FCC/IC Partial Scope Test Report

FOR

Verizon Telematics

Model Number: AT-250

Product Description: GPS Navigation Device with 3G and Bluetooth

FCC ID: ZOQAT-250
IC Certification Number: 9734A-AT250

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

TEST REPORT #: EMC_VERIT-001-13001_AT_250_FCC22_24
DATE: 2014-03-20

FCC: Accredited

IC recognized # 3462B-1

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

Table of Contents

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 2, 22 and 24 & Industry Canada Radio Standard Specifications RSS-GEN Issue 3, RSS-132 Issue 3 and RSS-133 Issue 6.
No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Verizon Telematics	GPS Navigation Device with 3G and Bluetooth	AT-250

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2014-03-20	Compliance	Josie Sabado (Test Lab Manager)	Signing on behalf of Franz Engert (Compliance Manager)

Responsible for the Report:

Date	Section	Name	Signature
2014-03-20	Compliance	Kenneth Reyes (EMC Engineer)	Kenneth Reyes Digitally signed by Kenneth Reyes DN: cn=Kenneth Reyes, c=US, o=CETECOM, ou=Compliance, email=kenneth.reyes@cetecom.com Reason: I have reviewed this report and it is ready to go. Date: 2014.03.20 18:28:01 -07'00'

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

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Acting Lab Manager:	Franz Engert
Test Engineer:	Kenneth Reyes

2.2 Identification of the Client

Applicant's Name:	Verizon Telematics, Inc.
Street Address:	2002 Summit Blvd., Suite 1800
City/Zip Code	Atlanta, GA / 30319
Country	USA
Contact Person:	Bryant Elliot
Phone No.	404-573-5848
Fax:	---
e-mail:	Bryant.elliot@verizon.com

2.3 Identification of the Manufacturer

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

2.4 Dates of Testing:

1/20/2014 – 1/21/2014

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Model Name:	AT-250
Product Description:	GPS Navigation Device with 3G and Bluetooth
Hardware Revision :	A0
Software Revision :	1.0.0
FCC-ID:	ZOQAT-250
IC Certification Number:	9734A-AT250
Integrated Module Information:	GPRS/EDGE data radio: Sierra Wireless SL8080 FCC ID: N7NSL8080; IC Certification Number: 2417C-SL8080
Frequency bands of test:	GSM 850, GSM 1900 WCDMA FDD Band II, WCDMA FDD Band V
Type(s) of Modulation:	GPRS, EGPRS: GMSK; WCDMA: QPSK
Number of channels:	GSM850: 125 and PCS 1900: 300 FDD II: 278/ FDD V: 103
Antenna Info:	Antenna Max (Peak) Gain = -1.6 dBi at 850 MHz Antenna Max (Peak) Gain = +1.0 dBi at 1900 MHz
Rated Operating Voltage Range: (VDC)	+6 to +24Vdc
Rated Operating Temperature Range:	-40ºC to +85ºC
Other Radios included:	1. Class 2 Bluetooth Radio; 2. GPS Receiver;
Test Sample Status	Prototype

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	Sample	HW/SW Version
1	352083060000007	Radiated	A0/1.0.0
2	352083060000148	Conducted	A0/1.0.0

3.3 Identification of Accessory equipment

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

4 Summary of Measurement Results

GSM 850/UMTS FDD V:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS132 5.4	RF Output Power	Nominal	GSM 850	■	☐	☐	☐	Complies
			UMTS FDD V	■	☐	☐	☐	Complies
§2.1055 §22.355 RSS132 5.3	Frequency Stability	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS FDD V	☐	☐	☐	■	Note 1
§2.1049 §22.917(b) RSS132 5.2	Occupied Bandwidth	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS FDD V	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS132 5.5	Band Edge Compliance	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS FDD V	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS132 5.5	Conducted Spurious Emissions	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS FDD V	☐	☐	☐	■	Note 1
§2.1053 §22.917 RSS132 5.5	Radiated Spurious Emissions	Nominal	GSM 850	■	☐	☐	☐	Complies
			UMTS FDD V	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.
Note 1: Leveraged from module certification. See Section 5.4.

GSM 1900/UMTS FDD II

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS132 5.4	RF Output Power	Nominal	GSM 1900	■	☐	☐	☐	Complies
			UMTS FDD II	■	☐	☐	☐	Complies
§2.1055 §22.355 RSS132 5.3	Frequency Stability	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS FDD II	☐	☐	☐	■	Note 1
§2.1049 §22.917(b) RSS132 5.2	Occupied Bandwidth	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS FDD II	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS132 5.5	Band Edge Compliance	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS FDD II	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS132 5.5	Conducted Spurious Emissions	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS FDD II	☐	☐	☐	■	Note 1
§2.1053 §22.917 RSS132 5.5	Radiated Spurious Emissions	Nominal	GSM 1900	■	☐	☐	☐	Complies
			UMTS FDD II	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.
Note 1: Leveraged from module certification. See Section 5.4.

5 Measurements

5.1 Nominal Environmental Test Conditions

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

5.2 Default Test Temperature and Voltage

- Test Temperature: 20°C (nominal);
- Test Voltage: 12.0VDC(nominal);

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

5.3 Measurement Uncertainty

- for conducted power and emission measurements: +/- 0.5dB;
- for radiated power and emission measurements: +/- 3.0 dB;

Where relevant deviating measurement uncertainty values are specified at individual tests.

5.4 Inheriting Test Results from Incorporated Module Certification:

The EUT integrates a pre-certified module Sierra Wireless SL8080
with FCC ID: N7NSL8080; IC Certification Number: 2417C-SL8080

Taking into account guidance from FCC KDB 996369 (modular approval) and where relevant test procedures did not change conducted test results are leveraged from the conducted test report for the SL8080 modem given by Sierra Wireless dated July 21, 2010 with FCC ID: N7NSL8080; IC Certification Number: 2417C-SL8080.

This test report contains full radiated testing as per FCC 22H/24E and RSS-132/133 and conducted power verification required per KDB 996369.

5.5 Other Testing Notes:

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 Measurement Method:

Testing is performed according to the guidelines provided in *FCC publication (KDB) 971168 D01 Power Meas License Digital Systems v02r01: Measurement Guidance for Certification of Licensed Digital Transmitters7, June 2013* and according to relevant parts of TIA-603C 2004 as detailed below.

5.7 RF Power Output

5.7.1 References

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232, CFR Part 27.50
IC: RSS-Gen Section 4.8; RSS-132 Section 5.4; RSS-133 Section 6.4, RSS-139 Section 6.4

5.7.2 Limits:

5.7.2.1 FCC 22.913 (a) Effective radiated power limits.

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

5.7.2.2 FCC 24.232 (b)(c) Power limits.

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

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. 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 (d)(6) of this section. 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.

(6) 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.

5.7.2.3 RSS-132, Issue 3, cl. 5.4

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.
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.

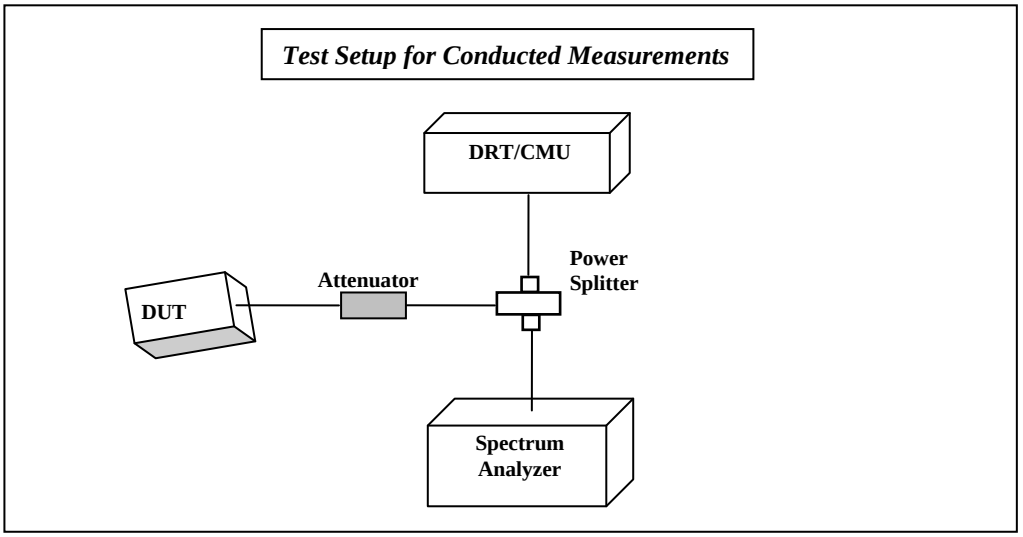
5.7.2.4 RSS-133, Issue 6, cl. 4.1 and 6.4

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

5.7.3 Conducted Output Power Measurement

5.7.3.1 Measurement Procedure:

Ref: TIA-603C 2004 2.2.1

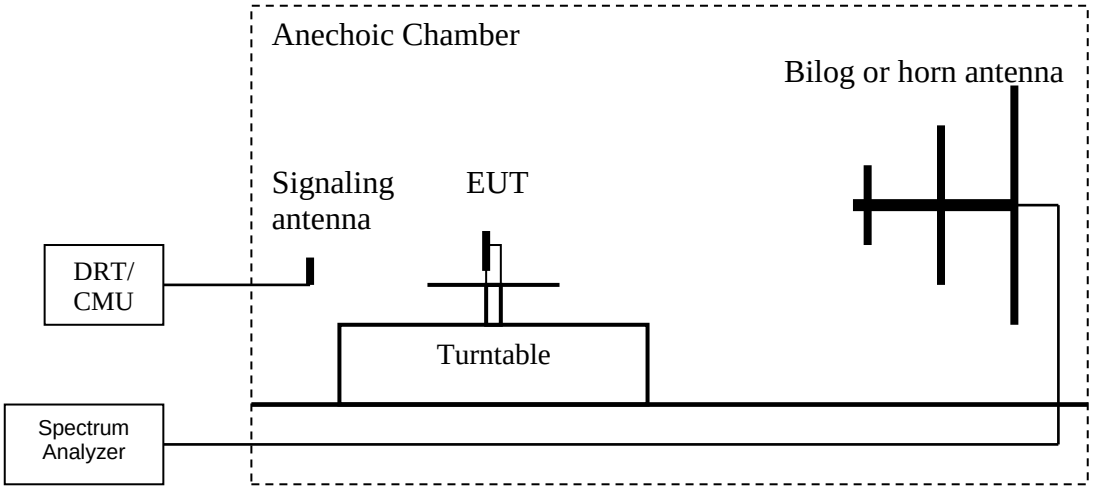


1. Connect the equipment as shown in the above diagram. A Digital Radio Communication Tester (DRT: R&S CMU200 here) is used to enable the EUT to transmit and to measure the output power.
2. Adjust the settings of the CMU200 to set the EUT to its maximum power at the required channel.
3. Record the Peak and Average Output power level measured by the CMU200.
4. Correct the measured level for all losses in the RF path.
5. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band and for all types of modulation schemes.
    a. GMSK mode measurements are performed in GSM 1 uplink slot configuration.
    b. UMTS mode measurements are performed in RMC 12.2K configuration
    c. CDMA mode measurements performed in 1xRTT and EVDO- Rel A configurations.

5.7.4 Radiated Output Power Measurement

5.7.4.1 Radiated Output Power Measurement Procedure

Ref: TIA-603C 2004 -2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



1. Connect the equipment as shown in the above diagram with the EUT's antenna in center of the turn table.
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 the channel frequency and to required settings: peak detector, max hold trace, RBW>OBW, VBW>3xRBW, sweeptime auto couple, span > 2x RBW.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically 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 ERP using the following equation: **ERP** (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation: **EIRP** (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
10. Radiated emission measurements were made in GMSK and UMTS and modes.

Note: Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.

5.7.4.2 Spectrum Analyzer Settings:

	ERP	EIRP
Resolution Bandwidth	5 MHz	5 MHz
Video Bandwidth	5 MHz	5 MHz
Detector	Peak	Peak
Trace Mode	Max Hold	Max Hold
Sweep Time	Auto	Auto

5.7.4.3 Measurement Results:

RF output power values given in dBm if not indicated otherwise.

Frequency (MHz)	Measured Peak Output Power from module's test report	Conducted Peak Output Power (*)	Conducted Average Output Power (*)	Peak ERP / EIRP	PAR Calculated
850 GMSK					
824.2	31.06	31.9	31.7	**30.69 / 32.84**	0.2
836.6	32.20	32.2	32	**30.61 / 32.76**	0.2
848.8	32.41	32.3	32.1	**29.06 / 31.21**	0.2
850 8PSK					
824.2	29.27	29.2	26	**28.40 / 30.55**	3.2
836.6	29.38	29.6	26.4	**27.28 / 29.43**	3.2
848.8	29.60	29.7	26.5	**26.46 / 28.61**	3.2
FDD V					
826.4	25.64	25.25	22.11	**20.59 / 22.74**	3.14
836.6	25.7	25.01	21.82	**20.73 / 22.88**	3.19
846.6	25.64	25.49	22.33	**20.73 / 22.88**	3.16
1900 GMSK					
1850.2	29.20	28.6	28.5	**26.88**	0.1
1880	29.09	28.7	28.6	**27.40**	0.1
1909.8	29.19	28.9	28.7	**27.68**	0.2
1900 8PSK					
1850.2	28.41	27.9	24.8	**26.04**	3.1
1880	28.28	28.1	24.9	**27.31**	3.2
1909.8	28.32	28.2	25	**27.54**	3.2
FDD II					
1852.4	26.40	24.83	21.32	**21.85**	3.51
1880	26.20	24.98	21.52	**23.16**	3.46
1907.6	26.03	24.91	21.34	**23.23**	3.57

(*) The EUT was directly connected to the CMU with a cable with the following cable losses:

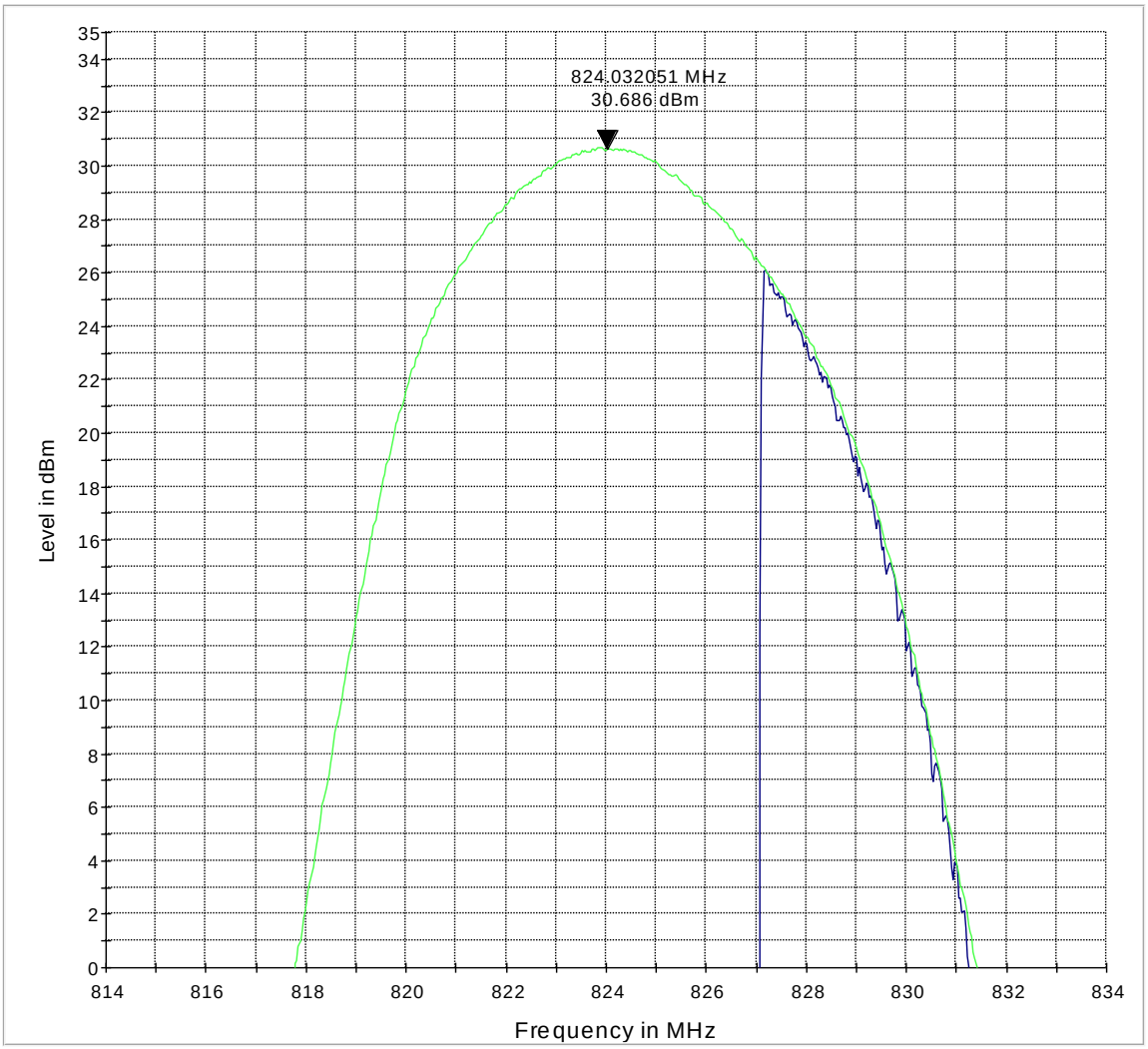
Frequency (MHz)	Cable Losses (dB)
850 GMSK	
824.2	0.59
836.6	0.53
848.8	0.45
1900 GMSK	
1850.2	0.25
1880	0.22
1909.8	0.20

5.7.4.4 Verification Result

All measured results remain within the manufacturing tolerance as taken from the 3G module manufacturer's specification. All radiated values within ERP / EIRP limits

5.7.4.5 ERP/EIRP Plots:

ERP (GSM – GMSK) CHANNEL 128



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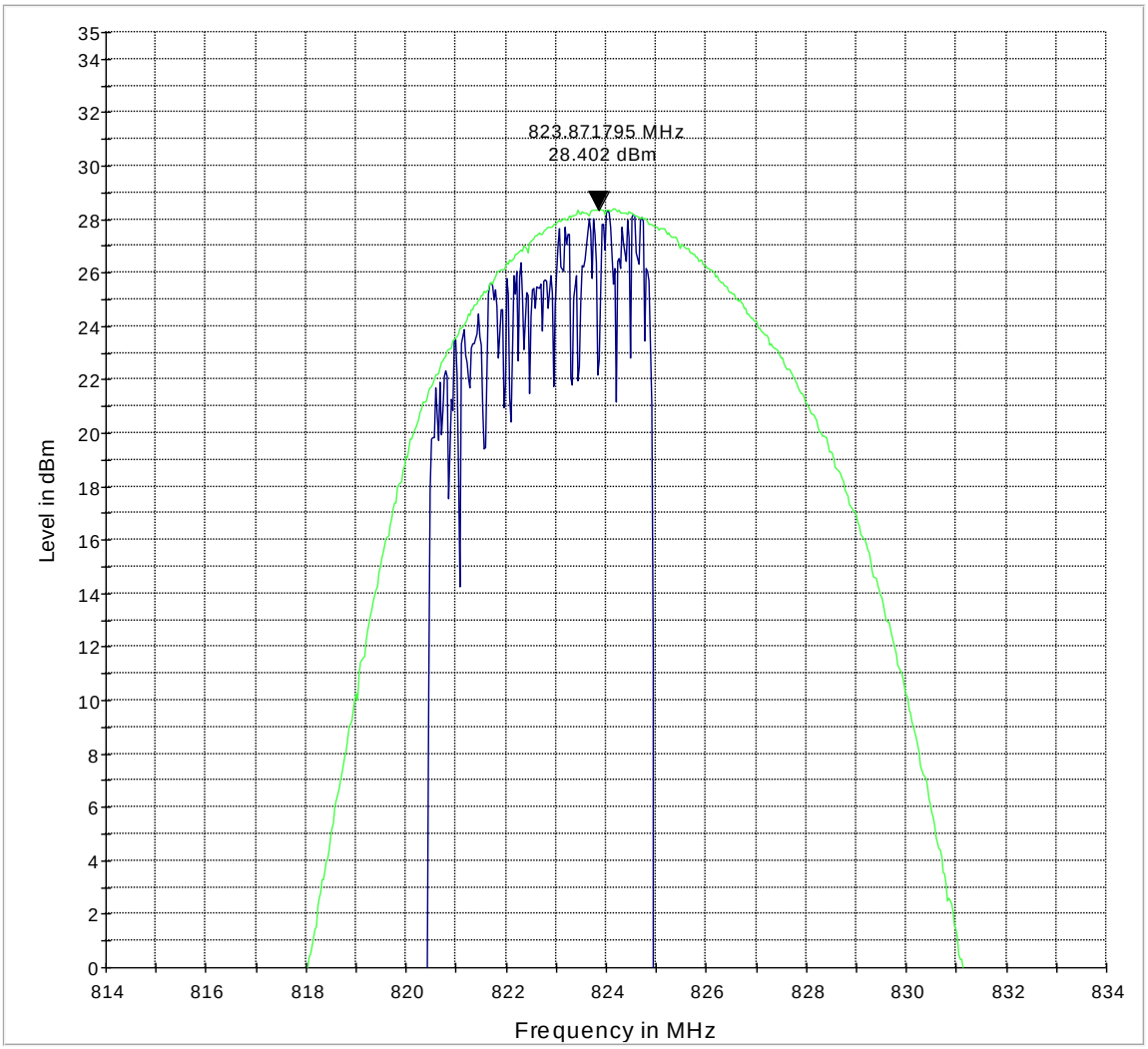
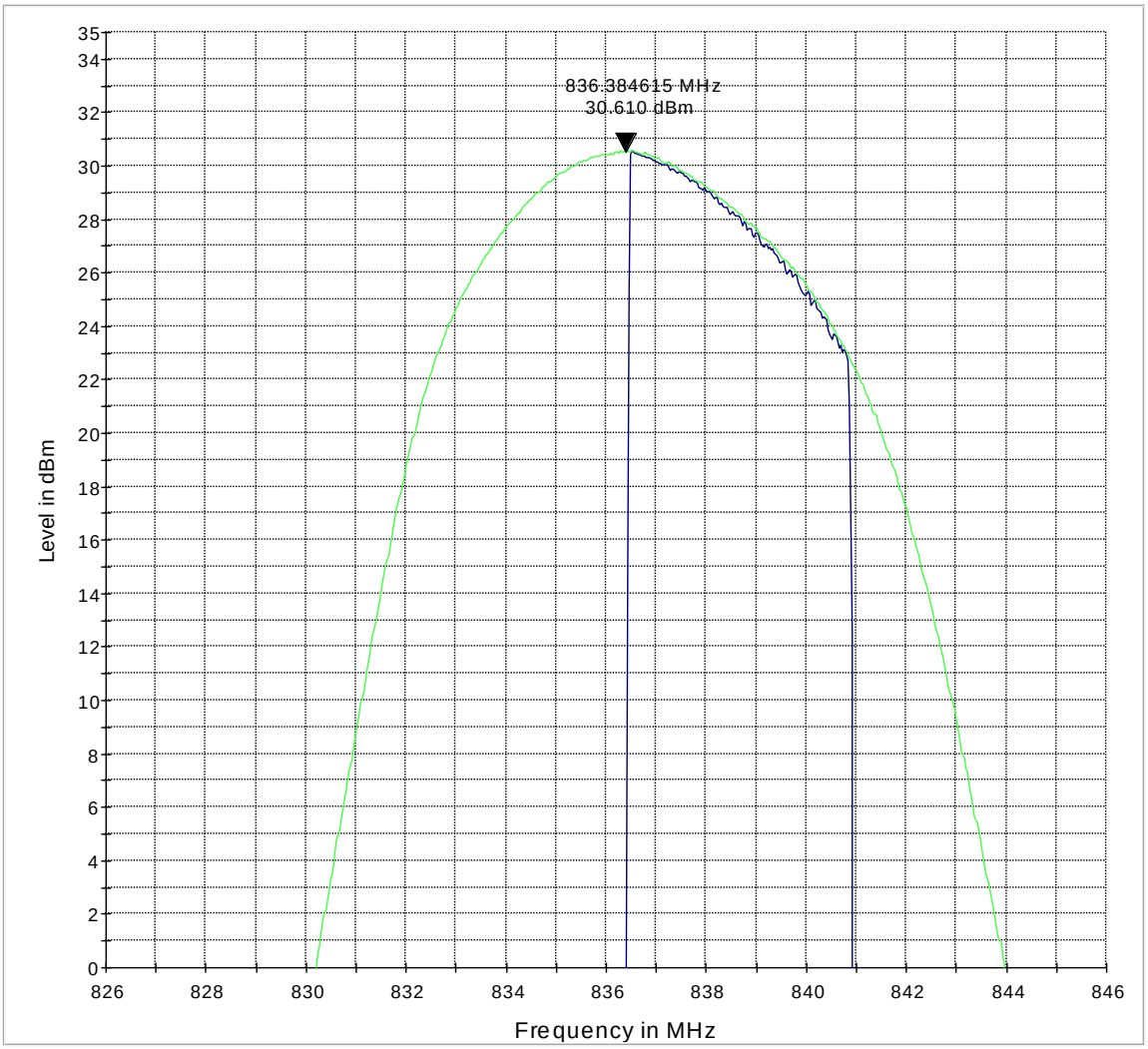
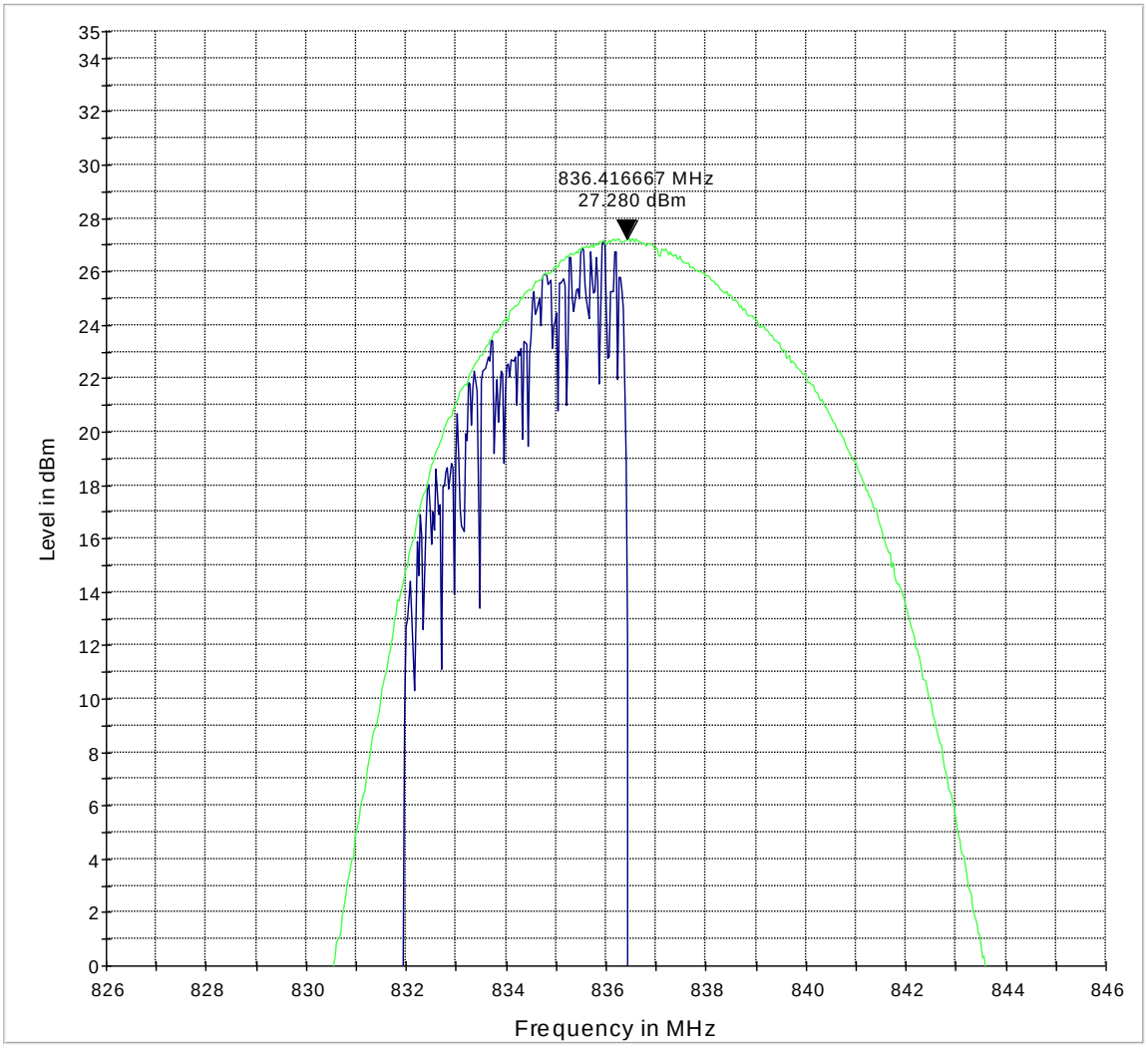


