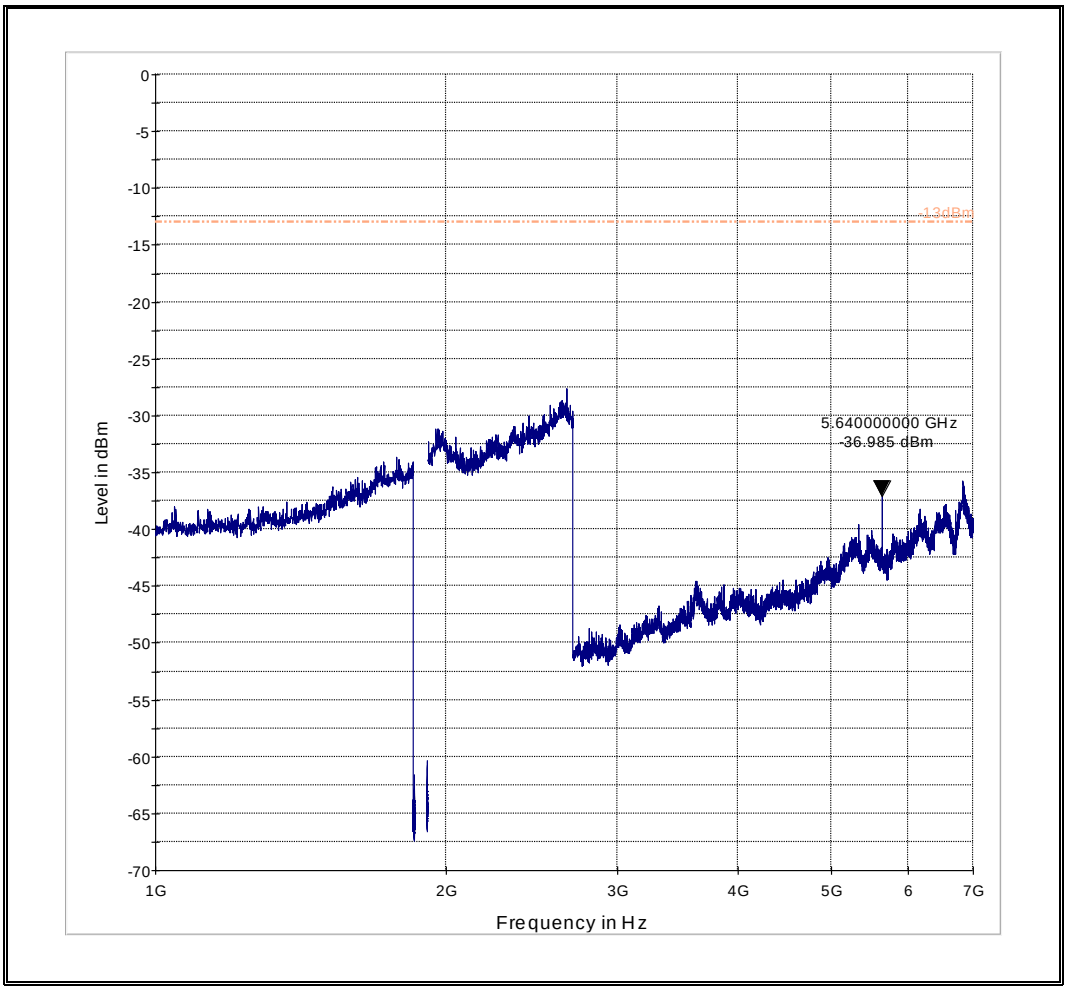
8.14.4 9 KHz - 30 MHz, Ch. Mid



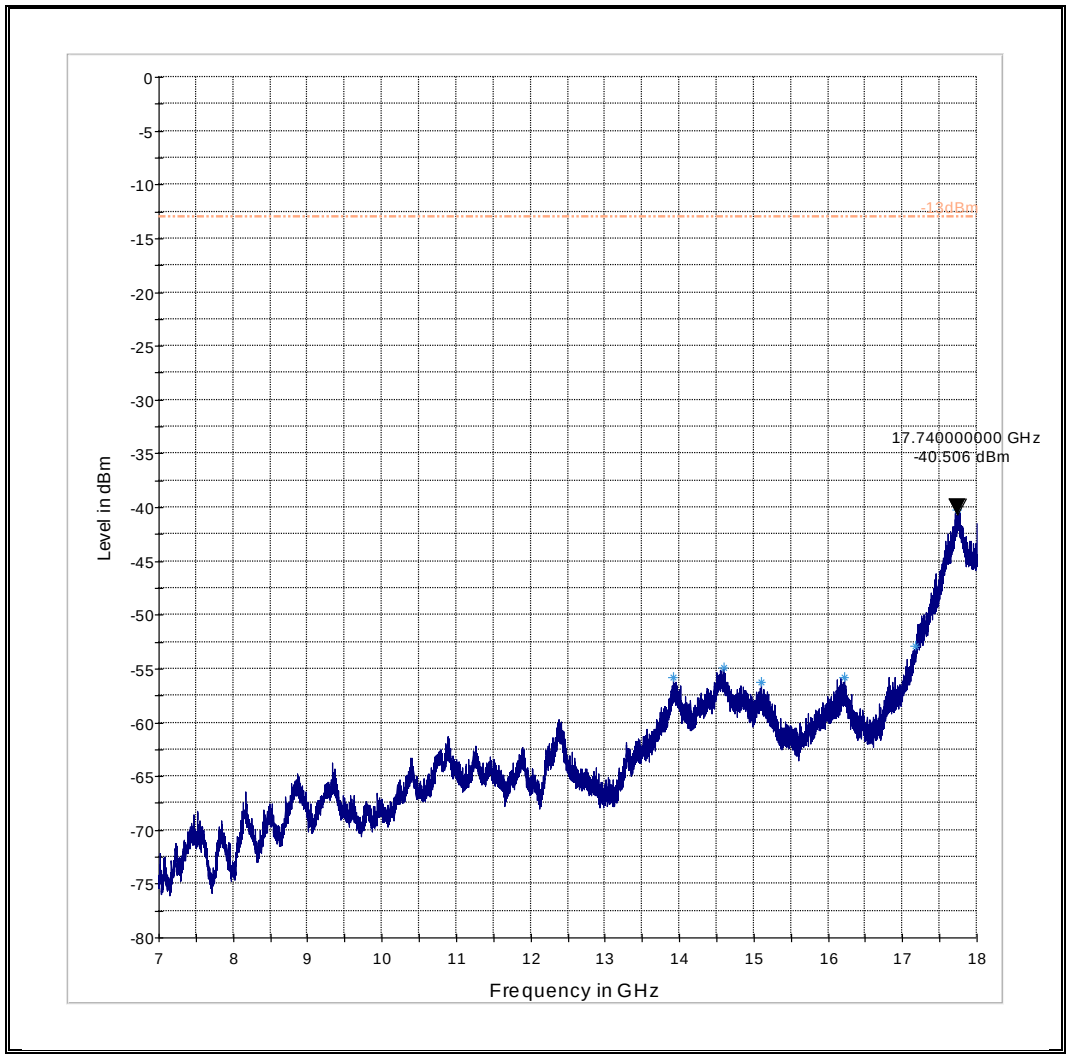
8.14.5 30 MHz - 1 GHz, Ch. Mid



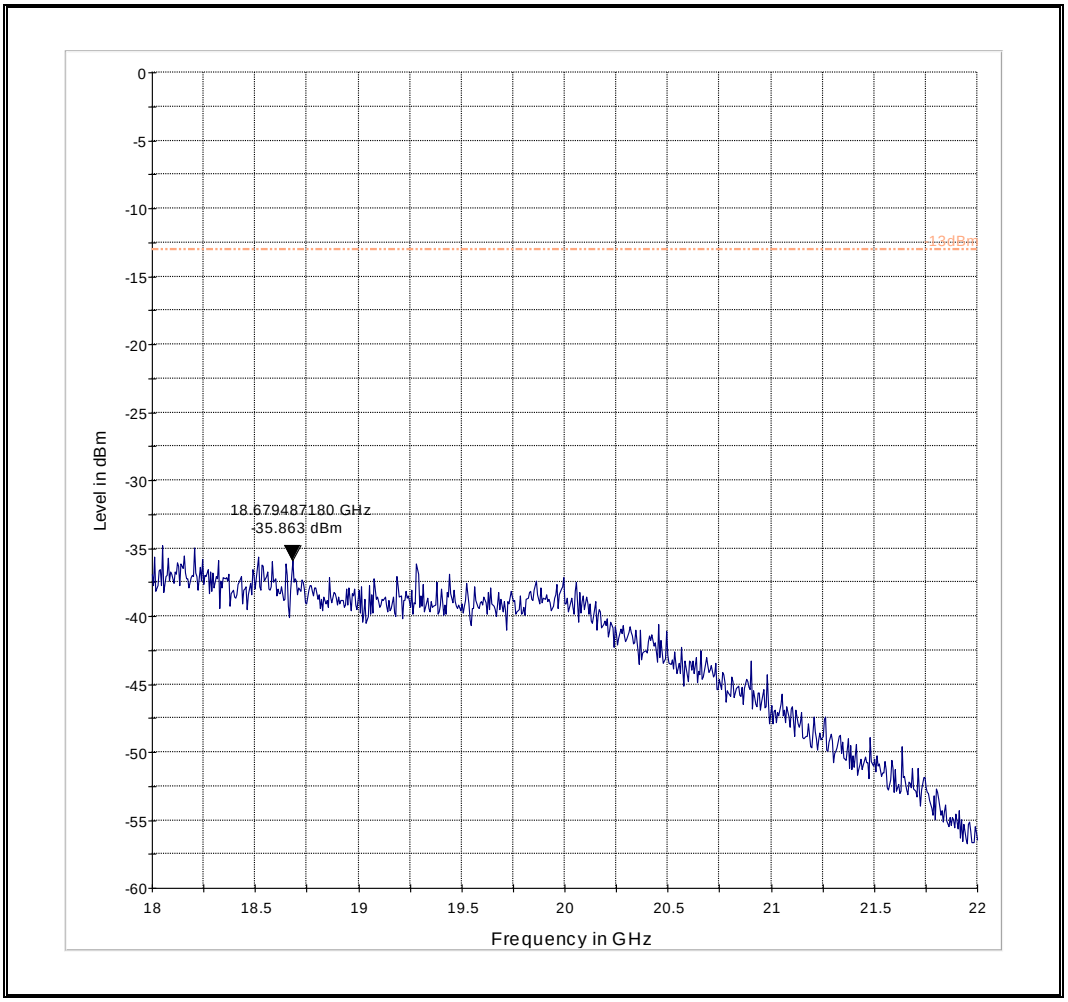
8.14.6 1 GHz - 7 GHz, Ch. Mid



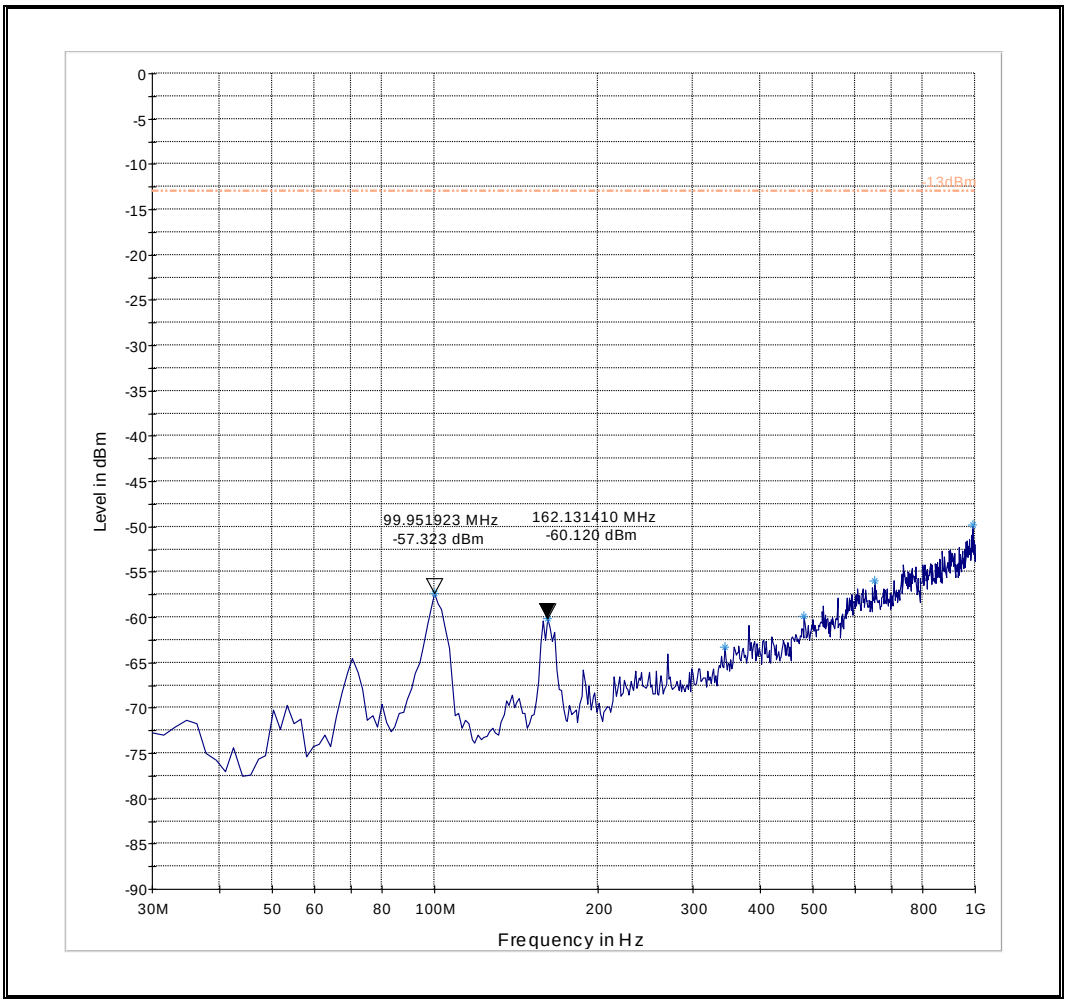
8.14.7 7 GHz - 18 GHz, Ch. Mid



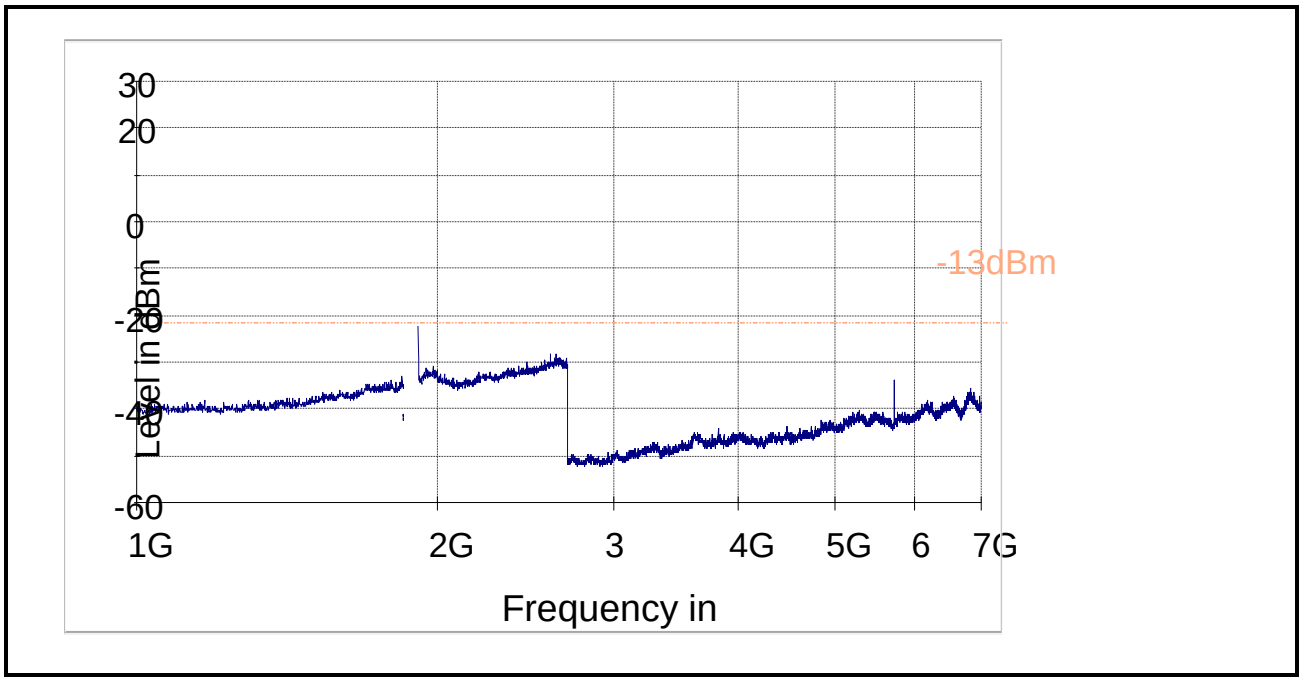
8.14.8 18 - 22 GHz, Ch. Mid



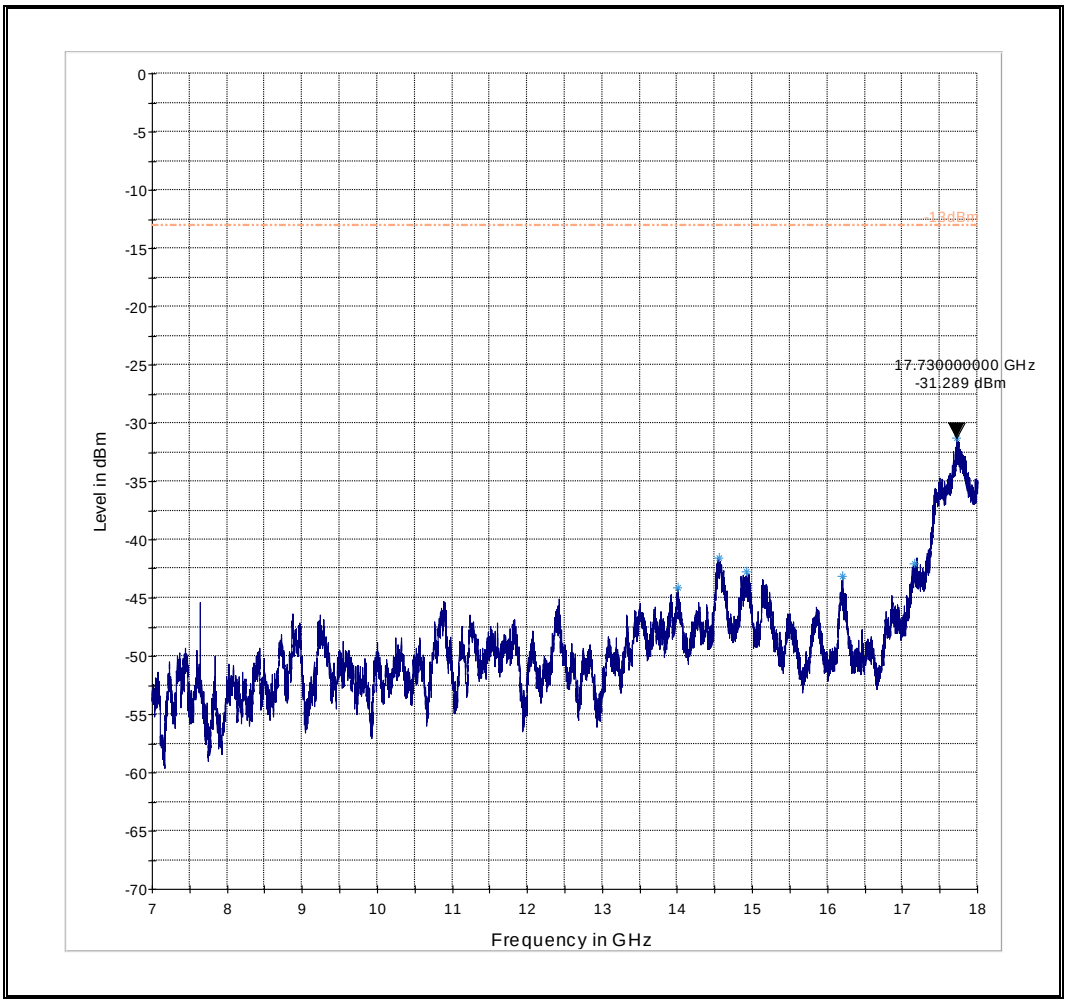
8.14.9 30 MHz - 1 GHz, Ch. High



8.14.10 1 - 7 GHz, Ch. High

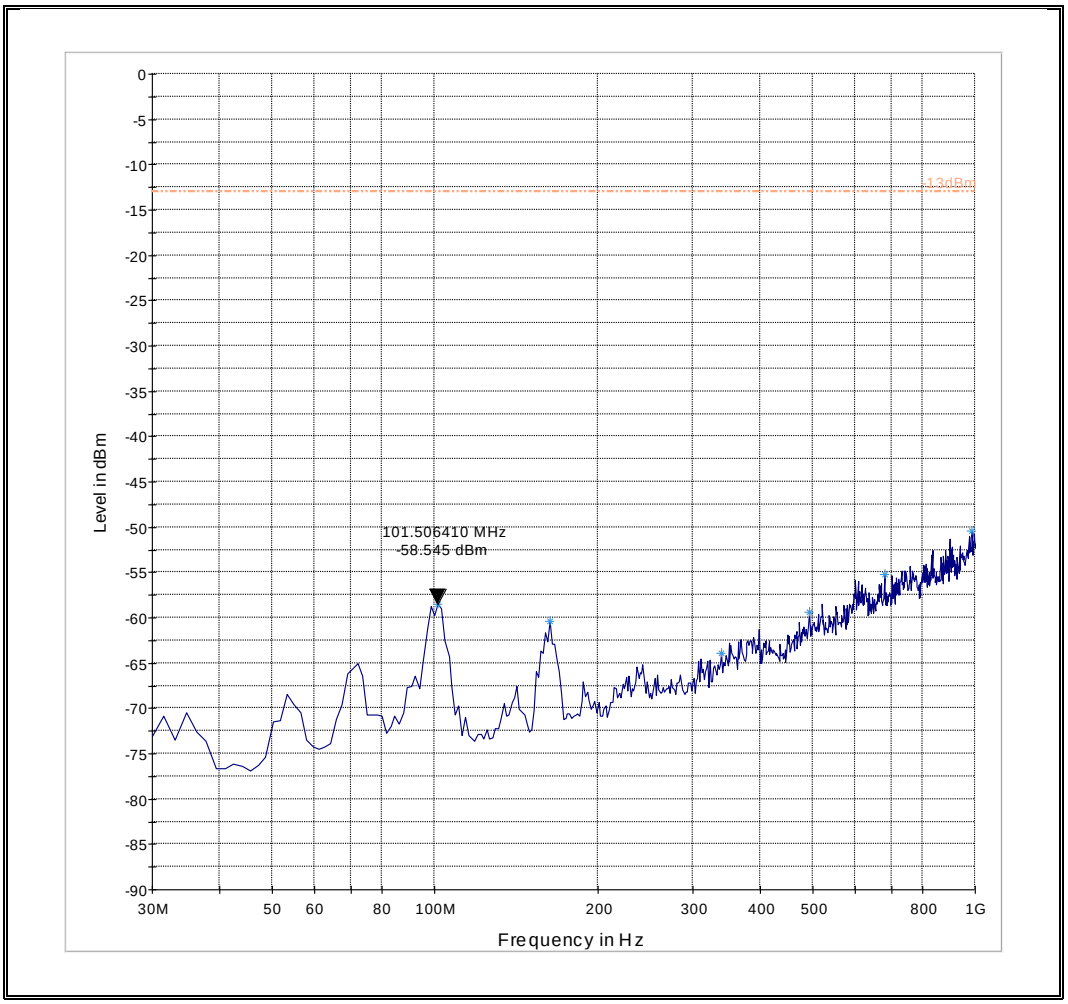


