



# FCC Test Report

## FCC Part 22, 24

**Model #: PRS-900**

**FCC ID: AK8PRS900**

**TEST REPORT #: EMC\_CET10\_045\_09502\_FCC22\_24\_rev3**  
**DATE: 2009-10-13**



**FCC listed:**  
**A2LA accredited**  
**IC recognized #**  
**3462B**

**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](mailto:info@cetecomusa.com) ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

© Copyright by CETECOM



**Table of Contents**

**1 ASSESSMENT .....3**

**2 ADMINISTRATIVE DATA.....4**

2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC 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

**4 SUBJECT OF INVESTIGATION.....7**

**5 MEASUREMENTS.....8**

5.1 RF POWER OUTPUT .....8

5.1.1 FCC 2.1046 Measurements required: RF power output.....8

5.1.2 Limits: .....8

5.1.2.1 FCC 22.913 (a) Effective radiated power limits. ....8

5.1.2.2 FCC 24.232 (b)(c) Power limits. ....8

5.1.3 Conducted Output Power Measurement procedure:.....8

5.1.4 Radiated Output Power Measurement procedure:.....9

5.1.5 ERP Results 850MHz band: .....10

5.1.6 EIRP Results 1900 MHz band:.....10

5.2 SPURIOUS EMISSIONS RADIATED .....29

5.2.1 FCC 2.1053 Measurements required: Field strength of spurious radiation.....29

5.2.2 Limits: .....29

5.2.2.1 FCC 22.917 Emission limitations for cellular equipment. ....29

5.2.2.2 FCC 24.238 Emission limitations for Broadband PCS equipment. ....29

5.2.3 Radiated out of band measurement procedure: .....30

5.2.4 Radiated out of band emissions results on EUT: .....32

5.2.4.1 Test Results Transmitter Spurious Emission GSM850: .....32

5.2.4.2 Test Results Transmitter Spurious Emission UMTS FDD5.....39

5.2.4.3 Test Results Transmitter Spurious Emission PCS-1900: .....46

5.2.5 Test Results Transmitter Spurious Emission UMTS FDD2: .....53

5.2.6 RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-132 & 133 .....61

5.2.6.1 Test Results Receiver Spurious Emission .....62

30M-1GHz .....62

5.3 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207.....64

5.3.1 Limits.....64

**6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS .....67**

**7 REFERENCES .....68**

**8 BLOCK DIAGRAMS .....69**

**9 REVISION HISTORY.....72**



**1 Assessment**

**The following is in compliance with the applicable criteria specified in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations.**

Company	Description	Model #
Sony Electronics	Electronic Book	PRS900

**Technical responsibility for area of testing:**

**Marc Douat**

**2009-10-13 EMC & Radio (Test Lab Manager)**

Date	Section	Name	Signature
------	---------	------	-----------

**This report is prepared by:**

**Satya Radhakrishna**

**2009-10-13 EMC & Radio (EMC Project Engineer)**

Date	Section	Name	Signature
------	---------	------	-----------

The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The 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 the CETECOM Inc USA.

The test results of this test report relate exclusively to radiated measurement only. Radio module used in this product has been previously certified under its own FCC and IC ID.

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	<b>CETECOM Inc.</b>
Department:	<b>EMC</b>
Address:	<b>411 Dixon Landing Road Milpitas, CA 95035 U.S.A.</b>
Telephone:	<b>+1 (408) 586 6200</b>
Fax:	<b>+1 (408) 586 6299</b>
Responsible Test Lab Manager:	<b>Marc Douat</b>
Responsible Project Leader:	<b>Satya Radhakrishna</b>

### 2.2 Identification of the Client

<b>APPLICANT</b>	
<b>Applicant (Company Name)</b>	<b>Sony Electronics</b>
<b>Street Address</b>	<b>Shinagawa Intercity C Tower, 2-15-3 Konan, Minato-ku</b>
<b>City/Zip Code</b>	<b>Tokyo/108-6201</b>
<b>Country</b>	<b>Japan</b>
<b>Contact Person</b>	<b>Manabu Handa</b>
<b>Telephone</b>	<b>+81 3 5769 5510</b>
<b>e-mail</b>	<b>Manabu.Handa@jp.sony.com</b>

### 2.3 Identification of the Manufacturer

Manufacturer's Name:	<b>Sony EMCS Corporation</b>
Street Address:	<b>9-15-22 hongo-chou,minokamo-city,</b>
City/Zip Code	<b>Gihu/505-8510</b>
Country	<b>Japan</b>
Contact Person:	<b>Funato Haruyuki</b>
Phone No.	<b>+81 574 25 9084</b>
e-mail:	<b>Funato.Haruyuki@jp.sony.com</b>

### 3 Equipment under Test (EUT)

#### 3.1 Specification of the Equipment under Test

Marketing Name of EUT (if not same as Model No.)	PRS-900
Model No.	PRS-900
FCC-ID	AK8PRS900
Frequency Range:	<b>824.2MHz – 848.8MHz for GSM 850</b> <b>1850.2MHz – 1909.8MHz for PCS 1900</b> <b>826.4MHz – 846.6MHz for UMTS FDD5</b> <b>1852.4MHz – 1907.6MHz for UMTS FDD2</b>
Type(s) of Modulation:	<b>GMSK, 8PSK, QPSK</b>
Number of Channels:	<b>GSM: 124 for GSM-850, 299 for PCS-1900</b> <b>UMTS: Depends on service.</b>
Antenna Type/gain:	<b>Internal PIFA Antenna/2dBi Max.</b>
Max. Output Power:	<b>Conducted measurements were not performed at Cetecom</b> <b>Radiated GSM850 GMSK: 30.316 dBm @ 848.8 MHz</b> <b>Radiated GSM850 8PSK: 28.317 dBm @ 848.8 MHz</b> <b>Radiated UMTS FDD5: 23.225dBm @ 826.4 MHz</b> <b>Radiated GSM1900 GMSK: 31.845 dBm @ 1880 MHz</b> <b>Radiated GSM1900 8PSK: 32.031 dBm @ 1880 MHz</b> <b>Radiated UMTS FDD2: 27.766 dBm @ 1880 MHz</b>

**3.2 Identification of the Equipment under Test (EUT)**

EUT #	TYPE	MANUFACTURER	MODEL	SERIAL#
1	Electronic Book	Sony Electronics	PRS900	9000244

**3.3 Identification of Accessory equipment**

AE #	TYPE	MANF.	MODEL	SERIAL
1	AC Adapter	Sony Corporation	AC-S5220E	147971421A096889

#### **4 Subject of Investigation**

All testing was performed on the EUT listed in Section 3. The EUT was maximized in the X, Y, Z positions, all data in this report shows the worst case between horizontal and vertical polarization for above 1GHz.

The device contains a FCC pre-certified GSM/UMTS module, the Ericsson F3507g FCC ID: PY7F3232011. This report contains only radiated data.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations.

## 5 Measurements

### 5.1 RF Power Output

#### 5.1.1 FCC 2.1046 Measurements required: 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.

#### 5.1.2 Limits:

##### 5.1.2.1 FCC 22.913 (a) Effective radiated power limits.

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

##### 5.1.2.2 FCC 24.232 (b)(c) Power limits.

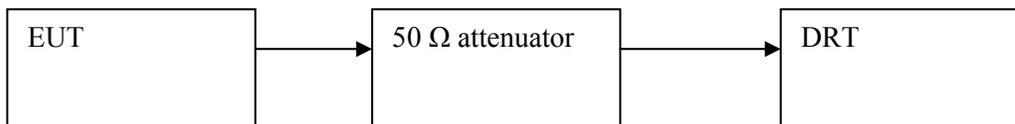
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(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.

#### 5.1.3 Conducted Output Power Measurement procedure:

**Based on TIA-603C 2004**

##### 2.2.1 Conducted Carrier Output Power Rating

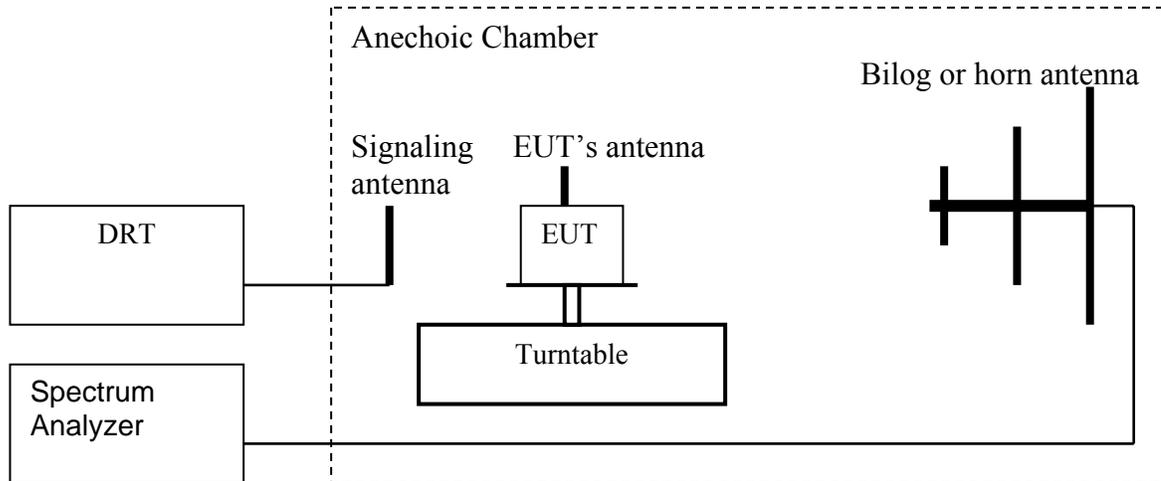


1. Connect the equipment as shown in the above diagram. A Digital Radiocommunication Tester (DRT) is used to enable the EUT to transmit and to measure the output power.
2. Adjust the settings of the DRT to set the EUT to its maximum power at the required channel.
3. Record the output power level measured by the DRT.
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.

#### 5.1.4 Radiated Output Power Measurement procedure:

Based on 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 a vertical 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 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:  

$$\mathbf{ERP\ (dBm) = LVL\ (dBm) + LOSS\ (dB)}$$
  8. Determine the EIRP using the following equation:  

$$\mathbf{EIRP\ (dBm) = ERP\ (dBm) + 2.14\ (dB)}$$
  9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band. **Spectrum analyzer settings = rbw=vbw=5MHz**
- (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.)

**5.1.5 ERP Results 850MHz band:**

USED RBW= 5 MHz VBW= 5 MHz

Power Control Level	Burst Peak ERP
5	≤38.45dBm (7W)

Frequency (MHz)	Effective Radiated Power (dBm)	
	GPRS (GMSK)	EGPRS (8PSK)
824.2	29.520	27.901
836.6	29.801	27.884
848.8	30.316	28.317

Frequency (MHz)	Effective Radiated Power (dBm)
	UMTS FDD5
826.4	23.225
836.6	23.132
846.6	22.321

**5.1.6 EIRP Results 1900 MHz band:**

USED RBW= 5 MHz VBW= 5 MHz

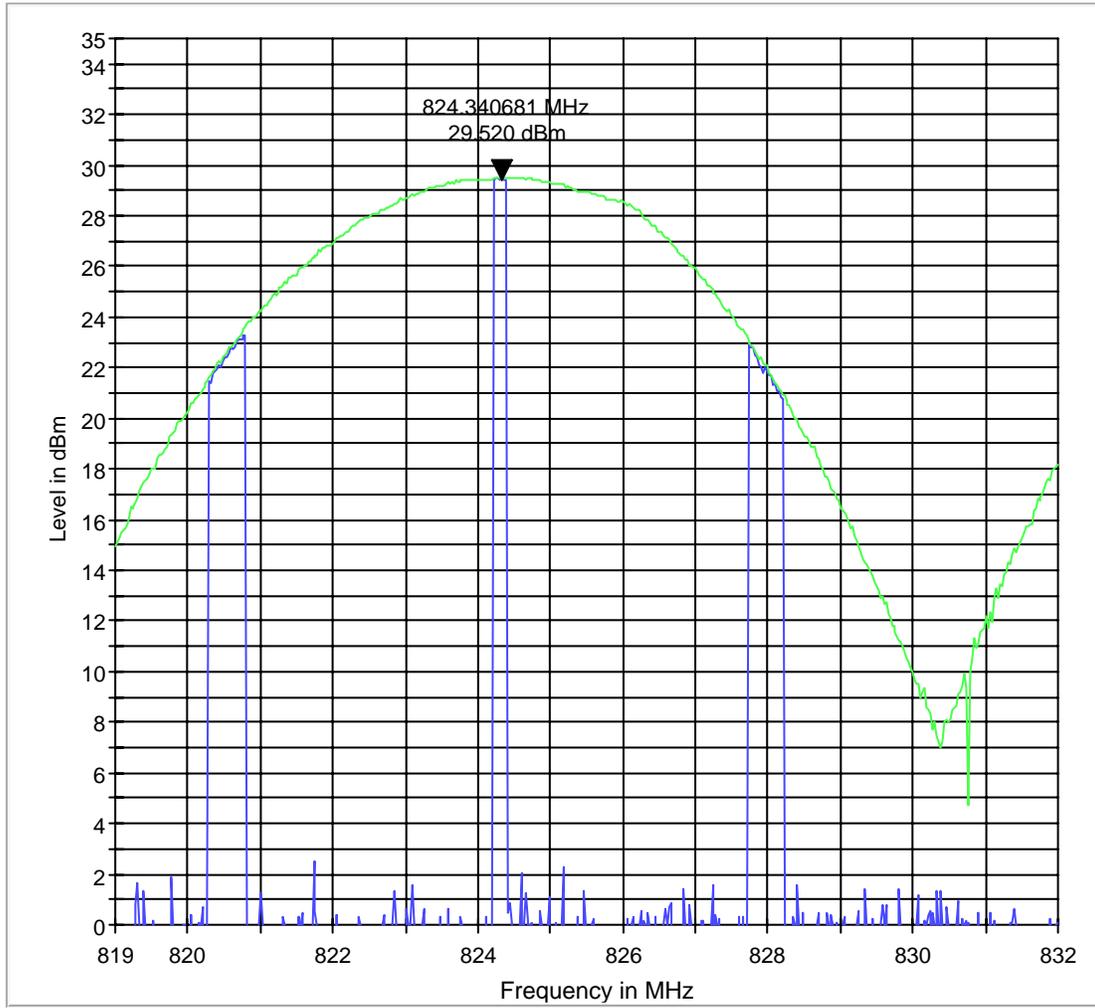
Power Control Level	Burst Peak EIRP
0	≤33dBm (2W)

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)	
	GSM (GMSK)	EGPRS (8PSK)
1850.2	29.912	29.974
1880.0	31.845	32.031
1909.8	31.269	31.33

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)
	UMTS FDD2
1852.4	26.959
1880	27.766
1907.6	26.980

**EIRP (GPRS 850) CHANNEL 128 §22.913(a)**

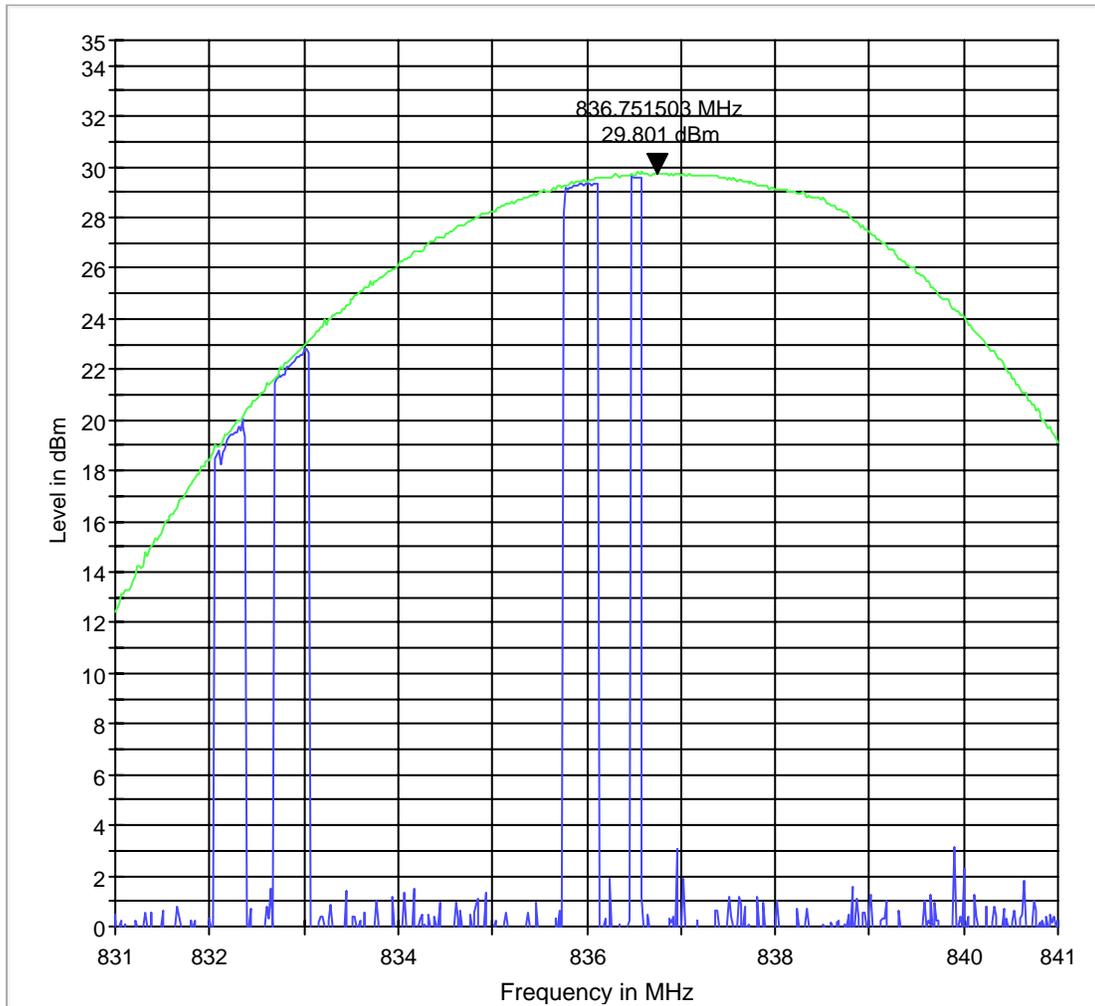
ERP 850 L



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

ERP (GPRS 850) CHANNEL 190 §22.913(a)

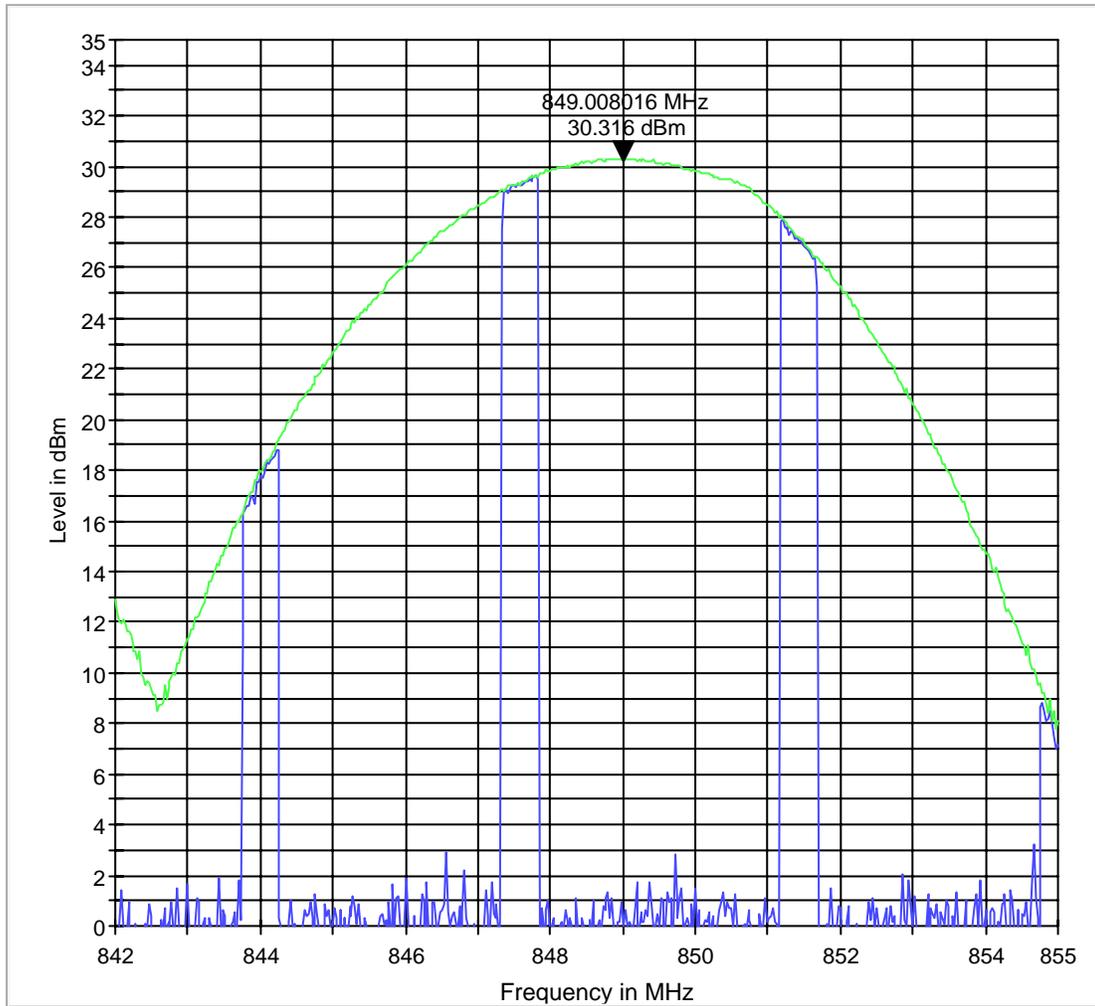
ERP 850 M



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

ERP (GPRS 850) CHANNEL 251 §22.913(a)

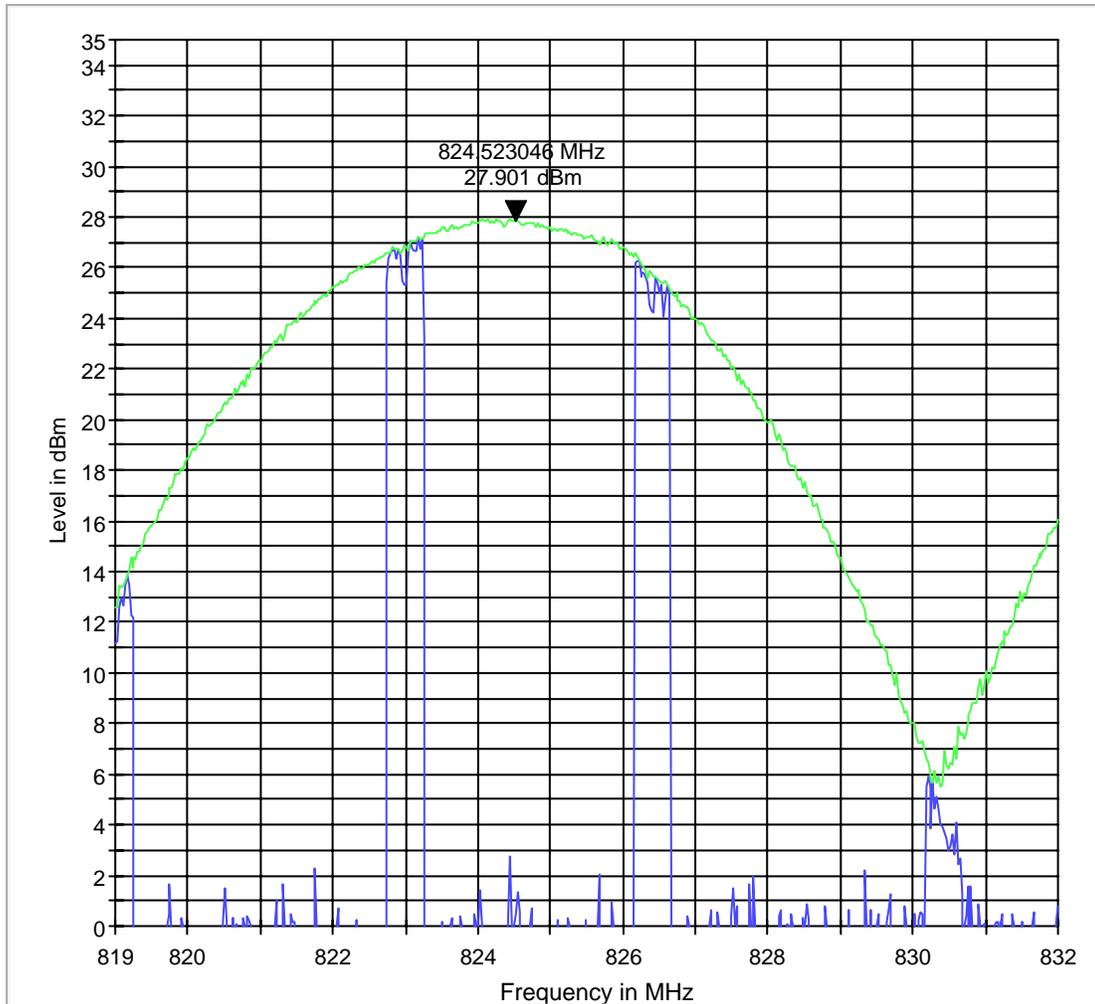
ERP 850 H



MaxPeak-ClearWrite      MaxPeak-MaxHold

ERP (EGPRS 850) CHANNEL 128 §22.913(a)

