FCC/IC Test Report

FOR:

Rosemount Aerospace Inc.

Model Name:

8730L1-5

Product Description:

Aircraft Interface Device

FCC ID: 2AEAK8730L1-5
IC ID: 12766A-8730L15

Per:
47 CFR: Part 22, Part 24, Part 27, part 90
RSS-130; RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3, RSS-195 Issue 2, RSS199 Issue 2

Report #: EMC-UTCAE-018-16501_FCC_22_24_27_90
Date: October 20, 2016

***CETECOM* Inc.**
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TABLE OF CONTENTS

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 and 90 and relevant ISED standards RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3, RSS-130, RSS199 Issue 2, RSS-195 Issue 2.

No deviations from the limits were ascertained.

Company Name	Product Description	Model #
Rosemount Aerospace Inc.	Aircraft Interface Device	8730L1-5

Review:

Date	Section	Name	Signature
October 20, 2016	Compliance	Kris Lazarov (EMC Engineer)	Kris Lazarov Digitally signed by Kris Lazarov DN: cn=Kris Lazarov, o, ou, email=kris.lazarov@cetecom.com, c=US

Responsible for evaluation and report:

Date	Section	Name	Signature
October 20, 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: 2016.12.20 15:04:50 -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 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
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Compliance Manager:	Franz Engert
Project Engineer:	Issa Ghanma

2.2 Identification of the Client

Applicant's Name:	Rosemount Aerospace Inc.
Street Address:	14300 Judicial Road
City/Zip Code	Burnsville, MN 55306
Country	USA

2.3 Identification of the Manufacturer

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

3. Equipment Under Test (EUT)

3.1 EUT Specifications

Model #:	8730L1-5
HW Version:	08730-0427-0005/K
SW Version:	08730-0459-0002
FCC-ID:	2AEAK8730L1-5
IC-ID:	12766A-8730L15
HVIN:	8730L1-5
PMN:	Aircraft Interface Device
Product Description	Aircraft Interface Device
Module Information:	Sierra Wireless MC7455, FCC ID: 2AEAK8730L1-5, IC ID: 12766A-8730L15 SW SWI9X30C_02.08.02.00 HW 1.0
Transceiver Technology / Type(s) of Modulation	WCDMA/UMTS: QPSK LTE: QPSK
TX Operating Frequency Ranges (MHz):	WCDMA/UMTS FDD BAND II : 1852.4MHz – 1907.6MHz WCDMA/UMTS FDD BAND IV : 1712.4MHz – 1752.6MHz WCDMA/UMTS FDD BAND V : 826.4MHz – 846.6MHz LTE BAND 25/2 : 1852.5MHz – 1912.3MHz LTE BAND 4 : 1710.7MHz – 1754.3MHz LTE BAND 26/5 : 814.5MHz – 846.5MHz LTE BAND 7 : 2502.5MHz – 2567.5MHz LTE BAND 12 : 699.7MHz – 715.3MHz LTE BAND 13 : 779.5MHz – 784.5MHz LTE BAND 30 : 2307.5MHz – 2312.5MHz LTE BAND 41 : 2498.5 – 2687.5MHz
Maximum AVG Conducted Output Power from module grant:	UMTS II 0.225W = 23.52 dBm UMTS IV 0.221W = 23.44dBm UMTS V 0.224W = 23.50dBm LTE 2/25 0.251W = 24.0dBm LTE 4 0.249W = 23.96dBm LTE 5/26 0.249W = 23.96dBm LTE 7 0.196W = 22.92dBm LTE 12 0.251W = 24.00dBm LTE 13 0.247W = 23.93dBm LTE 30 0.197W = 22.94dBm LTE 41 0.142W = 21.52dBm
Antenna info:	Dipole Blade Omnidirectional Antenna (DBA6927C1-FSMAF) with peak gain of 0.5dBi (698-960 MHz) and 2.2dBi (1710-2700) MHz
Rated Operating Voltage Range:	DC 18V to 32.2V
Operating Temperature Range:	Tlow: -40° C/ Tnom: 25° C/ Tmax: 55° C
Other Radios included in the device	N/A
Sample Revision	☐Prototype ■Production ☐ Pre-Production

3.2 EUT Sample details

EUT #	Radio Serial Number	HW Version	SW Version	Antenna cable	Antenna
1	8730L-2-2	08730-0427-0005/K	08730-0459-0002	Manufacture: BJG Model: 0dtu2	Dipole Blade Omnidirectional Antenna

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
NA	N/A	N/A	N/A	N/A

3.4 Ancillary Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Power supply	3003B	Proteck	H012771

4. Test Sample Configuration

Set-up #	EUT / AE used for set-up	Measurement	Comments
1	EUT #1 + AE #1	Power Verification	Power meter connected to antenna connector through cable.
2	EUT #1 + AE #1	Radiated Spurious Emissions	Antenna from 3.2 connected to EUT with provided 3 foot cables.

5. Subject of Investigations

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the device described under 3 against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 22, 24, 27, 90 and relevant ISED standards RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3, RSS-130, RSS199 Issue 2, RSS-195 Issue 2.
This evaluation is intended to support product certification under FCC-2AEAK870L1-5and IC ID: 12766A-8730L15.

A power-verification was performed on the host device described under 3 with worst case settings from the modular report and all powers were found to be lower than in the report and grant. This verification is deemed sufficient to conclude that conducted measurement results from the modular report are valid for the host device under investigation.

Radiated spurious emissions have been tested to evaluate the integration of the module into the host product.

6. Measurement

6.1 Dates of Testing:

August 18, 2016 – September 21, 2016

6.2 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 3000 MHz	±2.0 dB (Biconilog Antenna)
3 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

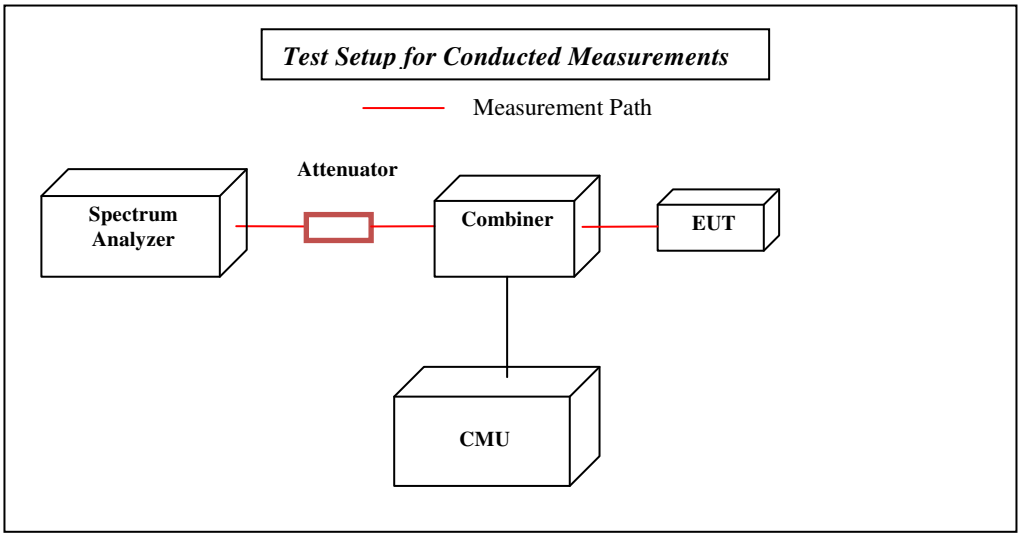
6.3 Environmental Conditions during Testing:

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

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

6.4 Conducted measurement setup

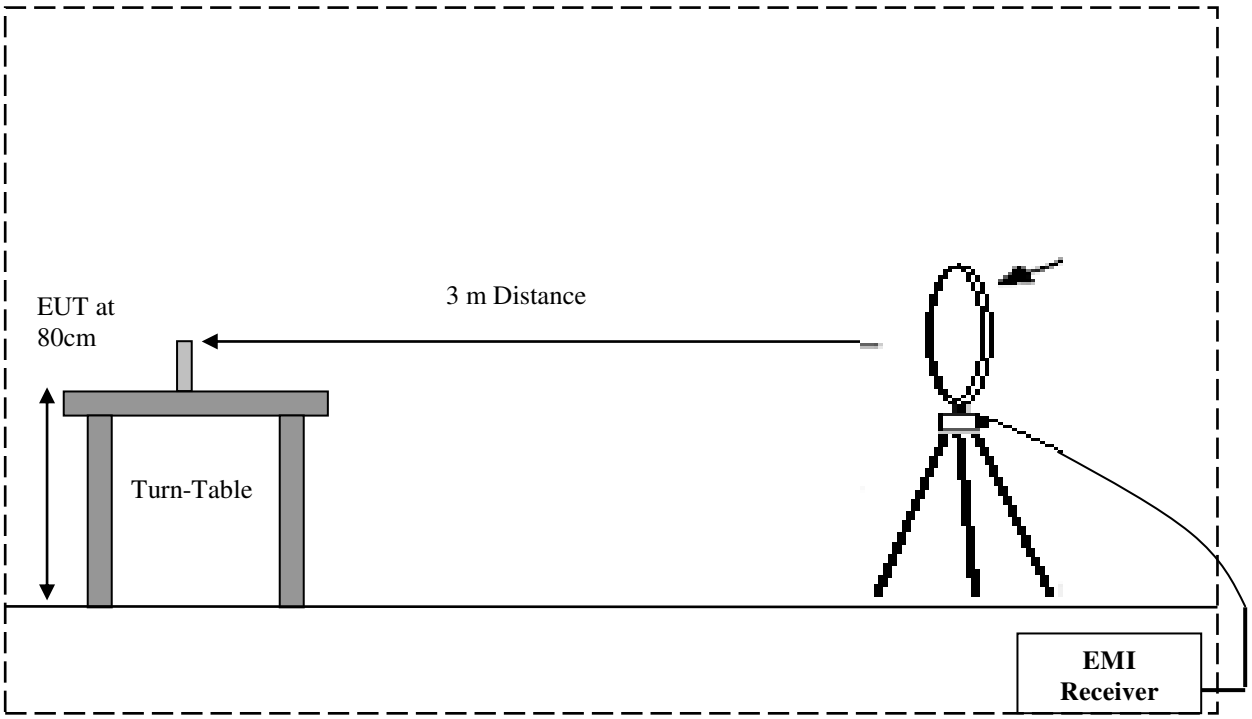
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v02r02 – "Measurement Guidance for Certification of Licensed Digital Transmitters" and according to relevant parts of TIA-603C 2004 as detailed below.



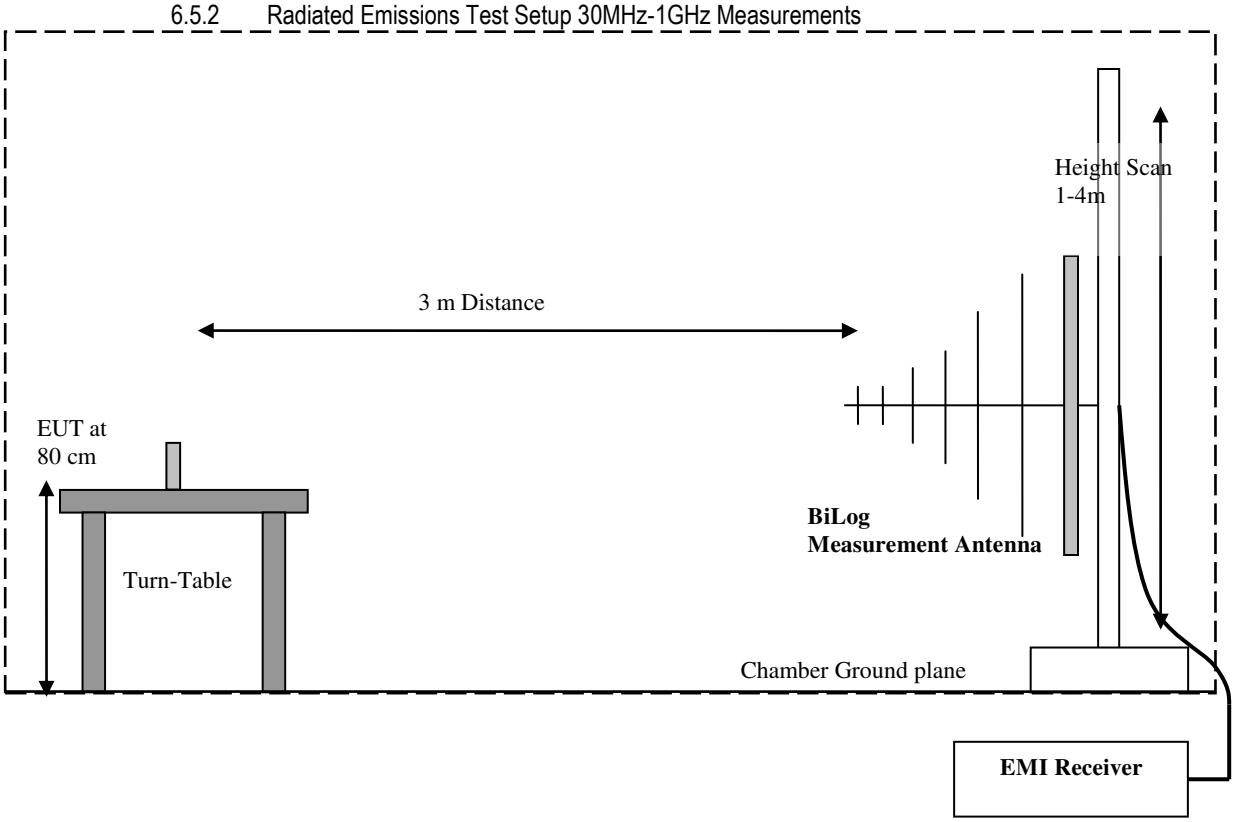
6.5 Radiated Measurement setup

- 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 3 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

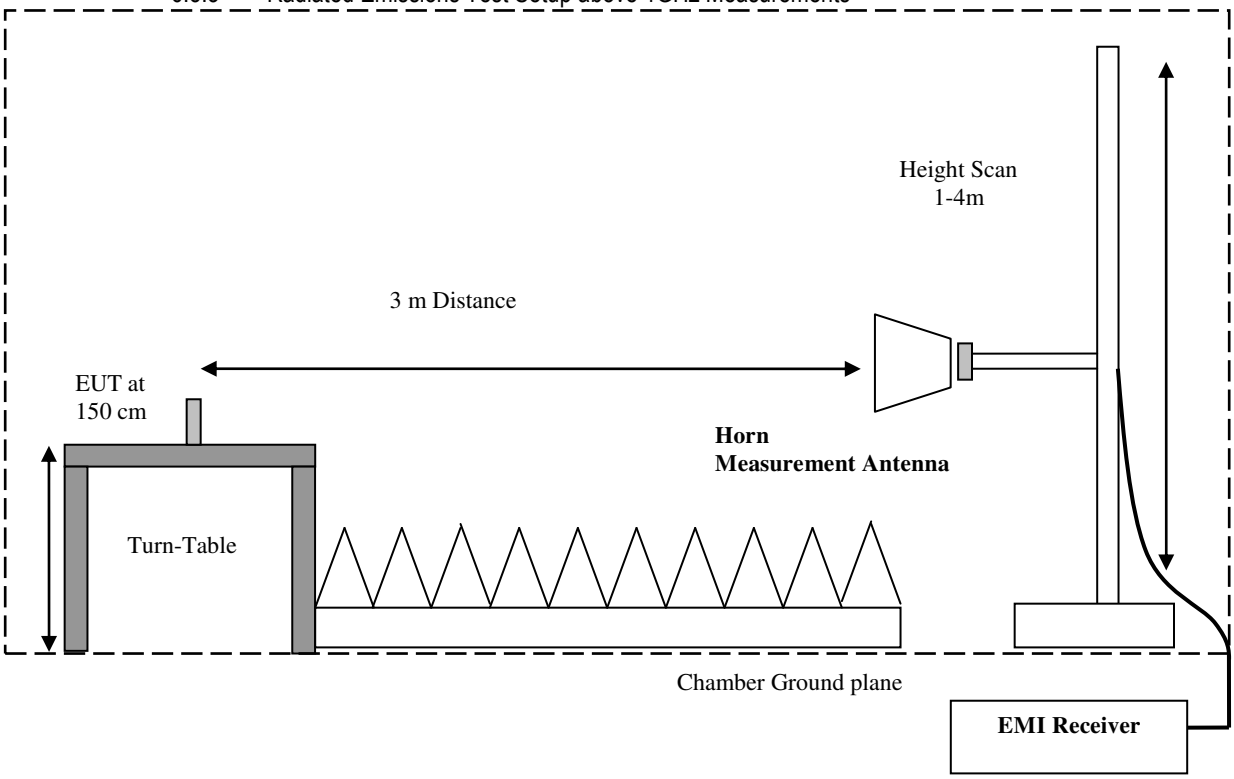
6.5.1 Radiated Emissions Test Setup below 30MHz Measurements



6.5.2 Radiated Emissions Test Setup 30MHz-1GHz Measurements



6.5.3 Radiated Emissions Test Setup above 1GHz Measurements



7 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

8 Measurement Results Summary

8.1 FCC 22,24,27,90:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §22.913 (a); §24.232 (a); §27.50 (a); §27.50 (b); §27.50 (c); §27.50 (d); §27.50 (h); §90.635(b);	RF Output Power	Nominal	LTE QPSK, WCDMA RMC12.2kbps	■	☐	☐	☐	Complies (Note 2)
	Frequency Stability	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
	Occupied Bandwidth	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
	Band Edge Compliance	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
	Conducted Spurious Emissions	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
§2.1053; §22.917(a); §24.238 (a); §27.53 (a); §27.53 (h); §27.53 (m); §27.53(g); §27.53(c); §90.210;	Radiated Spurious Emissions	Nominal	LTE QPSK, WCDMA RMC12.2kbps	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from the certification of the module after a power verification was performed on the worst case settings of the modular report (Report No.: B15W50446-FCC-RF).

8.2 Canada RSS132, RSS133, RSS

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
RSS-130 4.4 RSS-132 Issue 3-5.4 RSS-133 Issue 6-6.4 RSS-139 Issue 3-6.4 RSS-195 Issue 2-5.5 RSS-199 Issue 2-4.4	RF Output Power	Nominal	LTE QPSK, WCDMA RMC12.2kbps	■	☐	☐	☐	Complies (Note 2)
	Frequency Stability	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
	Occupied Bandwidth	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
	Band Edge Compliance	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
	Conducted Spurious Emissions	Nominal	LTE QPSK, WCDMA RMC12.2kbps	☐	☐	☐	■	Note 2
RSS-130-4.6 RSS-132 Issue 3-5.5 RSS-133 Issue 6–6.5 RSS-139 Issue 3-6.5 RSS-195 Issue 2-5.6 RSS-199 Issue 2-4.6	Radiated Spurious Emissions	Nominal	LTE QPSK, WCDMA RMC12.2kbps	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: Leveraged from the certification of the module after a power verification was performed on the worst case settings of the modular report (Report No.: B15W50446-FCC-RF).

9 RF Output Power

9.1 Reference

Measurement according to KDB 971168 D01 Power Meas License Digital Systems v02r02, and according to TIA-603C 2004- 2.2.12

9.2 Limits:

9.2.1 GSM850, UMTS V, LTE 5 (824-849MHz)

FCC Part 22.913
The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts (38.45dBm).

EIRP Limit 40.6dBm

RSS-132 Issue 3
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. Refer to SRSP-503 for base station e.i.r.p. limits.
In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

EIRP Limit 40.6dBm

9.2.2 GSM1900, UMTS II, LTE2 (1850-1910MHz)

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.

EIRP Limit 33dBm

RSS-133 Issue 6
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts.
In addition, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.
SRSP 510 - 5.1.2 Mobile Stations
Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

EIRP Limit 33dBm

9.2.3 UMTS IV, LTE 4 (1710-1785MHz)

FCC Part 27C.50 (d)
(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.
EIRP Limit 30dBm

RSS-139 Issue 3
The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt.
Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the band 2110-2180 MHz.
In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.
EIRP Limit 30dBm

9.2.4 LTE 12 (699-716MHz)

FCC Part 27C.50 (c)
(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
EIRP Limit 37dBm

RSS-130
The transmitter output power shall be measured in terms of average power.
For base and fixed equipment, refer to SRSP-518 for power limits.
The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.
In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

EIRP Limit 47dBm (mobile equipment or for outdoor fixed subscriber equipment)
EIRP Limit 37dBm (for portable equipment or for indoor fixed subscriber equipment)

9.2.5 LTE 13 (777-787MHz)

FCC Part 27C.50 (b)
(b) The following power and antenna height limits apply to transmitters operating in the 746-758 MHz, 775-788 MHz and 805-806 MHz bands:
(9) Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands are limited to 30 watts ERP.
EIRP Limit 47dBm

(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.
EIRP Limit 37dBm

RSS-130
The transmitter output power shall be measured in terms of average power.
For base and fixed equipment, refer to SRSP-518 for power limits.
The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.
In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.
EIRP Limit 47dBm (mobile equipment or for outdoor fixed subscriber equipment)
EIRP Limit 37dBm (for portable equipment or for indoor fixed subscriber equipment)

9.2.6 LTE 7 (2500-2570MHz)

FCC Part 27C.50 (h)
(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
EIRP Limit 33dBm

RSS-199 Issue 2
The transmitter output power shall be measured using a peak detector.
For base station equipment, refer to SRSP-517 for the e.i.r.p.
For mobile subscriber equipment, the e.i.r.p. shall not exceed 2 watts. For fixed subscriber equipment, the transmitter output power shall not exceed 2 watts and the e.i.r.p. shall be limited to 40 watts.
EIRP Limit 33dBm with peak detector

9.2.7 LTE26 (814-849MHz)

FCC Part 90.635 (b)
The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).
EIRP Limit 50dBm

Not licensed in Canada

9.2.8 LTE 30 (2305-2315MHz)

FCC Part 27.50 (a)
(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.
EIRP Limit 24dBm

RSS-195 Issue 2
The e.i.r.p. of mobile or portable equipment transmitting in the band 2305-2315 MHz or the band 2350-2360 MHz, employing 3GPP LTE (Third Generation Partnership Project Long Term Evolution) standards, shall not exceed 250 mW within any 5 MHz bandwidth. For other technologies, the e.i.r.p. shall not exceed 50 mW within any 1 MHz bandwidth.
EIRP Limit 24dBm

9.2.9 LTE 41 (2496-2690MHz)

FCC Part 27C.50 (h)
(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
EIRP Limit 33dBm

RSS-199 Issue 2
The transmitter output power shall be measured using a peak detector.
For base station equipment, refer to SRSP-517 for the e.i.r.p.
For mobile subscriber equipment, the e.i.r.p. shall not exceed 2 watts. For fixed subscriber equipment, the transmitter output power shall not exceed 2 watts and the e.i.r.p. shall be limited to 40 watts.
EIRP Limit 33dBm with peak detector

9.3 Summary Measurement Result:

Band	Frequency (MHz)	Channel	Measured conducted RMS power [dBm] uncorrected	Cable Loss Correction [dB]	Measured conducted RMS power [dBm] corrected	Maximum RMS conducted power from grant [dBm]	Margin to grant (dB)	Antenna Gain	EIRP RMS [dBm] with worst case gain	Limit [dBm]
LTE 2 & 25	1900	Mid	14	7.7	21.7	24	2.3	2.2	23.9	33
LTE 4	1700	Mid	14.5	7.4	21.9	23.96	2.06	2.2	24.1	30
LTE 5	850	Mid	17	6	23	23.96	0.96	0.5	23.5	38.45
LTE 26	850	Mid	17	6	23	23.96	0.96	0.5	23.5	50
LTE 7	2530	Low	11	8.3	19.3	22.92	3.62	2.2	21.5	33
LTE 12	700	Low	17.5	5.9	23.4	24.0	0.6	0.5	23.9	37
LTE 13	780	Mid	17.5	6	23.5	23.93	0.43	0.5	24	47
LTE 30	2300	Mid	13.25	8.2	21.45	22.94	1.49	2.2	**23.65**	24
LTE 41	2600	High	11.5	8.5	20	21.52	1.52	2.2	22.2	33
UMTS FDD II	1900	Low	14.63	7.7	22.33	23.52	1.19	2.2	24.53	33
UMTS FDD IV	1900	Low	15.18	7.4	22.58	23.44	0.86	2.2	24.78	30
UMTS FDD V	850	High	17.18	6	23.18	23.50	0.32	0.5	23.68	38.45

10 Radiated Spurious Emissions

10.1 Reference

Measurement according to KDB 971168 D01 Power Meas License Digital Systems v02r02, and according to TIA-603C 2004- 2.2.12

Spectrum Analyzer Settings

Frequency Range	9kHz – 150kHz	150kHz – 30MHz	30MHz – 1 GHz	1 – 40 GHz
Resolution Bandwidth	200Hz	9kHz	100 kHz	1 MHz
Video Bandwidth	1kHz	30kHz	100 kHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

10.2 Limits:

10.2.1 UMTS II, LTE 2

FCC Part 24.238 (a)

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.

RSS133- 6.5.1

Equipment shall comply with the limits in (i) and (ii) below.

In the 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 (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p(watts).

After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 $\log_{10}$p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

EIRP Limit -13dBm

10.2.2 UMTS IV, LTE 4

FCC 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)

RSS-136-6.5

Equipment shall comply with the limits in (i) and (ii) below.

In the 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 (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).

After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

EIRP Limit -13dBm

10.2.3 UMTS V, LTE 5

FCC Part 22.917 (a)

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.

RSS-132 - 5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p (watts).

After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

EIRP Limit -13dBm

10.2.4 LTE 7 (2500-2570MHz)

FCC Part 27.53 (m)
(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
EIRP Limit -10dBm closer than 5MHz from band edges
EIRP Limit -13dBm from 5MHz to nominal bandwidth of signal or 6MHz whichever is greater
EIRP Limit -25dBm further away than nominal bandwidth from band edges or 6MHz whichever is greater

RSS-199 Issue 2-4.6
In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth is allowed to be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1%/2% of the occupied bandwidth, as applicable.
Equipment shall comply with the following unwanted emissions limits:
For base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least 43 + 10 log10 p
For mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
40 + 10 log10 p from the channel edges to 5 MHz away,
43 + 10 log10 p between 5 MHz and X MHz from the channel edges, and
55 + 10 log10 p at X MHz and beyond from the channel edges.
in addition, the attenuation shall be not be less than 43 + 10 log10 p on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log10 p at or below 2490.5 MHz.
where p in (a) and (b) is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.
EIRP Limit -10dBm closer than 5MHz from band edges
EIRP Limit -13dBm from 5MHz to nominal bandwidth of signal or 6MHz whichever is greater
EIRP Limit -25dBm further away than nominal bandwidth from band edges or 6MHz whichever is greater

10.2.5 LTE 12 (699-716MHz)

FCC Part 27.53(g)
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
EIRP Limit -13dBm for mobile and portable

RSS-130-4.6
4.6.1 The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.
4.6.2 In addition to the limit outlined in Section 4.6.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:
(a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
(i) 76 + 10 log10 p (watts), dB, for base and fixed equipment, and
(ii) 65 + 10 log10 p (watts), dB, for mobile and portable equipment.
(b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed −70 dBW/MHz for wideband signal and −80 dBW for discrete emission with bandwidth less than 700 Hz.
EIRP Limit -13dBm for mobile and portable

10.2.6 LTE13 (777-787MHz)

FCC Part 27.53(c)
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
EIRP Limit -13dBm for mobile and portable

RSS-130-4.6
4.6.1 The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.
4.6.2 In addition to the limit outlined in Section 4.6.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:
(a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
(i) 76 + 10 log10 p (watts), dB, for base and fixed equipment, and
(ii) 65 + 10 log10 p (watts), dB, for mobile and portable equipment.
(b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed −70 dBW/MHz for wideband signal and −80 dBW for discrete emission with bandwidth less than 700 Hz.
EIRP Limit -13dBm for mobile and portable

10.2.7 LTE 26 (814-849MHz)

FCC Part 90.210
(g) Emission Mask G. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least 116 log (fd/6.1) dB, or 50 + 10 log (P) dB, or 70 dB, whichever is the lesser attenuation;
(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Not licensed in Canada

10.2.8 LTE 30 (2305-2315MHz)

FCC Part 27.53 (a)
(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, and not less than 75 + 10 log (P) dB on all frequencies between 2320 and 2345 MHz;
EIRP Limit -13dBm except 2320 <f<2345
EIRP Limit -37dBm 2320 <f<2345

RSS-195 Issue 2-5.6
EIRP Limit -13dBm except 2200 <f<2395
EIRP Limit -37dBm 2200 <f<2395

Table 2 — Unwanted Emissions for Mobile, Portable and Low-Power Fixed Subscriber Equipment

Frequency (MHz)	Attenuation (dB)
<2200	$43 + 10 \log_{10}(p)$
2200 - 2288	$70 + 10 \log_{10}(p)$
2288 - 2292	$67 + 10 \log_{10}(p)$
2292 - 2296	$61 + 10 \log_{10}(p)$
2296 - 2300	$55 + 10 \log_{10}(p)$
2300 - 2305	$43 + 10 \log_{10}(p)$
2305 - 2320	$43 + 10 \log_{10}(p)$ Footnote Note
2320 - 2324	$55 + 10 \log_{10}(p)$
2324 - 2328	$61 + 10 \log_{10}(p)$
2328 - 2337	$67 + 10 \log_{10}(p)$
2337 - 2341	$61 + 10 \log_{10}(p)$
2341 - 2345	$55 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)$ Footnote Note
2360 - 2365	$43 + 10 \log_{10}(p)$
2365 - 2395	$70 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

10.2.9 LTE 41 (2496-2690MHz)

FCC Part 27.53 (m)

(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

EIRP Limit -10dBm closer than 5MHz from band edges
EIRP Limit -13dBm from 5MHz to nominal bandwidth of signal or 6MHz whichever is greater
EIRP Limit -25dBm further away than nominal bandwidth from band edges or 6MHz whichever is greater

RSS-199 Issue 2-4.6

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth is allowed to be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1%/2% of the occupied bandwidth, as applicable.

Equipment shall comply with the following unwanted emissions limits:

For base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least 43 + 10 log10 p

For mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:

40 + 10 log10 p from the channel edges to 5 MHz away,

43 + 10 log10 p between 5 MHz and X MHz from the channel edges, and

55 + 10 log10 p at X MHz and beyond from the channel edges.

in addition, the attenuation shall be not be less than 43 + 10 log10 p on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log10 p at or below 2490.5 MHz.

where p in (a) and (b) is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

EIRP Limit -10dBm closer than 5MHz from band edges
EIRP Limit -13dBm from 5MHz to nominal bandwidth of signal or 6MHz whichever is greater
EIRP Limit -25dBm further away than nominal bandwidth from band edges or 6MHz whichever is greater

10.3 Test plan

Radiated Emissions for UMTS measured at RMC12.2k because this setting delivers maximum power according to report on file for FCC-ID.

Radiated Emissions for LTE between 30MHz and 18GHz measured at 1RB Starting Low on Low channel, Mid on Mid channel, High on High channel as this corresponds to maximum channel power according to report on file for FCC-ID.

Frequencies below 30MHz and frequencies above 18GHz have only been investigated for mid channel. For the frequency range between 1GHz and 18GHz low mid and high channel have been investigated.

10.4 Summary Measurement result:

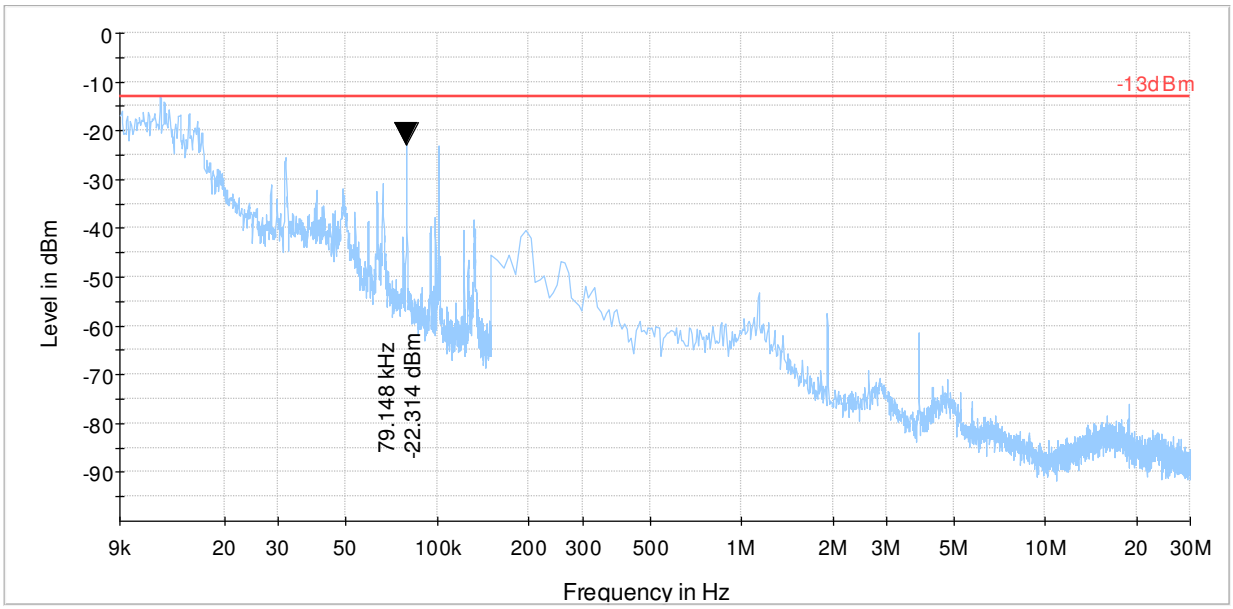
Channel	EUT Operating Mode	Scan Frequency	Limit [dBm] converted to 3m	Result	Frequency of highest emission [MHz]	Highest Emission [dBm]
Mid	WCDMA FDD II	9kHz – 30MHz	-13	Pass	0.079	-22
Low	WCDMA FDD II	30MHz – 1 GHz	-13	Pass	750.1	-58.3
Mid	WCDMA FDD II	30MHz – 1 GHz	-13	Pass		
High	WCDMA FDD II	30MHz – 1 GHz	-13	Pass	374.9	-60.3
Low	WCDMA FDD II	1GHz – 3GHz	-13	Pass		
Mid	WCDMA FDD II	1GHz – 3GHz	-13	Pass		
High	WCDMA FDD II	1GHz – 3GHz	-13	Pass		
Low	WCDMA FDD II	3GHz – 18GHz	-13	Pass		
Mid	WCDMA FDD II	3GHz – 18GHz	-13	Pass		
High	WCDMA FDD II	3GHz – 18GHz	-13	Pass		
Mid	WCDMA FDD II	18GHz – 40GHz	-13	Pass		
Mid	WCDMA FDD IV	9kHz – 30MHz	-13	Pass	0.079	-22
Low	WCDMA FDD IV	30MHz – 1 GHz	-13	Pass	374.9	-58.9
Mid	WCDMA FDD IV	30MHz – 1 GHz	-13	Pass	749.9	-58.6
High	WCDMA FDD IV	30MHz – 1 GHz	-13	Pass		
Low	WCDMA FDD IV	1GHz – 3GHz	-13	Pass		
Mid	WCDMA FDD IV	1GHz – 3GHz	-13	Pass		
High	WCDMA FDD IV	1GHz – 3GHz	-13	Pass		
Low	WCDMA FDD IV	3GHz – 18GHz	-13	Pass	15800	-46.1
Mid	WCDMA FDD IV	3GHz – 18GHz	-13	Pass		
High	WCDMA FDD IV	3GHz – 18GHz	-13	Pass		
Mid	WCDMA FDD IV	18GHz – 40GHz	-13	Pass		
Mid	WCDMA FDD V	9kHz – 30MHz	-13	Pass	0.079	-22
Low	WCDMA FDD V	30MHz – 1 GHz	-13	Pass		
Mid	WCDMA FDD V	30MHz – 1 GHz	-13	Pass		
High	WCDMA FDD V	30MHz – 1 GHz	-13	Pass		
Low	WCDMA FDD V	1GHz – 3GHz	-13	Pass		
Mid	WCDMA FDD V	1GHz – 3GHz	-13	Pass		
High	WCDMA FDD V	1GHz – 3GHz	-13	Pass	2400	-42.5
Low	WCDMA FDD V	3GHz – 18GHz	-13	Pass	15800	-45.7
Mid	WCDMA FDD V	3GHz – 18GHz	-13	Pass		
High	WCDMA FDD V	3GHz – 18GHz	-13	Pass		
Mid	LTE 25/2	9kHz – 30MHz	-13	Pass	.079	-23
Low	LTE 25/2	30MHz – 1 GHz	-13	Pass	374.9	-61.4
Mid	LTE 25/2	30MHz – 1 GHz	-13	Pass	749.9	-57.7
High	LTE 25/2	30MHz – 1 GHz	-13	Pass	749.9	-59.5
Low	LTE 25/2	1GHz – 3GHz	-13	Pass		
Mid	LTE 25/2	1GHz – 3GHz	-13	Pass		

High	LTE 25/2	1GHz – 3GHz	-13	Pass		
Low	LTE 25/2	3GHz – 18GHz	-13	Pass		
Mid	LTE 25/2	3GHz – 18GHz	-13	Pass		
High	LTE 25/2	3GHz – 18GHz	-13	Pass		
Mid	LTE 25/2	18GHz – 40GHz	-13	Pass		
Mid	LTE 4	9kHz – 30MHz	-13	Pass	.1	-19
Low	LTE 4	30MHz – 1 GHz	-13	Pass	749.9	-59.3
Mid	LTE 4	30MHz – 1 GHz	-13	Pass	750.1	-58.1
High	LTE 4	30MHz – 1 GHz	-13	Pass	374.9	-60.7
Low	LTE 4	1GHz – 3GHz	-13	Pass		
Mid	LTE 4	1GHz – 3GHz	-13	Pass		
High	LTE 4	1GHz – 3GHz	-13	Pass		
Low	LTE 4	3GHz – 18GHz	-13	Pass		
Mid	LTE 4	3GHz – 18GHz	-13	Pass		
High	LTE 4	3GHz – 18GHz	-13	Pass		
Mid	LTE 4	18GHz – 40GHz	-13	Pass		
Mid	LTE 26/5	9kHz – 30MHz	-13	Pass	.079	-25
Low	LTE 26/5	30MHz – 1 GHz	-13	Pass		
Mid	LTE 26/5	30MHz – 1 GHz	-13	Pass		
High	LTE 26/5	30MHz – 1 GHz	-13	Pass		
Low	LTE 26/5	1GHz – 3GHz	-13	Pass		
Mid	LTE 26/5	1GHz – 3GHz	-13	Pass		
High	LTE 26/5	1GHz – 3GHz	-13	Pass		
Low	LTE 26/5	3GHz – 18GHz	-13	Pass		
Mid	LTE 26/5	3GHz – 18GHz	-13	Pass		
High	LTE 26/5	3GHz – 18GHz	-13	Pass		
Mid	LTE 26/5	18GHz – 40GHz	-13	Pass		
Mid	LTE 7	9kHz – 30MHz	-25	Pass	.079	-25
Low	LTE 7	30MHz – 1 GHz	-25	Pass	750	-59.3
Mid	LTE 7	30MHz – 1 GHz	-25	Pass	750	-59.1
High	LTE 7	30MHz – 1 GHz	-25	Pass	749.9	-59.1
Low	LTE 7	1GHz – 3GHz	-25	Pass		
Mid	LTE 7	1GHz – 3GHz	-25	Pass		
High	LTE 7	1GHz – 3GHz	-25	Pass		
Low	LTE 7	3GHz – 18GHz	-25	Pass		
Mid	LTE 7	3GHz – 18GHz	-25	Pass		
High	LTE 7	3GHz – 18GHz	-25	Pass	5100	-42.6
Mid	LTE 7	18GHz – 40GHz	-25	Pass		
Mid	LTE 12	9kHz – 30MHz	-13	Pass	0.079	-24
Low	LTE 12	30MHz – 1 GHz	-13	Pass		
Mid	LTE 12	30MHz – 1 GHz	-13	Pass		
High	LTE 12	30MHz – 1 GHz	-13	Pass		
Low	LTE 12	1GHz – 3GHz	-13	Pass	1400	-29.3
Mid	LTE 12	1GHz – 3GHz	-13	Pass	1400	-28.4
High	LTE 12	1GHz – 3GHz	-13	Pass	1400	-33.4

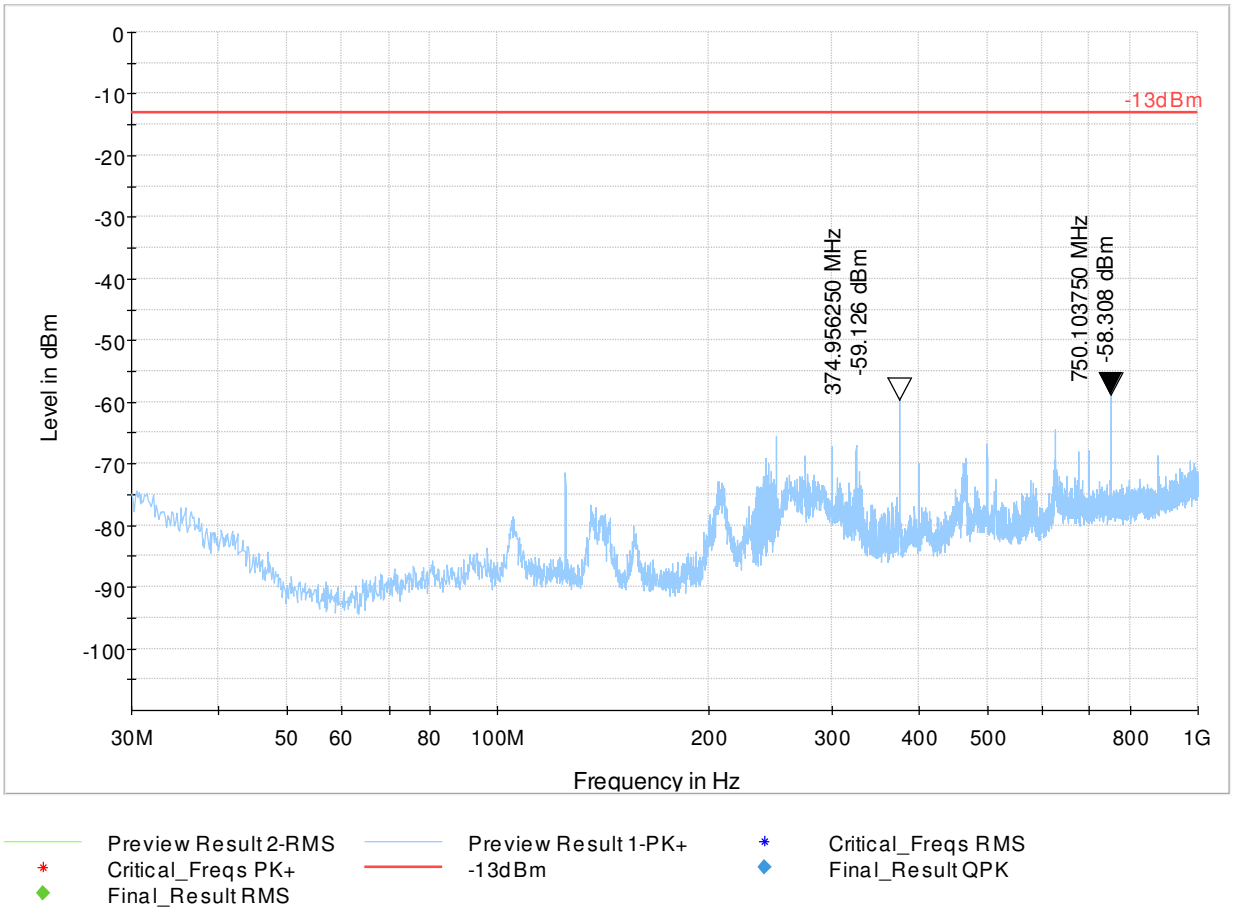
Low	LTE 12	3GHz – 18GHz	-13	Pass		
Mid	LTE 12	3GHz – 18GHz	-13	Pass		
High	LTE 12	3GHz – 18GHz	-13	Pass		
Mid	LTE 12	18GHz – 40GHz	-13	Pass		
Mid	LTE 13	9kHz – 30MHz	-13	Pass	0.079	-23
Low	LTE 13	30MHz – 1 GHz	-13	Pass		
Mid	LTE 13	30MHz – 1 GHz	-13	Pass		
High	LTE 13	30MHz – 1 GHz	-13	Pass		
Low	LTE 13	1GHz – 3GHz	-13	Pass		
Mid	LTE 13	1GHz – 3GHz	-13	Pass		
High	LTE 13	1GHz – 3GHz	-13	Pass		
Low	LTE 13	3GHz – 18GHz	-13	Pass		
Mid	LTE 13	3GHz – 18GHz	-13	Pass		
High	LTE 13	3GHz – 18GHz	-13	Pass		
Mid	LTE 13	18GHz – 40GHz	-13	Pass		
Mid	LTE 30	9kHz – 30MHz	-13	Pass	.079	-27
Low	LTE 30	30MHz – 1 GHz	-13	Pass	375	-58.9
Mid	LTE 30	30MHz – 1 GHz	-13	Pass	374	-57.5
High	LTE 30	30MHz – 1 GHz	-13	Pass	325	-60.2
Low	LTE 30	1GHz – 3GHz	-13	Pass		
Mid	LTE 30	1GHz – 3GHz	-13	Pass		
High	LTE 30	1GHz – 3GHz	-13	Pass		
Low	LTE 30	3GHz – 18GHz	-13	Pass		
Mid	LTE 30	3GHz – 18GHz	-13	Pass		
High	LTE 30	3GHz – 18GHz	-13	Pass		
Mid	LTE 30	18GHz – 40GHz	-13	Pass		
Mid	LTE 41	9kHz – 30MHz	-25	Pass	0.079	-28
Low	LTE 41	30MHz – 1 GHz	-25	Pass		
Mid	LTE 41	30MHz – 1 GHz	-25	Pass	325	-58
High	LTE 41	30MHz – 1 GHz	-25	Pass	374	-56
Low	LTE 41	1GHz – 3GHz	-25	Pass		
Mid	LTE 41	1GHz – 3GHz	-25	Pass		
High	LTE 41	1GHz – 3GHz	-25	Pass		
Low	LTE 41	3GHz – 18GHz	-25	Pass		
Mid	LTE 41	3GHz – 18GHz	-25	Pass	1290	-28.9
High	LTE 41	3GHz – 18GHz	-25	Pass	8000	-13.3
Mid	LTE 41	18GHz – 40GHz	-25	Pass		