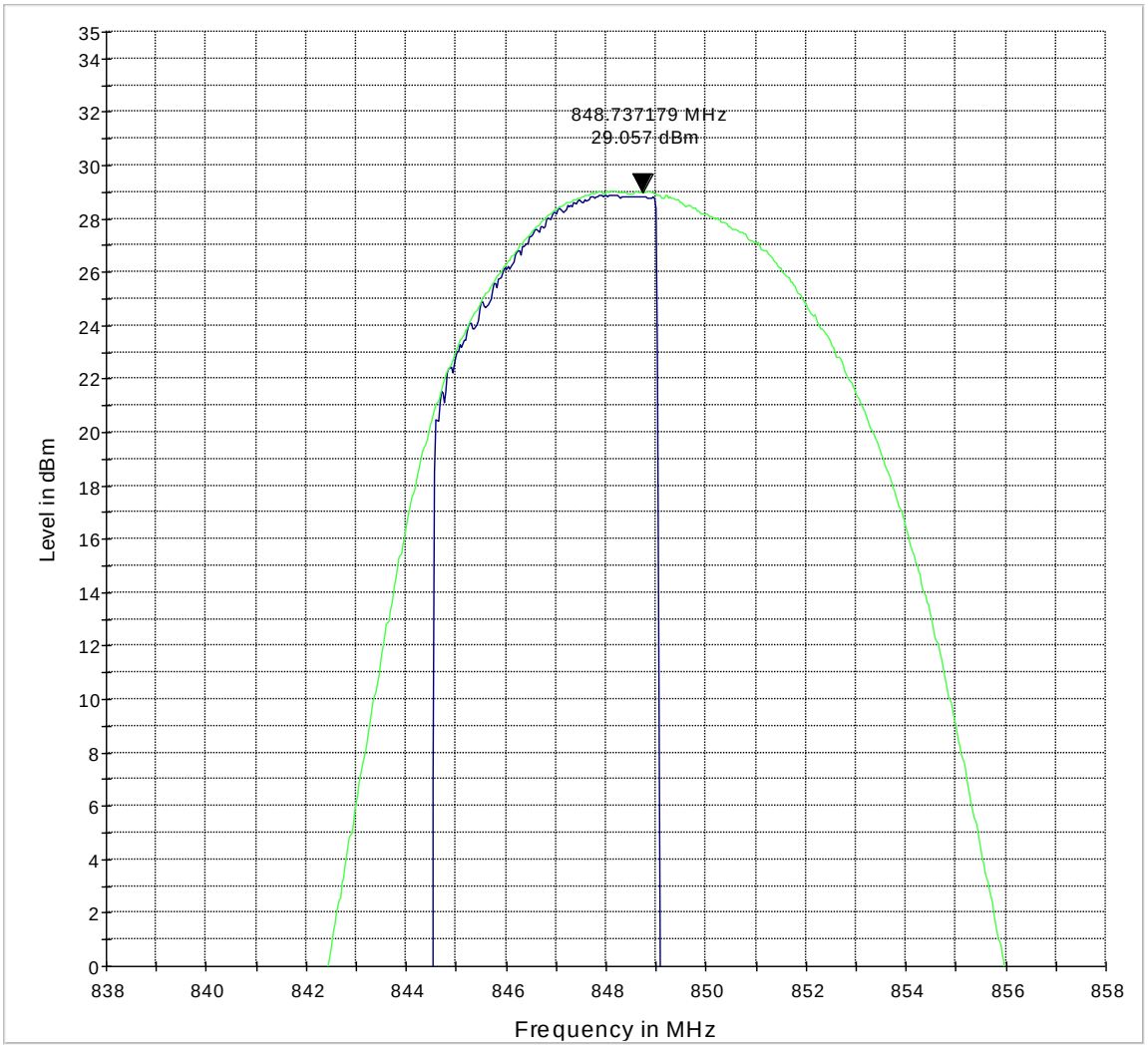
ERP (GSM – GMSK) CHANNEL 190


836.384615 MHz
30.610 dBm
Level in dBm
Frequency in MHz
MaxPeak-ClearWrite-PK+
MaxPeak-MaxHold-PK+

ERP (GSM – EGPRS/8PSK) CHANNEL 190



ERP (GSM – GMSK) CHANNEL 251



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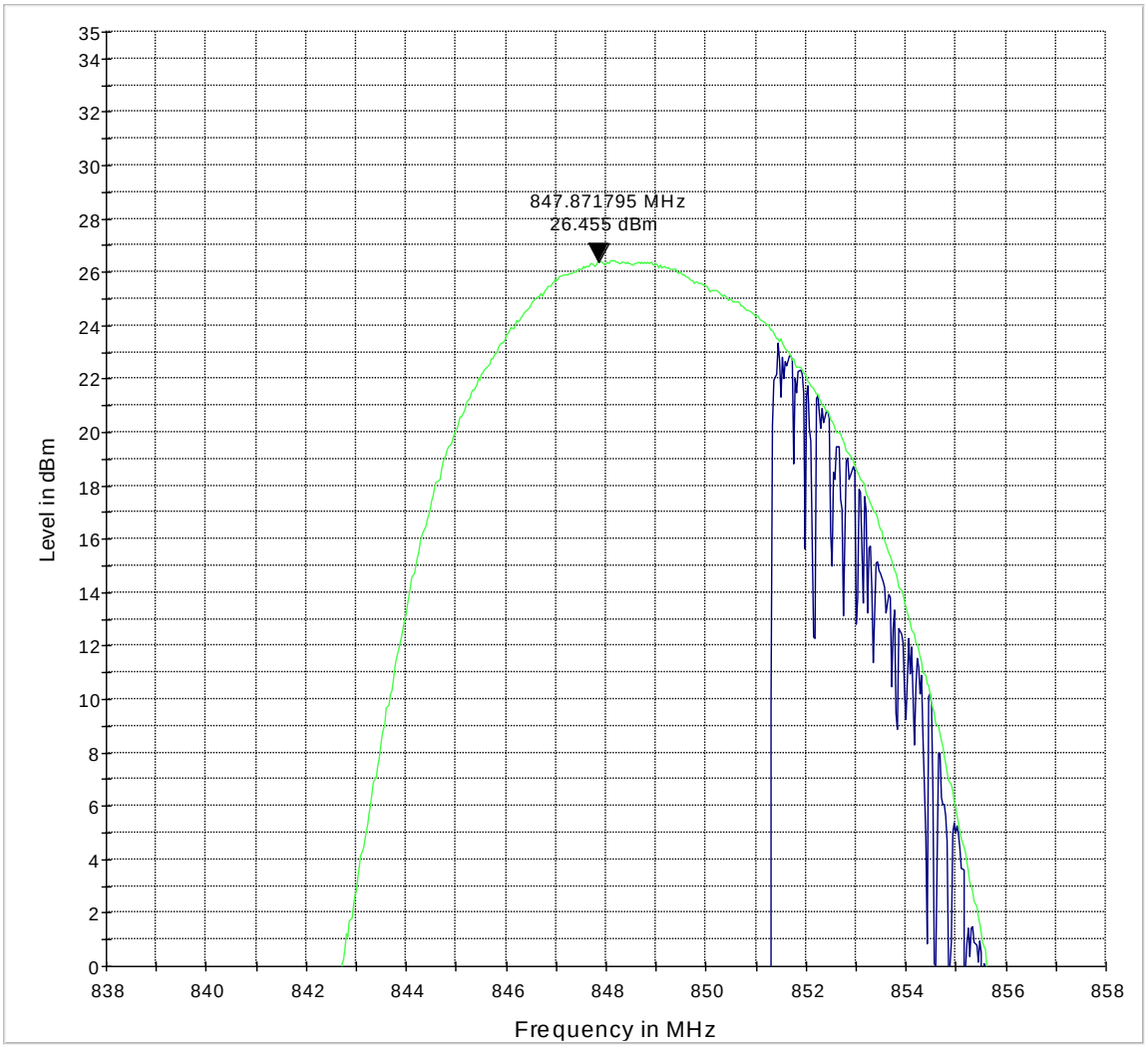
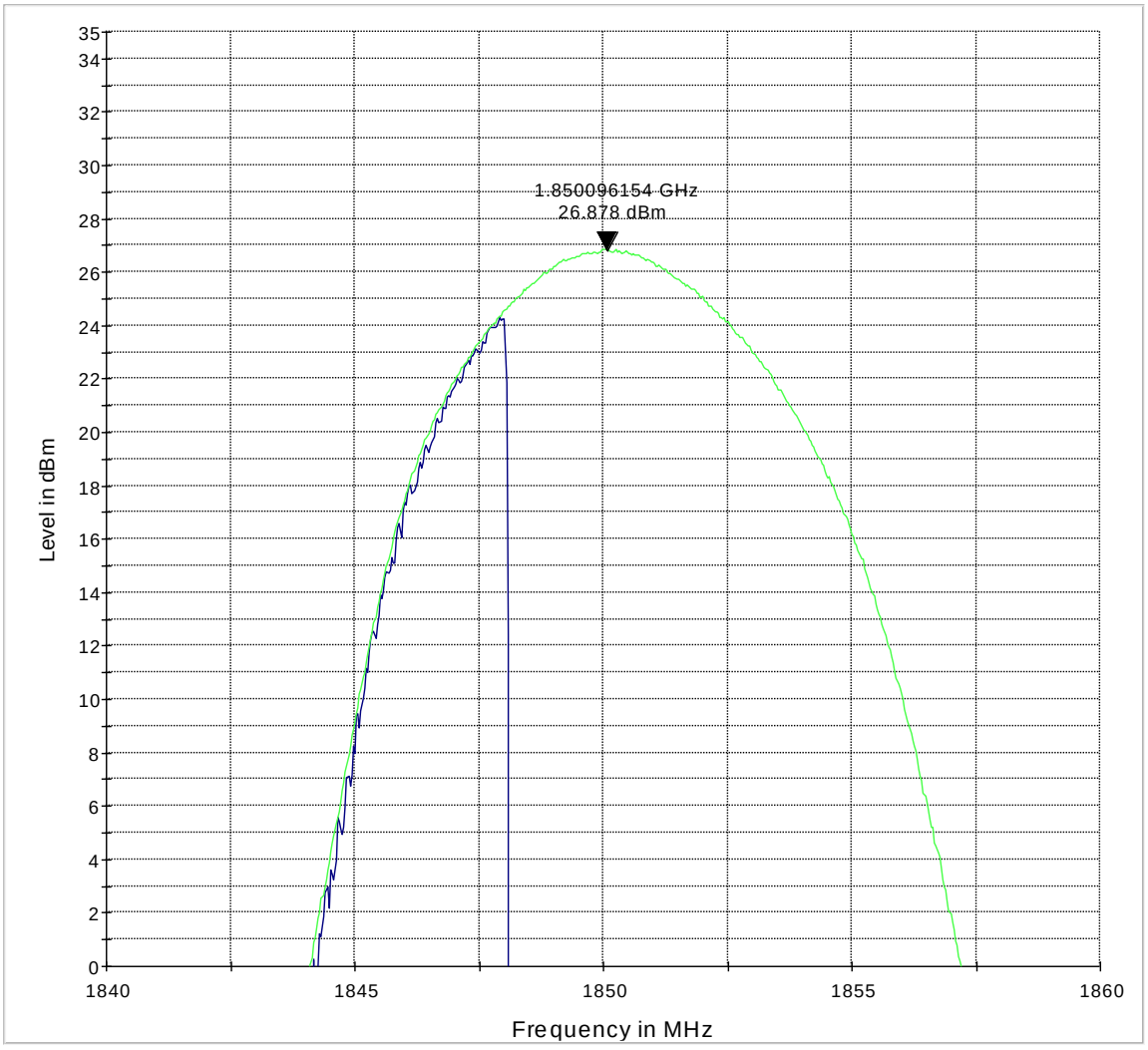


EIRP (GSM - GMSK) CHANNEL 512



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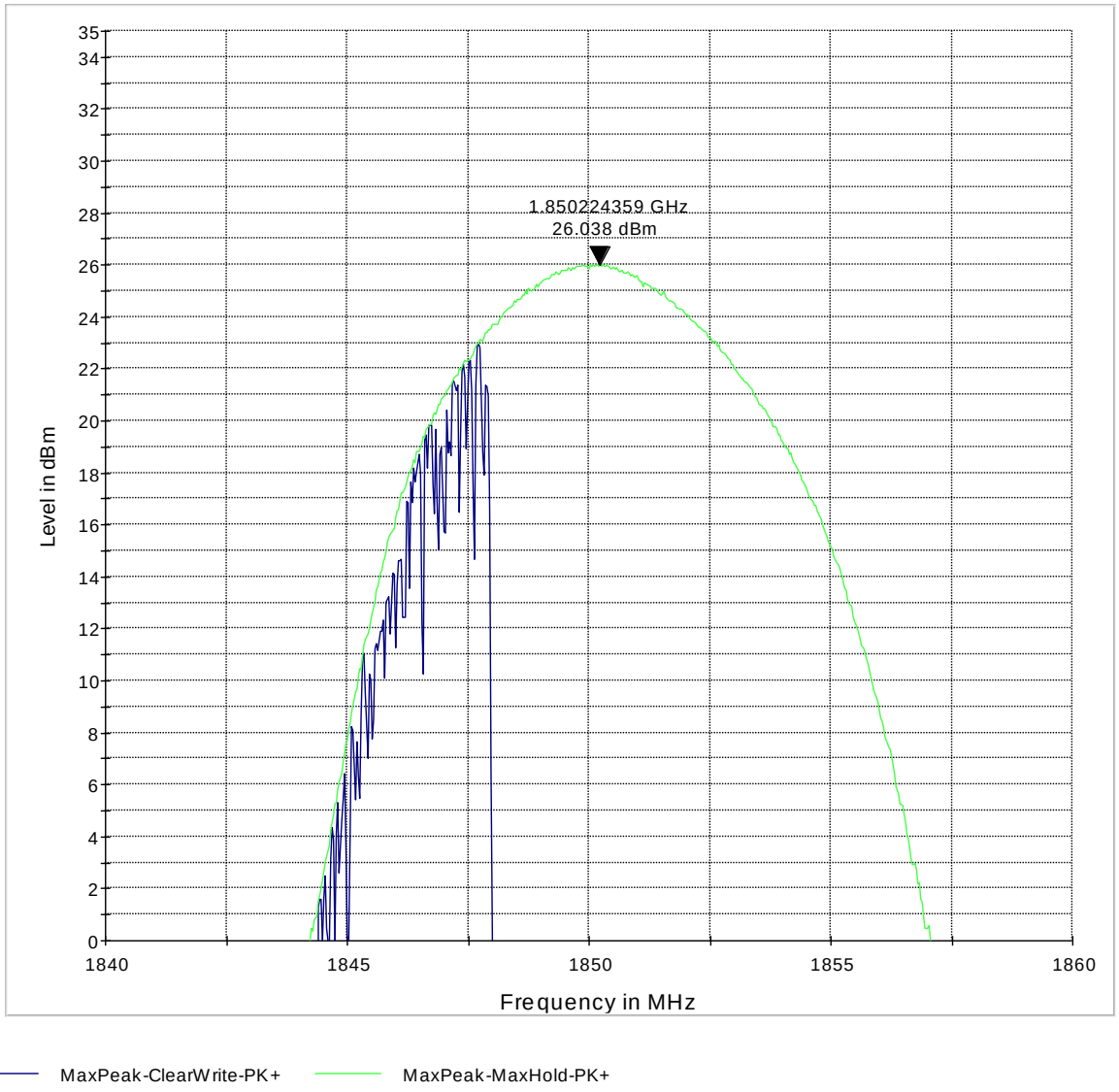

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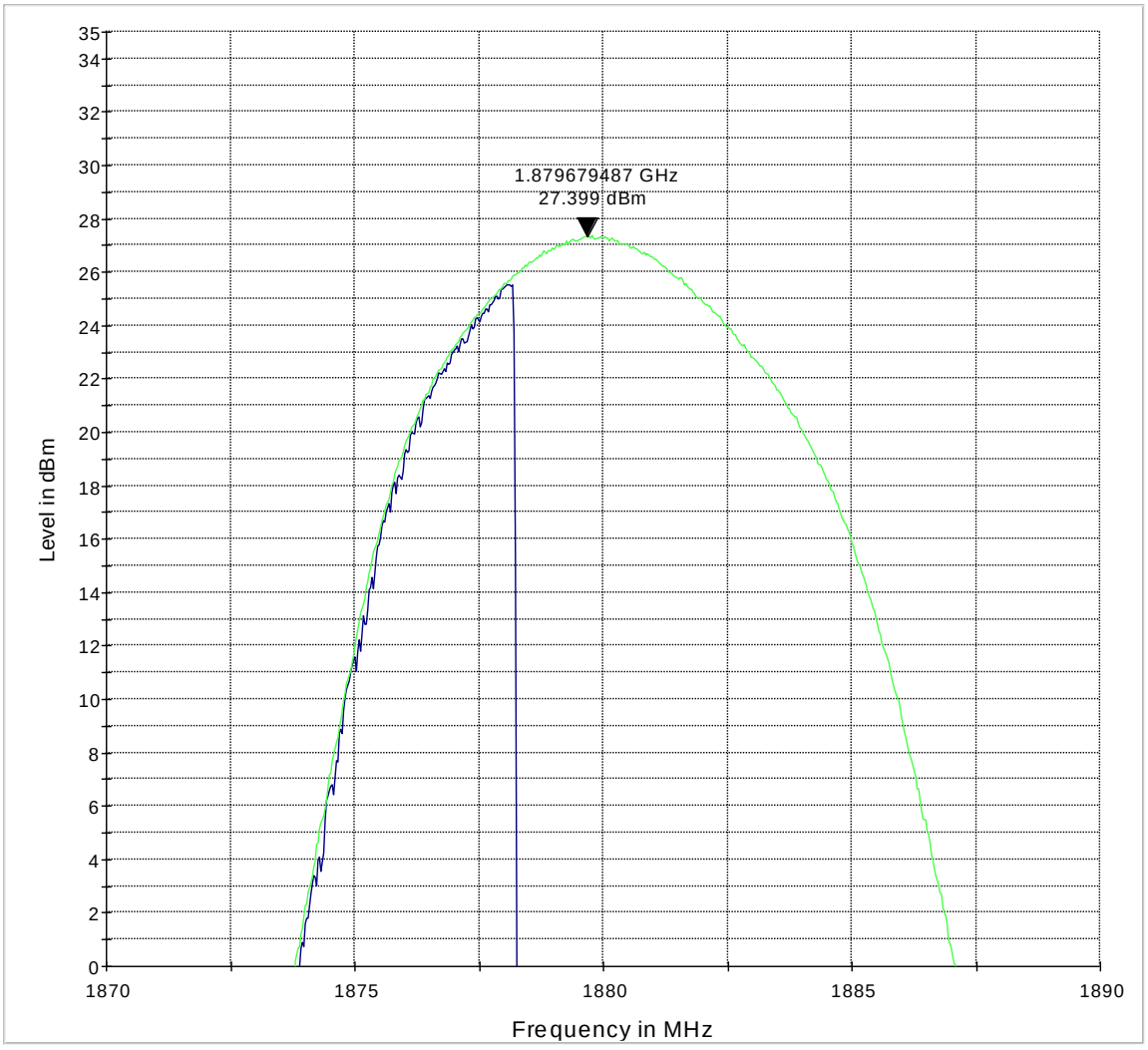
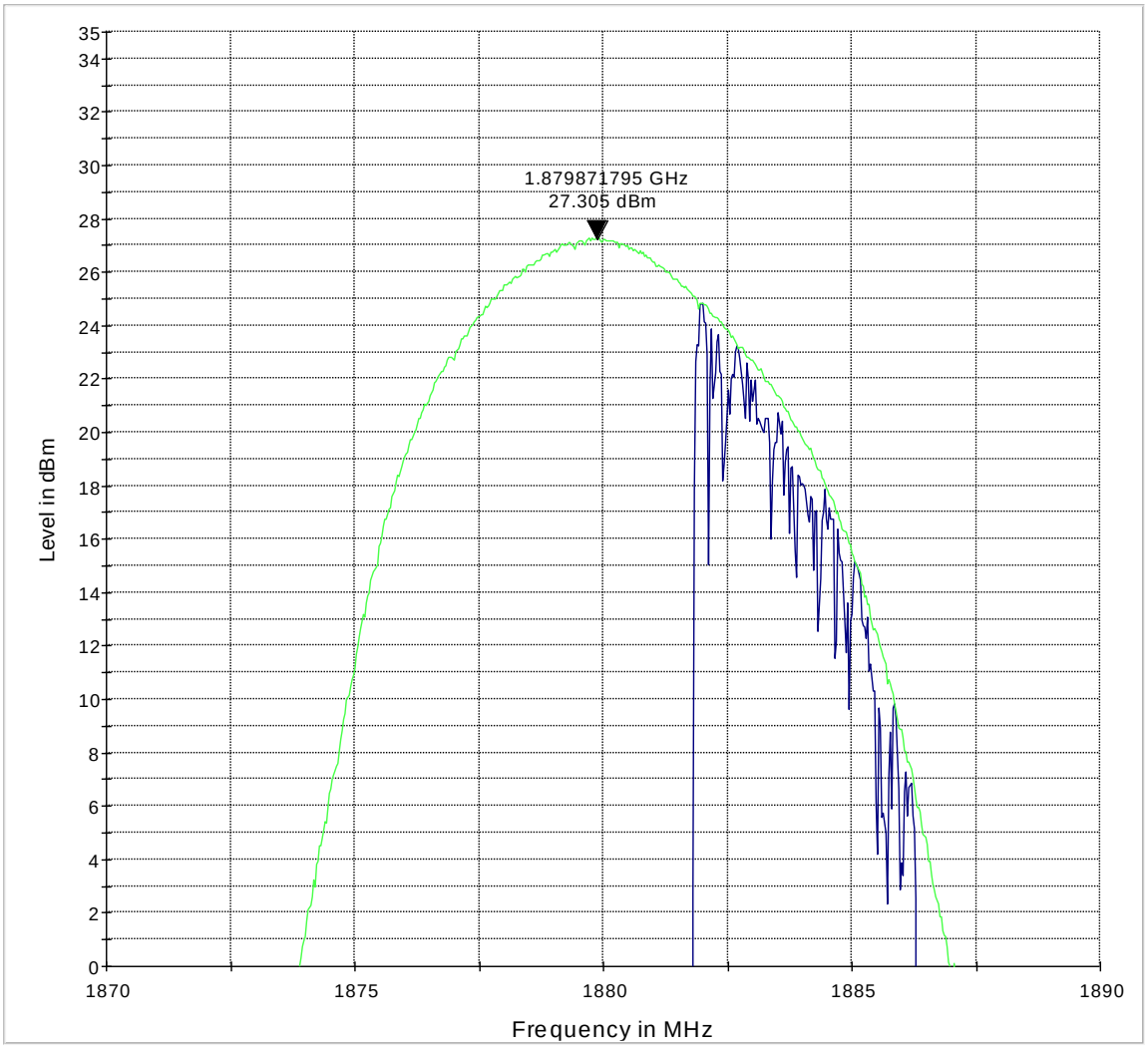
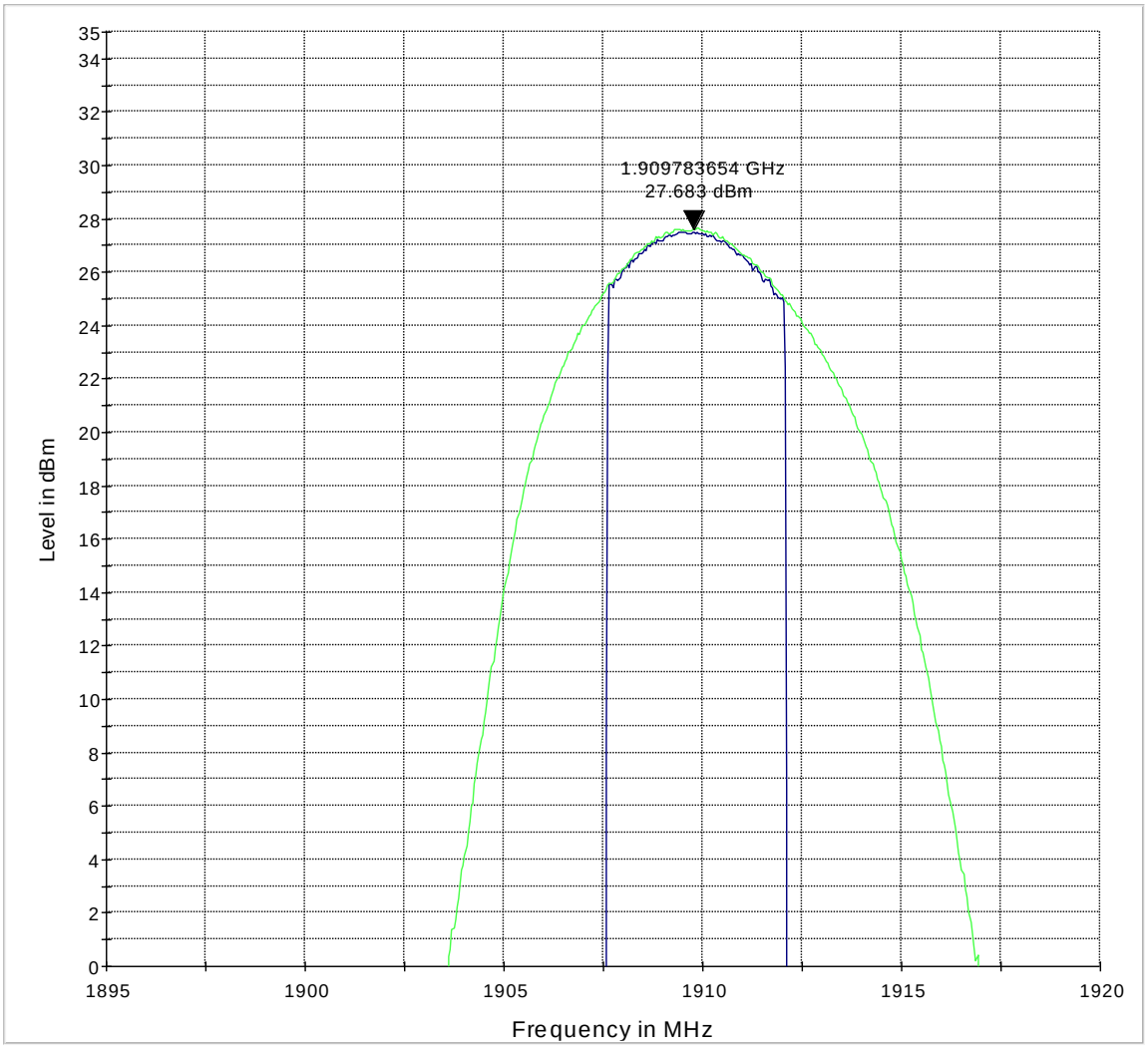


