



# FCC Test Report

## FCC Part 22, 24

**Model #: V02B-V02B001**

**FCC ID: E2KV02B001**

**TEST REPORT #: EMC\_FIHTD\_001\_09004\_FCC22\_24\_rev3**  
**DATE: 2009-11-05**



**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

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## **Table of Contents**

<b>1</b>	<b>ASSESSMENT .....</b>	<b>4</b>
<b>2</b>	<b>ADMINISTRATIVE DATA.....</b>	<b>5</b>
2.1	IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT.....	5
2.2	IDENTIFICATION OF THE CLIENT .....	5
2.3	IDENTIFICATION OF THE MANUFACTURER.....	5
<b>3</b>	<b>EQUIPMENT UNDER TEST (EUT).....</b>	<b>6</b>
3.1	SPECIFICATION OF THE EQUIPMENT UNDER TEST .....	6
3.2	IDENTIFICATION OF THE EQUIPMENT UNDER TEST (EUT).....	7
3.3	IDENTIFICATION OF ACCESSORY EQUIPMENT .....	7
<b>4</b>	<b>SUBJECT OF INVESTIGATION.....</b>	<b>8</b>
<b>5</b>	<b>MEASUREMENTS.....</b>	<b>9</b>
5.1	RF POWER OUTPUT .....	9
5.1.1	FCC 2.1046 Measurements required: RF power output.....	9
5.1.2	Limits: .....	9
5.1.2.1	FCC 22.913 (a) Effective radiated power limits. ....	9
5.1.2.2	FCC 24.232 (b)(c) Power limits. ....	9
5.1.3	Conducted Output Power Measurement procedure:.....	9
5.1.4	Radiated Output Power Measurement procedure:.....	10
5.1.5	Conducted Peak Power 850MHz band .....	11
5.1.6	Conducted Peak Power 1900 MHz band .....	11
5.1.7	ERP Results 850MHz band: .....	12
5.1.8	EIRP Results 1900 MHz band:.....	12
5.2	OCCUPIED BANDWIDTH/EMISSION BANDWIDTH .....	49
5.2.1	FCC 2.1049 Measurements required: Occupied bandwidth.....	49
5.2.2	Occupied / emission bandwidth measurement procedure:.....	49
5.2.3	Occupied bandwidth results 850 MHz band. ....	50
5.2.4	Occupied bandwidth results 1900 MHz band: .....	50
5.2.5	Emission bandwidth results 850 MHz band. ....	51
5.2.6	Emission bandwidth results 1900 MHz band:.....	51
5.3	FREQUENCY STABILITY.....	88
5.3.1	Limit .....	88
5.3.2	Test Results Frequency Stability (GSM-850).....	89
5.3.3	Test Results Frequency Stability (GSM-1900).....	90
5.3.4	Test Results Frequency Stability (UMTS FDD5).....	91
5.3.5	Test Results Frequency Stability (UMTS FDD2).....	92
5.4	SPURIOUS EMISSIONS CONDUCTED.....	93
5.4.1	FCC 2.1051 Measurements required: Spurious emissions at antenna terminals. ....	93
5.4.2	Limits: .....	93
5.4.2.1	FCC 22.917 Emission limitations for cellular equipment. ....	93
5.4.2.2	FCC 24.238 Emission limitations for Broadband PCS equipment. ....	93
5.4.3	Conducted out of band emissions measurement procedure:.....	94
5.4.4	Test Results: Conducted Out of band Emission: .....	94
5.5	SPURIOUS EMISSIONS RADIATED .....	120
5.5.1	FCC 2.1053 Measurements required: Field strength of spurious radiation.....	120

5.5.2	<i>Limits:</i> .....	120
5.5.2.1	FCC 22.917 Emission limitations for cellular equipment. ....	120
5.5.2.2	FCC 24.238 Emission limitations for Broadband PCS equipment. ....	120
5.5.3	<i>Radiated out of band measurement procedure:</i> .....	121
5.5.4	<i>Radiated out of band emissions results on EUT:</i> .....	123
5.5.4.1	Test Results Transmitter Spurious Emission GSM850: .....	123
5.5.4.2	Test Results Transmitter Spurious Emission UMTS FDD5 .....	130
5.5.4.3	Test Results Transmitter Spurious Emission PCS-1900: .....	140
5.5.4.4	Test Results Transmitter Spurious Emission UMTS FDD2: .....	147
5.5.5	<i>RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-132 &amp; 133</i> .....	158
5.5.5.1	Test Results Receiver Spurious Emission .....	159
	30M-1GHz, Antenna Horizontal.....	159
5.6	AC POWER LINE CONDUCTED EMISSIONS § 15.107/207.....	163
5.6.1	<i>Limits</i> .....	163
6	<b>TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS</b> .....	172
7	<b>REFERENCES</b> .....	173
8	<b>BLOCK DIAGRAMS</b> .....	174
9	<b>REVISION HISTORY</b> .....	177

## 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 #
Dell Inc.	GSM/UMTS Mobile Phone	V02B-V02B001

Technical responsibility for area of testing:

2009-11-05	EMC & Radio	Marc Douat (Test Lab Manager)	Thomas Tam(Test Lab Manager) On Behalf of Marc Douat
Date	Section	Name	Signature

This report is prepared by:

2009-09-14	EMC & Radio	Satya Radhakrishna (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>Dell Inc.</b>
<b>Street Address</b>	<b>One Dell Way</b>
<b>City/Zip Code</b>	<b>Round Rock, TX 78682</b>
<b>Country</b>	<b>USA</b>
<b>Contact Person</b>	<b>Sushil Gour</b>
<b>Telephone</b>	<b>+1-512-723-7639</b>
<b>e-mail</b>	<b>Sushil_Gour@Dell.com</b>

### **2.3 Identification of the Manufacturer**

Manufacturer's Name:	<b>Foxconn Precision Electronics(Tai Yuan) Co., Ltd.</b>
Street Address:	<b>No.1 Longfei Street, Economic-Technology Development Zone,</b>
City/Zip Code	<b>Taiyuan City, Shanxi Province/030032</b>
Country	<b>China</b>
Contact Person:	<b>Cosmos Yeh</b>
Phone No.	<b>+886-2-22685511</b>
e-mail:	<b>CosmosYeh@fintdc.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.)	Mini 3iX
Model No.	V02B-V02B001
FCC-ID	E2KV02B001
Frequency Range:	824.2MHz – 848.8MHz for GSM 850 1850.2MHz – 1909.8MHz for PCS 1900 826.4MHz – 846.6MHz for UMTS FDD5 1852.4MHz – 1907.6MHz for UMTS FDD2
Type(s) of Modulation:	GMSK, 8PSK, QPSK
Number of Channels:	GSM: 124 for GSM-850, 299 for PCS-1900 UMTS: Depends on service.
Antenna Type/gain:	Internal/0dBi
Max. Output Power:	Conducted GSM850 GMSK: 32.80 dBm @ 824.2 MHz Conducted GSM850 8PSK: 29.42 dBm @ 824.2 MHz Conducted UMTS FDD5: 26.07 dBm @ 846.6 MHz Conducted GSM1900 GMSK: 29.70 dBm @ 1850.2 MHz Conducted GSM1900 8PSK: 27.88 dBm @ 1850.2 MHz Conducted UMTS FDD2: 24.82 dBm @ 1907.6 MHz Radiated GSM850 GMSK: 33.46 dBm @ 848.8 MHz Radiated GSM850 8PSK: 27.66 dBm @ 848.8 MHz Radiated UMTS FDD5: 27.05 dBm @ 846.6 MHz Radiated GSM1900 GMSK: 29 dBm @ 1909.8 MHz Radiated GSM1900 8PSK: 26.6 dBm @ 1909.8 MHz Radiated UMTS FDD2: 21.4 dBm @ 1907.6 MHz

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

EUT #	TYPE	MANUFACTURER	MODEL	SERIAL#
1	GSM/UMTS Mobile Phone	Foxconn Precision Electronics(Tai Yuan) Co., Ltd.	V02B-V02B001	BLAEA000001823

**3.3 Identification of Accessory equipment**

AE #	TYPE	MANF.	MODEL
1	AC Adapter	Ktec Co. Ltd.	KSUFB0500100W1UV-1

## **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 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.

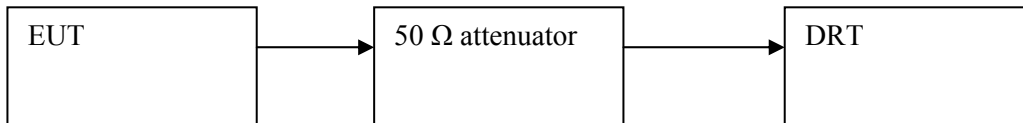
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(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

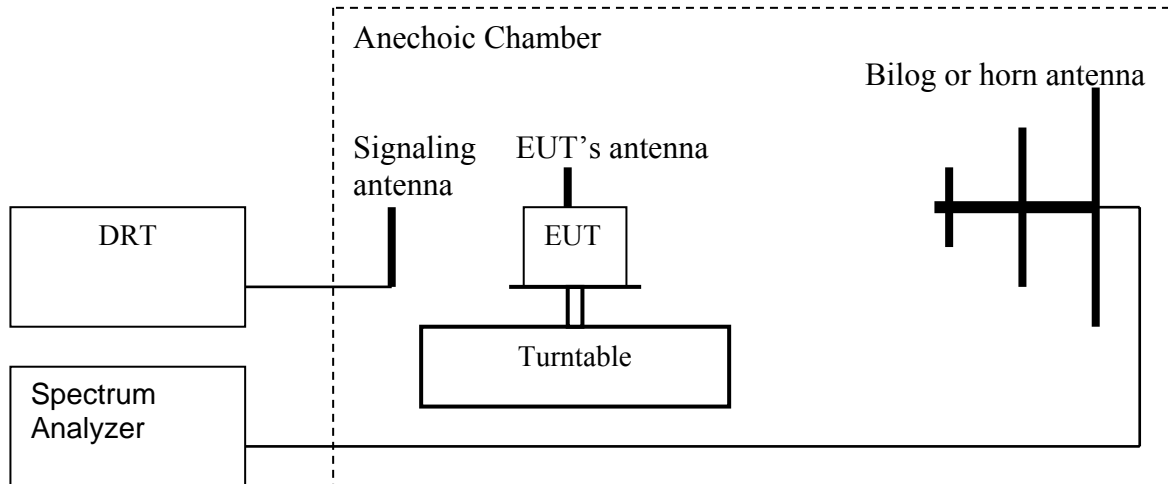


1. Connect the equipment as shown in the above diagram. A Digital Radiocommunication Tester (DRT) is used to enable the EUT to transmit and to measure the output power.
2. Adjust the settings of the DRT to set the EUT to its maximum power at the required channel.
3. Record the output power level measured 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=3MHz**
- (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 Conducted Peak Power 850MHz band

Frequency (MHz)	Conducted Peak Power (dBm)	
	GSM (GMSK)	EGPRS (8PSK)
824.2	32.80	29.42
836.6	32.69	29.23
848.8	32.60	28.89

Frequency (MHz)	Conducted Peak Power (dBm)
	UMTS FDD5
836.4	26.01
836.6	25.67
846.6	26.07

### 5.1.6 Conducted Peak Power 1900 MHz band

Frequency (MHz)	Conducted Peak Power (dBm)	
	GSM (GMSK)	EGPRS (8PSK)
1850.2	29.70	27.88
1880.0	29.34	26.62
1909.8	29.33	27.65

Frequency (MHz)	Conducted Peak Power (dBm)
	UMTS FDD5
1852.4	24.53
1880	24.25
1907.6	24.82

**5.1.7 ERP Results 850MHz band:**

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

Frequency (MHz)	Effective Radiated Power (dBm)	
	GSM (GMSK)	EGPRS (8PSK)
824.2	30.86	25.96
836.6	32.36	27.56
848.8	33.46	27.66

Frequency (MHz)	Effective Radiated Power (dBm)
	UMTS FDD5
836.4	24.53
836.6	25.25
846.6	27.05

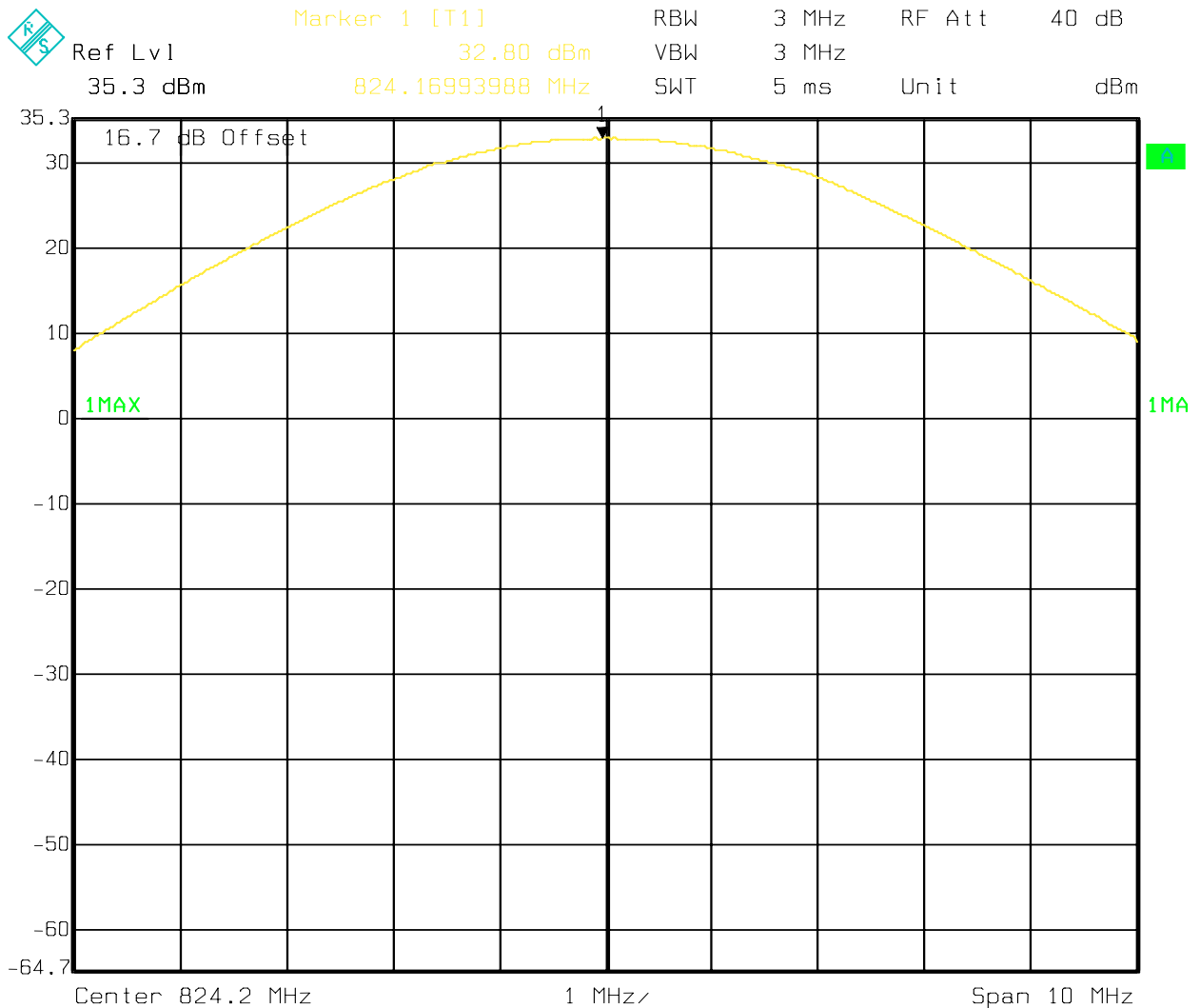
**5.1.8 EIRP Results 1900 MHz band:**

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

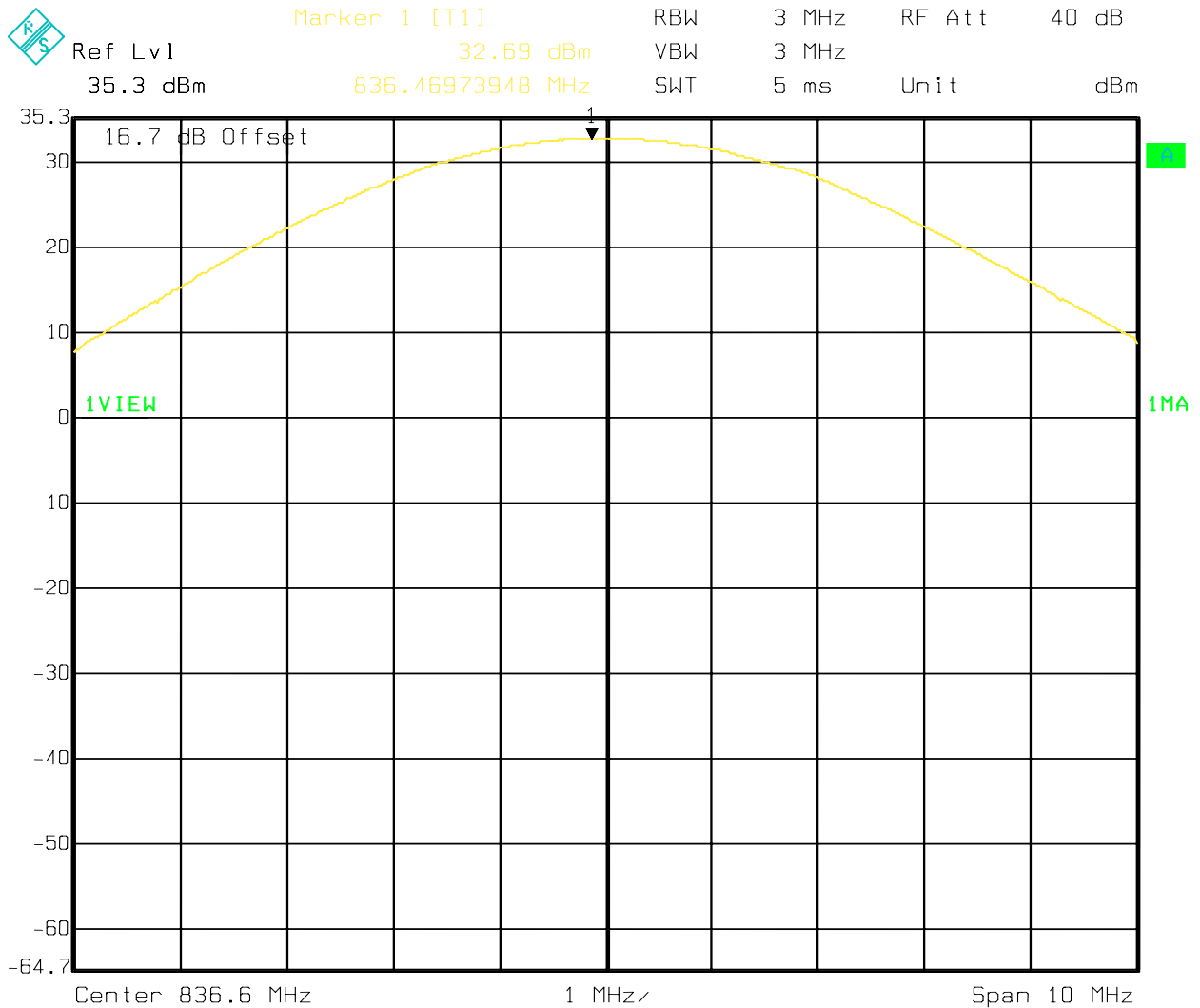
Frequency (MHz)	Effective Isotropic Radiated Power (dBm)	
	GSM (GMSK)	EGPRS (8PSK)
1850.2	27.1	26.5
1880.0	28.1	26
1909.8	29	26.6

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)
	UMTS FDD2
1852.4	20.51
1880	21.4
1907.6	20.77

**CONDUCTED PEAK POWER (GSM 850) CHANNEL 128 §22.913(a)**



Date: 03.JUL.2009 12:27:05

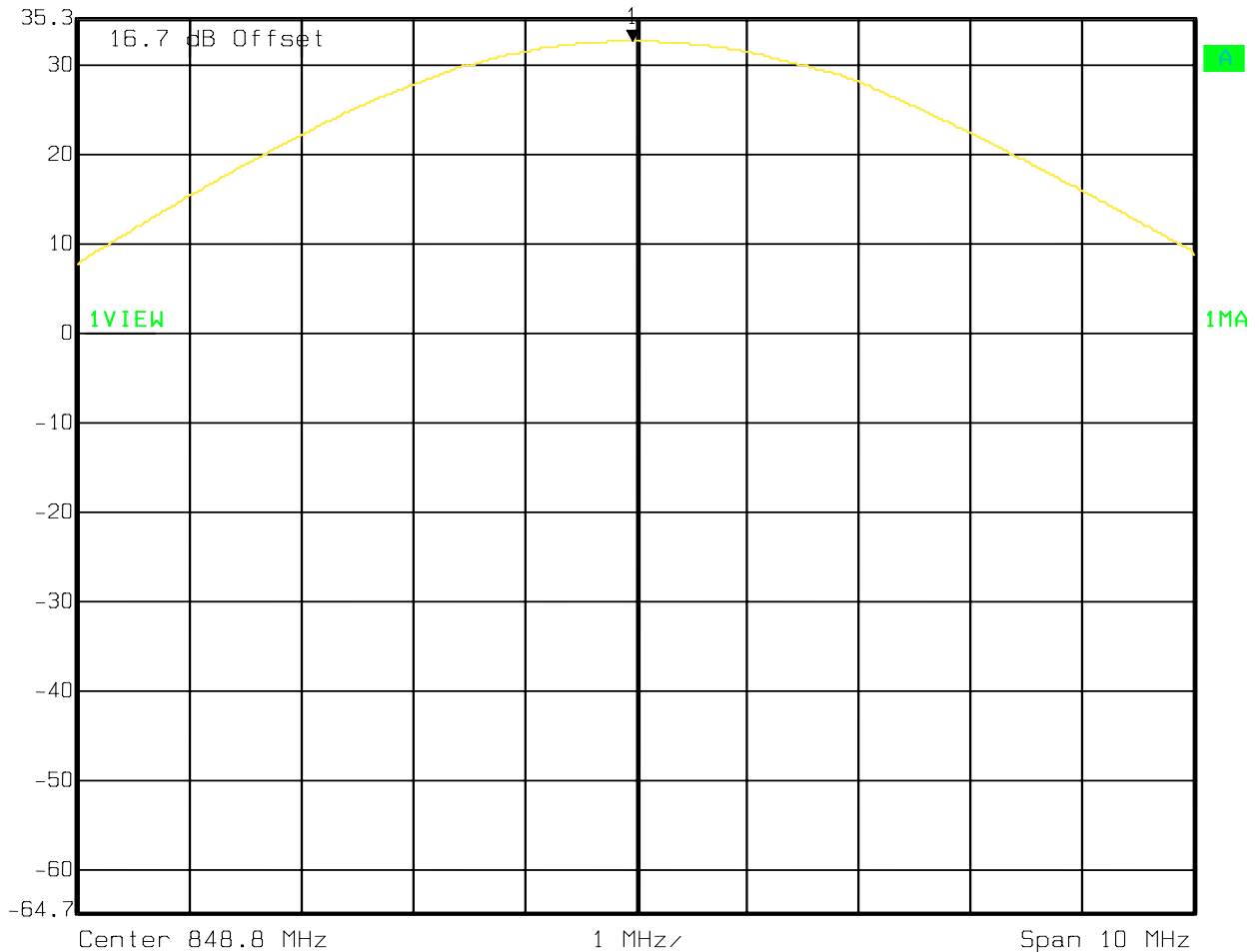
**CONDUCTED PEAK POWER (GSM 850) CHANNEL 190 §22.913(a)**

Date: 03.JUL.2009 12:30:18

**CONDUCTED PEAK POWER (GSM 850) CHANNEL 251 §22.913(a)**



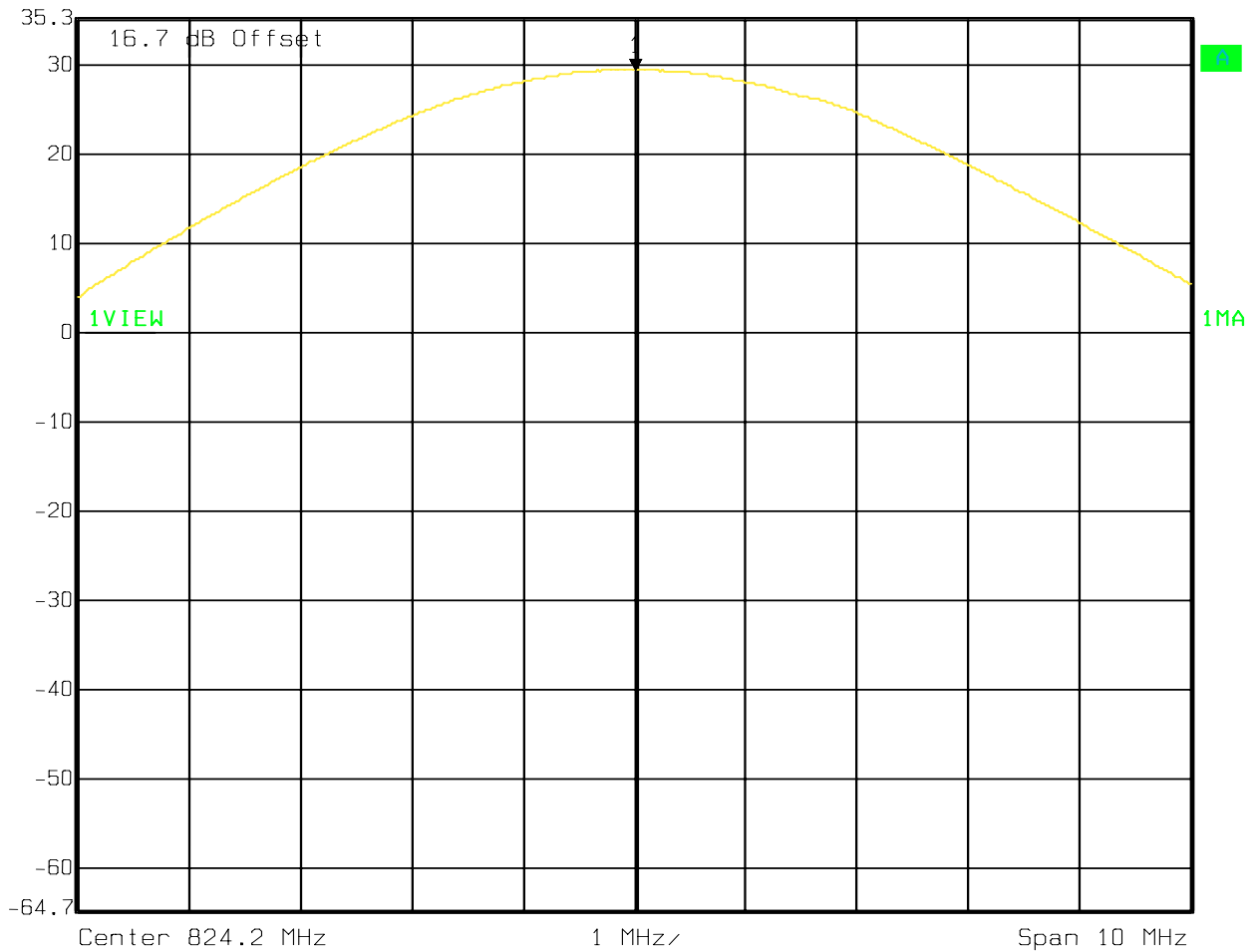
Marker 1 [T1] RBW 3 MHz RF Att 40 dB  
 Ref Lvl 32.60 dBm VBW 3 MHz  
 35.3 dBm 848.76993988 MHz SWT 5 ms Unit dBm



Date: 03.JUL.2009 12:31:49

**CONDUCTED PEAK POWER (EGPRS 850) CHANNEL 128 §22.913(a)**

Marker 1 [T1] RBW 3 MHz RF Att 40 dB  
Ref Lvl 29.42 dBm VBW 3 MHz  
35.3 dBm 824.21002004 MHz SWT 5 ms Unit dBm



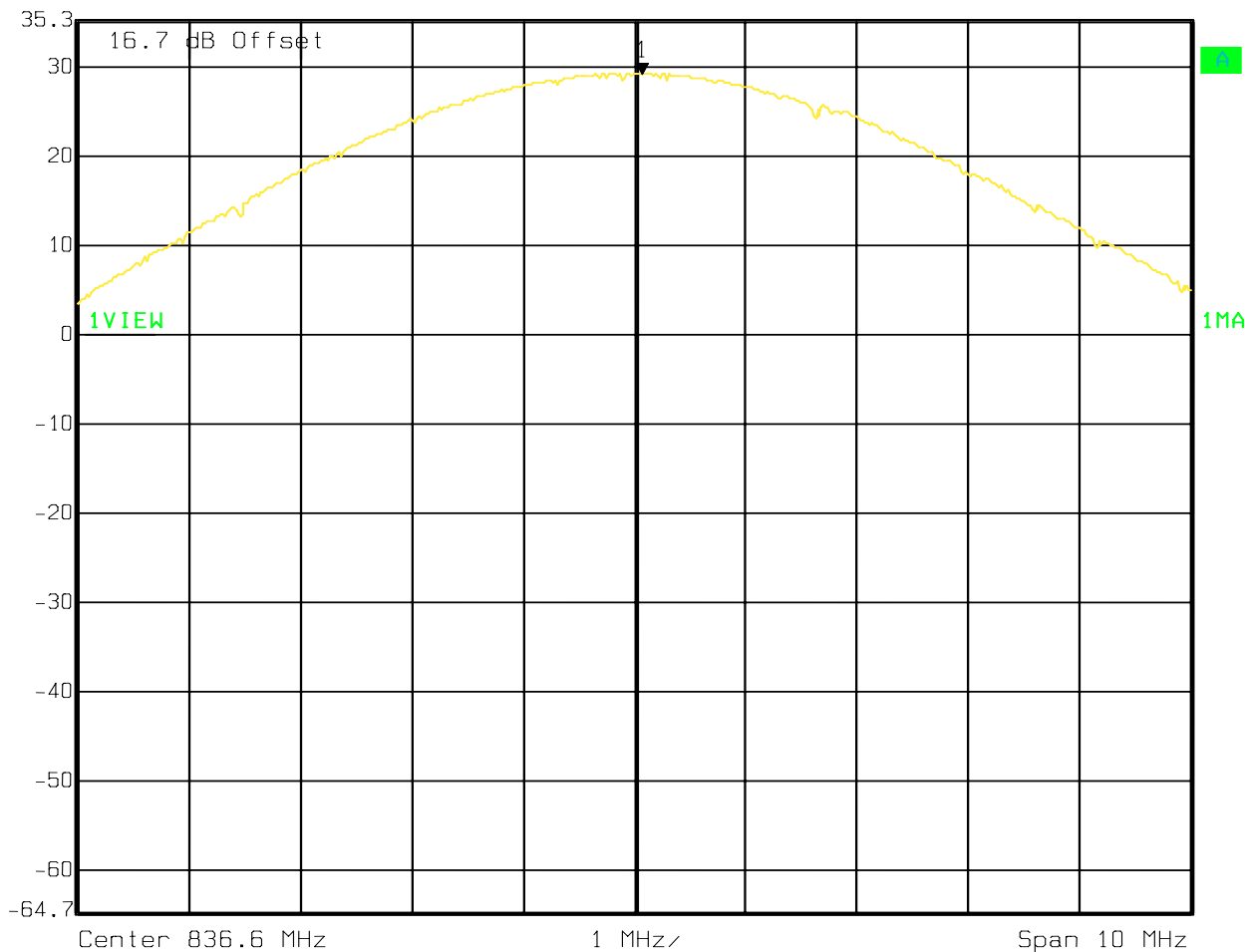
Date: 03.JUL.2009 13:02:12



**CONDUCTED PEAK POWER (EGPRS 850) CHANNEL 190 §22.913(a)**



Marker 1 [T1] RBW 3 MHz RF Att 40 dB  
 Ref Lvl 29.23 dBm VBW 3 MHz  
 35.3 dBm 836.67014028 MHz SWT 5 ms Unit dBm

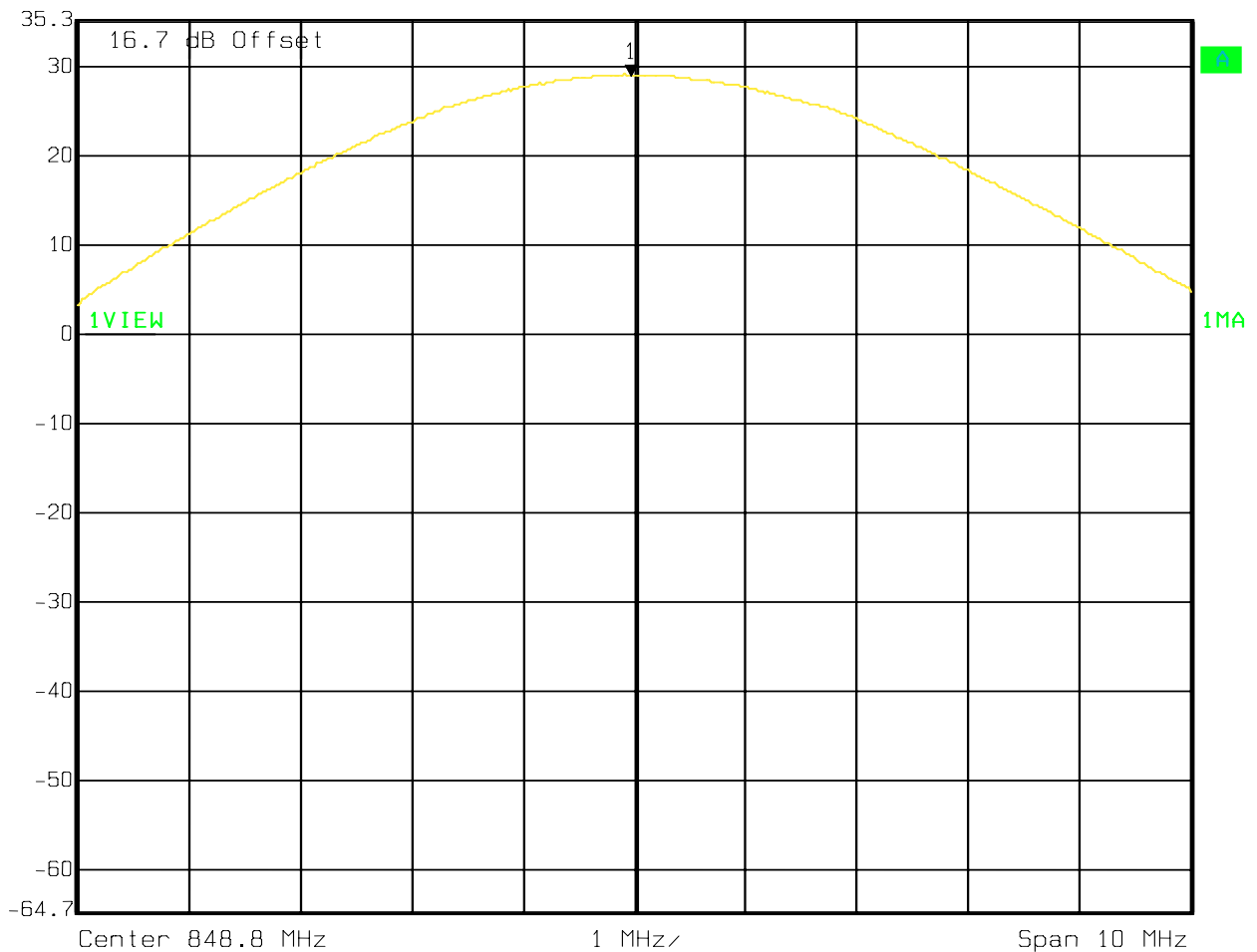


Date: 03.JUL.2009 13:03:29

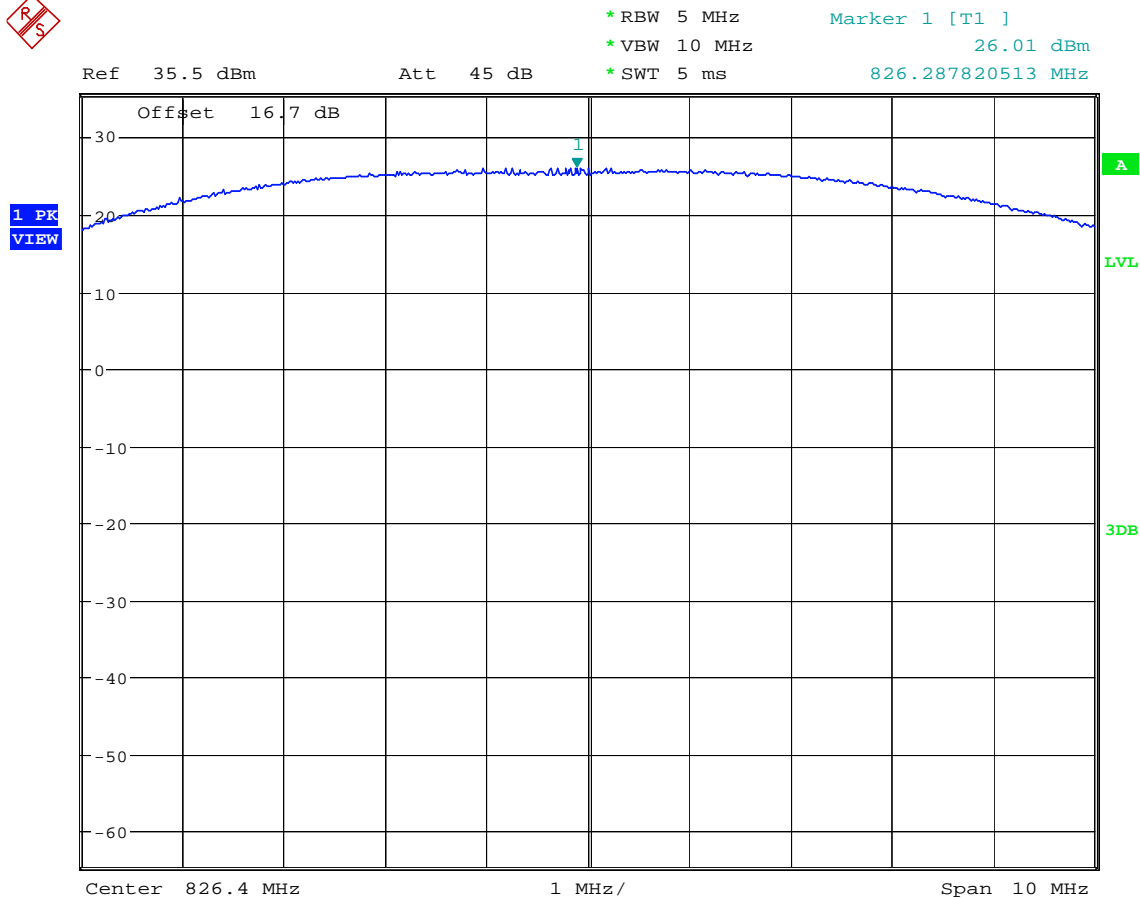
**CONDUCTED PEAK POWER (EGPRS 850) CHANNEL 251 §22.913(a)**



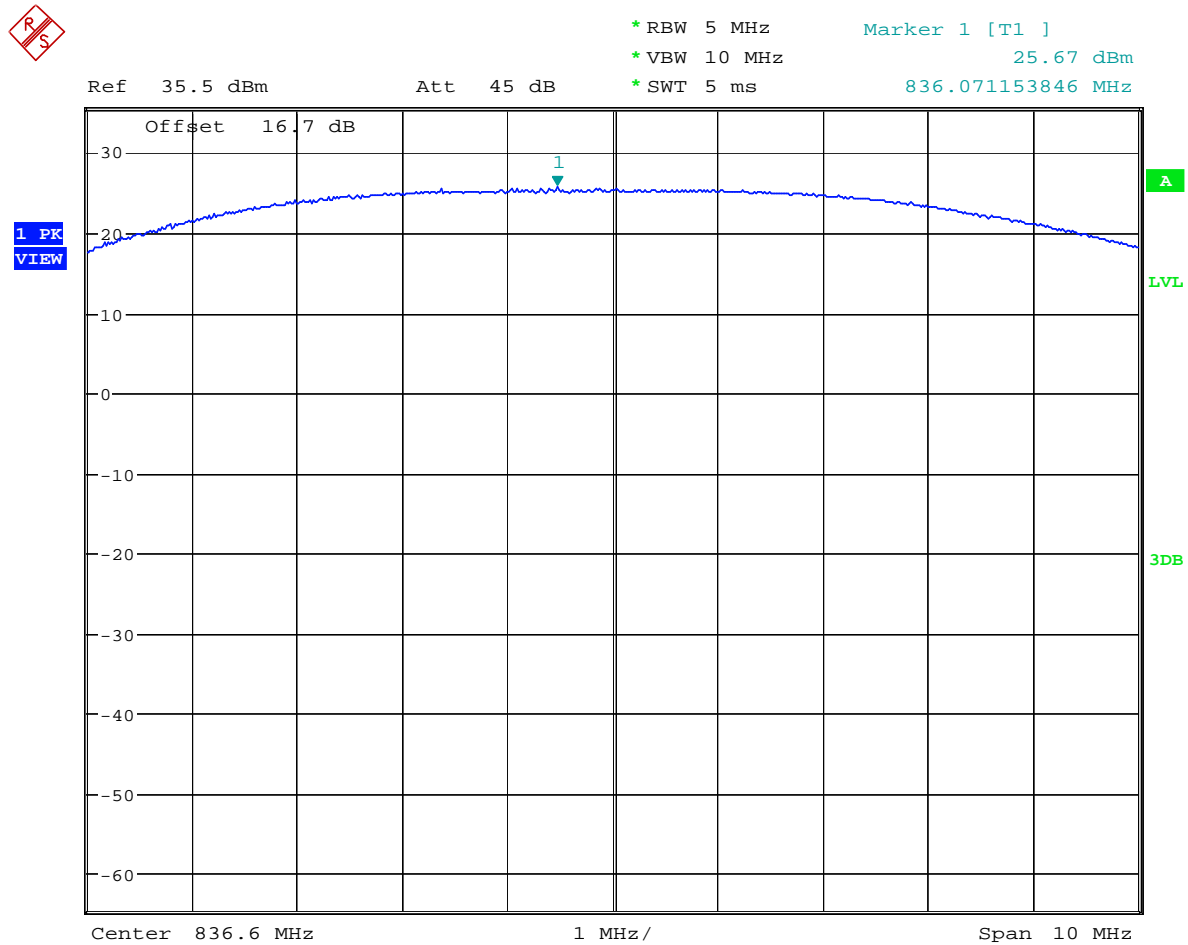
Marker 1 [T1] RBW 3 MHz RF Att 40 dB  
 Ref Lvl 28.89 dBm VBW 3 MHz  
 35.3 dBm 848.76993988 MHz SWT 5 ms Unit dBm



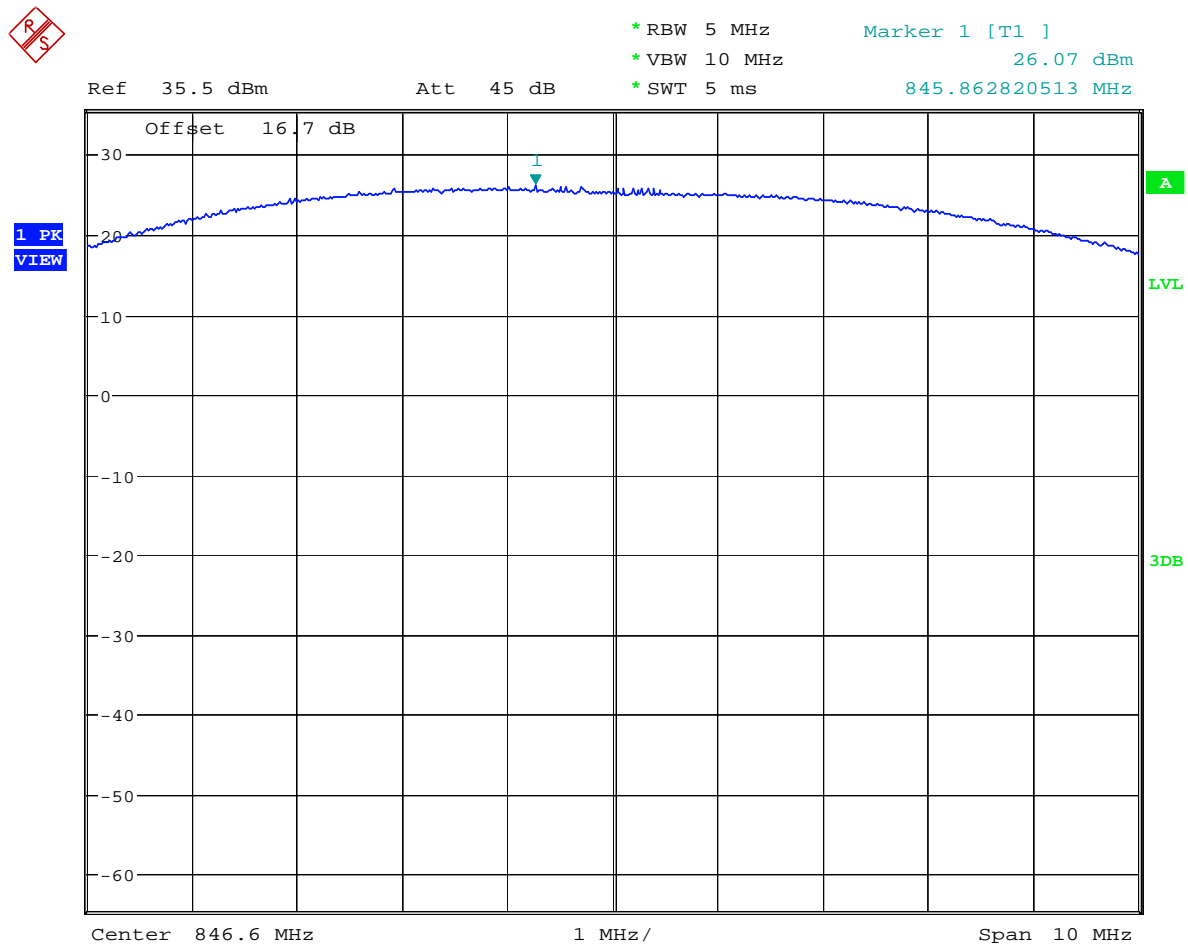
Date: 03.JUL.2009 12:35:08

**CONDUCTED PEAK POWER (UMTS FDD5) CHANNEL 4132 §22.913(a)**

Date: 3.JUL.2009 18:13:12

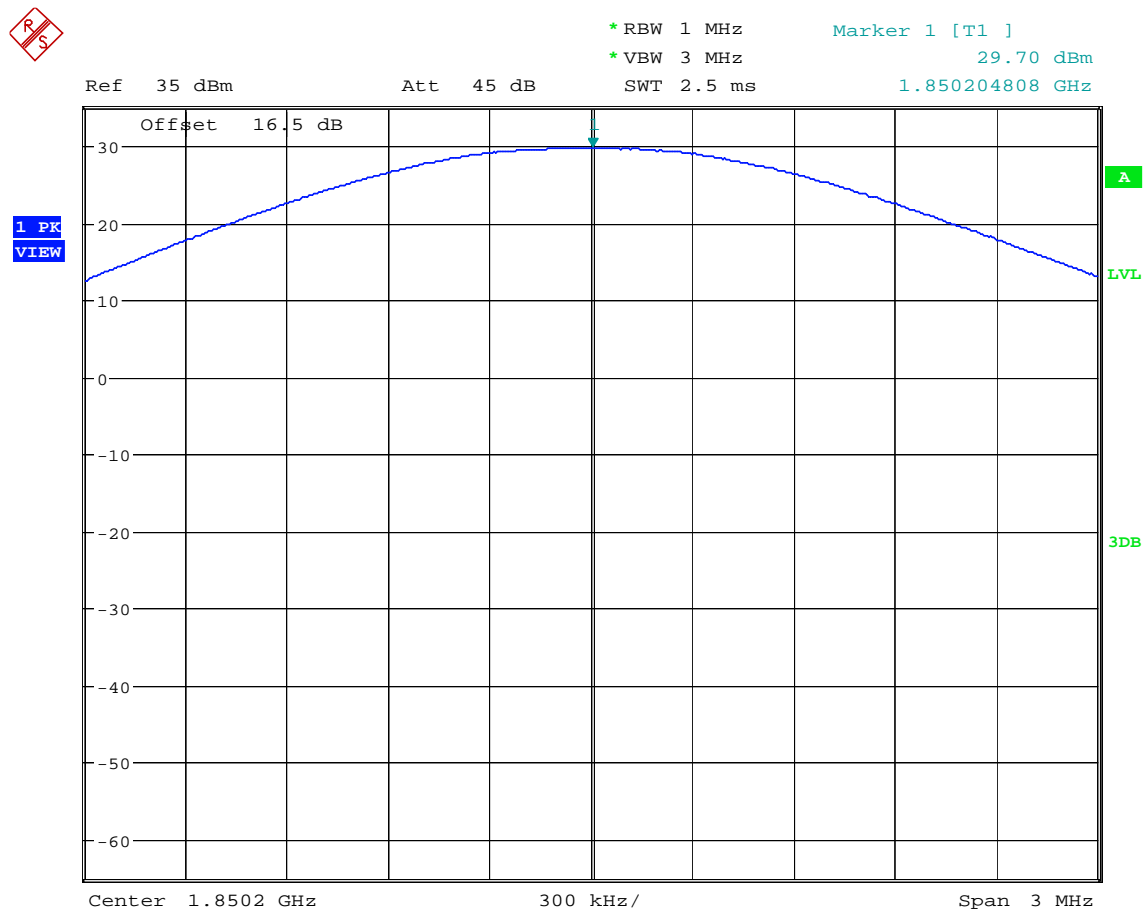
**CONDUCTED PEAK POWER (UMTS FDD5) CHANNEL 4183 §22.913(a)**

Date: 3.JUL.2009 18:15:18

**CONDUCTED PEAK POWER (UMTS FDD5) CHANNEL 4233 §22.913(a)**

Date: 3.JUL.2009 18:16:39

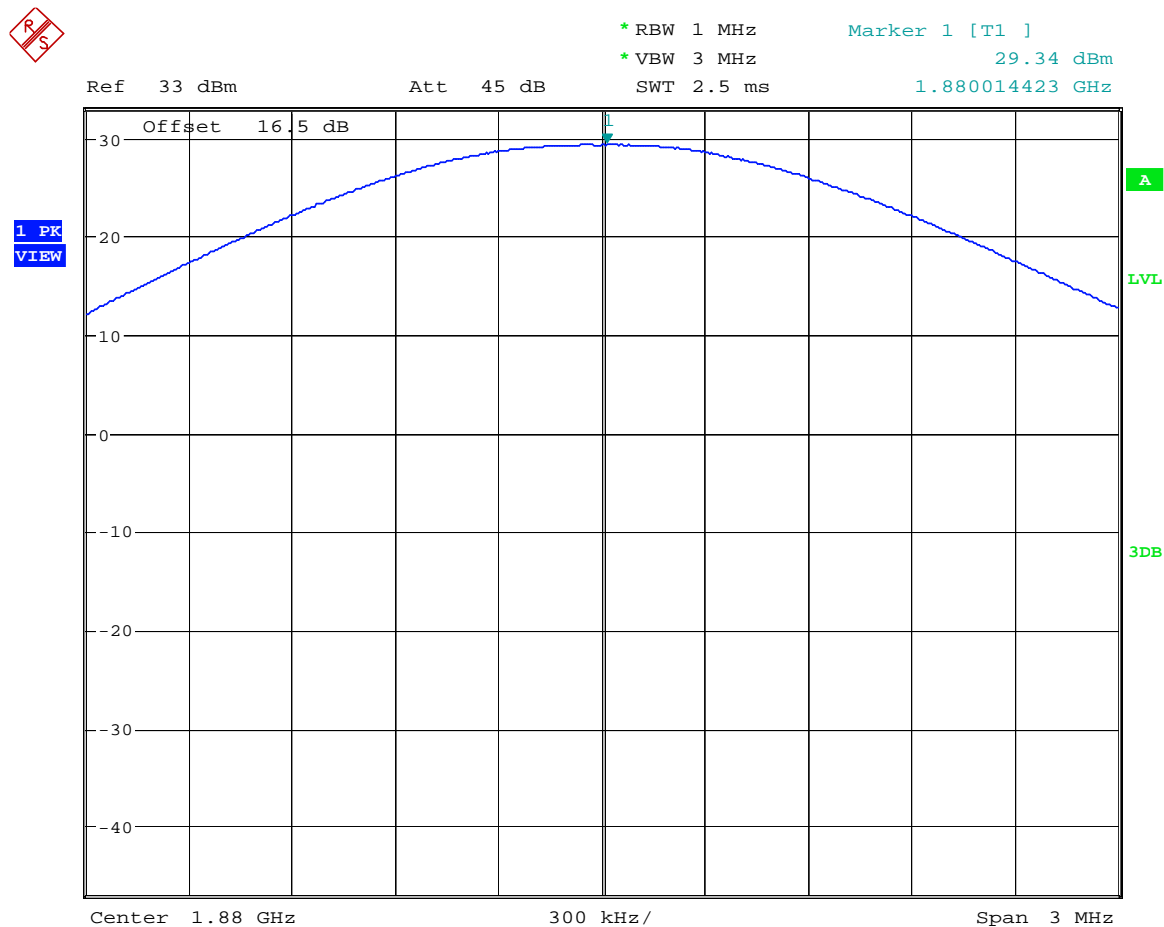
**CONDUCTED PEAK POWER (PCS-1900) CHANNEL 512 §24.232(b)**



Date: 8.JUL.2009 14:56:44

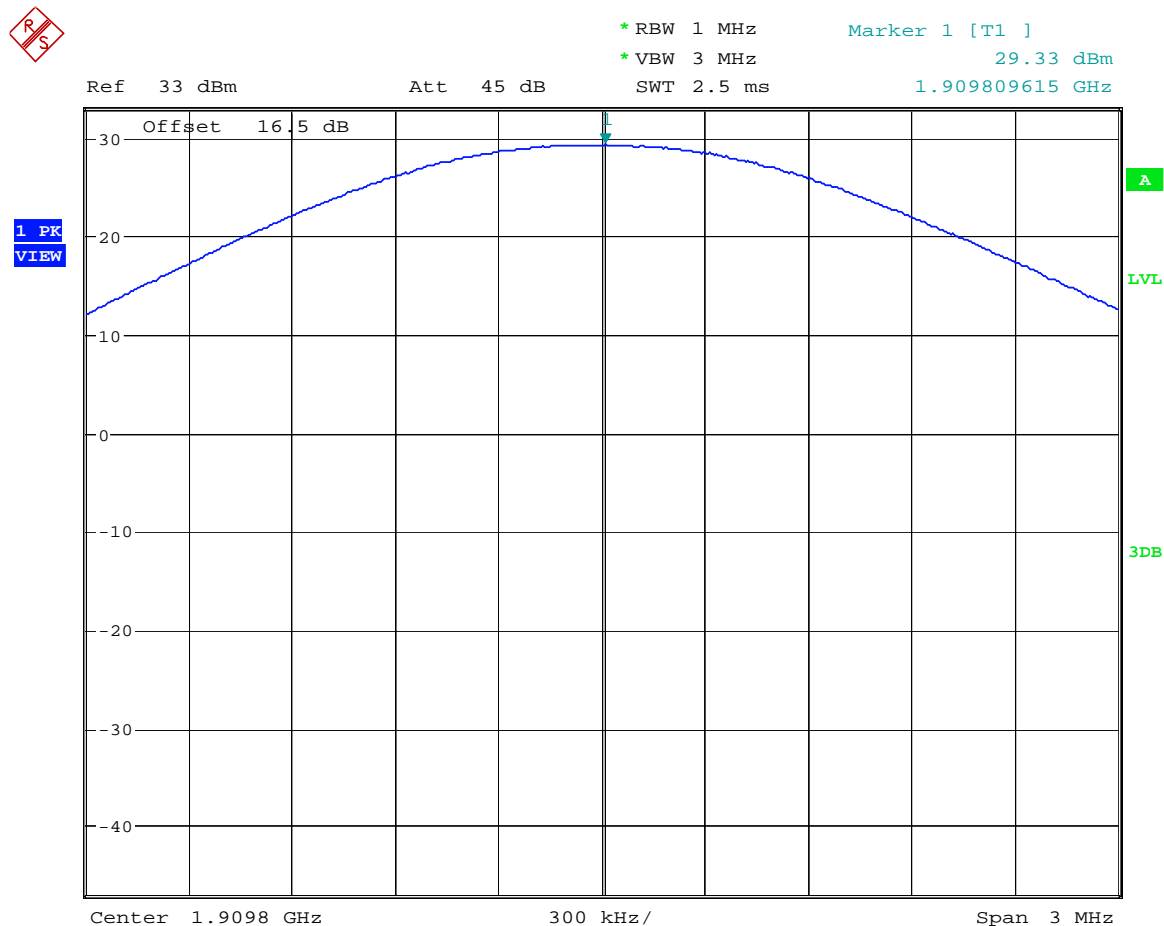
**CONDUCTED PEAK POWER (PCS-1900) CHANNEL 661**

**§24.232(b)**



Date: 8.JUL.2009 15:09:04

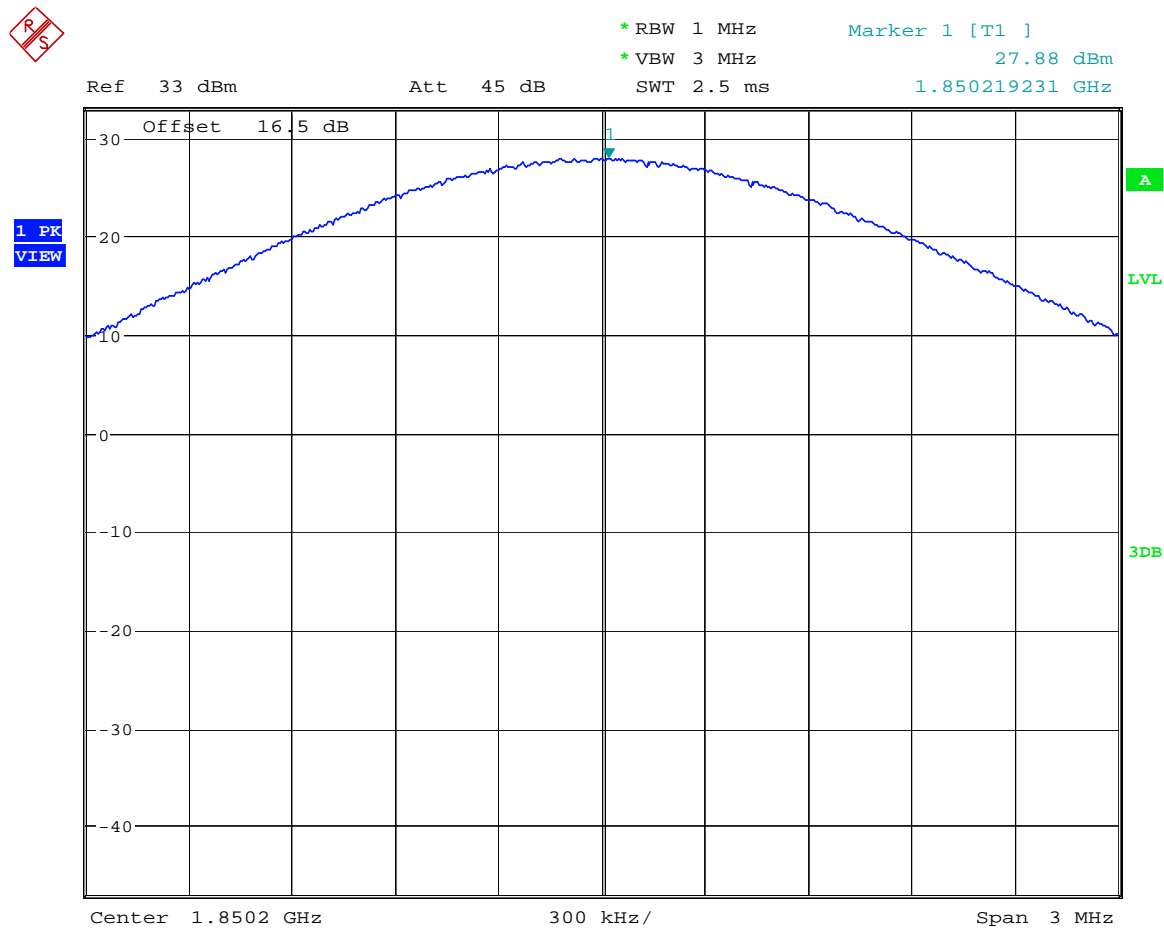
**CONDUCTED PEAK POWER (PCS-1900) CHANNEL 810 §24.232(b)**



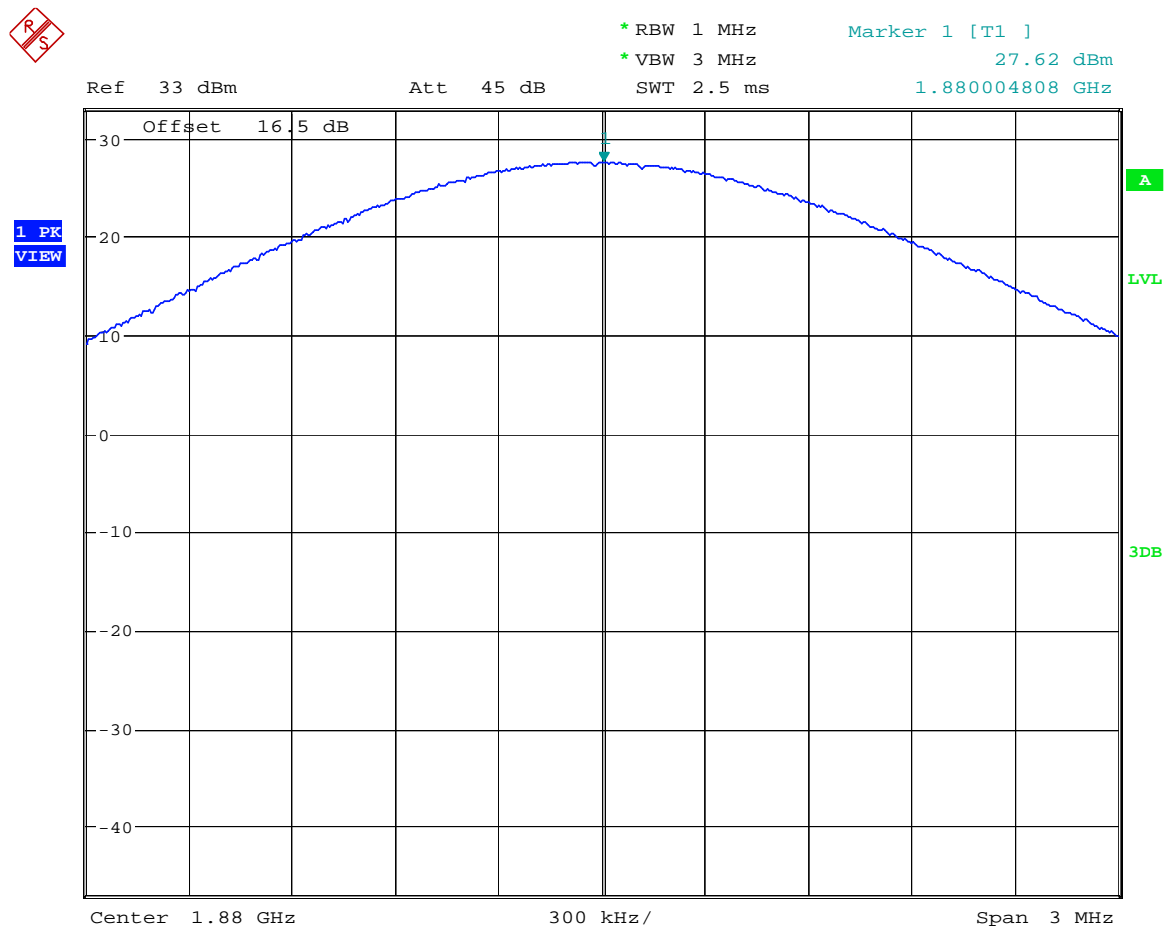
Date: 8.JUL.2009 15:17:10



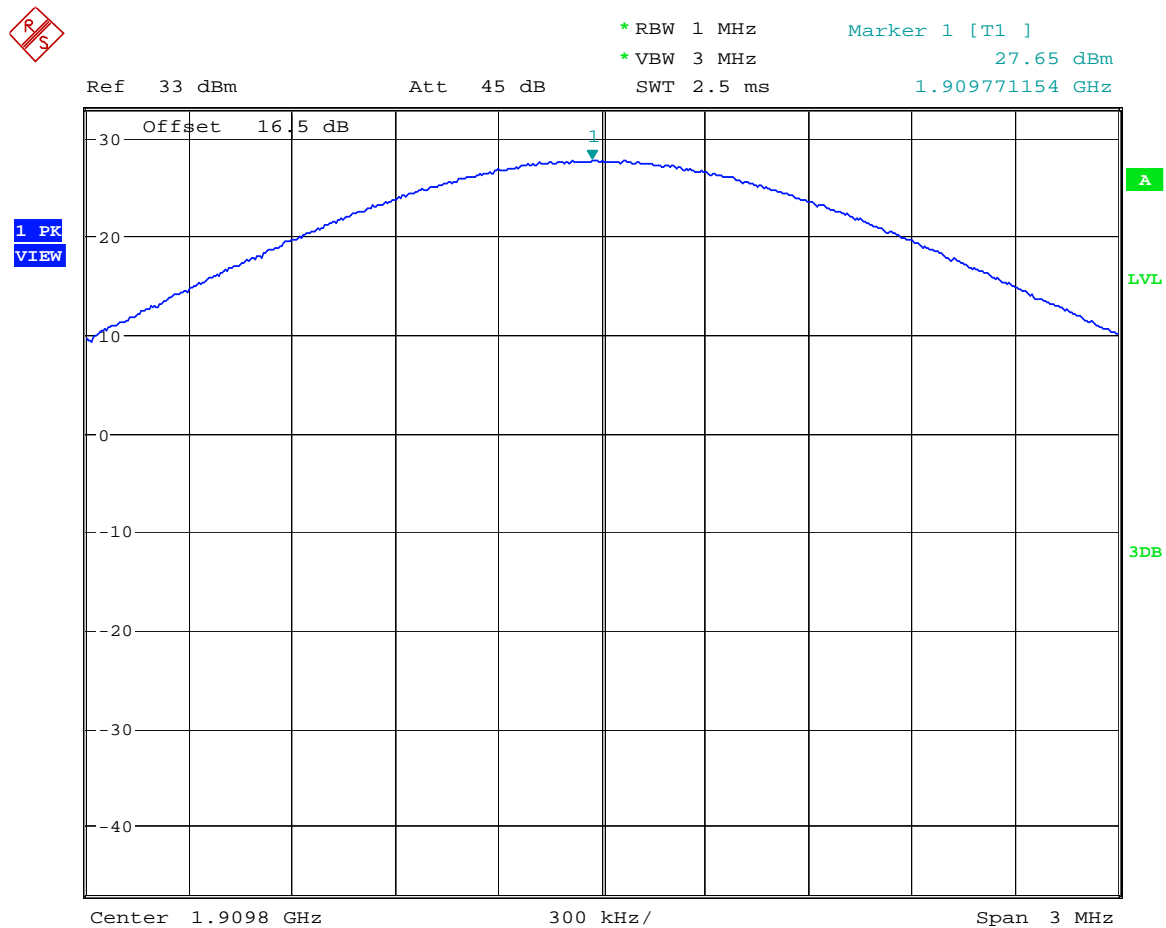
**CONDUCTED PEAK POWER (EGPRS 1900) CHANNEL 512 §24.232(b)**