10.5 Measurement Plots WCDMA/UMTS FDD II

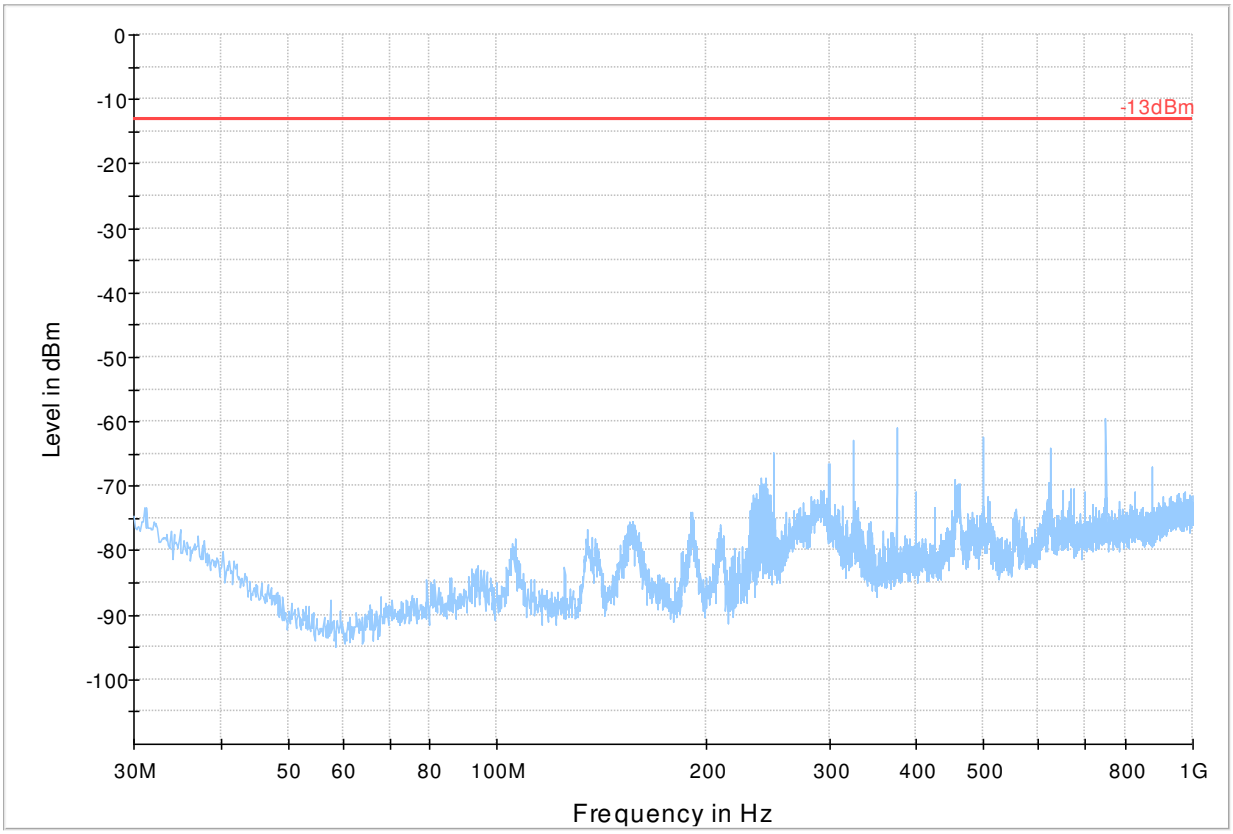
10.5.1 9 kHz – 30MHz, Ch. mid



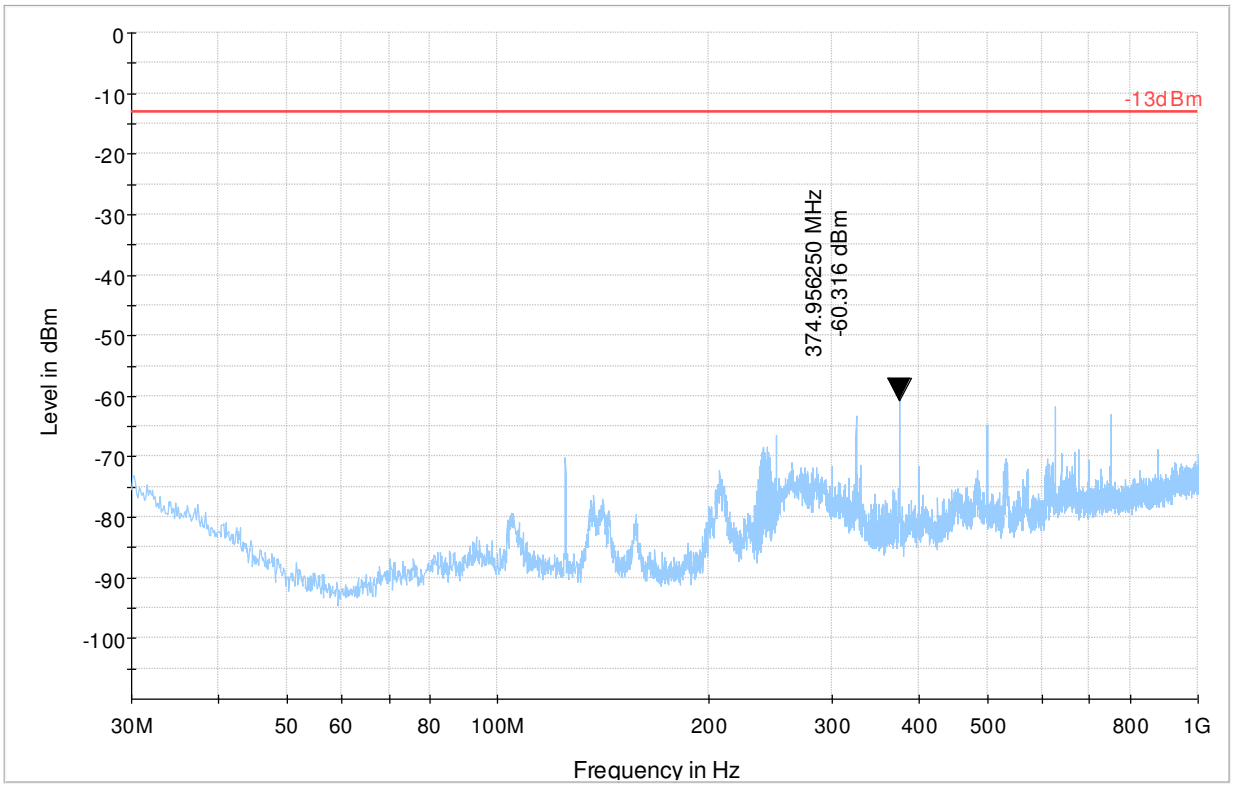
10.5.2 30MHz - 1GHz, Ch. Low



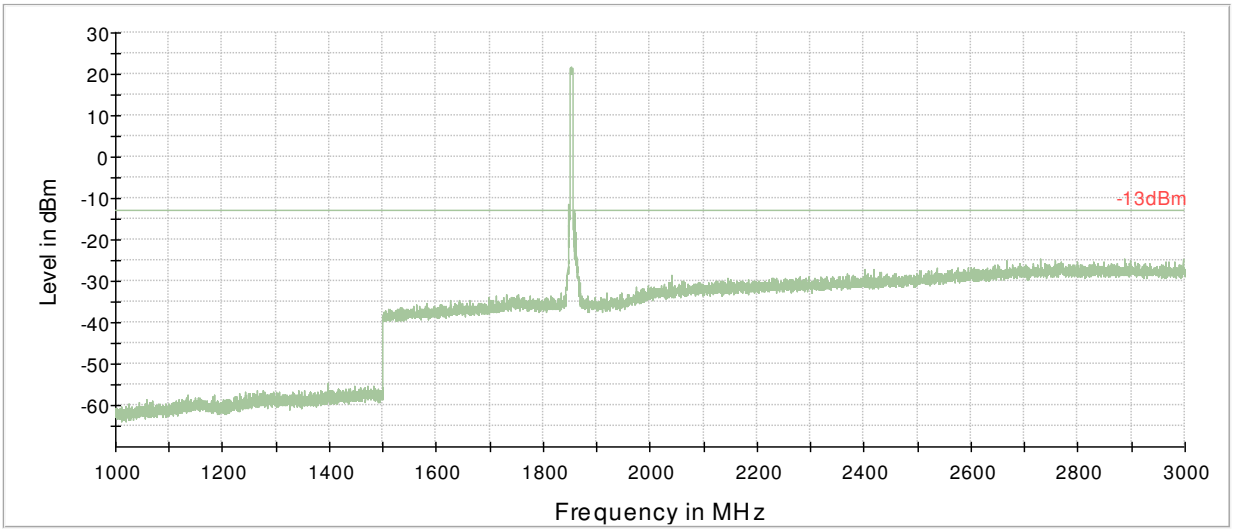
10.5.3 30MHz - 1GHz, Ch. Mid



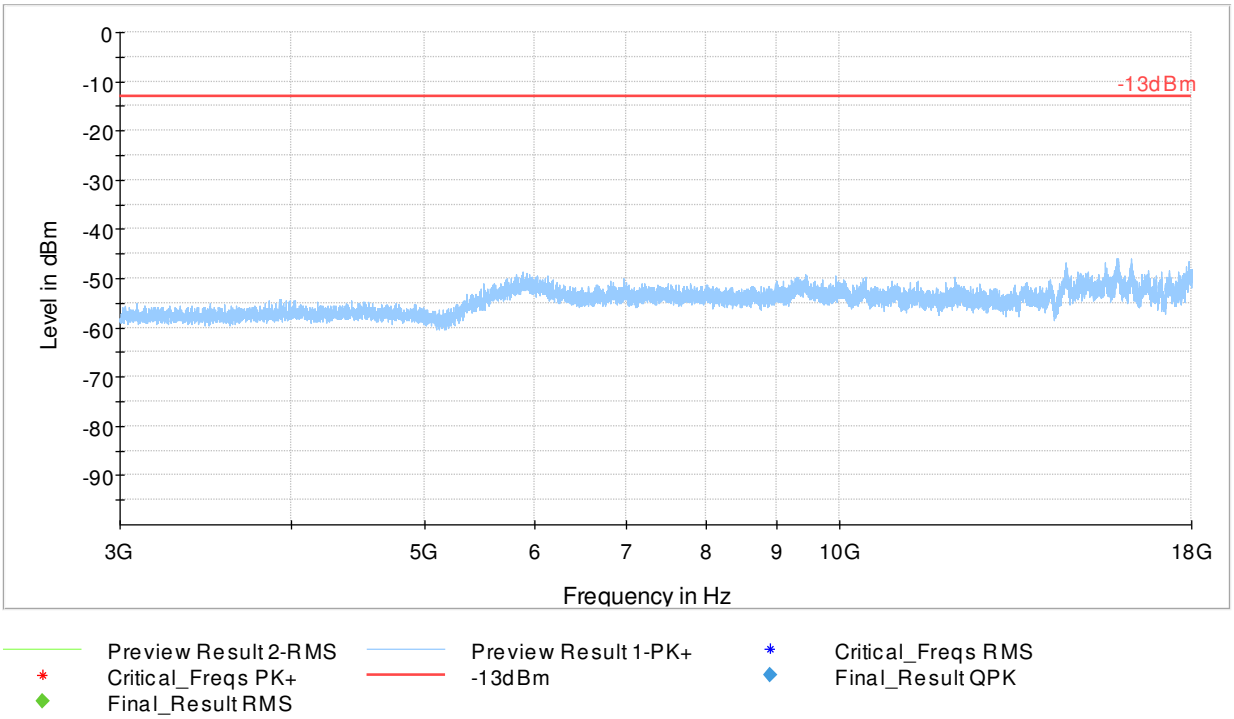
10.5.4 30MHz - 1GHz, Ch. High



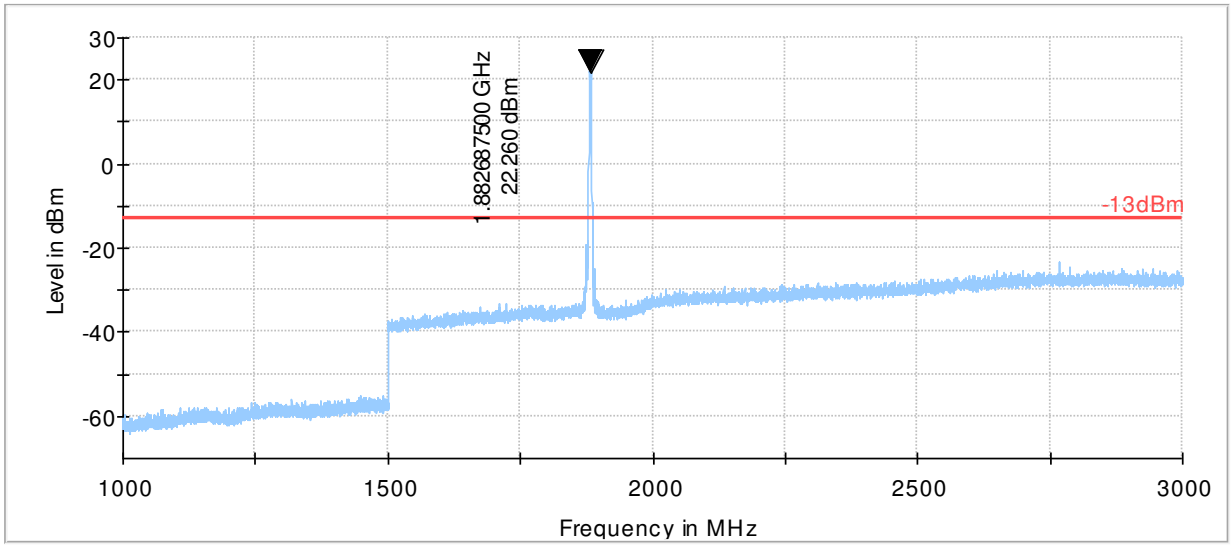
10.5.5 1 - 3GHz, Ch. Low



10.5.6 3GHz – 18GHz, Ch. Low

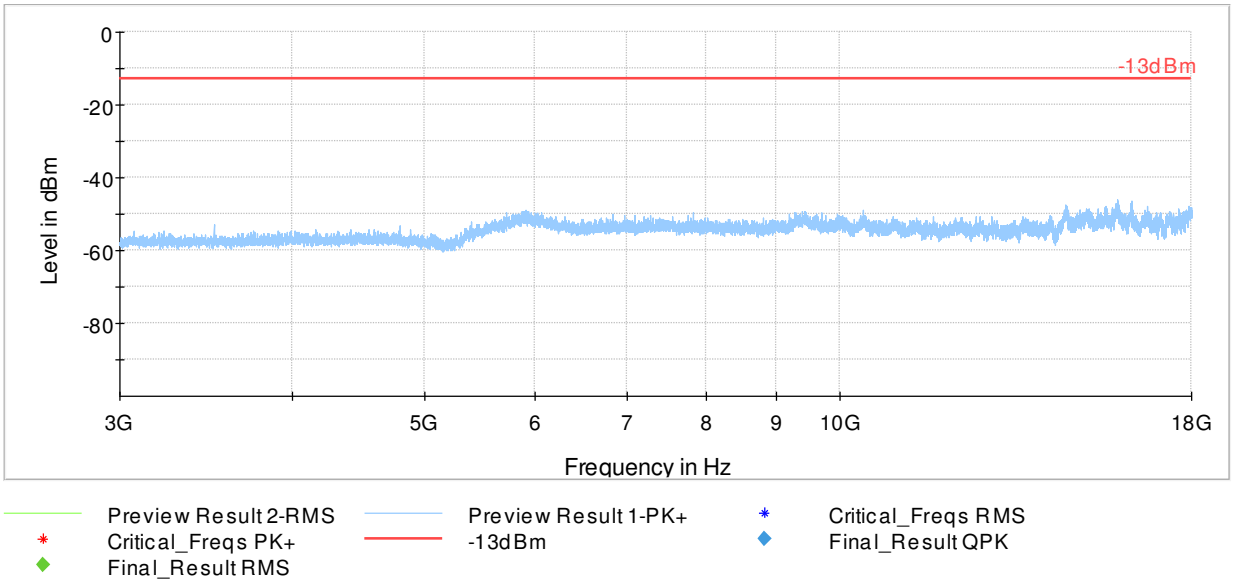


10.5.7 1GHz - 3GHz, Ch. Mid

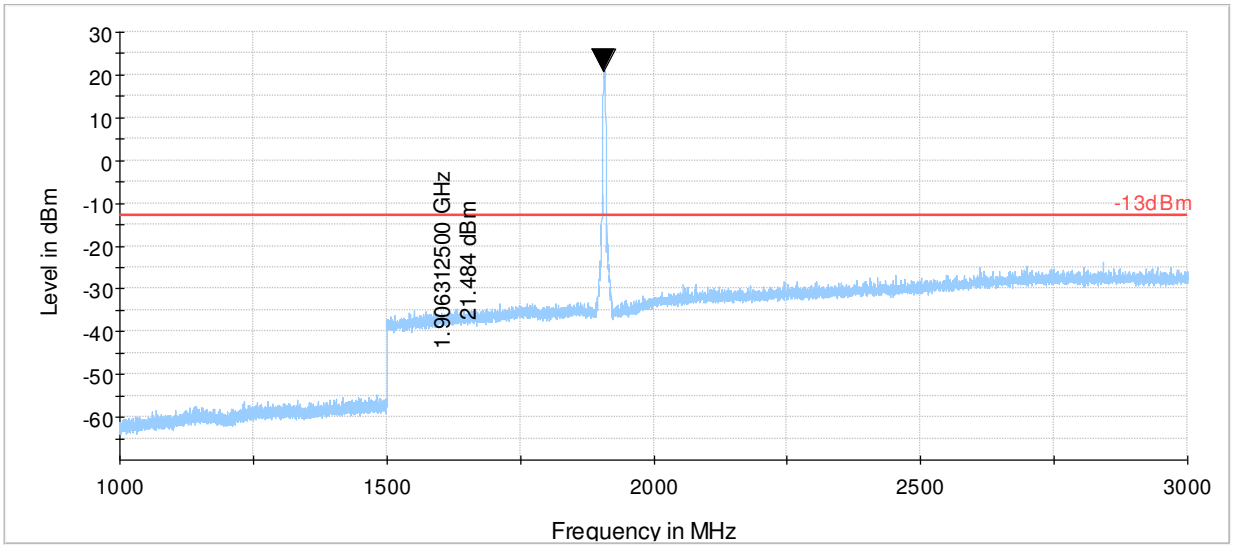


Preview Result 2-RMS [Preview Result 2.Result:2]
Preview Result 1-PK+ [Preview Result 1.Result:1]
Critical_Freqs RMS [Critical_Freqs.Result:5]
Critical_Freqs PK+ [Critical_Freqs.Result:4]

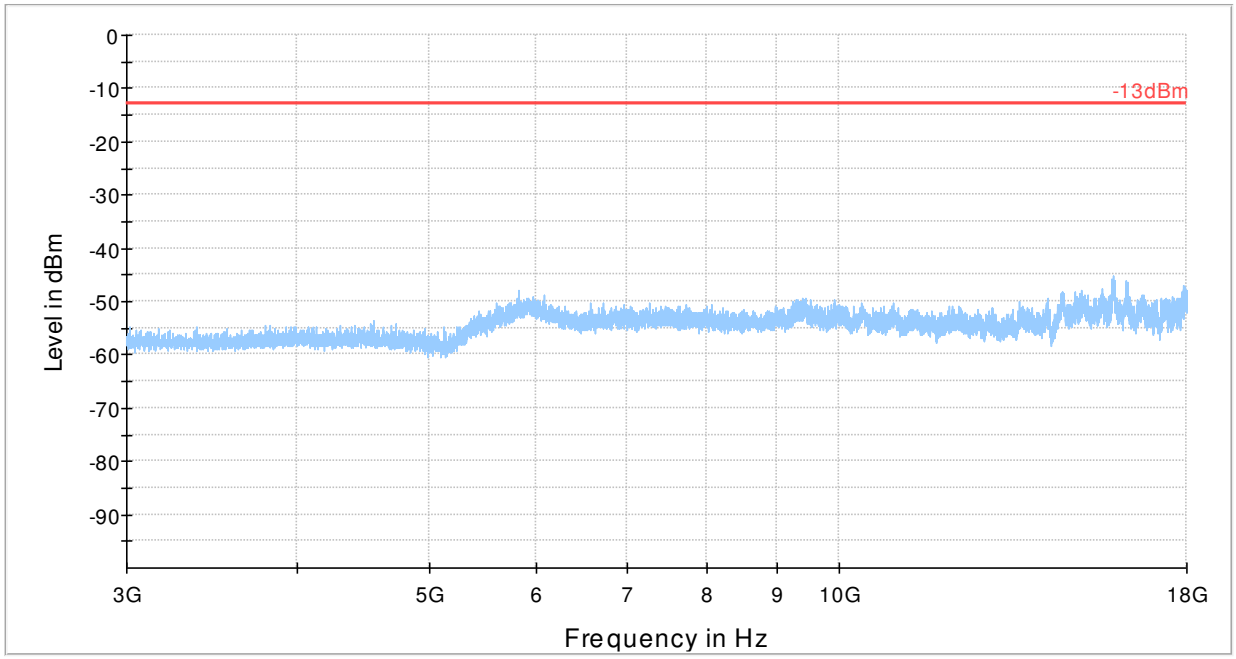
10.5.8 3GHz - 18GHz, Ch. Mid



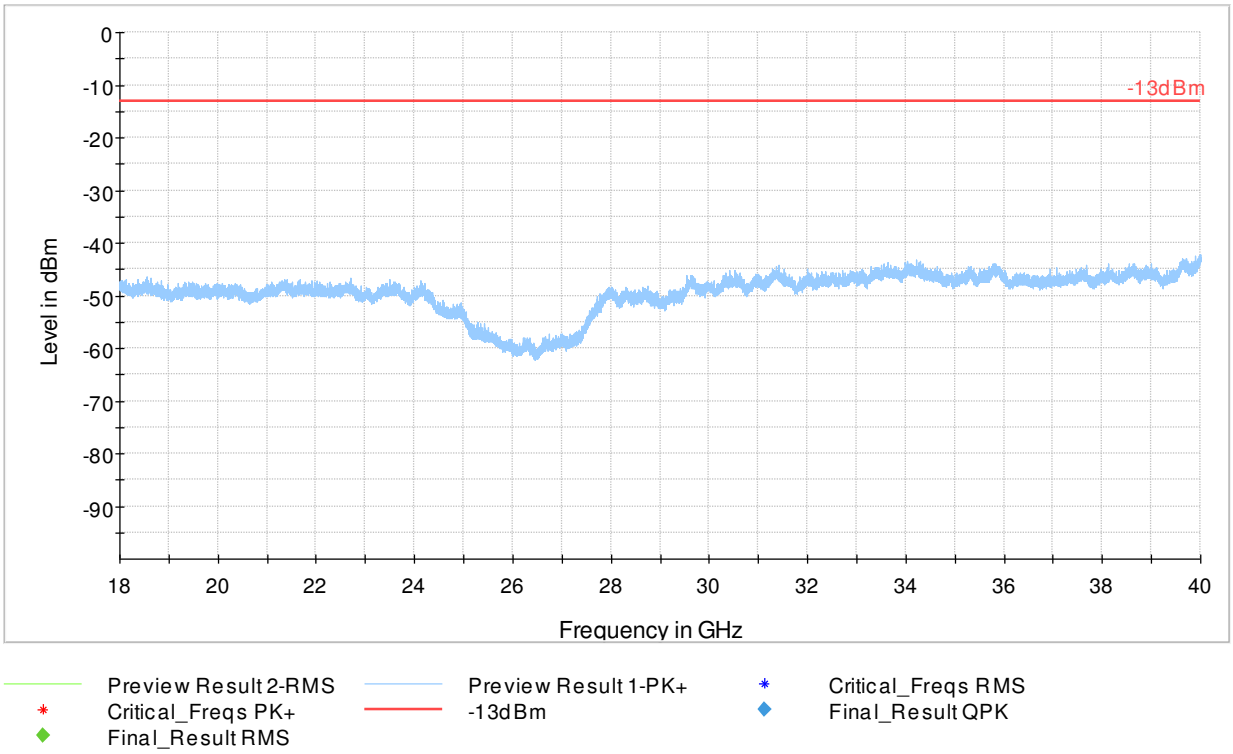
10.5.9 1GHz - 3GHz, Ch. High



10.5.10 3GHz - 18GHz, Ch. High

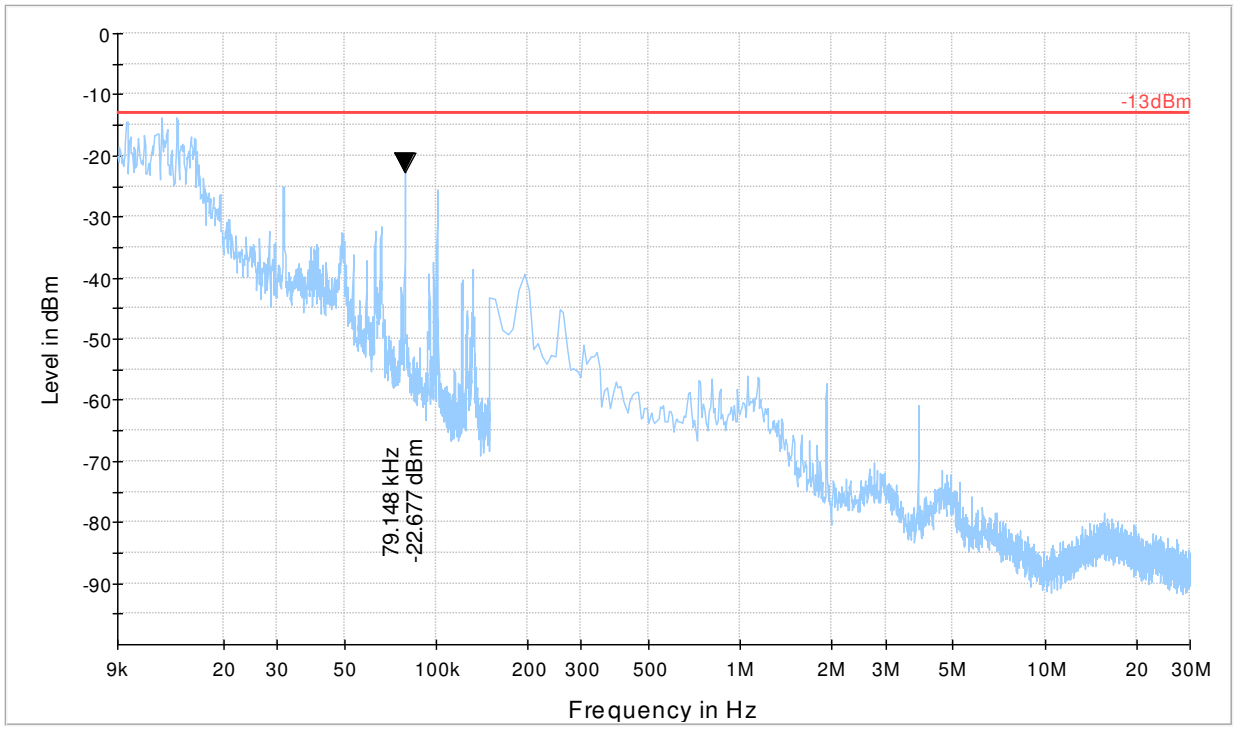


10.5.11 18 - 40 GHz, Ch. Mid

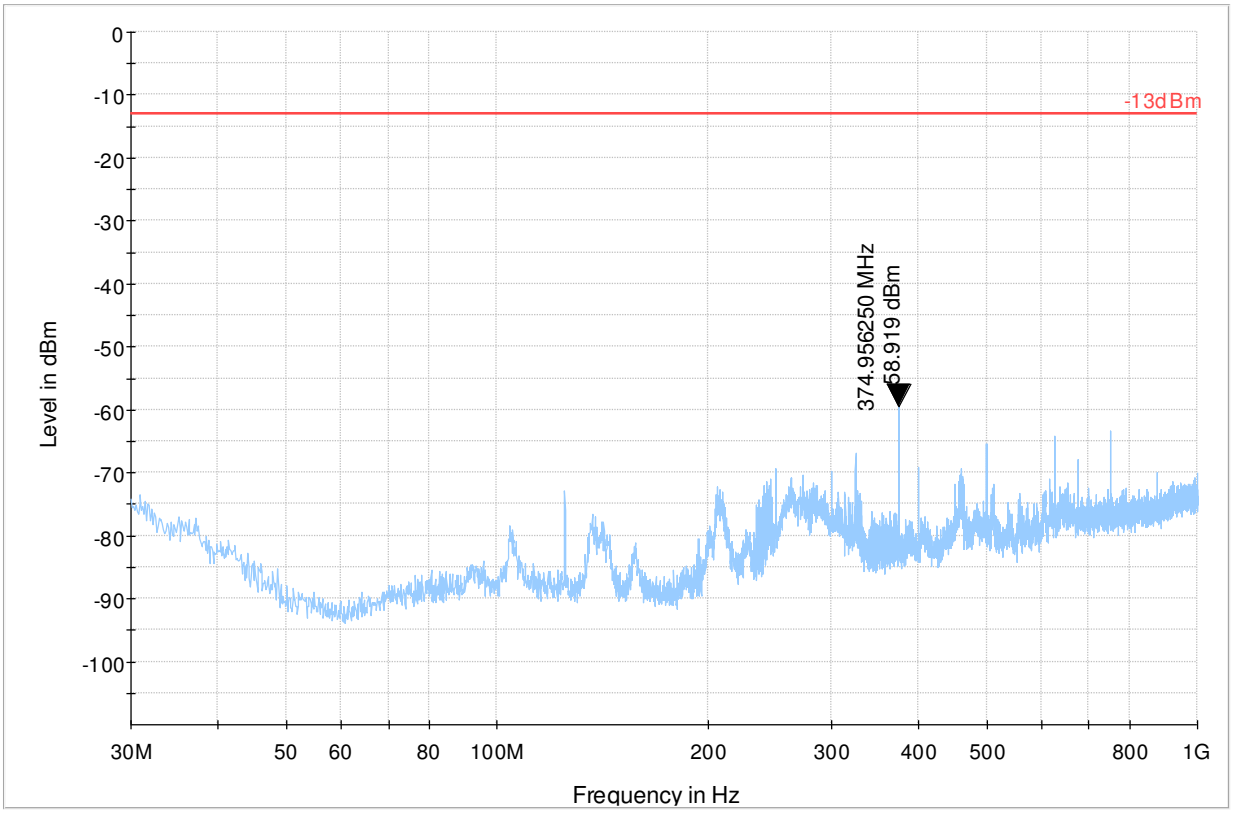


10.6 Measurement Plots WCDMA/UMTS FDD IV

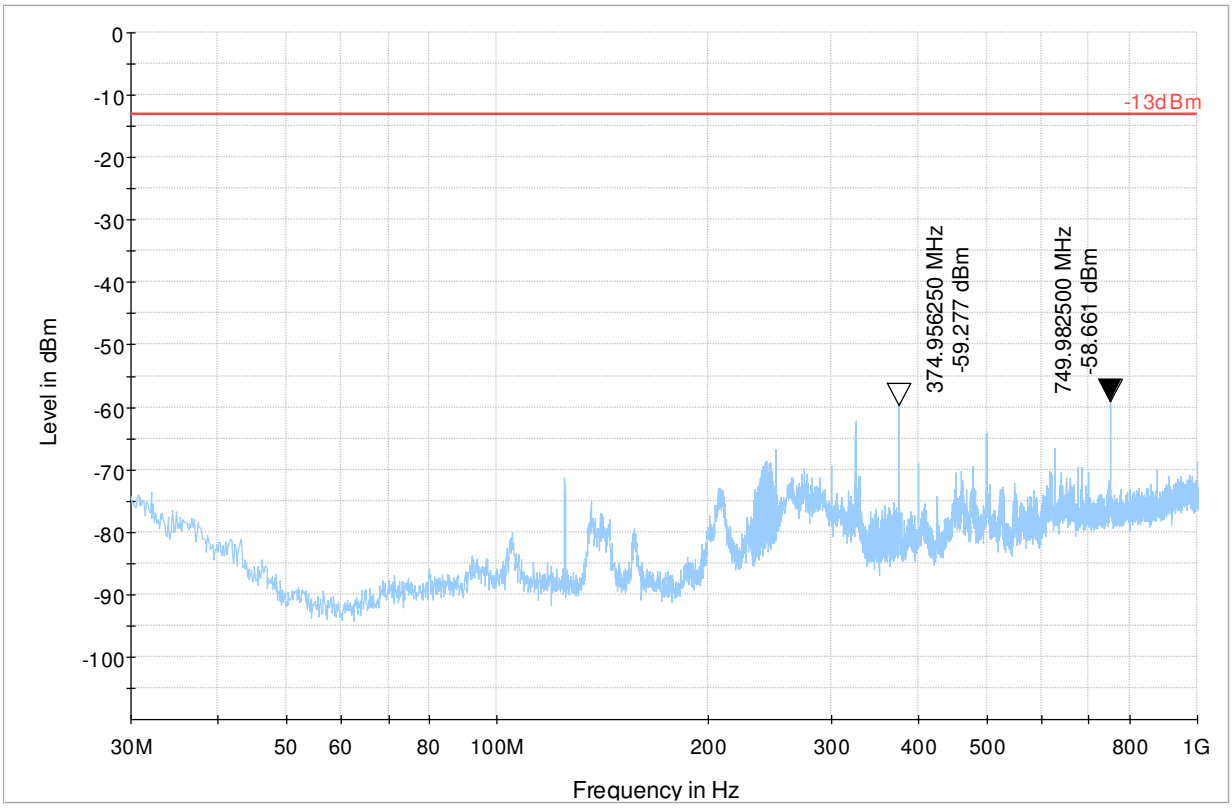
10.6.1 9 kHz – 30MHz, Ch. Mid



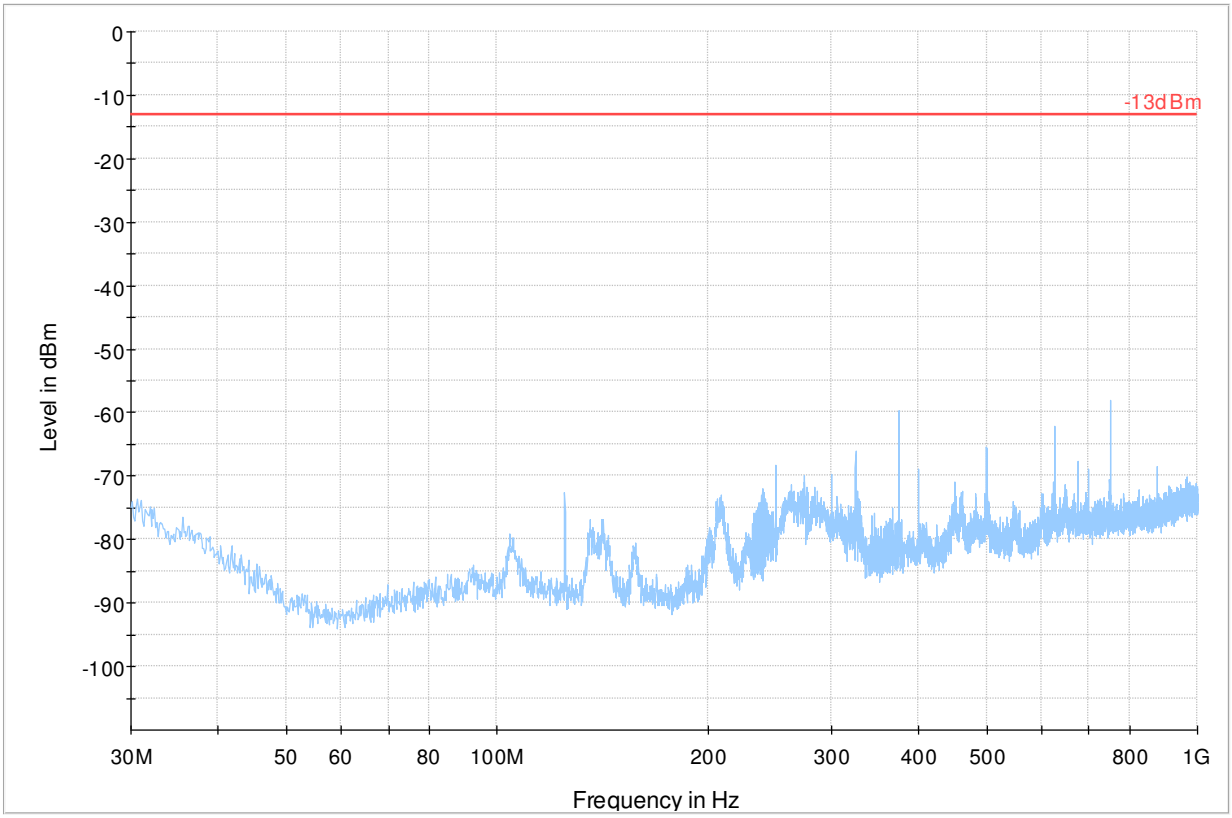
10.6.2 30MHz – 1GHz, Ch. Low



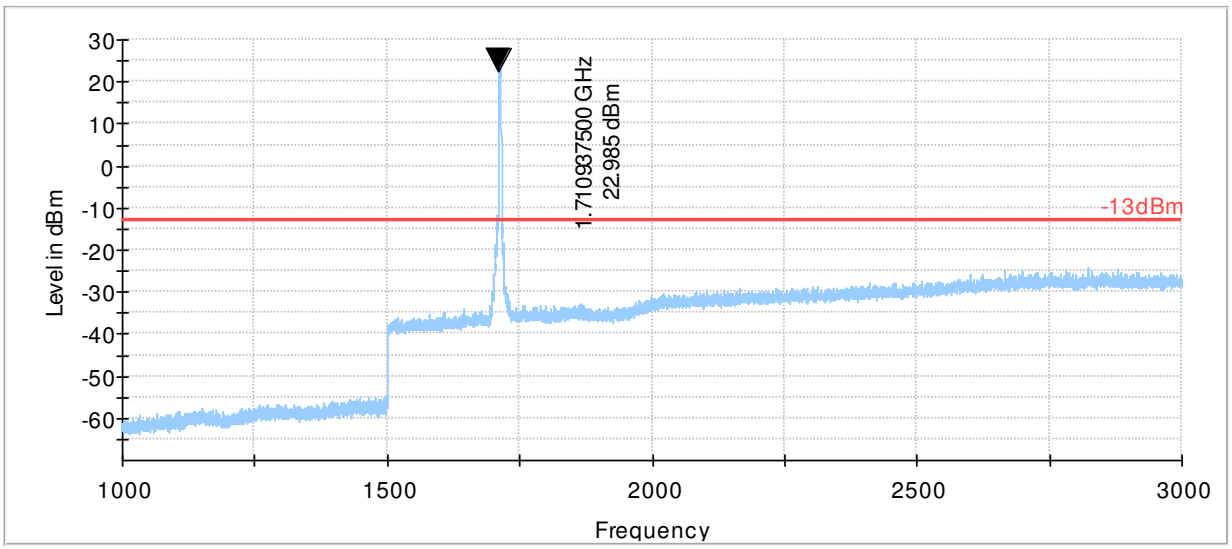
10.6.3 30MHz – 1GHz, Ch. Mid



10.6.4 30MHz – 1GHz, Ch. High

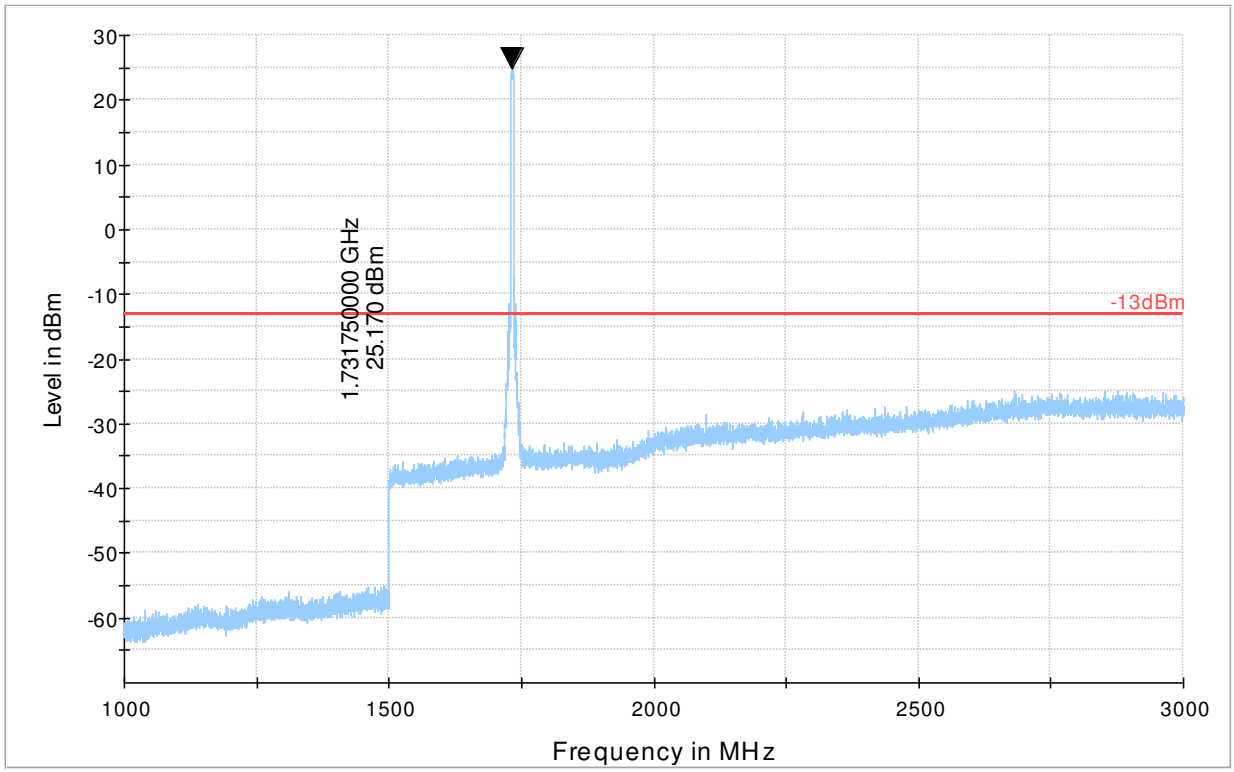

0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Level in dBm
-13dBm
30M
50
60
80
100M
200
300
400
500
800
1G
Frequency in Hz
Preview Result 2-RMS
Critical_Freqs PK+
Final_Result RMS
Preview Result 1-PK+
-13dBm
Critical_Freqs RMS
Final_Result QPK

10.6.5 1GHz – 3GHz, Ch. Low

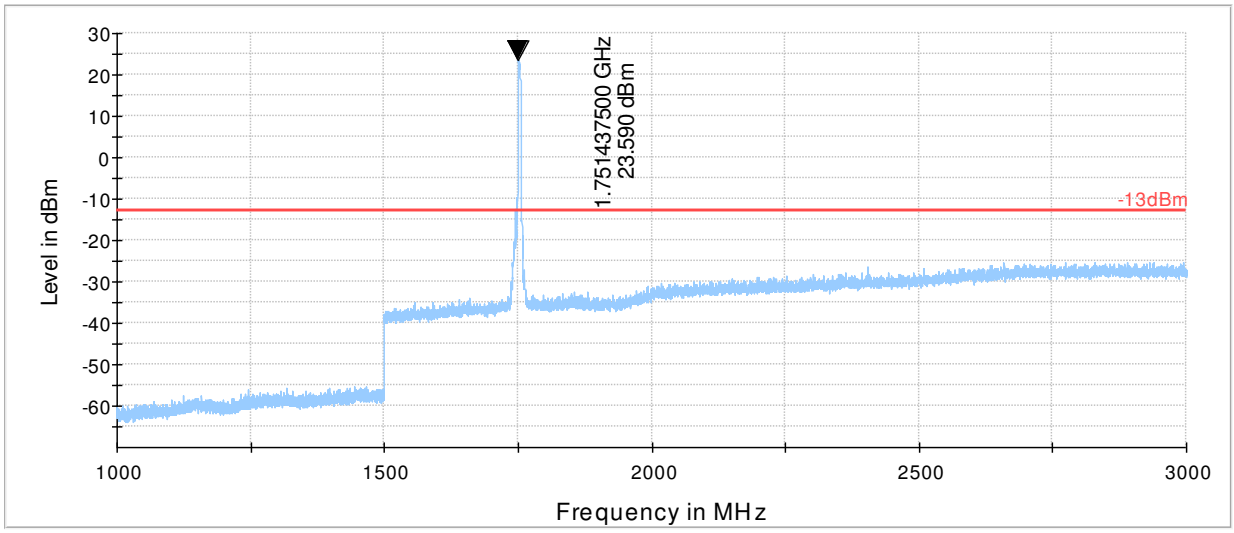


Preview Result 2-RMS [Preview Result 2.Result:2]
Preview Result 1-PK+ [Preview Result 1.Result:1]
Critical_Freqs RMS [Critical_Freqs.Result:5]
Critical_Freqs PK+ [Critical_Freqs.Result:4]

10.6.6 1GHz – 3GHz, Ch. Mid

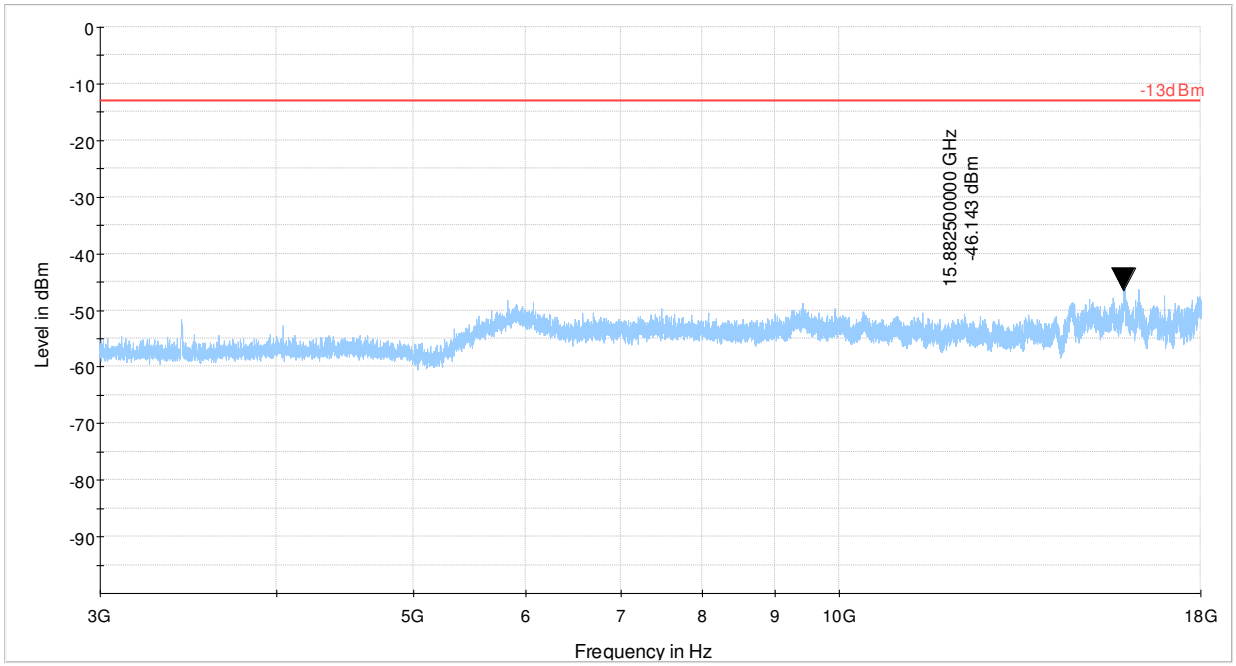


10.6.7 1GHz – 3GHz, Ch. High

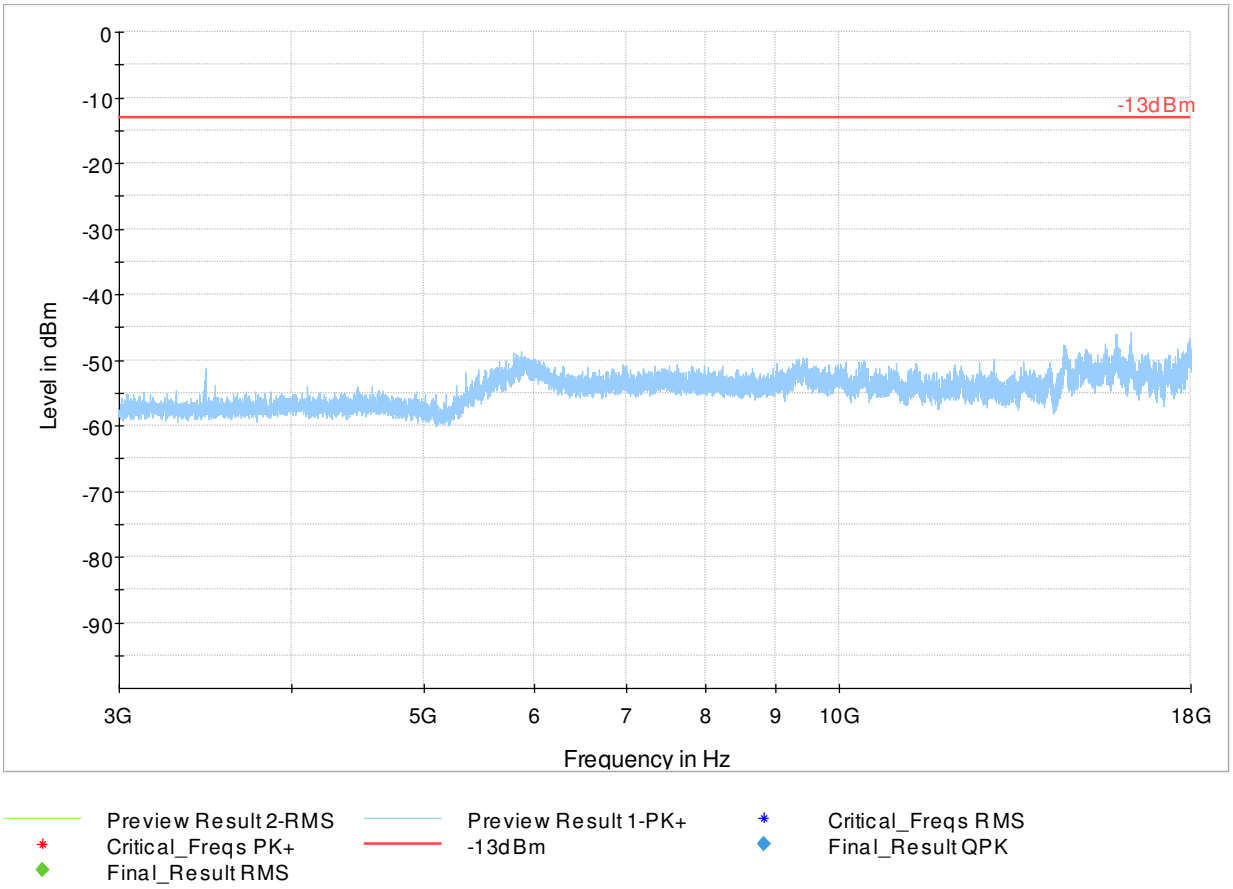


◆ Preview Result 2-RMS [Preview Result 2.Result:2]