EIRP (GSM – EGPRS/8PSK) CHANNEL 661



EIRP (GSM - GMSK) CHANNEL 810



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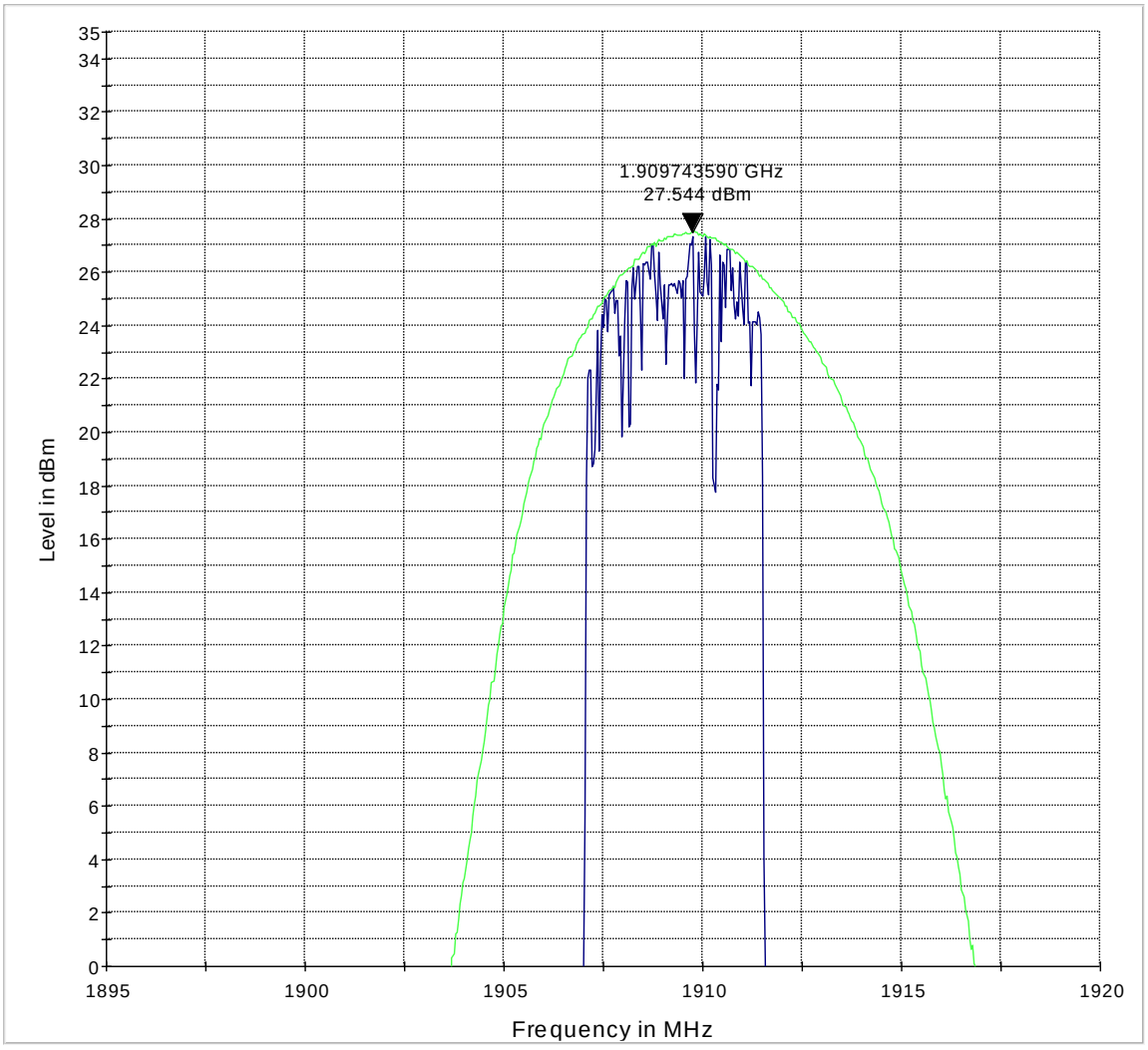

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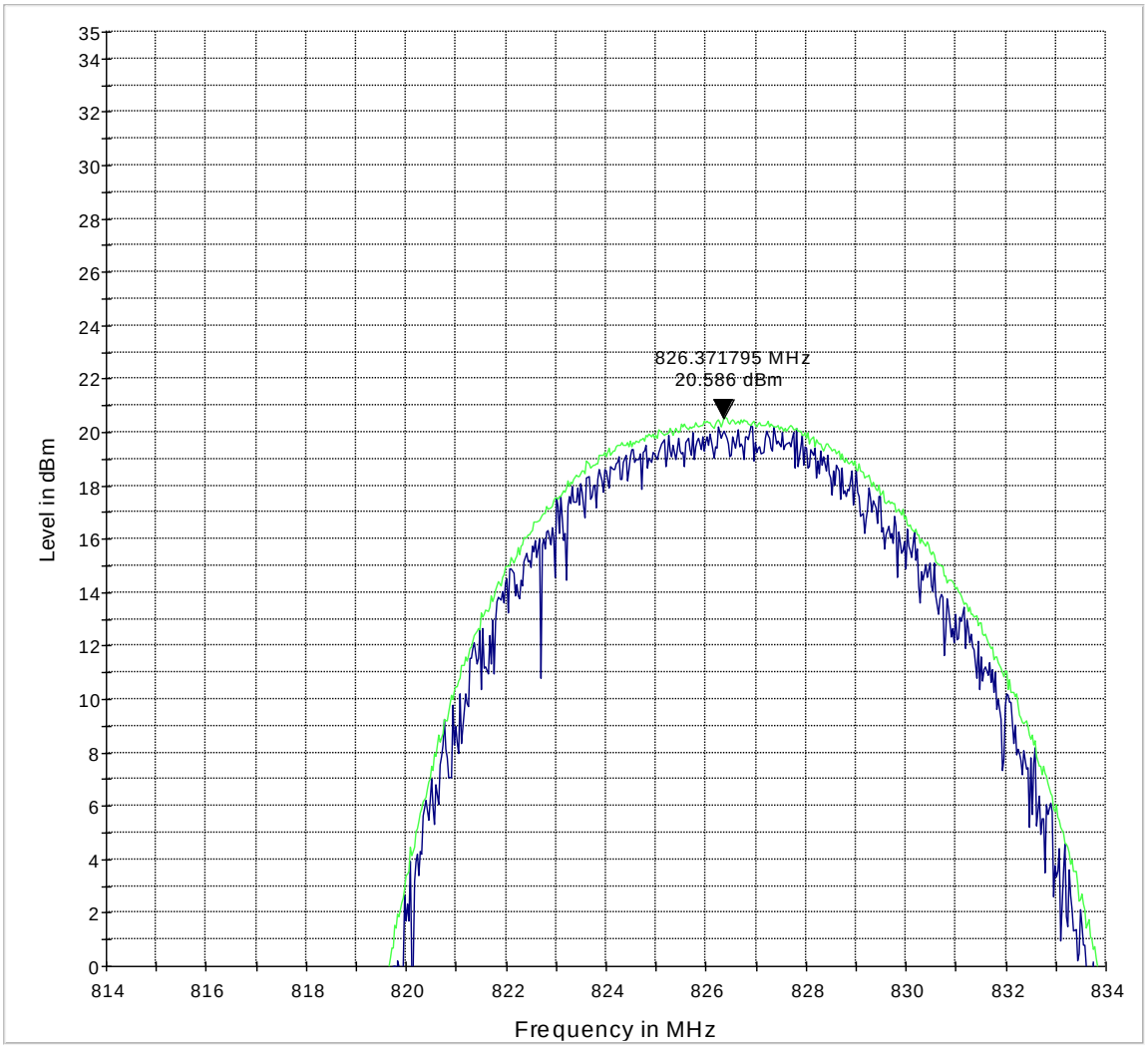

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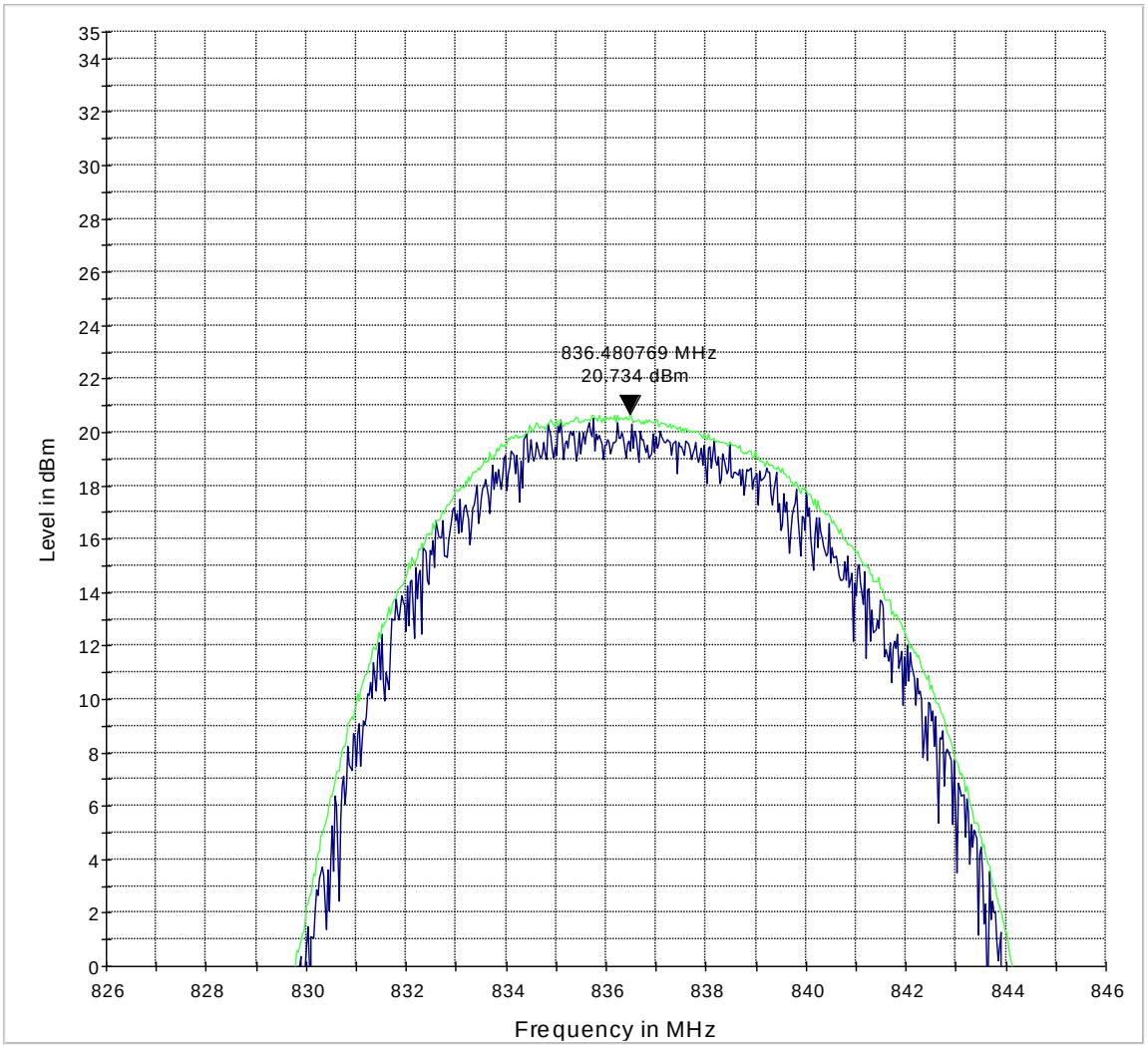

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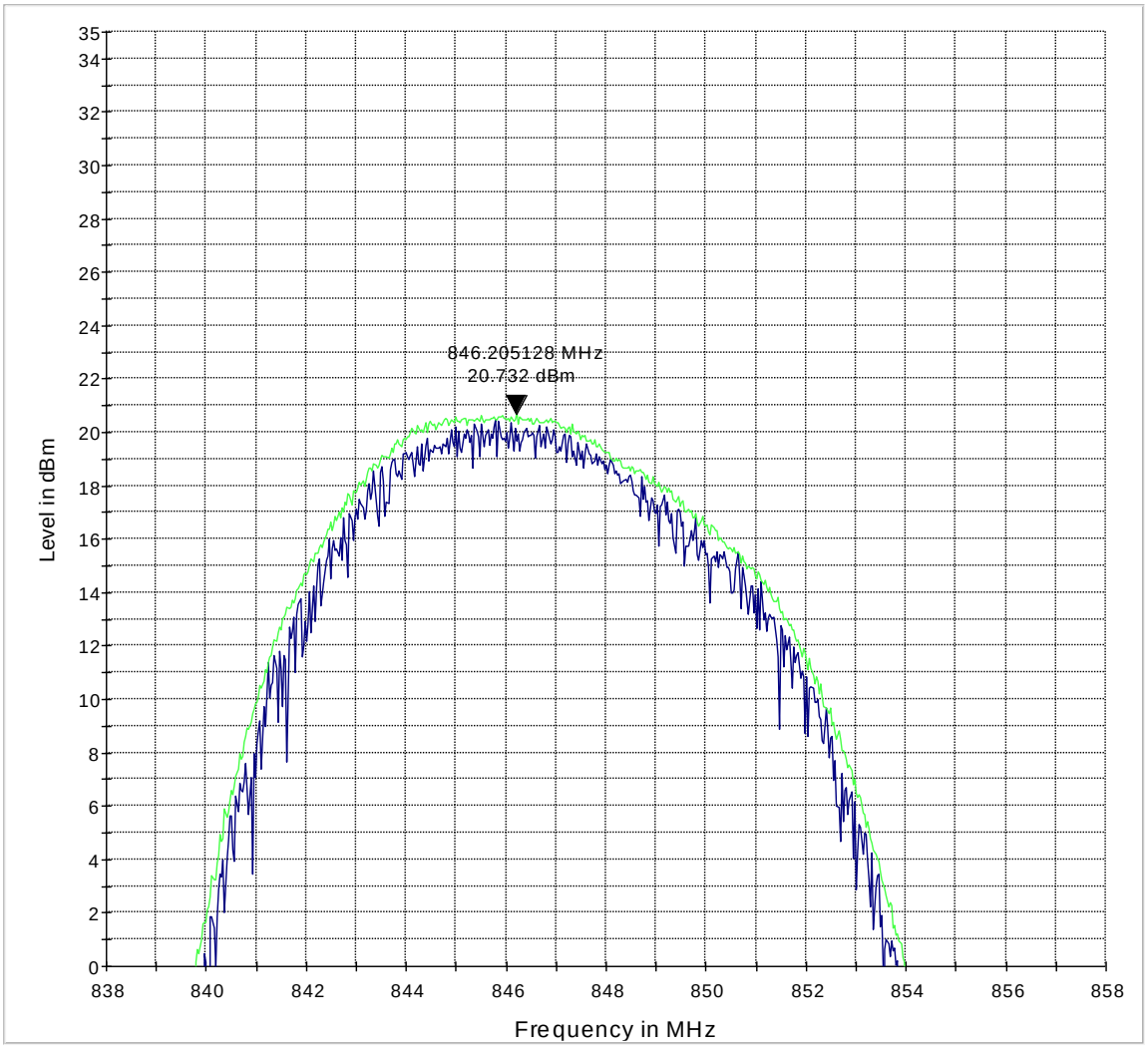

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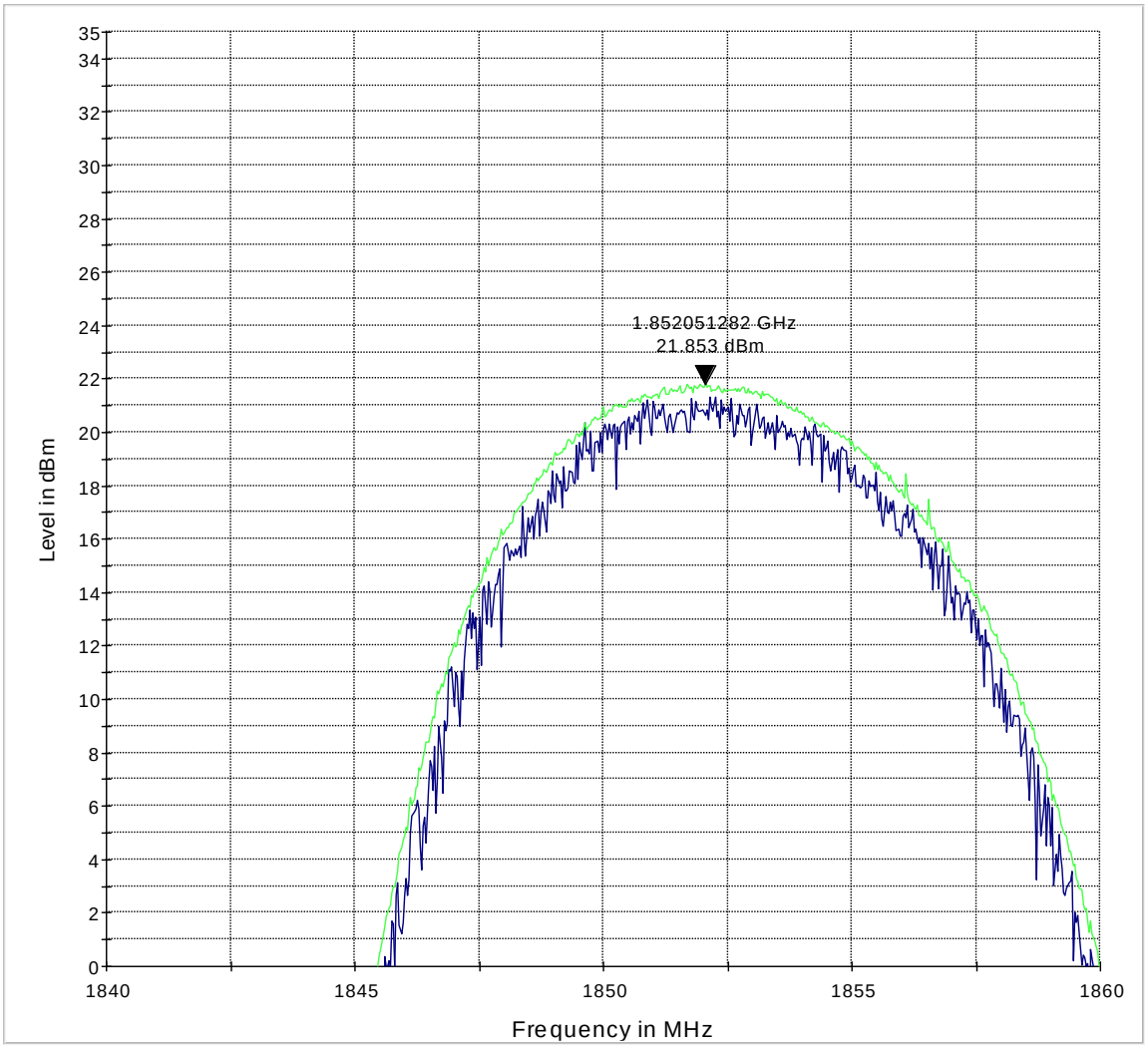

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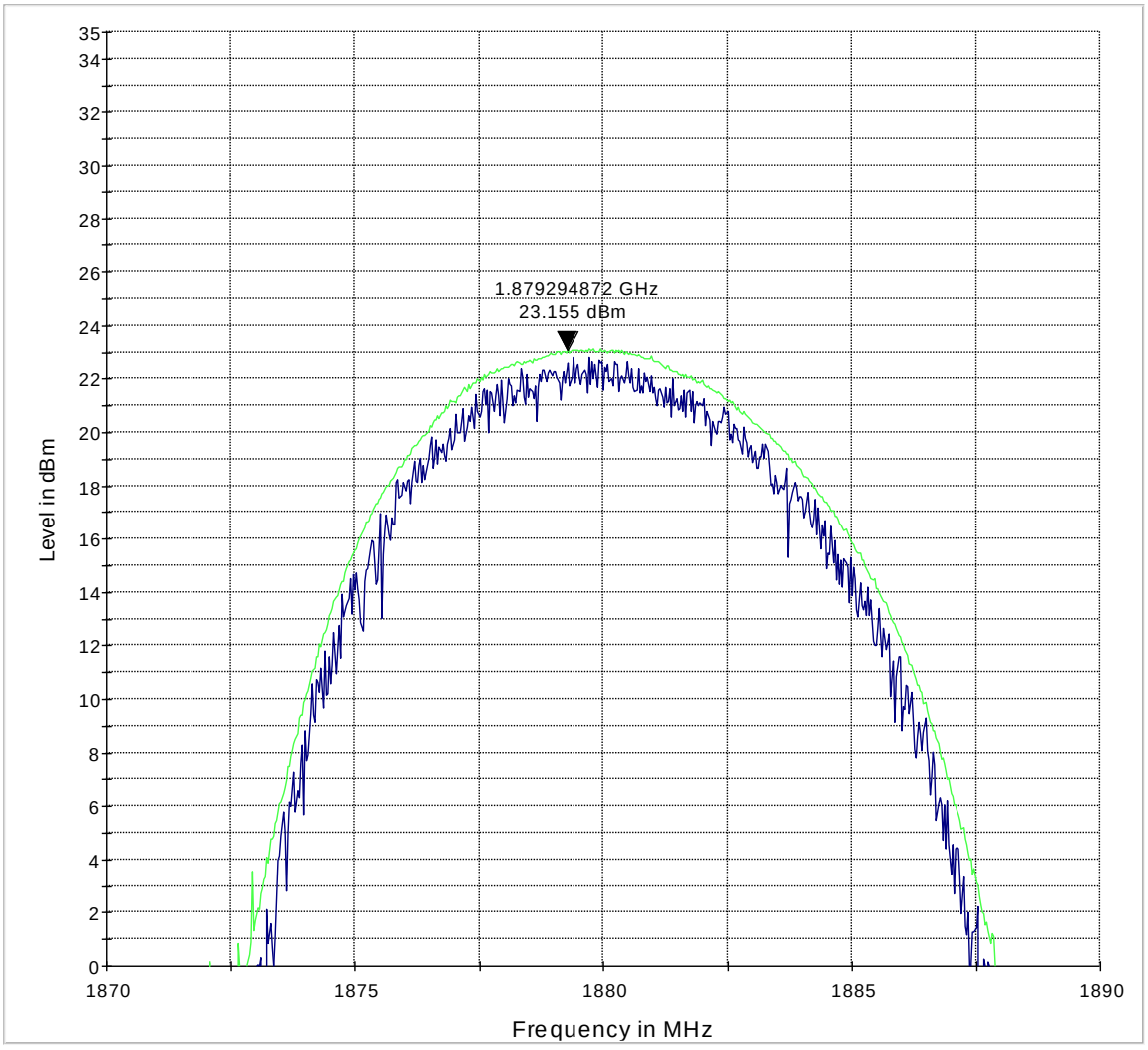

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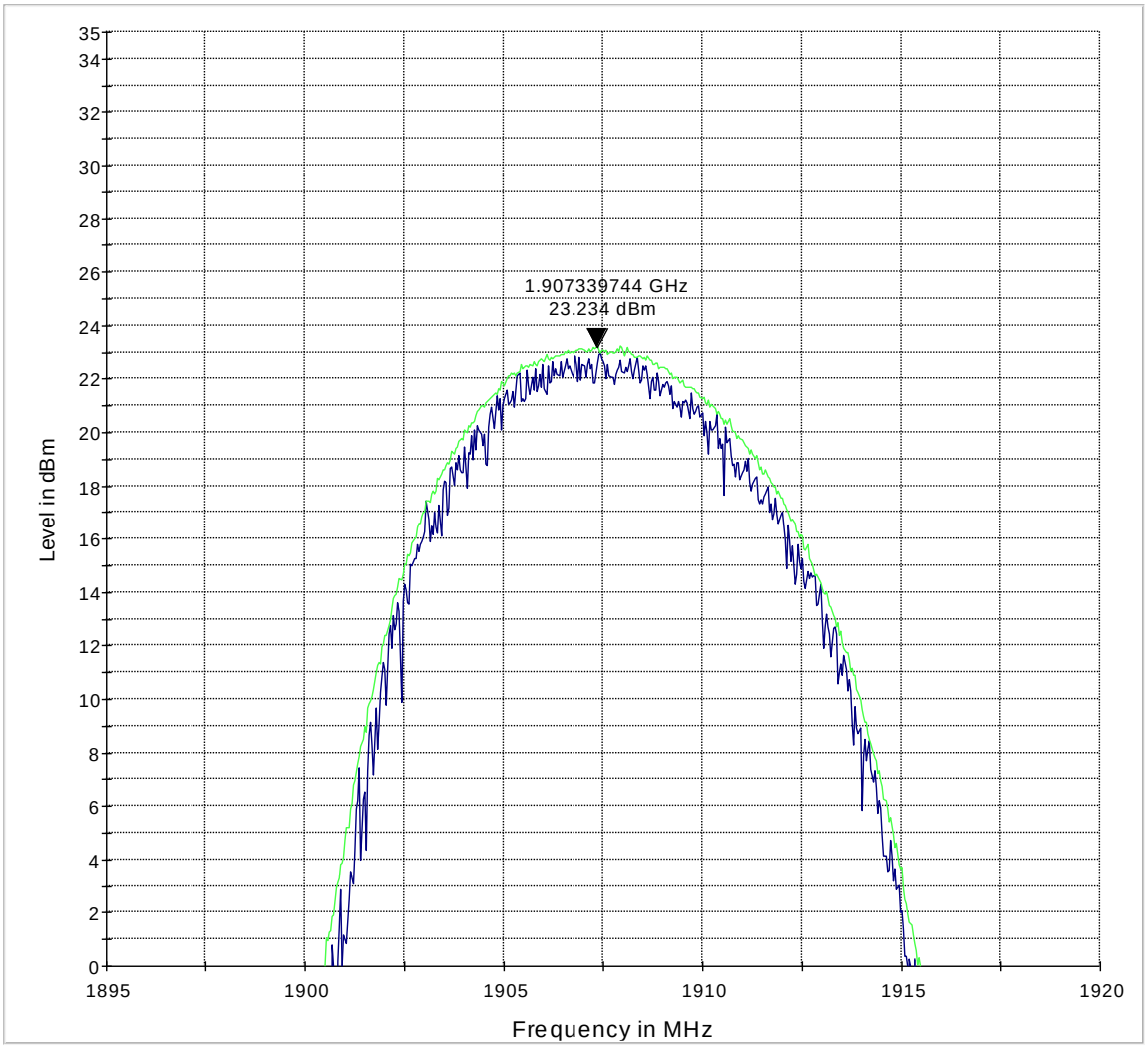


6 Spurious Emissions Radiated

6.1.1 References

FCC: CFR Part 2.1053, CFR Part 22.917, CFR Part 24.238, CFR Part 27.53
IC: RSS-Gen Section 4.9; RSS-132 Section 5.5; RSS-133 Section 6.5, RSS-139 Section 6.5

6.1.2 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.