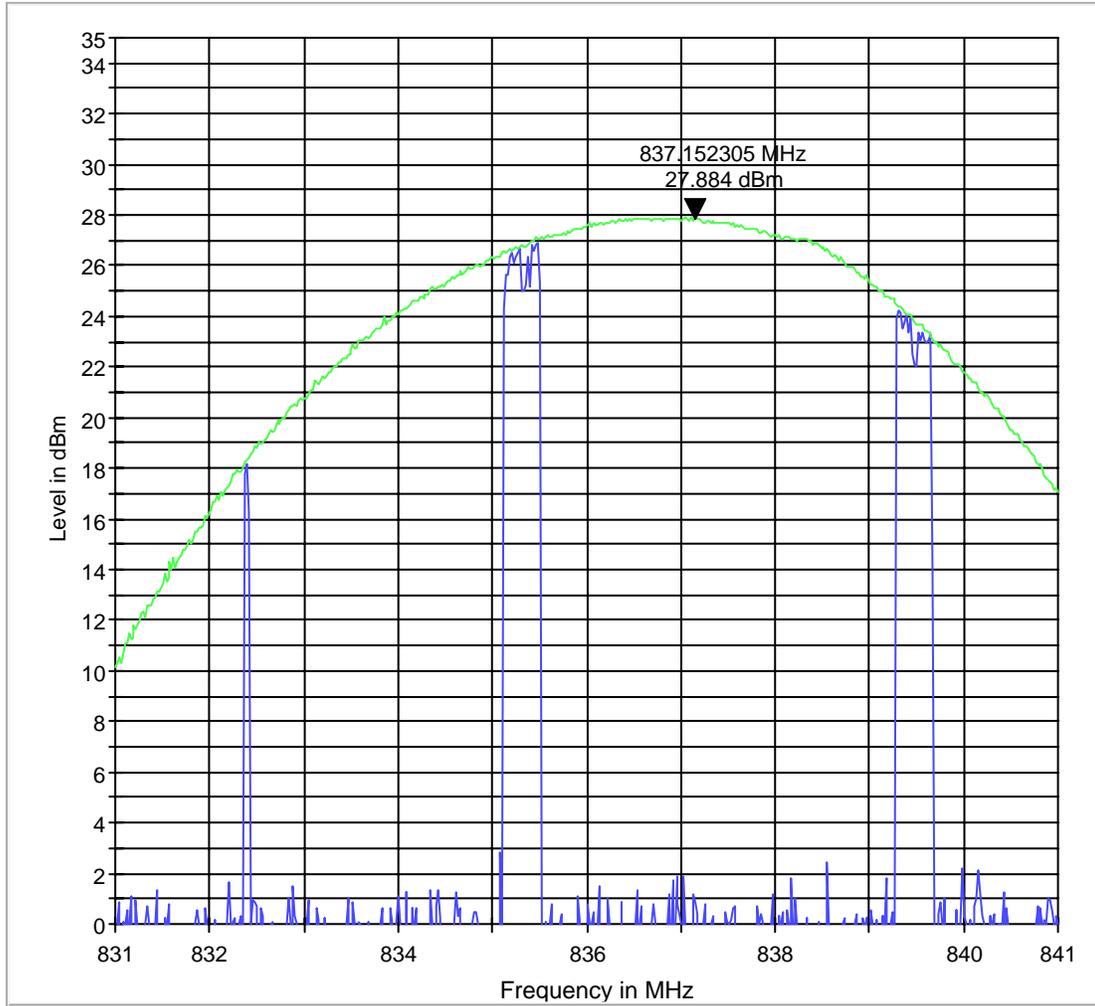
ERP 850 L



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**ERP (EGPRS 850) CHANNEL 190 §22.913(a)**

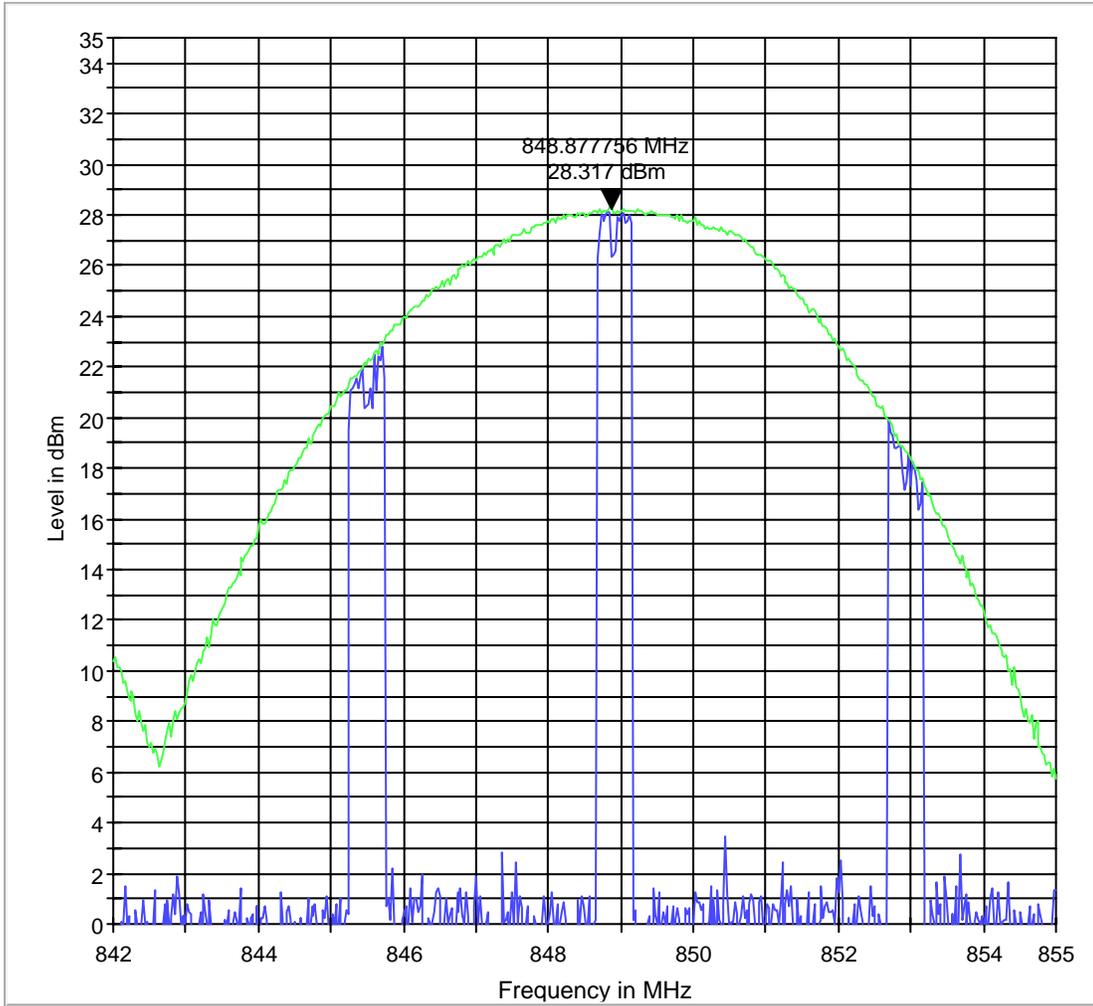
ERP 850 M



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (EGPRS 850) CHANNEL 251 §22.913(a)**

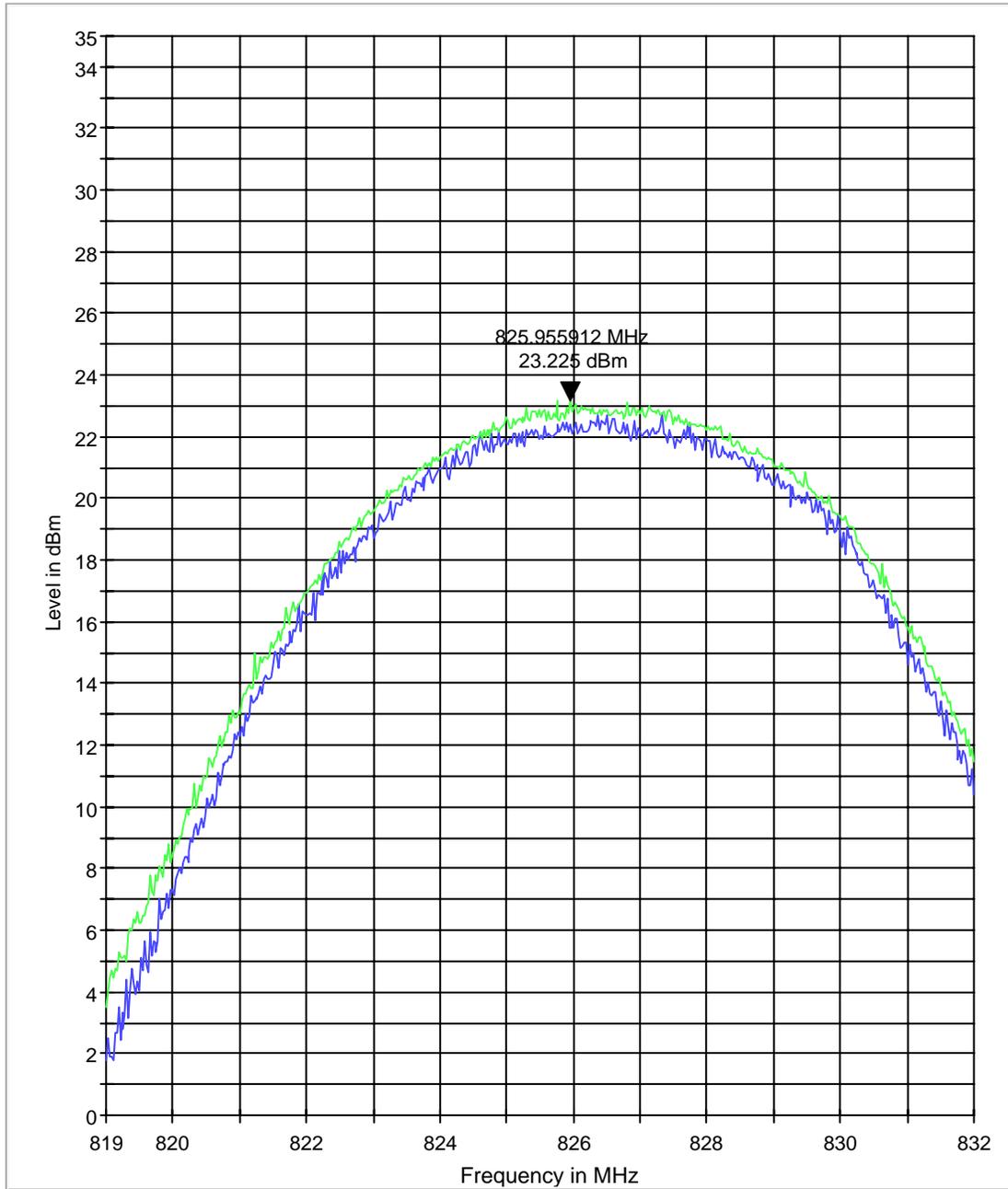
ERP 850 H



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

ERP (UMTS FDD5) CHANNEL 4132 §22.913(a)

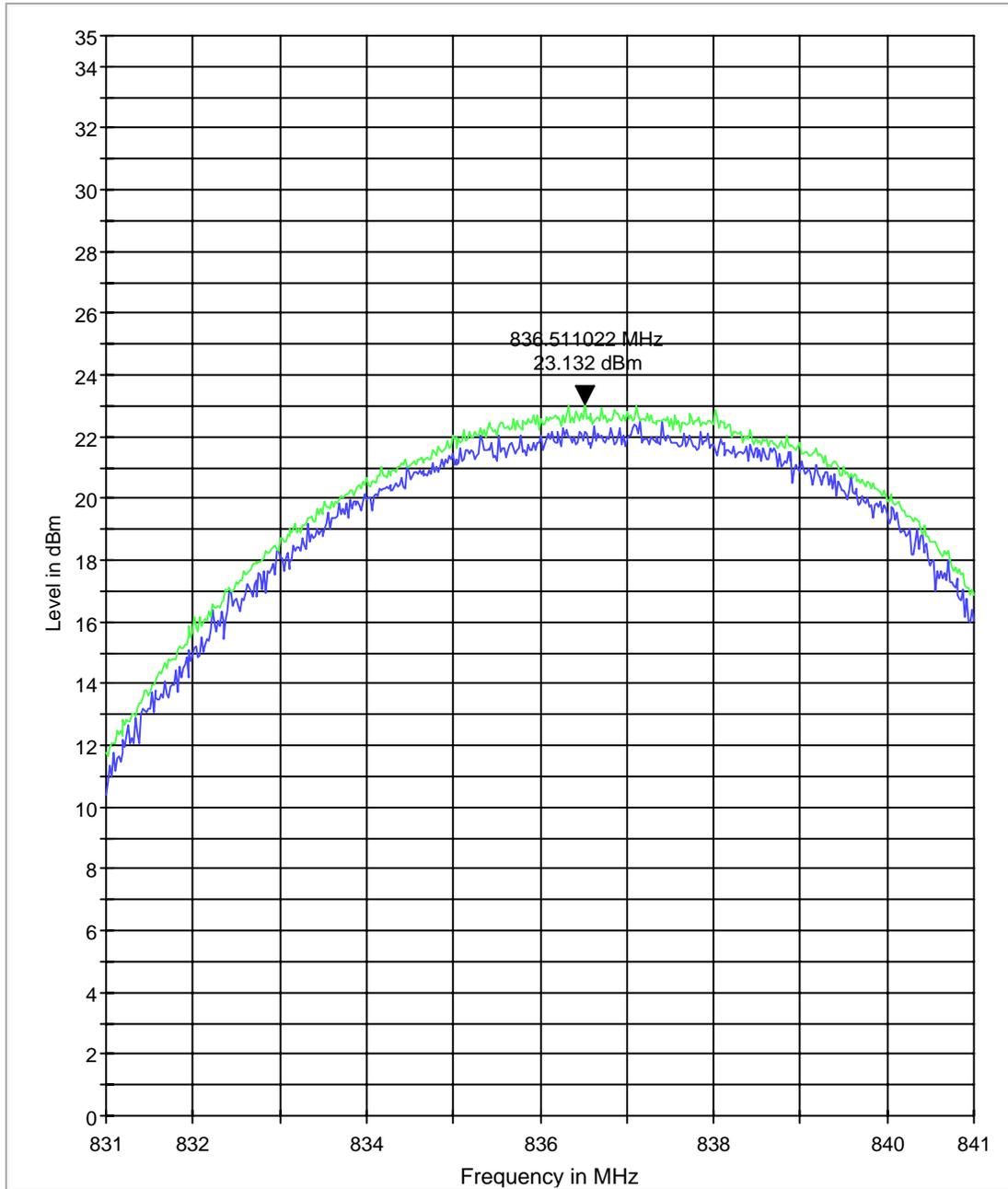
ERP 850 L



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

ERP (UMTS FDD5) CHANNEL 4183 §22.913(a)

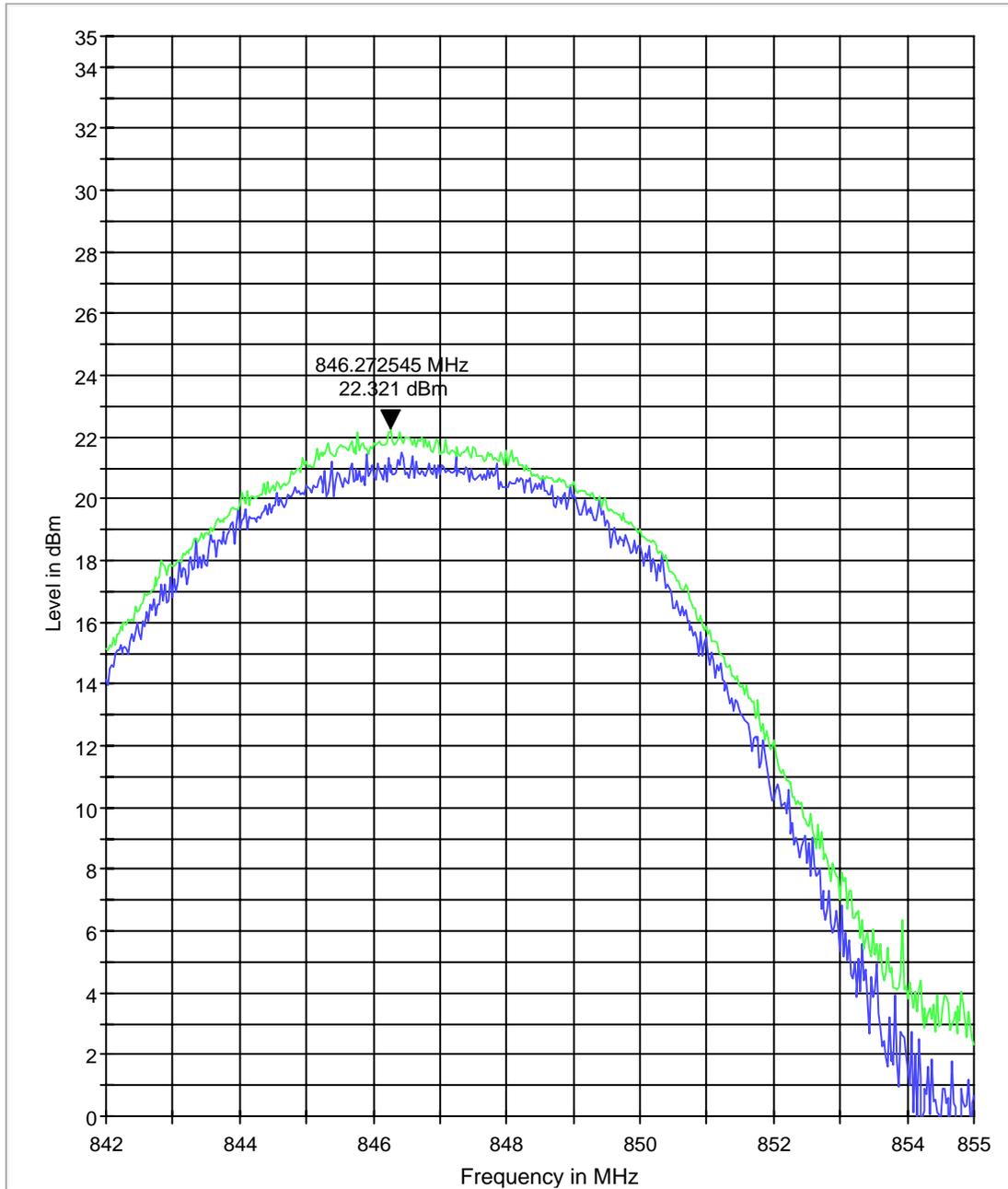
ERP 850 M



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

ERP (UMTS FDD5) CHANNEL 4233 §22.913(a)

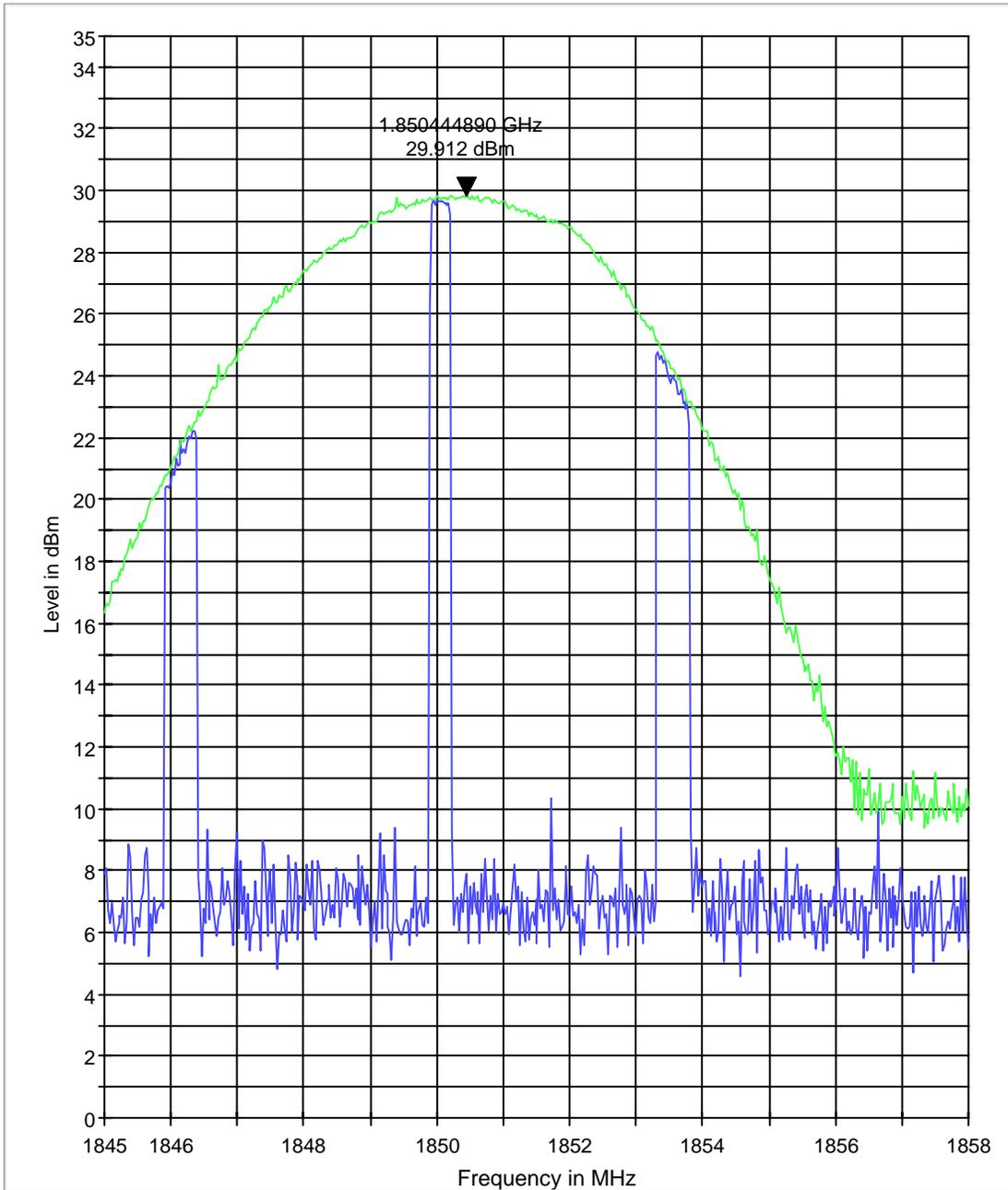
ERP 850 H



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (PCS-1900) CHANNEL 512 §24.232(b)**