Date: 8.JUL.2009 15:25:32

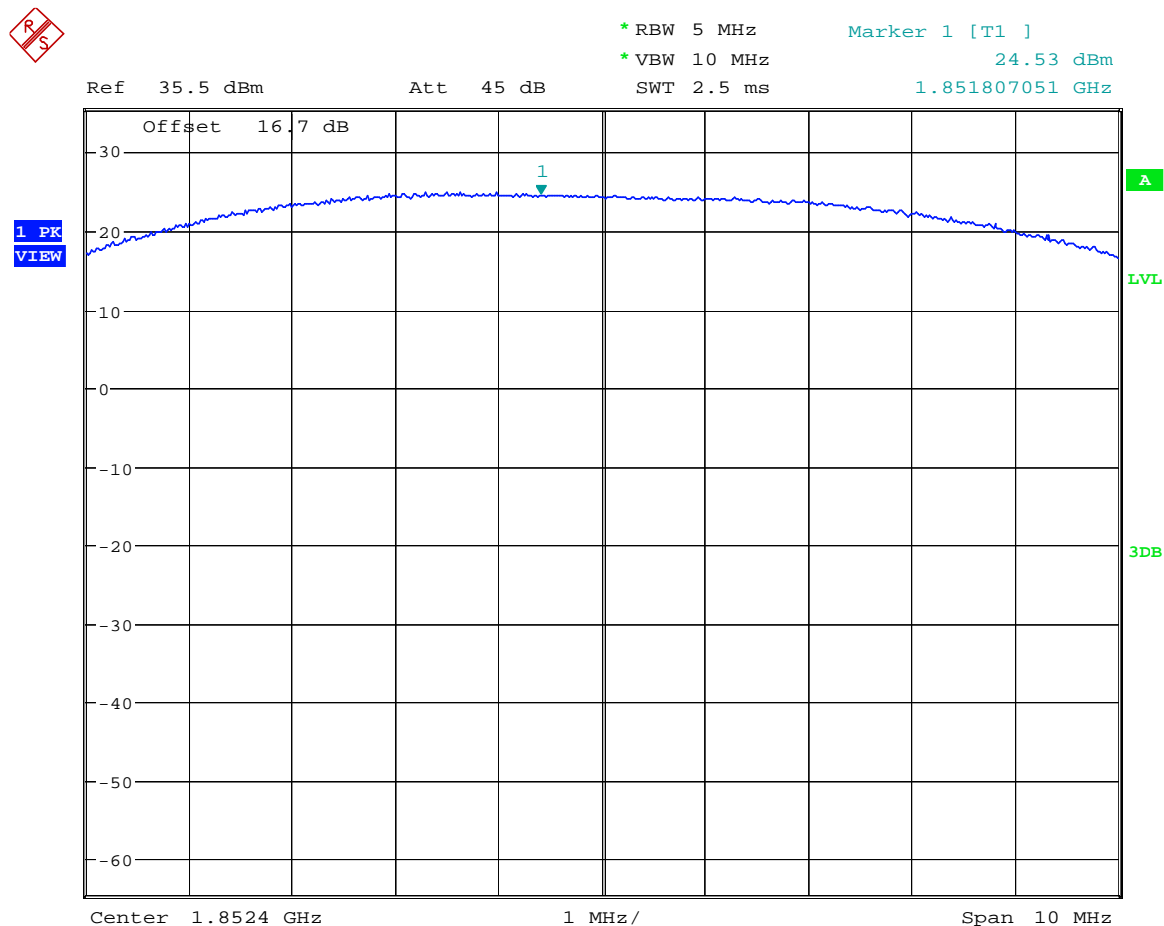
**CONDUCTED PEAK POWER (GPRS 1900) CHANNEL 661 §24.232(b)**

Date: 8.JUL.2009 15:24:26

**CONDUCTED PEAK POWER (GPRS 1900) CHANNEL 810 §24.232(b)**

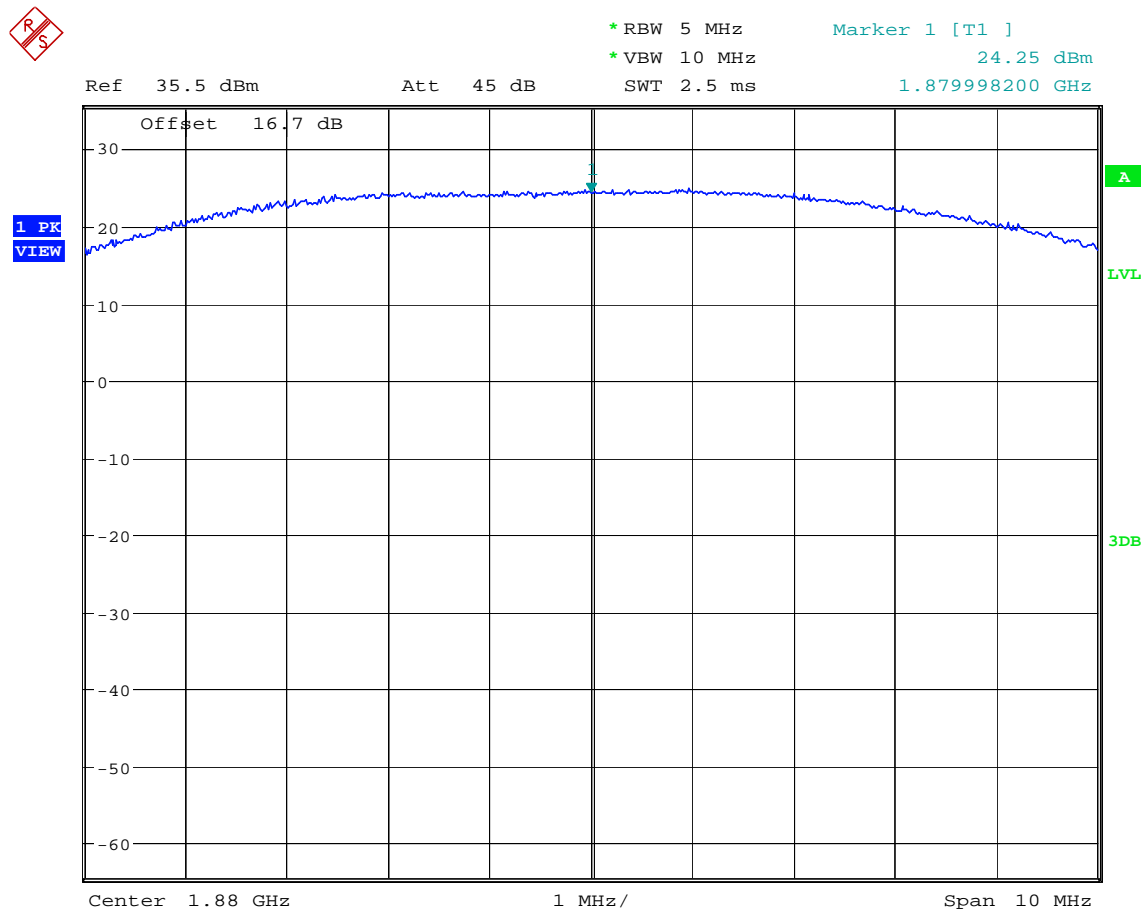
Date: 8.JUL.2009 15:21:16

**CONDUCTED PEAK POWER (UMTS FDD2) CHANNEL 9262 §24.232(b)**

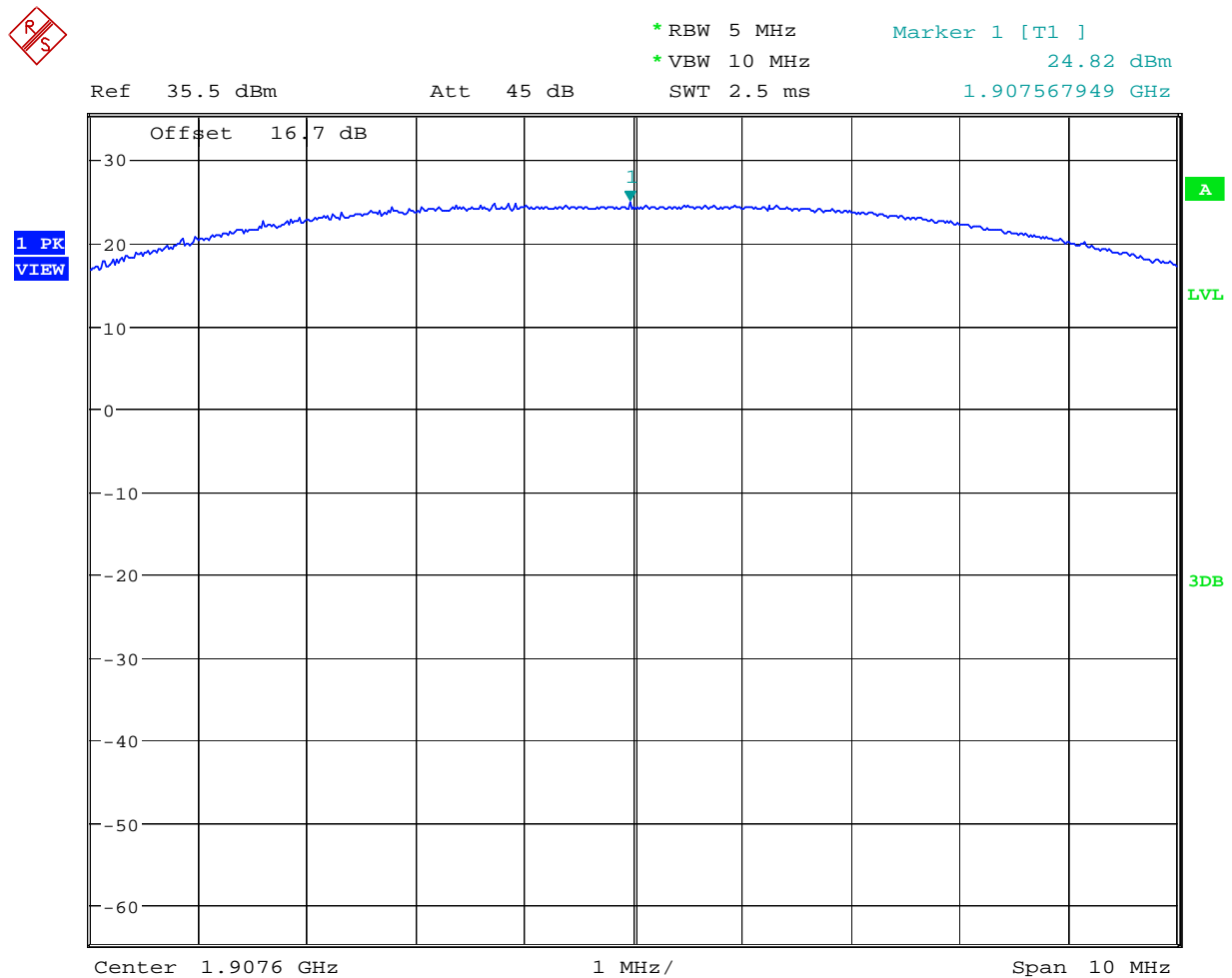


Date: 3.JUL.2009 19:07:41

**CONDUCTED PEAK POWER (UMTS FDD2) CHANNEL 9400 §24.232(b)**



Date: 3.JUL.2009 19:09:22

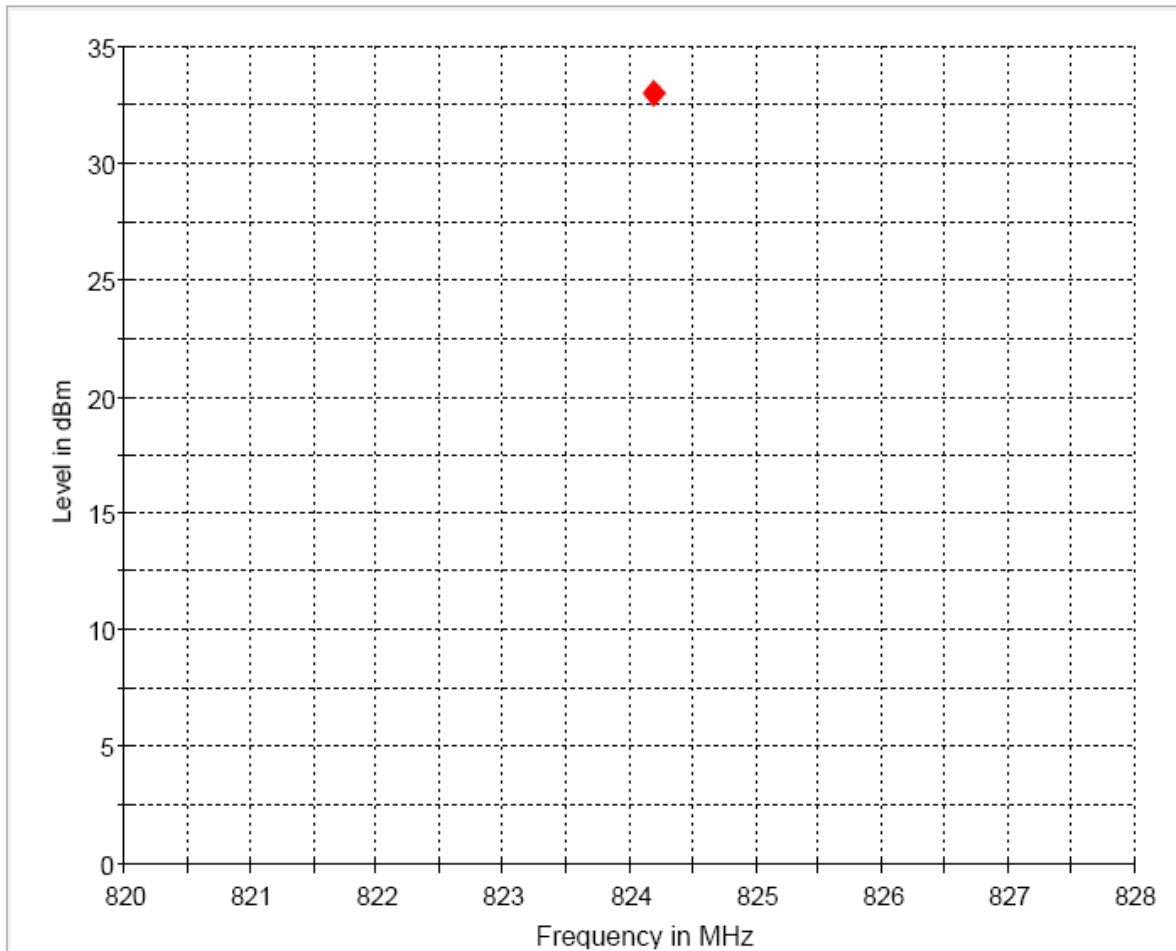
**CONDUCTED PEAK POWER (UMTS FDD2) CHANNEL 9538 §24.232(b)**

Date: 3.JUL.2009 19:10:41

**EIRP (GSM 850) CHANNEL 128 §22.913(a)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
824.200000	33.0	20.000	3000.000	120.0	V	45.0	-73.9	

ERP 850 CH128

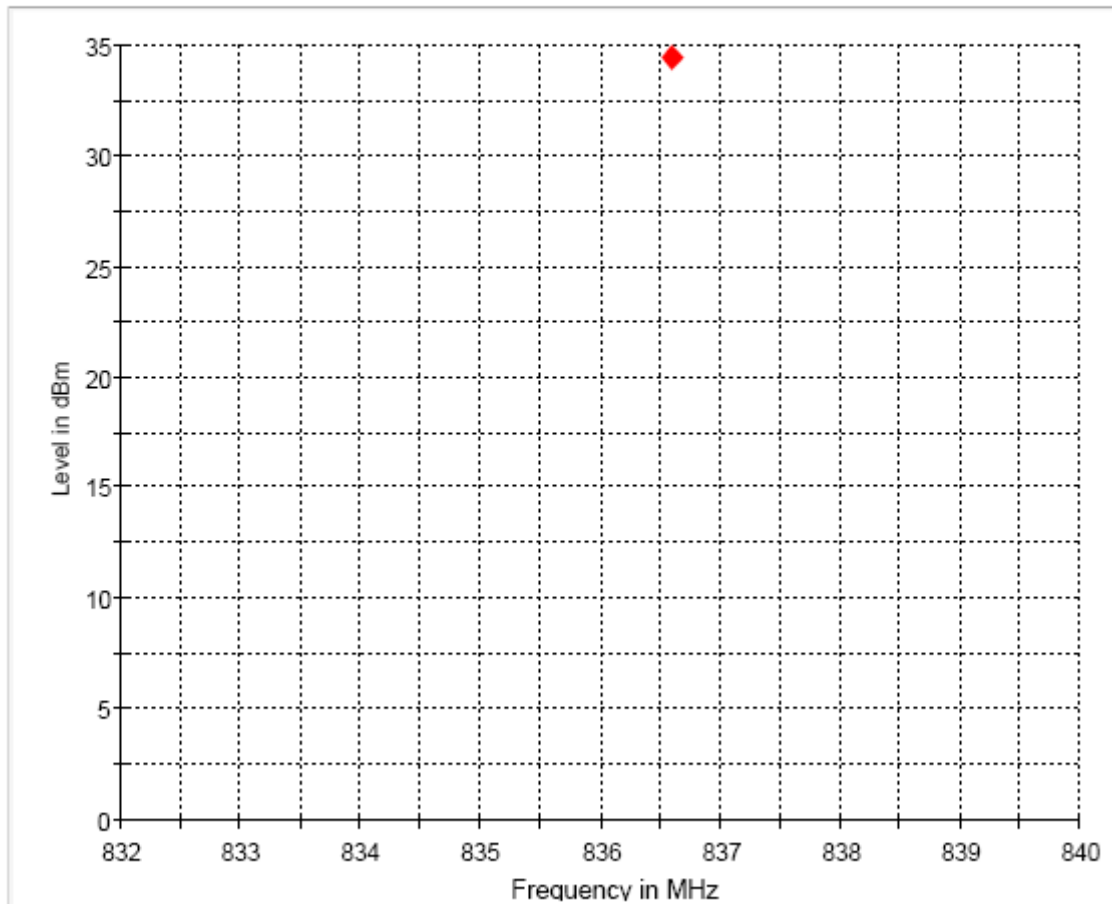


Final Result 1

**EIRP (GSM 850) CHANNEL 190 §22.913(a)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
836.600000	34.5	20.000	3000.000	120.0	V	180.0	-74.0	

ERP 850 CH190



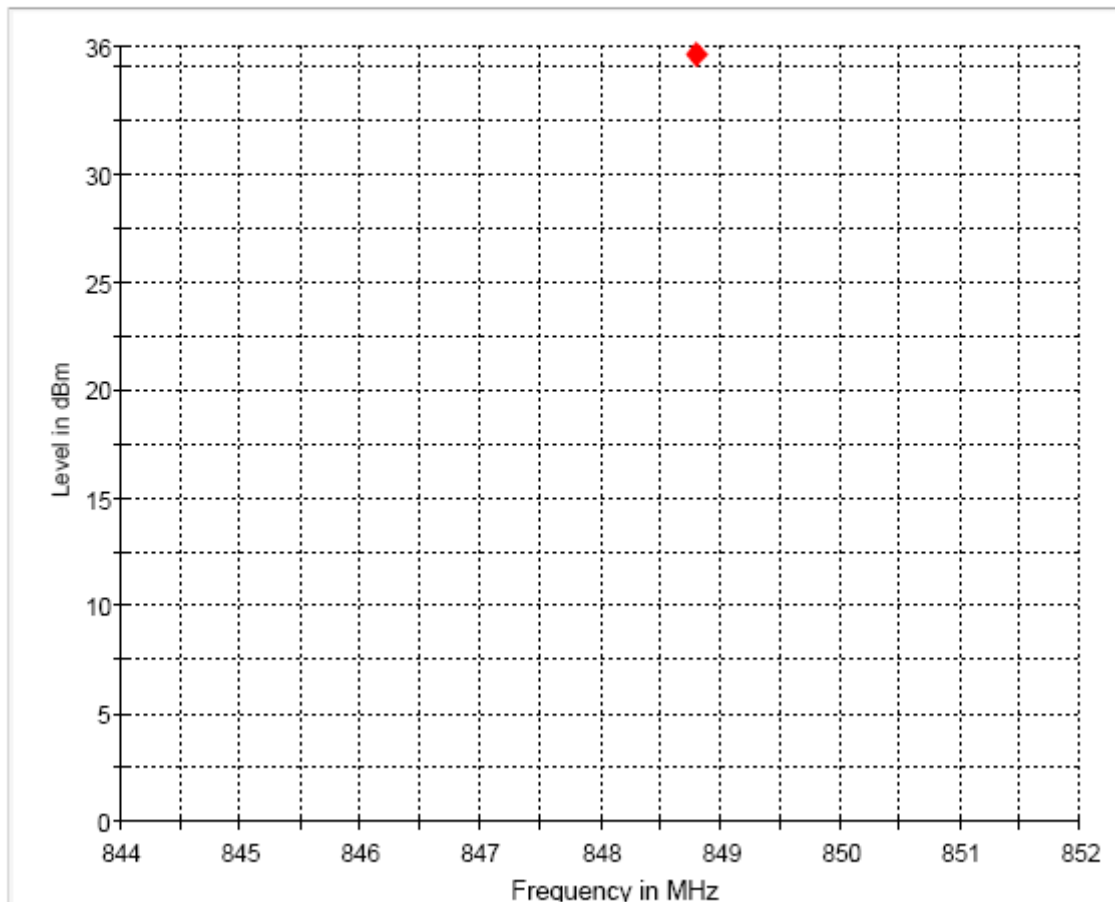
◆ Final Result 1



**EIRP (GSM 850) CHANNEL 251 §22.913(a)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
848.800000	35.6	20.000	3000.000	120.0	V	180.0	-74.1	

ERP 850 CH251

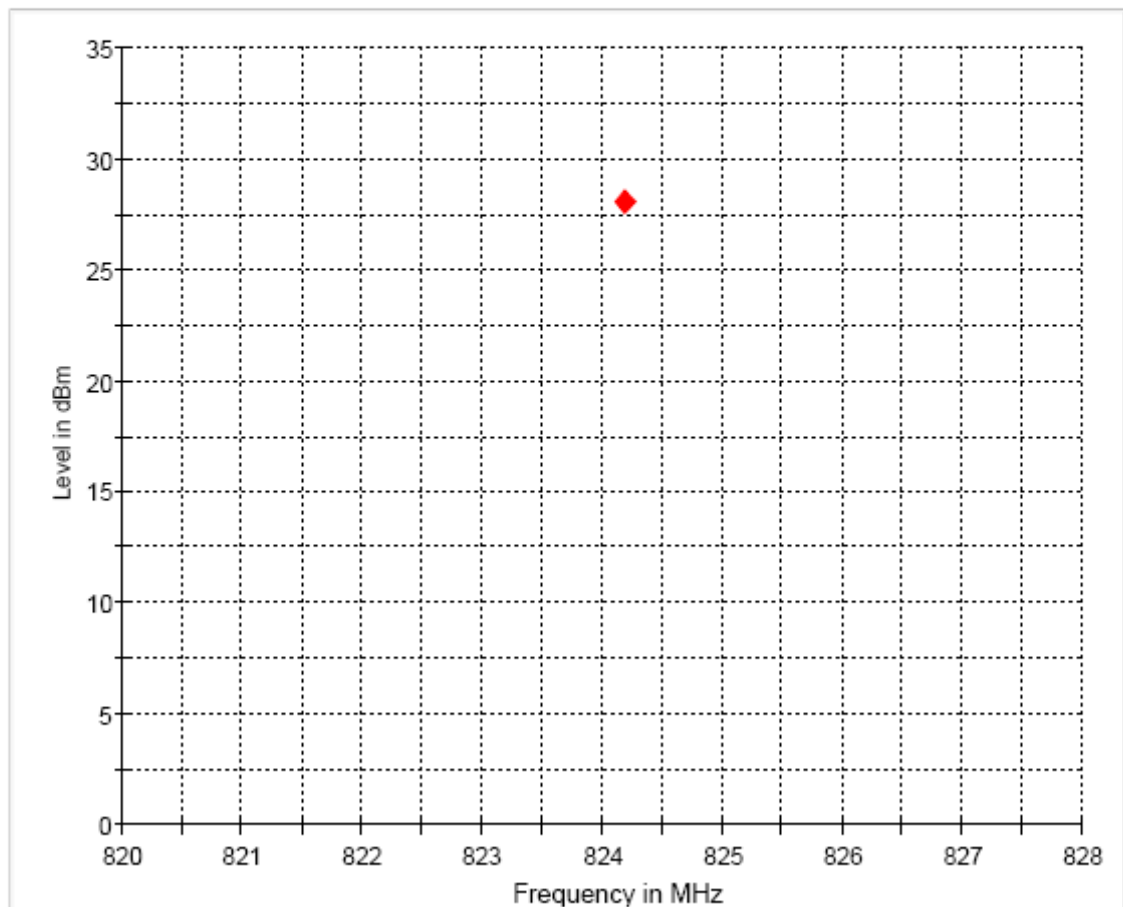


◆ Final Result 1

**EIRP (EGPRS 850) CHANNEL 128 §22.913(a)****EIRP\_1****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
824.200000	28.1	20.000	3000.000	139.0	V	112.0	-73.9	

ERP 850 CH128

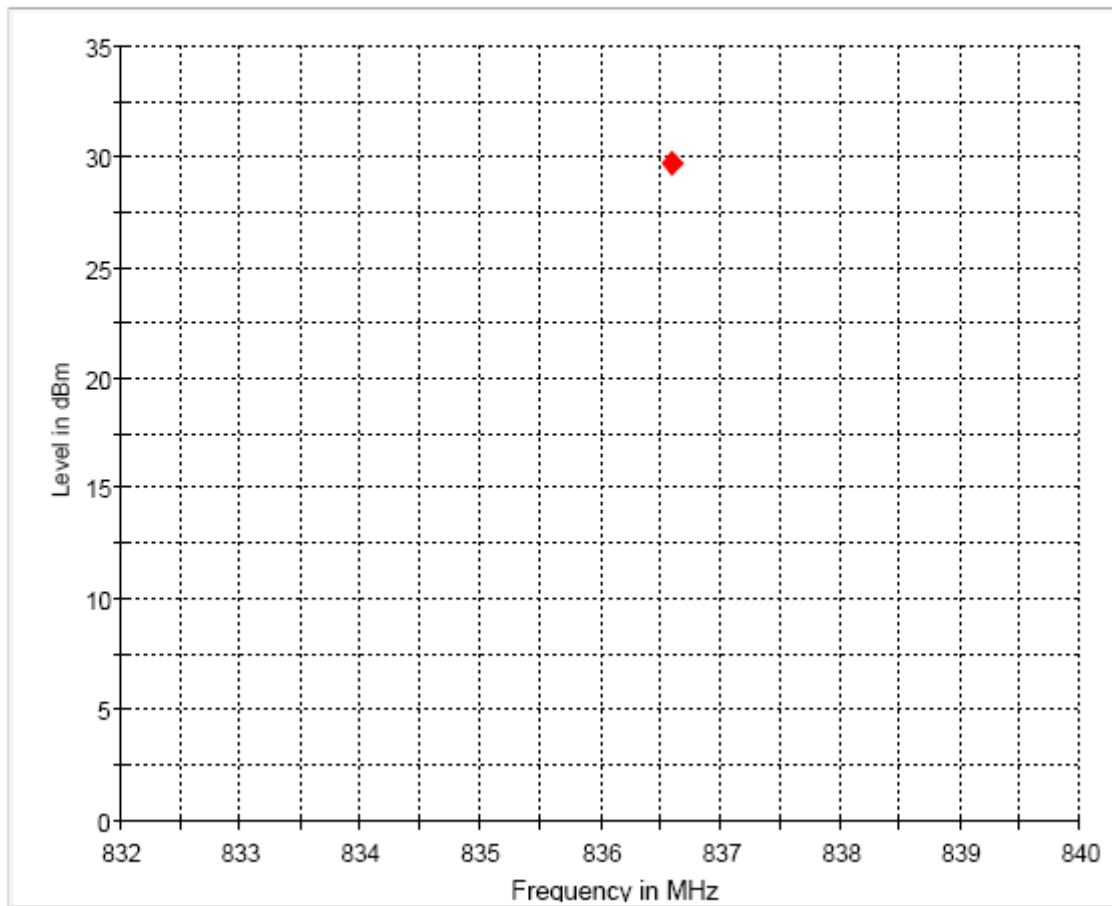


Final Result 1

**EIRP (EGPRS 850) CHANNEL 190 §22.913(a)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
836.600000	29.7	20.000	3000.000	120.0	V	43.0	-74.0	

ERP 850 CH190

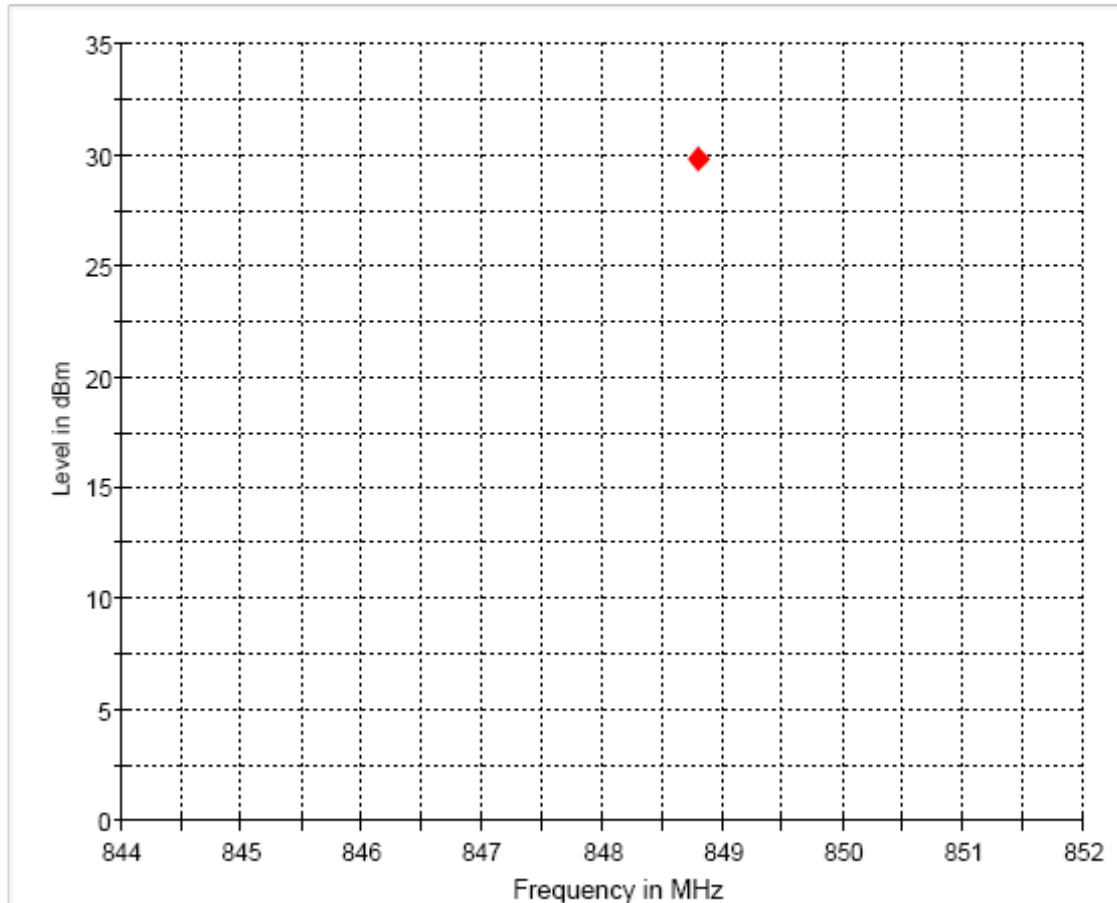


Final Result 1

**EIRP (EGPRS 850) CHANNEL 251 §22.913(a)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
848.800000	29.8	20.000	3000.000	120.0	V	159.0	-74.1	

ERP 850 CH251



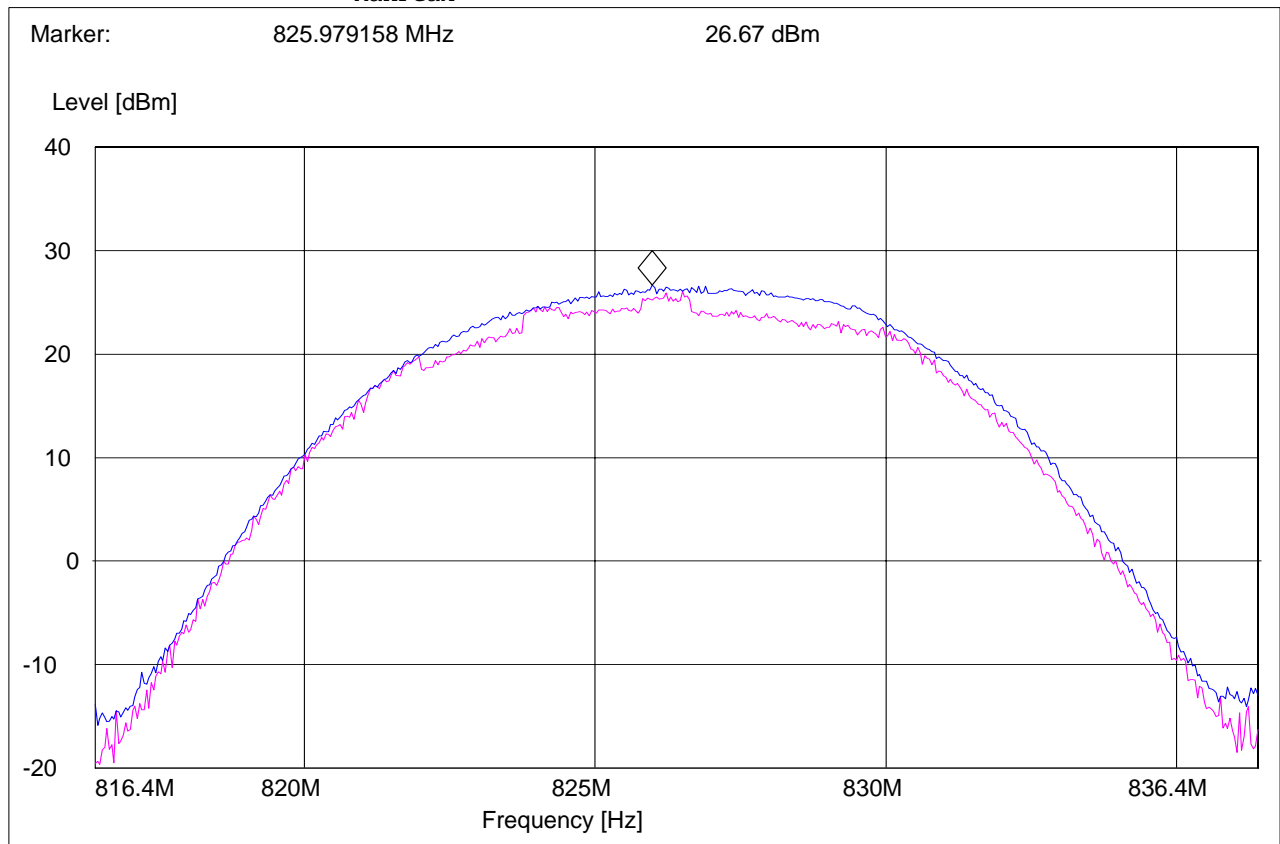
◆ Final Result 1

**EIRP (UMTS FDD5) CHANNEL 4132 §22.913(a)**

EUT: 34KA00a  
Customer: Firebrand  
Test Mode: FDD V CH. 4132  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "EIRP 850 CH 4132V"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
816.4 MHz	836.4 MHz	MaxPeak MaxPeak	Coupled	5 MHz	DUMMY-DBM

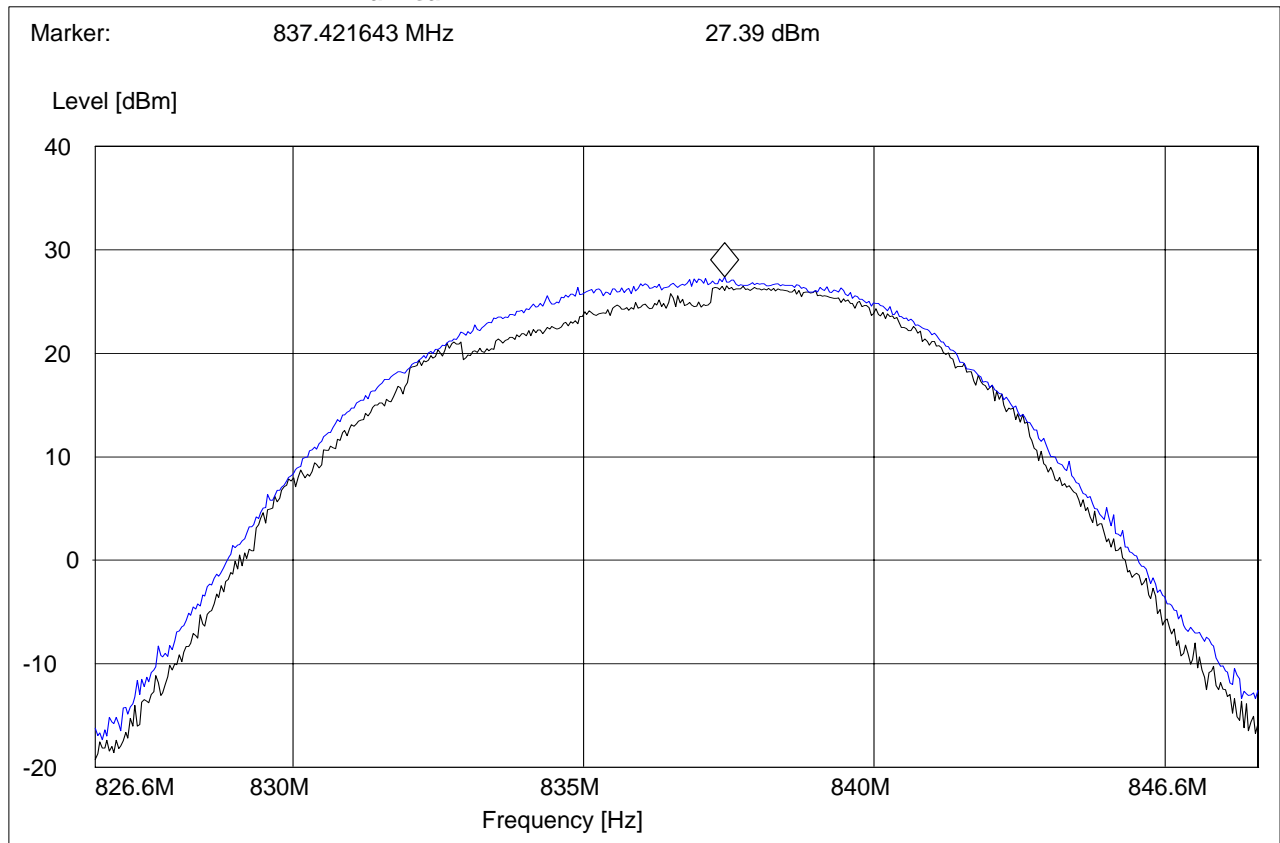


**EIRP (UMTS FDD5) CHANNEL 4183 §22.913(a)**

EUT: 34KA00a  
Customer:: Firebrand  
Test Mode: FDD V CH. 4183  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "EIRP 850 CH 4183 V"***

Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
826.6 MHz	846.6 MHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM
		MaxPeak			

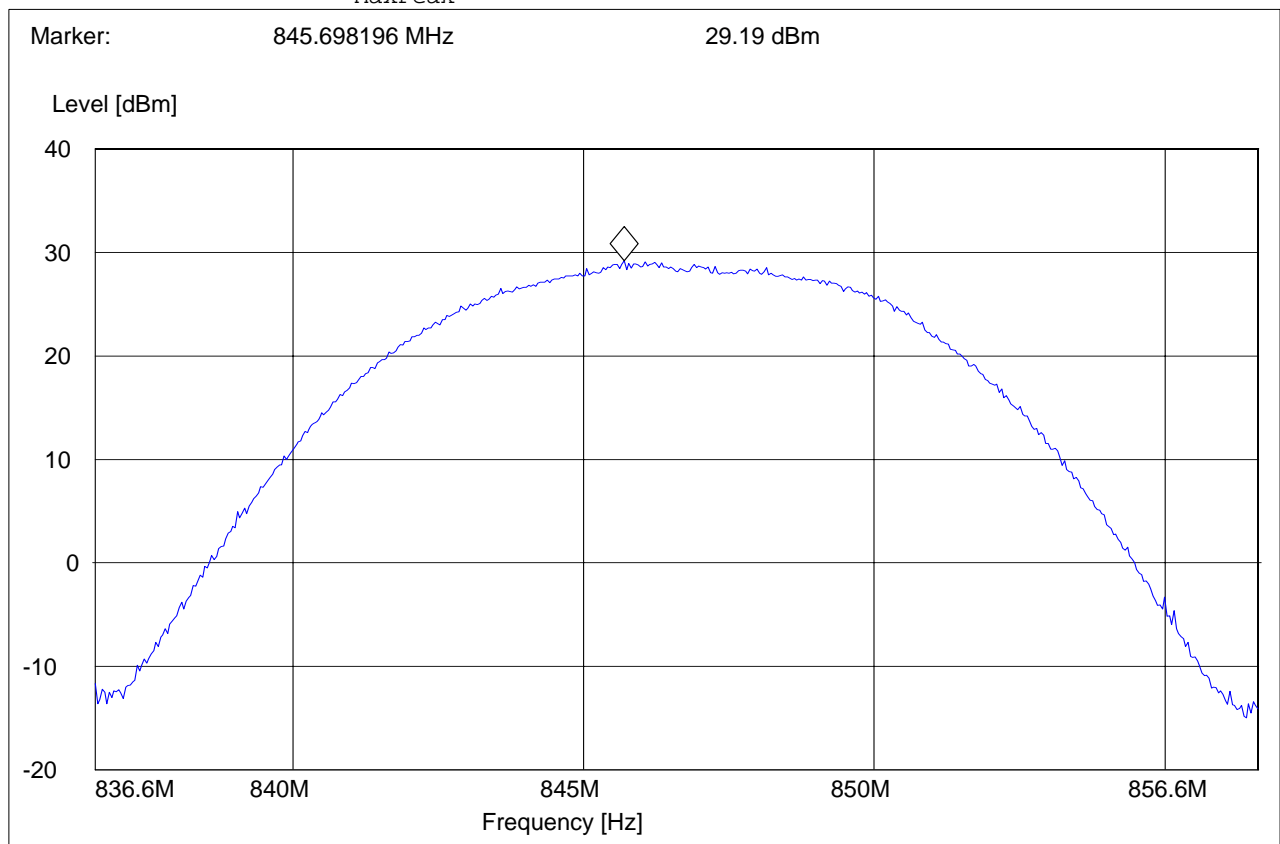


**EIRP (UMTS FDD5) CHANNEL 4233 §22.913(a)**

EUT: 34KA00a  
Customer:: Firebrand  
Test Mode: FDD V CH. 4233  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "EIRP 850 CH 4233 V"***

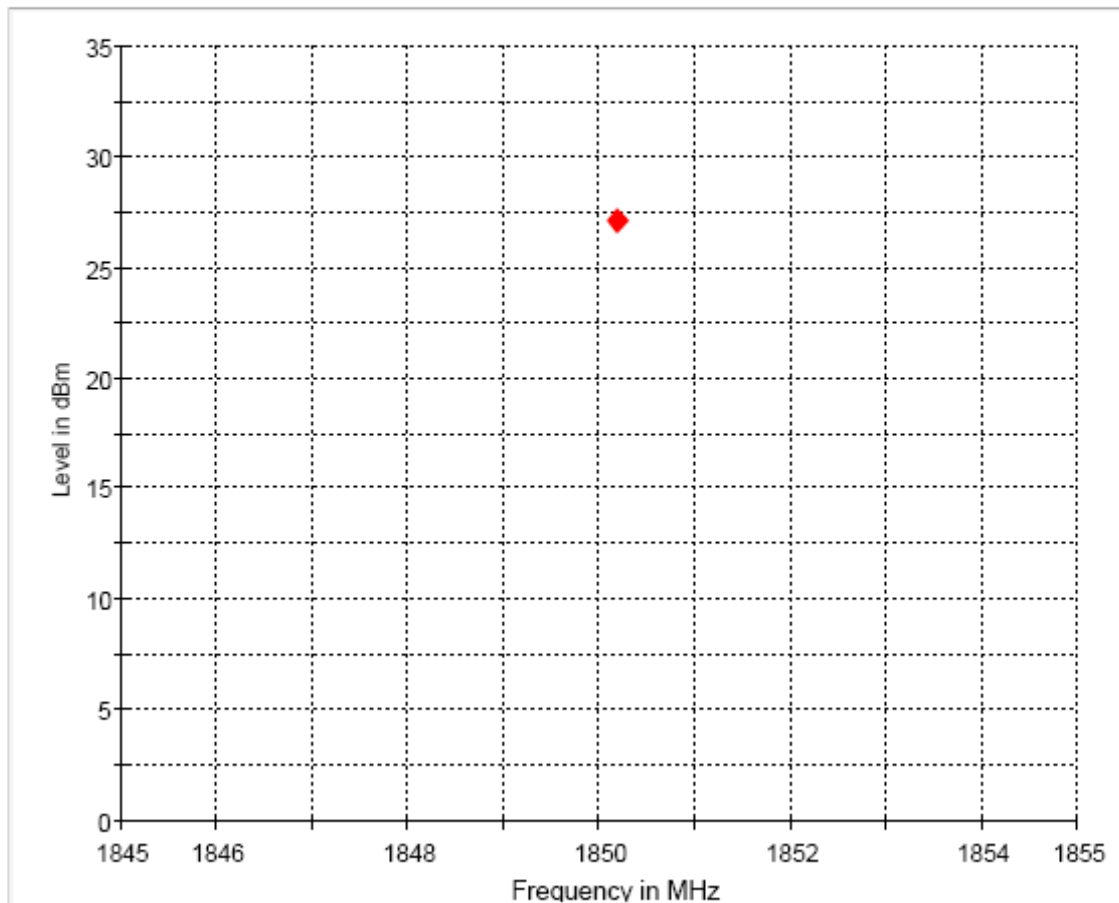
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
836.6 MHz	856.6 MHz	MaxPeak MaxPeak	Coupled	5 MHz	DUMMY-DBM



**EIRP (PCS-1900) CHANNEL 512 §24.232(b)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1850.200000	27.1	20.000	3000.000	120.0	H	154.0	-72.4	

EIRP 1900 CH512



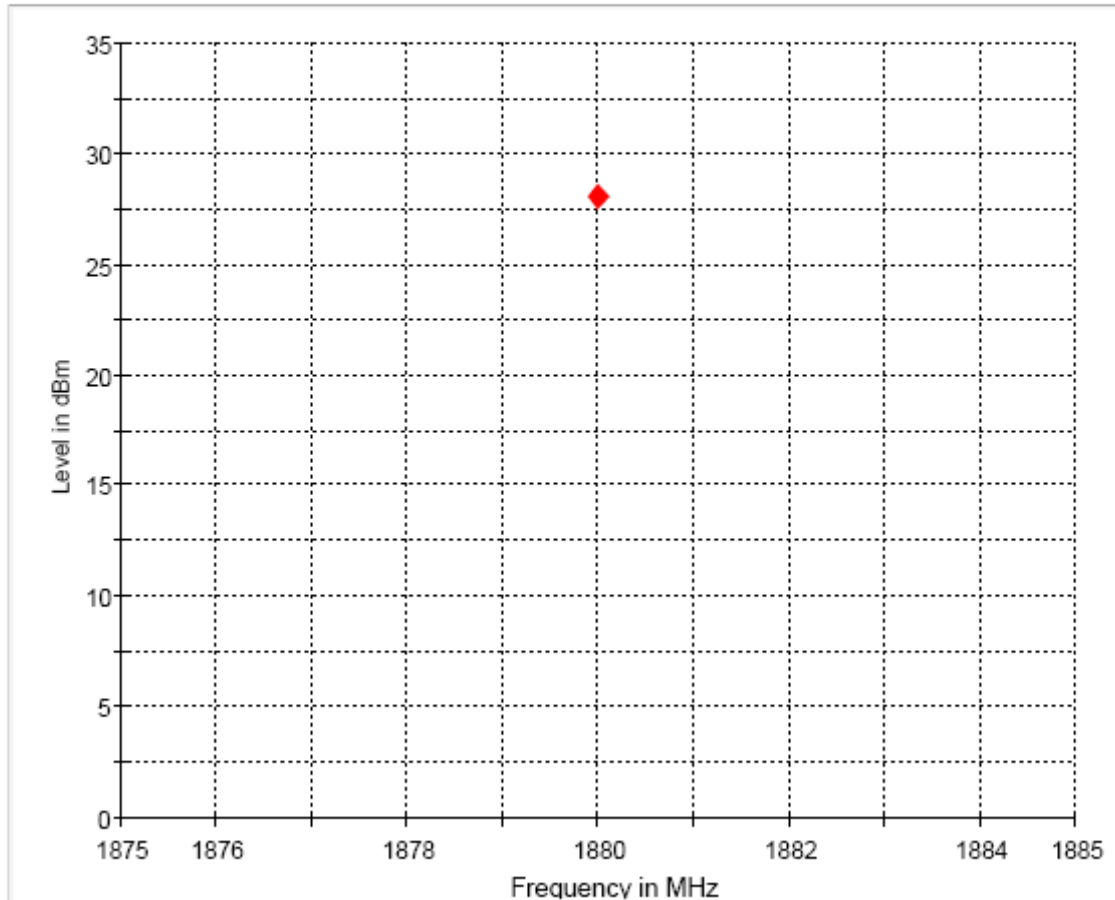
Final Result 1



**EIRP (PCS-1900) CHANNEL 661 §24.232(b)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1880.000000	28.1	20.000	3000.000	120.0	H	168.0	-72.0	

EIRP 1900 CH661



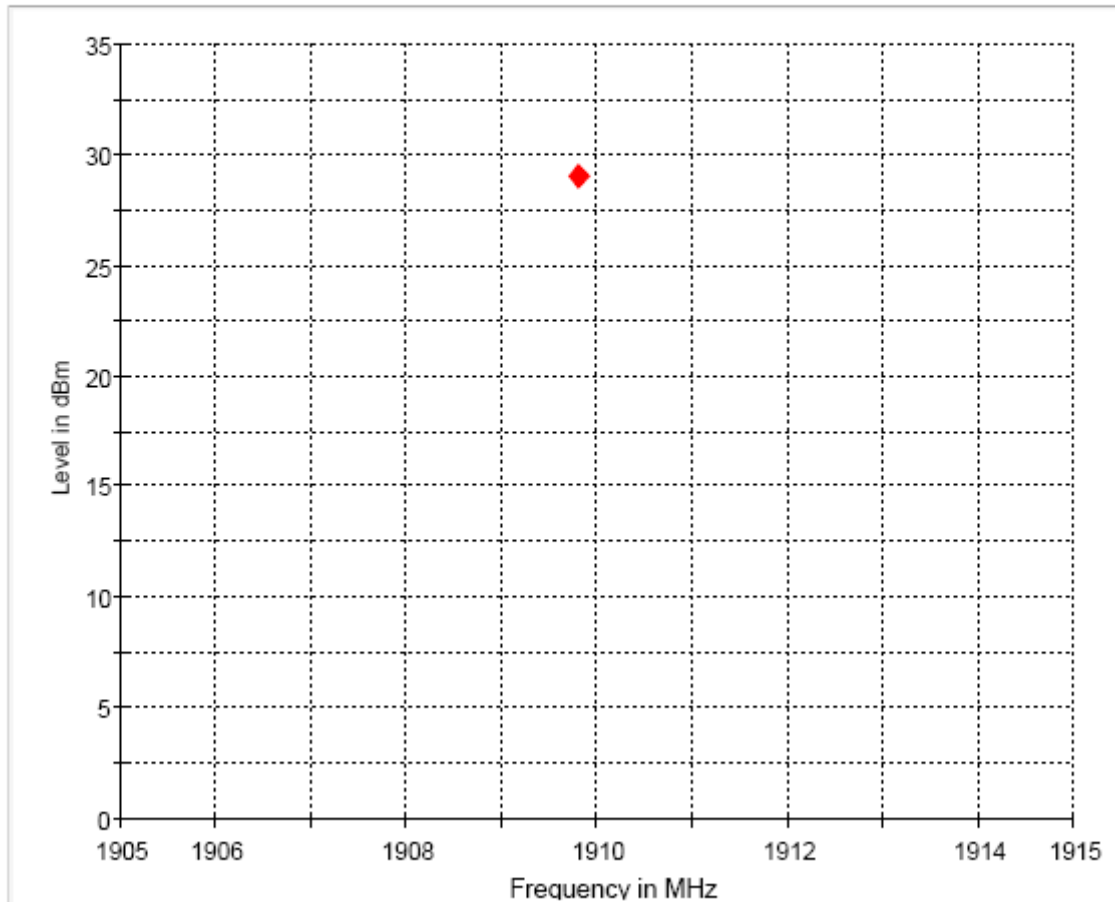
◆ Final Result 1

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

**Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1909.800000	29.0	20.000	3000.000	120.0	H	173.0	-72.0	

EIRP 1900 CH810

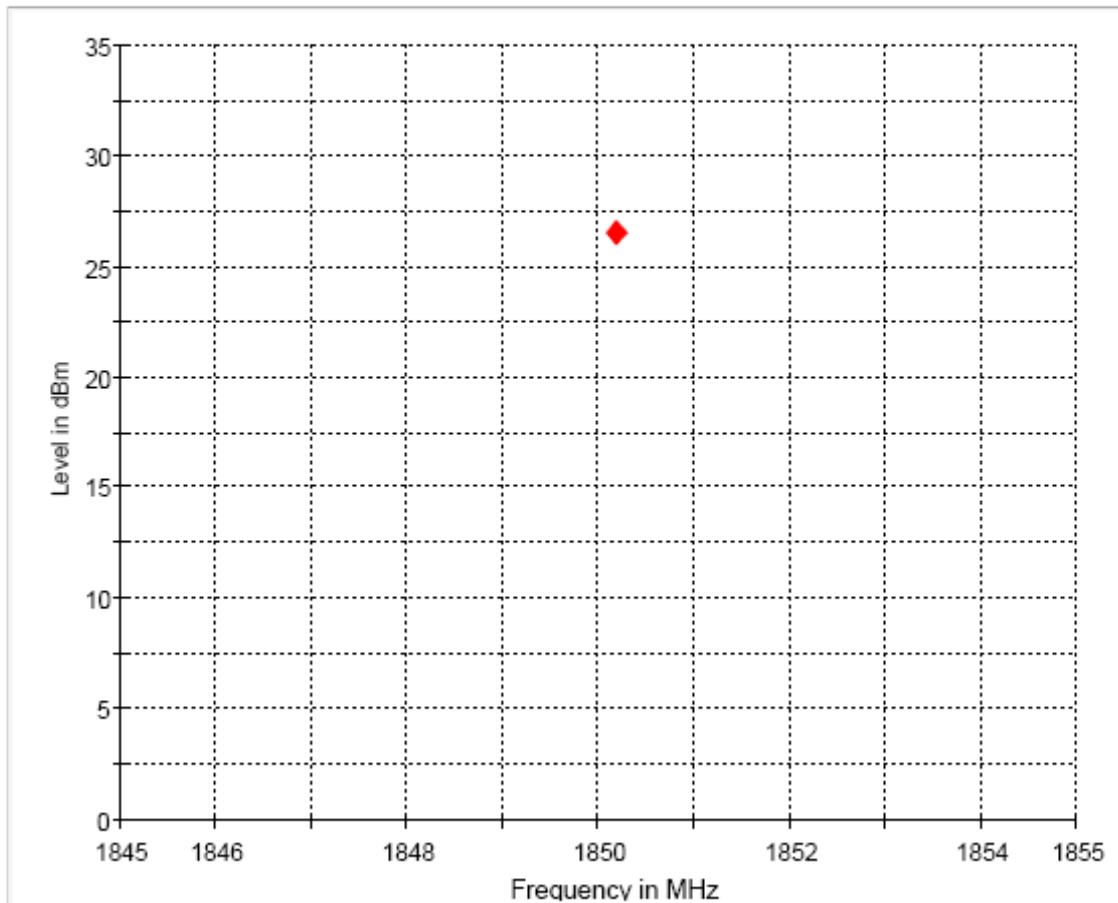


◆ Final Result 1

**EIRP (EGPRS 1900) CHANNEL 512 §24.232(b)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1850.200000	26.5	20.000	3000.000	120.0	H	153.0	-72.4	

EIRP 1900 CH512

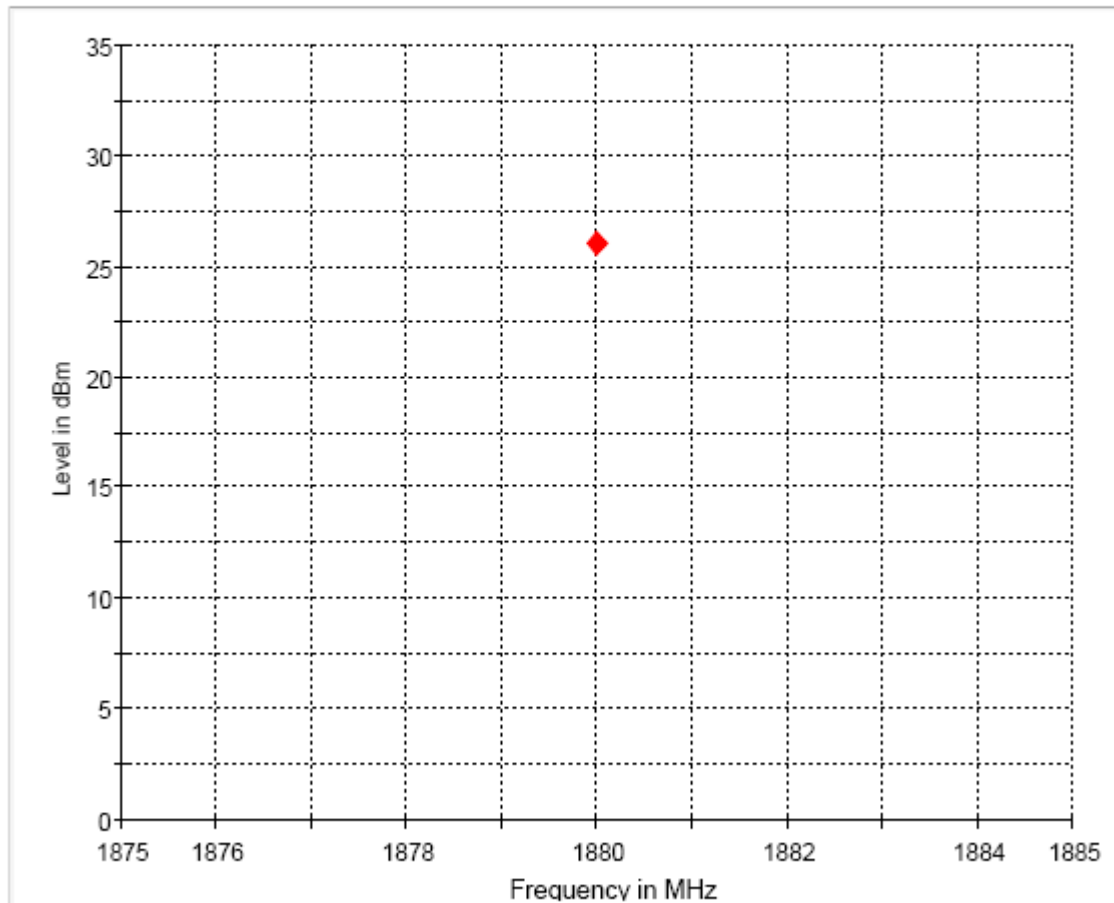


Final Result 1

**EIRP (EGPRS 1900) CHANNEL 661 §24.232(b)****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1880.000000	26.0	20.000	3000.000	141.0	H	151.0	-72.0	

EIRP 1900 CH661



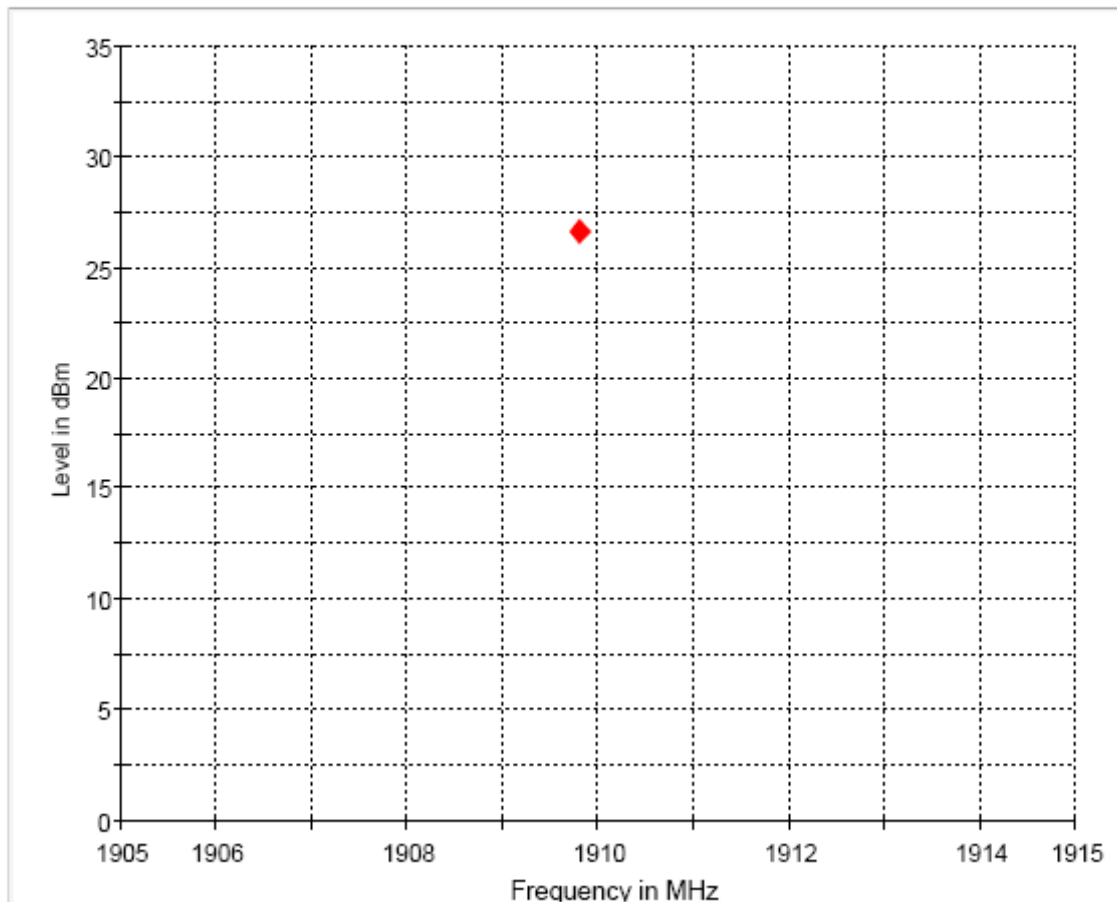
◆ Final Result 1

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

**Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1909.800000	26.6	20.000	3000.000	140.0	H	180.0	-72.0	

EIRP 1900 CH810



◆ Final Result 1

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

EUT: 34KA00a

Customer:: Firebrand

Test Mode: FDD II CH. 9262

ANT Orientation: V

EUT Orientation: V

Test Engineer: Chris

Voltage: Internal Battery

Comments:

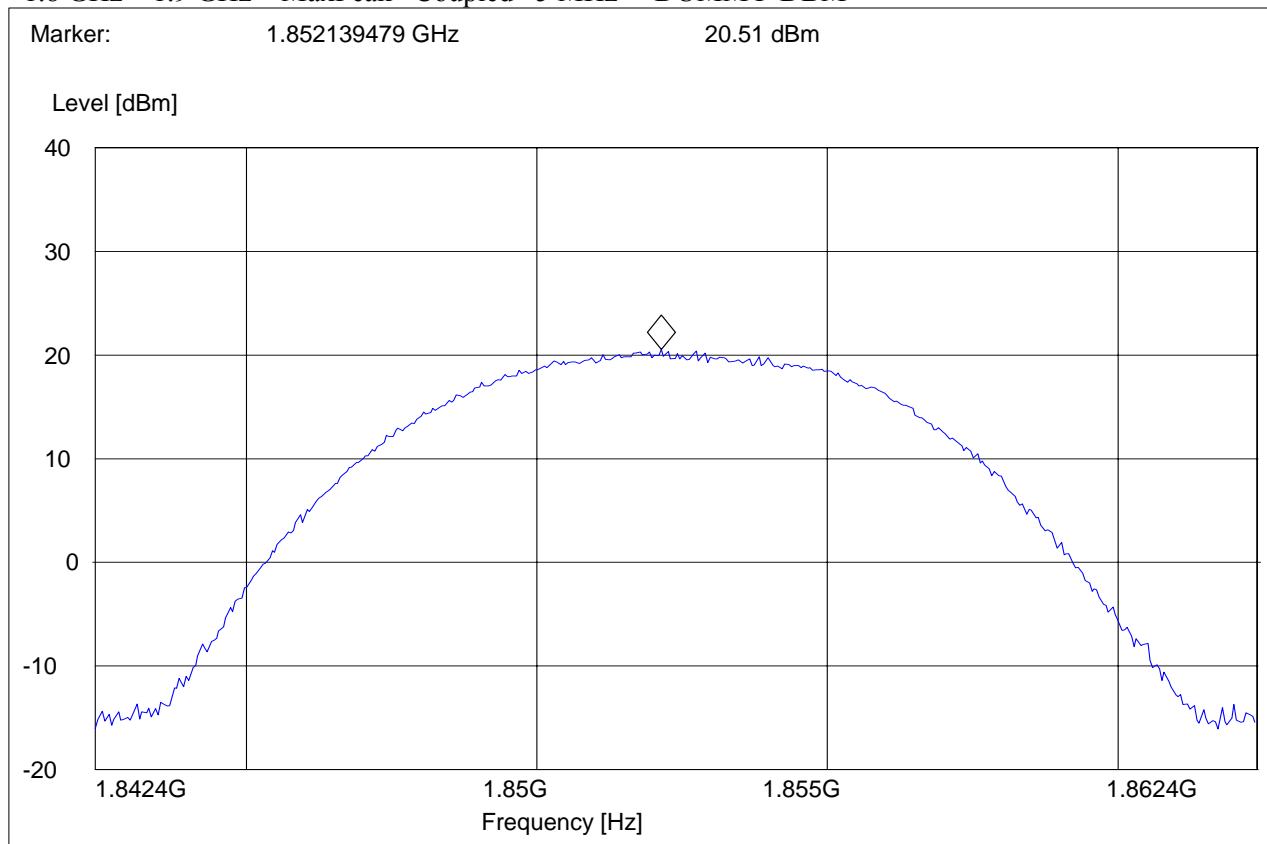
***SWEEP TABLE: "EIRP 1900 CH 9262"***

Short Description: EIRP PCS 1900 for channel-512

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.8 GHz 1.9 GHz MaxPeak Coupled 5 MHz DUMMY-DBM

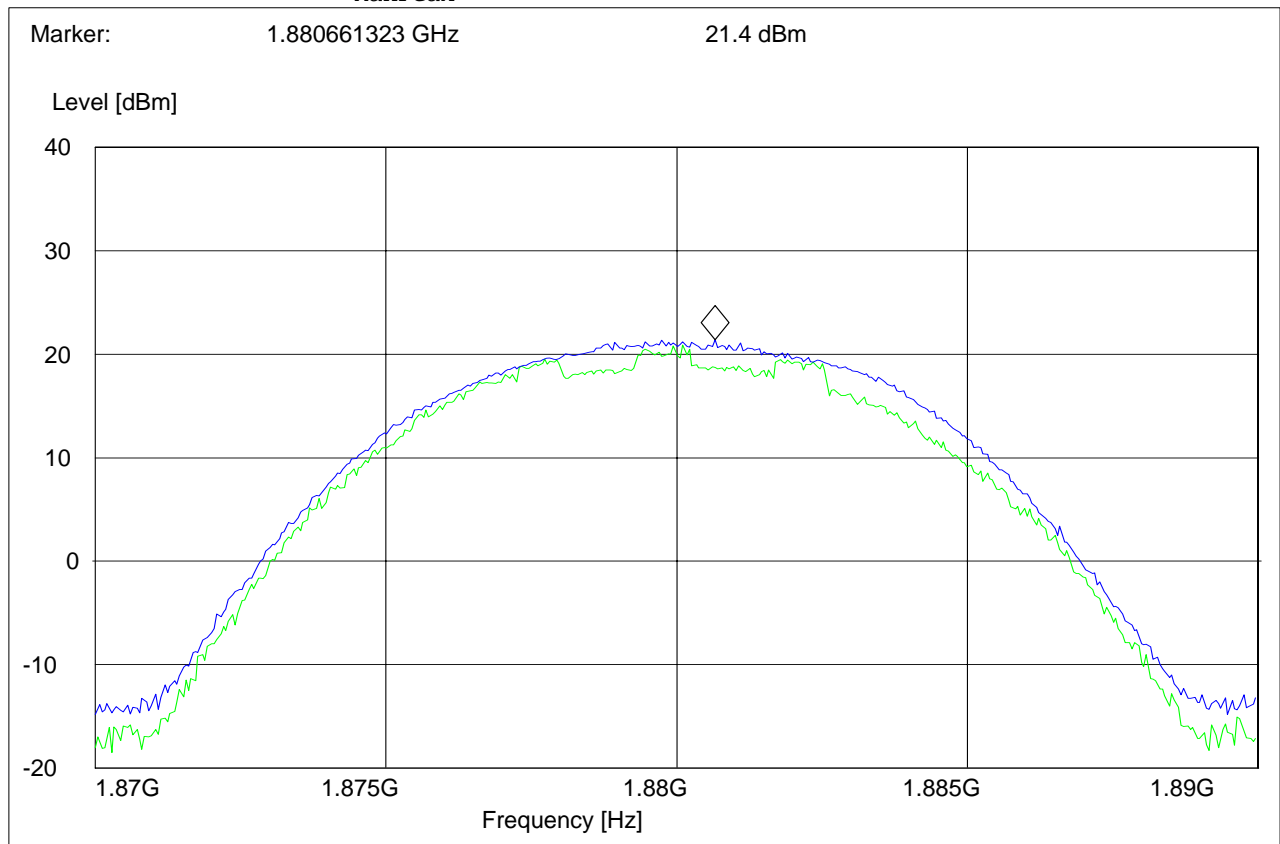


**EIRP (UMTS FDD2) CHANNEL 9400 §24.232(b)**

EUT: 34KA00a  
Customer:: Firebrand  
Test Mode: FDD II CH. 9400  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "EIRP 1900 CH 9400"***

Short Description:		EIRP PCS 1900 for channel-661			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM
		MaxPeak			



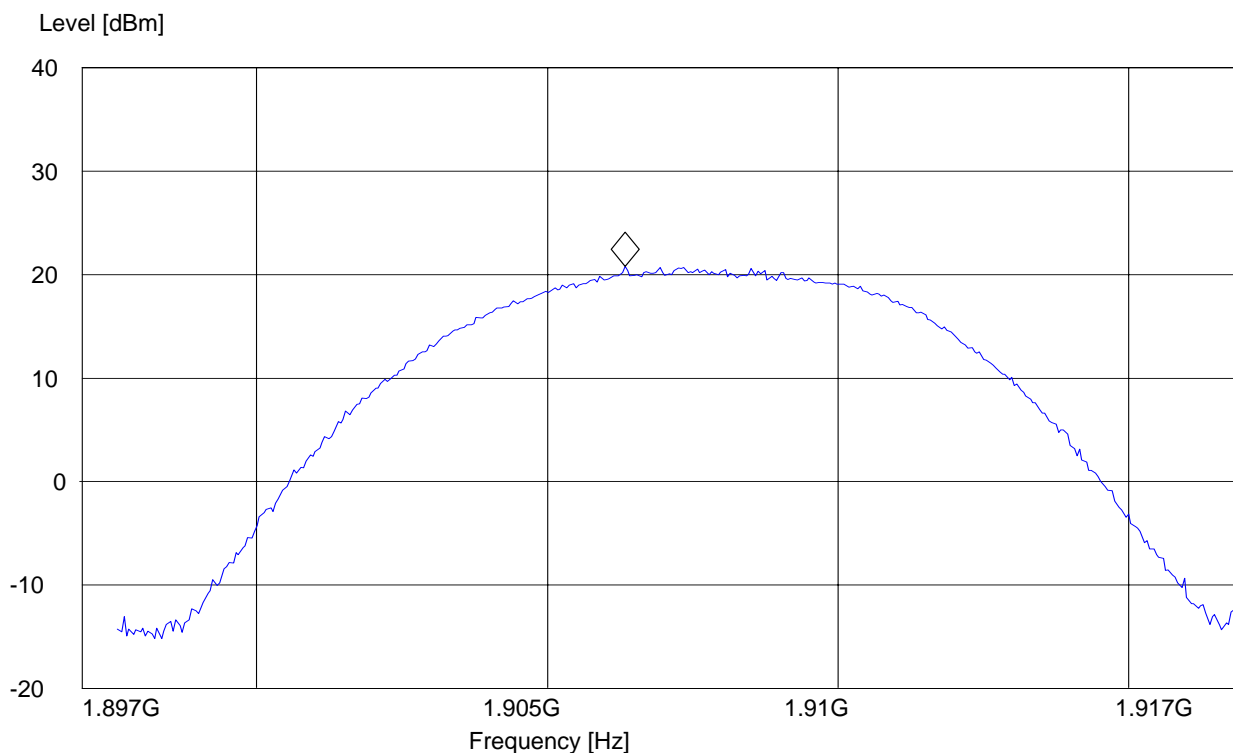
**EIRP (UMTS FDD2) CHANNEL 9538 §24.232(b)**

EUT: 34KA00a  
Customer:: Firebrand  
Test Mode: FDD II CH. 9538  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "EIRP 1900 CH 9538"***

Short Description:		EIRP PCS 1900 for channel-810			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

Marker: 1.906337475 GHz 20.77 dBm





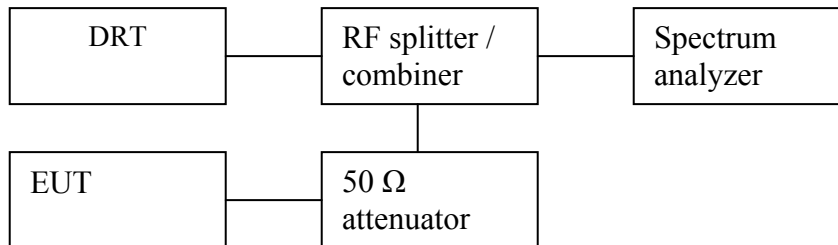
## 5.2 Occupied Bandwidth/Emission Bandwidth

### 5.2.1 FCC 2.1049 Measurements required: Occupied bandwidth

The occupied bandwidth, that is the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable.

