



FCC / IC Test Report

FOR:

UTC Fire & Security Americas Corporation, Inc

Model Name: XpressKEY

Model Number: 002210

Product Description: Electronic Access Key for Real Estate Professionals

FCC ID: TCZ-10103379G1

IC ID: 1175F-10103379G1

47 CFR Part 22, 24

RSS-132 Issue 3

RSS-133 Issue 6

TEST REPORT #: EMC_UTCFI-008-15001_FCC_22_24

DATE: 2015-11-24



IC recognized #
3462B-1

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1 Assessment

The following equipment as further described in section 3 of this test report was evaluated against the applicable criteria specified in FCC CFR47 Parts 22 and 24 and Industry Canada Radio Standard Specifications RSS-132 Issue 3 and RSS-133 Issue 6. No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
UTC Fire & Security Americas Corporation, Inc	Electronic Access Key for Real Estate Professionals	002210

Report reviewed by:

2015-11-24	Compliance	Franz Engert (Compliance Manager)	
Date	Section	Name	Signature

Responsible for the Report:

2015-11-24	Compliance	Douglas Antioco (EMC Engineer)	
Date	Section	Name	Signature

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

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Compliance Manager:	Franz Engert
Responsible Project Leader	Douglas Antioco

2.2 Identification of the Client

Client Firm/Name:	UTC Fire & Security Americas Corporation, Inc
Street Address:	4001 Fairview Industrial Dr SE
City/Zip Code	Salem, Oregon 97302
Country	USA
Contact Person:	Kim Vertner
Phone No.	503-589-8747
e-mail:	Kim.Vertner@fs.utc.com

2.3 Identification of the Manufacturer

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

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name / Description:	XpressKEY/ Electronic Access Key for Real Estate Professionals		
Model Number:	002210		
FCC-ID :	TCZ-10103379G1		
IC-ID:	1175F-10103379G1		
PMN	XpressKEY		
HVIN	002210		
Product Description:	Electronic Access Key with Cellular Module		
Technology / Type(s) of Modulation:	GSM/(E)GPRS 850/1900 WCDMA FDD II/V		
Integrated Module Info:	Cinterion EHS5-US (FCC ID: QIPEHS5-US/ IC ID: 7830A-EHS5US) GSM/GPRS/EDGE/UMTS/HSPA Module		
Operating Frequency Ranges (MHz)	GSM 850: 824-849 MHz GSM 1900: 1850-1910 MHz WCDMA FDD II: 824-849 MHz WCDMA FDD V: 1850-1910 MHz		
Antenna info:	Internal antenna, Ethertronics Part Number 1003086 Documented Maximum Antenna Gain obtained from Antenna Manufacturer datasheet: 850MHz: -0.6 dBi 1900MHz: -0.6 dBi		
Max. Output Powers:	Manufacturer Declared Maximum RMS powers at antenna port: (Tolerance -1 dB / +0.5 dB)		
	GSM :		
	Mode	850 Band	1900 Band
	GPRS (GMSK)	30 dBm	26 dBm
	EGPRS (GMSK)	30 dBm	26 dBm
	EGPRS (8PSK)	24 dBm	22 dBm

	UMTS/WCDMA:	
	850 Band	1900 Band
	22 dBm	22 dBm
Rated Operating Voltage Range:	3.0 V (Low) / 3.7 V (Nom) / 4.2 V (High)	
Rated Operating Temperature Range:	-20°C to 50°C	
Test Sample Status:	Production	

3.2 Identification of the Equipment under Test (EUT)

EUT #	IMEI	Sample	HW / SW Version
1	357330050620301	Radiated	10103379G1 Rev A/ 2.0.0
2	357330050609650	Conducted	10103379G1 Rev A/ 2.0.0

3.3 Identification of Accessory equipment

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

3.4 Dates of Testing:

2015/08/13 – 2015/11/06

4 Summary of Measurement Results

850MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS-132 5.4	RF Output Power	Nominal	GSM & UMTS	■	□	□	□	Complies (See Note 1)
§2.1055 §22.355 RSS-132 5.3	Frequency Stability	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1049 §22.917(b) RSS-132 5.2	Occupied Bandwidth	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1051 §22.917 RSS-132 5.5	Band Edge Compliance	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1051 §22.917 RSS-132 5.5	Conducted Spurious Emissions	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1053 §22.917 RSS-132 5.5	Radiated Spurious Emissions	Nominal	GSM & UMTS	■	□	□	□	Complies

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

Note 1: Verification done on mid channel for each band, low and high channel measurements leveraged from module certification.

Note 2: Leveraged from module certification.

1900 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS-133 6.4	RF Output Power	Nominal	GSM & UMTS	■	□	□	□	Complies (See Note 1)
§2.1055 §24.235 RSS-133 6.3	Frequency Stability	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1049 §24.238(b) RSS-133 6.2	Occupied Bandwidth	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1051 §24.238 RSS-133 6.5	Band Edge Compliance	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1051 §24.238 RSS-133 6.5	Conducted Spurious Emissions	Nominal	GSM & UMTS	□	□	□	■	Note 2
§2.1053 §24.238 RSS-133 6.5	Radiated Spurious Emissions	Nominal	GSM & UMTS	■	□	□	□	Complies

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

Note 1: Verification done on mid channel for each band, low and high channel measurements leveraged from module certification.

Note 2: Leveraged from module certification.

5 Measurements

5.1 Measurement Uncertainty

	Uncertainty in dB radiated <30MHz	Uncertainty in dB radiated 30MHz - 1GHz	Uncertainty in dB radiated > 1GHz	Uncertainty in dB Conducted measurement
standard deviation k=1	2.48	1.94	2.16	0.64
95% confidence interval in dB	4.86	3.79	4.24	1.25
95% confidence interval in dB in delta to Result	+/-2.5 dB	+/-2.0 dB	+/- 2.3dB	+/-0.7dB

5.2 Nominal Environmental Conditions

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

5.3 Nominal Environmental Test Conditions

- Test Temperature: 20°C (nominal);
- Test Voltage: 3.7 VDC(nominal);

Deviating test conditions are indicated at individual test description where applicable.

5.4 Inheriting Test Results from Incorporated Module Certification:

The EUT integrates the certified module Cinterion EHS5-US (details see EUT spec in section 3.1)

Taking into account guidance from FCC KDB 996369 (modular approval) and where relevant test procedures did not change conducted test results are leveraged.

5.5 Nominal Cellular Test Conditions

1. The different cellular operation modes of the EUT as required for testing are controlled through the link with the Digital Radio Communication Tester (R&S CMU200).
2. The EUT is tested on the low, mid and high channel of each of the supported cellular operation modes.

5.6 Additional Test Information.

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 ANSI 63.4 as detailed below.

Measurements were done on GSM mode with GMSK Modulation and on UMTS with QPSK Modulation.

6 RF Power Output Verification (Conducted)

6.1 References

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

IC: RSS-Gen issue 4, section 6.12; RSS-132 issue 3, section 5.4; RSS-133 issue 6, section 6.4

6.2 Limits:

ERP/EIRP (850 MHz Band)

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

FCC: ERP < 38.45 dBm (7W)

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

IC: EIRP < 40.60 dBm (11.5W)

The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.

EIRP (1900 MHz Band)

FCC Part 24.232 (c) (e) & RSS-133 Section 6.4/SRSP-510 Section 5.1.2

FCC: EIRP < 33 dBm (2W)

(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(c) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement over the full bandwidth of the channel.

IC: EIRP < 33 dBm (2W)

The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 2 watts.

6.4 Measurement Result:

All ERP/EIRP are within the regulatory limits and are lower than the power levels of the module certification.

6.5 Measurement Data:

Note: The EUT's module is intentionally tuned below the values of the module certification.

GSM

Frequency (MHz)	Modulation	Conducted Average Output Power at antenna port from module's test report	Conducted Average Output Power	Rated Conducted Output Power of EUT (-1 / +0.5 dB Tolerance)	ERP / EIRP Calculated (-0.6 dBi Gain)
GSM 850 GPRS					
836.6 MHz	GMSK	33.0	29.8	30	27.05/29.2
GSM 1900 GPRS					
1880 MHz	GMSK	27.1	25.7	26	22.65/24.8
GSM 850 EGPRS					
836.6 MHz	8PSK	30.2	24.0	24	21.25/23.4
GSM 1900 EGPRS					
1880 MHz	8PSK	26.0	21.7	22	18.95/21.1

UMTS/WCDMA

Frequency (MHz)	Conducted Average Output Power at antenna port from module's test report	Conducted Average Output Power	Rated Output Power (-1 / +0.5 dB Tolerance)	ERP / EIRP Calculated (-0.6 dBi Gain)
UMTS FDD II				
1880 MHz	24.04	21.4	22	18.65/20.8
UMTS FDD V				
836.6 MHz	23.78	22.0	22	19.25/21.4

7 Spurious Emissions Radiated

7.1 References:

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

IC: RSS-Gen issue 4, section 6.13; RSS-132 issue 3, section 5.5; RSS-133 issue 6, section 6.5

7.2 Limits:

(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.

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

7.2.1 **FCC 22.917 Emission limitations for cellular equipment.**

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

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

7.2.2 **FCC 24.238 Emission limitations for Broadband PCS equipment.**

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

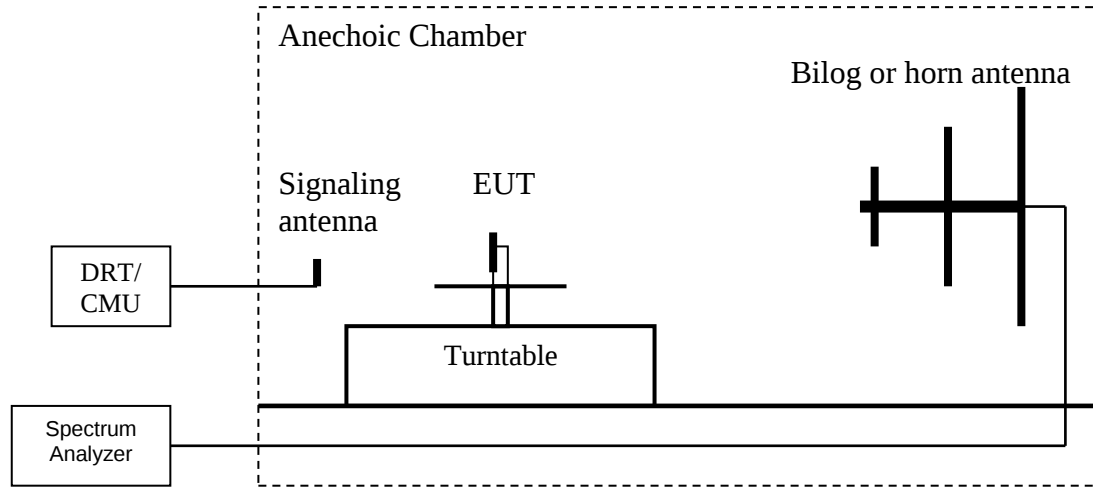
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

7.2.3 **RSS-132 Section 5.5.1.1 and RSS-133 Section 6.5.1**

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

After the first 1.5 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log_{10}(P)$, dB, in any MHz of bandwidth.

7.3 Radiated out of band measurement procedure:
Ref: ANSI C63.4 Radiated Emission Measurements



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

7.3.1 Sample Calculations for Radiated Measurements: **Power Measurements using Substitution Procedure:**

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

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

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

7.3.2 Spectrum Analyzer Settings

Settings for FCC 22

	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

Settings for FCC 24

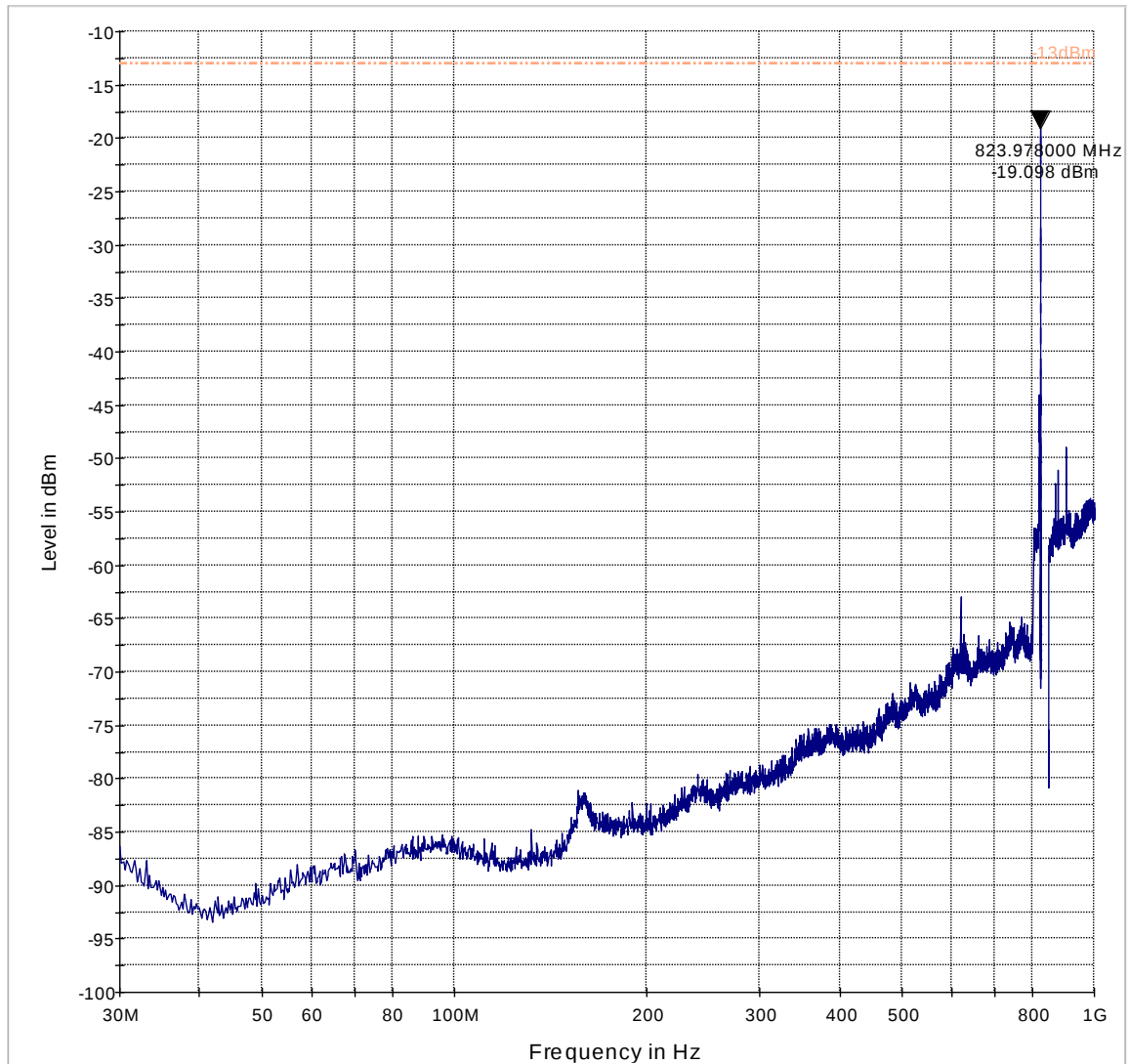
	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 GHz	18 – 19.1 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

7.4 Test Results

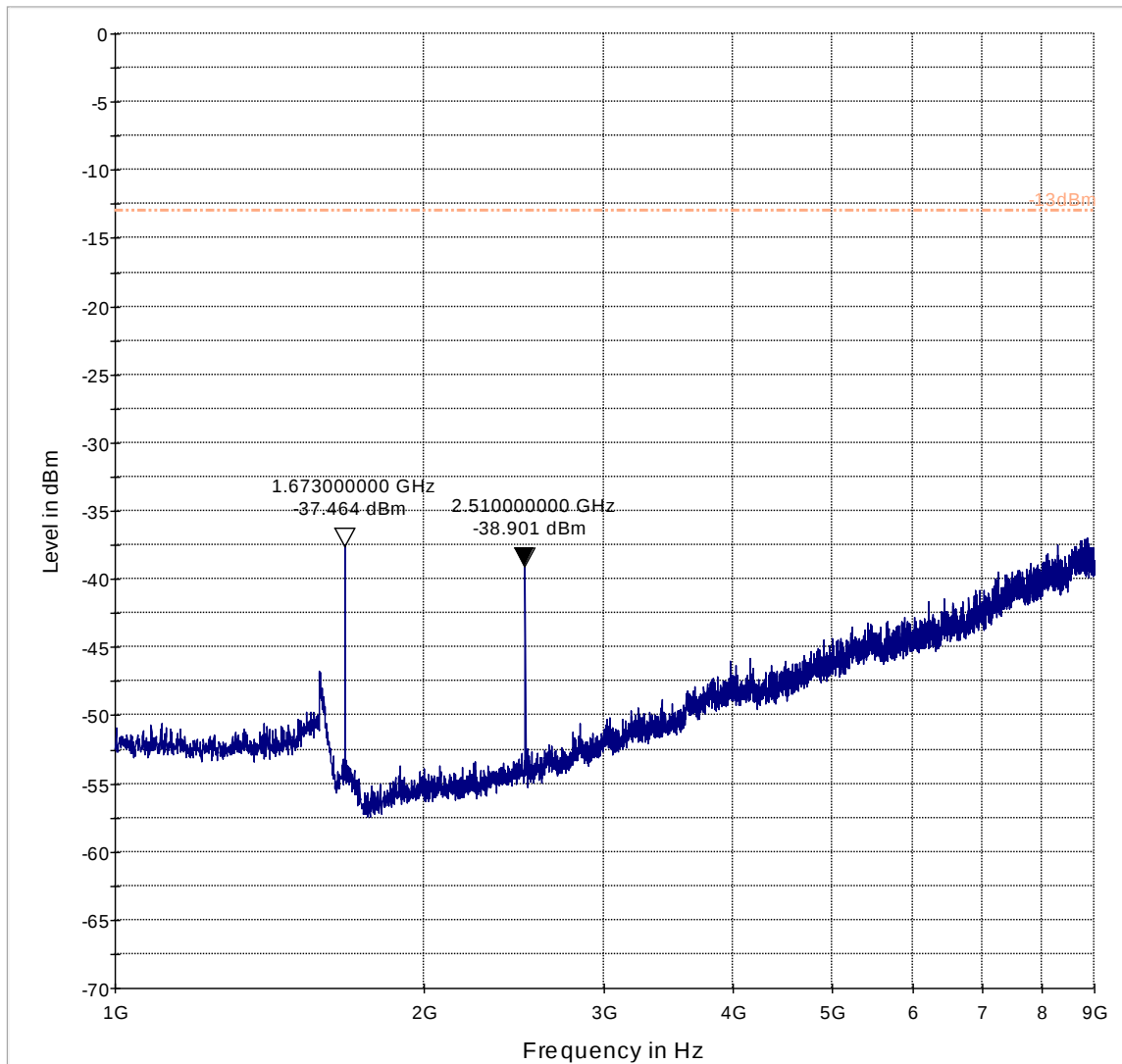
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7.5 Measurement Plots:

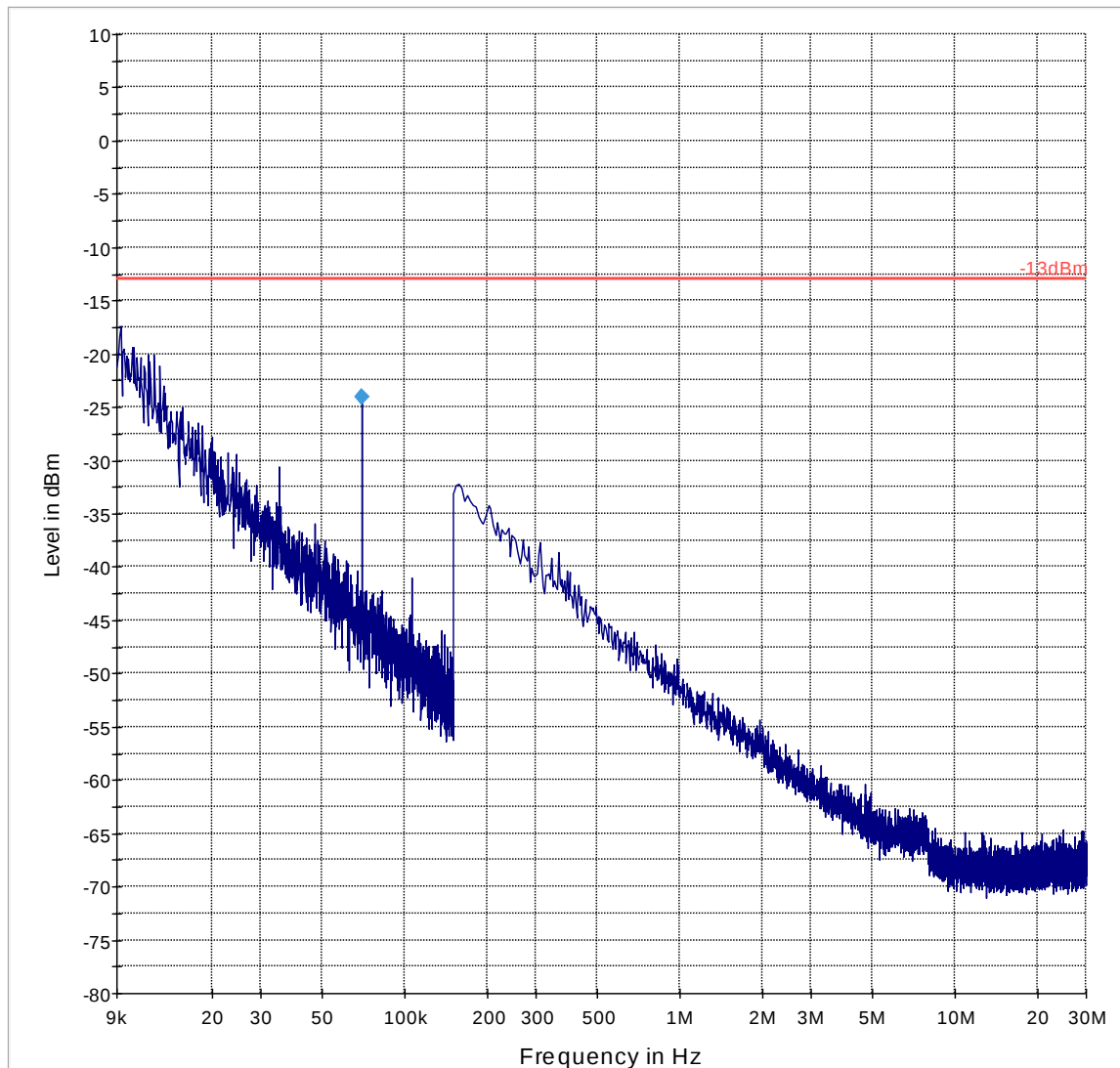
7.5.1 30 MHz – 1 GHz, GSM 850, Tx: Ch. Low



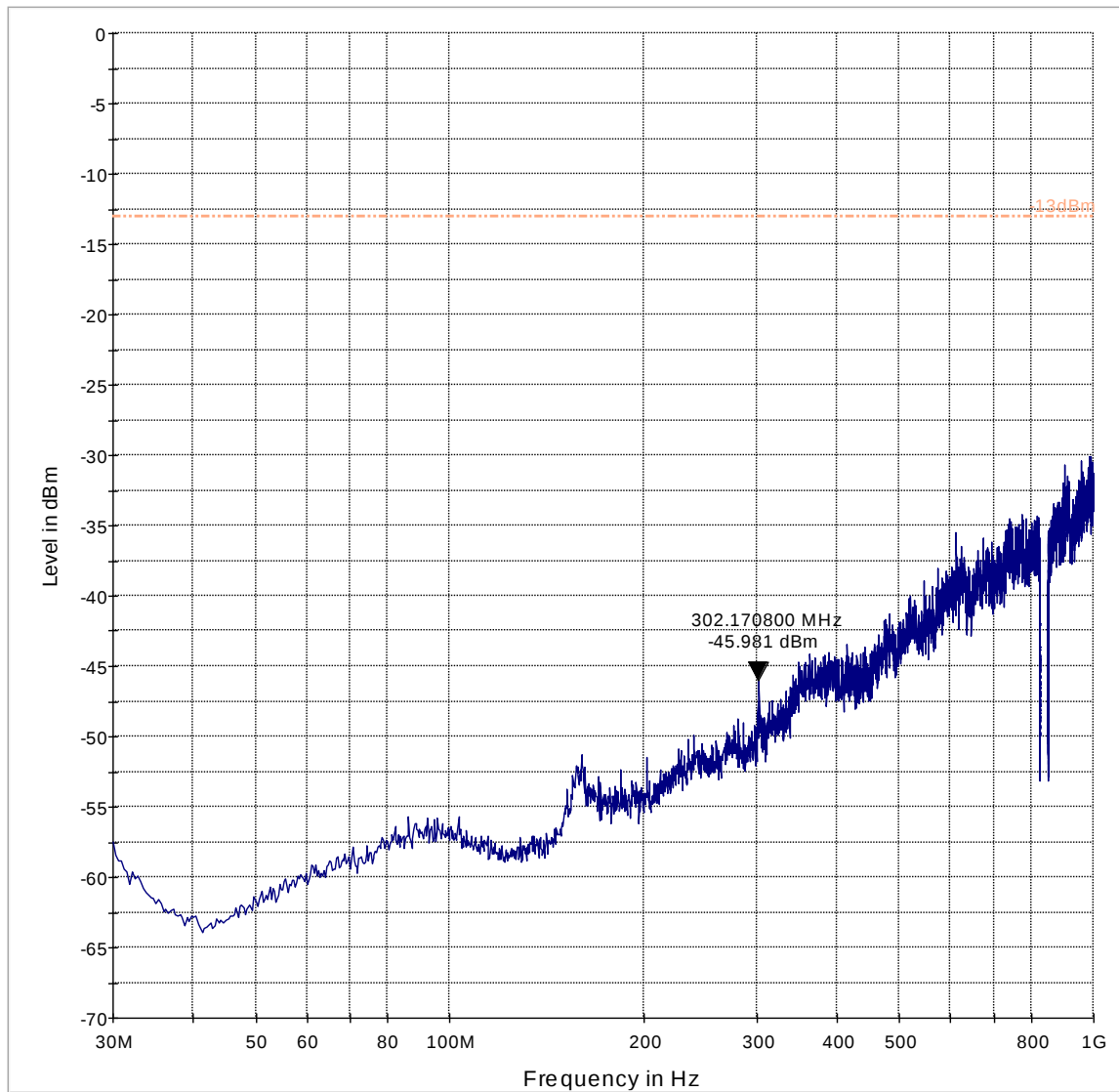
7.5.2 1 GHz – 9 GHz, GSM 850, Tx: Ch. Low



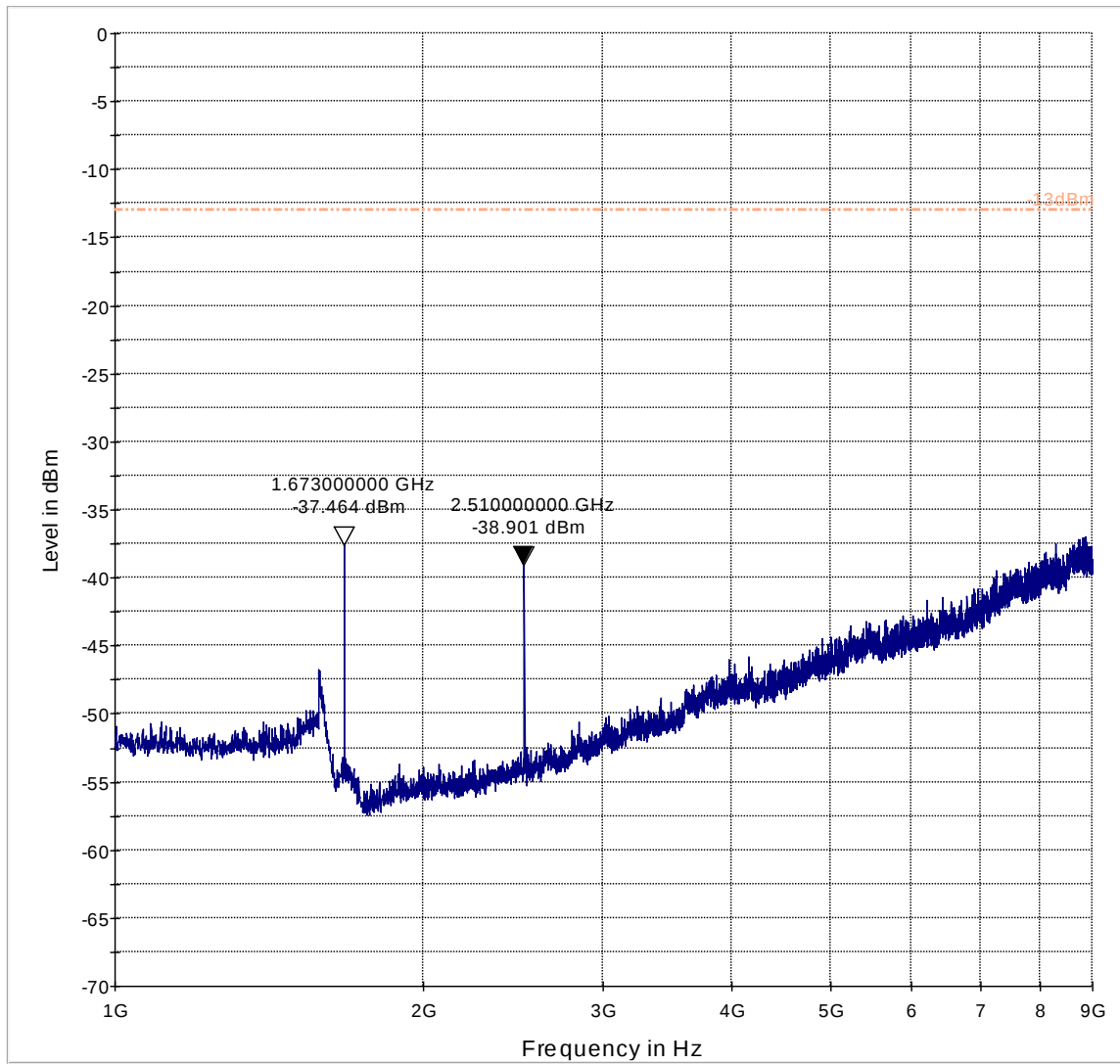
7.5.3 9 KHz – 30 MHz, GSM 850, Tx: Ch. Mid



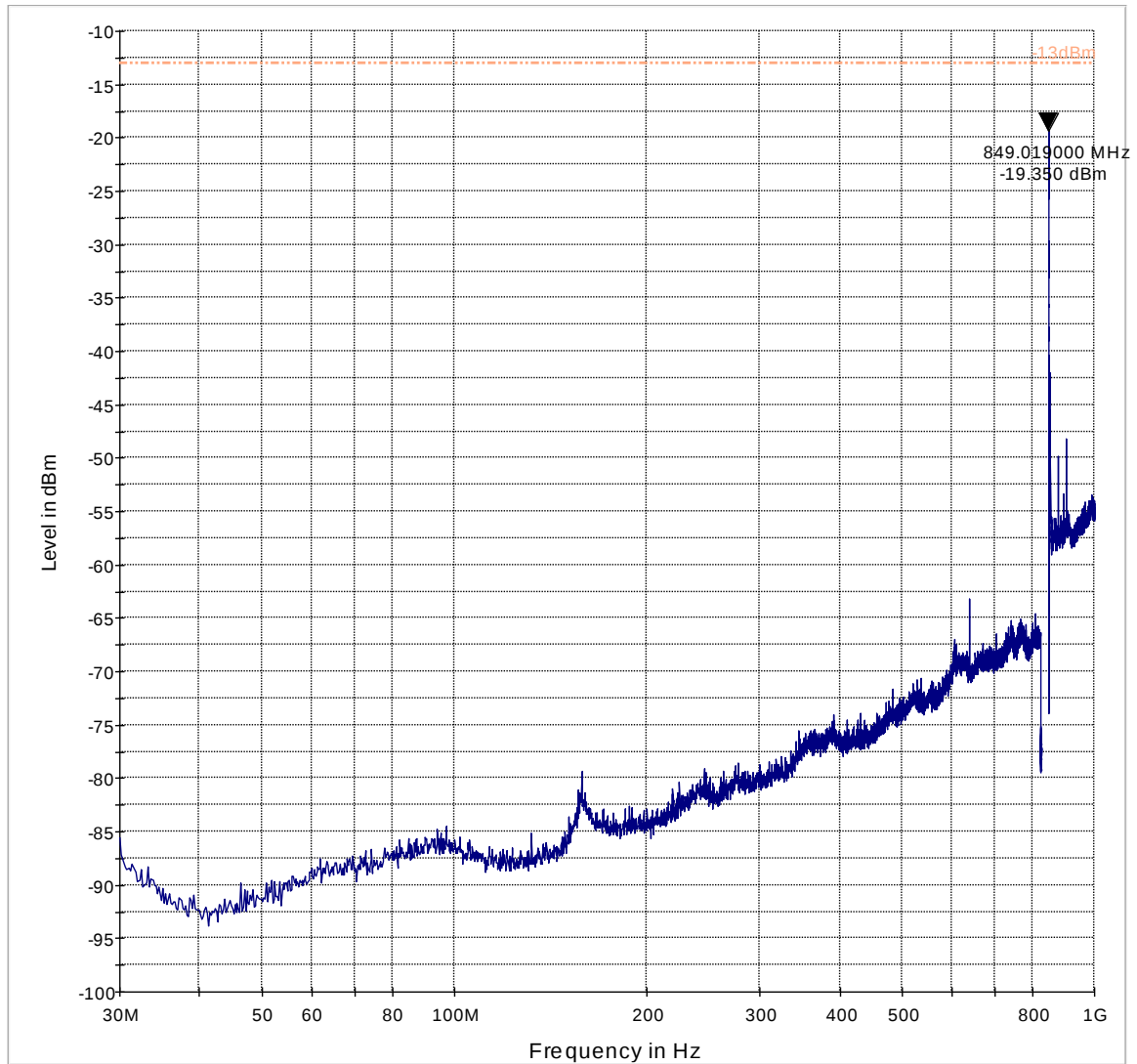
7.5.4 30 MHz – 1 GHz, GSM 850, Tx: Ch. Mid