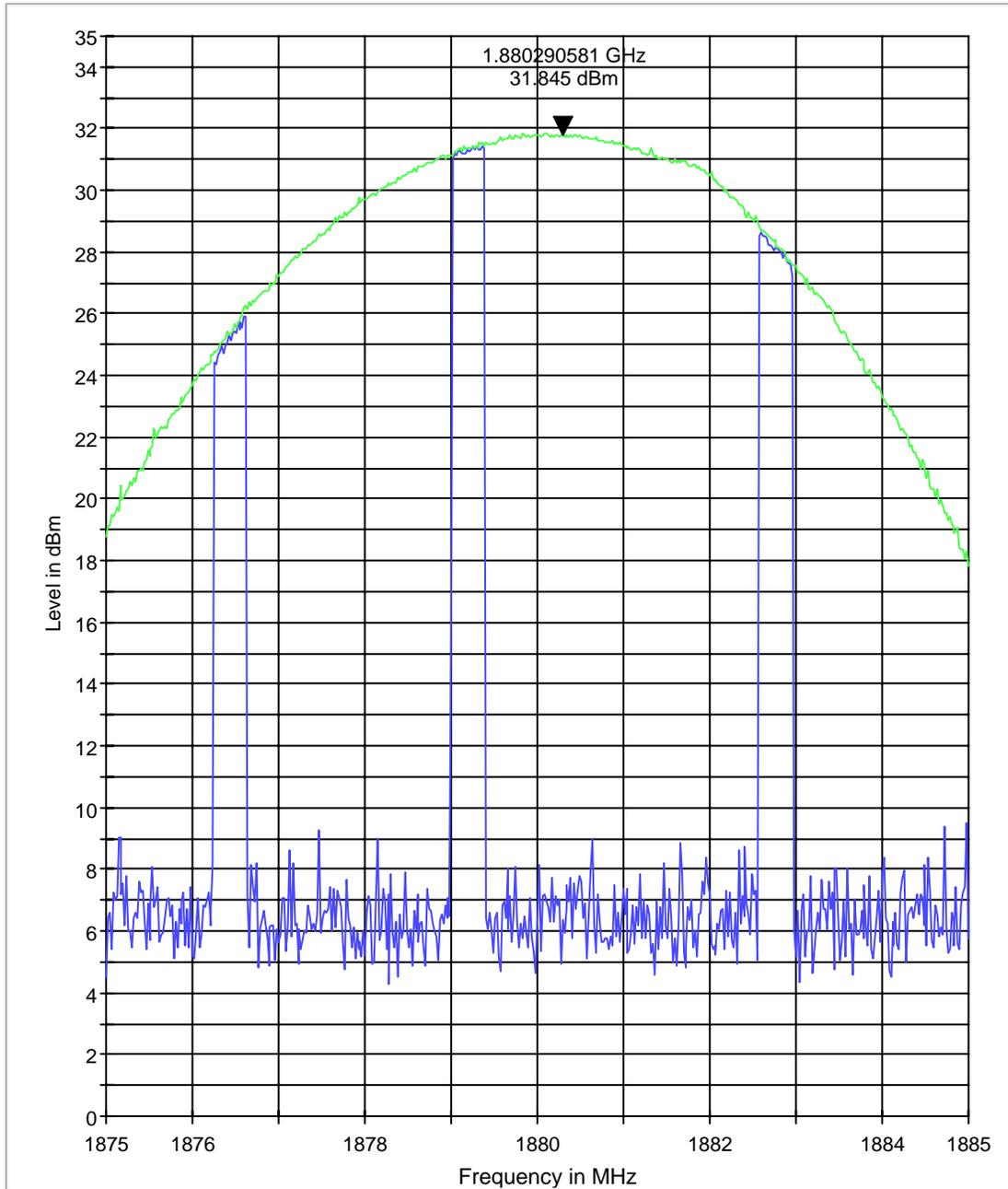
EIRP 1900 L



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (PCS-1900) CHANNEL 661 §24.232(b)**

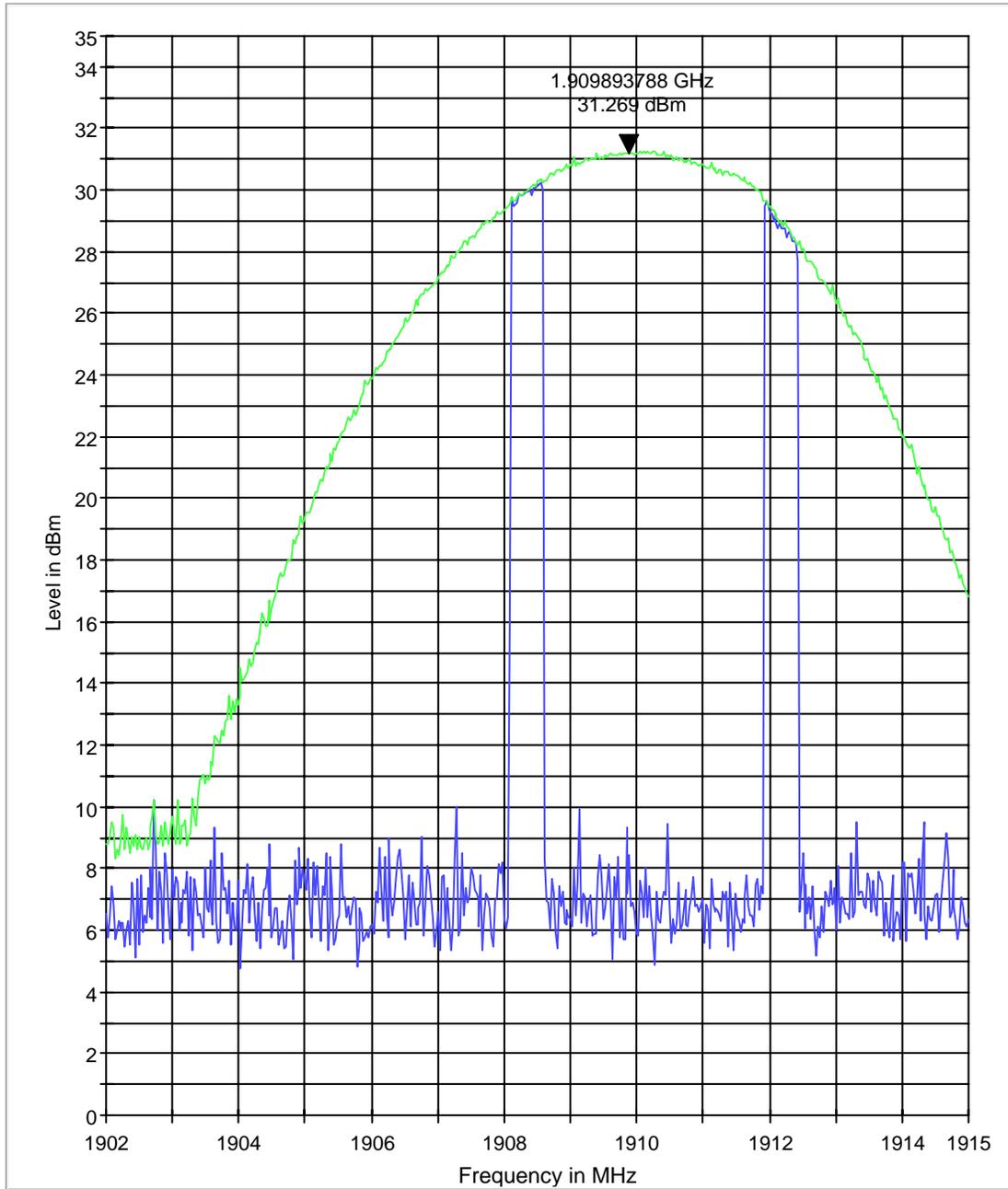
EIRP 1900 M



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (PCS-1900) CHANNEL 810 §24.232(b)**

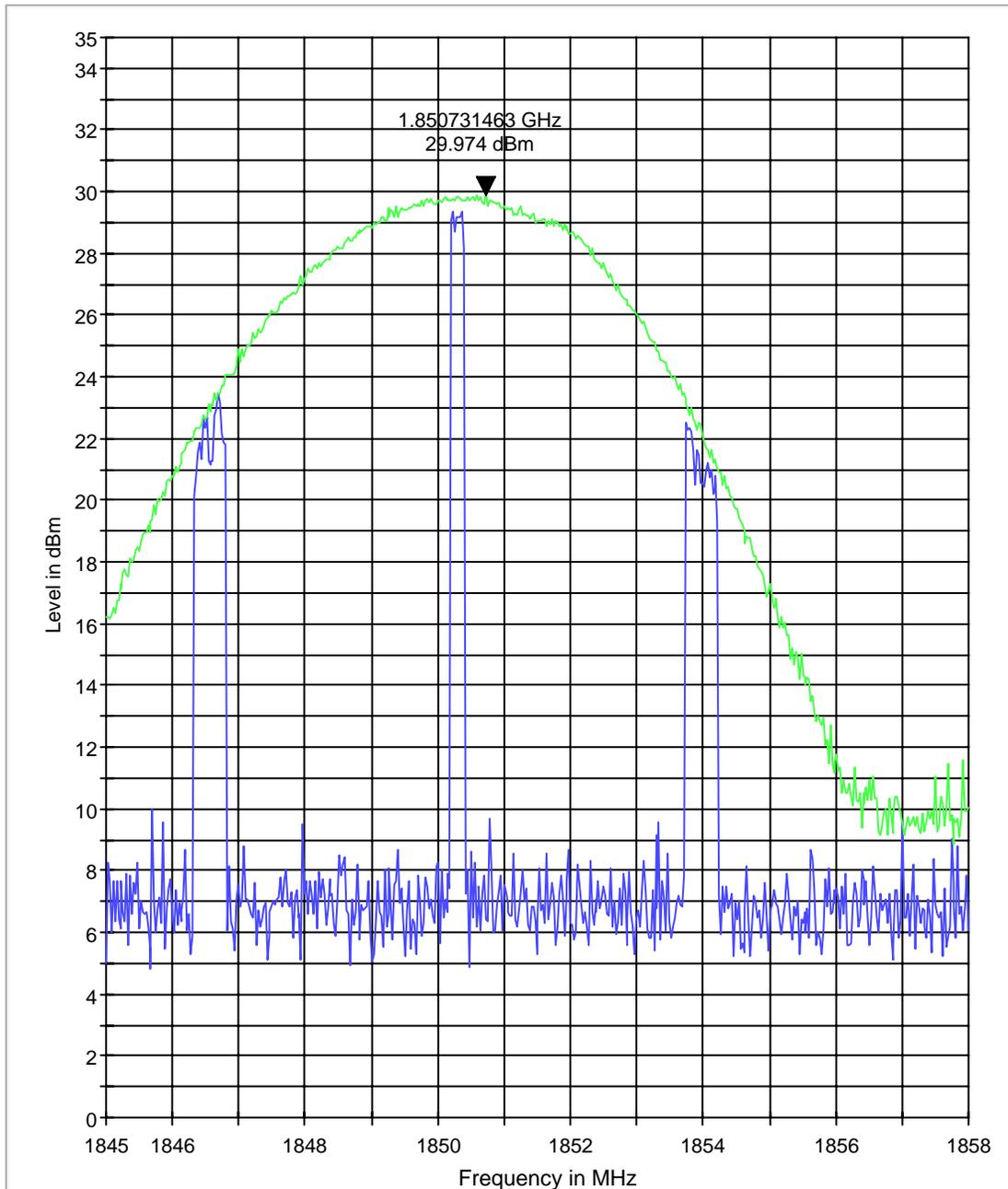
EIRP 1900 H



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (EGPRS 1900) CHANNEL 512 §24.232(b)**

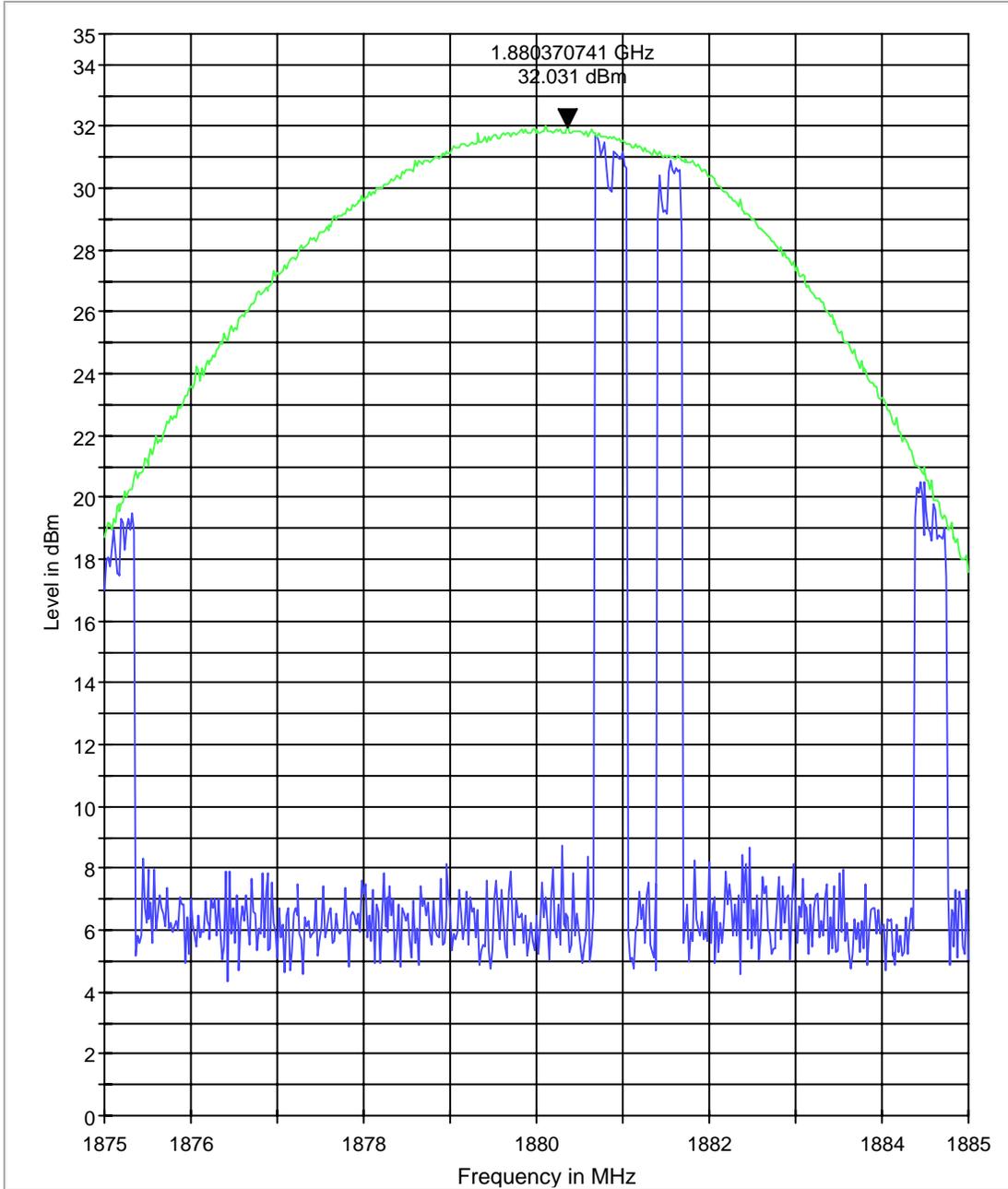
EIRP 1900 L



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

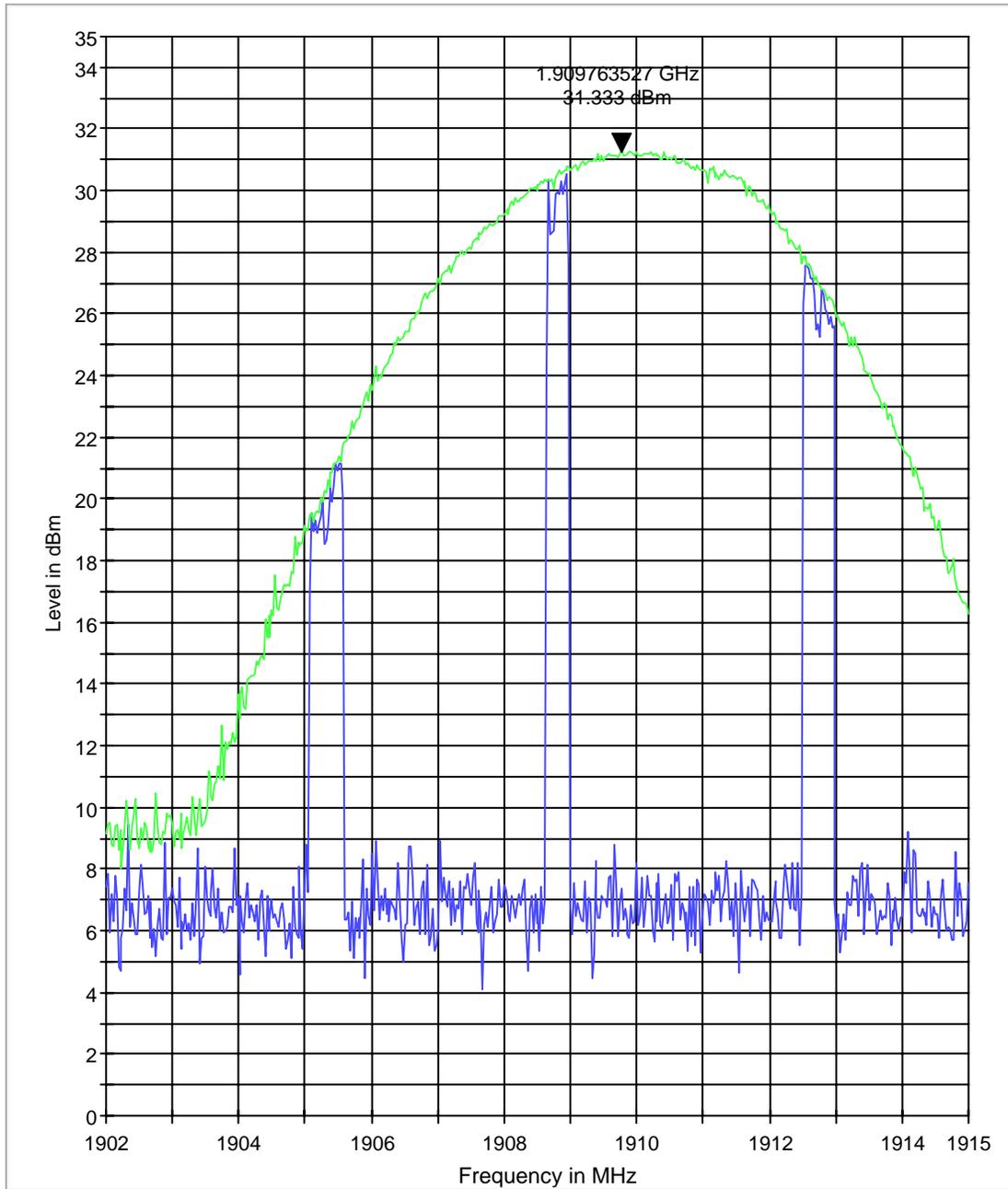
**EIRP (EGPRS 1900) CHANNEL 661 §24.232(b)**

EIRP 1900 M



**EIRP (EGPRS 1900) CHANNEL 810 §24.232(b)**

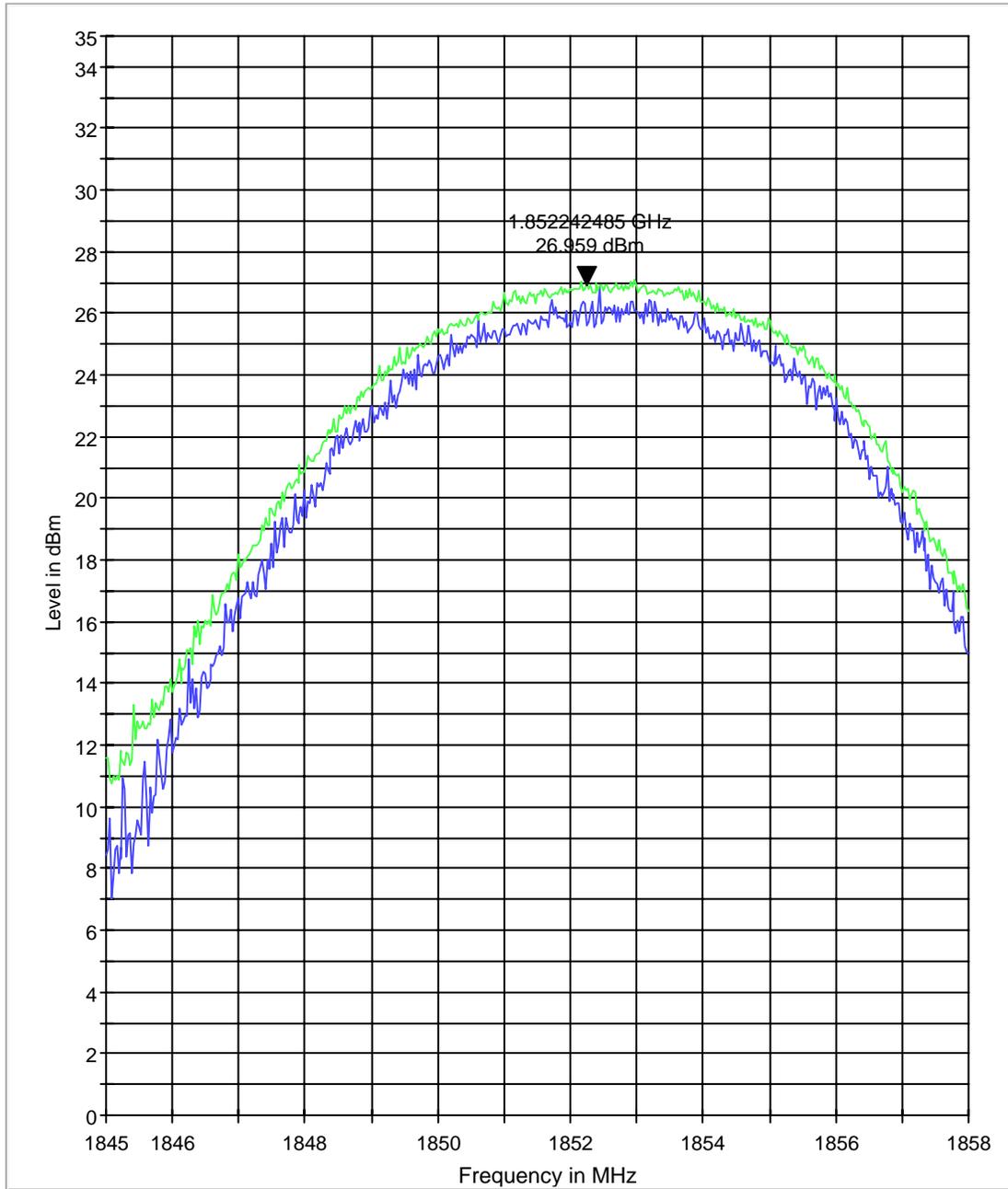
EIRP 1900 H



MaxPeak-ClearWrite      MaxPeak-MaxHold

**EIRP (UMTS FDD2) CHANNEL 9262 §24.232(b)**

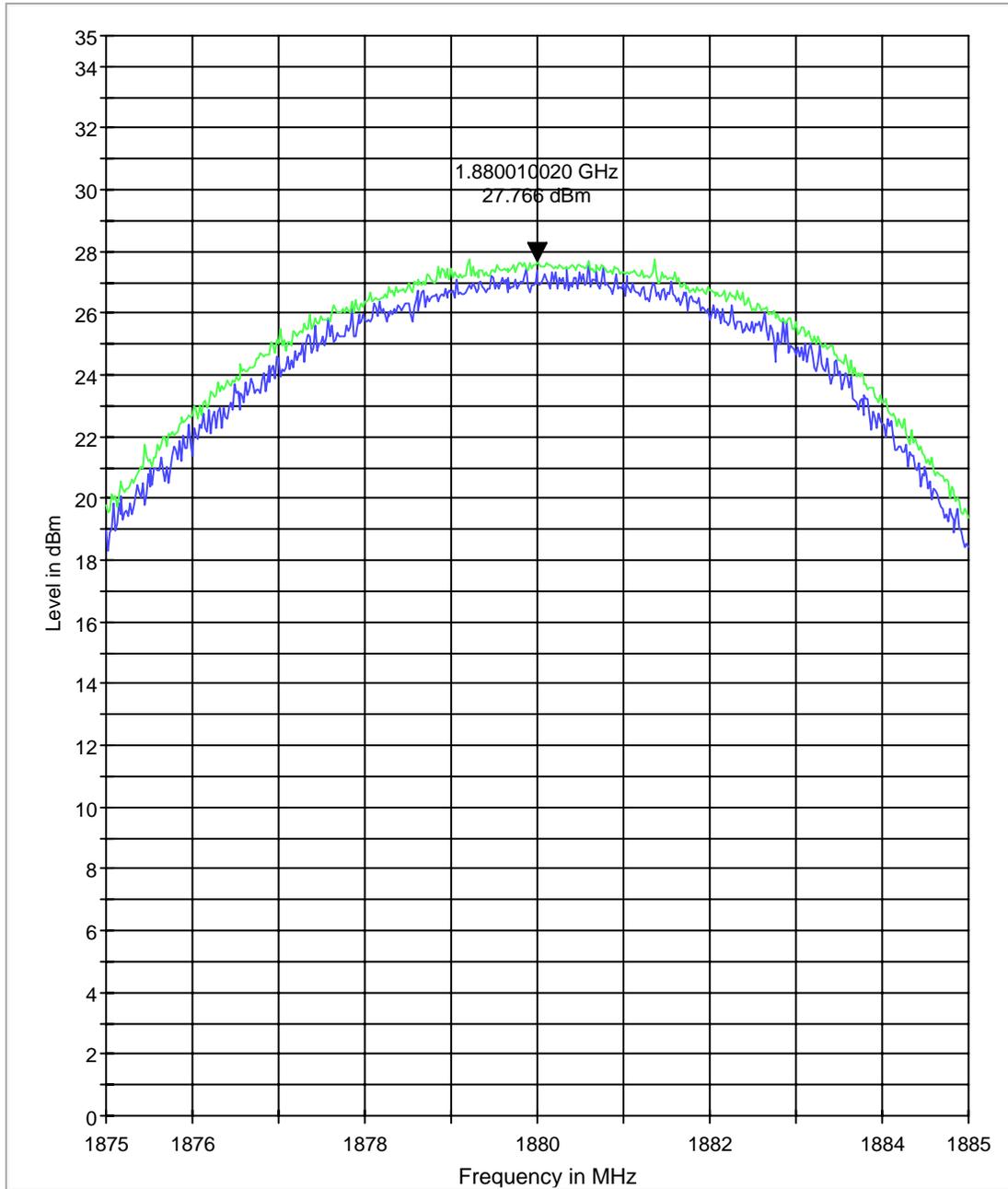
EIRP 1900 L



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (UMTS FDD2) CHANNEL 9400 §24.232(b)**