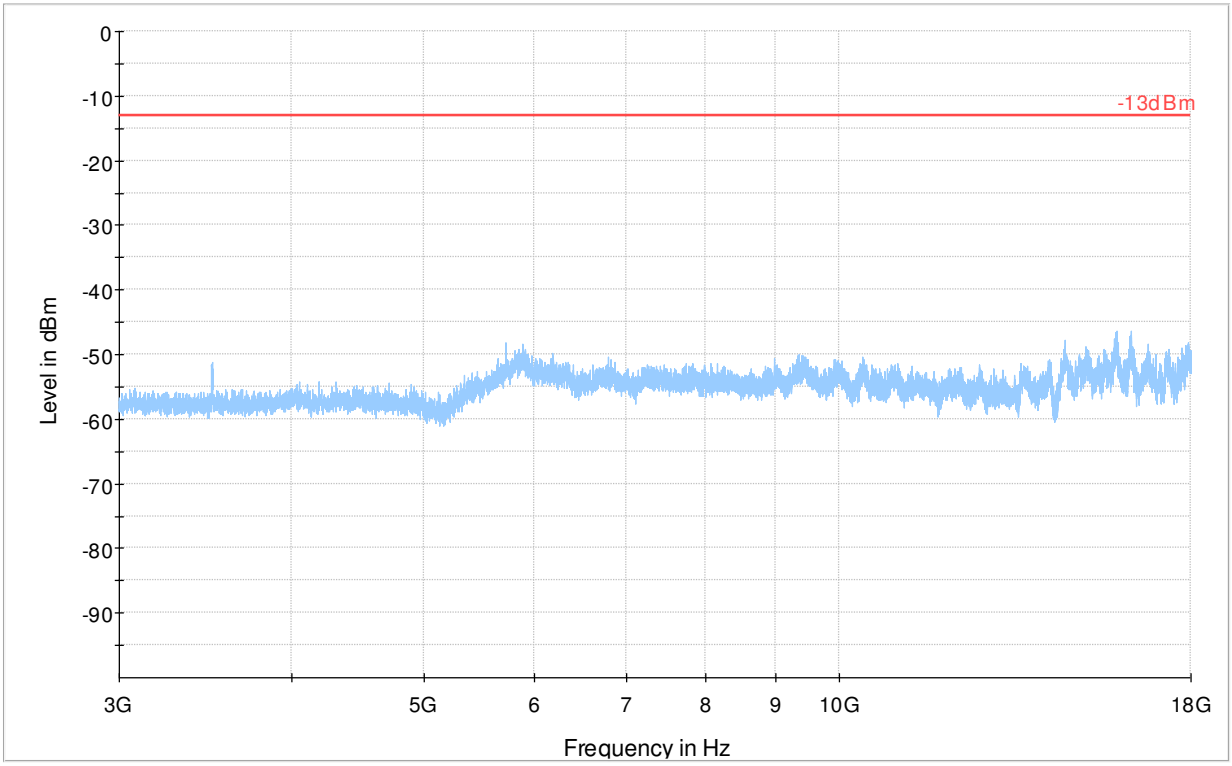
10.6.8 3GHz – 18GHz, Ch. Low



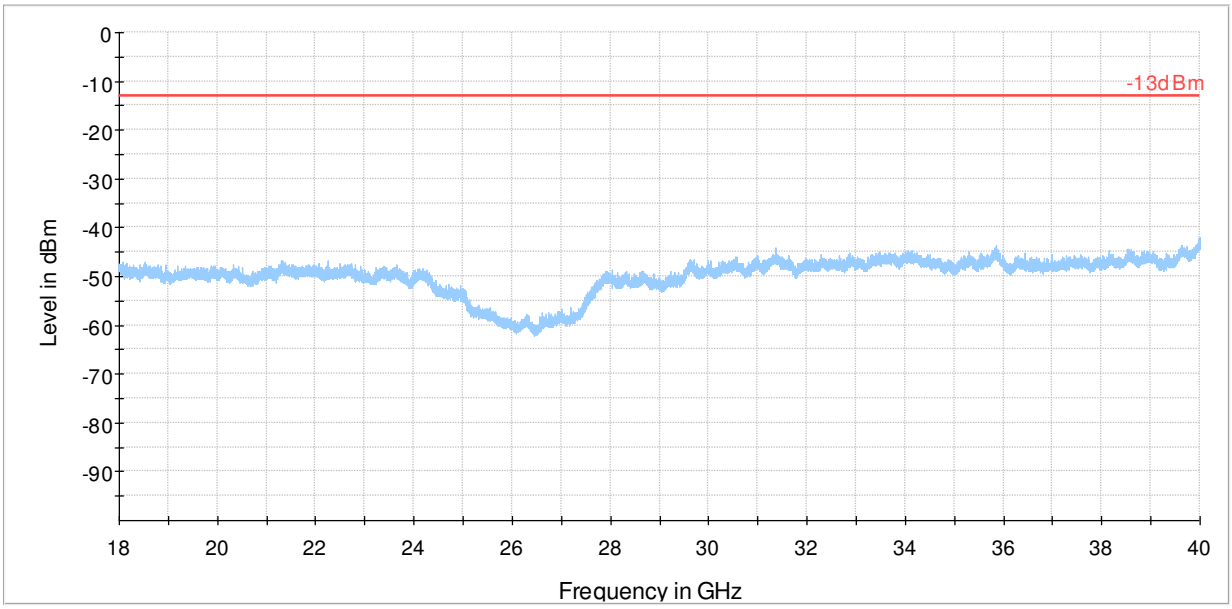
10.6.9 3GHz – 18GHz, Ch. Mid



10.6.10 3GHz – 18GHz, Ch. High

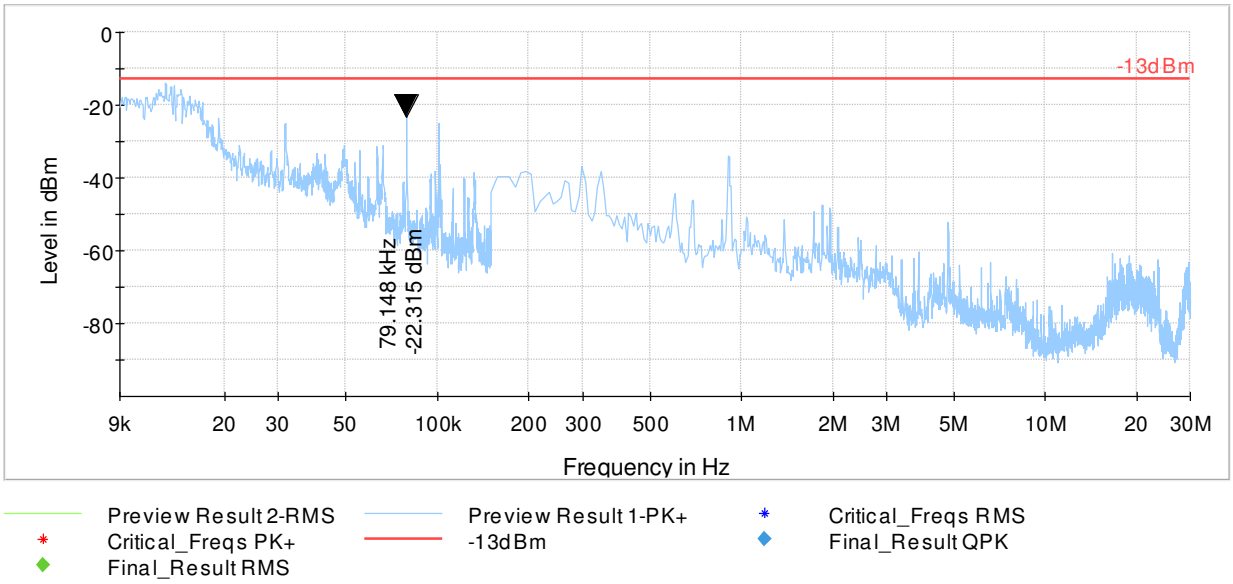


10.6.11 18GHz – 40GHz, Ch. Mid

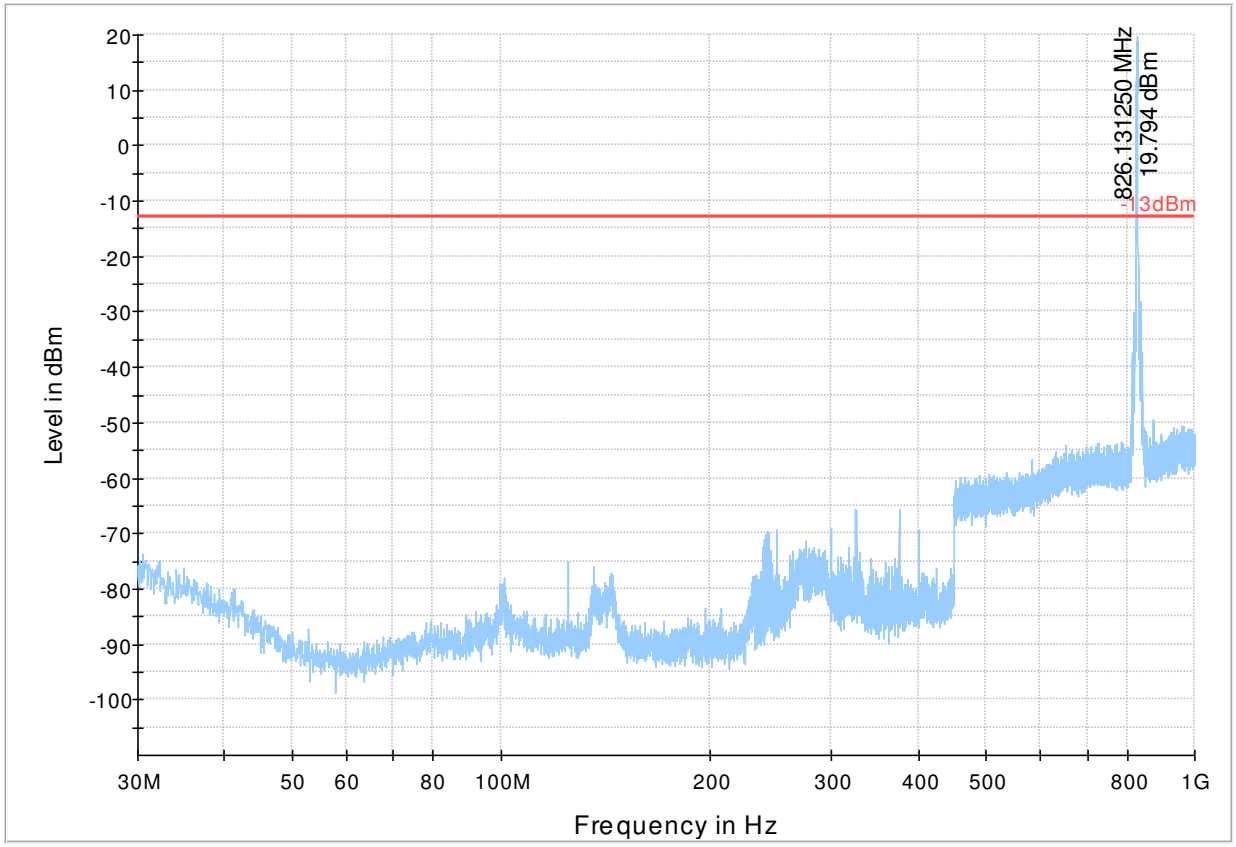


10.7 Measurement Plots WCDMA/UMTS FDD V:

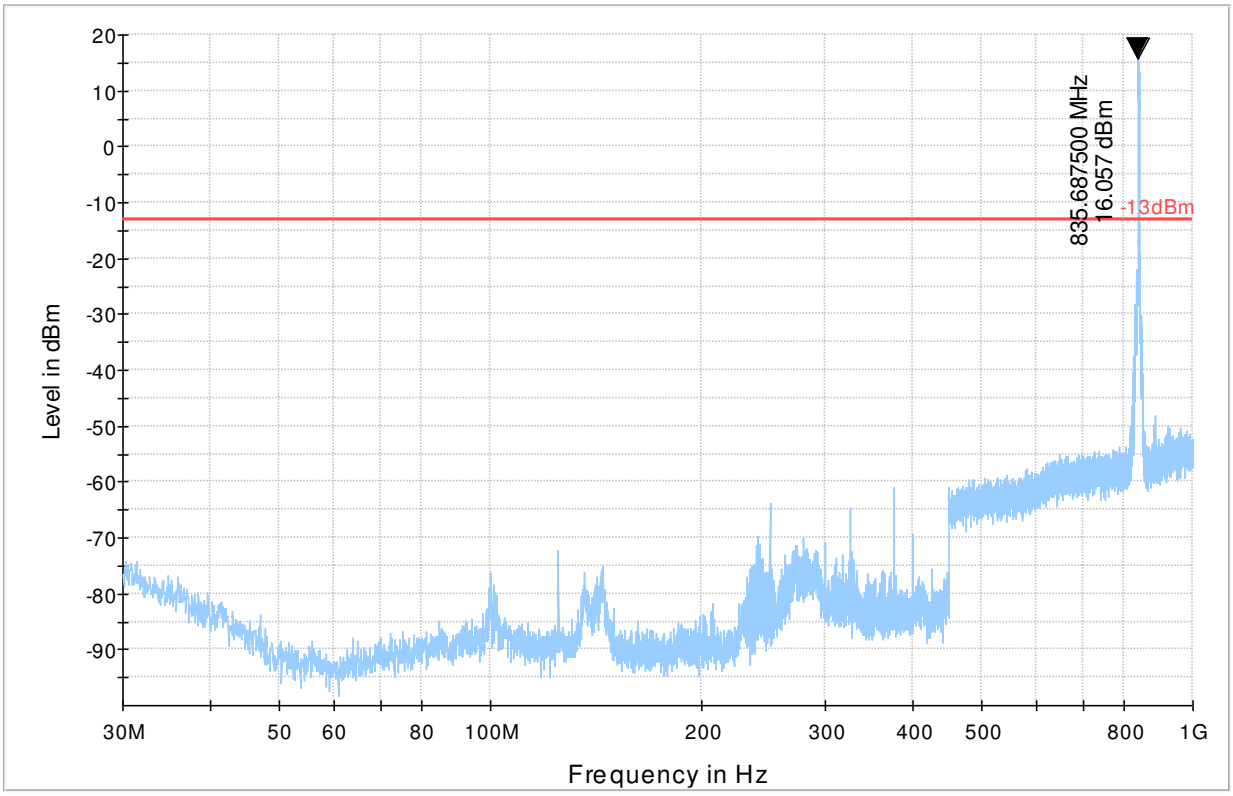
10.7.1 9 kHz – 30MHz, Ch. mid



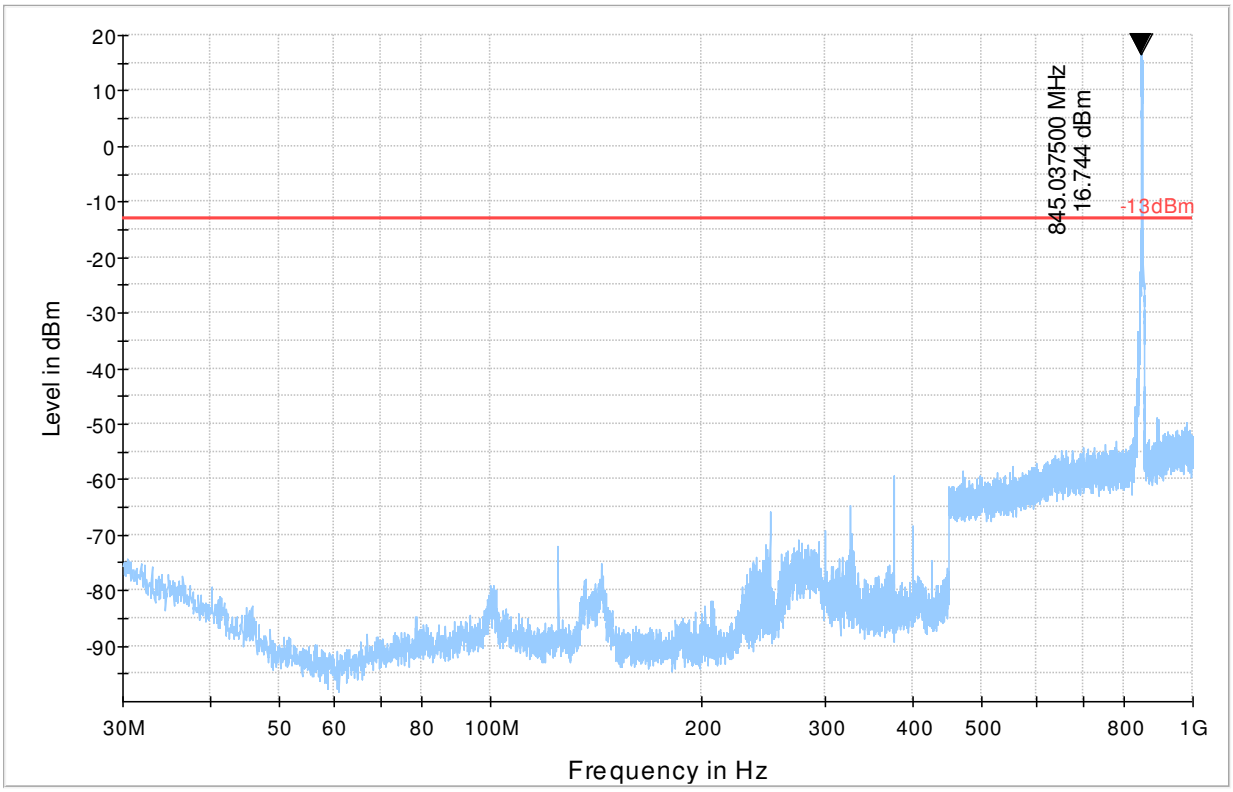
10.7.2 30 MHz – 1 GHz, Ch. Low



10.7.3 30 MHz – 1 GHz, Ch. Mid

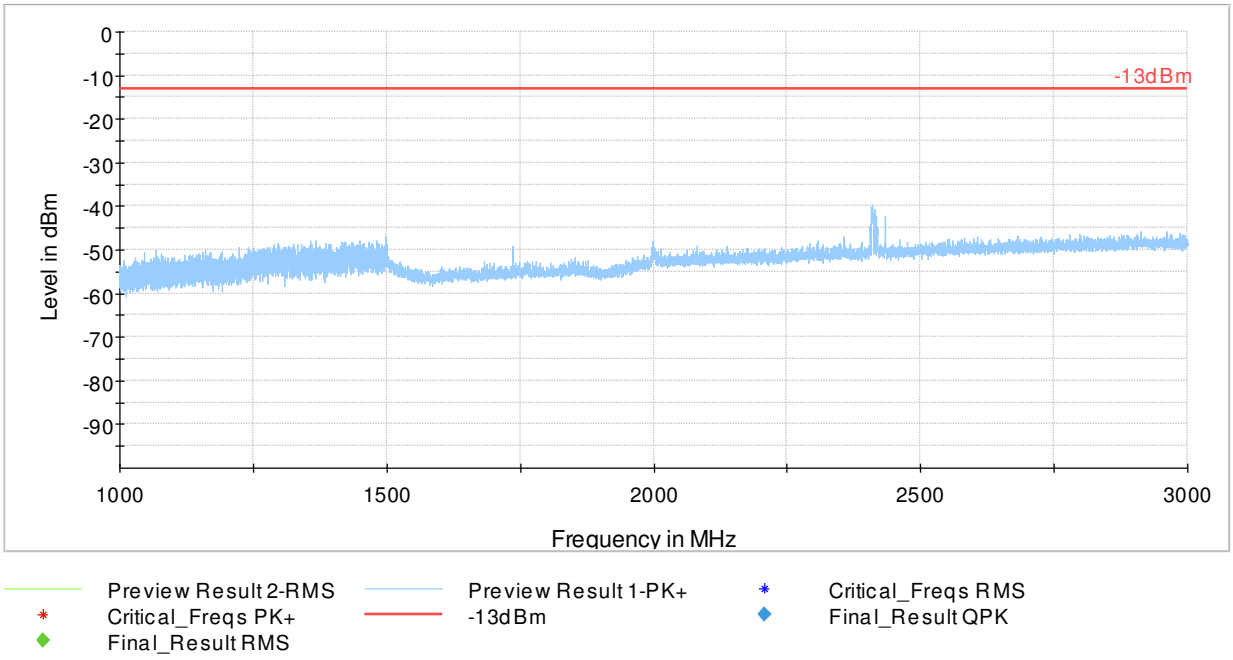


10.7.4 30 MHz – 1 GHz, Ch. High

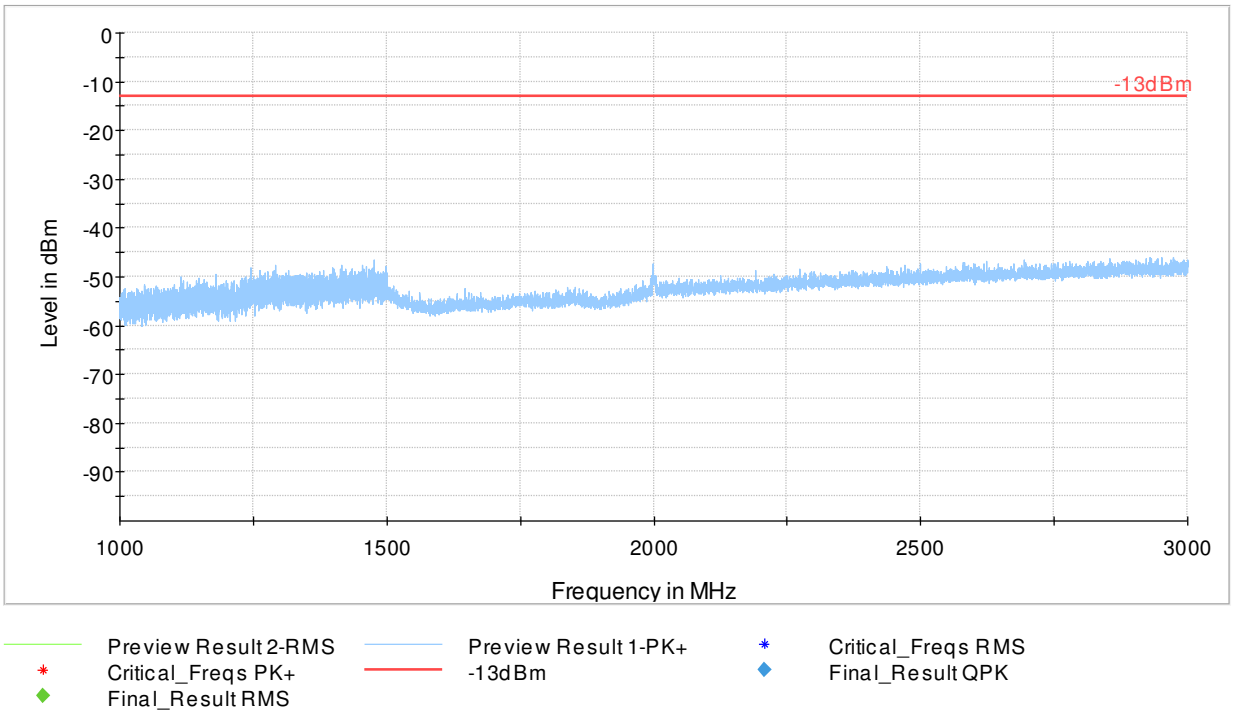


Preview Result 2-RMS
Critical_Freqs PK+
Final_Result RMS
Preview Result 1-PK+
-13dBm
Critical_Freqs RMS
Final_Result QPK

