



FCC/IC Test Report

FOR:

Manufacturer: Embedded Wireless Labs Sdn Bhd

Model Number: ZMX8100

Product Description: Digital Transmission System

FCC ID: R42ZMX8100

47 CFR Part 2, 22, 24

TEST REPORT #: EMC_EMBED-001-12001_WWAN

DATE: 2012-12-06



**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	3
2	Administrative Data	4
2.1	Identification of the Testing Laboratory Issuing the Test Report	4
2.2	Identification of the Client	4
2.3	Identification of the Manufacturer	4
3	Equipment under Test (EUT)	5
3.1	Specification of the Equipment under Test	5
3.2	Identification of the Equipment Under Test (EUT)	6
3.3	Identification of Accessory equipment.....	6
3.4	Environmental conditions during Test:	6
3.5	Dates of Testing:	6
4	Subject of Investigation	7
5	Summary of Measurement Results.....	8
6	Measurements.....	10
6.1	RF Power Output.....	10
6.1.1	References	10
6.1.2	Measurement requirements:	10
6.1.3	Limits:	10
6.1.4	Conducted Output Power Verification:	11
6.1.5	Radiated Output Power Measurement procedure	14
6.2	Spurious Emissions Radiated	26
6.2.1	References	26
6.2.2	Measurement requirements:	26
6.2.3	Limits:	26
6.2.4	Radiated out of band measurement procedure:	27
6.2.5	Sample Calculations for Radiated Measurements	28
6.2.6	Measurement Survey:	28
6.2.7	Test Conditions:	28
6.3	Radiated out of band emissions results on EUT- Transmit Mode:	29
6.3.1	Test Results Transmitter Spurious Emission GSM850:	29
6.3.2	Test Results Transmitter Spurious Emission UMTS FDDV	36
6.3.3	Test Results Transmitter Spurious Emission PCS-1900:	43
6.3.4	Test Results Transmitter Spurious Emission UMTS FDD II:	51
7	Test Equipment and Ancillaries used for tests	59
8	Test Setup Diagrams	60
9	Revision History	61

1 Assessment

The following equipment (and as identified in Ch.3 of this test report) was evaluated against the applicable criteria specified in FCC CFR47 Parts 2, 22 and 24 and no deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Embedded Wireless Labs Sdn Bhd	Digital Transmission System	ZMX8100

Responsible for Testing Laboratory:

2012-12-06	Compliance	Sajay Jose (EMC Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

2012-12-06	Compliance	Calvin Lee (Test 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
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Manager:	Sajay Jose
Test Engineer:	Calvin Lee

2.2 Identification of the Client

Client:	Embedded Wireless Labs Sdn Bhd
Street Address:	702, Level 7, Uptown 2, 2, Jalan SS21/37, Damansara Uptown,
City/Zip Code	Petaling Jaya, Selangor, Malaysia 47400
Country	MALAYSIA
Contact Person:	Jeyaraman
Phone No.	+60376609787
Fax:	+60376609786

2.3 Identification of the Manufacturer

Same as Client.

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	Zilant Health Server
Model Number:	ZMX8100
FCC ID:	R42ZMX8100
HW Version:	V2R1
SW Version:	03.0103.02.05.05.2990
Product Description:	Digital Transmission System
Frequency Range of Test:	GSM-850: 824.2-848.8MHz; PCS-1900: 1850.2-1909.8MHz FDD V: 826.4-846.6MHz; FDD II: 1852.4-1907.6MHz
No. of Channels:	GSM850: 125 and PCS-1900: 300 FDD II: 278 and FDD V: 102
Type(s) of Modulation:	GSM: GMSK, 8-PSK UMTS: QPSK
Antenna Info:	High Gain Penta-Band Cellular Antenna (<i>used for testing purposes only; no specified antenna sold with the device</i>) Manufacturer stated Max Antenna Gain : 1.5 dBi for 850 MHz band of operation 4 dBi for 1900 MHz band of operation
Other Radios in the device:	Bluetooth: 2402 – 2480 MHz 802.15.4 (ZigBee): 2405-2480 MHz WLAN: 2412-2462 MHz
Rated Operating Voltage:	12 VDC
Rated Operating Temperature Range:	0°C to 50°C
Test Sample Status:	Prototype

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Notes
1	EW03010000076	V2R1	03.0103.02.05.05.2990	Radiated Sample
2	EW03010000141	V2R1	03.0103.02.05.05.2990	Conducted Sample

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Notes
1	AC/DC Adapter	Universal Range AC Input	SYS1359-3612-T3	
2	Antenna	Alpha Micro Wireless	AMC-ANTGS9C55TD	Used for testing purposes only. No antennas sold with the device.

3.4 Environmental conditions during Test:

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

Ambient Temperature: 20-25°C

Relative humidity: 40-60%

3.5 Dates of Testing:

Nov 5-6, 2012.

4 Subject of Investigation

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

- 47 CFR Part 2: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission Frequency allocations and radio treaty matters; general rules and regulations.
- 47 CFR Part 22: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 22- Public mobile services
- 47 CFR Part 24: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 24- Personal communication services

This test report is to support a request for new equipment authorization with FCC ID: **R42ZMX8100**.

Model ZMX8100 integrates the precertified WWAN module MC8790 from Sierra Wireless.

Per guidelines from KDB 996369, conducted signal test data from module certification has been re-used for this certification as the output power has been verified to be identical (within production tolerances and measurement uncertainties).

The module test data can be obtained under the FCC Filing ID: N7N-MC8790, Test Report #MC8790 issued by Sierra Wireless, Inc. on Dec 1, 2008.

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

5 Summary of Measurement Results

850 MHz Band:

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

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

1. Conducted measurements reused from module certification data.

1900 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a)	RF Output Power	Nominal	PCS-1900	■	□	□	□	Complies
			UMTS Band II	■	□	□	□	Complies
§2.1055 §24.235	Frequency Stability	Nominal	PCS-1900	□	□	□	■	Note 1
			UMTS Band II	□	□	□	■	Note 1
§2.1049 §24.238(b)	Occupied Bandwidth	Nominal	PCS-1900	□	□	□	■	Note 1
			UMTS Band II	□	□	□	■	Note 1
§2.1051 §24.238	Band Edge Compliance	Nominal	PCS-1900	□	□	□	■	Note 1
			UMTS Band II	□	□	□	■	Note 1
§2.1051 §24.238	Conducted Spurious Emissions	Nominal	PCS-1900	□	□	□	■	Note 1
			UMTS Band II	□	□	□	■	Note 1
§2.1053 §24.238	Radiated Spurious Emissions	Nominal	PCS-1900	■	□	□	□	Complies
			UMTS Band II	■	□	□	□	Complies

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

1. Conducted measurements reused from module certification data.

6 Measurements

6.1 RF Power Output

6.1.1 References

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232, CFR Part 27.50

6.1.2 Measurement requirements:

6.1.2.1 FCC 2.1046: RF power output.

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

6.1.3 Limits:

6.1.3.1 FCC 22.913 (a) Effective radiated power limits.

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

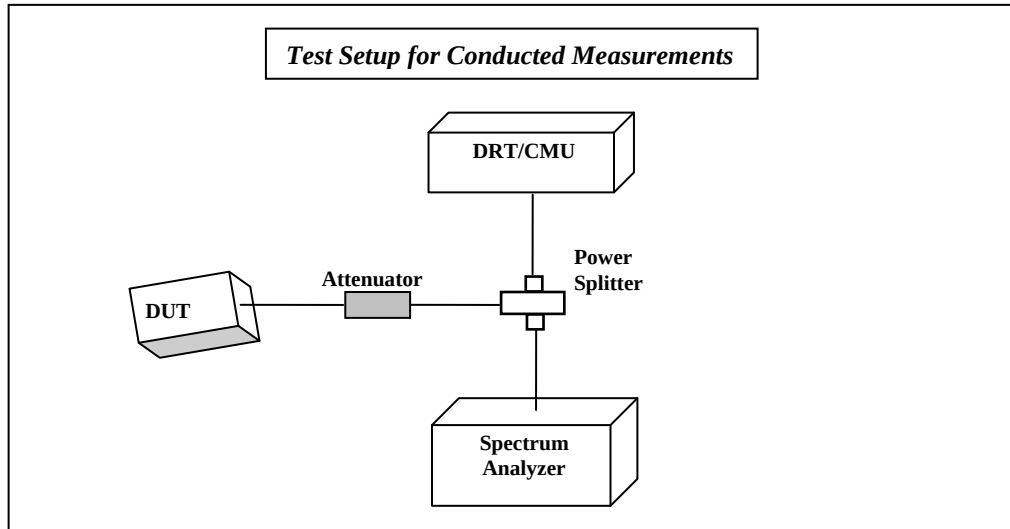
6.1.3.2 FCC 24.232 (b) Power limits.

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

6.1.4 Conducted Output Power Verification:

6.1.4.1 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 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 performed in 1 Uplink configuration
 - b. EGPRS mode measurements performed in 1 Uplink MCS-9 configuration
 - c. UMTS mode measurements performed in RMC 12.2k configuration

Measurement Uncertainty= +/- 0.5 dB

6.1.4.2 Test Conditions:

Tnom: 25°C; Vnom: 12V

6.1.4.3 Measurement Results:

GSM Cellular 850 (GMSK Mode)			
Frequency (MHz)	Conducted Output Power from module certification (Peak)	Conducted Output Power from the EUT (Peak)	Conducted Output Power from the EUT (Ave)
	(dBm)	(dBm)	(dBm)
824.2	31.8	32.4	32.2
836.6	31.8	32.2	32.1
848.8	31.5	32.1	32

GSM Cellular 850 (8PSK Mode)			
Frequency (MHz)	Conducted Output Power from module certification (Ave)	Conducted Output Power from the EUT (Peak)	Conducted Output Power from the EUT (Ave)
	(dBm)	(dBm)	(dBm)
824.2	27.1	30.7	27.5
836.6	27.1	30.5	27.3
848.8	26.8	30.4	27.3

FDD V 850 (UMTS Mode)			
Frequency (MHz)	Conducted Output Power from module certification (Peak)	Conducted Output Power from the EUT (Peak)	Conducted Output Power from the EUT (Ave)
	(dBm)	(dBm)	(dBm)
826.2	26.2	26.5	21.4
836.6	26.5	27.5	22.1
846.6	26.3	27.3	22.1

GSM PCS-1900 (GMSK Mode)			
Frequency (MHz)	Conducted Output Power from module certification (Peak)	Conducted Output Power from the EUT (Peak)	Conducted Output Power from the EUT (Ave)
	(dBm)	(dBm)	(dBm)
1850.2	28.7	29.7	29.6
1880	28.6	29.6	29.4
1909.8	28.6	29.5	29.4

GSM PCS-1900 (8PSK Mode)			
Frequency (MHz)	Conducted Output Power from module certification (Ave)	Conducted Output Power from the EUT (Peak)	Conducted Output Power from the EUT (Ave)
	(dBm)	(dBm)	(dBm)
1850.2	25.9	30	26.8
1880	25.8	29.8	26.6
1909.8	25.8	29.8	26.5

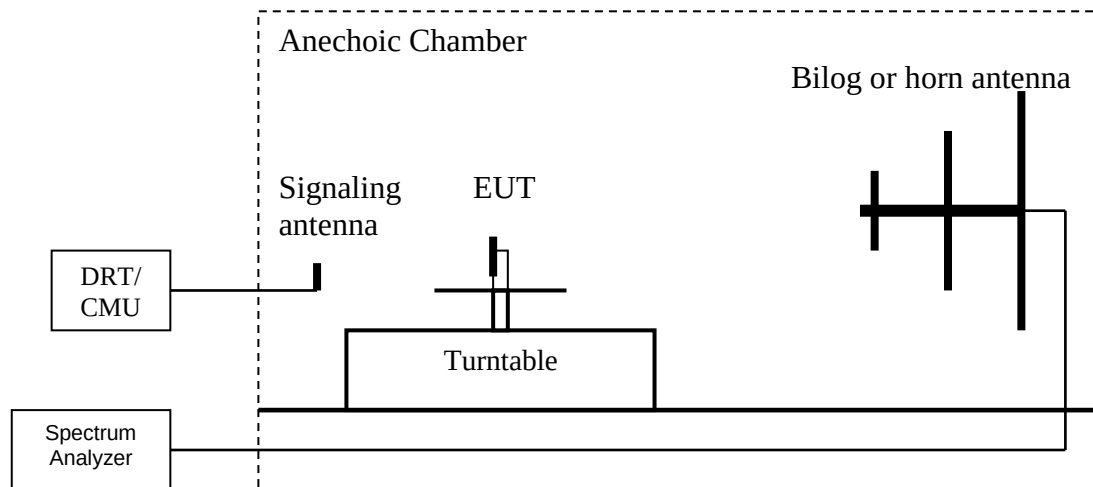
FDD II 1900 (UMTS Mode)			
Frequency (MHz)	Conducted Output Power from module certification (Peak)	Conducted Output Power from the EUT (Peak)	Conducted Output Power from the EUT (Ave)
	(dBm)	(dBm)	(dBm)
1852.4	26.6	27.5	22.8
1880	26.5	27.4	23.0
1907.6	26.5	27.5	22.8

6.1.4.4 Verification Result

Peak output power from module certification test report has been compared to the measured conducted power from the EUT. All results within manufacturer tolerance and measurement uncertainty.

6.1.5 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. Set the analyzer to measure peak hold with the required settings.
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. GPRS and EGPRS modes were tested in 1Uplink CS1 and MCS9 configurations respectively. UMTS configuration was tested in RMC 12.2K mode.

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.)

Measurement Uncertainty (Radiated): ±3.0 dB

6.1.5.1 Test Conditions:

Tnom: 25°C; Vnom: 12 V

6.1.5.2 Limits

Nominal Peak Output Power < 38.45 dBm (7W)

6.1.5.3 Test Results- 850 MHz Band

GSM-850: GMSK Mode	
Frequency (MHz)	Radiated Power
	ERP (dBm)
824.2	32.51
836.6	32.1
848.8	31.3

EGPRS 850: 8PSK Mode	
Frequency (MHz)	Radiated Power
	ERP (dBm)
824.2	30.65
836.6	30.17
848.8	28.67

FDD V: UMTS Mode	
Frequency (MHz)	Radiated Power
	ERP (dBm)
826.4	25.69
836.6	26.01
846.6	26.99

6.1.5.3.1 Test Verdict

Pass.

6.1.5.4 Limits

Nominal Peak Output Power < 33 dBm (2W)

6.1.5.5 Test Results- 1900 MHz Band

PCS-1900: GMSK Mode	
Frequency (MHz)	Radiated Power
	EIRP (dBm)
1850.2	28.15
1880.0	27.95
1909.8	28.3

EGPRS 1900: 8PSK Mode	
Frequency (MHz)	Radiated Power
	EIRP (dBm)
1850.2	26.2
1880.0	25.97
1909.8	26.4

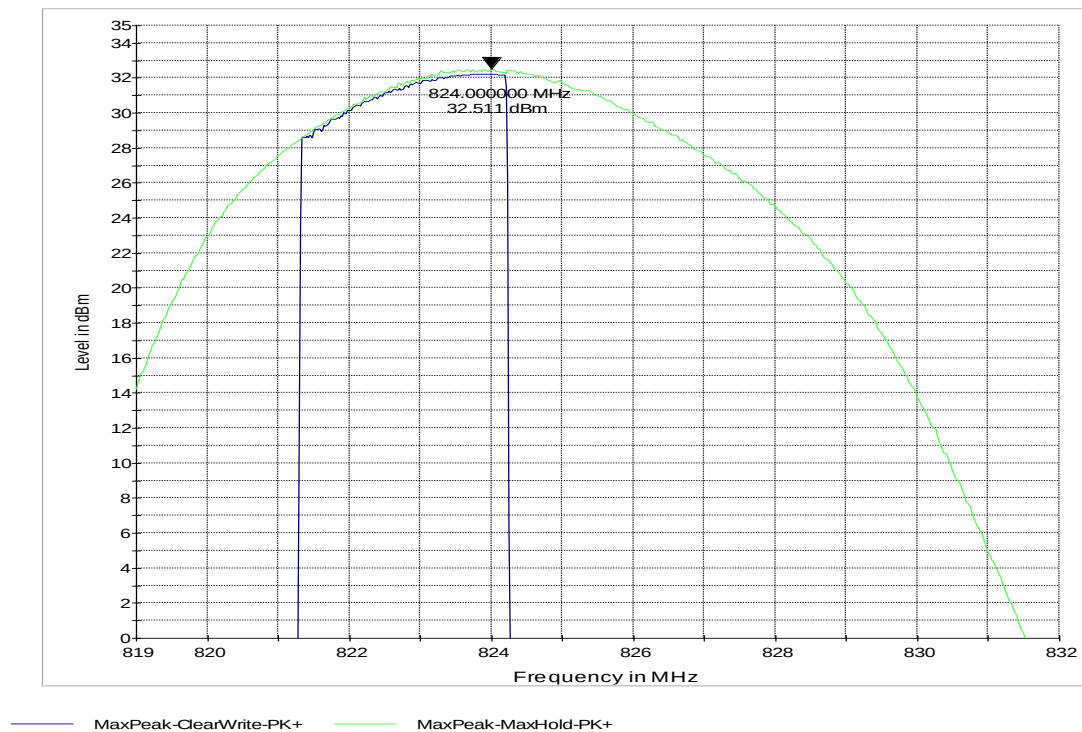
FDD II: UMTS Mode	
Frequency (MHz)	Radiated Power
	EIRP (dBm)
1852.4	25.2
1880.0	26.07
1907.6	24.3

6.1.5.5.1 Test Verdict

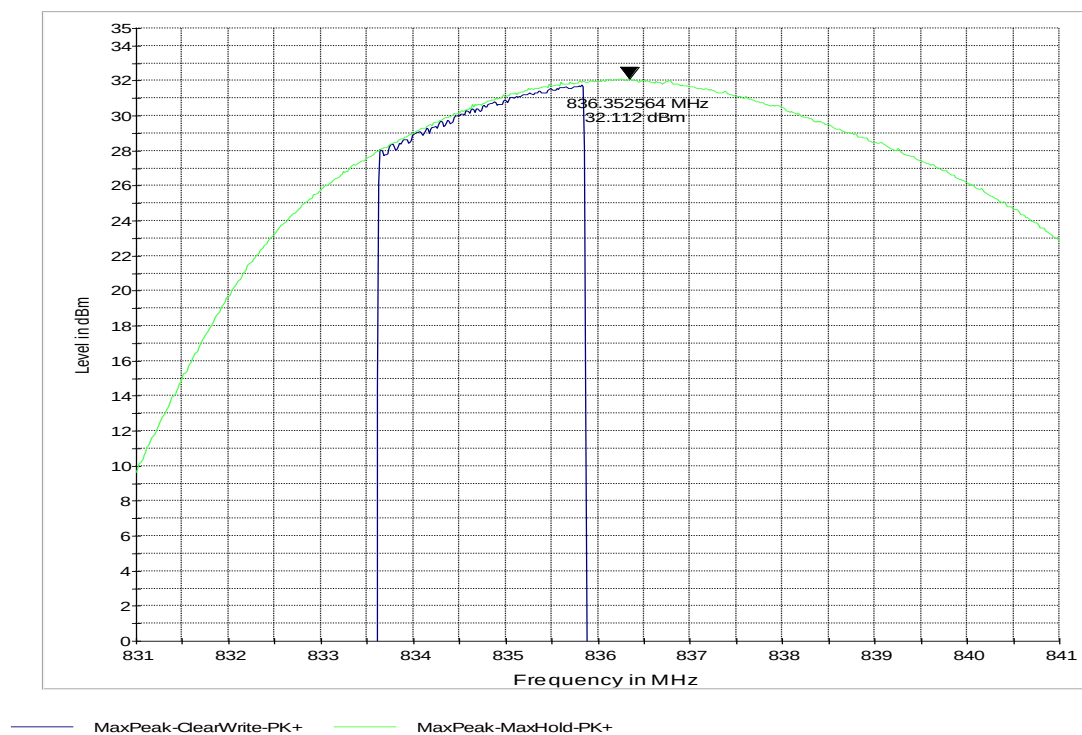
Pass.