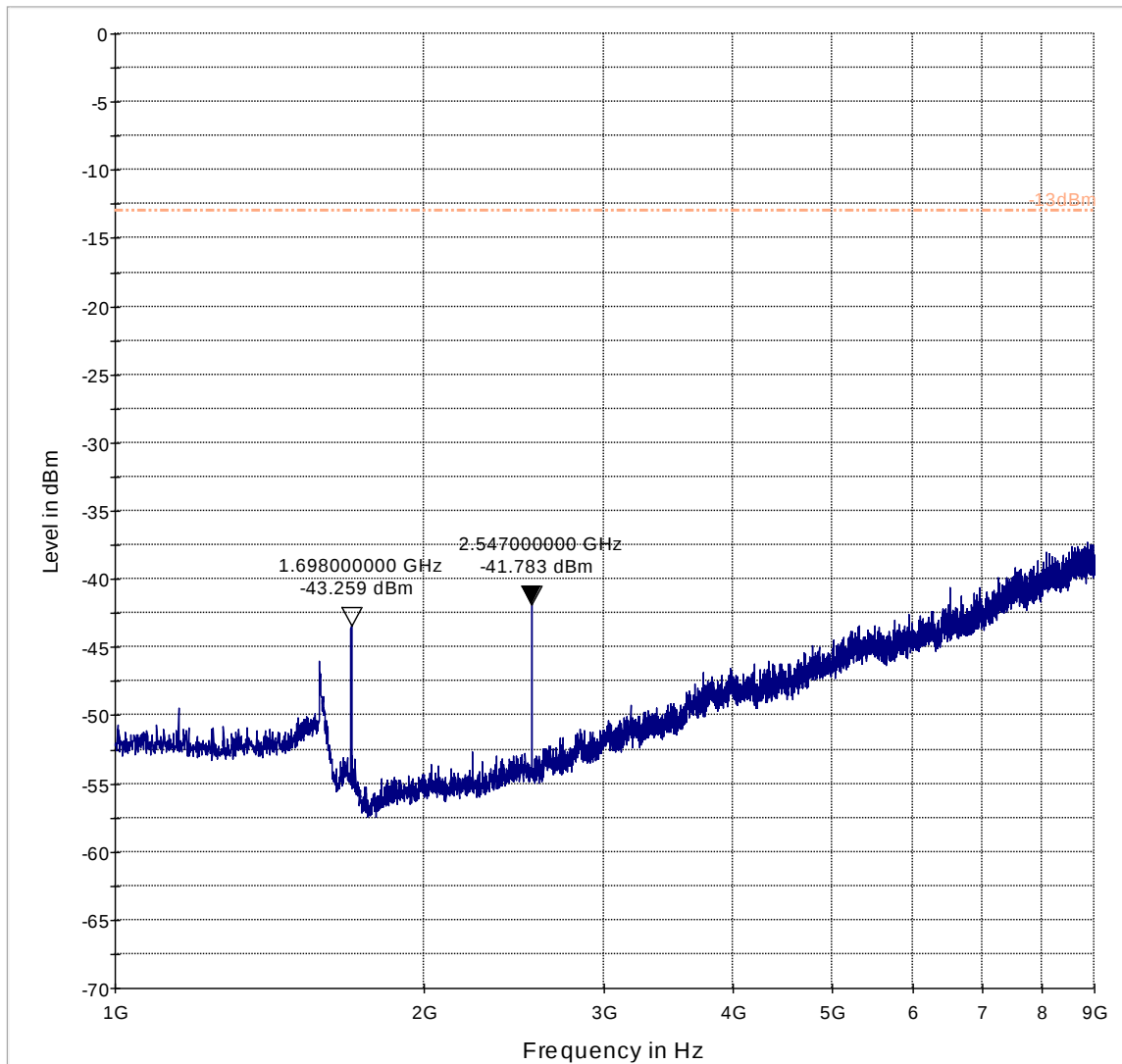
7.5.5 1 GHz – 9 GHz, GSM 850, Tx: Ch. Mid



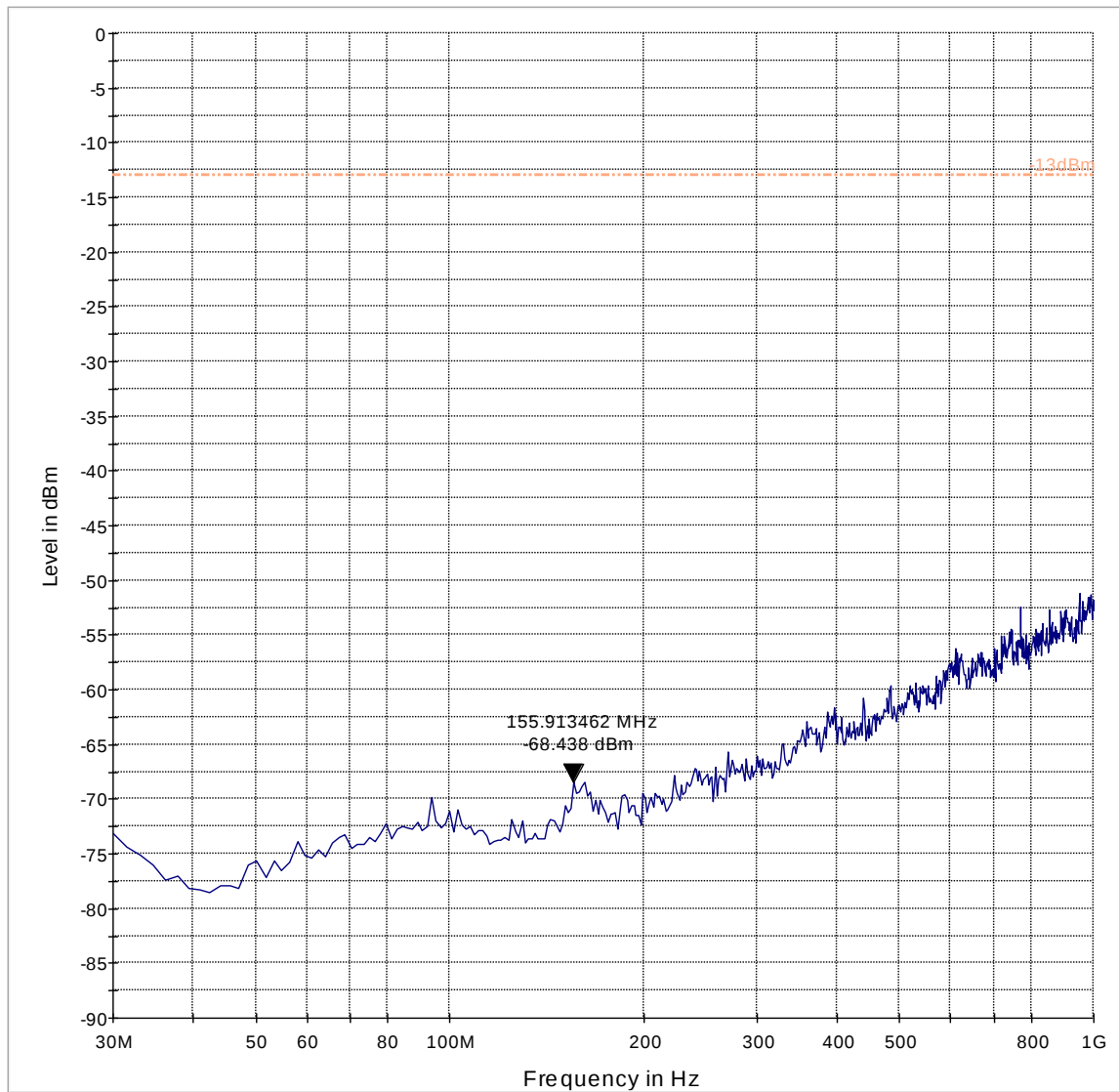
7.5.6 30 MHz – 1 GHz, GSM 850, Tx: Ch. High



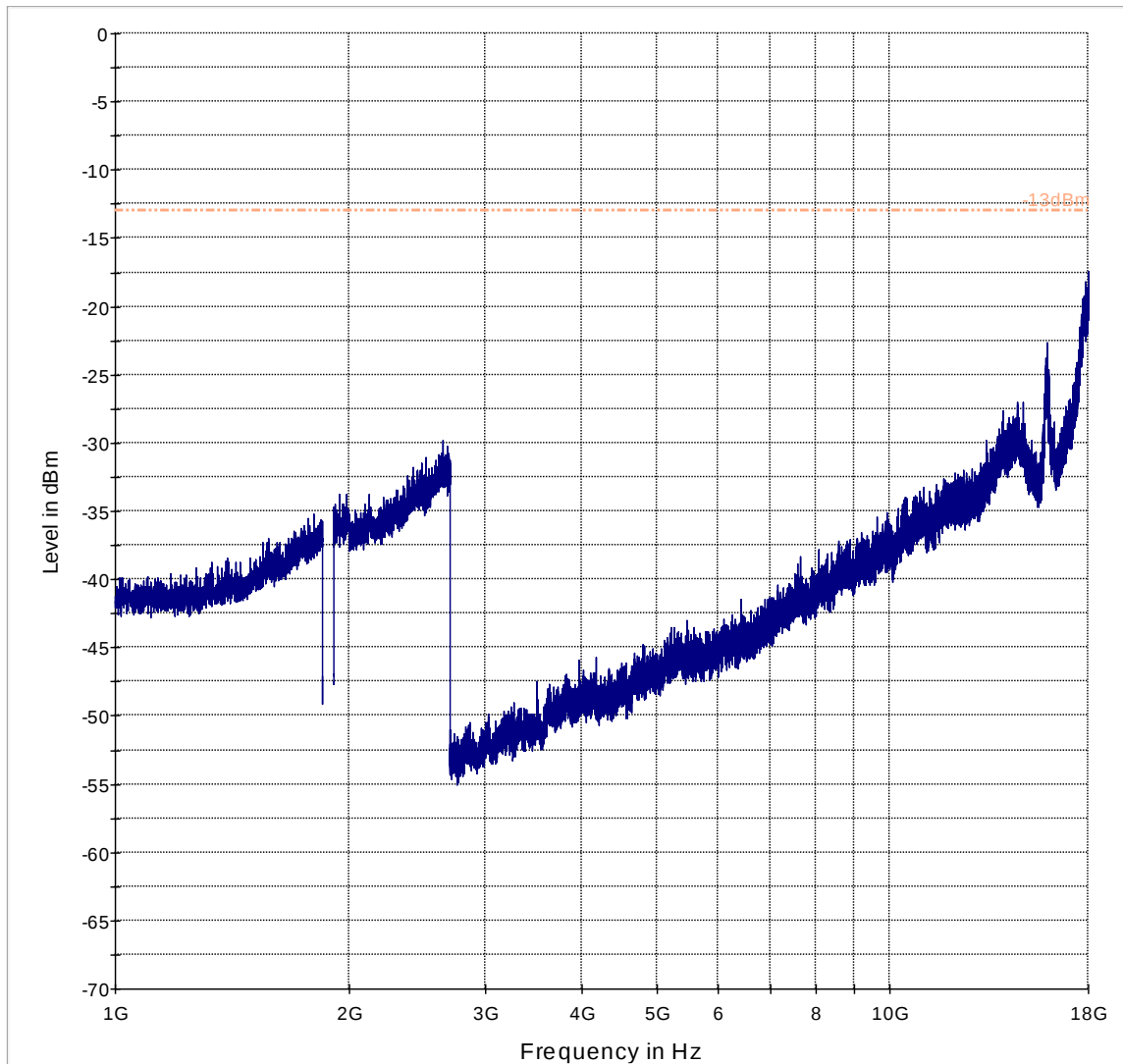
7.5.7 1 GHz – 9 GHz, GSM 850, Tx: Ch. High



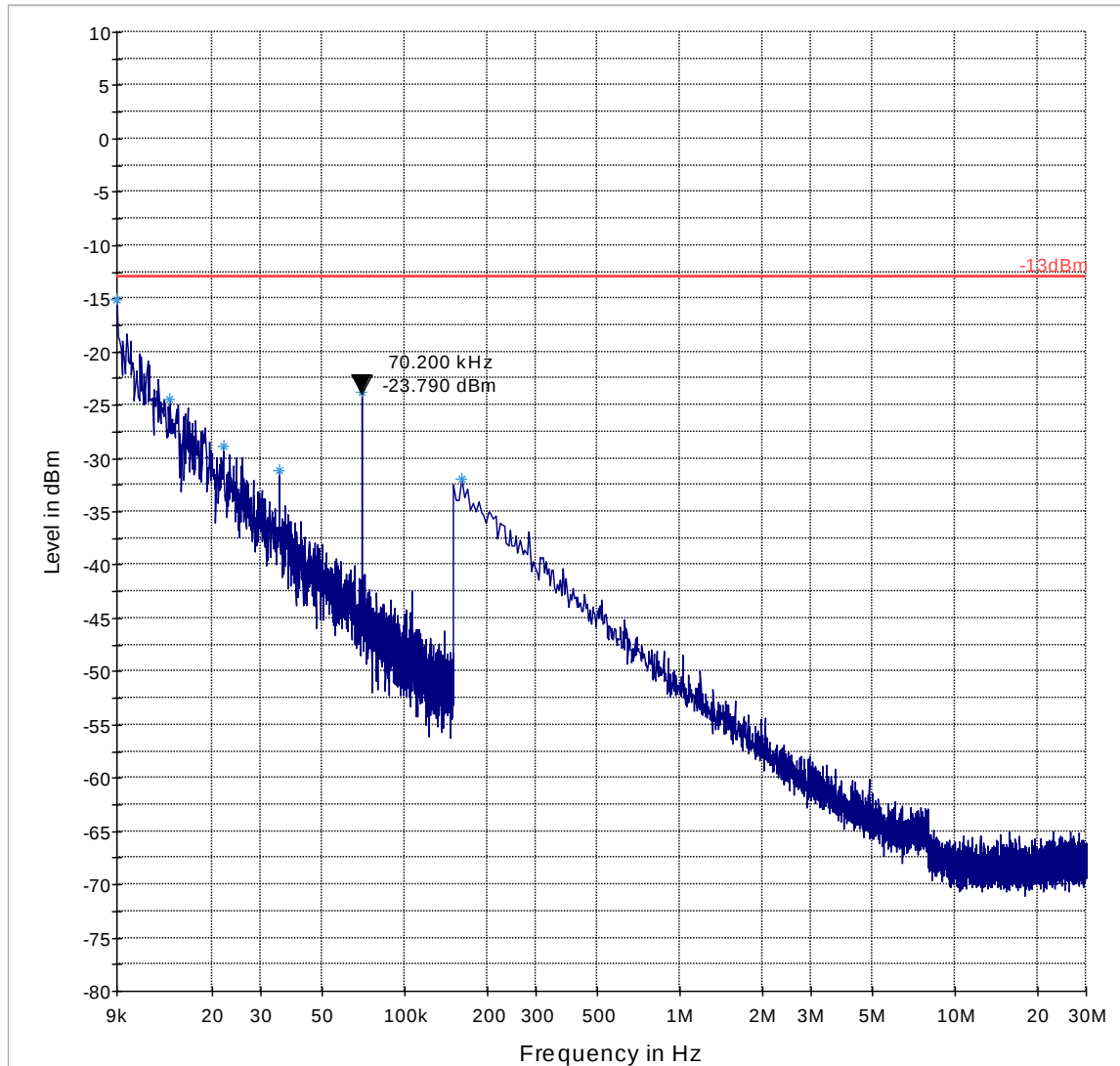
7.5.8 30 MHz – 1 GHz, GSM 1900, Tx: Ch. Low



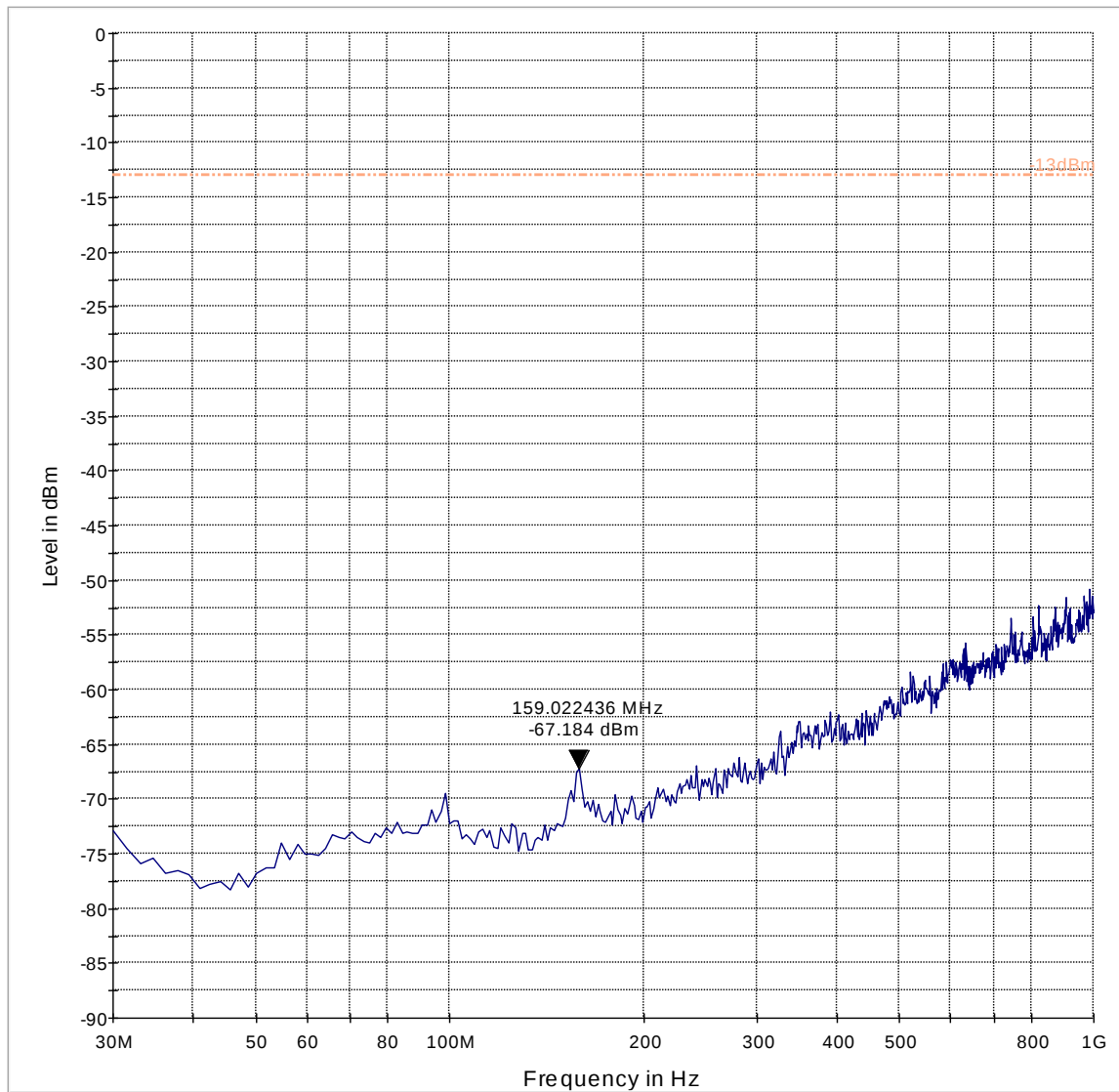
7.5.9 1 GHz – 18 GHz, GSM 1900, Tx: Ch. Low