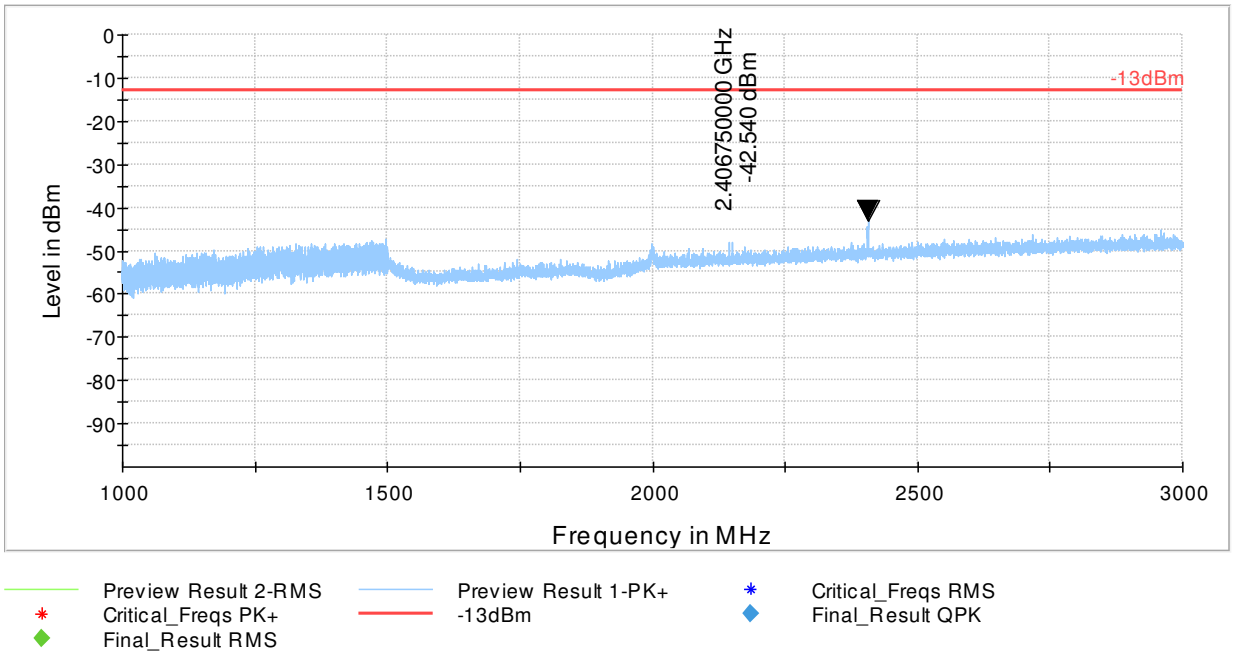
10.7.5 1 GHz – 3GHz, Ch. Low



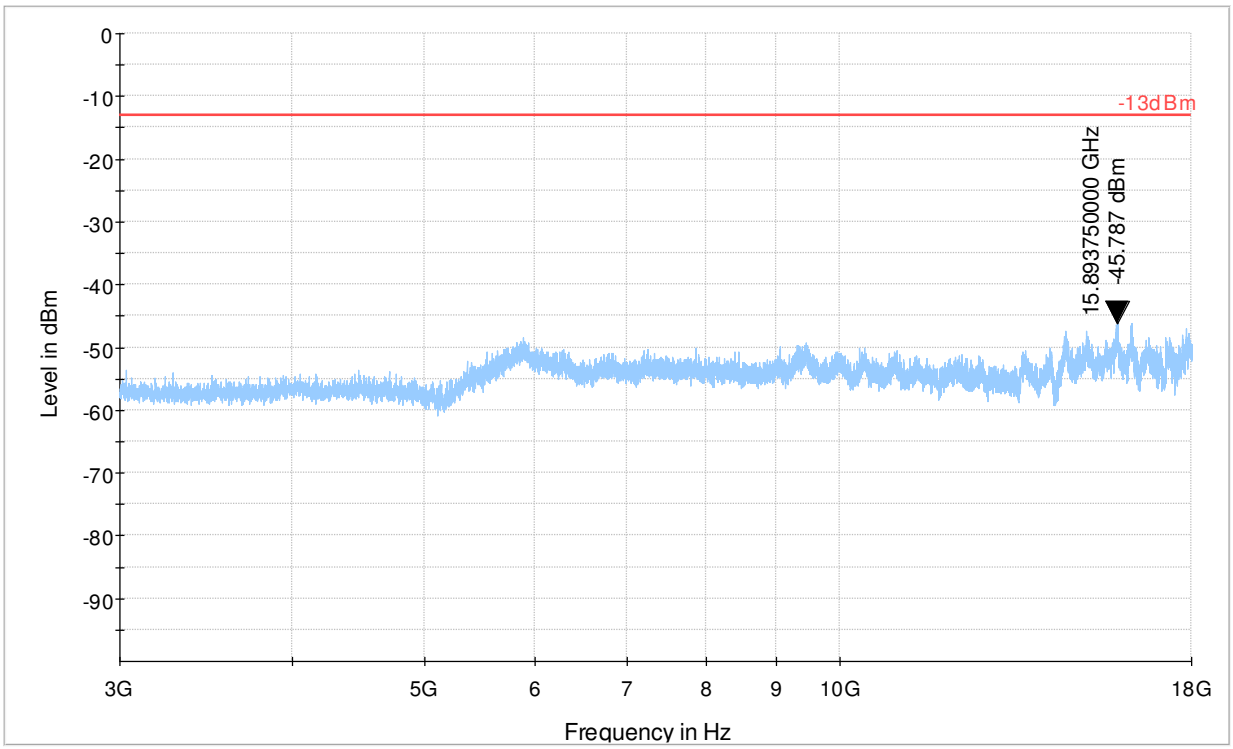
10.7.6 1 GHz – 3 GHz, Ch. Mid



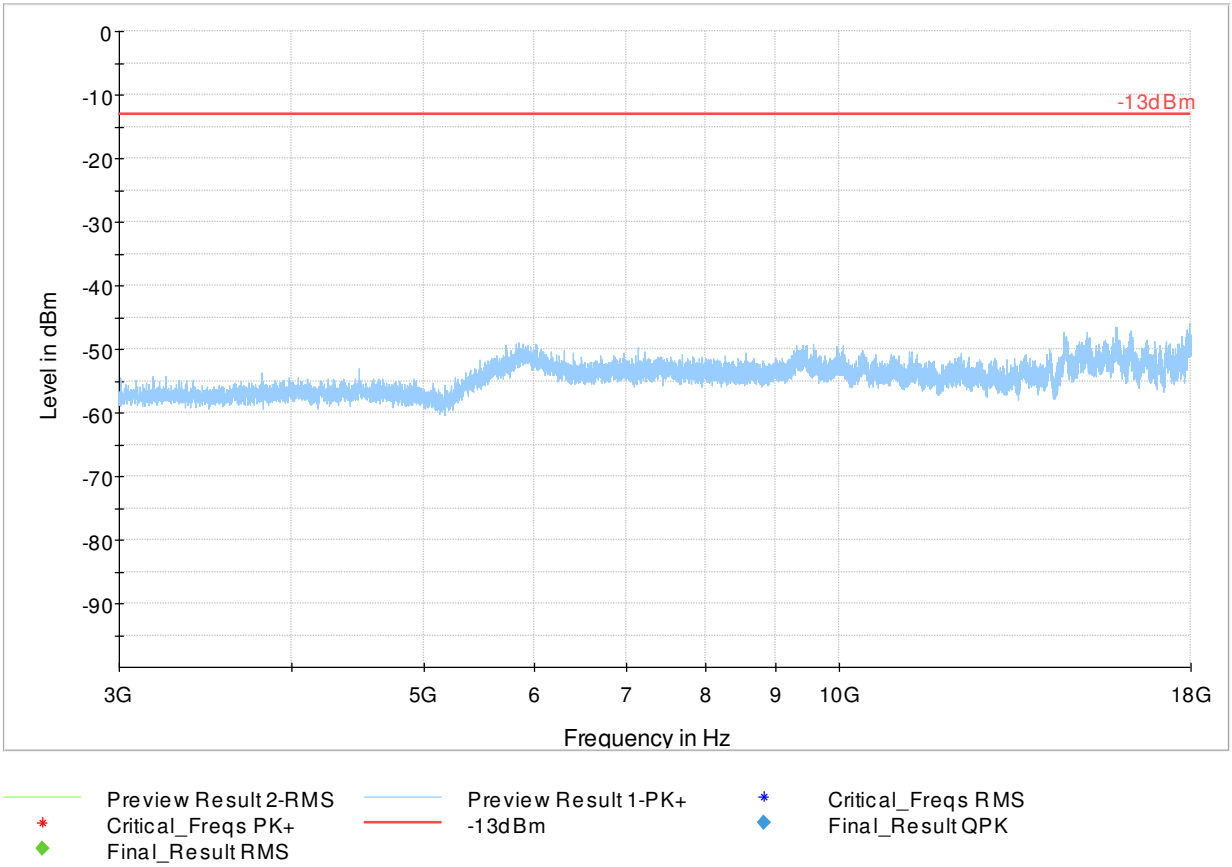
10.7.7 1 GHz – 3 GHz, Ch. High



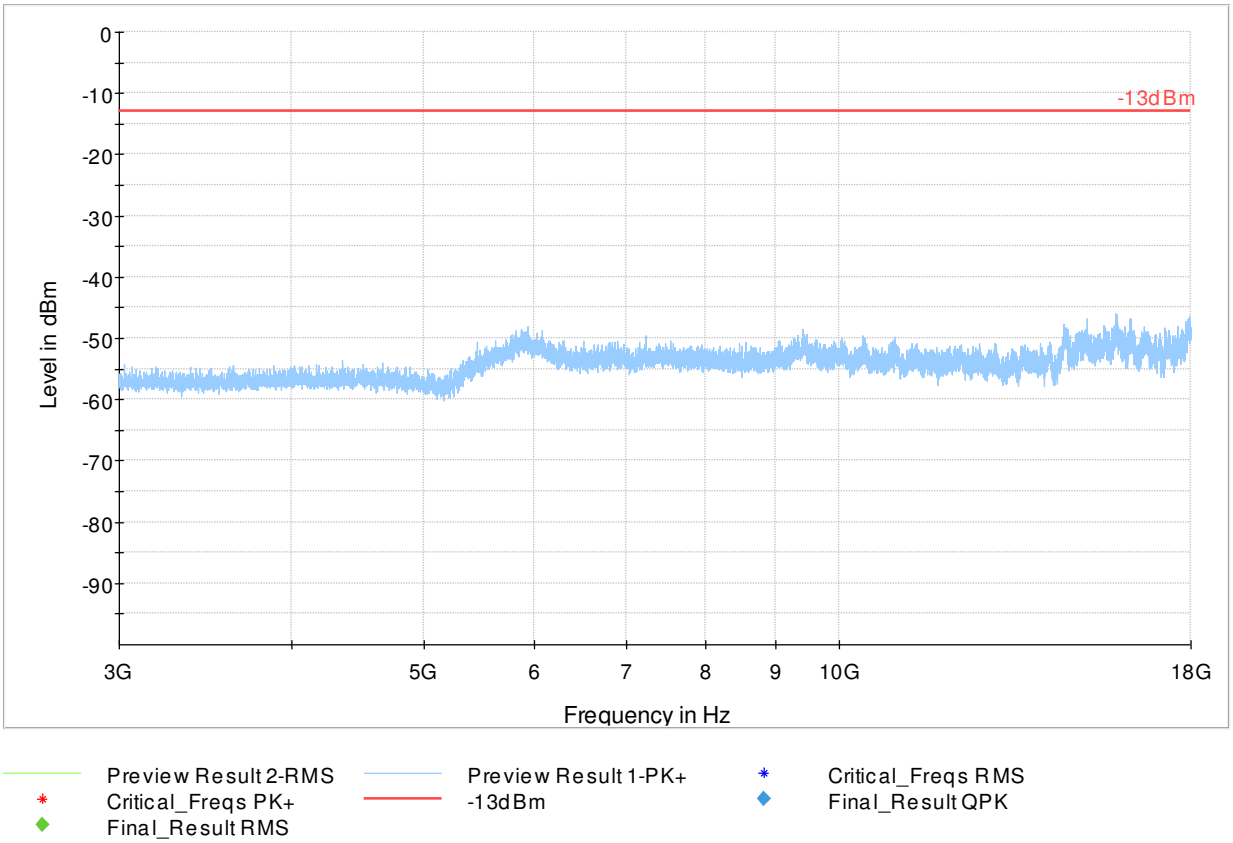
10.7.8 3 GHz – 18GHz, Ch. Low



10.7.9 3 GHz – 18GHz, Ch. High

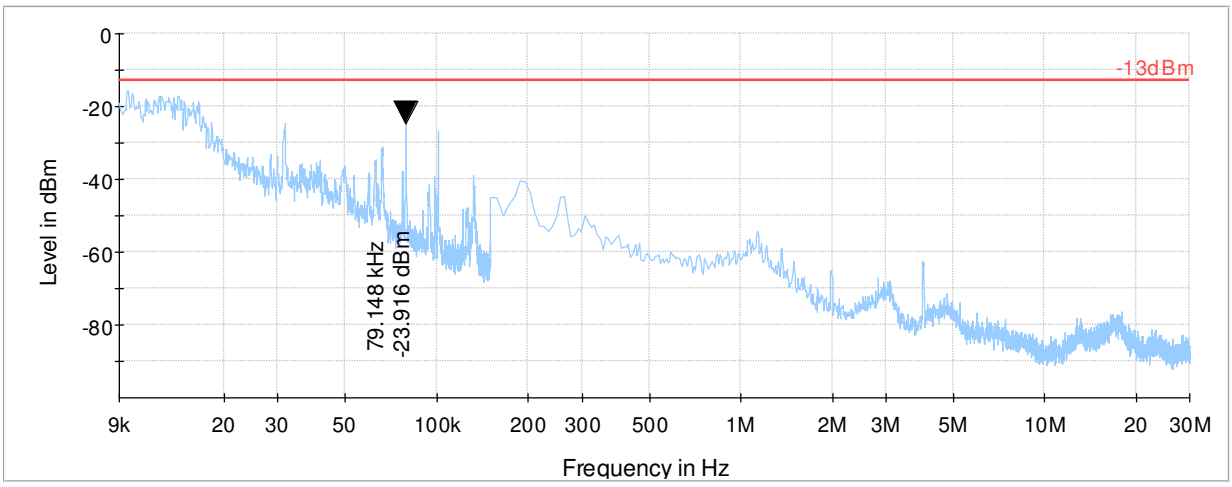


10.7.10 3 GHz – 18GHz, Ch. Mid

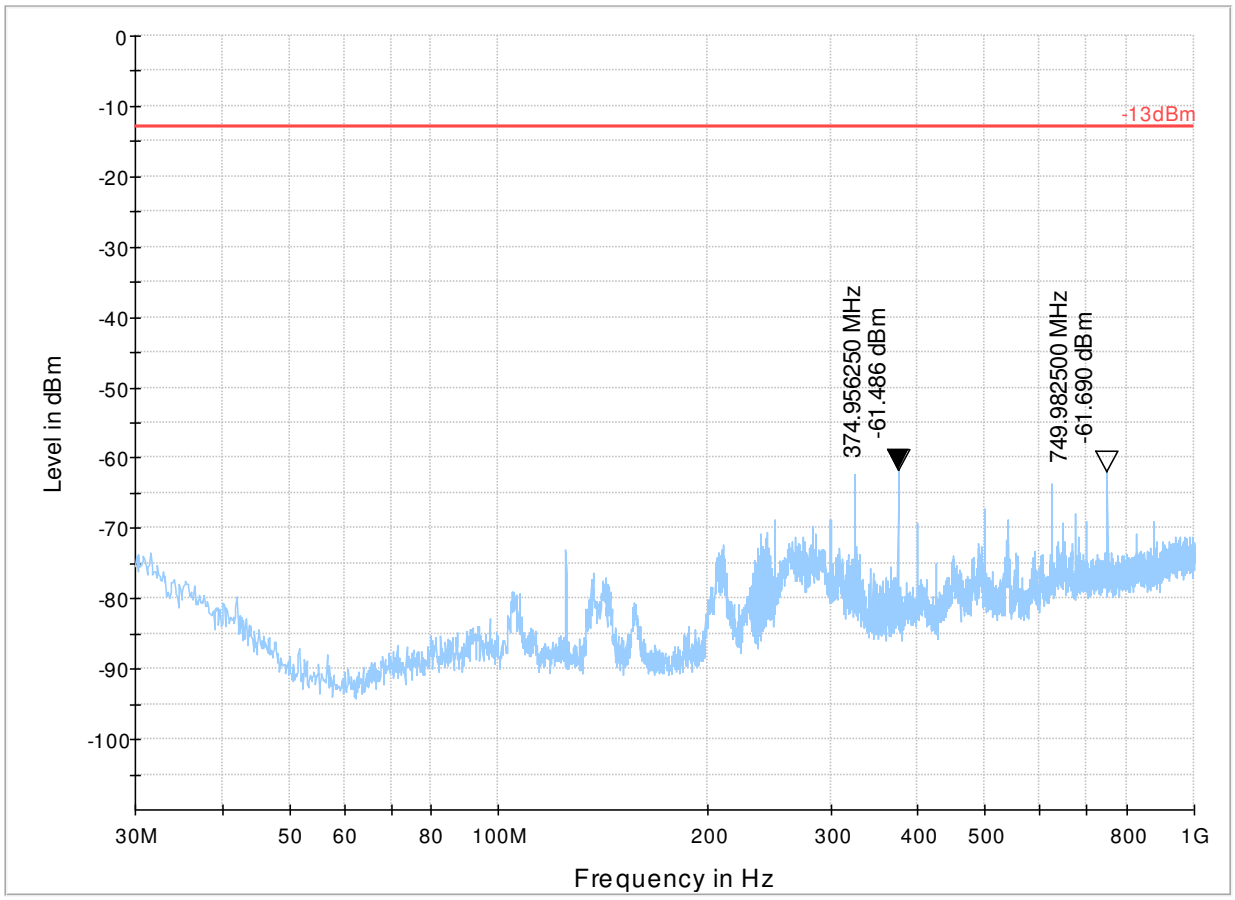


10.8 Measurement Plots LTE Band 25/ Band 2:

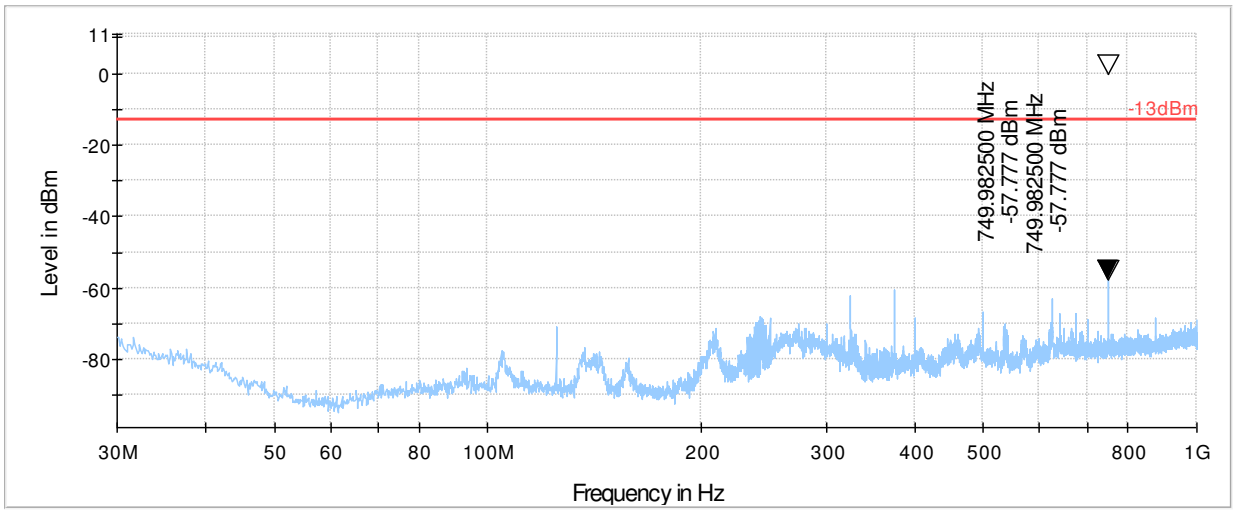
10.8.1 9 kHz – 30MHz, Ch. Mid



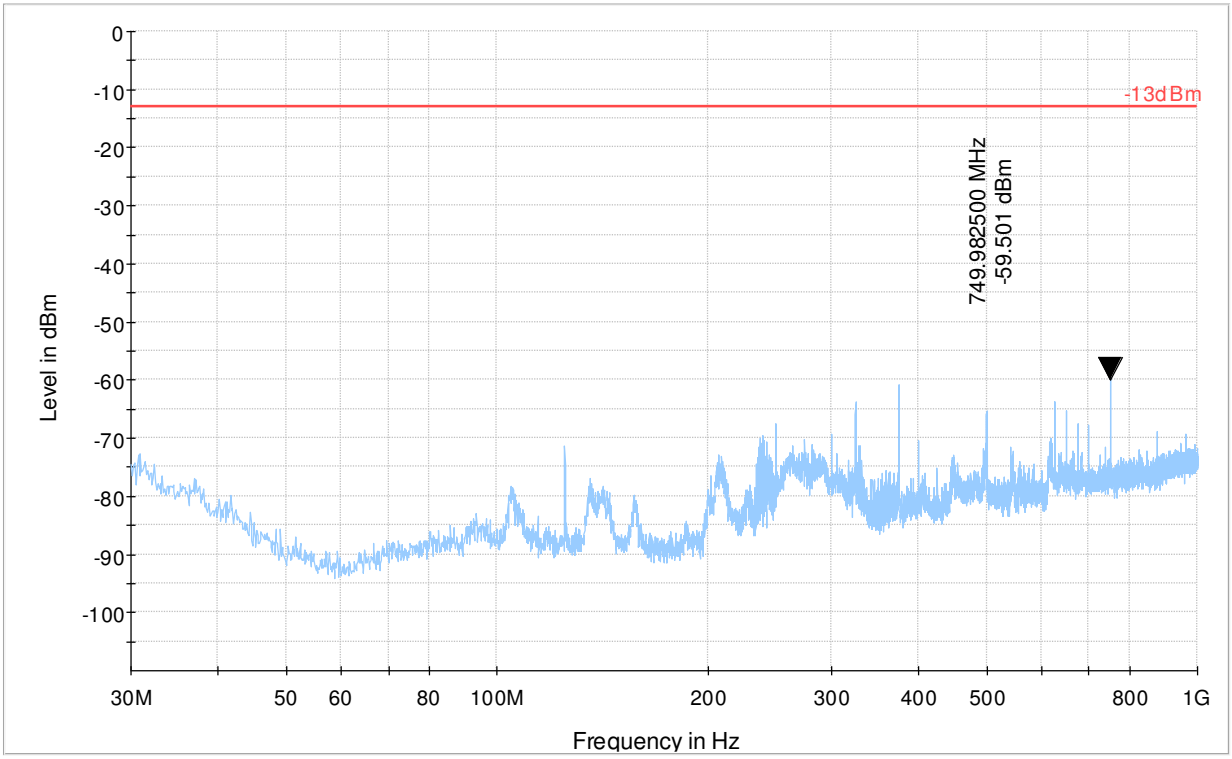
10.8.2 30MHz – 1GHz, Ch. Low



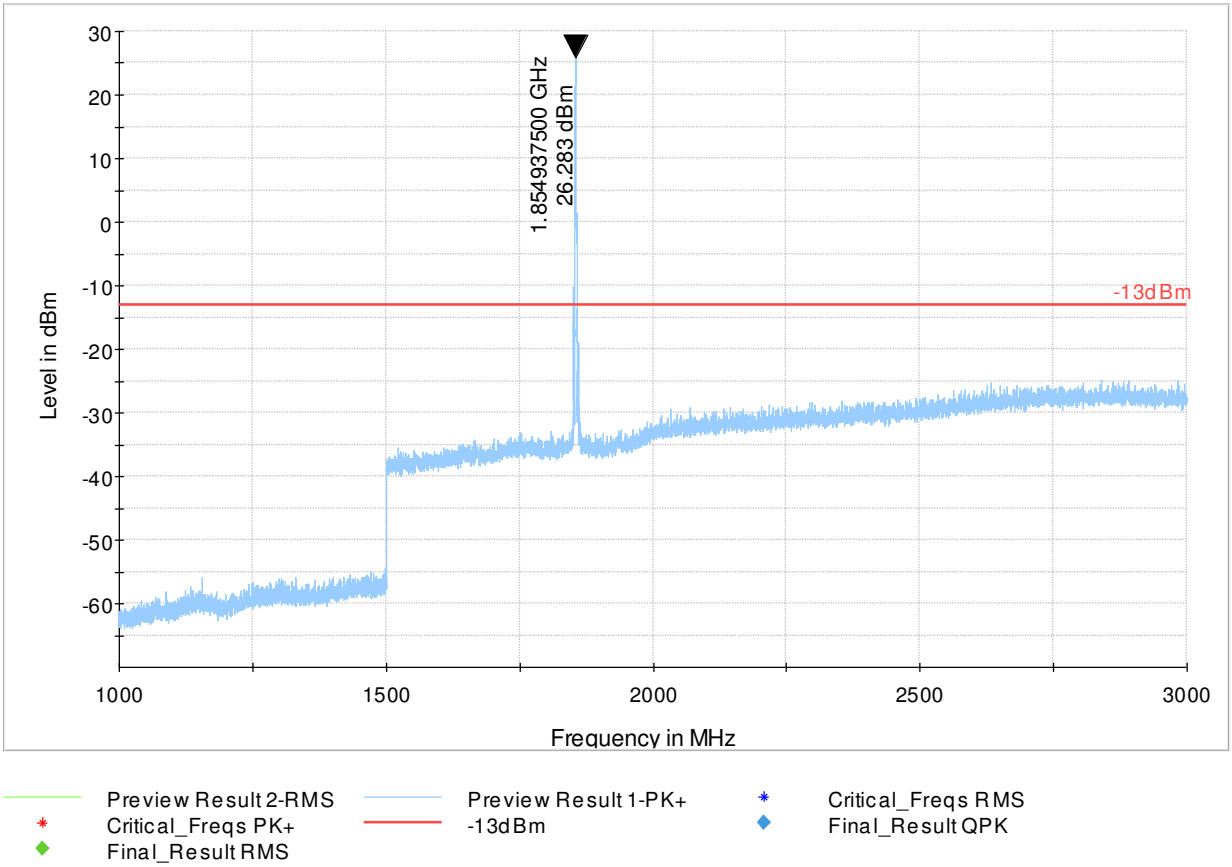
10.8.3 30MHz – 1GHz, Ch. Mid



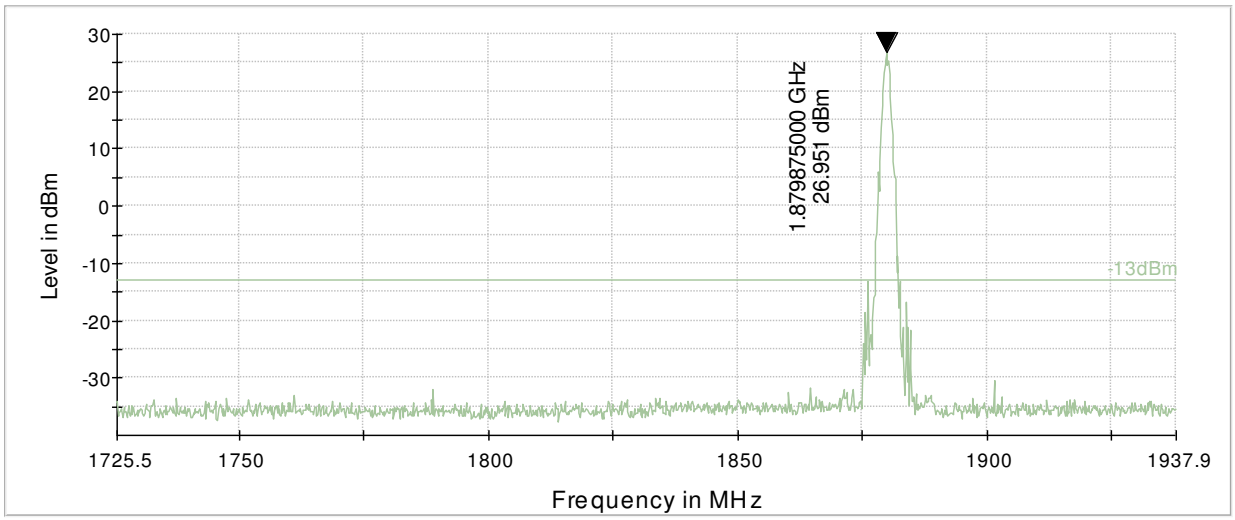
10.8.4 30MHz – 1GHz, Ch. High



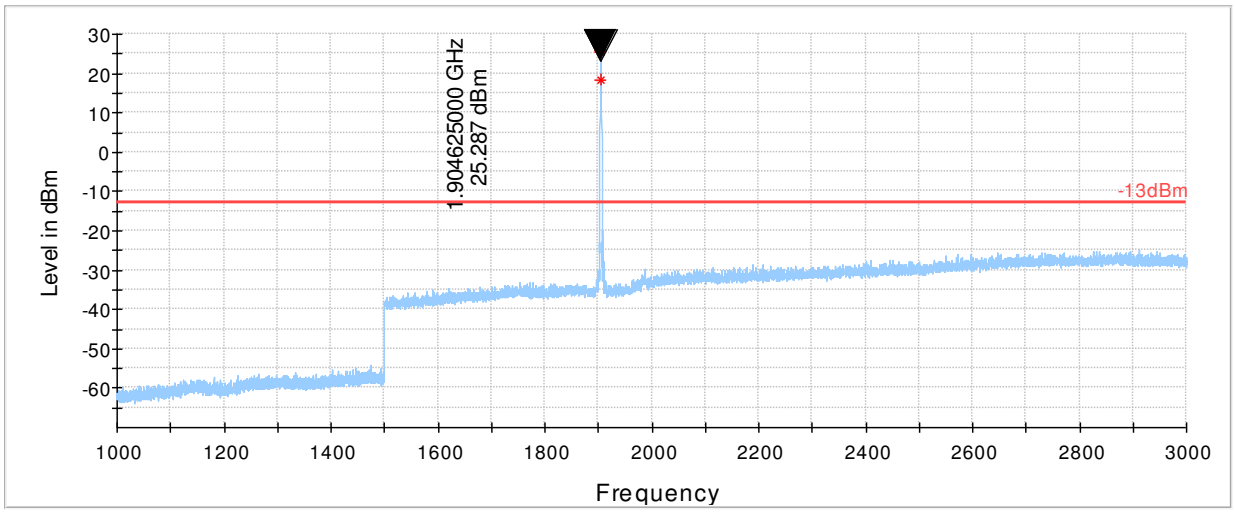
10.8.5 1GHz – 3GHz, Ch. Low



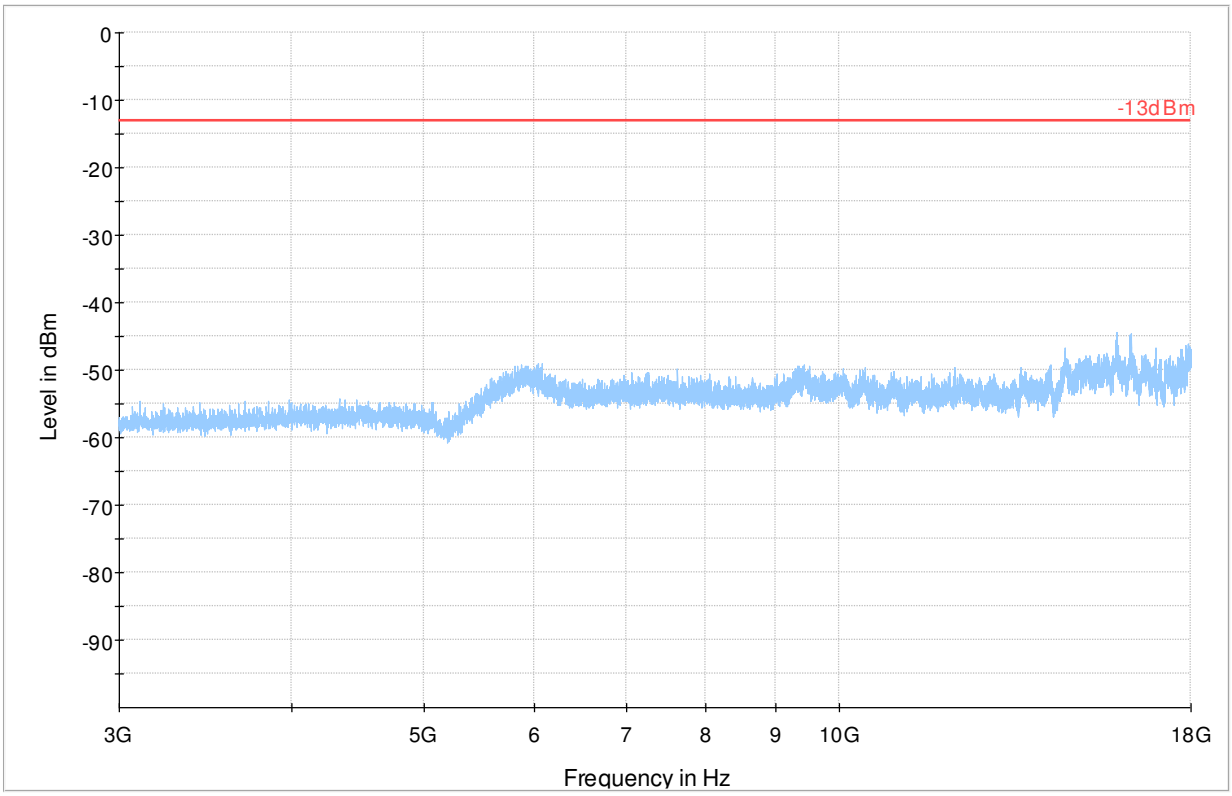
10.8.6 1GHz – 3GHz, Ch. Mid



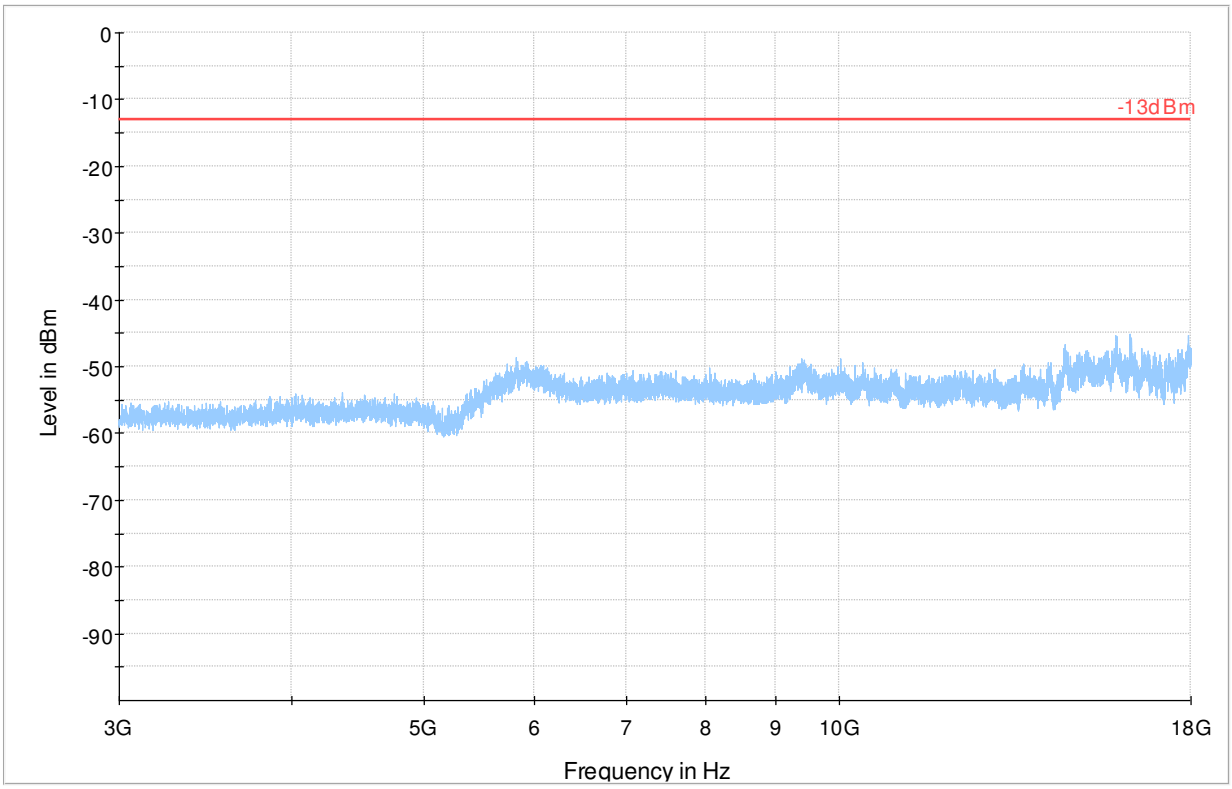
10.8.7 1GHz – 3GHz, Ch. High



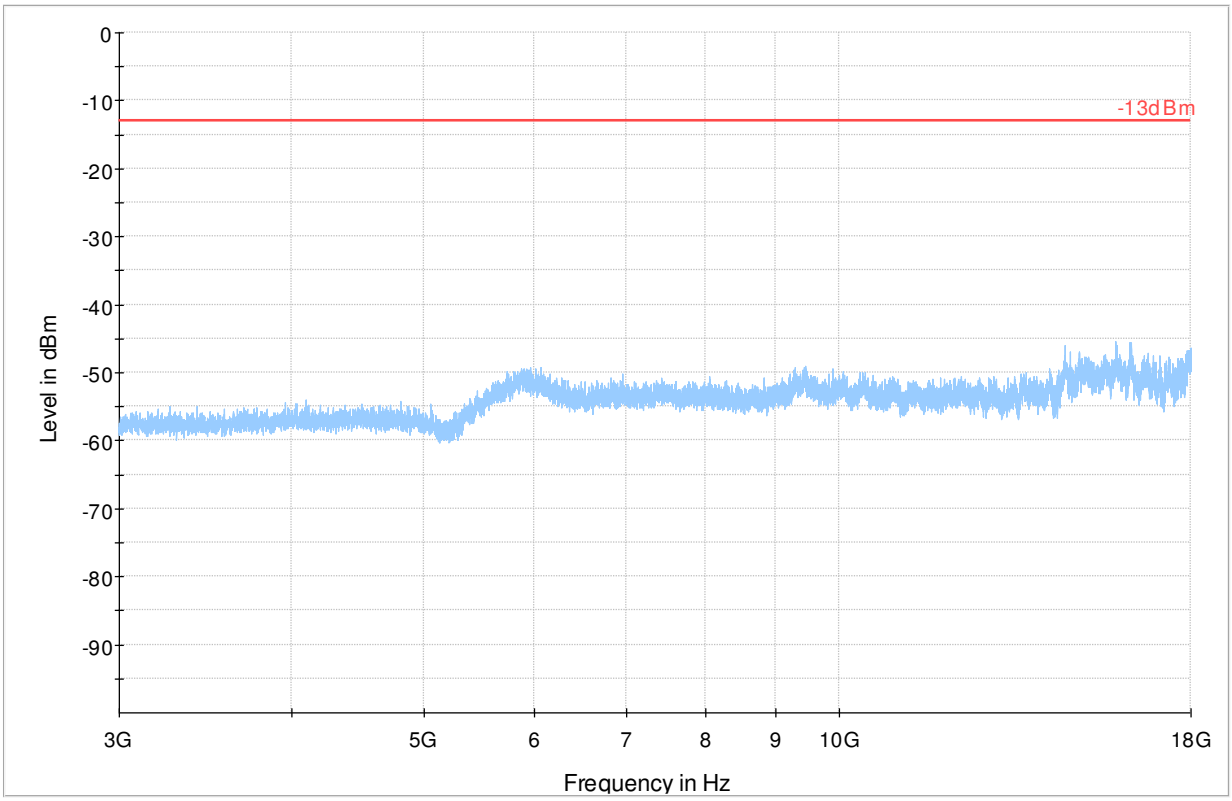
10.8.8 3GHz – 18GHz, Ch. Low



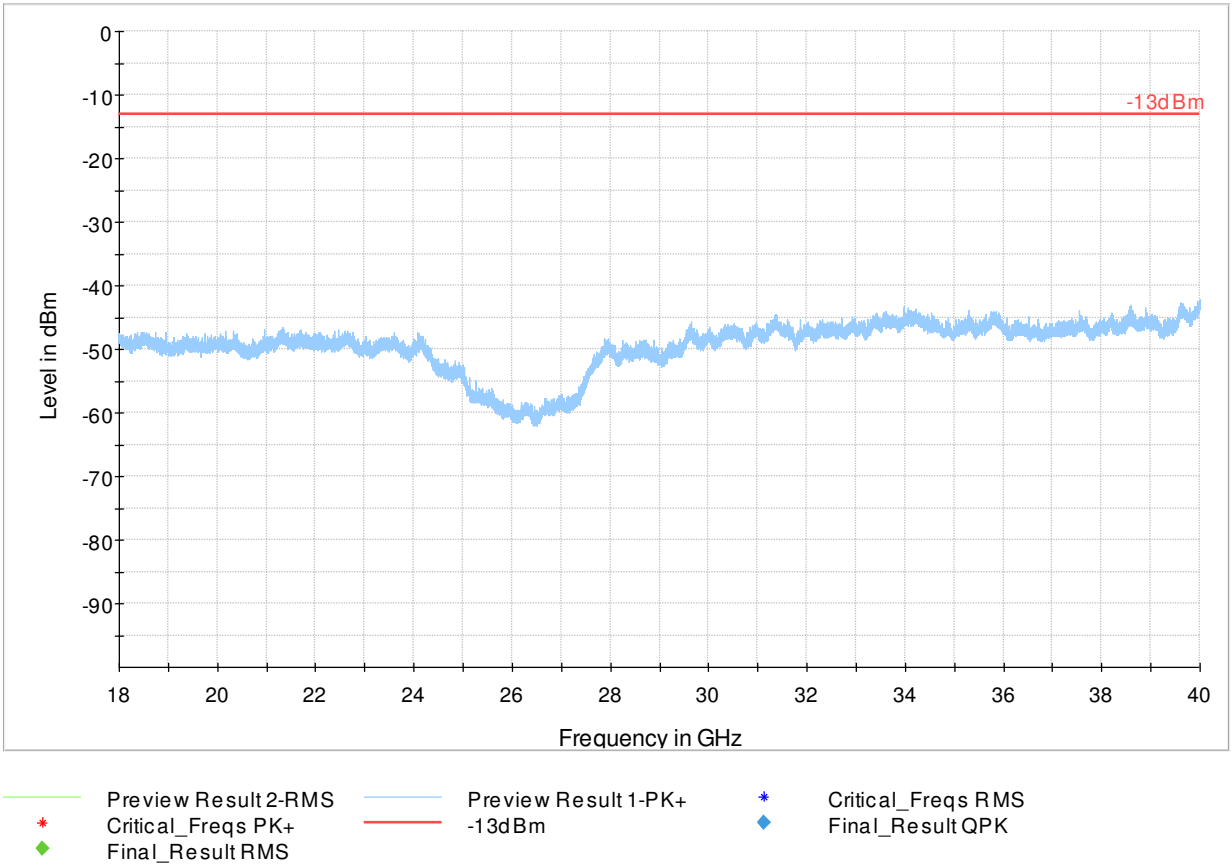
10.8.9 3GHz – 18GHz, Ch. Mid



10.8.10 3GHz – 18GHz, Ch. High

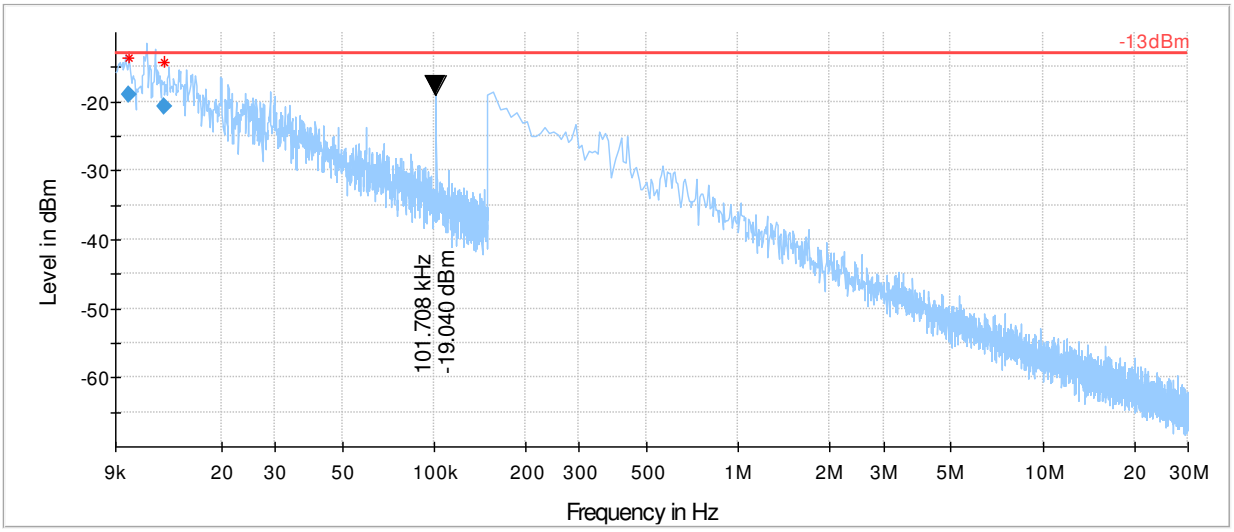


10.8.11 18GHz – 40GHz, Ch. Mid



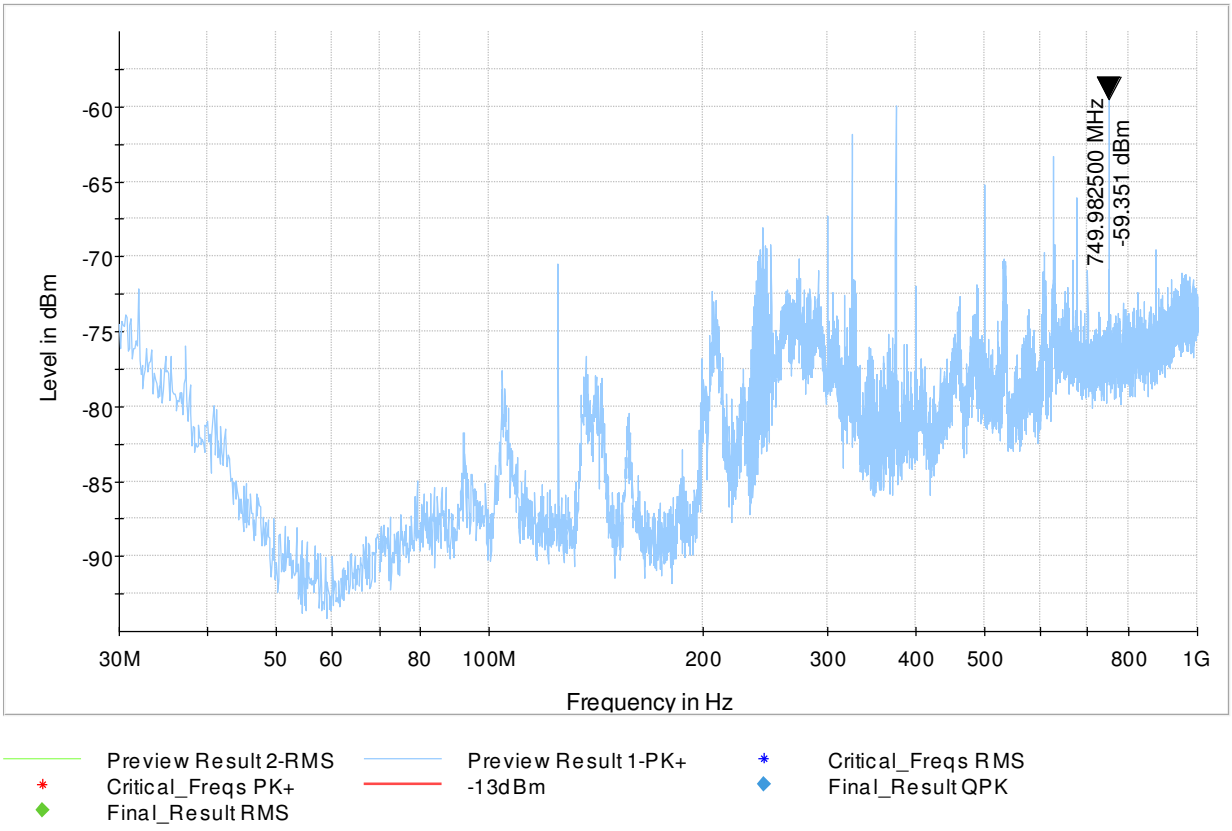
10.9 Measurement Plots LTE Band 4:

10.9.1 9 KHz – 30MHz, Ch. Mid

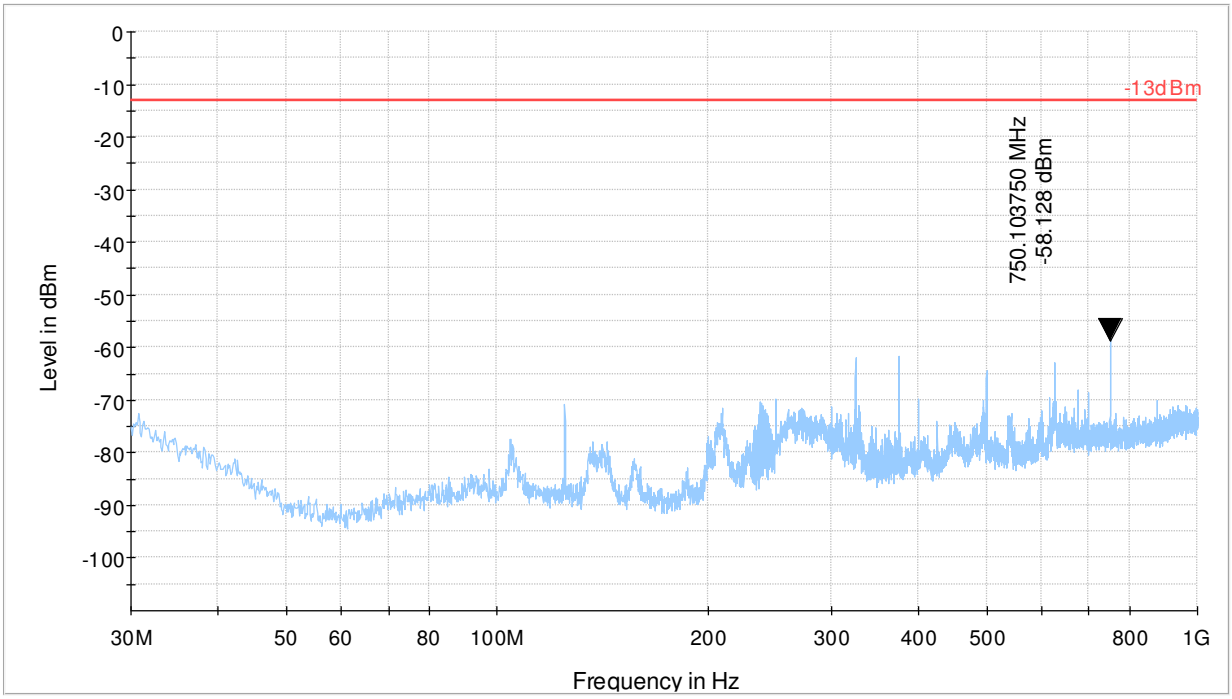


◆ Preview Result 2-RMS [Preview Result 2.Result:2]