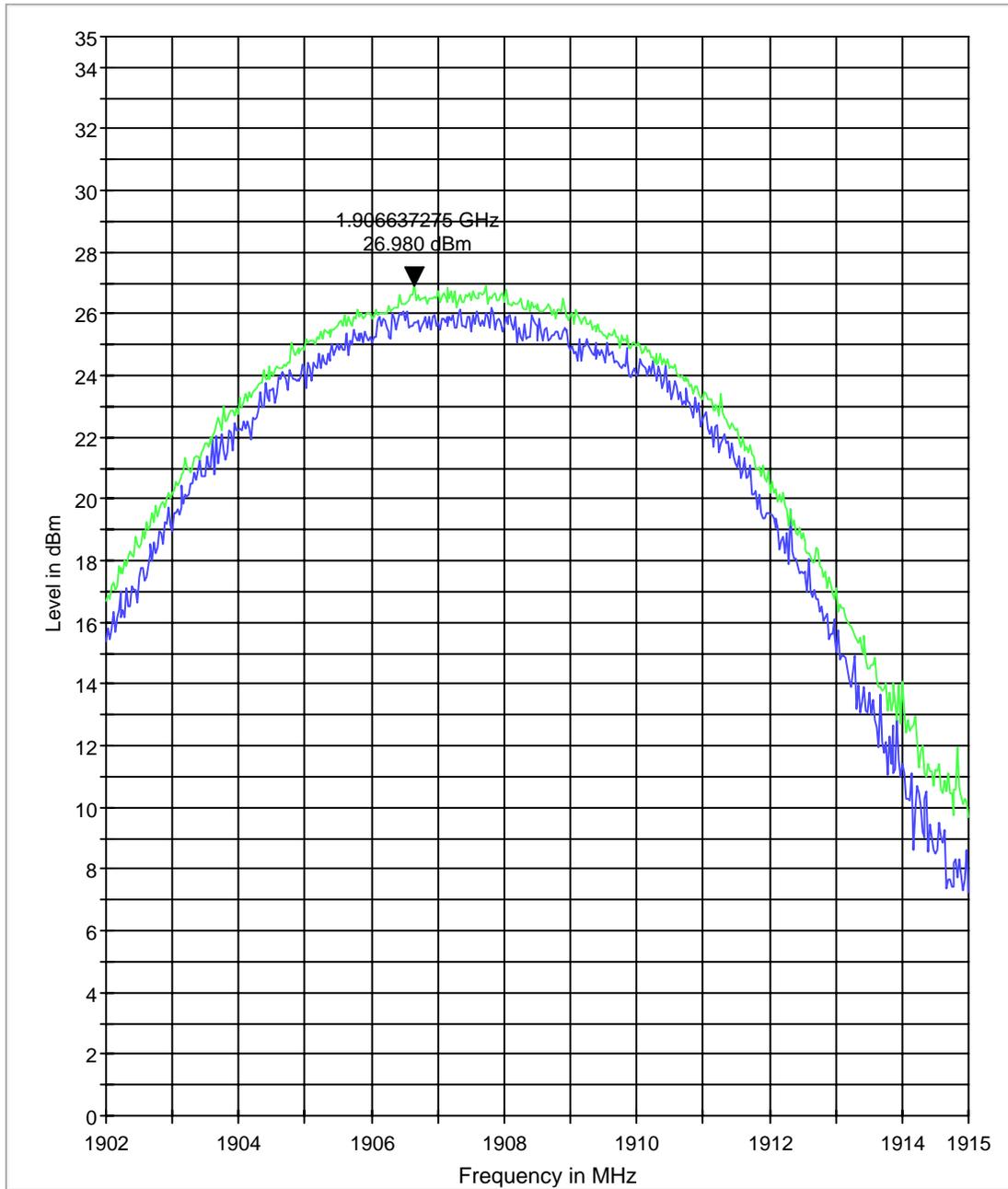
EIRP 1900 M



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

**EIRP (UMTS FDD2) CHANNEL 9538 §24.232(b)**

EIRP 1900 H



— MaxPeak-ClearWrite      — MaxPeak-MaxHold

## 5.2 Spurious Emissions Radiated

### 5.2.1 FCC 2.1053 Measurements required: Field strength of spurious radiation.

- (a) 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.

### 5.2.2 Limits:

#### 5.2.2.1 **FCC 22.917 Emission limitations for cellular equipment.**

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

- (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.

(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 or 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.

#### 5.2.2.2 **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.

- (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.

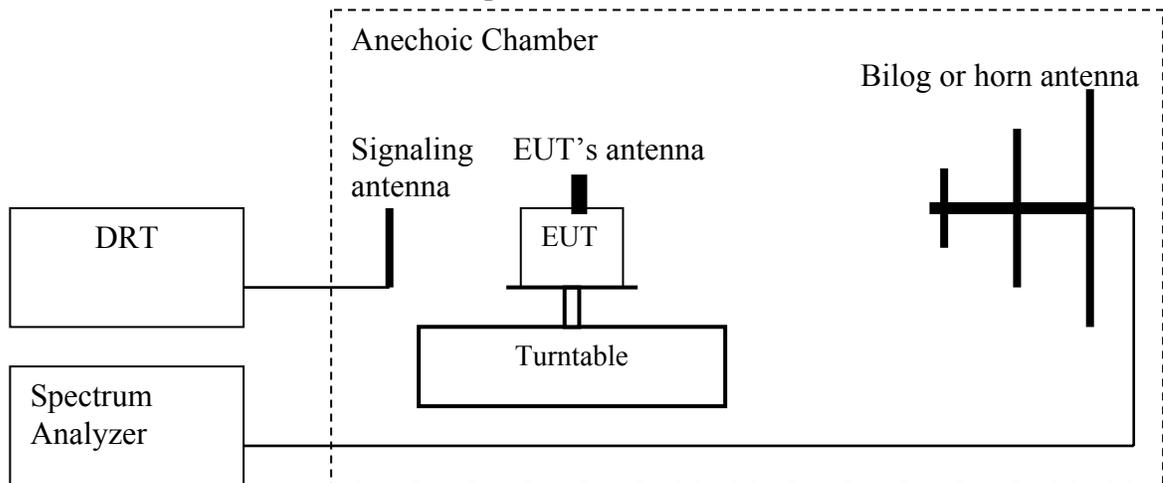
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of 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.

### 5.2.3 Radiated out of band measurement procedure:

Based on 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).  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .
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.)

**Spectrum analyzer settings:**

Res B/W: 1 MHz

Vid B/W: 1 MHz

**Measurement Survey:**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands. 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 band 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 only with Circuit Switched mode GMSK modulation because this mode represents the worse case emission for all the modulations for GSM. See section 5.5.4.1 and 5.5.4.3

Radiated emissions measurements were made also with UMTS FDD mode. See section 5.5.4.2 and 5.5.4.4

#### 5.2.4 Radiated out of band emissions results on EUT:

##### 5.2.4.1 Test Results Transmitter Spurious Emission GSM850:

Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	1648.4	NF	1673.2	NF	1697.6	NF
3	2472.6	NF	2509.8	NF	2546.4	NF
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						

### RADIATED SPURIOUS EMISSIONS (GSM-850) TX: 30MHz - 1GHz

Spurious emission limit -13dBm

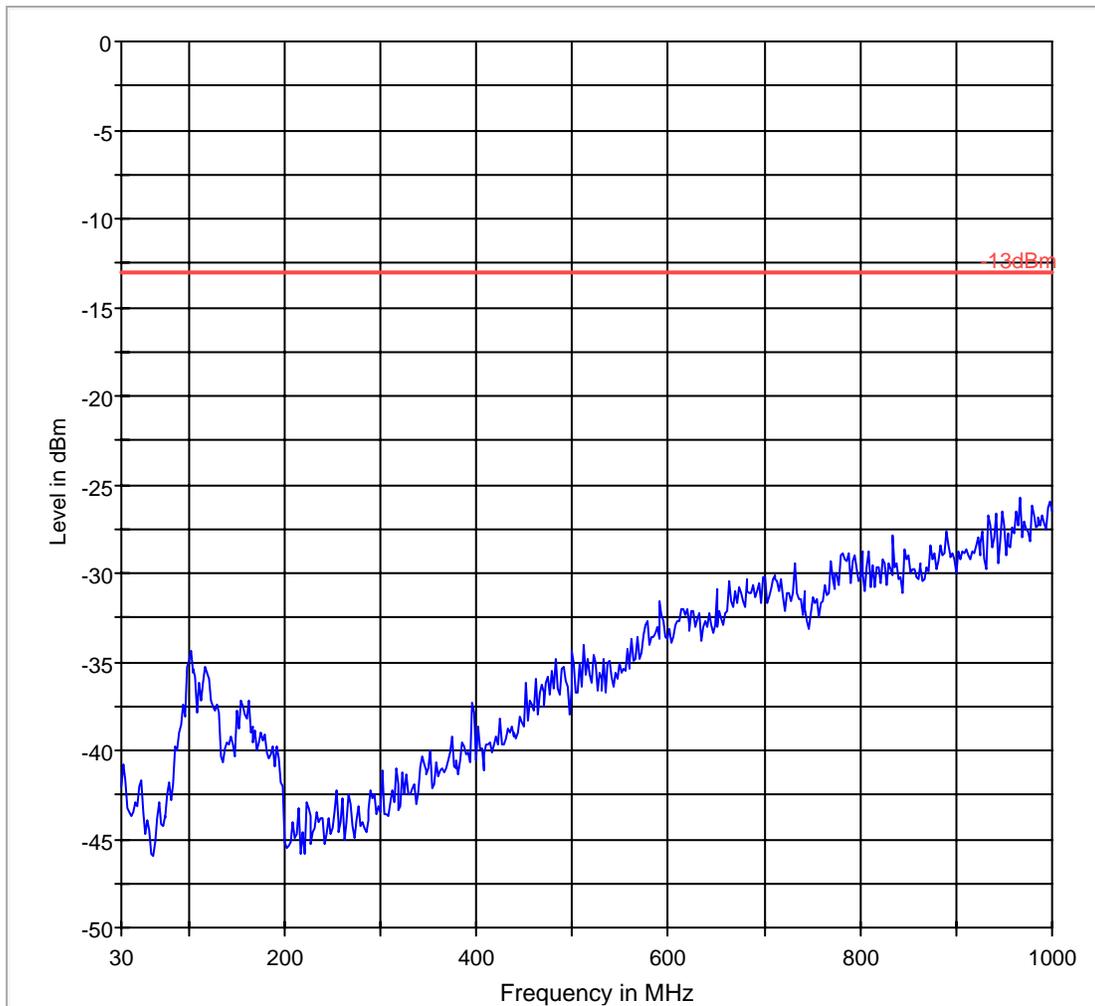
USED RBW=100 kHz VBW=100 kHz

Note:

- 1. This plot contains results of antenna in both horizontal and vertical polarizations

## FCC 22 30-1000MHz Low Channel

FCC 22 30-1000MHz



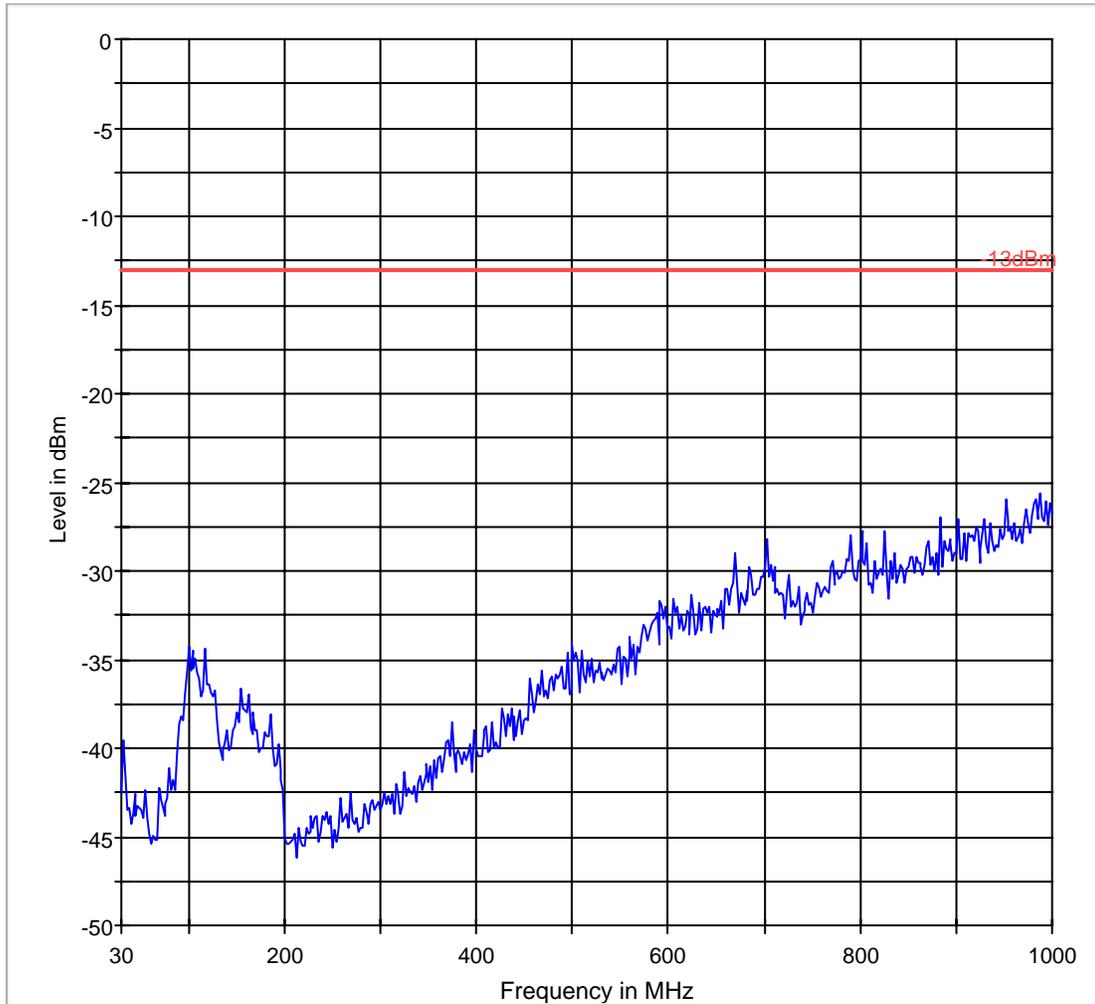
— -13dBm.LimitLine      — Preview Result 1

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations.

# FCC 22 30-1000MHz Mid Channel

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1

Note: This plot contains results of antenna in both horizontal and vertical polarizations

Note: Marker placed on transmit signal

# FCC 22 30-1000MHz High Channel

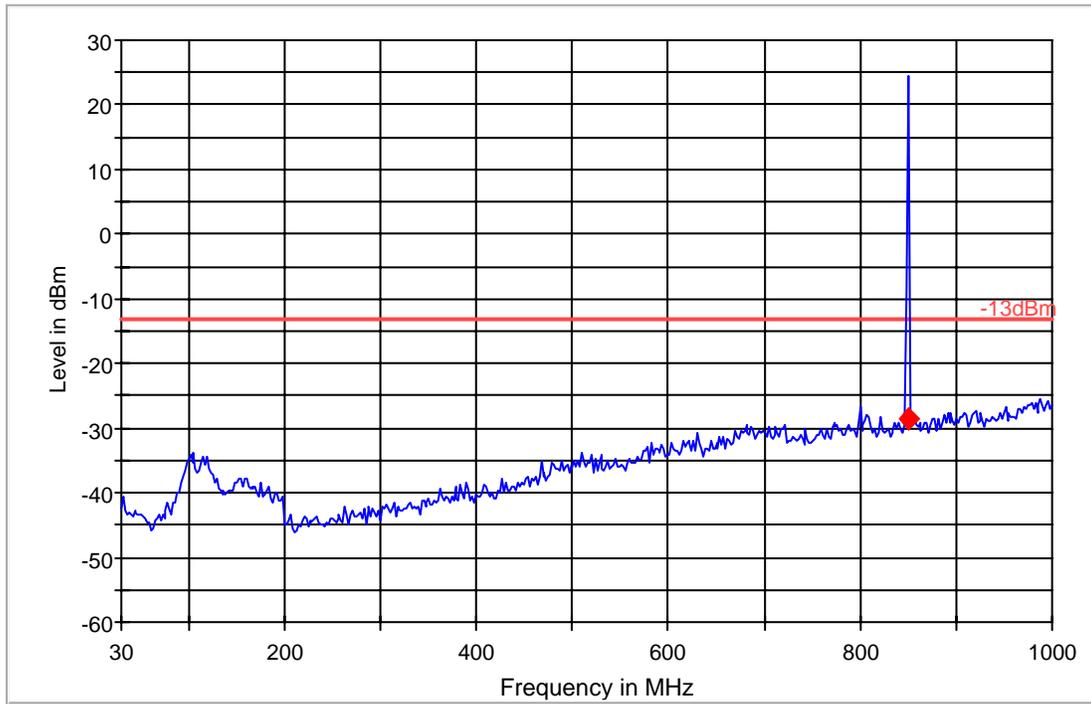
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
850.485972	-28.4	20.000	100.000	122.0	V	18.0	-70.7	15.4	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
850.485972	

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

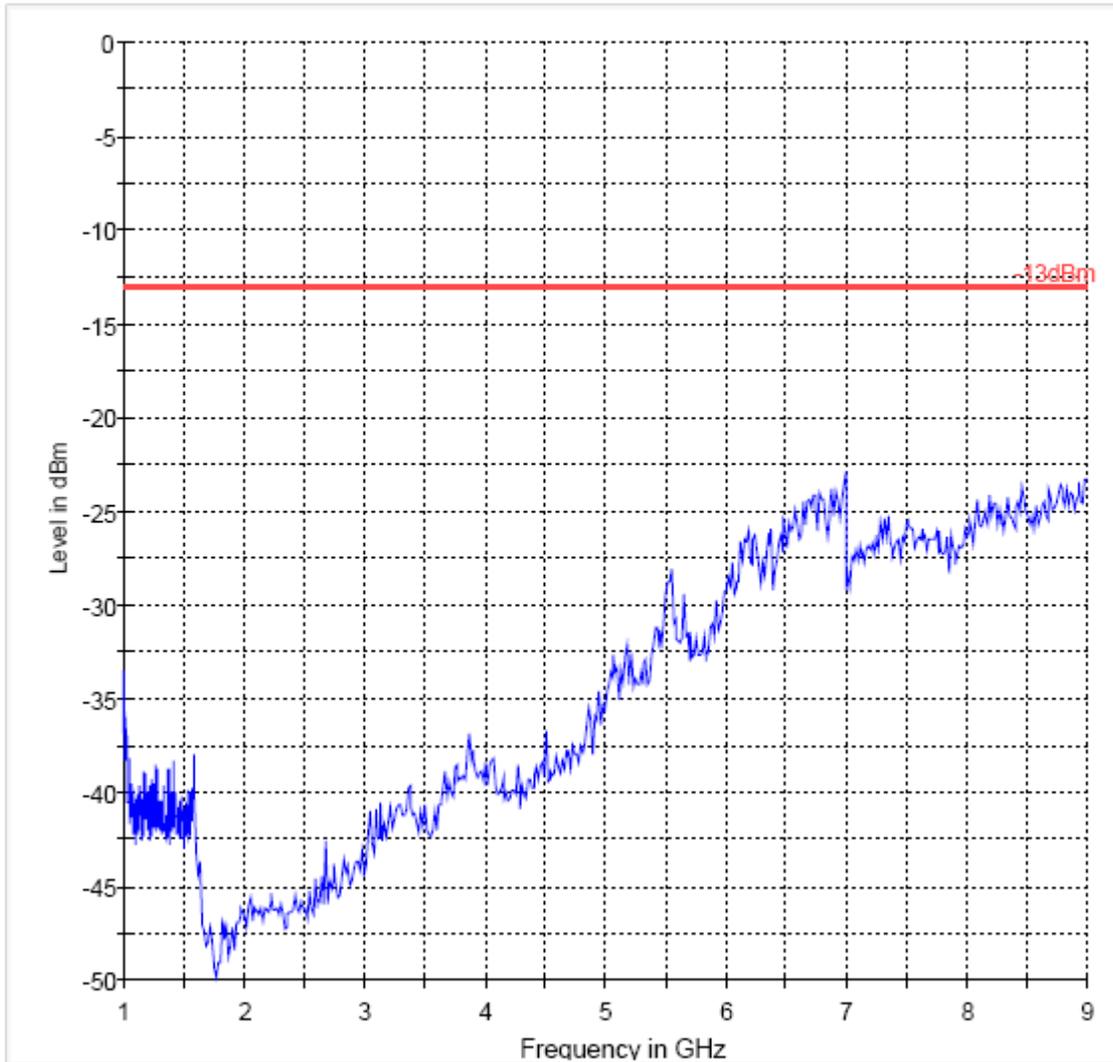
**RADIATED SPURIOUS EMISSIONS (GSM-850): 1GHz – 9GHz**

USED RBW=1 MHz VBW=1 MHz

This plot contains results of antenna in both horizontal and vertical polarizations

**FCC 22 1-9GHz Low Channel**

FCC 22 1-9GHz



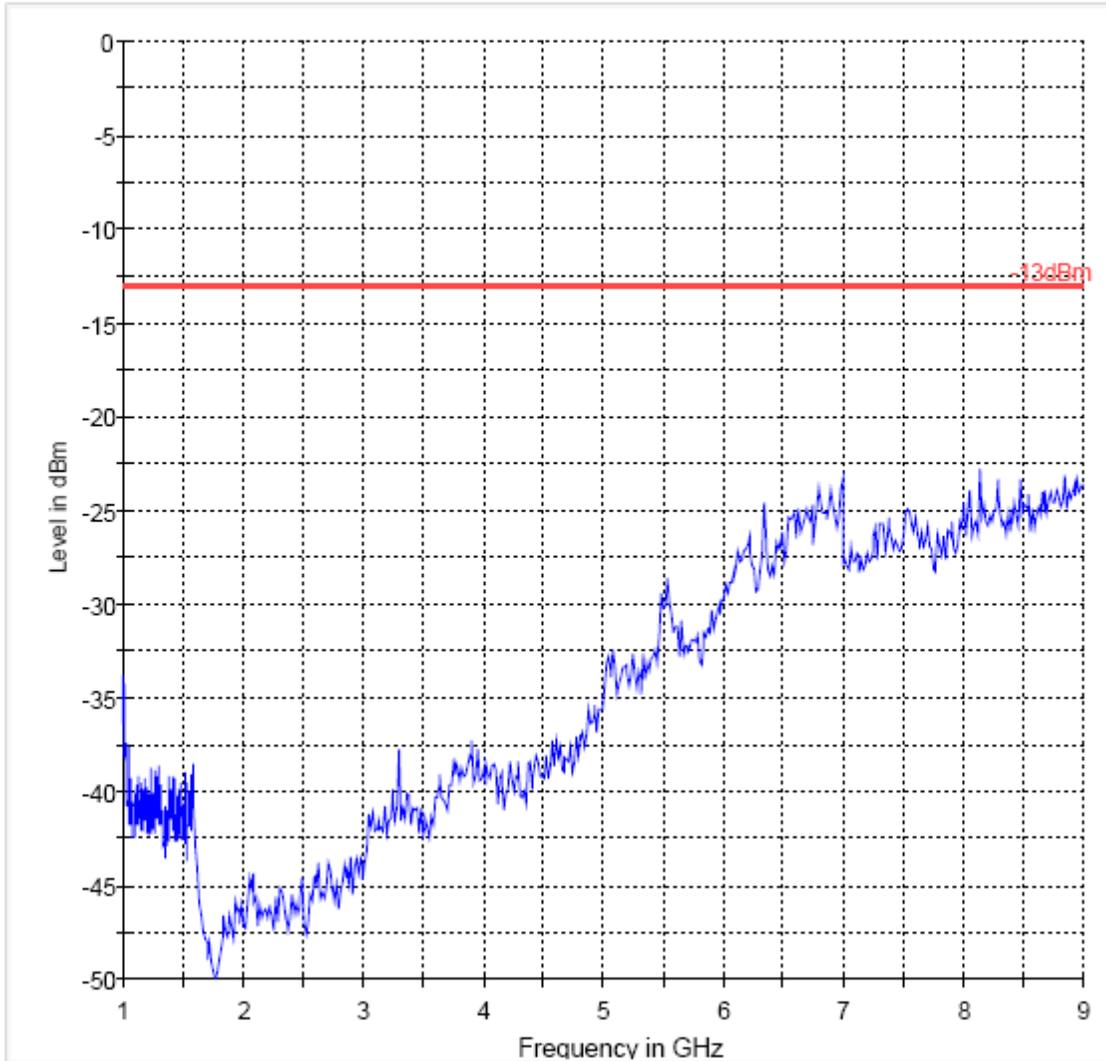
— -13dBm.LimitLine      — Preview Result 1