(h) Transmitters employing digital modulation techniques-when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated.

### 5.2.2 Occupied / emission bandwidth measurement procedure:



1. Connect the equipment as shown in the above diagram.
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 the 99% (-20 dB) occupied bandwidth. Record the value.
4. Set the spectrum analyzer to measure the 99.5% (-26 dB) emission bandwidth. Record the value.
5. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

**5.2.3 Occupied bandwidth results 850 MHz band.**

Frequency (MHz)	Occupied Bandwidth (kHz)	
	GSM	EGPRS
824.2	240.385	240.385
836.6	240.385	240.385
848.8	245.192	240.385

Frequency (MHz)	Occupied Bandwidth (MHz)
	UMTS FDD5
836.4	4.167
836.6	4.183
846.6	4.183

**5.2.4 Occupied bandwidth results 1900 MHz band:**

Frequency (MHz)	Occupied Bandwidth (kHz)	
	GSM	EGPRS
1850.2	240.385	240.385
1880.0	245.192	235.577
1909.8	240.385	240.385

Frequency (MHz)	Occupied Bandwidth (MHz)
	UMTS FDD2
1852.4	4.167
1880	4.151
1907.6	4.183

**5.2.5 Emission bandwidth results 850 MHz band.**

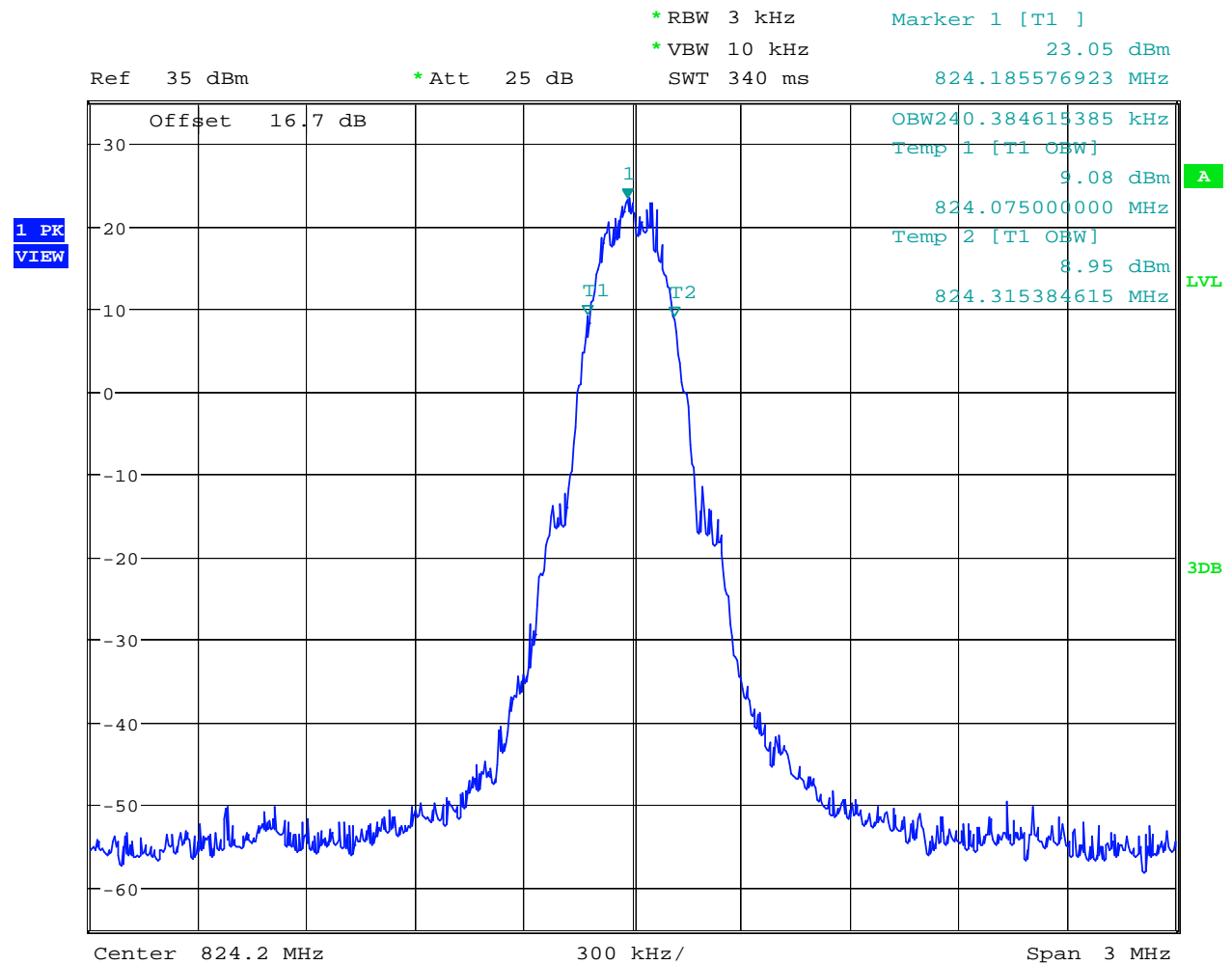
Frequency (MHz)	Emission Bandwidth (kHz)	
	GSM	EGPRS
824.2	317.308	302.865
836.6	312.5	307.692
848.8	317.308	312.5

Frequency (MHz)	Emission Bandwidth (MHz)
	UMTS FDD5
836.4	4.776
836.6	4.76
846.6	4.76

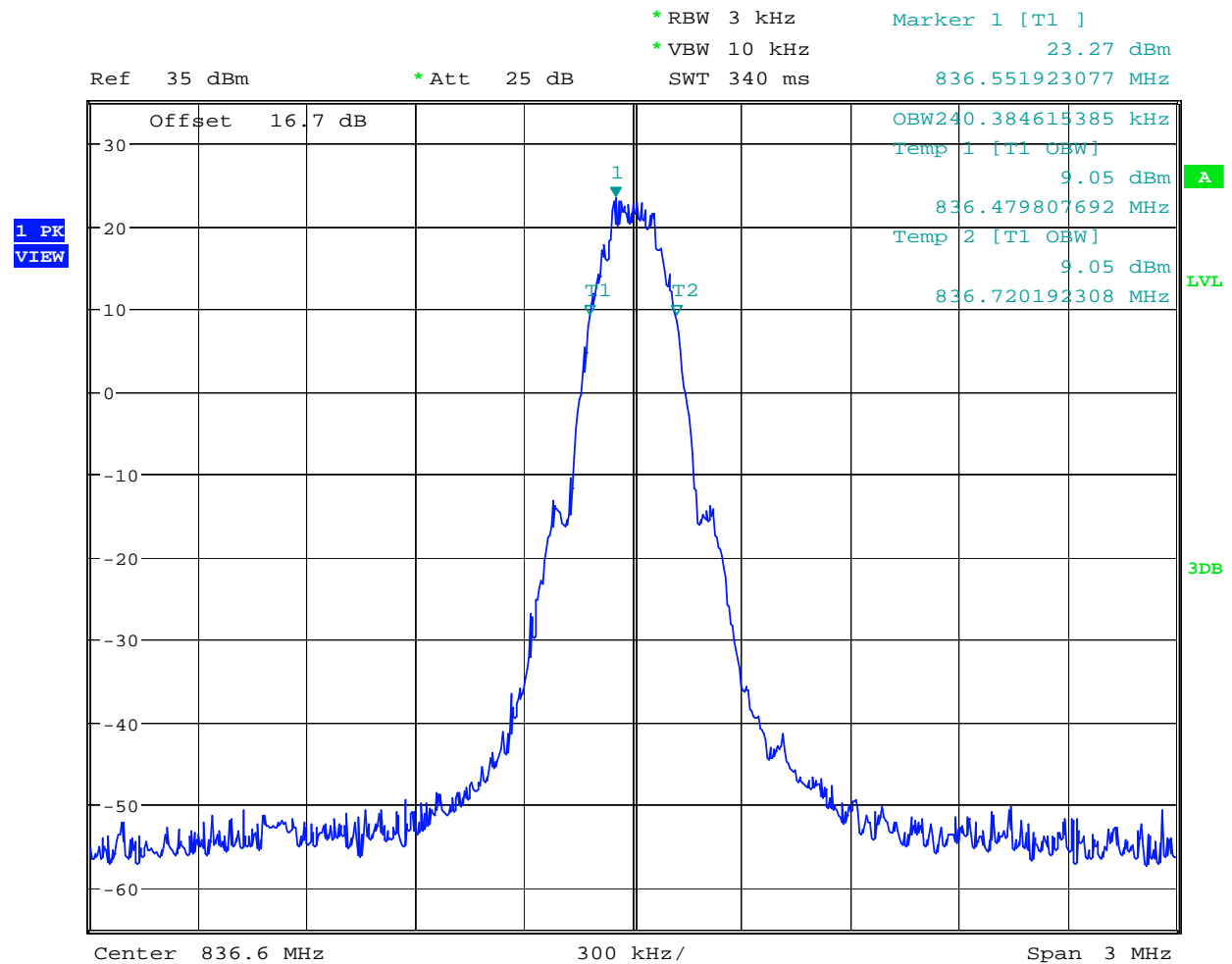
**5.2.6 Emission bandwidth results 1900 MHz band:**

Frequency (MHz)	Emission Bandwidth (kHz)	
	GSM	EGPRS
1850.2	307.692	312.5
1880.0	307.692	302.885
1909.8	307.692	302.885

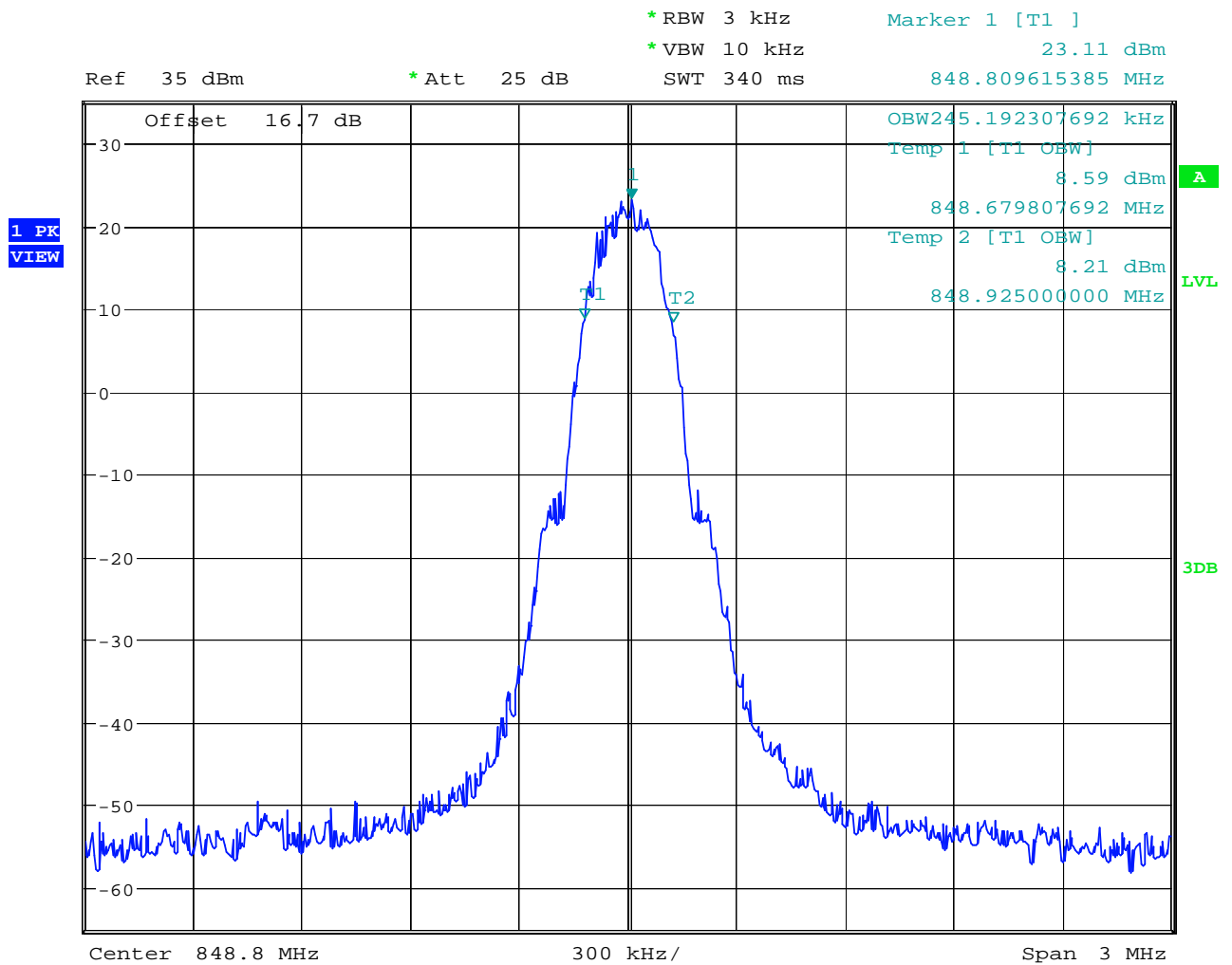
Frequency (MHz)	Emission Bandwidth (MHz)
	UMTS FDD2
1852.4	4.792
1880	4.76
1907.6	4.76

**Occupied band Width GSM850 MHz Channel 128 GSM**

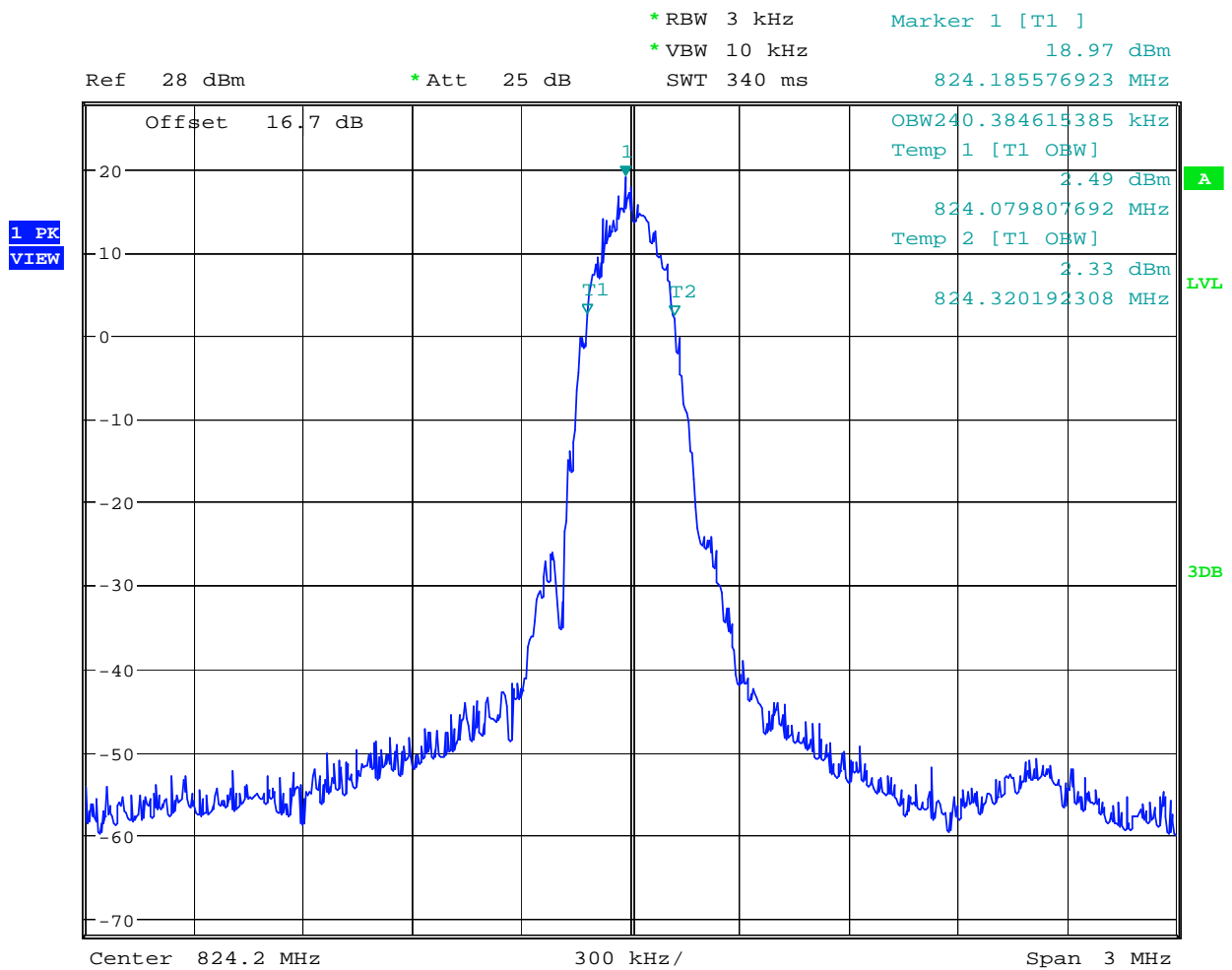
Date: 23.JUL.2009 19:42:40

**Occupied band Width GSM850 MHz Channel 190 GSM**

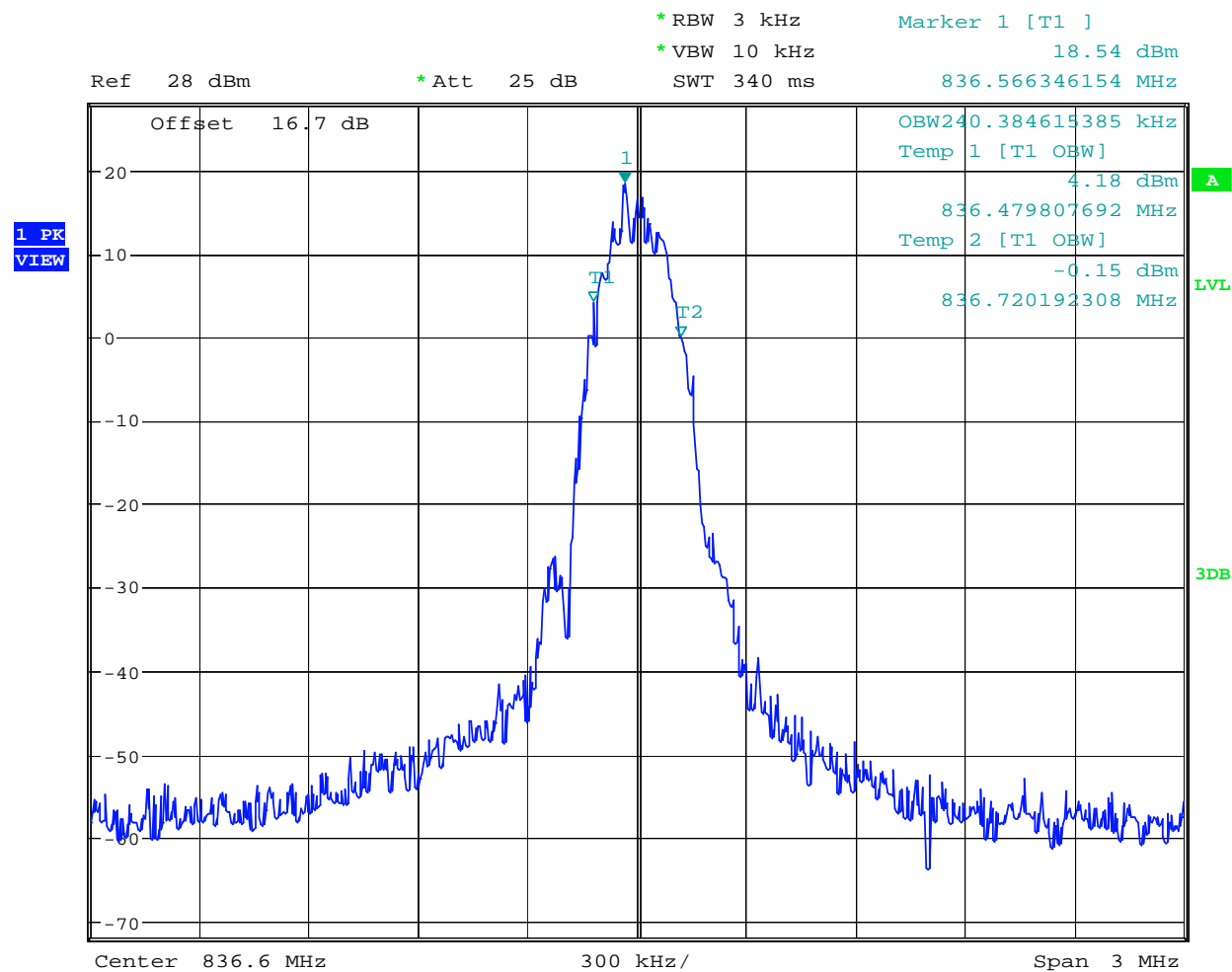
Date: 23.JUL.2009 19:44:25

**Occupied band Width GSM850 MHz Channel 251 GSM**

Date: 23.JUL.2009 19:45:58

**Occupied band Width GSM850 MHz Channel 128 EGPRS**

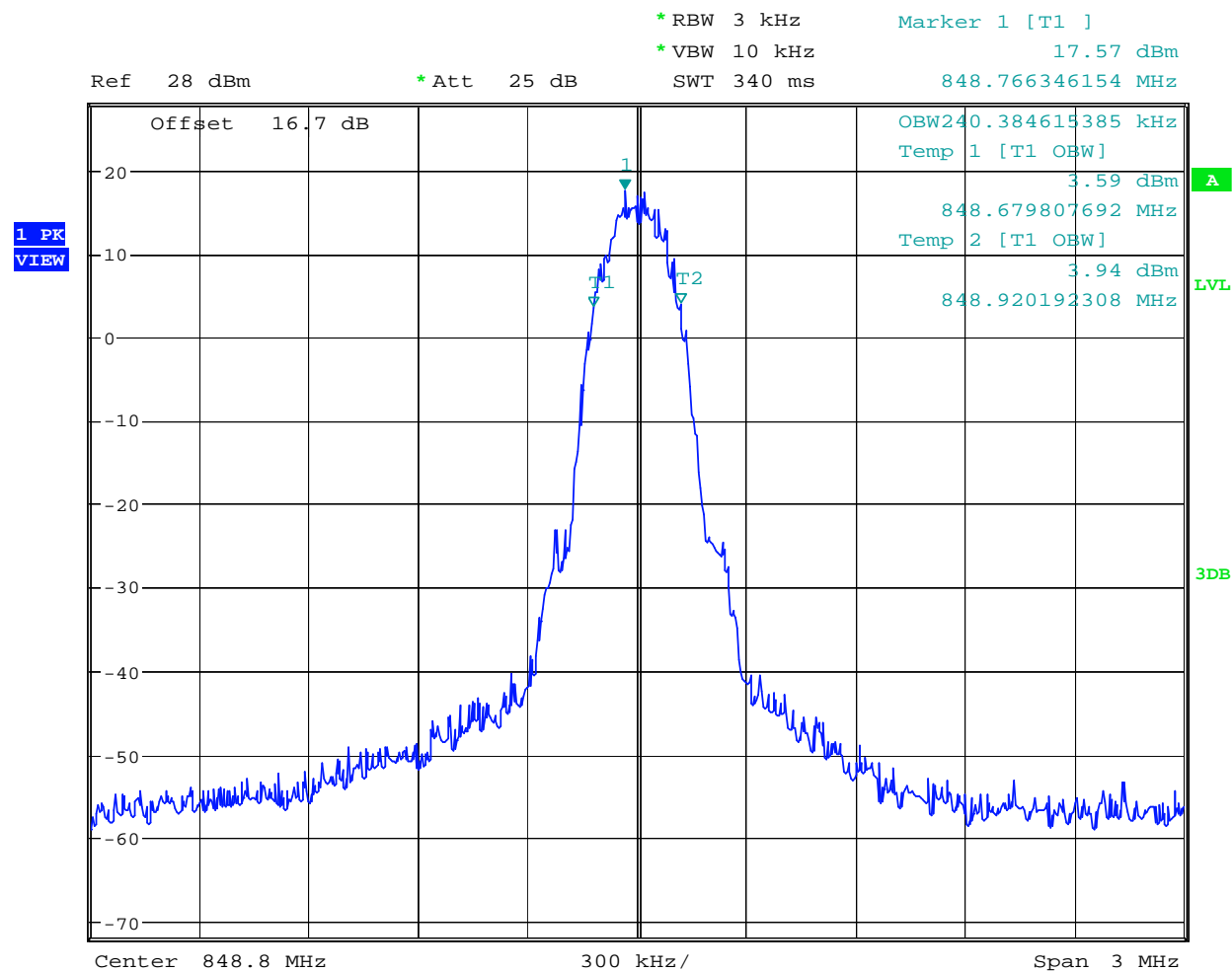
Date: 24.JUL.2009 10:34:36

**Occupied band Width GSM850 MHz Channel 190 EGPRS**

Date: 24.JUL.2009 10:33:26

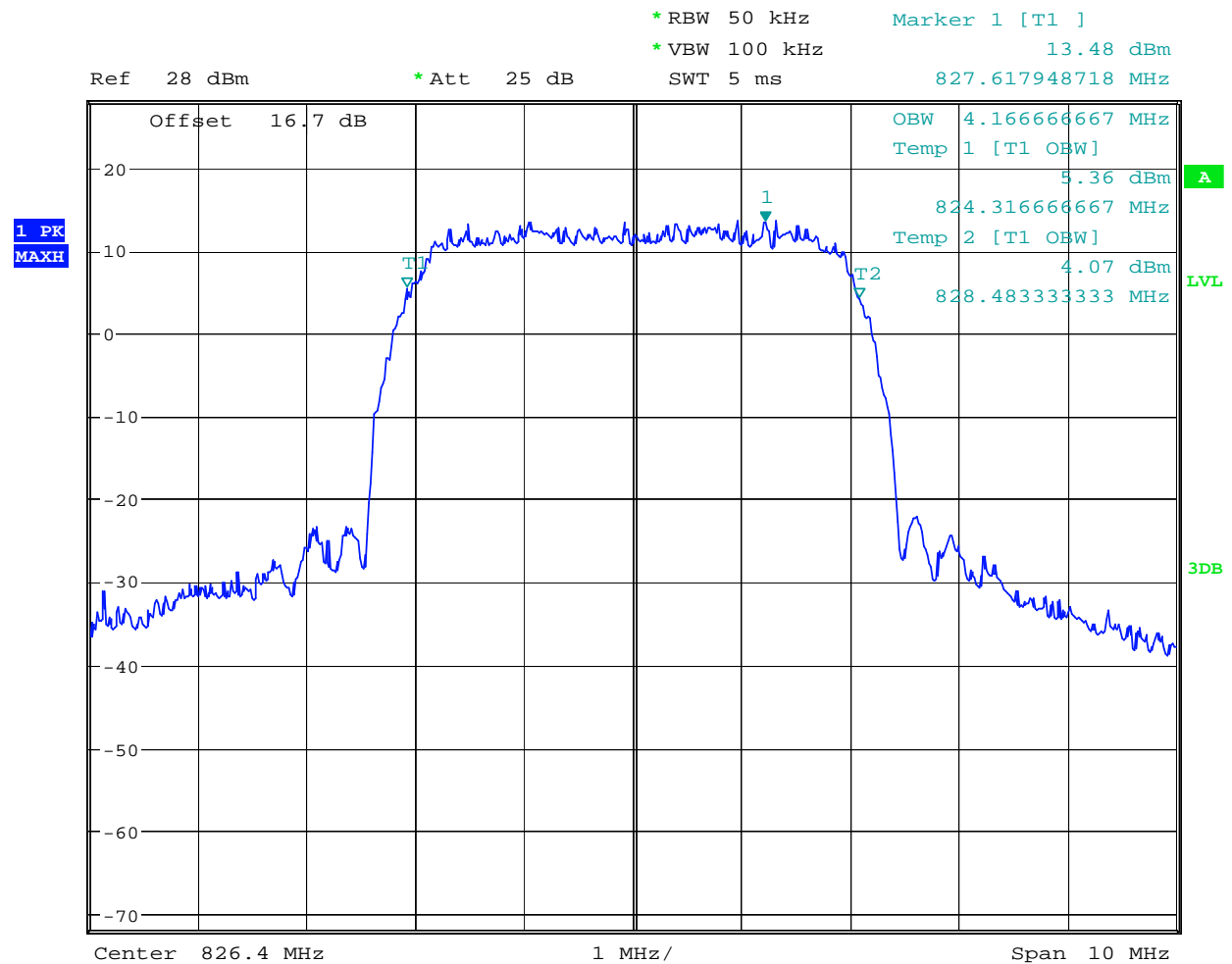


## Occupied band Width GSM850 MHz Channel 251 EGPRS

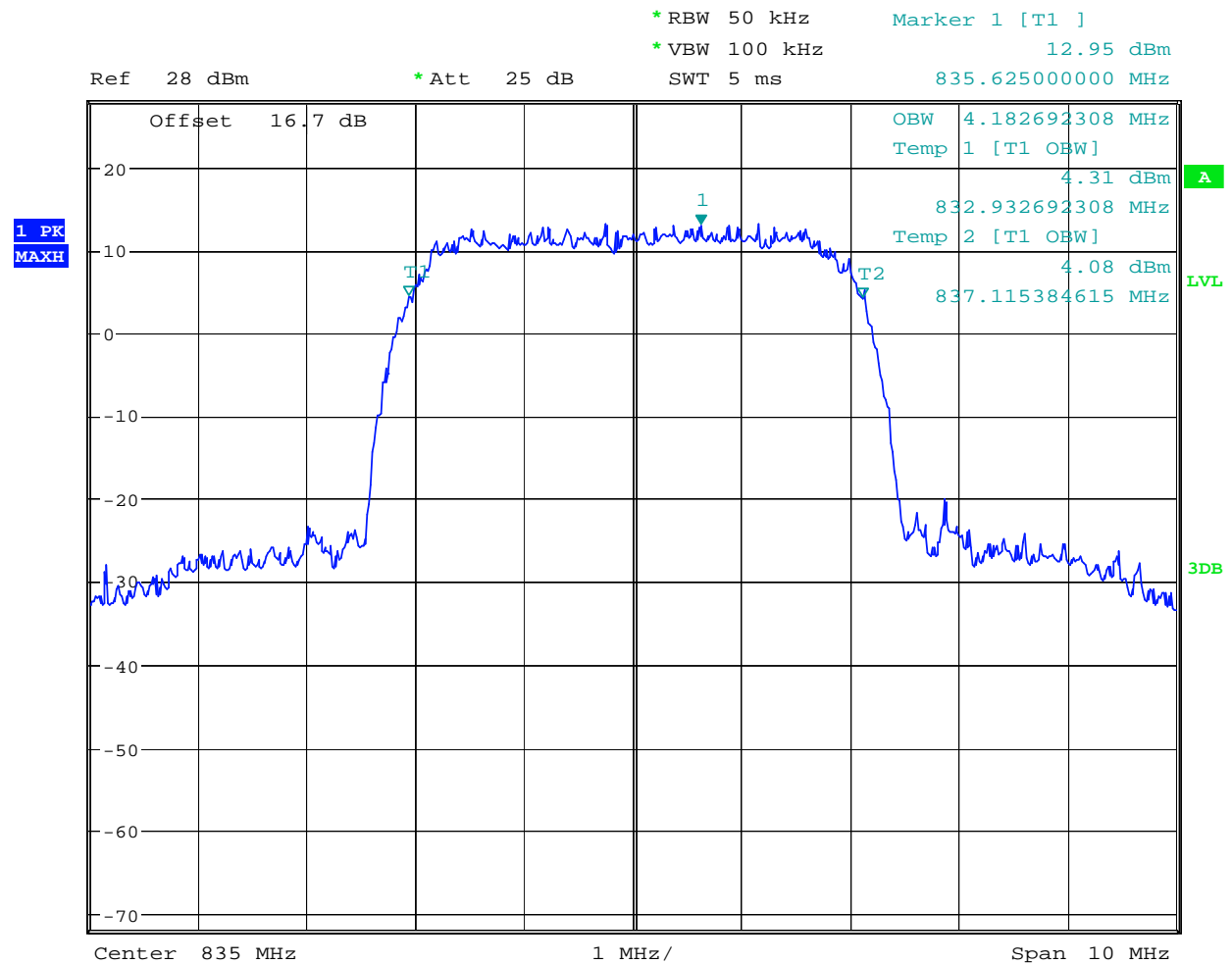


Date: 24.JUL.2009 10:31:50

## Occupied band Width UMTS FDD5 Channel 4132

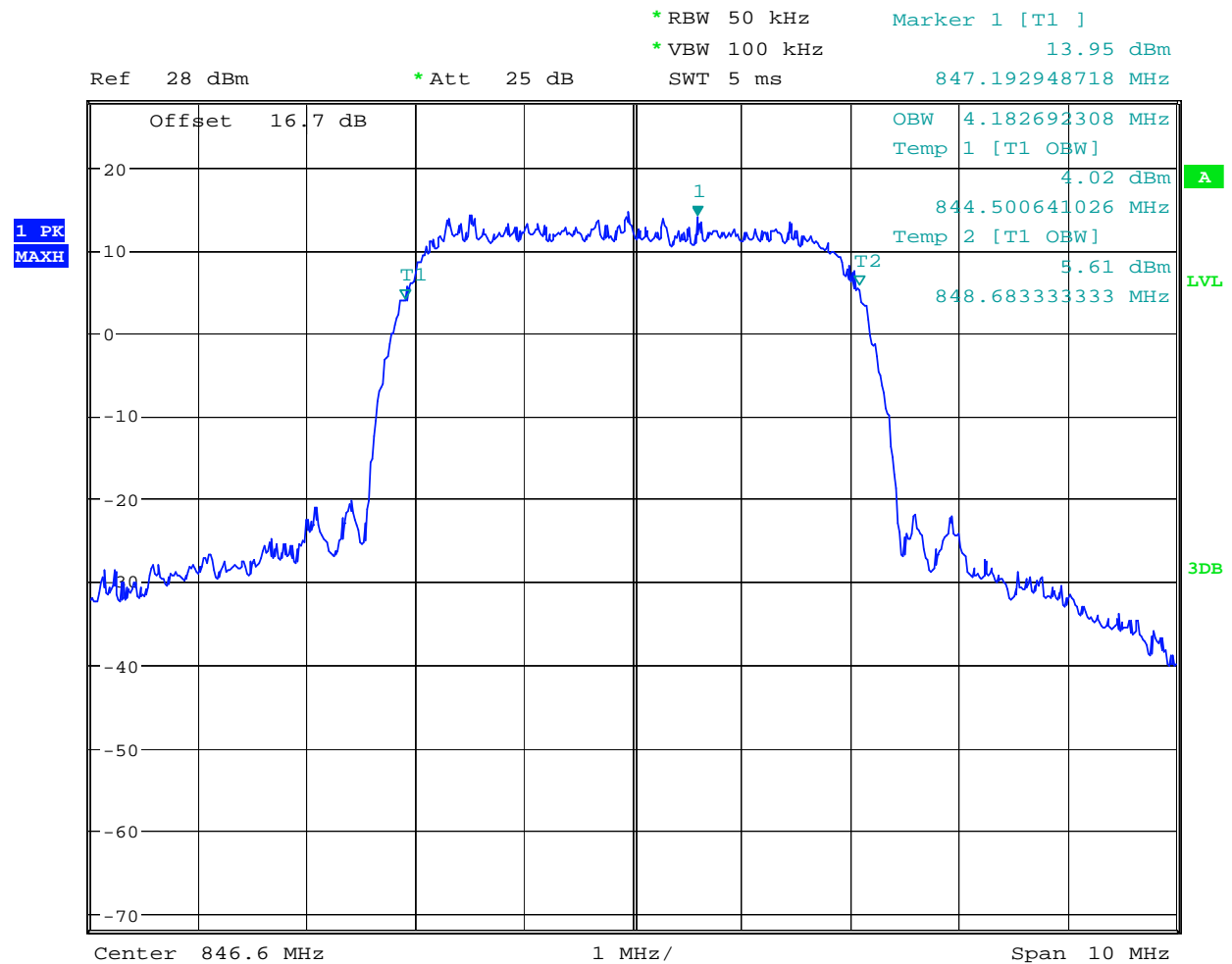


Date: 24.JUL.2009 12:52:10

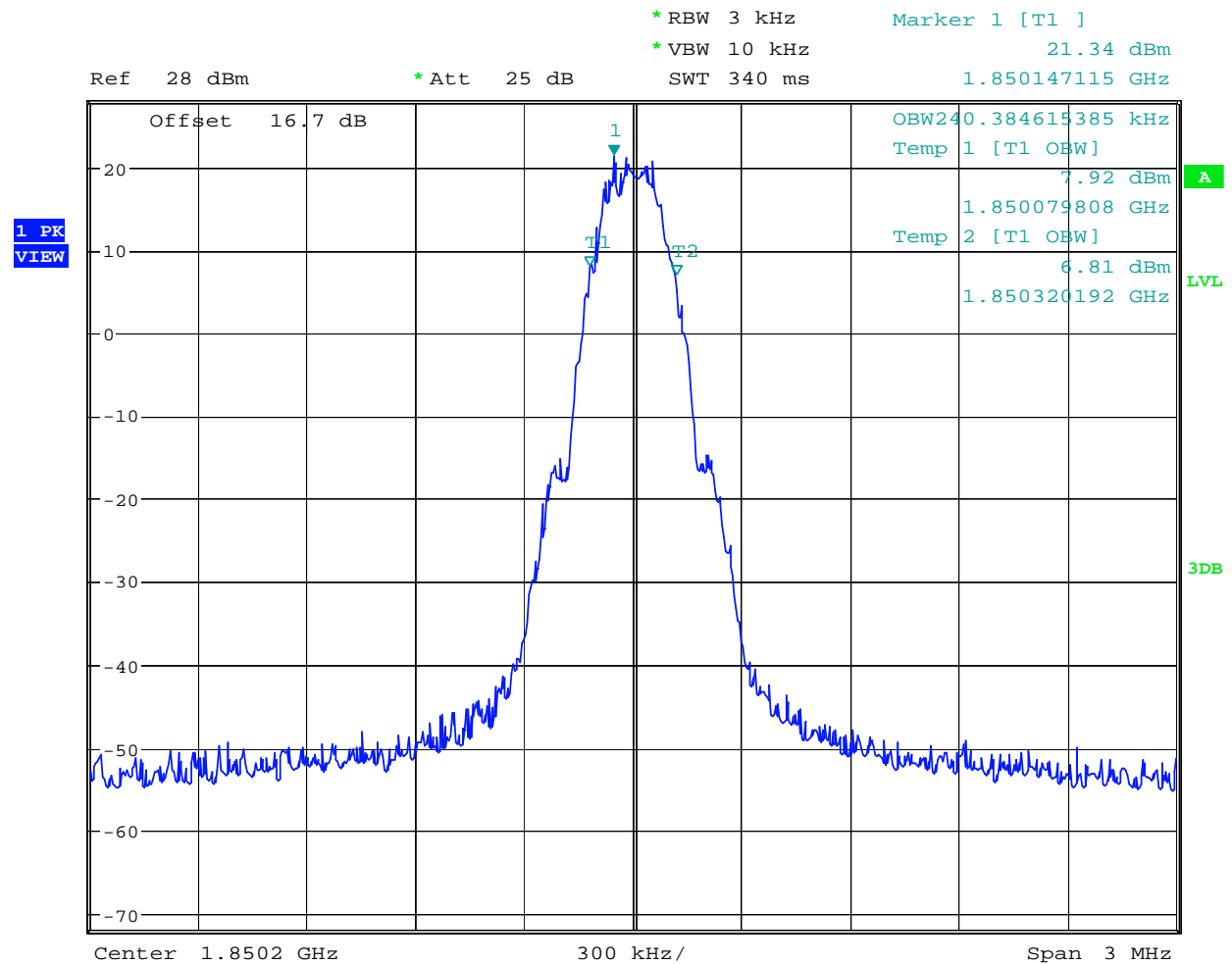
**Occupied band Width UMTS FDD5 Channel 4183**

Date: 24.JUL.2009 12:51:36

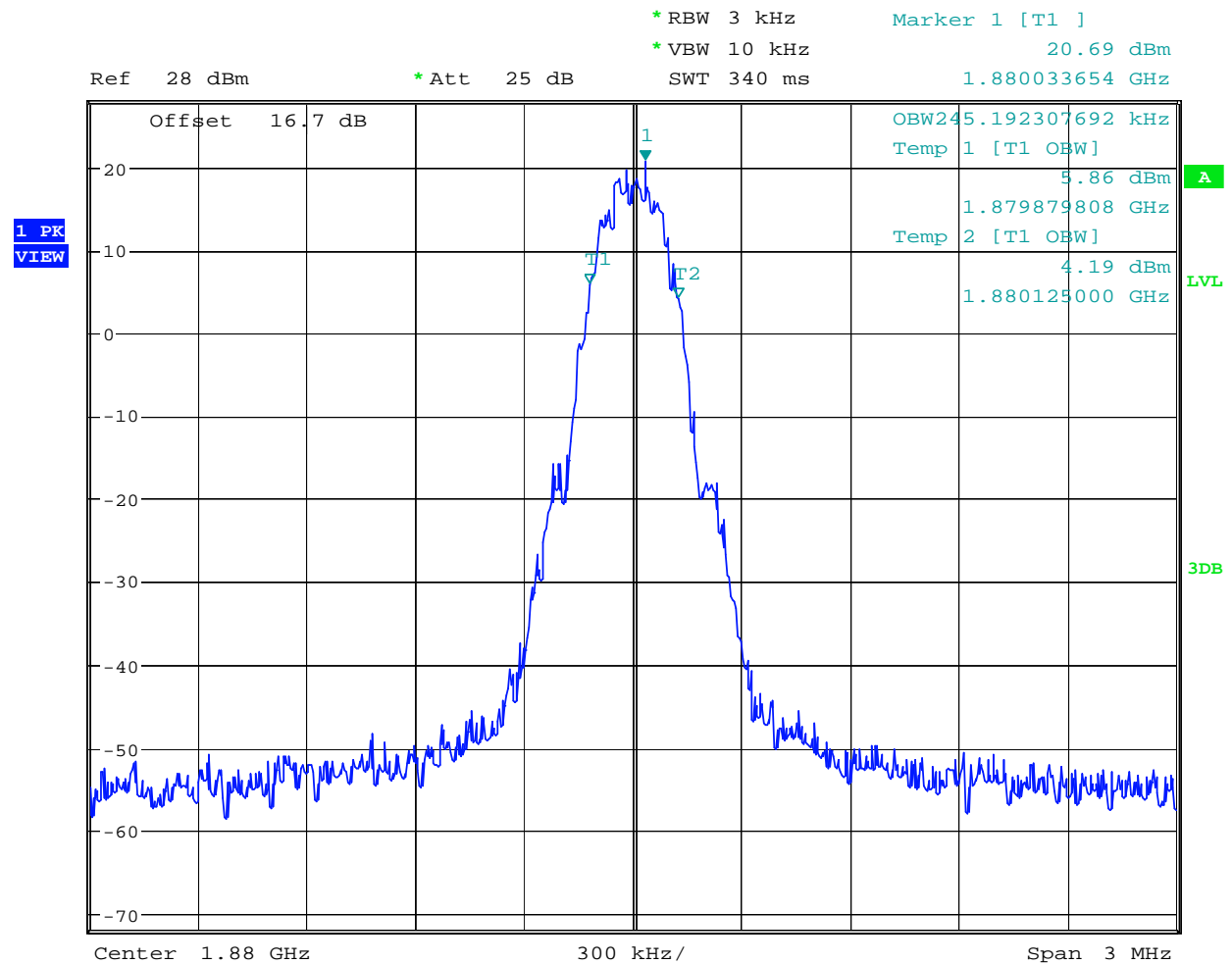
## Occupied band Width UMTS FDD5 Channel 4233



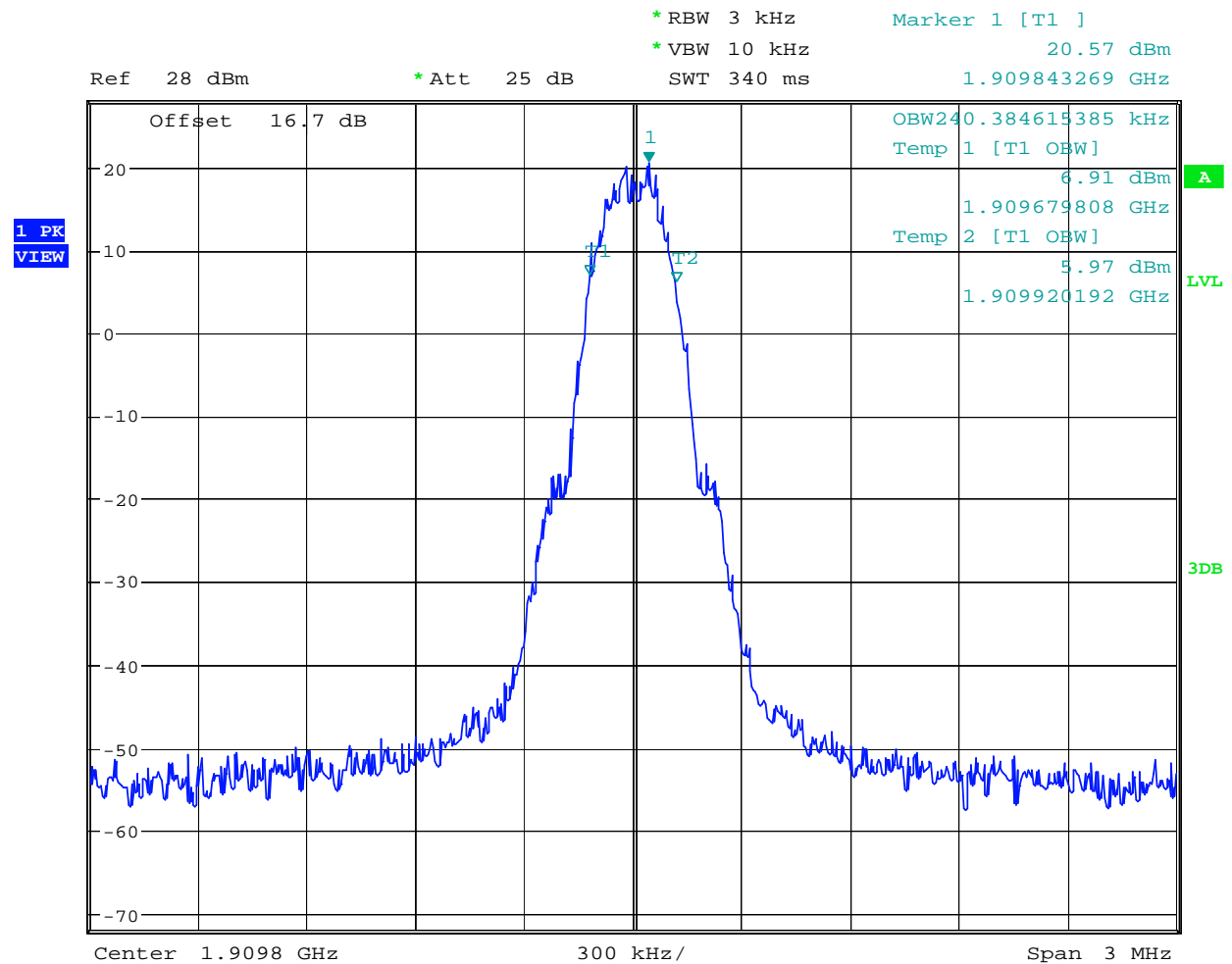
Date: 24.JUL.2009 12:50:53

**Occupied band Width PCS1900 MHz Channel 512 GSM**

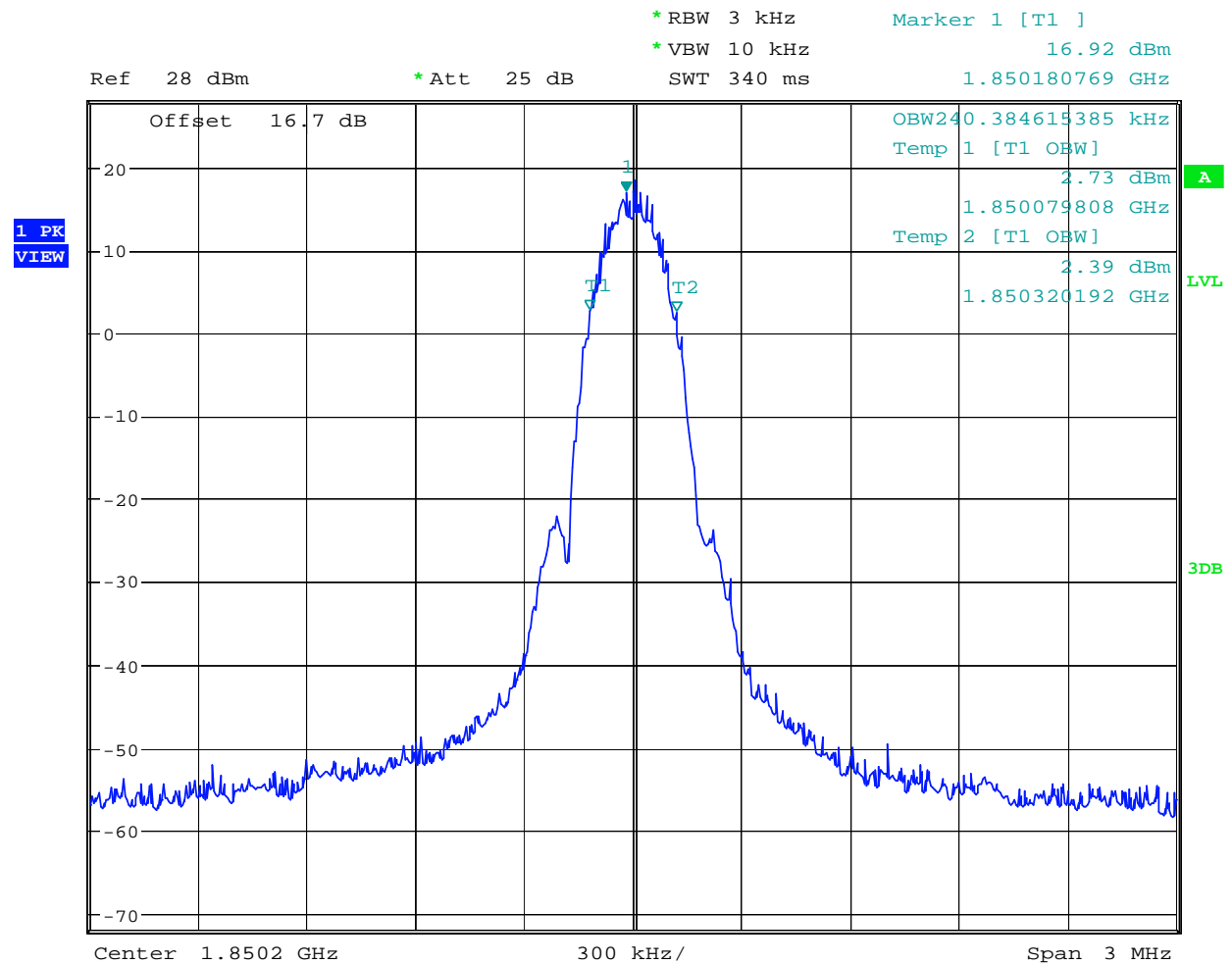
Date: 24.JUL.2009 11:47:21

**Occupied band Width PCS1900 MHz Channel 661 GSM**

Date: 24.JUL.2009 11:48:48

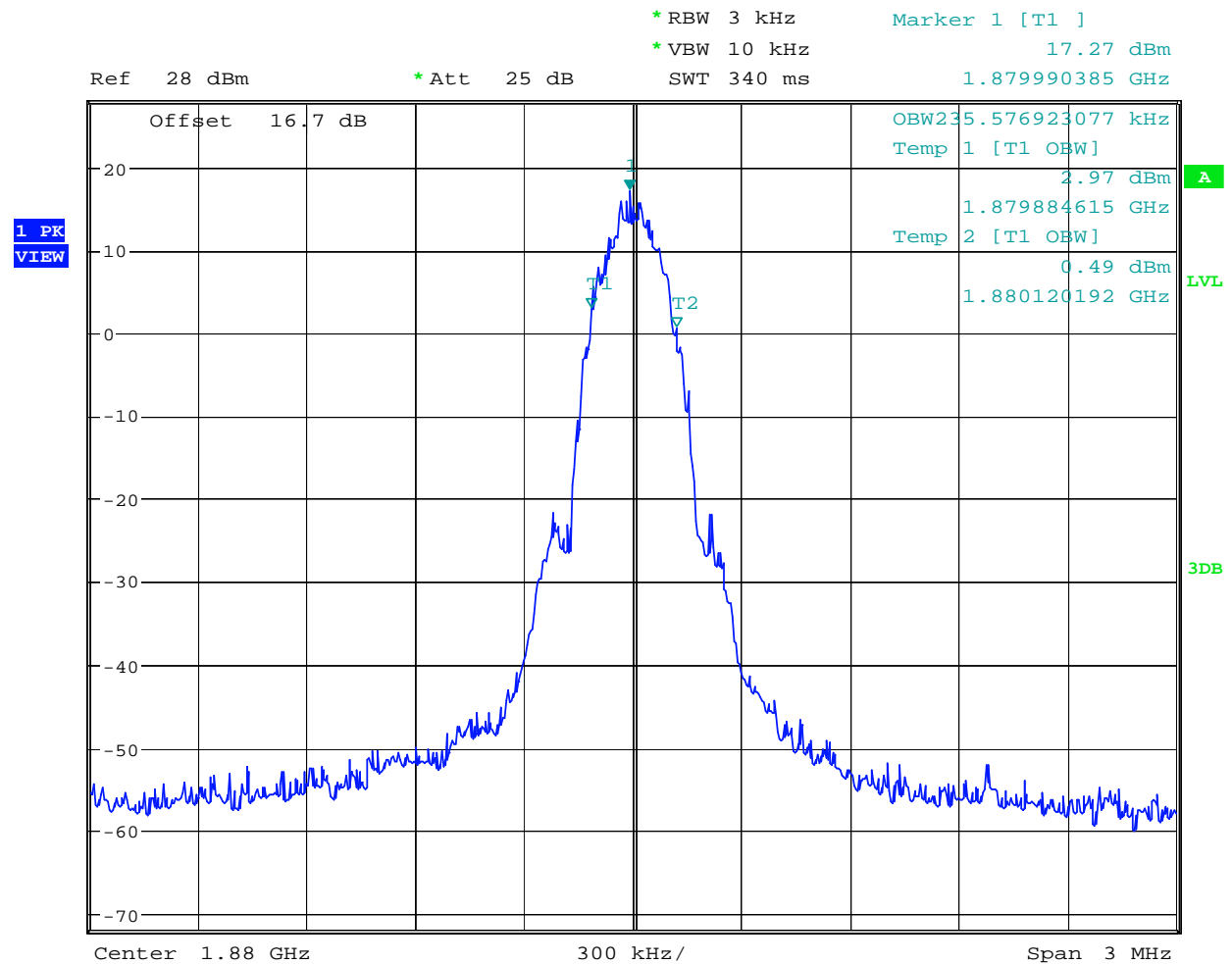
**Occupied band Width PCS1900 MHz Channel 810 GSM**

Date: 24.JUL.2009 11:45:22

**Occupied band Width PCS1900 MHz Channel 512 EGPRS**

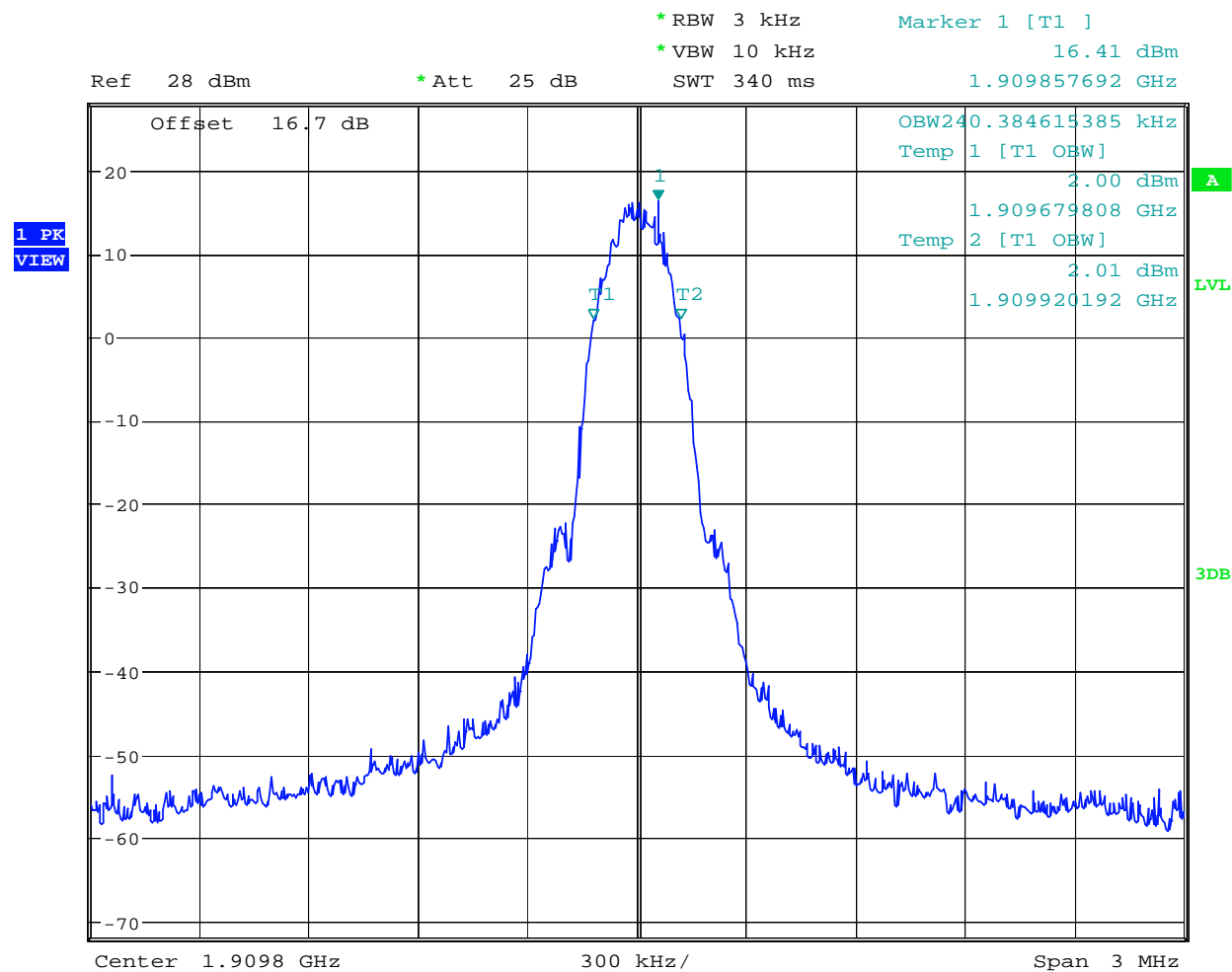
Date: 24.JUL.2009 10:47:48



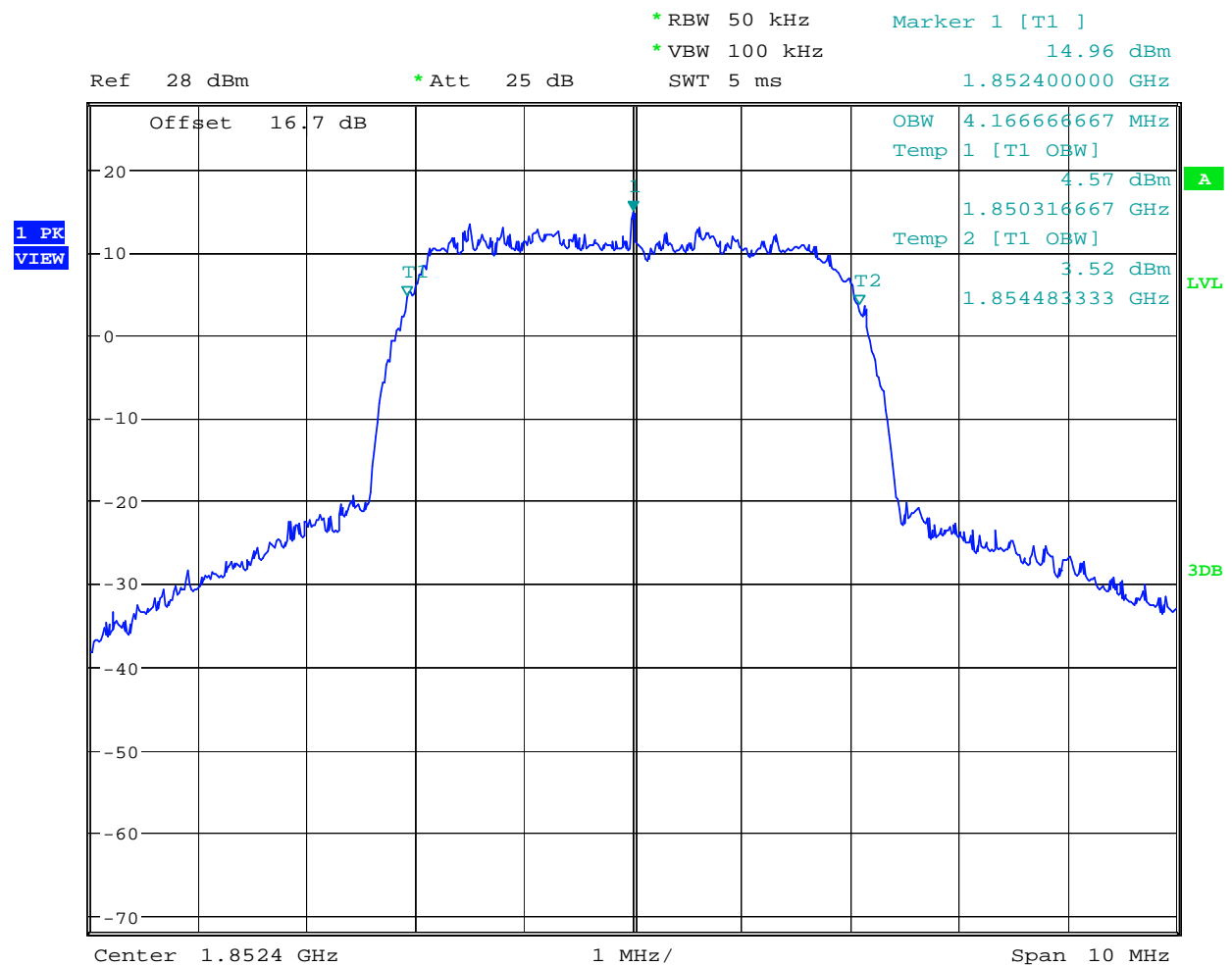
**Occupied band Width PCS1900 MHz Channel 661 EGPRS**