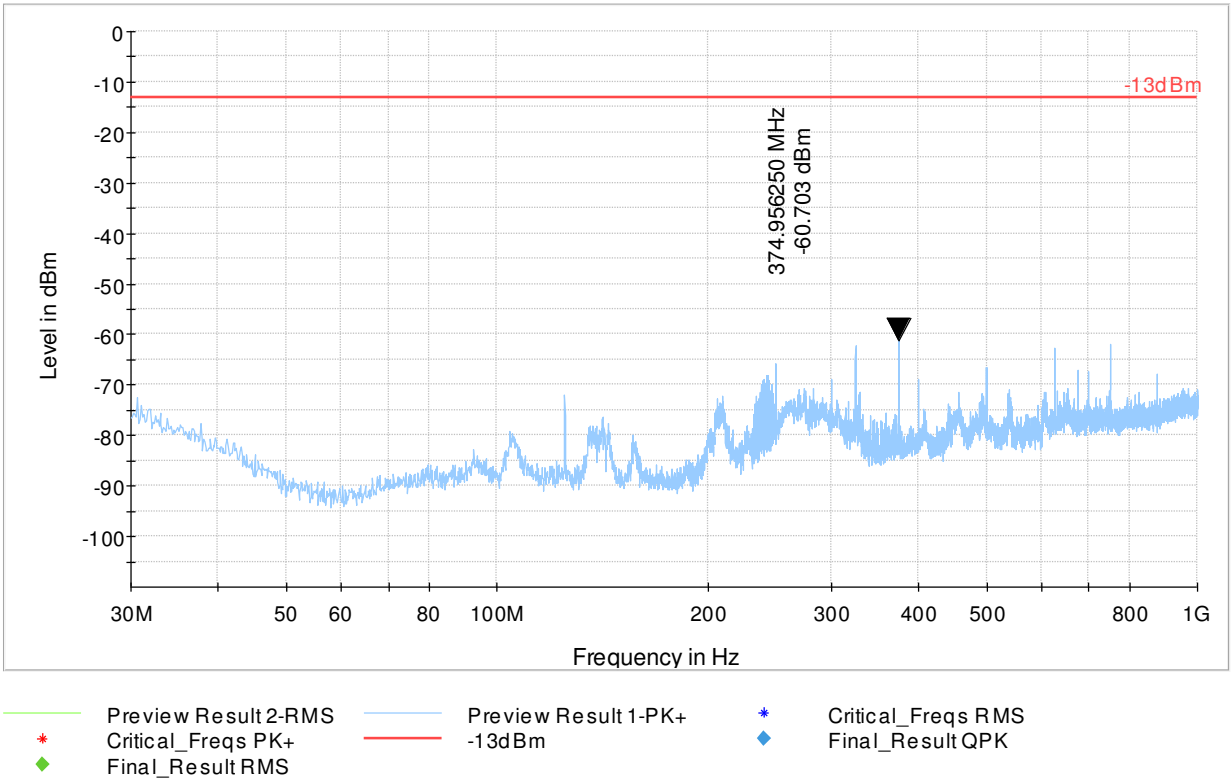
10.9.2 30MHz – 1GHz, Ch. Low



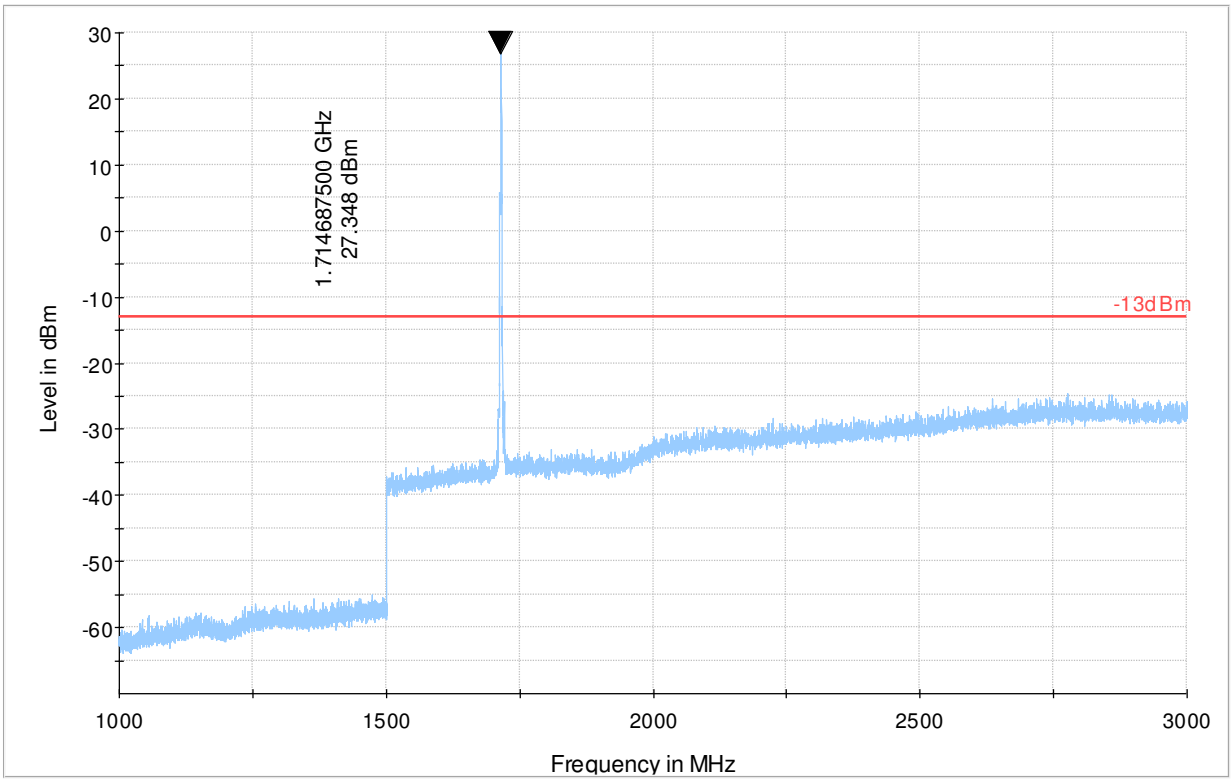
10.9.3 30MHz – 1GHz, Ch. Mid



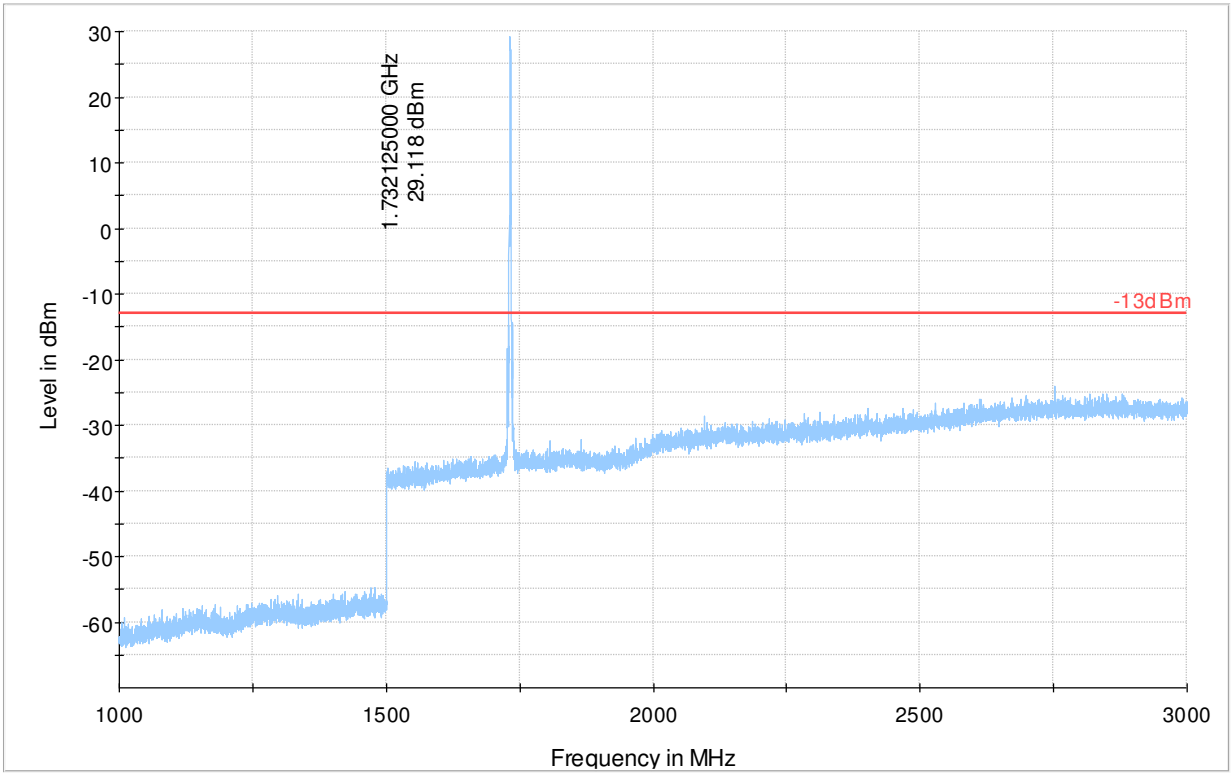
10.9.4 30MHz – 1GHz, Ch. High



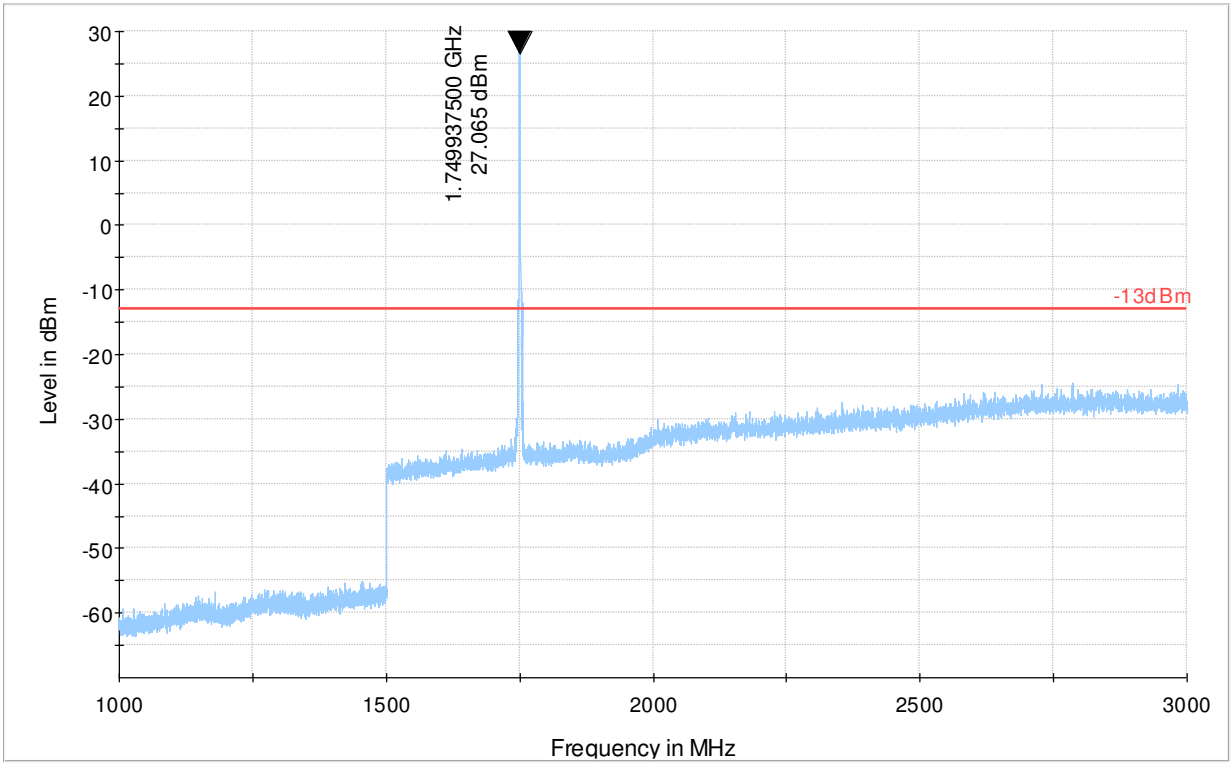
10.9.5 1GHz – 3GHz, Ch. Low



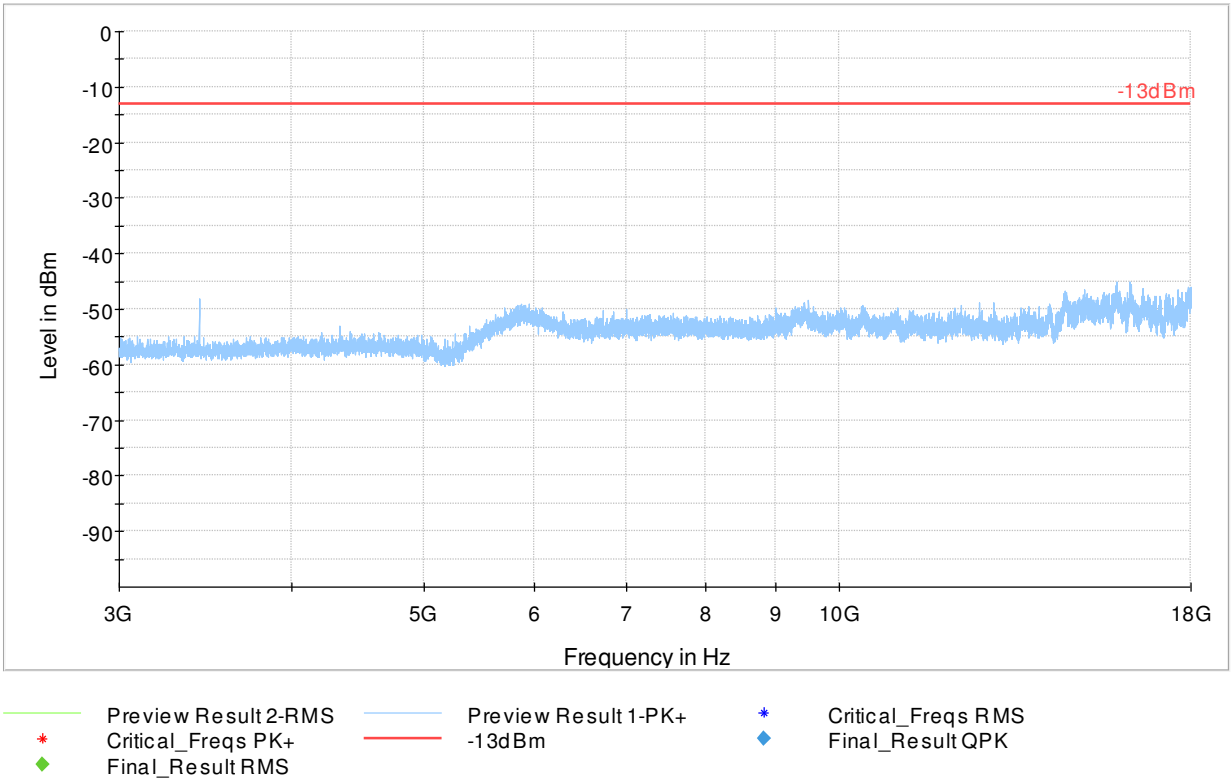
10.9.6 1GHz – 3GHz, Ch. Mid



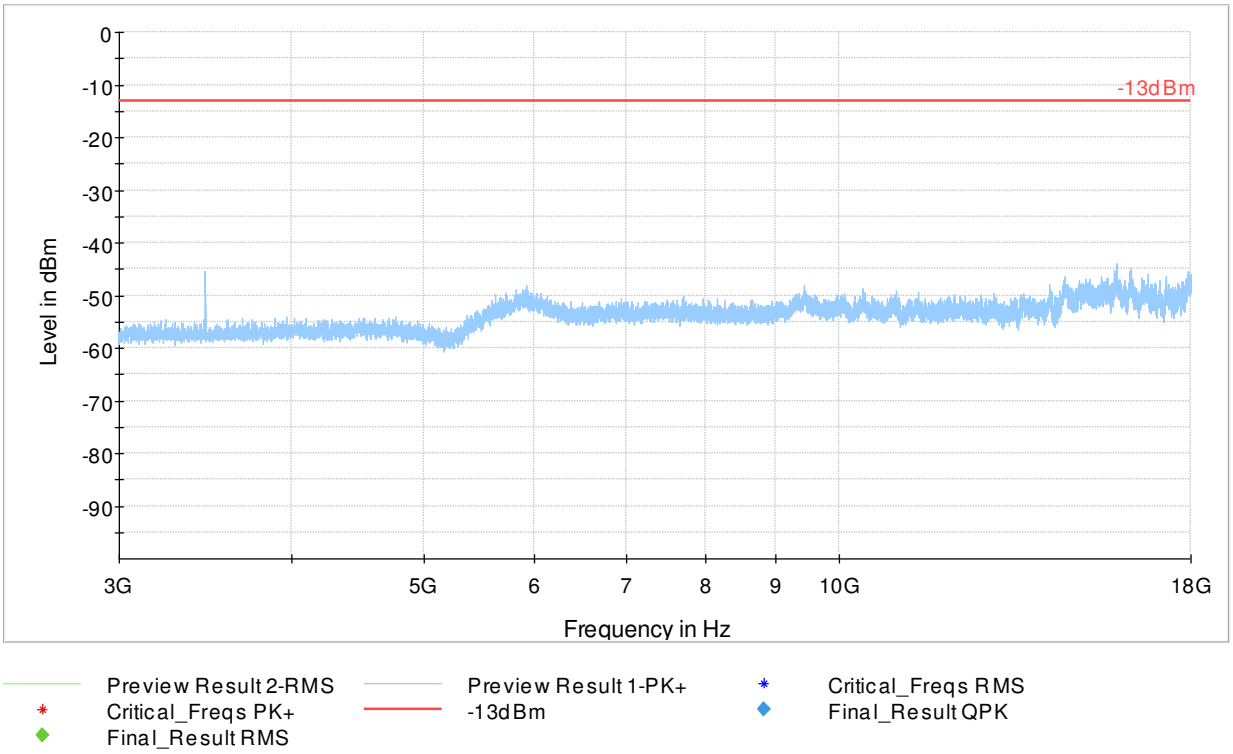
10.9.7 1GHz – 3GHz, Ch. High



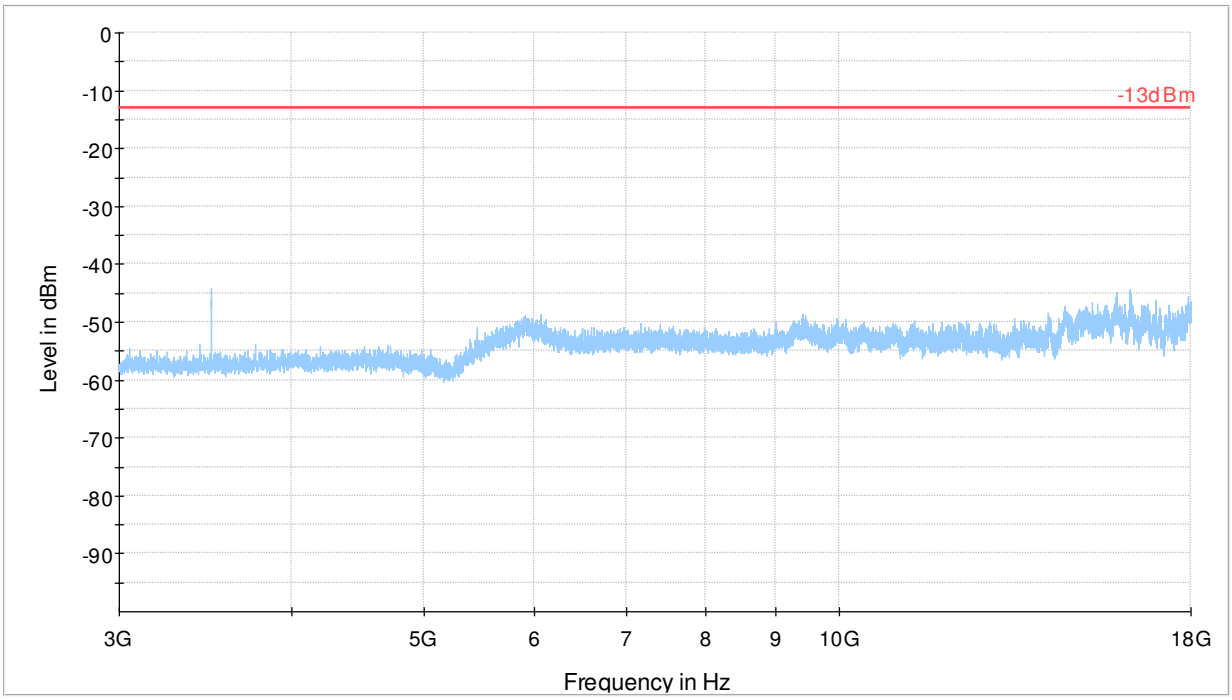
10.9.8 3GHz – 18GHz, Ch. Low



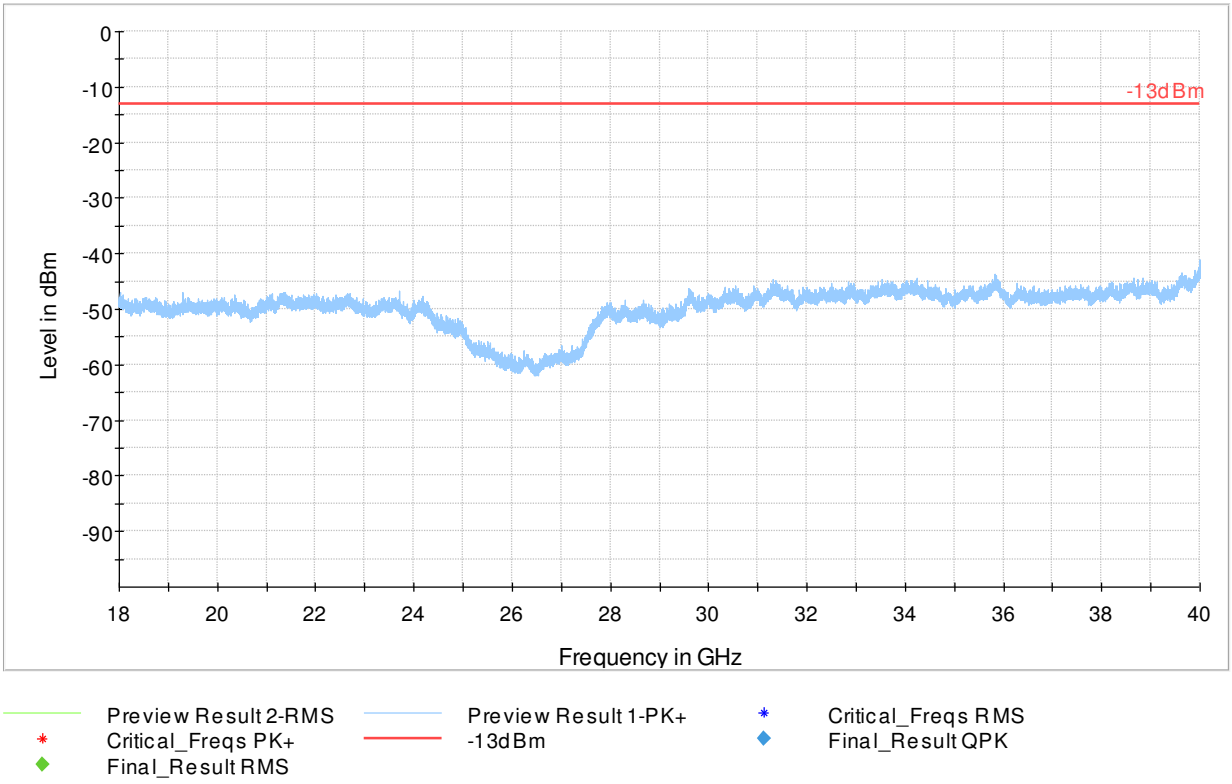
10.9.9 3GHz – 18GHz, Ch. Mid



10.9.10 3GHz – 18GHz, Ch. High

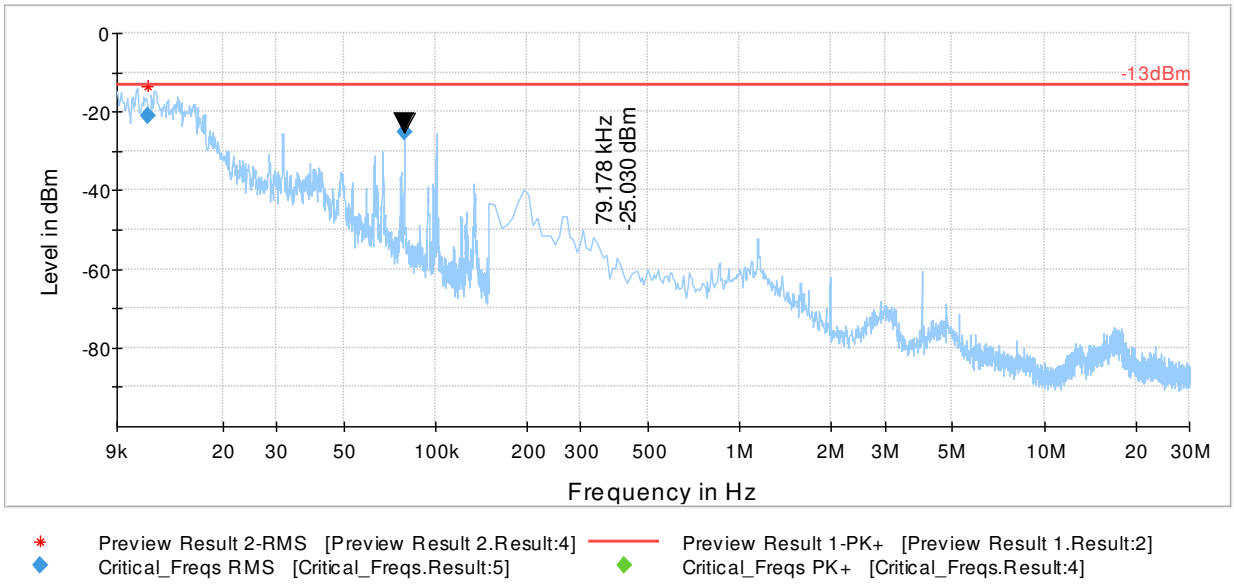


10.9.11 18GHz – 40GHz, Ch. Mid

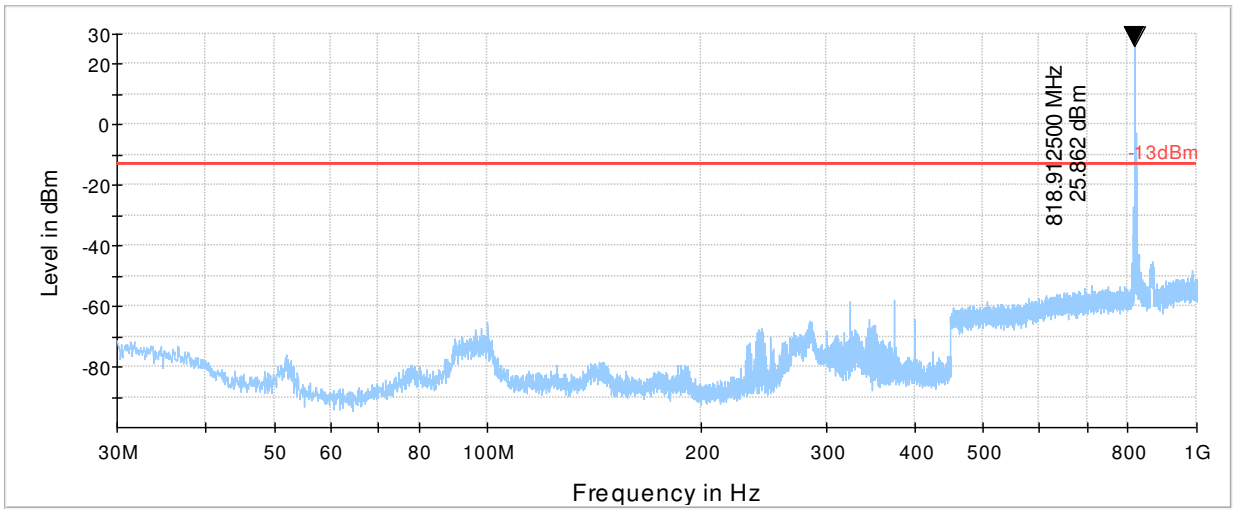


10.10 Measurement Plots LTE Band 26/ Band 5:

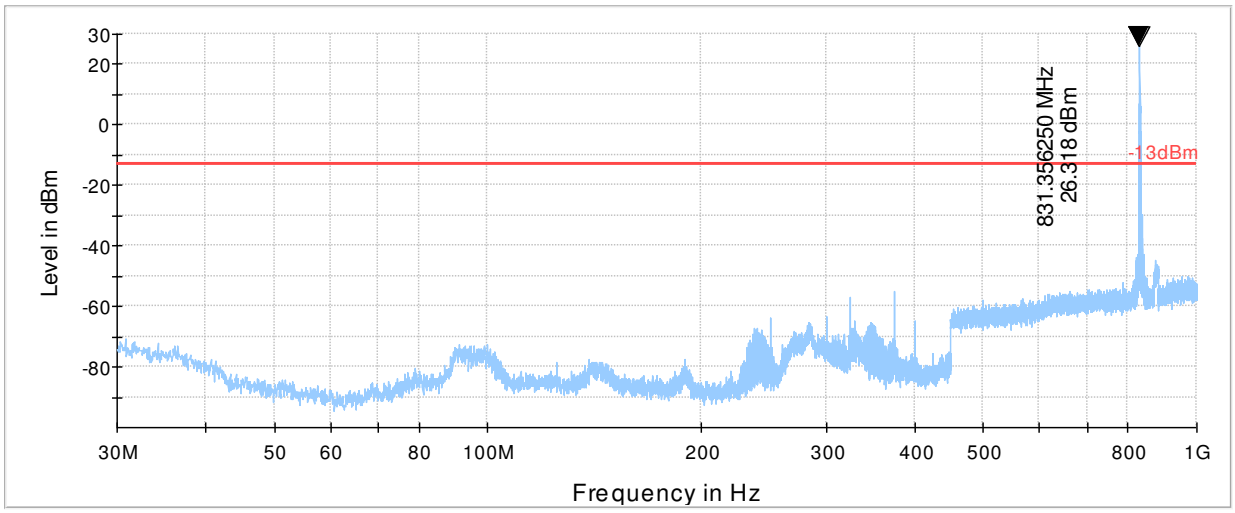
10.10.1 9 KHz – 30MHz, Ch. Mid



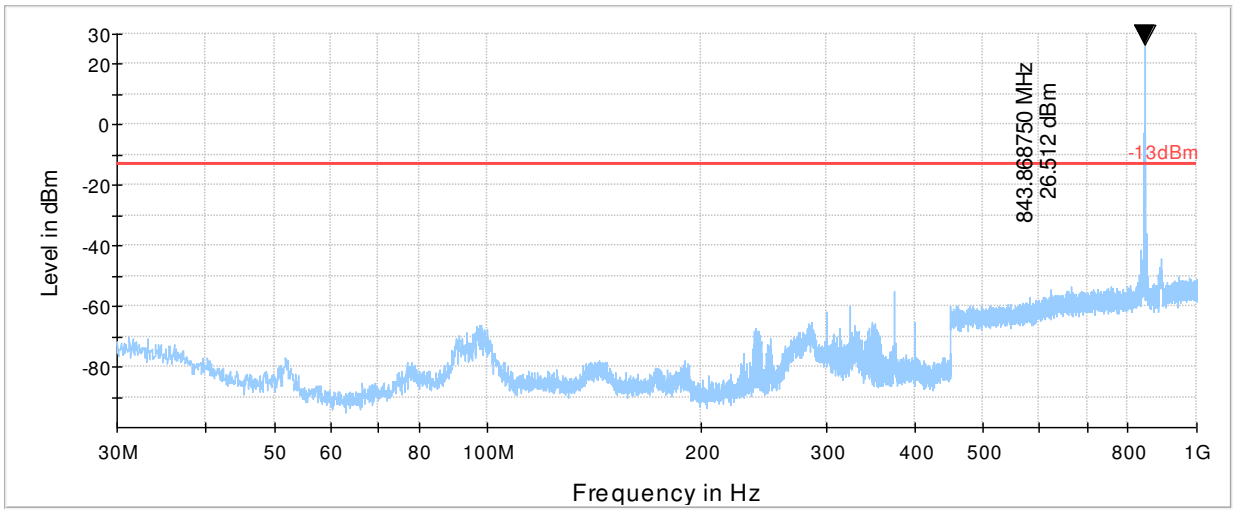
10.10.2 30MHz – 1GHz, Ch. Low



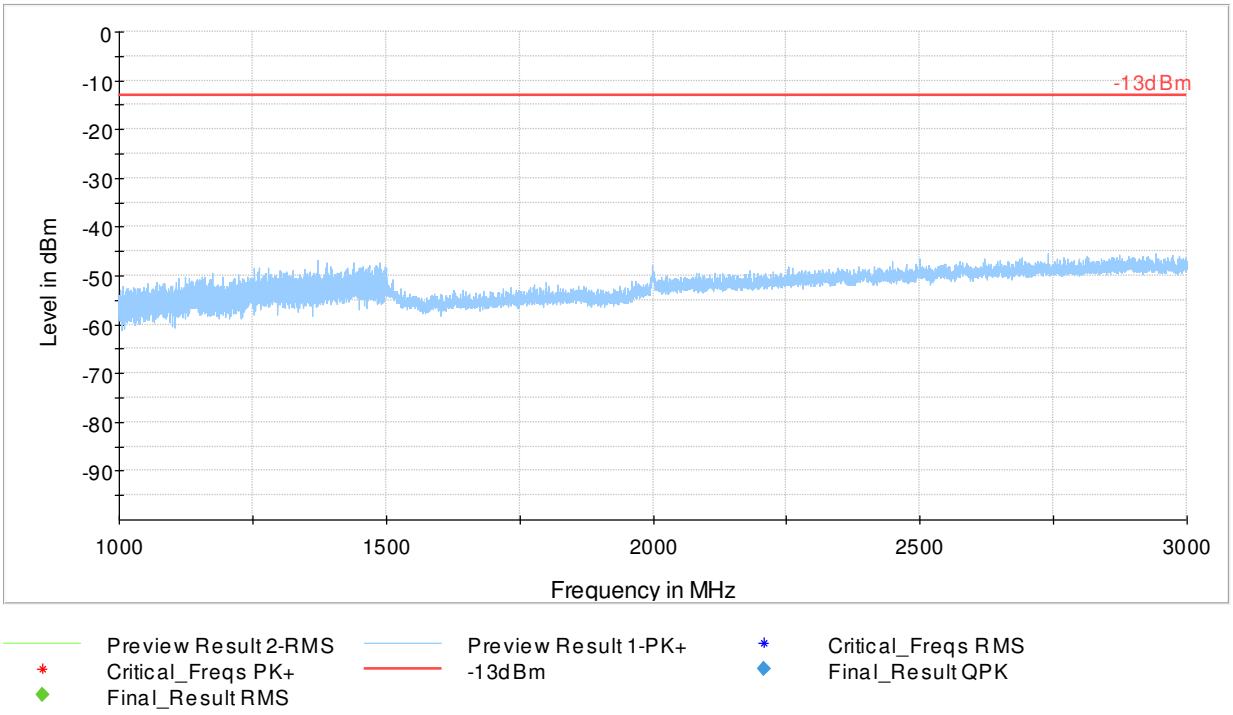
10.10.3 30MHz – 1GHz, Ch. Mid



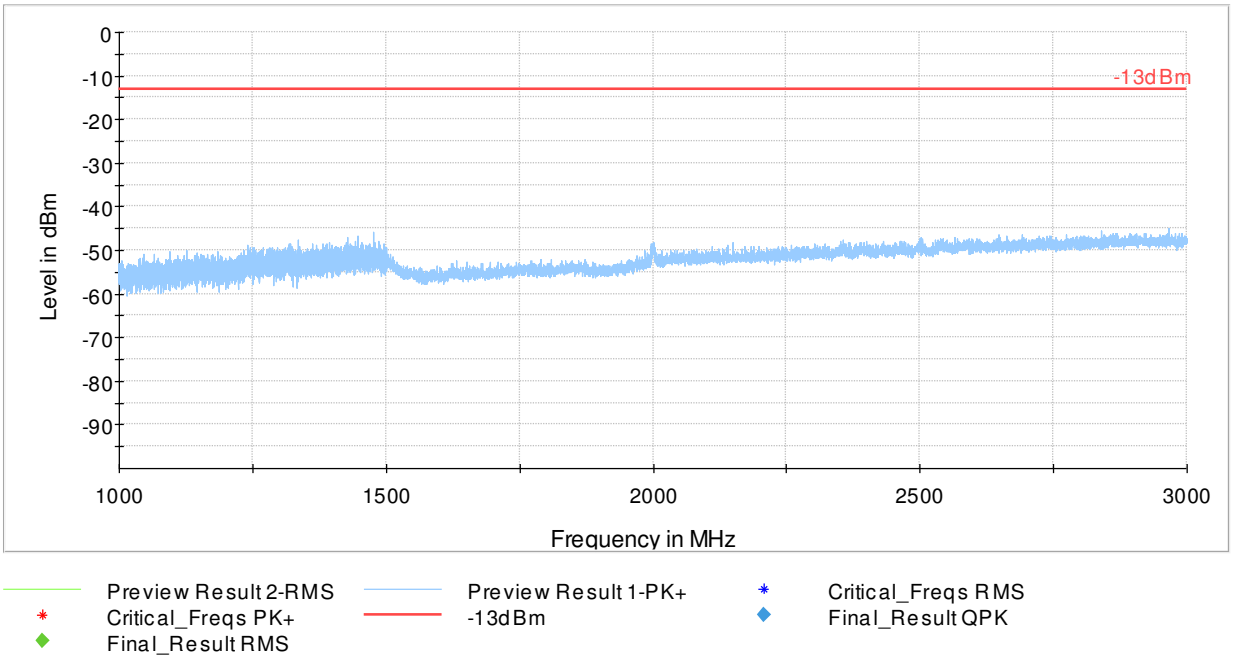
10.10.4 30MHz – 1GHz, Ch. High



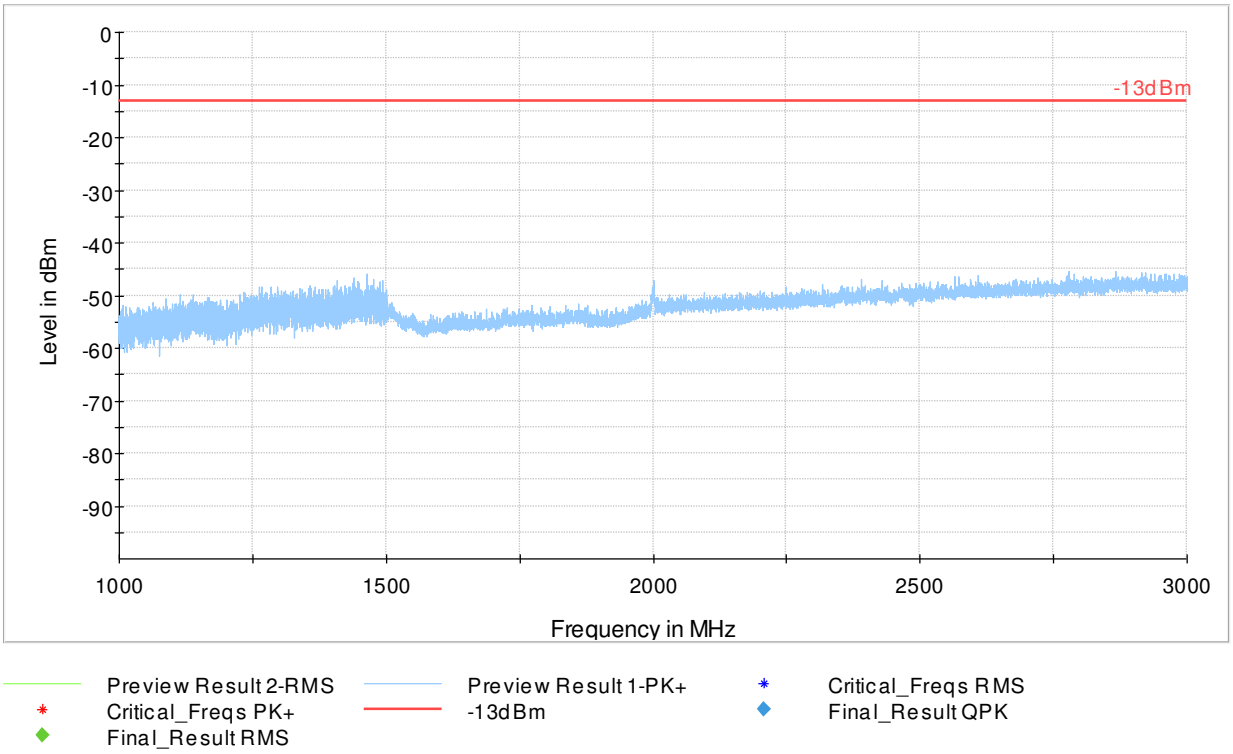
10.10.5 1GHz – 3GHz, Ch. Low



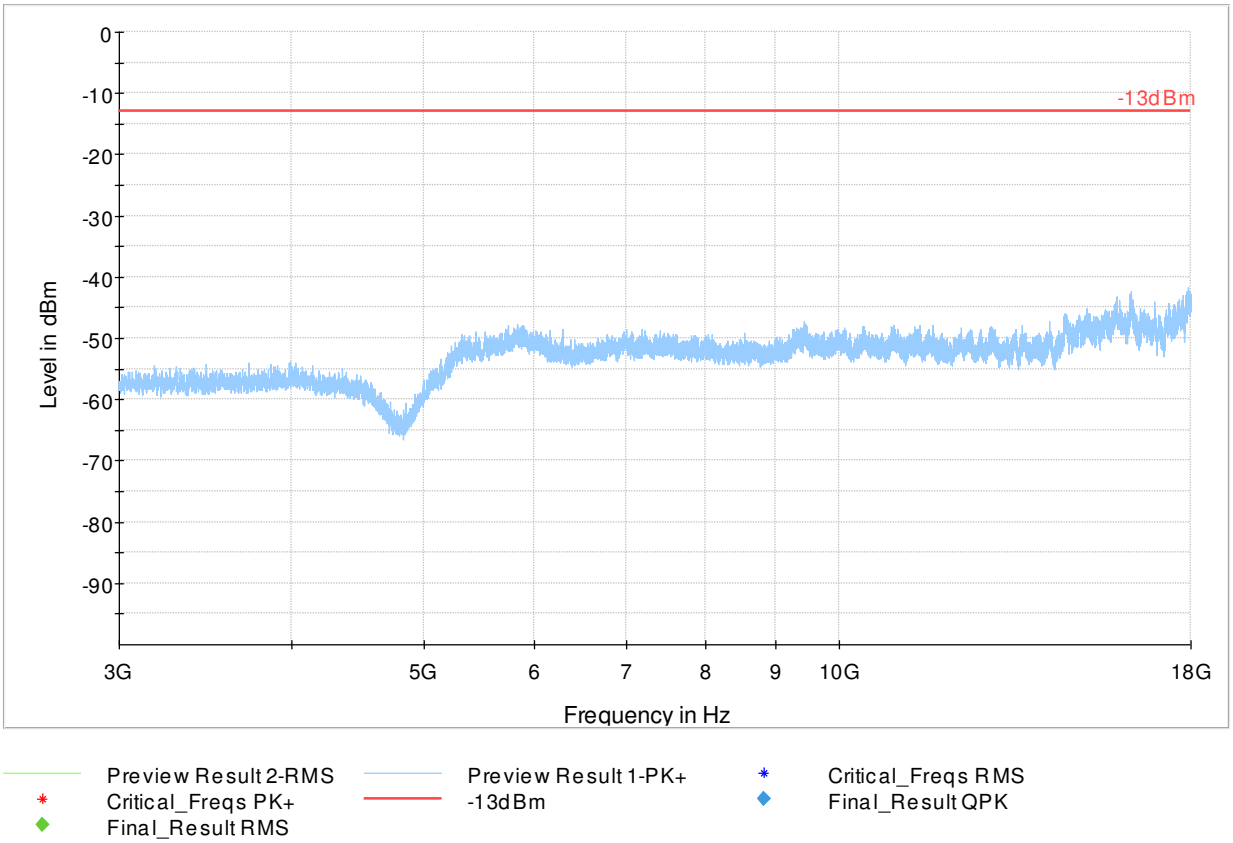
10.10.6 1GHz – 3GHz, Ch. Mid



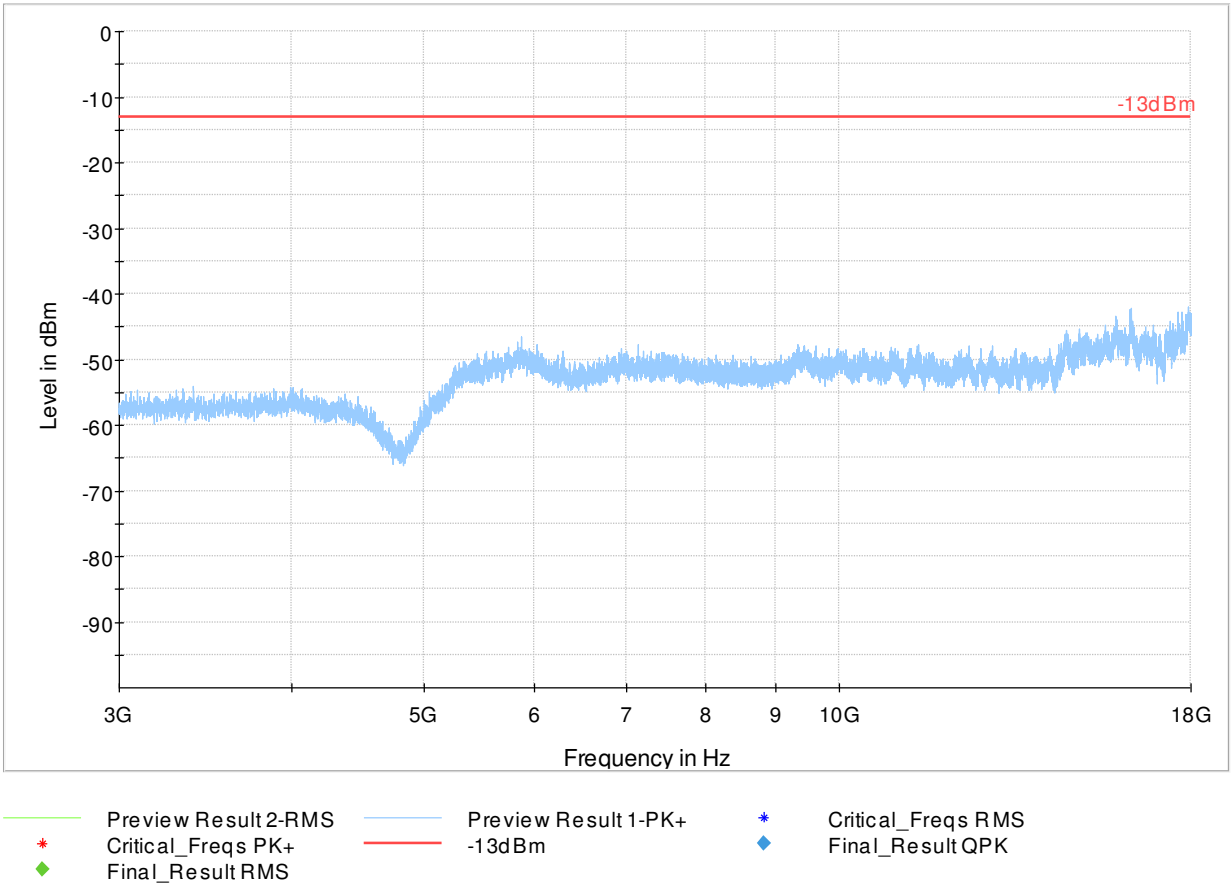