USED RBW=1 MHz VBW=1 MHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 22 1-9GHz Mid Channel

FCC 22 1-9GHz



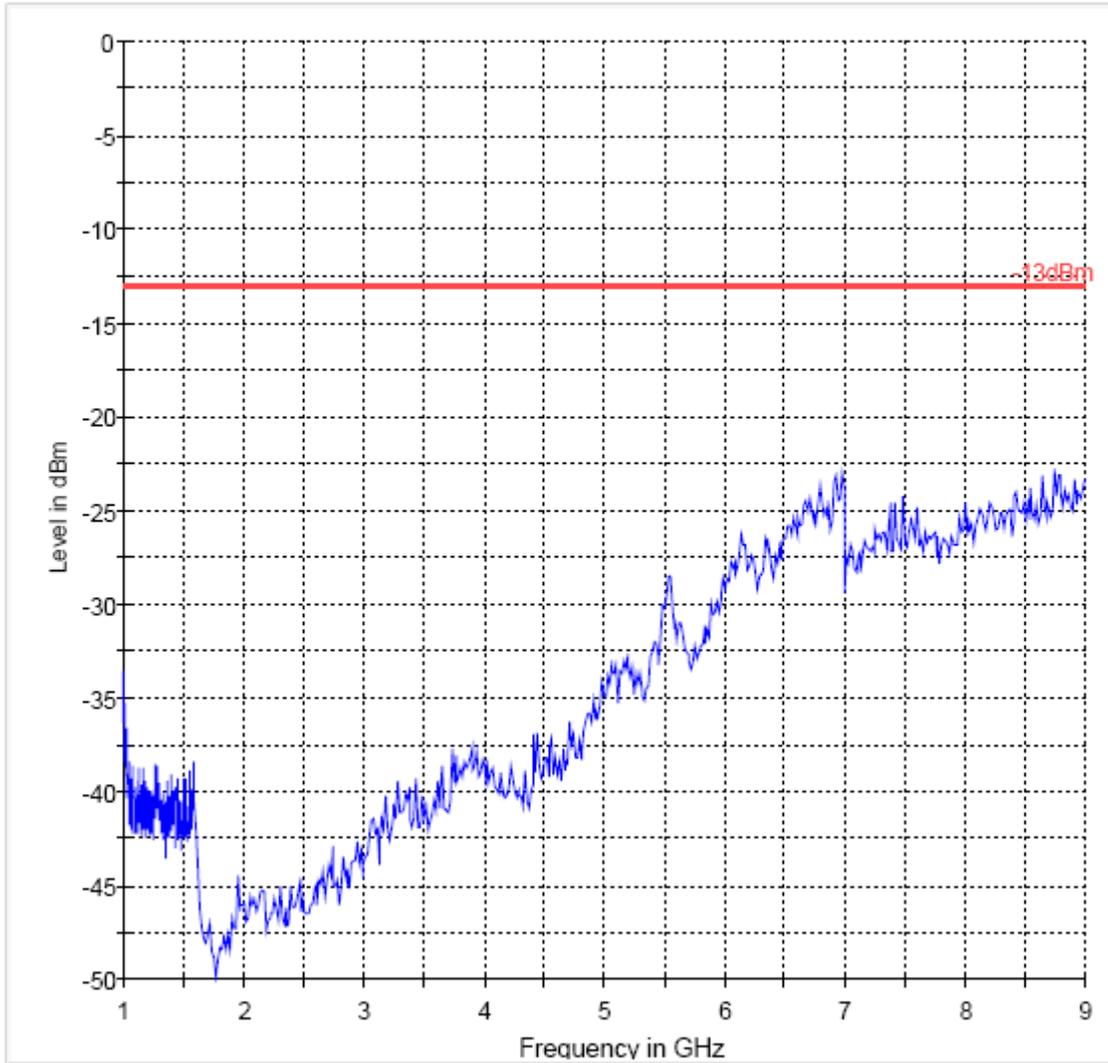
— -13dBm.LimitLine      — Preview Result 1

USED RBW=1 MHz VBW=1 MHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 22 1-9GHz High Channel

FCC 22 1-9GHz



— -13dBm.LimitLine      — Preview Result 1

**5.2.4.2 Test Results Transmitter Spurious Emission UMTS FDD5**

<b>Harmonics</b>	<b>Tx ch-4132 Freq. (MHz)</b>	<b>Level(dBm)</b>	<b>Tx ch- 4183 Freq. (MHz)</b>	<b>Level(dBm)</b>	<b>Tx ch- 4233 Freq. (MHz)</b>	<b>Level(dBm)</b>
<b>2</b>	<b>1652.8</b>	NF	<b>1673.2</b>	NF	<b>1693.2</b>	NF
<b>3</b>	<b>2479.2</b>	NF	<b>2509.8</b>	NF	<b>2539.8</b>	NF
<b>4</b>	<b>3305.6</b>	NF	<b>3346.4</b>	NF	<b>3386.4</b>	NF
<b>5</b>	<b>4132</b>	NF	<b>4183</b>	NF	<b>4233</b>	NF
<b>6</b>	<b>4958.4</b>	NF	<b>5019.6</b>	NF	<b>5079.6</b>	NF
<b>7</b>	<b>5784.8</b>	NF	<b>5856.2</b>	NF	<b>5926.2</b>	NF
<b>8</b>	<b>6611.2</b>	NF	<b>6692.8</b>	NF	<b>6772.8</b>	NF
<b>9</b>	<b>7437.6</b>	NF	<b>7529.4</b>	NF	<b>7619.4</b>	NF
<b>10</b>	<b>8264</b>	NF	<b>8366</b>	NF	<b>8466</b>	NF

**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) TX: 30MHz - 1GHz**

Spurious emission limit -13dBm

Note:

1. The peak above the limit line is the carrier freq.
2. This plot contains results of antenna in both horizontal and vertical polarizations

## FCC 22 30-1000MHz Low Channel

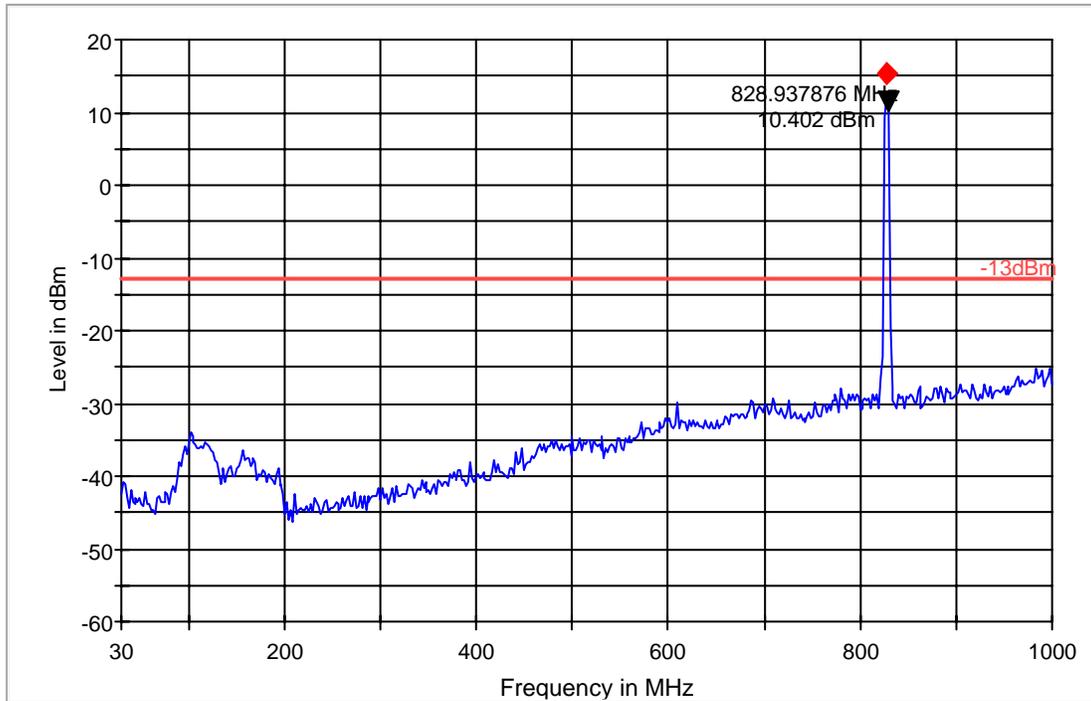
### Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
826.986974	15.4	20.000	100.000	120.0	V	292.0	-70.4	-28.4	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
826.986974	

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

Note: This plot contains results of antenna in both horizontal and vertical polarizations

Note: Marker placed on transmit signal

# FCC 22 30-1000MHz Mid Channel

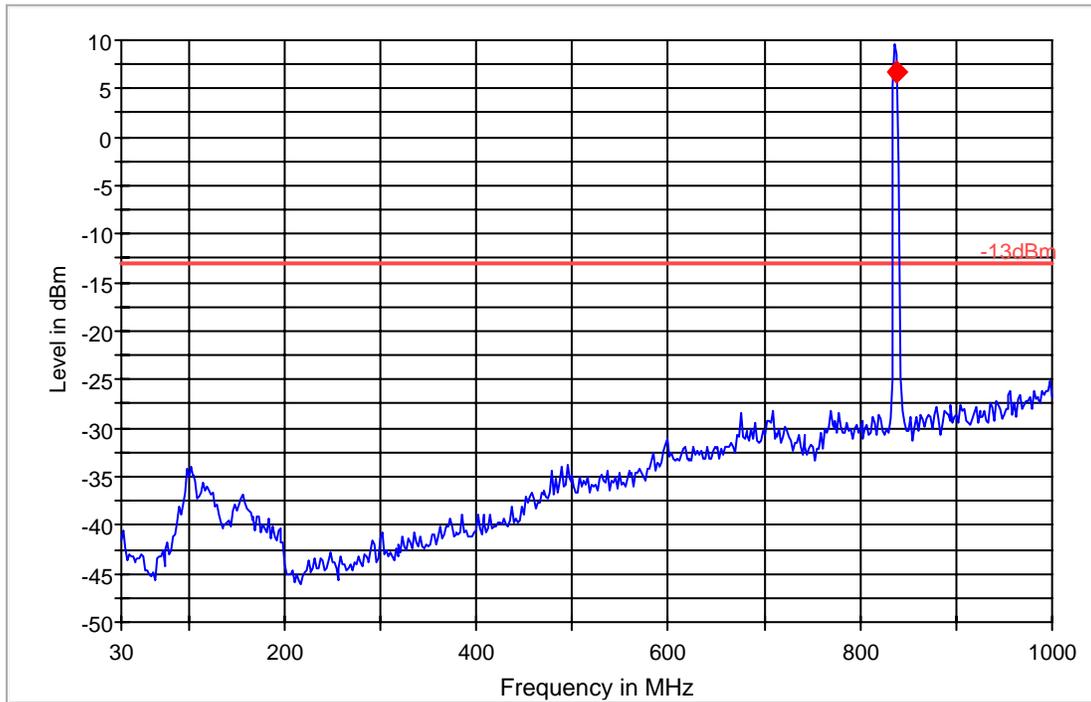
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
837.209419	6.8	20.000	100.000	120.0	V	292.0	-70.6	-19.8	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
837.209419	

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

Note: This plot contains results of antenna in both horizontal and vertical polarizations

Note: Emission over the limit is transmit signal

# FCC 22 30-1000MHz High Channel

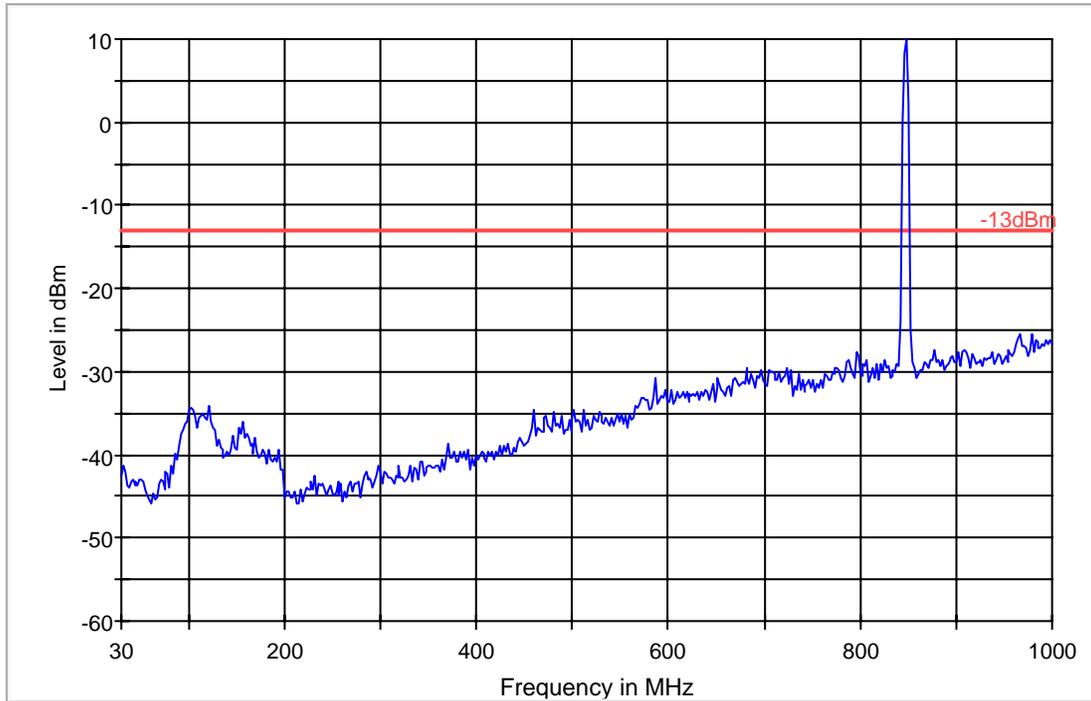
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
847.956914	11.6	20.000	100.000	120.0	V	292.0	-70.7	-24.6	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
847.956914	

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

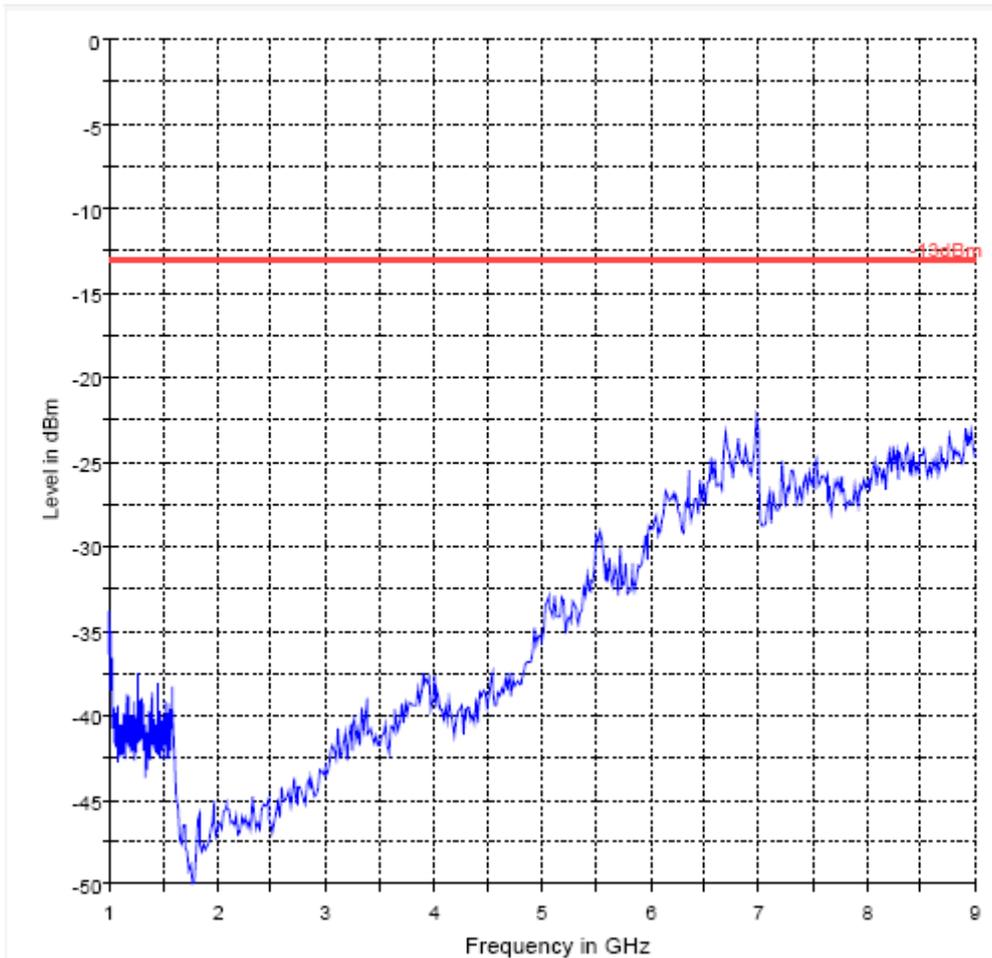
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4132: 1GHz - 9GHz**

USED RBW=1 MHz VBW=1 MHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

## FCC 22 1-9GHz Low Channel

FCC 22 1-9GHz



— -13dBm.LimitLine      — Preview Result 1

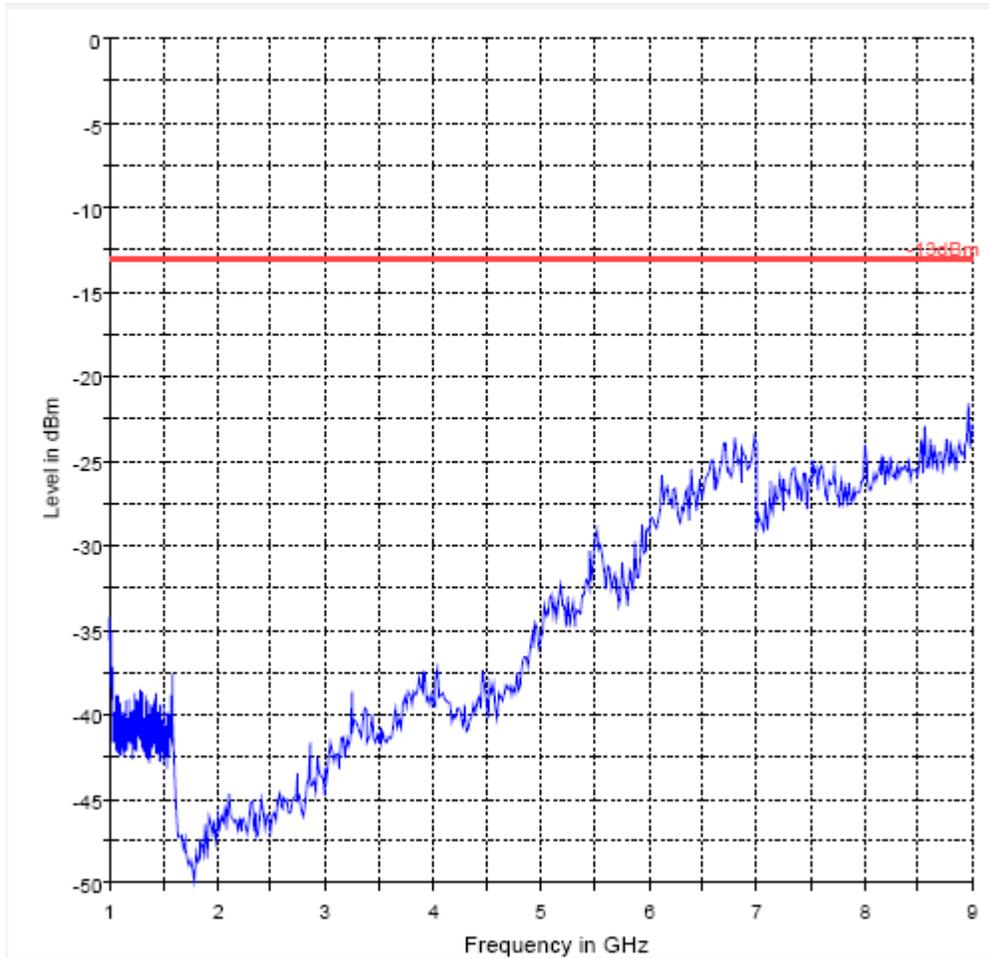
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4183: 1GHz - 9GHz**

USED RBW=1 MHz VBW=1 MHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

## FCC 22 1-9GHz Mid Channel

FCC 22 1-9GHz



— -13dBm.LimitLine      — Preview Result 1

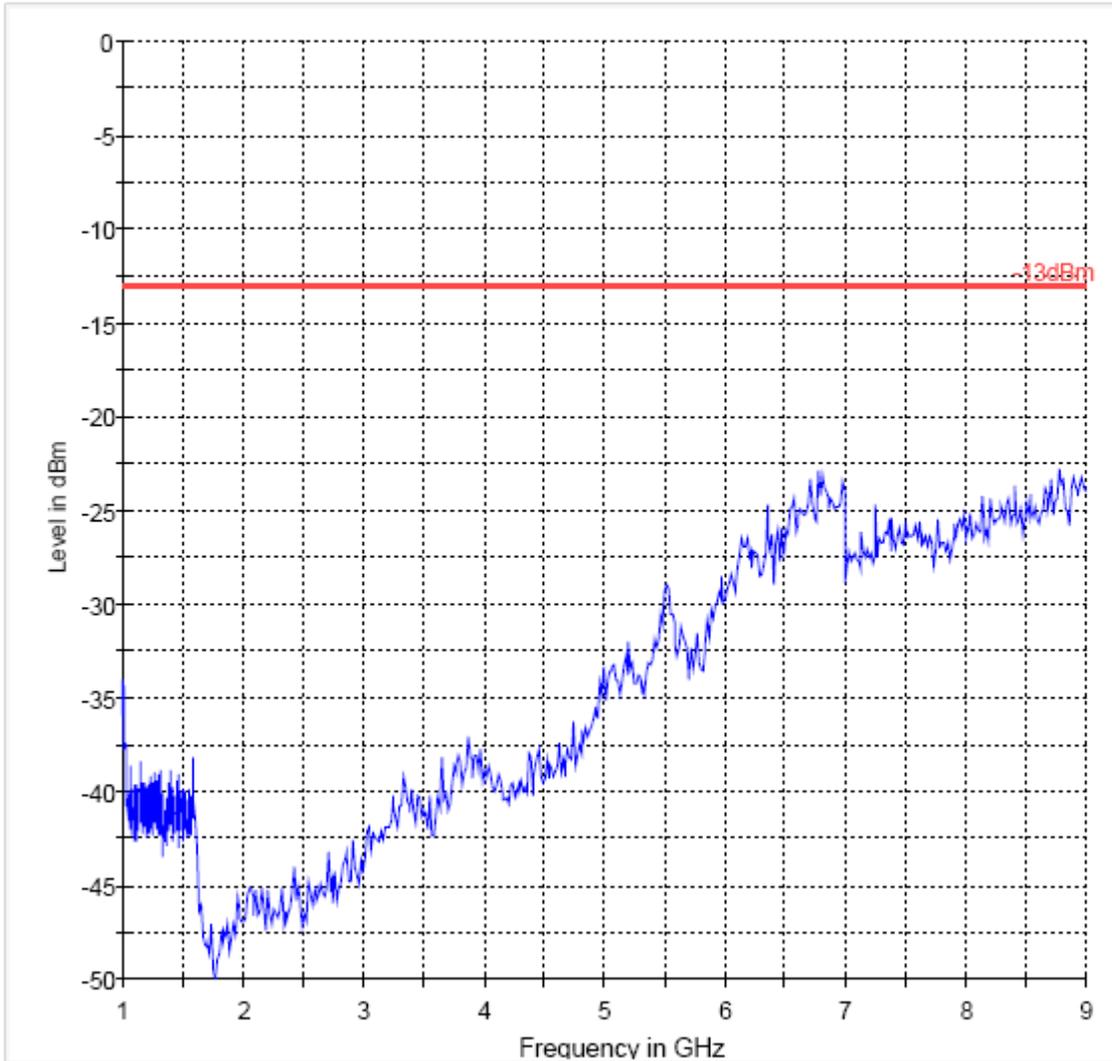
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4233: 1GHz – 9GHz**

USED RBW=1 MHz VBW=1 MHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 22 1-9GHz High Channel

FCC 22 1-9GHz



— -13dBm.LimitLine      — Preview Result 1

### 5.2.4.3 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)
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
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						