Date: 24.JUL.2009 10:50:30

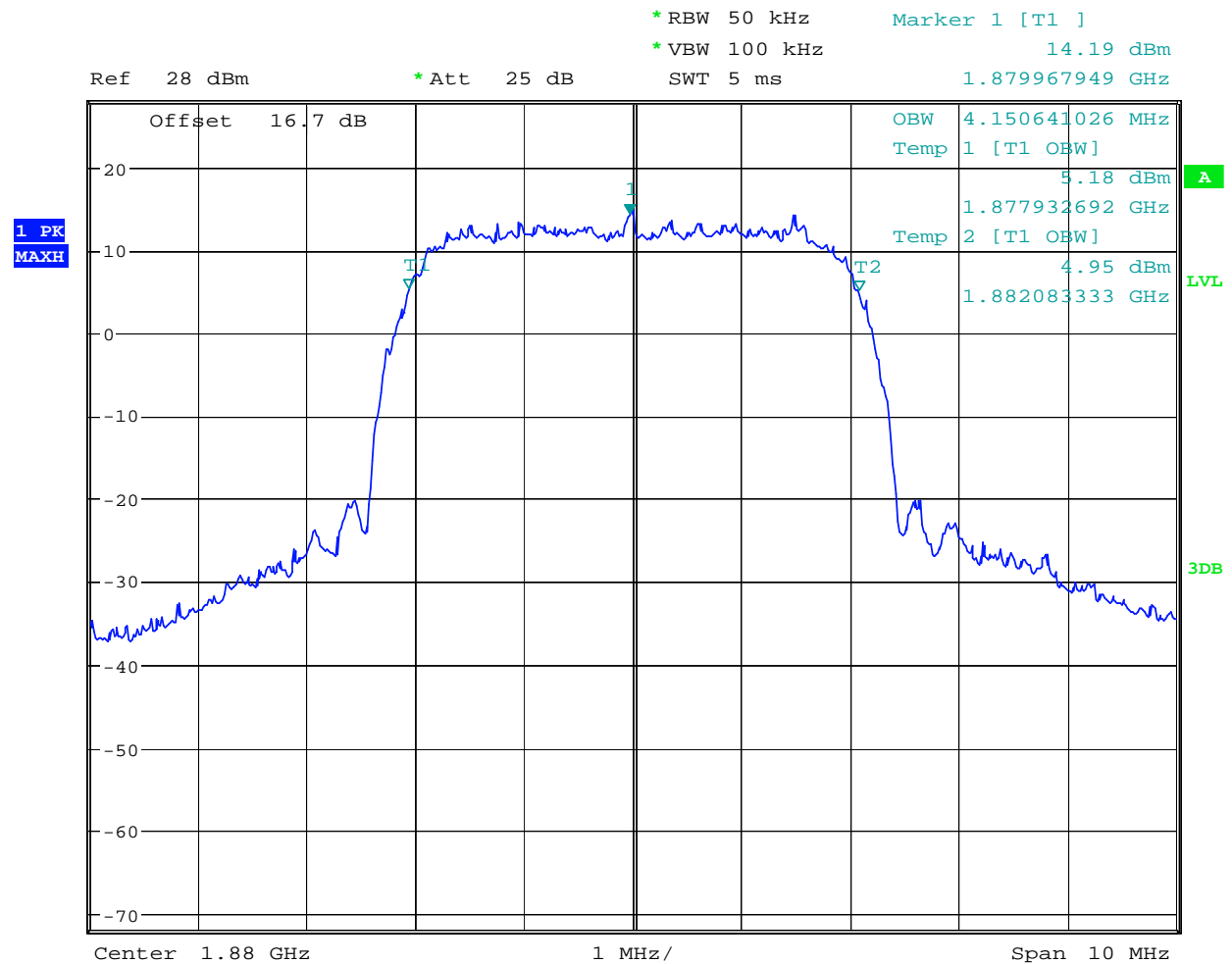
## Occupied band Width PCS1900 MHz Channel 810 EGPRS



Date: 24.JUL.2009 10:53:10

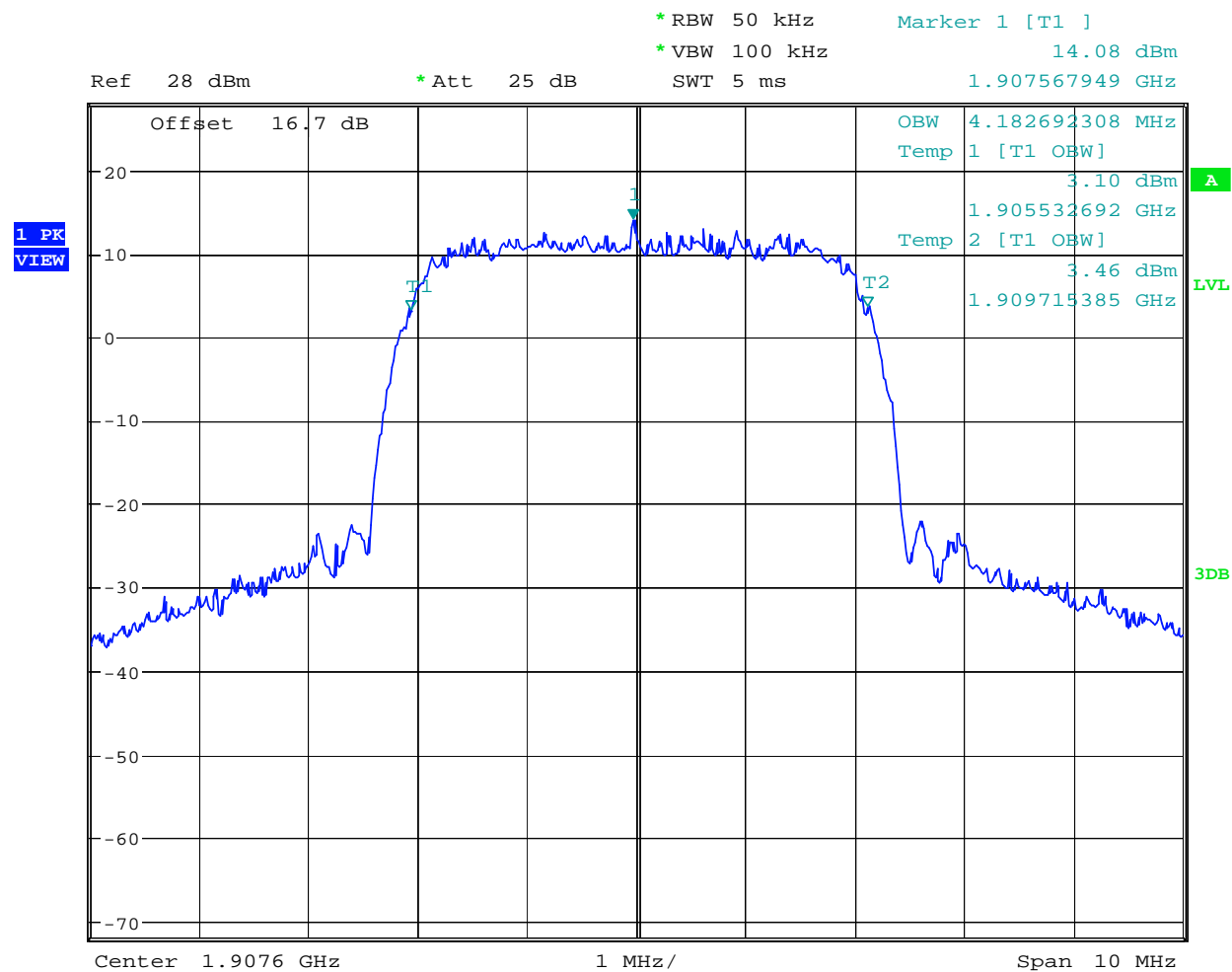
**Occupied band Width UMTS FDD2 Channel 9262**

Date: 24.JUL.2009 12:11:21

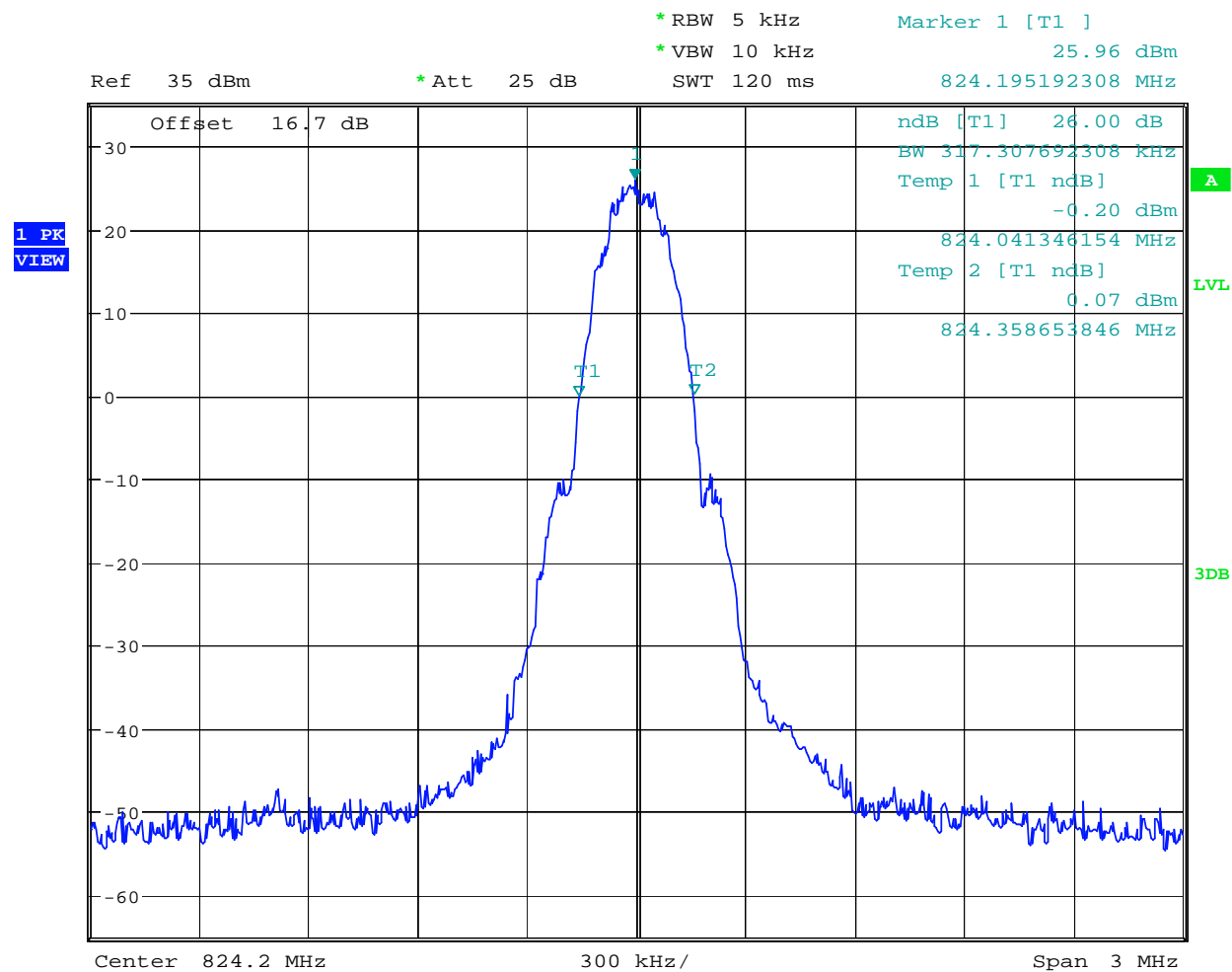
**Occupied band Width UMTS FDD2 Channel 9400**

Date: 24.JUL.2009 12:02:49

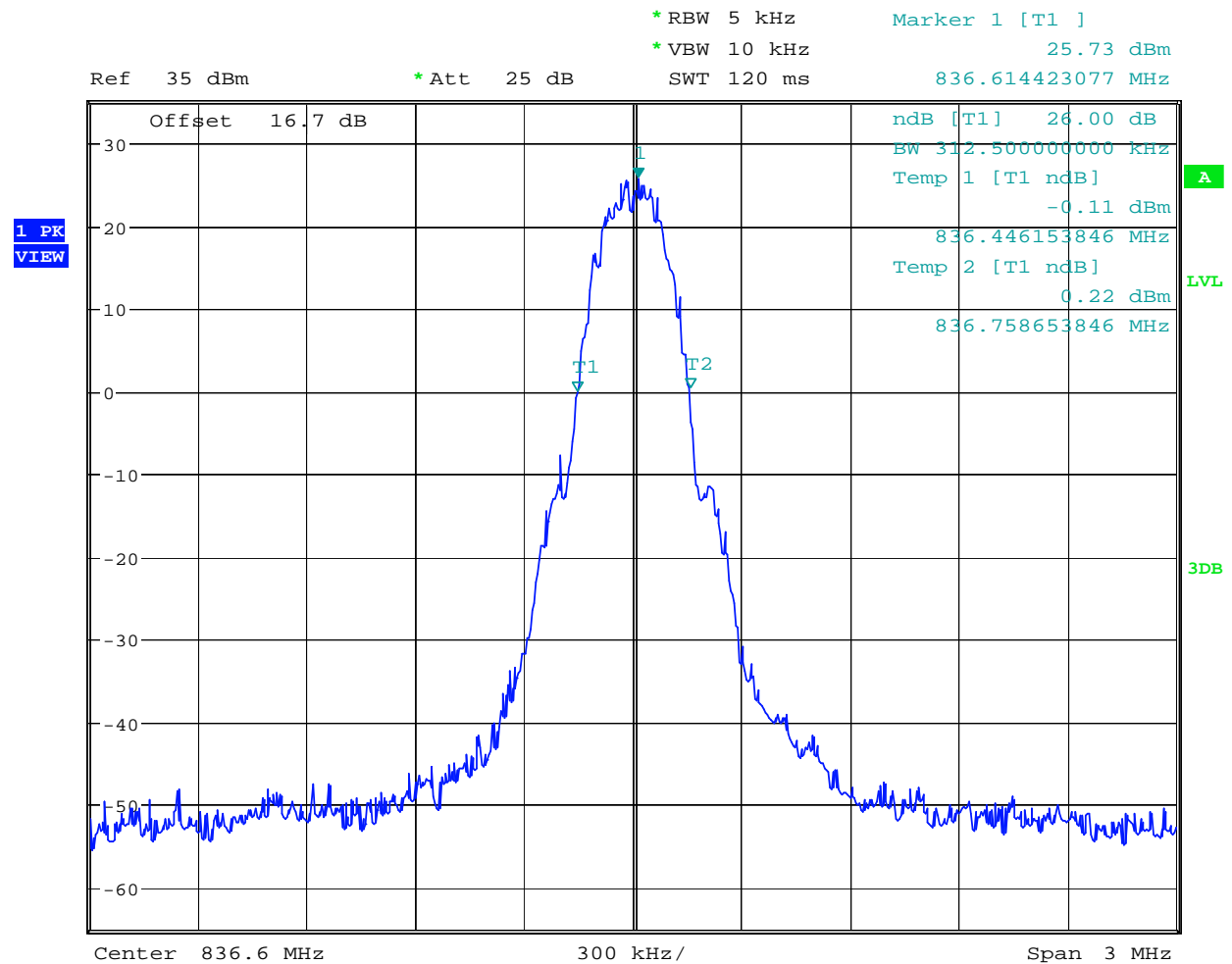
## Occupied band Width UMTS FDD2 Channel 9538



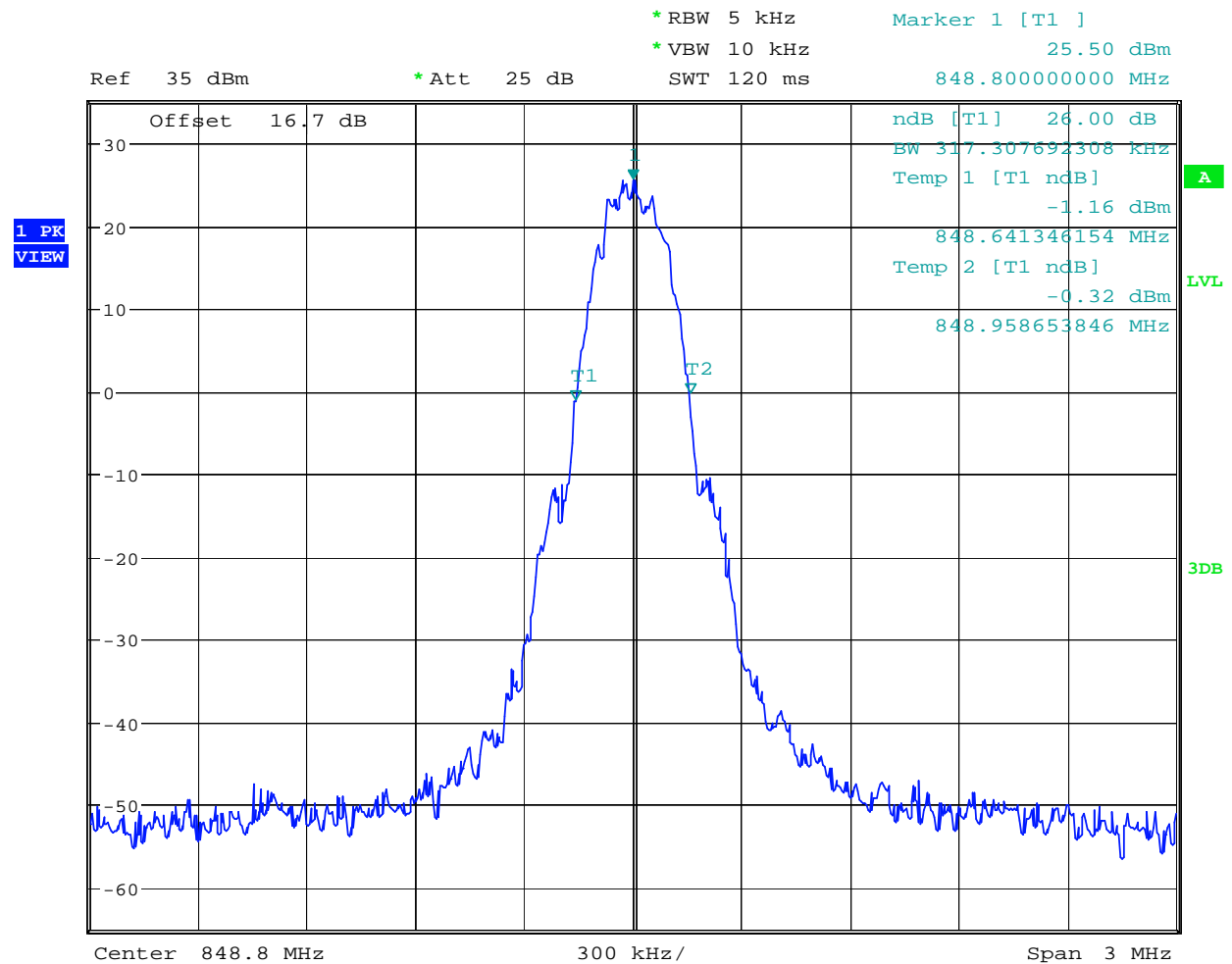
Date: 24.JUL.2009 12:12:17

**Emission band Width GSM850 MHz Channel 128 GSM**

Date: 23.JUL.2009 19:53:02

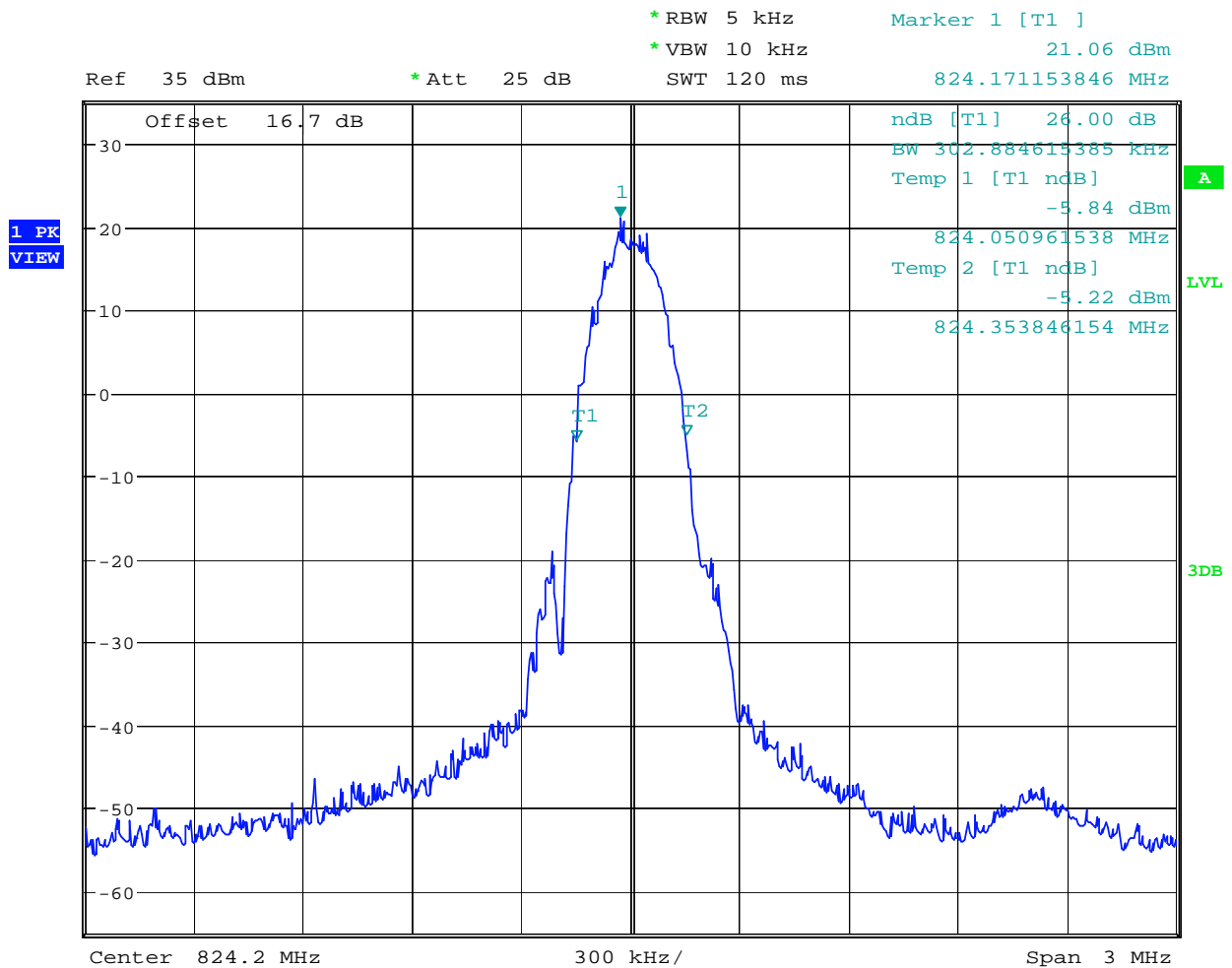
**Emission band Width GSM850 MHz Channel 190 GSM**

Date: 23.JUL.2009 19:50:58

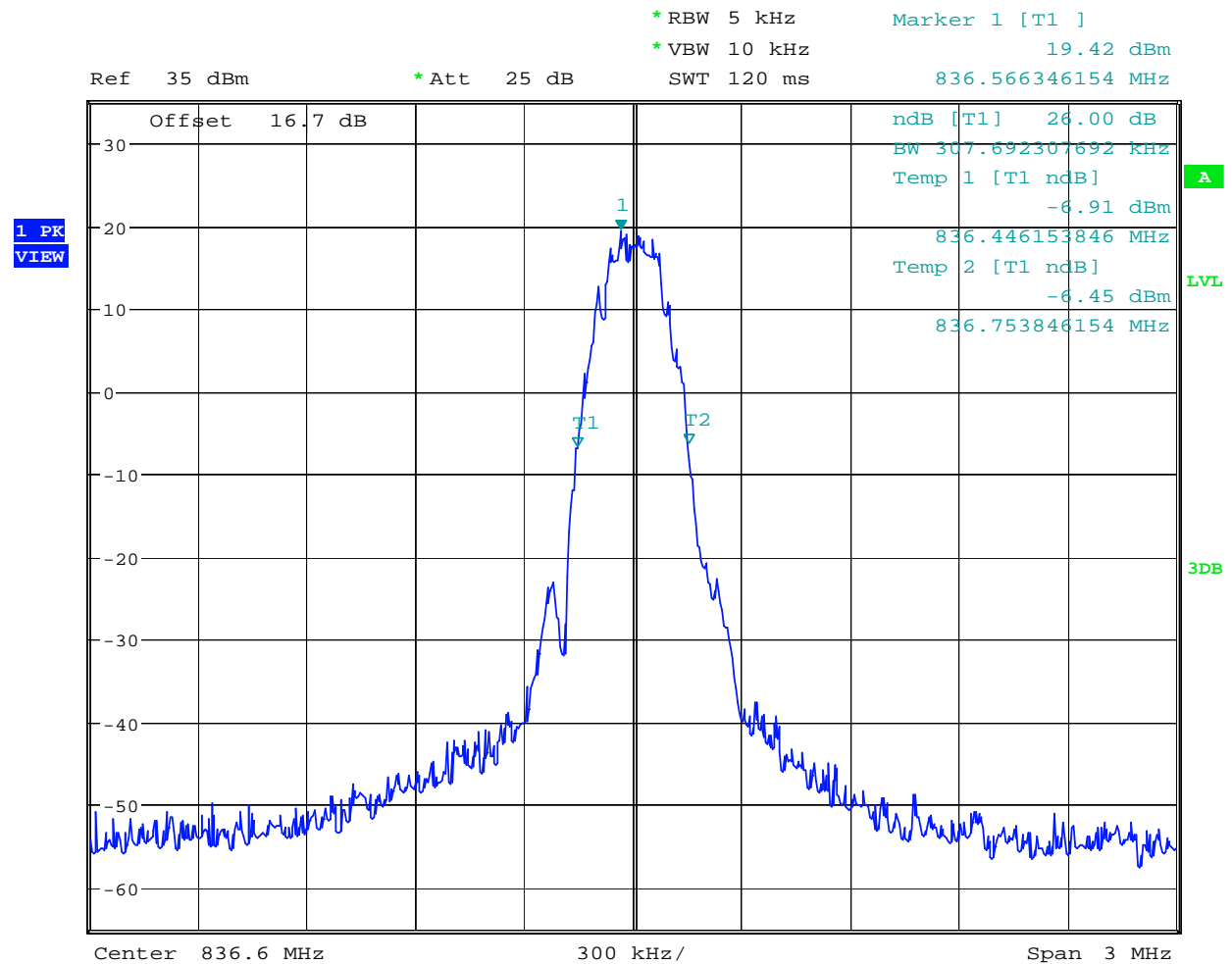
**Emission band Width GSM850 MHz Channel 251 GSM**

Date: 23.JUL.2009 19:49:30

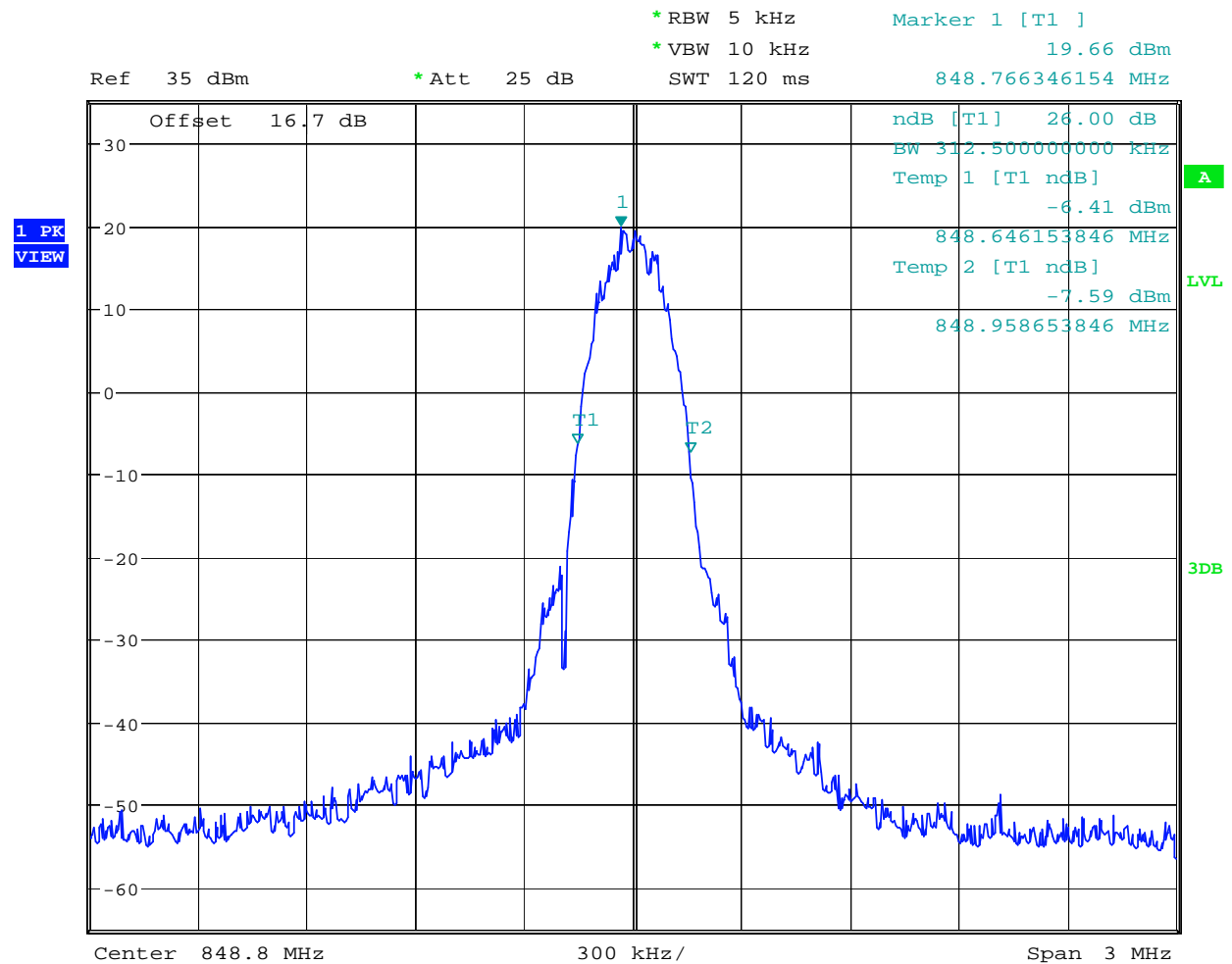


**Emission band Width GSM850 MHz Channel 128 EGPRS**

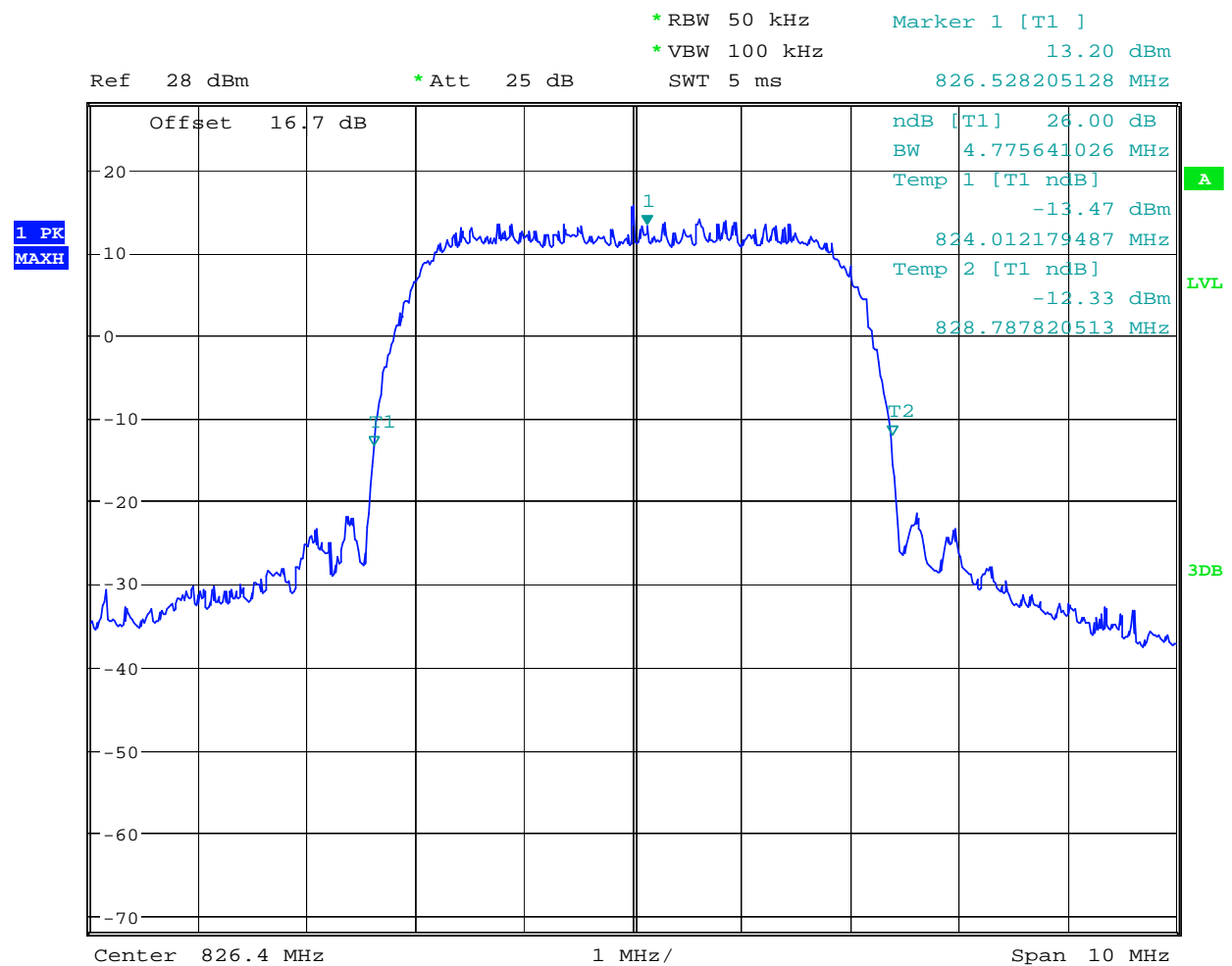
Date: 24.JUL.2009 10:23:18

**Emission band Width GSM850 MHz Channel 190 EGPRS**

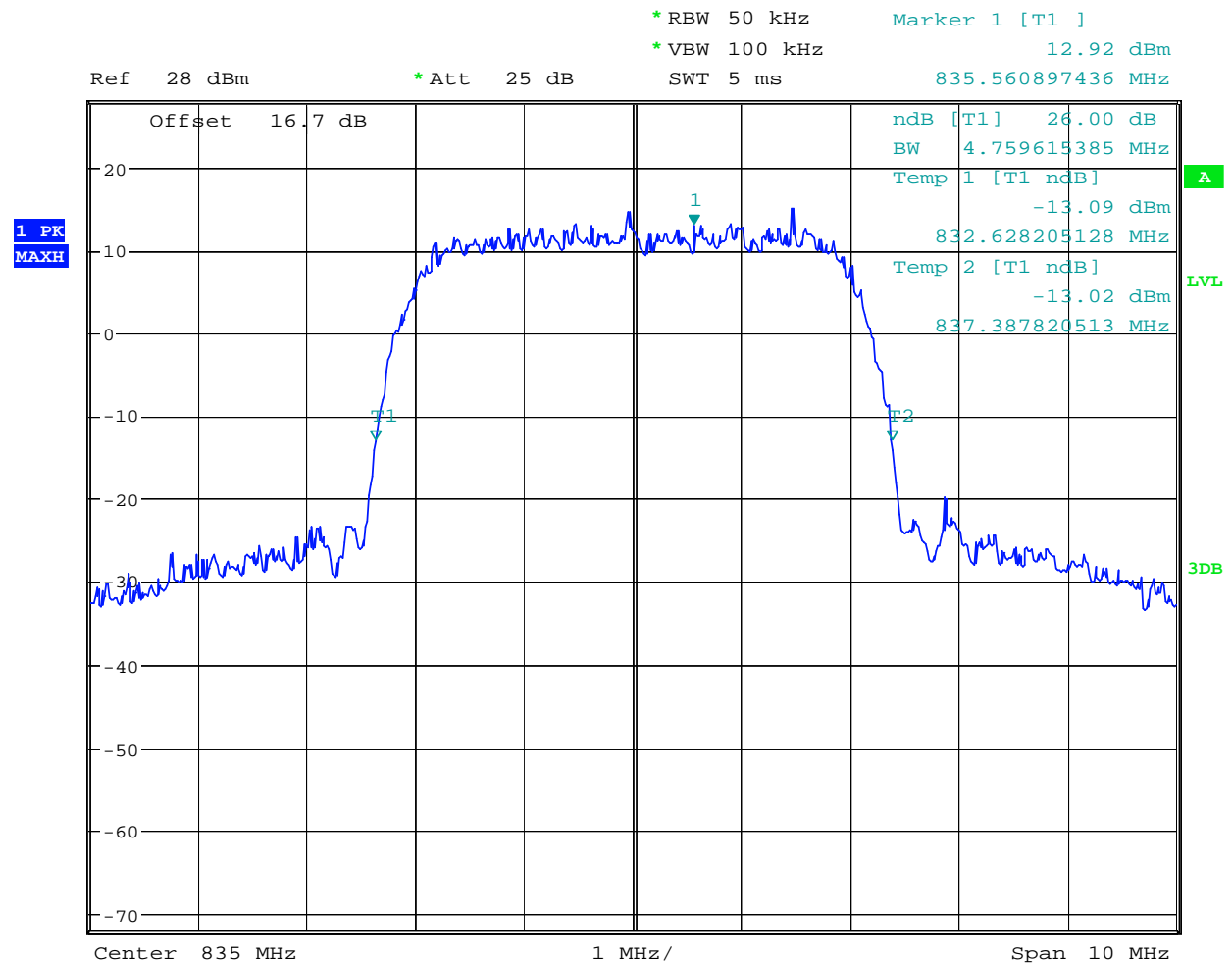
Date: 24.JUL.2009 10:24:43

**Emission band Width GSM850 MHz Channel 251 EGPRS**

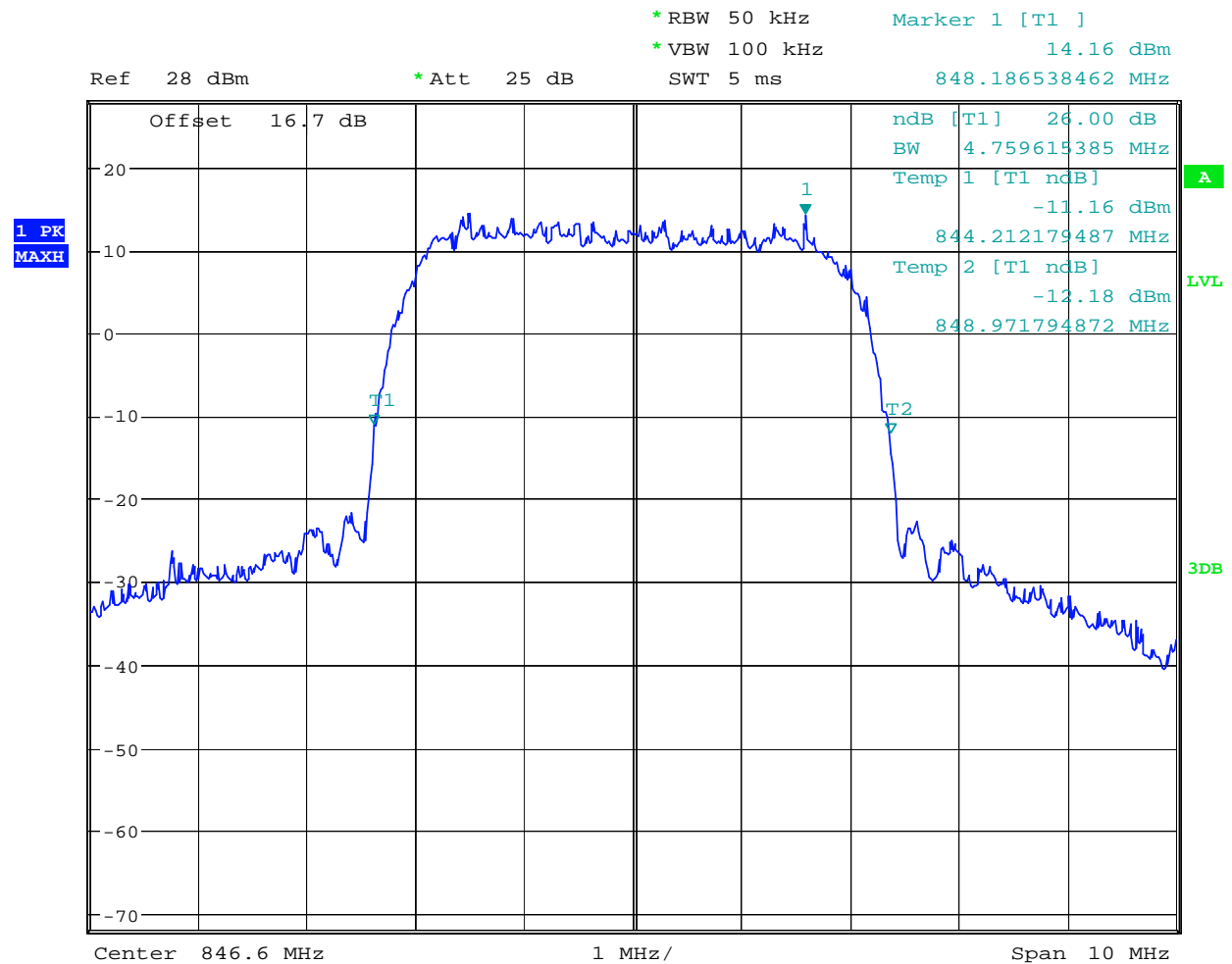
Date: 24.JUL.2009 10:27:36

**Emission band Width UMTS FDD5 Channel 4132**

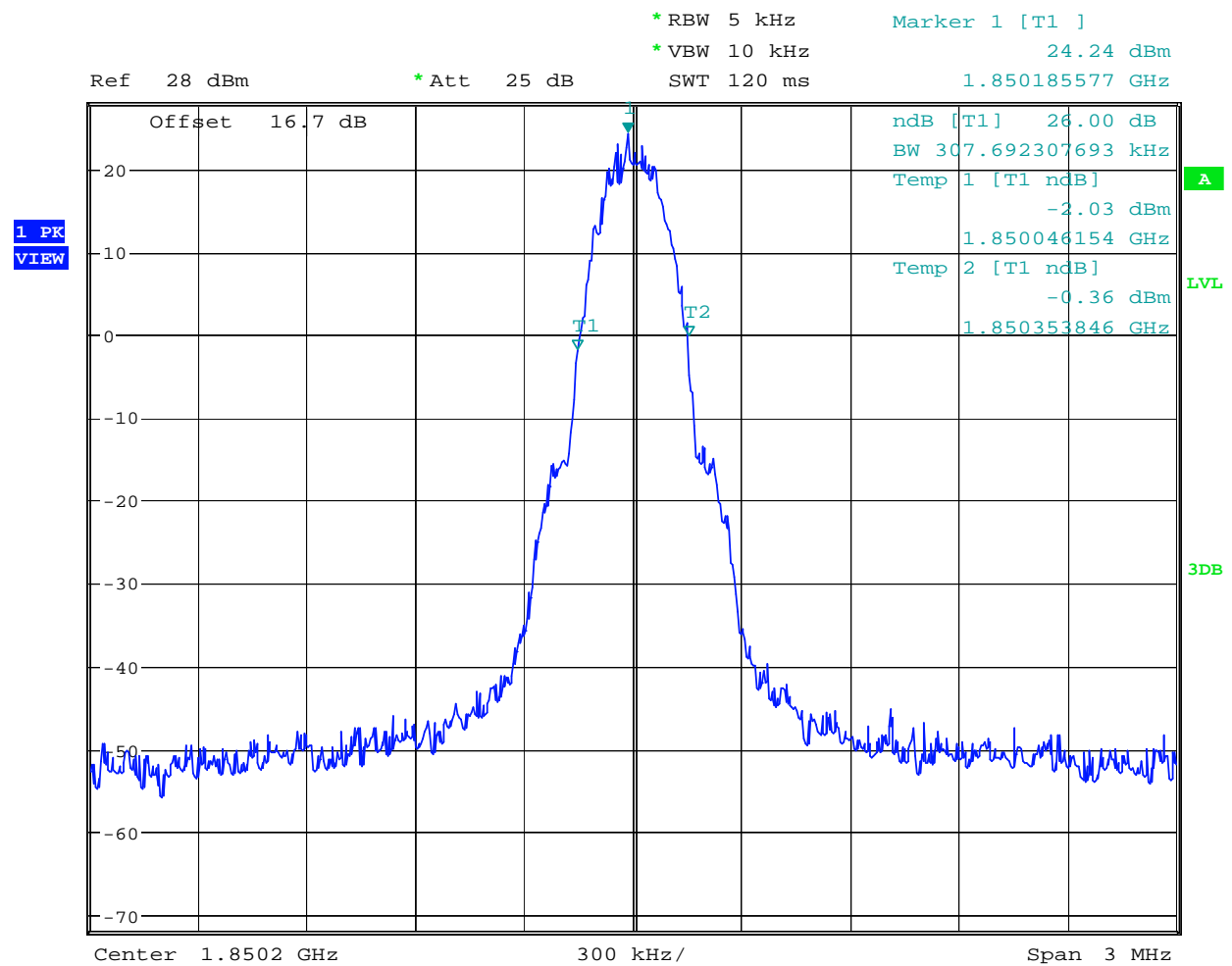
Date: 24.JUL.2009 12:48:45

**Emission band Width UMTS FDD5 Channel 4183**

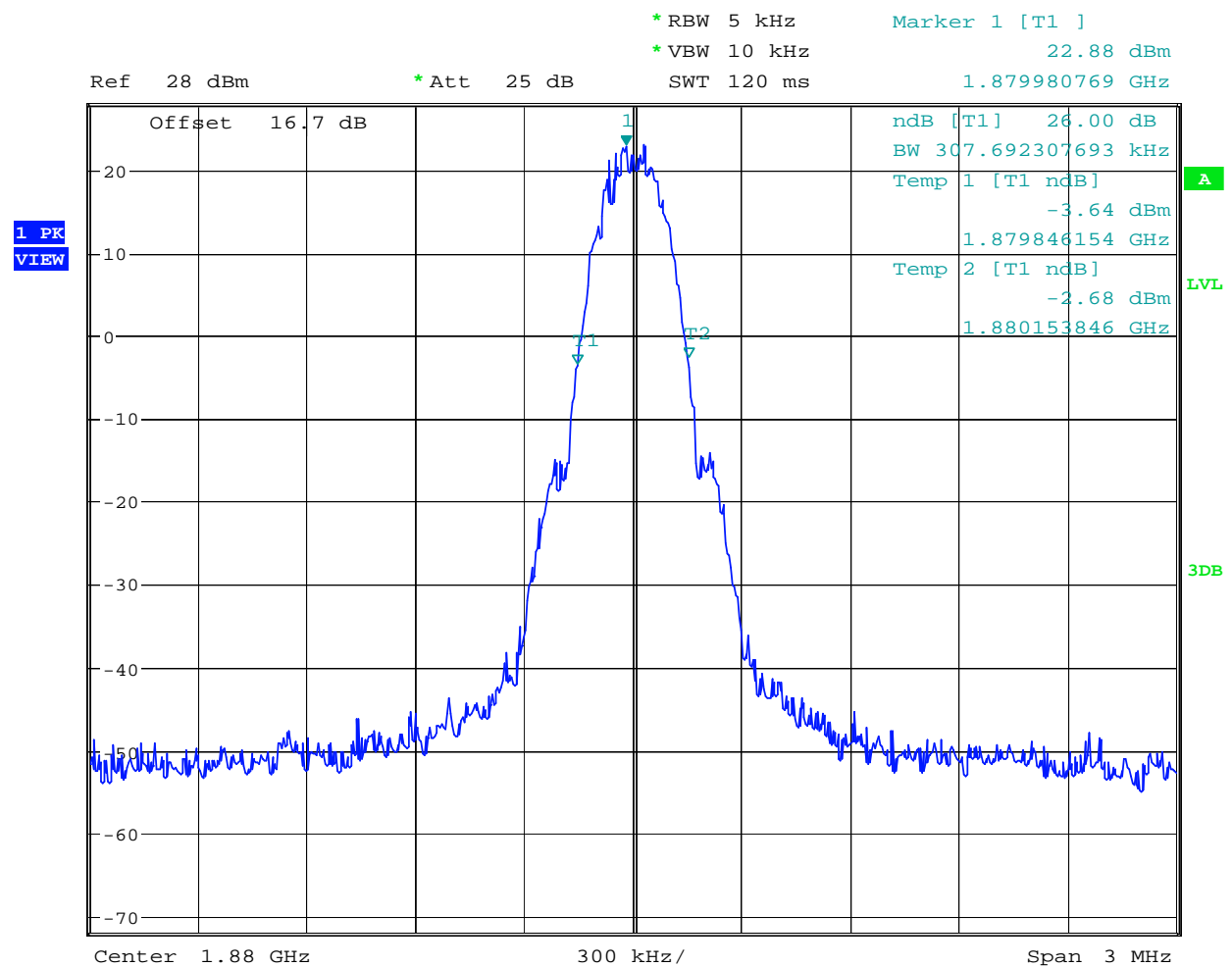
Date: 24.JUL.2009 12:49:21

**Emission band Width UMTS FDD5 Channel 4233**

Date: 24.JUL.2009 12:49:58

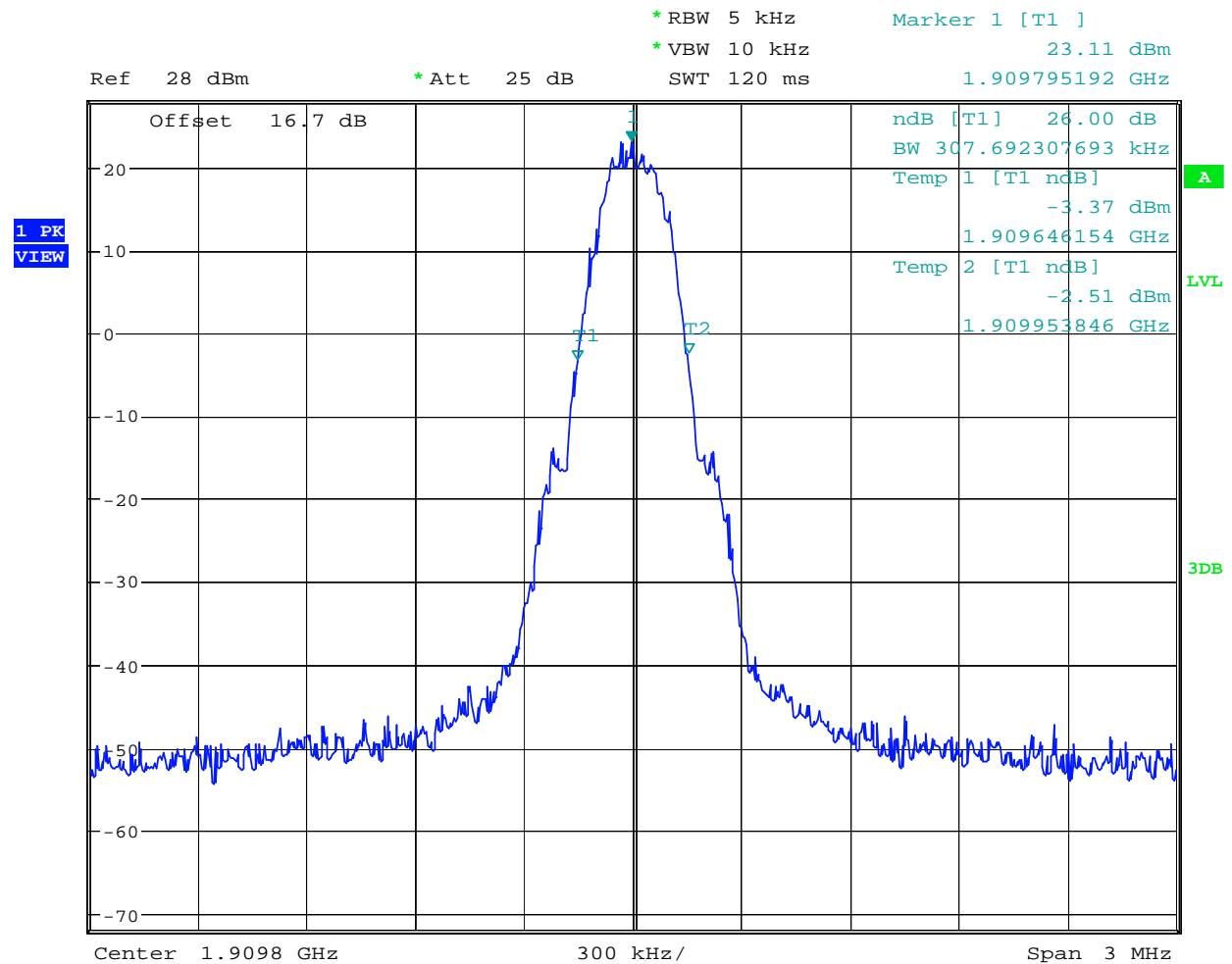
**Emission band Width PCS1900 MHz Channel 512 GSM**

Date: 24.JUL.2009 11:41:54

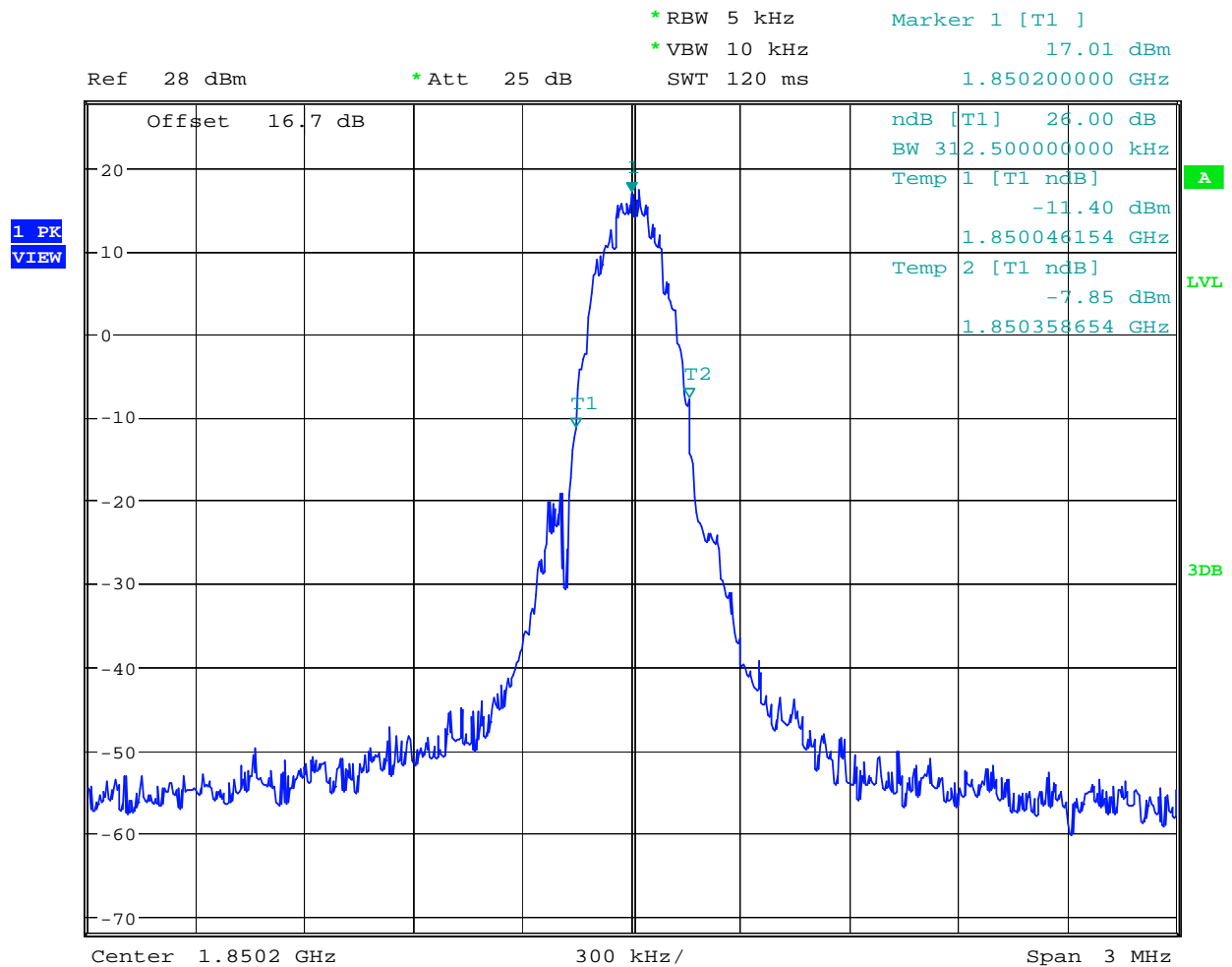
**Emission band Width PCS1900 MHz Channel 661 GSM**

Date: 24.JUL.2009 11:41:00

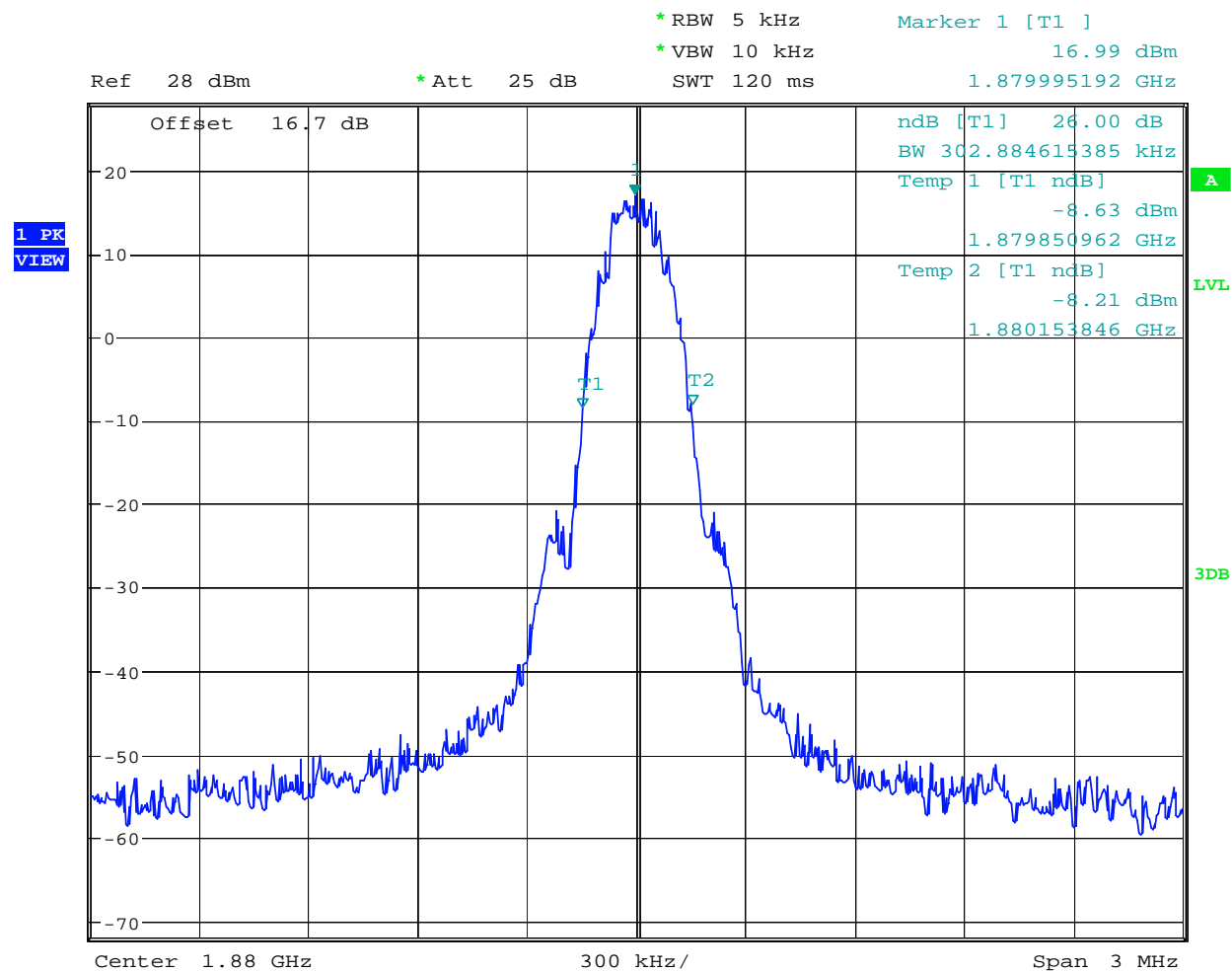


**Emission band Width PCS1900 MHz Channel 810 GSM**

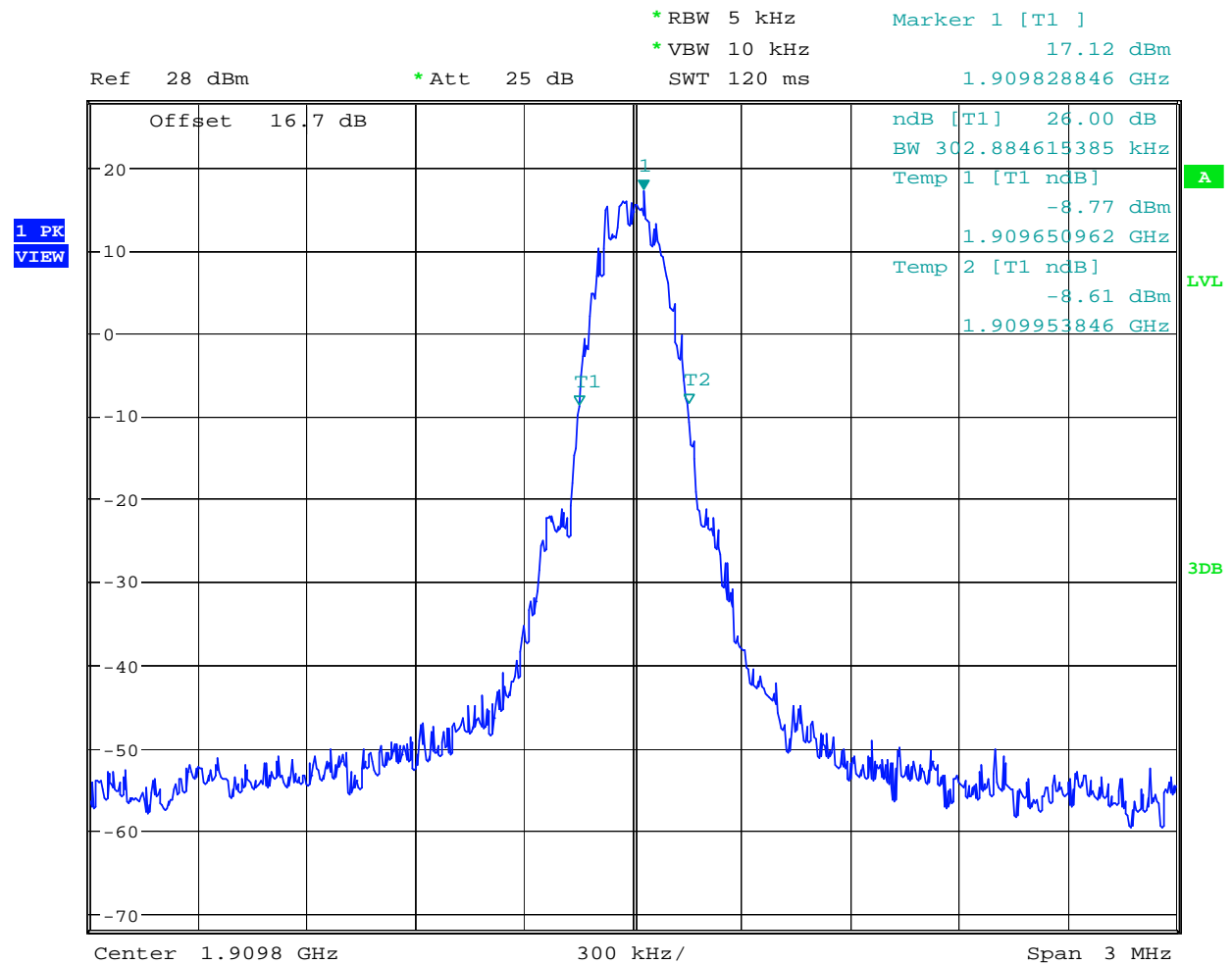
Date: 24.JUL.2009 11:43:09

**Emission band Width PCS1900 MHz Channel 512 EGPRS**

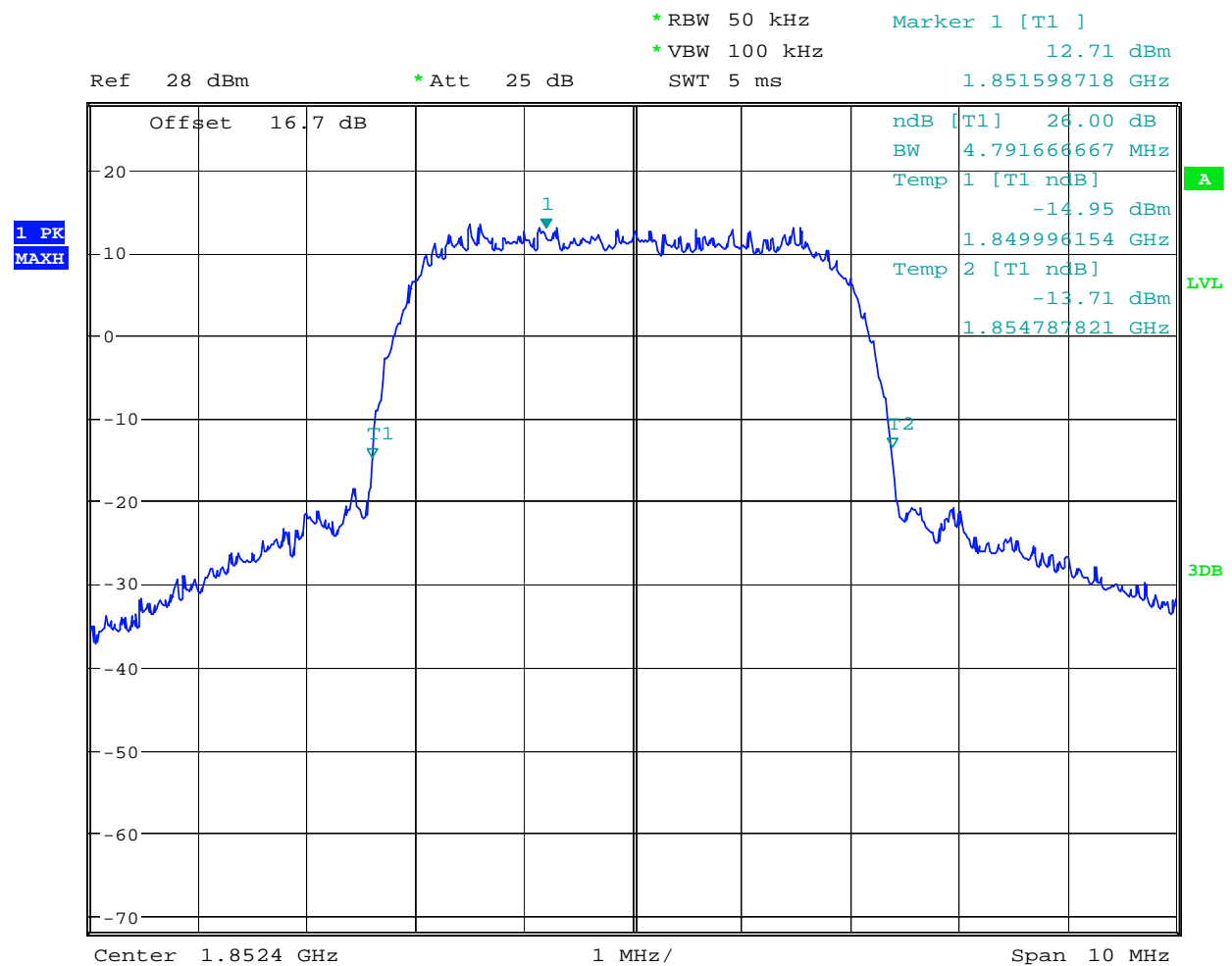
Date: 24.JUL.2009 10:59:15

**Emission band Width PCS1900 MHz Channel 661 EGPRS**

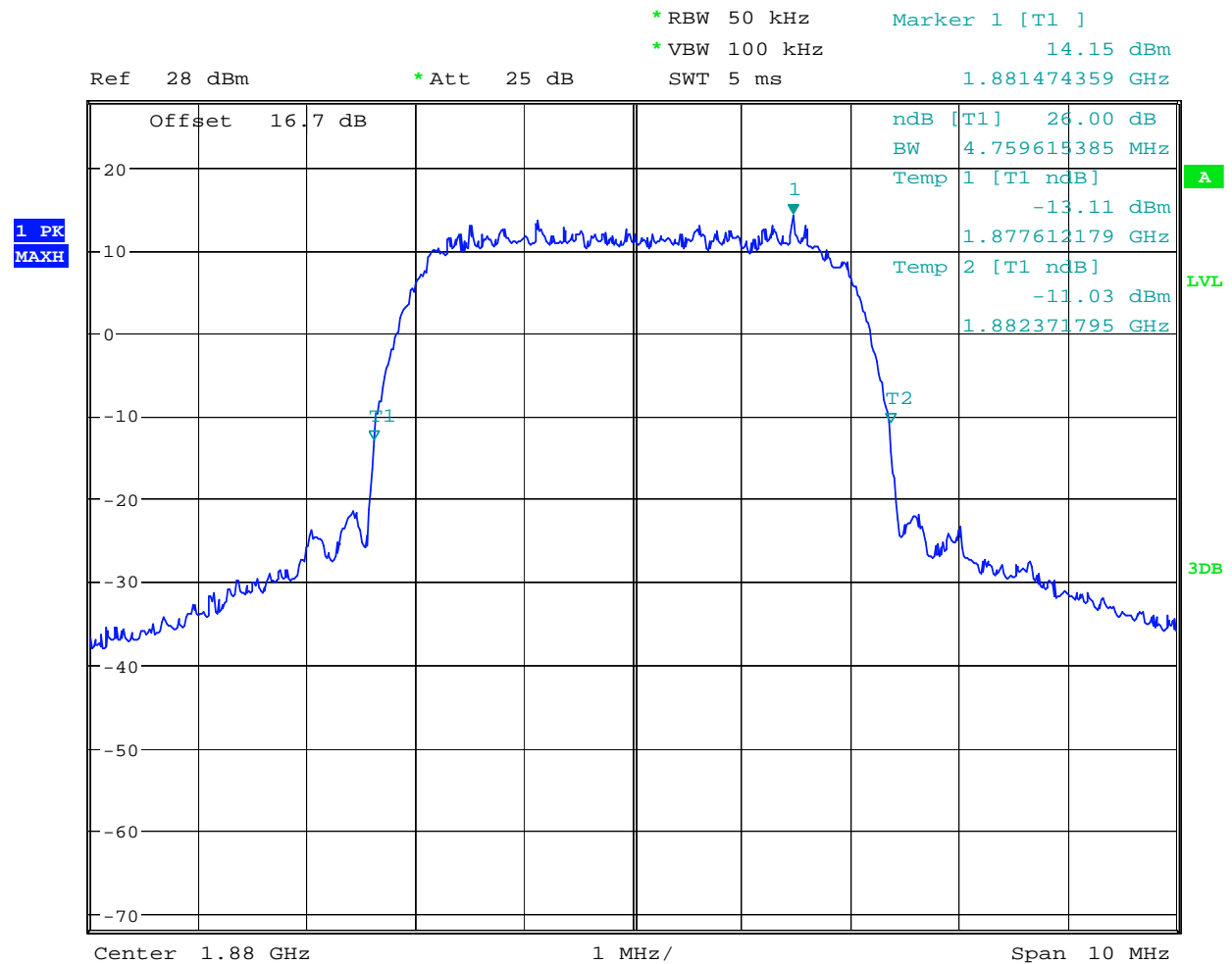
Date: 24.JUL.2009 11:00:50

**Emission band Width PCS1900 MHz Channel 810 EGPRS**

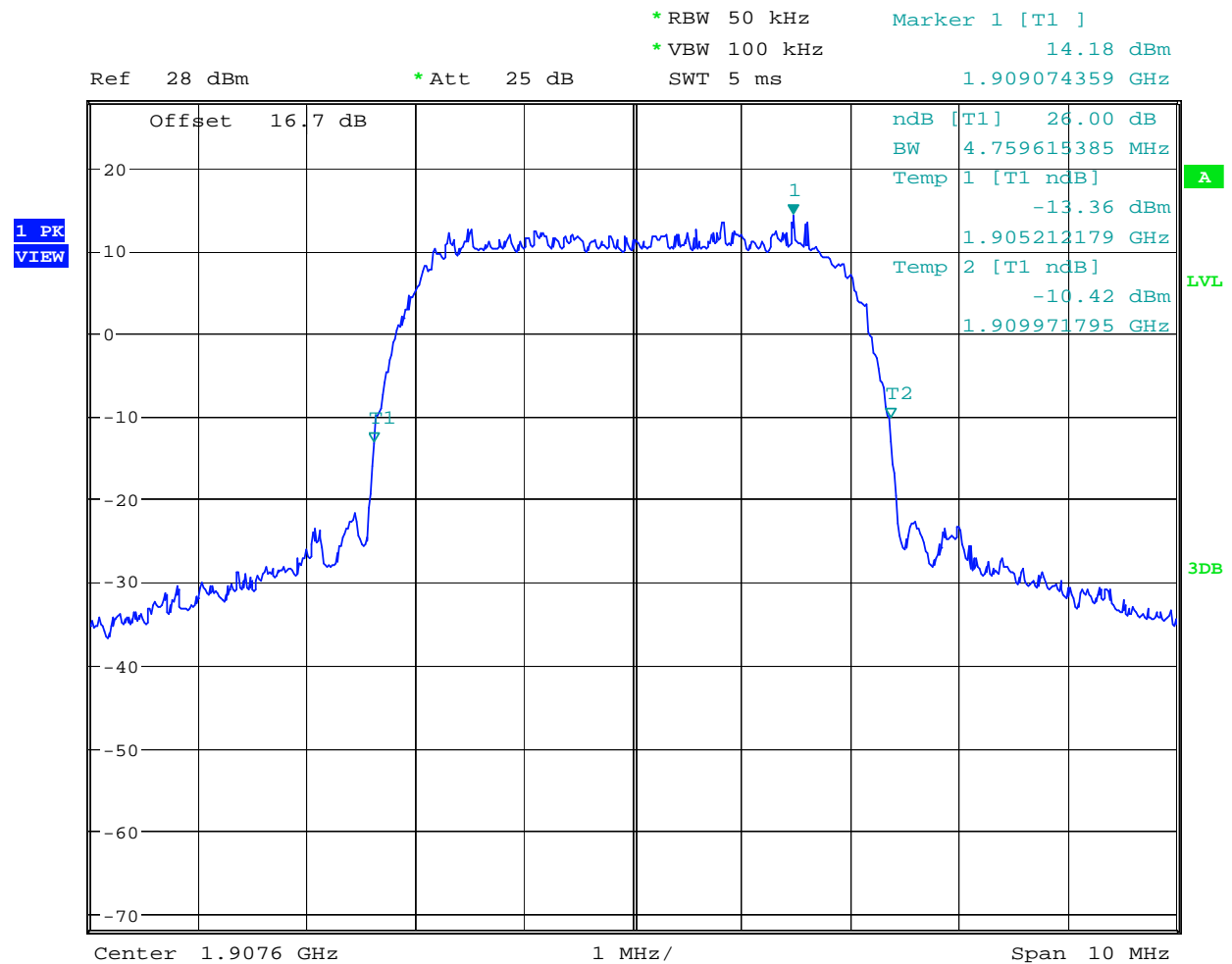
Date: 24.JUL.2009 10:56:09

**Emission band Width UMTS FDD2 Channel 9262**

Date: 24.JUL.2009 12:47:52

**Emission band Width UMTS FDD2 Channel 9400**

Date: 24.JUL.2009 12:47:05

**Emission band Width UMTS FDD2 Channel 9538**

Date: 24.JUL.2009 12:13:45

### 5.3 Frequency Stability

#### 5.3.1 Limit

**For Hand carried battery powered equipment:**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.2VDC and 4.5VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -2.7% and +21.62%. For the purposes of measuring frequency stability these voltage limits are to be used.