6.1.5.6 Test Data

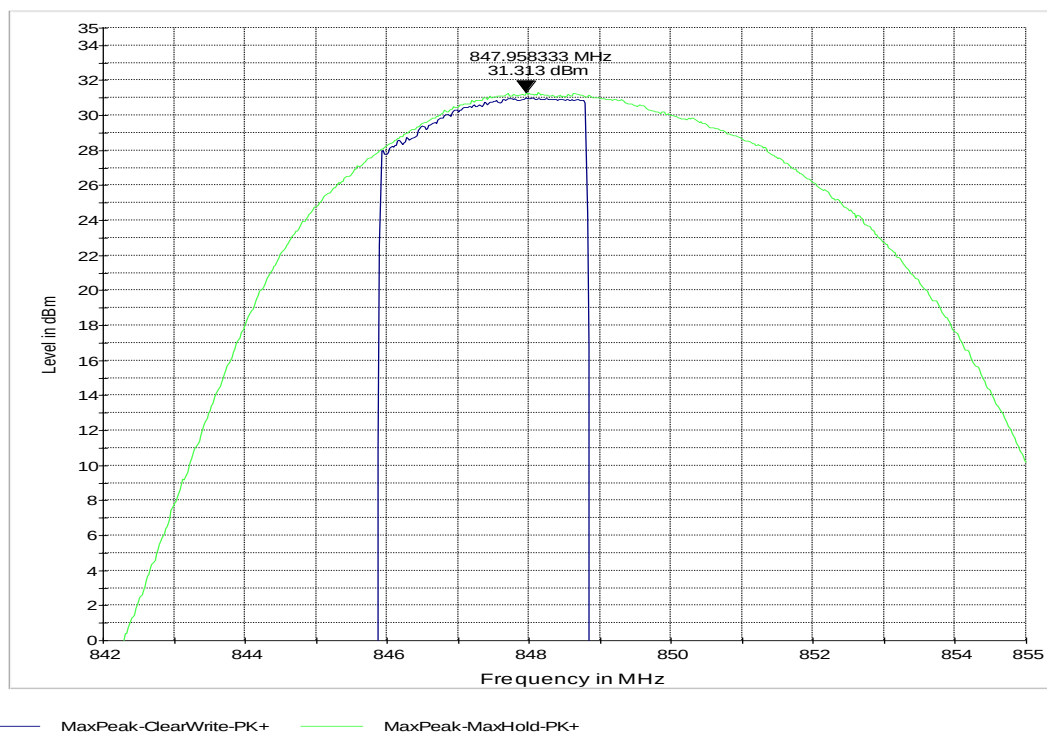
ERP (GSM-850) CHANNEL 128



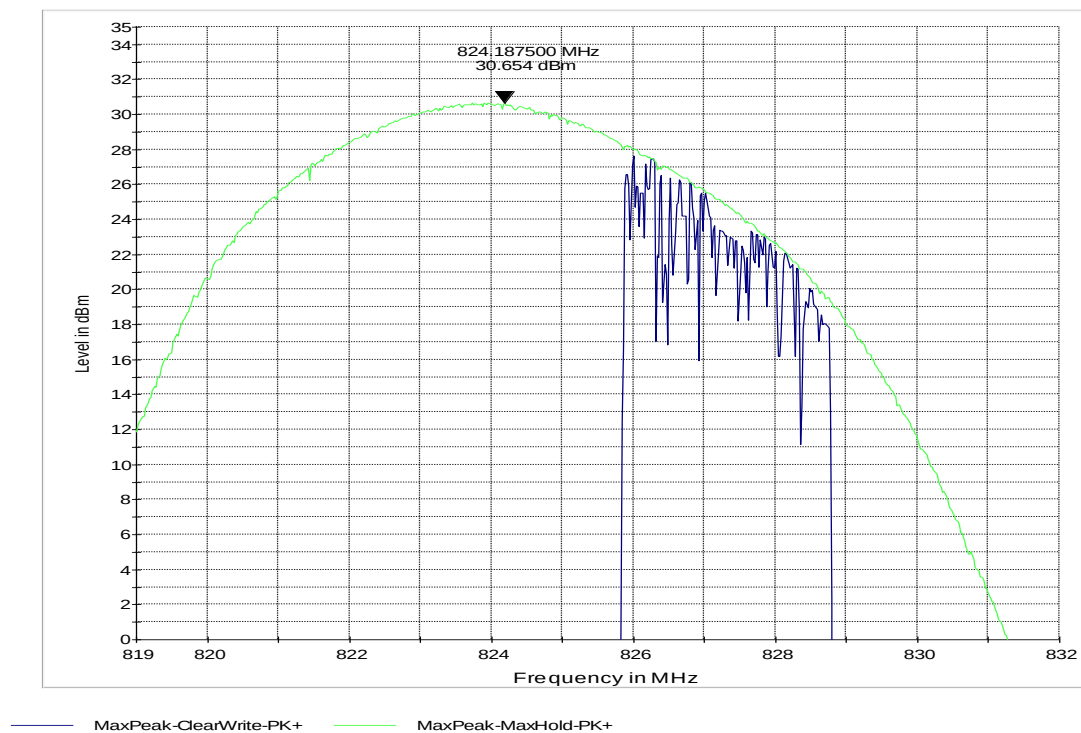
ERP (GSM-850) CHANNEL 190



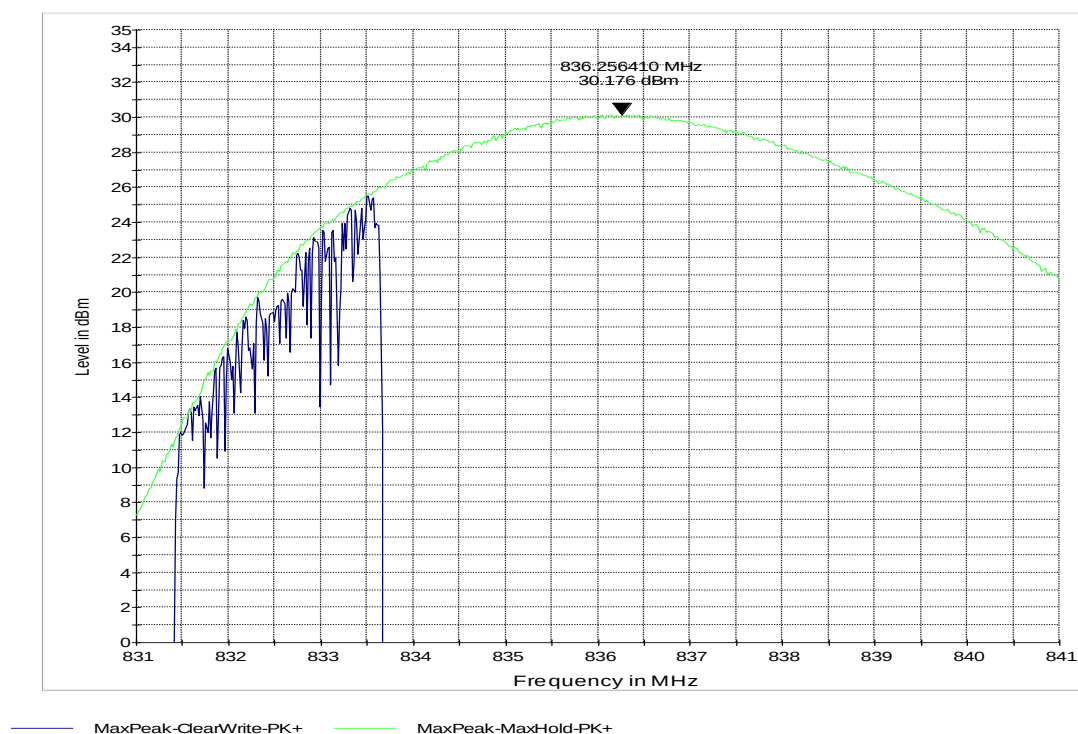
ERP (GSM-850) CHANNEL 251



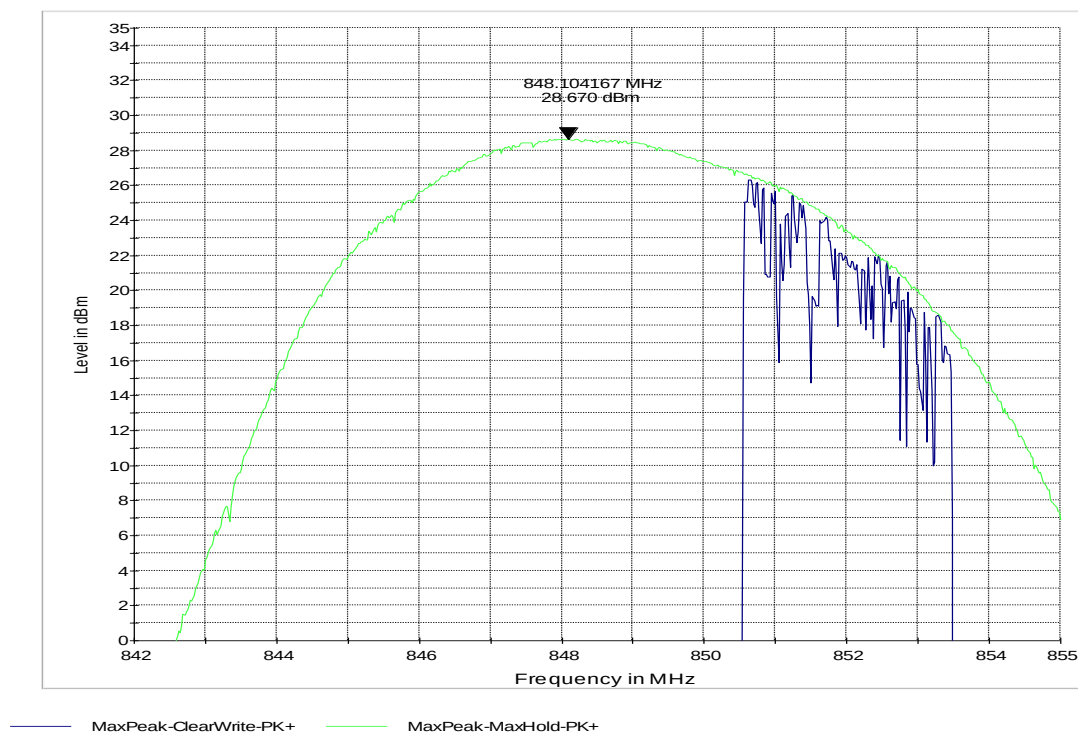
ERP (EGPRS 850) CHANNEL 128



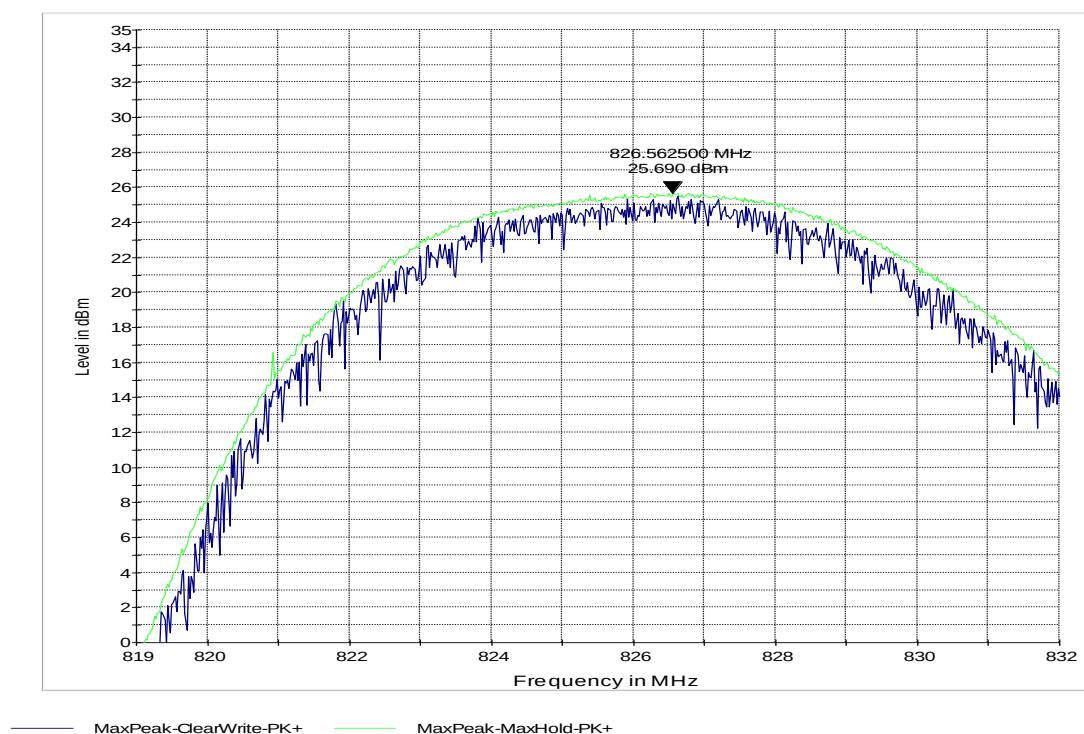
ERP (EGPRS 850) CHANNEL 190



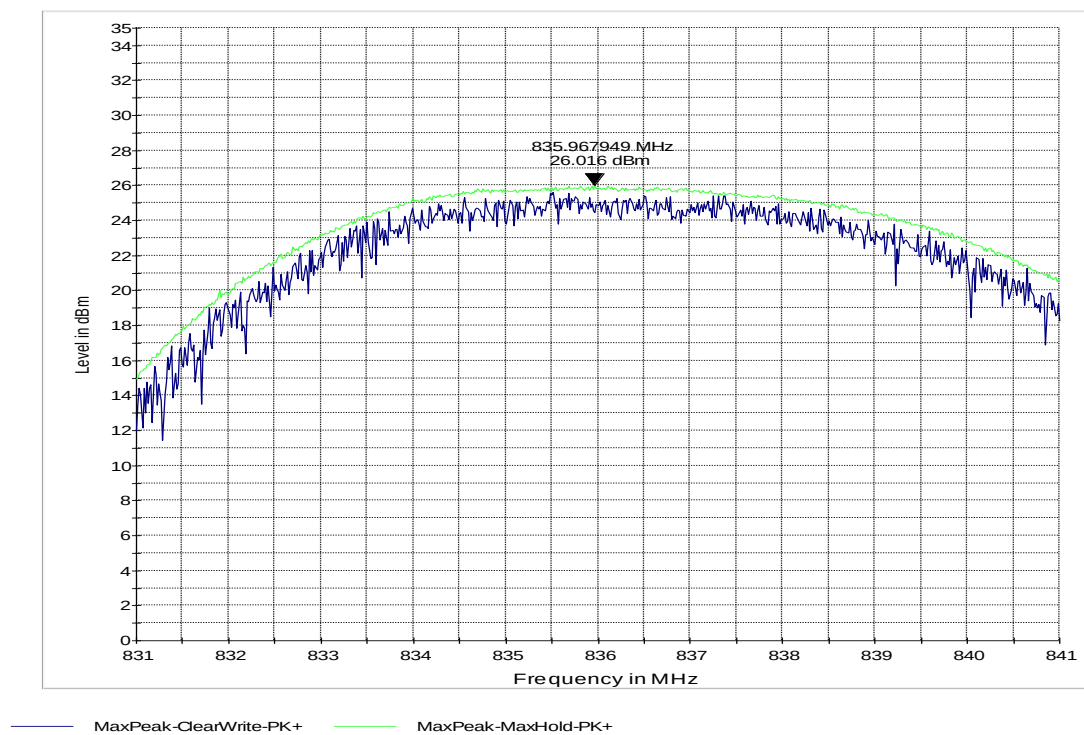
ERP (EGPRS 850) CHANNEL 251



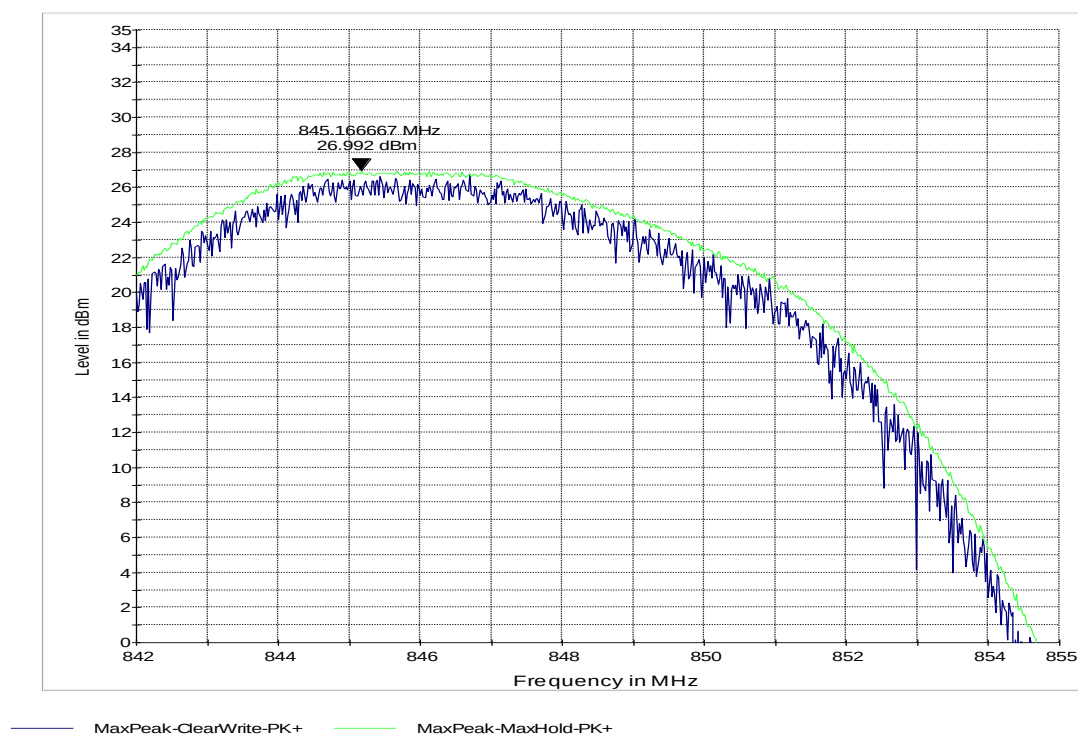
ERP (UMTS FDD V) CHANNEL 4132



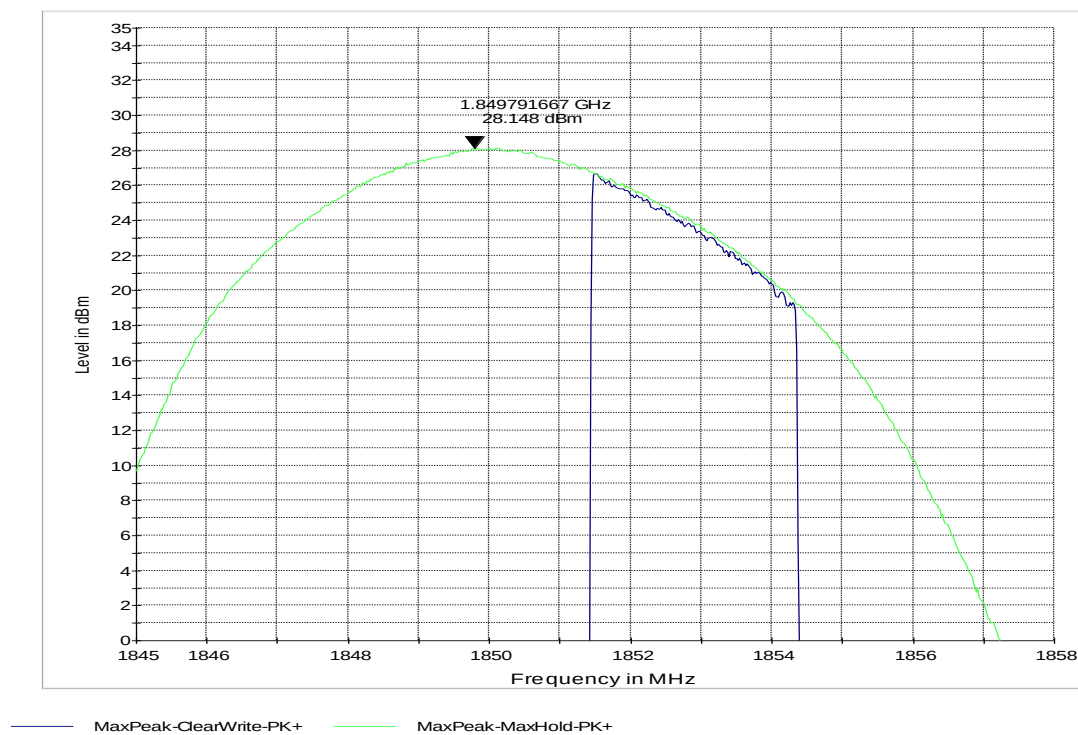
ERP (UMTS FDD V) CHANNEL 4183



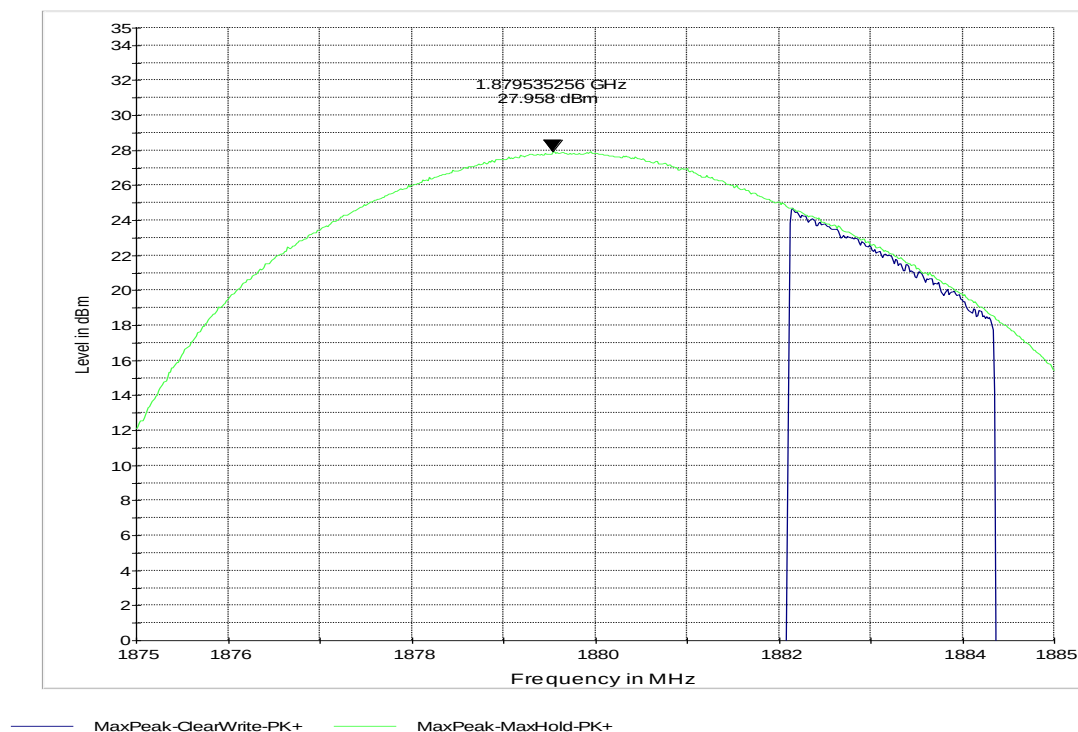
ERP (UMTS FDD V) CHANNEL 4233



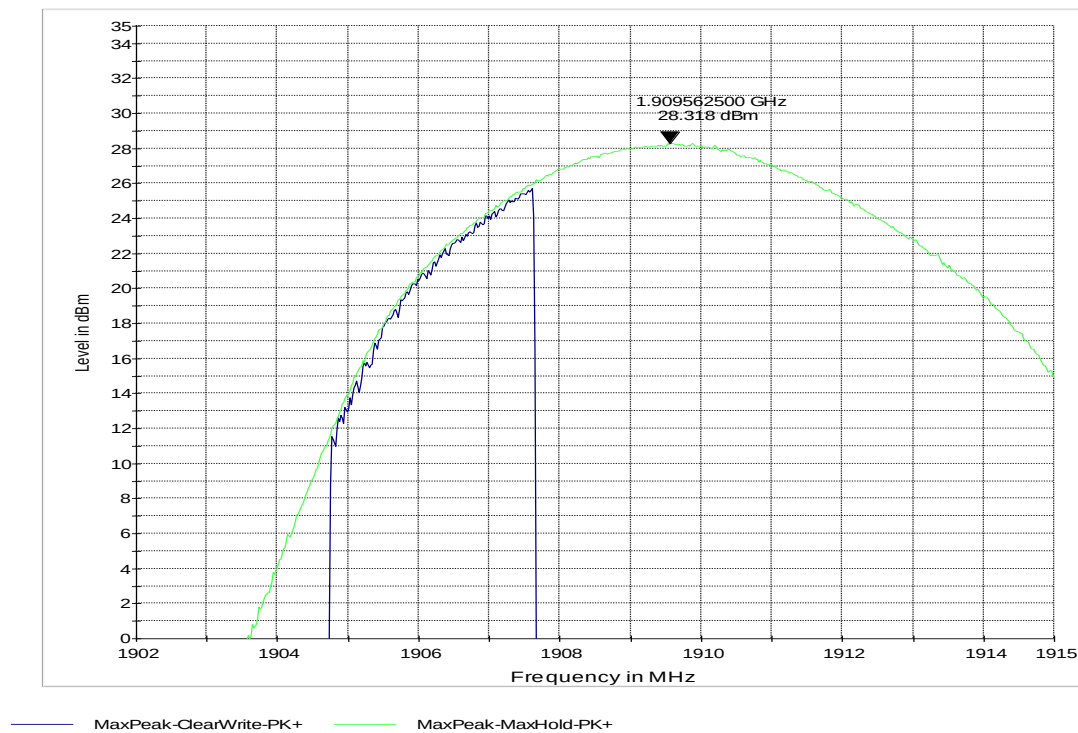
EIRP (PCS-1900) CHANNEL 512



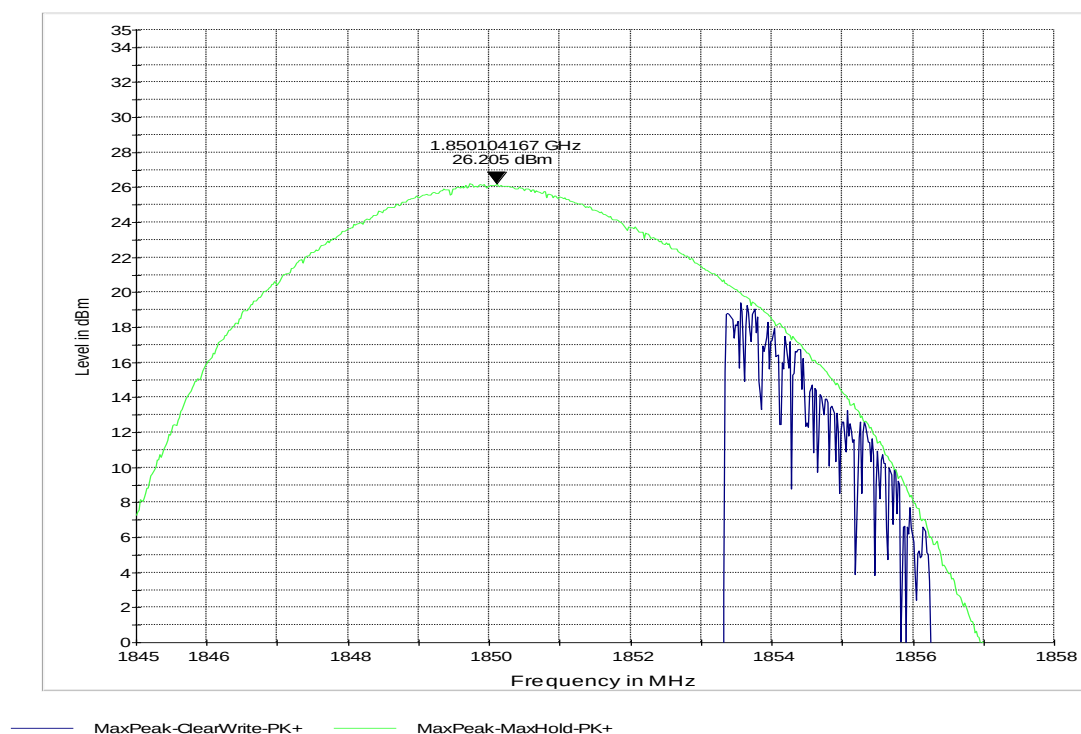
EIRP (PCS-1900) CHANNEL 661



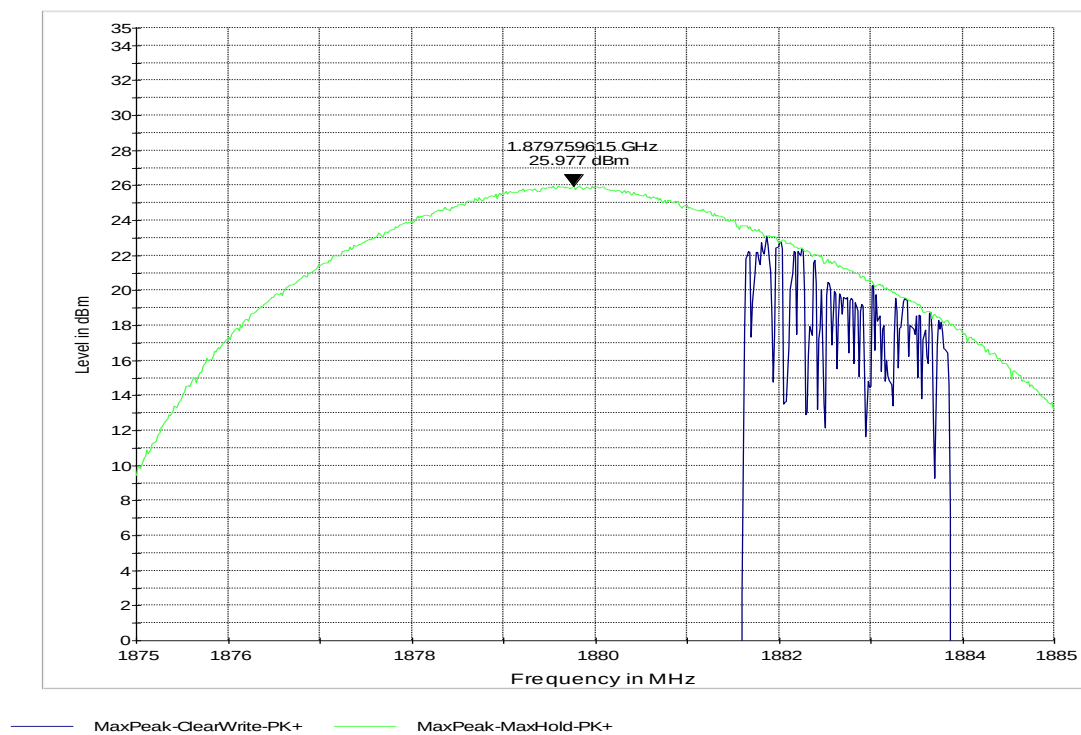
EIRP (PCS-1900) CHANNEL 810