8.14.11 7 - 18 GHz, Ch. High

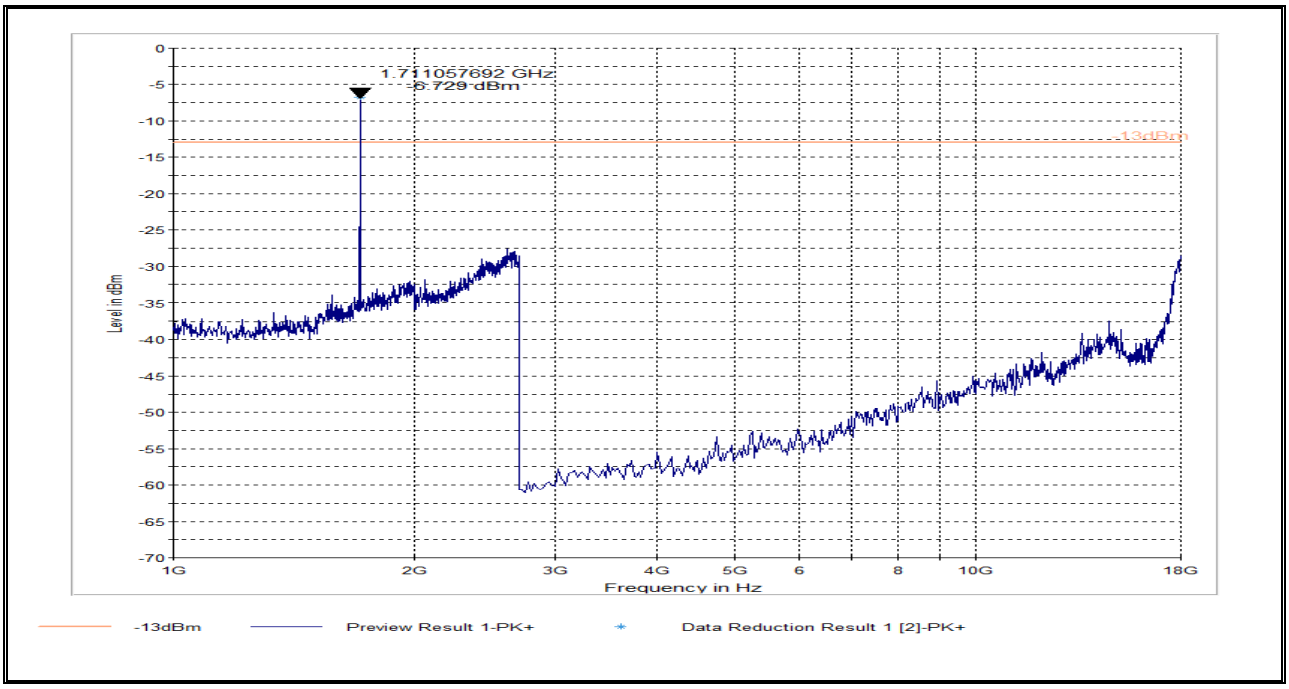


8.15 Measurement Plots LTE 4

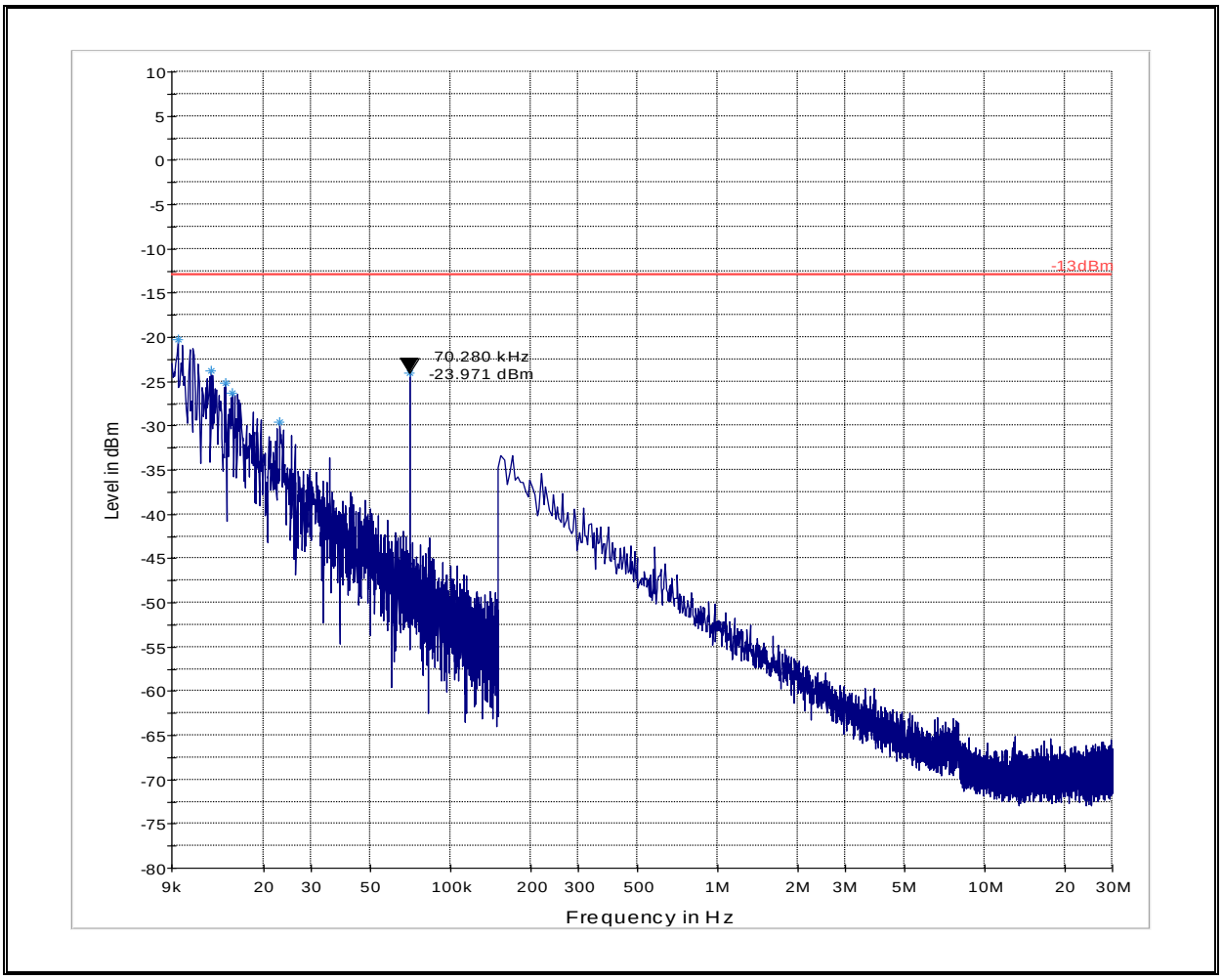
8.15.1 30 MHz - 1 GHz, Ch. Low



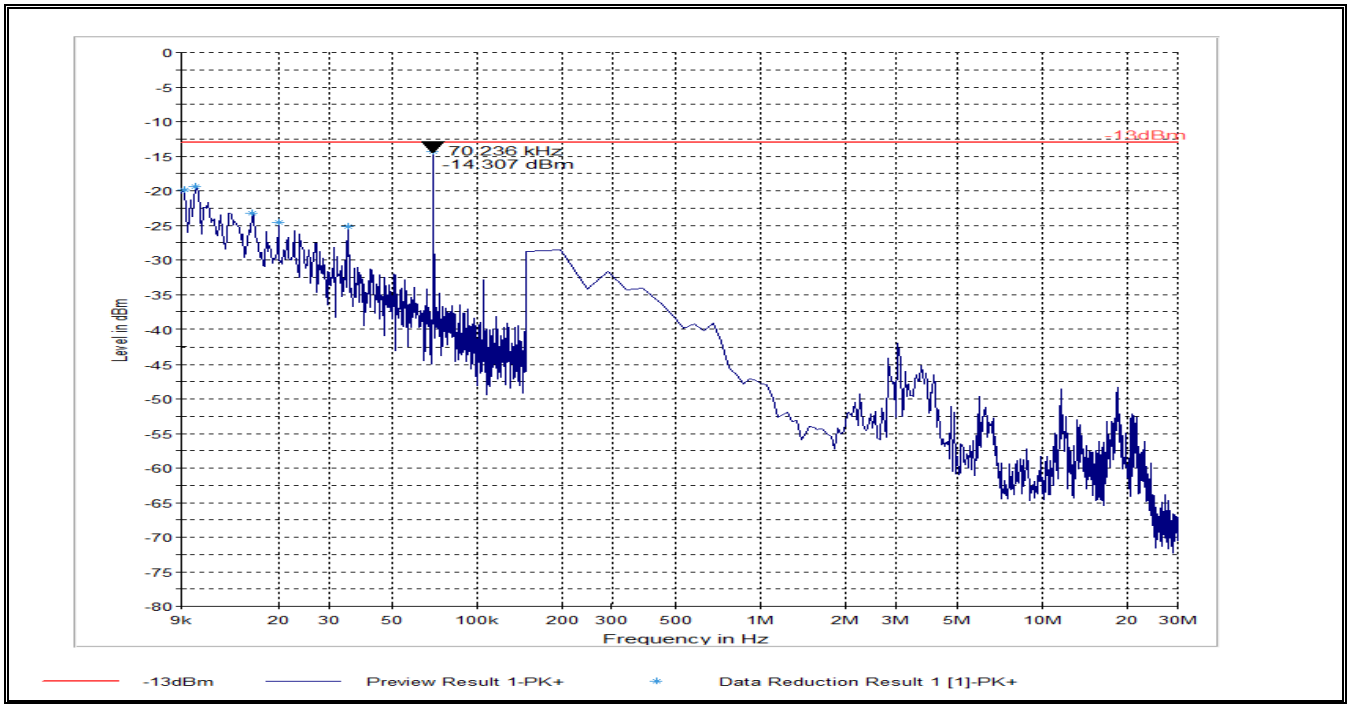
8.15.2 1 - 18 GHz, Ch. Low



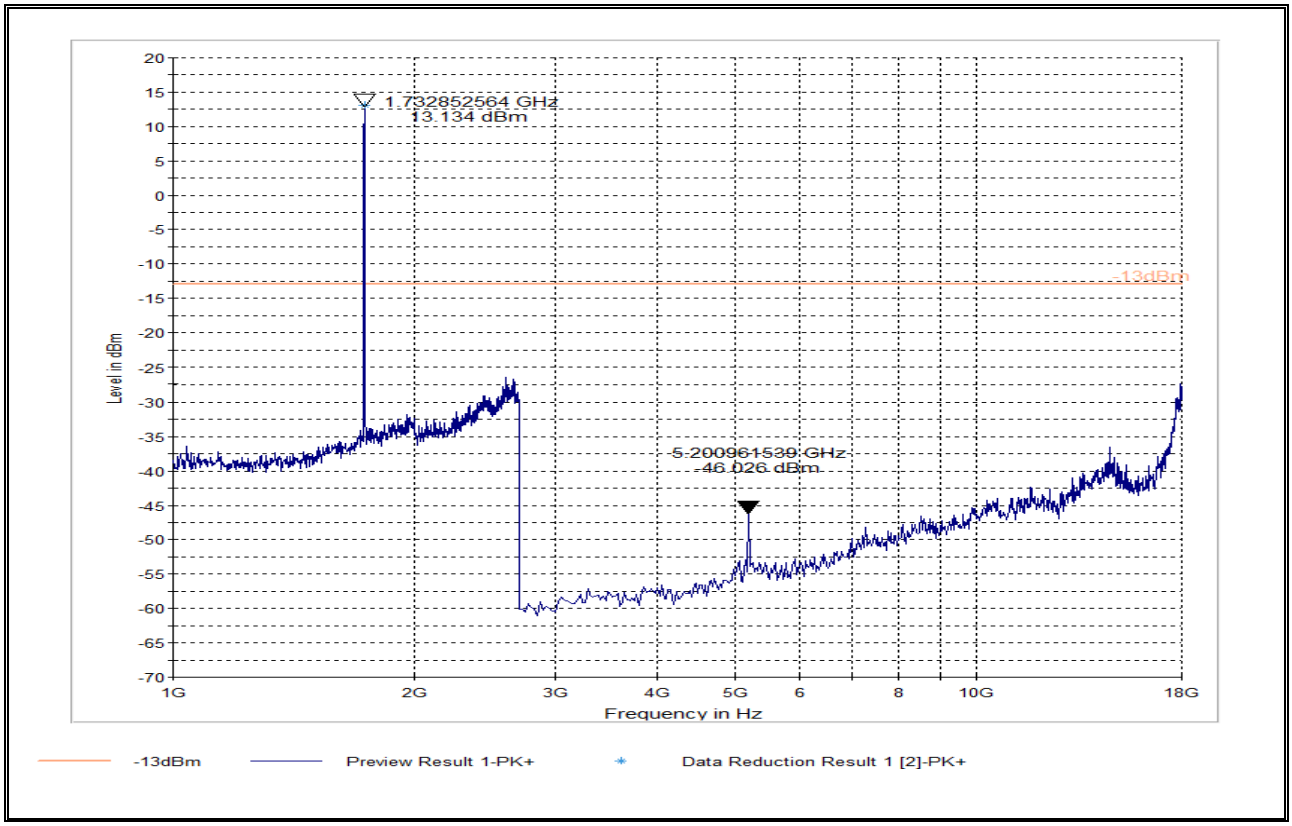
8.15.3 9 KHz - 30 MHz, Ch. Mid



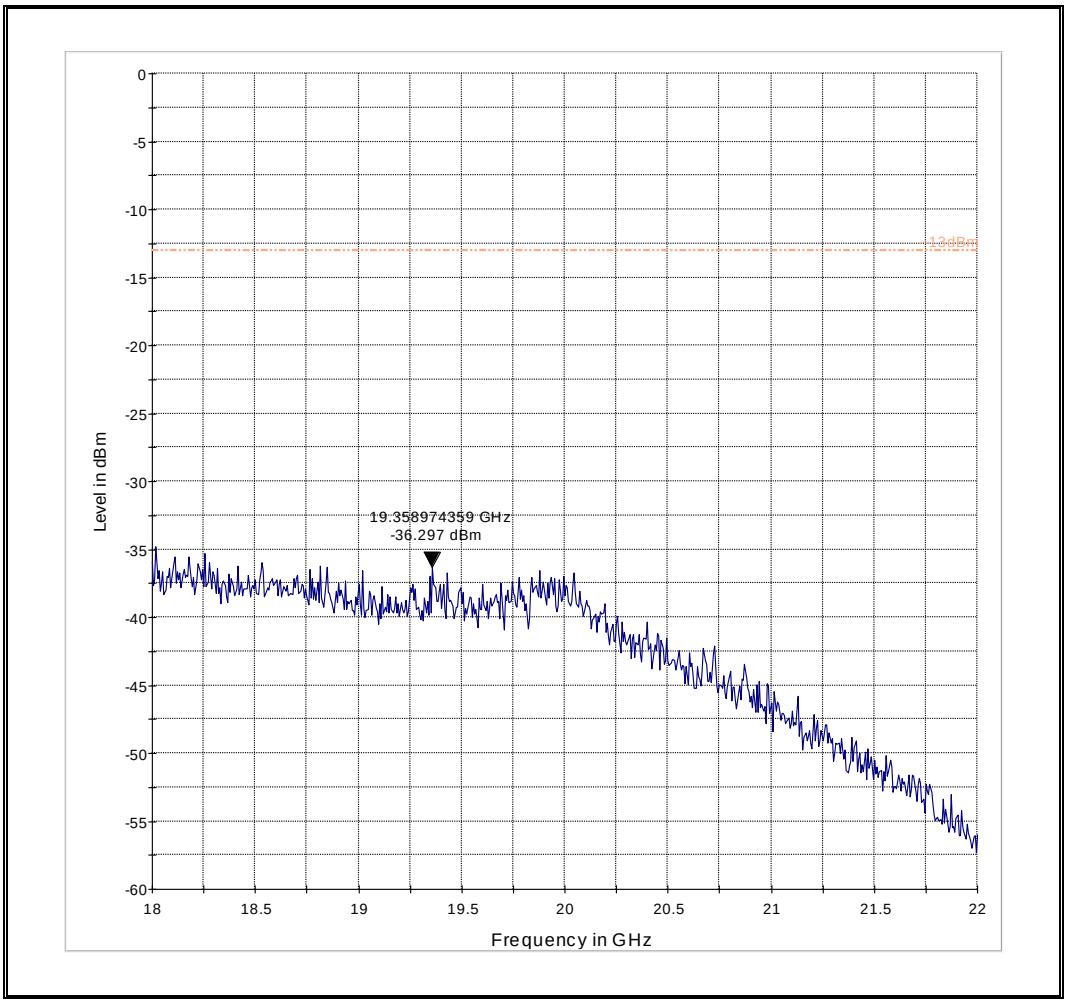
8.15.4 30 MHz – 1 GHz, Ch. Mid



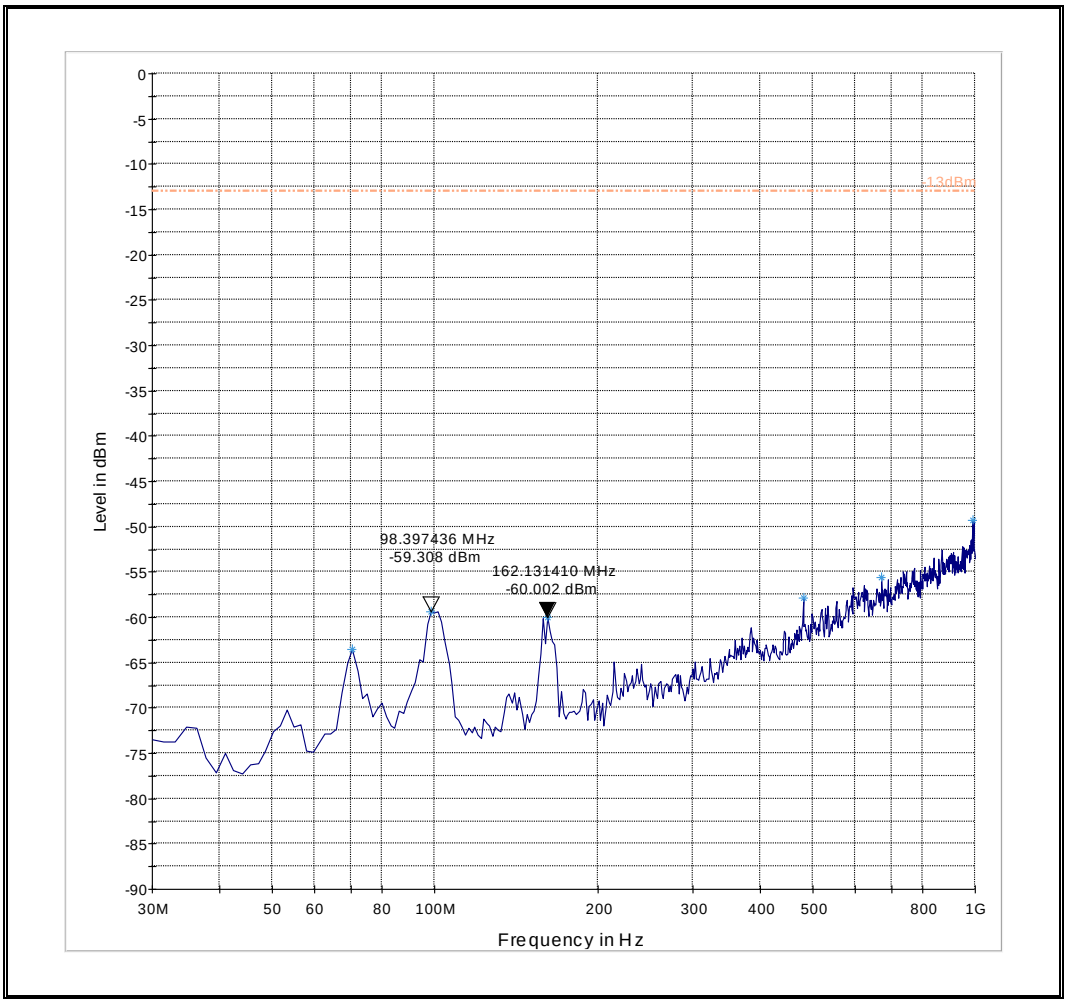
8.15.5 1 GHz – 18 GHz, Ch. Mid



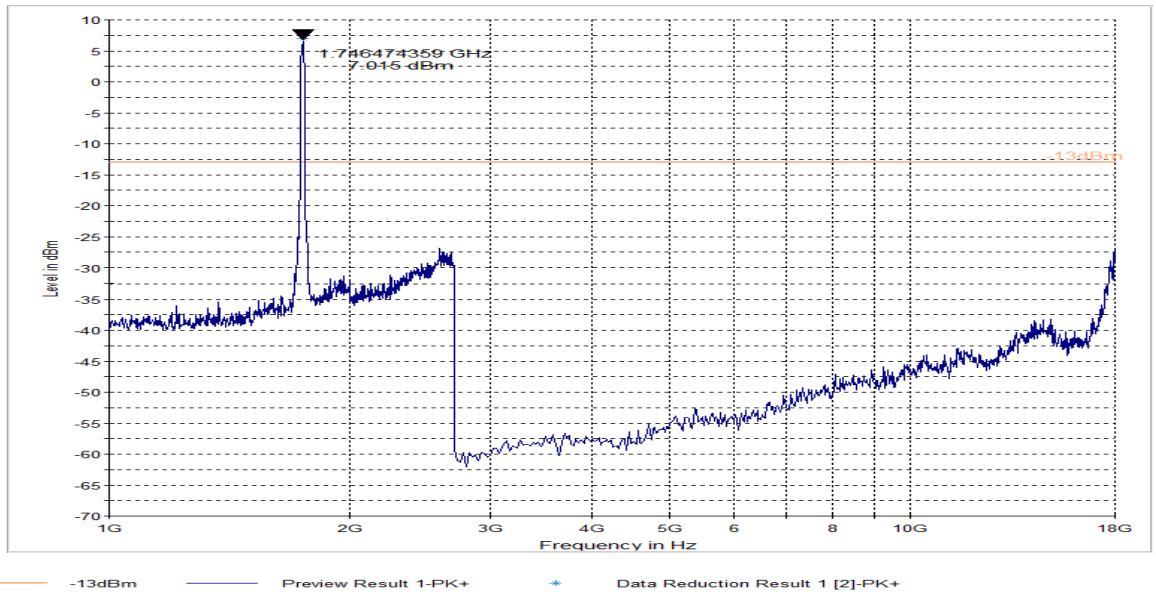
8.15.6 18 GHz - 22 GHz, Ch. Mid