**Method of Measurement:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU 200 UNIVERSAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30 C.
3. With the EUT, powered via nominal voltage, connected to the CMU 200 and in a simulated call on mid channel (190 for GSM 850 & 4183 for FDD5 & 661 for PCS-1900&9400 for FDD2), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10 C increments from -30 C to +50 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1 Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours un-powered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50 C.
7. With the EUT, powered via nominal voltage, connected to the CMU 200 and in a simulated call on mid channel (190 for GSM 850 & 4183 for FDD5 & 661 for PCS-1900&9400 for FDD2), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50 C to -30 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

**For equipment powered by primary supply voltage:**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

For this EUT section 2.1055(d)(1) applies. This requires to vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.



### 5.3.2 Test Results Frequency Stability (GSM-850)

Channel No. 190	836.6MHz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:3.23	3	0.0036
High vol.:4.37	-10	-0.0119

### §2.1055 (a)(1)

#### AFC FREQ ERROR vs. TEMPERATURE

Channel No. 190	836.6MHz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	-11	-0.0131
-20	-10	-0.0119
-10	-5	-0.00598
0	-14	-0.0167
+10	-9	-0.01076
+20	-12	-0.014
+30	-10	-0.0119
+35	-11	-0.0131
+50	-10	-0.0119

### §2.1055 (b)(2)

#### Battery end point

Channel No. 190	836.6MHz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
3.13 V	-1	-1.1953

### 5.3.3 Test Results Frequency Stability (GSM-1900)

Channel No. 661	1880MHz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:3.23	-9	-0.00479
High vol.:4.37	-11	-0.0059

### §2.1055 (a)(1)

#### AFC FREQ ERROR vs. TEMPERATURE

Channel No. 661	1880MHz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	-29	-0.0154
-20	-12	-0.00638
-10	-9	-0.00479
0	-18	-0.0096
+10	-12	-0.00638
+20	-13	-0.0069
+30	-5	-0.0265
+35	-8	-0.00425
+50	-14	-0.00745

### §2.1055 (b)(2)

#### Battery end point

Channel No. 661	1880MHz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
3.14V	-7	-0.00372

### 5.3.4 Test Results Frequency Stability (UMTS FDD5)

Channel No. 4183	836.6Hz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:3.23	-9	-0.01076
High vol.:4.37	27	0.0323

### §2.1055 (a)(1)

#### AFC FREQ ERROR vs. TEMPERATURE

Channel No. 4183	836.6Hz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	-32	-0.0383
-20	24	0.0287
-10	26	0.0311
0	13	0.0155
+10	26	0.0311
+20	-16	0.0191
+30	6	0.0072
+35	23	0.0275
+50	-16	0.0191

### §2.1055 (b)(2)

#### Battery end point

Channel No. 4183	836.6Hz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
3.14	-16	0.0191

### 5.3.5 Test Results Frequency Stability (UMTS FDD2)

Channel No. 9400	1880MHz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:3.23	-28	-0.014
High vol.:4.37	16	0.0085

### §2.1055 (a)(1)

#### AFC FREQ ERROR vs. TEMPERATURE

Channel No. 9400	1880MHz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	-32	-0.017
-20	-20	-0.0106
-10	-32	-0.017
0	-31	-0.016
+10	-28	-0.014
+20	16	0.0085
+30	-31	-0.016
35	-29	-0.0154
+50	-26	-0.0138

### §2.1055 (b)(2)

#### Battery end point

Channel No. 9400	1880MHz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
3.14	-25	0.0133

## **5.4 Spurious Emissions Conducted**

### **5.4.1 FCC 2.1051 Measurements required: Spurious emissions at antenna terminals.**

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in FCC 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

### **5.4.2 Limits:**

#### **5.4.2.1 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 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.

#### **5.4.2.2 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.

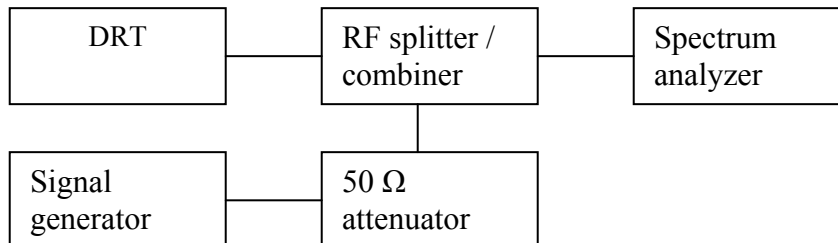
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

#### **5.4.3 Conducted out of band emissions measurement procedure:**

**Based on TIA-603C 2004**

##### **2.2.13 Unwanted Emissions: Conducted Spurious**



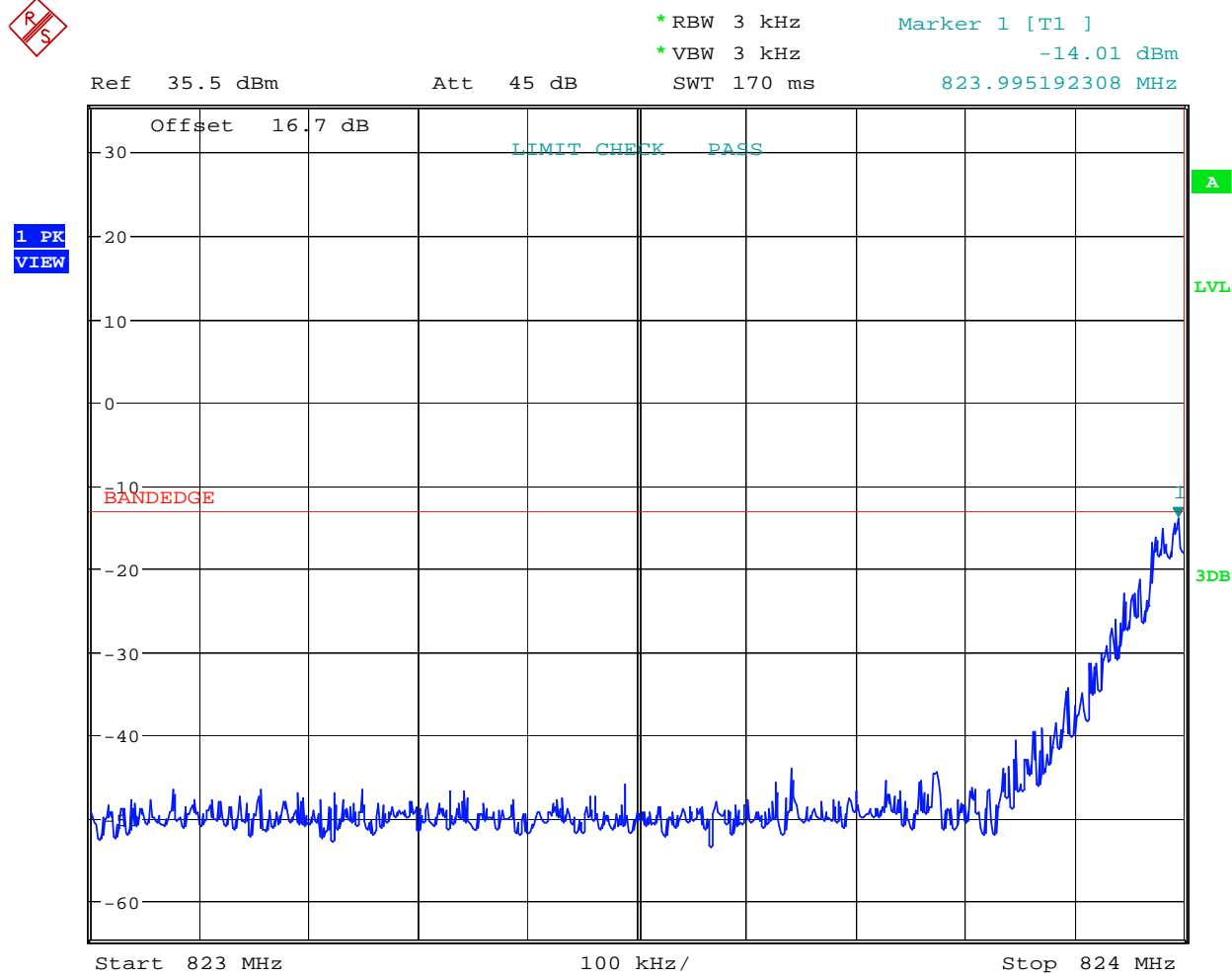
1. Connect the equipment as shown in the above diagram.
2. Set the spectrum analyzer to measure peak hold with the required settings.
3. Set the signal generator to a known output power and record the path loss in dB (**LOSS**) for frequencies up to the tenth harmonic of the EUT's carrier frequency. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
4. Replace the signal generator with the EUT.
5. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
6. Set the spectrum analyzer to measure peak hold with the required settings. Offset the spectrum analyzer reference level by the path loss measured above.
7. Measure and record all spurious emissions up to the tenth harmonic of the carrier frequency.
8. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
9. If necessary steps 6 and 7 may be performed with the spectrum analyzer set to average detector.

**(note:** Step 3 above is performed prior to testing and **LOSS** is recorded by test software. Steps 2, 6, and 7 above are performed with test software.)

#### **5.4.4 Test Results: Conducted Out of band Emission:**

No measurable emissions noted. See plots.

All measurement conducted in GSM and UMTS mode with highest power settings. Plots here show worse case emission for each channel under any modulation.

**Lower Band Edge GSM850 GSM**

Date: 3.JUL.2009 17:48:26

## Upper Band Edge GSM850 GSM



\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 3 kHz

-15.91 dBm

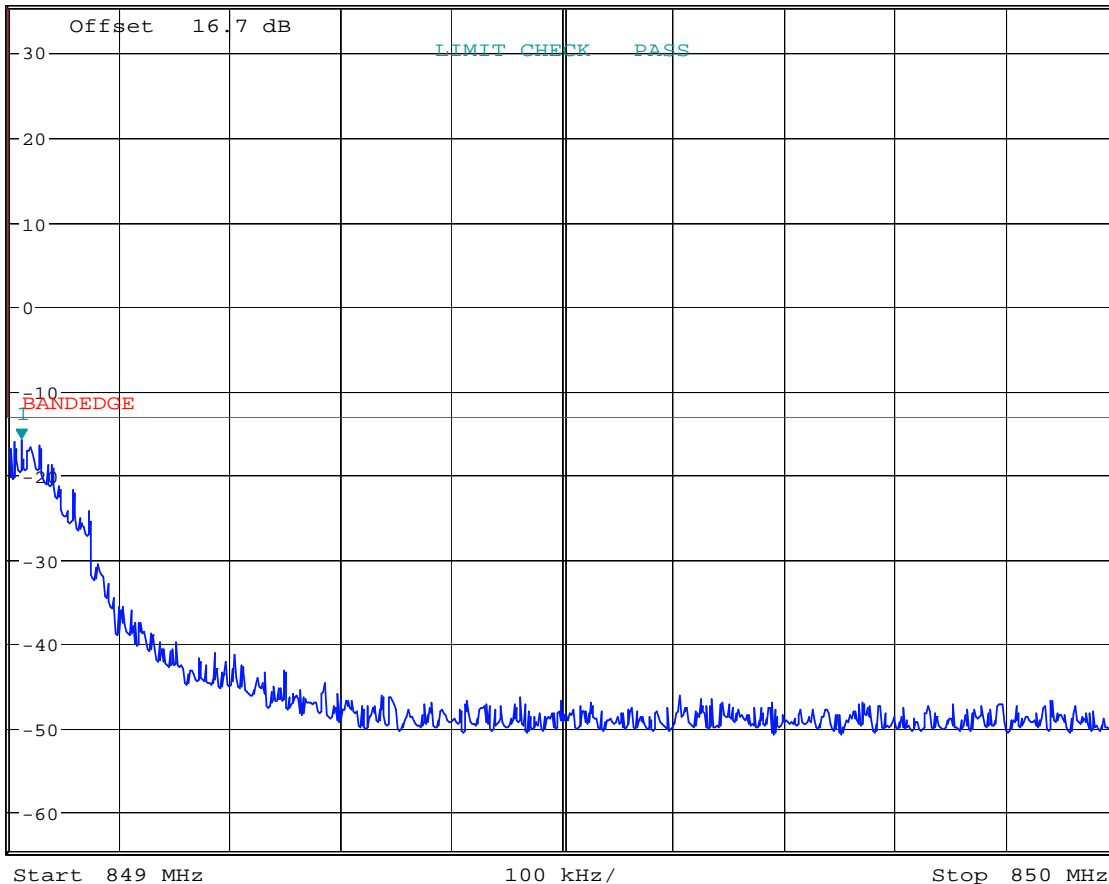
Ref 35.5 dBm

Att 45 dB

SWT 170 ms

849.011217949 MHz

1 PK  
VIEW



Date: 3.JUL.2009 17:50:33



**Lower Band Edge GSM850 EGPRS**

\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 3 kHz

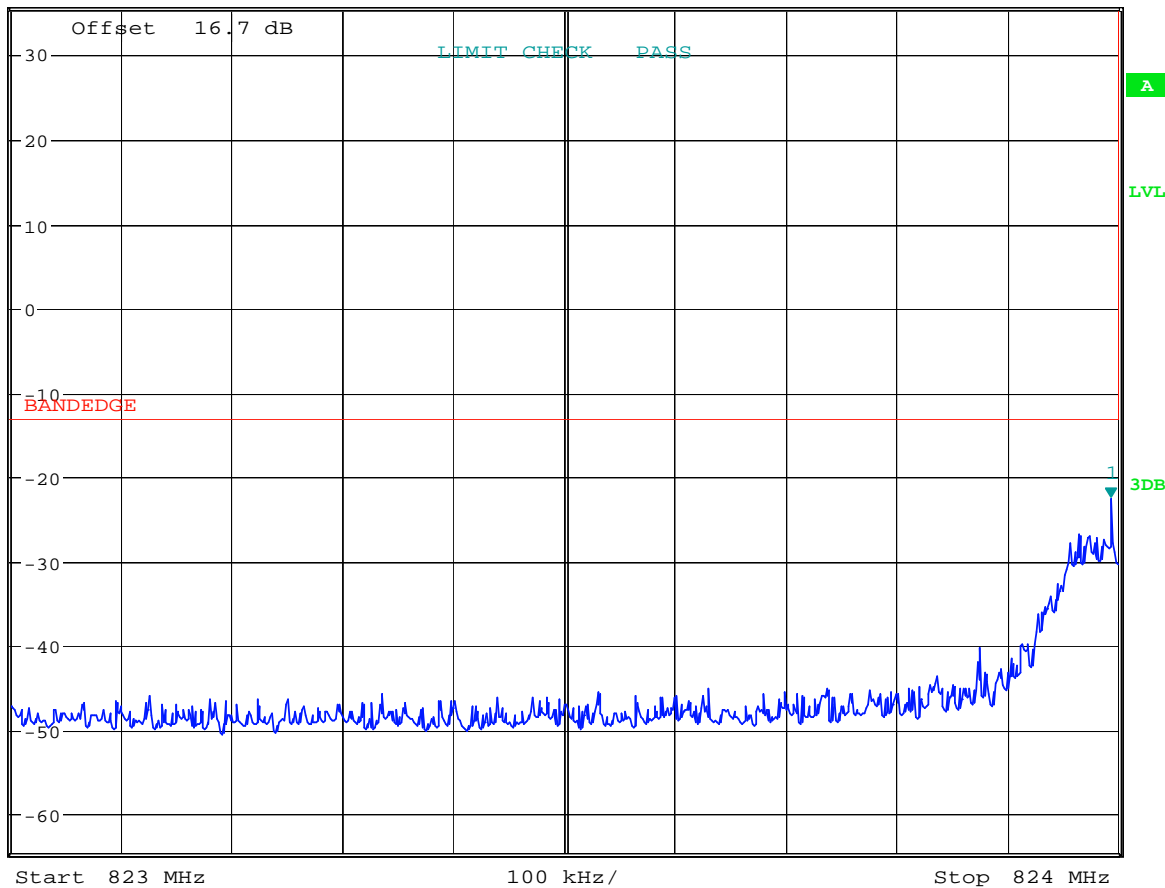
-22.54 dBm

Ref 35.5 dBm

Att 45 dB

SWT 170 ms

823.993589744 MHz

1 PK  
VIEW

Date: 3.JUL.2009 17:54:24

## Upper Band Edge GSM850 EGPRS



\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 3 kHz

-21.31 dBm

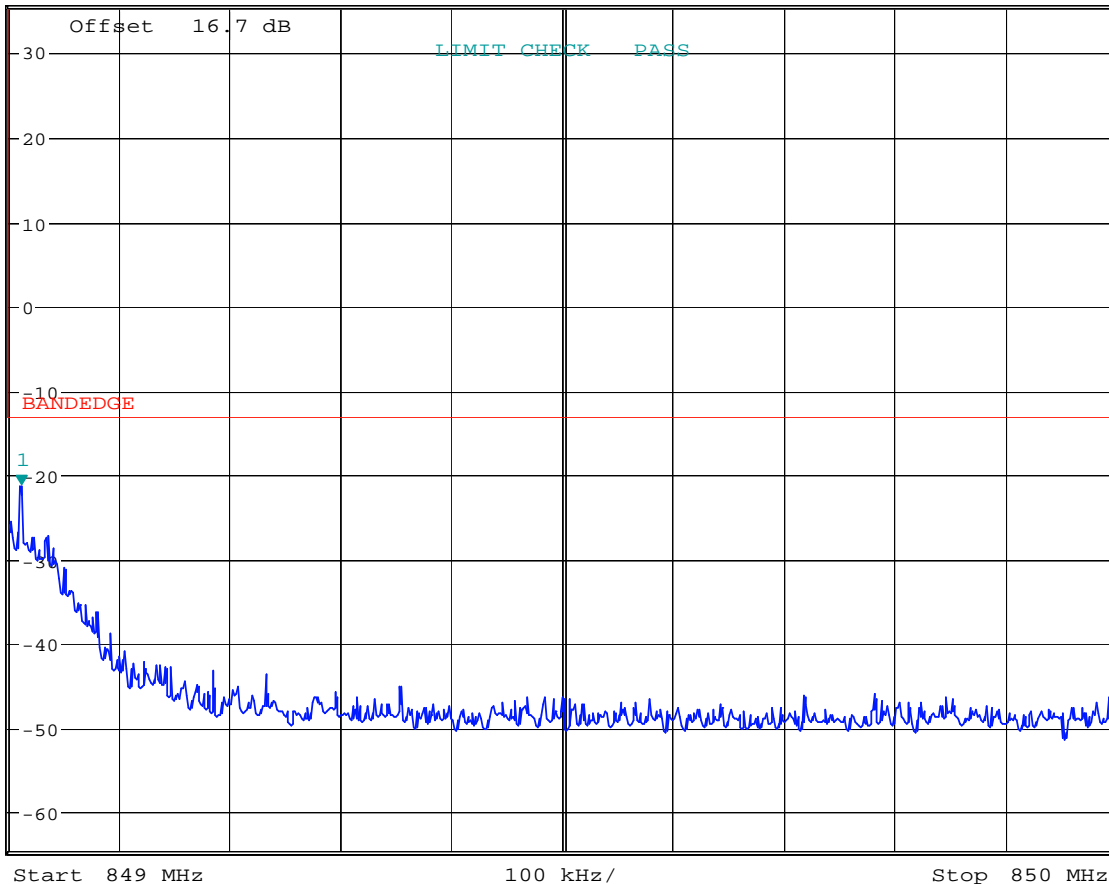
Ref 35.5 dBm

Att 45 dB

SWT 170 ms

849.011217949 MHz

1 PK  
VIEW

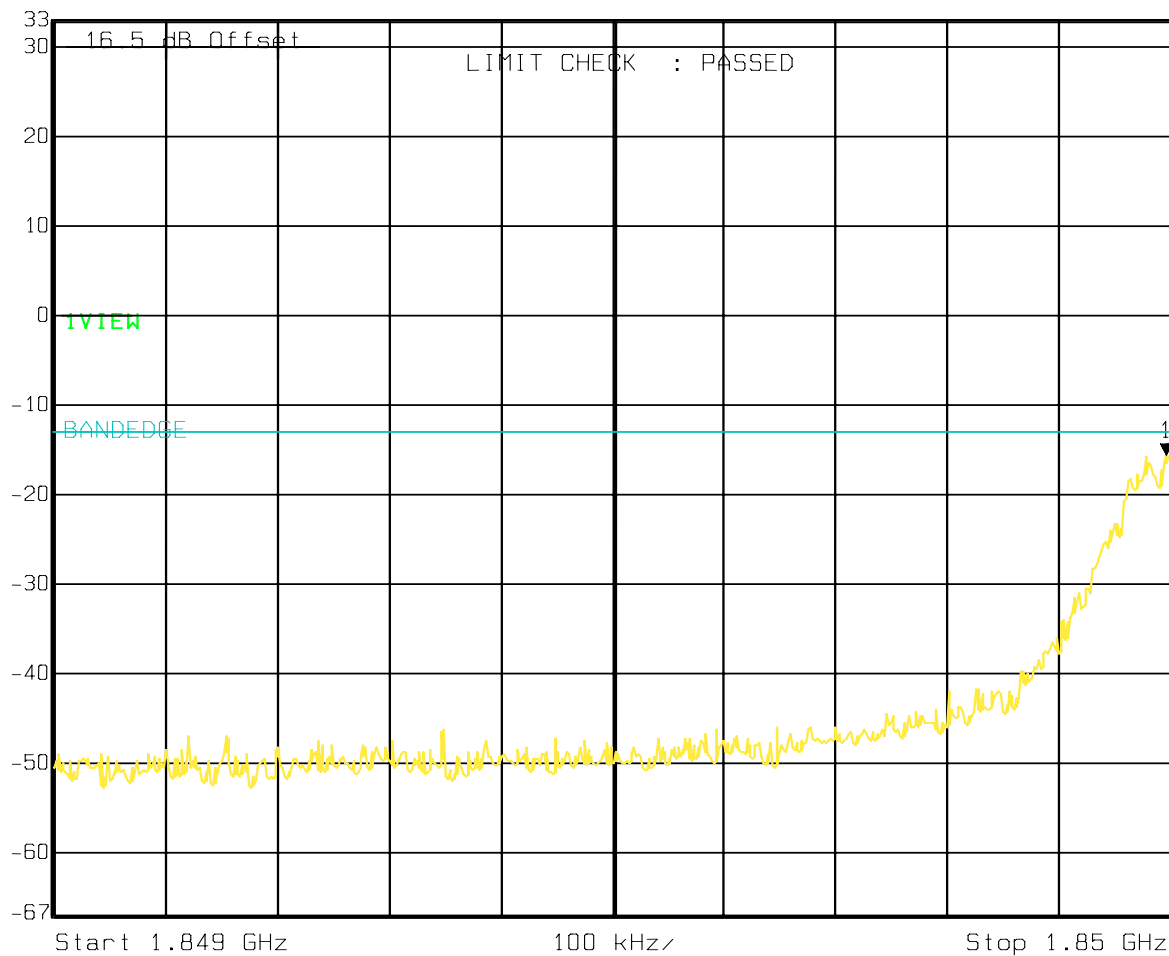


Date: 3.JUL.2009 17:53:29

# Lower Band Edge GSM1900 GSM



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
 Ref Lvl -15.67 dBm VBW 3 kHz  
 33 dBm 1.84999599 GHz SWT 280 ms Unit dBm



Date: 05.NOV.2009 12:12:21

## Upper Band Edge GSM1900 GSM



\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 3 kHz

-16.53 dBm

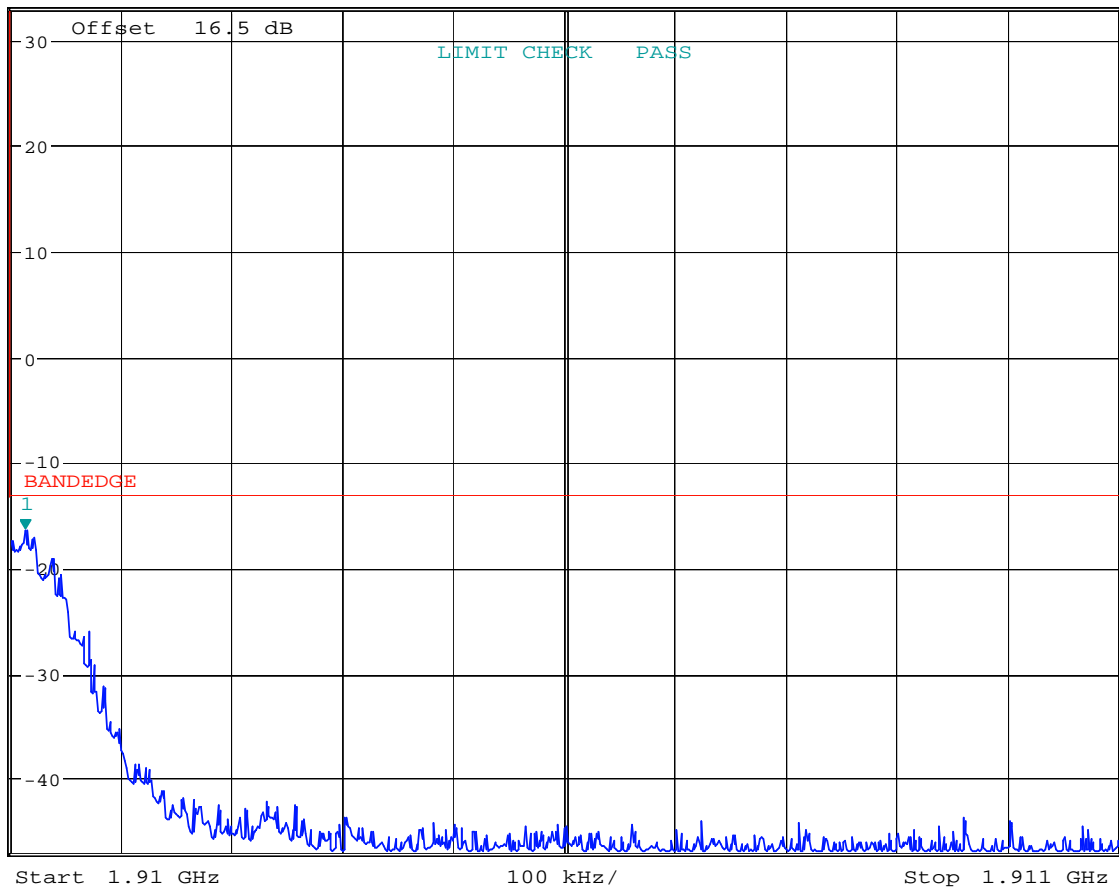
SWT 170 ms

1.910012821 GHz

Ref 33 dBm

Att 45 dB

1 PK  
VIEW



Date: 8.JUL.2009 16:03:16

**Lower Band Edge GSM1900 EGPRS**

\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 3 kHz

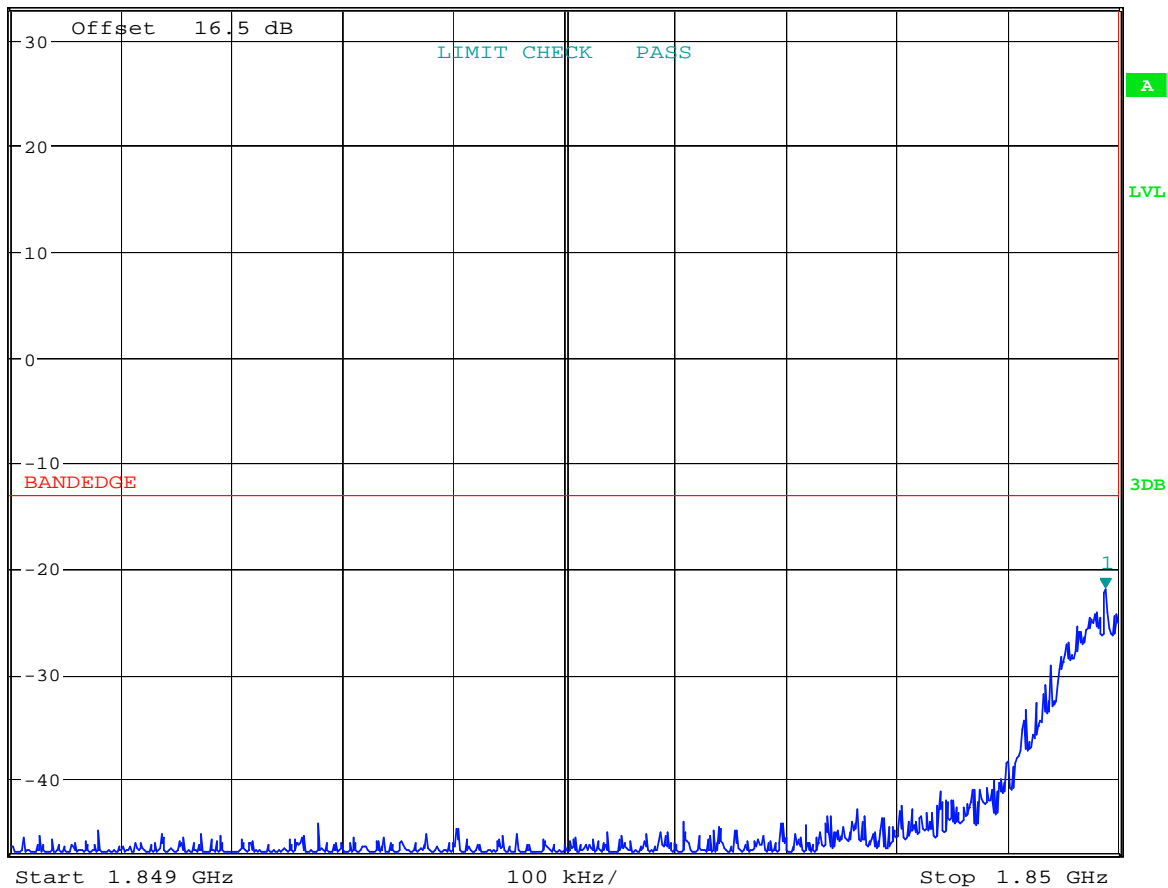
-22.08 dBm

Ref 33 dBm

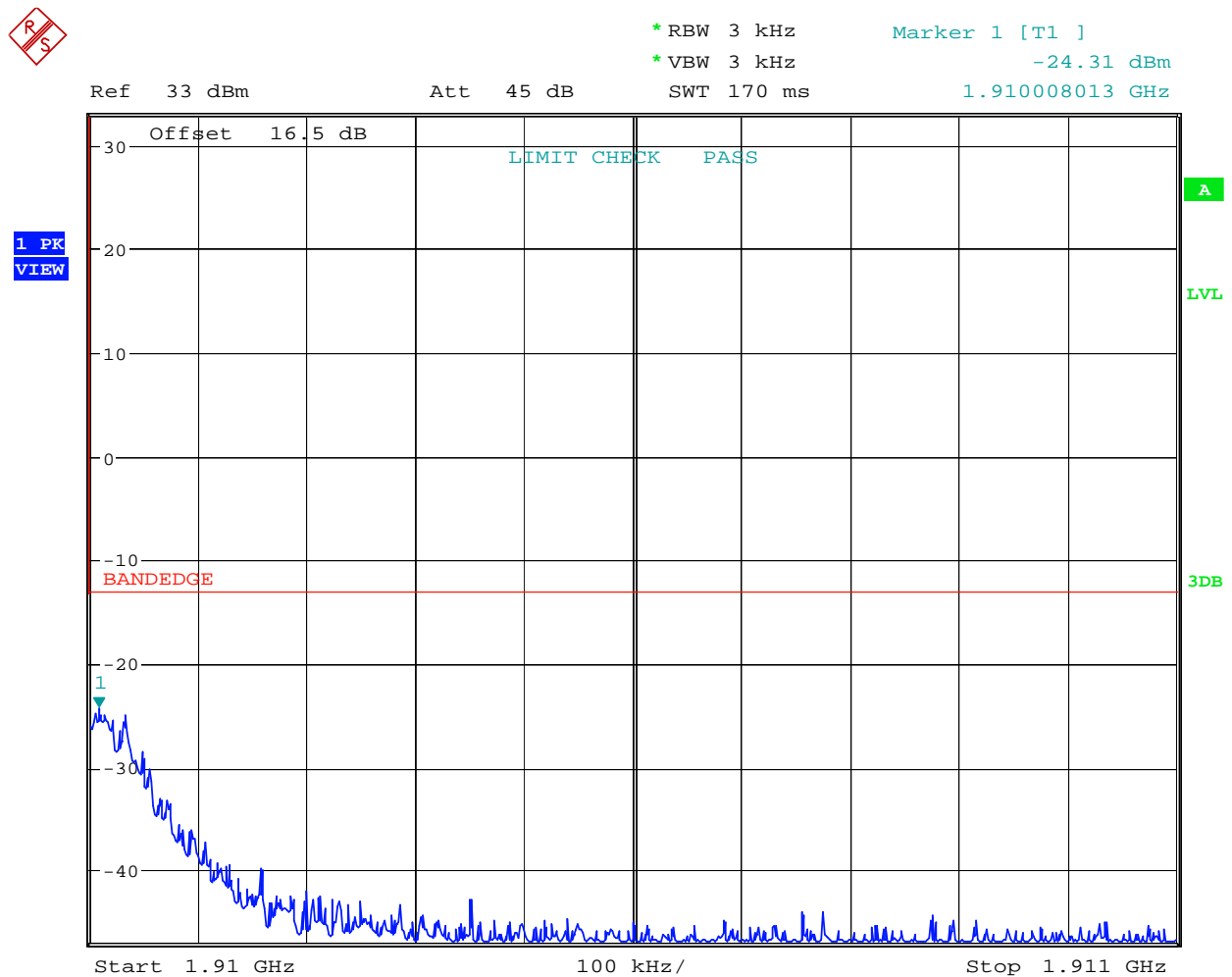
Att 45 dB

SWT 170 ms

1.849988782 GHz

1 PK  
VIEW

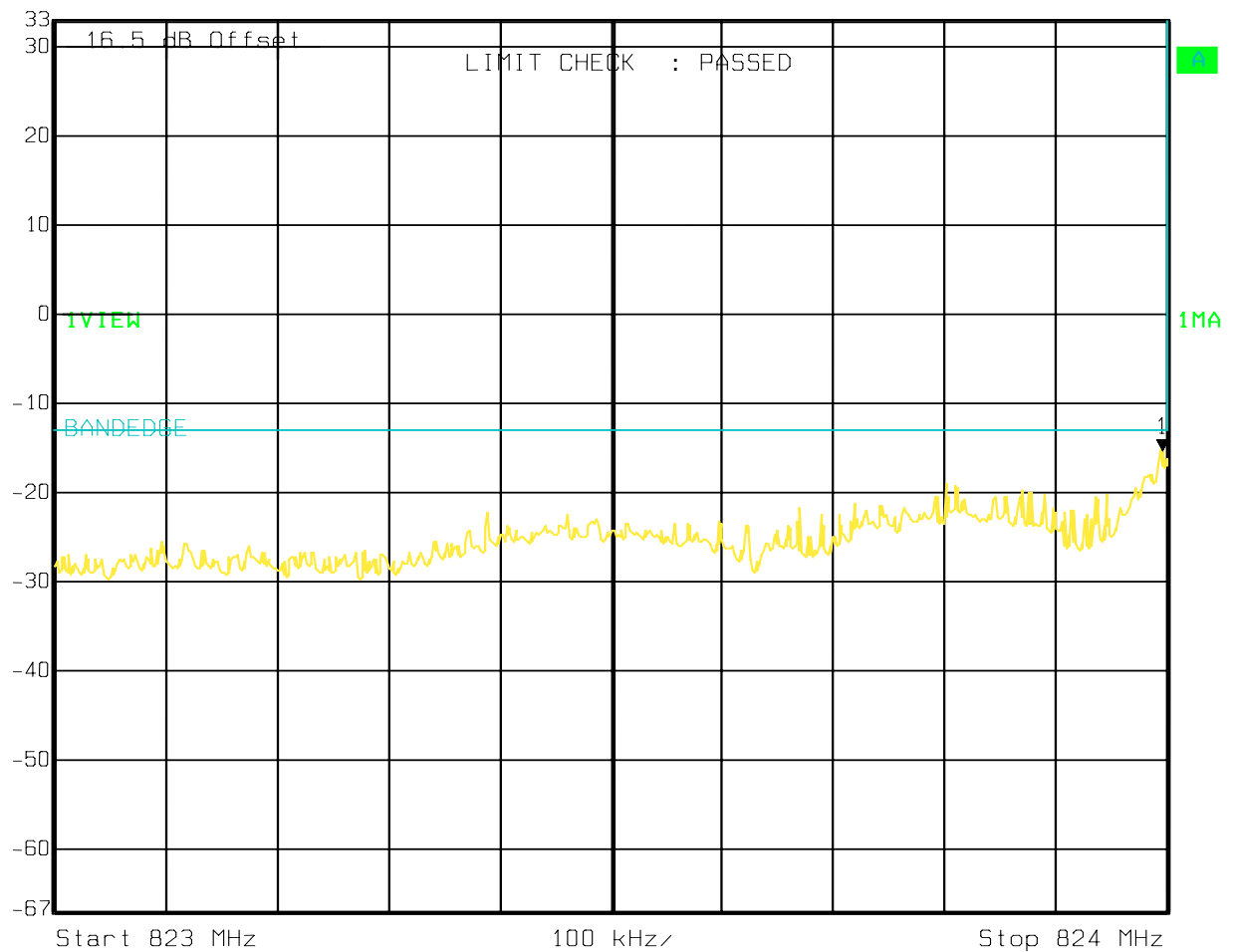
Date: 8.JUL.2009 16:42:28

**Upper Band Edge GSM1900 EGPRS**

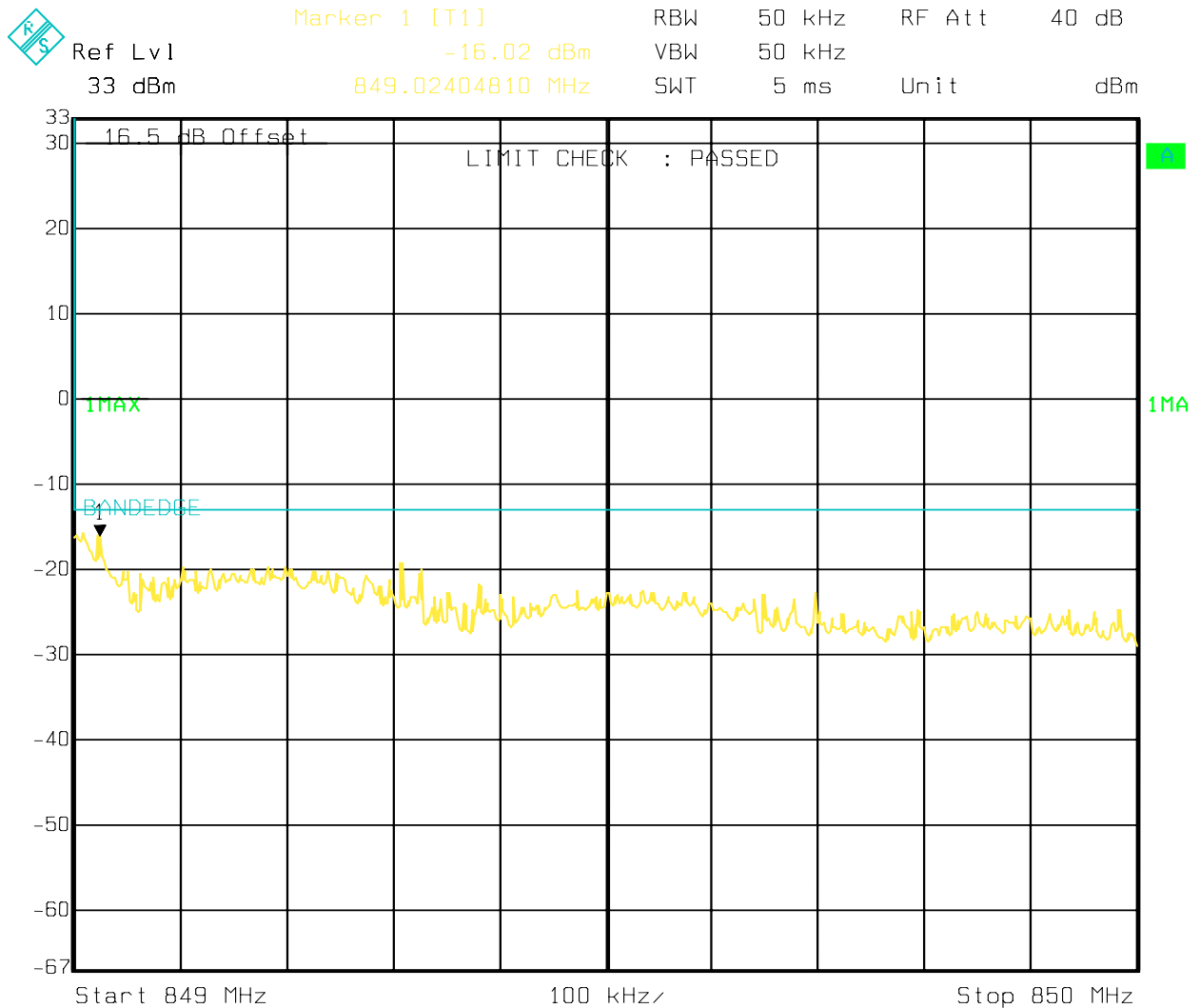
Date: 8.JUL.2009 16:44:08

**Lower Band Edge UMTS FDD5**

 Marker 1 [T1] RBW 50 kHz RF Att 40 dB  
Ref Lvl -15.34 dBm VBW 50 kHz  
33 dBm 823.99599198 MHz SWT 5 ms Unit dBm



Date: 05.NOV.2009 12:48:47

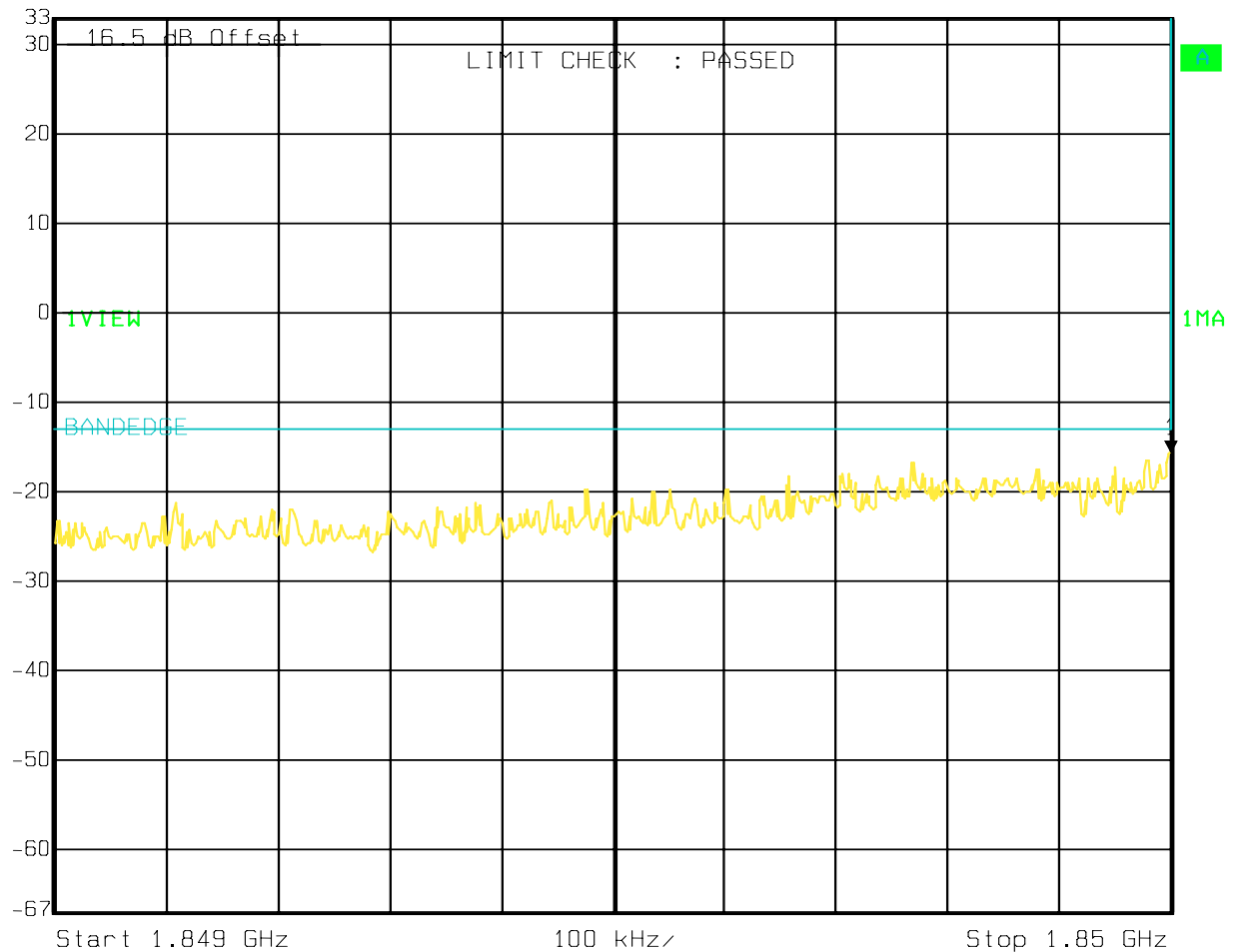
**Upper Band Edge UMTS FDD5**

Date: 05.NOV.2009 12:51:30

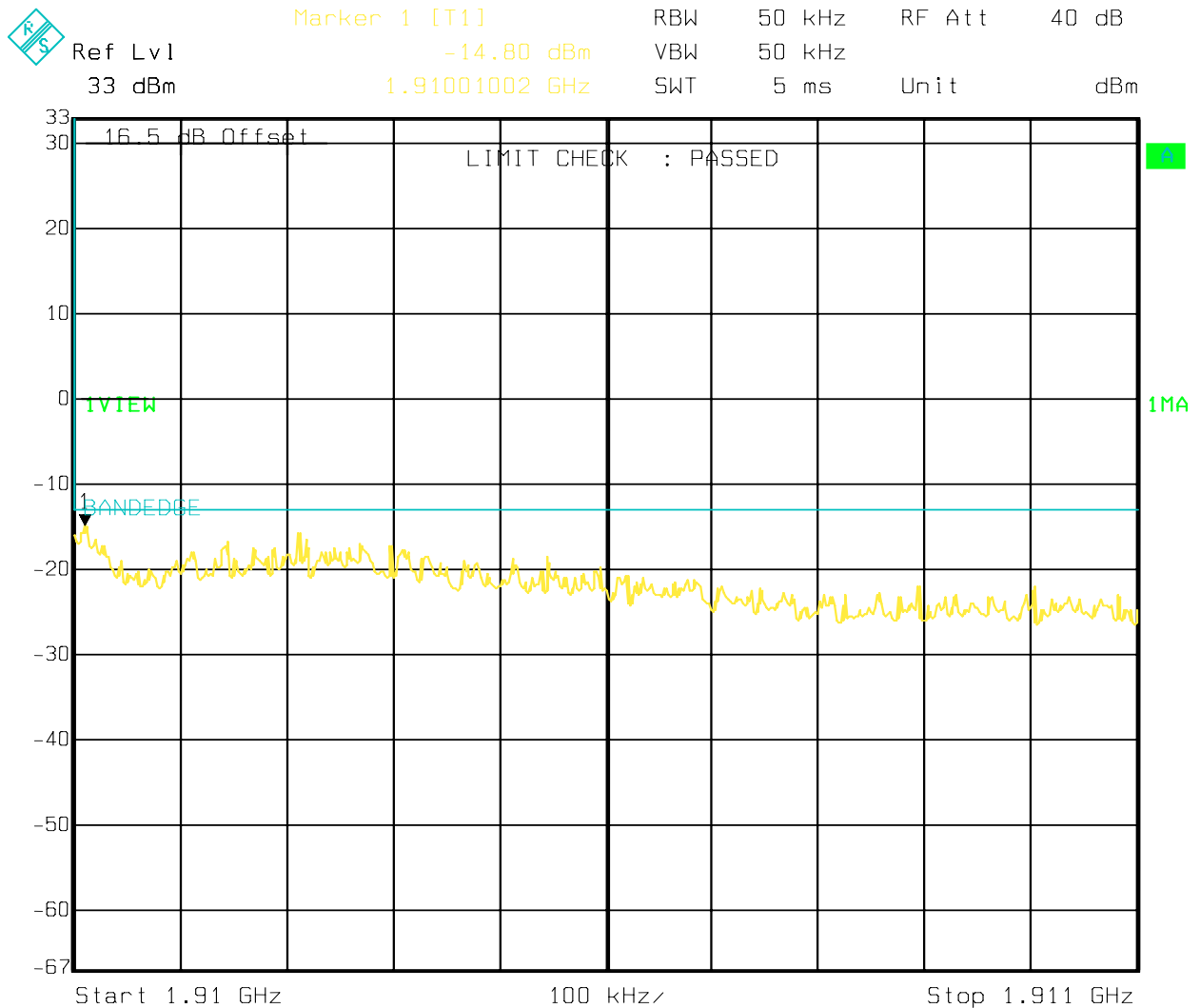


**Lower Band Edge UMTS FDD2**

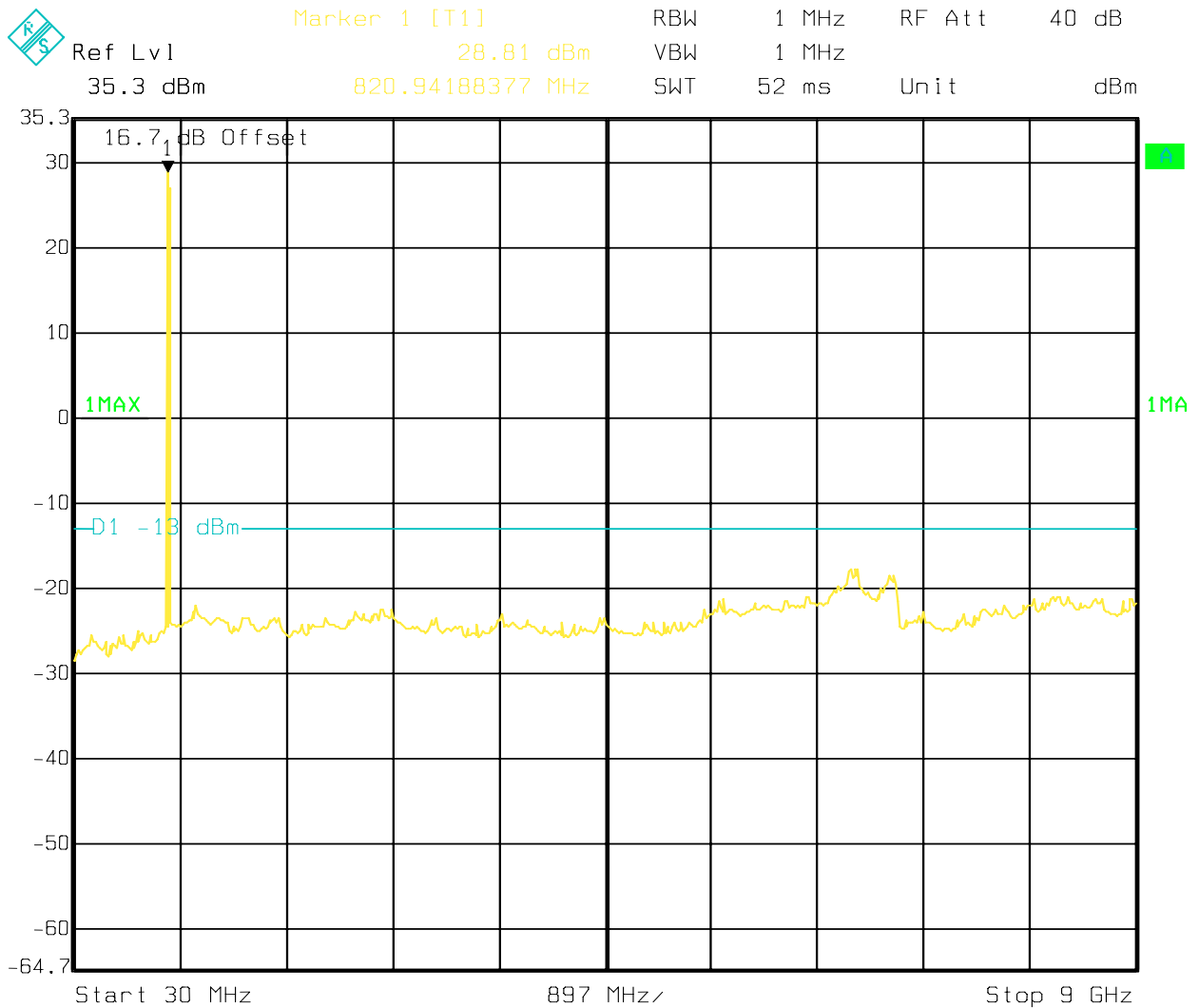
Marker 1 [T1] RBW 50 kHz RF Att 40 dB  
Ref Lvl -15.59 dBm VBW 50 kHz  
33 dBm 1.85000000 GHz SWT 5 ms Unit dBm