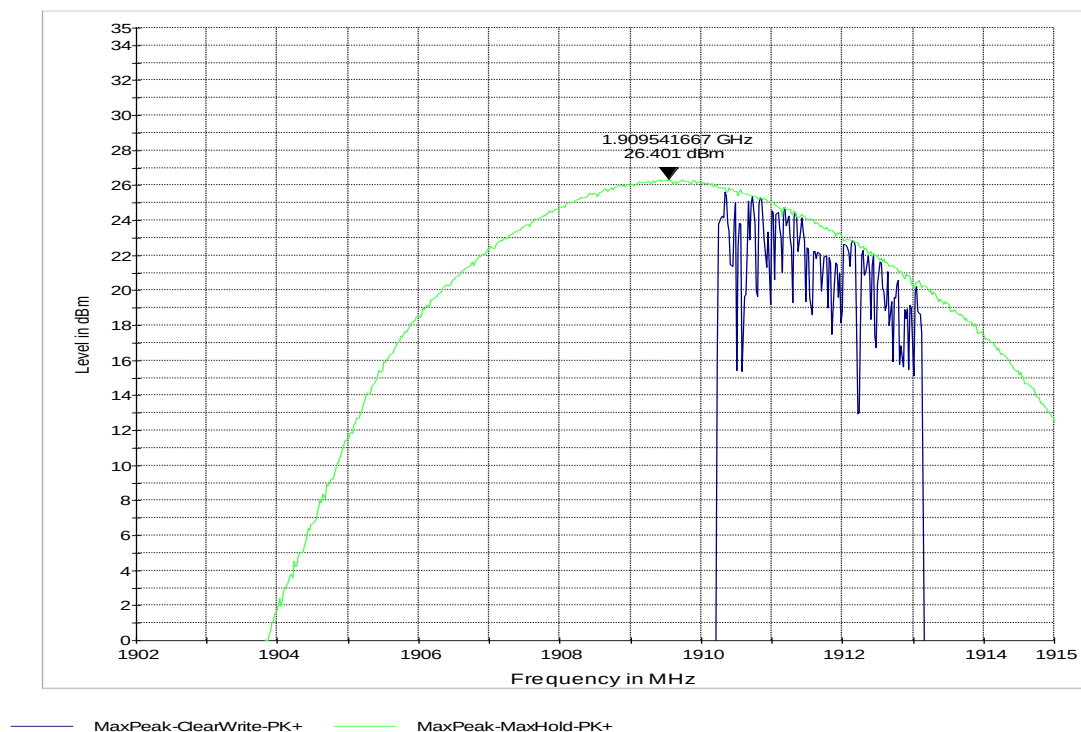
EIRP (EGPRS 1900) CHANNEL 512



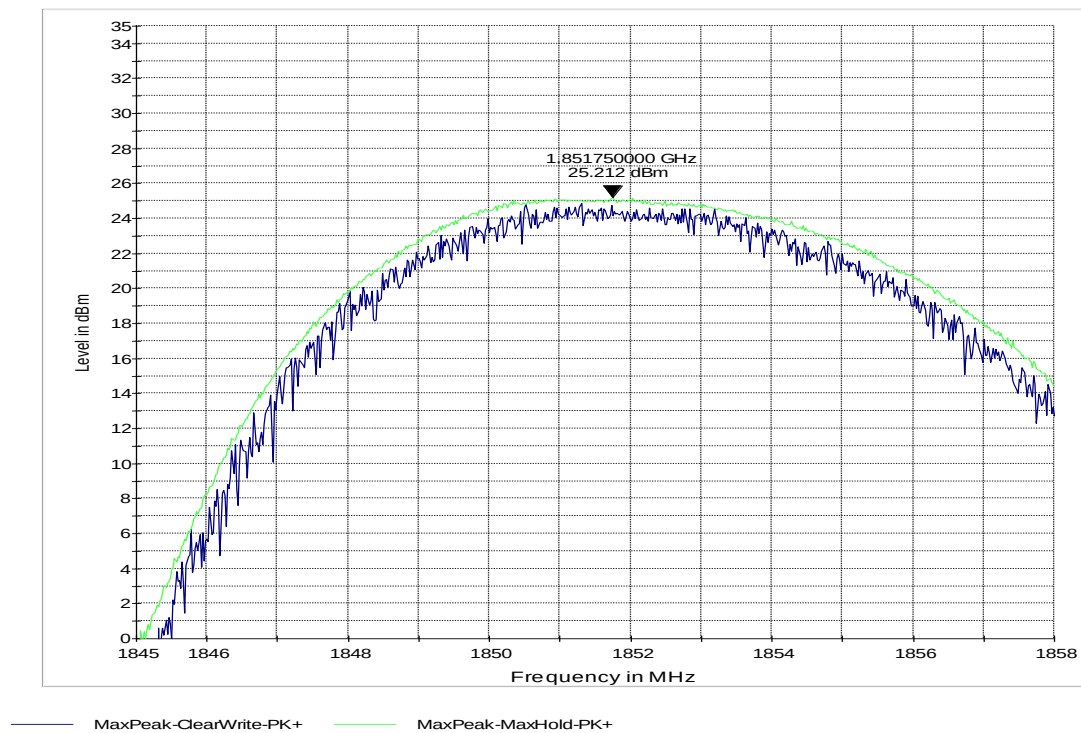
EIRP (EGPRS 1900) CHANNEL 661



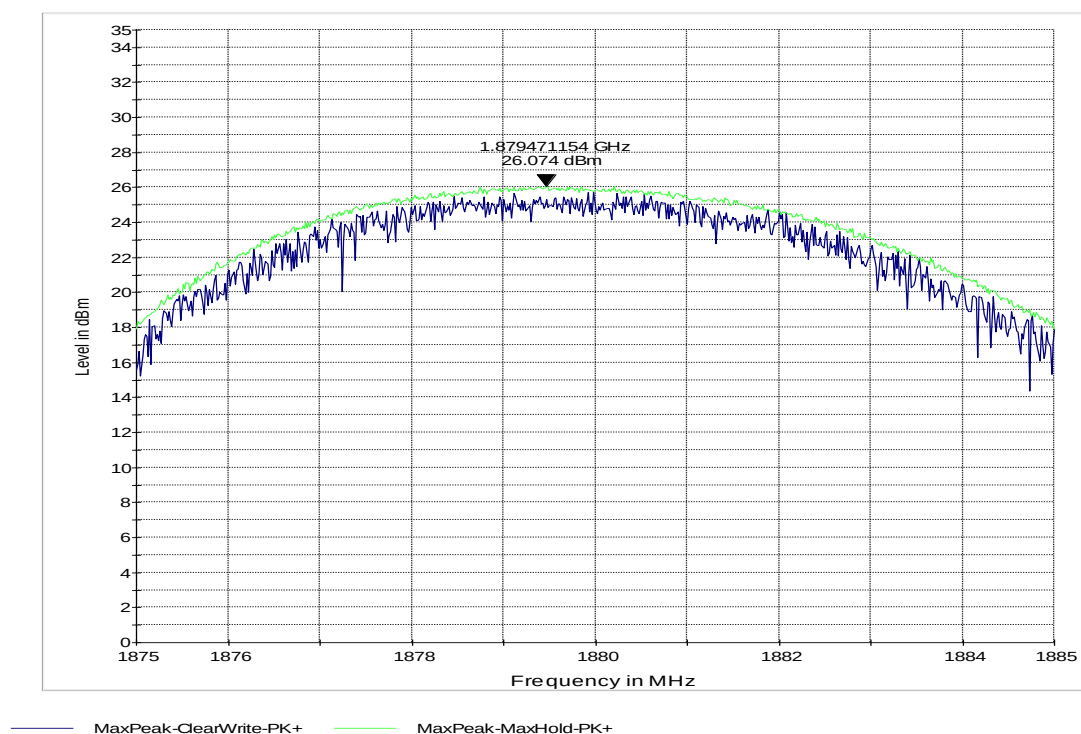
EIRP (EGPRS 1900) CHANNEL 810



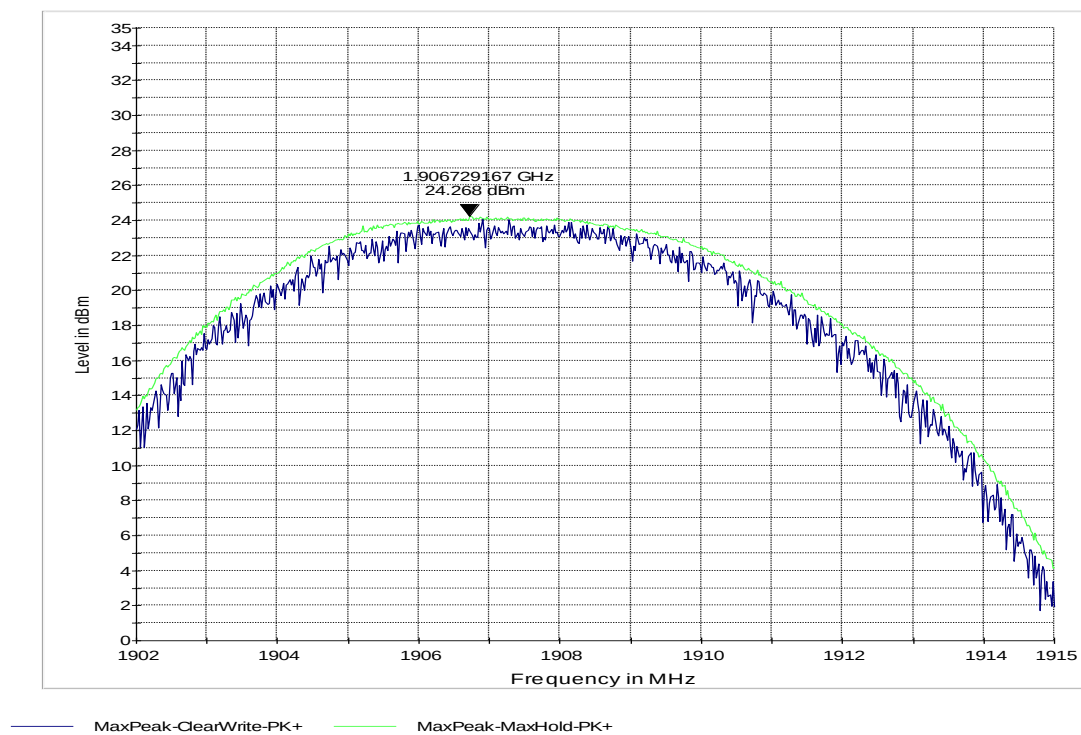
EIRP (UMTS FDD II) CHANNEL 9262



EIRP (UMTS FDD II) CHANNEL 9400



EIRP (UMTS FDD II) CHANNEL 9538



6.2 Spurious Emissions Radiated

6.2.1 References

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

6.2.2 Measurement requirements:

6.2.2.1 FCC 2.1053: Field strength of spurious radiation.

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

6.2.3 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.

6.2.3.1 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.

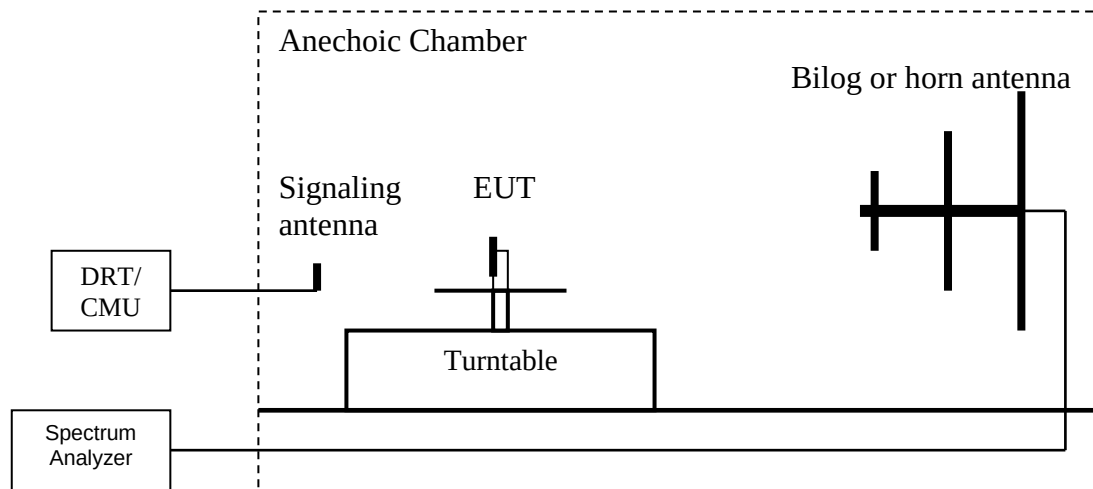
6.2.3.2 FCC 24.238 Emission limitations for Broadband PCS equipment.