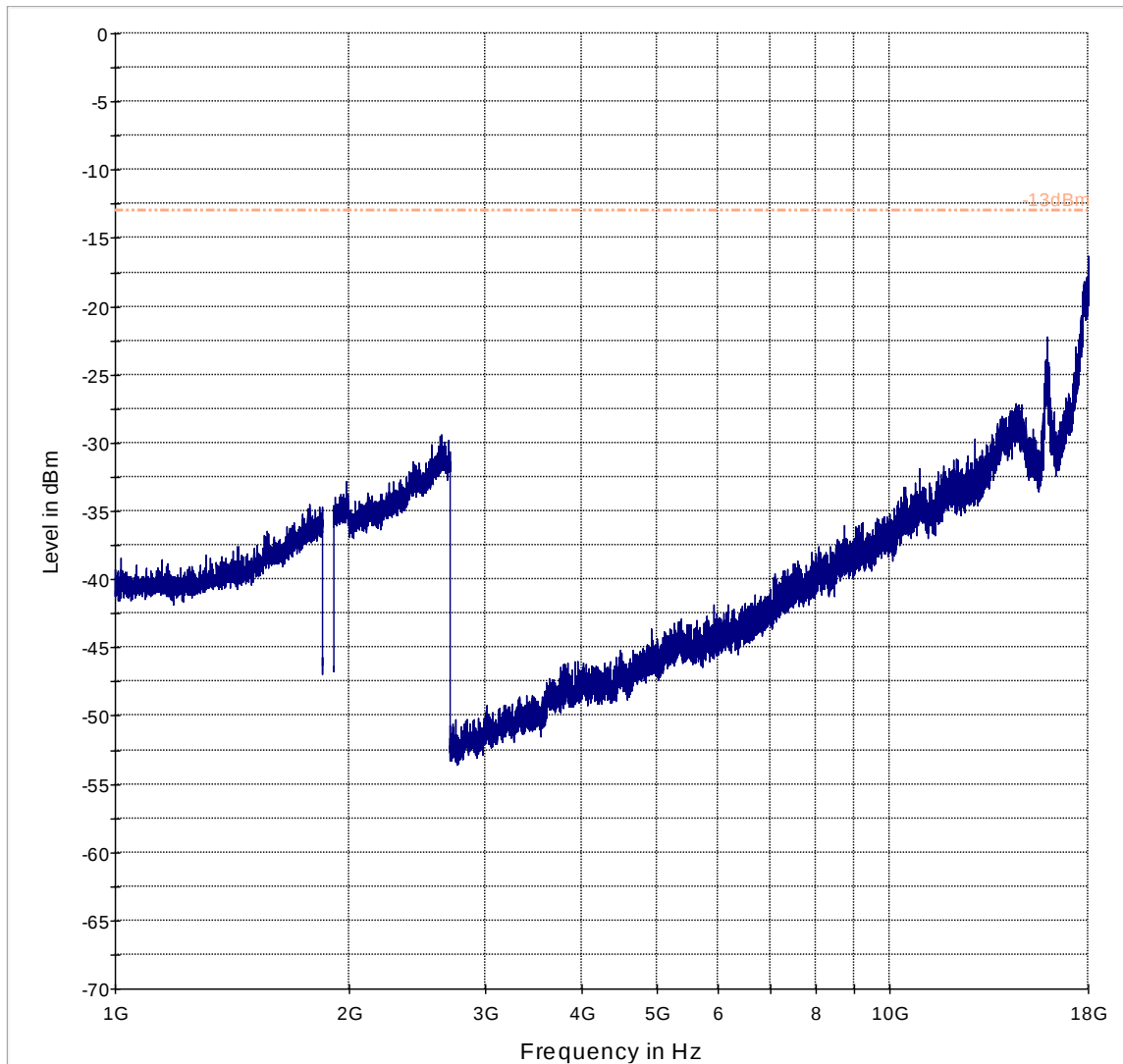
7.5.10 9 KHz – 30 MHz, GSM 1900, Tx: Ch. Mid



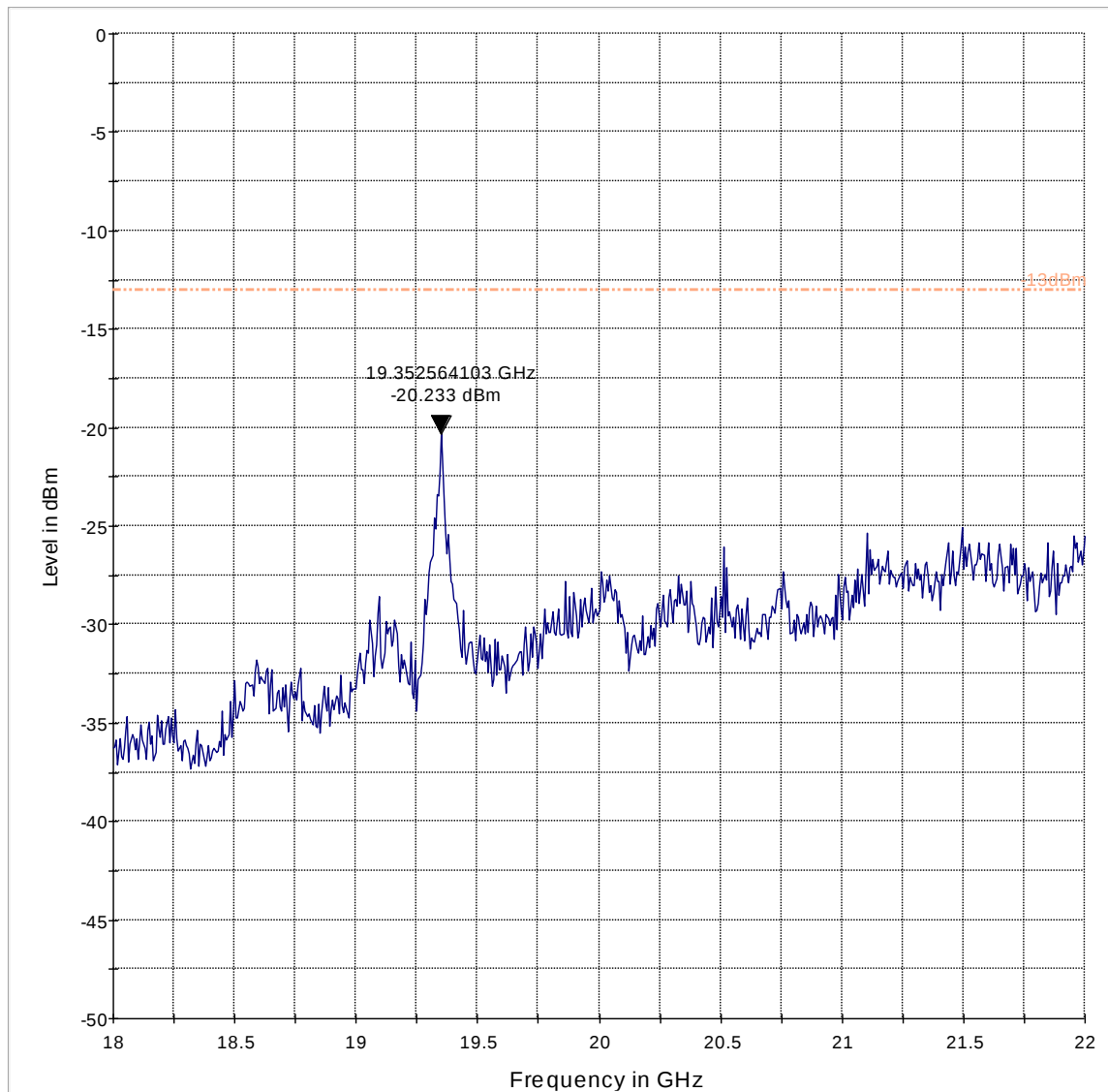
7.5.11 30 MHz – 1 GHz, GSM 1900, Tx: Ch. Mid



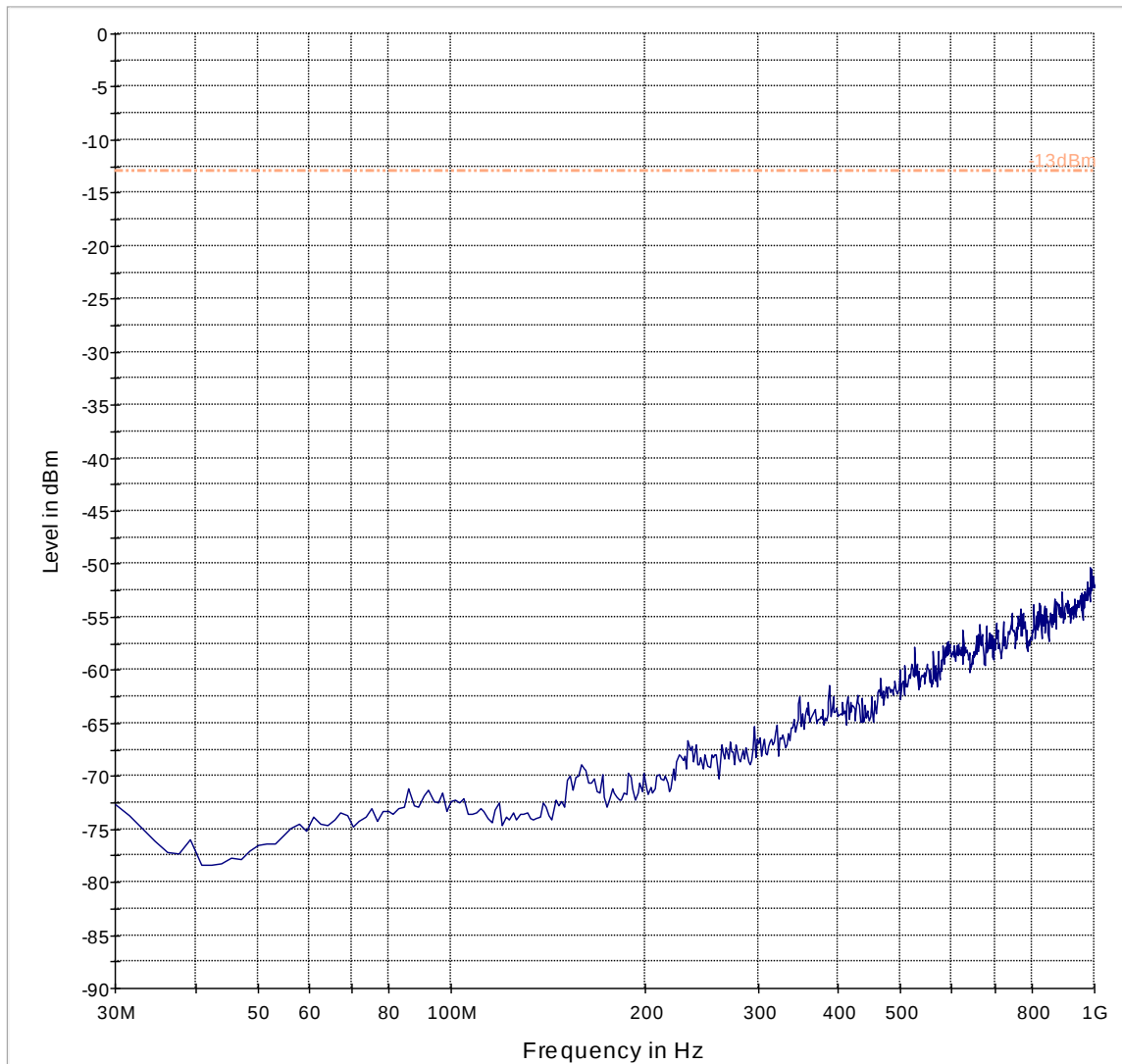
7.5.12 1 GHz – 18 GHz, GSM 1900, Tx: Ch. Mid



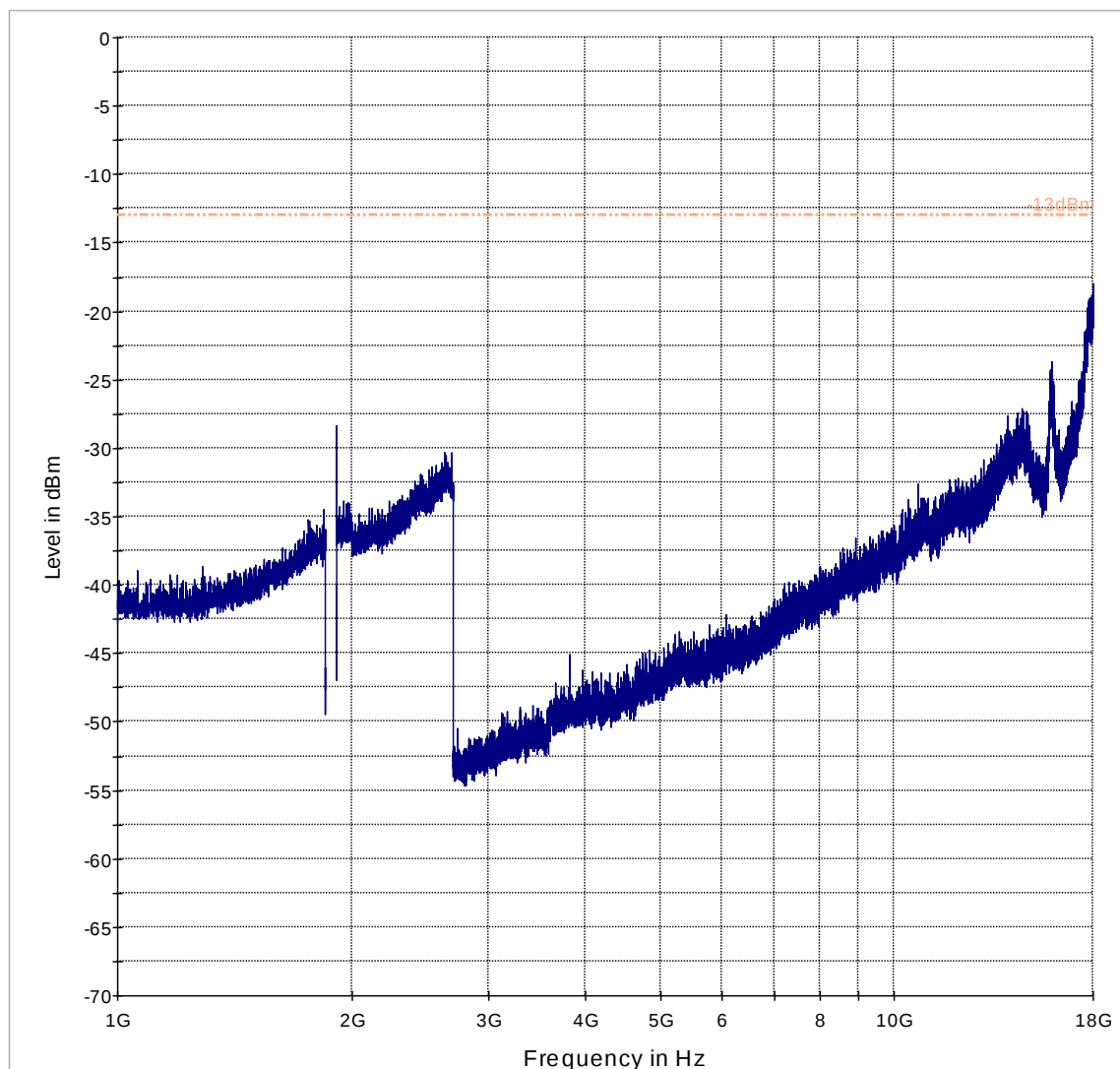
7.5.13 18 GHz -22 GHz, GSM 1900, Tx: Ch. Mid