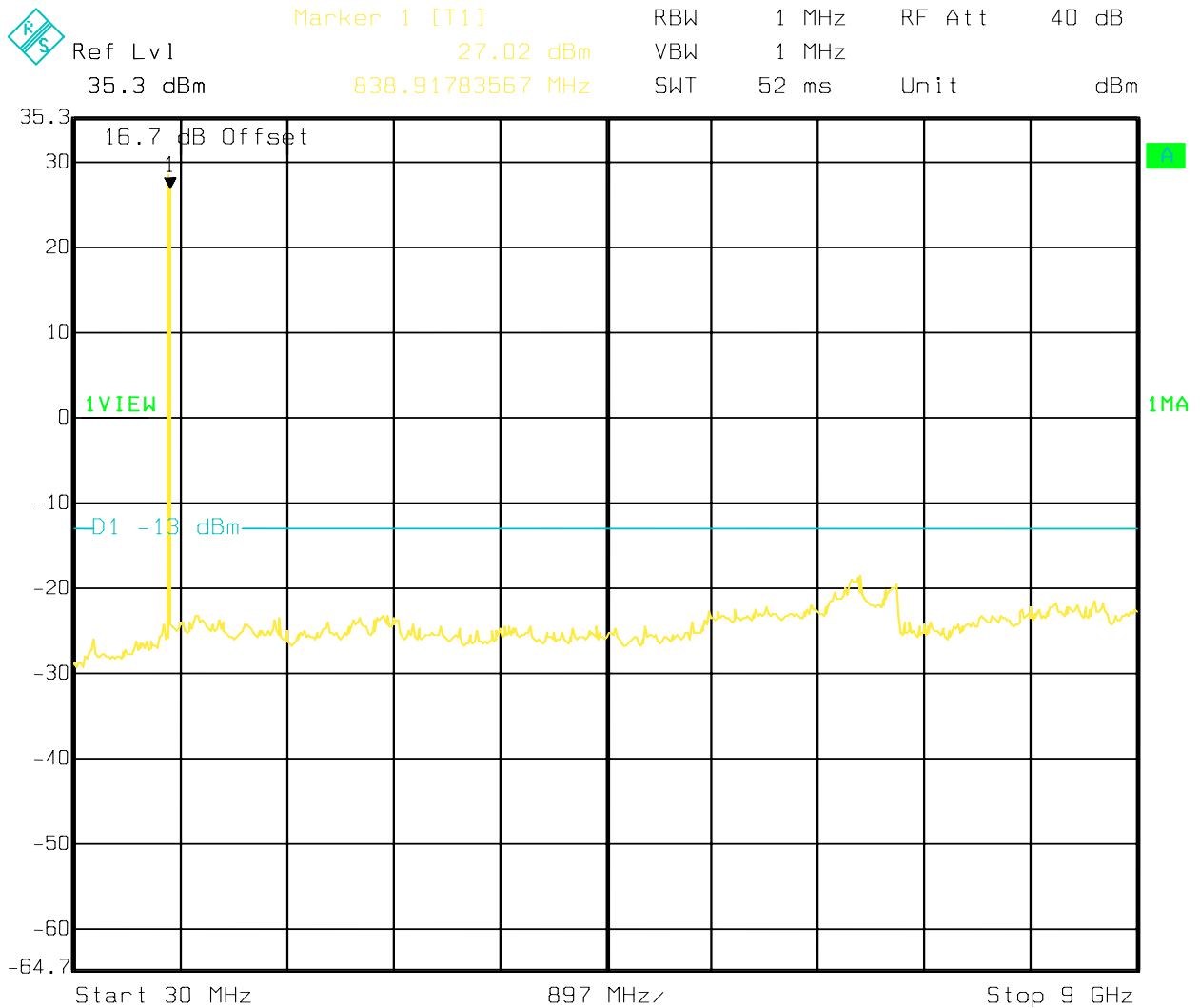
Date: 05.NOV.2009 14:20:08

**Upper Band Edge UMTS FDD2**

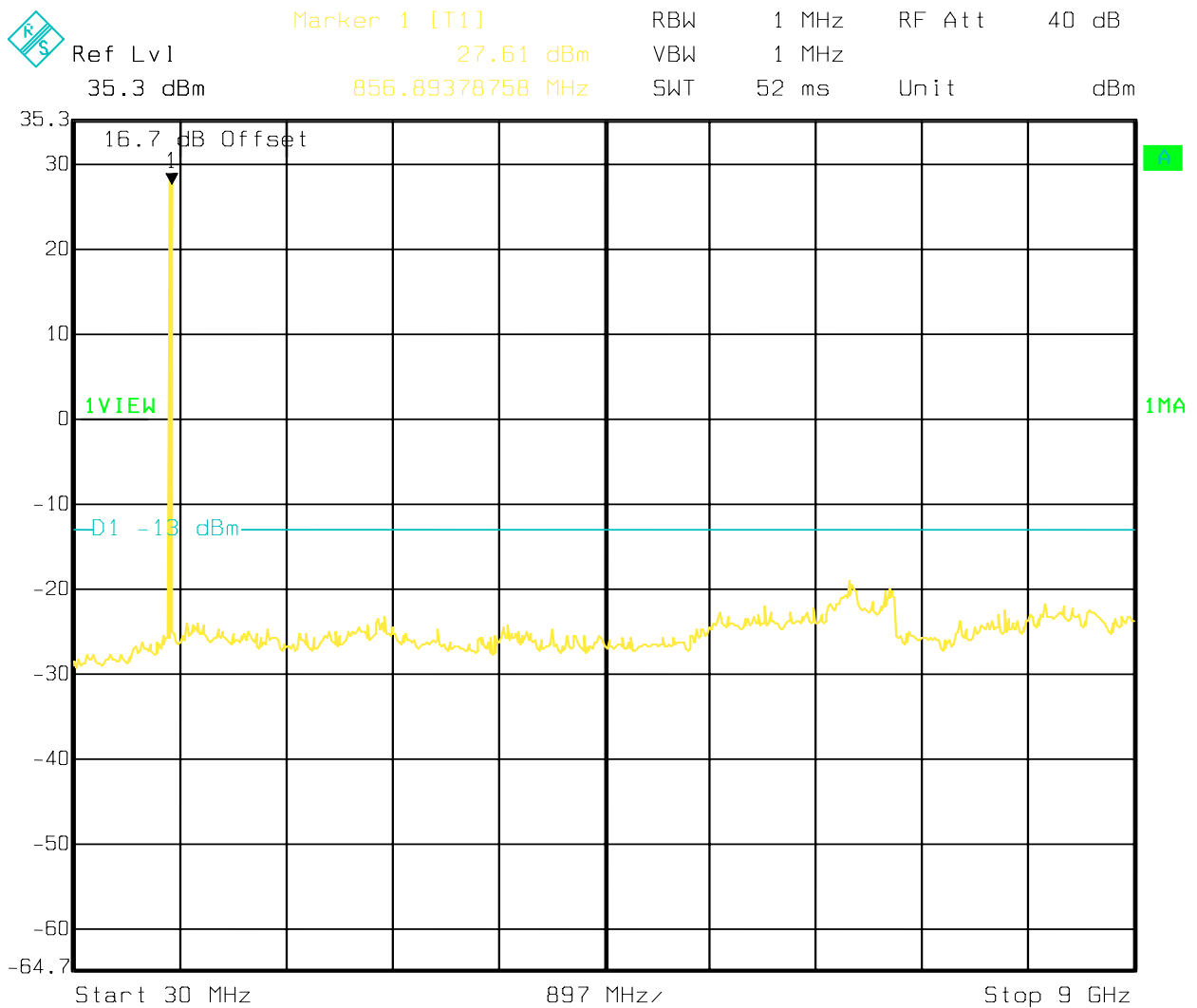
Date: 05.NOV.2009 13:14:12

**Conducted Out of band Emission GSM850 channel 128:****(Note that emission above limit is mobile station uplink.)**

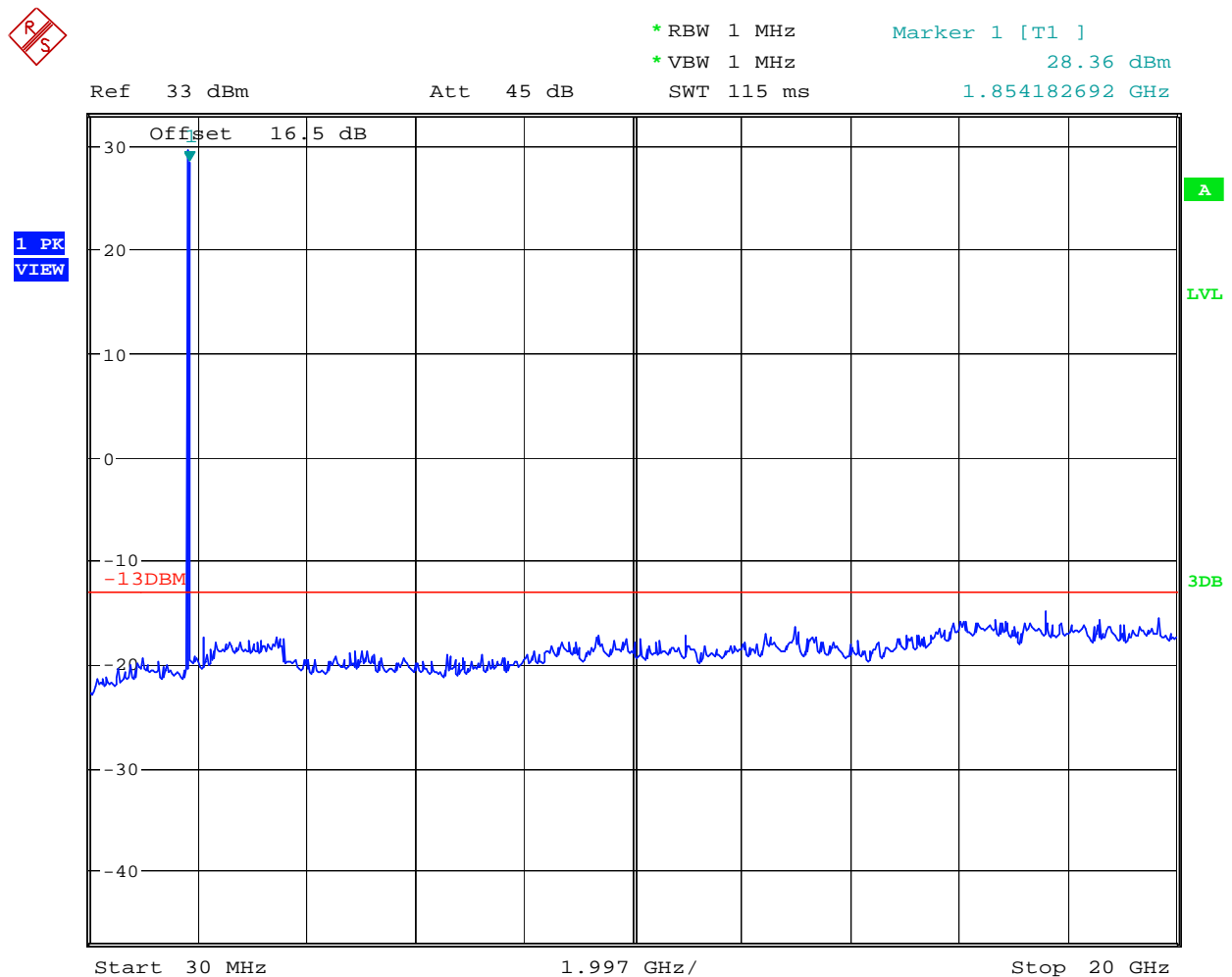
Date: 03.JUL.2009 13:10:56

**Conducted Out of band Emission GSM850 channel 190:**  
**(Note that emission above limit is mobile station uplink.)**

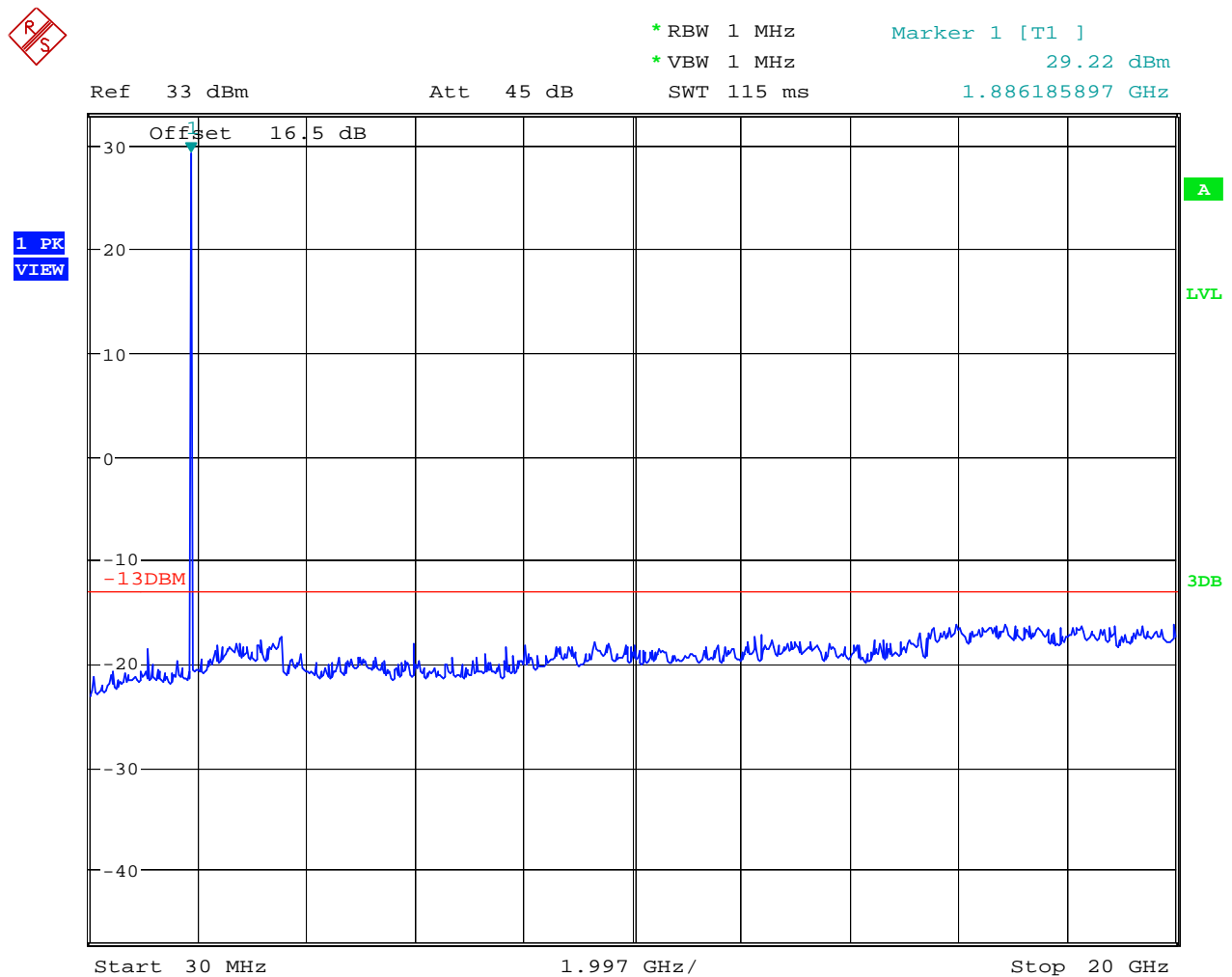
Date: 03.JUL.2009 13:12:57

**Conducted Out of band Emission GSM850 channel 251:****(Note that emission above limit is mobile station uplink.)**

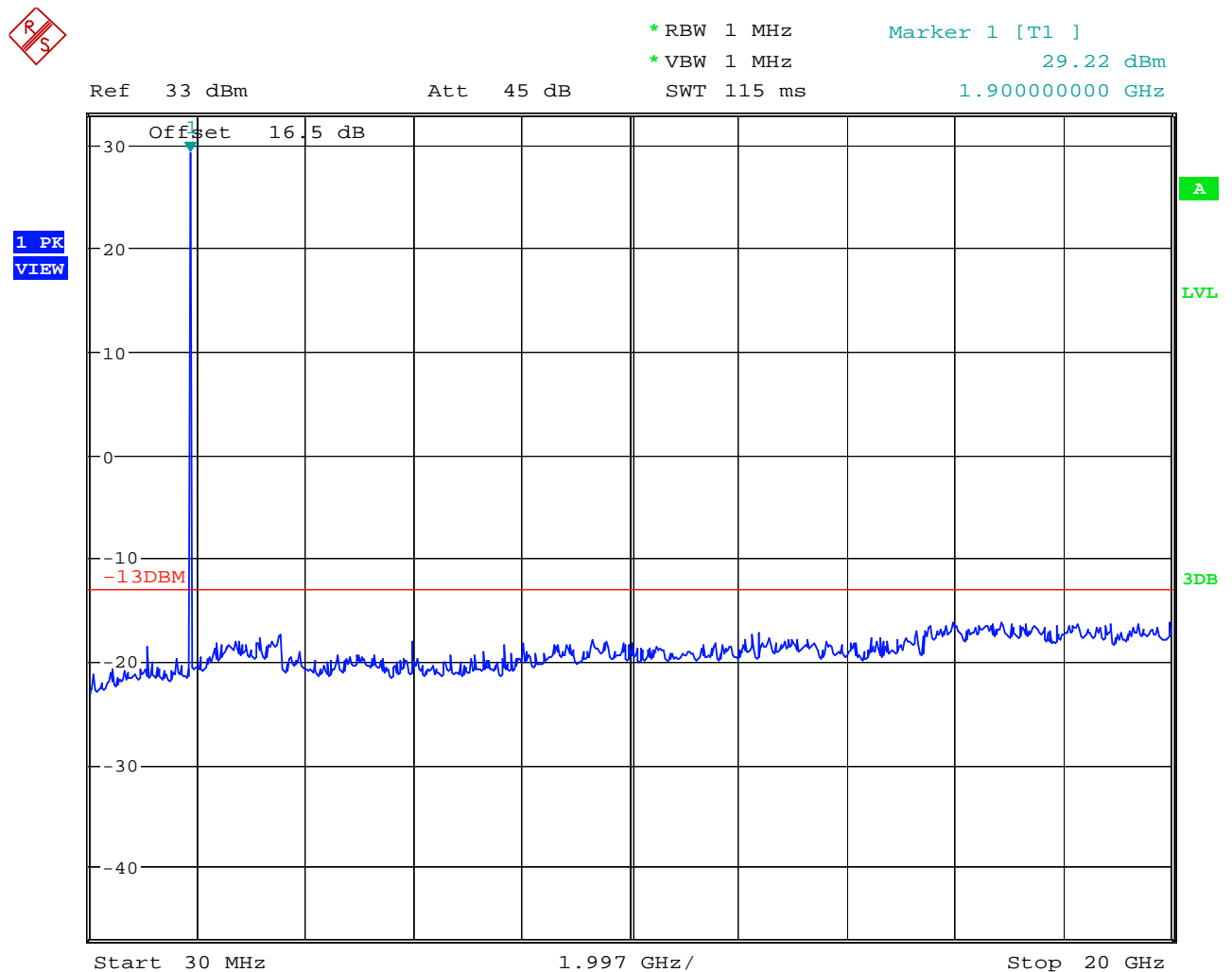
Date: 03.JUL.2009 13:14:35

**Conducted Out of band Emission GSM1900 channel 512:****(Note that marked emission is mobile station uplink.)**

Date: 8.JUL.2009 16:35:19

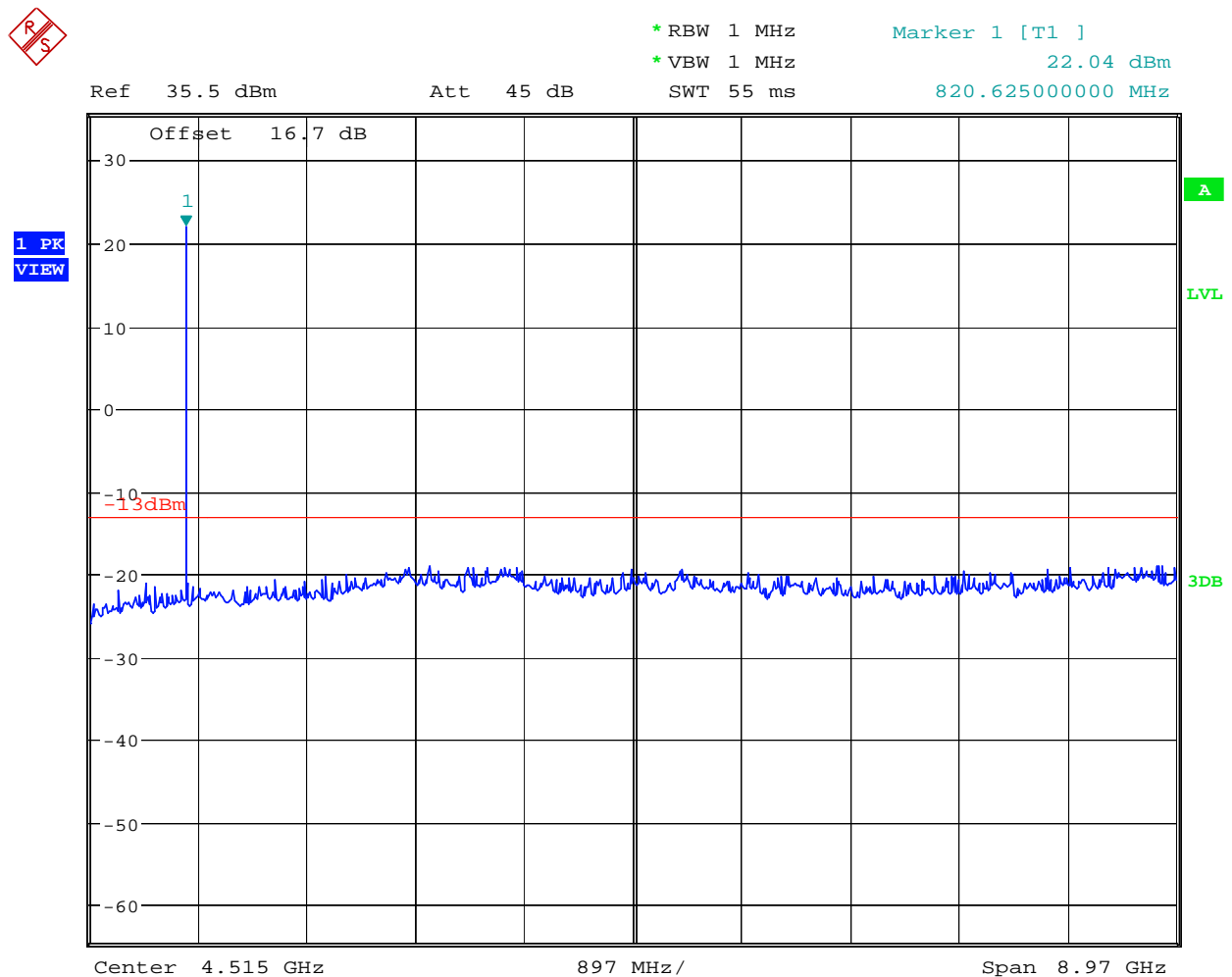
**Conducted Out of band Emission GSM1900 channel 661:****(Note that emission above limit is mobile station uplink.)**

Date: 8.JUL.2009 16:37:05

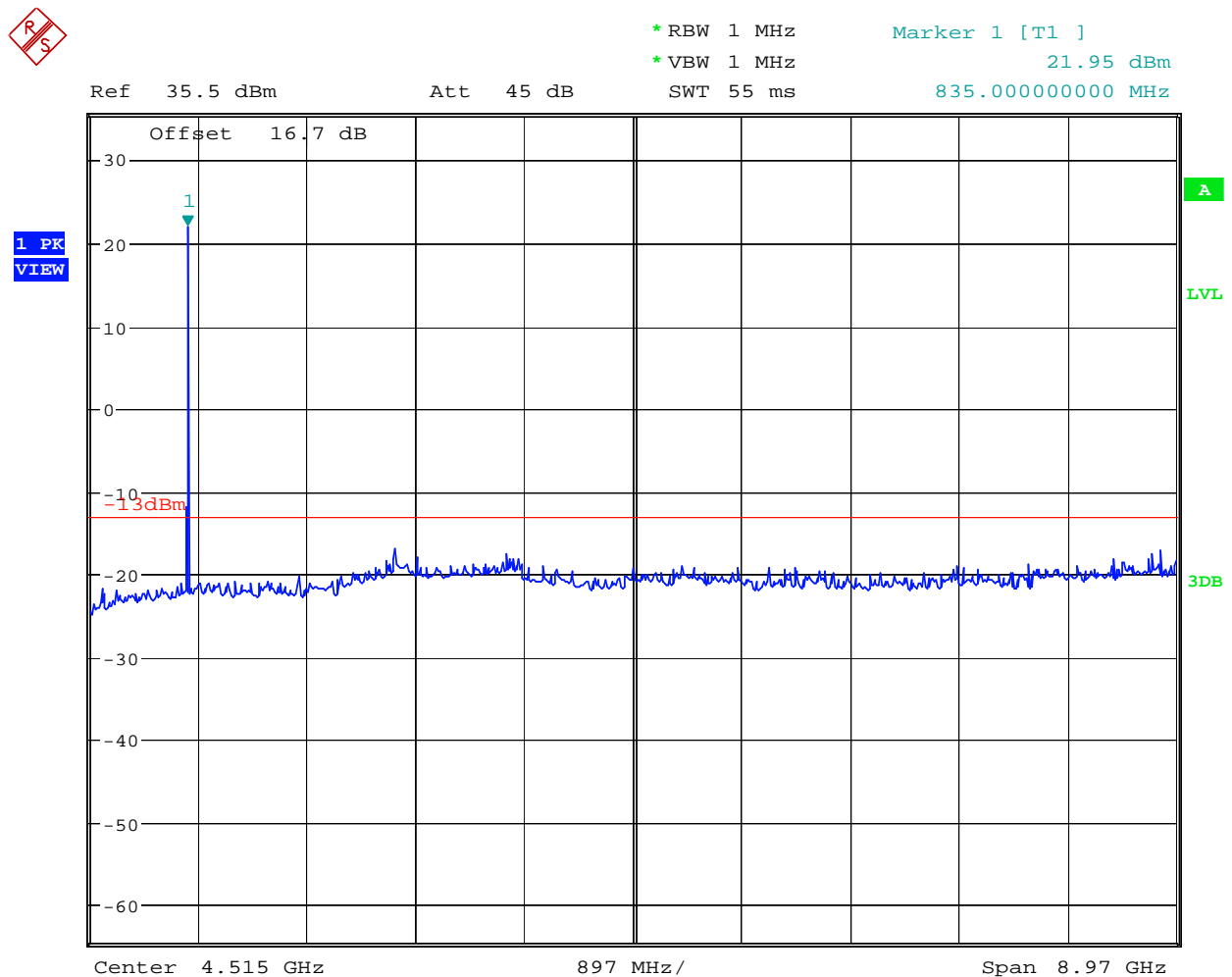
**Conducted Out of band Emission GSM1900 channel 810:****(Note that emission above limit is mobile station uplink.)**

Date: 8.JUL.2009 16:37:54



**Conducted Out of band Emission UMTS FDD5 channel 4132:****(Note that emission above limit is mobile station uplink.)**

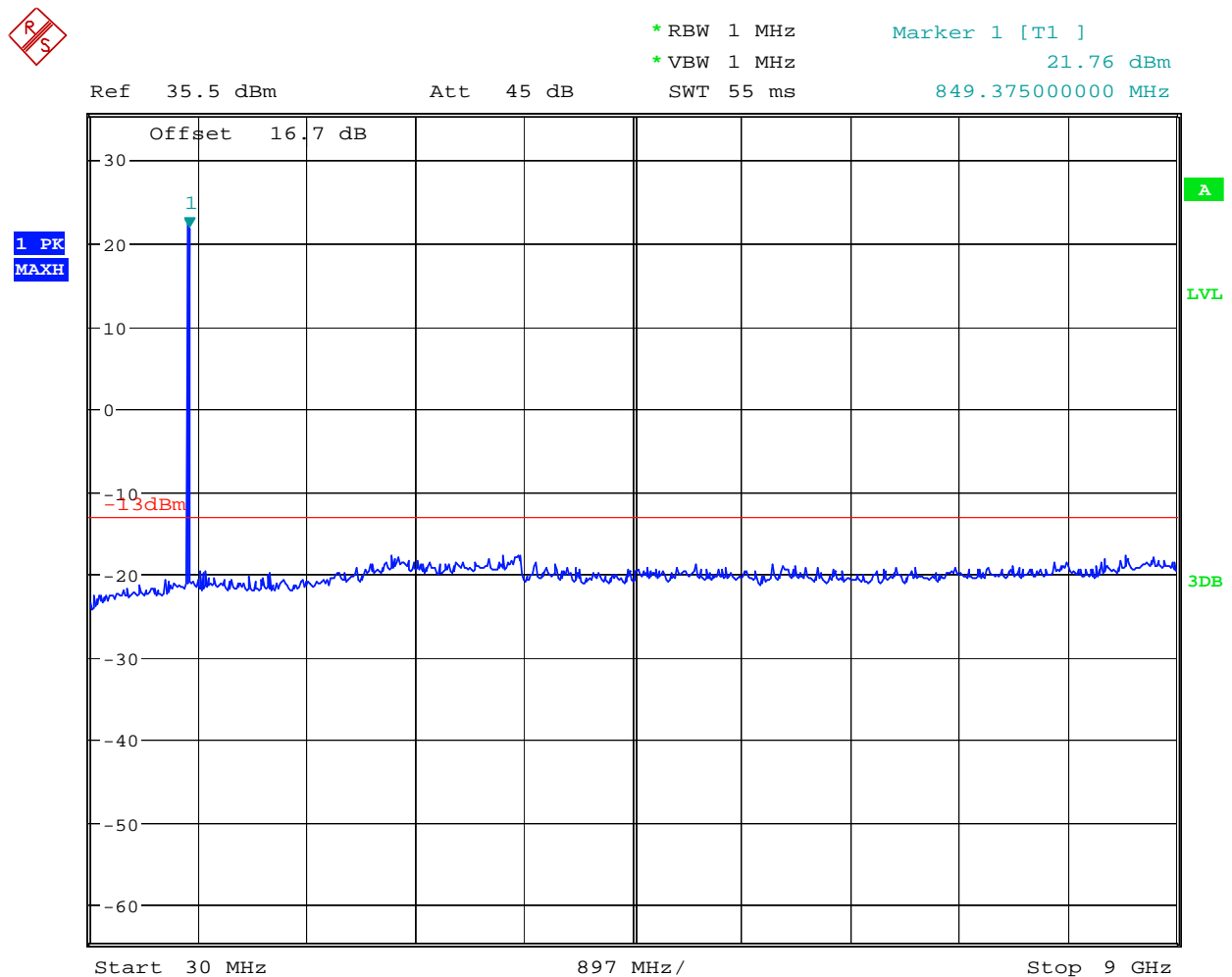
Date: 3.JUL.2009 18:22:42

**Conducted Out of band Emission UMTS FDD5 channel 4183:****(Note that emission above limit is mobile station uplink.)**

Date: 3.JUL.2009 18:22:07

**Conducted Out of band Emission UMTS FDD5 channel 4233:**

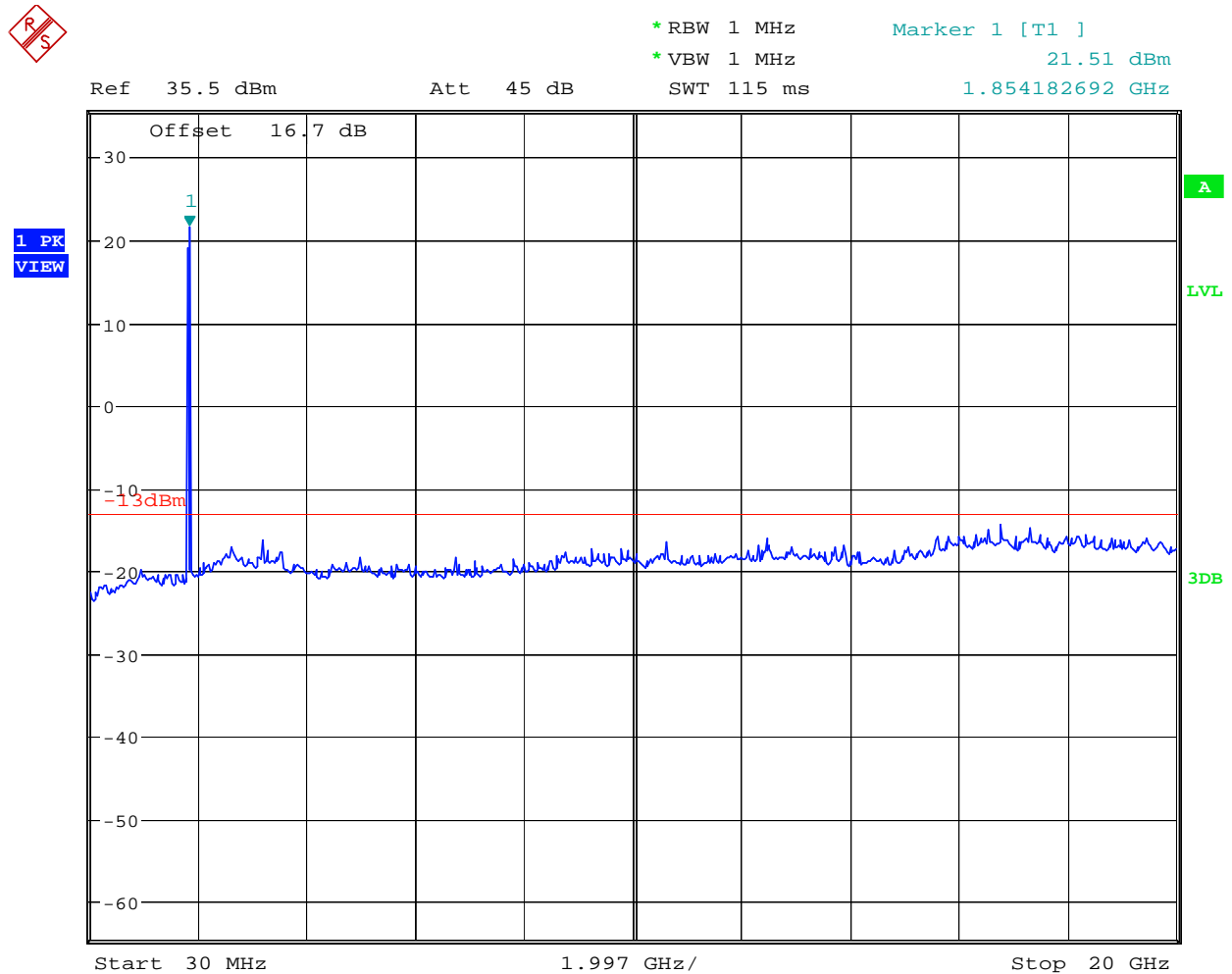
(Note that marked emission is mobile station uplink.)



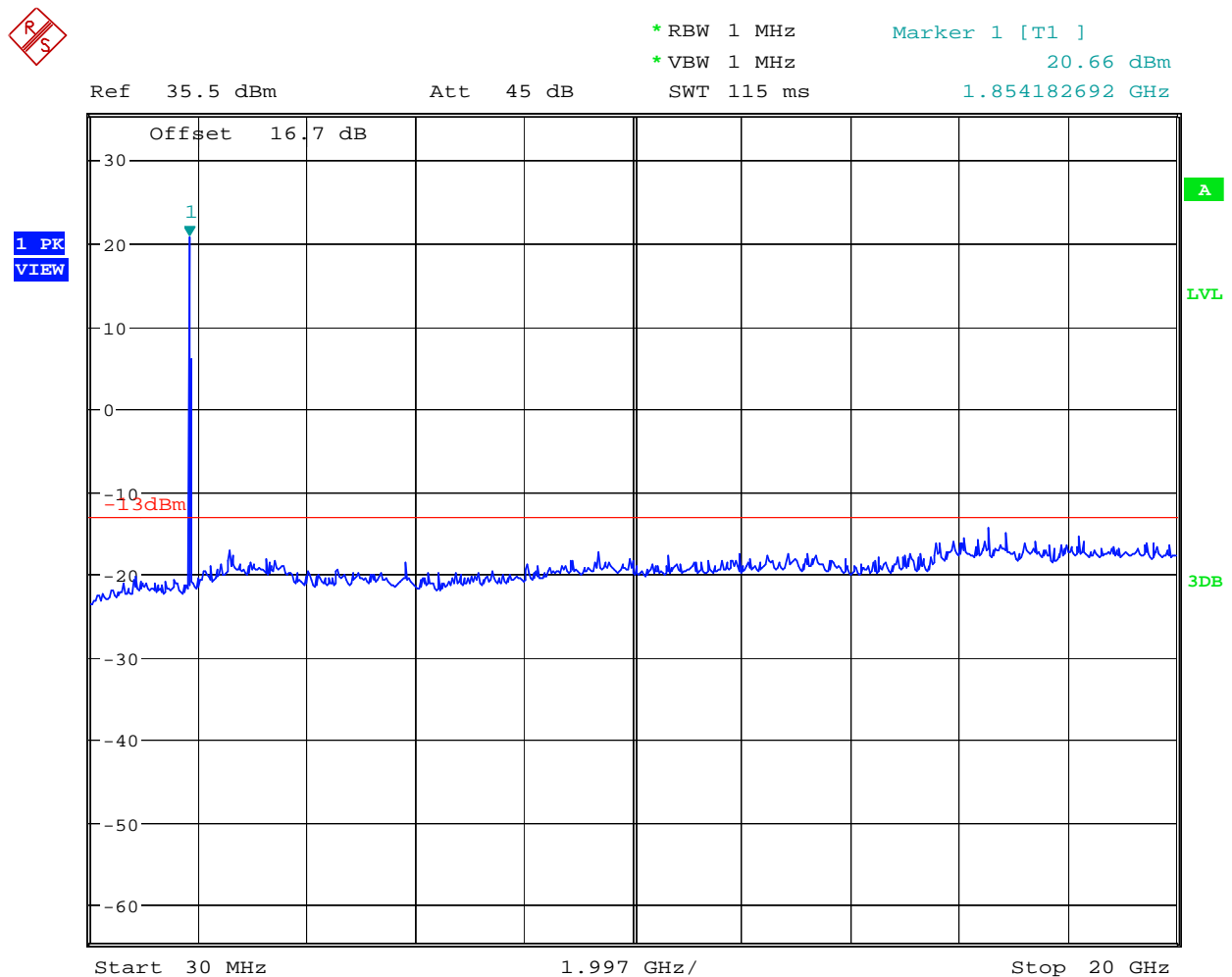
Date: 3.JUL.2009 18:21:04

**Conducted Out of band Emission UMTS FDD2 channel 9262:**

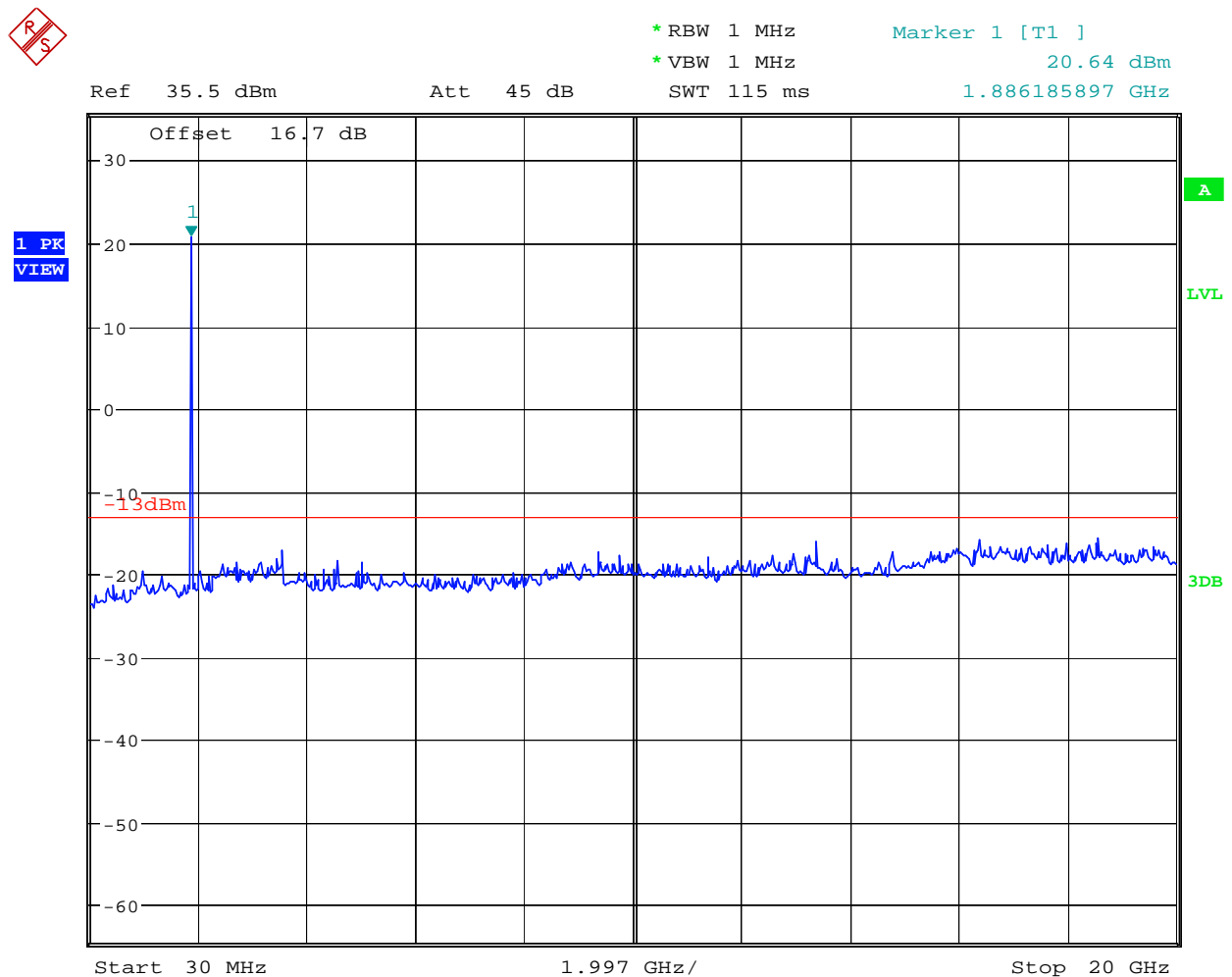
(Note that marked emission is mobile station uplink.)



Date: 3.JUL.2009 19:15:54

**Conducted Out of band Emission UMTS FDD2 channel 9400:****(Note that marked emission is mobile station uplink.)**

Date: 3.JUL.2009 19:14:45

**Conducted Out of band Emission UMTS FDD2 channel 9538:****(Note that marked emission is mobile station uplink.)**

Date: 3.JUL.2009 19:12:52

**Conducted Out of band Emission Receiver Mode**

\* RBW 1 MHz

Marker 1 [T1 ]

\* VBW 1 MHz

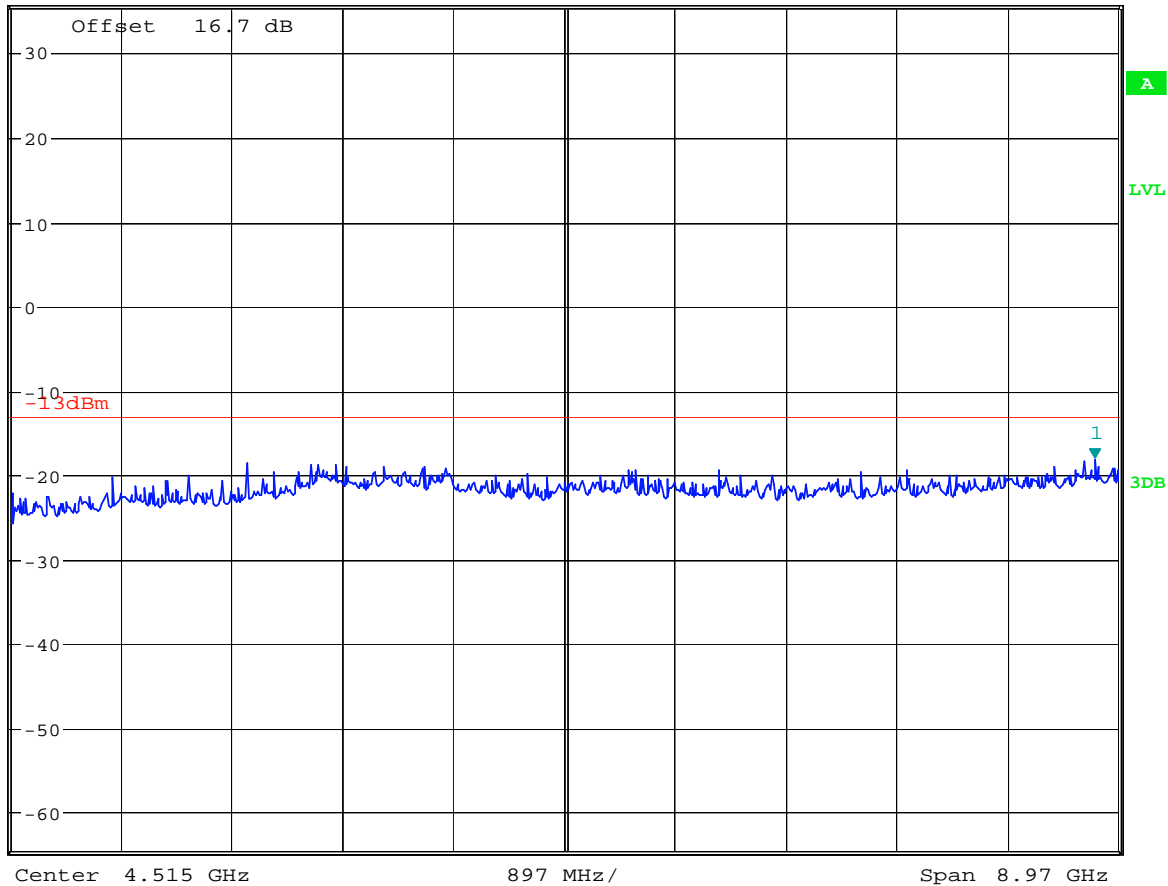
-18.16 dBm

Ref 35.5 dBm

Att 45 dB

SWT 55 ms

8.813125000 GHz

1 PK  
VIEW

Date: 3.JUL.2009 18:23:18

## 5.5 Spurious Emissions Radiated

### 5.5.1 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.

### 5.5.2 Limits:

#### 5.5.2.1 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 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.

#### 5.5.2.2 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

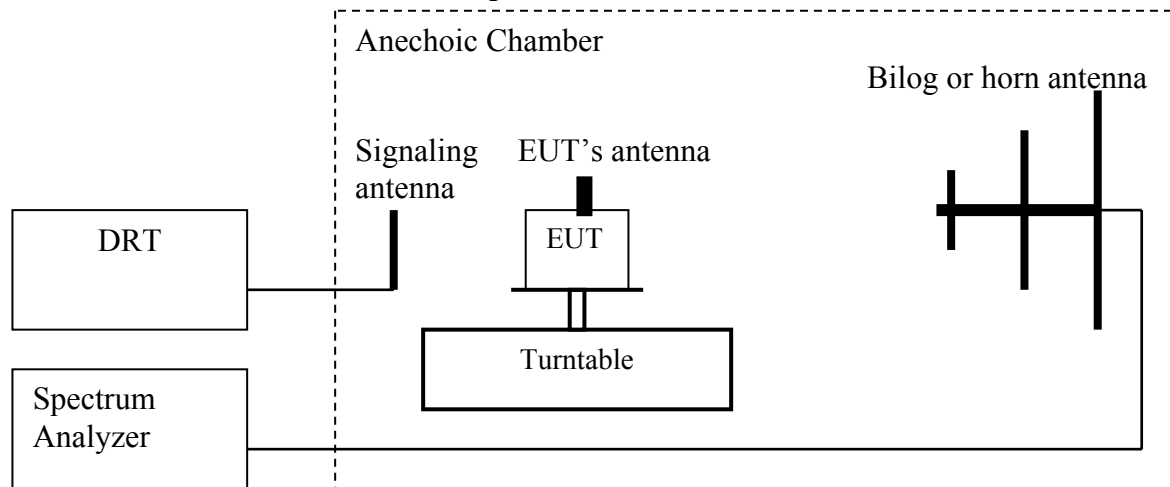


emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 5.5.3 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).  $\text{LOSS} = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .
7. Determine the level of spurious emissions using the following equation:  
 $\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:  
 $\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$
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

**5.5.4 Radiated out of band emissions results on EUT:****5.5.4.1 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**

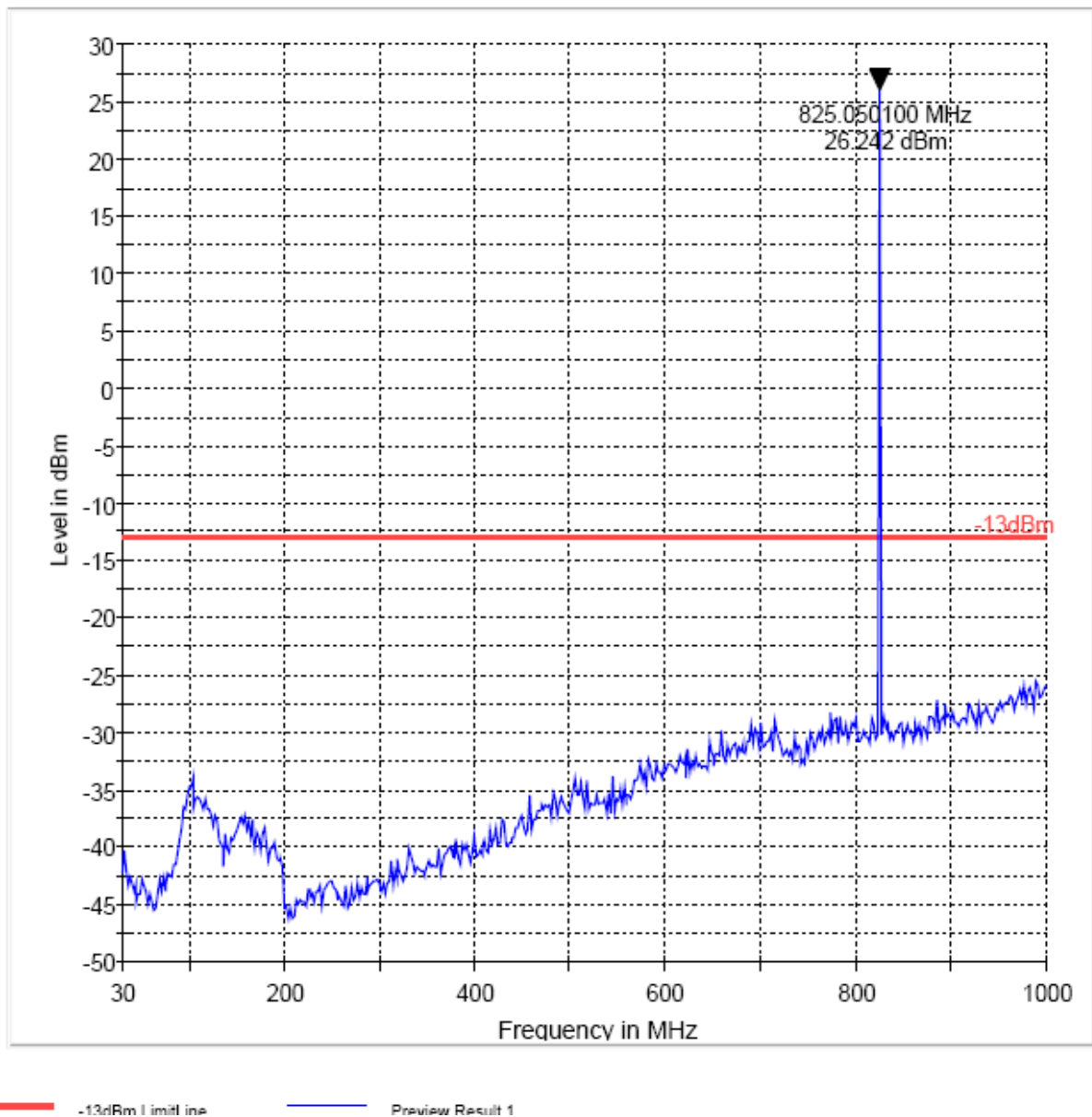
Spurious emission limit -13dBm

## 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**

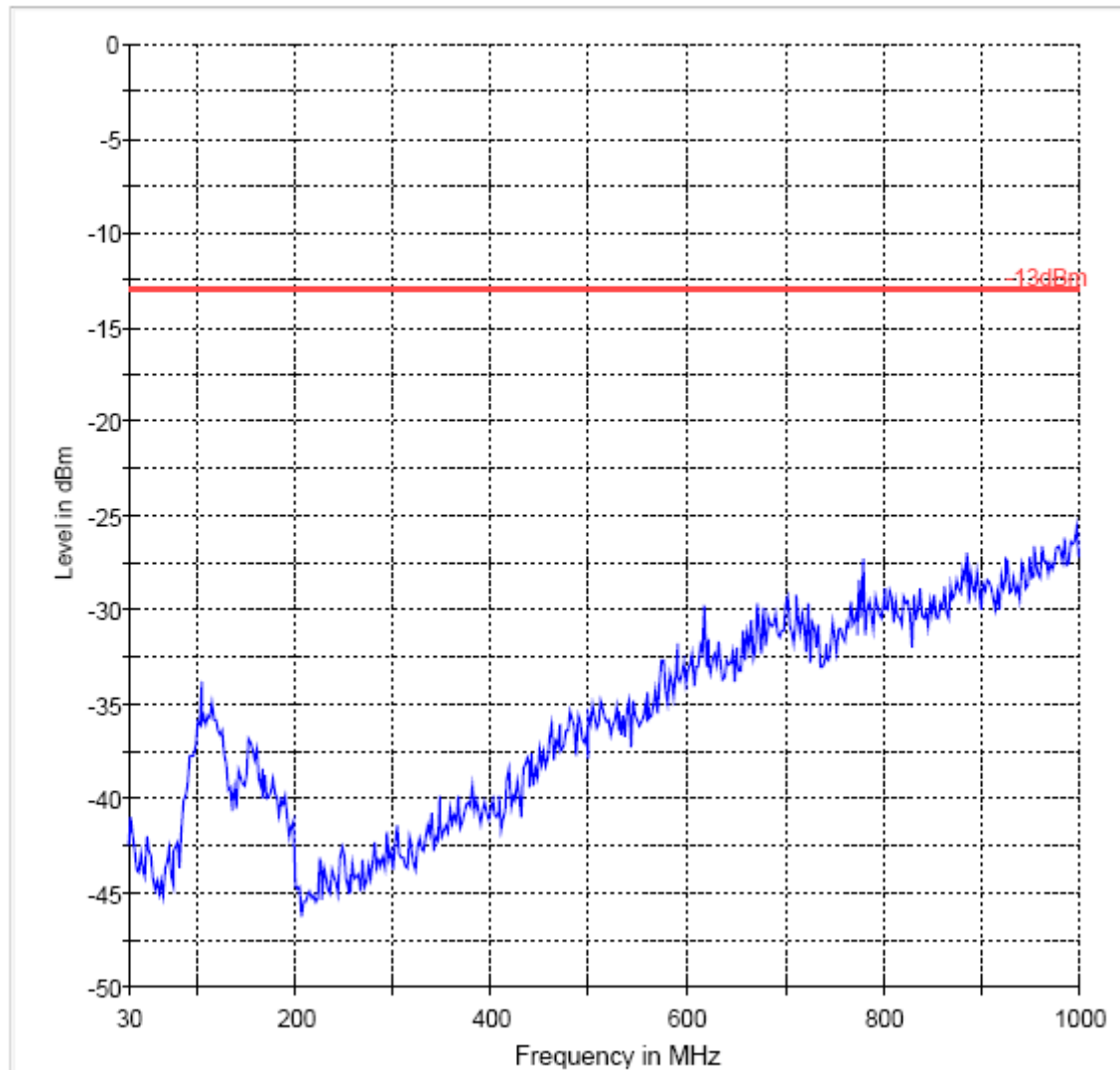
FCC 22 30-1000MHz



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

## FCC 22 30-1000MHz Mid Channel

FCC 22 30-1000MHz

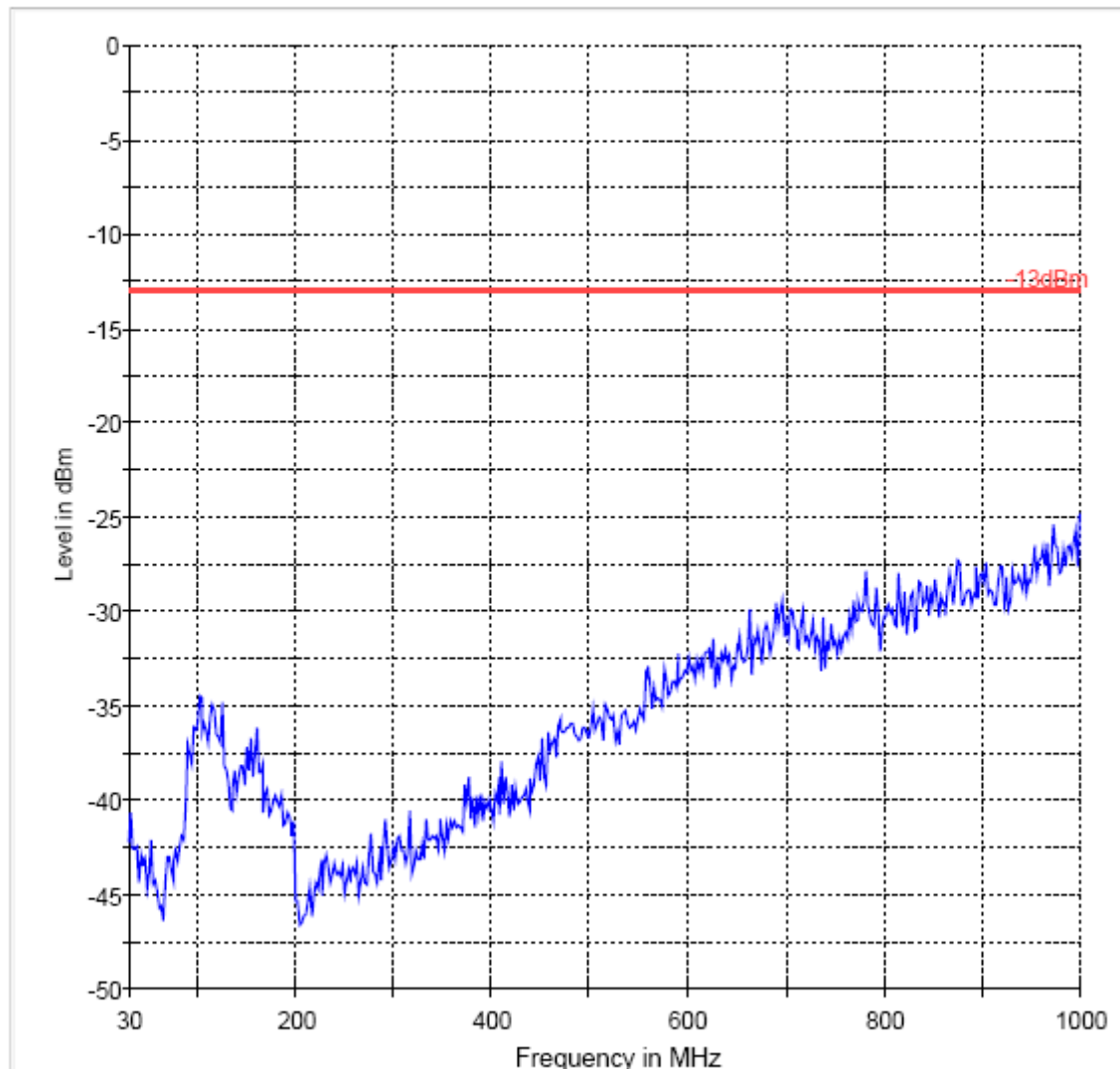


— -13dBm.LimitLine      — Preview Result 1

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

## FCC 22 30-1000MHz High Channel

FCC 22 30-1000MHz



— -13dBm.LimitLine

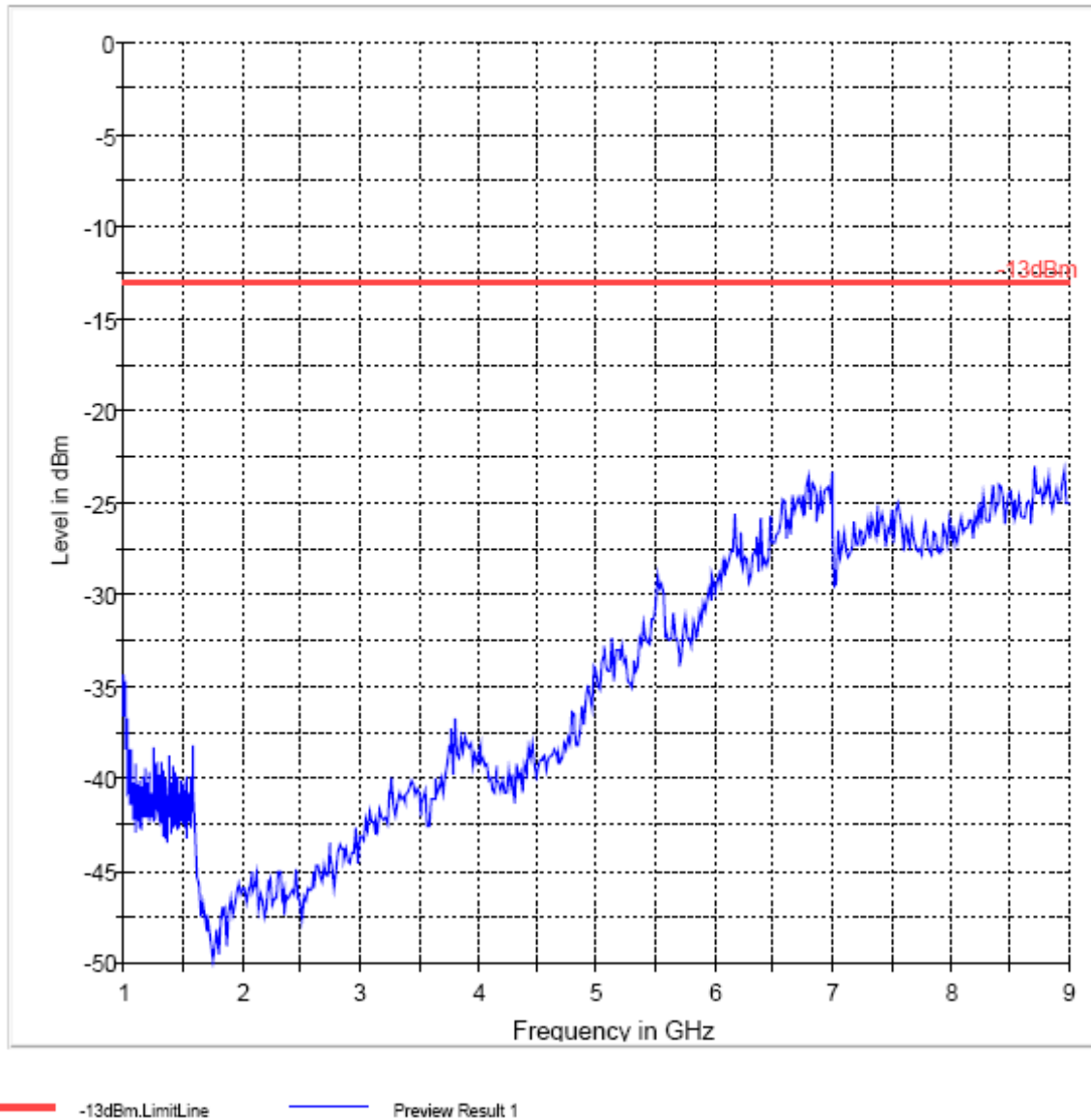
— Preview Result 1

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

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

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

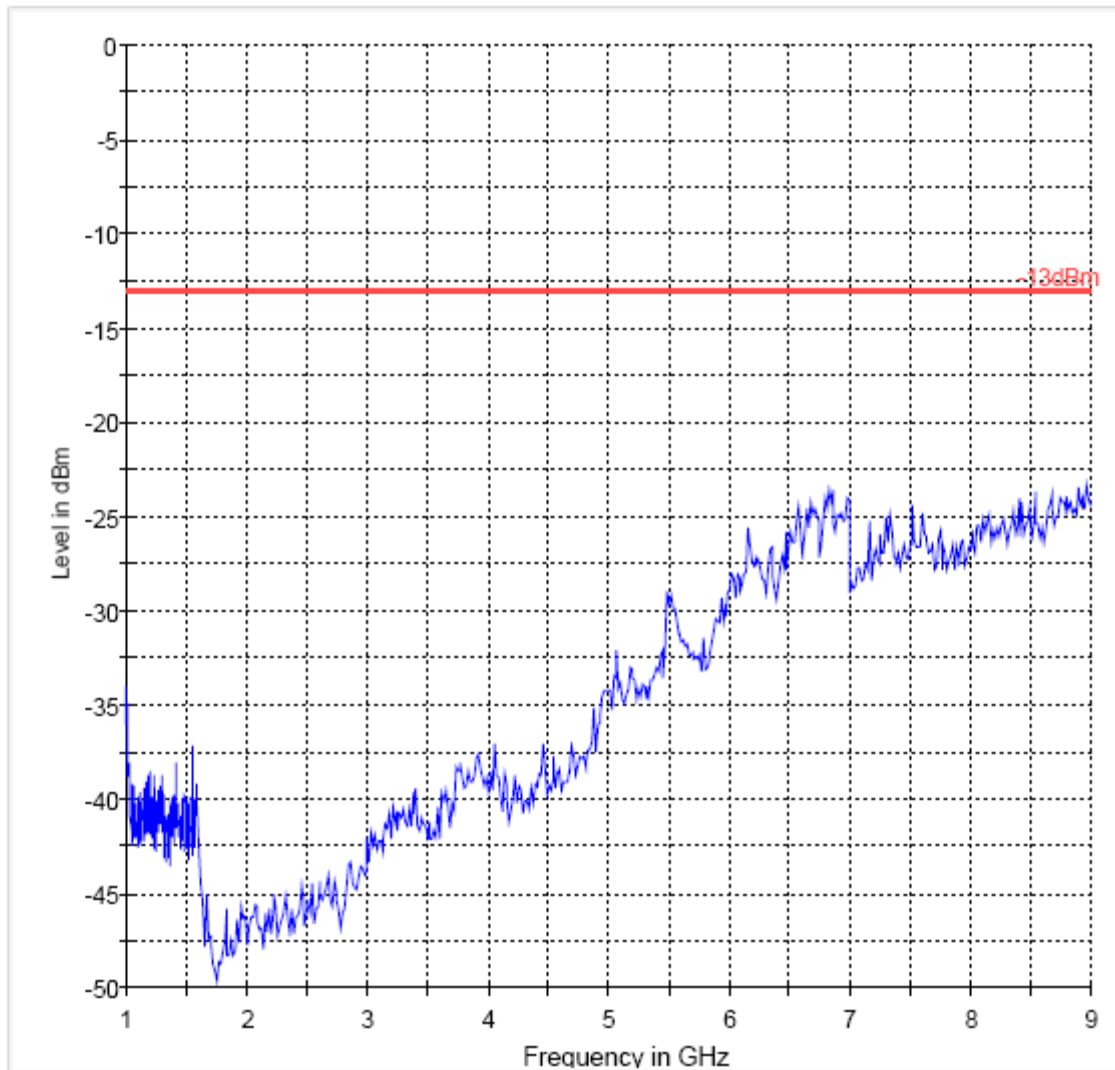
FCC 22 1-9GHz



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

## FCC 22 1-9GHz Mid Channel

FCC 22 1-9GHz



— -13dBm.LimitLine

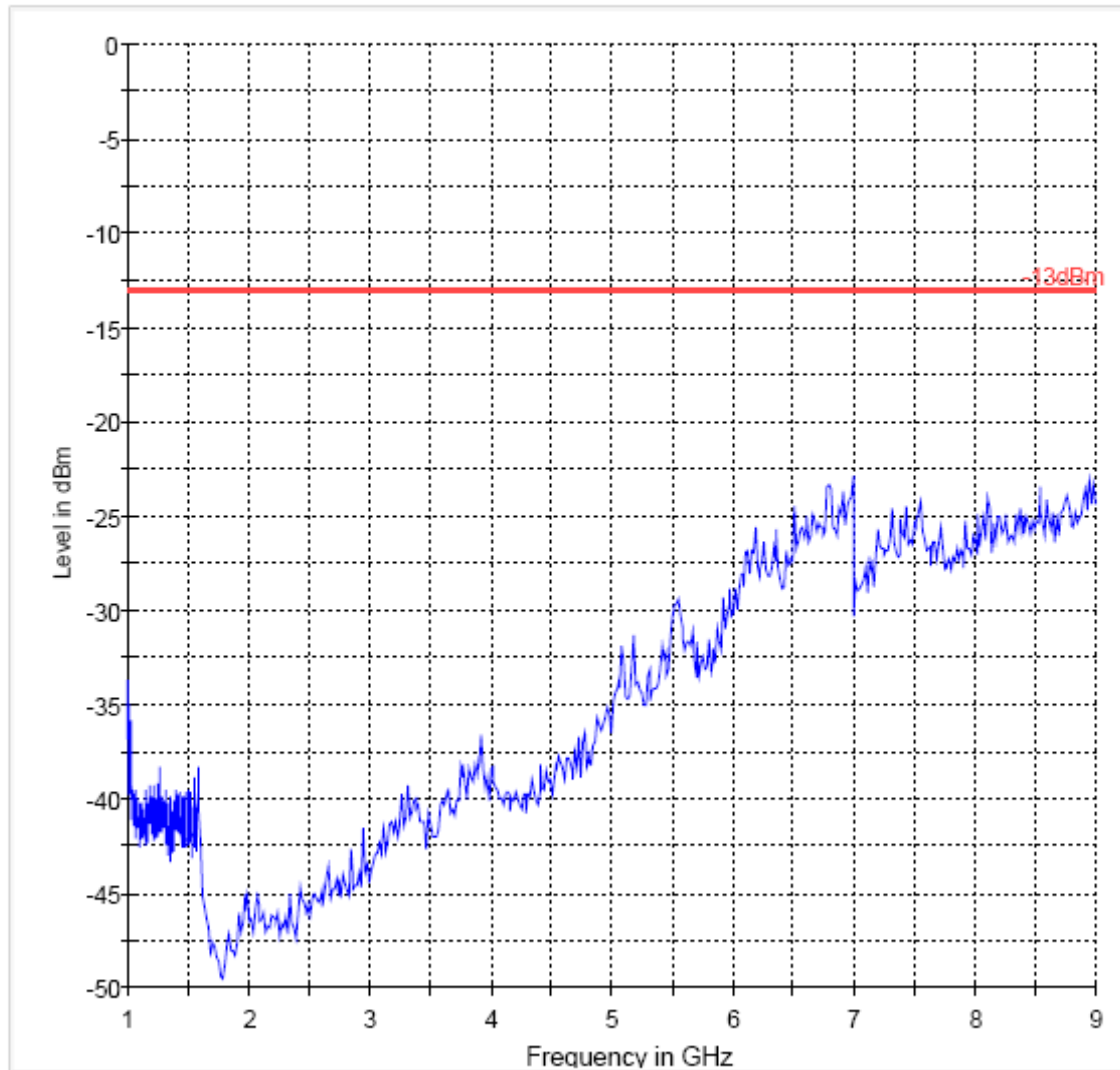
— Preview Result 1



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

**5.5.4.2 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

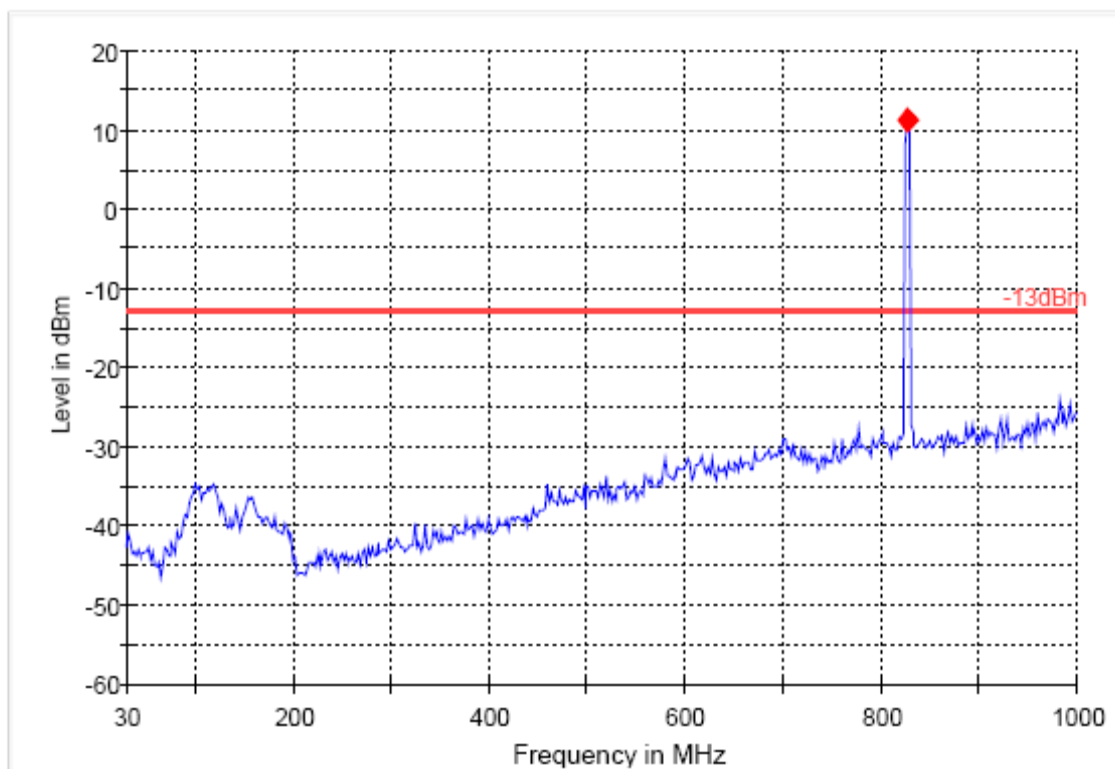
**FCC 22 30-1000MHz Low Channel****Final Result 1**

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
827.151303	11.2	20.000	100.000	120.0	V	68.0	-70.5	-24.2	-13.0

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

Frequency (MHz)	Comment
827.151303	

FCC 22 30-1000MHz



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

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

## FCC 22 30-1000MHz Mid Channel

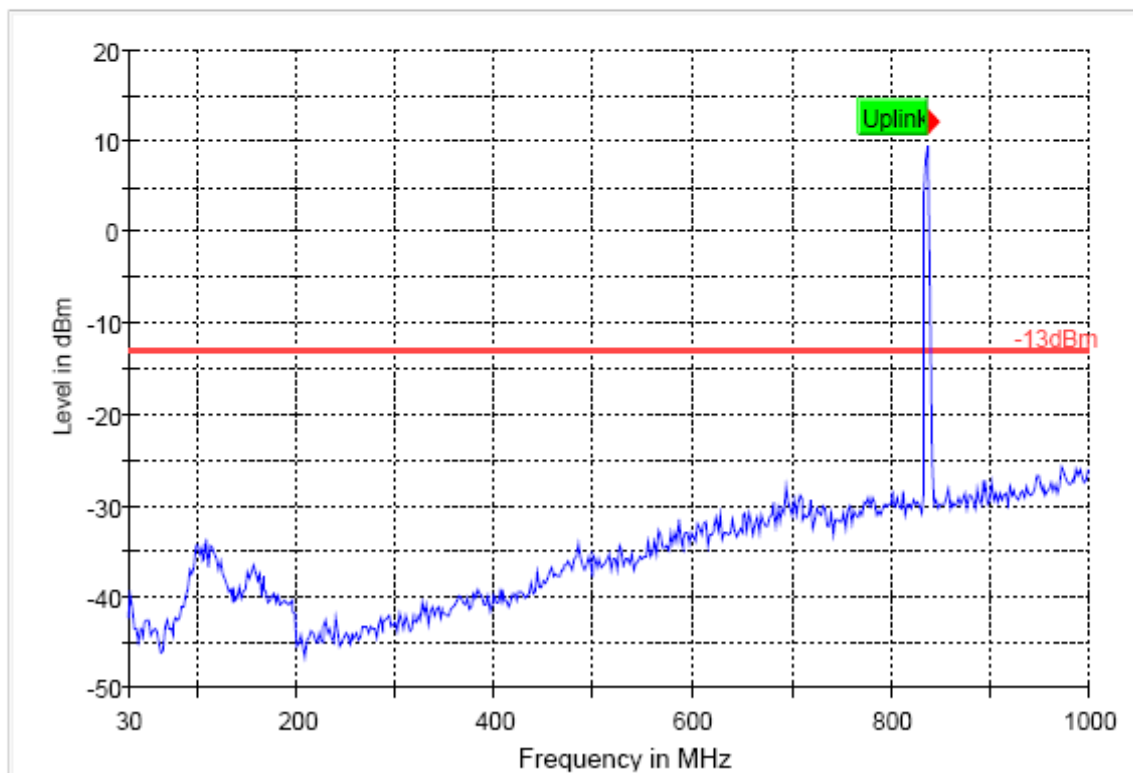
### Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
838.161323	12.0	20.000	100.000	120.0	V	2.0	-70.6	-25.0	-13.0

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

Frequency (MHz)	Comment
838.161323	

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.