10.10.7 1GHz – 3GHz, Ch. High



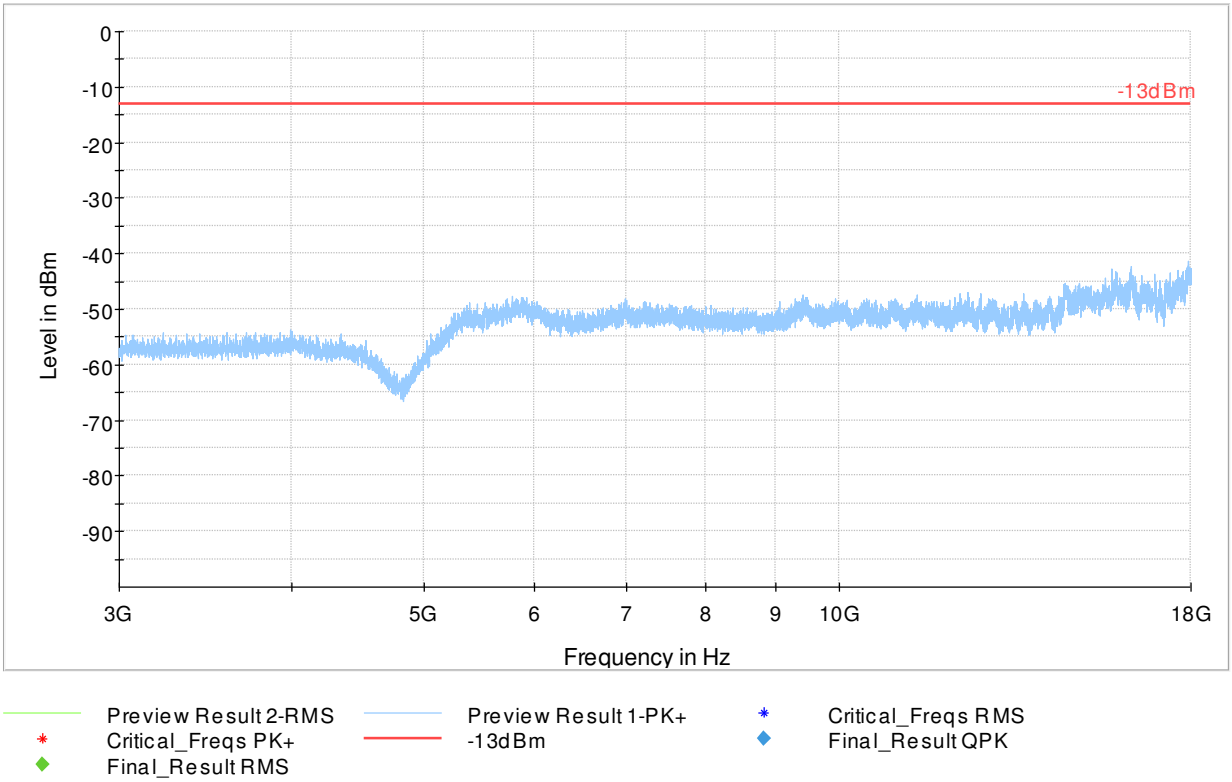
10.10.8 3GHz – 18GHz, Ch. Low



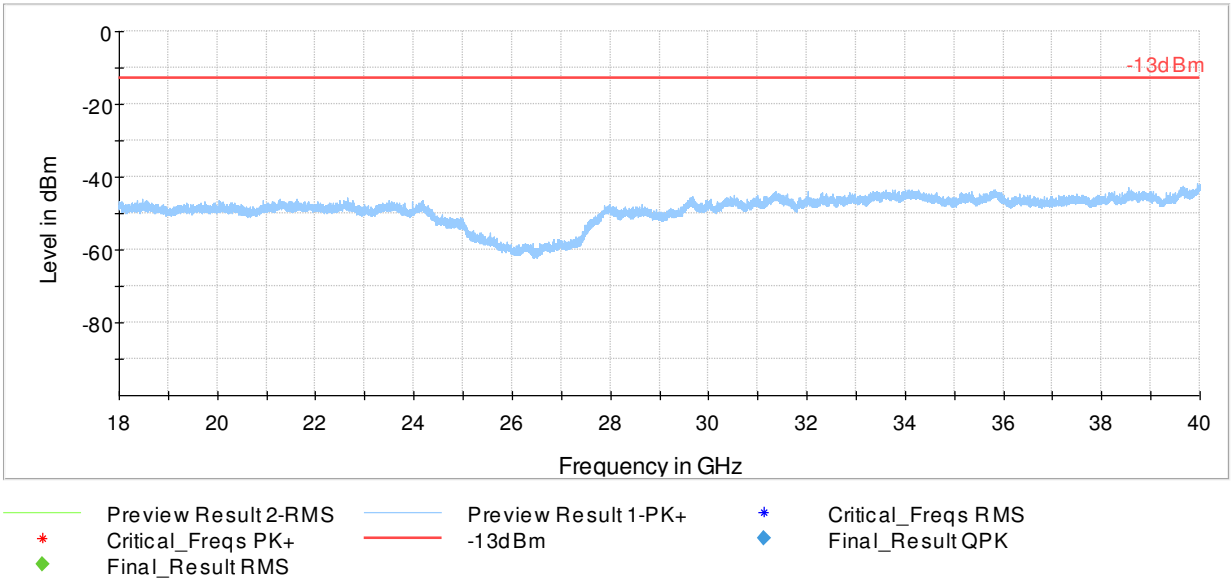
10.10.9 3GHz – 18GHz, Ch. Mid



10.10.10 3GHz – 18GHz, Ch. High

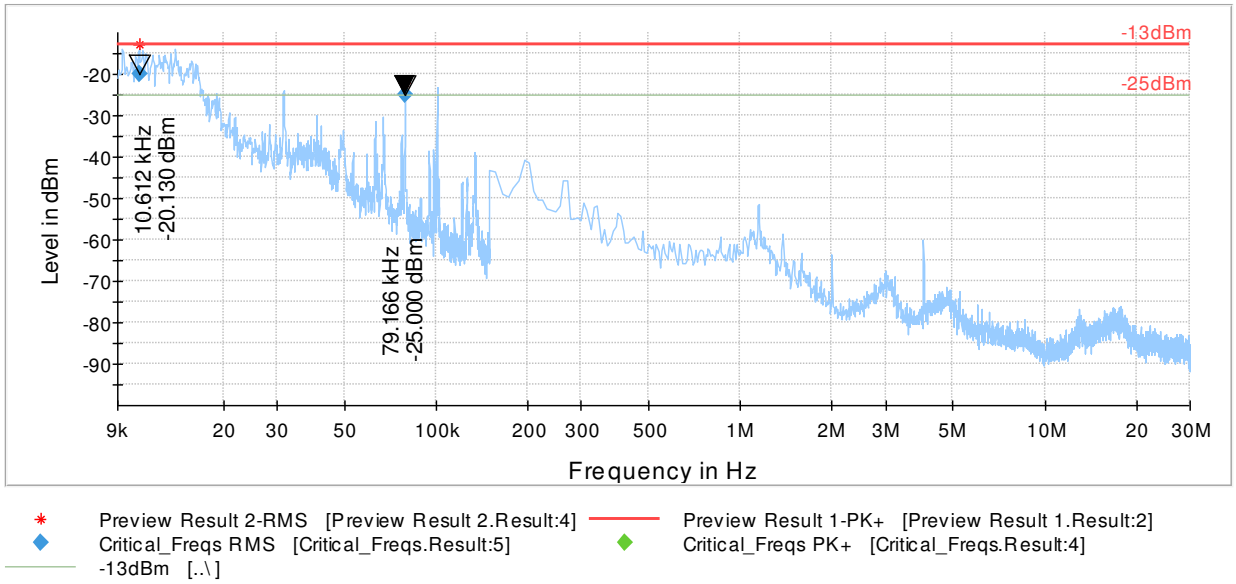


10.10.11 18GHz – 40GHz, Ch. Mid

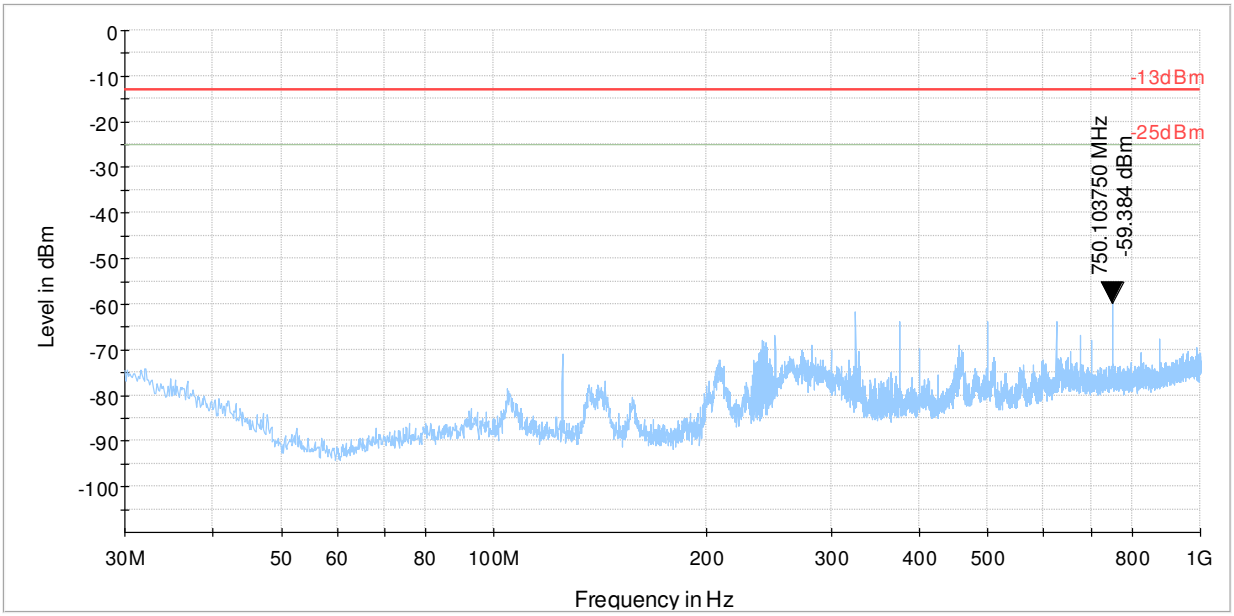


10.11 Measurement Plots LTE Band 7:

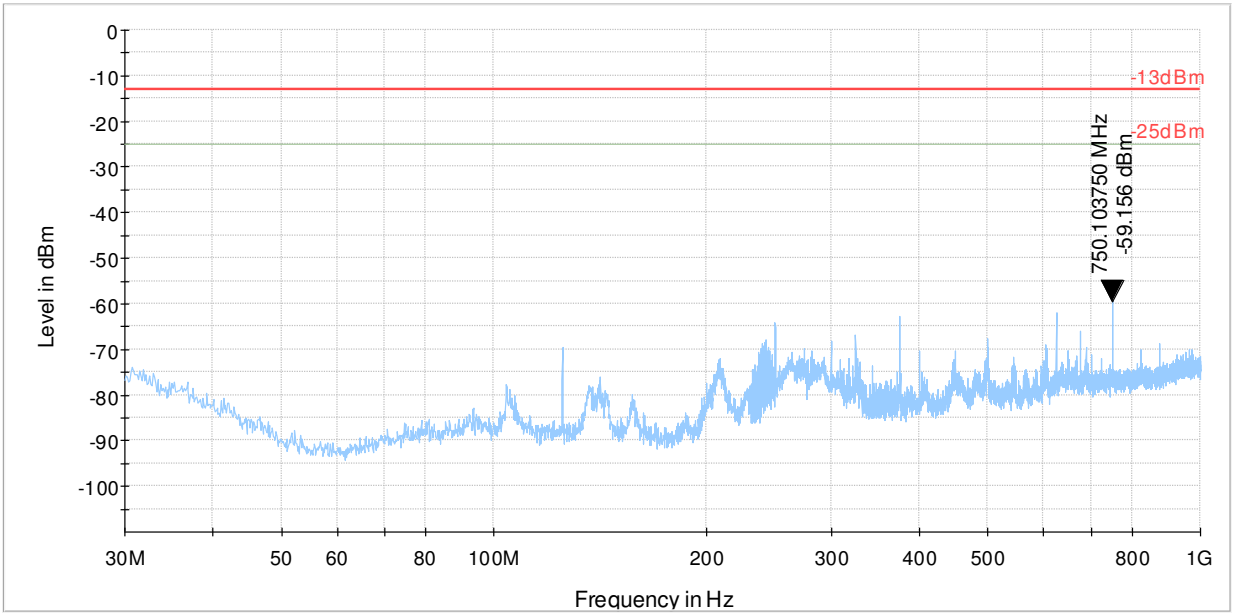
10.11.1 9 KHz – 30MHz, Ch. Mid



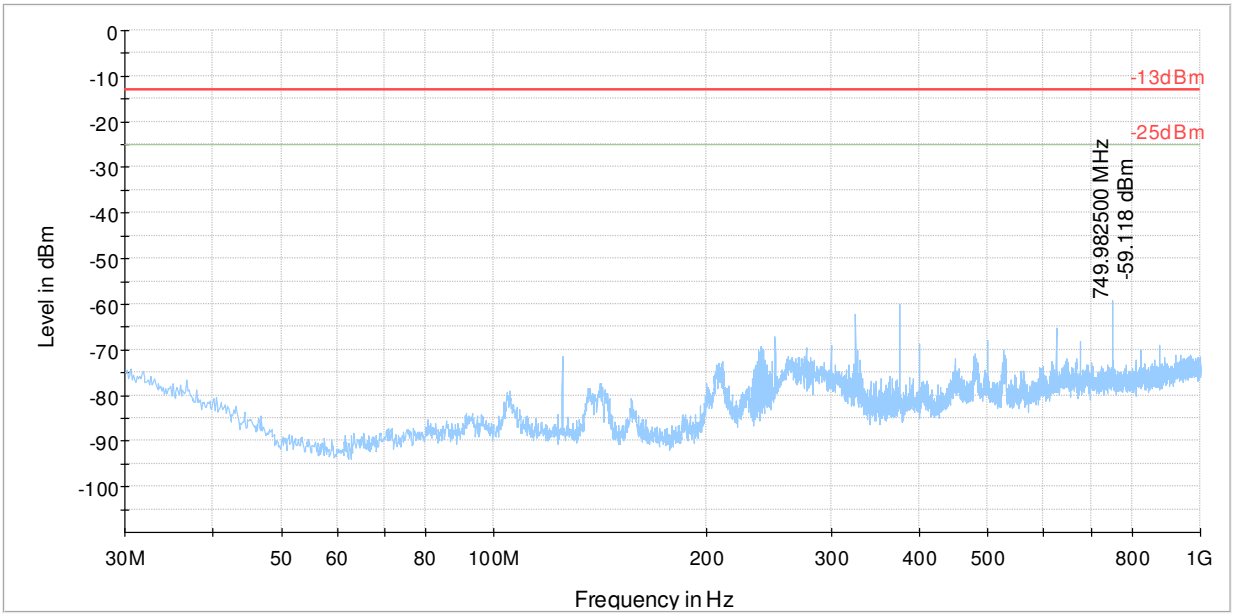
10.11.2 30MHz – 1GHz, Ch. Low



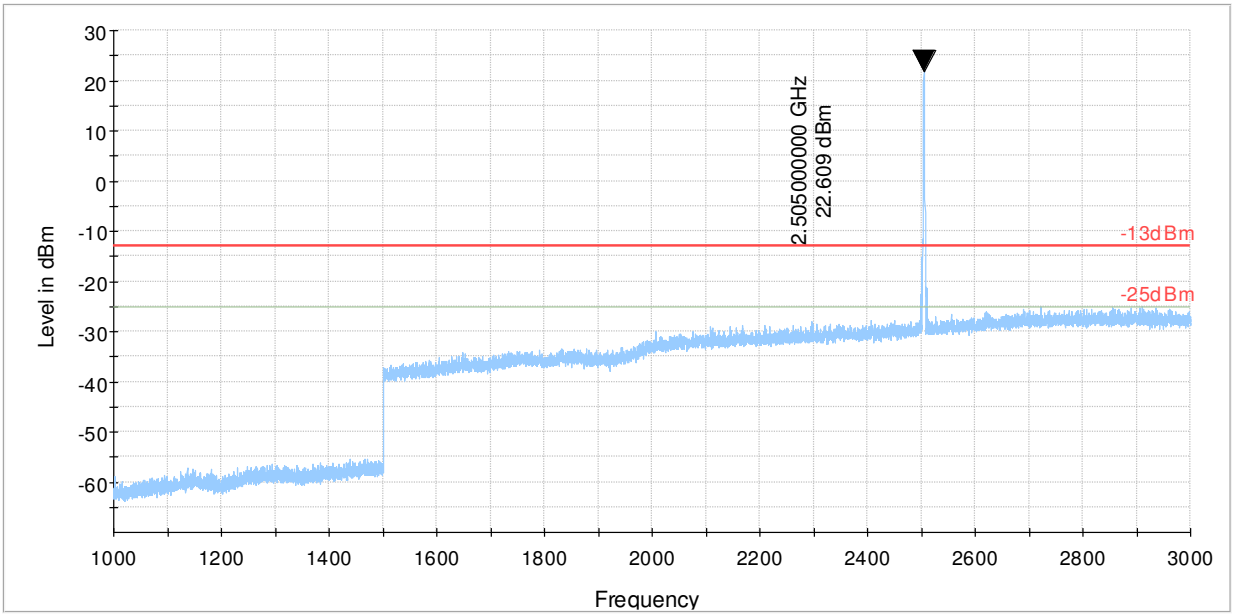
10.11.3 30MHz – 1GHz, Ch. Mid



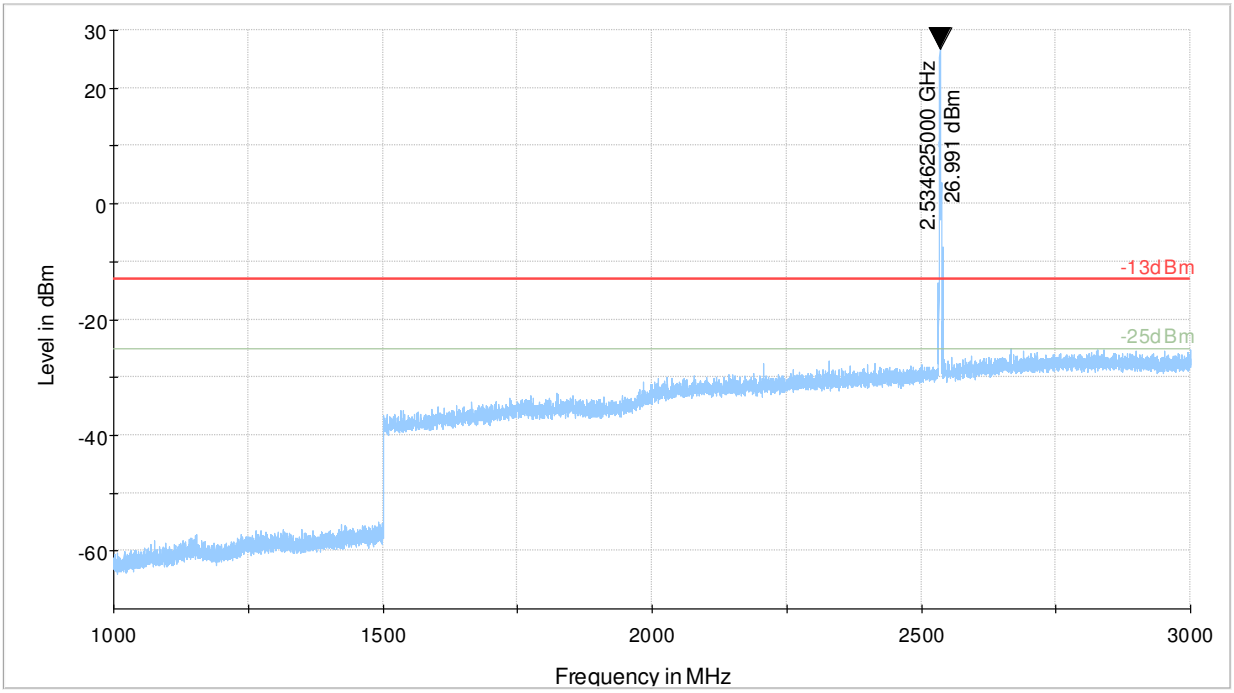
10.11.4 30MHz – 1GHz, Ch. High



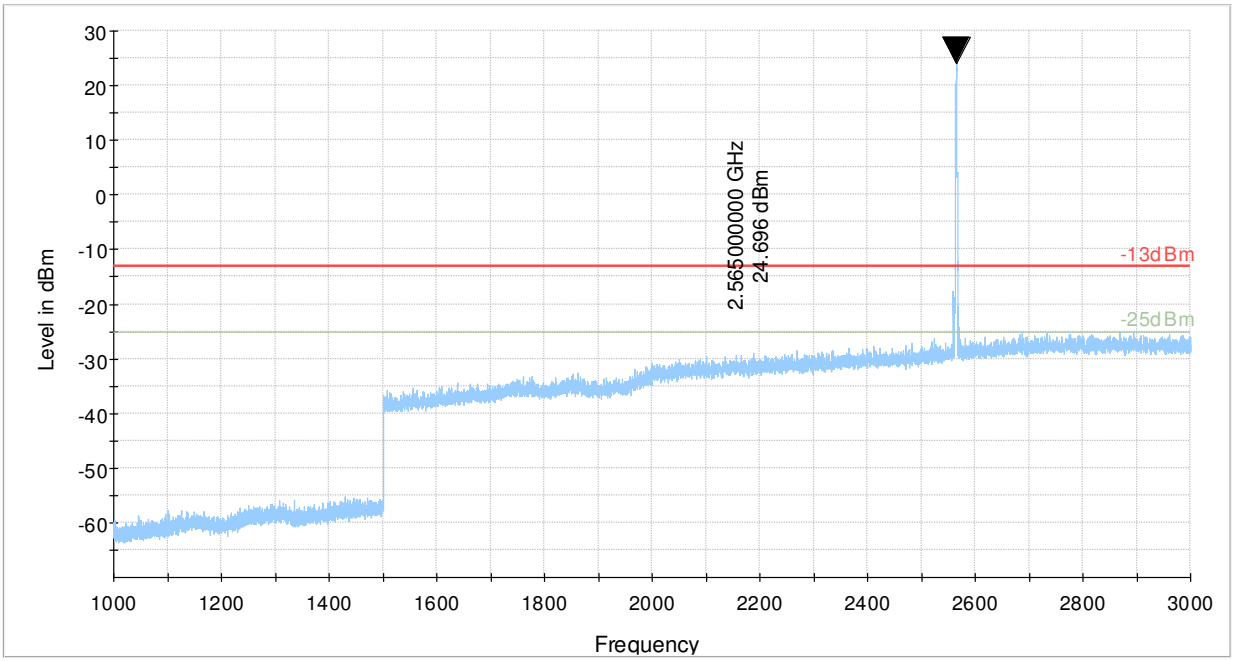
10.11.5 1GHz – 3GHz, Ch. Low



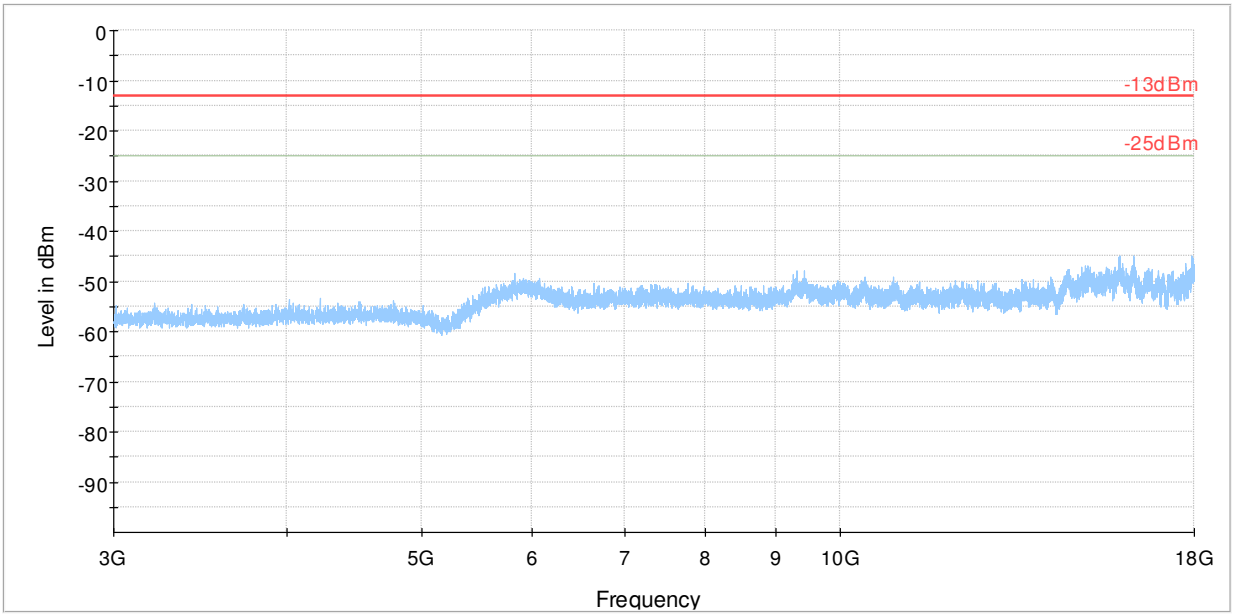
10.11.6 1GHz – 3GHz, Ch. Mid



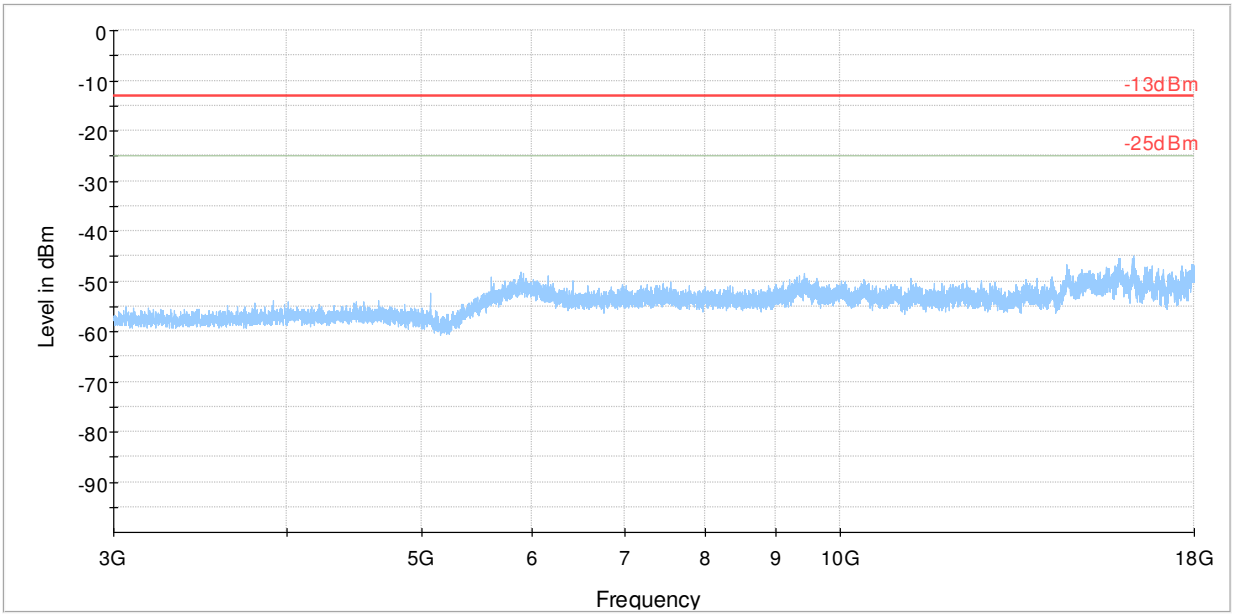
10.11.7 1GHz – 3GHz, Ch. High



10.11.8 3GHz – 18GHz, Ch. Low

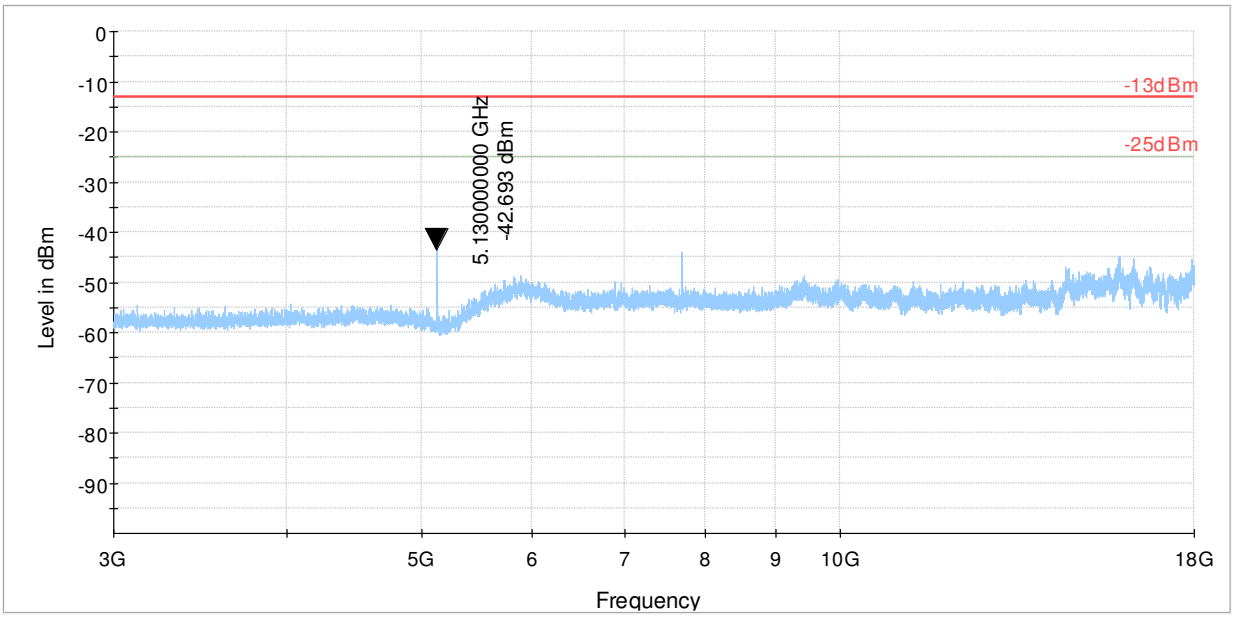


10.11.9 3GHz – 18GHz, Ch. Mid

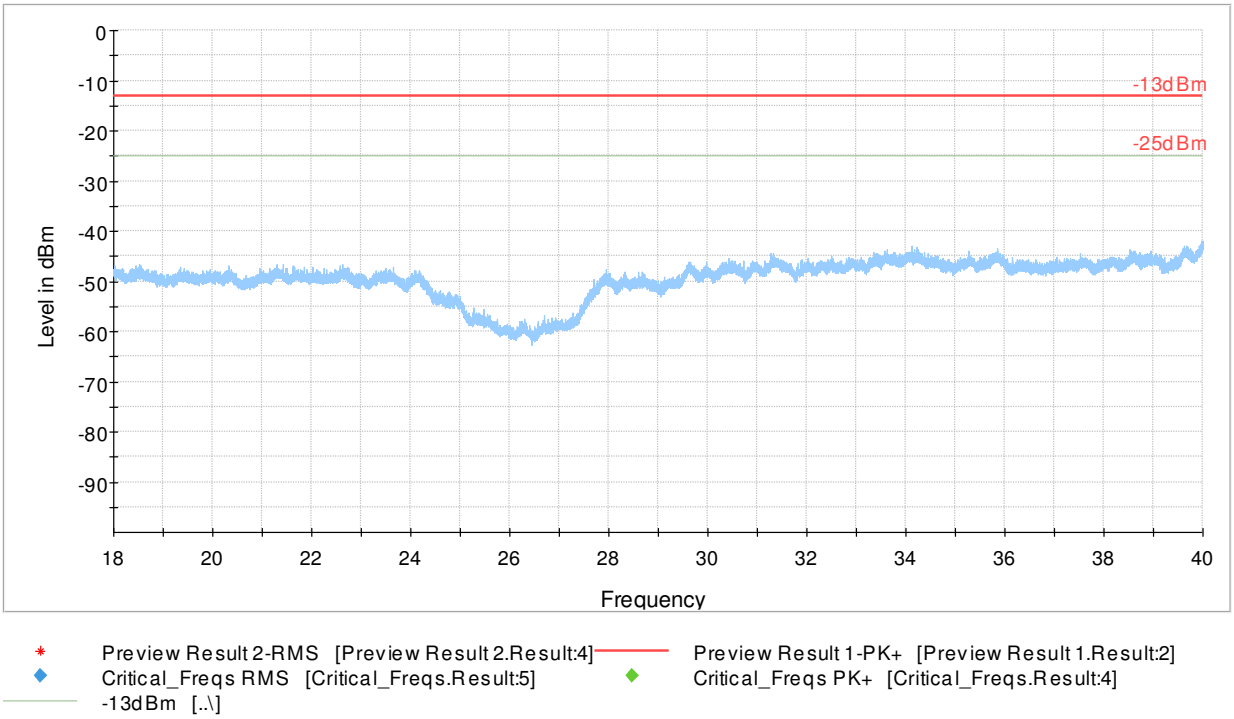


Preview Result 2-RMS [Preview Result 2.Result:2]
Preview Result 1-PK+ [Preview Result 1.Result:1]
Critical_Freqs RMS [Critical_Freqs.Result:5]
Critical_Freqs PK+ [Critical_Freqs.Result:4]
-13dBm [..\]