6.1.2.1 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.

6.1.2.2 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.

6.1.2.3 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.

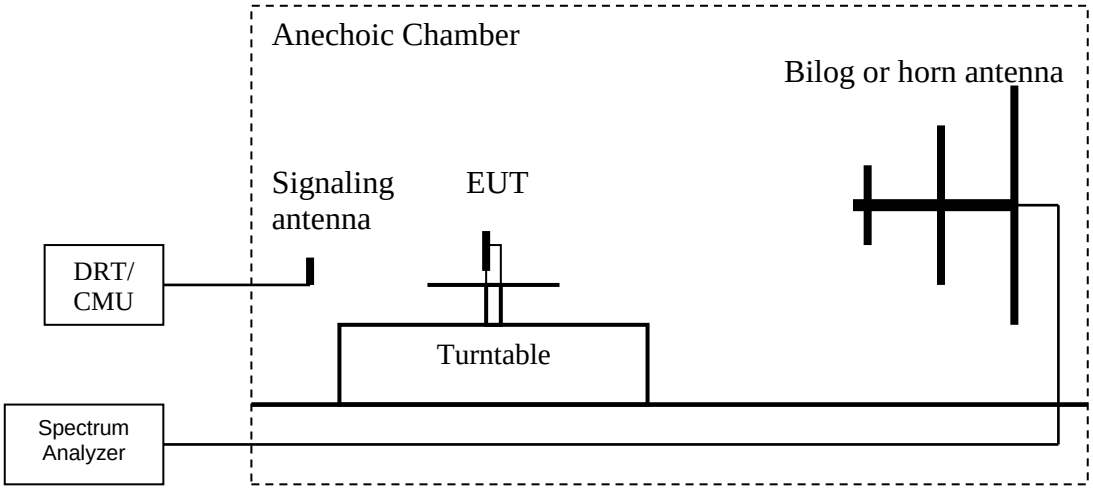
6.1.2.4 RSS-139 Section 6.5

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

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

6.1.3 Radiated out of band measurement procedure:

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



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

6.1.4 Sample Calculations for Radiated Measurements

6.1.4.1 Power Measurements using Substitution Procedure:

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

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

Example:

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

6.1.5 Measurement Survey:

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

Radiated emission measurements were made in GMSK (1 uplink slot), UMTS RMC 12.2k.

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

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

6.1.6 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

6.1.7 Test Results:

6.1.7.1 Transmitter Spurious Emissions (GSM 850/UMTS FDD V):

GSM 850

Harmonic	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	**1649.4**	-43	**1673.04**	-36	**1696.62**	-46
3	**2474.1**	-45	**2509.56**	-46	**2544.93**	-55
4	**3298.8**	-37	**3346.08**	-40	**3393.24**	-45
NF = Noise Floor Measurement Uncertainty: ±3dB						

UMTS FDD V

Harmonic	Tx ch-4132 Freq. (MHz)	Level (dBm)	Tx ch-4183 Freq. (MHz)	Level (dBm)	Tx ch-4233 Freq. (MHz)	Level (dBm)
2	**1652.8**	-52	**1673.2**	-50	**1693.2**	-49
3	**2479.2**	-51	**2509.8**	-52	**2519.6**	-50
4	**3305.6**	NF	**3336.2**	NF	**3346.0**	NF
NF = Noise Floor Measurement Uncertainty: ±3dB						

6.1.7.2 Transmitter Spurious Emissions (GSM 1900/UMTS FDD II):

GSM 1900

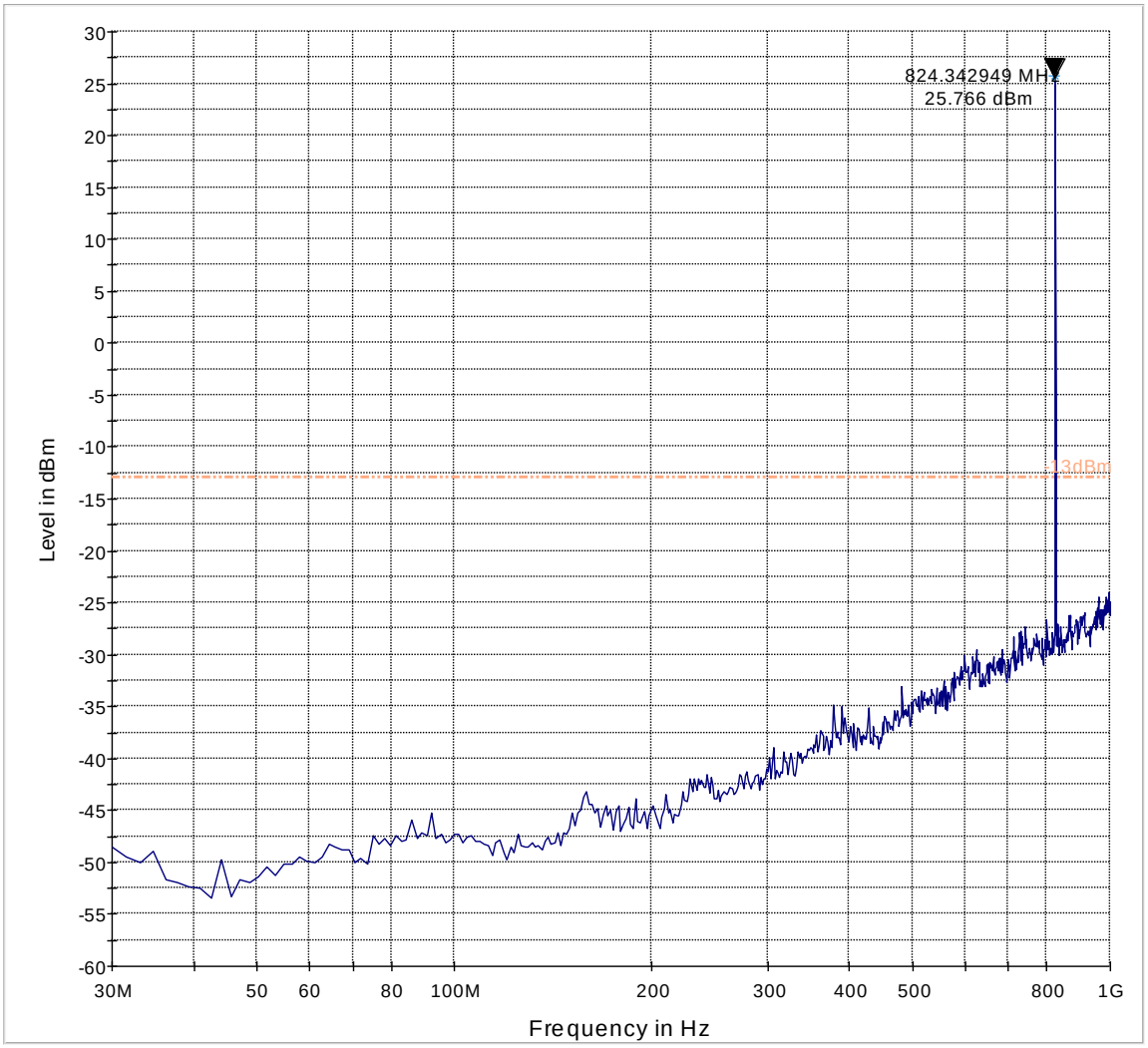
Harmonic	Tx ch-512 Freq. (MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	**3700.4**	NF	**3760**	NF	**3819.6**	NF
3	**5550.6**	NF	**5640**	NF	**5729.4**	NF
4	**7400.8**	NF	**7520**	NF	**7639.2**	NF
NF = Noise Floor Measurement Uncertainty: ±3dB						

UMTS FDD II

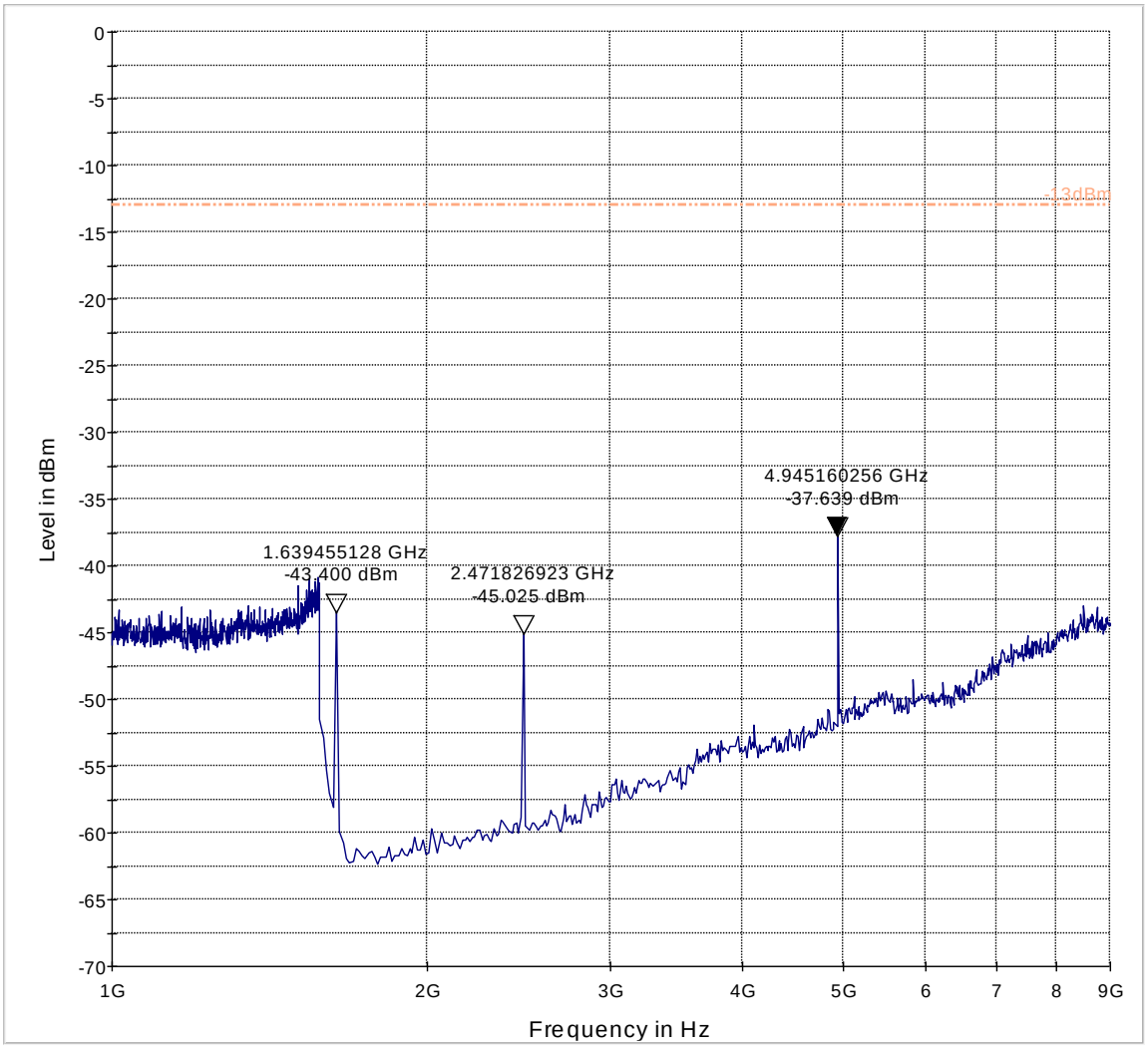
Harmonic	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
2	**3704.8**	NF	**3760**	NF	**3815.2**	NF
3	**5557.2**	NF	**5640**	NF	**5722.8**	NF
4	**7409.6**	NF	**7520**	NF	**7630.4**	NF
NF = Noise Floor Measurement Uncertainty: ±3dB						

6.1.7.3 Plots:

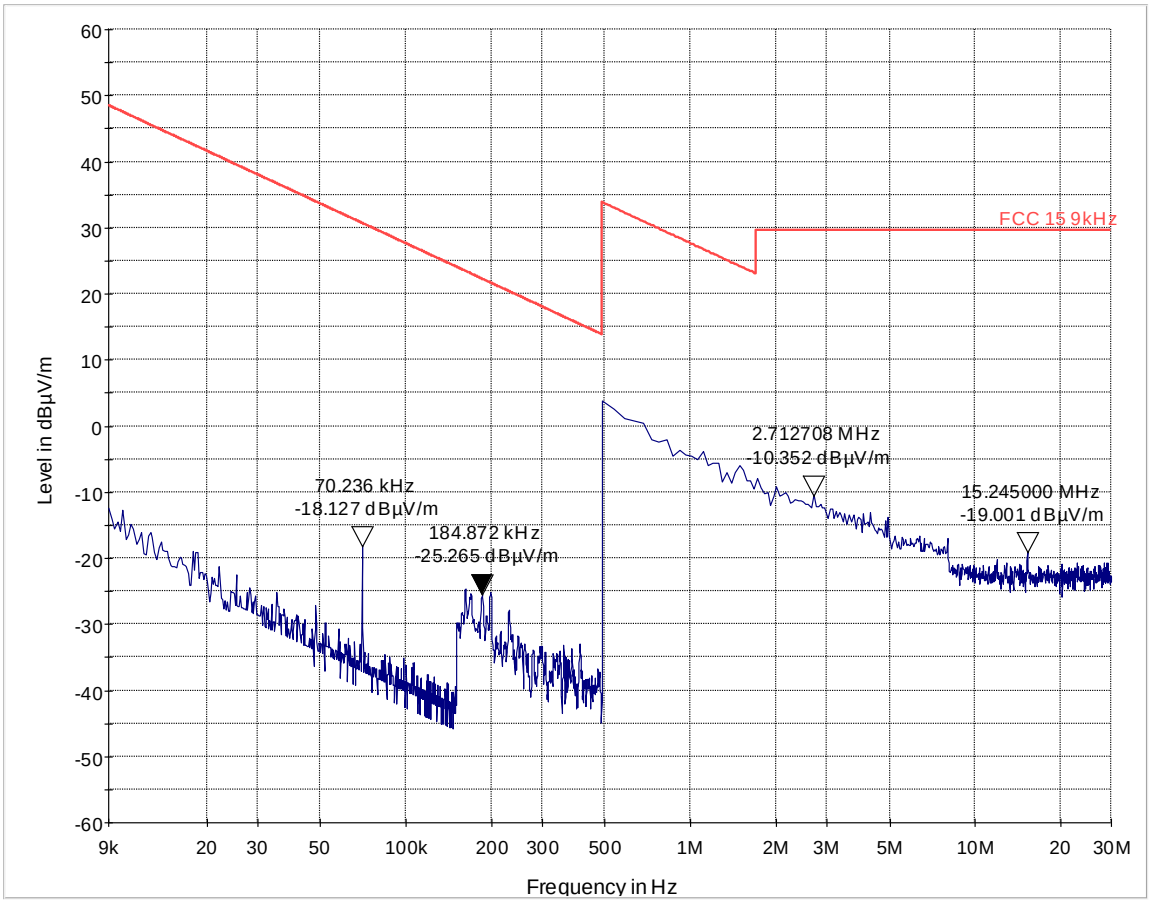
Radiated Spurious Emissions (GSM 850MHz) Tx: Low Channel
Test results 30MHz-1GHz



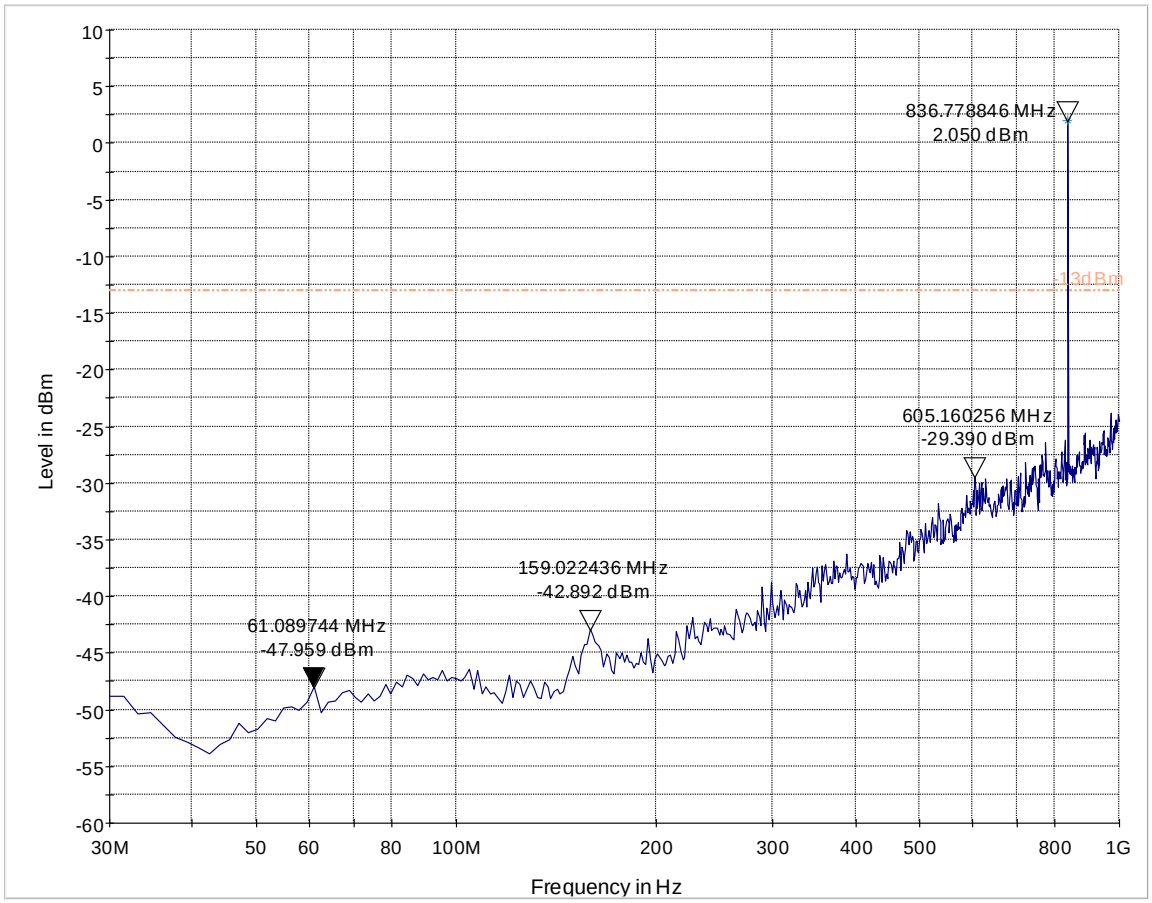
Test results 1GHz-9GHz



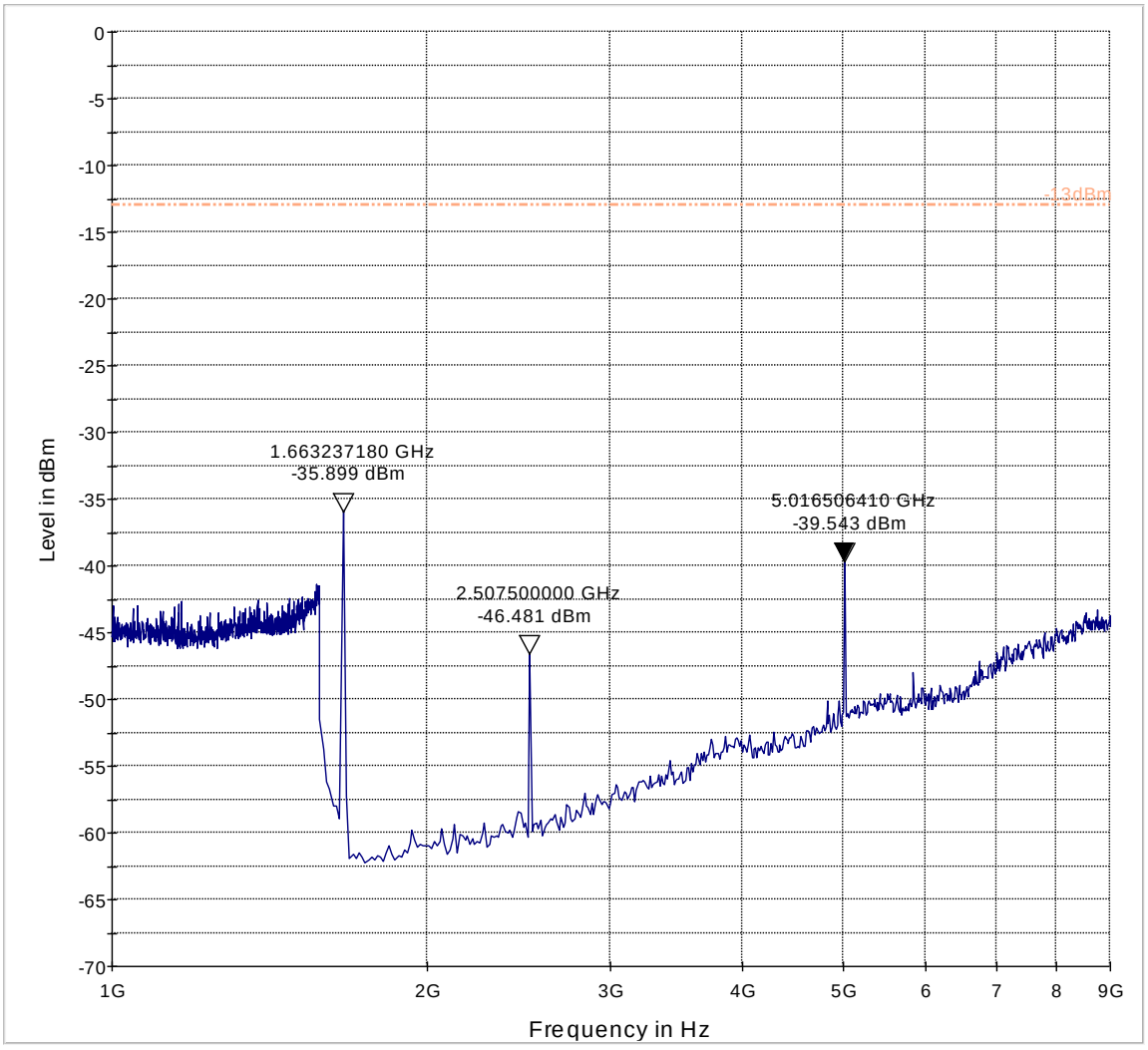
Radiated Spurious Emissions (GSM 850MHz) Tx: Mid Channel
Test results 9kHz-30MHz