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.

6.2.4 Radiated out of band measurement procedure:

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



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital RadioCommunication 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.)

6.2.5 Sample Calculations for Radiated Measurements

6.2.5.1 Power Measurements using Substitution Procedure:

1. The measurement from the Spectrum Analyzer is used as a basis for the Substitution procedure.
2. 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 reading as in Step 1.

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

Eg:

Frequency (MHz)	Signal Generator setting (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	EIRP (dBm)
1000	24.5	6.5	3.5	27.5

6.2.6 Measurement Survey:

The site is constructed in accordance with ANSI C63.4 requirements and is recognized by the FCC to be in compliance for a 3m site. The spectrum is scanned from 30MHz to the 10th harmonic of the highest frequency generated by the EUT.

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850, PCS-1900, UMTS FDD II and UMTS FDD V band.

Radiated emission measurements were made in GMSK and RMC Modes (for UMTS), since these modes operate with the highest output power and hence represents the worst case scenario.

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.

Measurement Uncertainty= +/- 3.0 dB.

6.2.7 Test Conditions:

Tnom: 25°C; Vnom: 12 V

6.3 Radiated out of band emissions results on EUT- Transmit Mode:

6.3.1 Test Results Transmitter Spurious Emission GSM850:

Harmonic	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
1	824.2	-	836.6	-	848.8	-
2	1648.4	-52	1673.2	-55	1697.6	-55
3	2472.6	-53	2509.8	-52	2546.4	-52
4	3296.8	NF	3346.4	NF	3395.2	NF
5	4121	NF	4183	NF	4244	NF
6	4945.2	NF	5019.6	NF	5092.8	NF
7	5769.4	NF	5856.2	NF	5941.6	NF
8	6593.6	NF	6692.8	NF	6790.4	NF
9	7417.8	NF	7529.4	NF	7639.2	NF
10	8242	NF	8366	NF	8488	NF
NF = Noise Floor Measurement Uncertainty: ±3dB						

6.3.1.1 Test Verdict

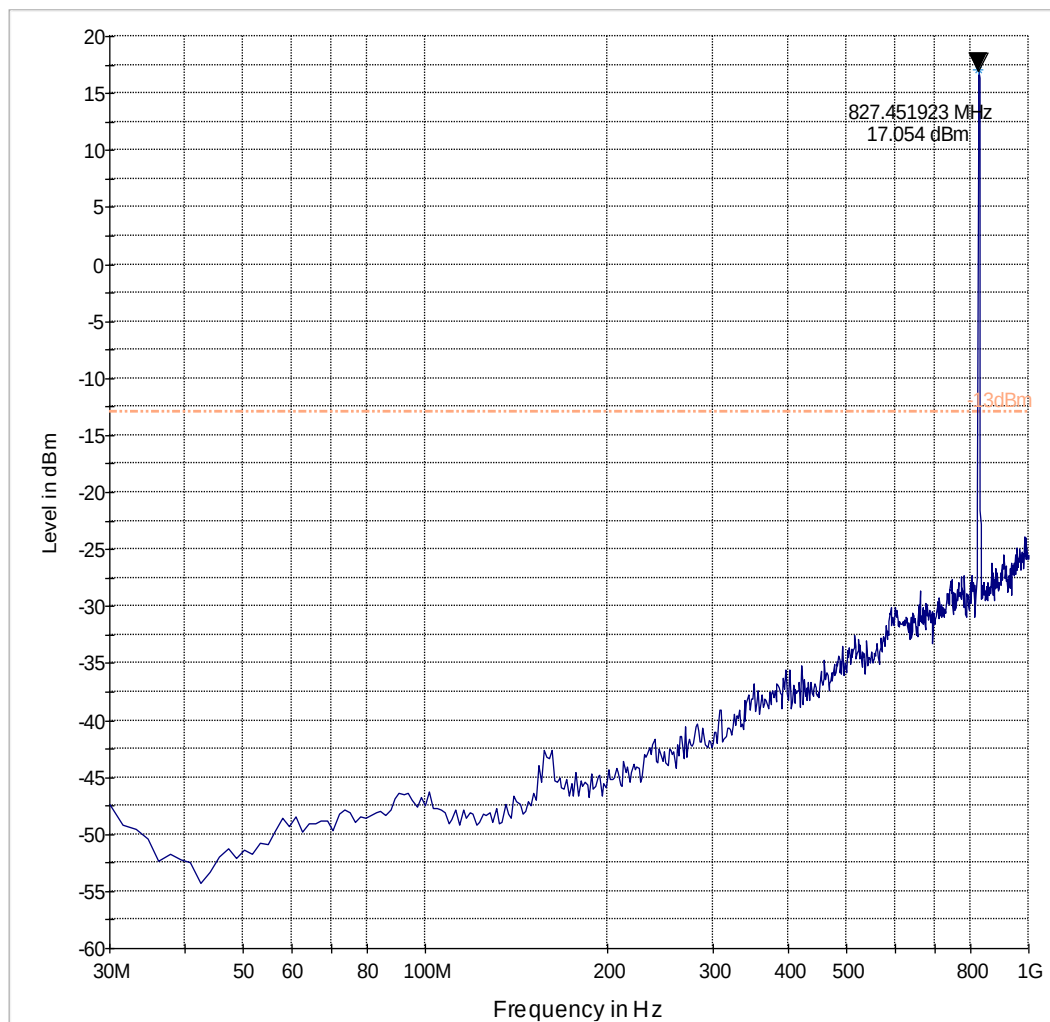
Pass.

Legend for the plots:

- -13dBm.LimitLine
- Preview Result
- ✱ Data Reduction Result
- ◆ Final Measurement Result

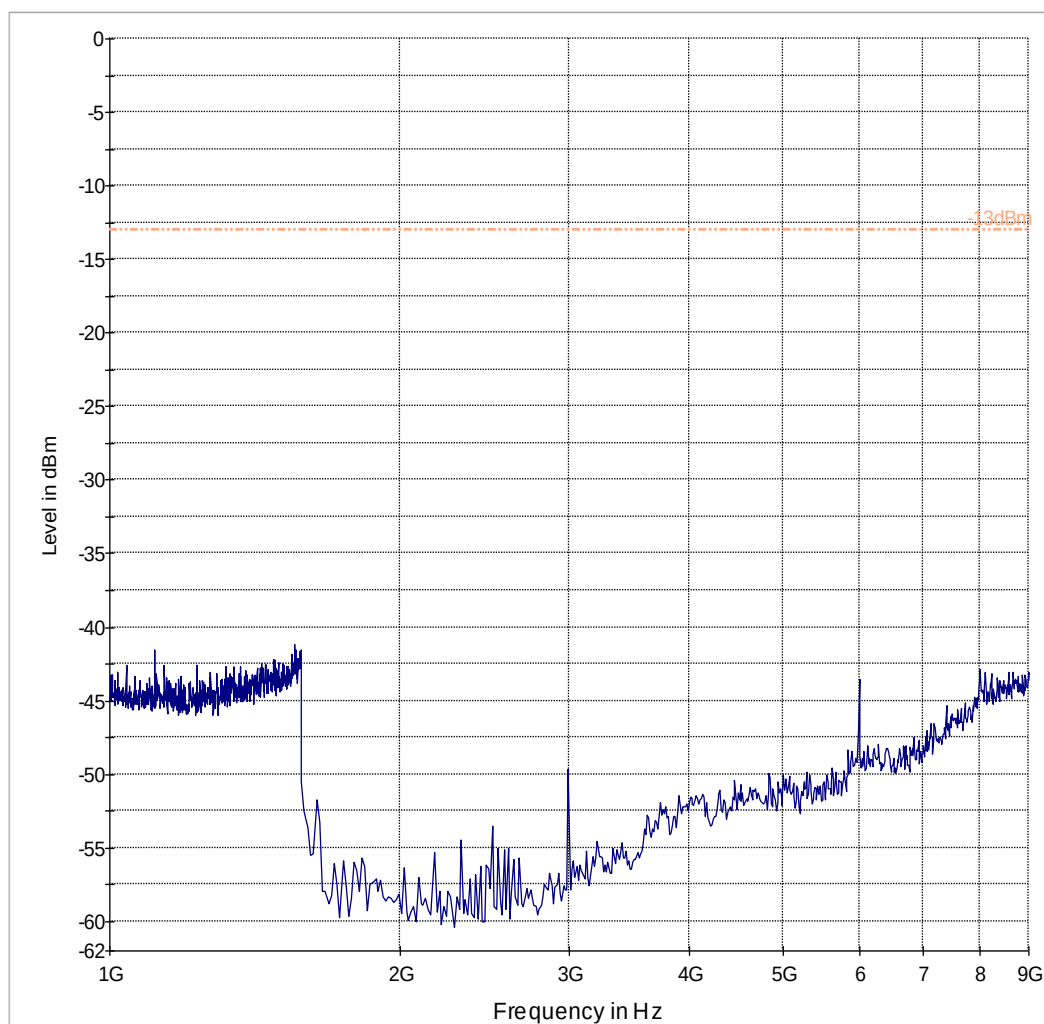
Radiated Spurious Emissions (GSM-850) Tx: Low Channel

30MHz-1GHz



----- -13dBm — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

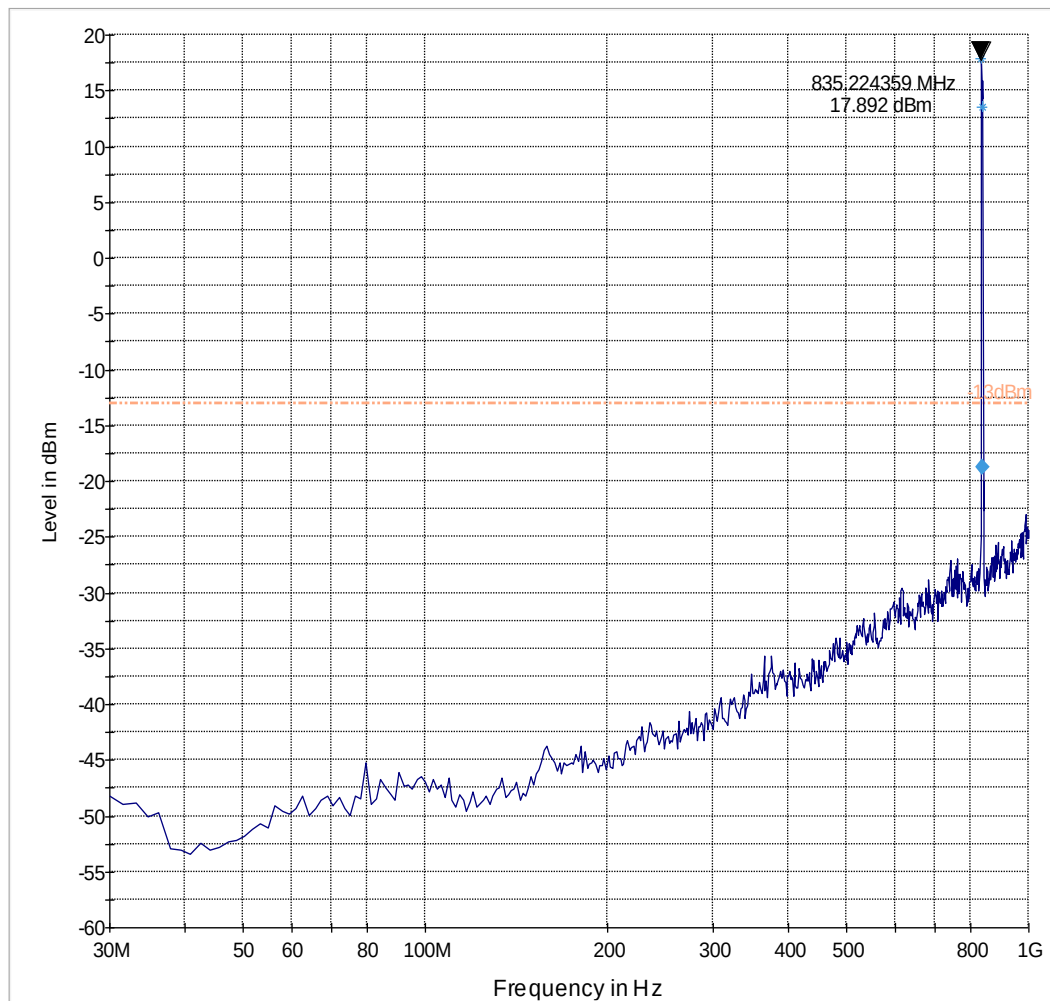
Test results: 1GHz-9GHz



----- -13dBm ——— Preview Result 1-PK+

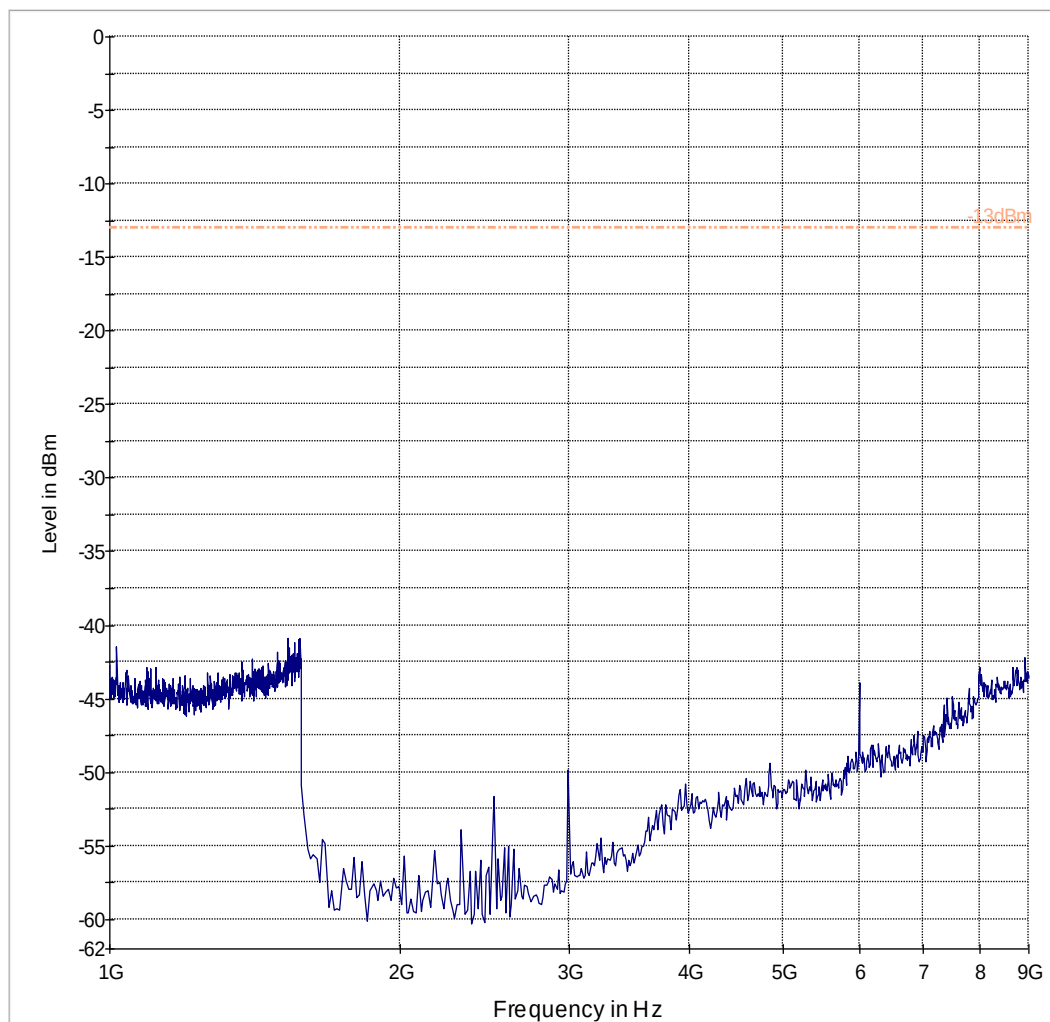
Radiated Spurious Emissions (GSM-850) Tx: Mid Channel

Test results 30M-1GHz



----- -13dBm
* Data Reduction Result 1 [1]-PK+ Preview Result 1-PK+
◆ Final Measurement Result 1-PK+

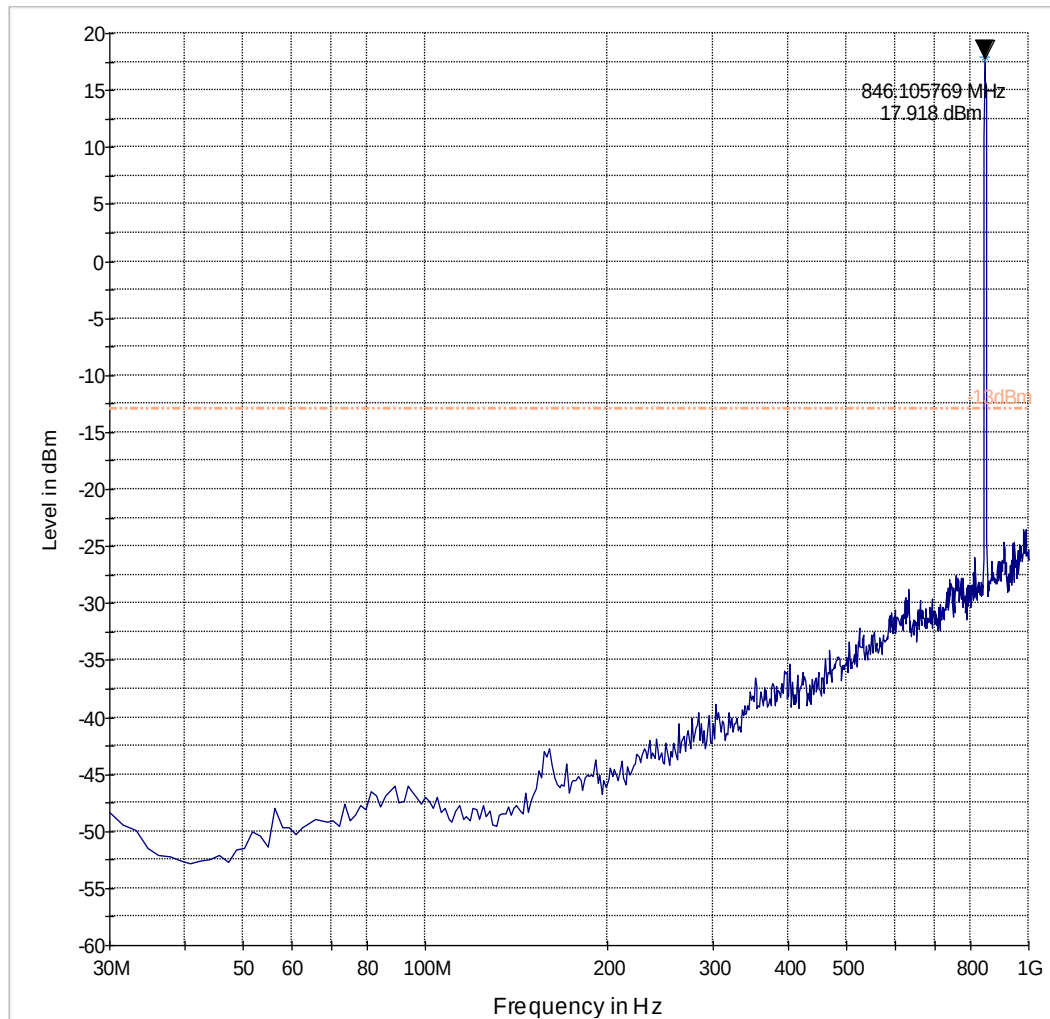
Test results: 1GHz-9GHz



----- -13dBm ——— Preview Result 1-PK+

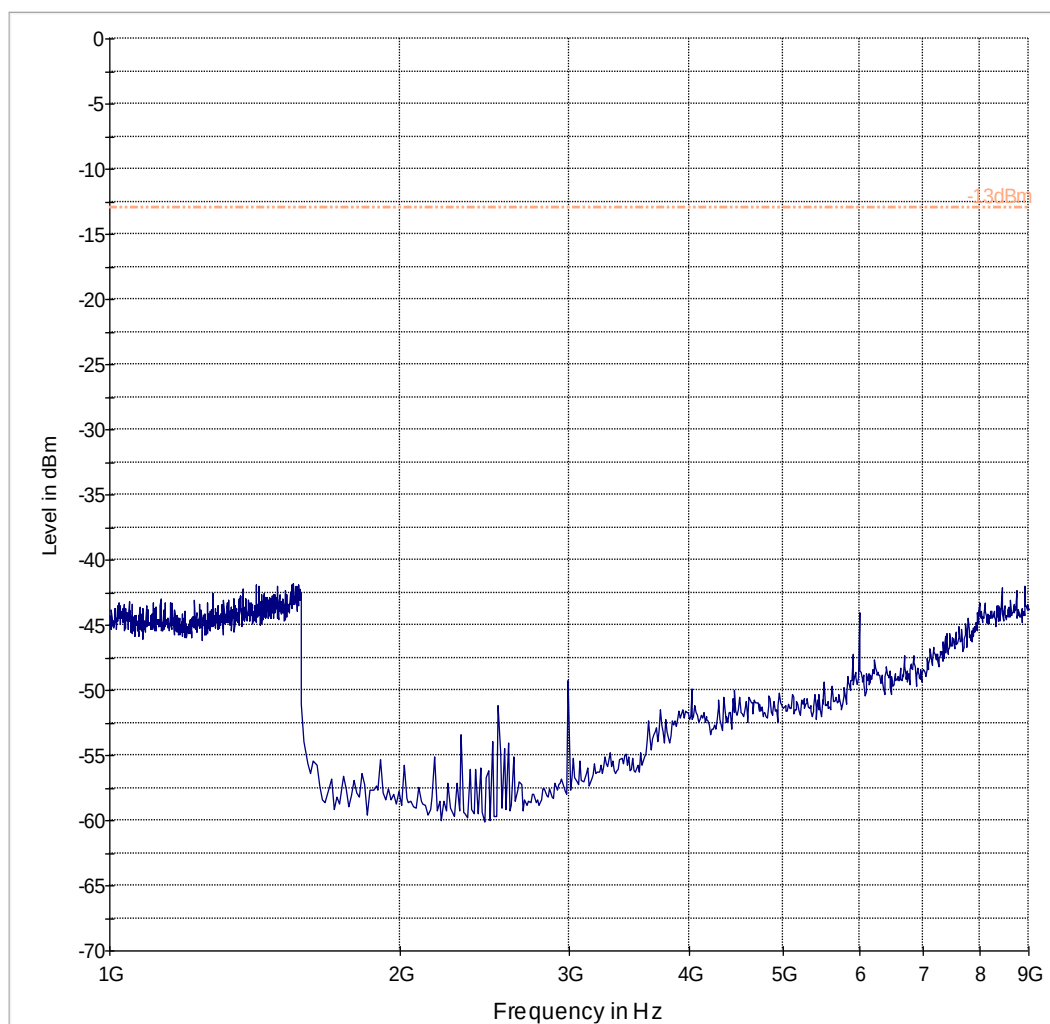
Radiated Spurious Emissions (GSM-850) Tx: High Channel