## FCC 22 30-1000MHz High Channel

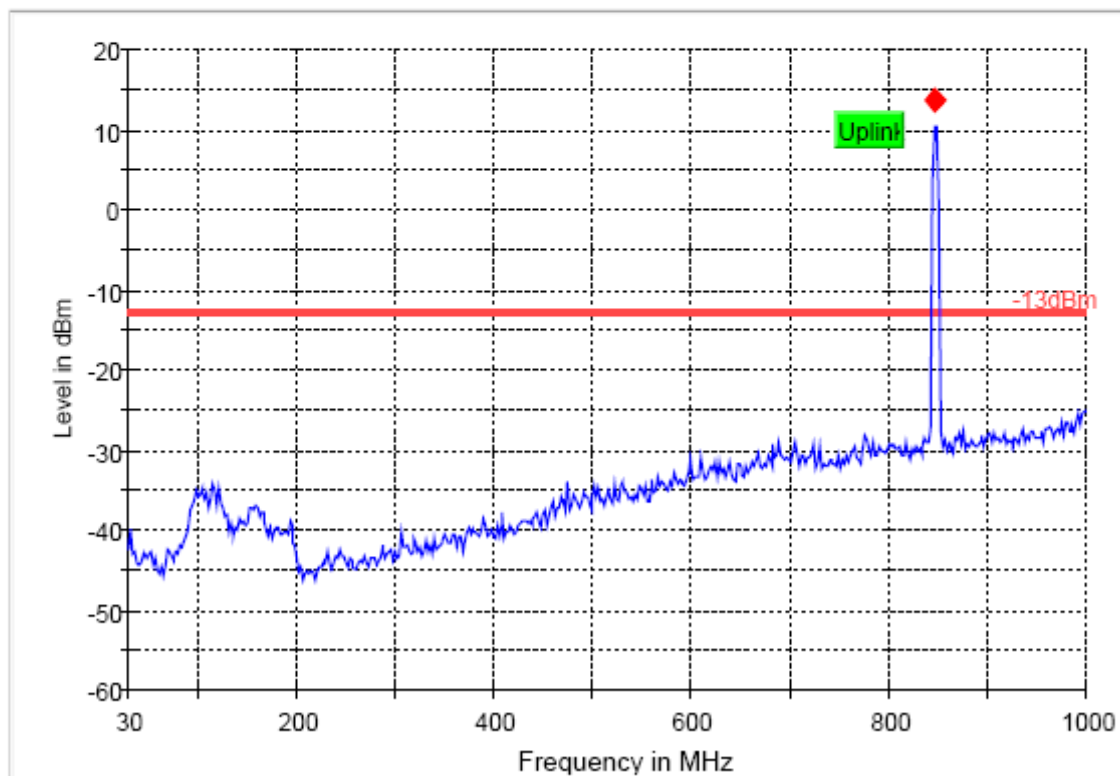
### Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
846.075151	13.7	20.000	100.000	120.0	V	4.0	-70.7	-26.7	-13.0

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

Frequency (MHz)	Comment
846.075151	

FCC 22 30-1000MHz



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

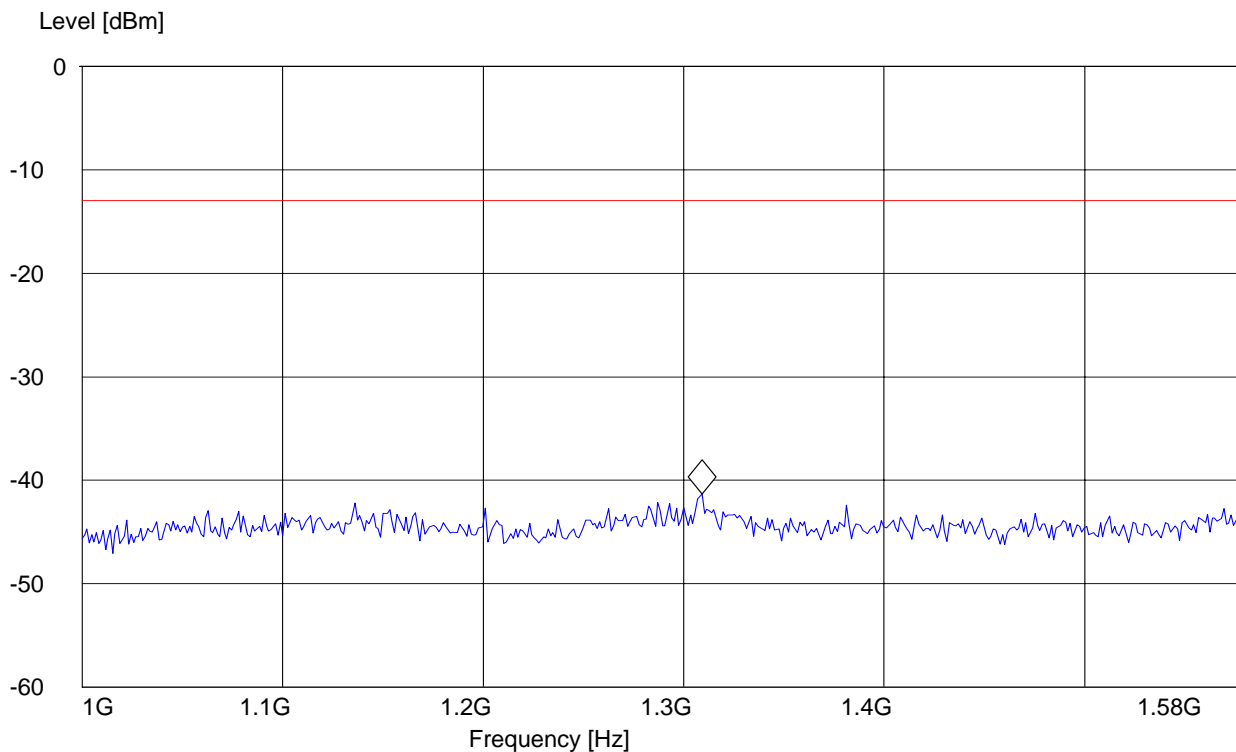
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4132: 1GHz - 1.58GHz**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD V CH. 4132  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 22Spuri 1-1.58G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.309178357 GHz -41.33 dBm



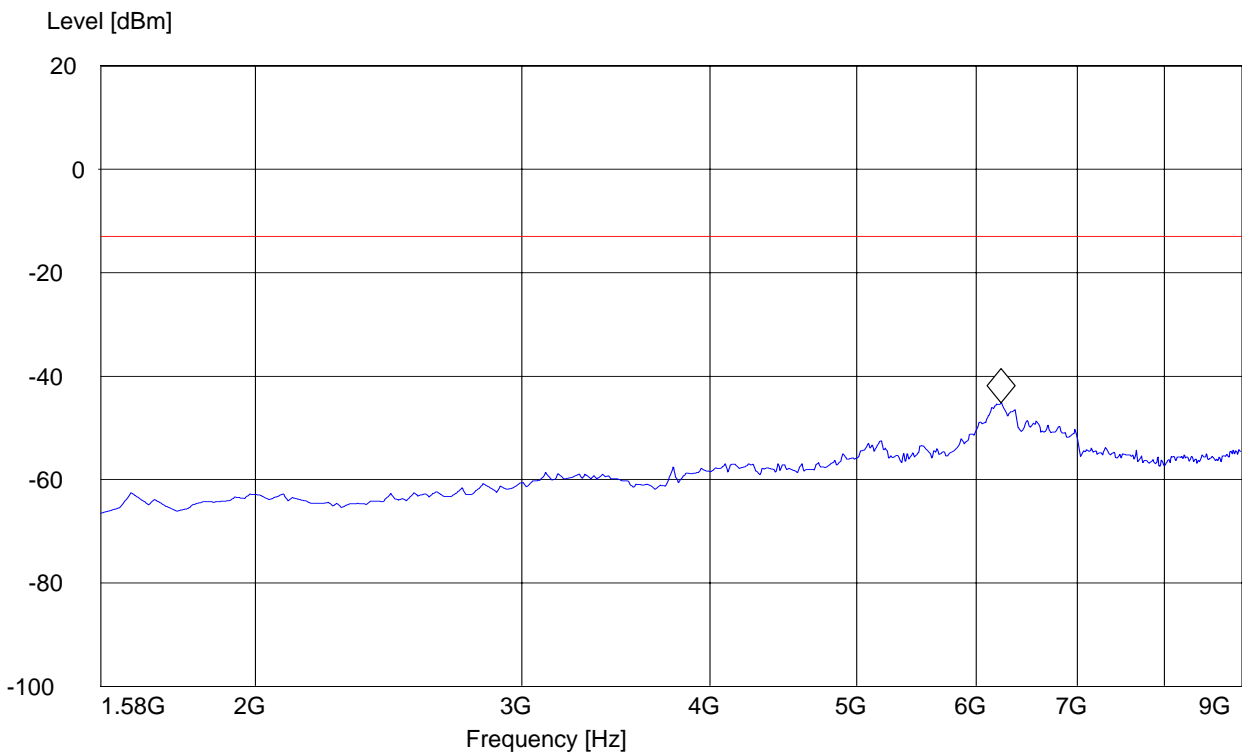
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4132: 1.58GHz – 9GHz**

EUT: V02B-V02B001  
Customer:: Firebrand  
Test Mode: FDD V CH. 4132  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 22Spuri 1.58-9G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 6.234228457 GHz -45.15 dBm

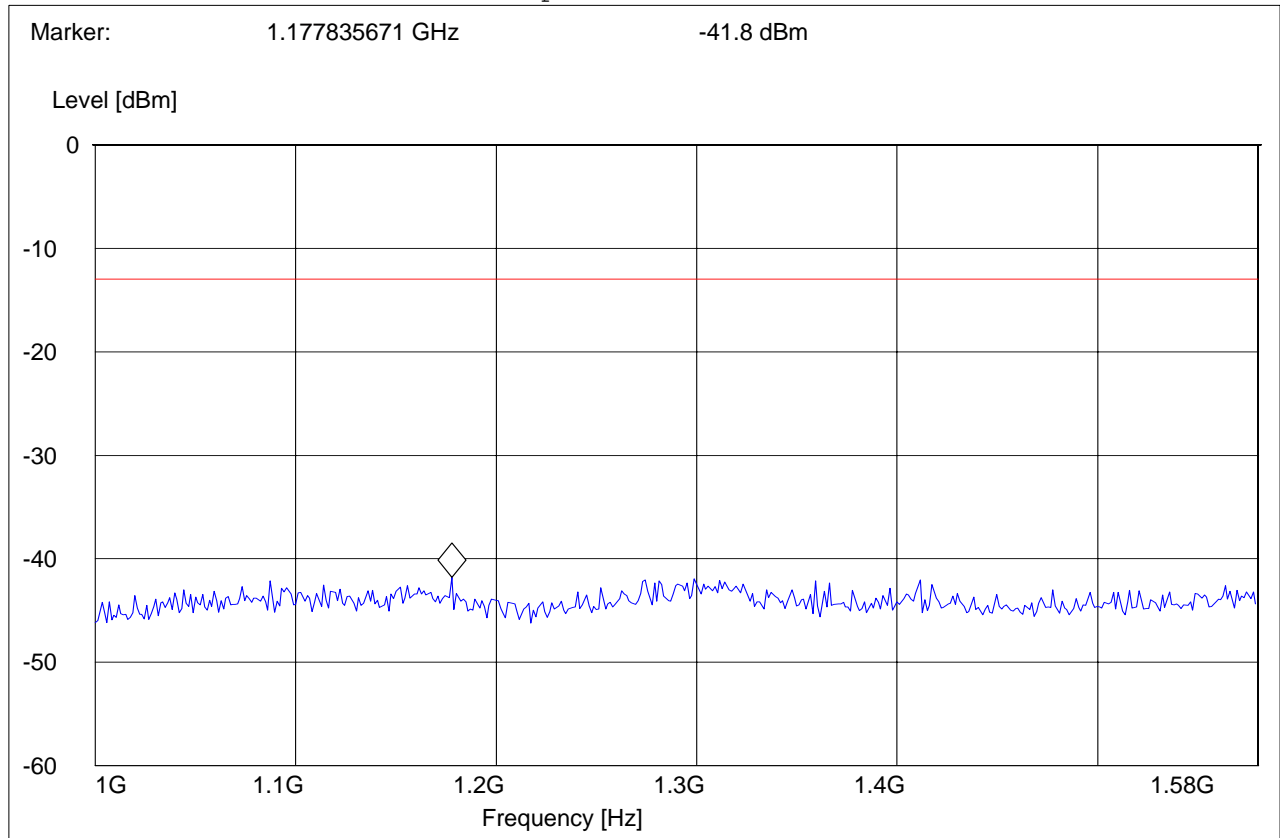


**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4183: 1GHz - 1.58GHz**

EUT: V02B-V02B001  
Customer:: Firebrand  
Test Mode: FDD V CH. 4183  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 22Spuri 1-1.58G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM





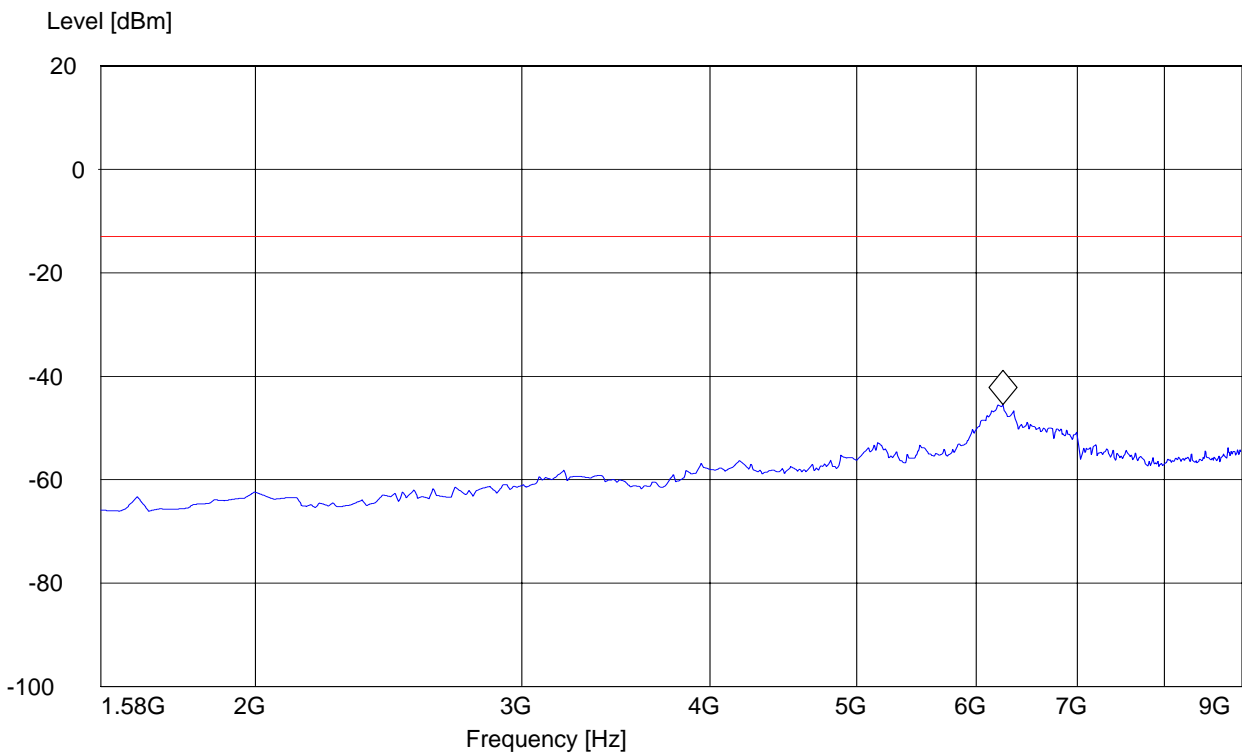
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4183: 1.58GHz – 9GHz**

EUT: V02B-V02B001  
Customer:: Firebrand  
Test Mode: FDD V CH. 4183  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 22Spuri 1.58-9G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 6.249098196 GHz -45.5 dBm



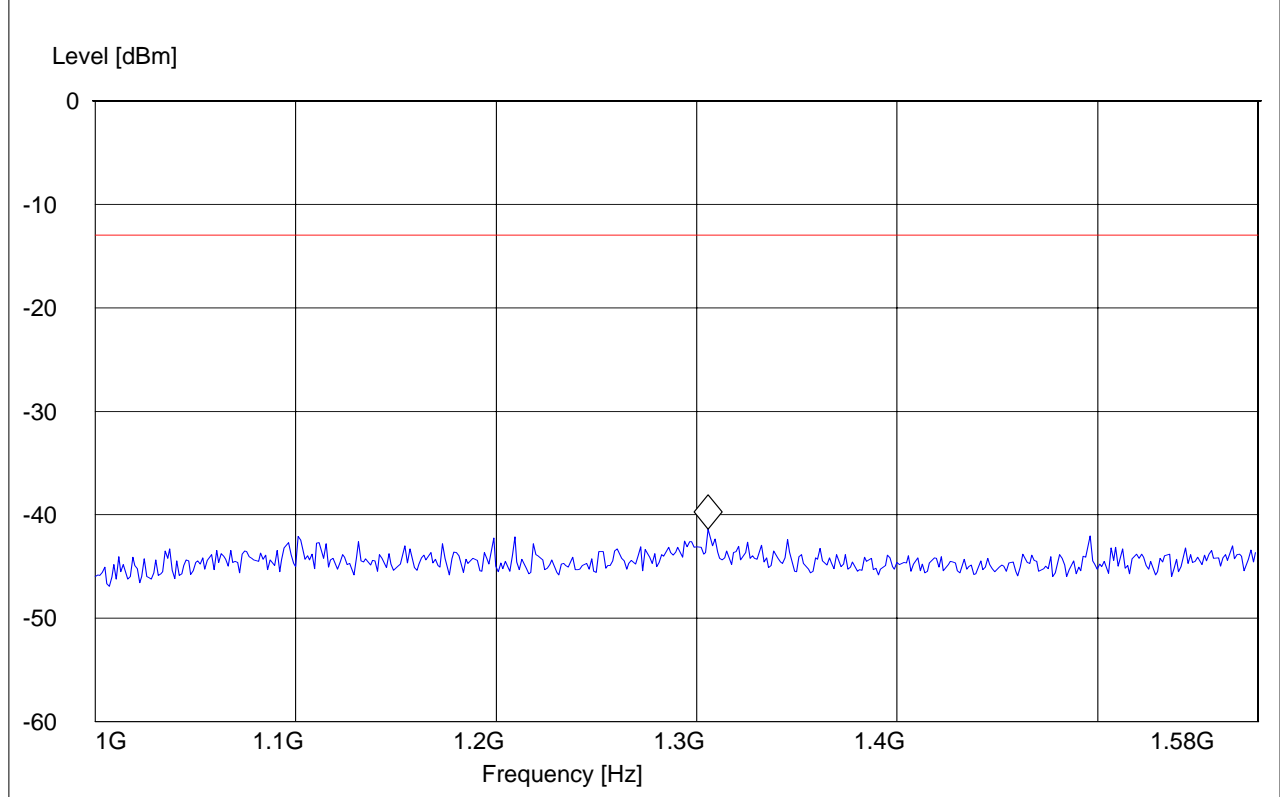
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4233: 1GHz - 1.58GHz**

EUT: V02B-V02B001  
Customer:: Firebrand  
Test Mode: FDD V CH. 4233  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 22Spuri 1-1.58G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.305691383 GHz -41.39 dBm



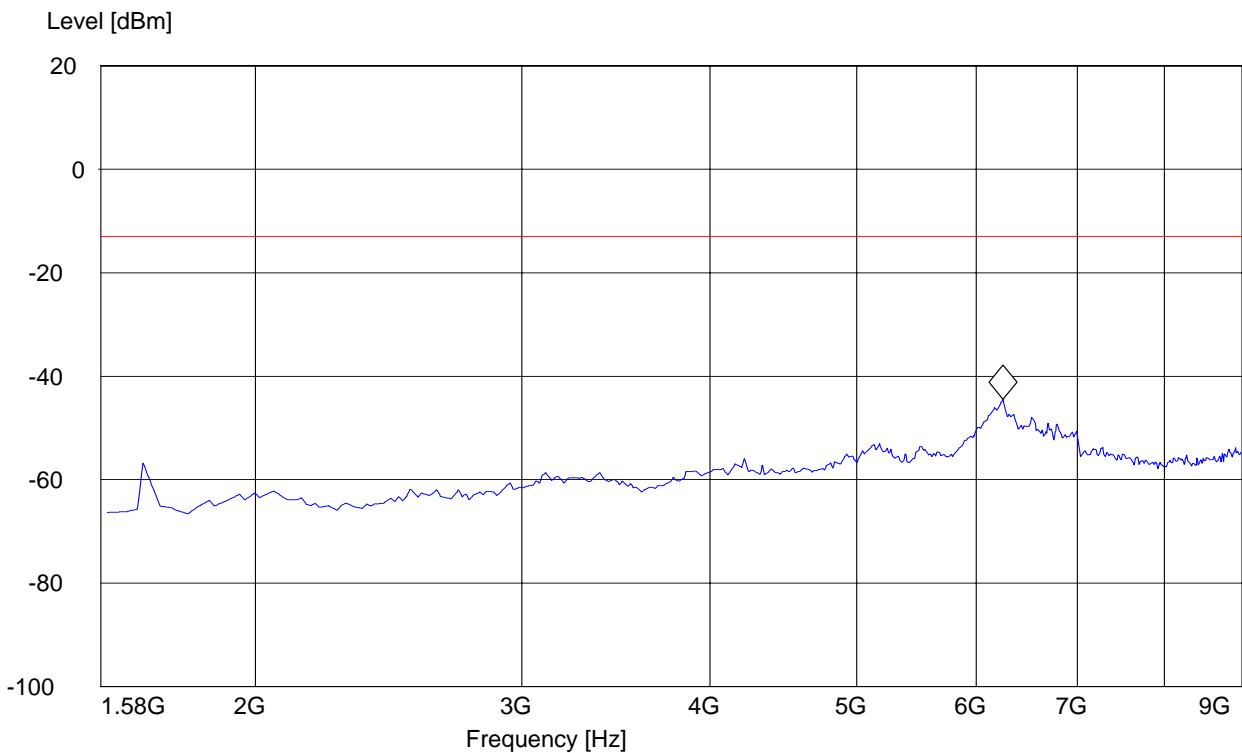
**RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4233: 1.58GHz -9GHz**

EUT: V02B-V02B001  
Customer:: Firebrand  
Test Mode: FDD V CH. 4233  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 22Spuri 1.58-9G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 6.249098196 GHz -44.47 dBm



**5.5.4.3 Test Results Transmitter Spurious Emission PCS-1900:**

<b>Harmonic</b>	<b>Tx ch-512 Freq.(MHz)</b>	<b>Level (dBm)</b>	<b>Tx ch-661 Freq. (MHz)</b>	<b>Level (dBm)</b>	<b>Tx ch-810 Freq. (MHz)</b>	<b>Level (dBm)</b>
<b>2</b>	<b>3700.4</b>	NF	<b>3760</b>	NF	<b>3819.6</b>	NF
<b>3</b>	<b>5550.6</b>	NF	<b>5640</b>	NF	<b>5729.4</b>	NF
<b>4</b>	<b>7400.8</b>	NF	<b>7520</b>	NF	<b>7639.2</b>	NF
<b>5</b>	<b>9251</b>	NF	<b>9400</b>	NF	<b>9549</b>	NF
<b>6</b>	<b>11101.2</b>	NF	<b>11280</b>	NF	<b>11458.8</b>	NF
<b>7</b>	<b>12951.4</b>	NF	<b>13160</b>	NF	<b>13368.6</b>	NF
<b>8</b>	<b>14801.6</b>	NF	<b>15040</b>	NF	<b>15278.4</b>	NF
<b>9</b>	<b>16651.8</b>	NF	<b>16920</b>	NF	<b>17188.2</b>	NF
<b>10</b>	<b>18502</b>	NF	<b>18800</b>	NF	<b>19098</b>	NF
NF = NOISE FLOOR						

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

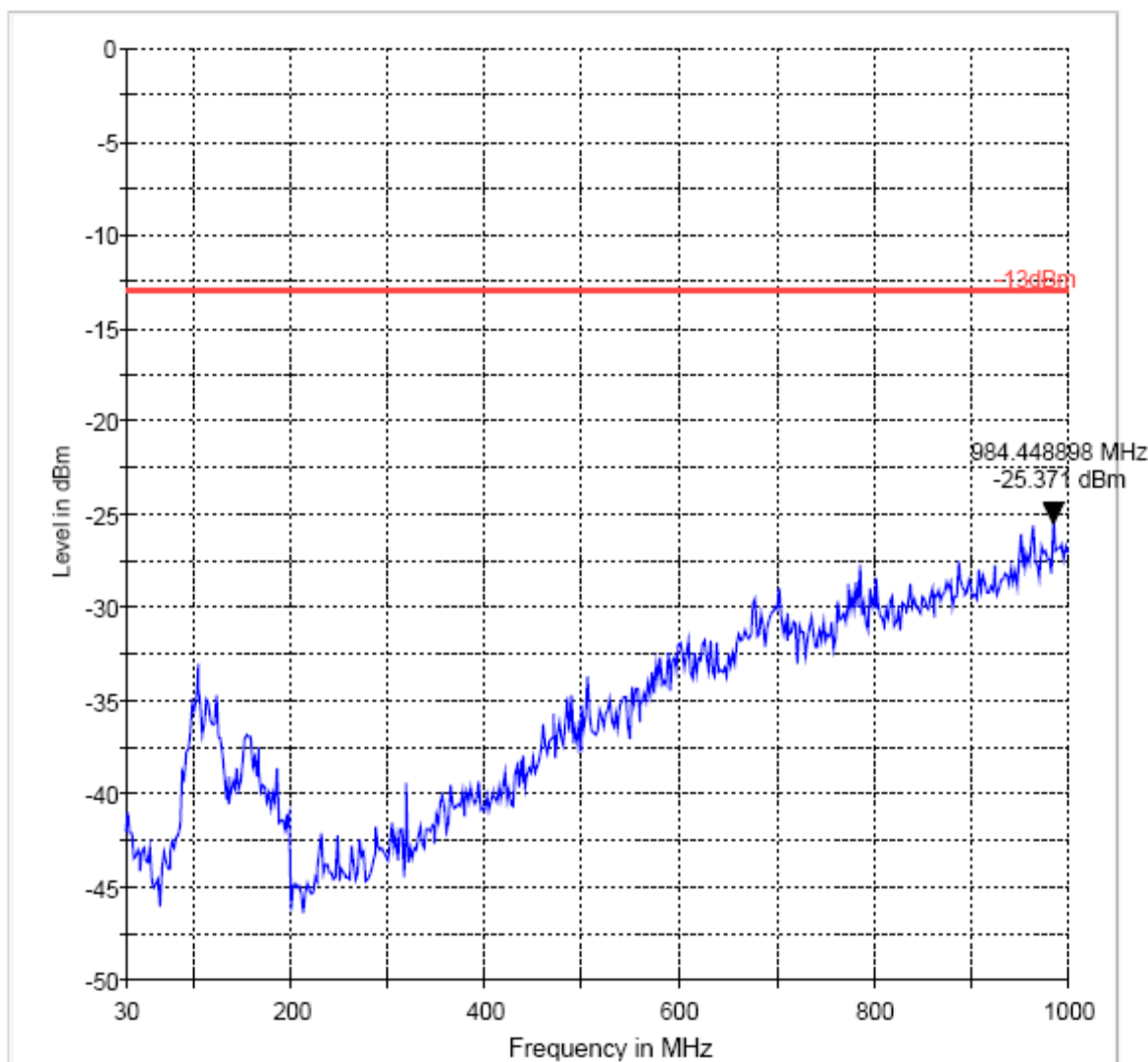
Spurious emission limit -13dBm

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 24 30-1000MHz Low Channel**

FCC 22 30-1000MHz

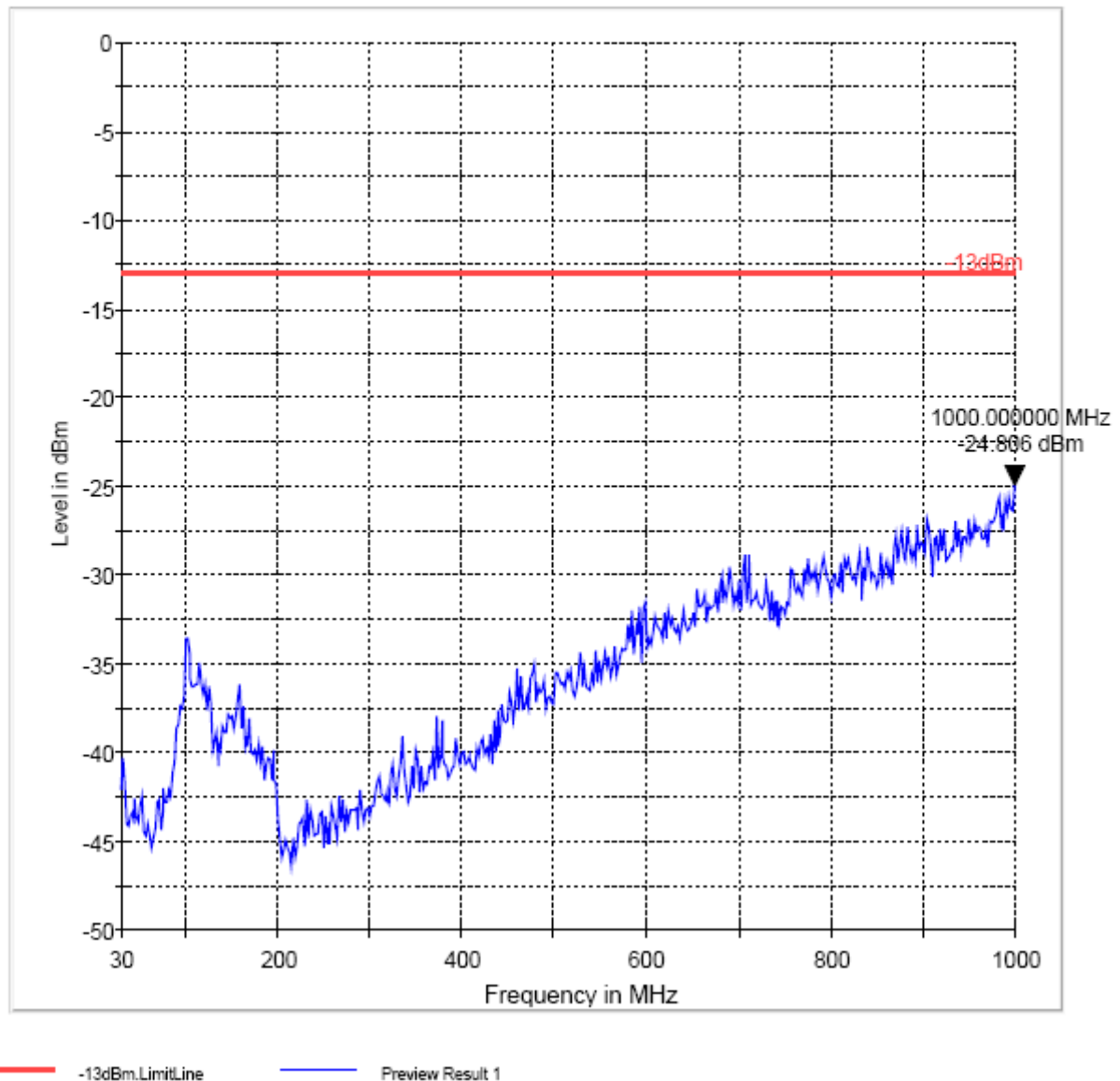


— -13dBm.LimitLine      — Preview Result 1

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

## FCC 24 30-1000MHz Mid Channel

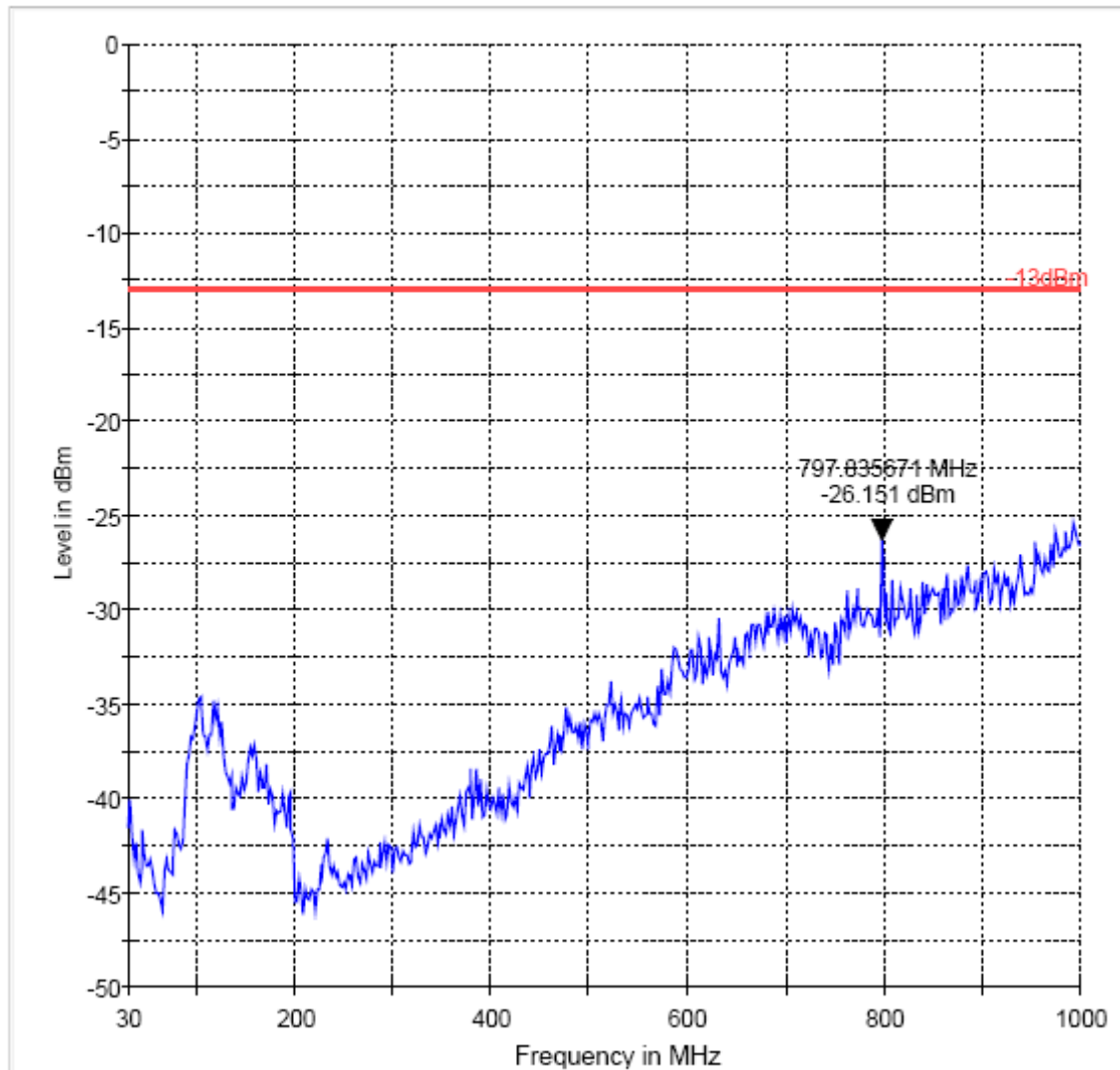
FCC 22 30-1000MHz



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

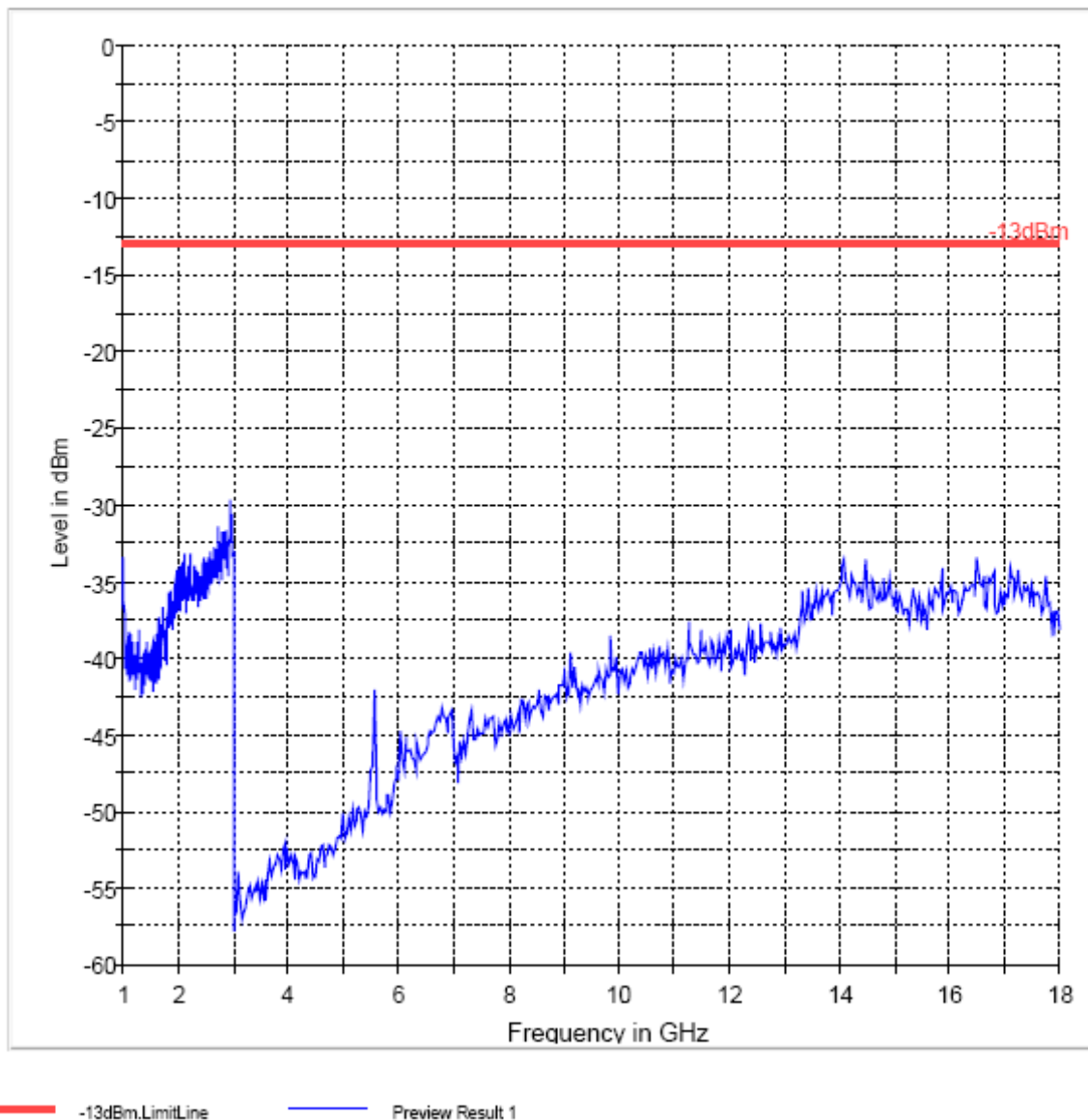
**RADIATED SPURIOUS EMISSIONS(PCS 1900) Tx CHANNEL 512: 1GHz – 18GHz**

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 24 1-18GHz Low Channel**

FCC 24 1-18GHz

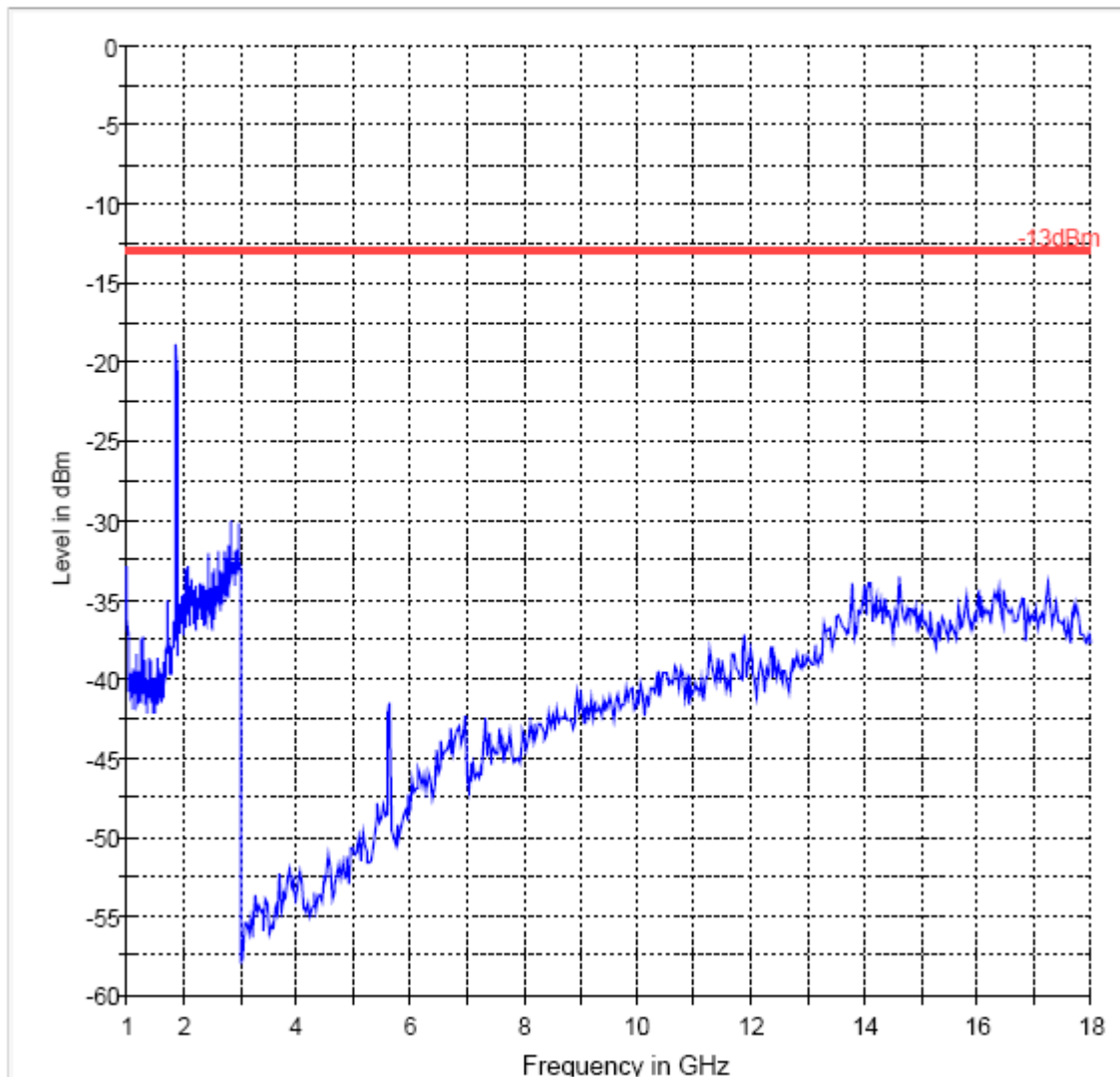




Note: This plot contains results of antenna in both horizontal and vertical polarizations

## FCC 24 1-18GHz Mid Channel

FCC 24 1-18GHz



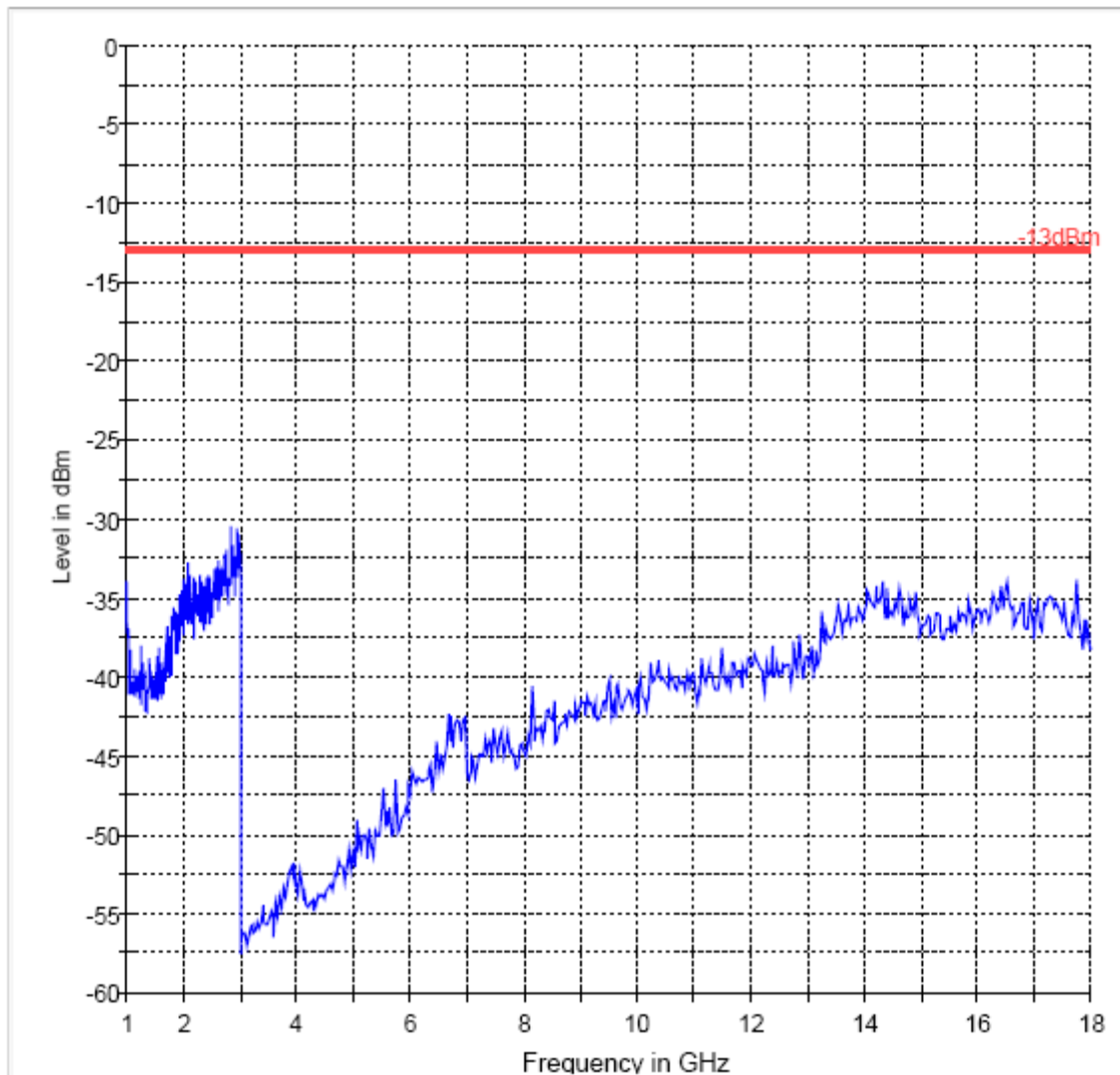
— -13dBm.LimitLine

— Preview Result 1

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

## FCC 24 1-18GHz High Channel

FCC 24 1-18GHz



— -13dBm.LimitLine

— Preview Result 1

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

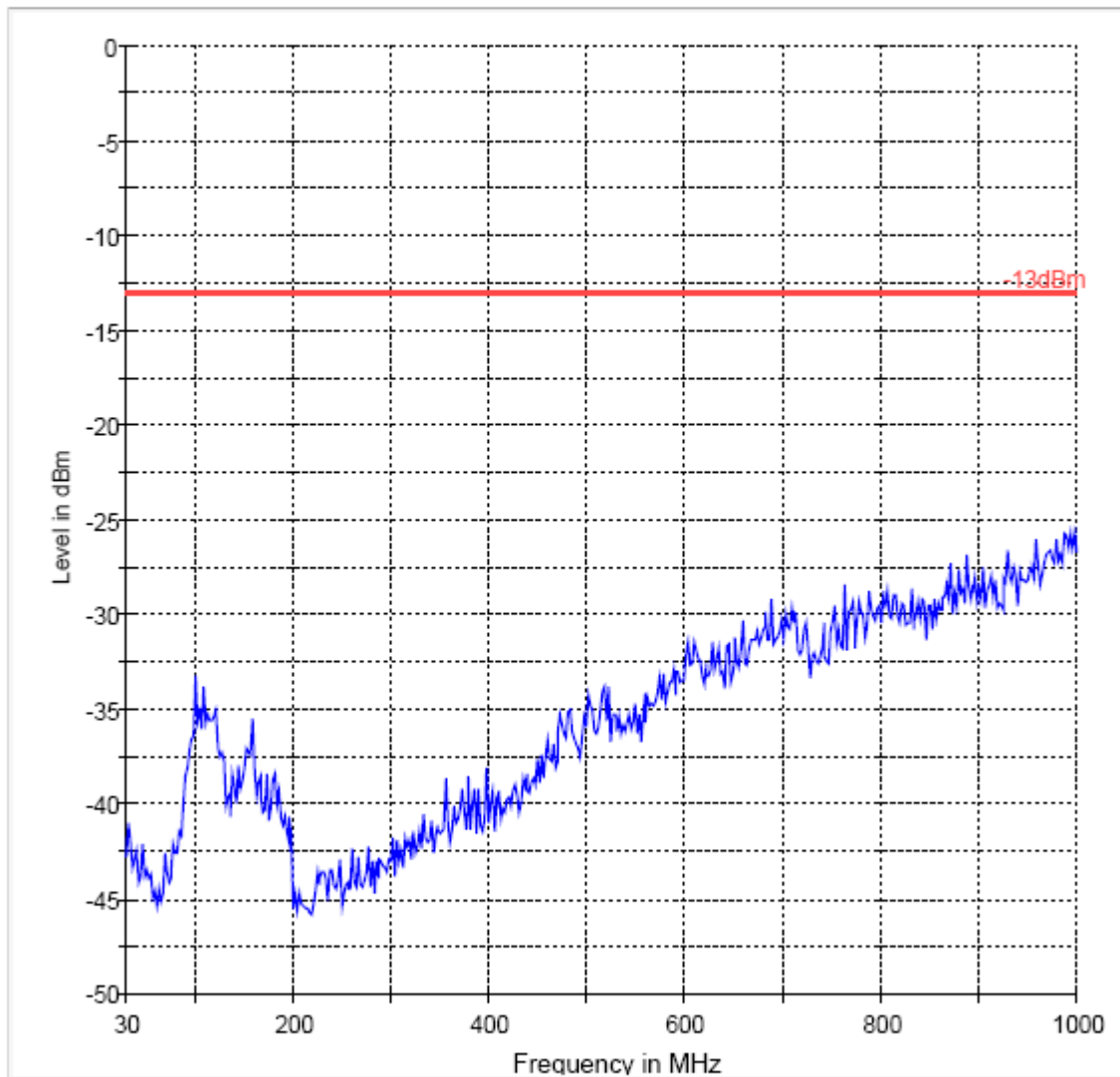
Harmonics	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
<b>2</b>	<b>3704.8</b>	NF	<b>3760</b>	NF	<b>3815.2</b>	NF
<b>3</b>	<b>5557.2</b>	NF	<b>5640</b>	NF	<b>5722.8</b>	NF
<b>4</b>	<b>7409.6</b>	NF	<b>7520</b>	NF	<b>7630.4</b>	NF
<b>5</b>	<b>9262</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**

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

**FCC 24 30-1000MHz Low Channel**

FCC 22 30-1000MHz

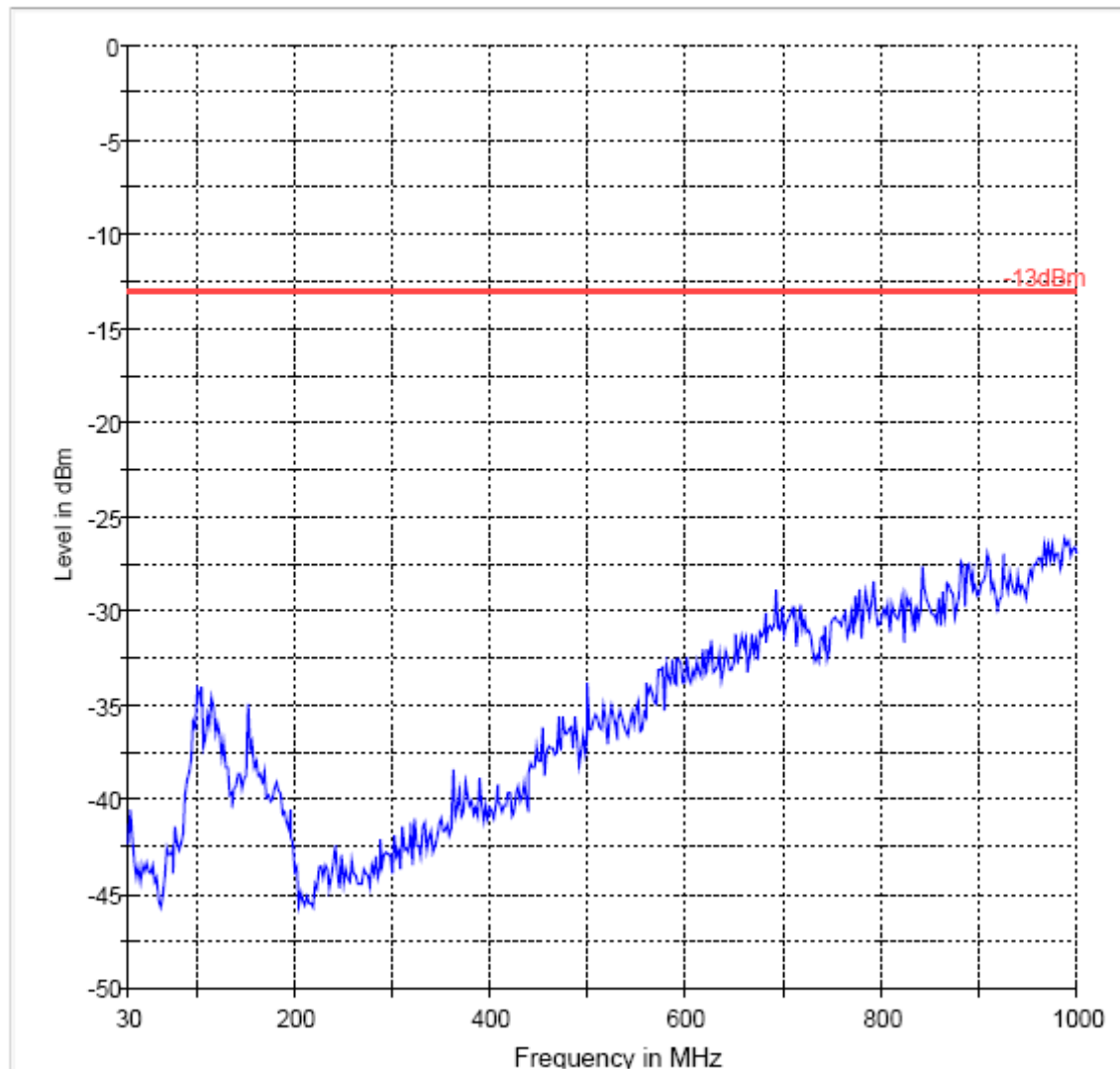


— -13dBm.LimitLine — Preview Result 1

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

## FCC 24 30-1000MHz Mid Channel

FCC 22 30-1000MHz



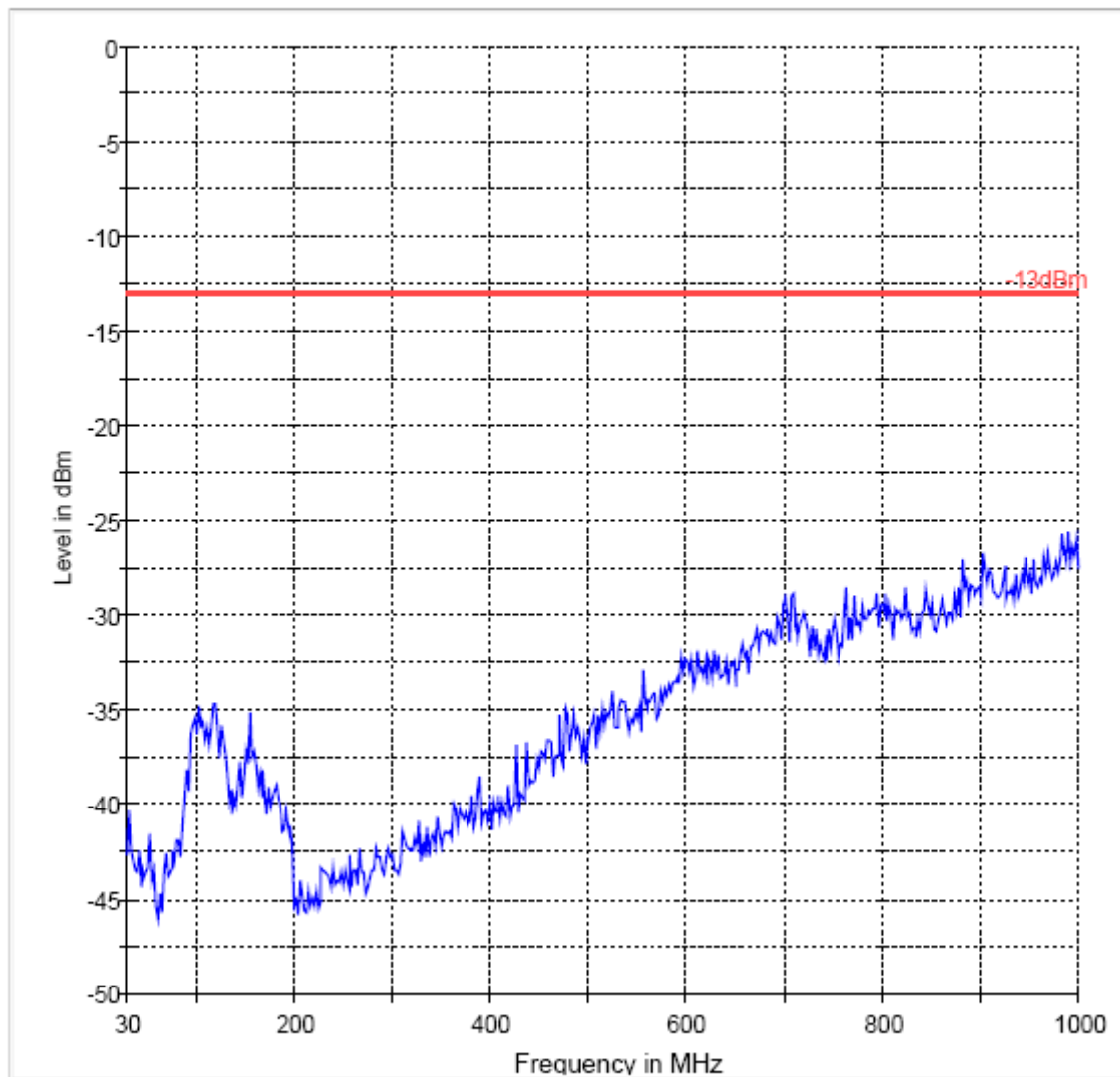
— -13dBm.LimitLine

— Preview Result 1

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

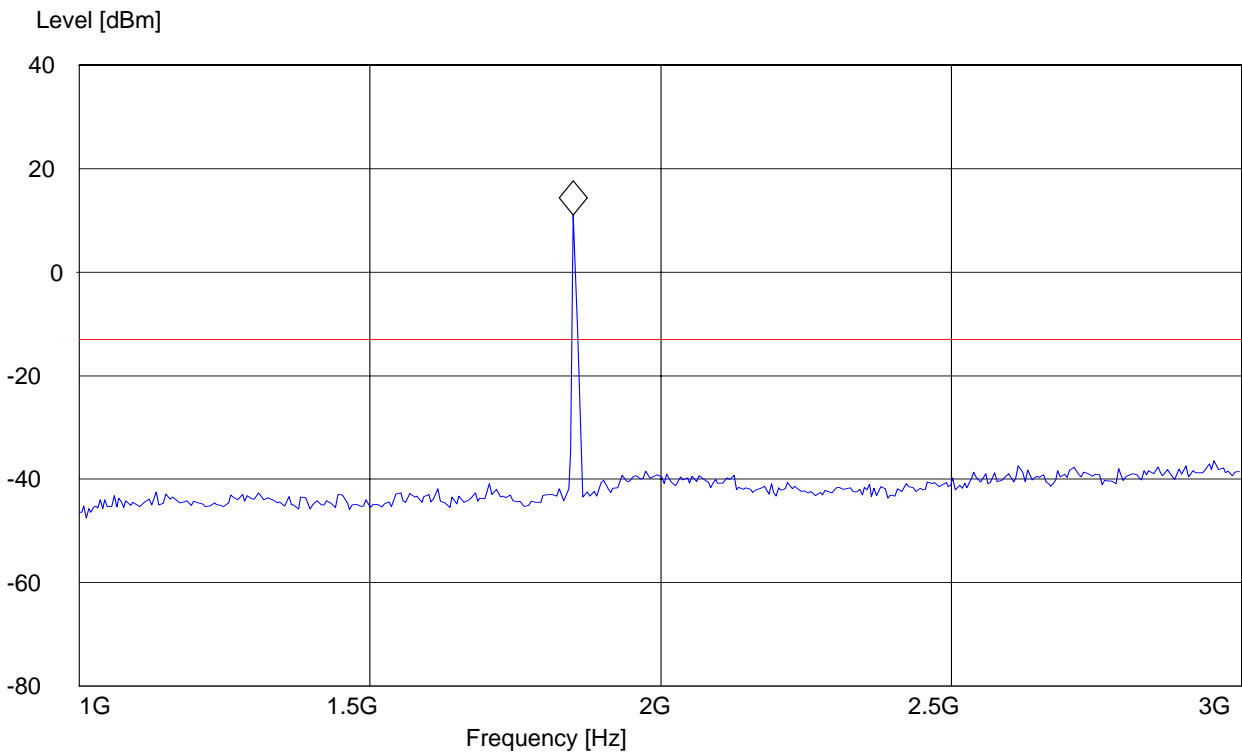
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9262: 1GHz – 3GHz****Note: The peak above the limit line is the carrier freq. at ch-9262.**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9262  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments: Marker placed on transmit signal

***SWEEP TABLE: "FCC 24Spuri 1-3G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.849699399 GHz 11.07 dBm



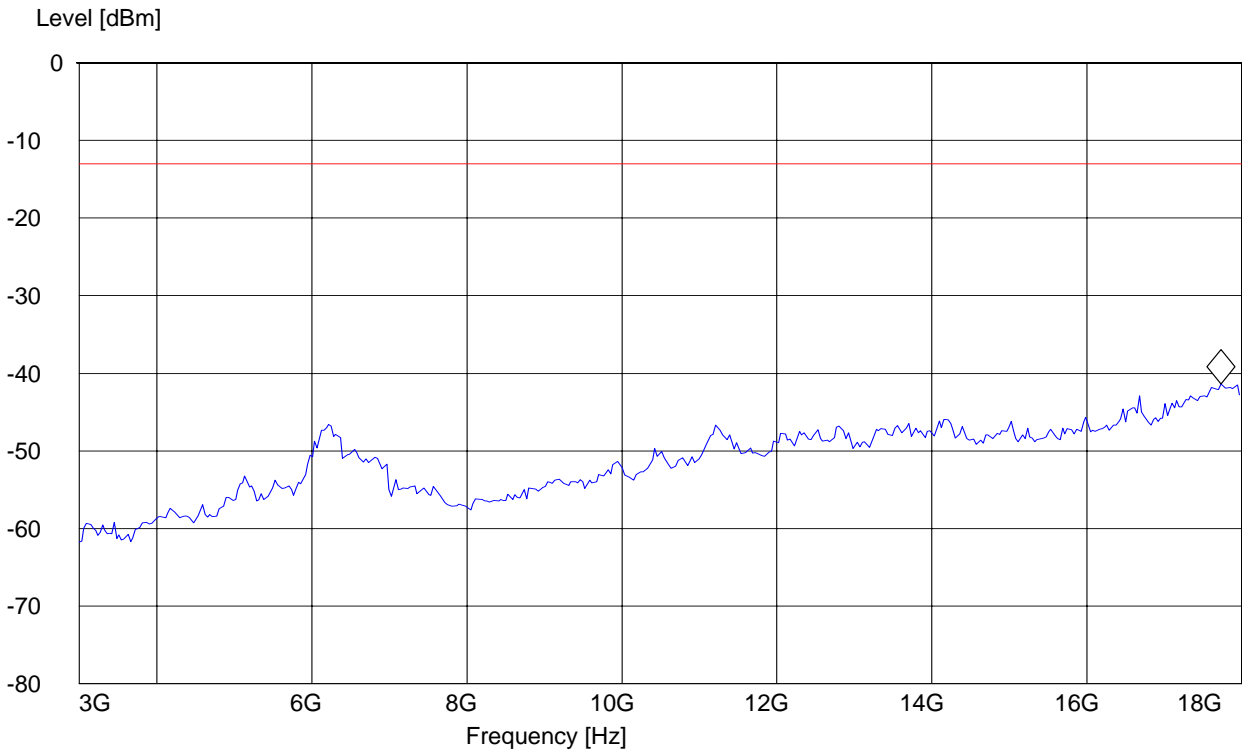
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9262: 3GHz – 18GHz**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9262  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 24Spuri 3-18G"***

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

Marker: 17.729458918 GHz -41.37 dBm





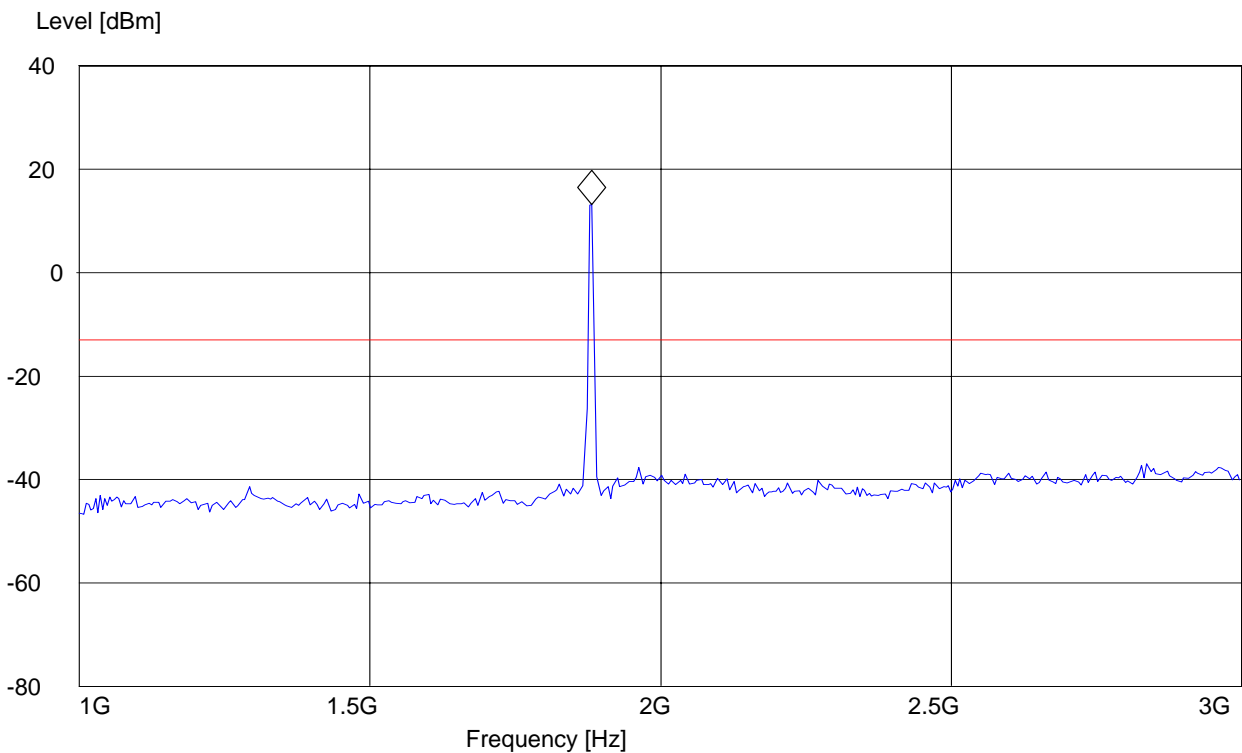
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9400: 1GHz – 3GHz**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9400  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments: Marker placed on transmit signal