8.15.7 30 MHz - 1 GHz, Ch. High

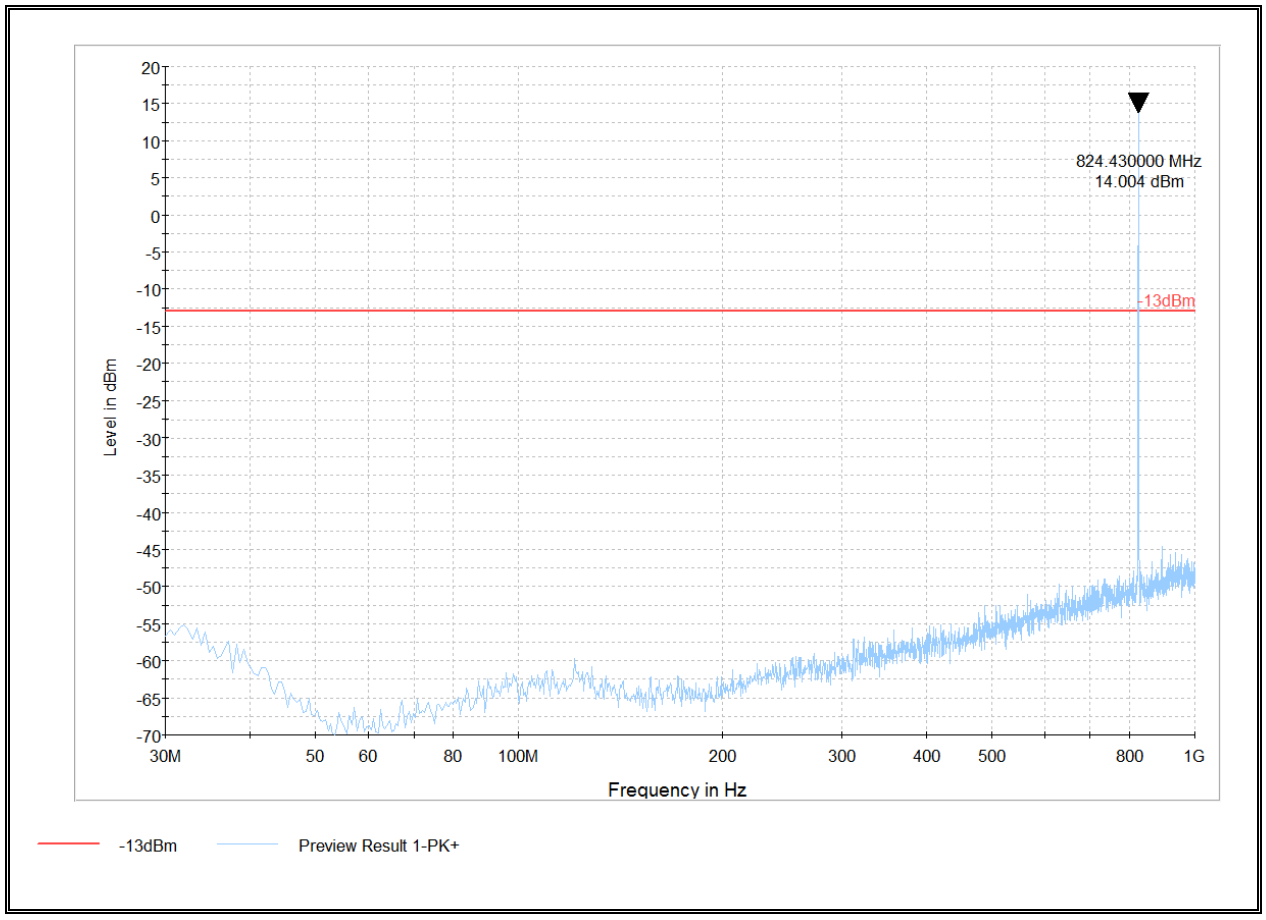


8.15.8 1 - 18 GHz, Ch. High

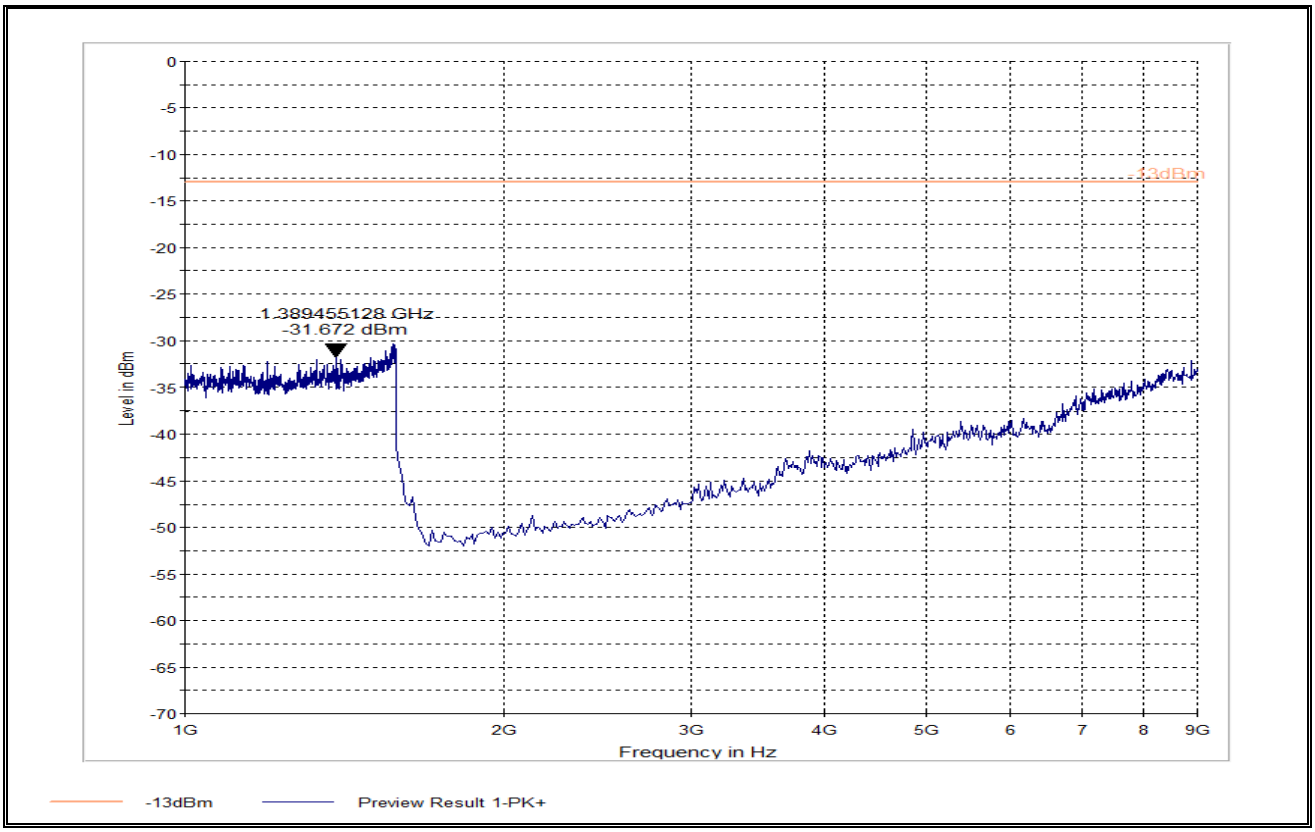


8.16 Measurement Plots LTE 5

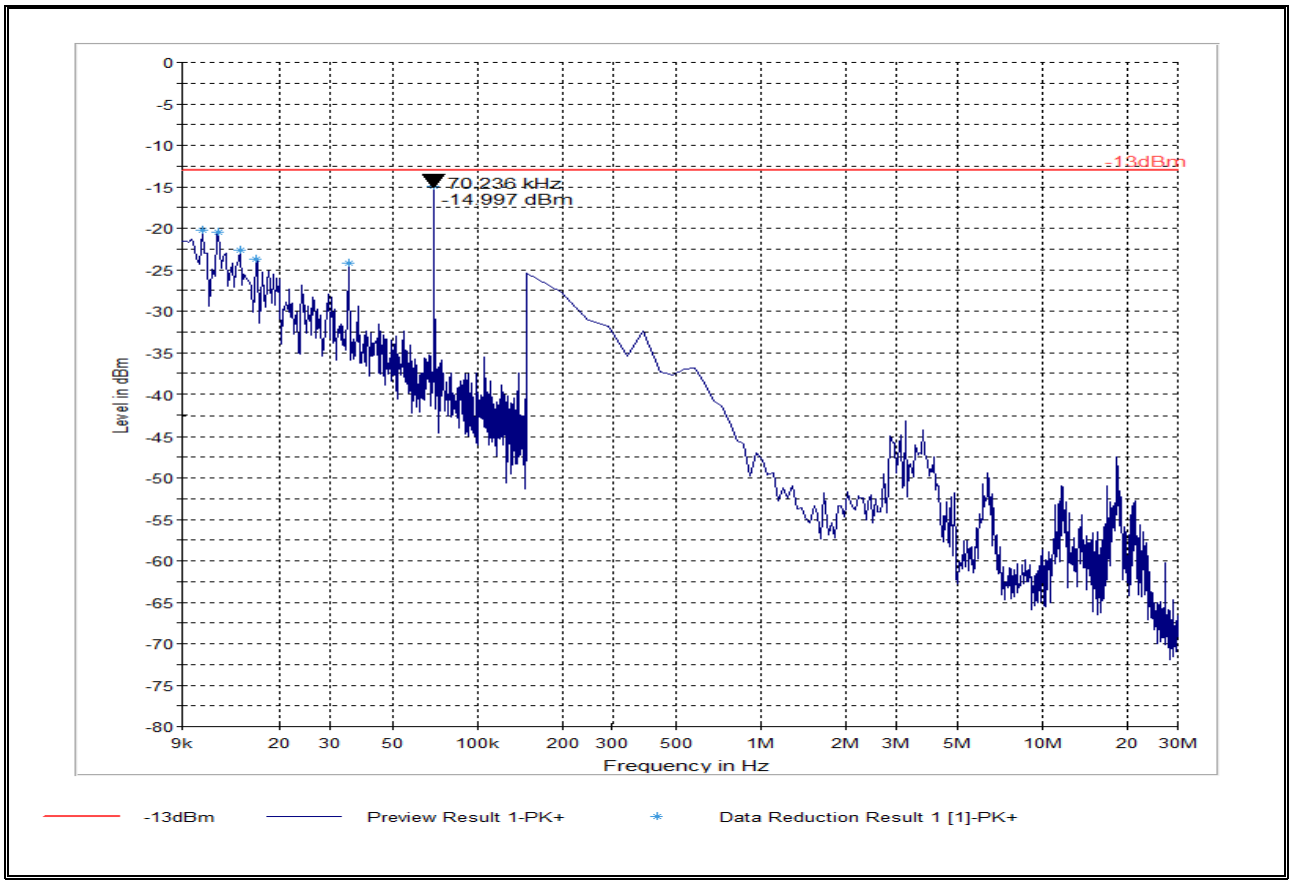
8.16.1 30 MHz – 1 GHz, Ch. Low



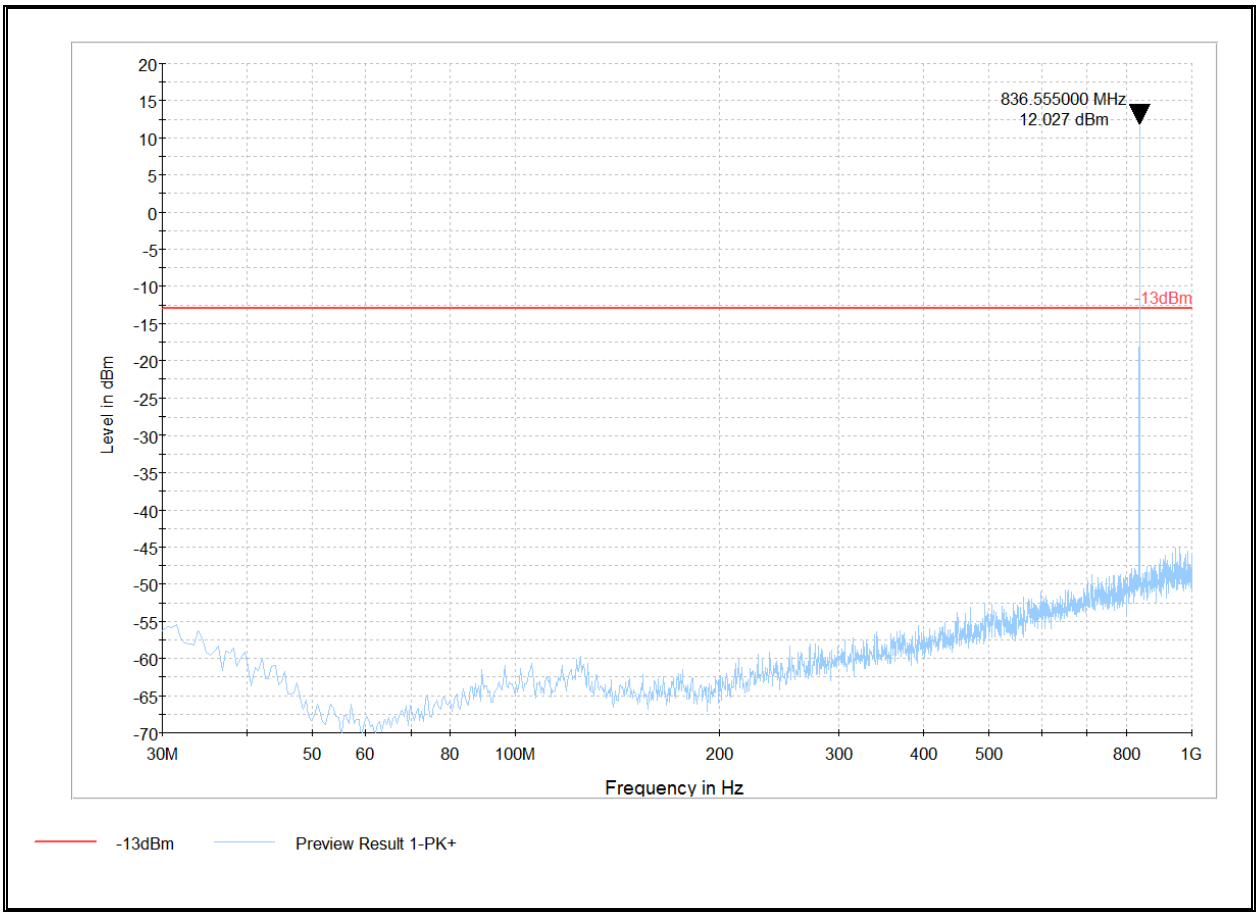
8.16.2 1 – 9 GHz, Ch. Low



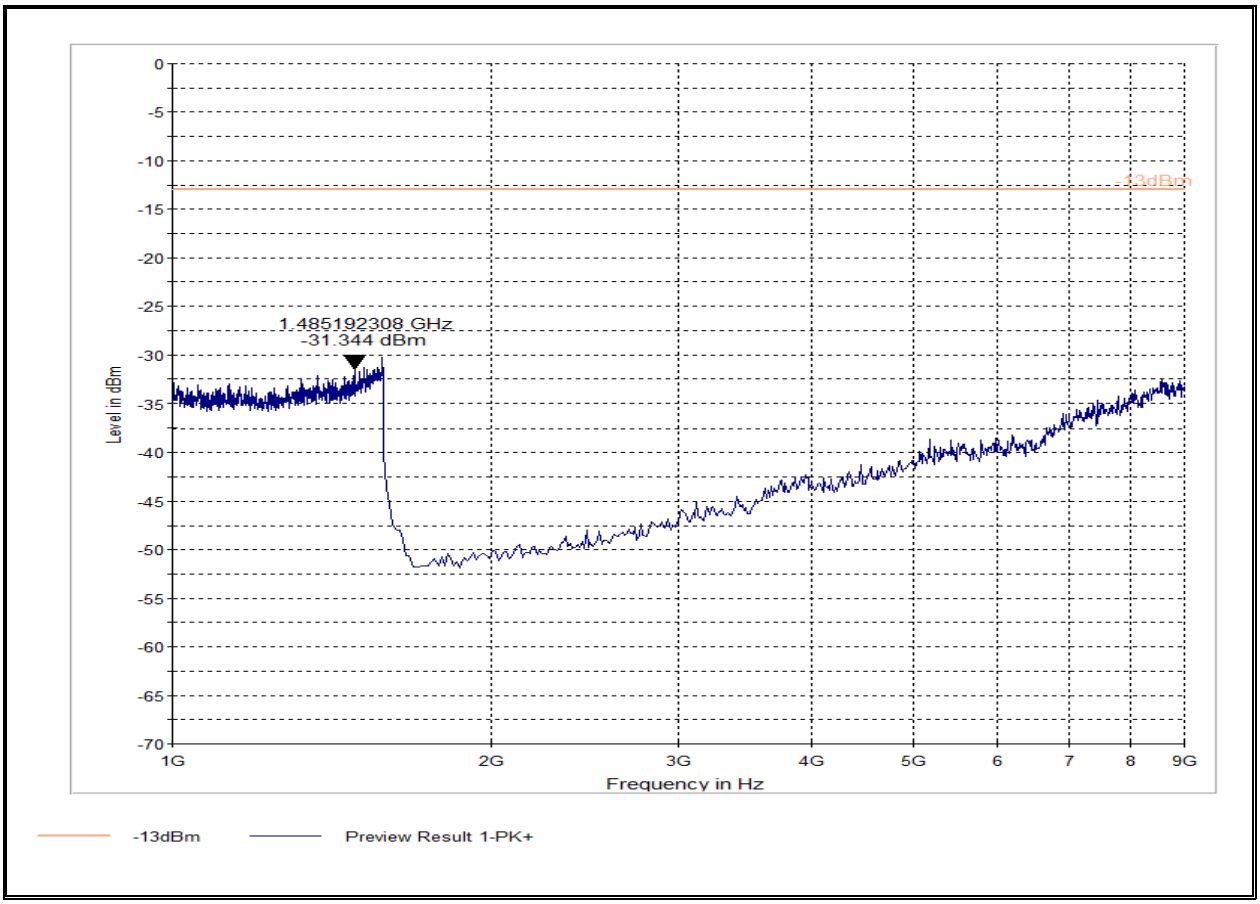
8.16.3 9 KHz – 30 MHz, Ch. Mid



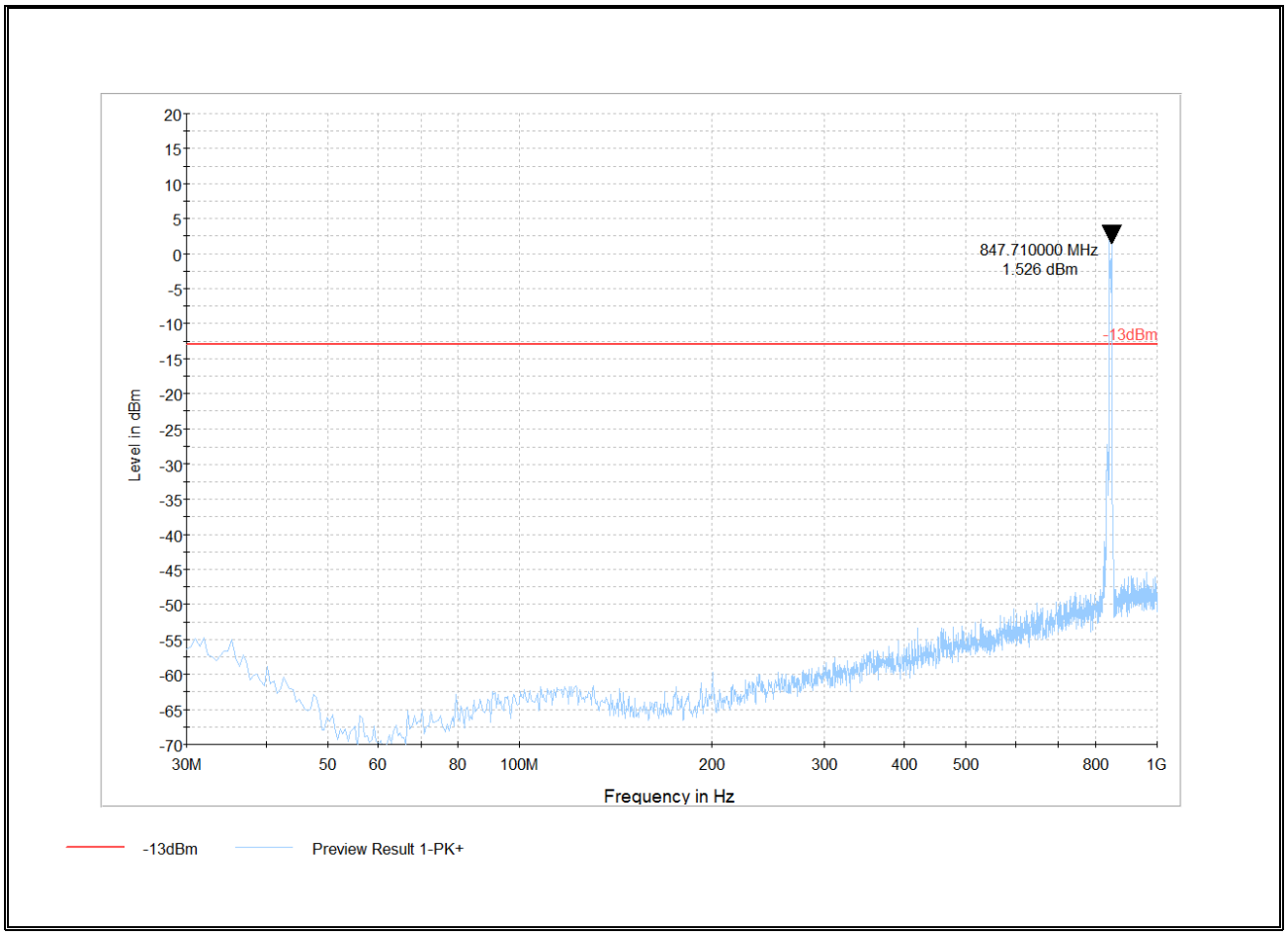
8.16.4 30 MHz – 1 GHz, Ch. Mid



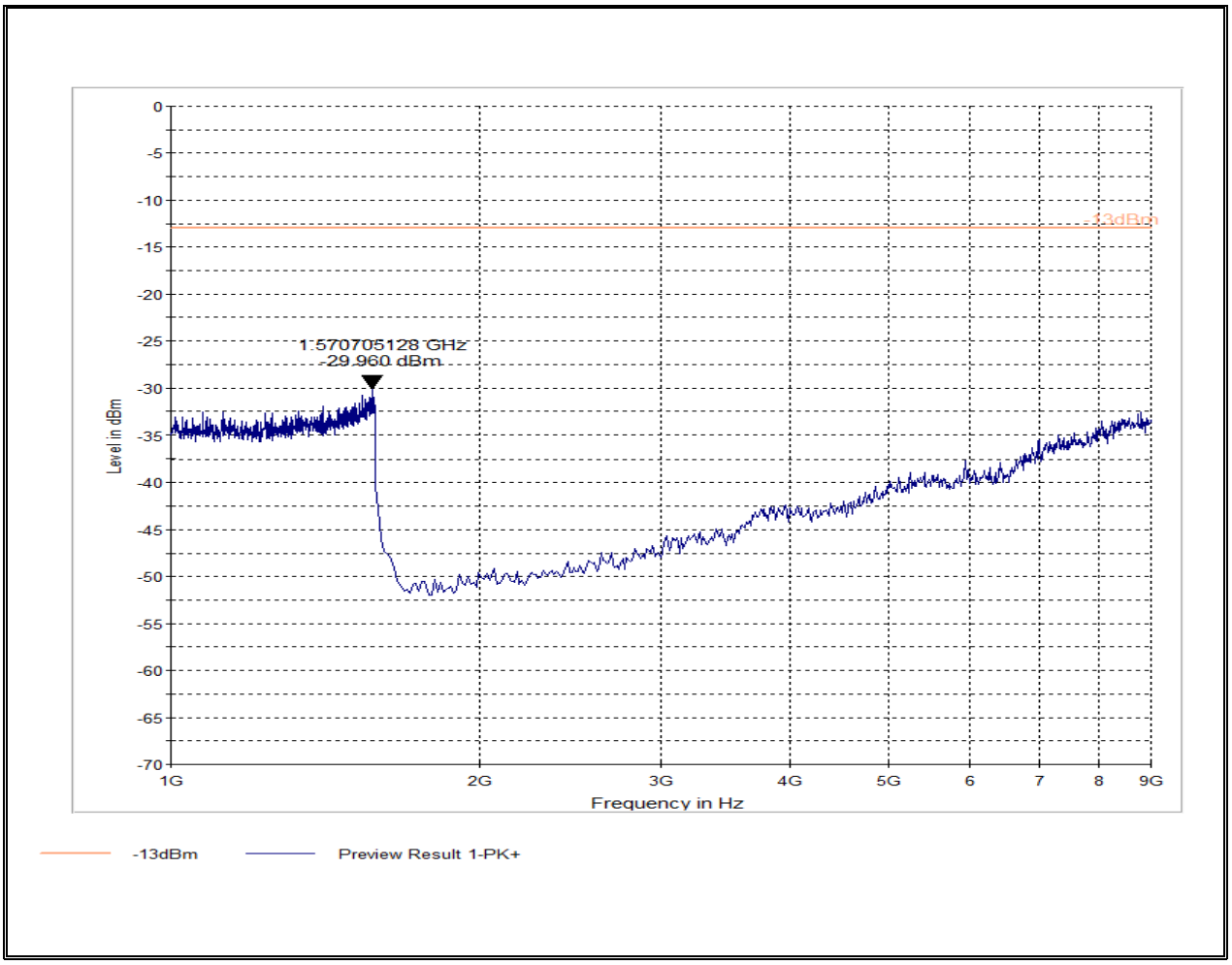