30MHz-1GHz



----- -13dBm Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

Test results: 1GHz-9GHz



----- -13dBm ——— Preview Result 1-PK+

6.3.2 Test Results Transmitter Spurious Emission UMTS FDDV

Harmonic	Tx ch-4132 Freq. (MHz)	Level (dBm)	Tx ch-4183 Freq. (MHz)	Level (dBm)	Tx ch-4233 Freq. (MHz)	Level (dBm)
1	826.4	-	836.6	-	846.6	-
2	1652.8	-52	1673.2	-55	1693.2	-56
3	2479.2	NF	2509.8	NF	2539.8	NF
4	3305.6	NF	3346.4	NF	3386.4	NF
5	4132	NF	4183	NF	4233	NF
6	4958.4	NF	5019.6	NF	5079.6	NF
7	5784.8	-48.1	5856.2	NF	5926.2	NF
8	6611.2	NF	6692.8	NF	6772.8	NF
9	7437.6	NF	7529.4	NF	7619.4	NF
10	8264	NF	8366	NF	8466	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.3.2.1 Test Verdict

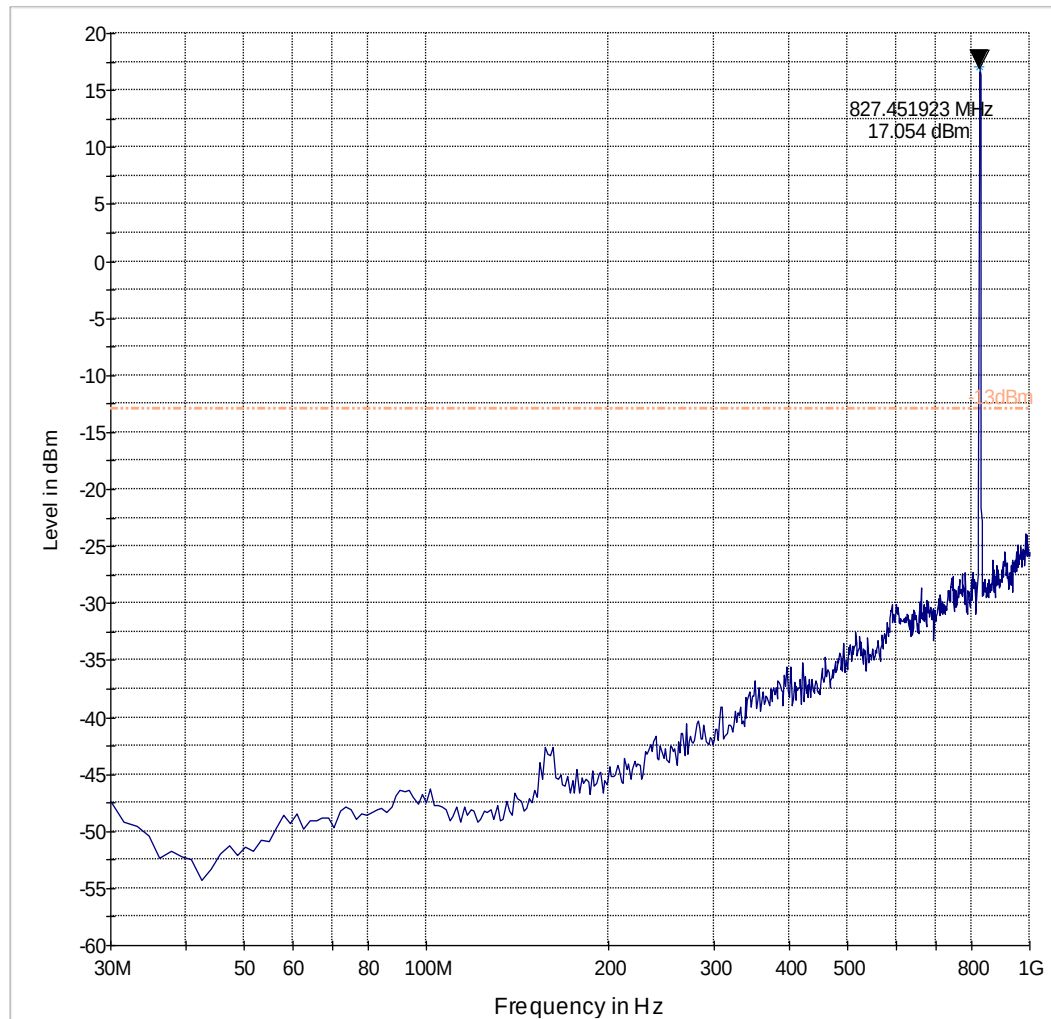
Pass.

Legend for the plots:

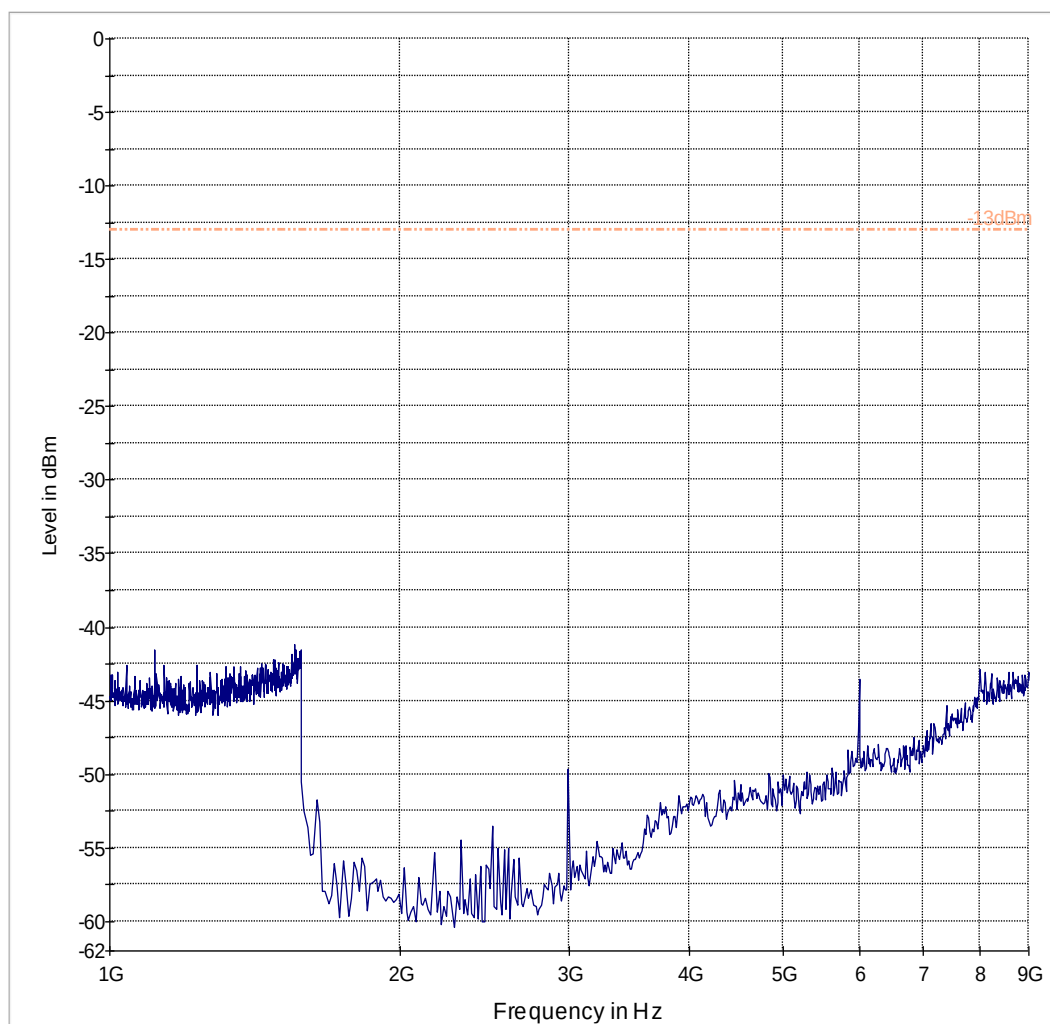
- -13dBm.LimitLine
- Preview Result
- ✱ Data Reduction Result
- ◆ Final Measurement Result

Radiated Spurious Emissions (UMTS Band 5) Tx: Low Channel

30MHz-1GHz



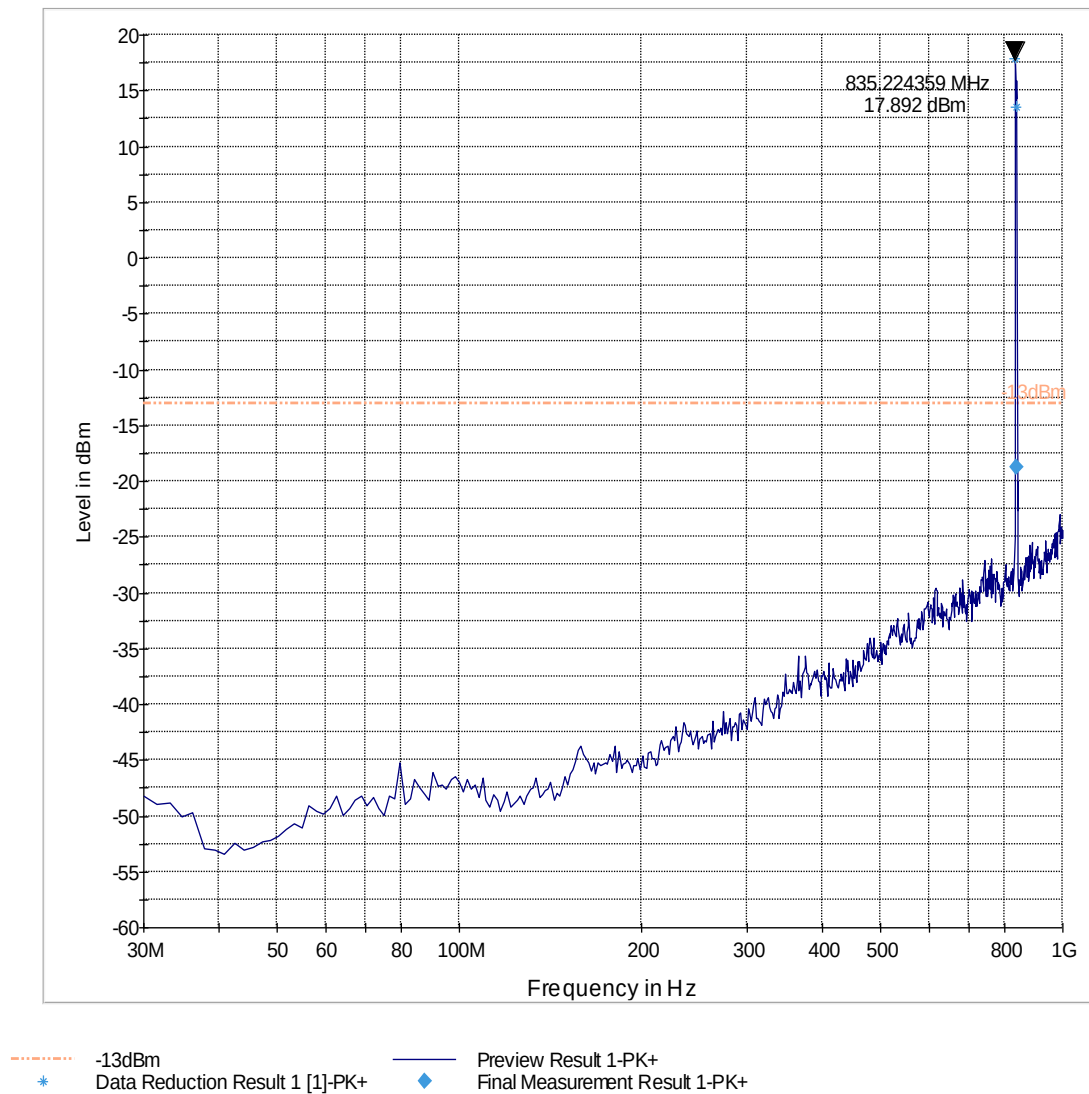
Test results: 1GHz-9GHz



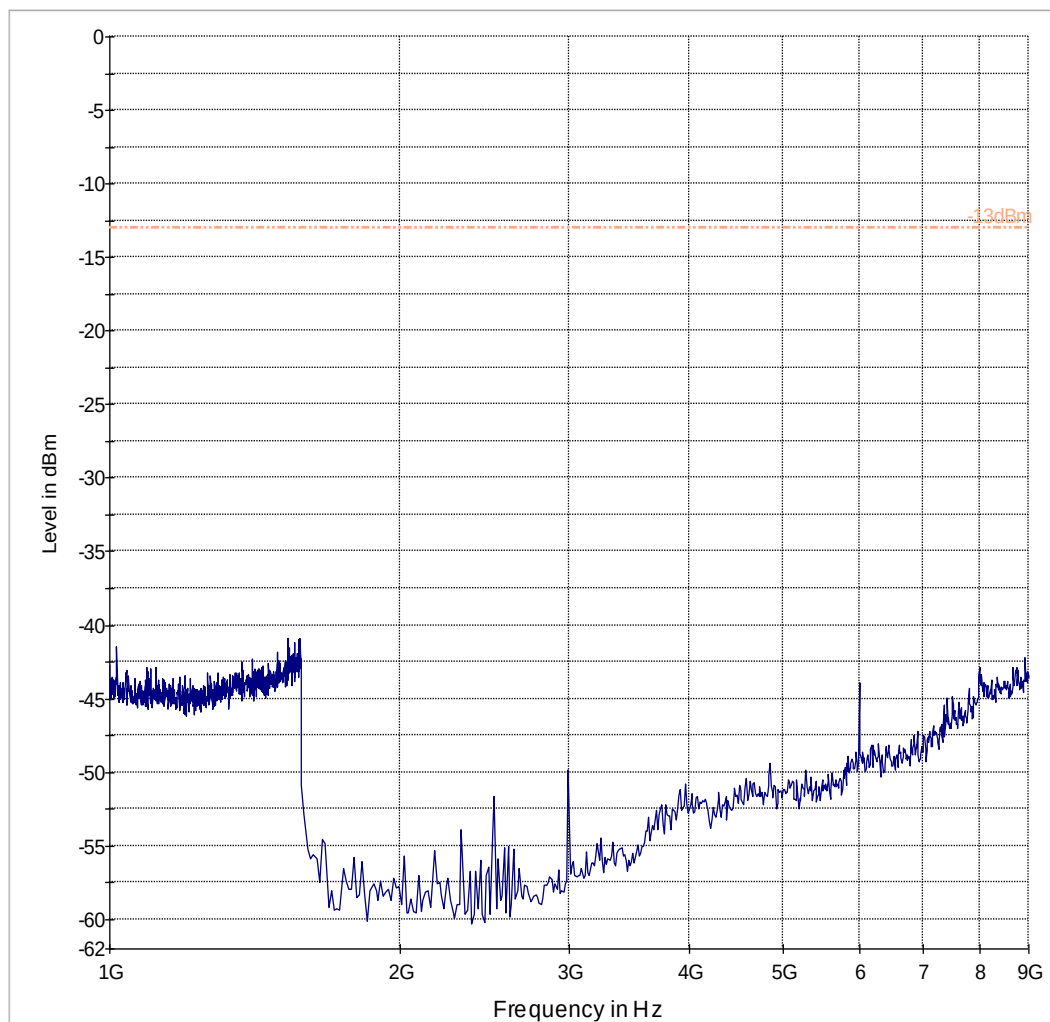
----- -13dBm ——— Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band 5) Tx: Mid Channel