**RADIATED SPURIOUS EMISSIONS (PCS 1900) TX: 30MHz - 1GHz**

Spurious emission limit -13dBm

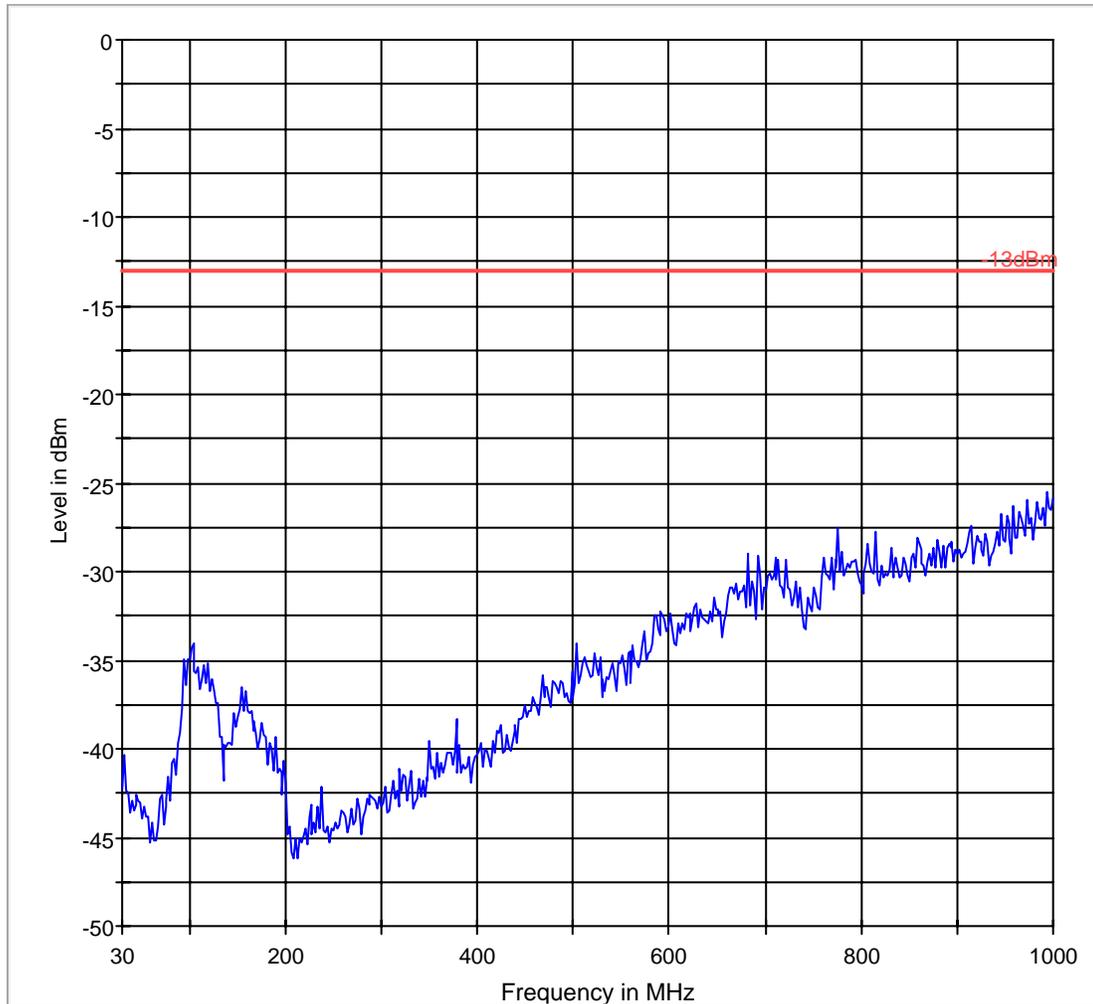
USED RBW=100 kHz VBW=100 kHz

Note:

- 1. This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 30-1000MHz Low Channel

FCC 22 30-1000MHz



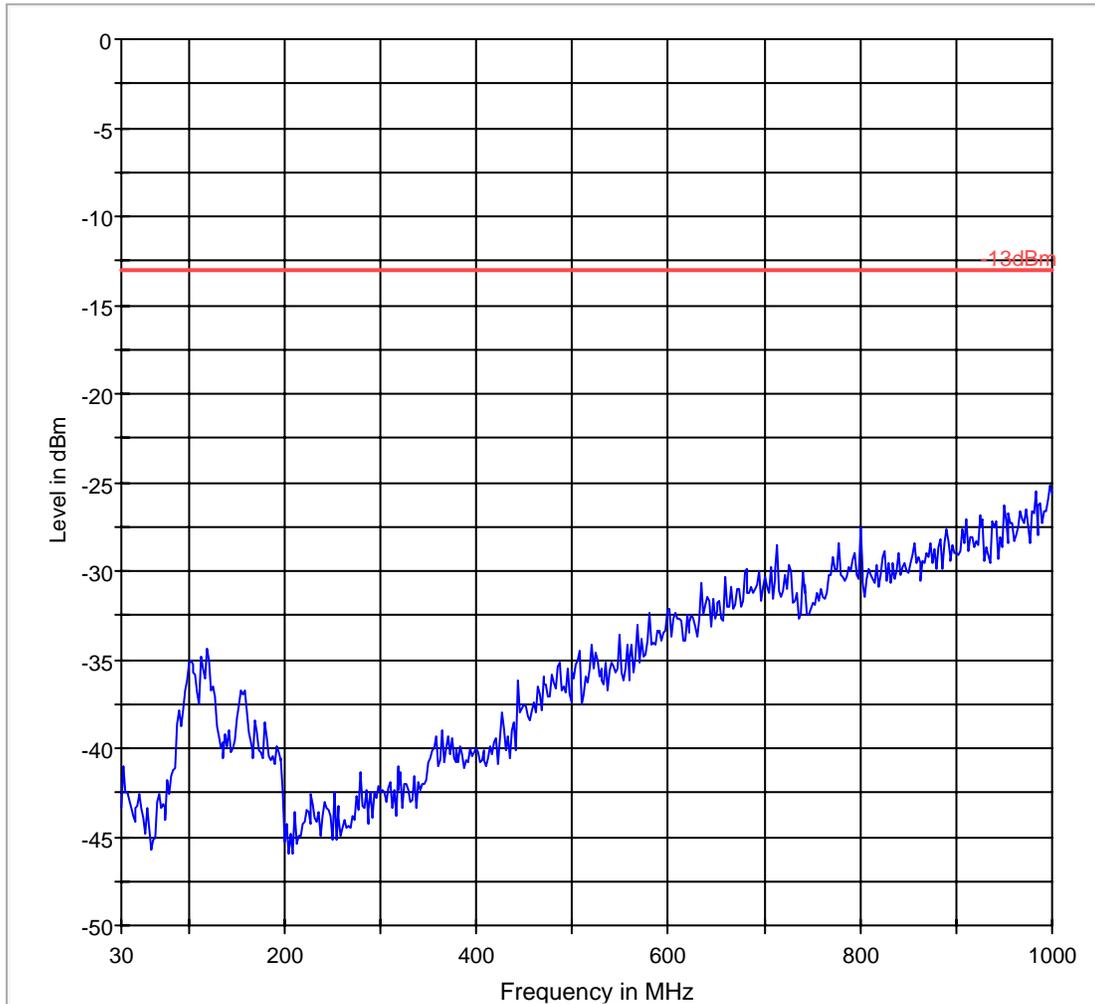
— -13dBm.LimitLine      — Preview Result 1

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 30-1000MHz Mid Channel

FCC 22 30-1000MHz



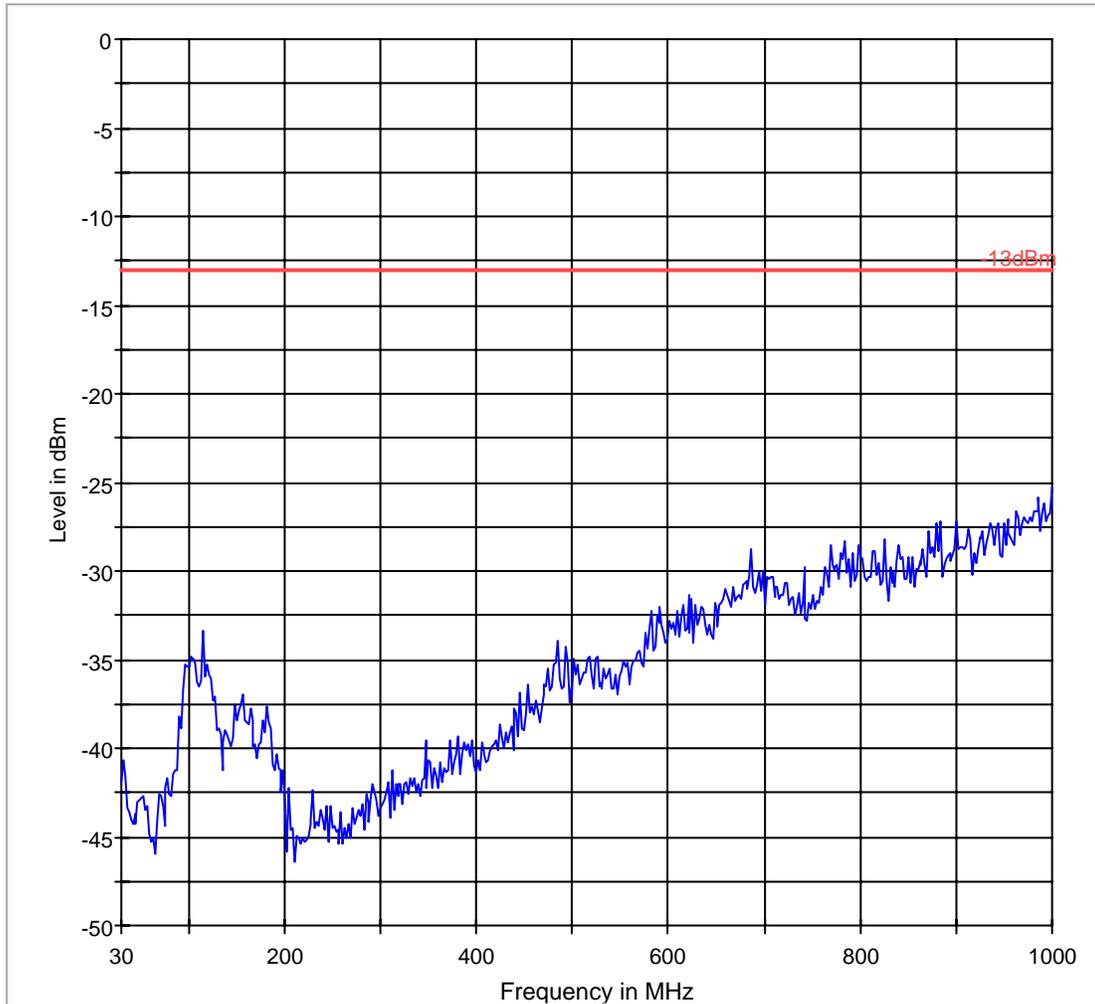
— -13dBm.LimitLine      — Preview Result 1

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 30-1000MHz High Channel

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1

**RADIATED SPURIOUS EMISSIONS(PCS 1900) Tx CHANNEL 512: 1GHz – 18GHz**

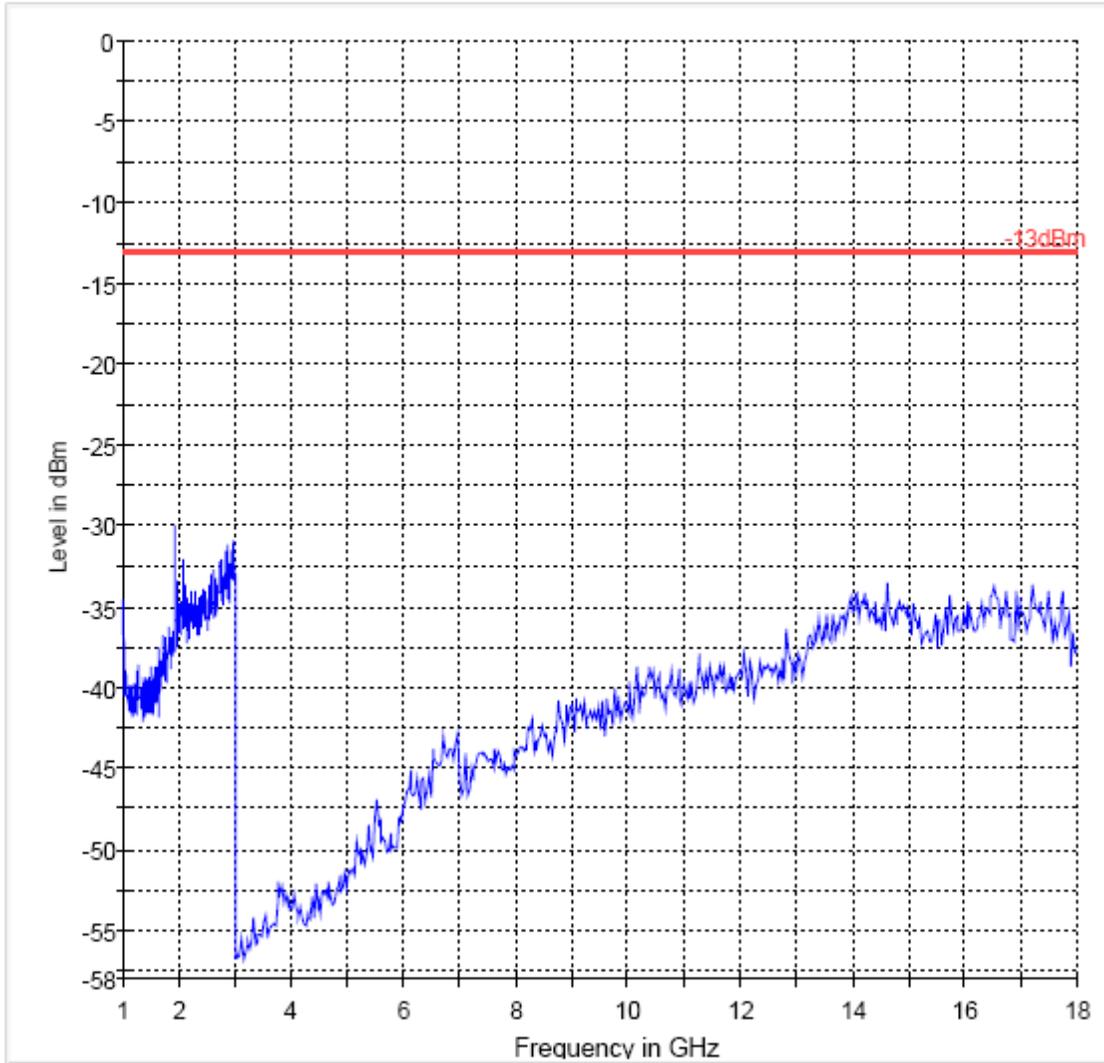
USED RBW=1 MHz VBW=1 MHz

Note:

- 1. This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 1-18GHz Low Channel

FCC 24 1-18GHz



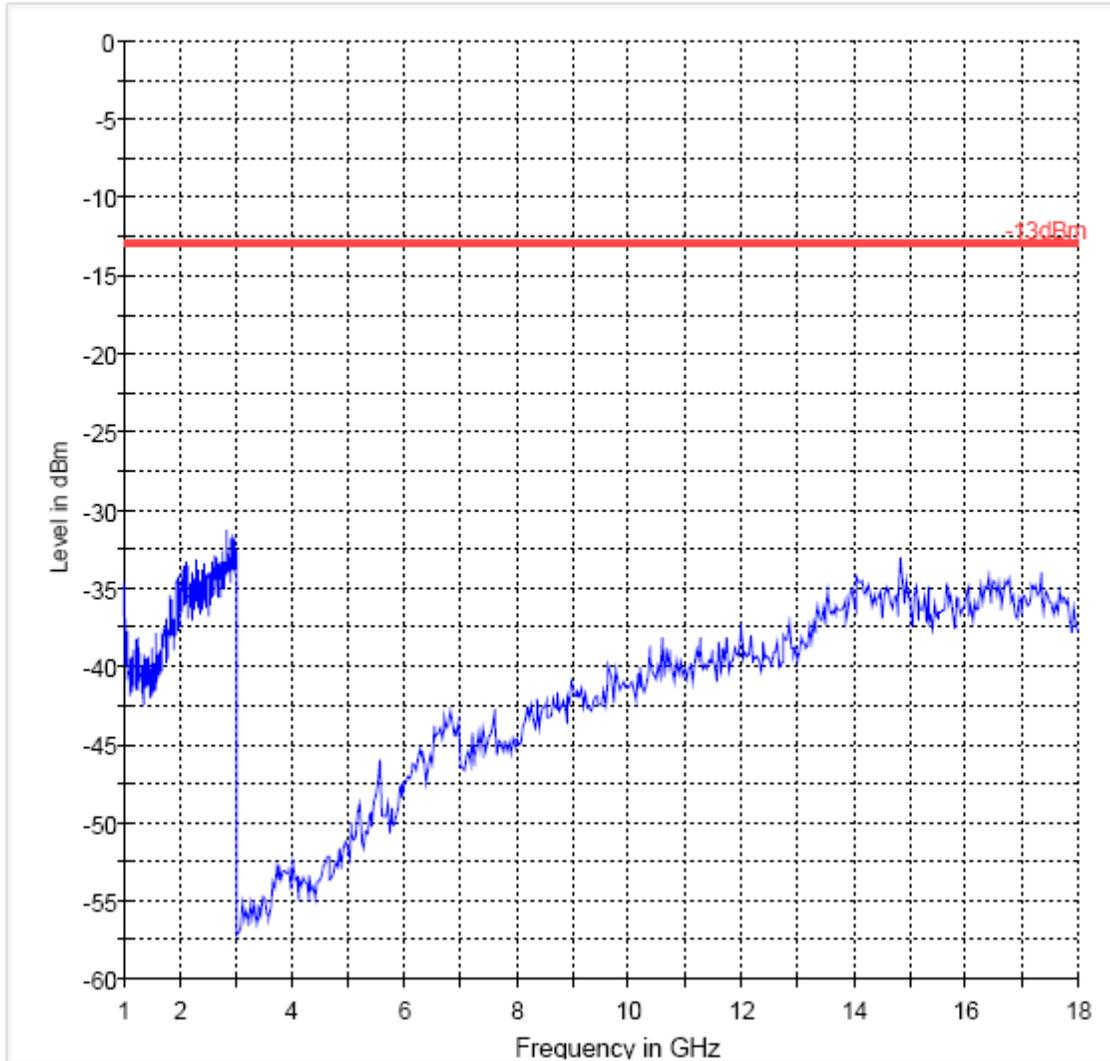
— -13dBm.LimitLine      — Preview Result 1

USED RBW=1 MHz VBW=1 MHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 1-18GHz Mid Channel

FCC 24 1-18GHz



— -13dBm.LimitLine      — Preview Result 1

Note: This plot contains results of antenna in both horizontal and vertical polarizations

Note: Marker placed on transmit signal

# FCC 24 1-18GHz High Channel

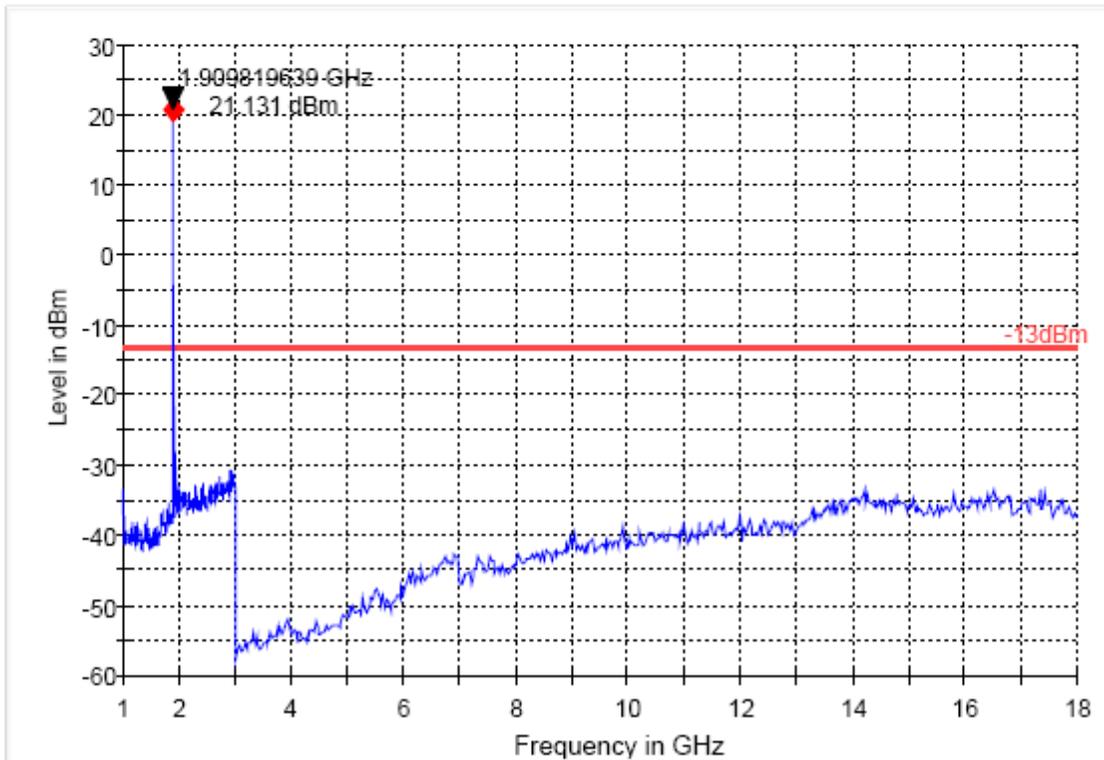
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1909.388777	20.6	1000.000	1000.000	120.0	V	253.0	-70.5	-33.6	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
1909.388777	

FCC 24 1-18GHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

**5.2.5 Test Results Transmitter Spurious Emission UMTS FDD2:**

Harmonics	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
<b>2</b>	<b>3704.8</b>	NF	<b>3760</b>	NF	<b>3815.2</b>	NF
<b>3</b>	<b>5557.2</b>	NF	<b>5640</b>	NF	<b>5722.8</b>	NF
<b>4</b>	<b>7409.6</b>	NF	<b>7520</b>	NF	<b>7630.4</b>	NF
<b>5</b>	<b>9262</b>	NF	<b>9400</b>	NF	<b>9538</b>	NF
<b>6</b>	<b>11114.4</b>	NF	<b>11280</b>	NF	<b>11445.6</b>	NF
<b>7</b>	<b>12966.8</b>	NF	<b>13160</b>	NF	<b>13353.2</b>	NF
<b>8</b>	<b>14819.2</b>	NF	<b>15040</b>	NF	<b>15260.8</b>	NF
<b>9</b>	<b>16671.6</b>	NF	<b>16920</b>	NF	<b>17168.4</b>	NF
<b>10</b>	<b>18524</b>	NF	<b>18800</b>	NF	<b>19076</b>	NF

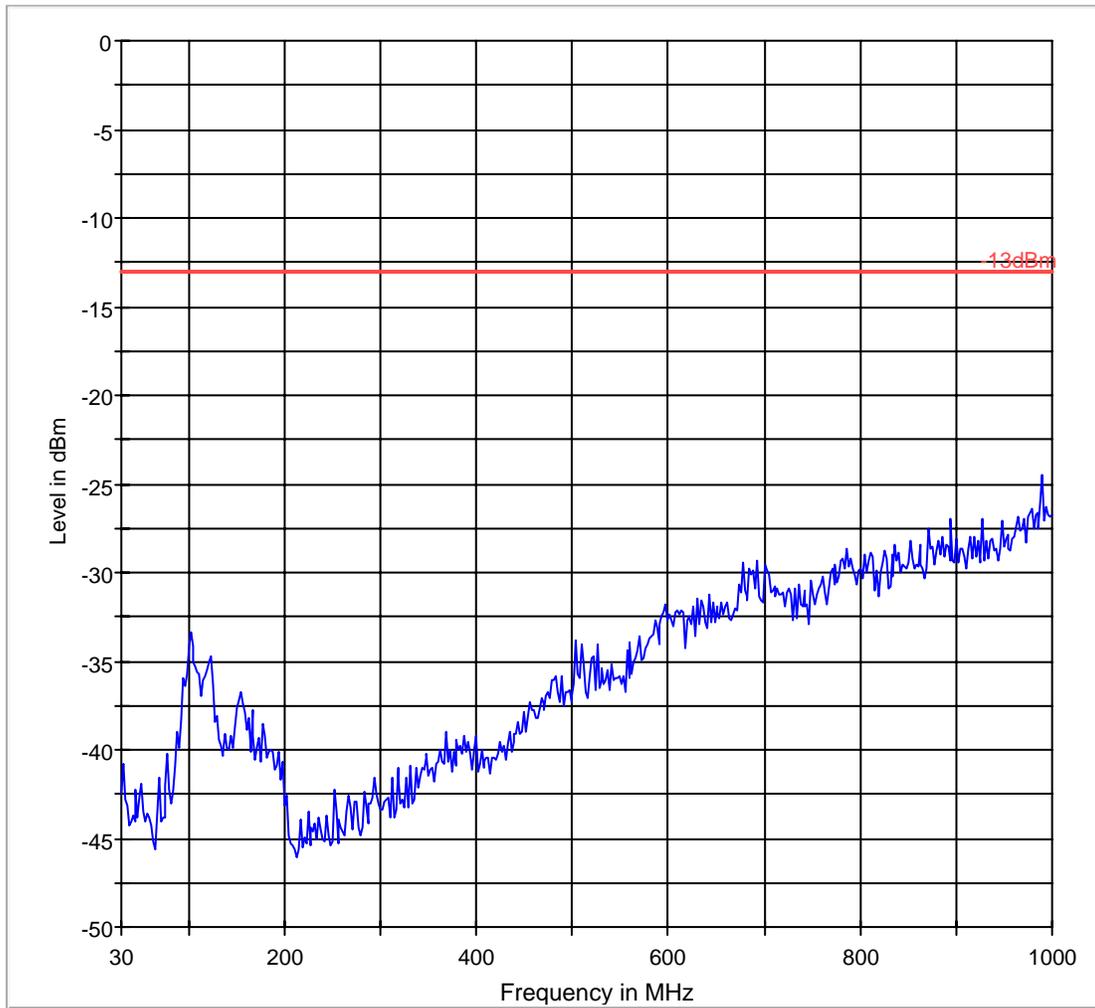
**RADIATED SPURIOUS EMISSIONS (UMTS FDD2) TX: 30MHz - 1GHz**