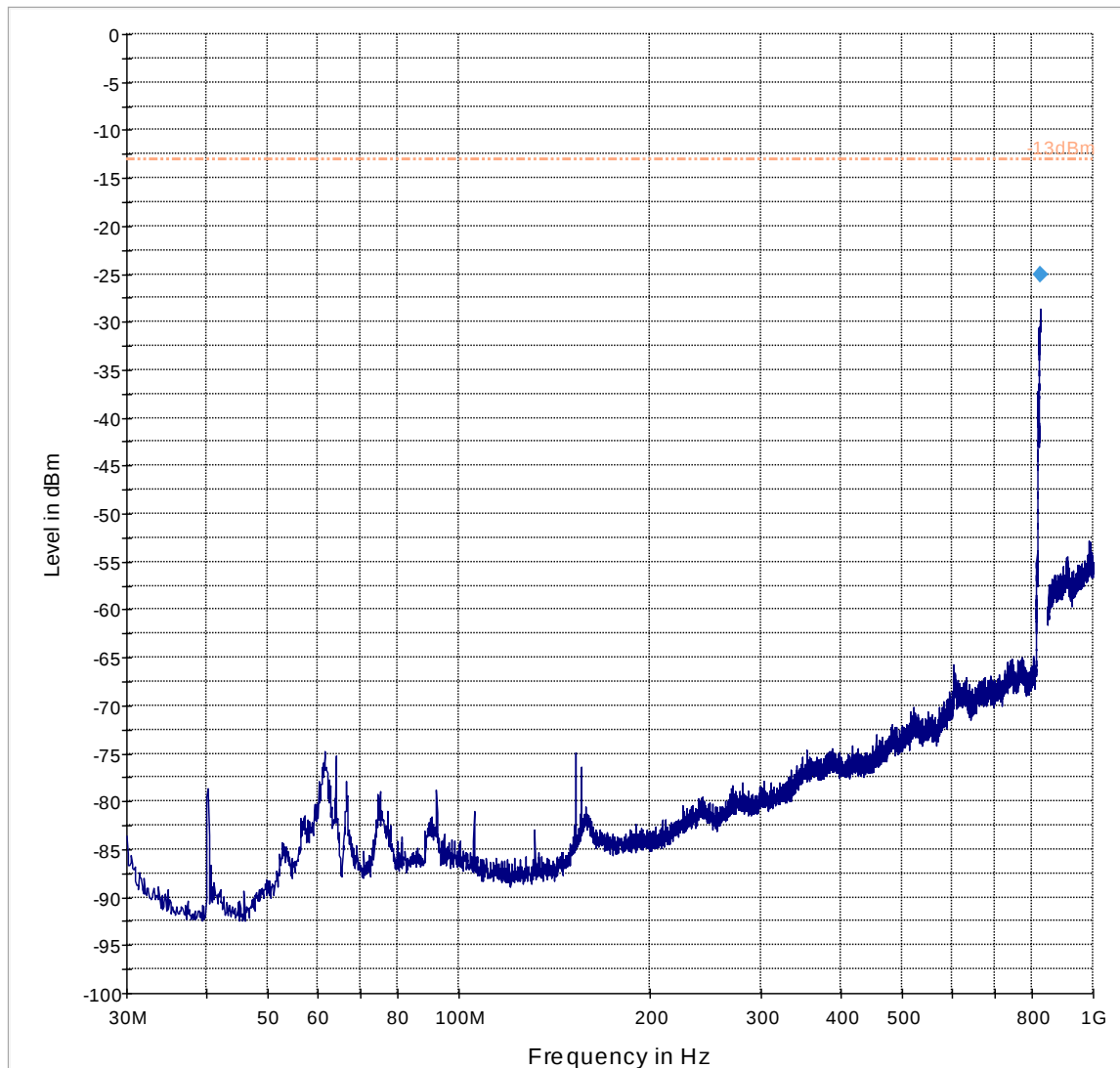
7.5.14 30 MHz – 1 GHz, GSM 1900, Tx: Ch. High



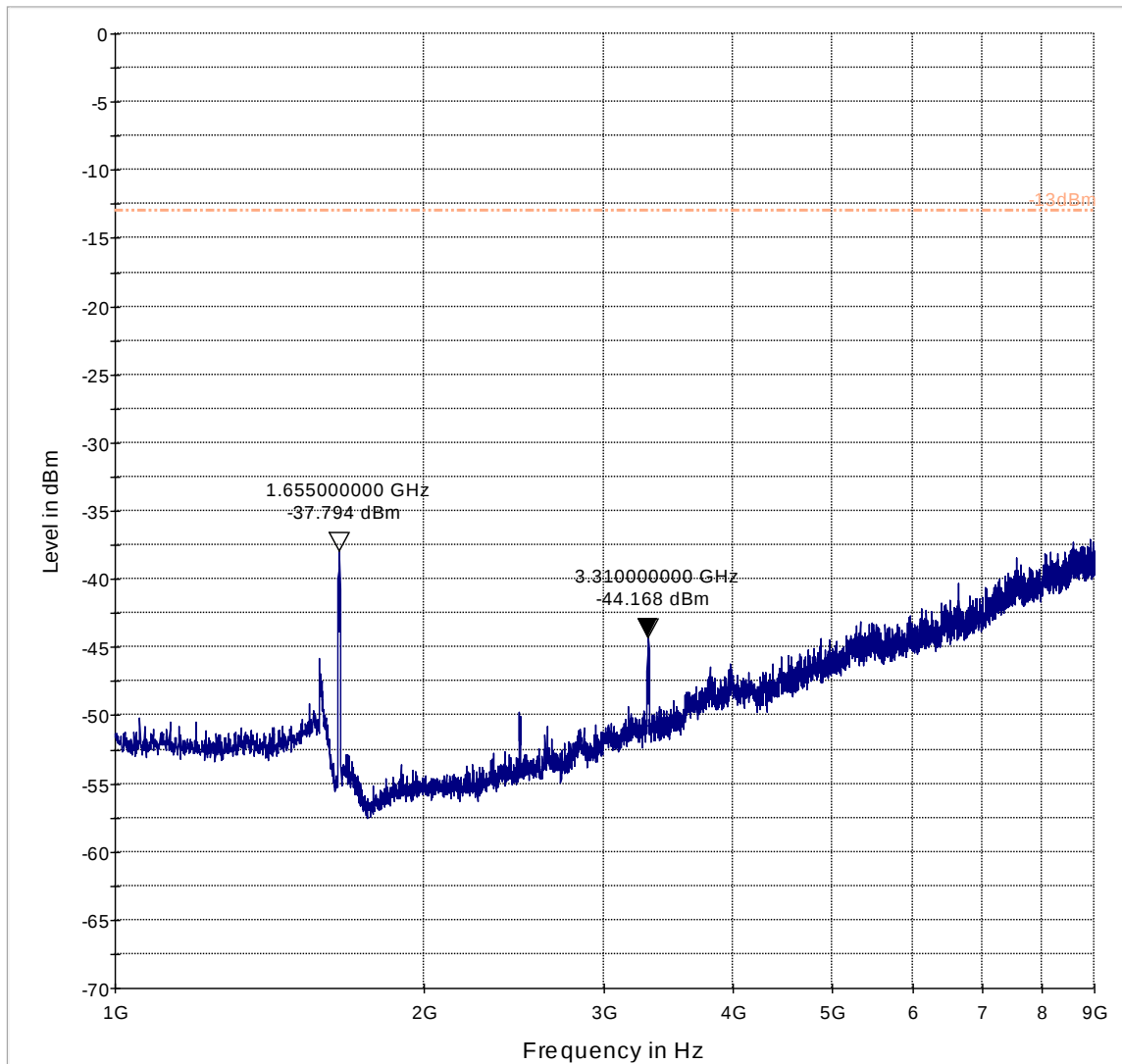
7.5.15 1 GHz – 18 GHz, GSM 1900, Tx: Ch. High



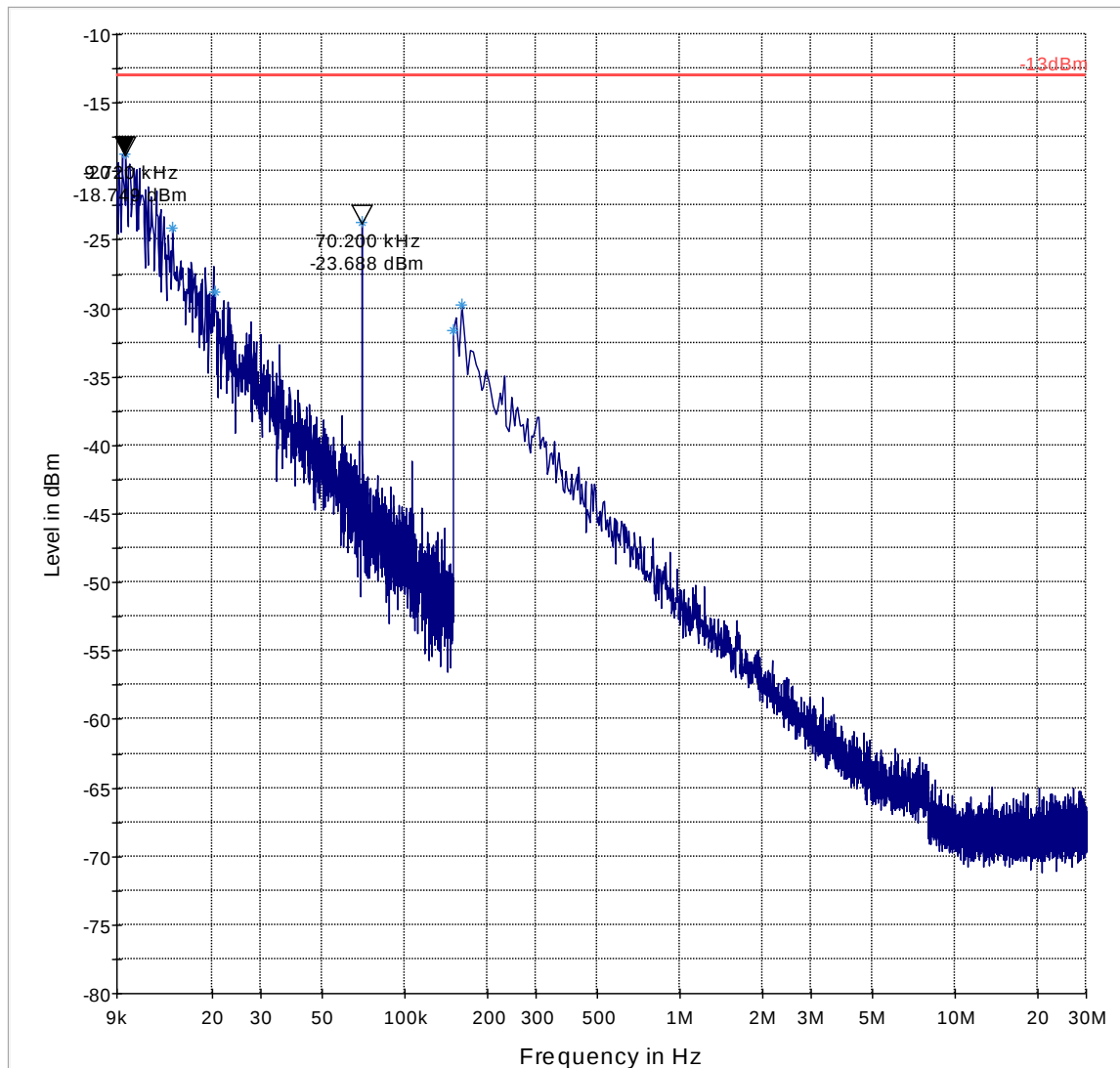
7.5.16 30 MHz – 1 GHz, UMTS FDD V, Tx: Ch. Low



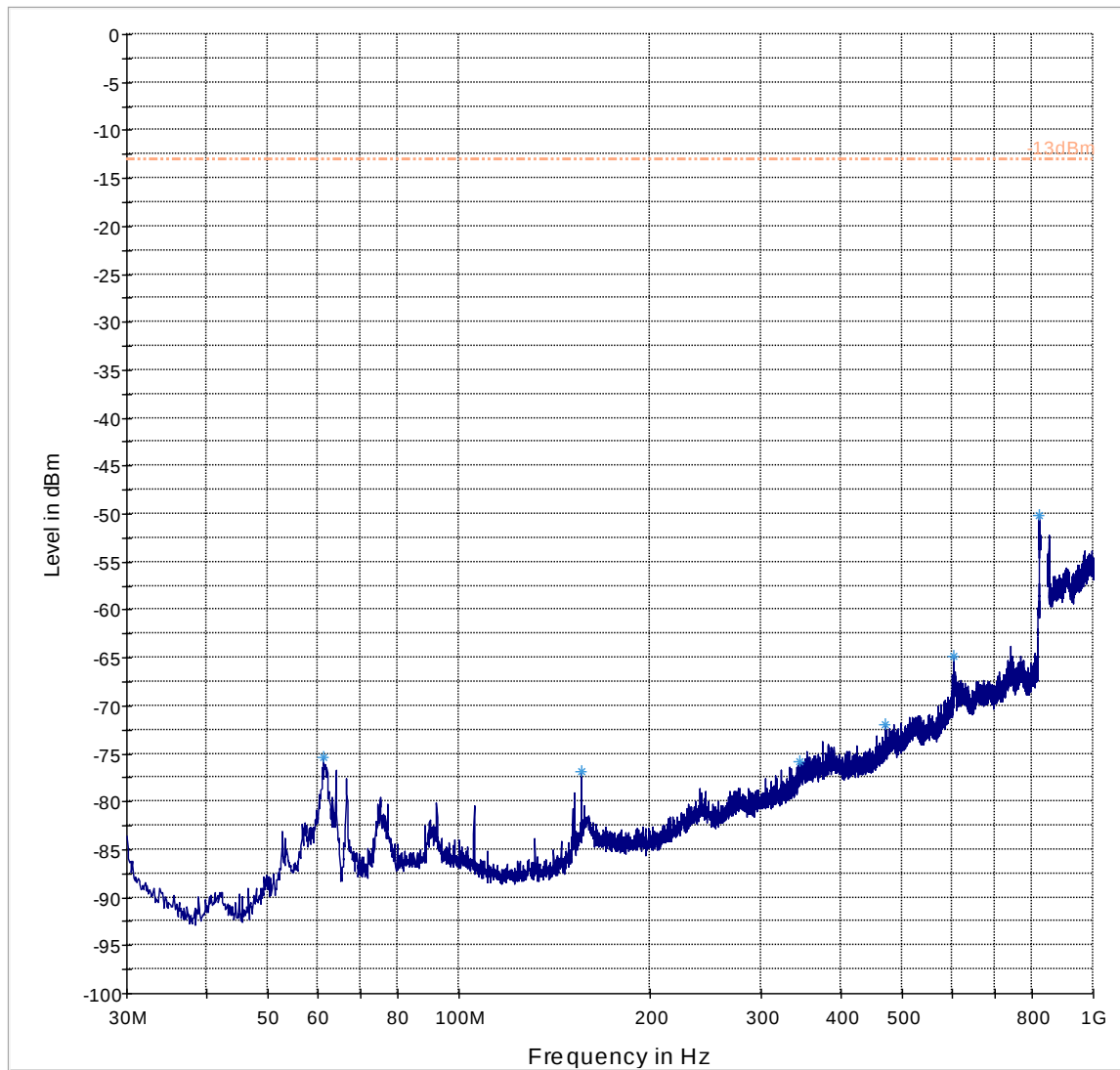
7.5.17 1 GHz – 9 GHz, UMTS FDD V, Tx: Ch. Low



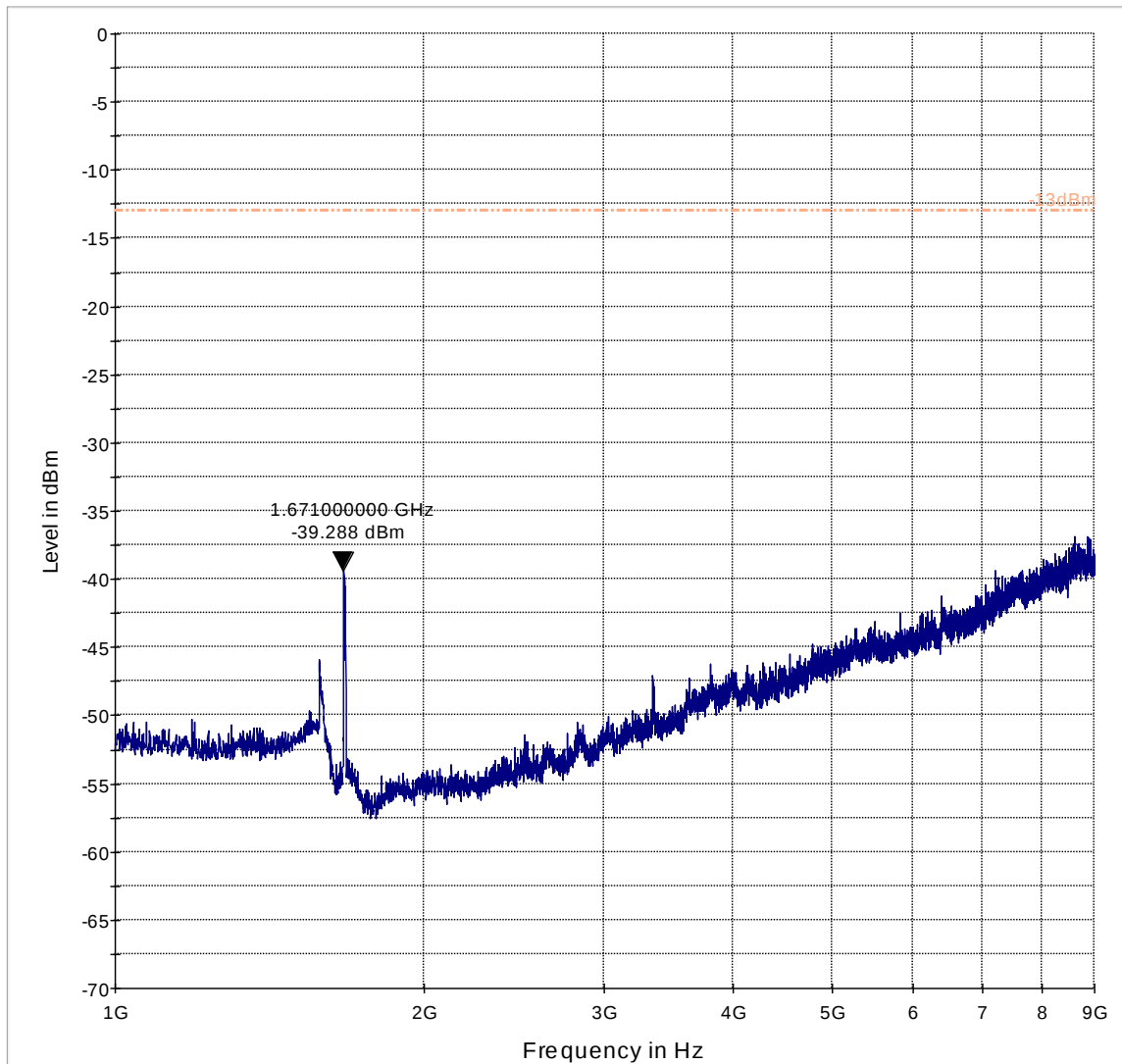
7.5.18 9 KHz – 30 MHz, UMTS FDD V, Tx: Ch. Mid