30MHz-1GHz



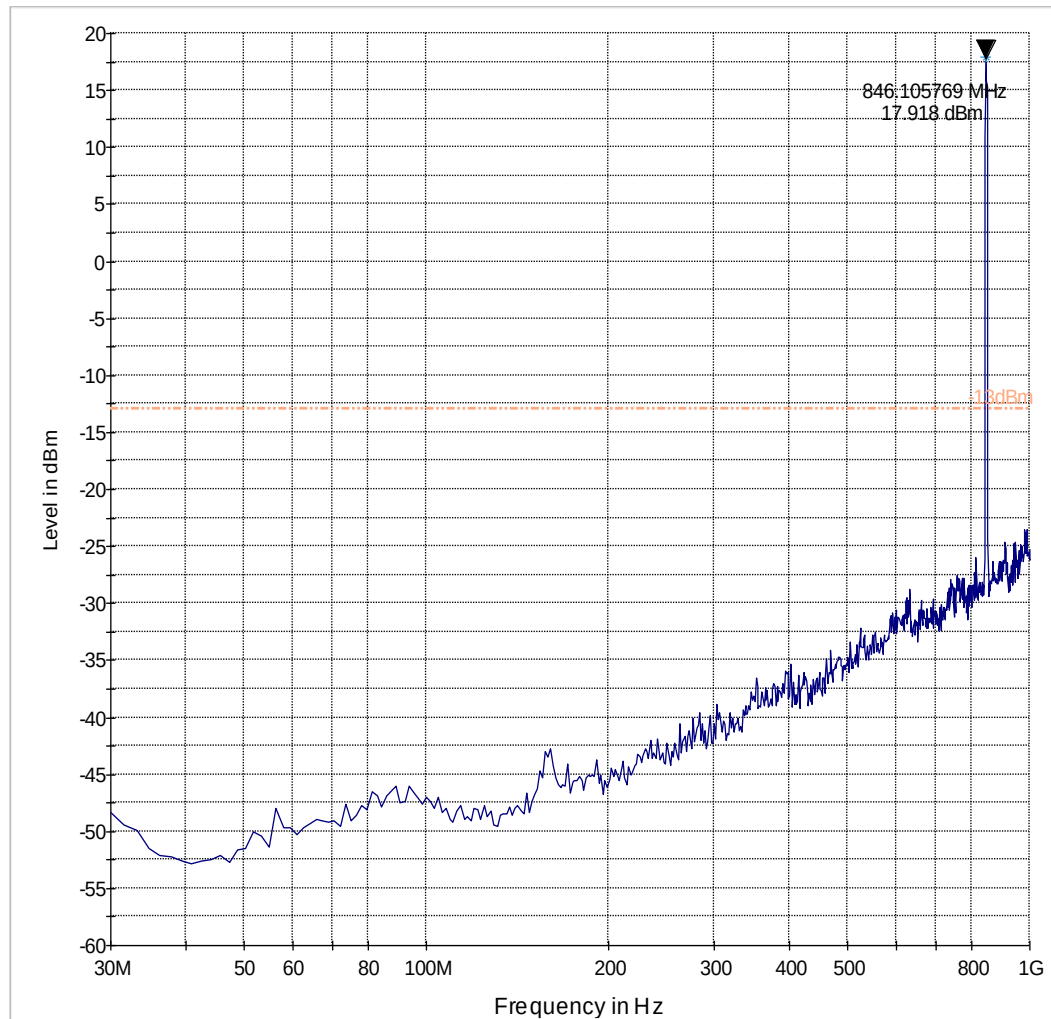
Test results: 1GHz-9GHz



----- -13dBm ——— Preview Result 1-PK+

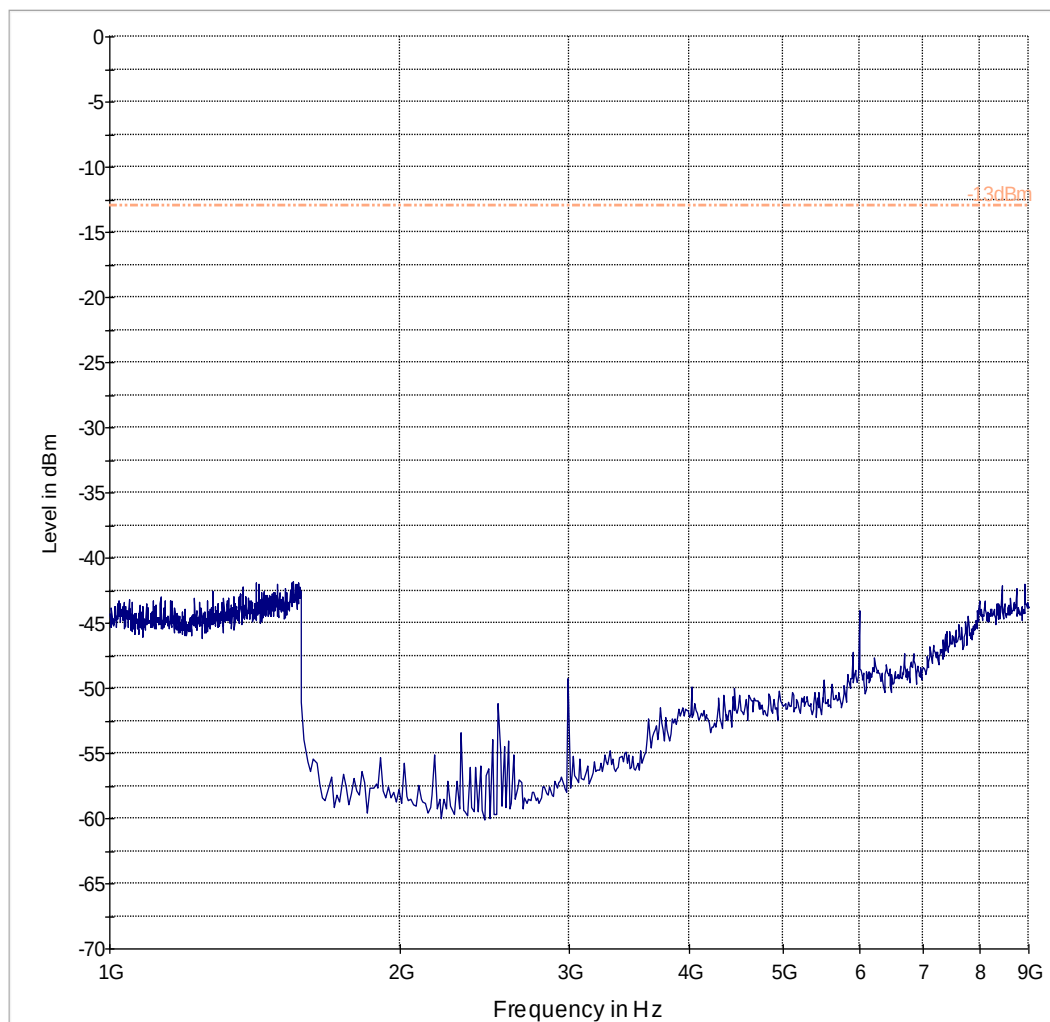
Radiated Spurious Emissions (UMTS Band 5) Tx: High Channel

30MHz-1GHz



----- -13dBm — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

Test results: 1GHz-9GHz



----- -13dBm ——— Preview Result 1-PK+

6.3.3 Test Results Transmitter Spurious Emission PCS-1900:

Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
1	1850.2	-	1880.0	-	1909.8	-
2	3700.4	-47	3760	-48	3819.6	-48
3	5550.6	-49	5640	-49	5729.4	-50
4	7400.8	NF	7520	NF	7639.2	NF
5	9251	NF	9400	NF	9549	NF
6	11101.2	NF	11280	NF	11458.8	NF
7	12951.4	NF	13160	NF	13368.6	NF
8	14801.6	NF	15040	NF	15278.4	NF
9	16651.8	NF	16920	NF	17188.2	NF
10	18502	NF	18800	NF	19098	NF
NF = Noise Floor Measurement Uncertainty: ± 3 dB						

6.3.3.1 Test Verdict

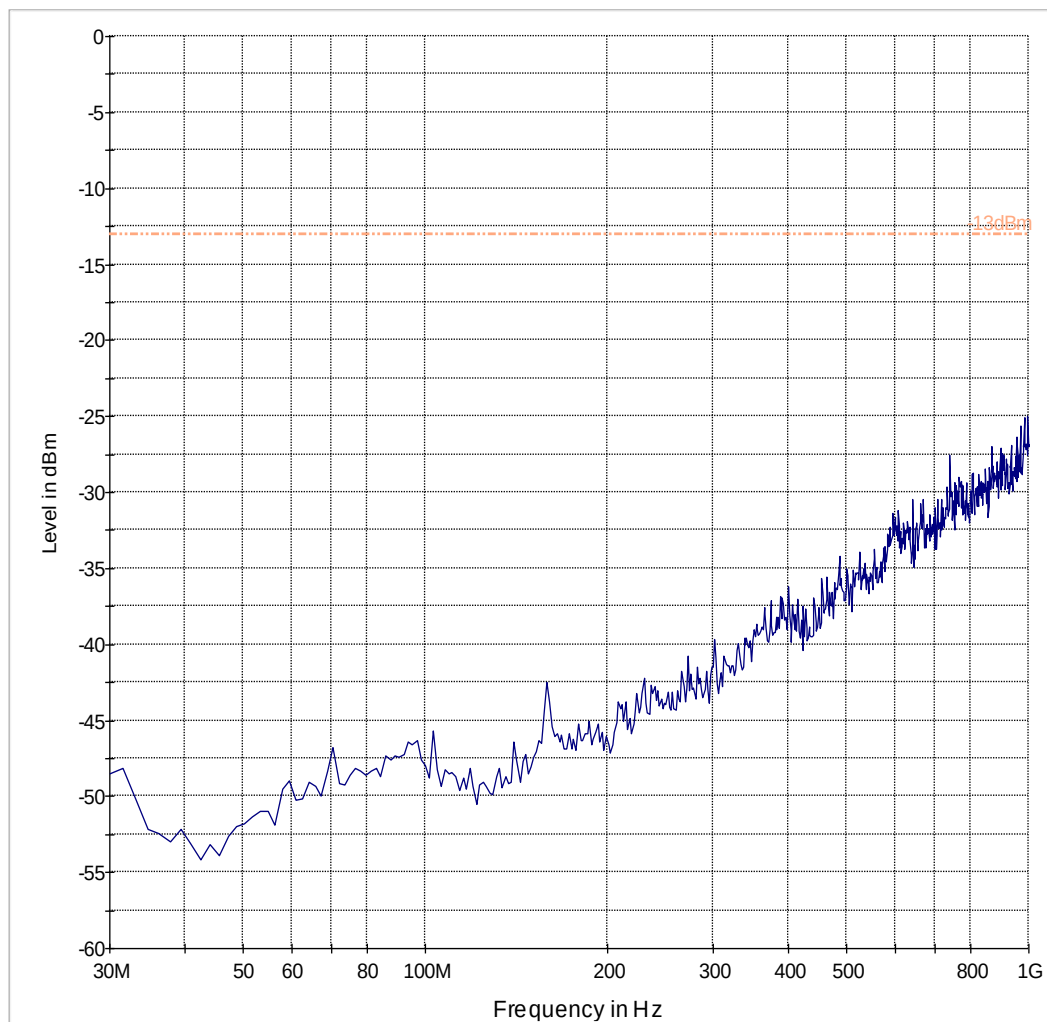
Pass.

Legend for the plots:

- -13dBm.LimitLine
- Preview Result
- ✱ Data Reduction Result
- ◆ Final Measurement Result

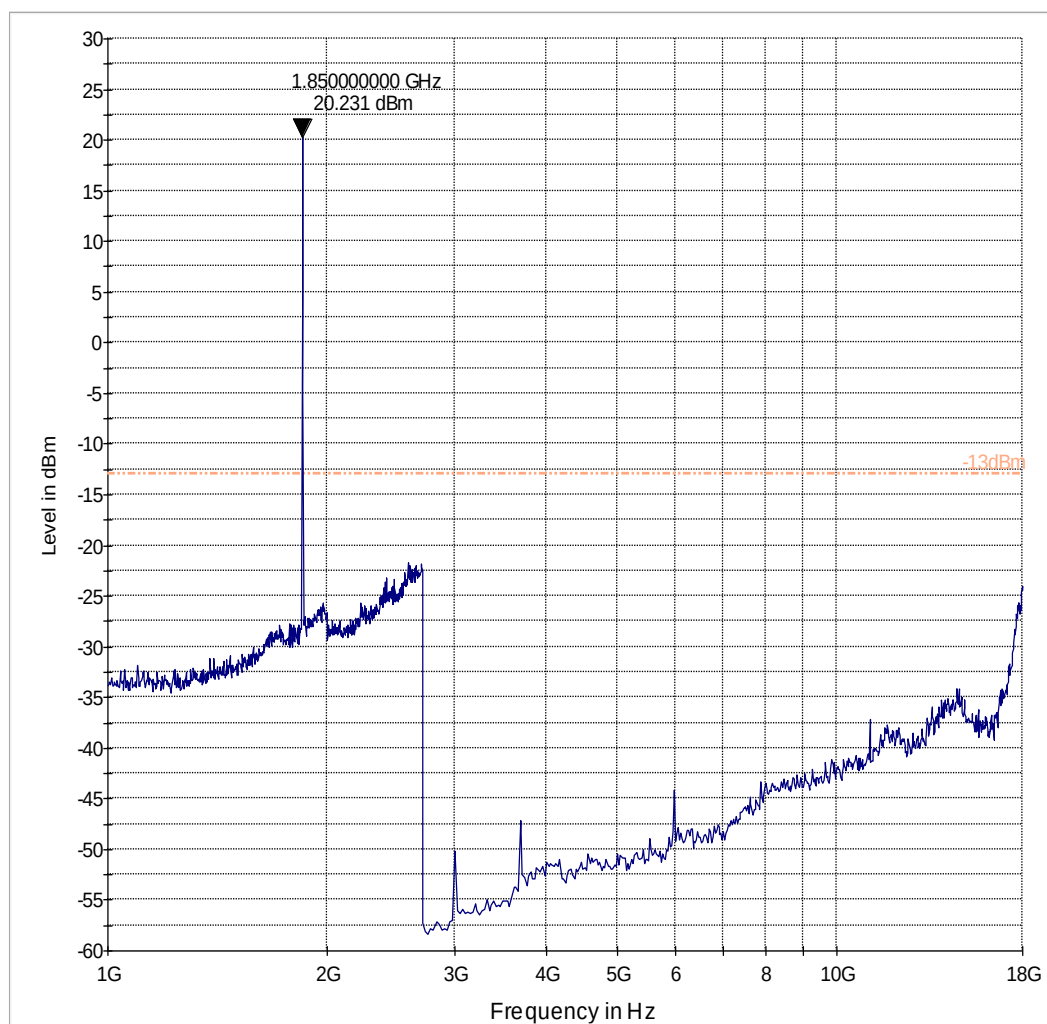
Radiated Spurious Emissions (GSM-1900) Tx: Low Channel

Test results: 30M-1GHz



----- -13dBm — Preview Result 1-PK+

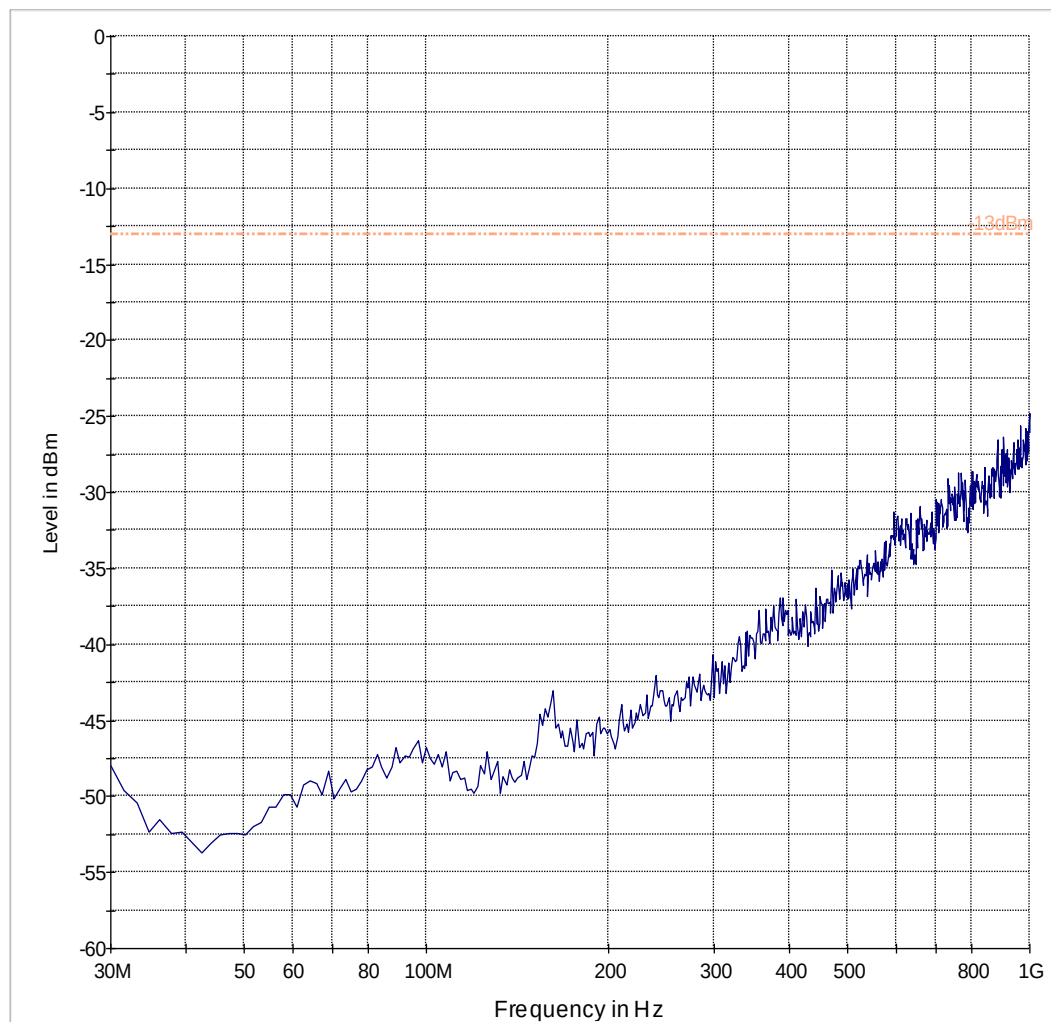
Test results: 1GHz-18GHz



----- -13dBm ——— Preview Result 1-PK+

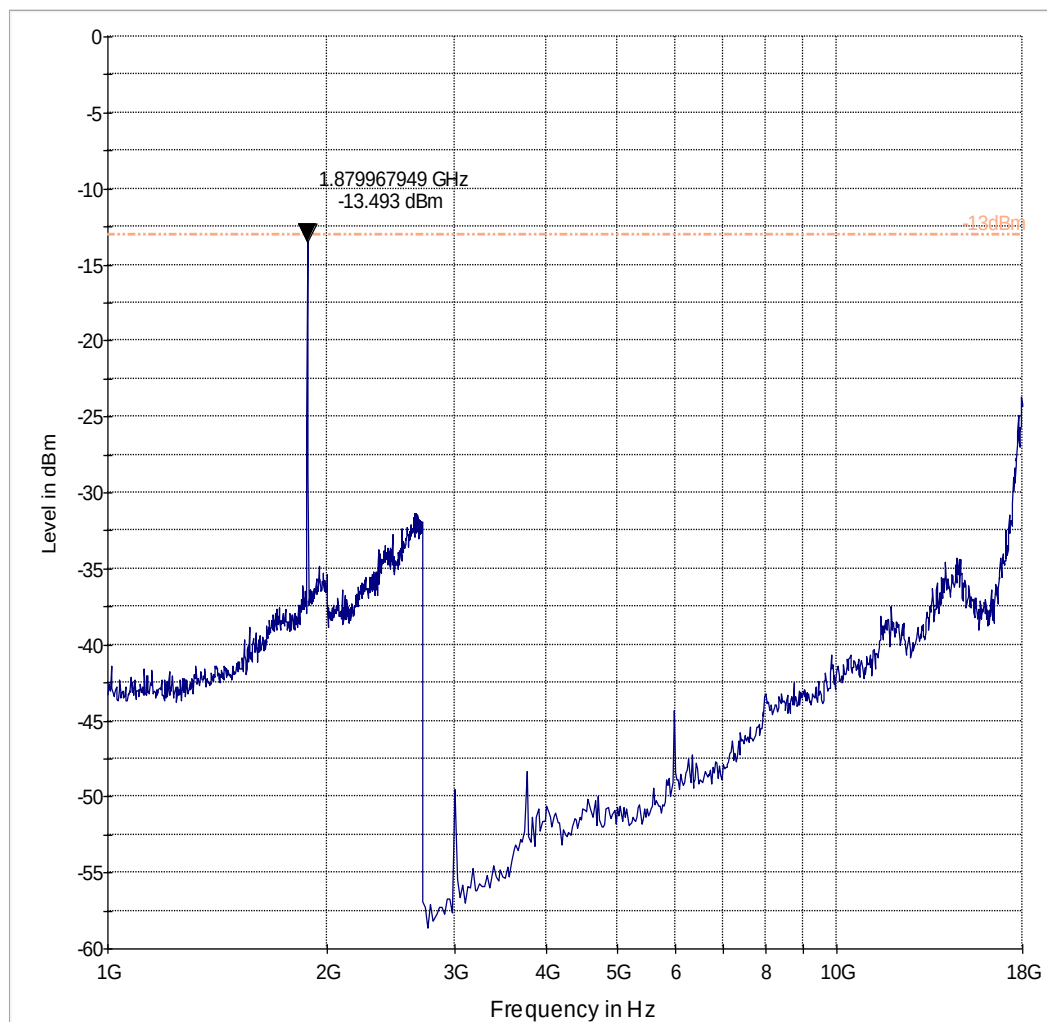
Radiated Spurious Emissions (GSM-1900) Tx: Mid Channel