10.11.10 3GHz – 18GHz, Ch. High

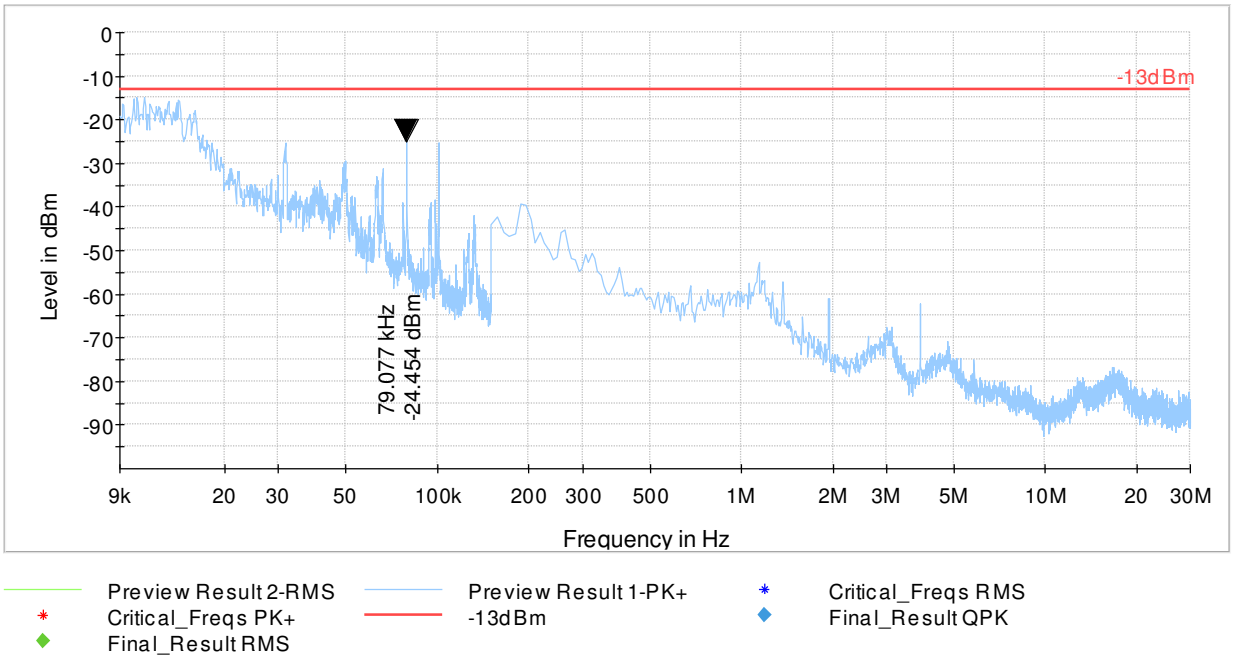


10.11.11 18GHz – 40GHz, Ch. Mid

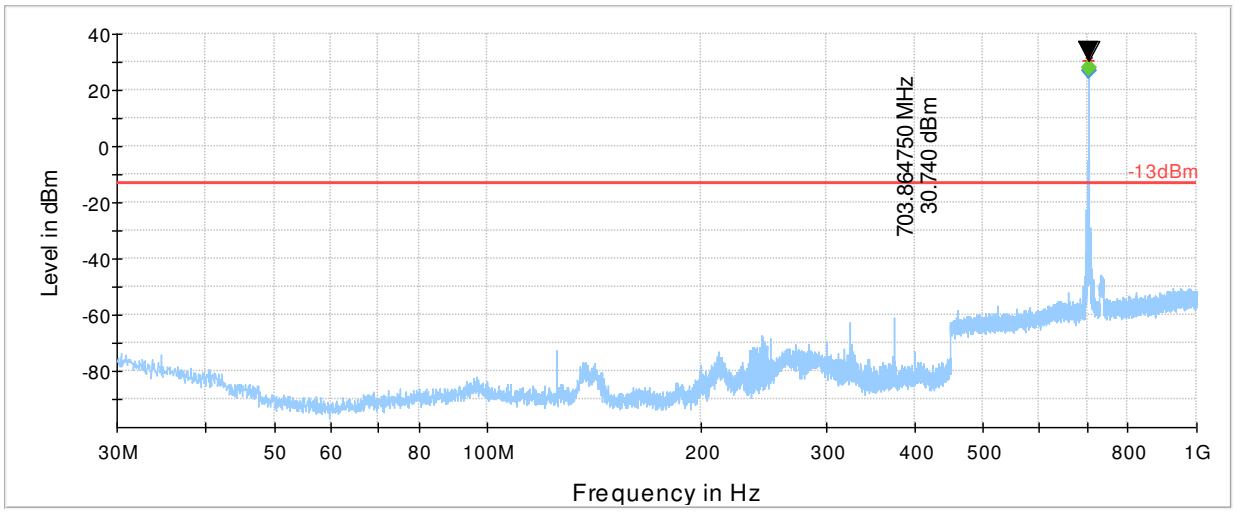


10.12 Measurement Plots LTE Band 12:

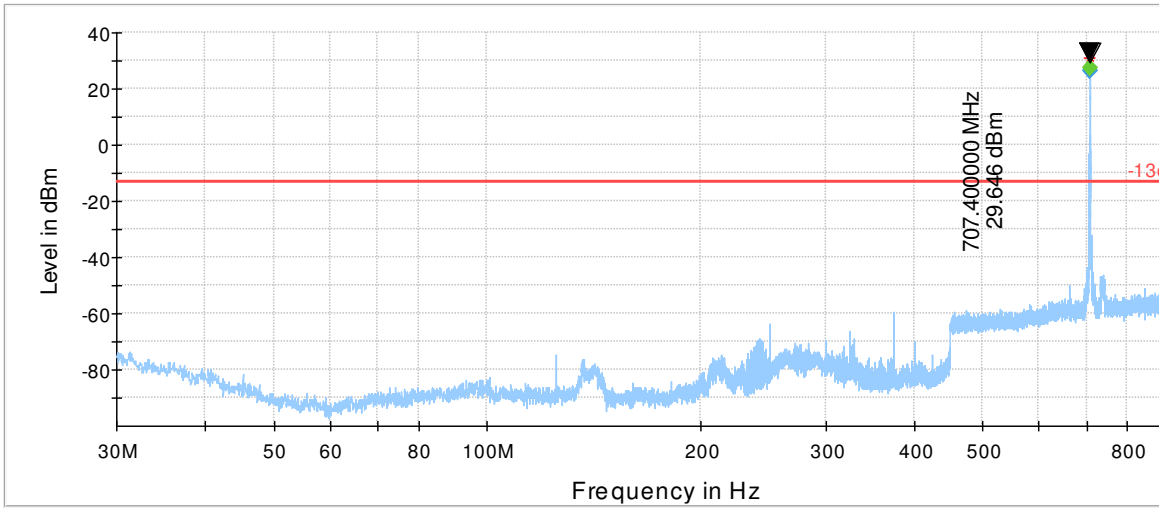
10.12.1 9 KHz – 30MHz, Ch. Mid



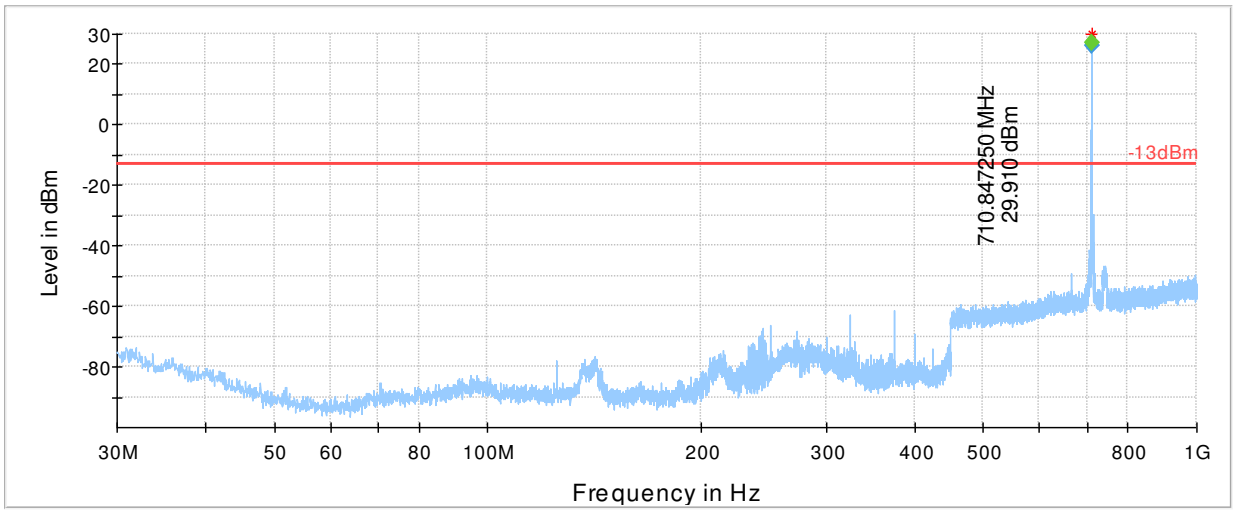
10.12.2 30MHz – 1GHz, Ch. Low



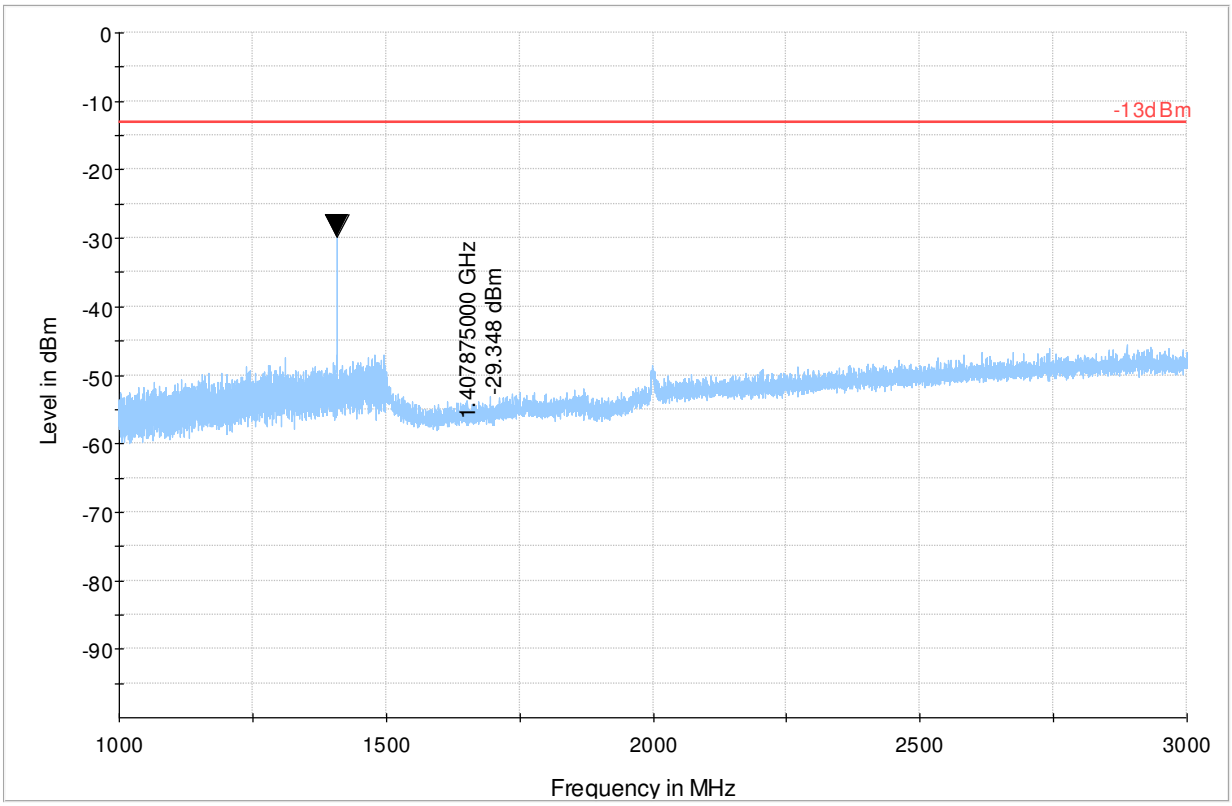
10.12.3 30MHz – 1GHz, Ch. Mid



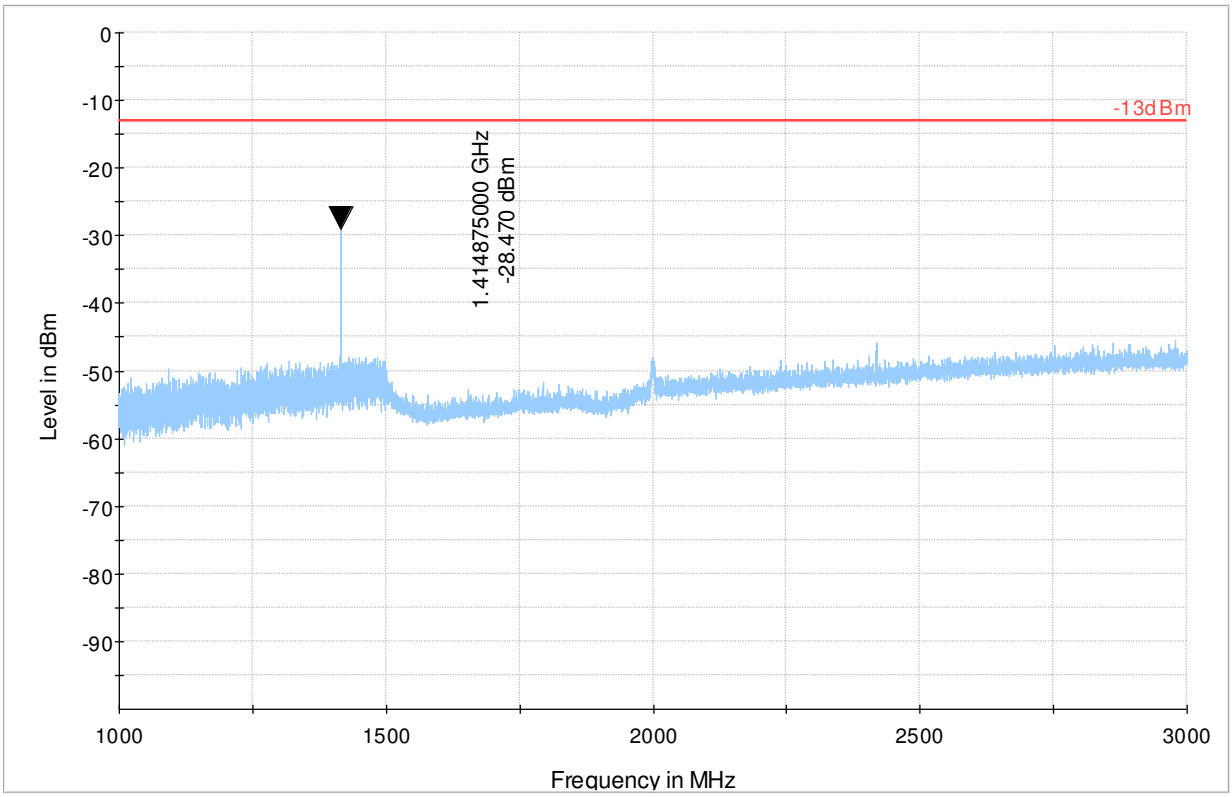
10.12.4 30MHz – 1GHz, Ch. High



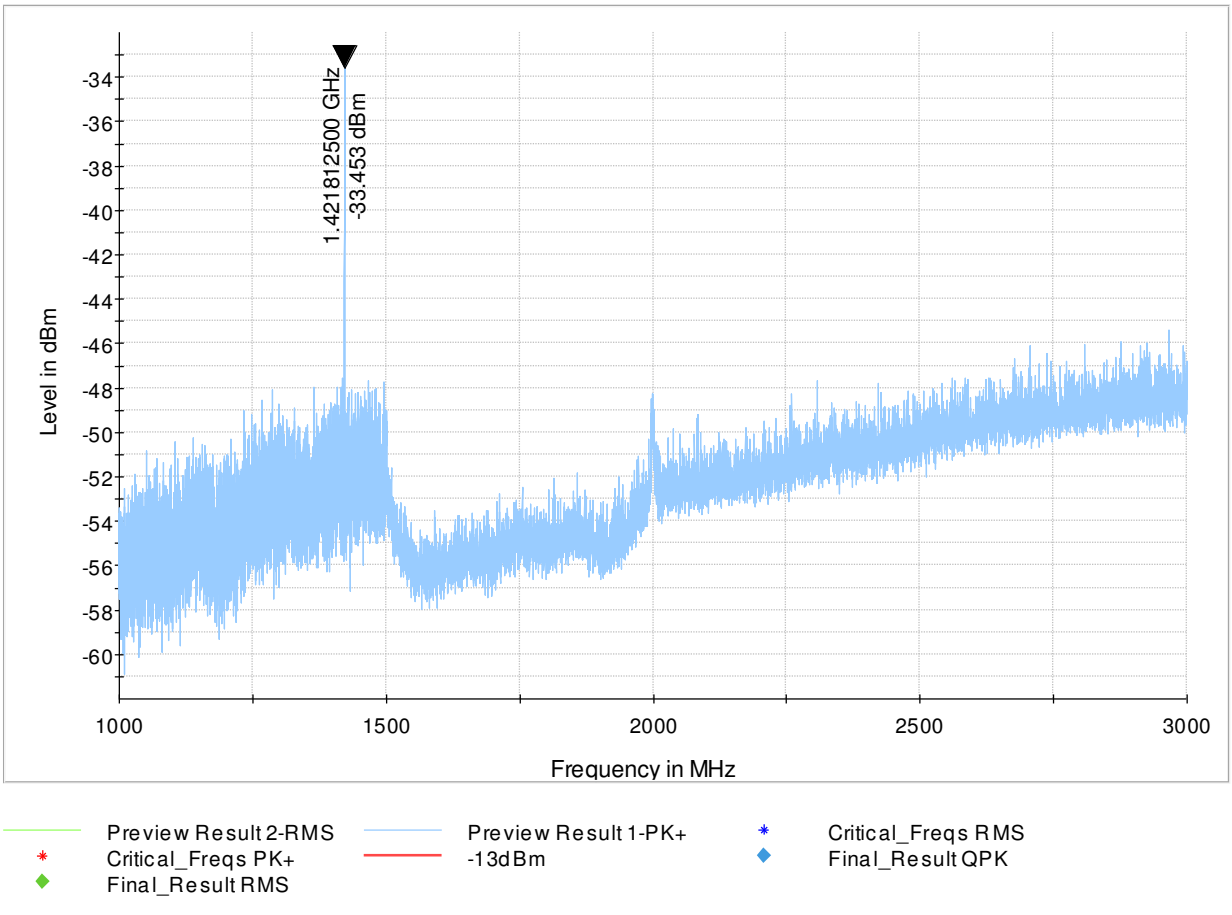
10.12.5 1GHz – 3GHz, Ch. Low



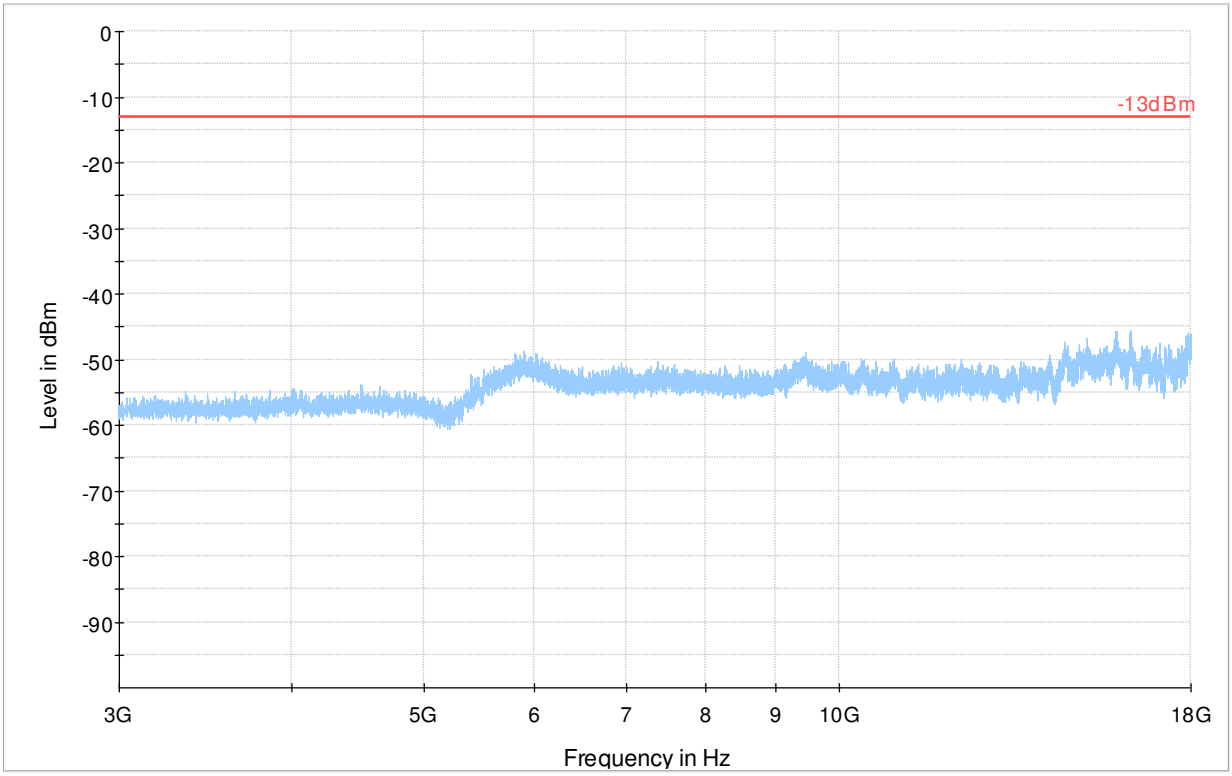
10.12.6 1GHz – 3GHz, Ch. Mid



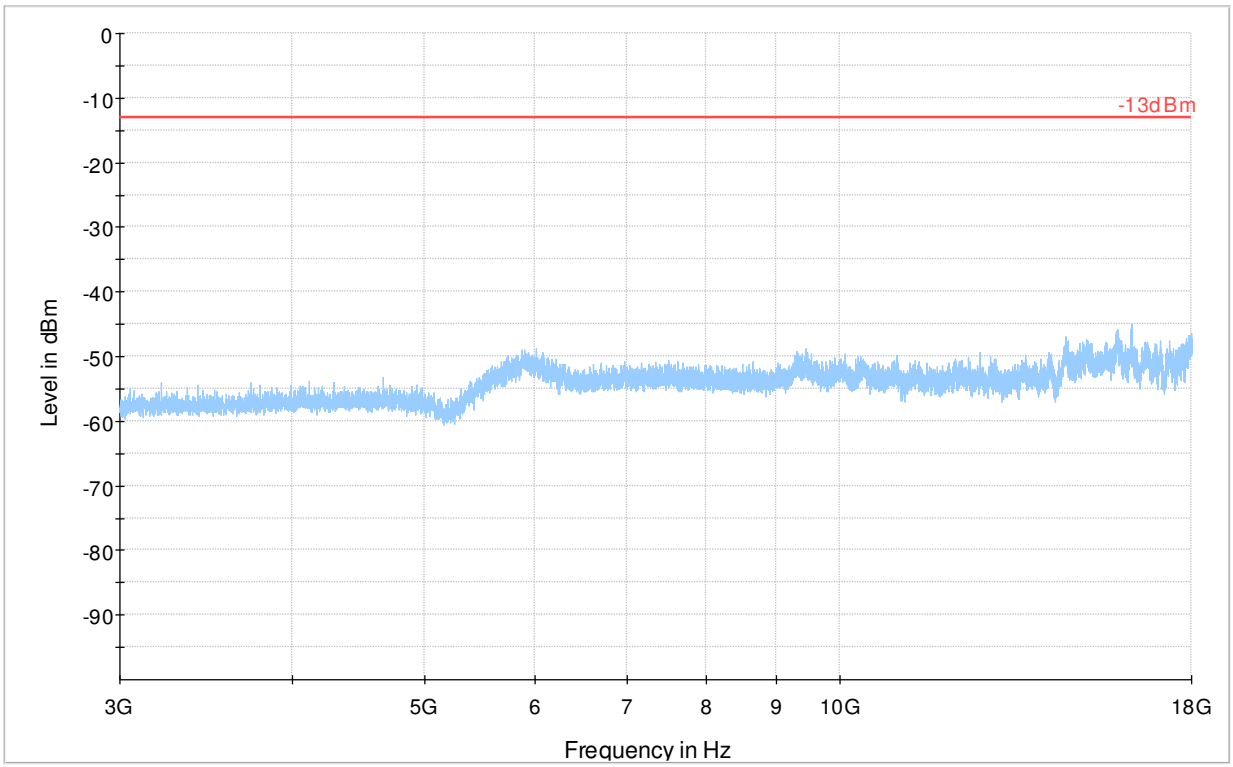
10.12.7 1GHz – 3GHz, Ch. High



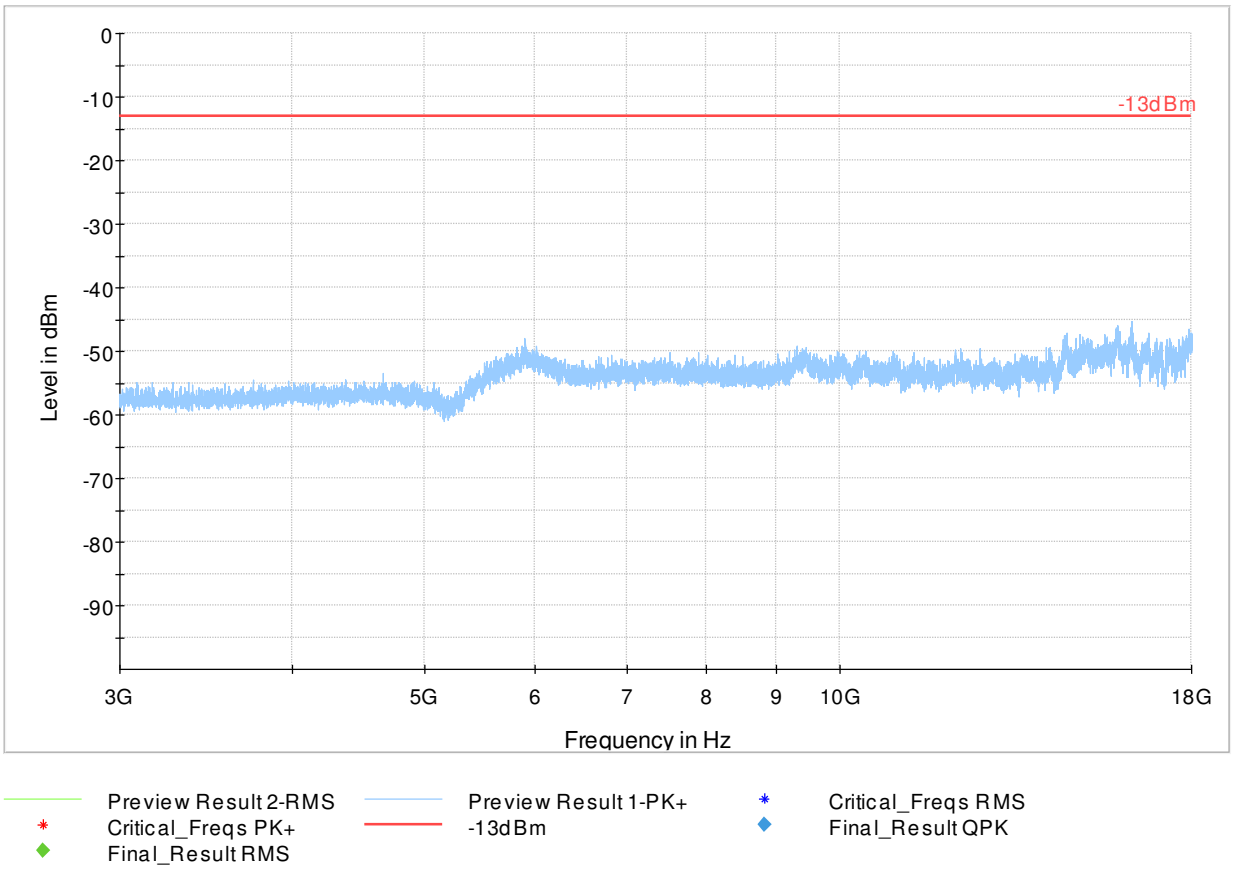
10.12.8 3GHz – 18GHz, Ch. Low



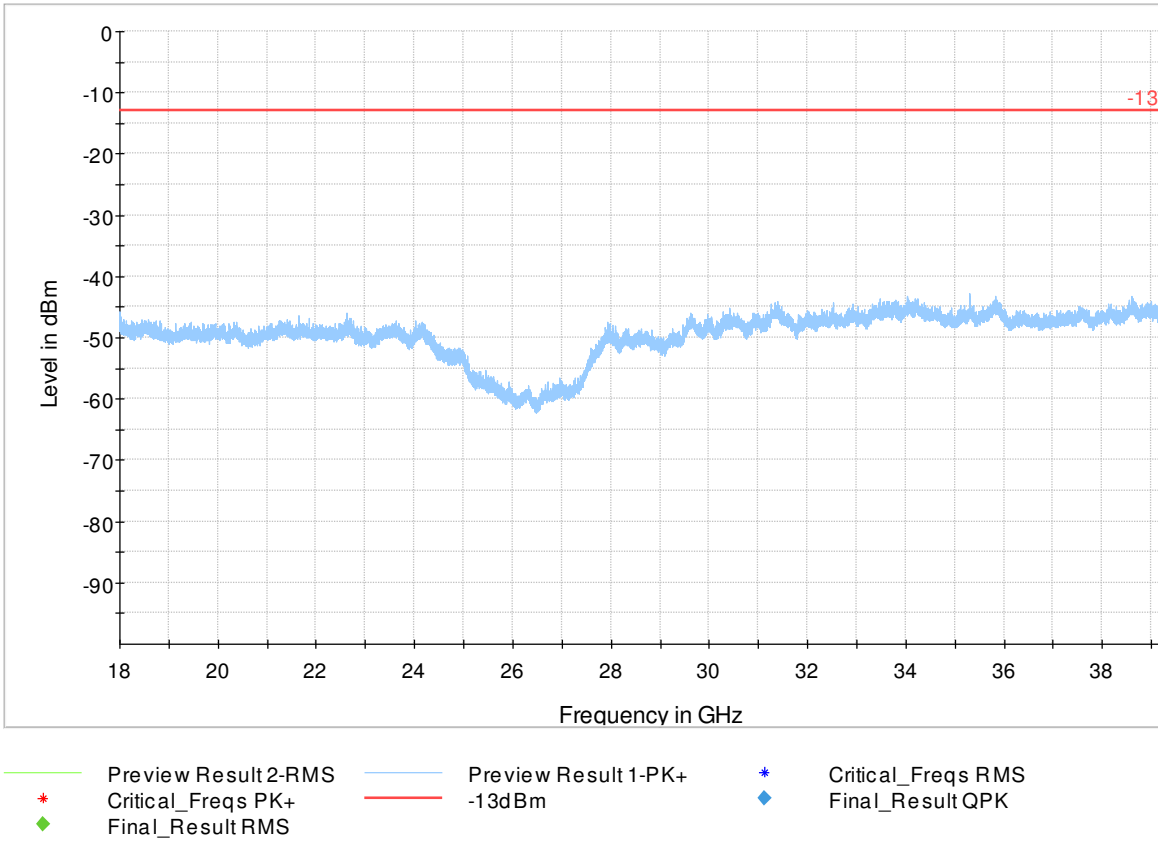
10.12.9 3GHz – 18GHz, Ch. Low



10.12.10 3GHz – 18GHz, Ch. High

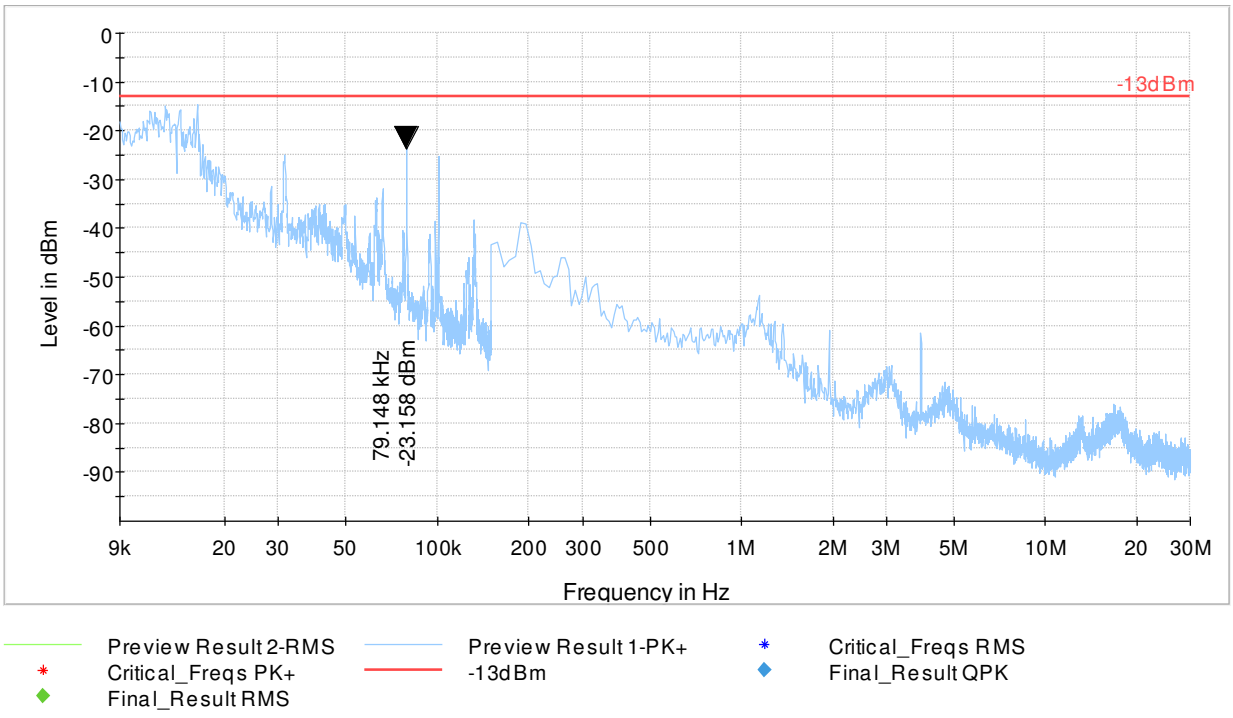


10.12.11 18GHz – 40GHz, Ch. Mid

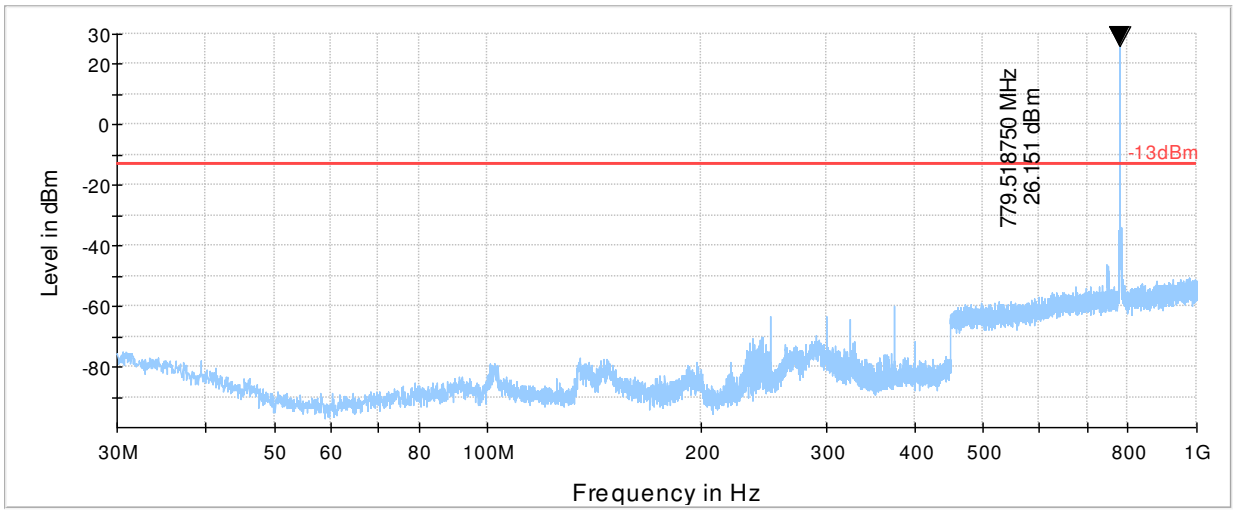


10.13 Measurement Plots LTE Band 13:

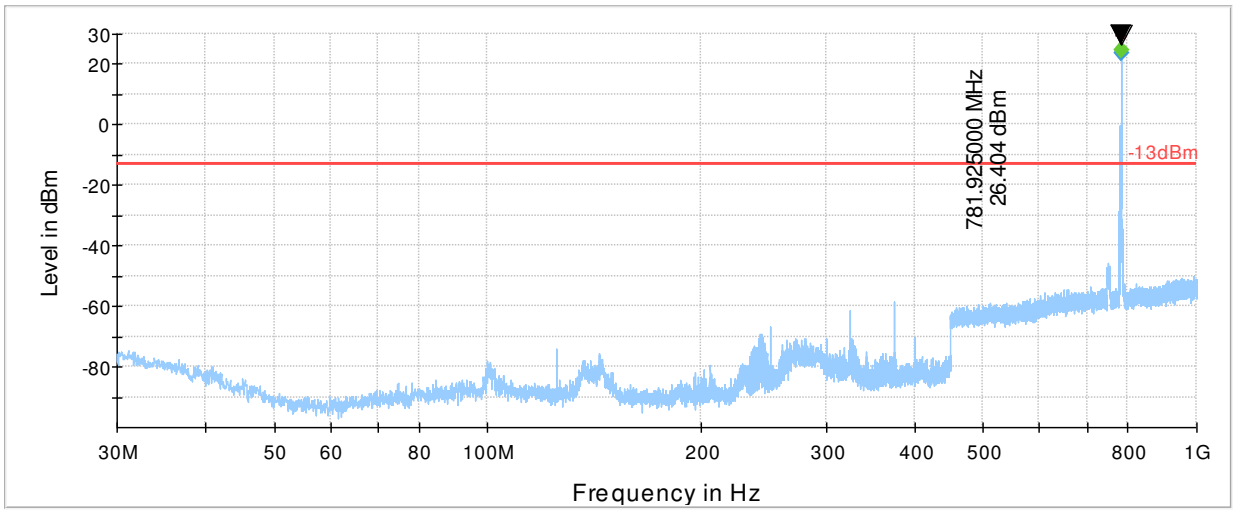
10.13.1 9 KHz – 30MHz, Ch. Mid



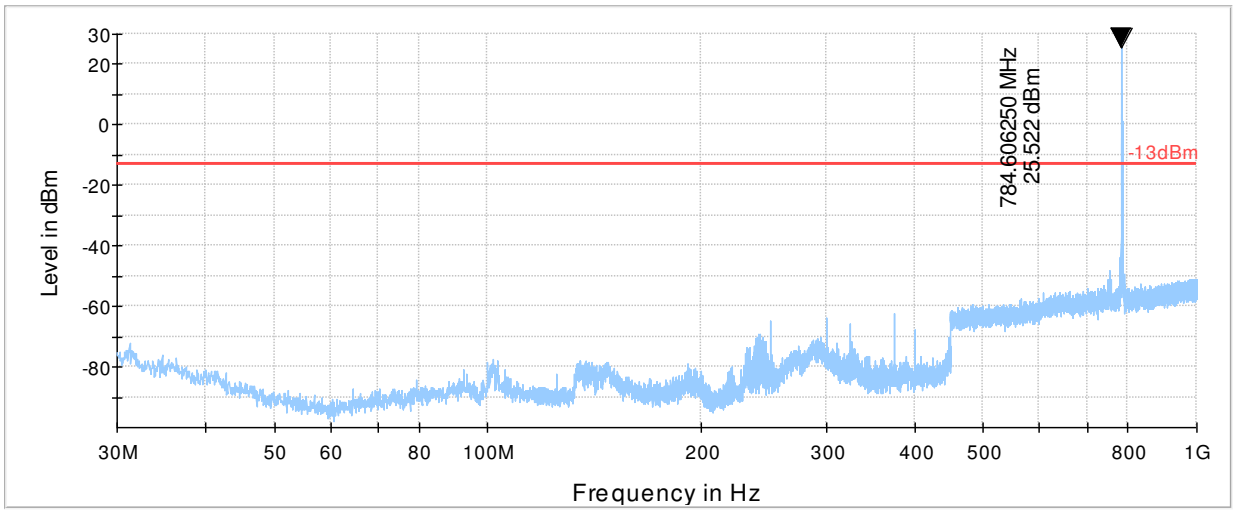
10.13.2 30MHz – 1GHz, Ch. Low



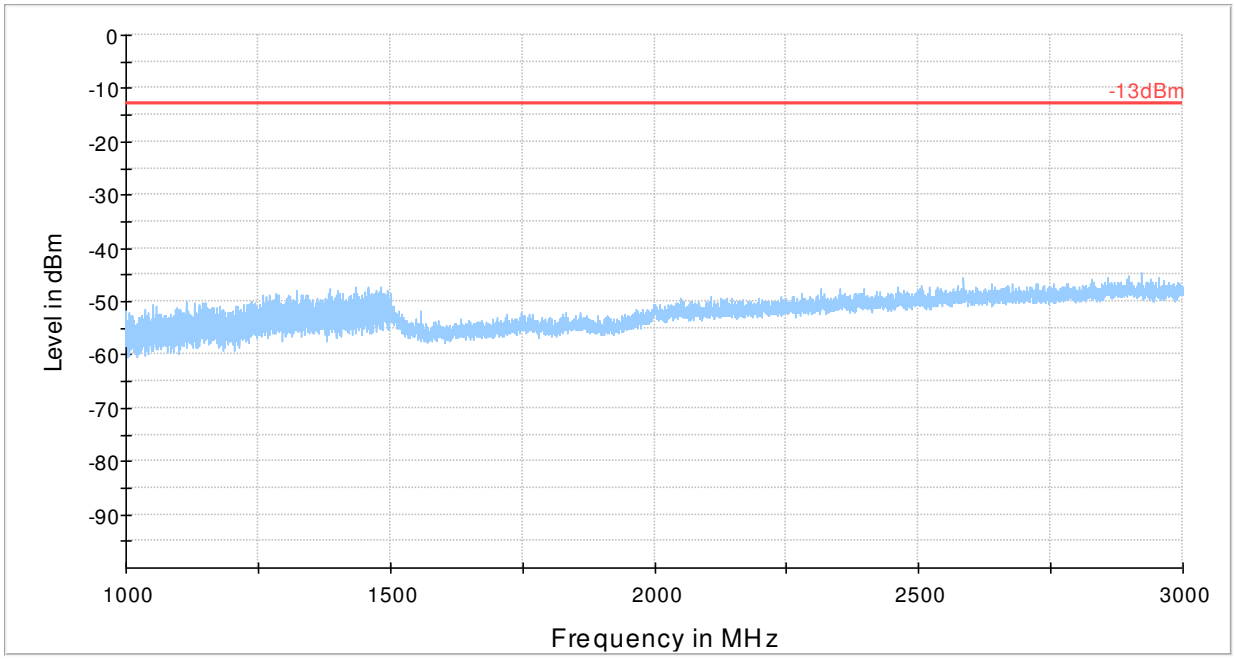
10.13.3 30MHz – 1GHz, Ch. Mid



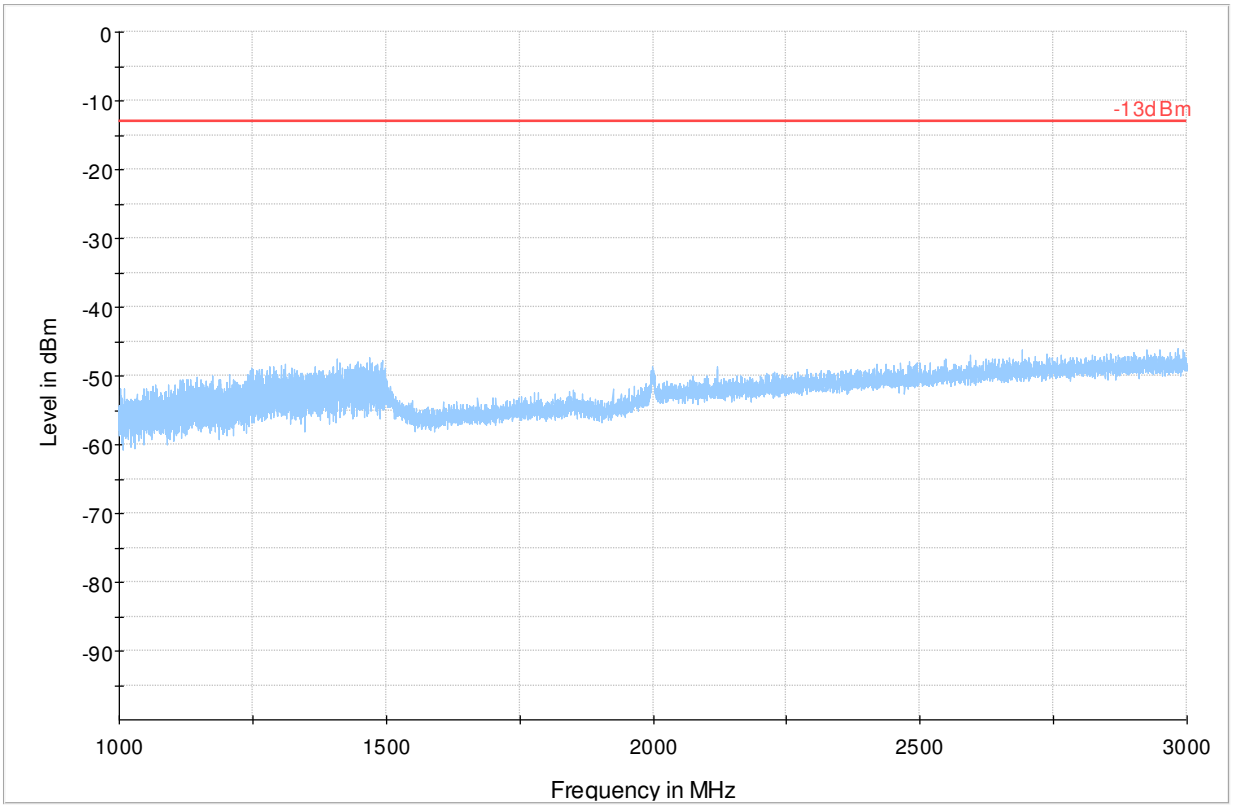
10.13.4 30MHz – 1GHz, Ch. High



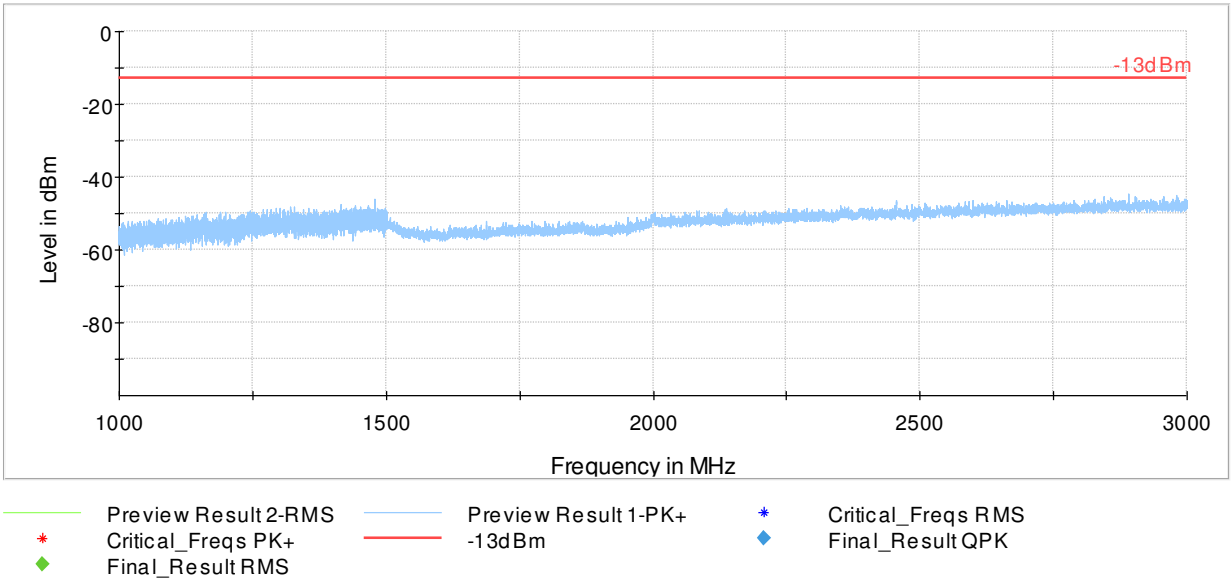
10.13.5 1GHz – 3GHz, Ch. Low



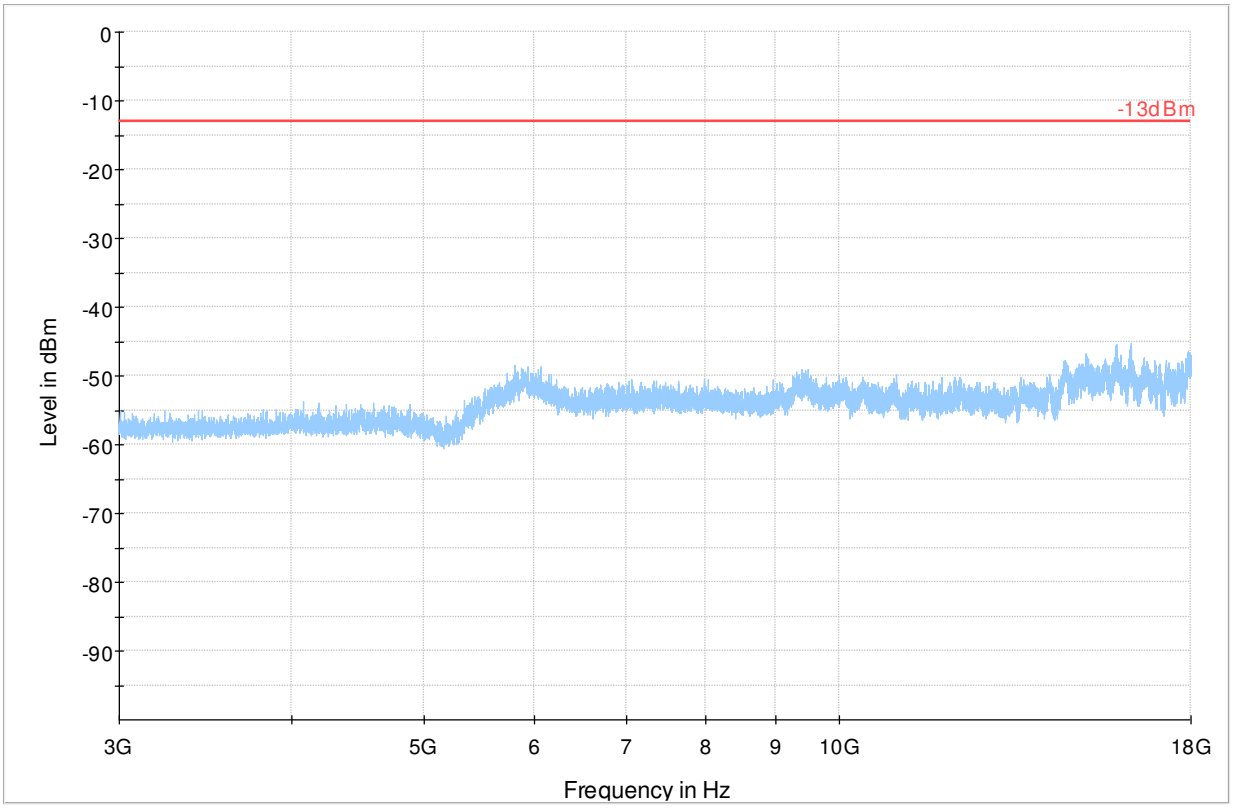
10.13.6 1GHz – 3GHz, Ch. Mid



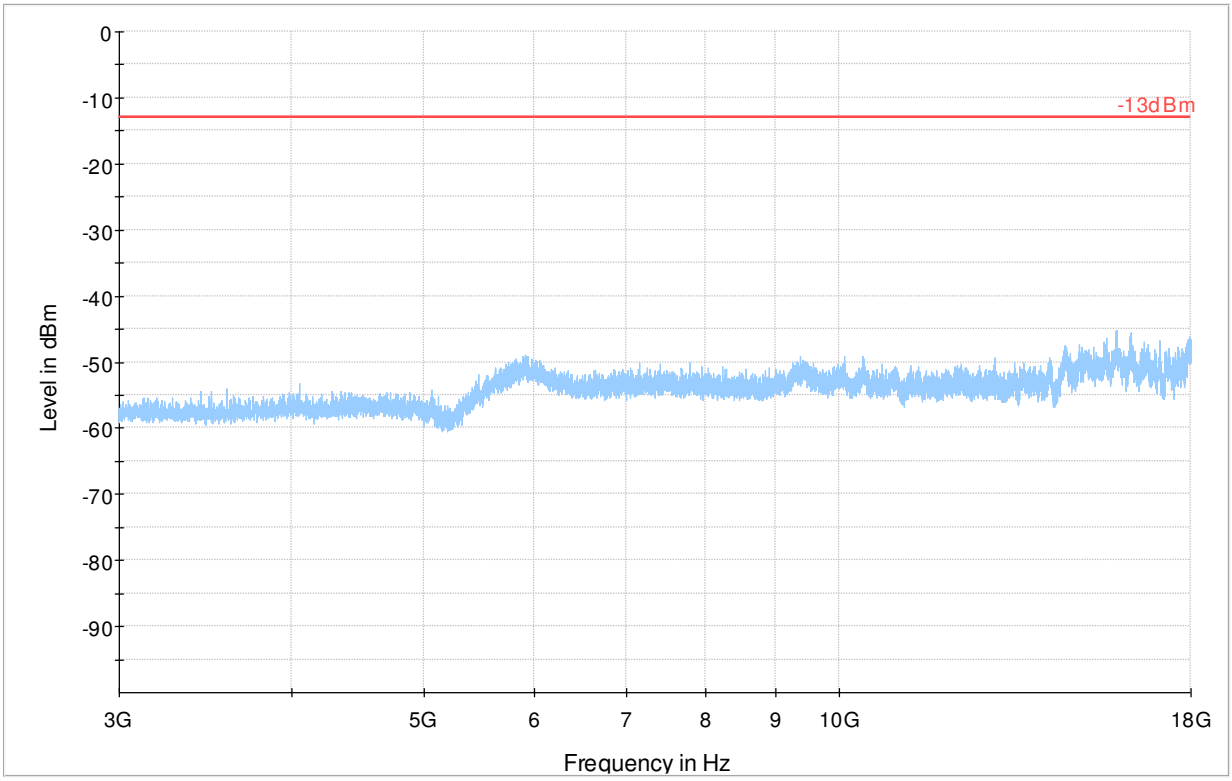
10.13.7 1GHz – 3GHz, Ch. High



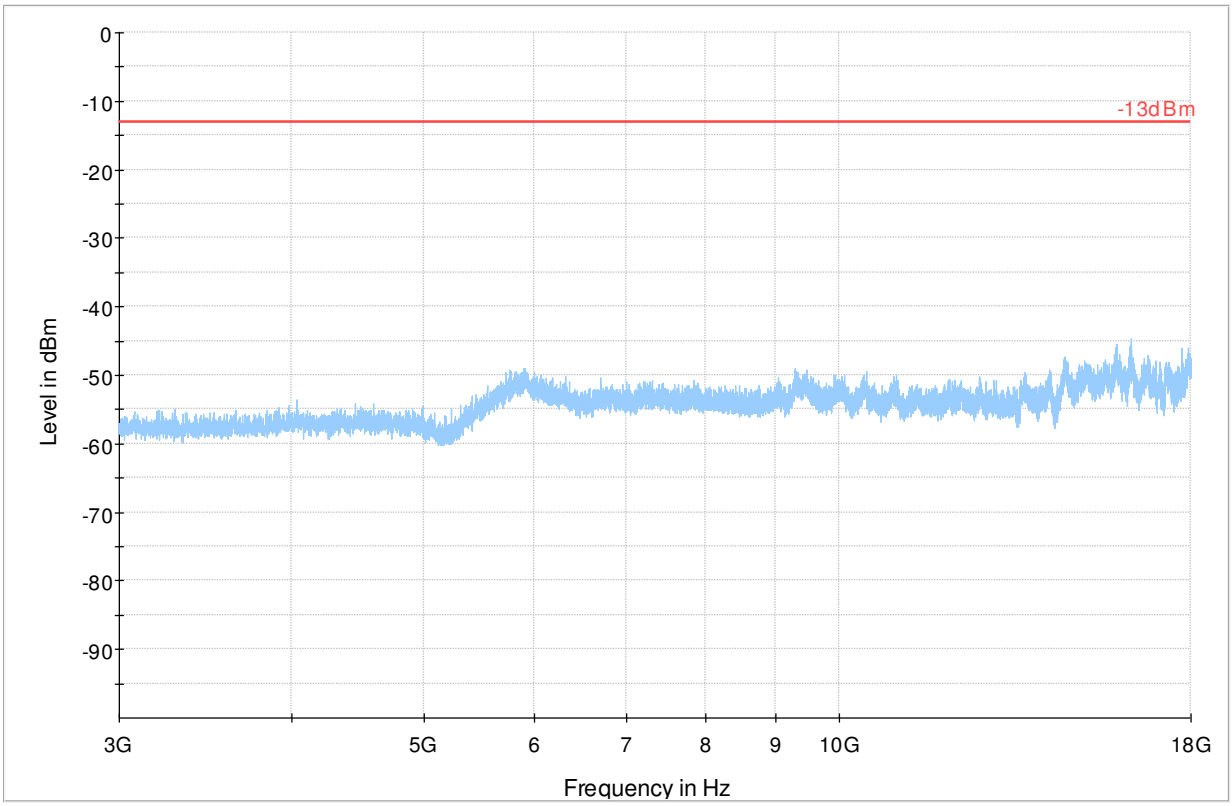
10.13.8 3GHz – 18GHz, Ch. Low



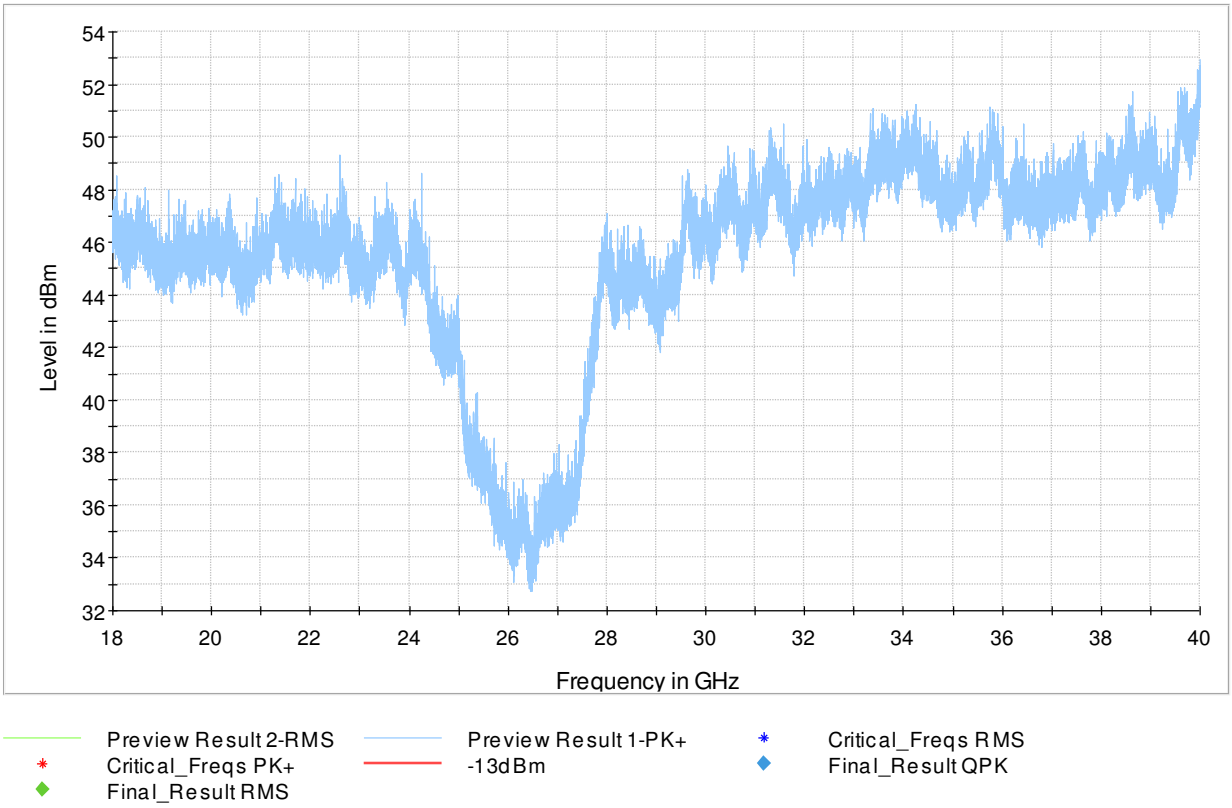
10.13.9 3GHz – 18GHz, Ch. Mid



10.13.10 3GHz – 18GHz, Ch. High

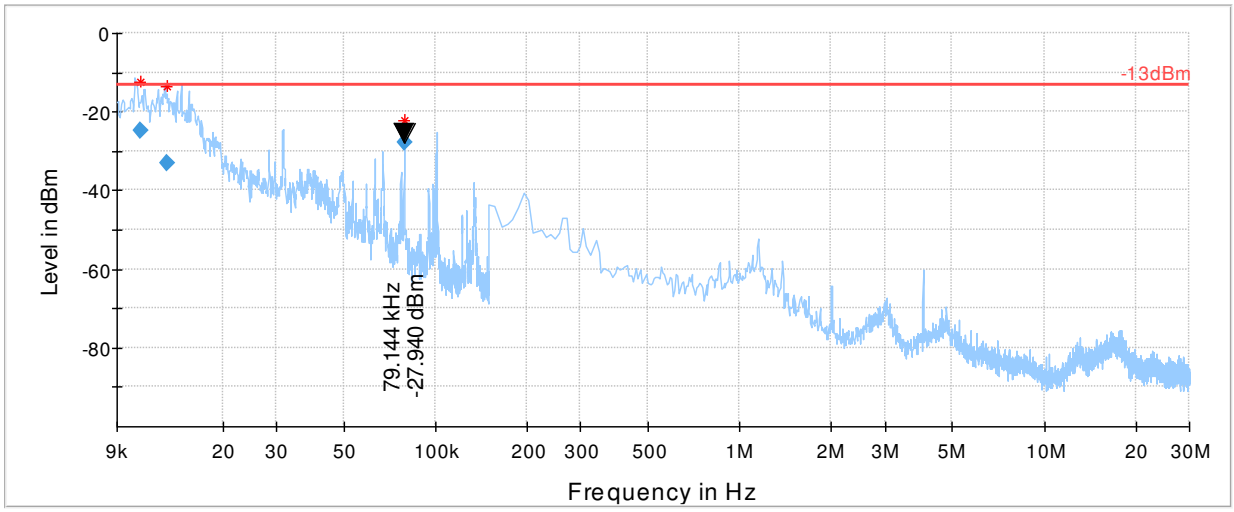


10.13.11 18GHz – 40GHz, Ch. Mid

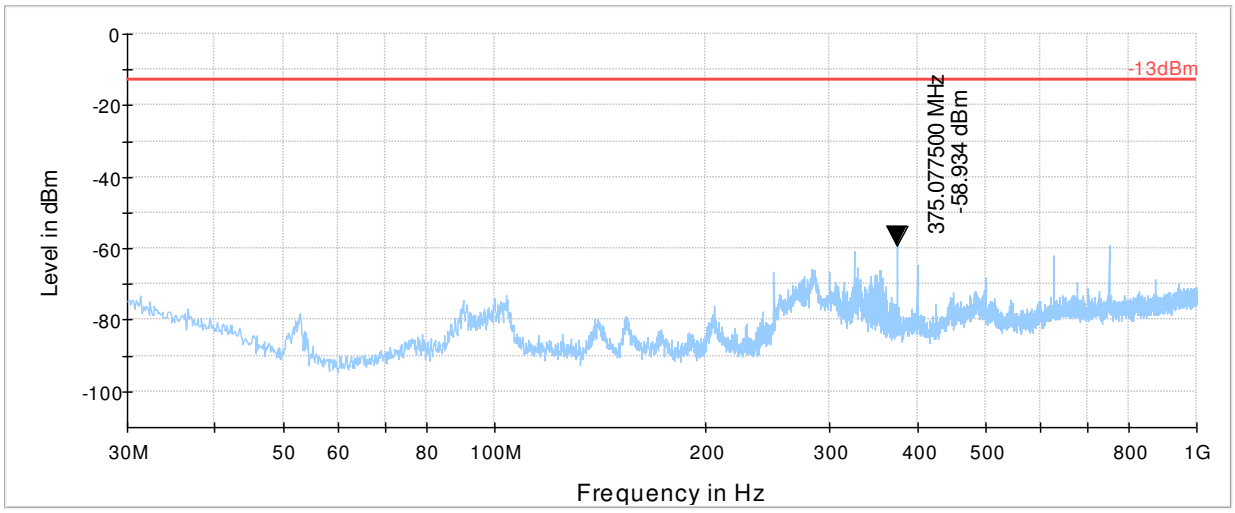


10.14 Measurement Plots LTE Band 30:

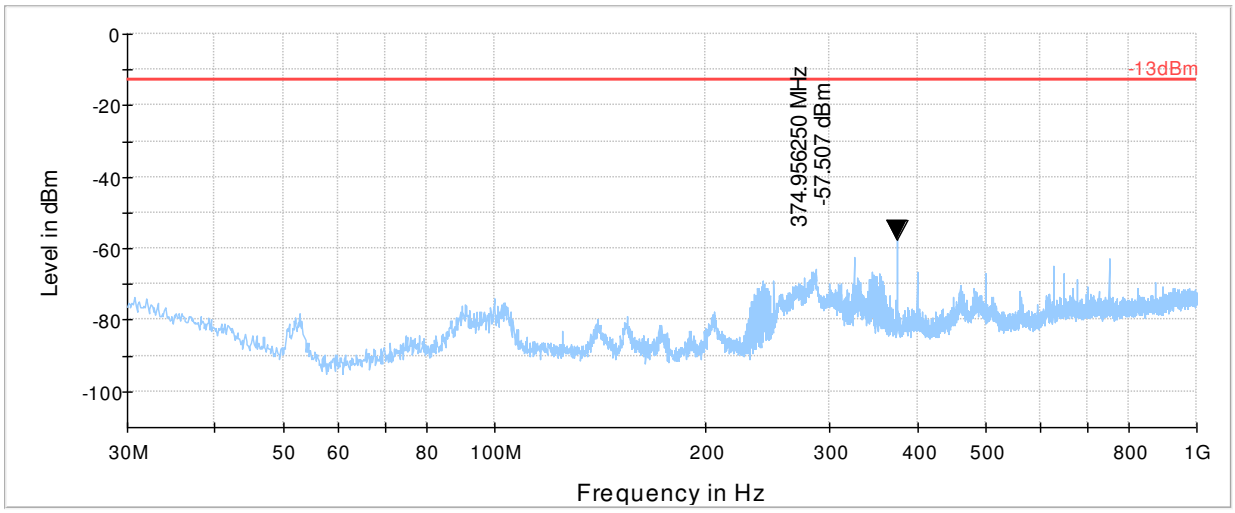
10.14.1 9 KHz – 30MHz, Ch. Mid



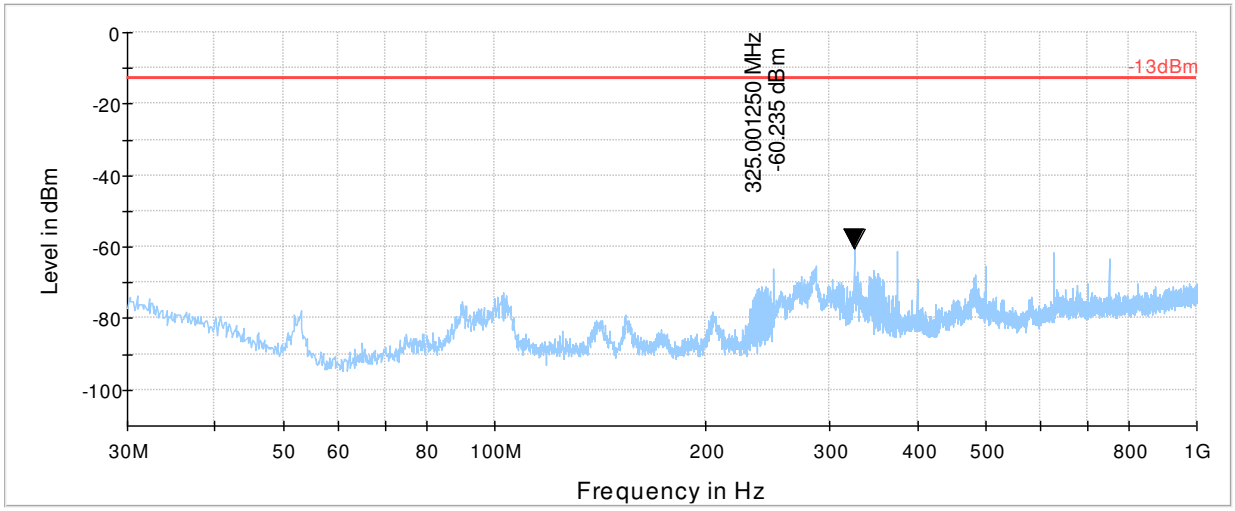
10.14.2 30MHz – 1GHz, Ch. Low



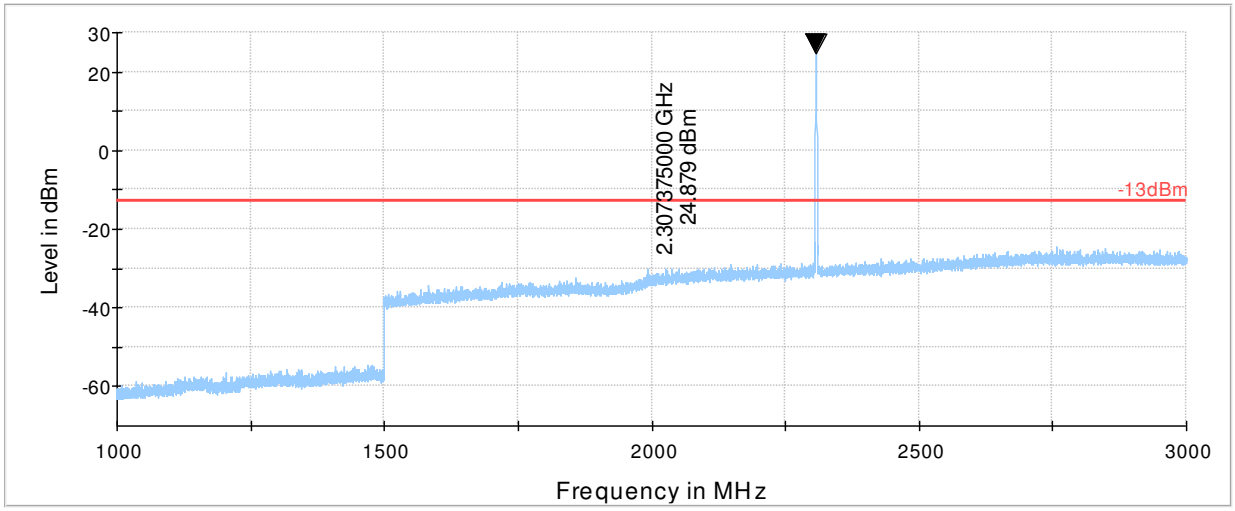
10.14.3 30MHz – 1GHz, Ch. Mid



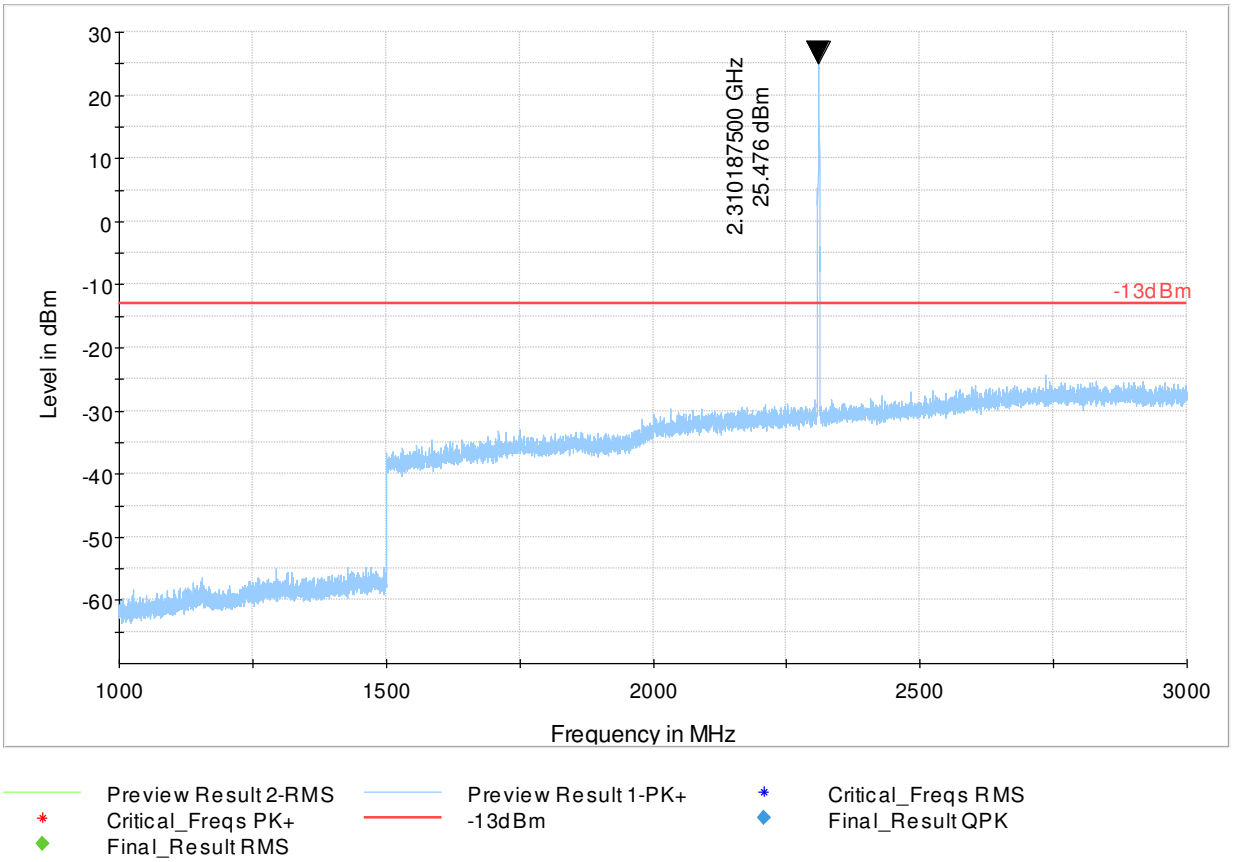
10.14.4 30MHz – 1GHz, Ch. High



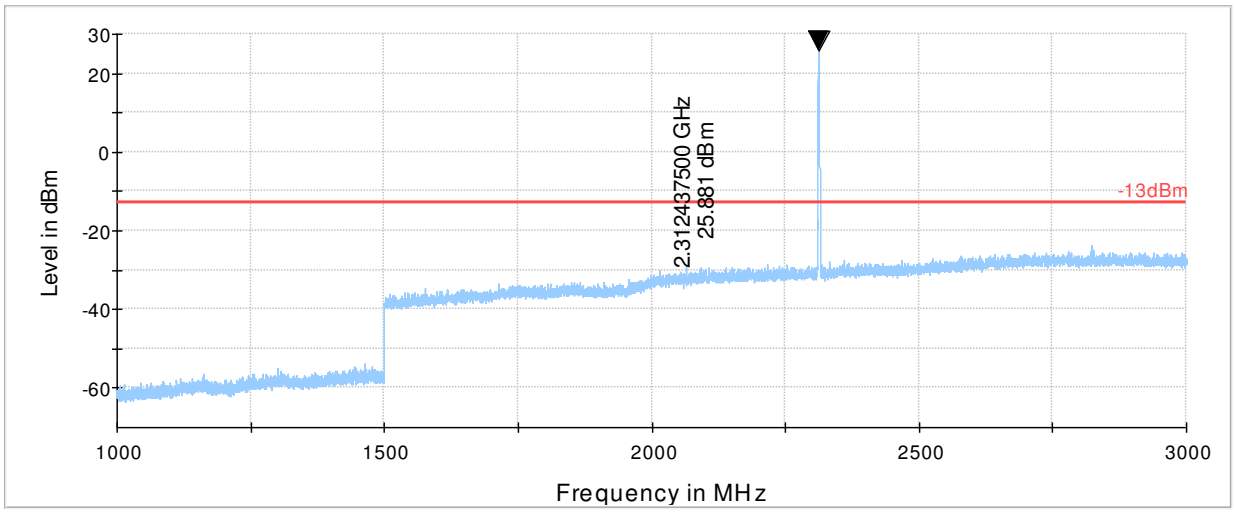
10.14.5 1GHz – 3GHz, Ch. Low



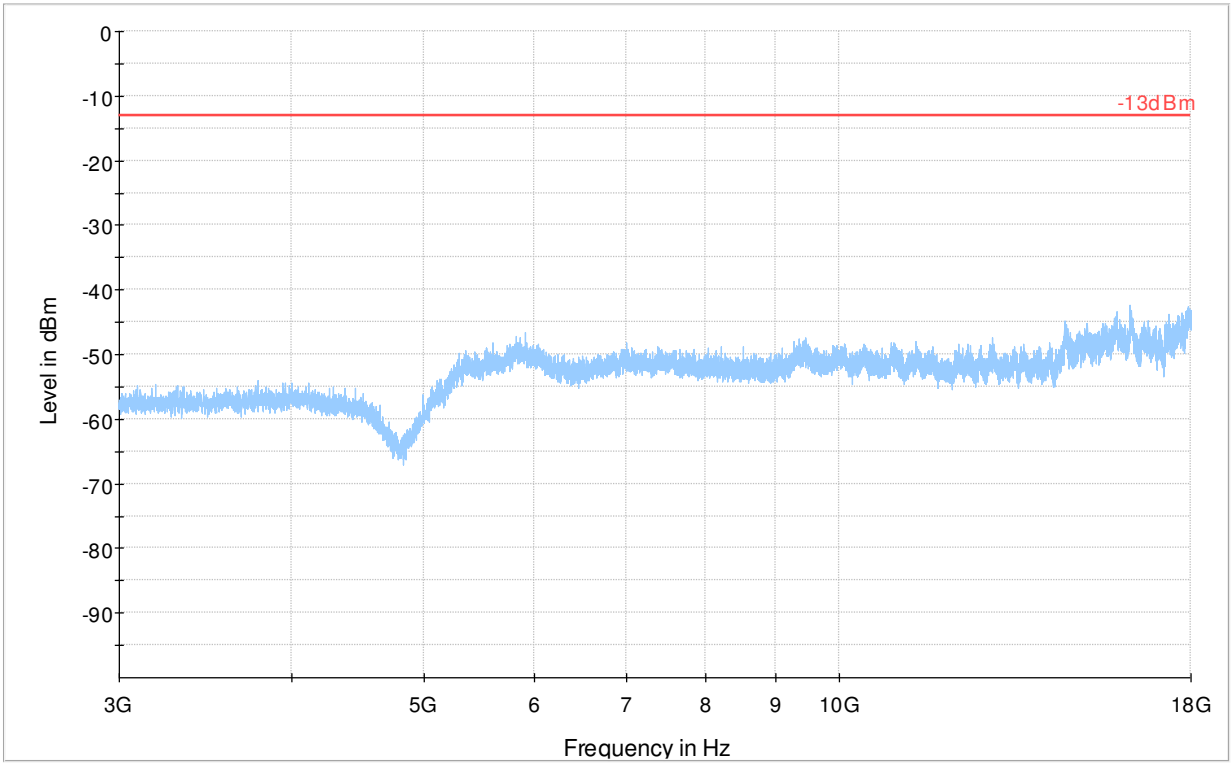
10.14.6 1GHz – 3GHz, Ch. Mid



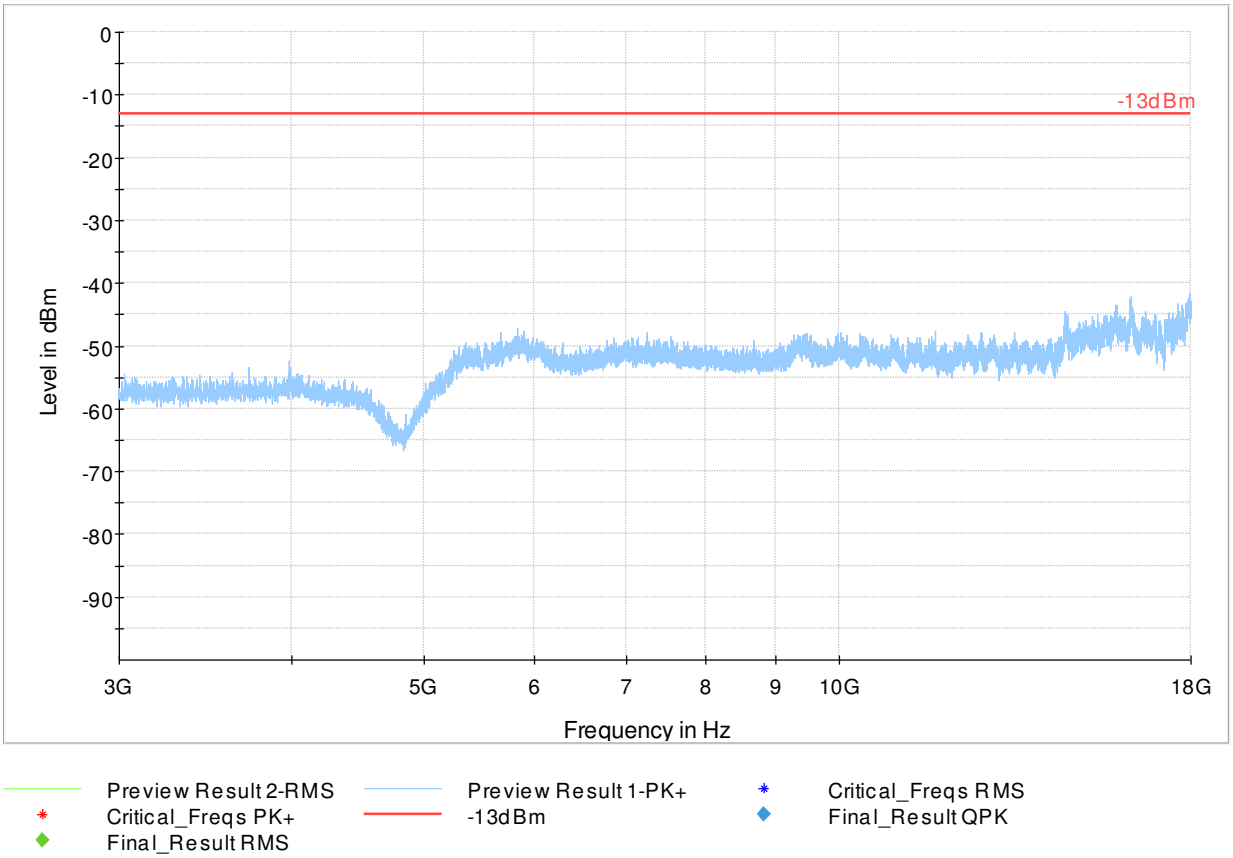
10.14.7 1GHz – 3GHz, Ch. High



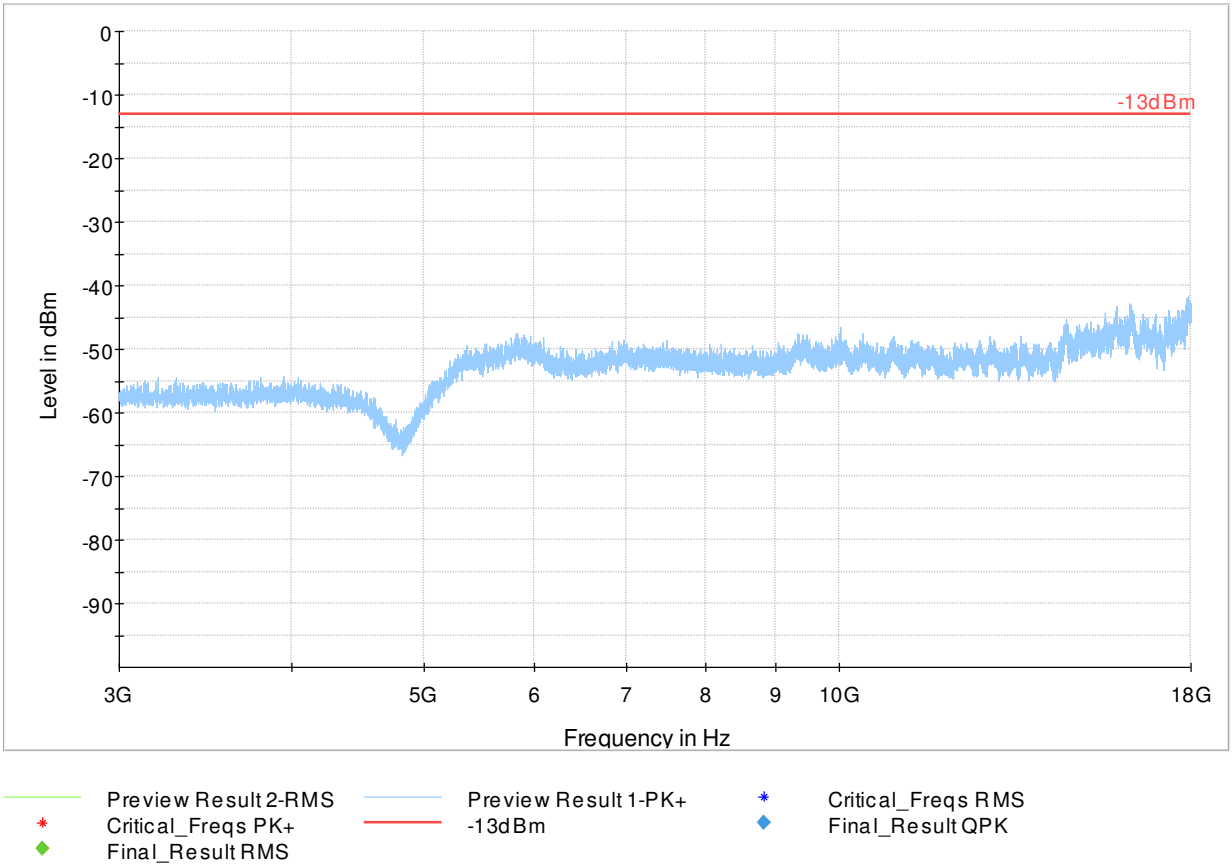