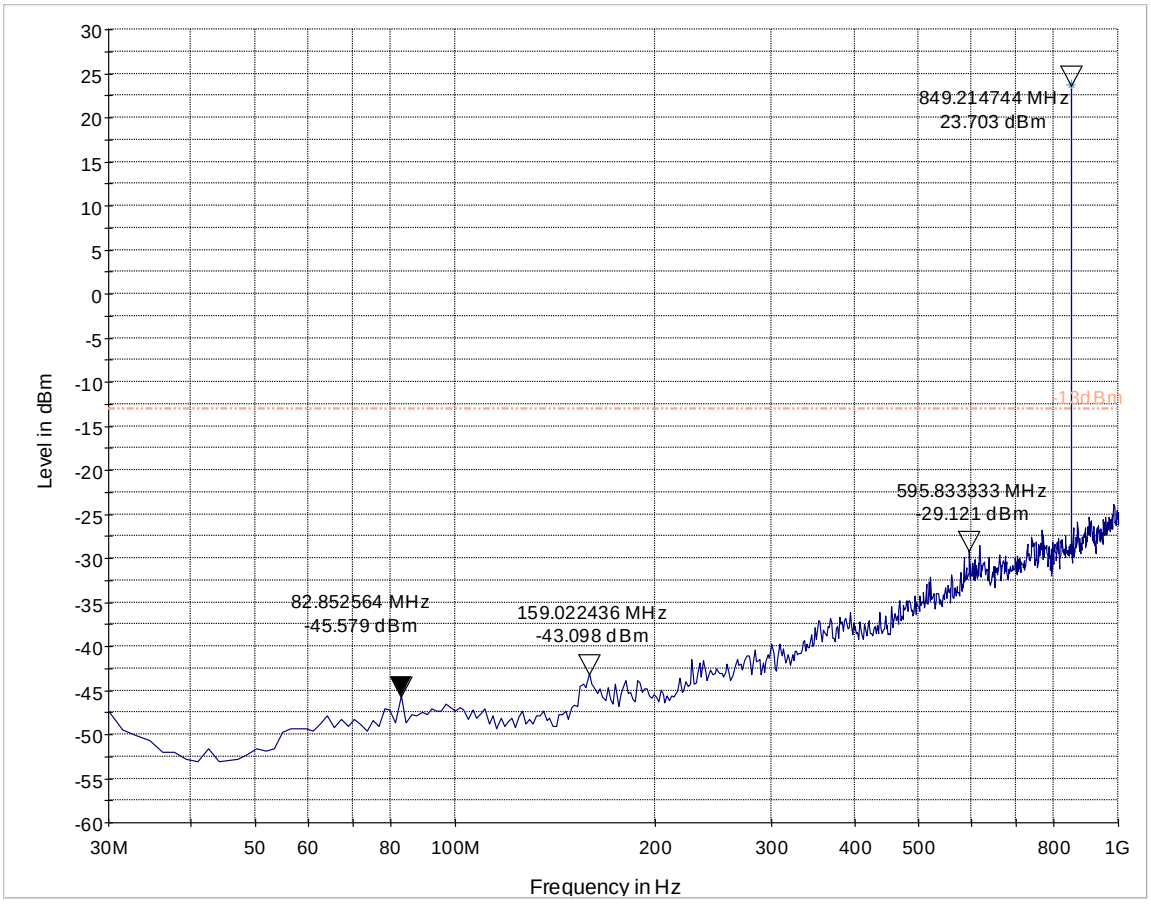
Test results 30MHz-1GHz



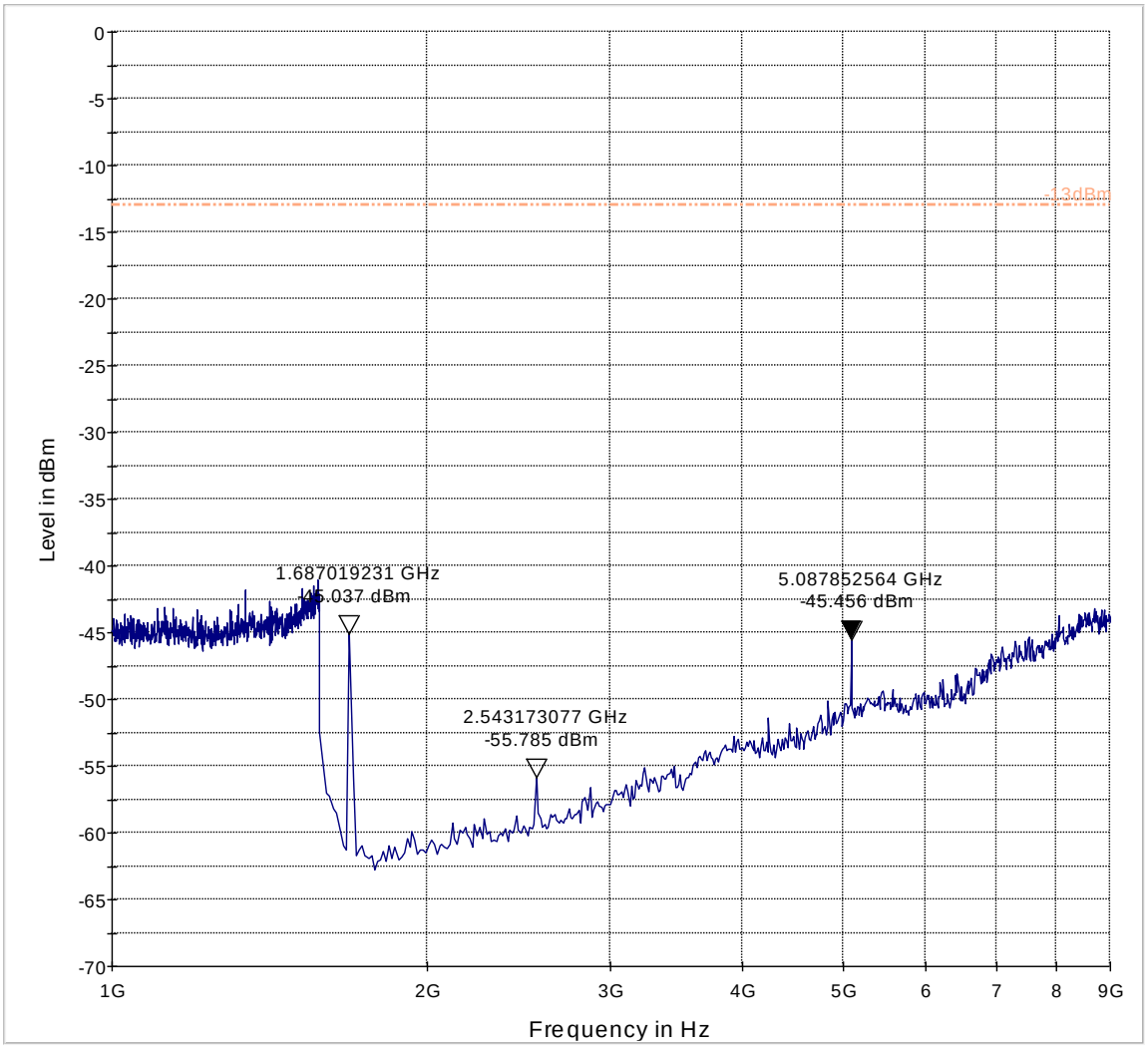
Test results 1GHz-9GHz



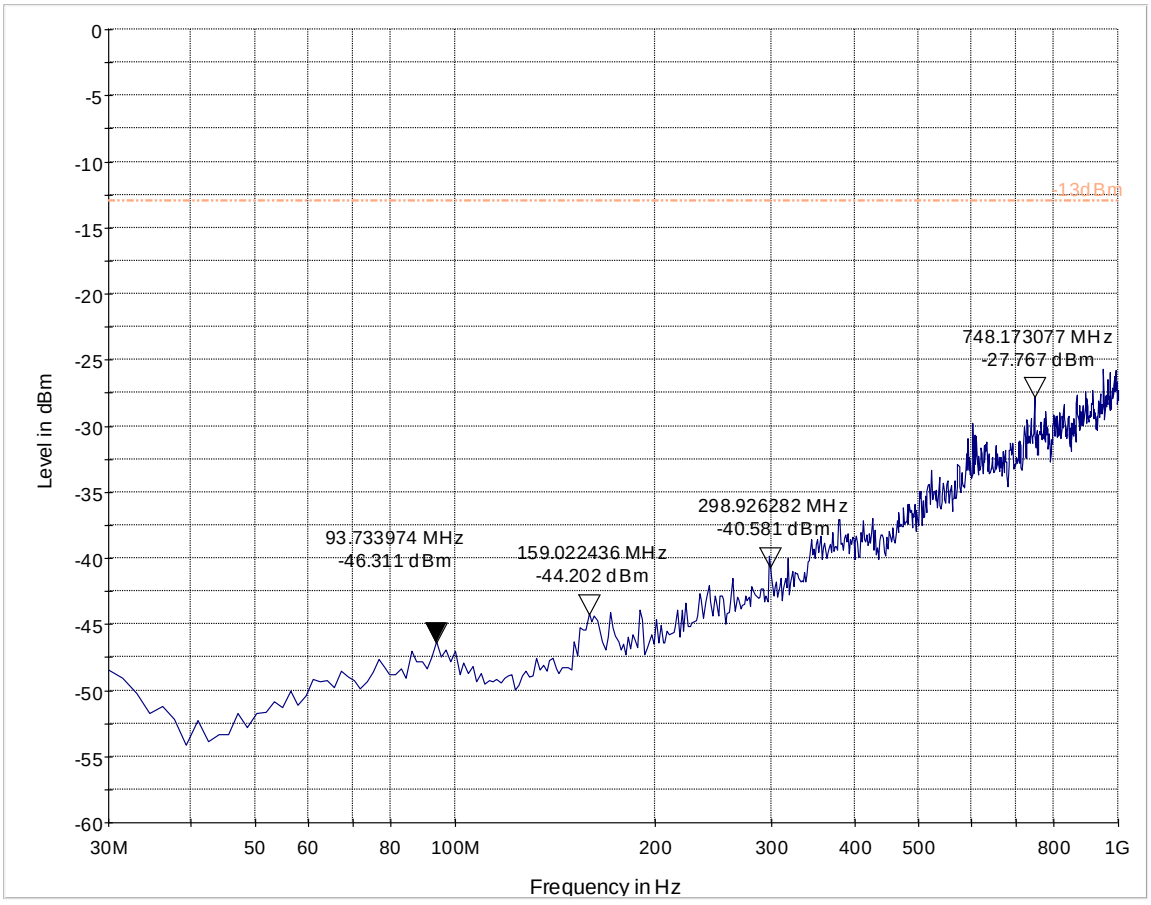
Radiated Spurious Emissions (GSM 850MHz) Tx: High Channel
Test results 30MHz-1GHz



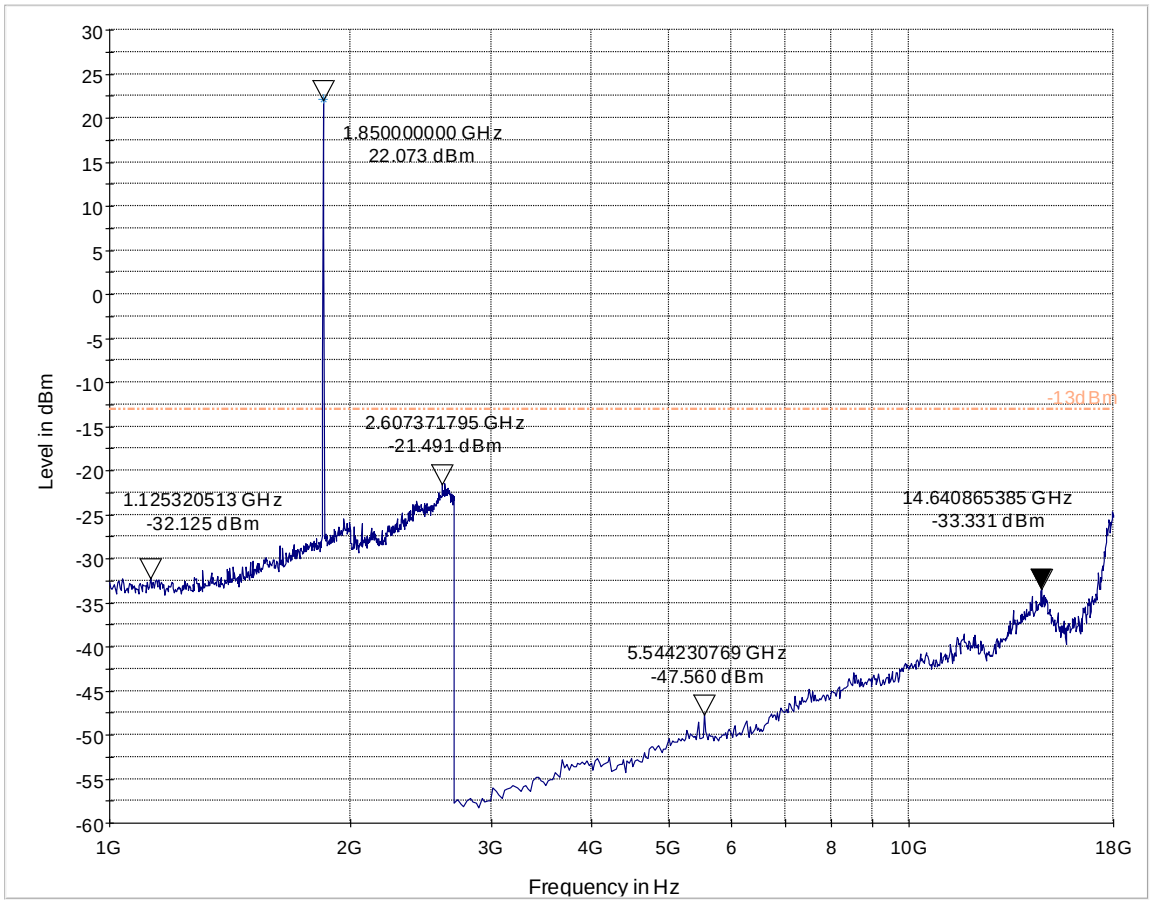
Test results 1GHz-9GHz



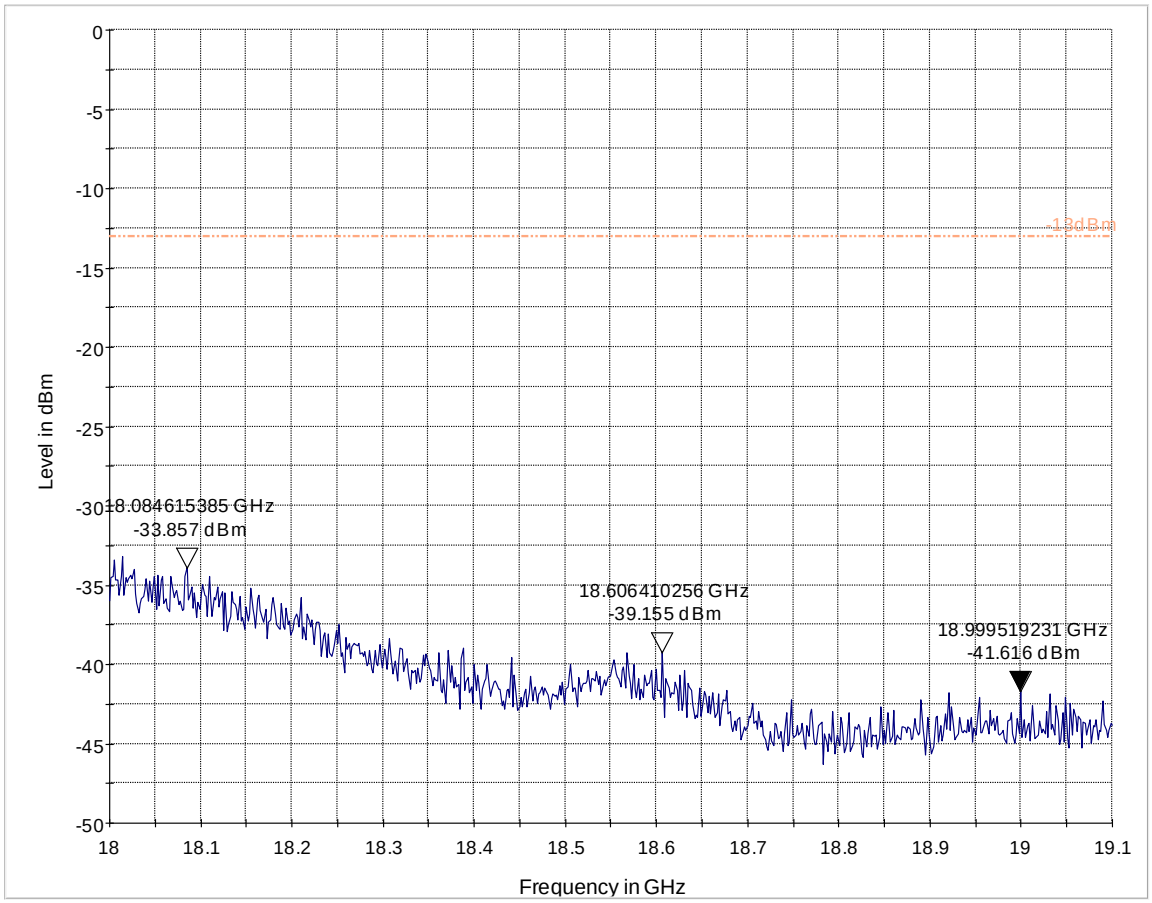
Radiated Spurious Emissions (GSM 1900MHz) Tx: Low Channel
Test results 30MHz-1GHz



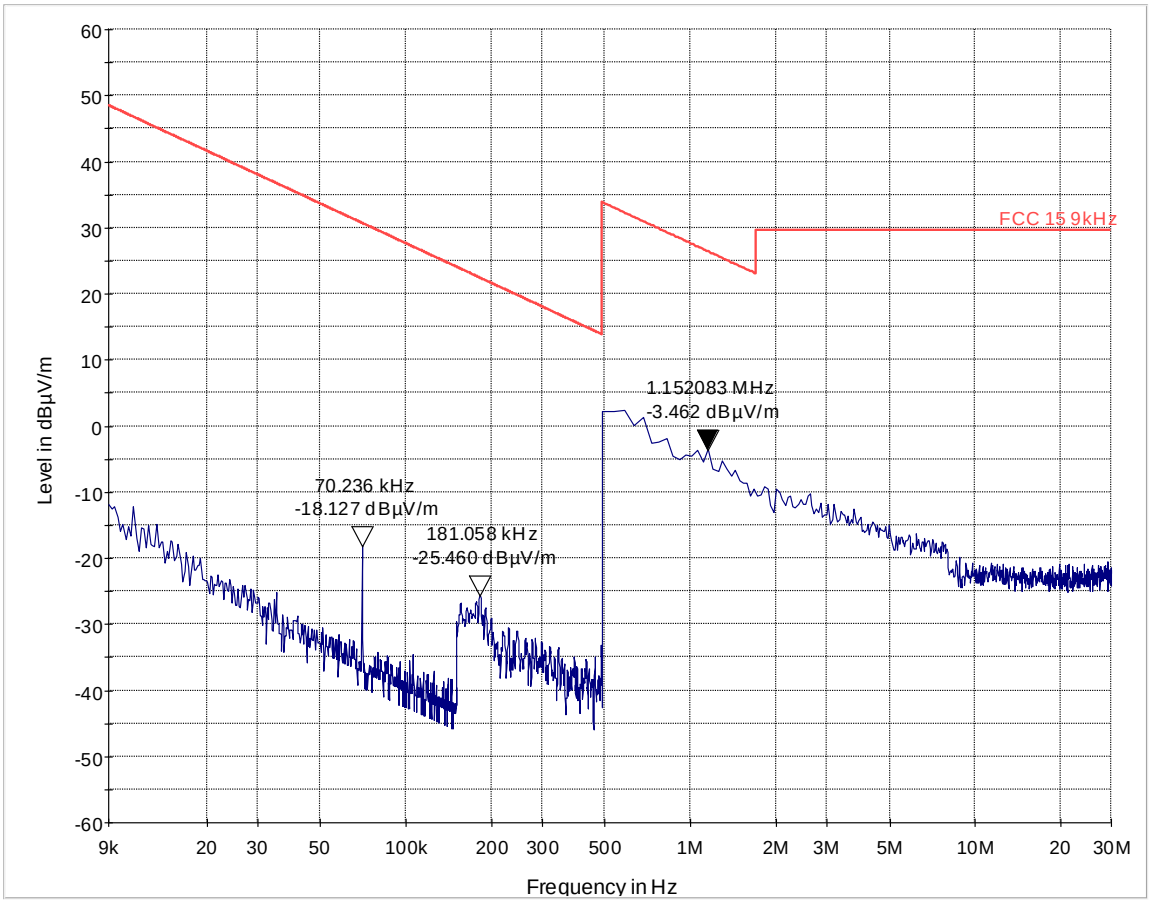
Test results 1GHz-18GHz



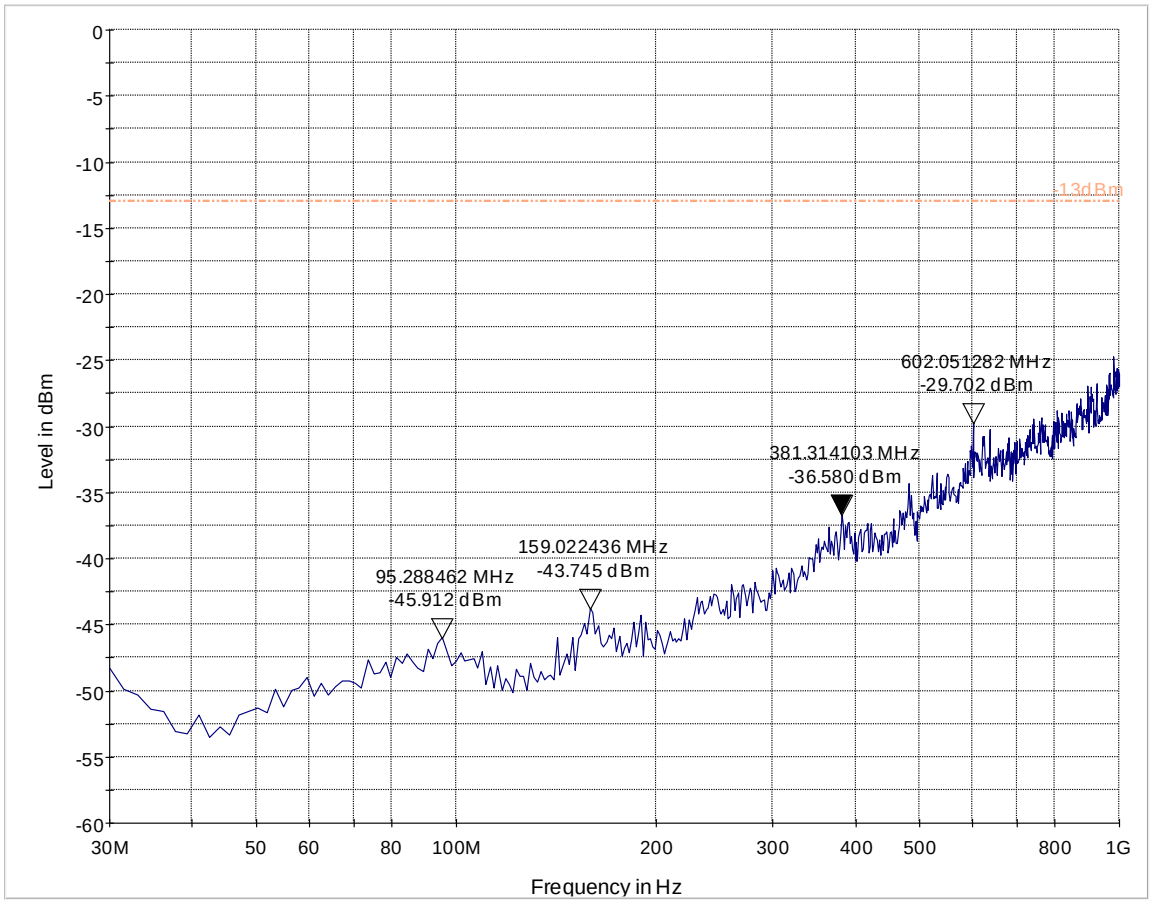
Test results 18GHz-19.1GHz



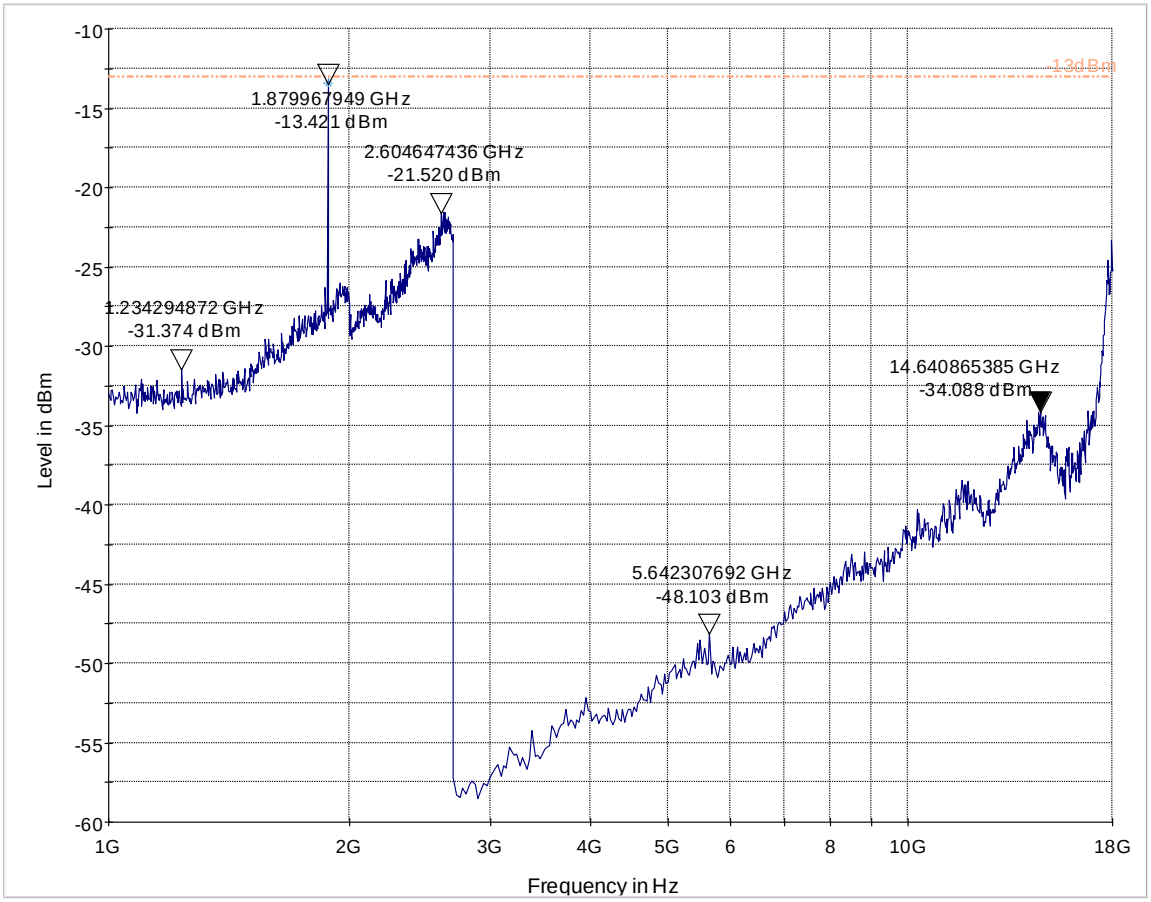
Radiated Spurious Emissions (GSM 1900MHz) Tx: Mid Channel
Test results 9kHz-30MHz