Test results: 30M-1GHz



----- -13dBm — Preview Result 1-PK+

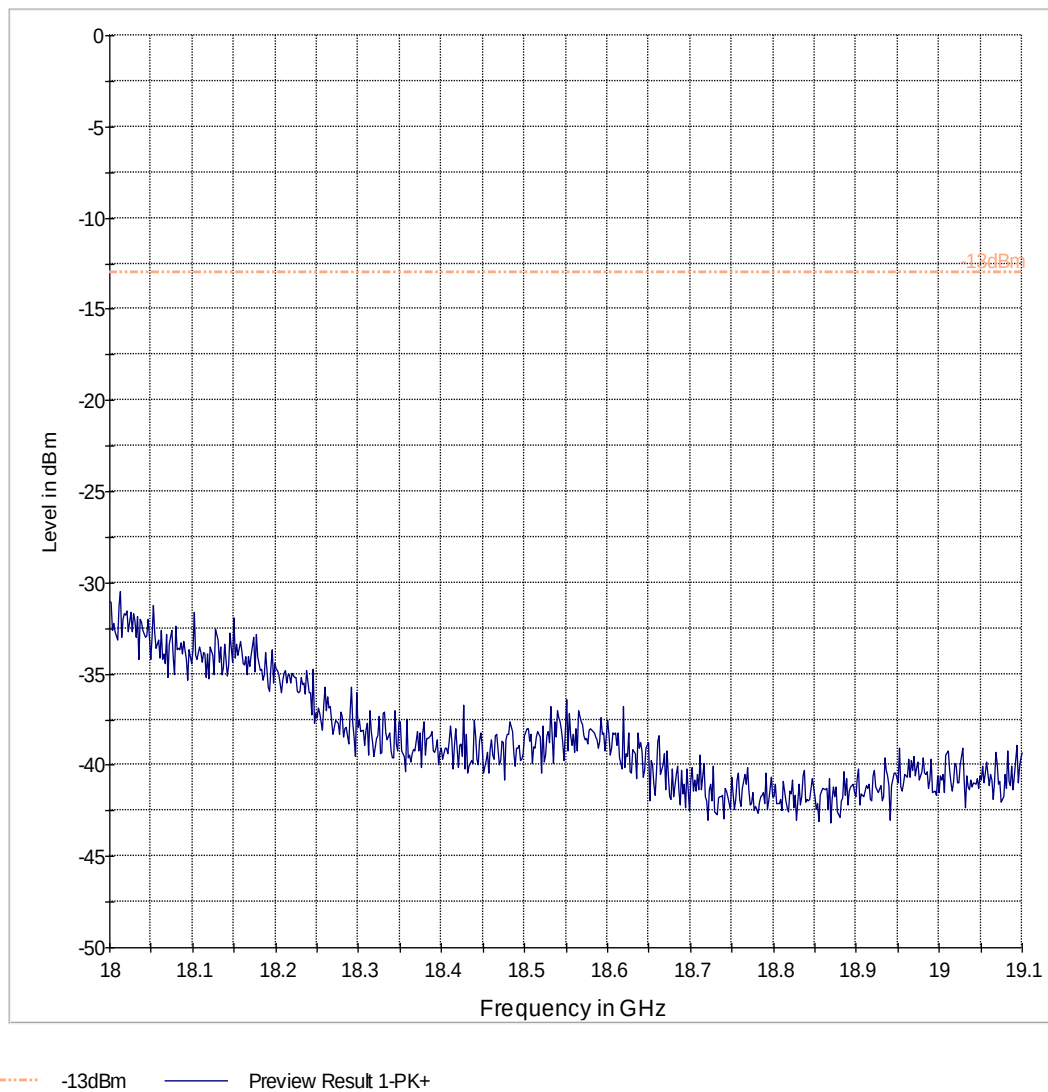
Test results: 1GHz-18GHz



----- -13dBm ——— Preview Result 1-PK+

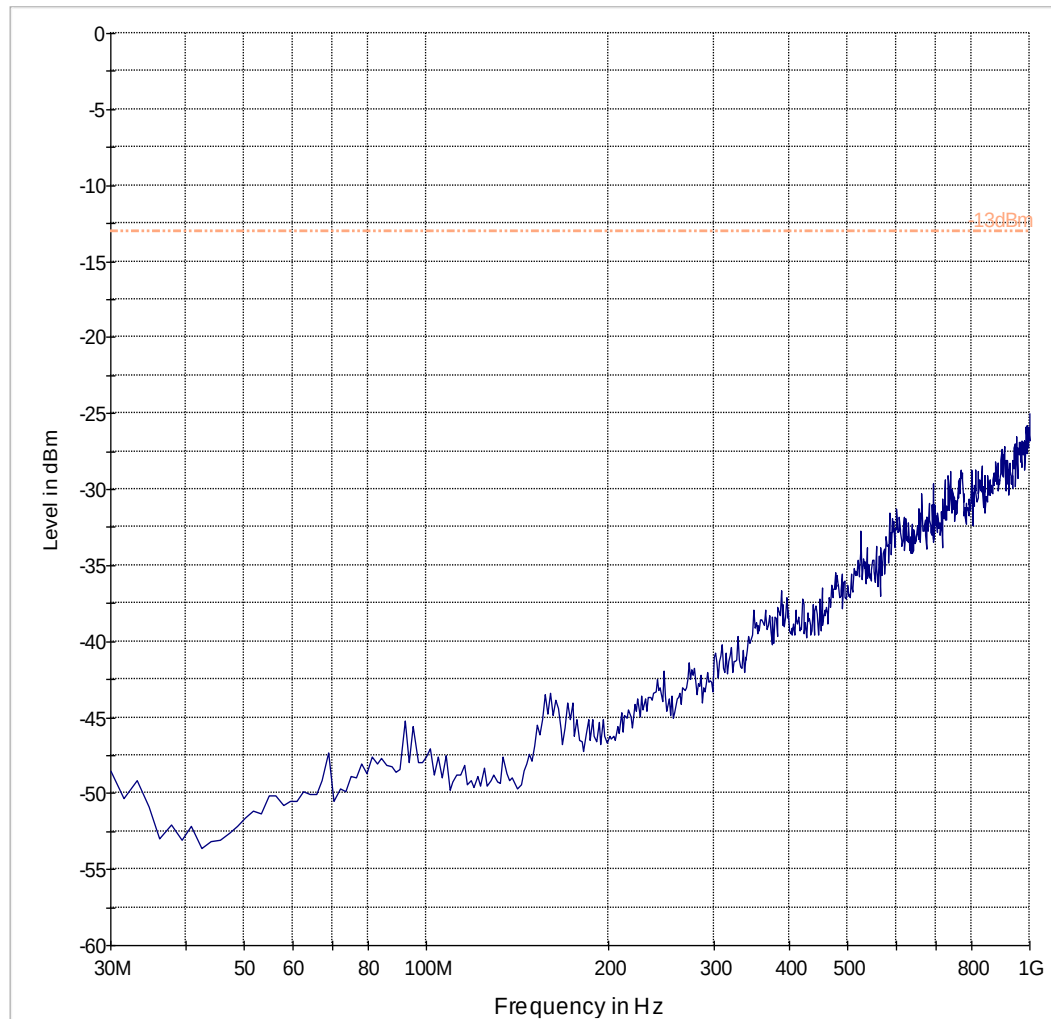
Test results: 18GHz-19.1GHz

Note: Worst case representation for all channels in this band of operation.



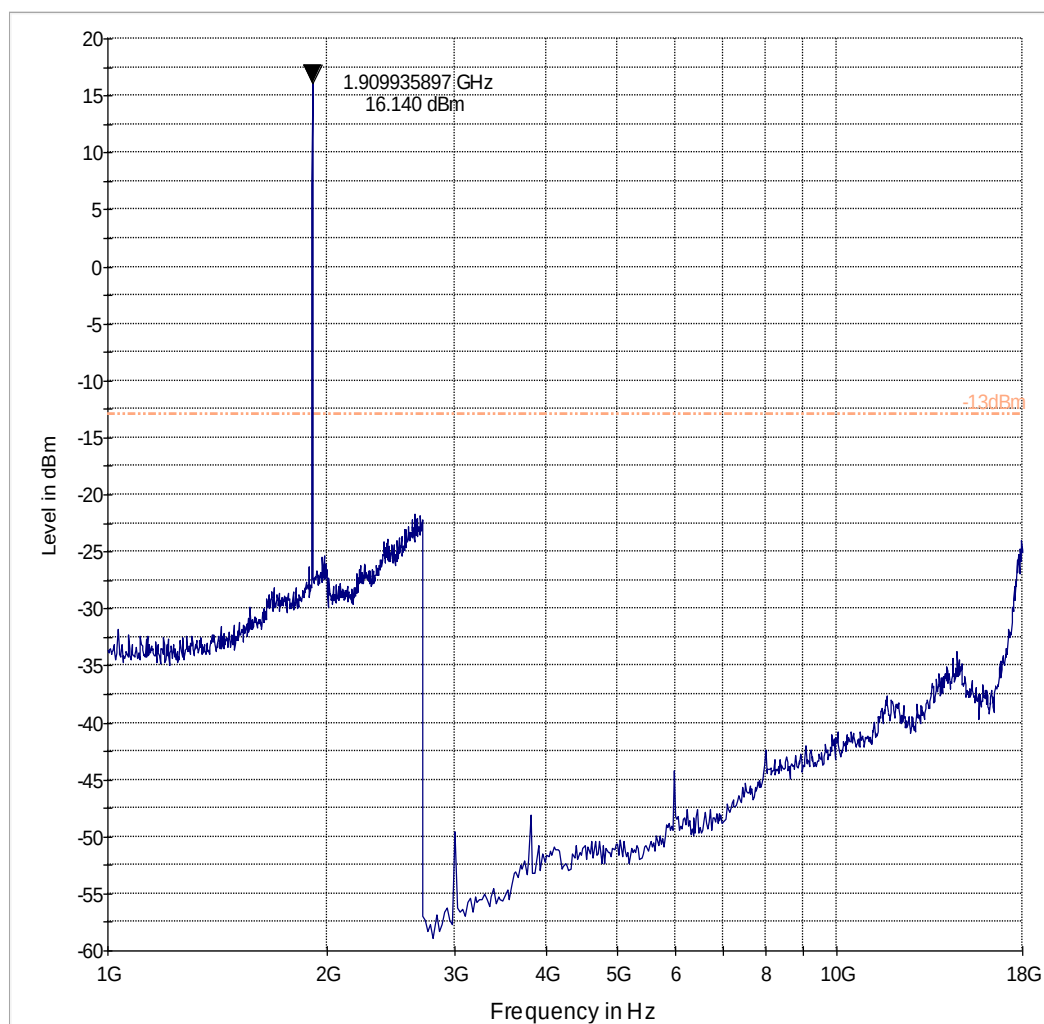
Radiated Spurious Emissions (GSM-1900) Tx: High Channel

Test results: 30M-1GHz



----- -13dBm — Preview Result 1-PK+

Test results: 1GHz-18GHz



----- -13dBm ——— Preview Result 1-PK+

6.3.4 Test Results Transmitter Spurious Emission 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)
1	1852.4	-	1880.0	-	1907.6	-
2	3704.8	-37	3760	-37	3815.2	-30
3	5557.2	NF	5640	NF	5722.8	NF
4	7409.6	NF	7520	NF	7630.4	NF
5	9262	NF	9400	NF	9538	NF
6	11114.4	NF	11280	NF	11445.6	NF
7	12966.8	NF	13160	NF	13353.2	NF
8	14819.2	NF	15040	NF	15260.8	NF
9	16671.6	NF	16920	NF	17168.4	NF
10	18524	NF	18800	NF	19076	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.3.4.1 Test Verdict

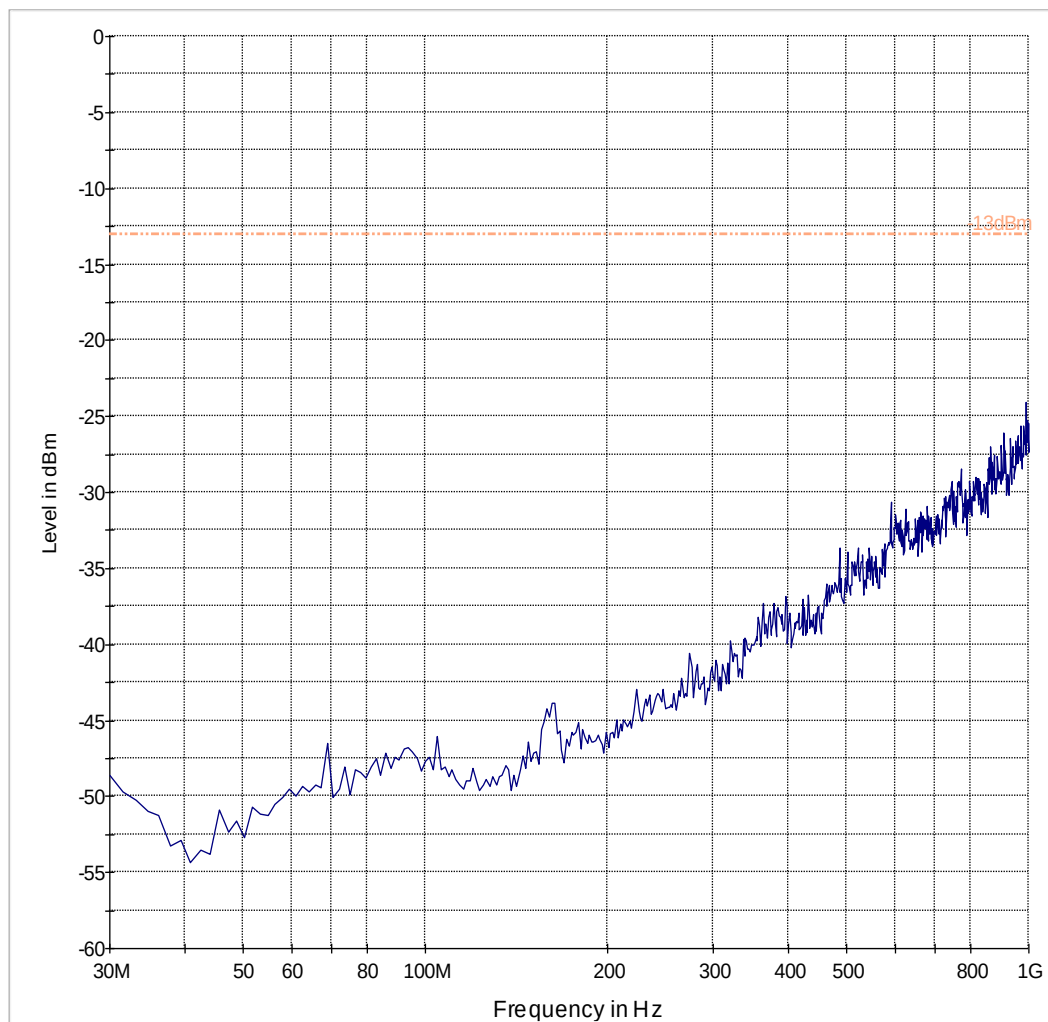
Pass.

Legend for the plots:

- -13dBm.LimitLine
- Preview Result
- ✱ Data Reduction Result
- ◆ Final Measurement Result

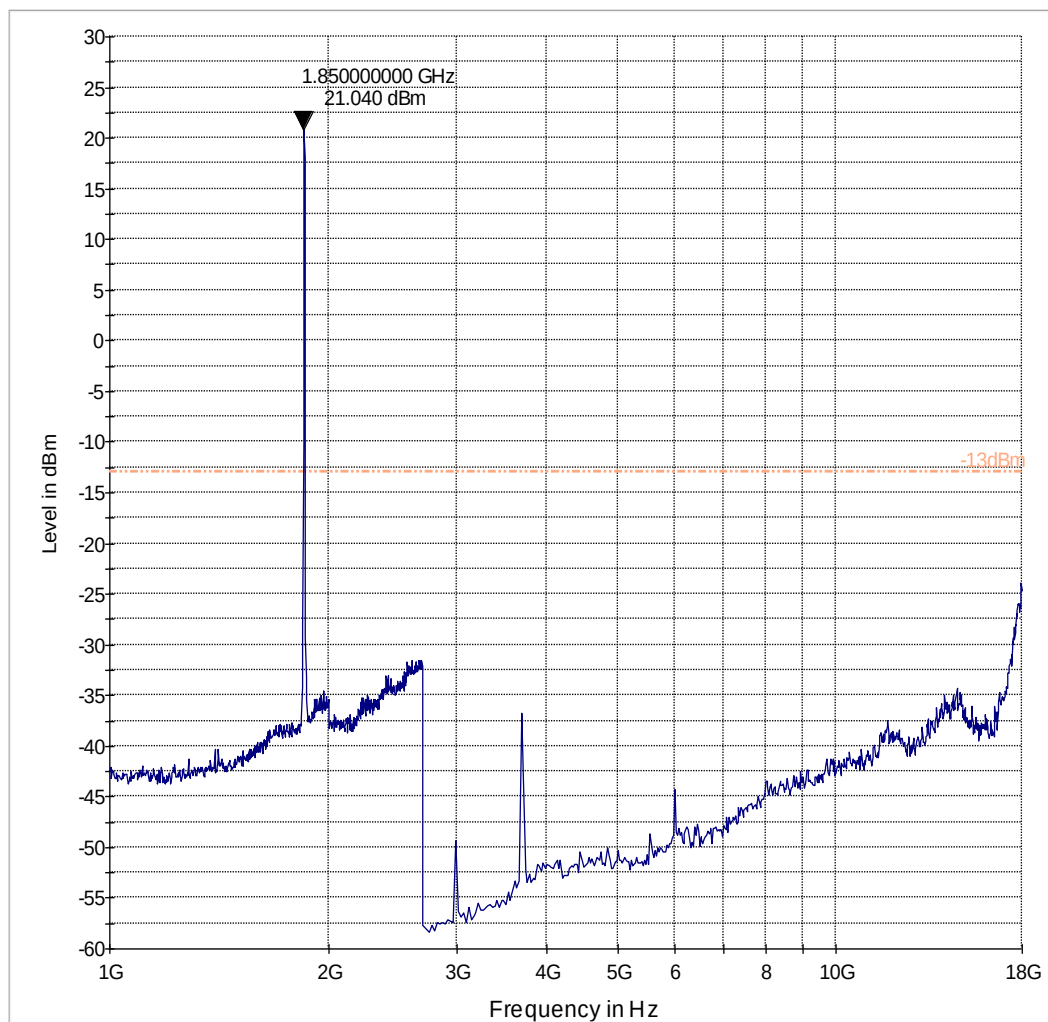
Radiated Spurious Emissions (UMTS Band 2) Tx: Low Channel

Test results: 30M-1GHz



----- -13dBm — Preview Result 1-PK+

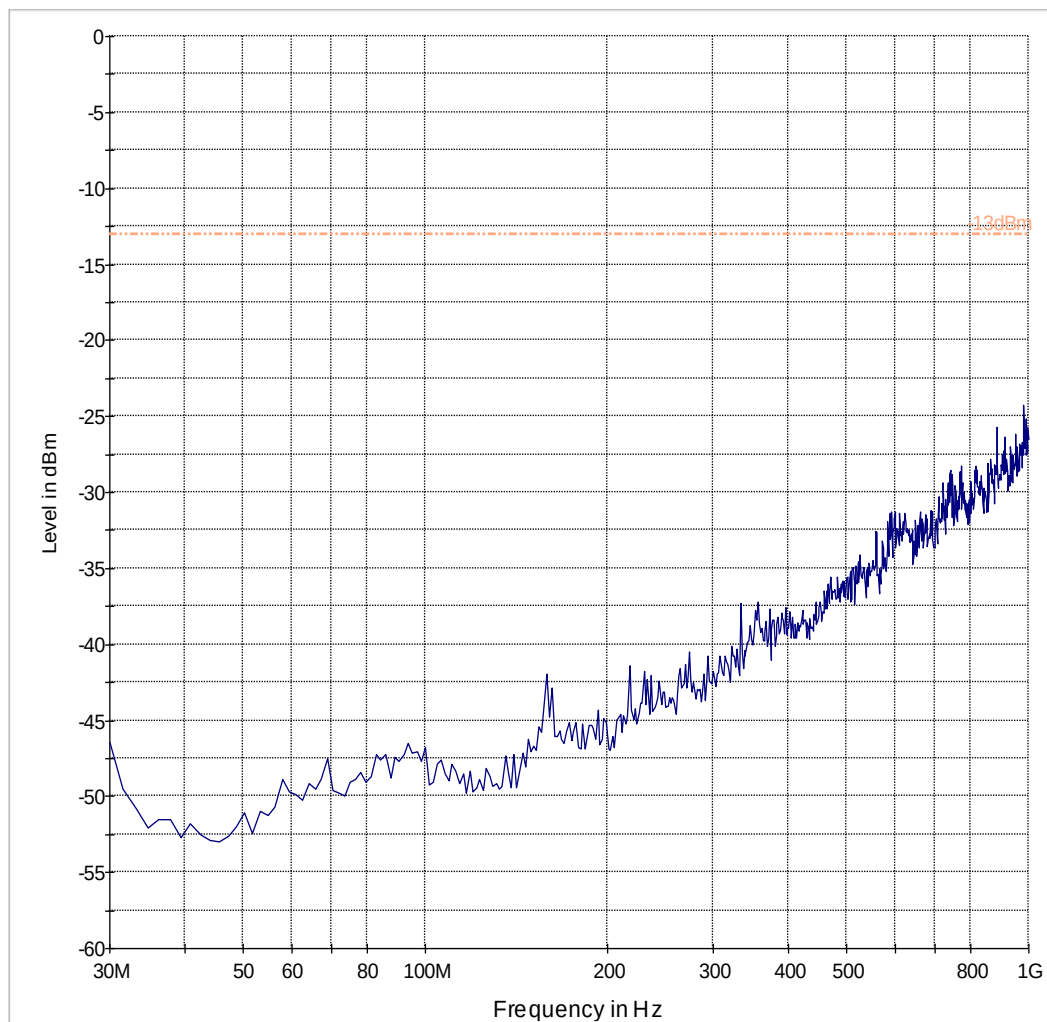
Test results: 1GHz-18GHz



----- -13dBm ——— Preview Result 1-PK+

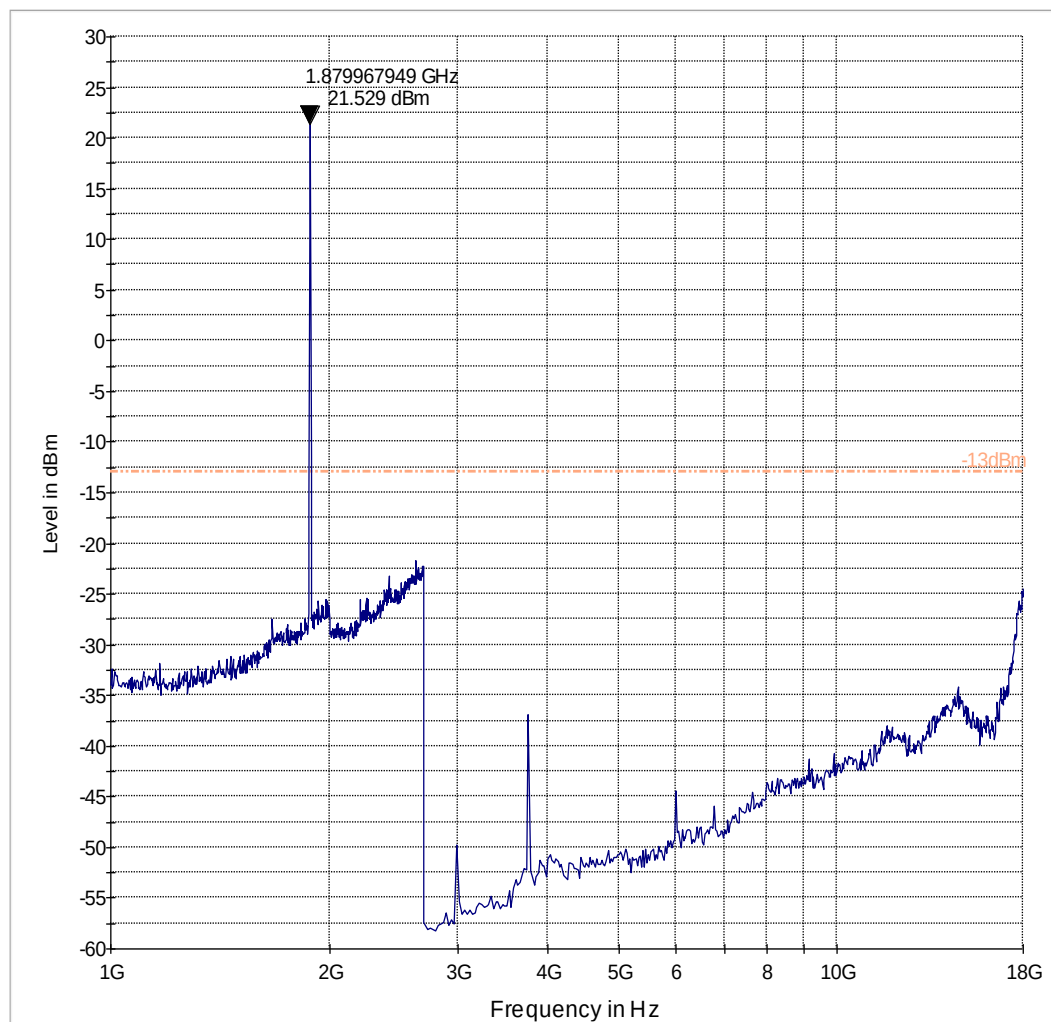
Radiated Spurious Emissions (UMTS Band 2) Tx: Mid Channel