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 30-1000MHz Low Channel

FCC 22 30-1000MHz



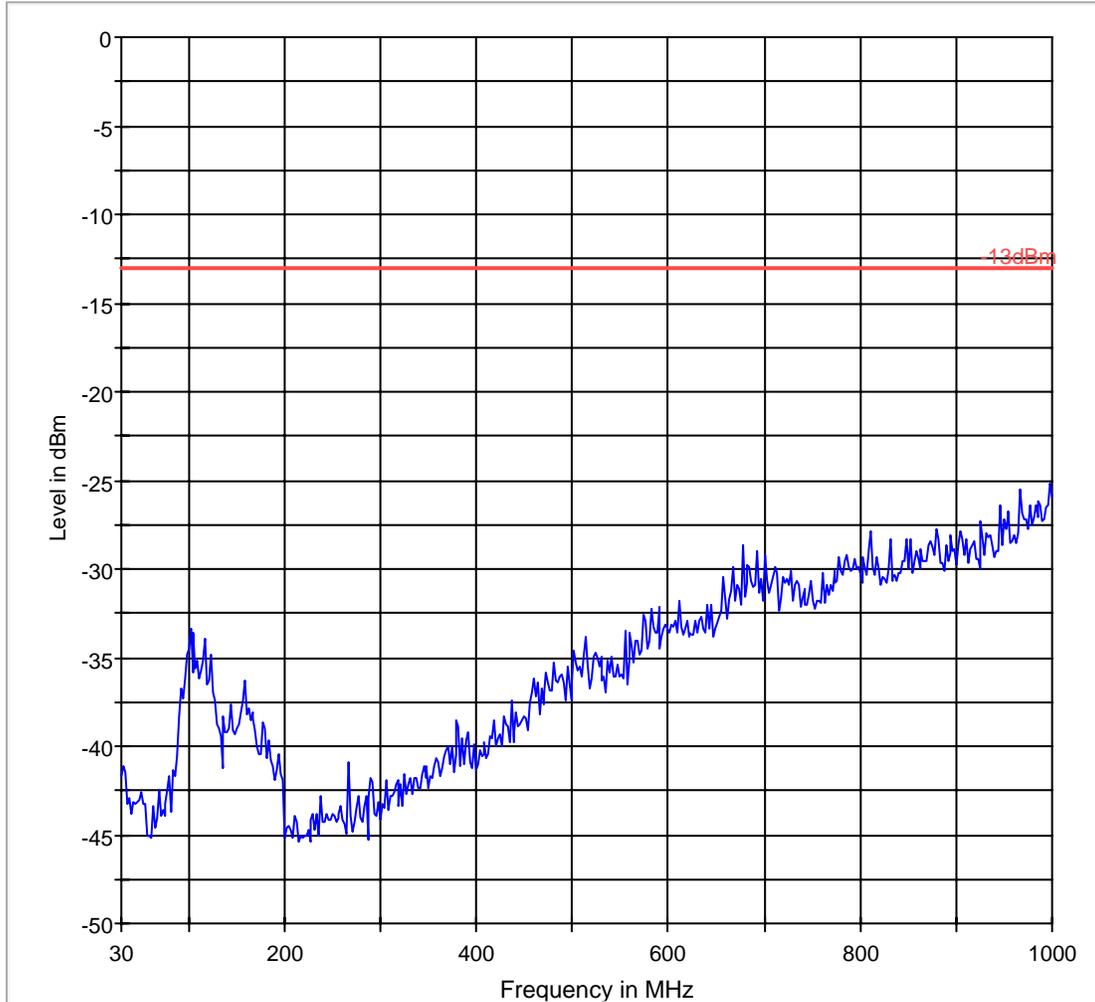
— -13dBm.LimitLine      — Preview Result 1

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 30-1000MHz Mid Channel

FCC 22 30-1000MHz



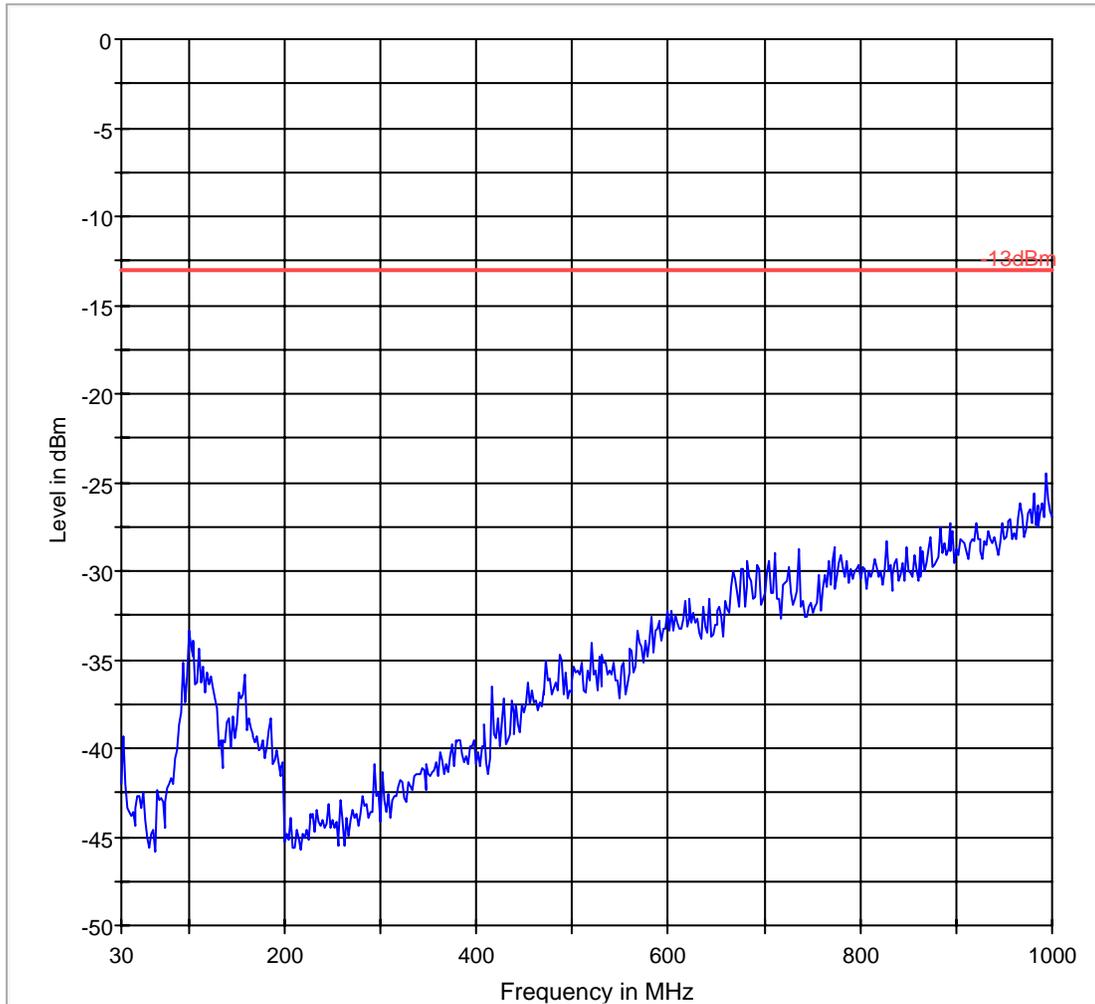
— -13dBm.LimitLine      — Preview Result 1

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations

# FCC 24 30-1000MHz High Channel

FCC 22 30-1000MHz



— -13dBm.LimitLine      — Preview Result 1

**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9262: 1GHz – 18GHz**

Note: The peak above the limit line is the carrier freq. at ch-9262.

Note: This plot contains results of antenna in both horizontal and vertical polarizations. Polarity where peak is measured is listed in table.

# FCC 24 1-18GHz Low Channel

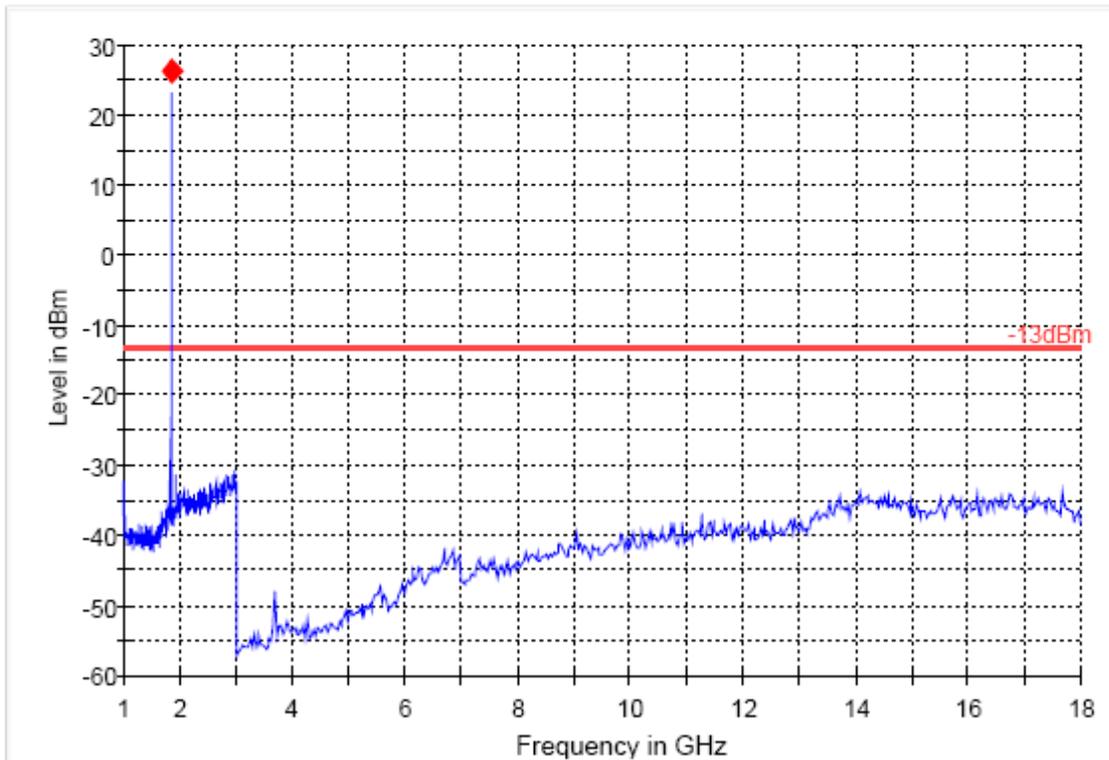
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1852.935872	26.2	1000.000	1000.000	145.0	H	202.0	-69.6	-39.2	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
1852.935872	

FCC 24 1-18GHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

**RADIATED SPURIOUS EMISSIONS (UMTS FDD2) Tx CHANNEL 9400: 1GHz – 18GHz**

Note: The peak above the limit line is the carrier freq. at ch-9400.

Note: This plot contains results of antenna in both horizontal and vertical polarizations. Polarity where peak is measured is listed in table.

# FCC 24 1-18GHz Mid Channel

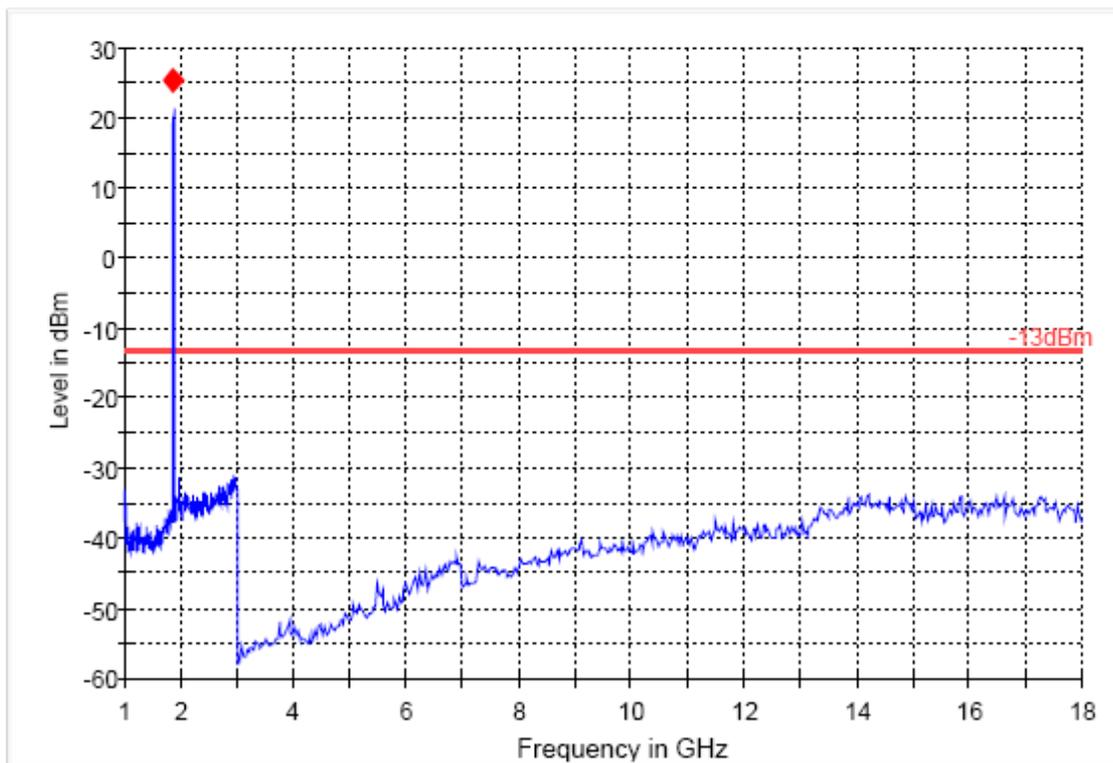
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1878.927856	25.5	1000.000	1000.000	145.0	H	202.0	-69.5	-38.5	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
1878.927856	

FCC 24 1-18GHz



— -13dBm.LimitLine      — Preview Result 1      ◆ Final Result 1

**RADIATED SPURIOUS EMISSIONS (UMTS FDD2) Tx CHANNEL 9538: 1GHz – 18GHz**

Note: The peak above the limit line is the carrier freq. at ch-9538.

Note: This plot contains results of antenna in both horizontal and vertical polarizations. Polarity where peak is measured is listed in table.

# FCC 24 1-18GHz High Channel

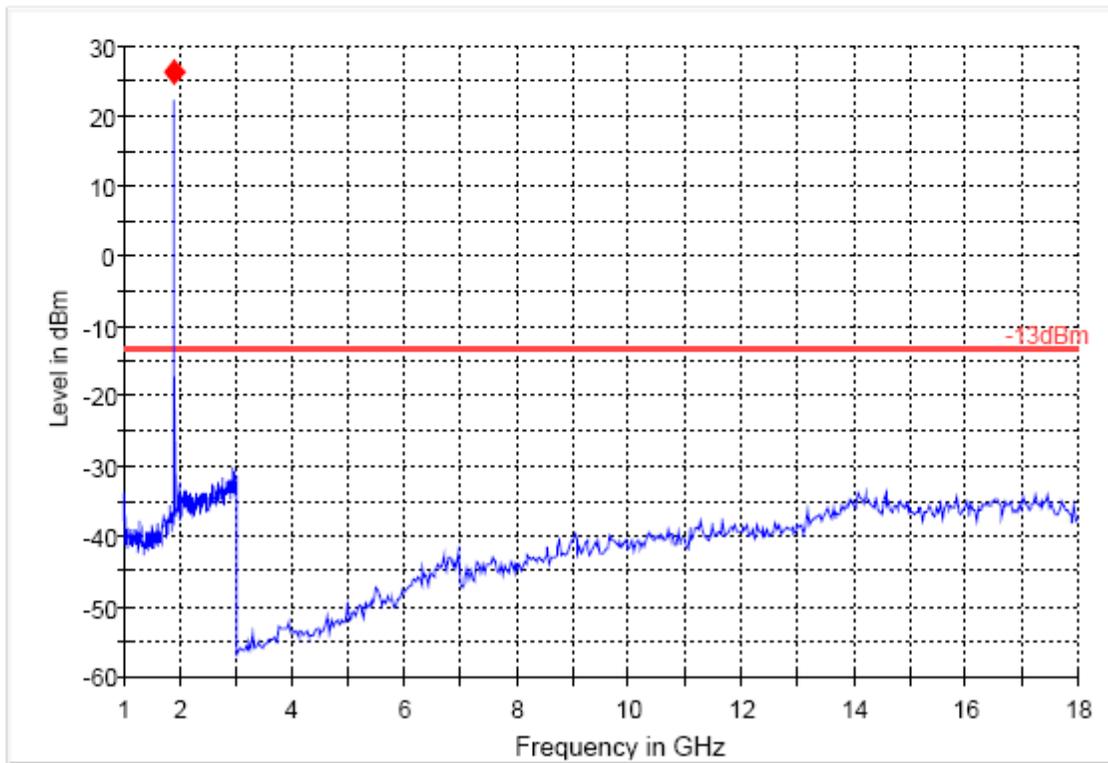
## Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1906.543086	26.4	1000.000	1000.000	145.0	H	202.0	-69.5	-39.4	-13.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
1906.543086	

FCC 24 1-18GHz



— -13dBm.LimitLine     
 — Preview Result 1     
 ◆ Final Result 1



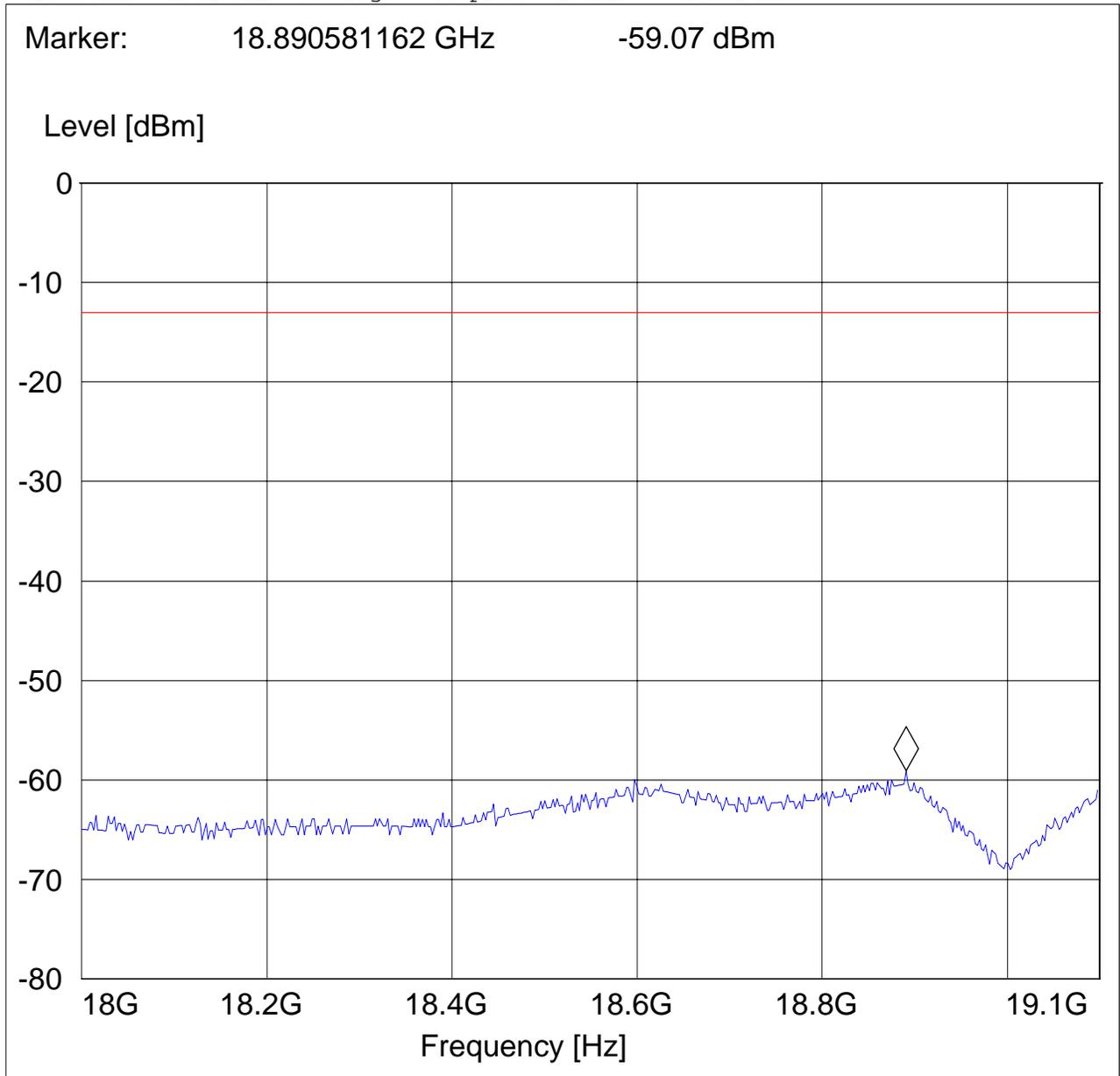
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) 18GHz – 19.1GHz**

**Note: 1.This plot is valid for low, mid & high channels (worst-case plot)**

EUT: Ebook  
 Customer:: Sony  
 Test Mode: FDD II CH 9538  
 ANT Orientation: H  
 EUT Orientation: V  
 Test Engineer: SAM  
 Voltage: AC

**SWEEP TABLE: "FCC 24spuri 18-19.1G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	19.1 GHz	Average	Coupled	1 MHz	DUMMY-DBM



**5.2.6 RECEIVER RADIATED EMISSIONS** **§ 2.1053 / RSS-132 & 133**
**NOTE:**

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the noise level.

**Limits****SUBCLAUSE § RSS-133**

Frequency (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

No significant emissions measurable. Plots reported here represent the worse case emissions.

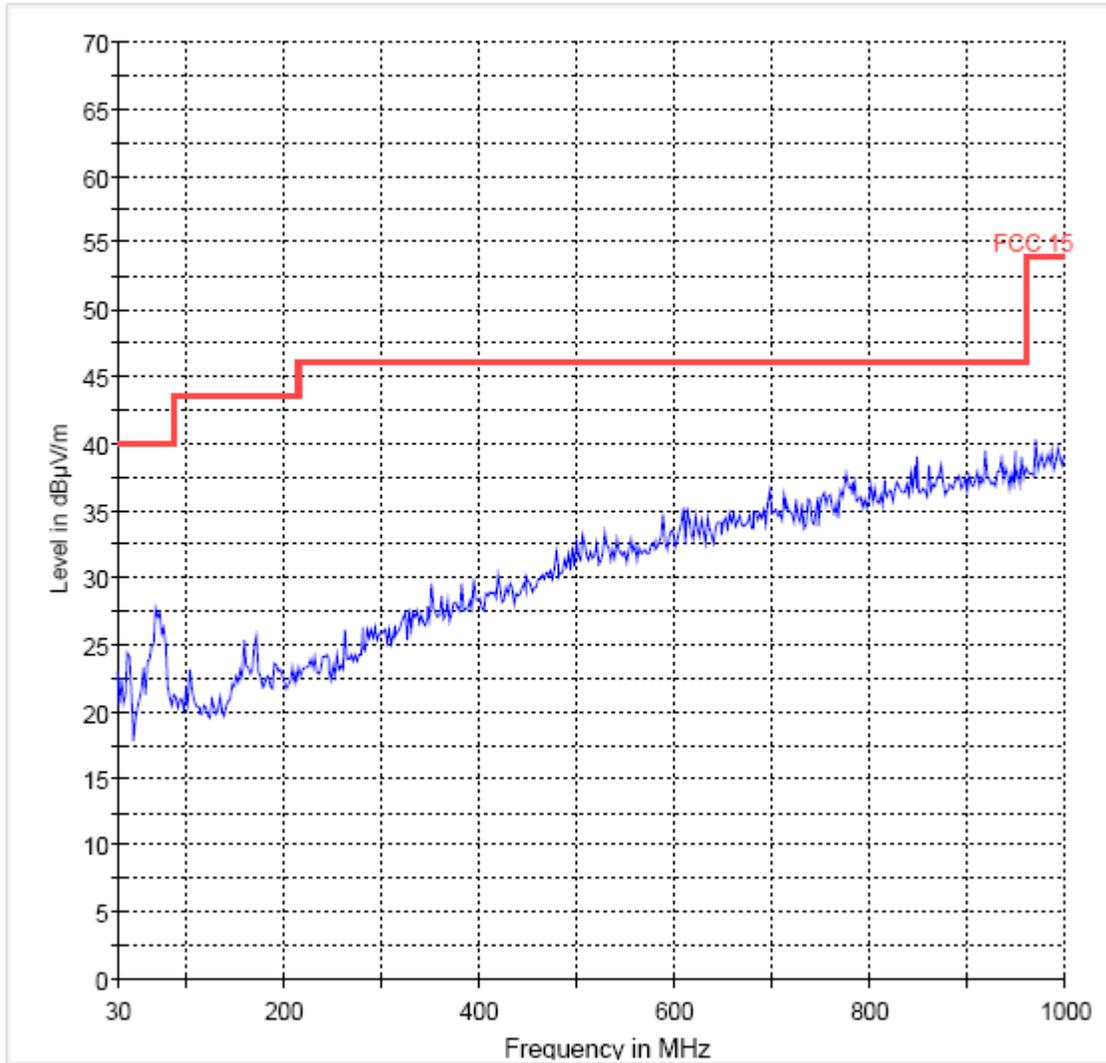
### 5.2.6.1 Test Results Receiver Spurious Emission

#### 30M-1GHz

USED RBW=100 kHz VBW=100 kHz

Note: This plot contains results of antenna in both horizontal and vertical polarizations.