8.16.5 1 GHz – 9 GHz, Ch. Mid



8.16.6 30 MHz – 1 GHz, Ch. High

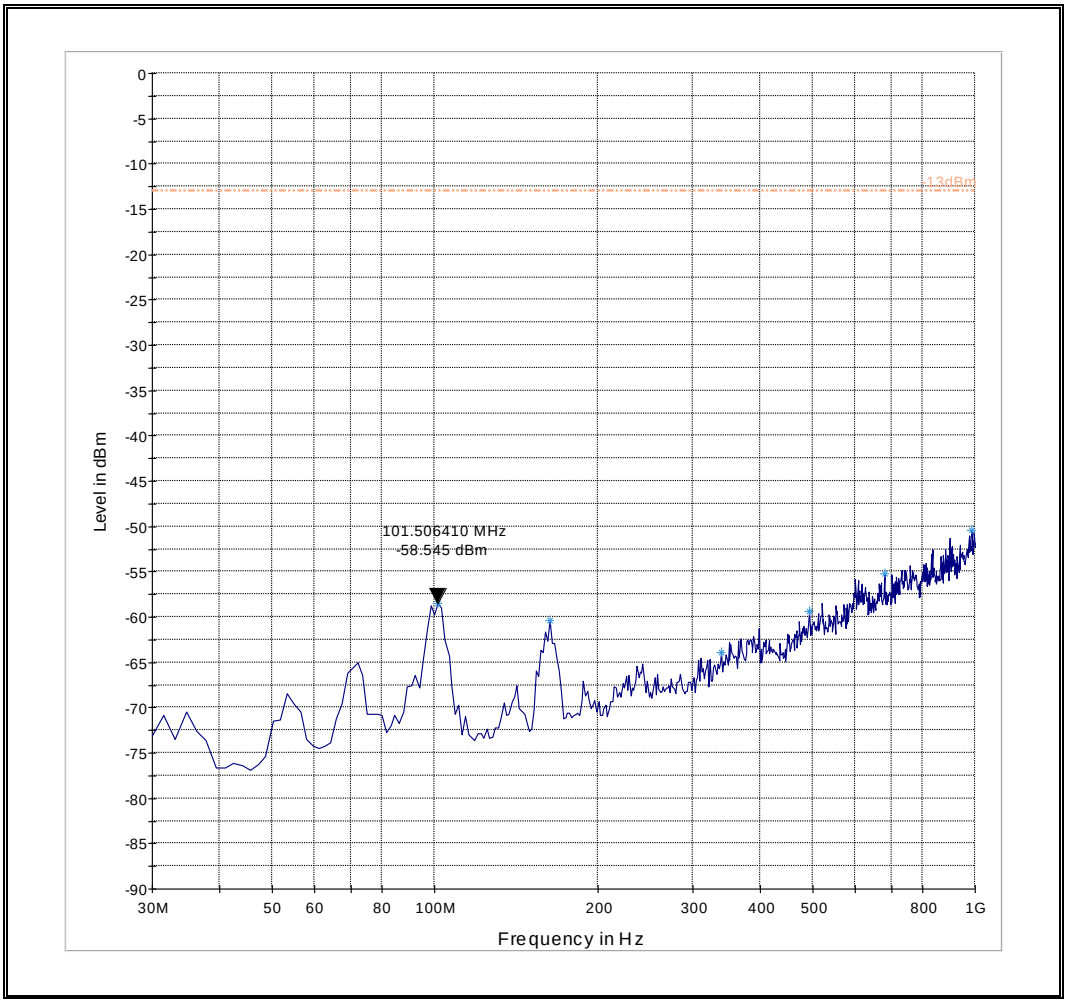


8.16.7 1 - 9 GHz, Ch. High

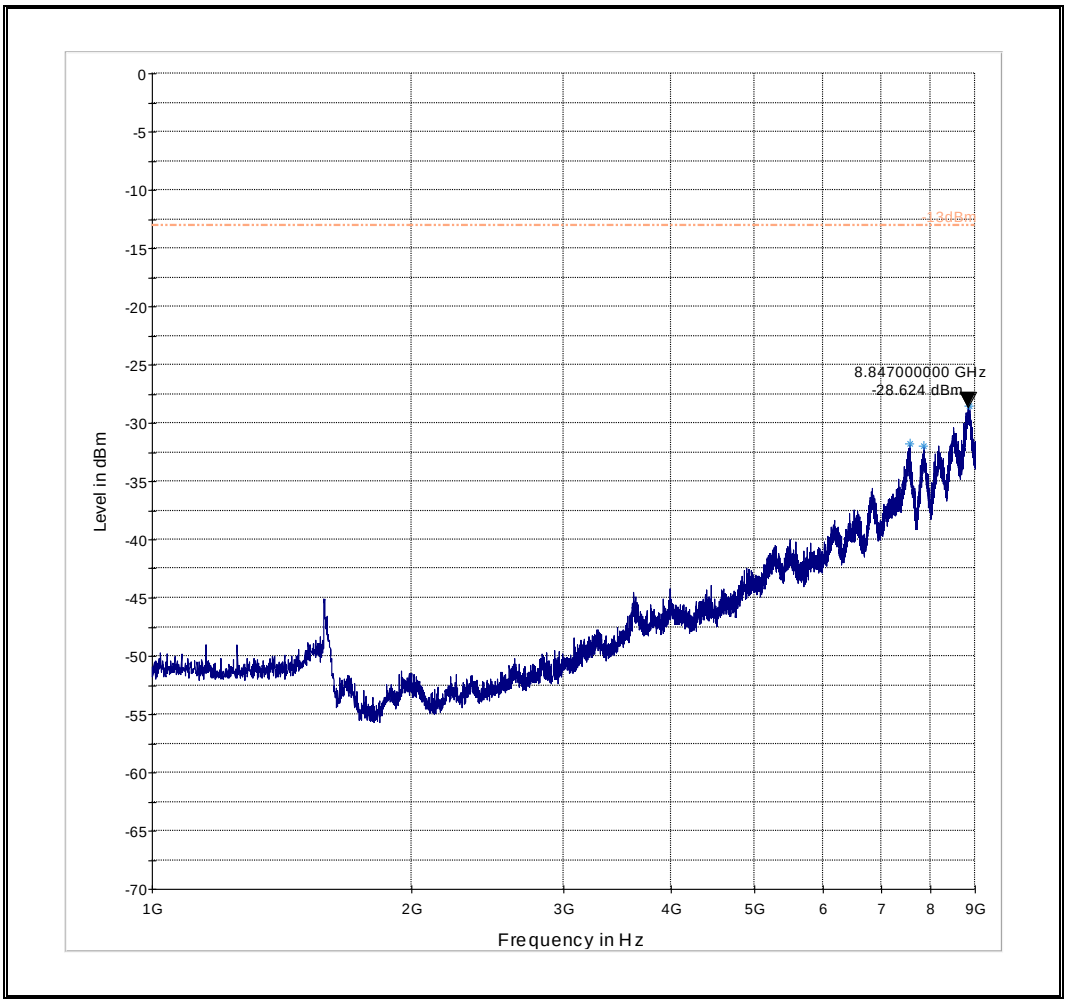


8.17 Measurement Plots LTE 13

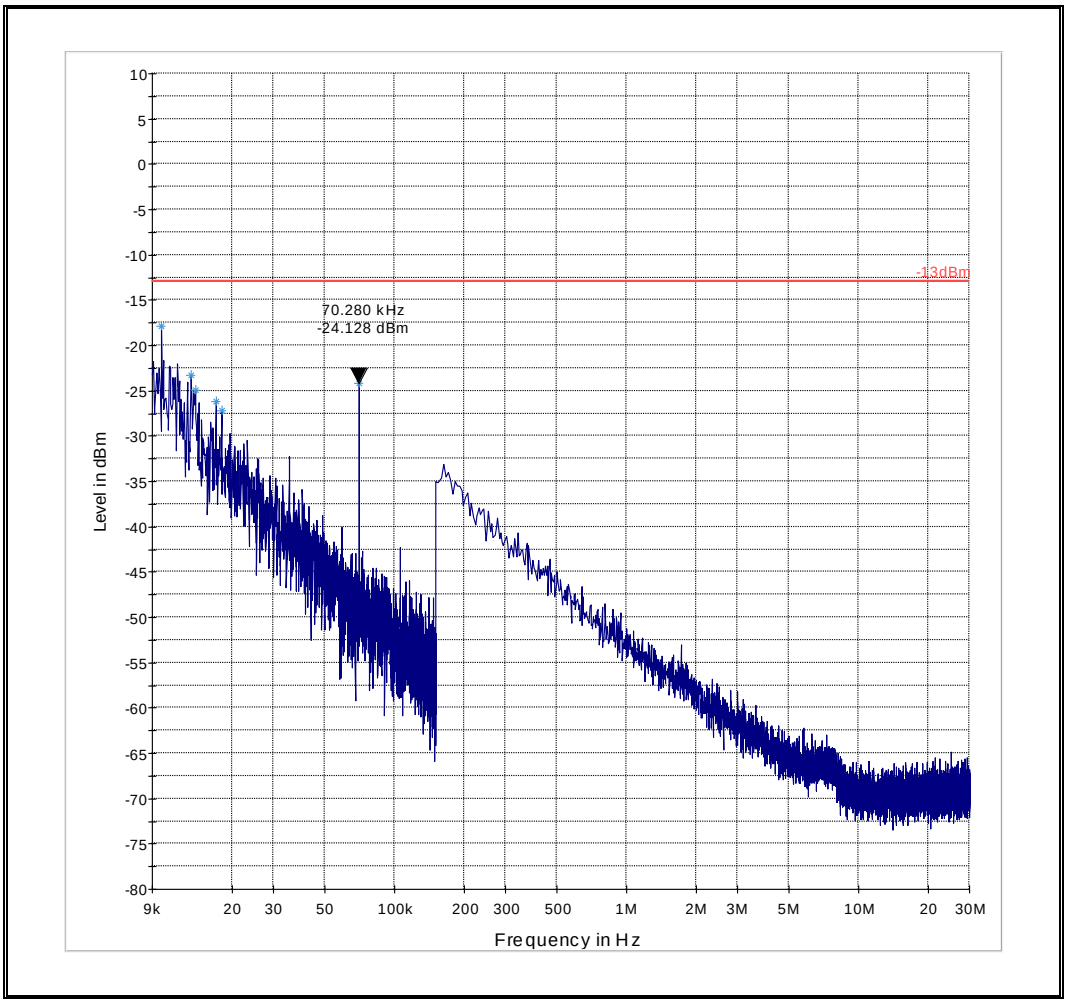
8.17.1 30 MHz - 1 GHz, Ch. Low



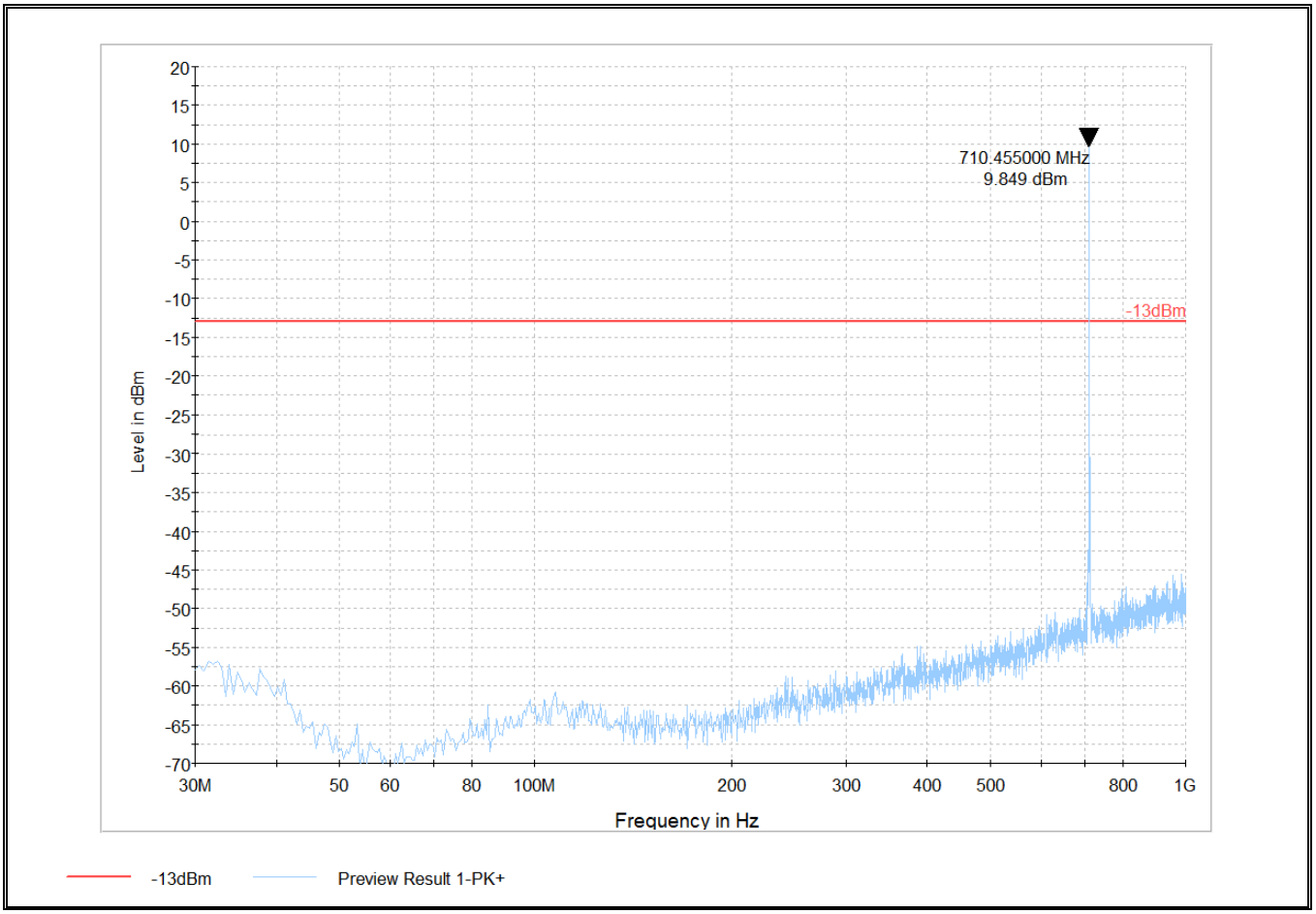
8.17.2 1 - 9 GHz, Ch. Low



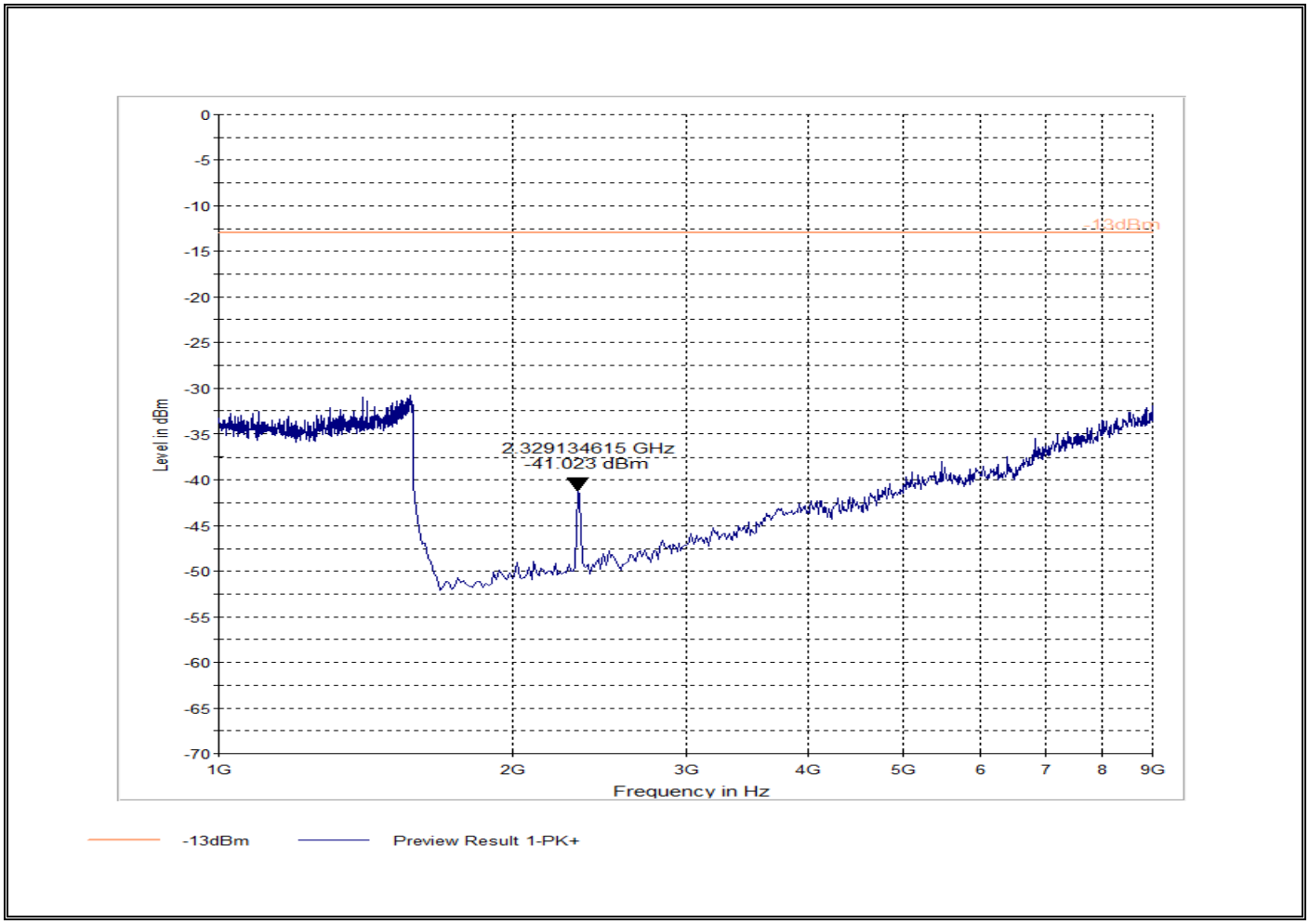
8.17.3 9 KHz - 30 MHz, Ch. Mid



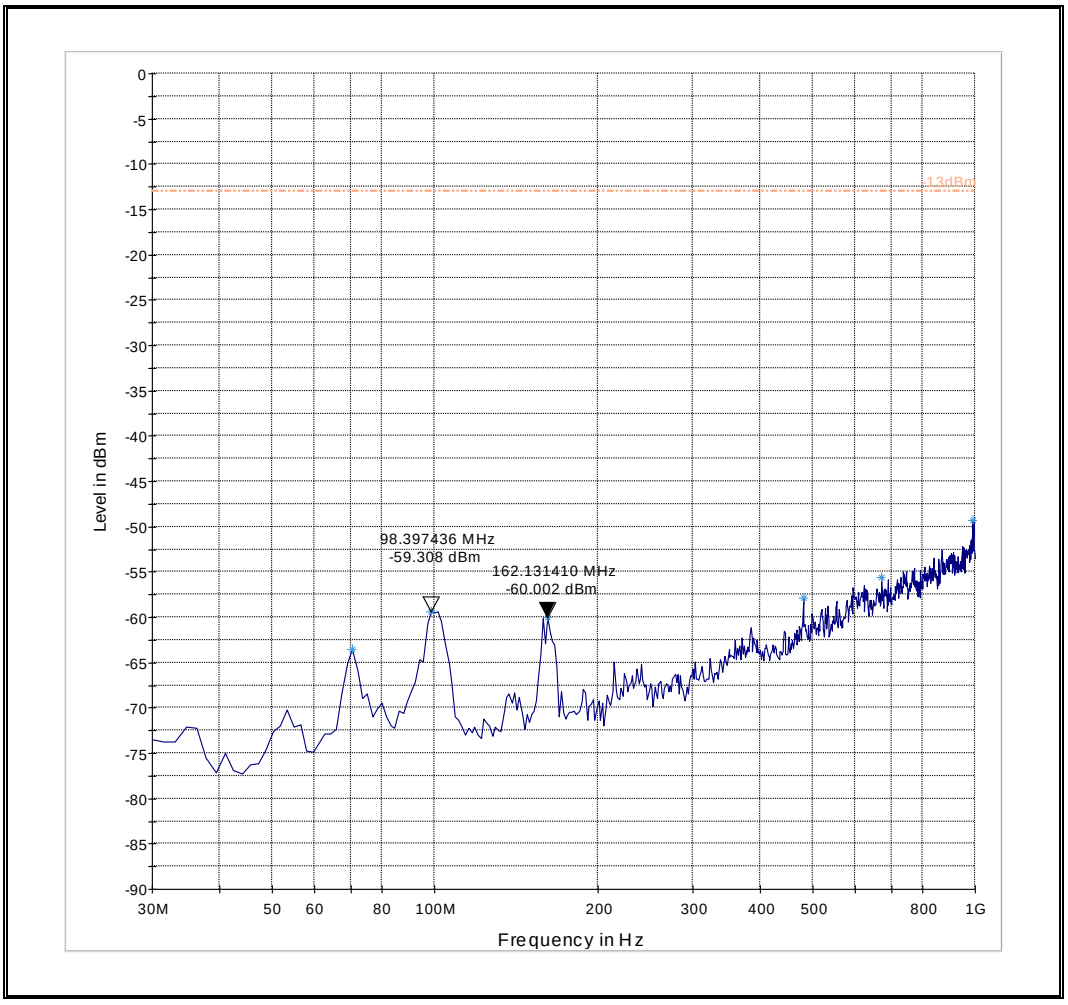
8.17.4 30 MHz – 1 GHz, Ch. Mid



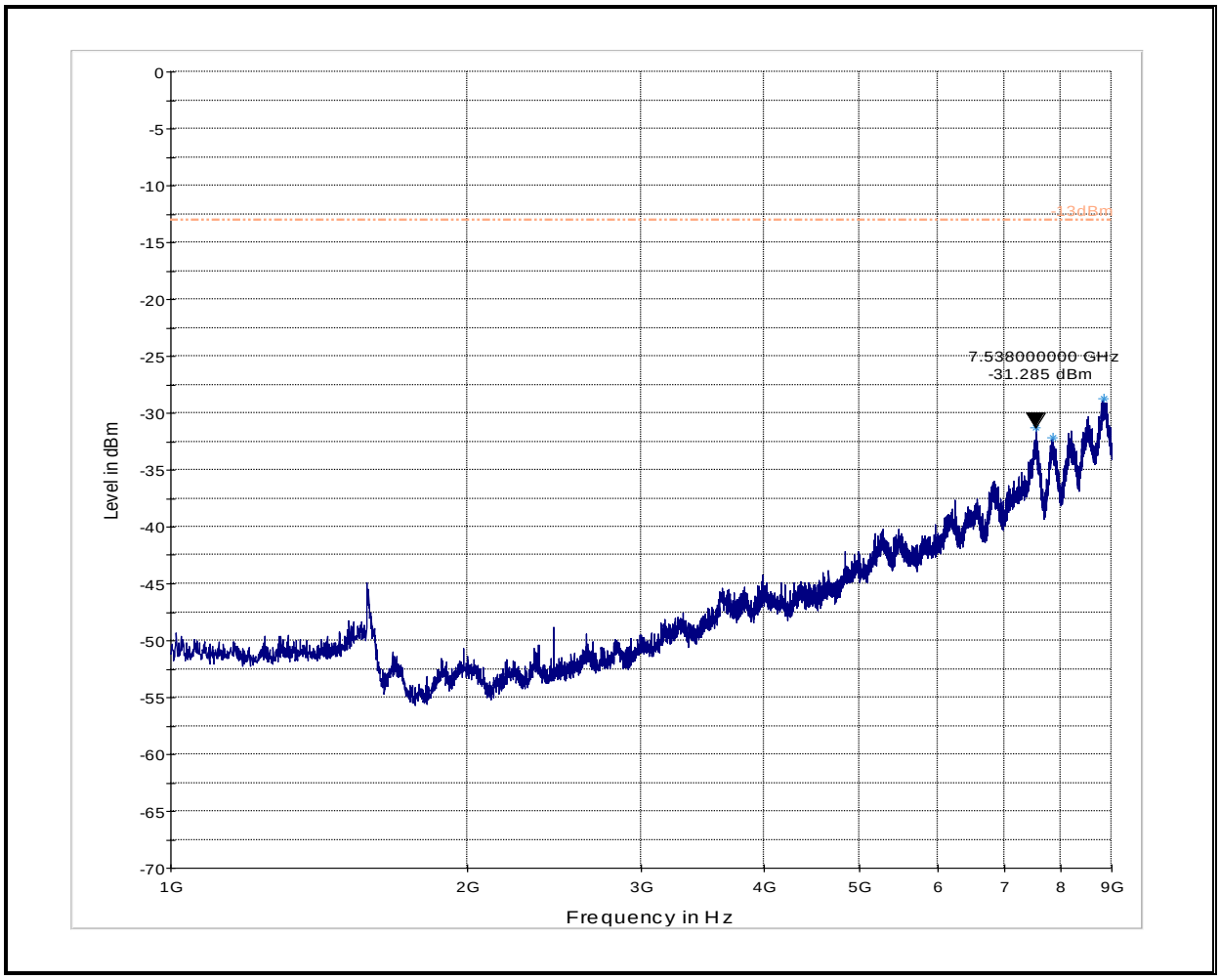