Test results: 30M-1GHz



----- -13dBm — Preview Result 1-PK+

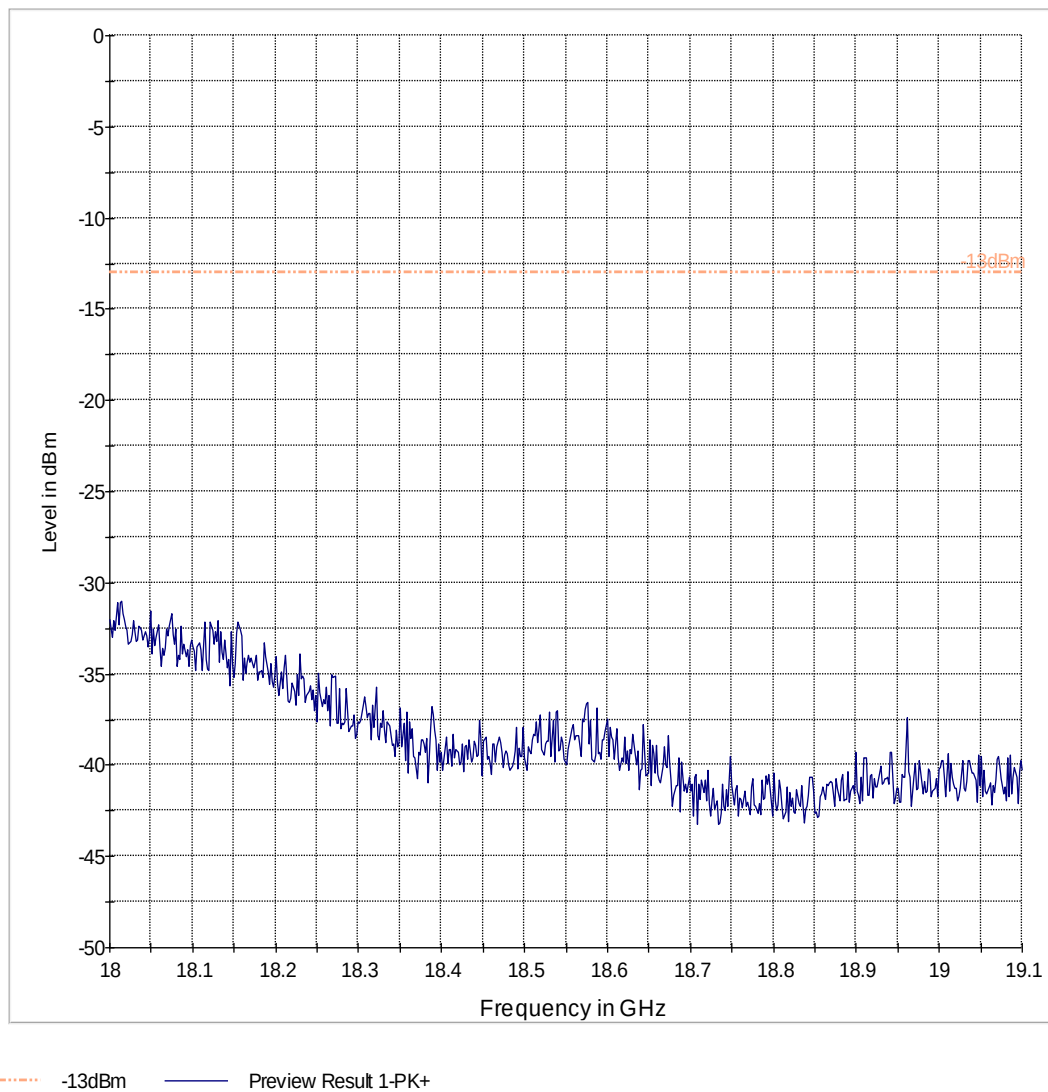
Test results 1GHz-18GHz



----- -13dBm ——— Preview Result 1-PK+

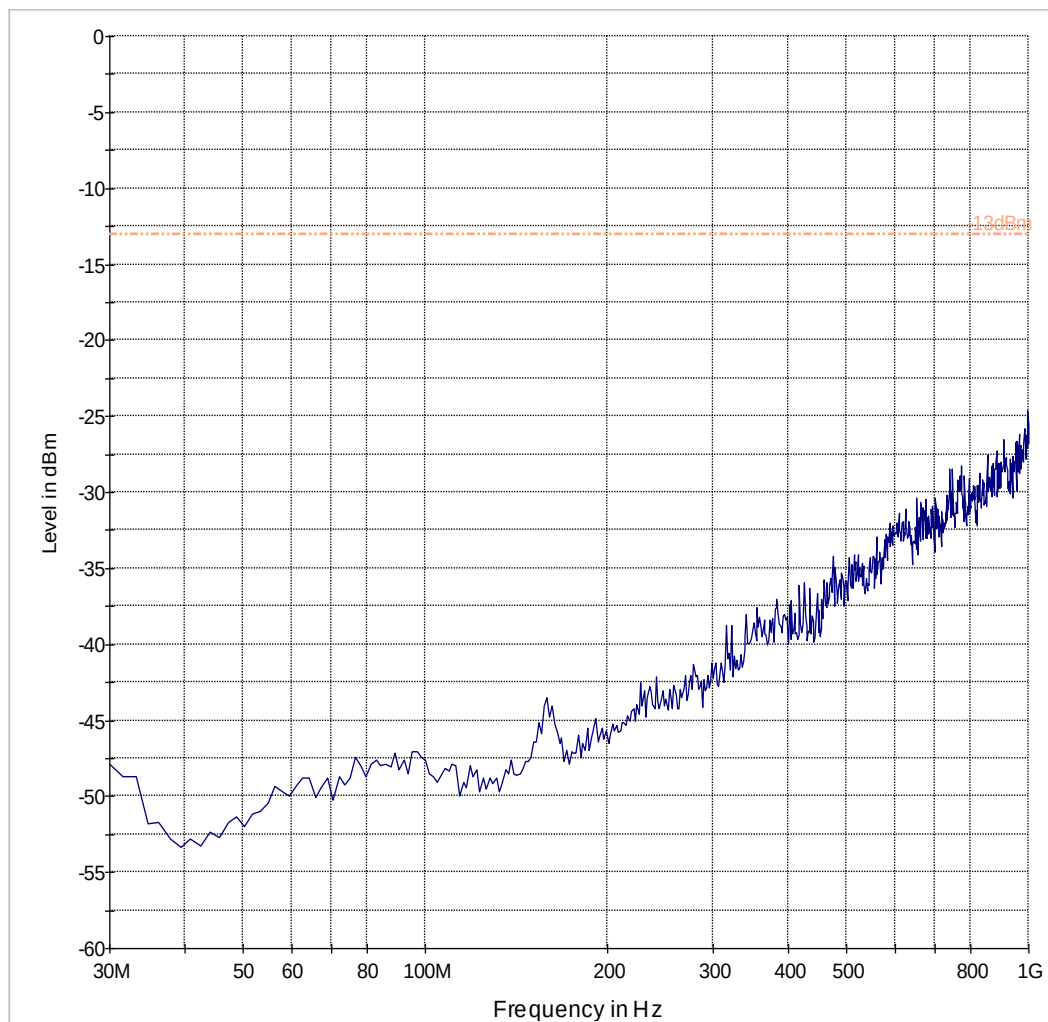
Test results: 18GHz-19.1GHz

Note: Worst case representation for all channels in this band of operation



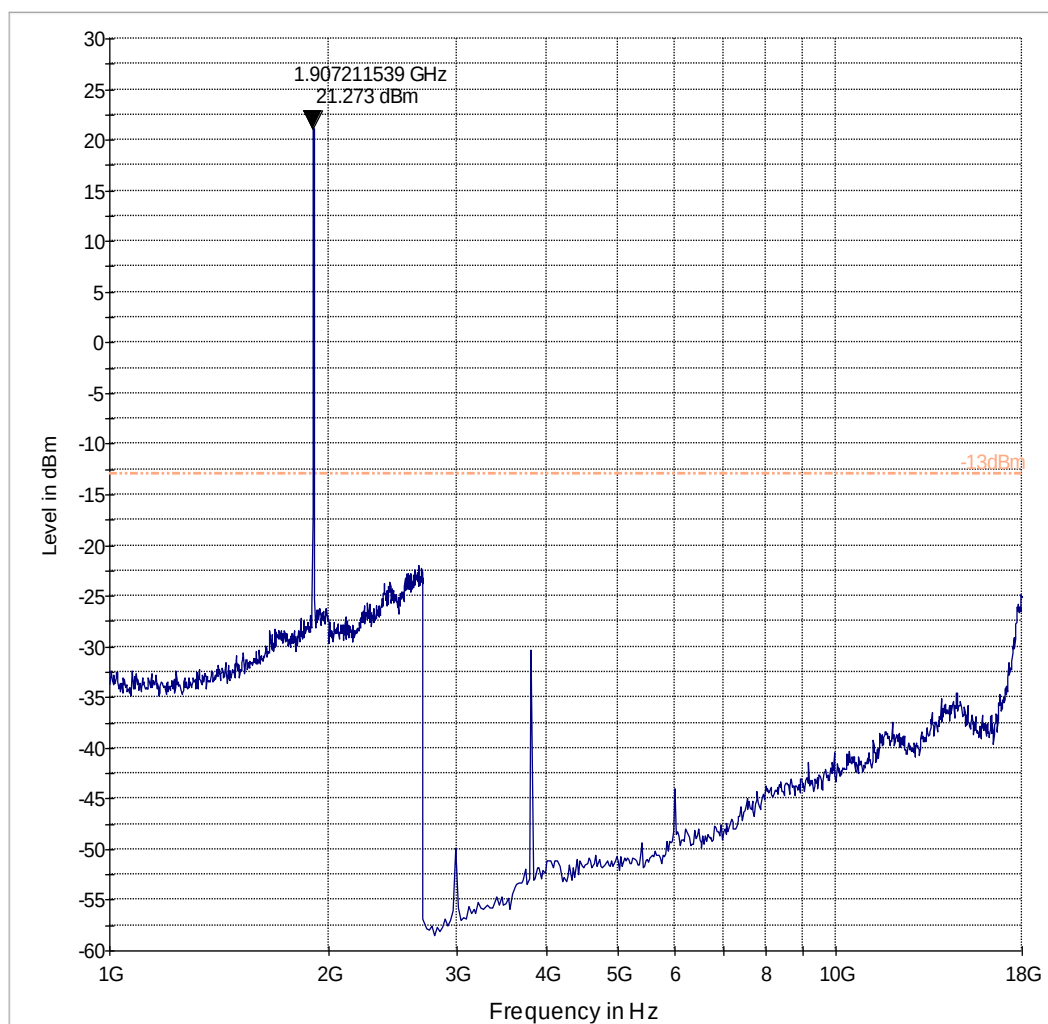
Radiated Spurious Emissions (UMTS Band 2) Tx: High Channel

Test results 30M-1GHz



----- -13dBm — Preview Result 1-PK+

Test results: 1GHz-18GHz

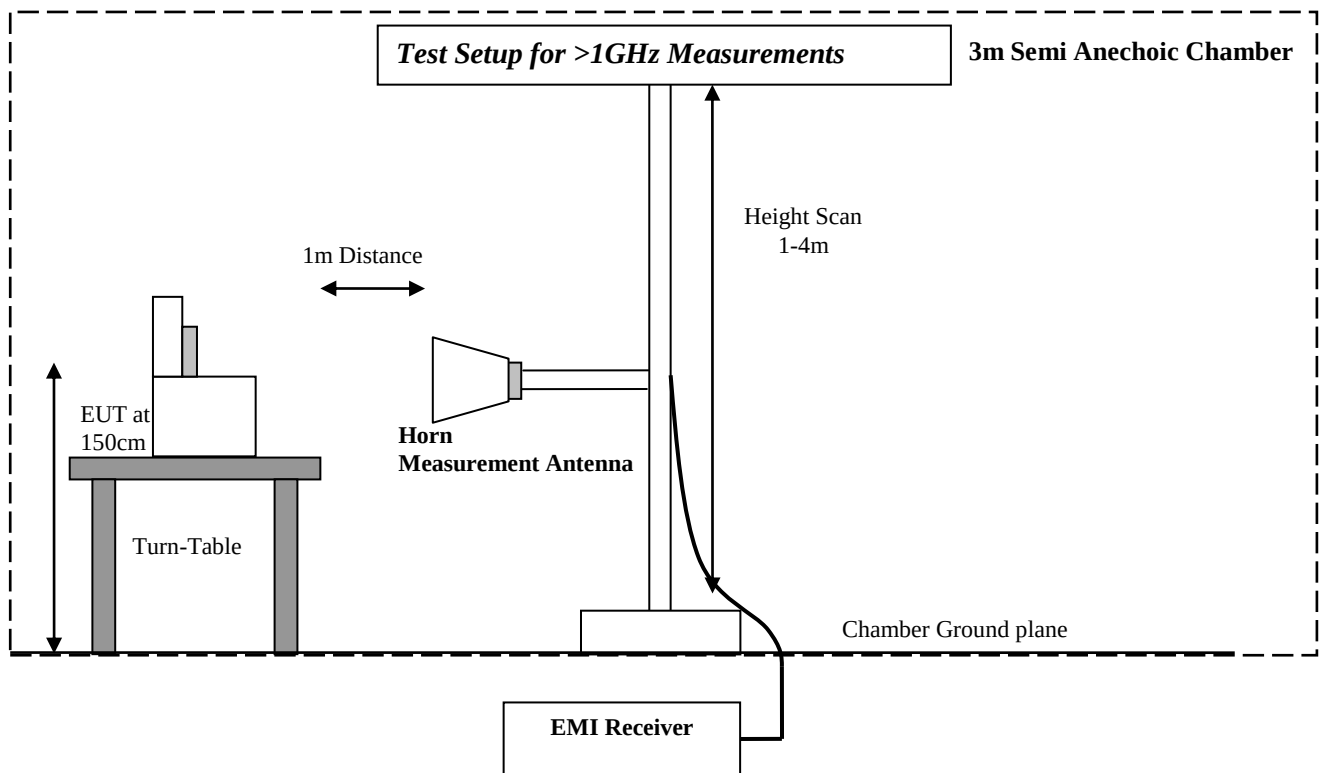
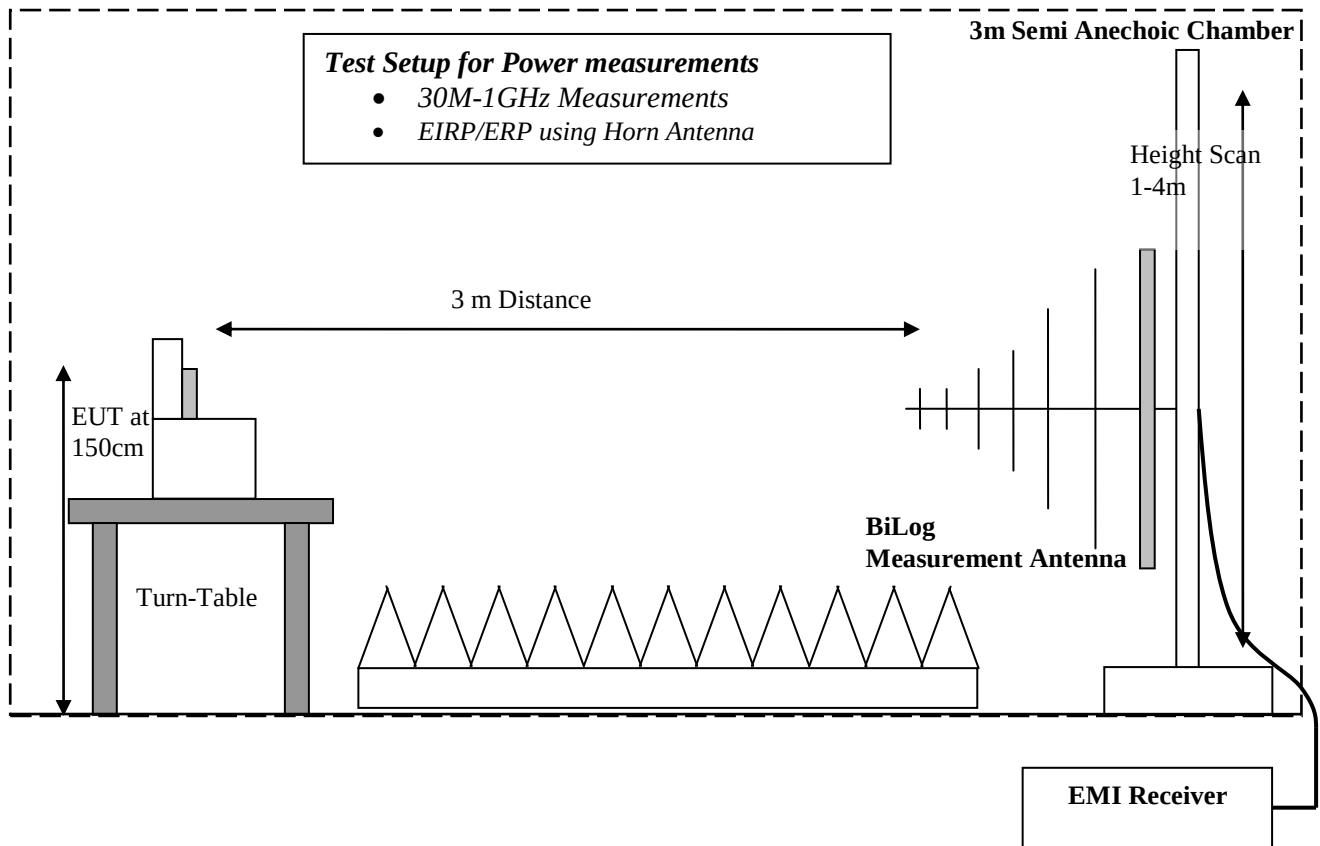


----- -13dBm ——— Preview Result 1-PK+

7 Test Equipment and Ancillaries used for tests

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2011	2 Years
EMI Receiver/Analyzer	ESU 40	Rohde & Schwarz	100251	Aug 2012	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Loop Antenna	6512	EMCO	00049838	Aug 2011	3 years
Biconilog Antenna	3141	EMCO	0005-1186	Apr 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Apr 2012	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Sep 2011	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
6GHz High Pass Filter	HPM50106	Microtronics	001	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
LISN	50-25-2-08	FCC	08014	July 2012	2 Years
Power Smart Sensor	R&S	NRP-Z81	100161	May 2011	2 Years
Multimeter	MM200	Klein	N/A	Apr 2011	2 Years
Temp Hum Logger	TM320	Dickson	03280063	Mar 2012	1 Year
Temp Hum Logger	TM325	Dickson	5285354	Mar 2012	1 Year

8 Test Setup Diagrams



9 Revision History

Date	Report Name	Changes to report	Report prepared by
2012-12-06	EMC_EMBED-001-12001_WWAN	First version	C. Lee