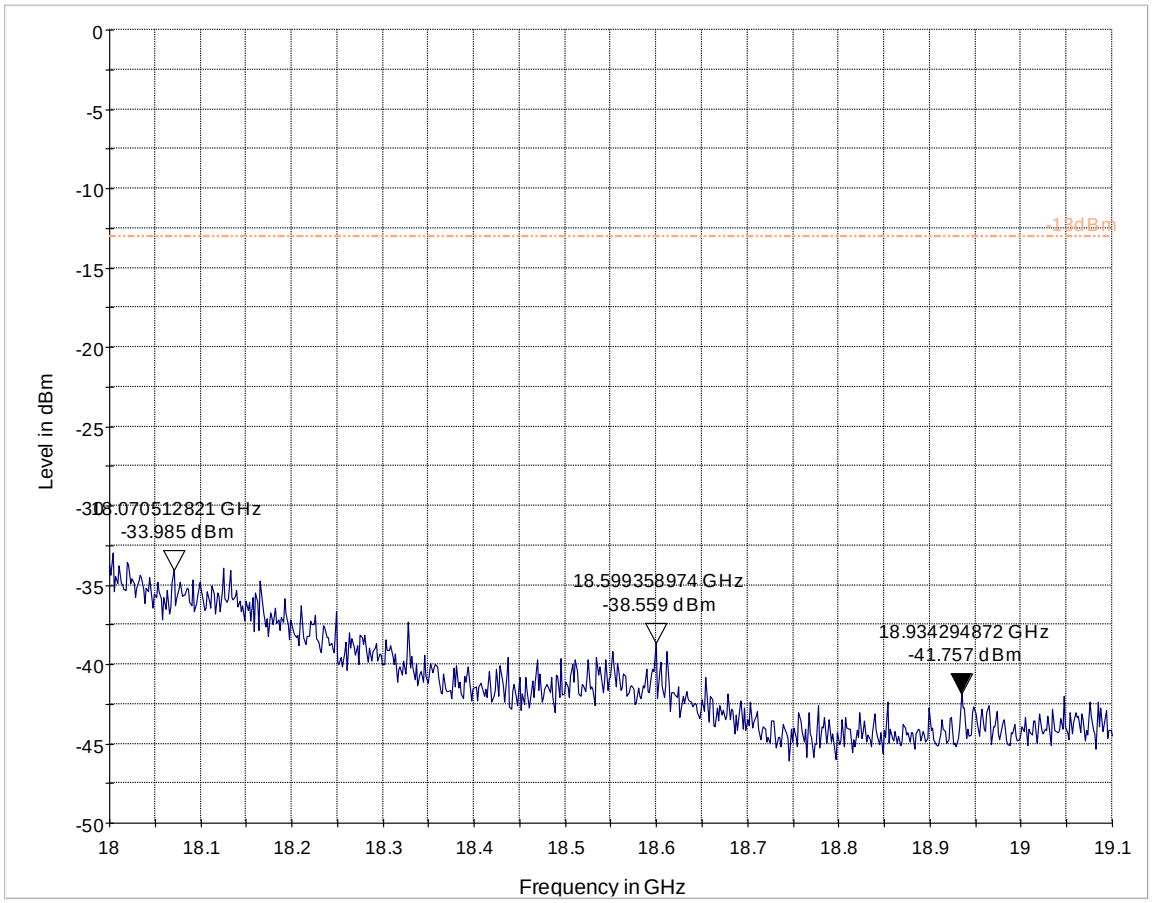
Test results 30MHz-1GHz



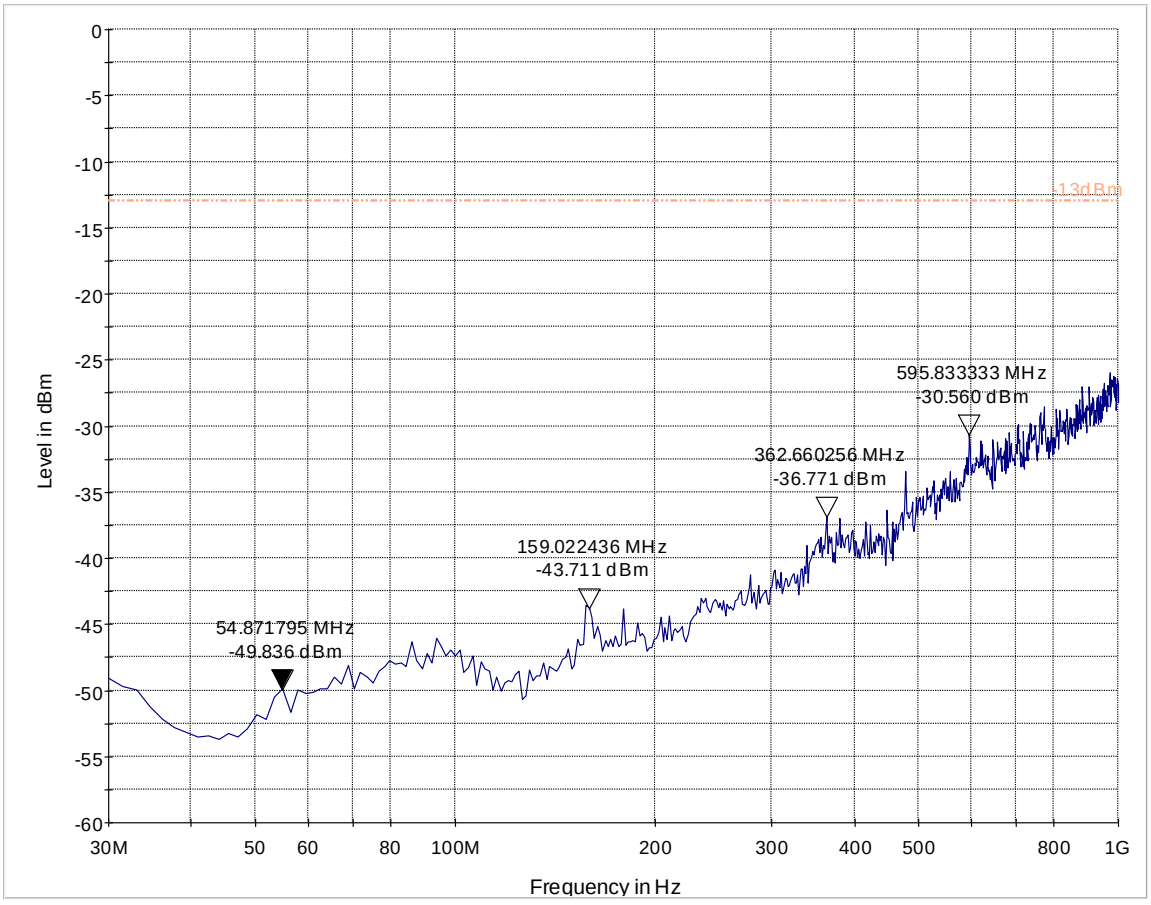
Test results 1GHz-18GHz



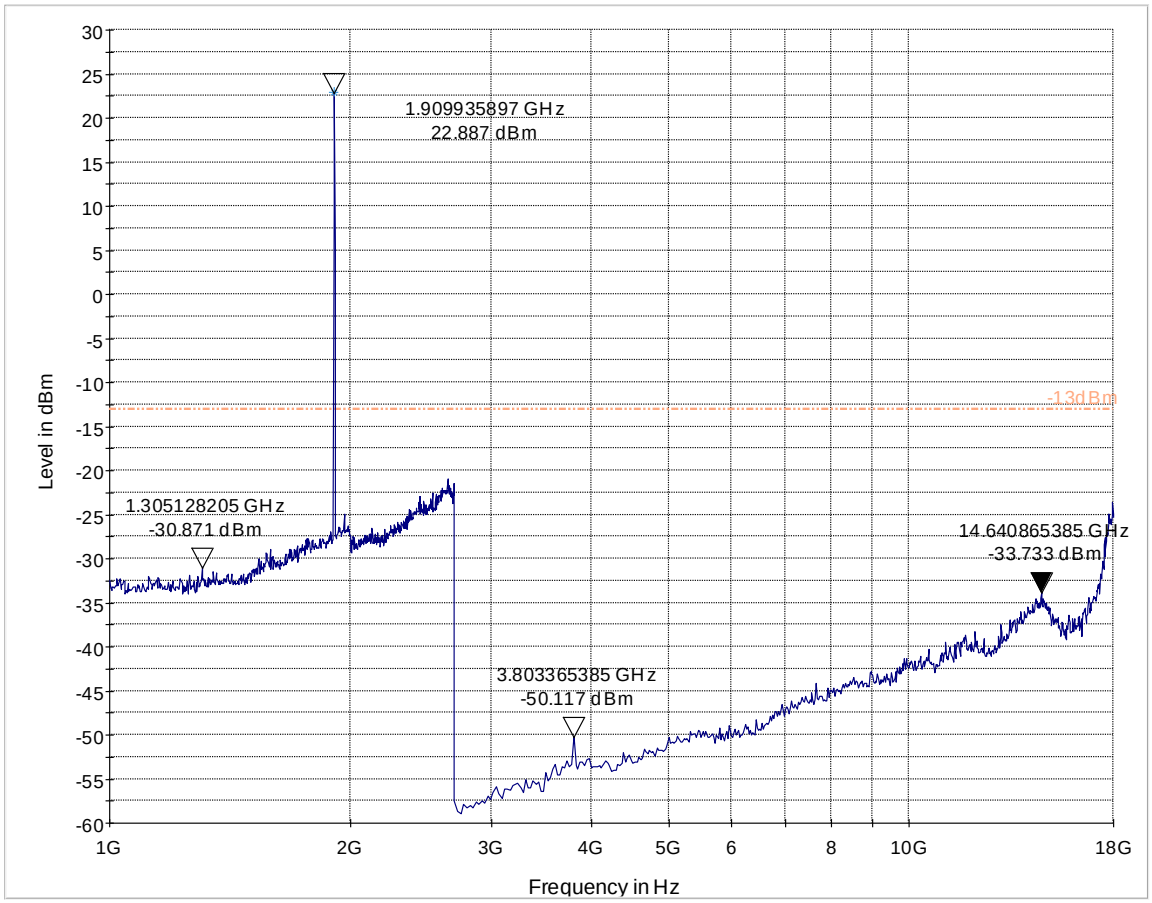
Test results 18GHz-19.1GHz



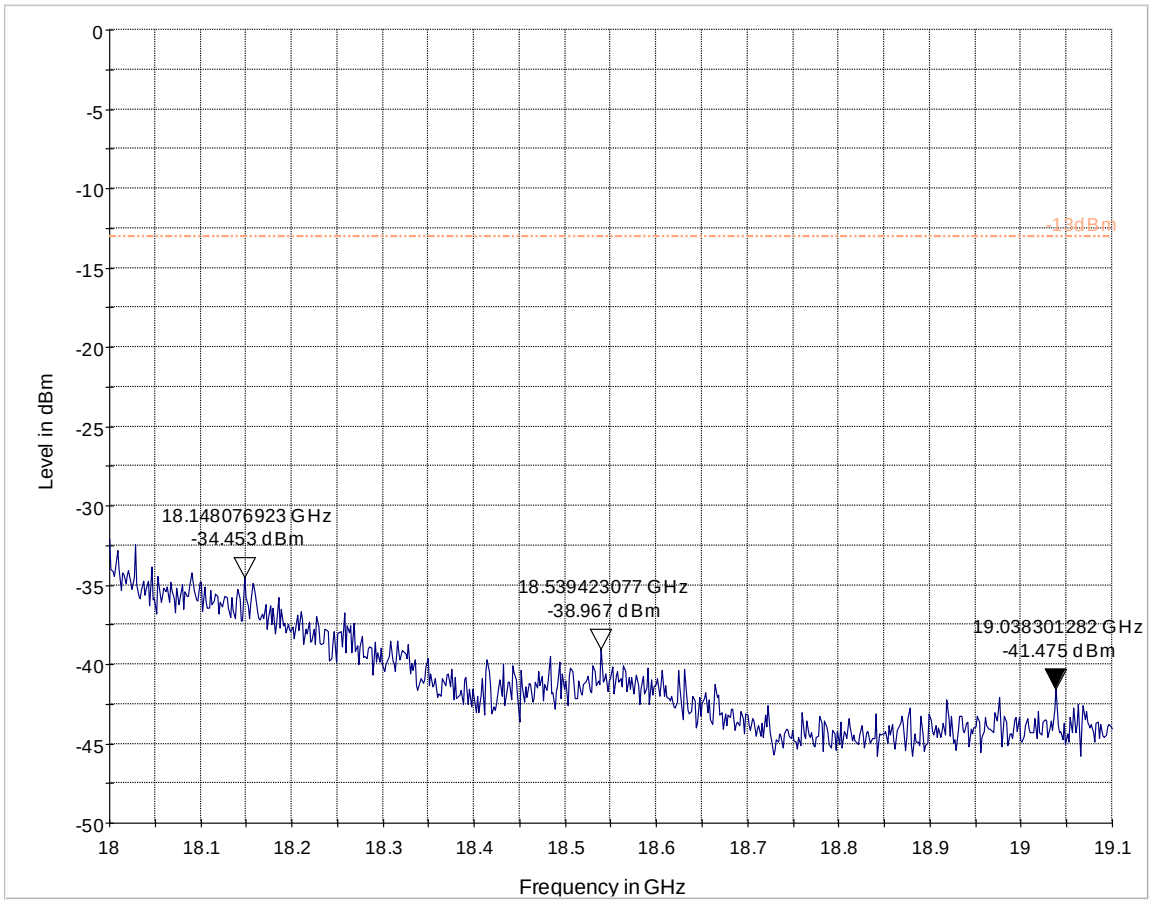
Radiated Spurious Emissions (GSM 1900MHz) Tx: High Channel
Test results 30MHz-1GHz



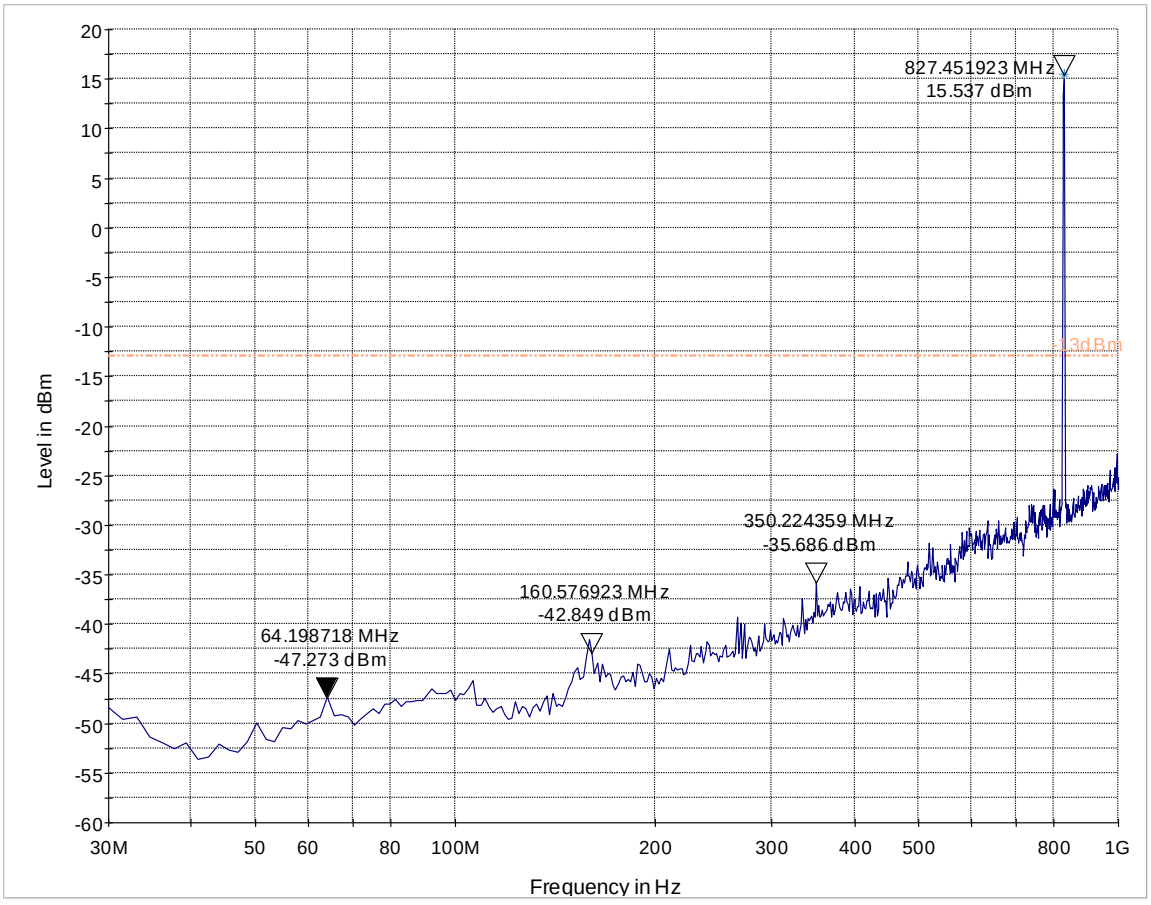
Test results 1GHz-18GHz



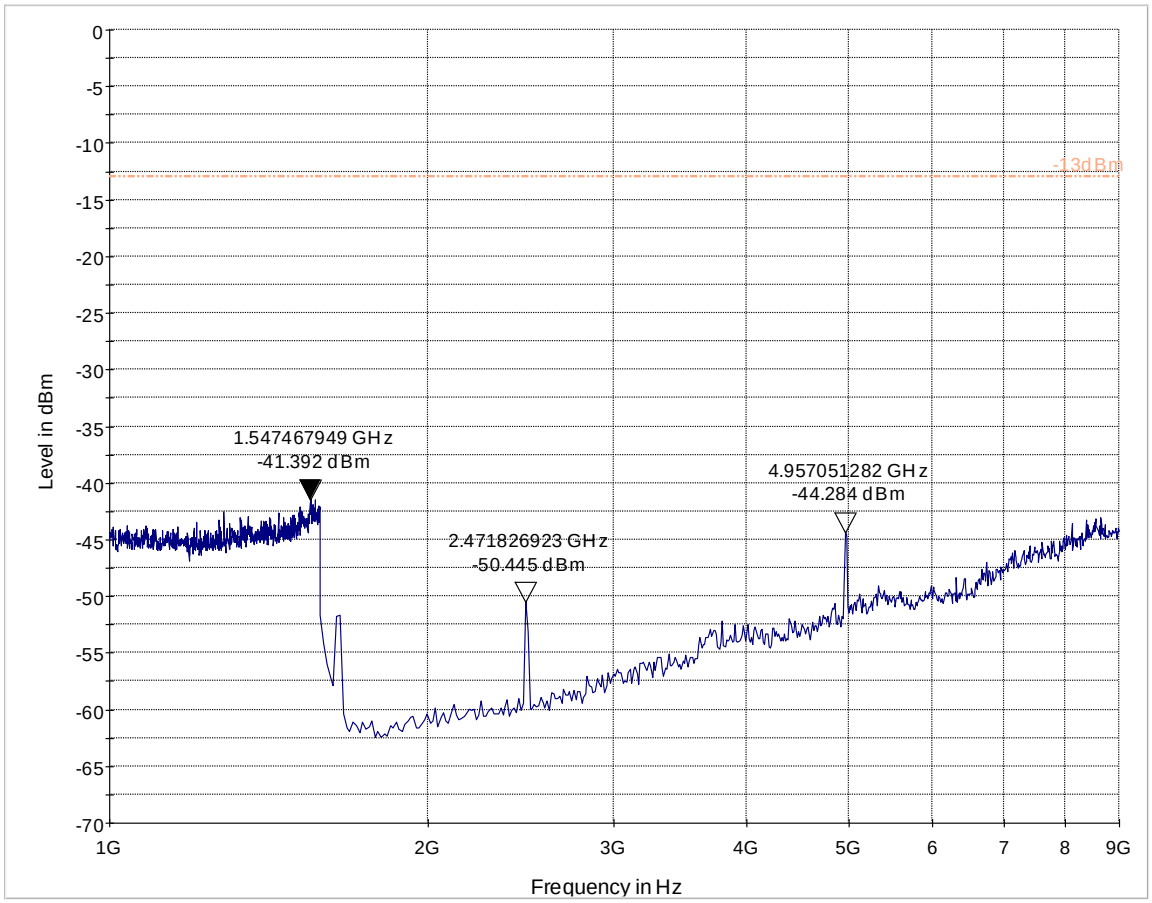
Test results 18GHz-19.1GHz



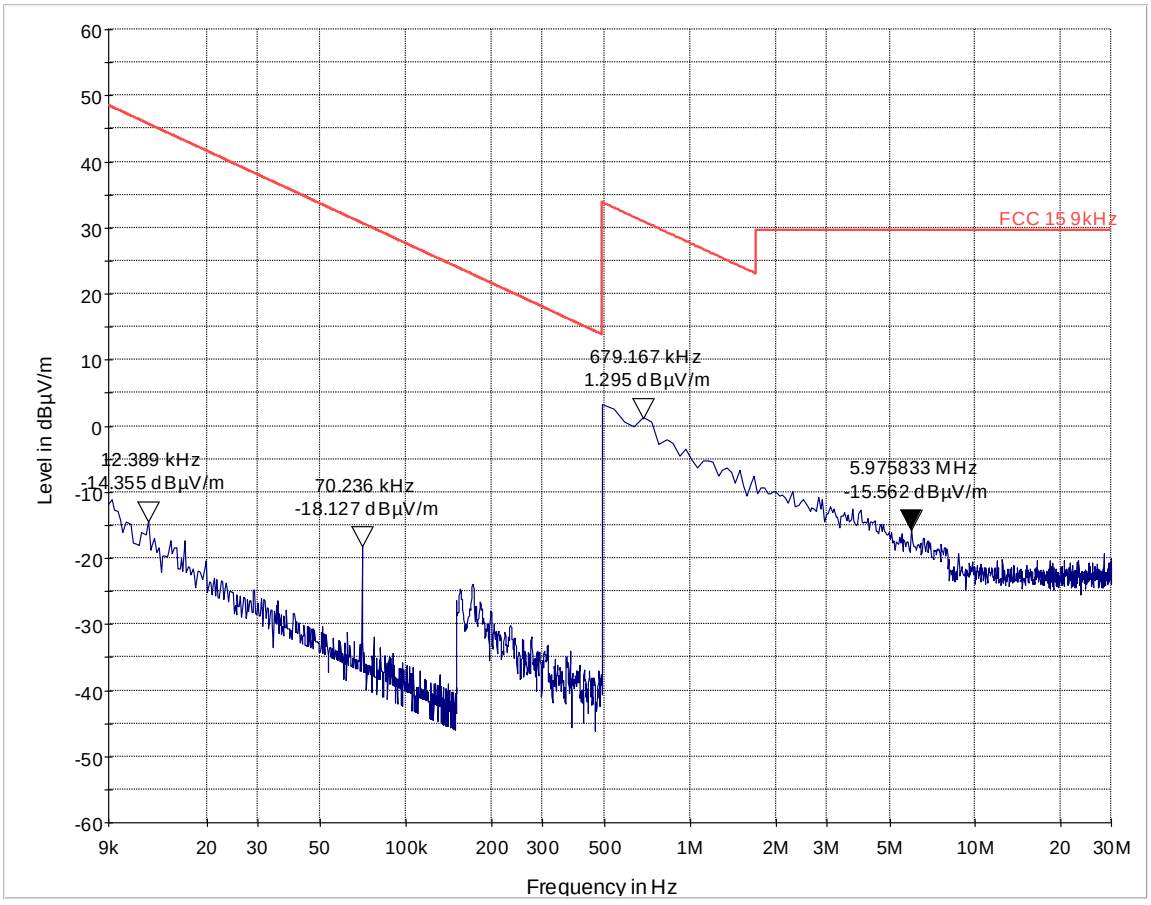
Radiated Spurious Emissions (UMTS FDD V) Tx: Low Channel
Test results 30MHz-1GHz



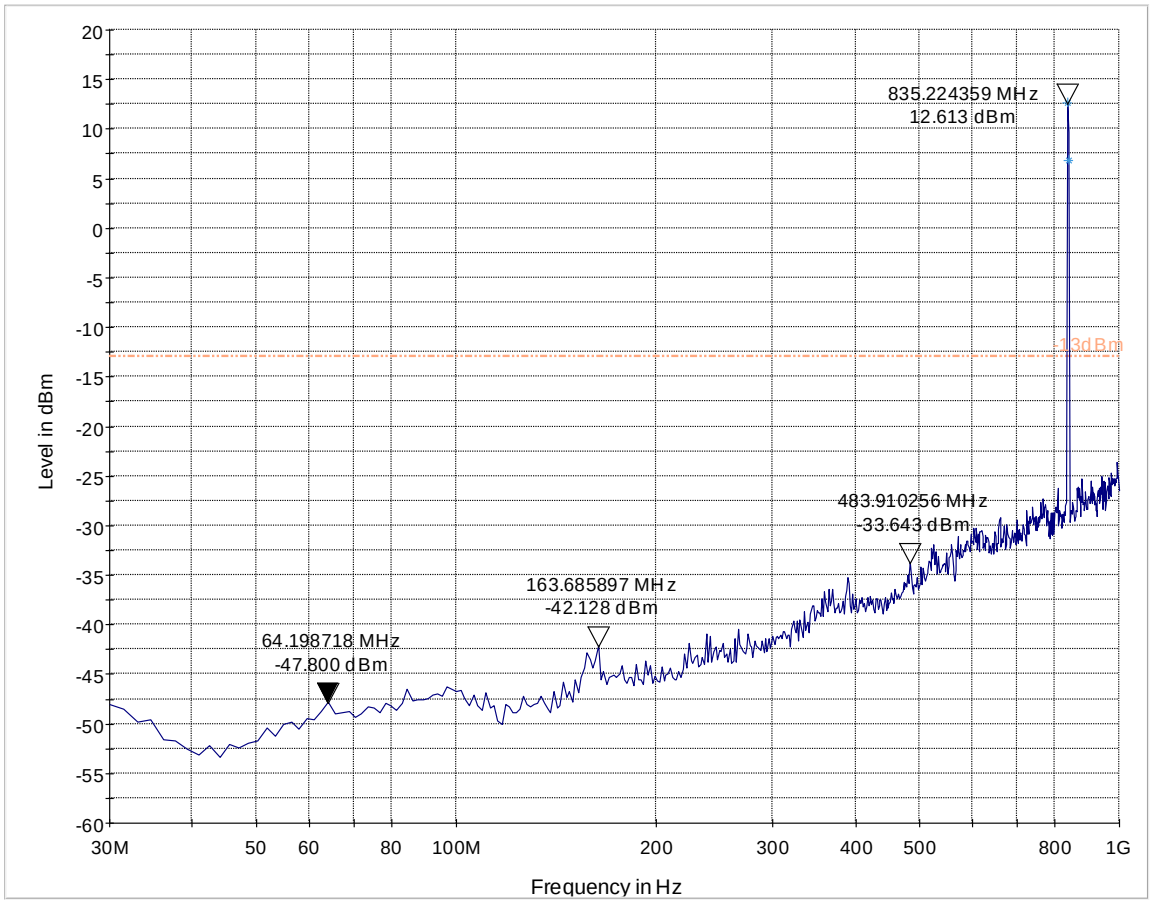
Test results 1GHz-9GHz



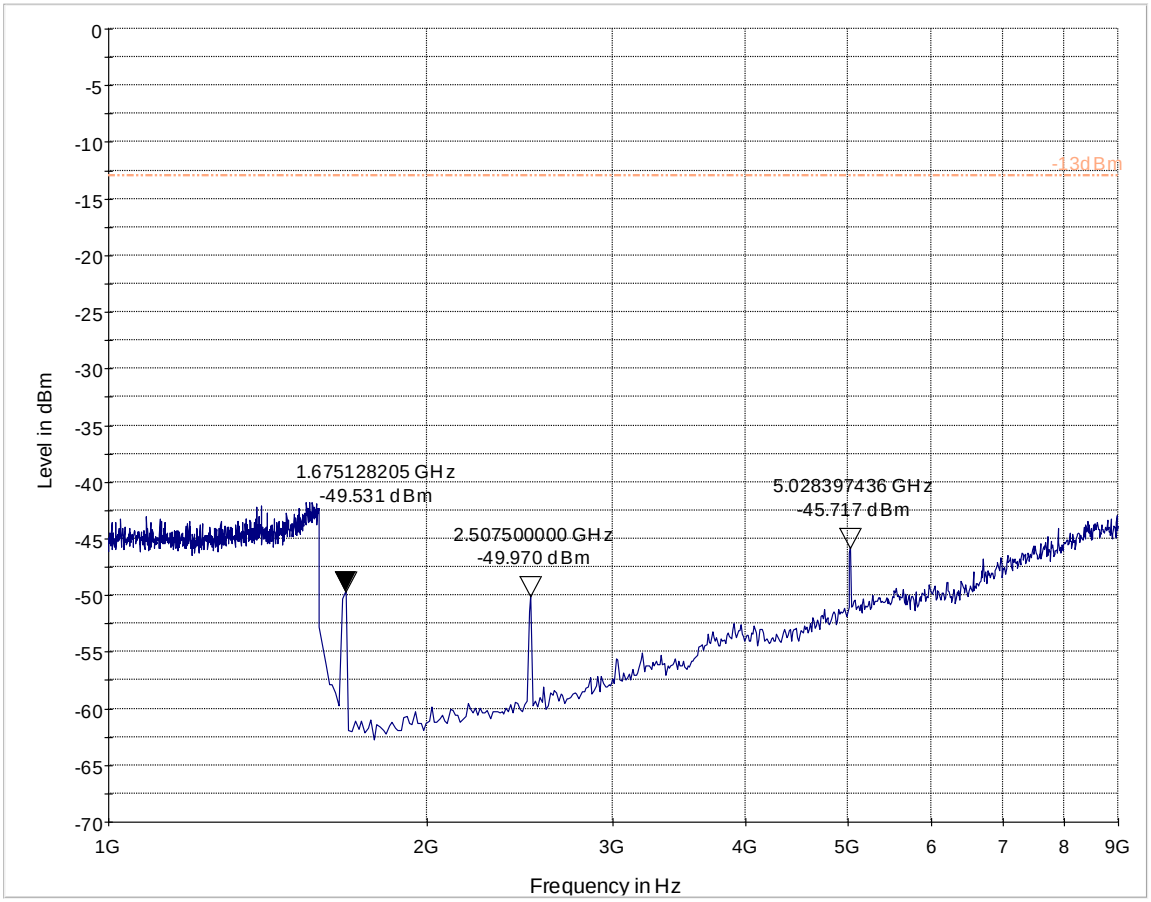
Radiated Spurious Emissions (UMTS FDD V) Tx: Mid Channel
Test results 9kHz-30MHz