8.17.5 1 – 9 GHz, Ch. Mid



8.17.6 30 MHz - 1 GHz, Ch. High

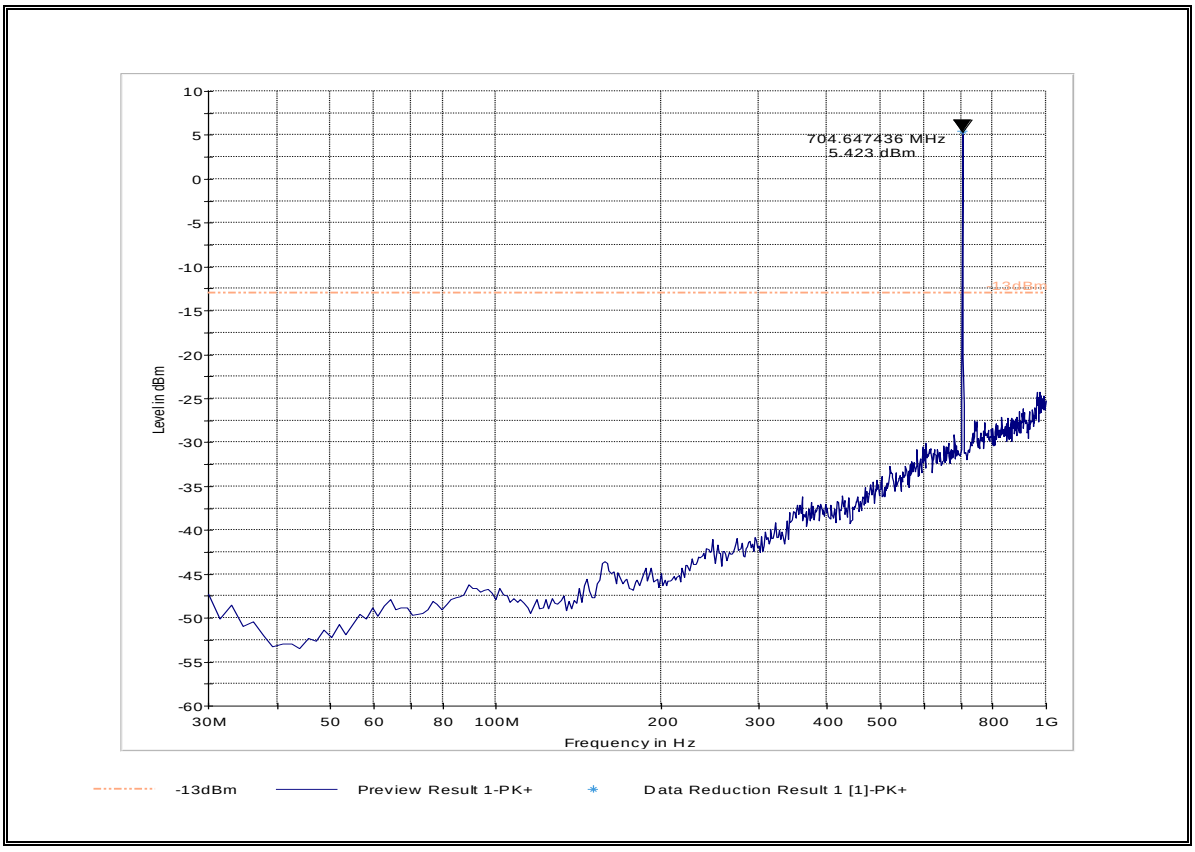


8.17.7 1 - 9 GHz, Ch. High

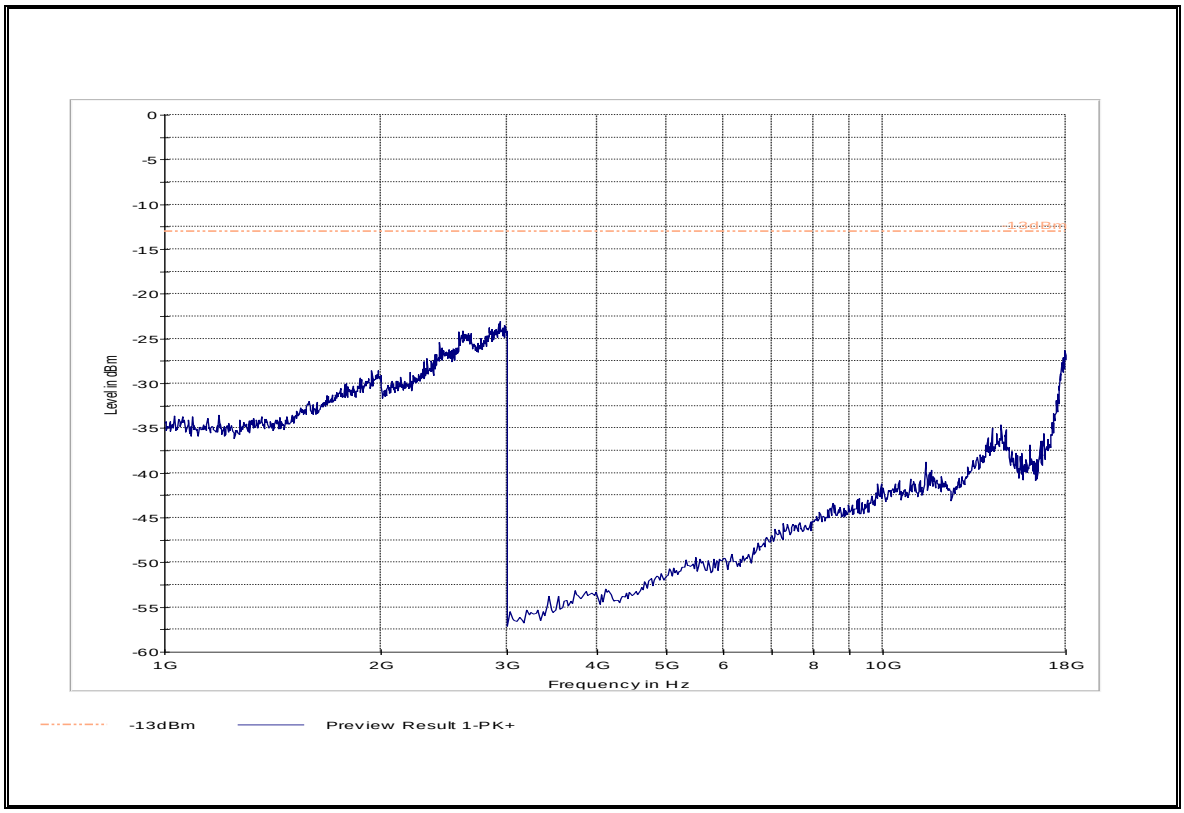


8.18 Measurement Plots LTE 17

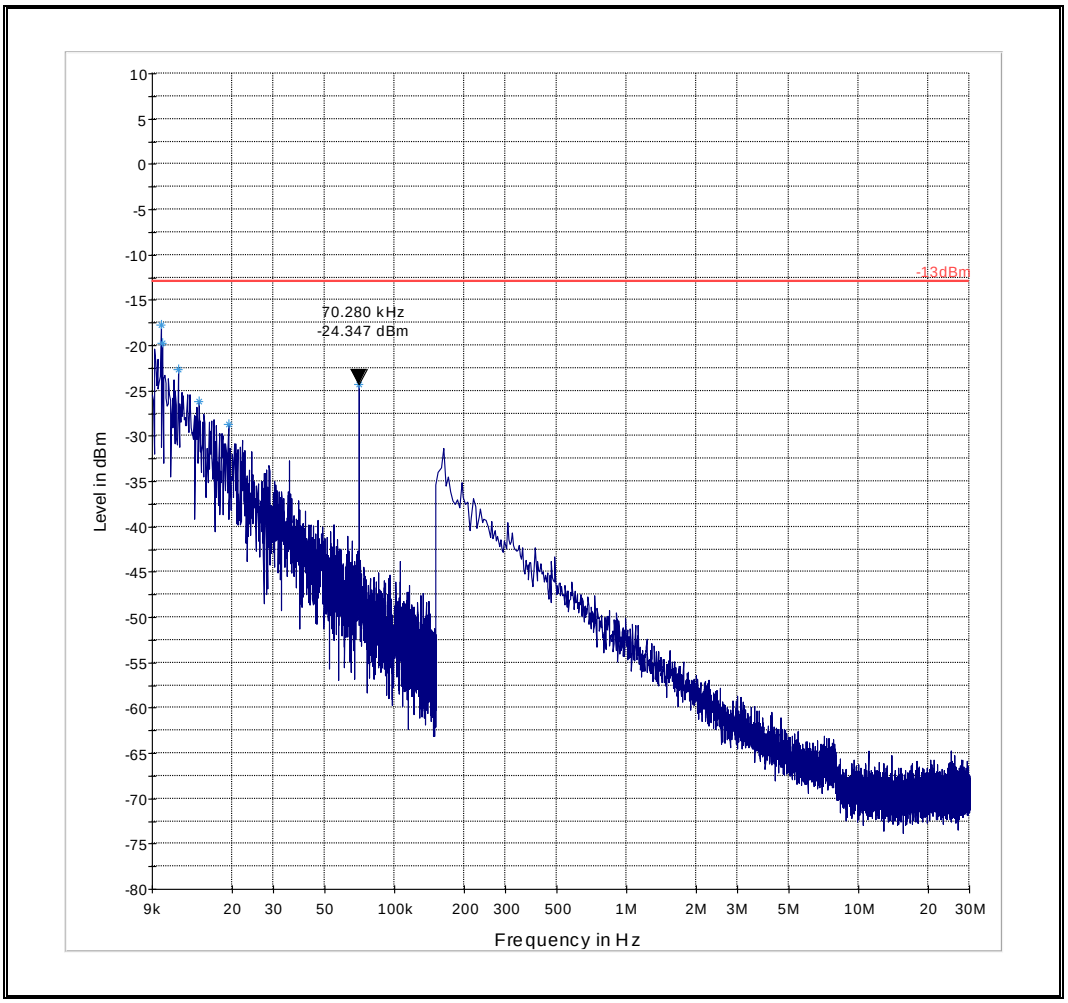
8.18.1 30 MHz - 1 GHz, Ch. Low



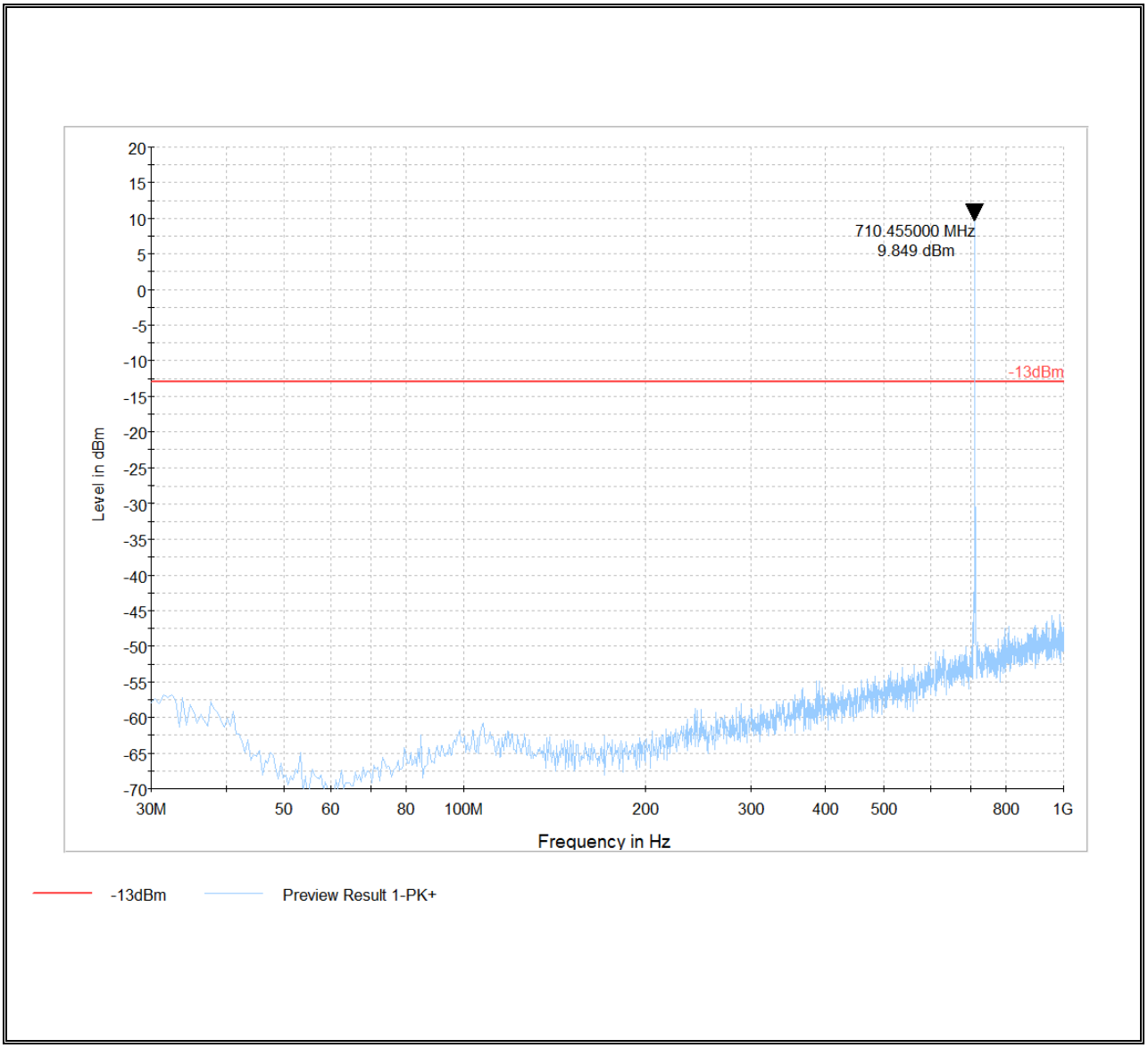
8.18.2 1 - 9 GHz, Ch. Low



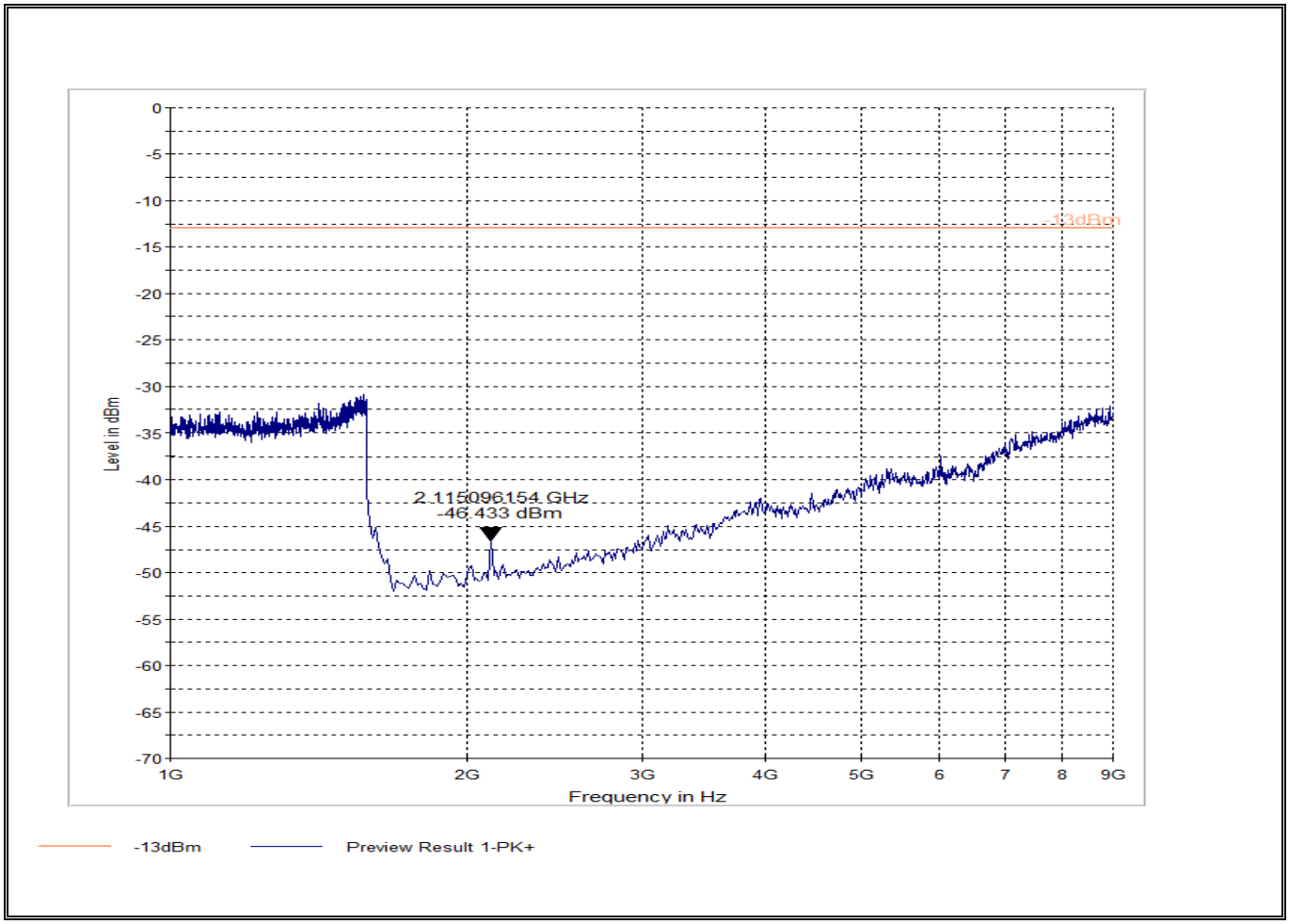
8.18.3 9 KHz - 30 MHz, Ch. Mid



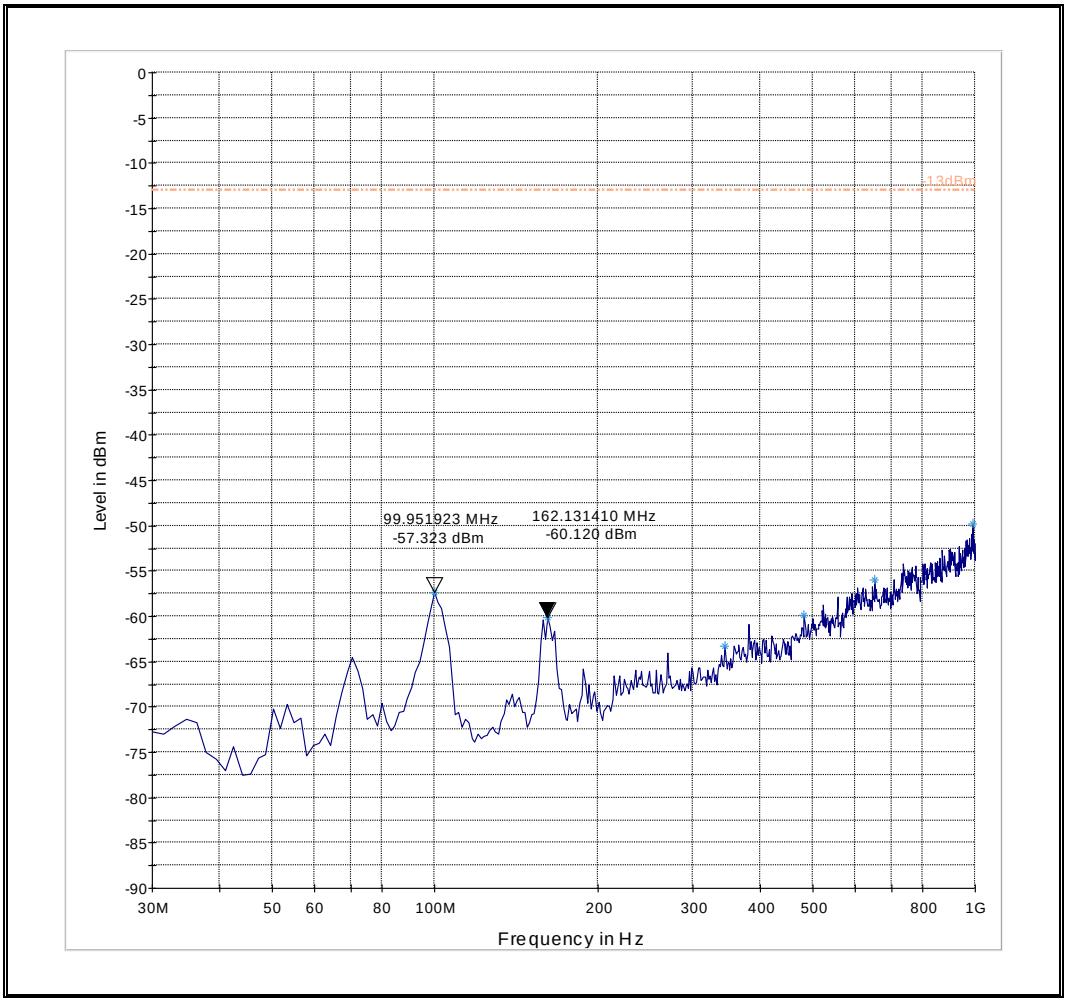
8.18.4 30 MHz- 1 GHz, Ch. Mid