10.14.8 3GHz – 18GHz, Ch. Low



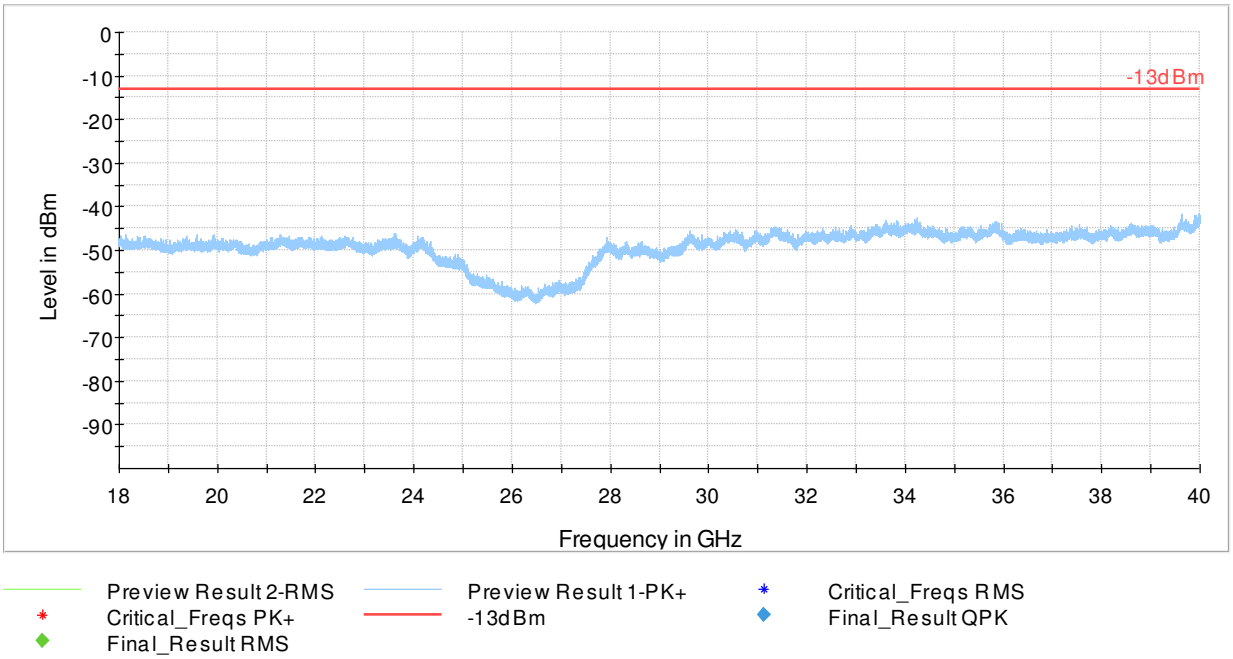
10.14.9 3GHz – 18GHz, Ch. Mid



10.14.10 3GHz – 18GHz, Ch. High

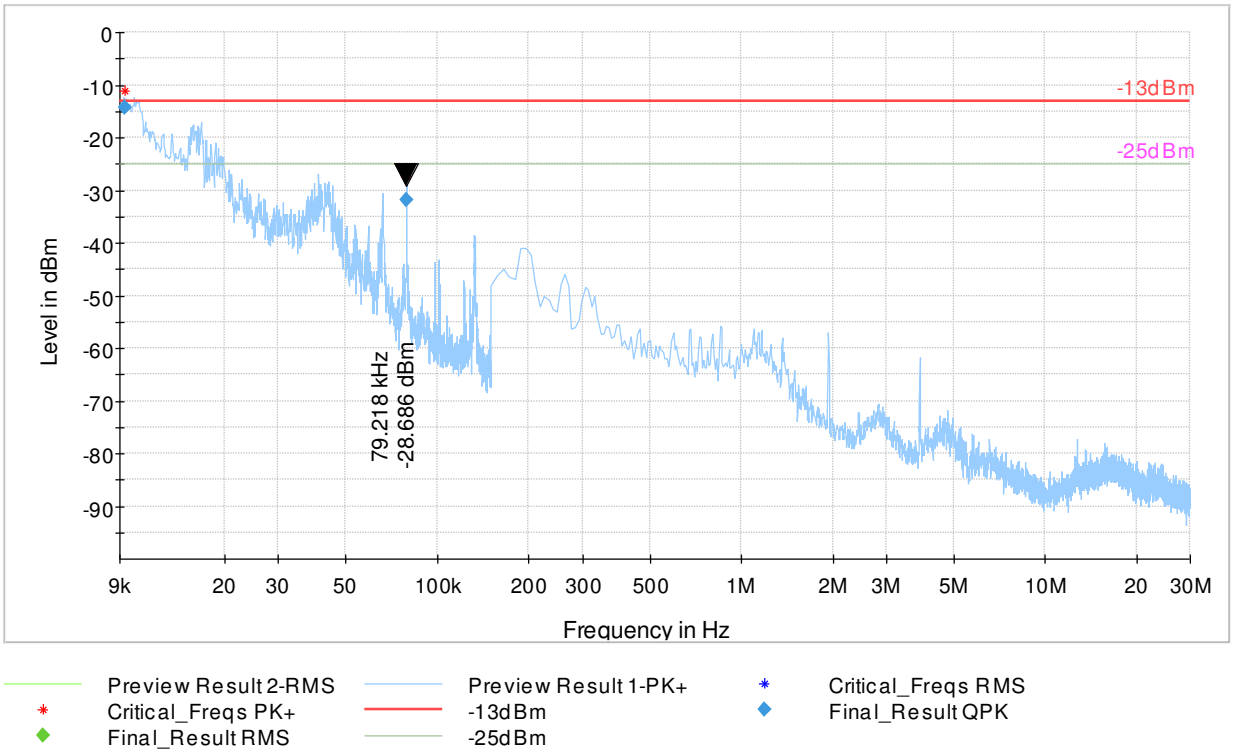


10.14.11 18GHz – 40GHz, Ch. Mid

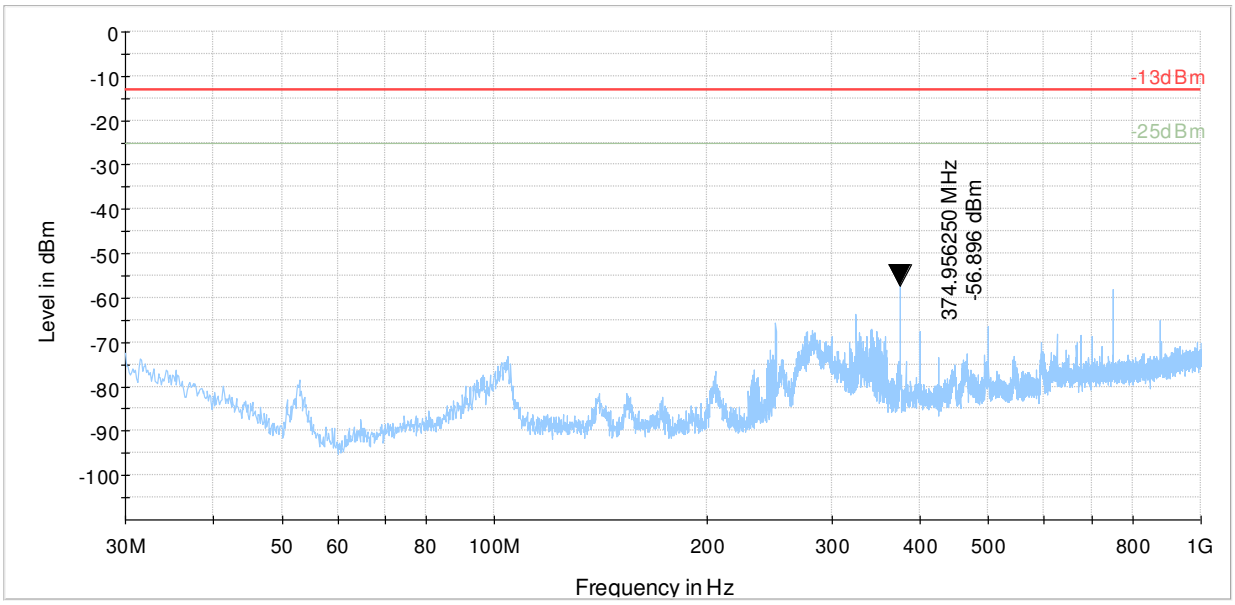


10.15 Measurement Plots LTE Band 41:

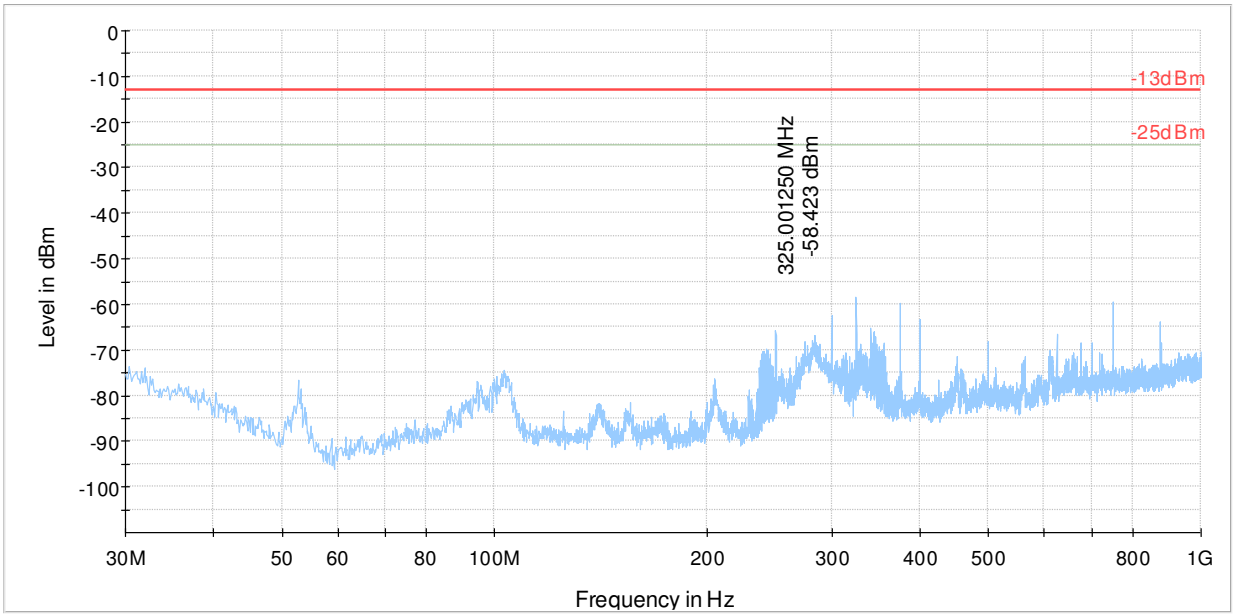
10.15.1 9 KHz – 30MHz, Ch. Mid



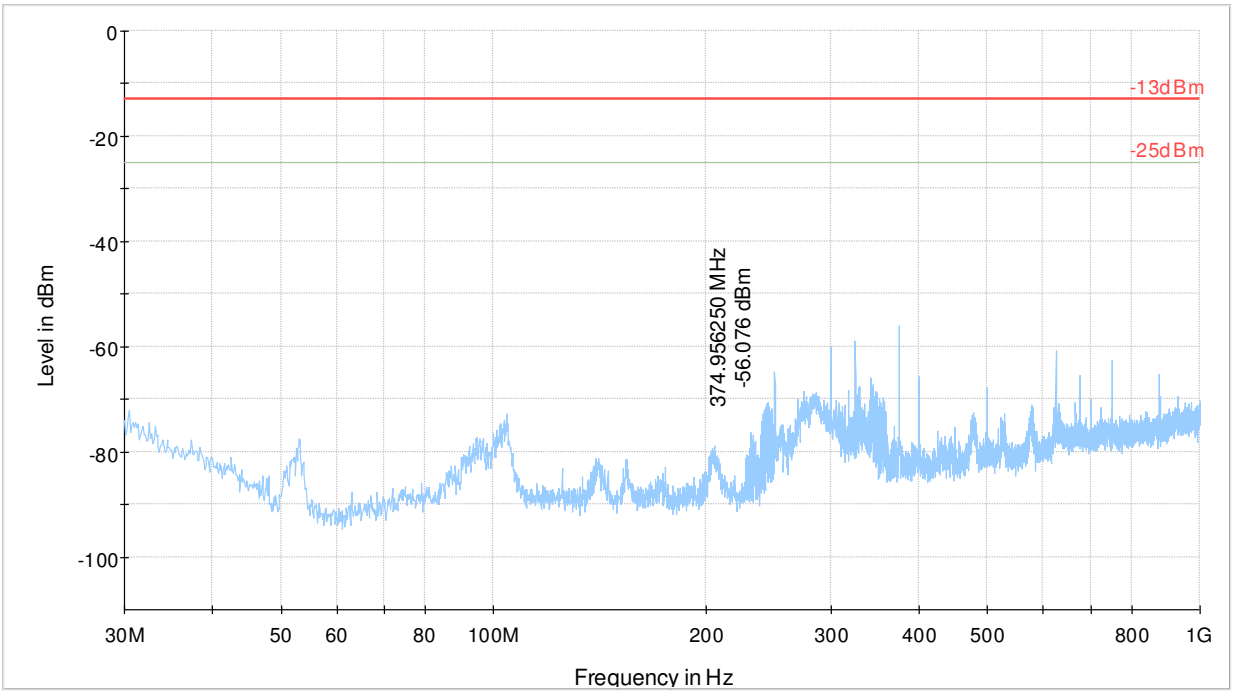
10.15.2 30MHz – 1GHz, Ch. Low



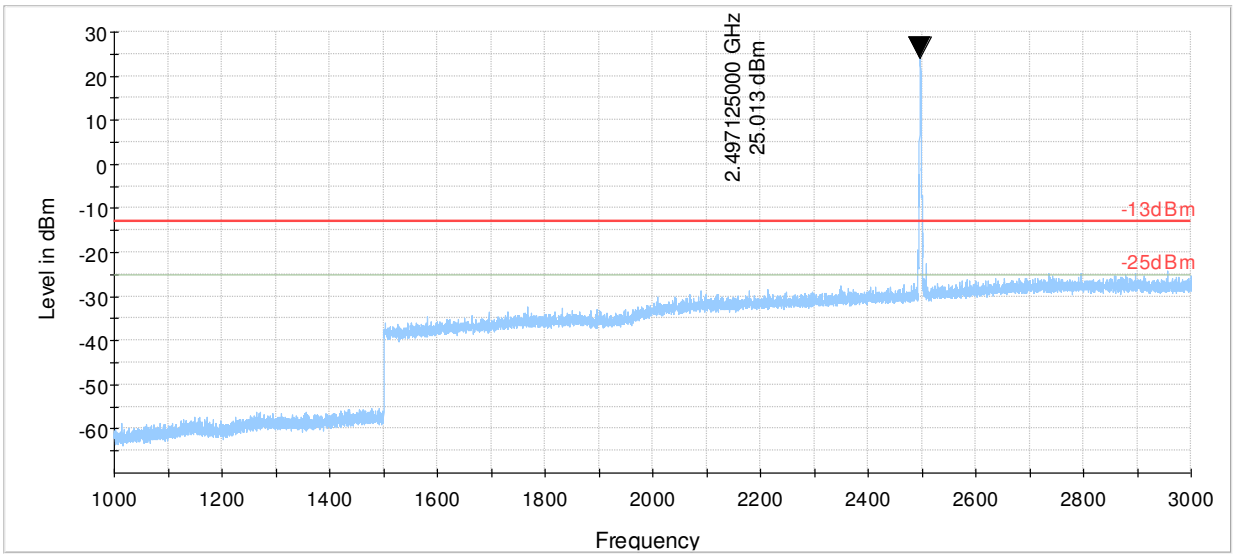
10.15.3 30MHz – 1GHz, Ch. Mid



10.15.4 30MHz – 1GHz, Ch. High

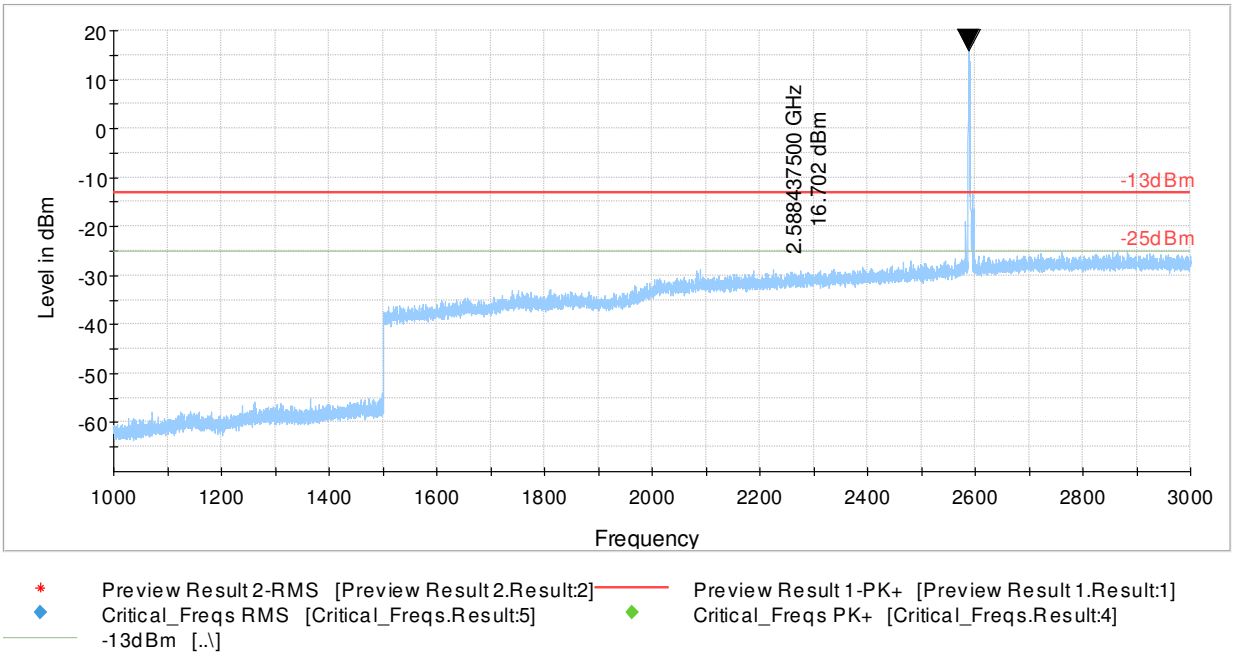


10.15.5 1GHz – 3GHz, Ch. Low

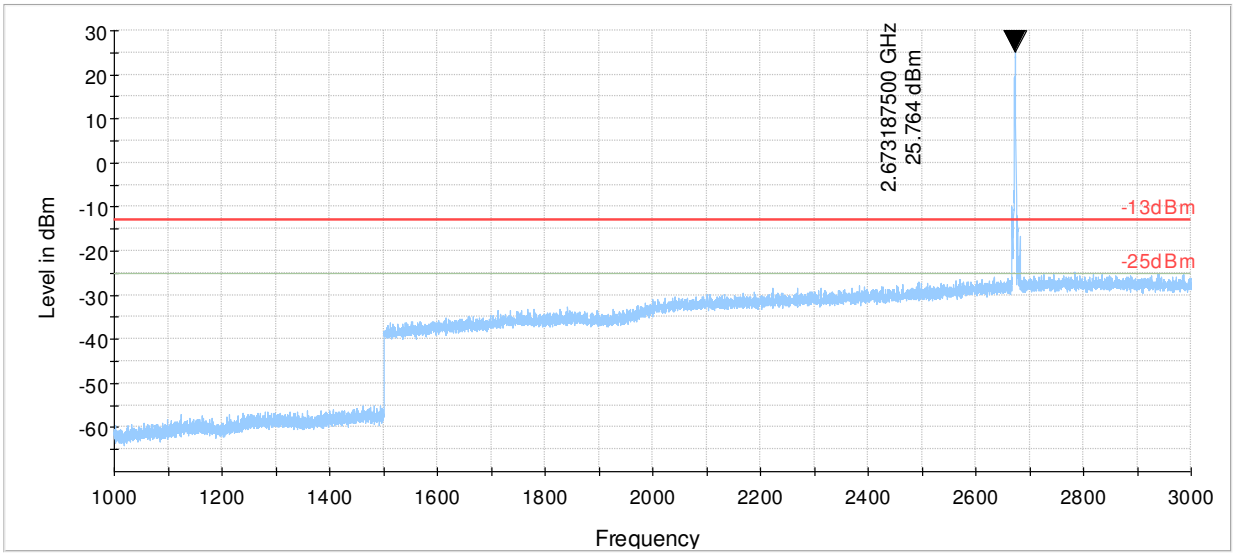


Preview Result 2-RMS [Preview Result 2.Result:2]
Critical_Freqs RMS [Critical_Freqs.Result:5]
-13dBm [..\]
Preview Result 1-PK+ [Preview Result 1.Result:1]
Critical_Freqs PK+ [Critical_Freqs.Result:4]

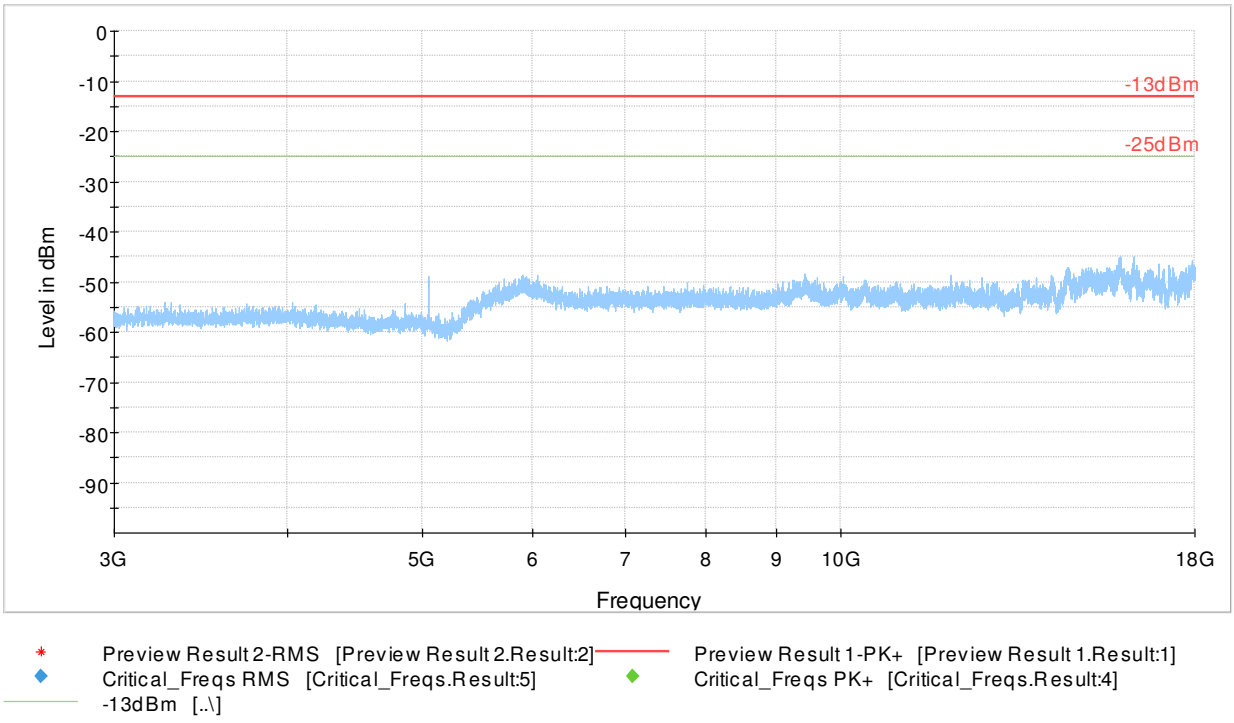
10.15.6 1GHz – 3GHz, Ch. Mid



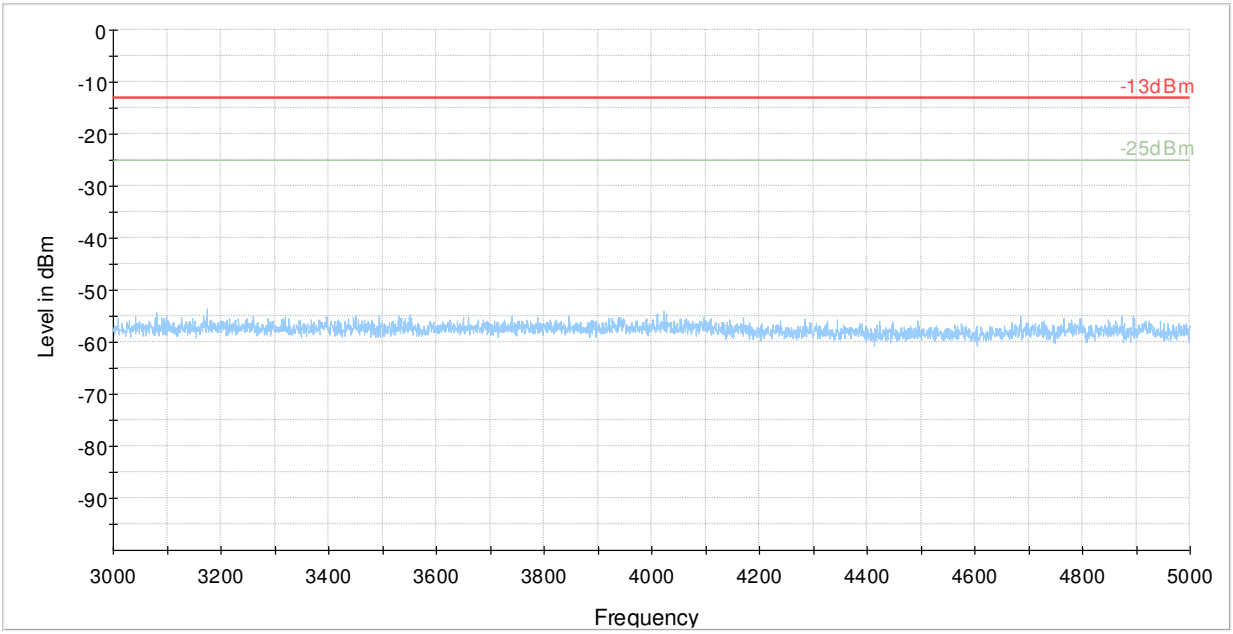
10.15.7 1GHz – 3GHz, Ch. High



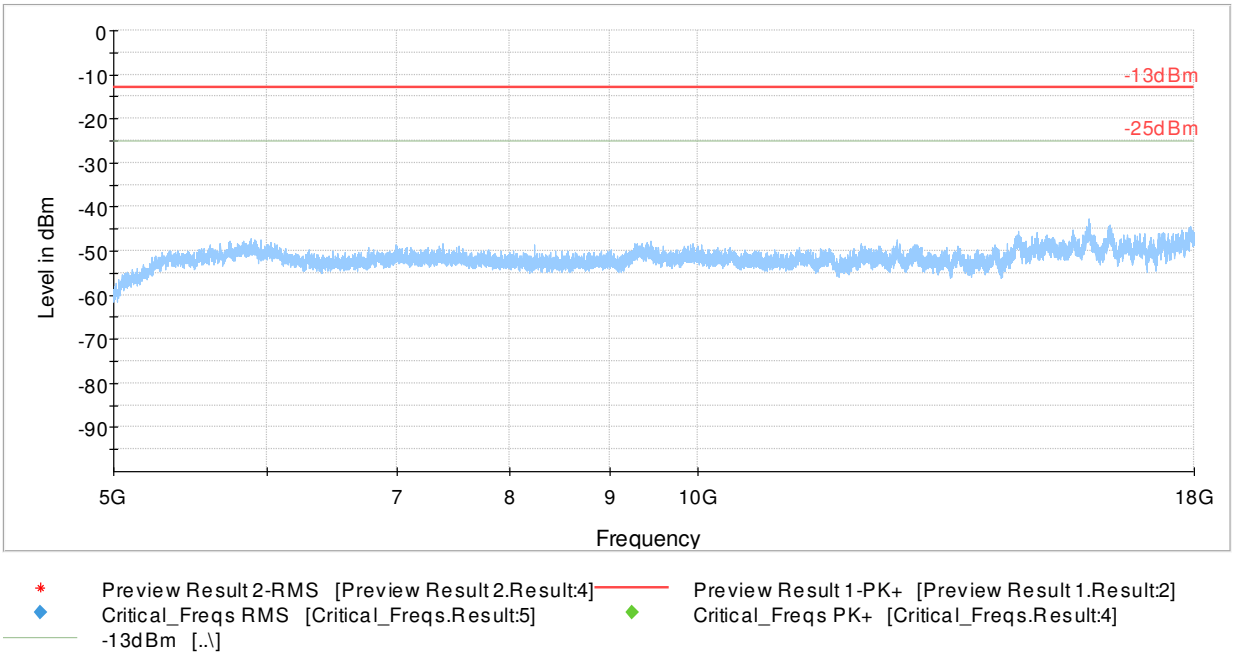
10.15.8 3GHz – 18GHz, Ch. Low



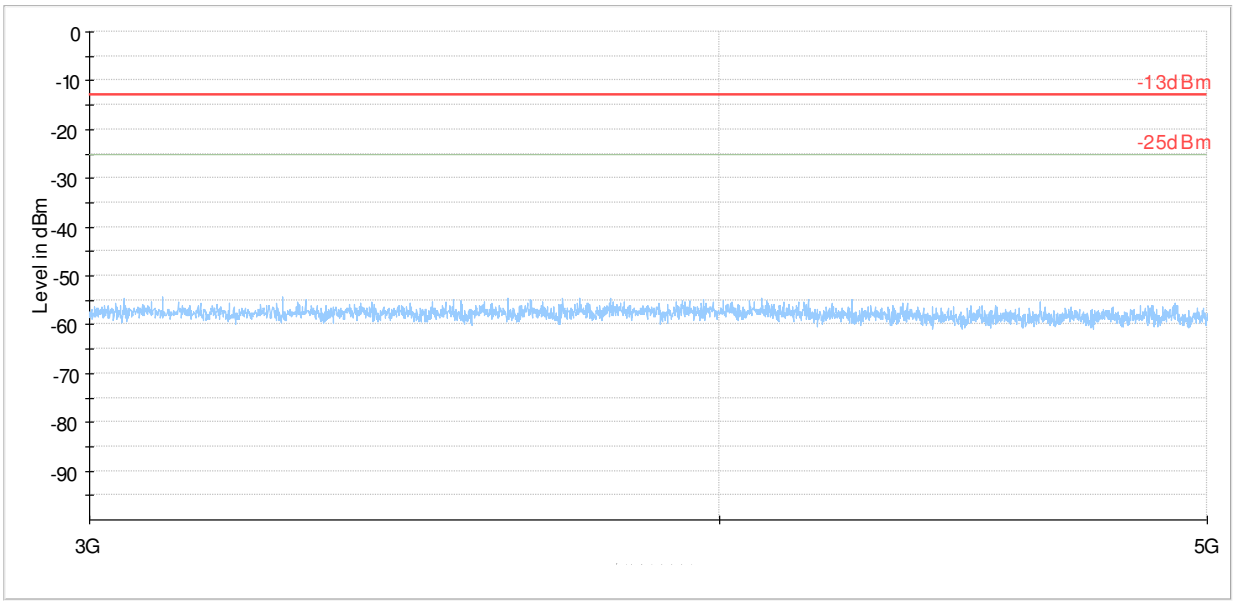
10.15.9 3GHz – 5GHz, Ch. Mid



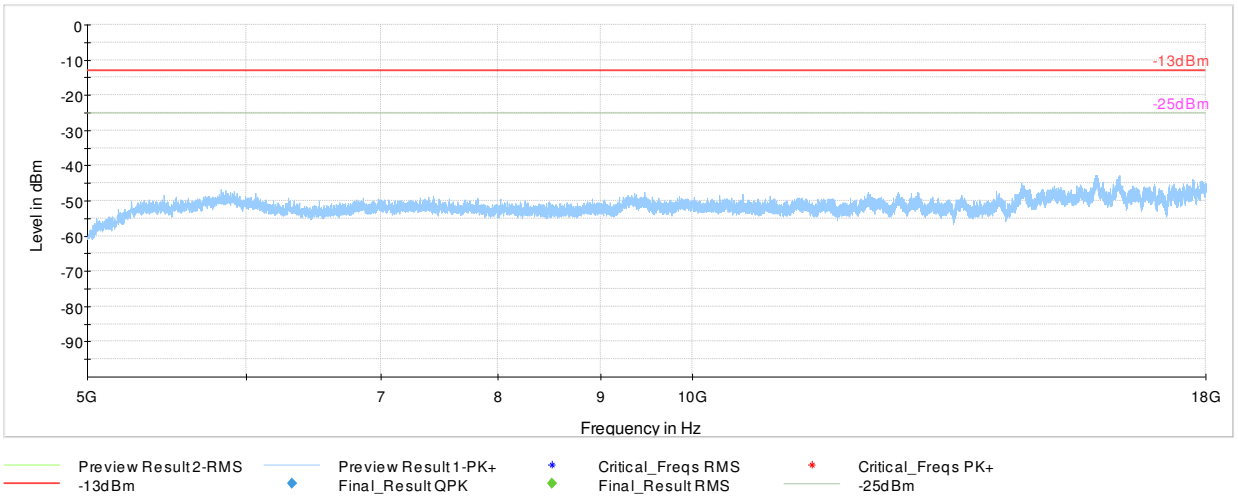
10.15.10 5GHz – 18GHz, Ch. Mid



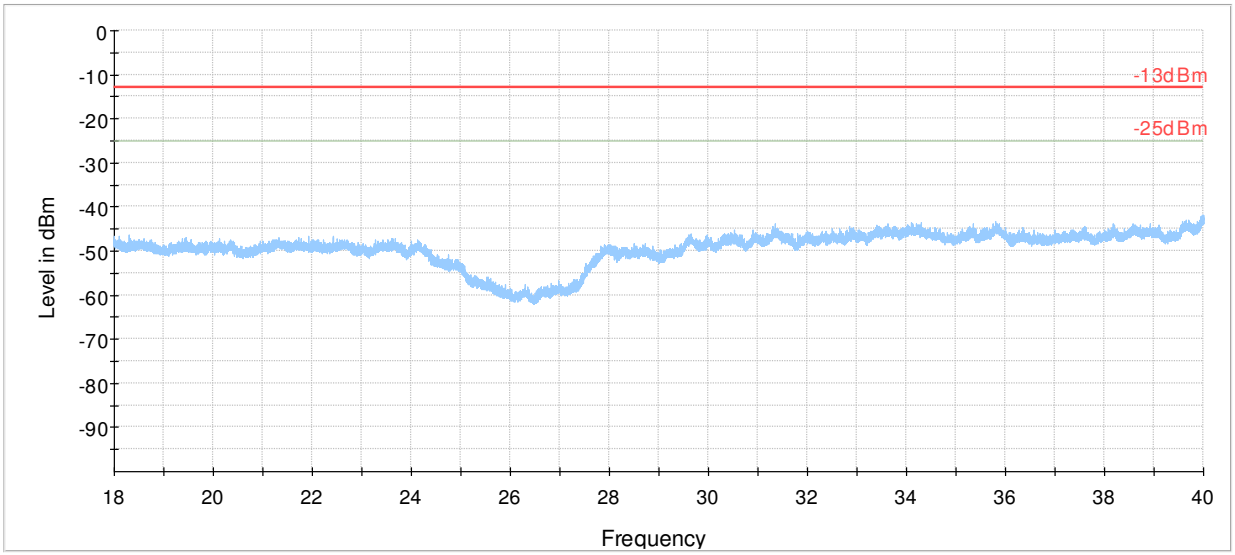
10.15.11 3GHz – 5GHz, Ch. High



10.15.13 5GHz – 18GHz, Ch. High



10.15.14 18GHz – 40GHz, Ch. Mid



11 Test Setup Photos

Setup photos are included in supporting file name: “EMC-UTCAE-018-16501_TestSetupPhotos.pdf”

12 Test Equipment and Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Loop 6512	Loop (Passive)	ETS Lindgren	6512	00164698	3 years	7/22/2014
Antenna Biconilog	Biconilog (Type 3)	Rohde & Schwarz	HL652	100495	3 years	6/24/2015
Antenna Horn 3116	DTG Horn(Small 1)	ETS Lindgren	3116C-PA	00169535	3 years	8/14/2014
Antenna Horn 3117	DTG Horn(Medium)	ETS Lindgren	3117-PA	00167061	3 years	8/13/2014
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	3 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
Signal Analyzer	Receiver/FSV 40	R&S	ESU 40	101022	3 years	7/28/2014
MT8820C	Radio communication analyzer	Anritsu	MT8820C	6201381652	3 years	4/29/2016
Thermometer Humidity TM320	Thermometer Humidity	Dickson	TM320	5280063	3 Year	7/29/2016

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.

13 Revision History

Date	Report Name	Changes to report	Report prepared by
October 19, 2016	EMC-UTCAE-018-16501_FCC_22_24_27_90	Initial Version	James Donnellan