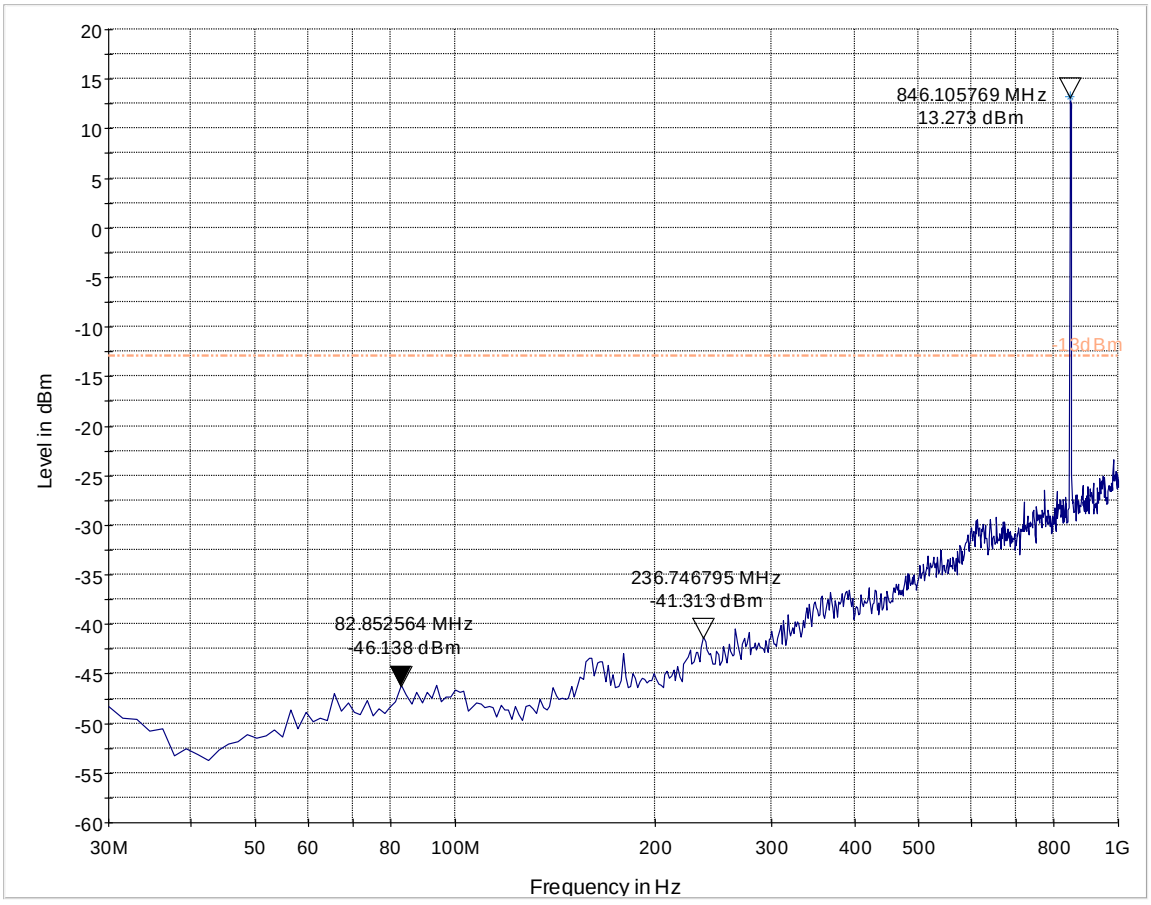
Test results 30MHz-1GHz



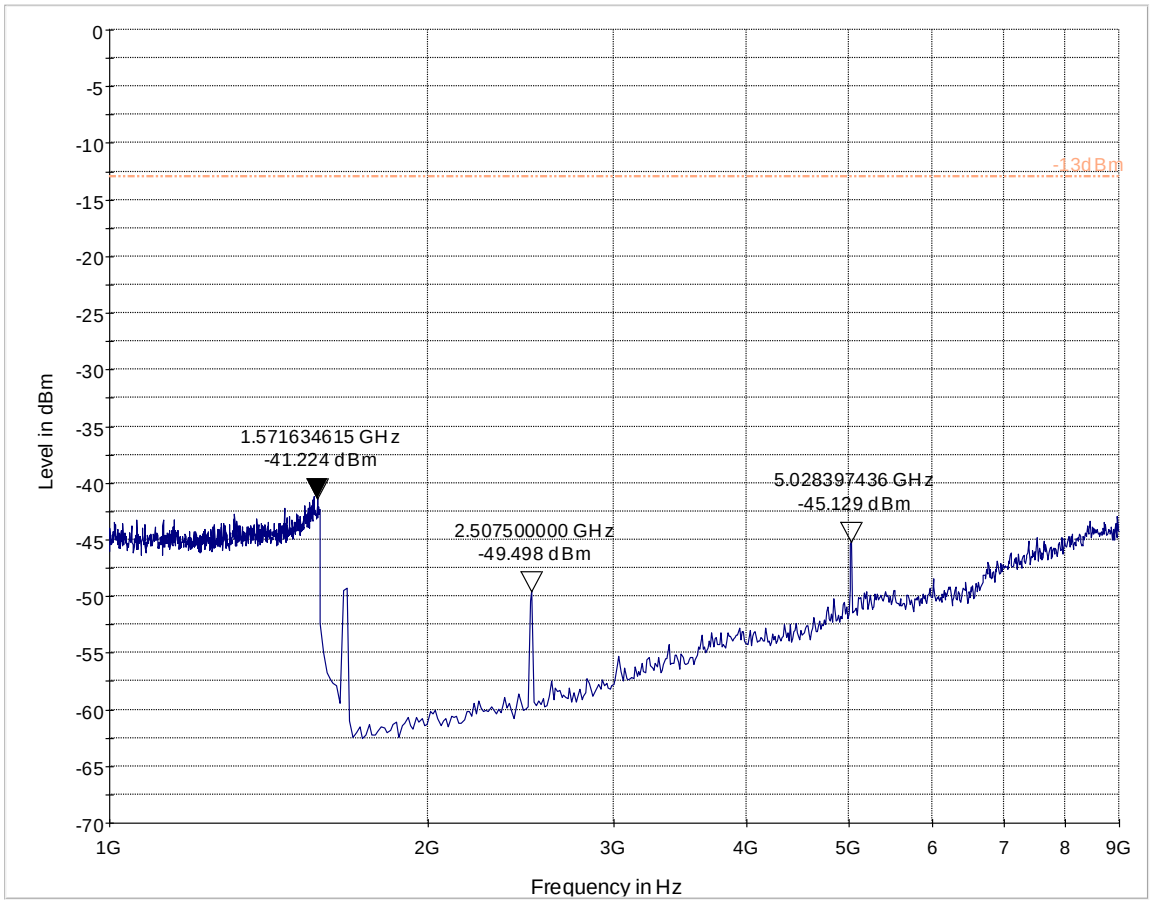
Test results 1GHz-9GHz



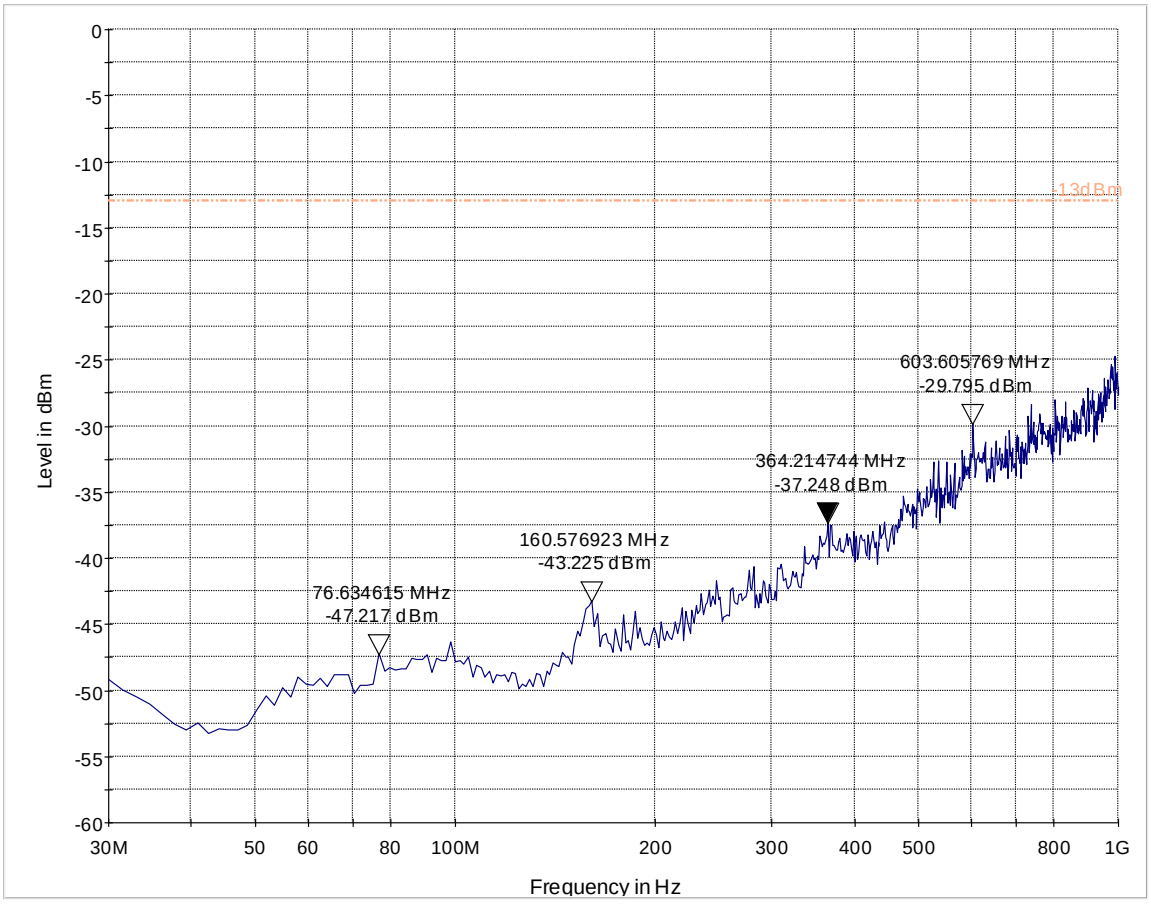
Radiated Spurious Emissions (UMTS FDD V) Tx: High Channel
Test results 30MHz-1GHz



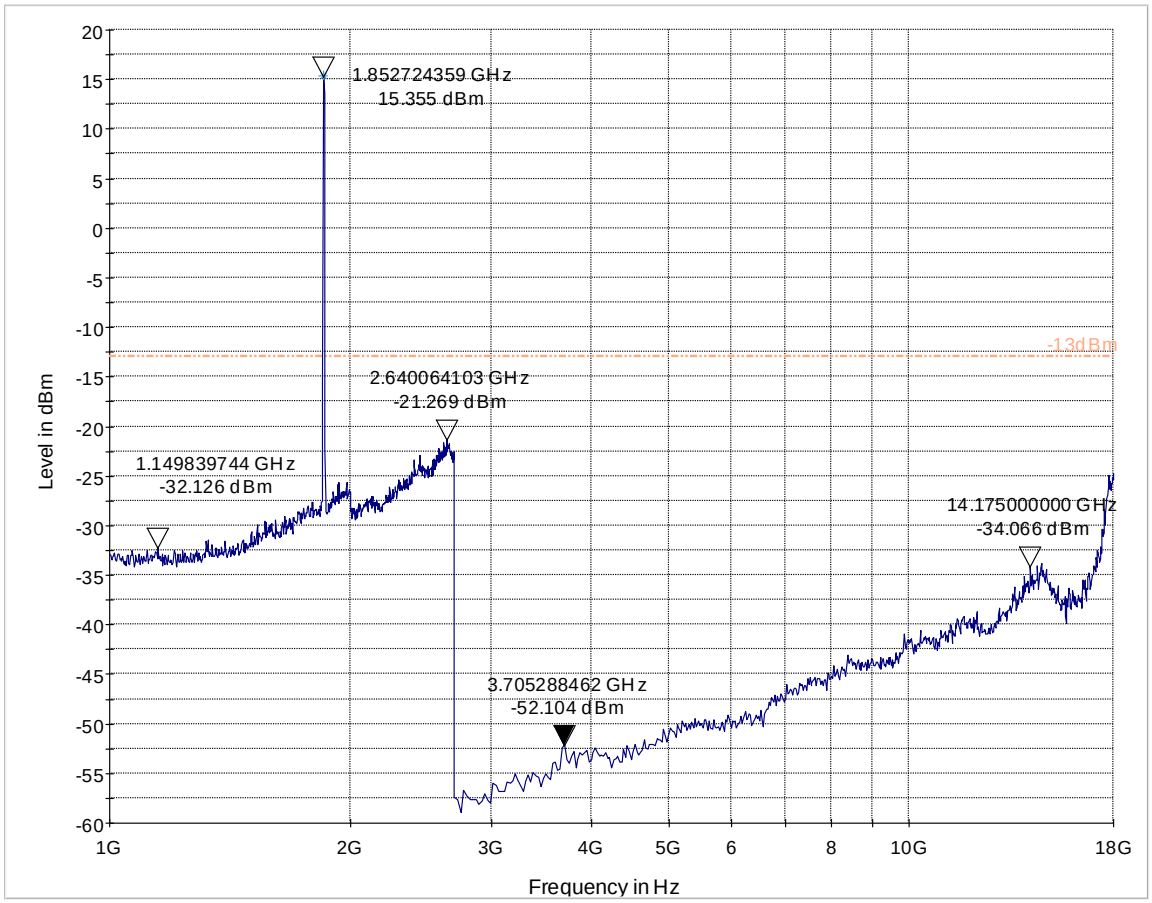
Test results 1GHz-9GHz



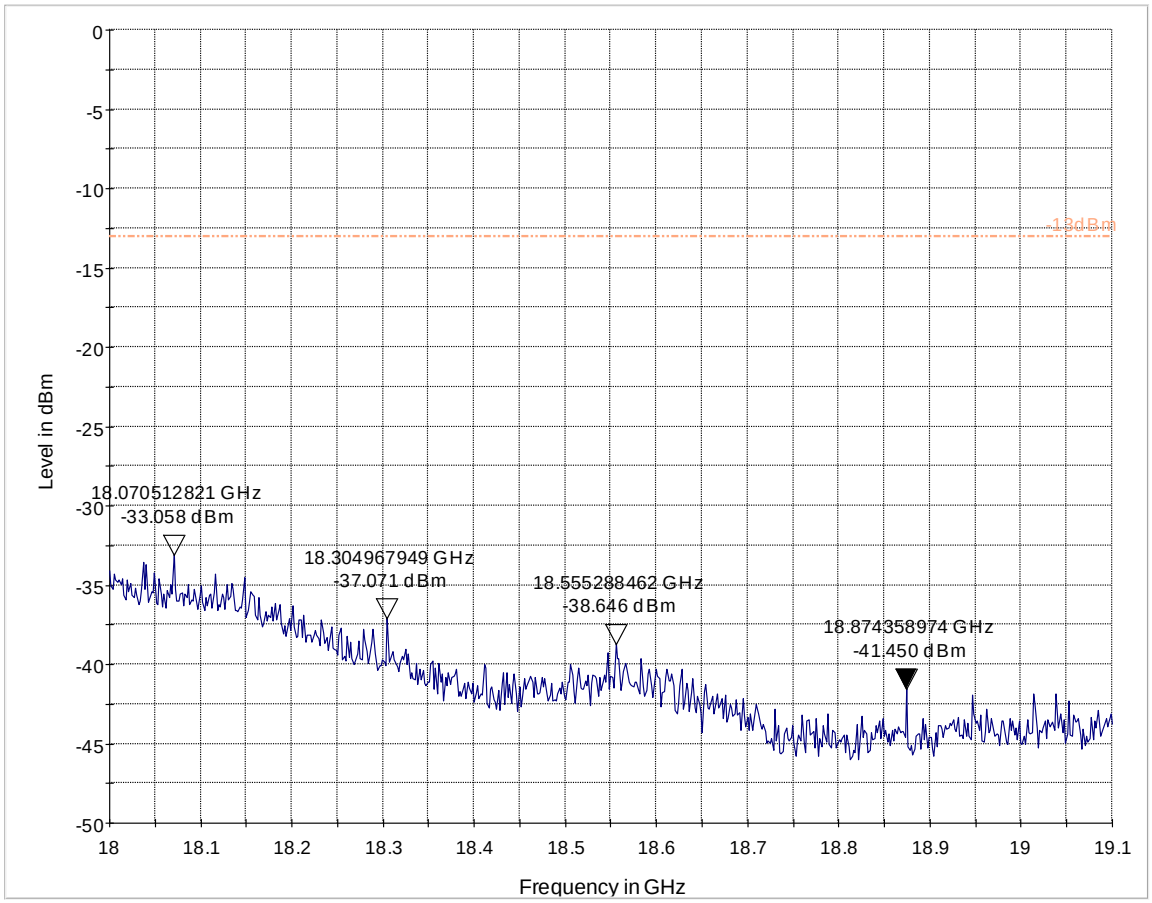
Radiated Spurious Emissions (UMTS FDD II) Tx: Low Channel
Test results 30MHz-1GHz



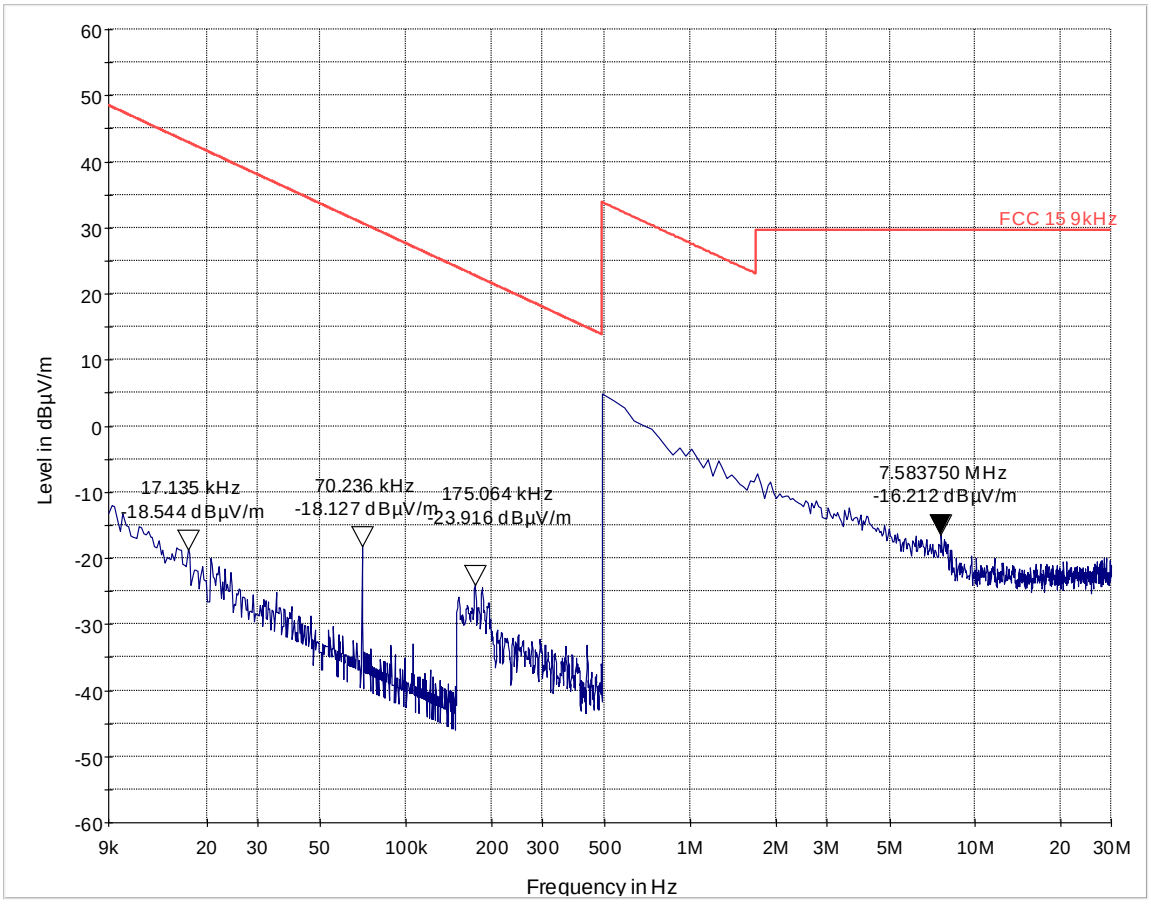
Test results 1GHz-18GHz



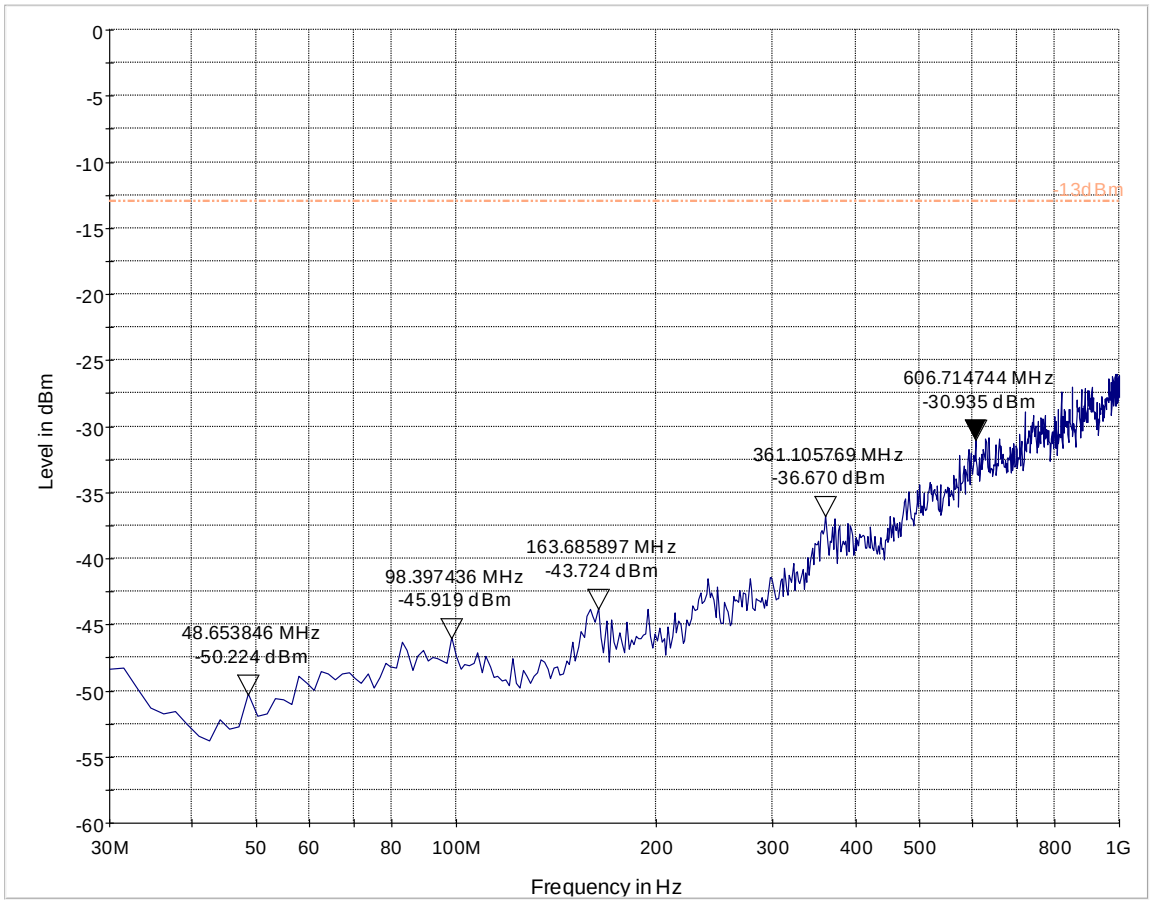
Test results 18GHz-19.1GHz



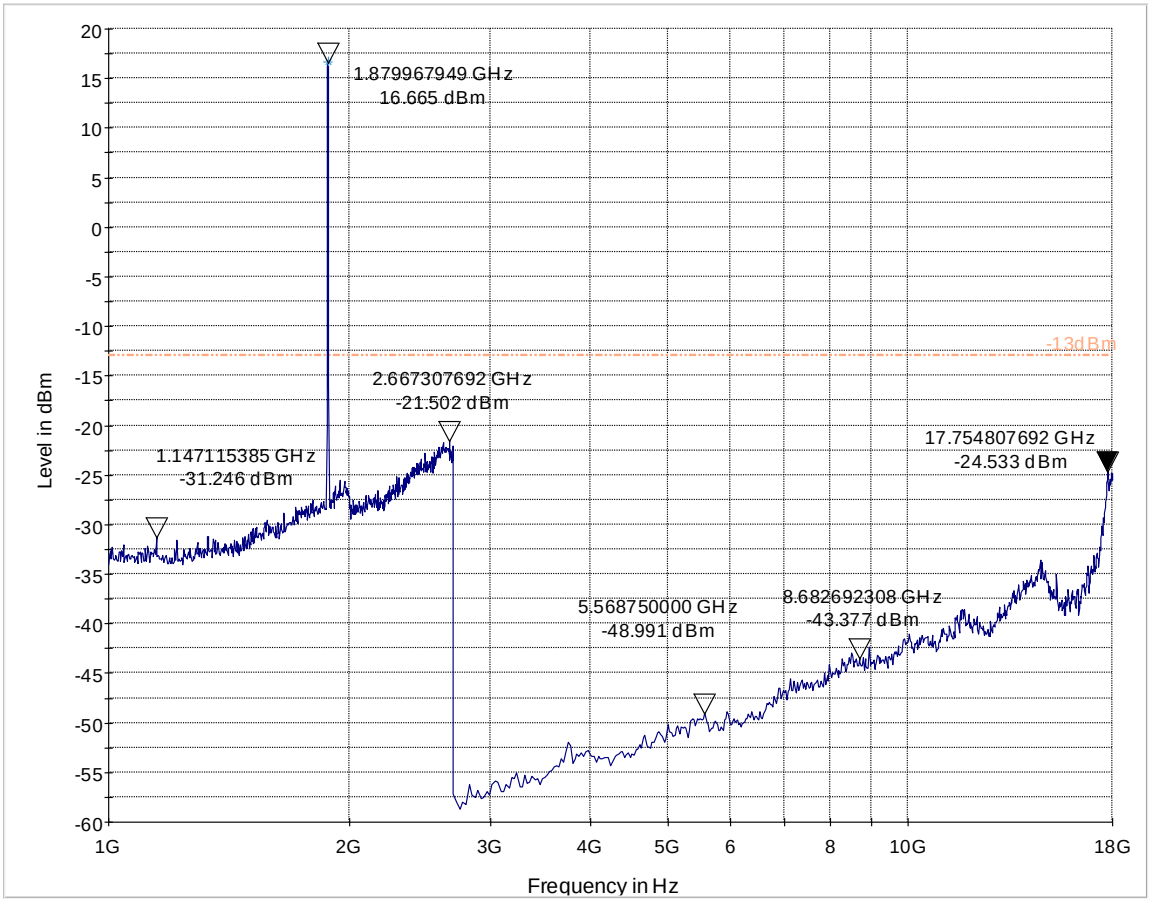
Radiated Spurious Emissions (UMTS FDD II) Tx: Mid Channel
Test results 9kHz-30MHz