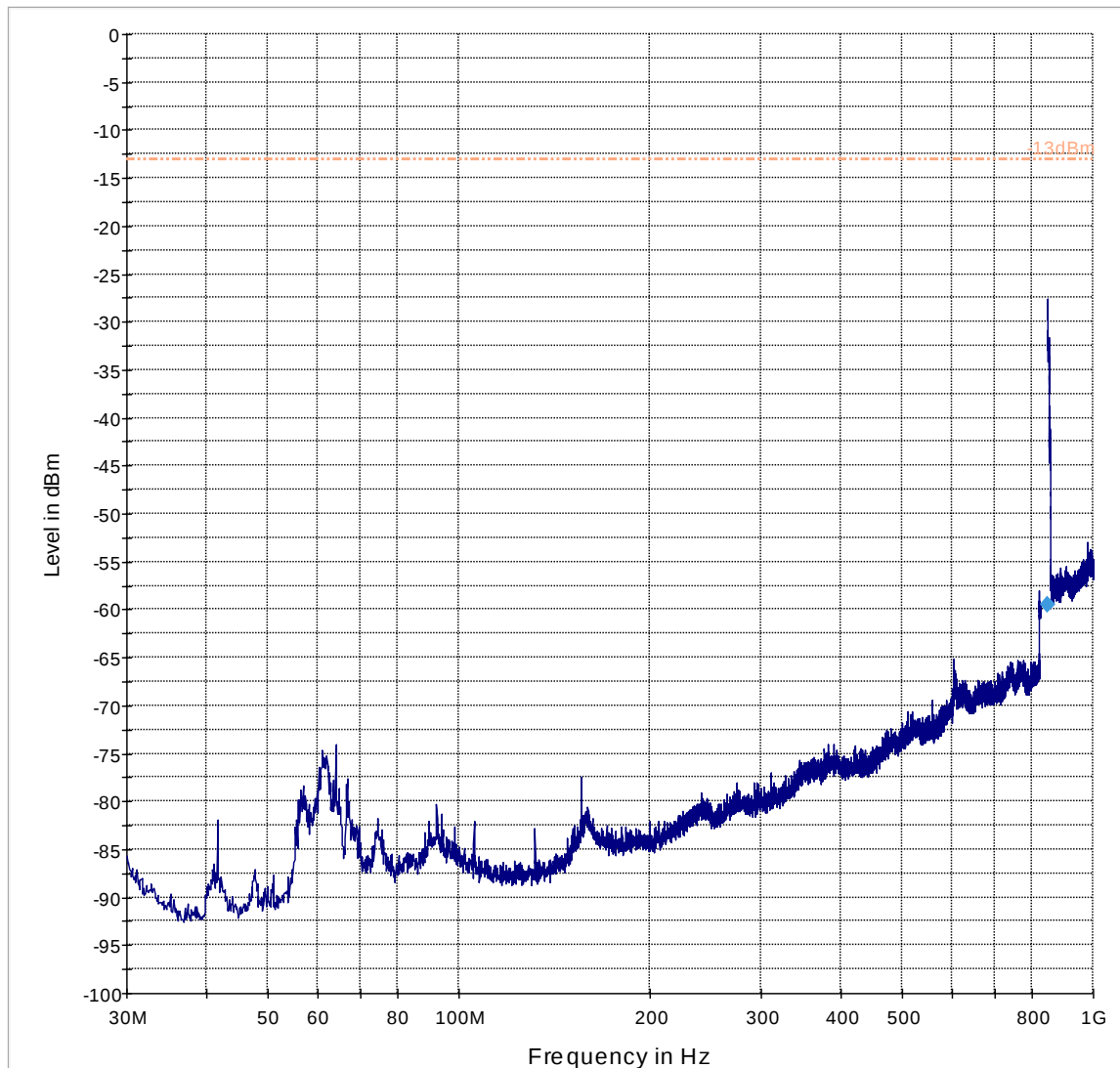
7.5.19 30 MHz – 1 GHz, UMTS FDD V, Tx: Ch. Mid



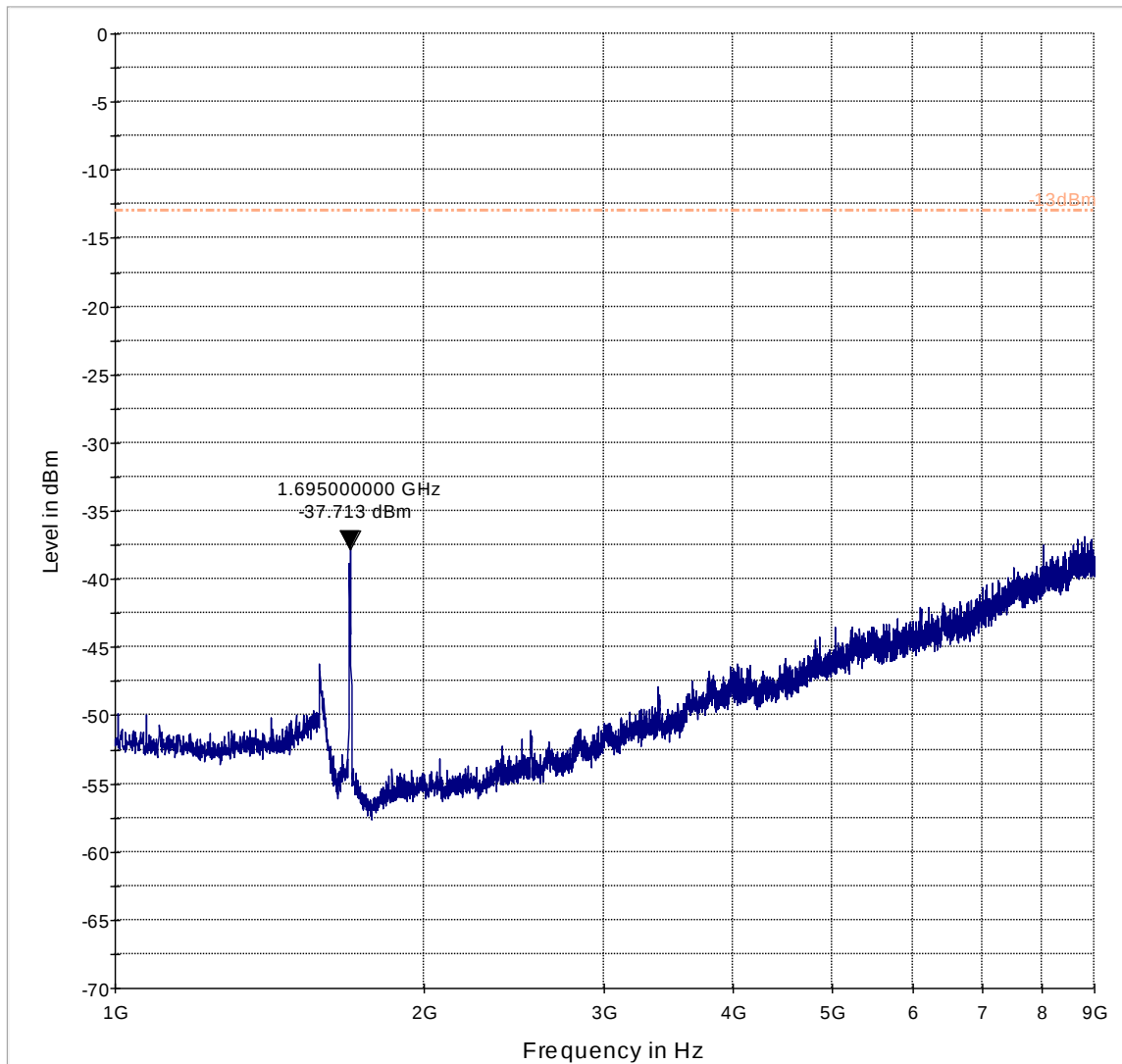
7.5.20 1 GHz – 9 GHz, UMTS FDD V, Tx: Ch. Mid



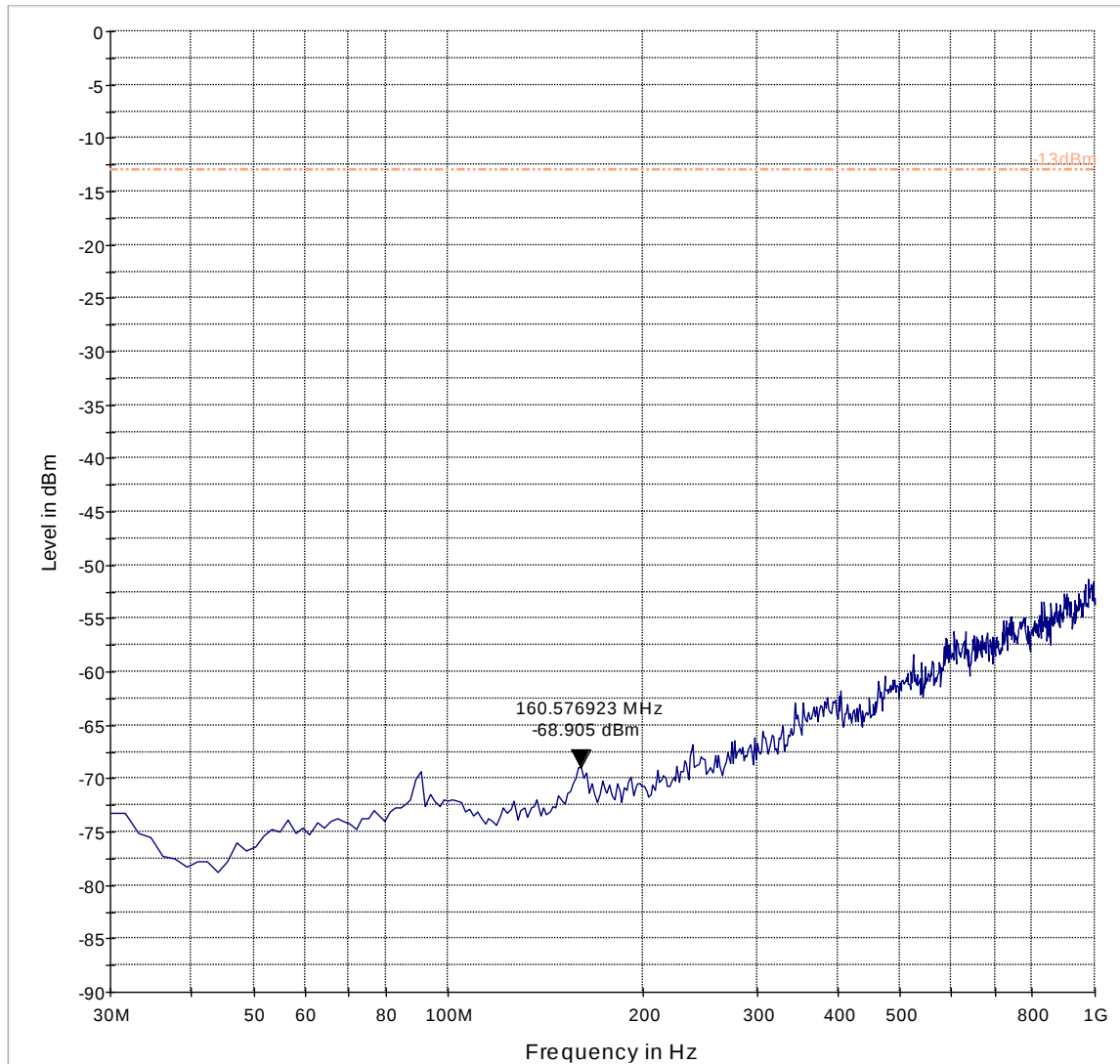
7.5.21 30 MHz – 1 GHz, UMTS FDD V, Tx: Ch. High



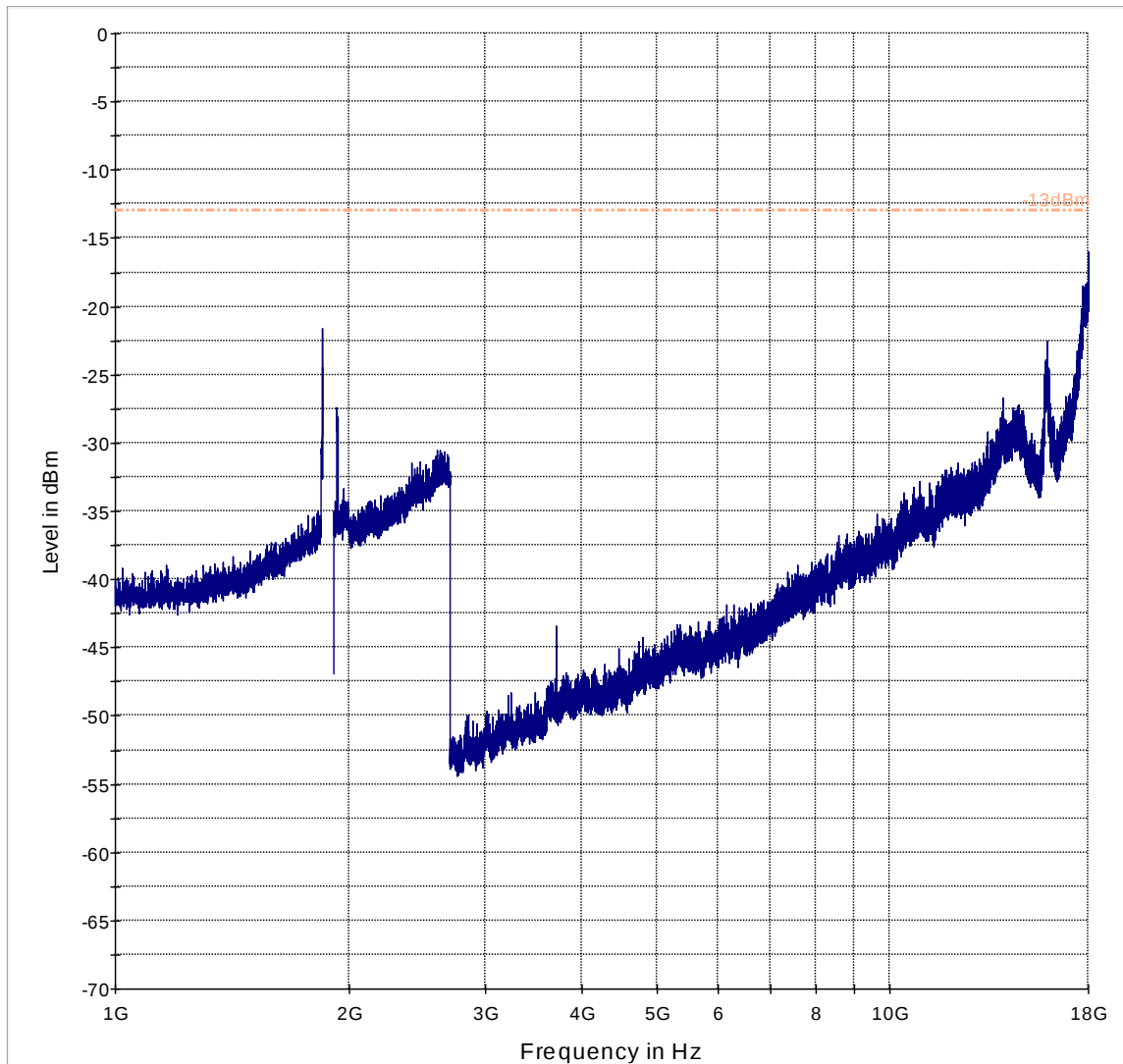
7.5.22 1 GHz – 9 GHz, UMTS FDD V, Tx: Ch. High