FCC 15 30-1000MHz



— FCC 15.LimitLine — Preview Result 1

**Receiver Spurious Emission UMTS FDD2: 1-18GHz**

Note: This plot contains results of antenna in both horizontal and vertical polarizations. Polarity where peak is measured is listed in table.

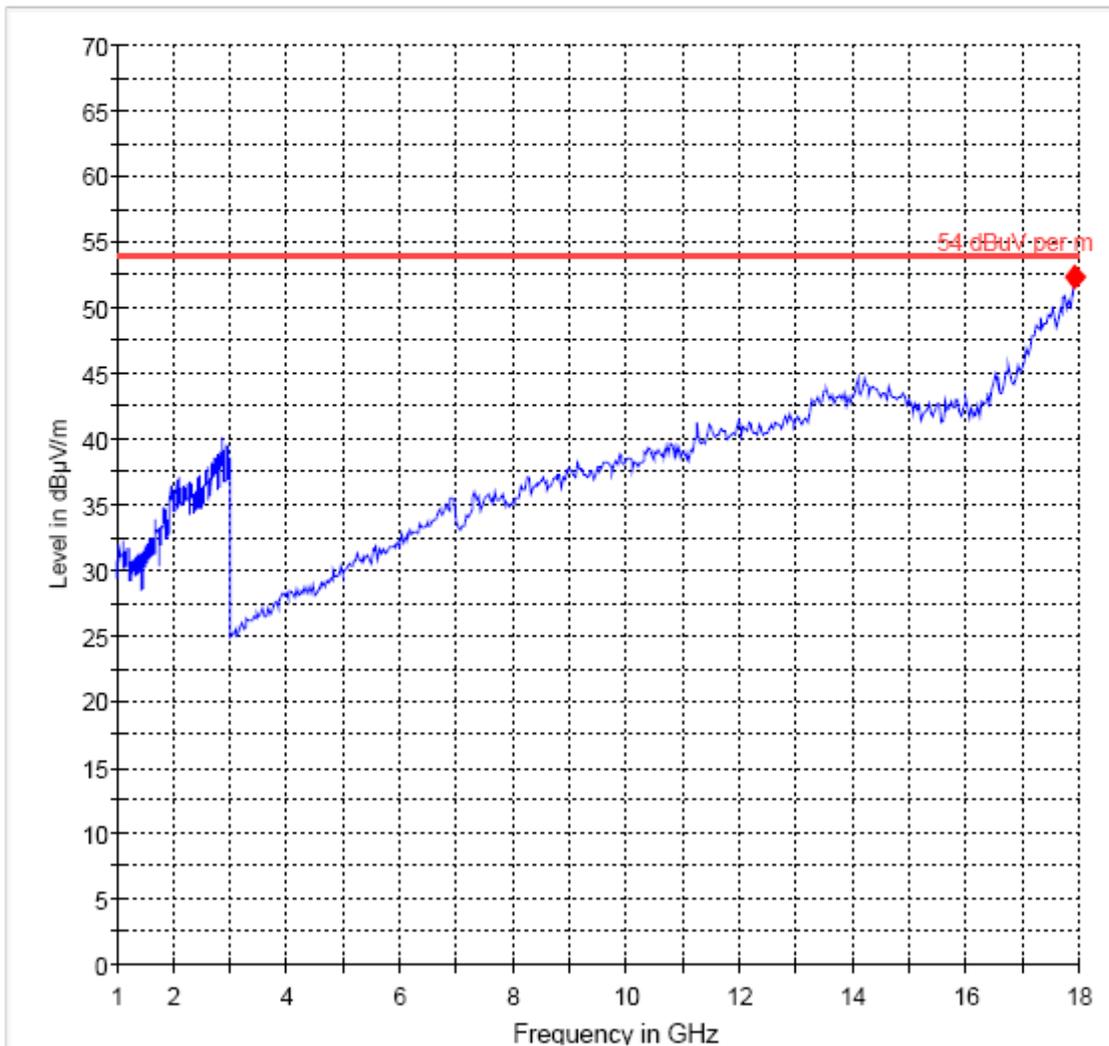
**Final Result 1**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
17935.460922	52.4	20.000	1000.000	145.0	V	158.0	29.6	1.6	54.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
17935.460922	

FCC 15 1-18GHz



— 54 dBµV per m.LimitLine      — Preview Result 1      ◆ Final Result 1

### 5.3 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207

#### 5.3.1 Limits

**Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)**

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

#### **Limit**

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

\* Decreases with logarithm of the frequency

**ANALYZER SETTINGS: RBW = 9 kHz VBW = 9 kHz**

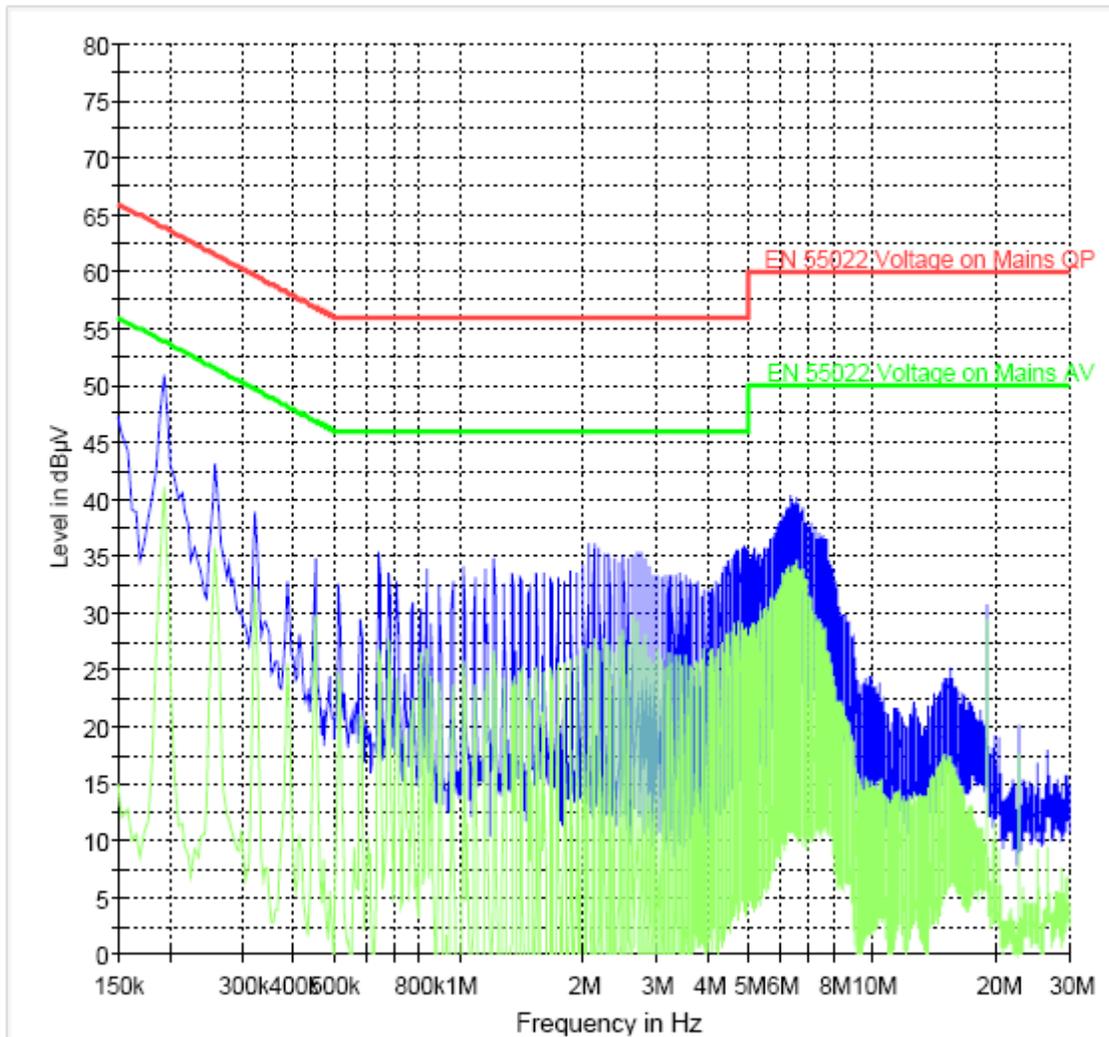
**850 TX**

USED RBW=9 kHz VBW=9 kHz

Note: This plot contains results of measurements performed both on Line and Neutral.

# Test

CISPR 22 Mains Conducted



EN 55022 Voltage on Mains QP LimitLine  
Preview Result 1

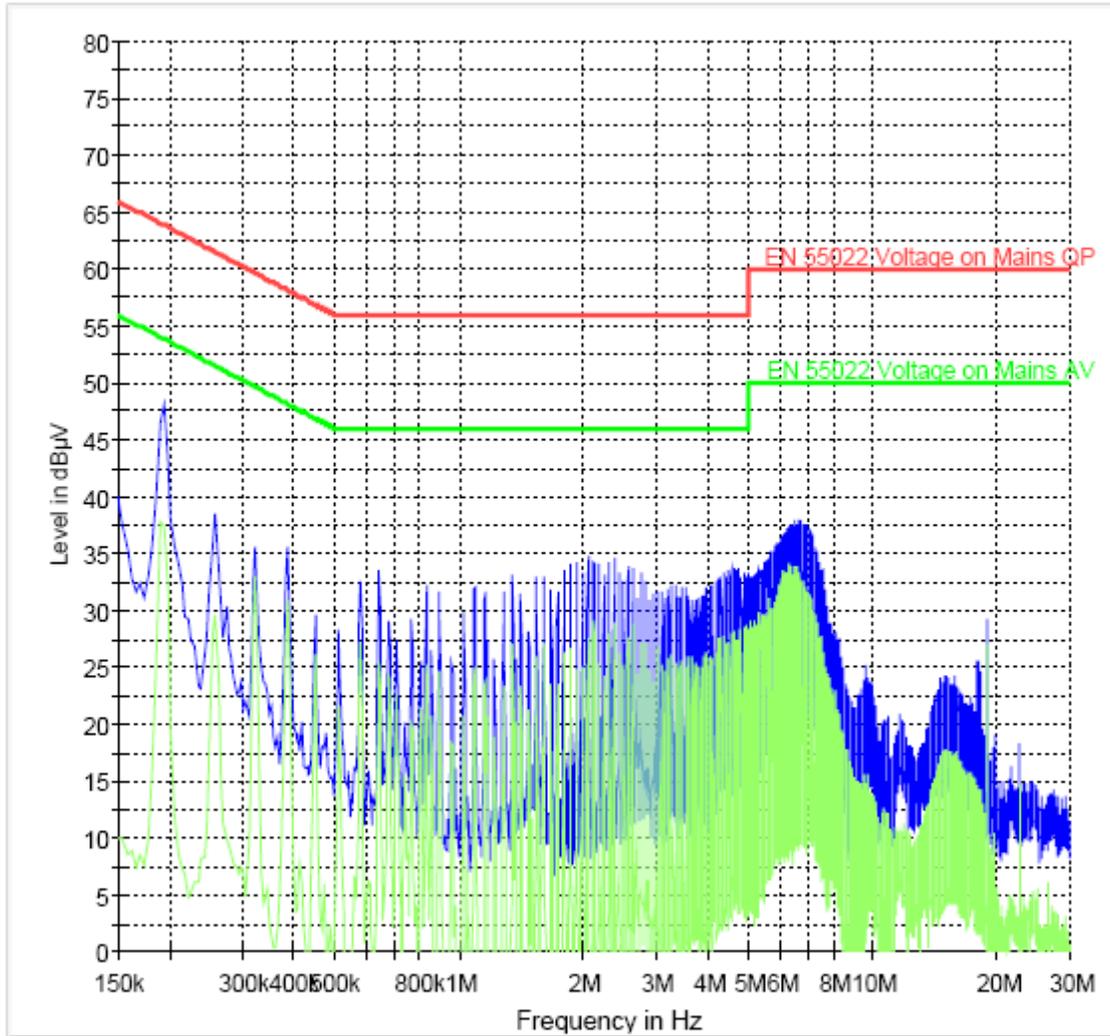
EN 55022 Voltage on Mains AV LimitLine  
Preview Result 2

**WCDMA FDDII RX**

USED RBW=9 kHz VBW=9 kHz

Note: This plot contains results of measurements performed both on Line and Neutral.

CISPR 22 Mains Conducted



EN 55022 Voltage on Mains QP.LimitLine  
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine  
Preview Result 2

## 6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2010	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2010	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2010	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2010	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2010	1 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2010	1 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2010	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltch	G1115	May 2010	1 year
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2010	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2010	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2010	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2010	1 year
16	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2010	1 year
17	Loop Antenna	6512	EMCO	00049838	July 2010	2 years

## **7 References**

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION, PART 2--FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS October 1, 2001.

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION, PART 22 PUBLIC MOBILE SERVICES October 1, 1998.

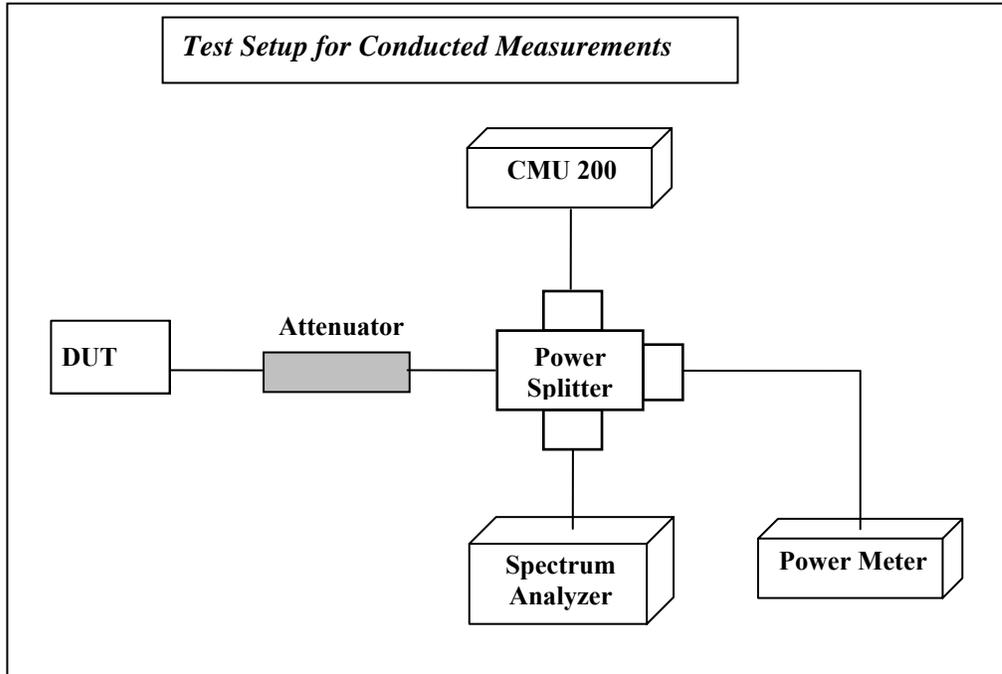
FCC Report and order 02-229 September 24, 2002.

Title 47—Telecommunication, CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION, PART 24 PERSONAL COMMUNICATIONS SERVICES October 1, 1998.

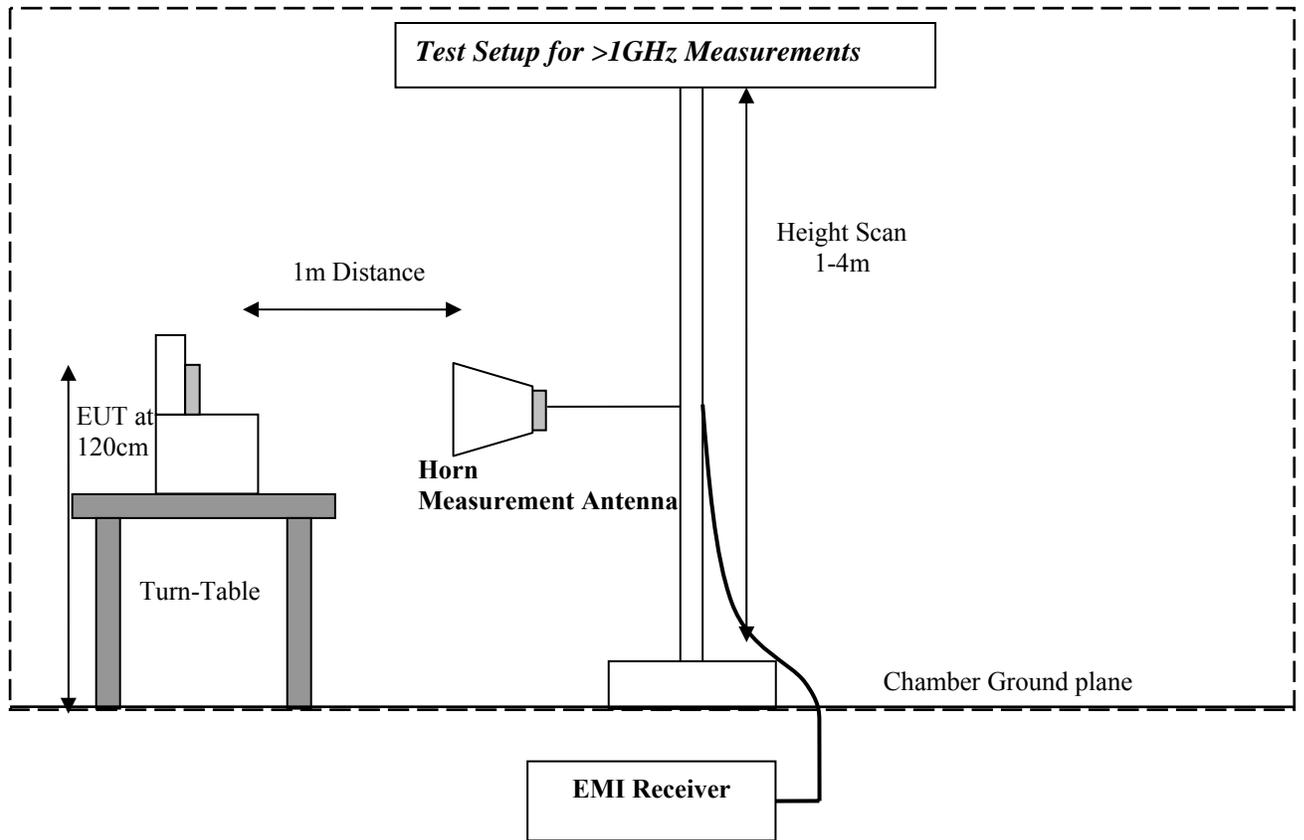
ANSI / TIA-603-C-2004 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard November 7, 2002.

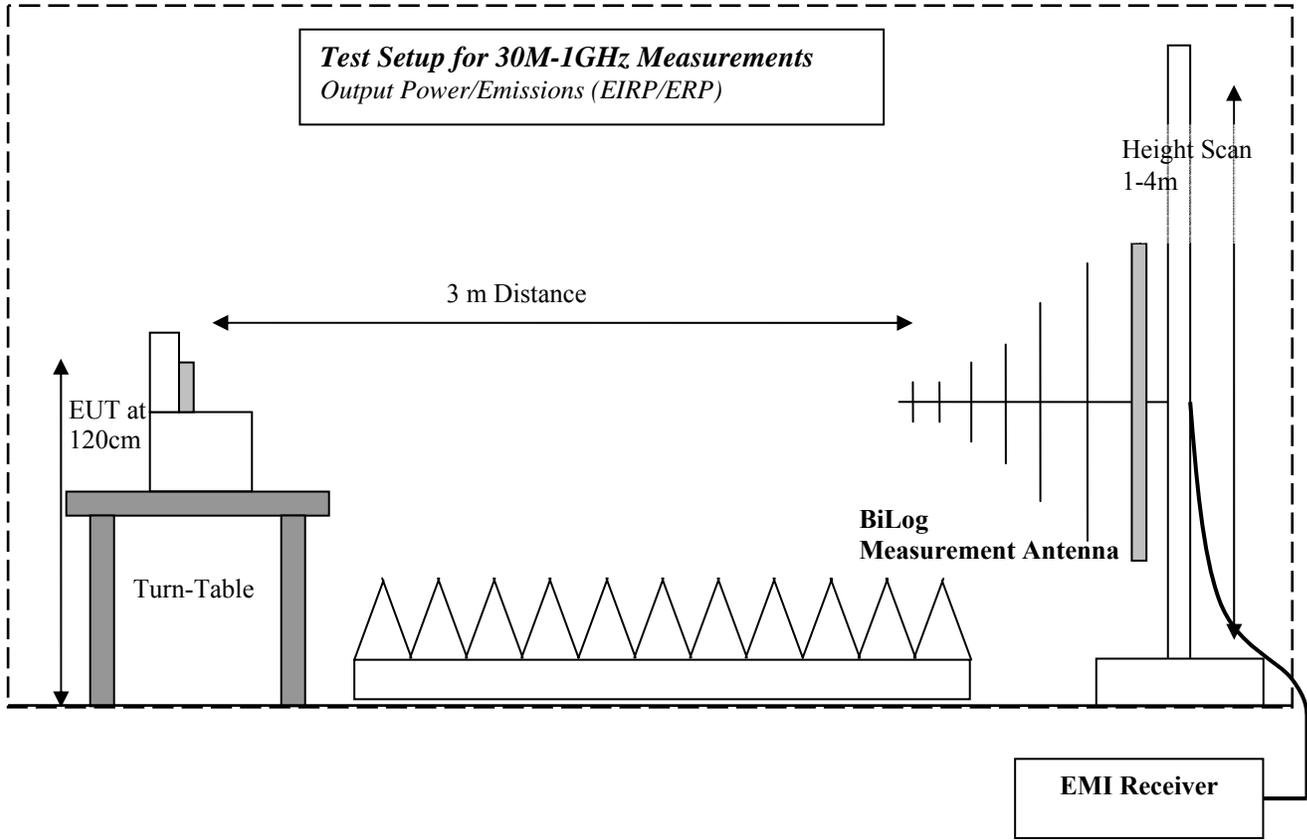
## 8 BLOCK DIAGRAMS

### Conducted Testing



### Radiated Testing





## 9 Revision History

2009-09-21:

EMC\_CET10\_045\_09502\_FCC22\_24: Original report

2009-10-01:

EMC\_CET10\_045\_09502\_FCC22\_24\_rev1: (replaces report# EMC\_CET10\_045\_09502\_FCC22\_24)

- a. Included RBW and VBW used in ERP and EIRP measurements on page 9 and 10.
- b. Included RBW and VBW used in transmitter and receiver radiated spurious measurements.
- c. Included RBW and VBW used in conducted emission measurements.

2009-10-12:

EMC\_CET10\_045\_09502\_FCC22\_24\_rev2: (replaces report# EMC\_CET10\_045\_09502\_FCC22\_24\_rev1)

- a. ERP was remeasured in GPRS and EGPRS 850 bands and values were entered in the tables in sections 3.1 and 5.1.5.

2009-10-13:

EMC\_CET10\_045\_09502\_FCC22\_24\_rev3: (replaces report# EMC\_CET10\_045\_09502\_FCC22\_24\_rev2)

- a. ERP was remeasured in WCDMA FDD V band and values were entered in the tables 3.1 and 5.1.5
- b. EIRP was was remeasured in GPRS 1900, EGPRS 1900 and WCDMA FDD II bands and values were entered in the tables in sections 3.1 and 5.1.6