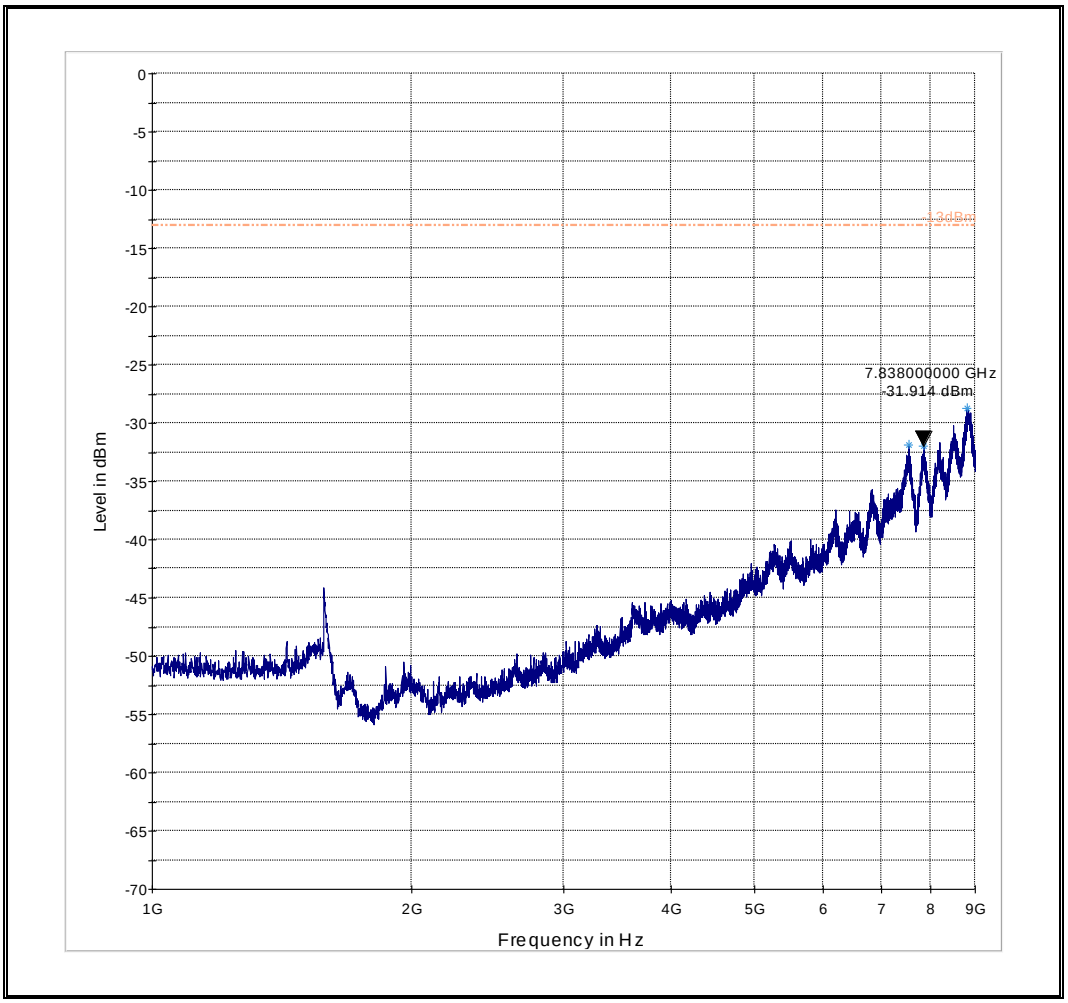
8.18.5 1 – 9 GHz, Ch. Mid



8.18.6 30 MHz - 1 GHz, Ch. High



8.18.7 1 - 9 GHz, Ch. High



9 Test Setup Photos

Setup photos are included in supporting file name: “EMC_21NET-0402-15001_FCC_22_24_27_Setup_Photos.pdf”

10 Test Equipment And Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	6/14/2014
Antenna Loop 6512	Loop Antenna	ETS Lindgren	6512	49838	3 years	3/13/2014
Antenna Horn 3115 SN 35111	Horn Antenna	EMCO	3115	35111	3 years	7/24/2015
Antenna Horn 3116	Horn Antenna	ETS Lindgren	3116	70497	3 years	7/22/2015
LISN FCC-LISN-50-25-2-08	LISN	FCC	FCC-LISN-50-25-2-08	8014	2 Years	3/26/2015
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	2 Years	4/7/2015
Digital Radio Comm. Tester CMU 200 #1	Digital Radio Comm. Tester	R&S	CMU 200 #1	101821	2 Years	7/4/2015
Spectrum Analyzer FSU26 #2	Spectrum Analyzer	R&S	FSU26	200065	3 years	7/4/2015
Thermometer Humidity TM320	Thermometer Humidity	Dickson	TM320	5280063	1 Year	7/29/2015

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 Revision History

Date	Report Name	Changes to report	Report prepared by
March 14, 2016	EMC_21NET-002-15001_FCC_22_24_27_90	First Version	Yu-Chien Ho
July 22, 2016	EMC_21NET-002-15001_FCC_22_24_27_90_REV1	Added justification for mode / channel not tested. Added justification for delta in output power between the results in the modular test report and this test report.	Yu-Chien Ho
August 10, 2016	EMC_21NET-002-15001_FCC_22_24_27_90_REV3	Added missing data for power verification and radiated emissions after CDMA,GPRS,EGPRS added to operational description.	Franz Engert