***SWEEP TABLE: "FCC 24Spuri 1-3G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.881763527 GHz 13.17 dBm



**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL9400: 3GHz – 18GHz**

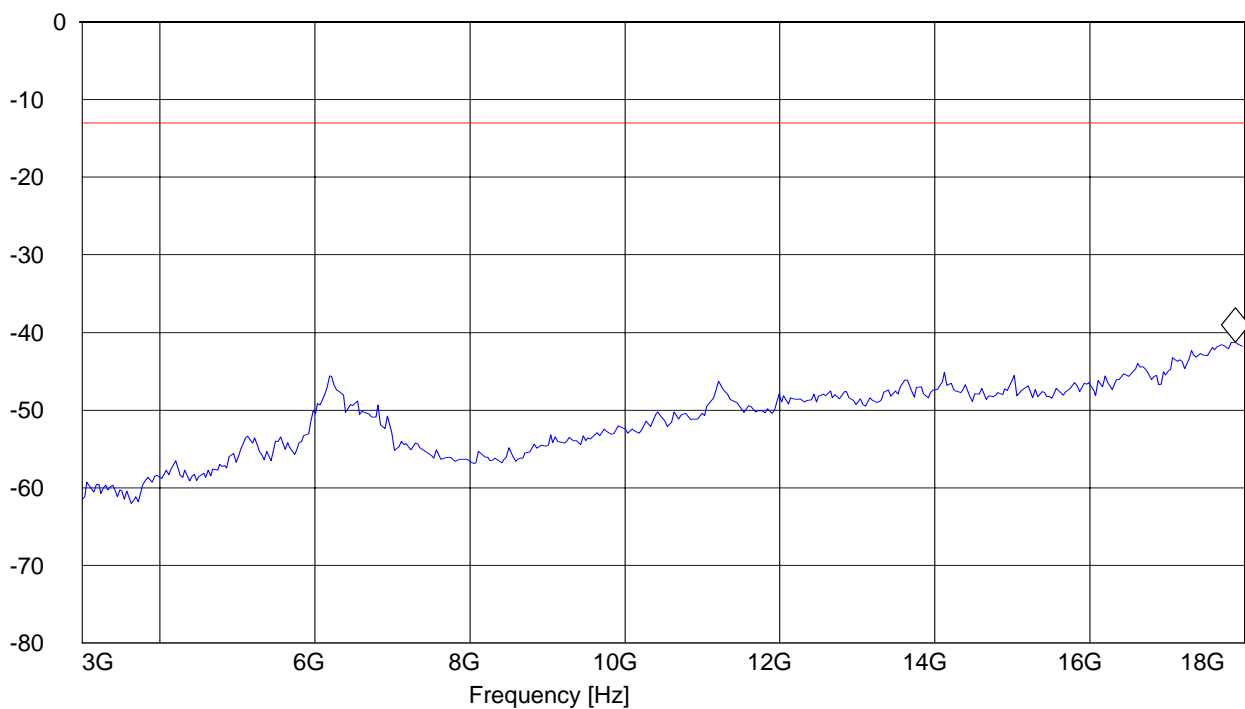
EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9400  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 24Spuri 3-18G"***

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

Marker: 17.879759519 GHz -41.21 dBm

Level [dBm]



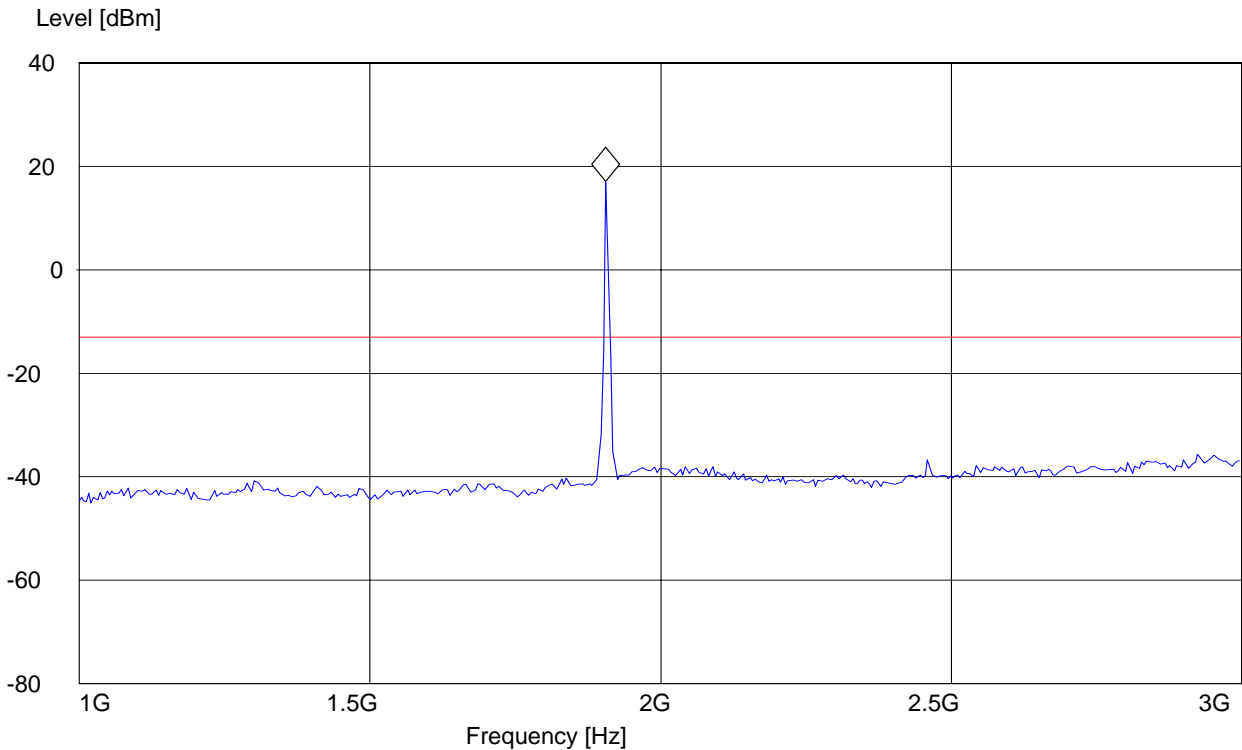
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9538: 1GHz – 3GHz**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9538  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments: Marker placed on transmit signal

***SWEEP TABLE: "FCC 24Spuri 1-3G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM

Marker: 1.905811623 GHz 17.09 dBm



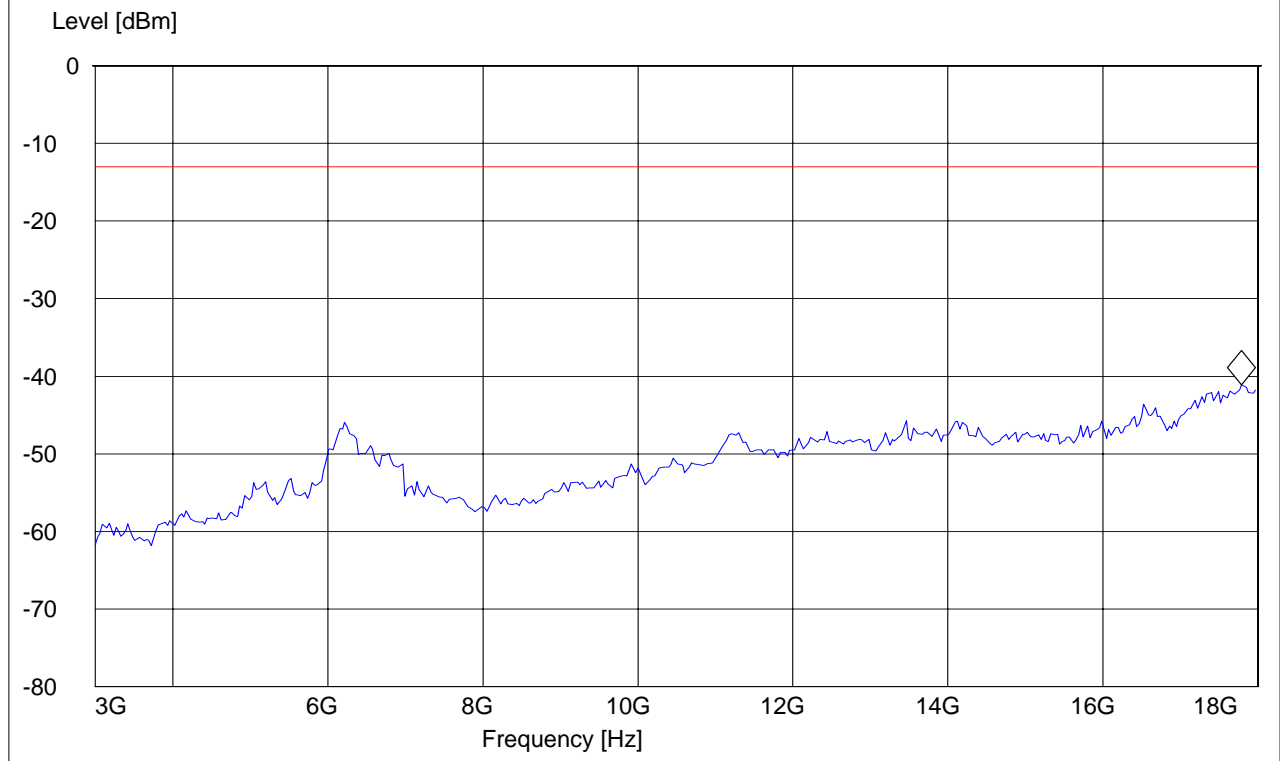
**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9538: 3GHz – 18GHz**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9538  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "FCC 24Spuri 3-18G"***

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

Marker: 17.789579158 GHz -41.09 dBm



**RADIATED SPURIOUS EMISSIONS(UMTS FDD2) 18GHz – 19.1GHz****Note:****1.This plot is valid for low, mid & high channels (worst-case plot)**

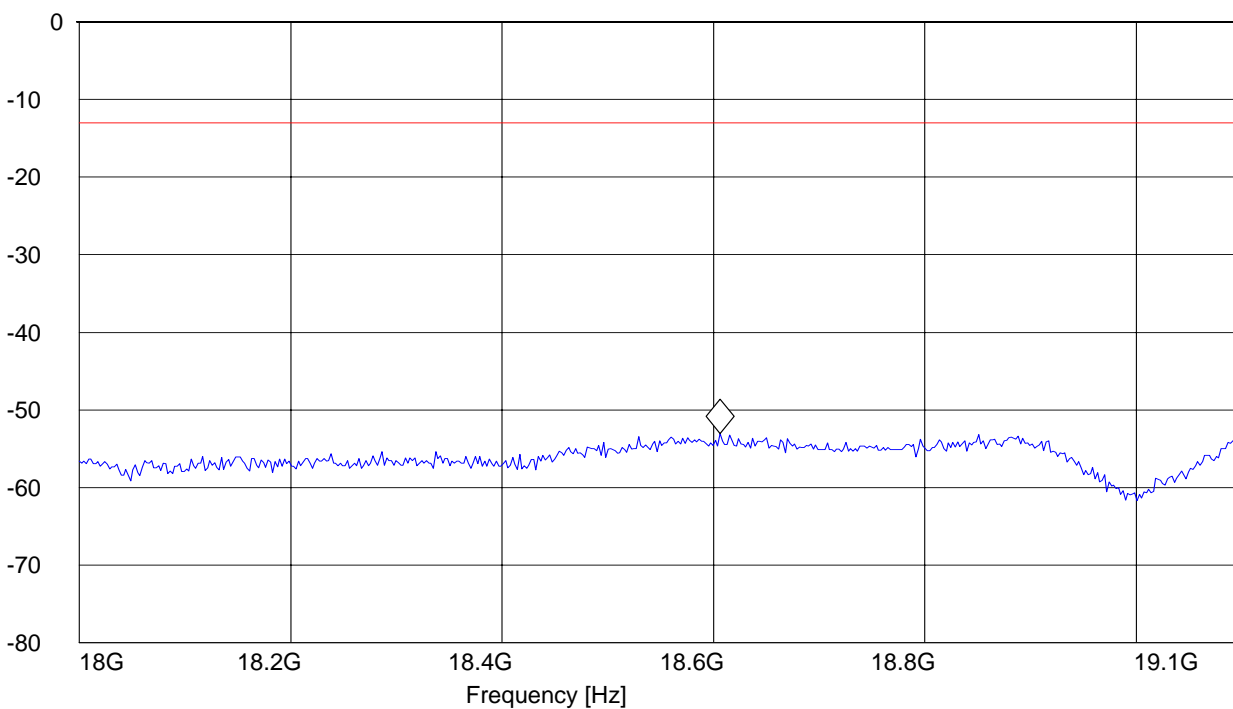
EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II CH. 9400  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***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

Marker: 18.606212425 GHz -53.06 dBm

Level [dBm]



**5.5.5 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 (μV/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.

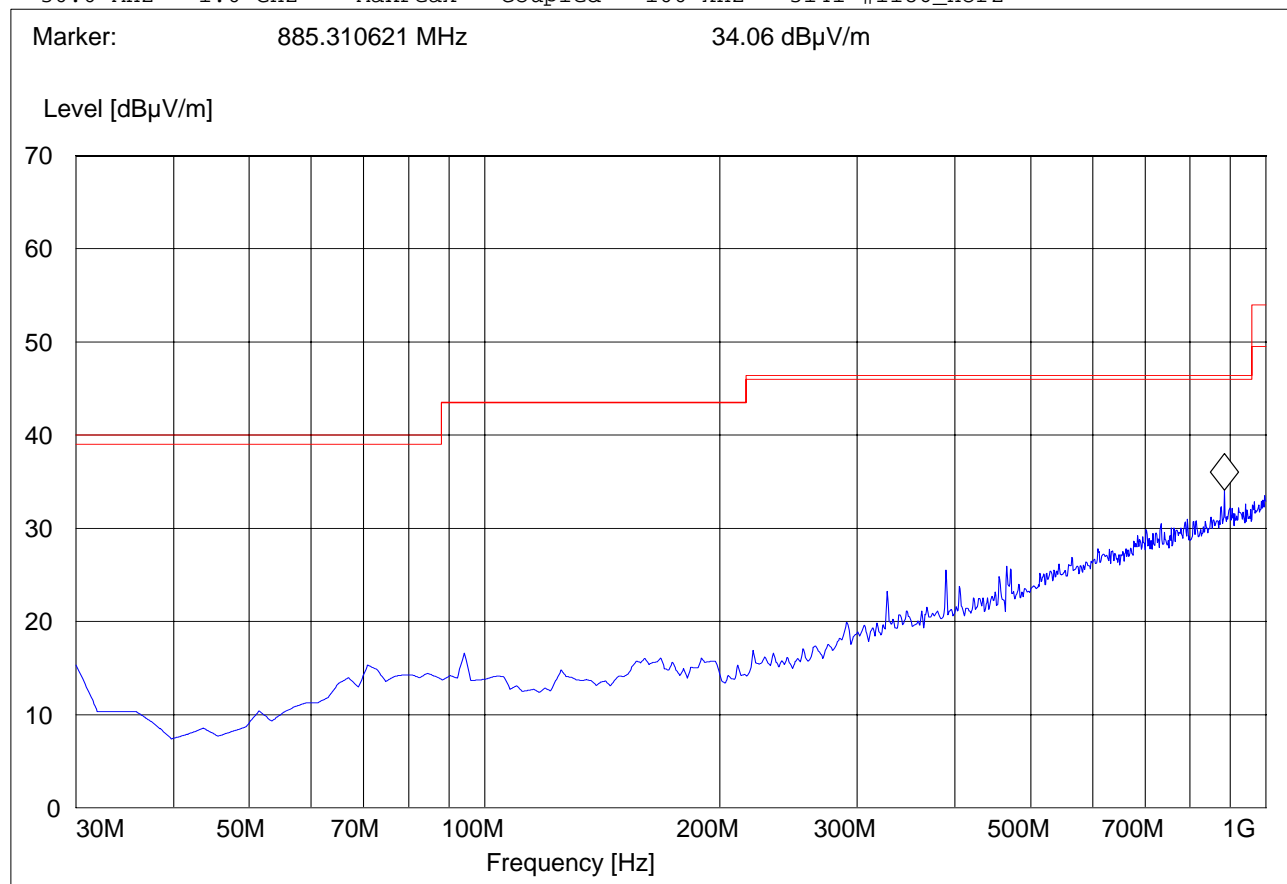
### 5.5.5.1 Test Results Receiver Spurious Emission

#### 30M-1GHz, Antenna Horizontal

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II rx mode  
ANT Orientation: H  
EUT Orientation: H  
Test Engineer: Satya  
Voltage: AC  
Comments:

#### ***SWEEP TABLE: "CANDA RE\_30M-1G\_Hor"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz

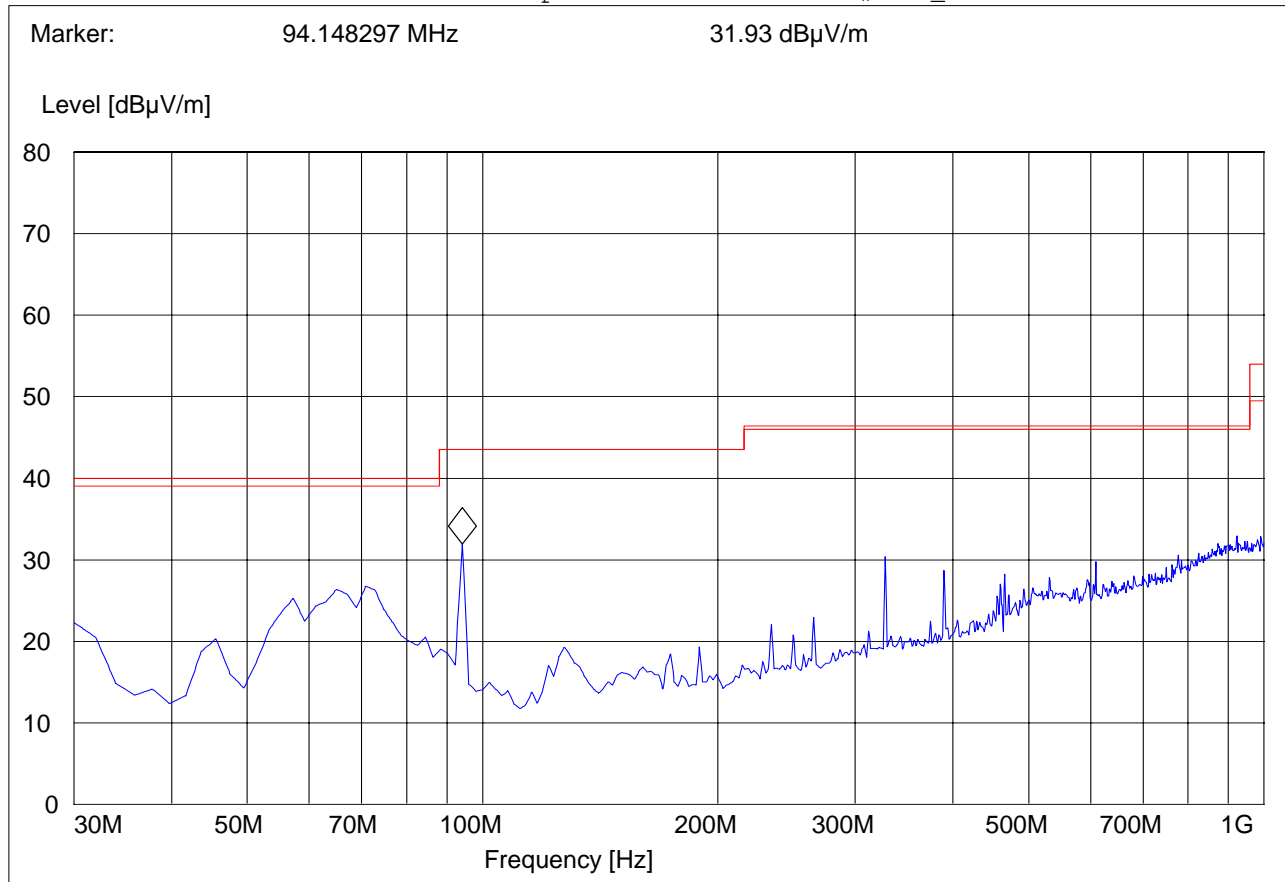


**30M-1GHz, Antenna Vertical**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II rx mode  
ANT Orientation: V  
EUT Orientation: H  
Test Engineer: Satya  
Voltage: AC  
Comments:

***SWEEP TABLE: "CANADA RE\_30M-1G\_Ver"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Vert





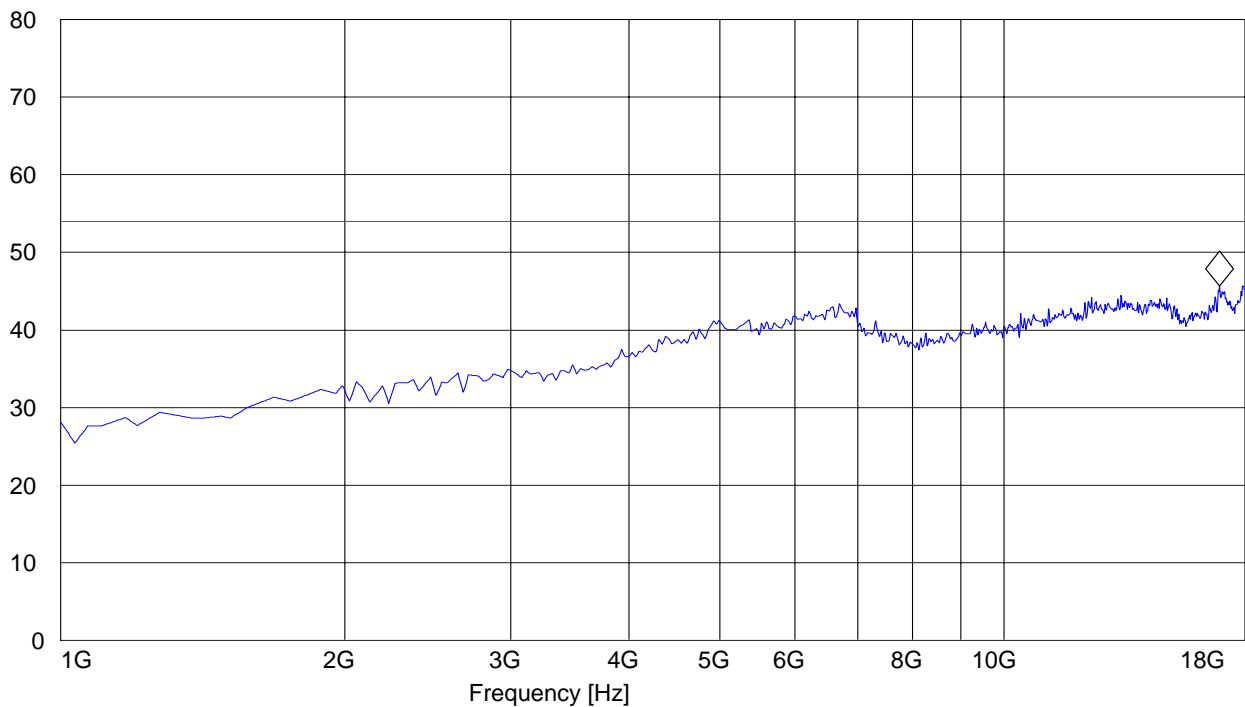
**Receiver Spurious Emission UMTS FDD2: 1-18GHz****CETECOM Inc.****411 Dixon Landing Road; Milpitas, CA 95035**

EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II Rx  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery

**SWEEP TABLE: "CANADA RE\_1-18G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326horn_AF_horz

Marker: 16.909819639 GHz 45.66 dB $\mu$ V/m

Level [dB $\mu$ V/m]

**Receiver Spurious Emission UMTS FDD2: 18-26.5GHz**

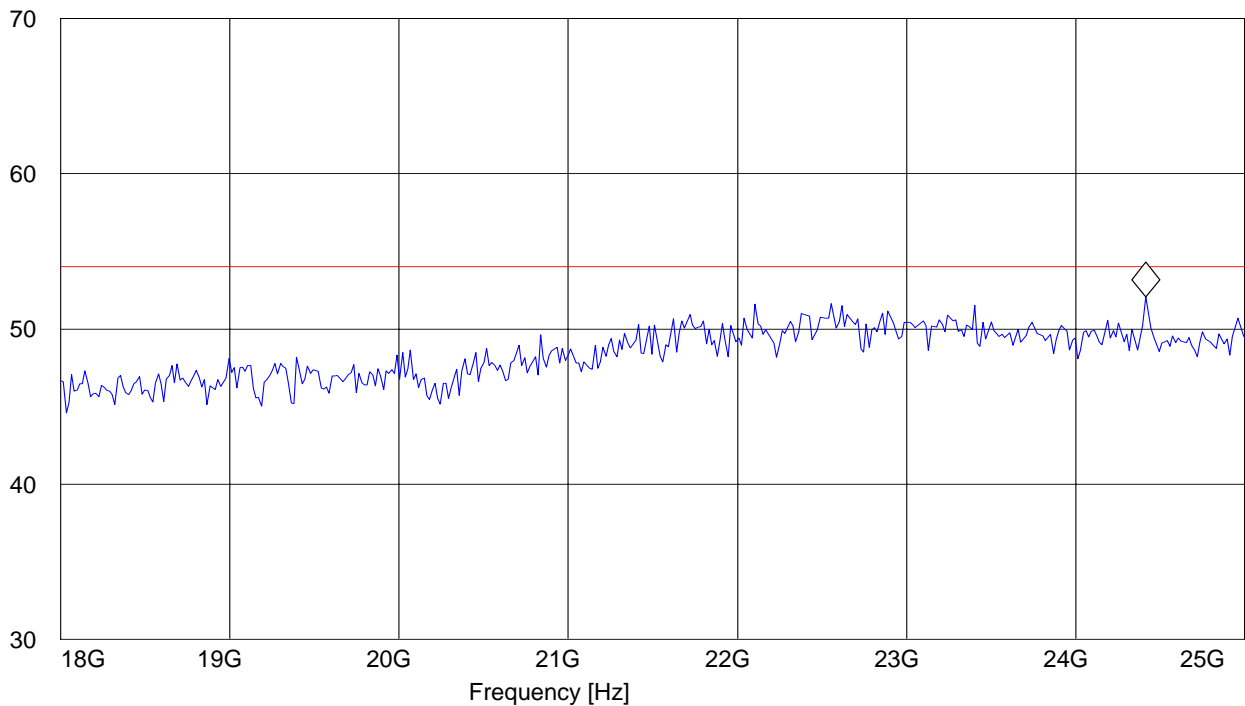
EUT: V02B-V02B001  
Customer:: Dell Inc.  
Test Mode: FDD II Rx  
ANT Orientation: V  
EUT Orientation: V  
Test Engineer: Chris  
Voltage: Internal Battery  
Comments:

***SWEEP TABLE: "CANADA RE\_18-26.5G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
18.0 GHz	26.0 GHz	MaxPeak	Coupled	1 MHz	Horn # 3116_18-40G

Marker: 24.412825651 GHz 52.05 dB $\mu$ V/m

Level [dB $\mu$ V/m]



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

### 5.6.1 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

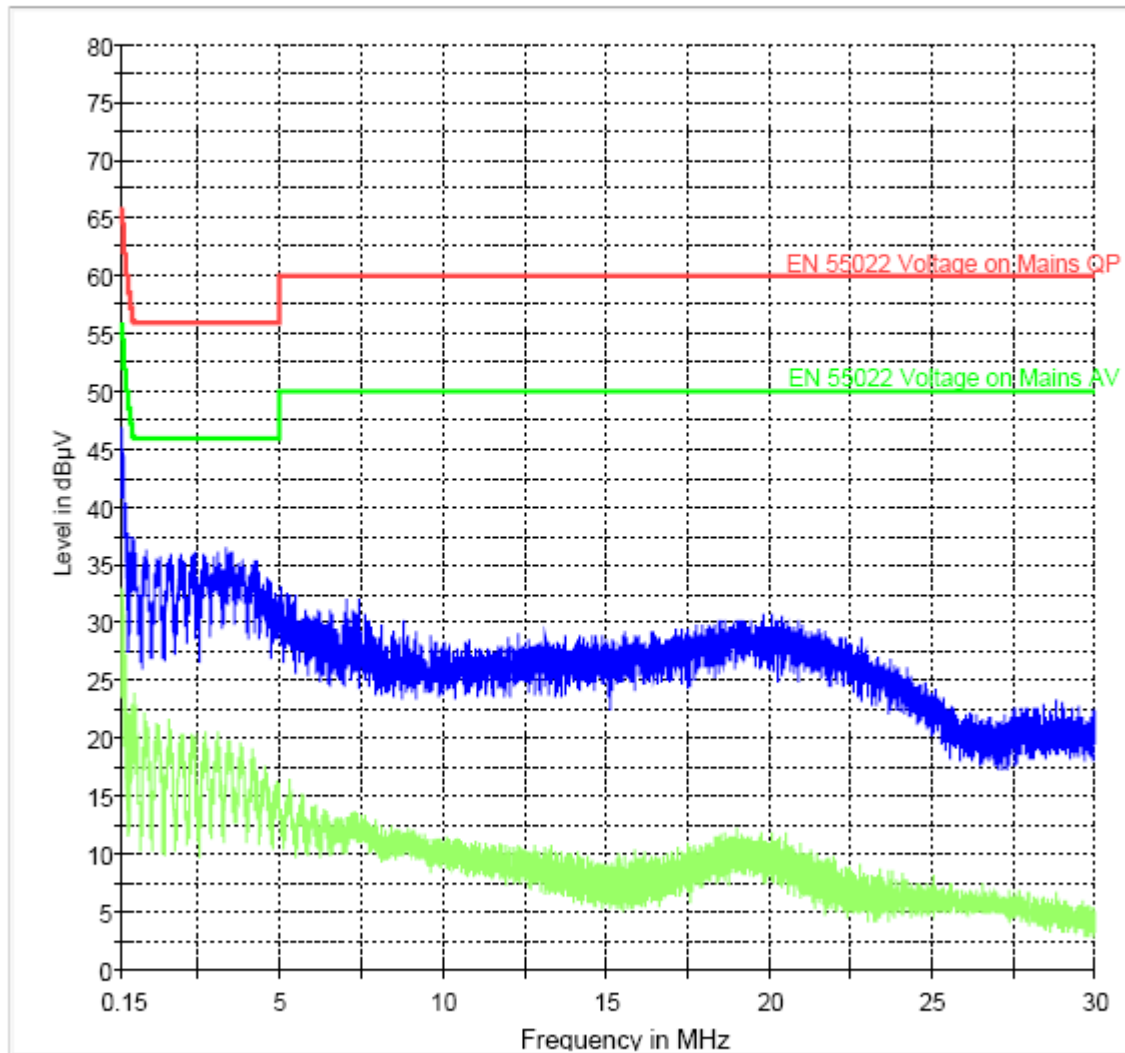
**ANALYZER SETTINGS: RBW = 10KHz**

**VBW = 10KHz**

LINE 850 TX

**Line**

CISPR 22 Mains Conducted - L



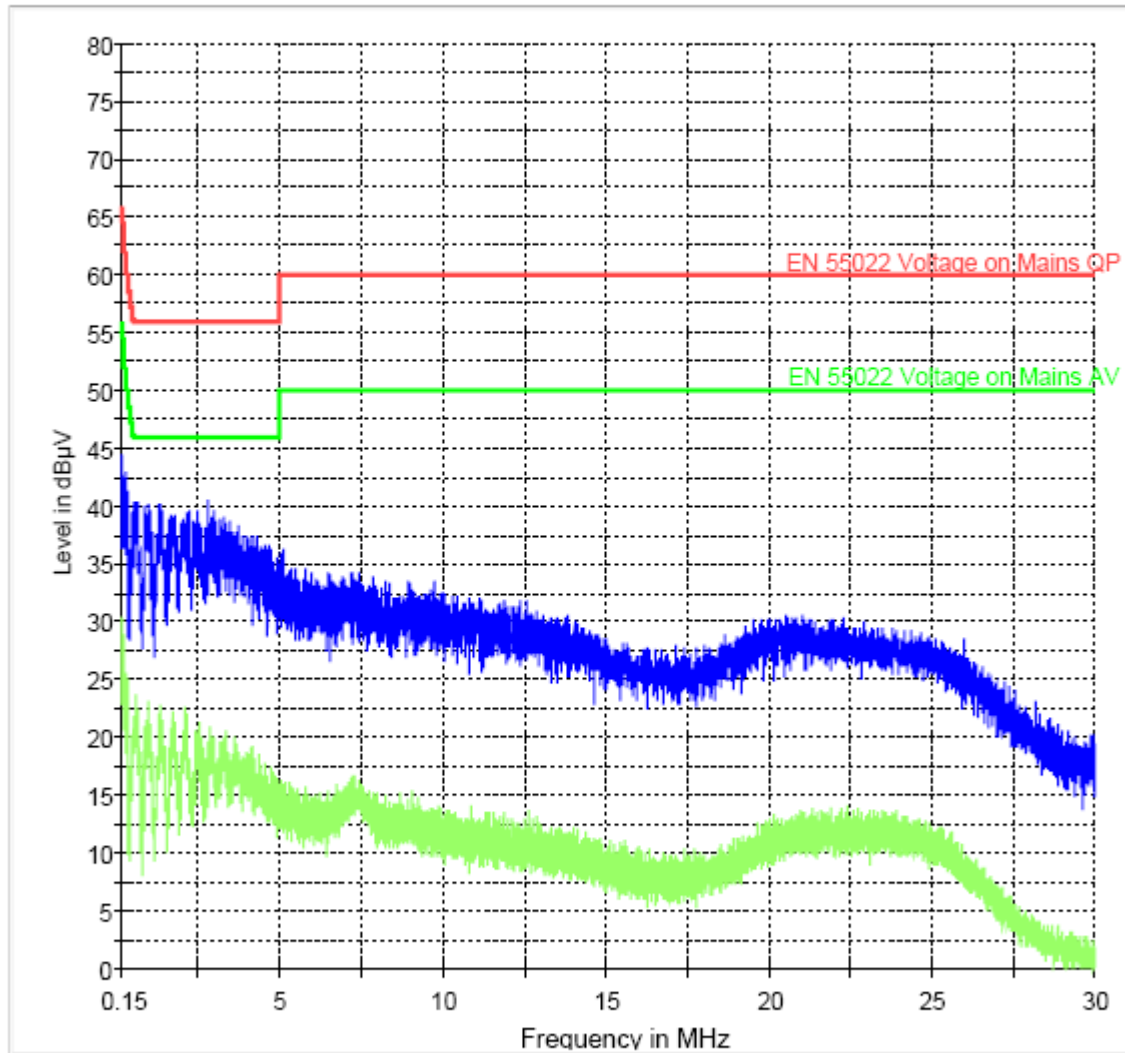
EN 55022 Voltage on Mains QP.LimitLine  
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine  
Preview Result 2

**NEUTRAL 850 TX**

**Neutral**

CISPR 22 Mains Conducted - N

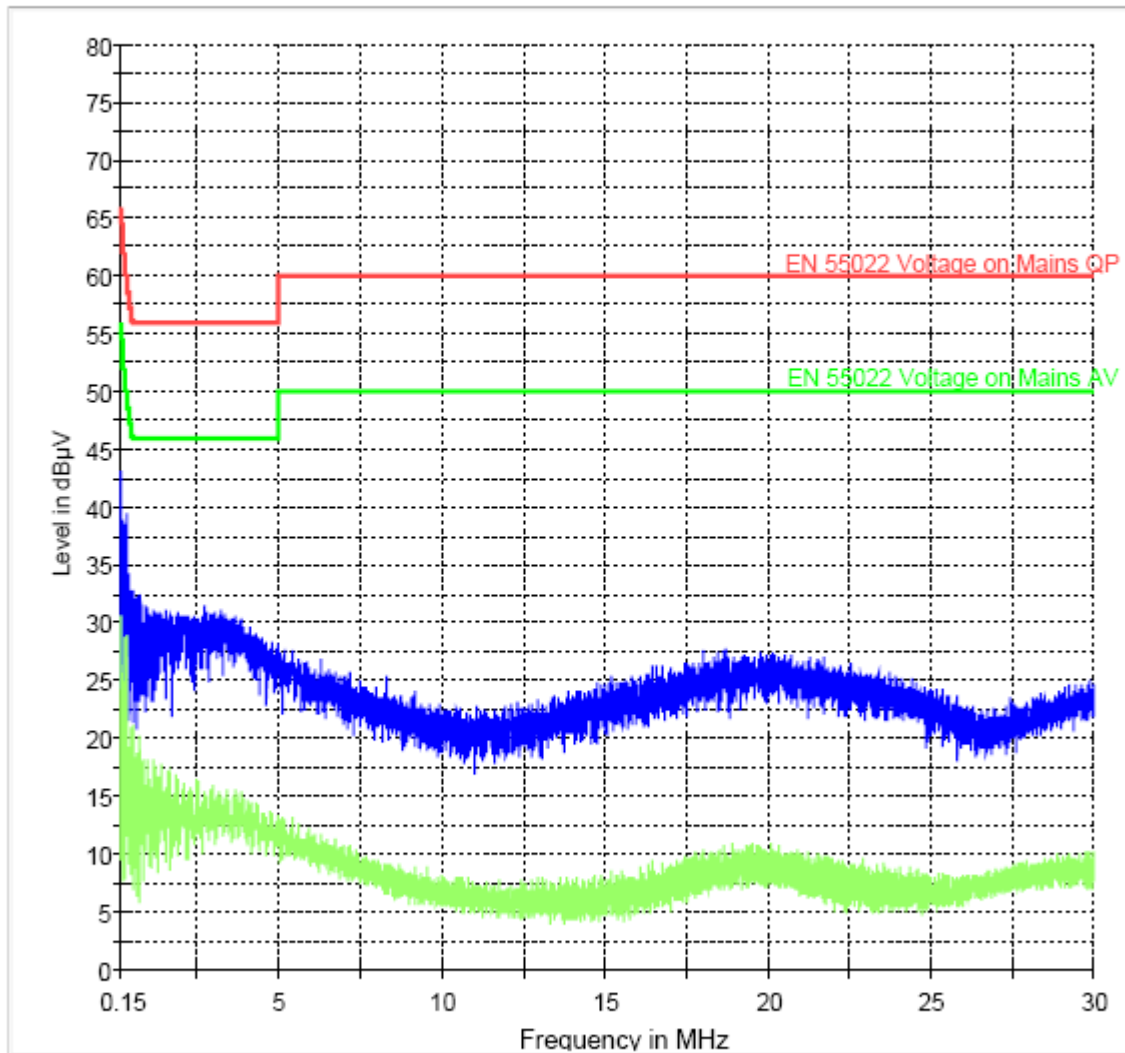


EN 55022 Voltage on Mains QP.LimitLine  
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine  
Preview Result 2

**LINE WCDMA FDDV TX****Line**

CISPR 22 Mains Conducted - L

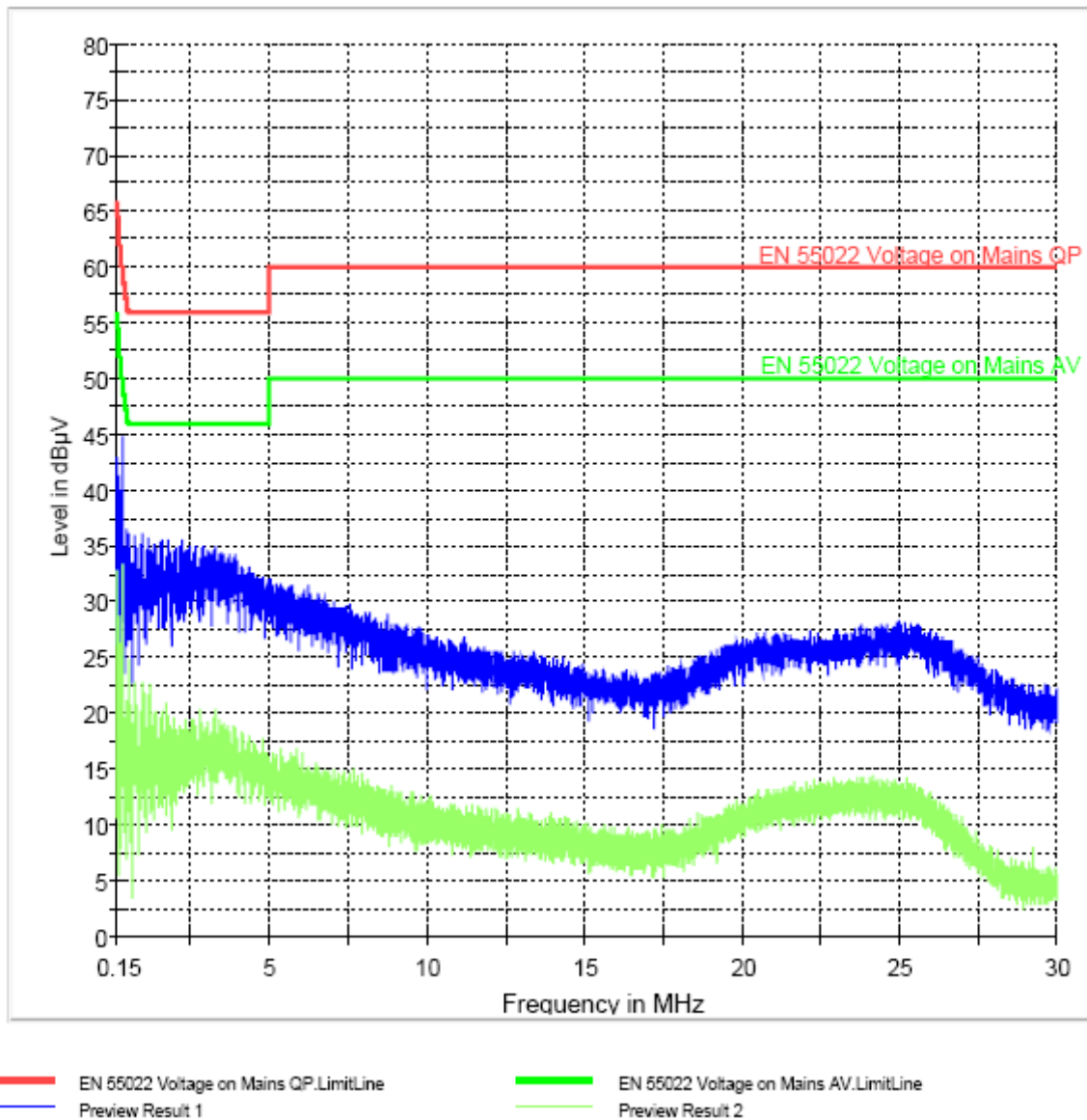


EN 55022 Voltage on Mains QP.LimitLine  
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine  
Preview Result 2

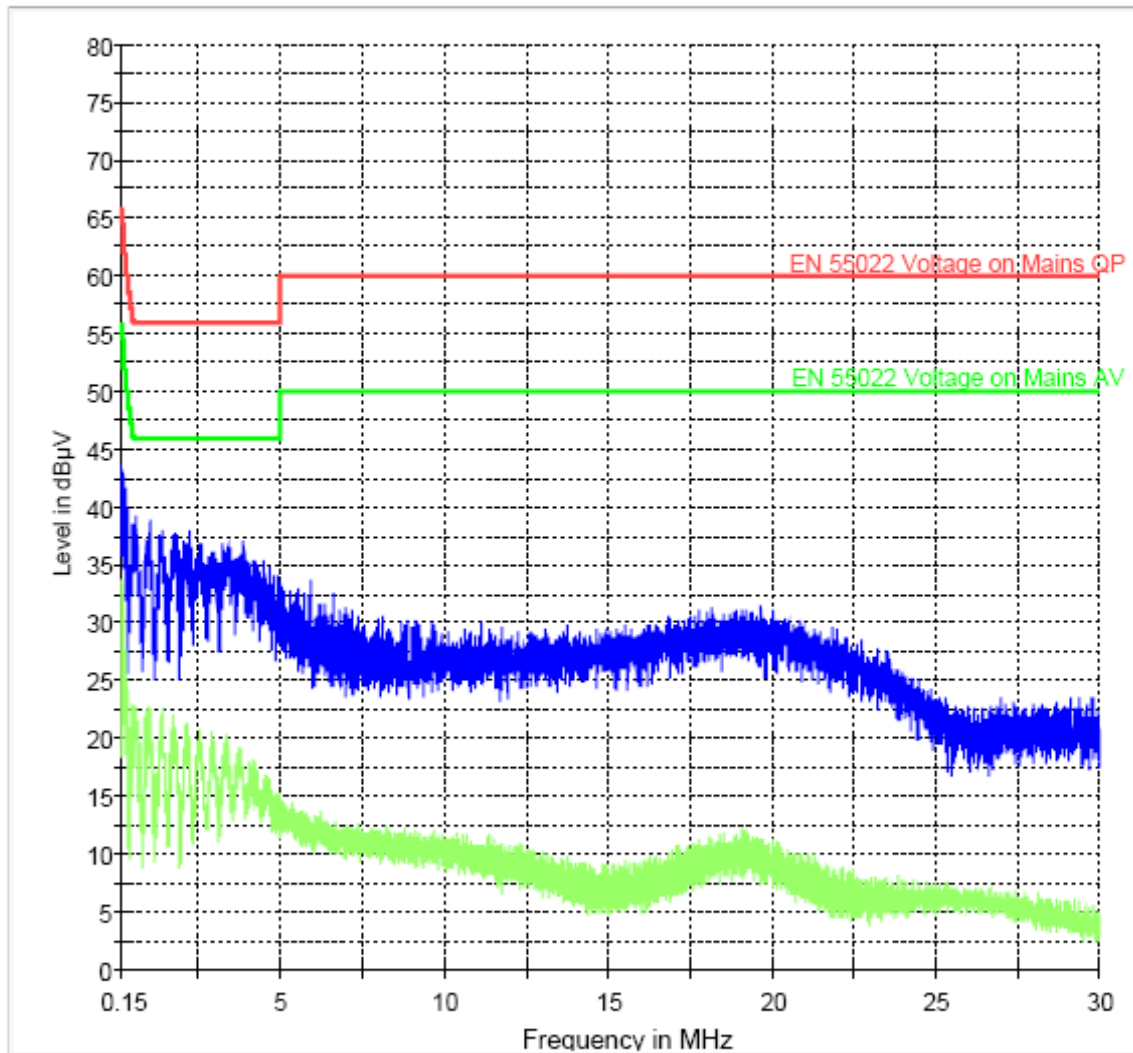
**NEUTRAL WCDMA FDD V****Neutral**

CISPR 22 Mains Conducted - N



**LINE GSM 1900 TX****Line**

CISPR 22 Mains Conducted - L



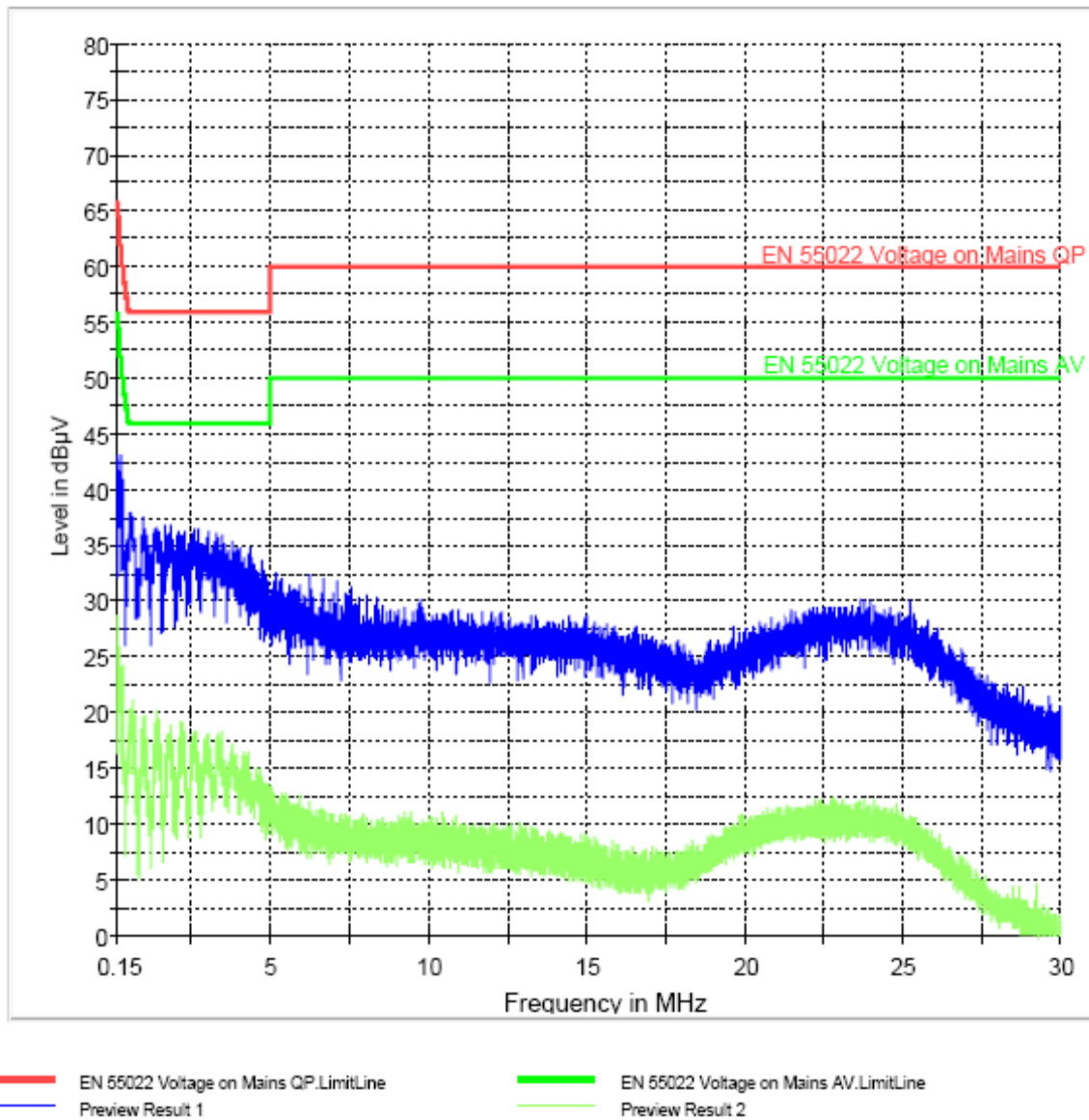
EN 55022 Voltage on Mains QP.LimitLine  
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine  
Preview Result 2



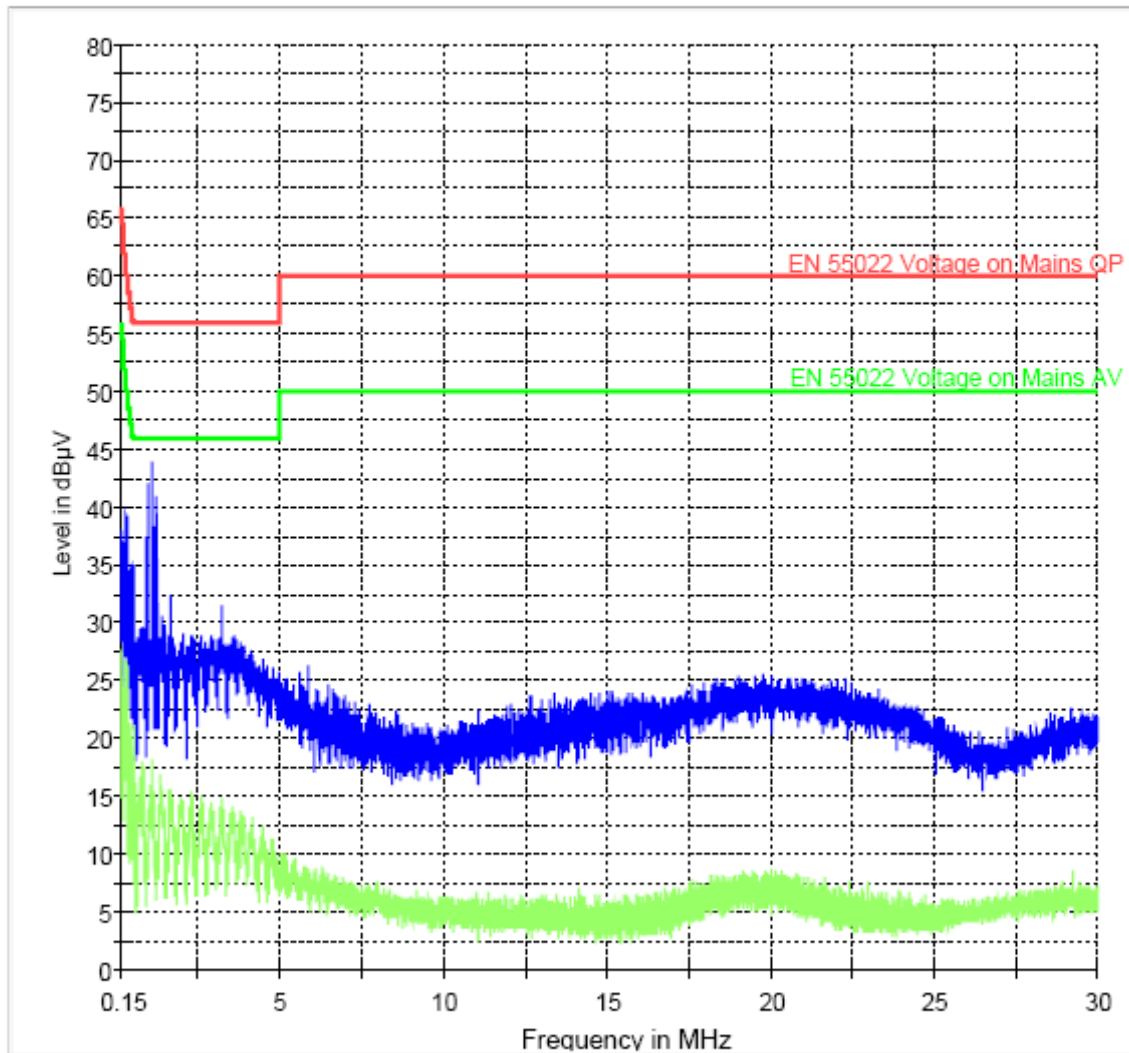
**NEUTRAL GSM 1900 TX****Neutral**

CISPR 22 Mains Conducted - N



**LINE FDD II RX****Line**

CISPR 22 Mains Conducted - L

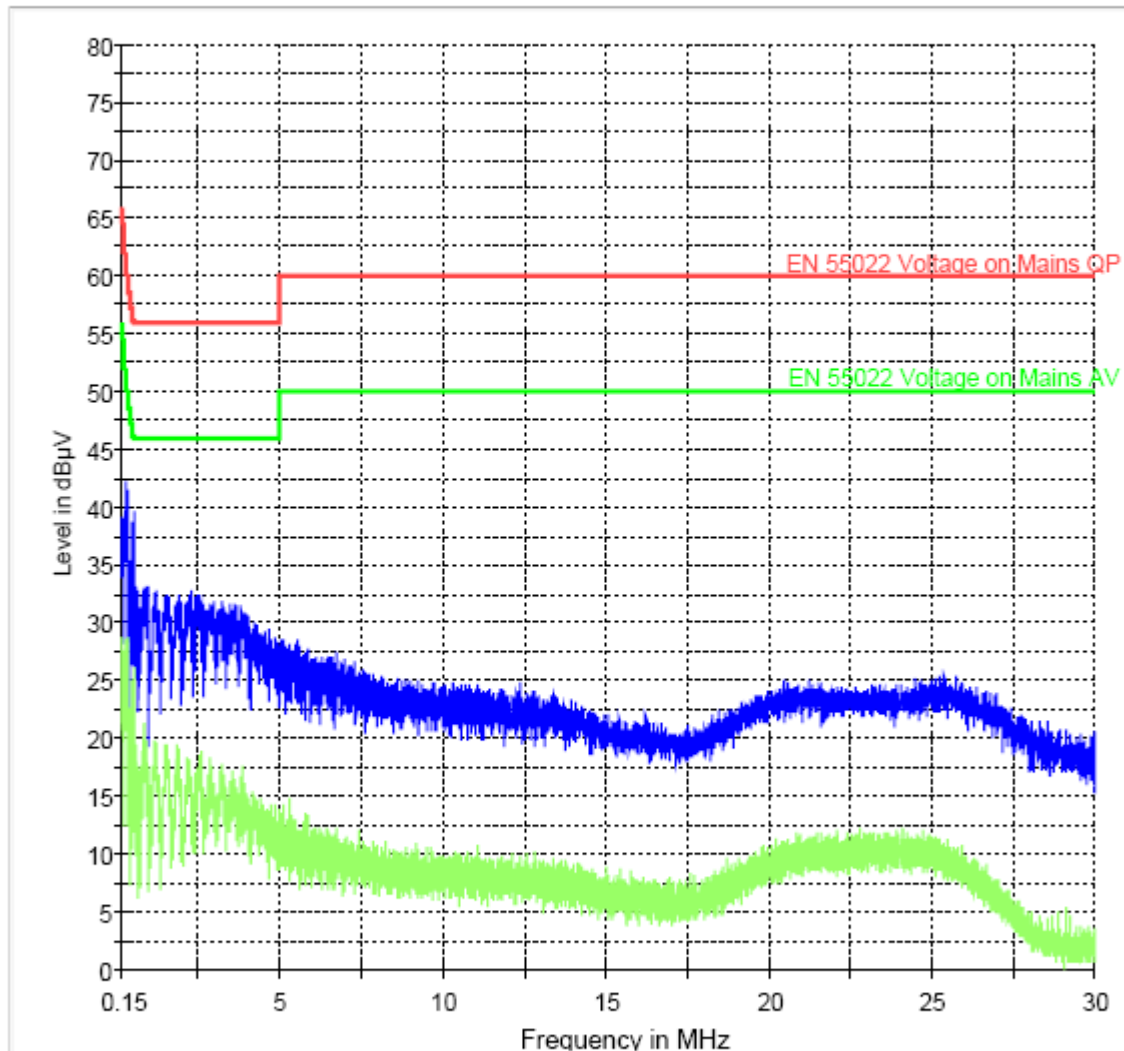


EN 55022 Voltage on Mains QP.LimitLine  
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine  
Preview Result 2

**NEUTRAL FDD II RX****Neutral**

CISPR 22 Mains Conducted - N



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.

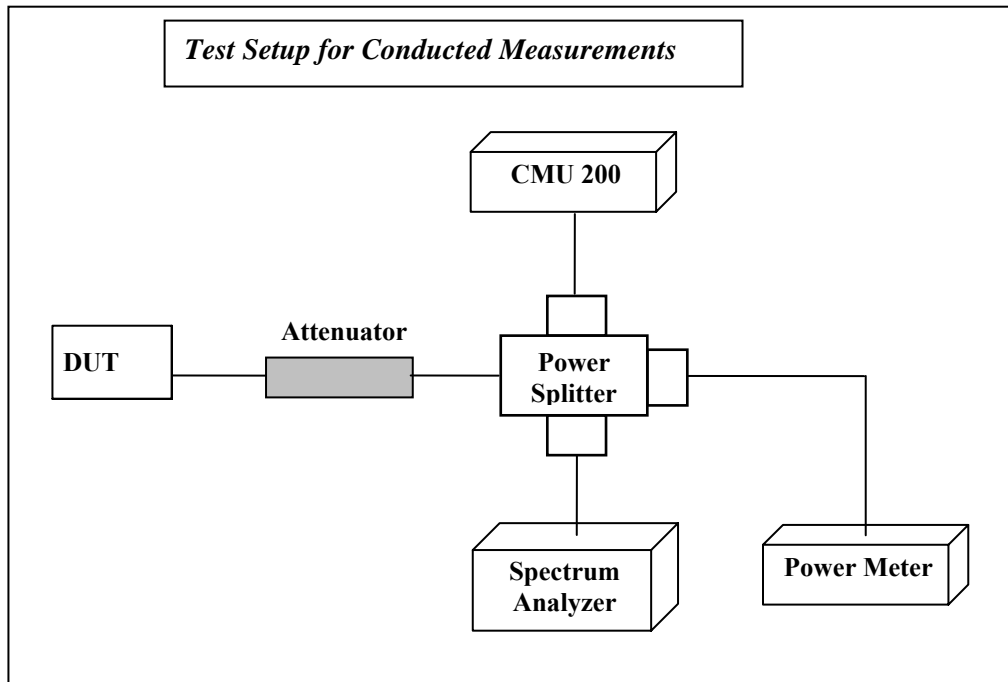
FCC Report and order 02-229 September 24, 2002.

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

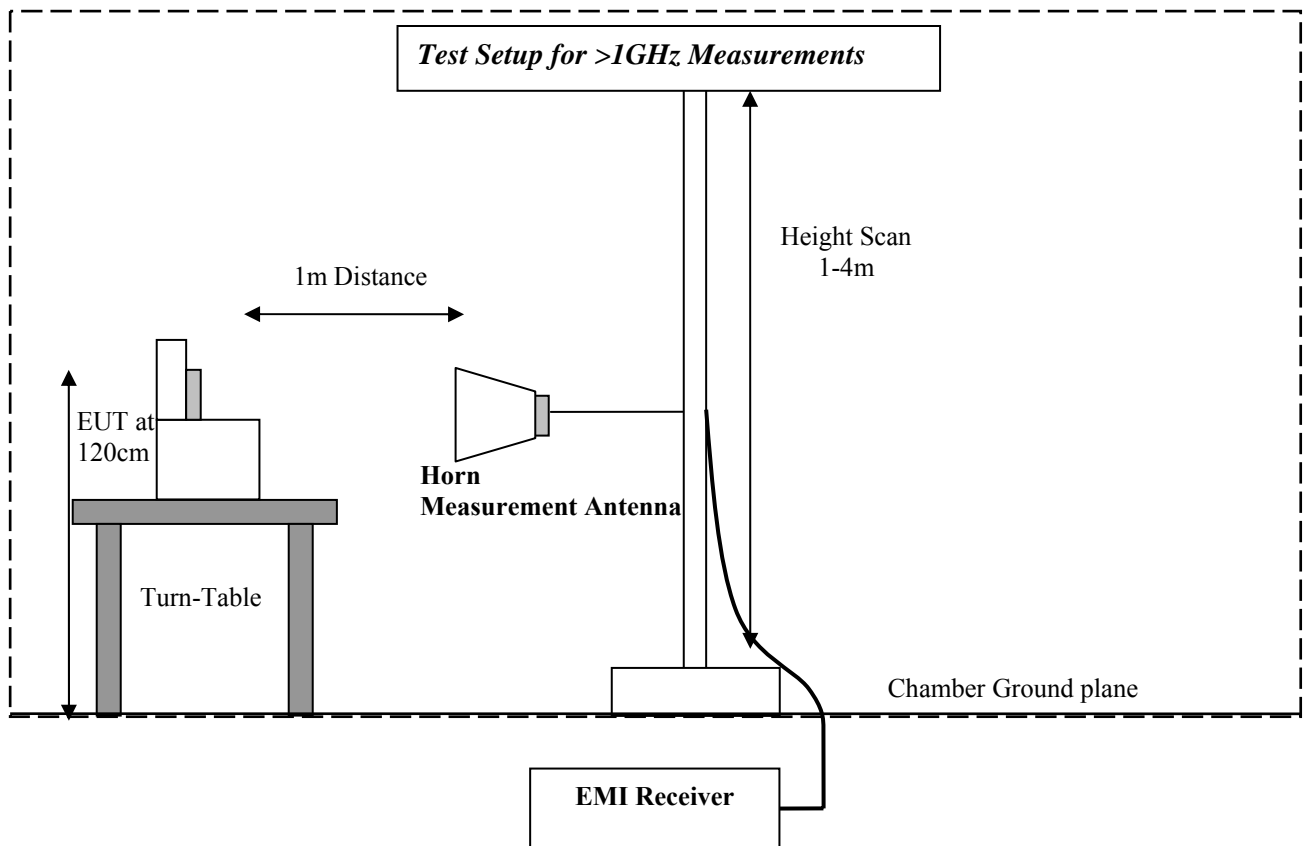
ANSI / TIA-603-C-2004 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard November 7, 2002.

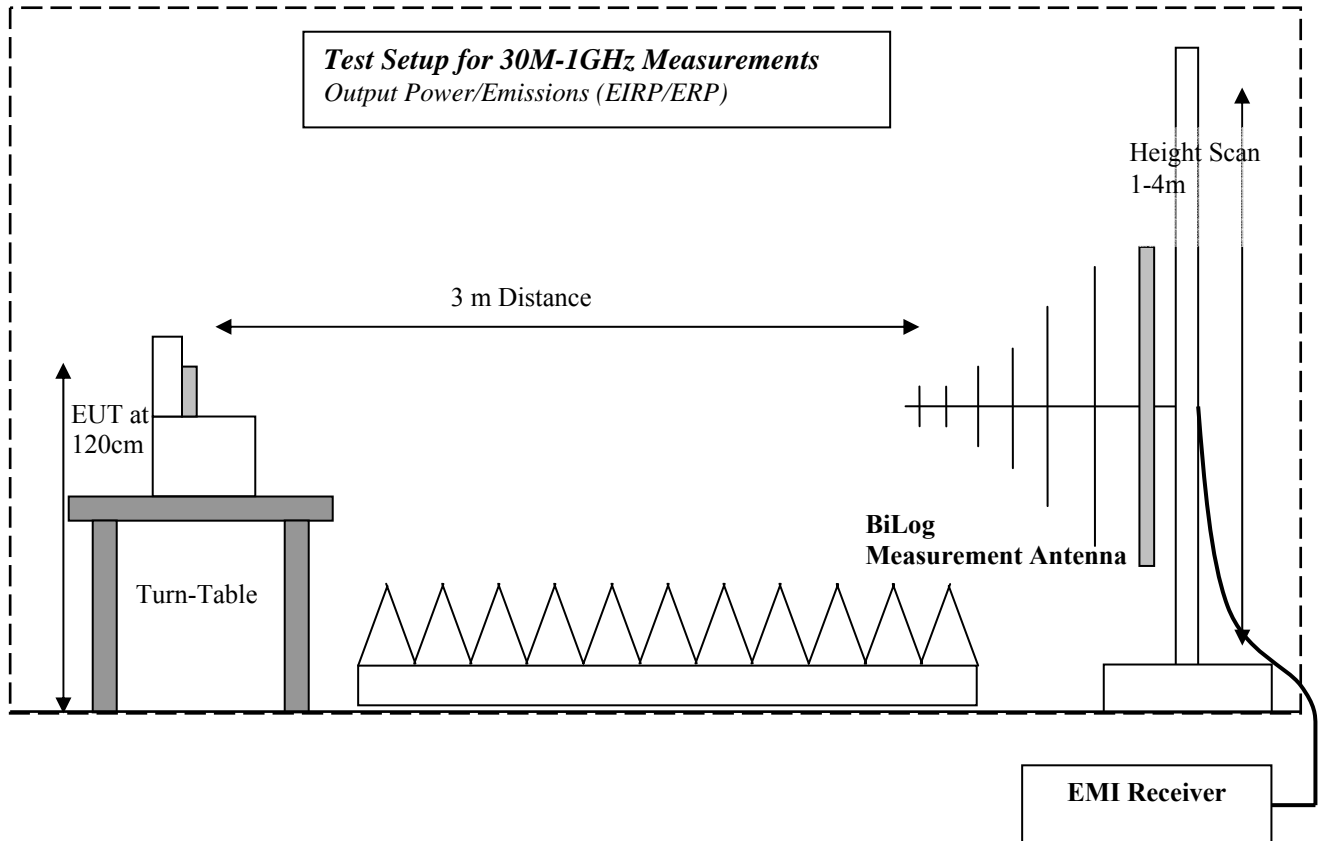
## 8 BLOCK DIAGRAMS

### Conducted Testing



## Radiated Testing







## **9 Revision History**

2009-08-11:

**EMC\_FIHTD\_001\_09004\_FCC22\_24:** Original report

2009-09-01:

**EMC\_FIHTD\_001\_09004\_FCC22\_24\_rev1:** (replaces report# EMC\_FIHTD\_001\_09004\_FCC22\_24) Model name changed from V02B to V02B-V02B001 and marketing name changed from V02B to Mini 3iX

2009-09-14:

**EMC\_FIHTD\_001\_09004\_FCC22\_24\_rev2:** (replaces report# EMC\_FIHTD\_001\_09004\_FCC22\_24\_rev1) Address and contact person information changed in section 2.2 Identification of Client.

2009-11-05:

**EMC\_FIHTD\_001\_09004\_FCC22\_24\_rev3:** (replaces report# EMC\_FIHTD\_001\_09004\_FCC22\_24\_rev2)

1. Average power readings on page 11 removed.
2. Plots on pages 99, 103, 104, 105 and 106 changed.