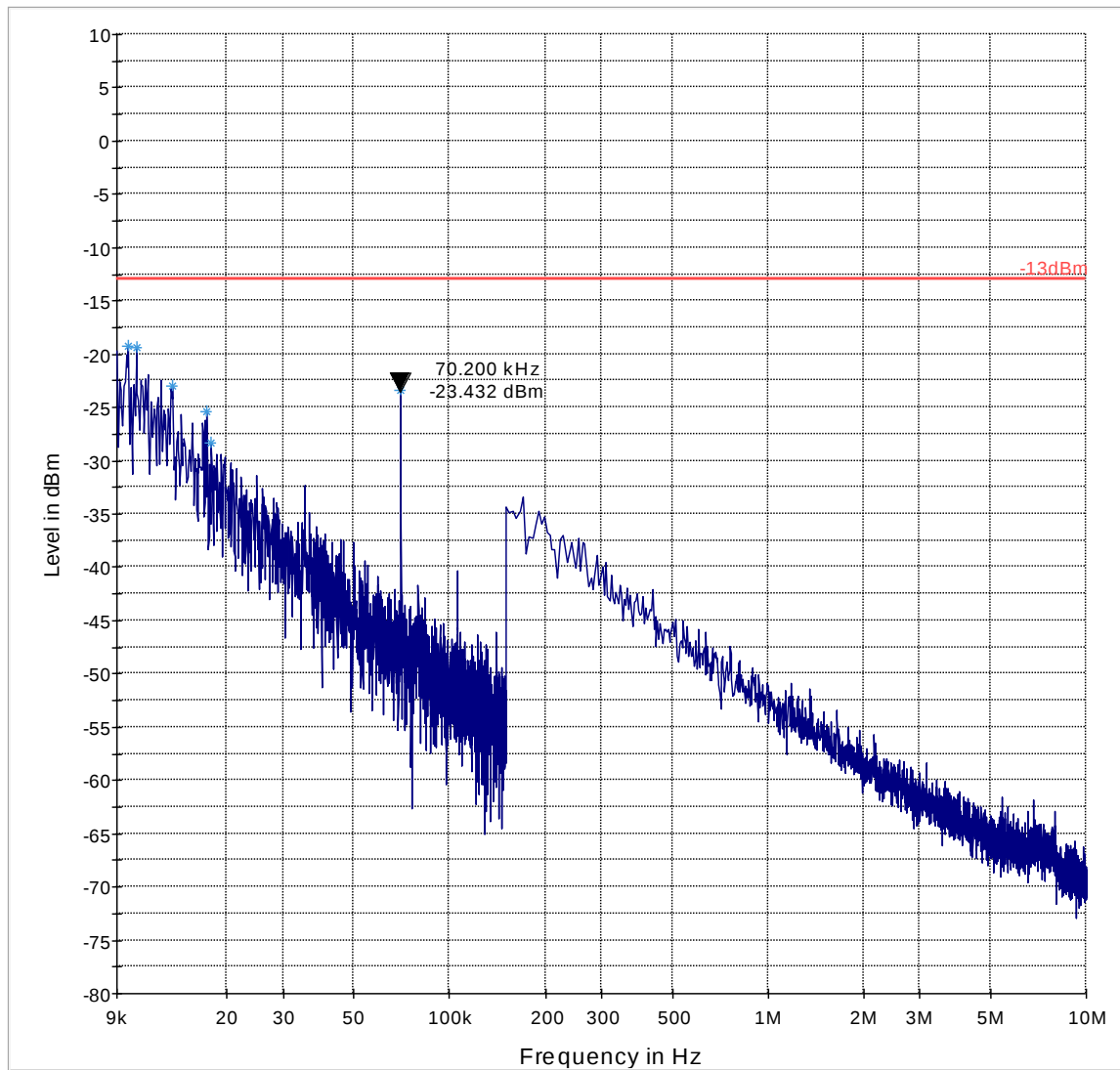
7.5.23 30 MHz – 1 GHz, UMTS FDD II, Tx: Ch. Low



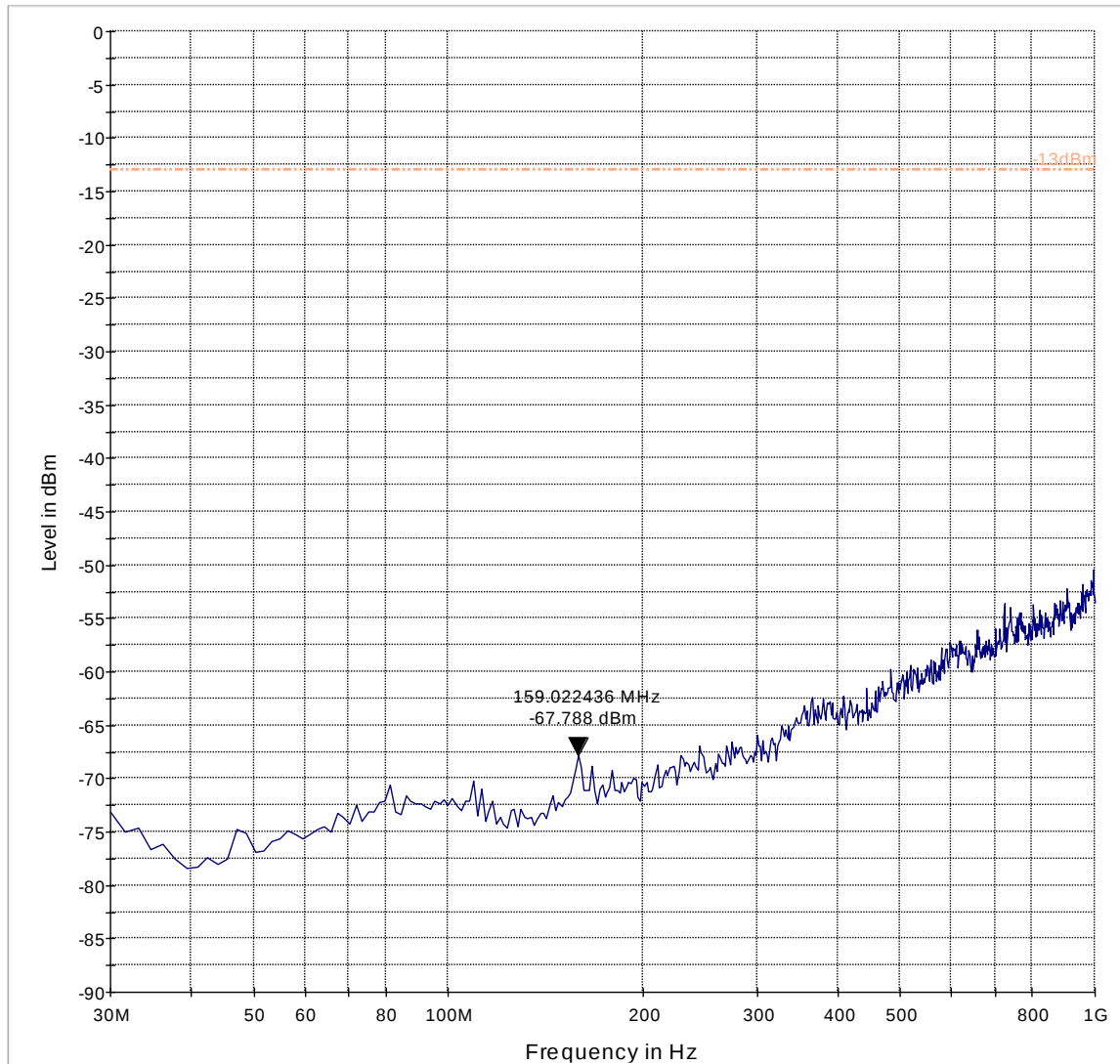
7.5.24 1 GHz – 18 GHz, UMTS FDD II, Tx: Ch. Low



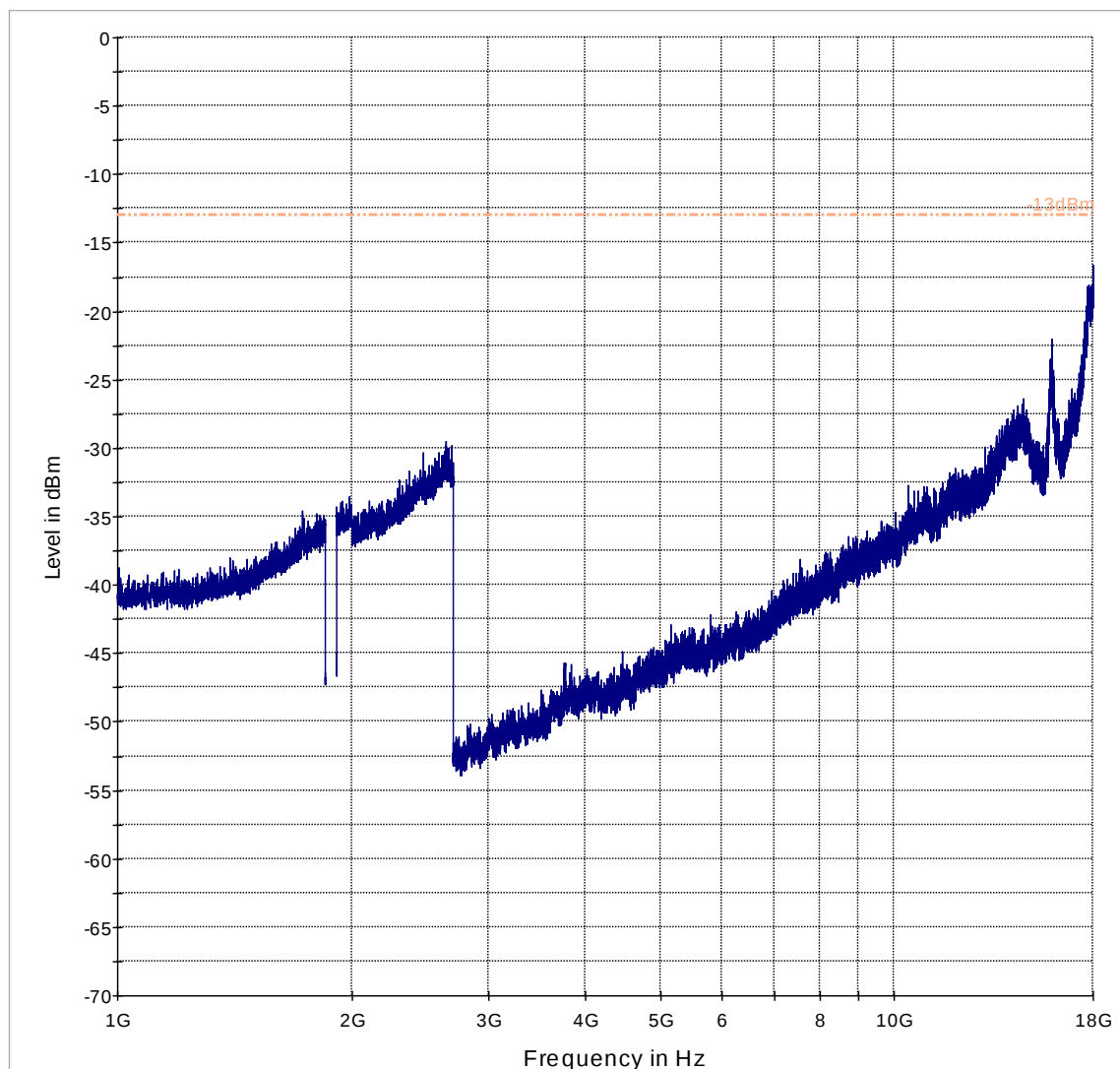
7.5.25 9 KHz – 30 MHz, UMTS FDD II, Tx: Ch. Mid



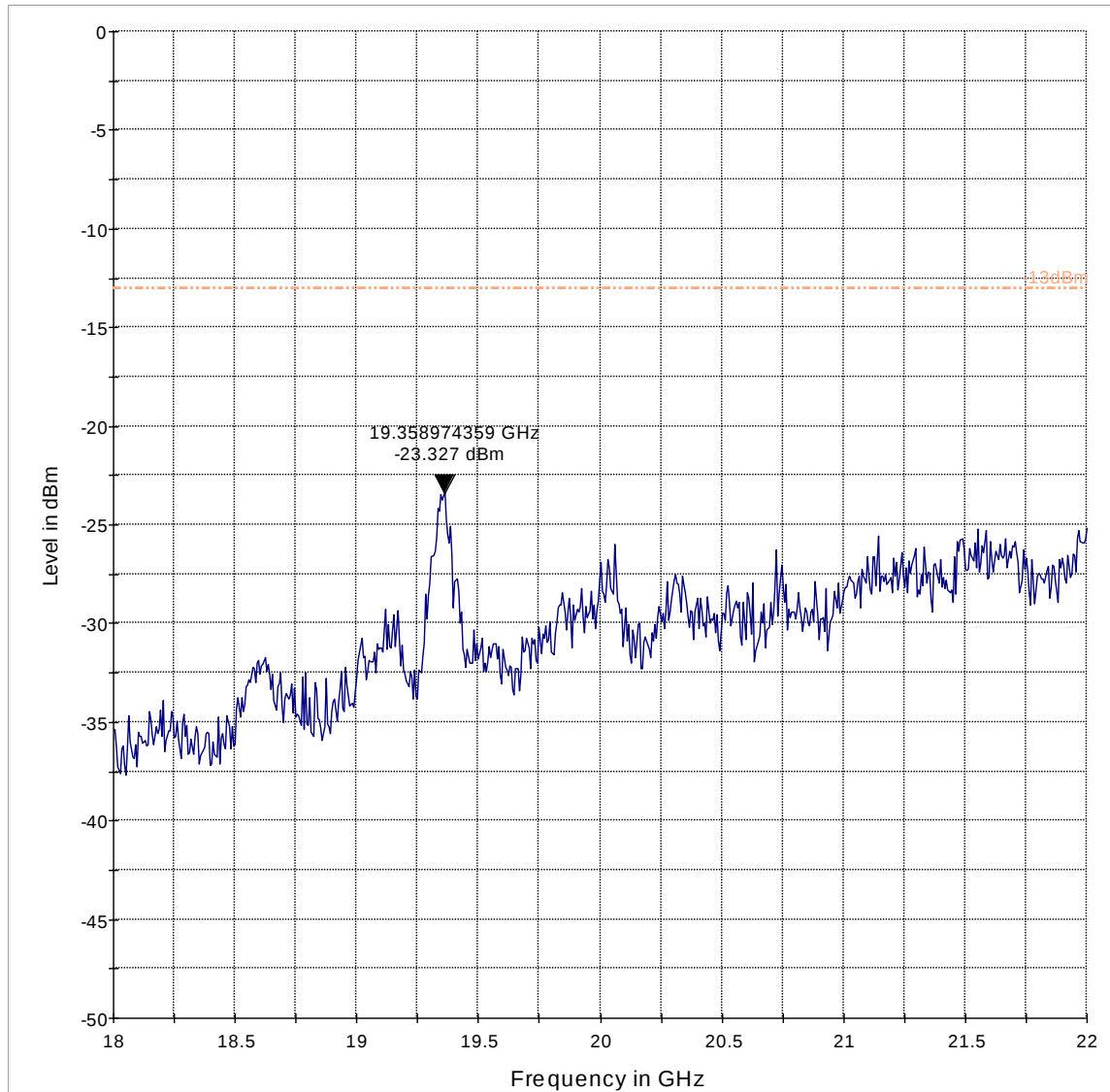
7.5.26 30 MHz – 1 GHz, UMTS FDD II, Tx: Ch. Mid



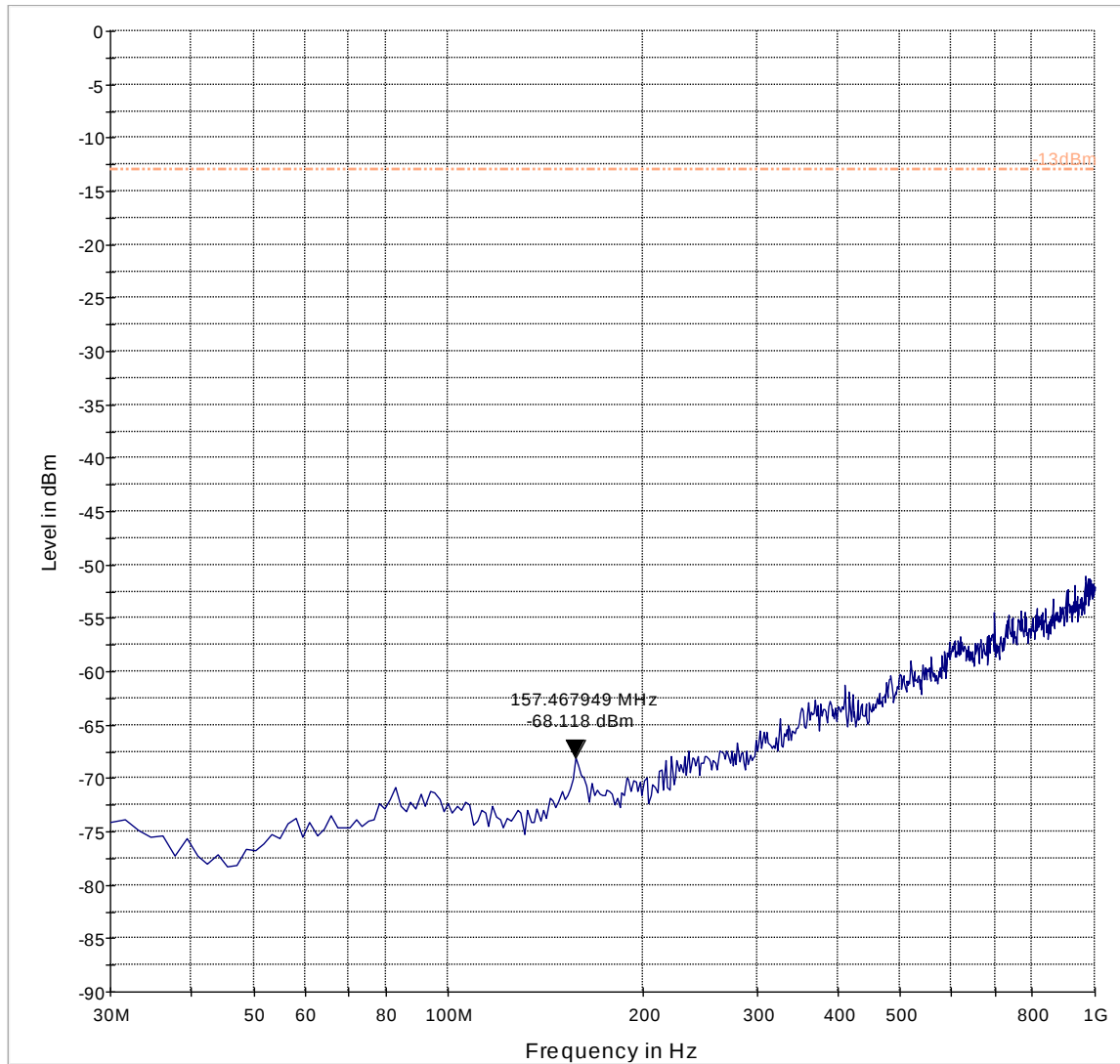
7.5.27 1 GHz – 18 GHz, UMTS FDD II, Tx: Ch. Mid