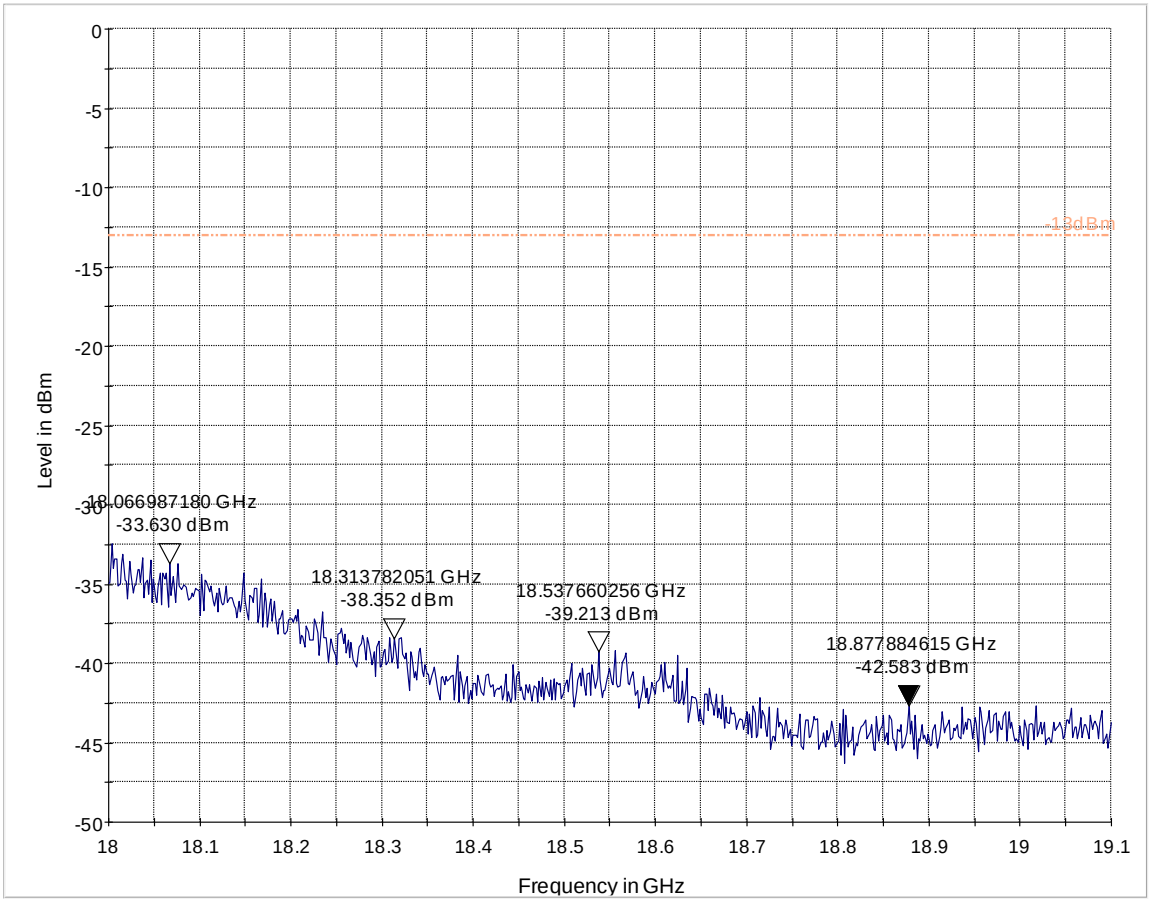
Test results 30MHz-1GHz



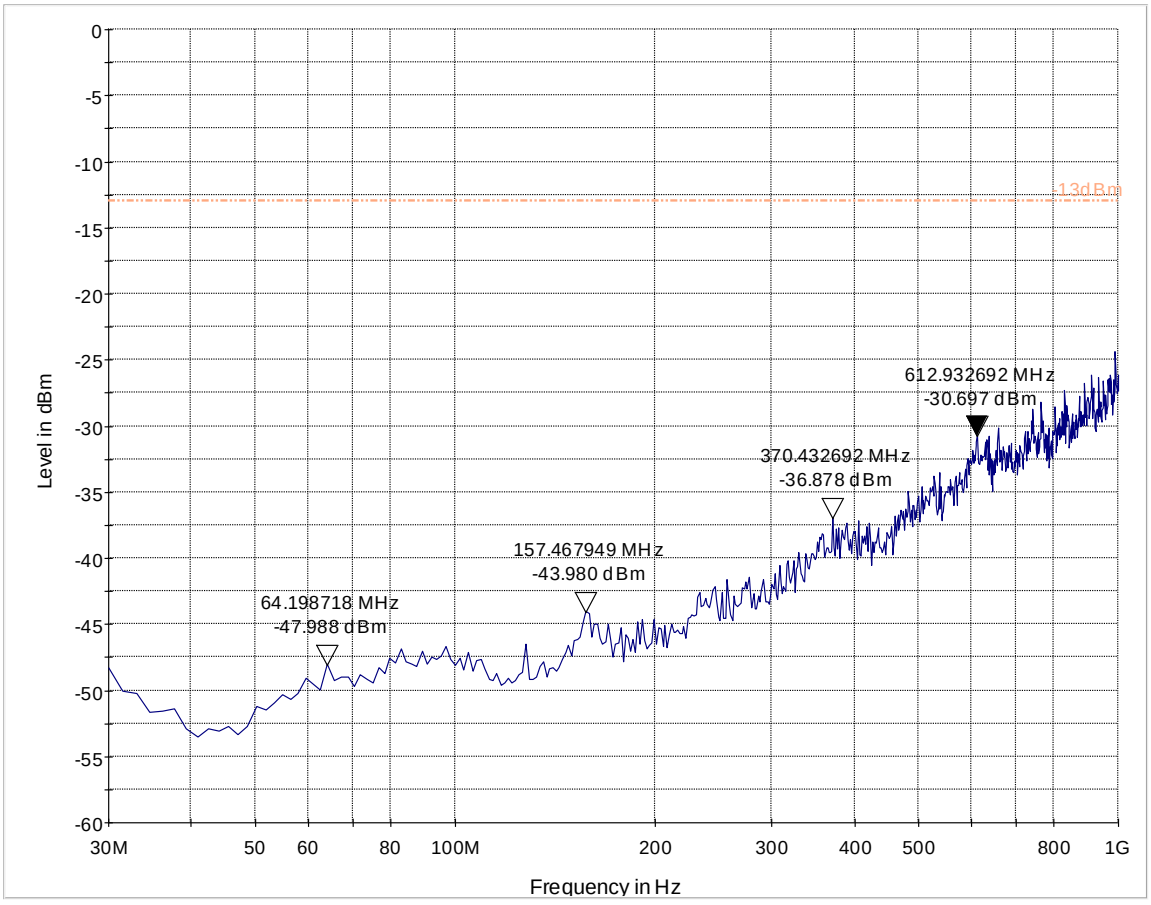
Test results 1GHz-18GHz



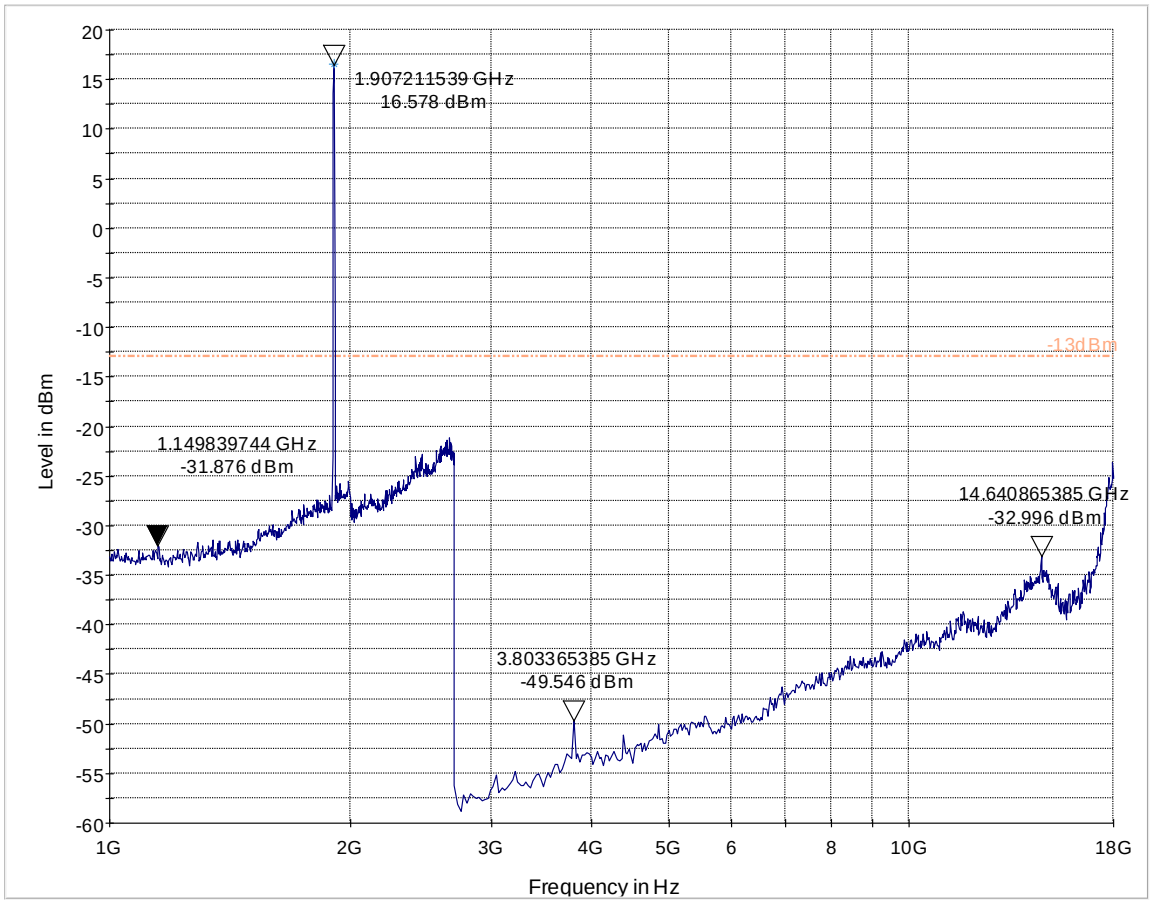
Test results 18GHz-19.1GHz



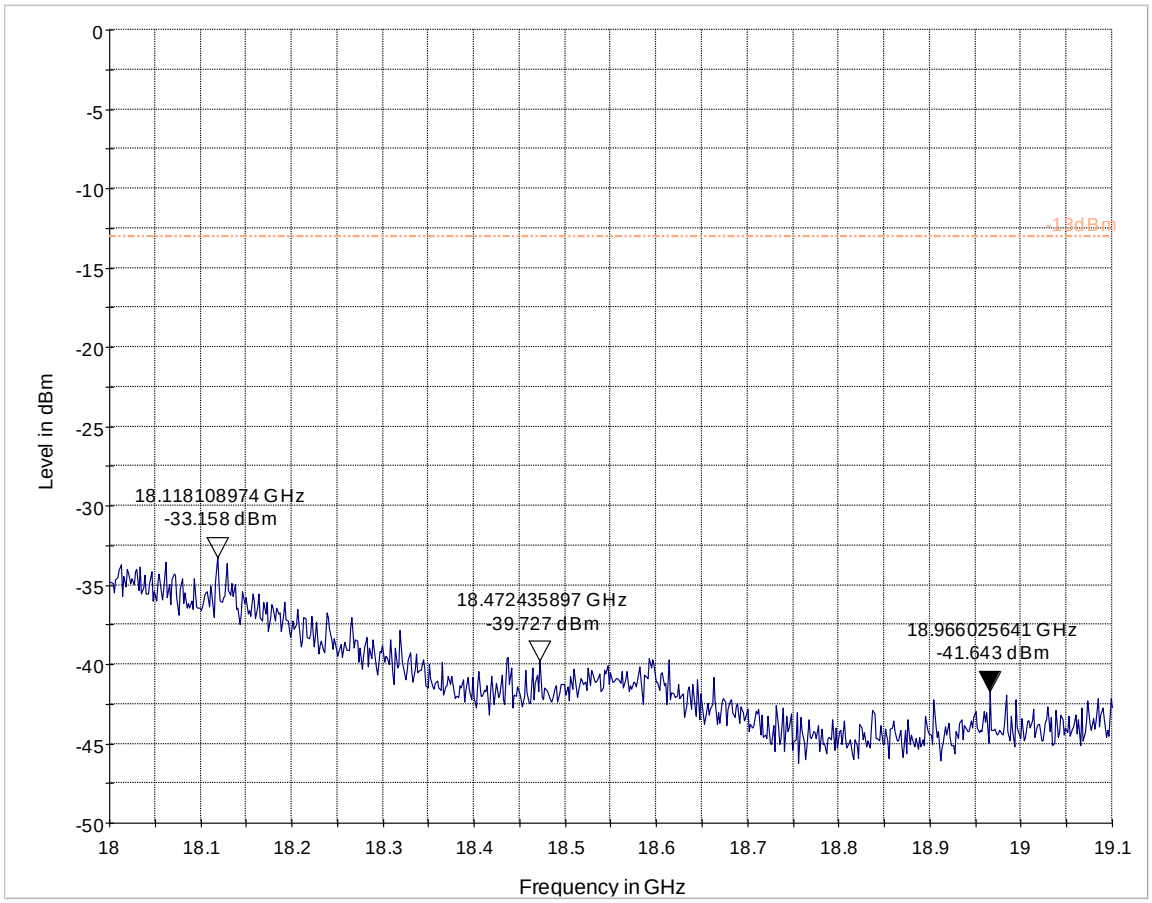
Radiated Spurious Emissions (UMTS FDD II) Tx: High Channel
Test results 30MHz-1GHz



Test results 1GHz-18GHz



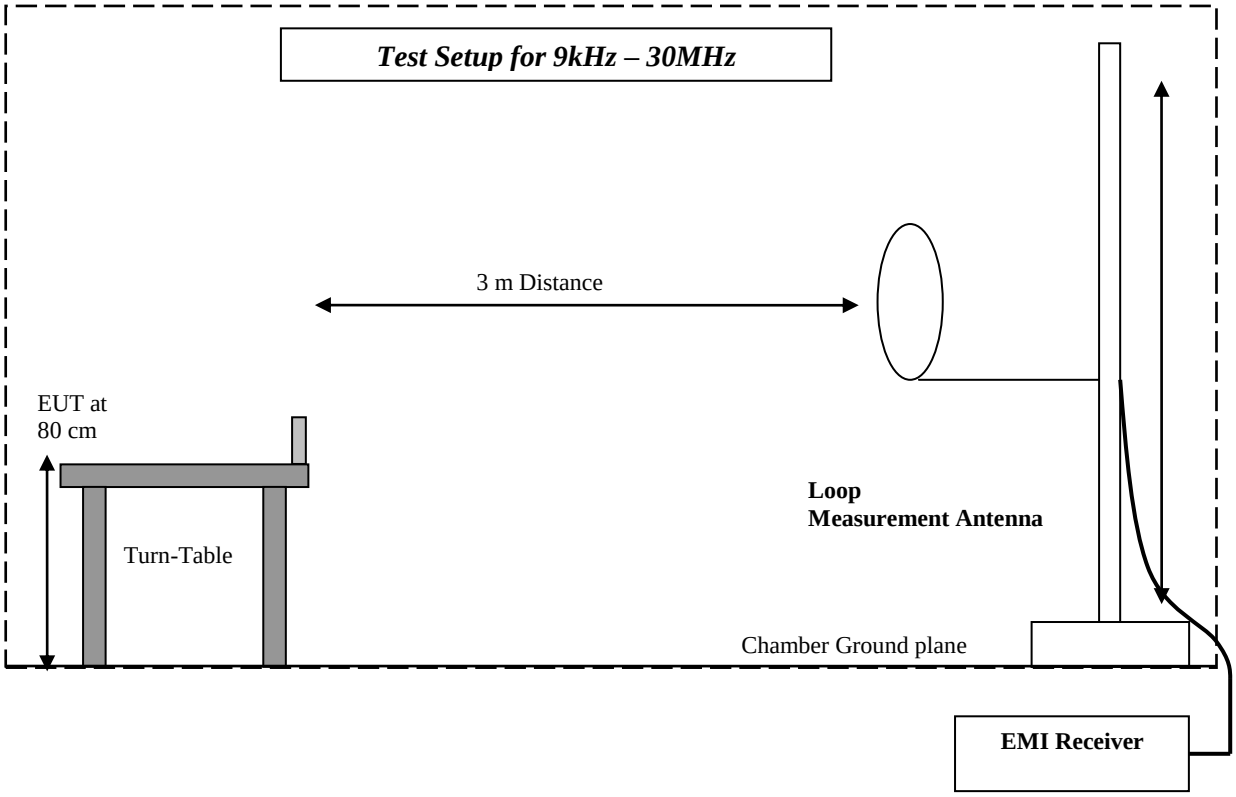
Test results 18GHz-19.1GHz

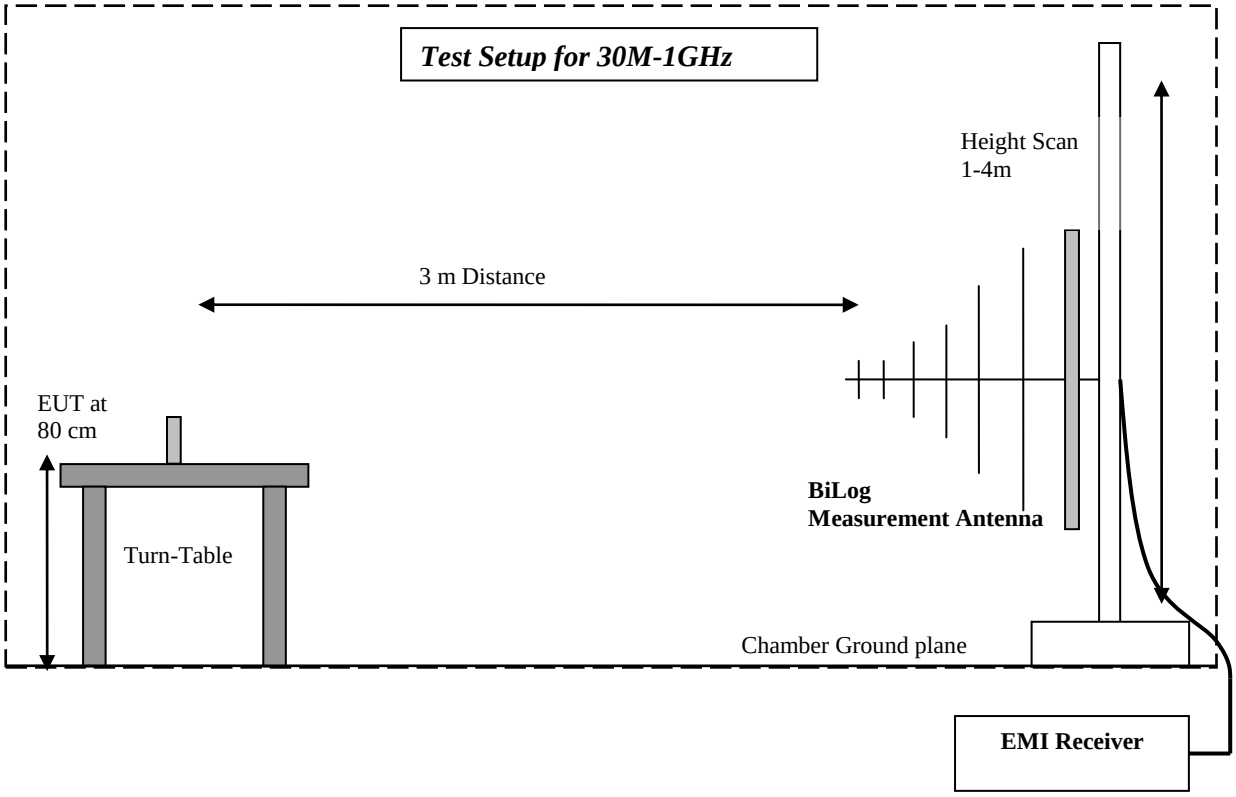


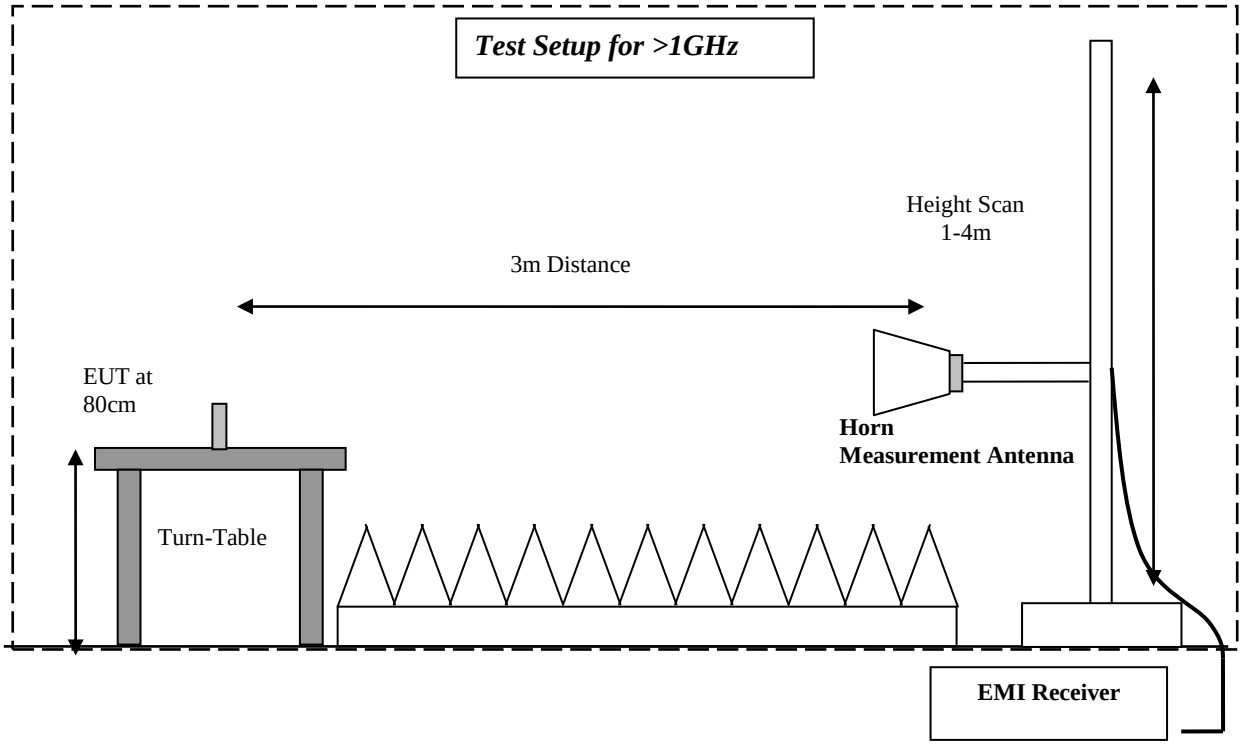
7 Test Equipment and Ancillaries used for tests

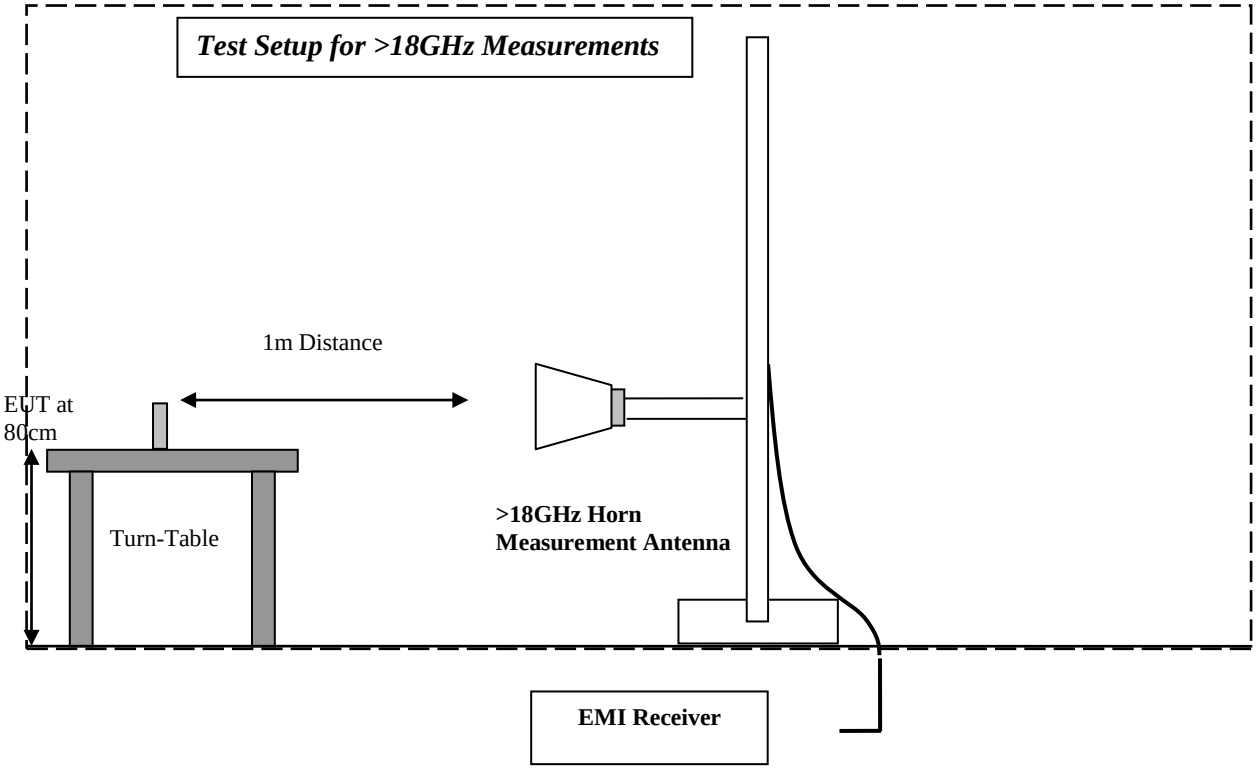
No.	Equipment Name	Manufacturer	Type/model	Serial No.	Cal Date	Cal Interval
3m Semi- Anechoic Chamber:						
	Turn table	EMCO	2075	N/A	N/A	N/A
	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
	Antenna Mast	EMCO	2075	N/A	N/A	N/A
	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
	EMI Receiver/Analyzer(*)	Rohde&Schwarz	ESU 40	100365	Feb 2013	2 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 2012	3 Years
	Binconilog Antenna	ETS	3149	J000123908	Feb 2012	3 years
	Horn Antenna	EMCO	3115	35114	Mar 2012	3 Years
	LISN	FCC	50-25-2-08	08014	Jul 2012	2 Year
Ancillary equipment						
	Multimeter	Klein Tools	MM200	001	Apr 2011	3 Years
	Humidity Temperature Logger	Dickson	TM320	03280063	Apr 2013	1 Year
	Digital Barometer	VWR	35519-055	91119547	Nov 2011	3 Years
	DC Power Supply	HP	E3610A	KR83023316	N/A	N/A
	DC Power Supply	Protek	3003B	H012771	N/A	N/A
	Communication Antenna	IBP5-900/1940	Kathrein	N/A	N/A	N/A

8 Test Setup Diagrams






Test Setup for >1GHz
Height Scan
1-4m
3m Distance
EUT at
80cm
Horn
Measurement Antenna
Turn-Table
EMI Receiver


Test Setup for >18GHz Measurements
1m Distance
EUT at
80cm
>18GHz Horn
Measurement Antenna
Turn-Table
EMI Receiver

9 Revision History

Date	Report Name	Changes to report	Report prepared by
2014-03-20	EMC_VERIT-001-13001_AT_250_FCC22_24	First Version	Kenneth Reyes