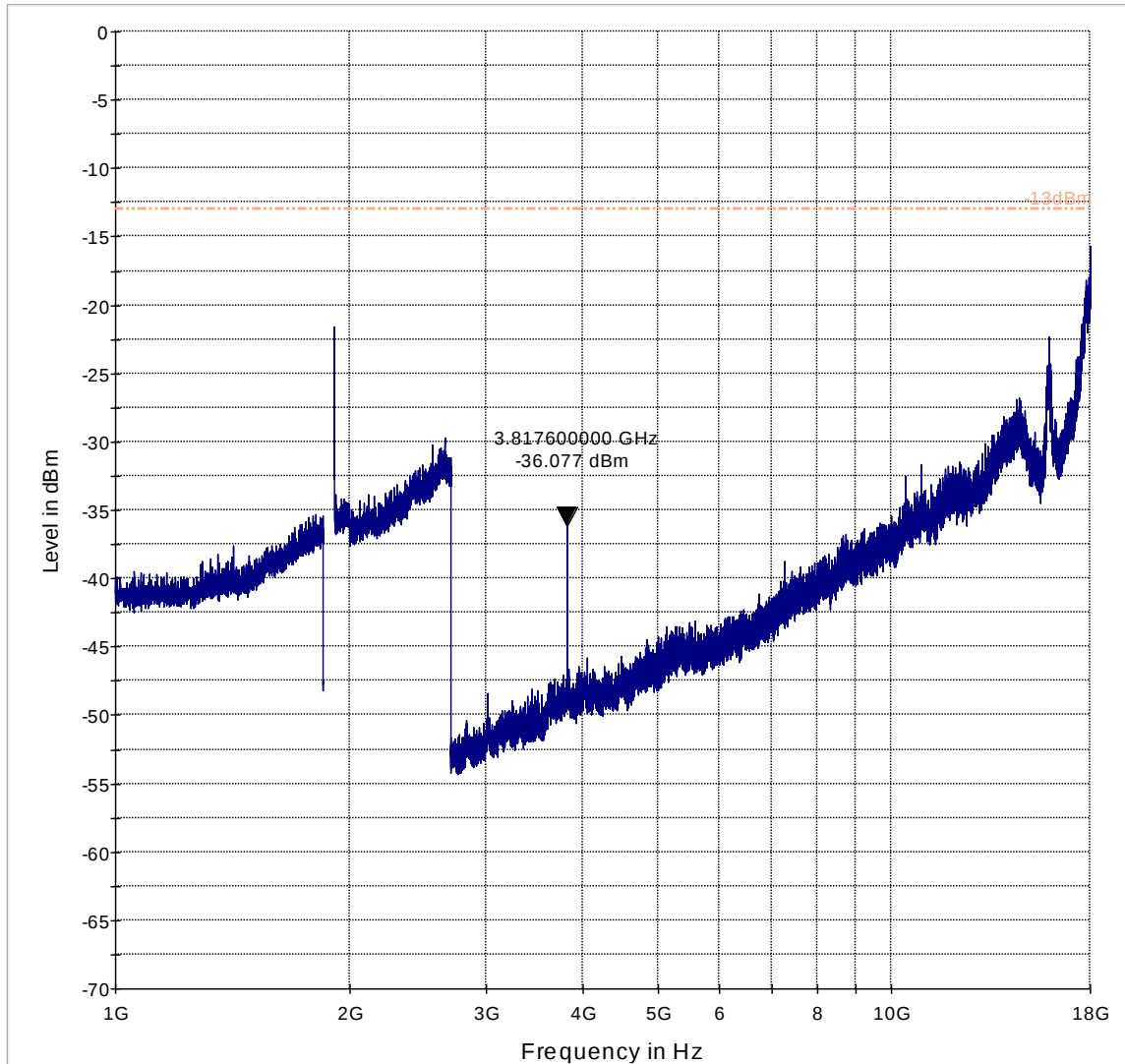
7.5.28 18 GHz -40 GHz, UMTS FDD II, Tx: Ch. Mid



7.5.29 30 MHz – 1 GHz, UMTS FDD II, Tx: Ch. High



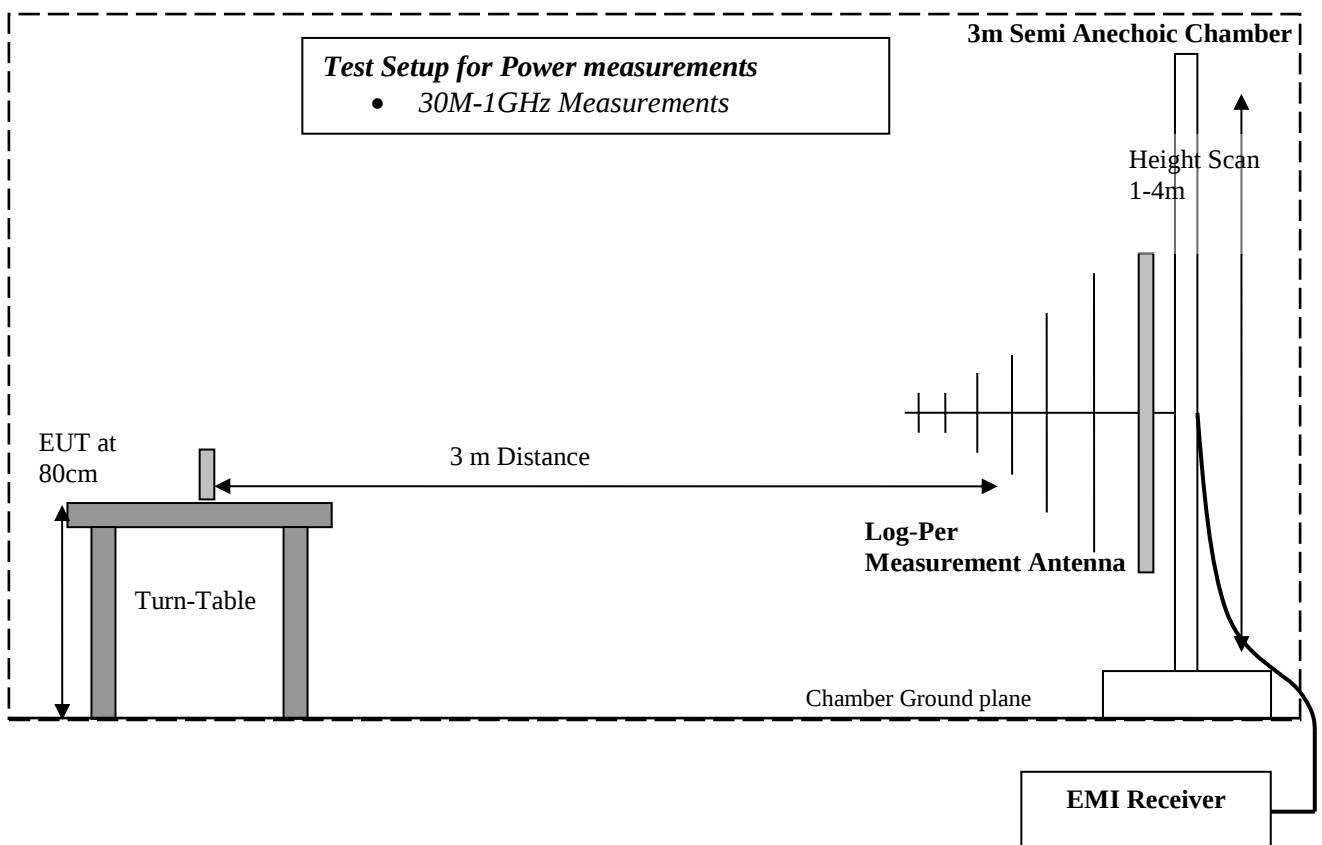
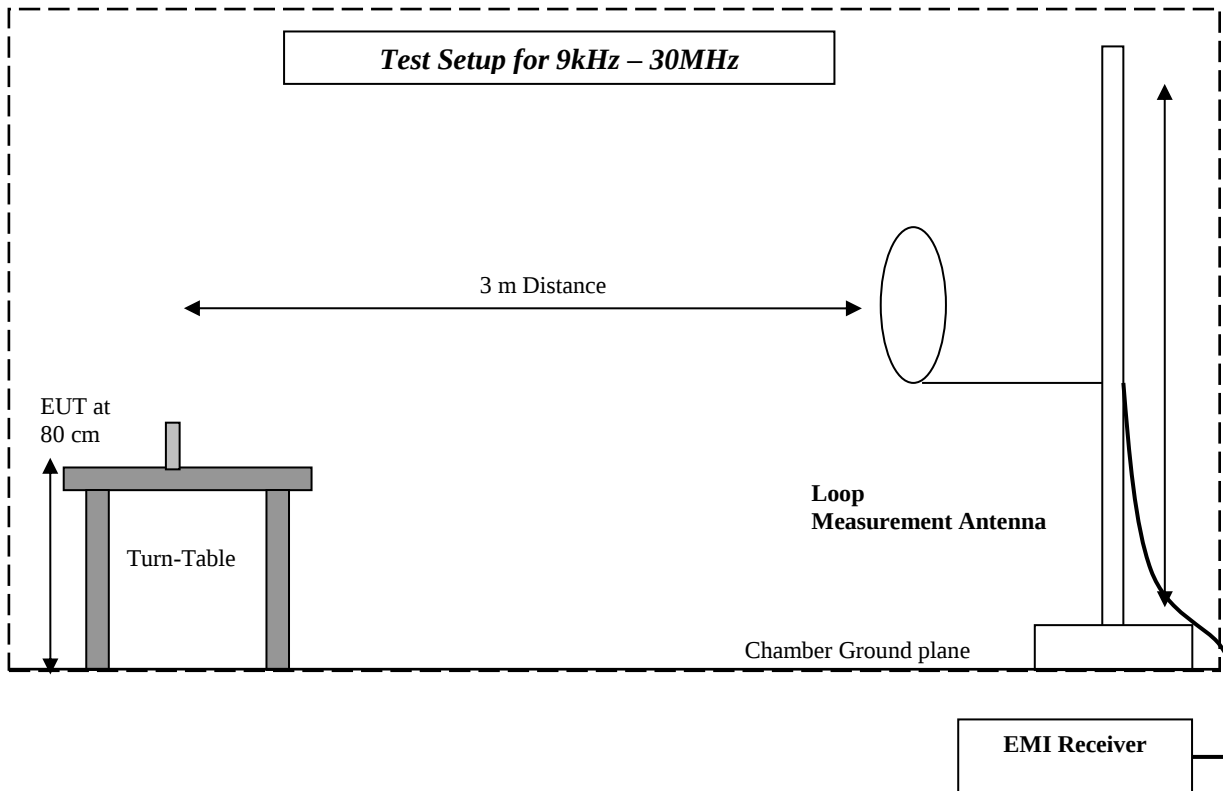
7.5.30 1 GHz – 18 GHz, UMTS FDD II, Tx: Ch. High

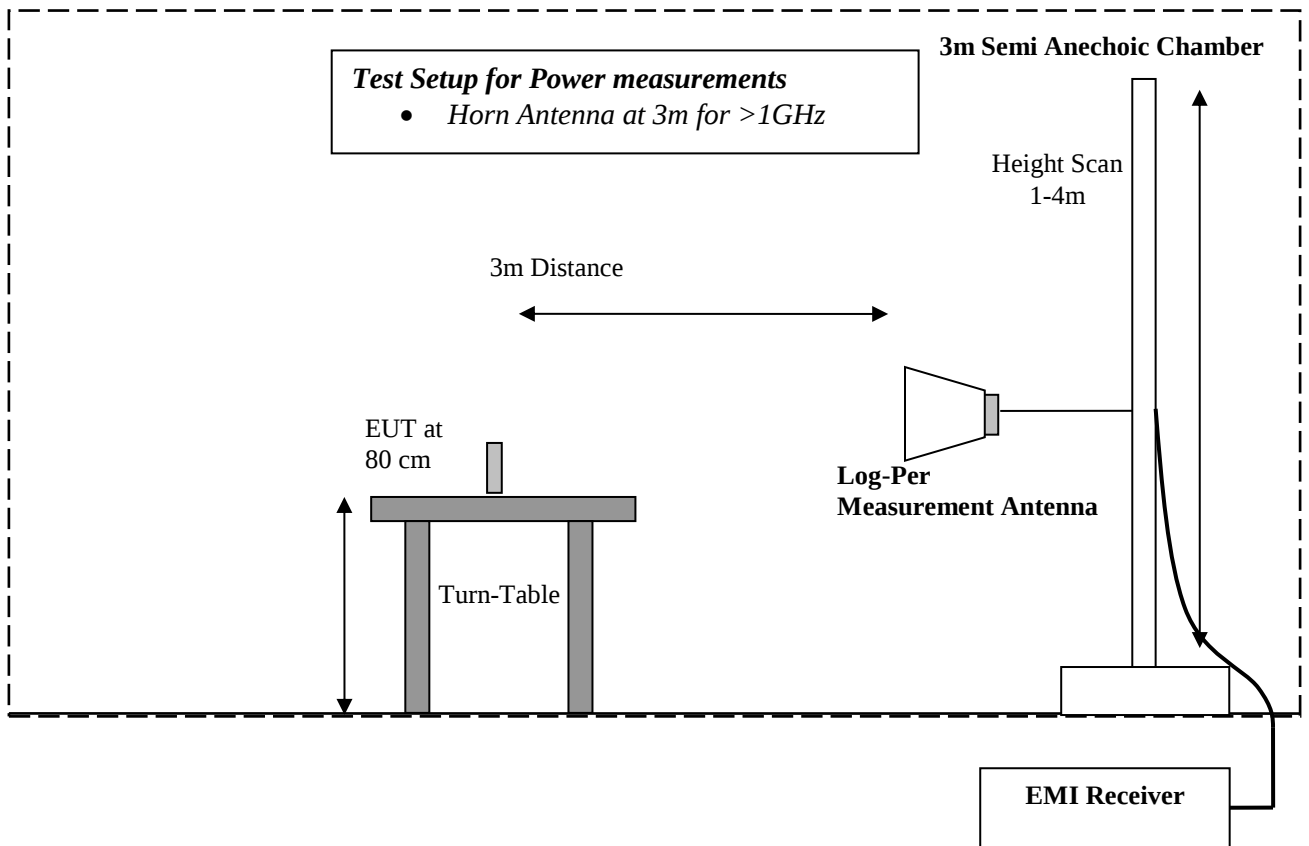


8 Test Equipment and Ancillaries used for tests.

No.	Equipment Name	Manufacturer	Type/model	Serial No.	Cal Date	Cal Interval
3m Semi- Anechoic Chamber:						
	Digital Radio Comm. Tester	Rohde&Schwarz	CMU 200	101821	July 2015	2 Years
	EMC32 Measurement Software	Rohde&Schwarz	8.52.0	N/A	N/A	N/A
	Turn table	EMCO	2075	N/A	N/A	N/A
	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
	Antenna Mast	EMCO	2075	N/A	N/A	N/A
	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
	EMI Receiver/Analyzer	Rohde&Schwarz	ESU 40	100251	Sep 2015	1 Year
	1500MHz HP Filter	Filtek	HP12/1700	14c48	N/A	N/A
	2800 MHz HP Filter	Filtek	HP12/2800	14C47	N/A	N/A
	Pre-Amplifier	Miteq	JS40010260	340125	N/A	N/A
	Binconilog Antenna	EMCO	3141	0005-1186	Apr 2015	3 Years
	Horn Antenna	EMCO	3115	35114	Mar 2015	3 Years
	Horn Antenna	ETS Lindgren	3116	70497	Mar 2015	3 Years
	Spectrum Analyzer	Rohde&Schwarz	FSU	100189	Jun 2015	2 Years
	Loop Antenna 6512	ETS Lindgren	6512	49838	Mar 2014	3 Years
Ancillary equipment						
	Humidity Temperature Logger	Dickson	TM320	03280063	Apr 2015	2 Year
	Communication Antenna	IBP5-900/1940	Kathrein	N/A	N/A	N/A

9 Block Diagrams





10 Revision History

Date	Report Name	Changes to Report	Report prepared by
2015-11-24	EMC_UTCFI-008-15001_FCC_22_24	First Version	Douglas Antioco