



FCC Test Report

FOR:

**Dell Inc.
Model Name: V01B
FCC ID: E2KV01B001**

47 CFR Part 2, 22, 24

**TEST REPORT #: EMC_001_09003_FCC_22_24
DATE: 2010-04-07**



**FCC listed:
A2LA accredited

IC recognized #
3462B-1**

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: info@cetecomusa.com ♦ <http://www.cetecom.com>

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

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

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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	V01B

Responsible for Testing Laboratory:

2010-04-07 Compliance Marc Douat
(Test Lab Manager)

Date	Section	Name	Signature
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Responsible for the Report:

2010-04-07 Compliance Satya Radhakrishna
(EMC Project Engineer)

Date	Section	Name	Signature
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The test results of this test report relate exclusively to the test item specified in Section 3. 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.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Heiko Strehlow
Responsible Project Leader:	Satya Radhakrishna

2.2 Identification of the Client

Applicant's Name:	Dell Inc.
Street Address:	One Dell Way Round Rock, TX 78682 Mail stop PS4-30
City/Zip Code	Round Rock, TX 78682
Country	USA
Contact Person:	Richard Worley
Phone No.	+1-512-728-1081
Fax:	+1-512-728-5278
e-mail:	Richard_Worley@dell.com

2.3 Identification of the Manufacturer

Same as above.

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	Aero
Model No:	V01B
Product Type:	Portable
Hardware Revision :	EPR2
Software Revision :	1001210212ZEN_FBW1.4BENZ_WBD_512rabbit_31895331062317640 66729122
FCC-ID:	E2KV01B001
Frequency:	GSM 850: 824.2-848.8MHz; PCS 1900: 1850.2-1909.8MHz FDD V: 826.4-846.6MHz; FDD II: 1852.4-1907.6MHz
Type(s) of Modulation:	GMSK; 8-PSK; QPSK; 16QAM
Number of channels:	GSM850: 125 and PCS 1900: 300 FDD II: 278/ FDD V: 103
Antenna Type:	Integral
Power Supply:	AC, Battery
Temperature Range:	-10°C to 55°C

3.2 Identification of the Equipment Under Test (EUT)

EUT #	Serial Number	HW Version	SW Version
1	BZ3EA000002597	EPR2	1001210212ZEN_FBW1.4BENZ_WBD_512rabbit _3189533106231764066729122

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Serial Number
1	USB Cable	N/A	N/A	N/A
2	AC Adapter	N/A	N/A	N/A

4 Subject of Investigation

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in the following test standards:

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

5 Measurements

5.1 RF Power Output

5.1.1 References

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

IC: RSS 132 Section 4.4 and 6.4; RSS 133 Section 4.3

5.1.2 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.

5.1.3 Limits:

5.1.3.1 **FCC 22.913 (a) Effective radiated power limits.**

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

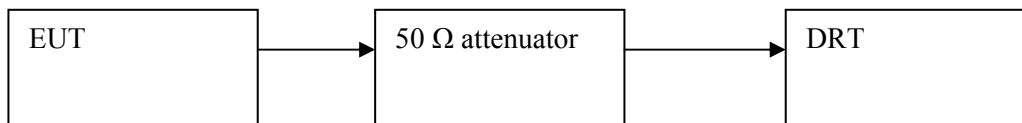
5.1.3.2 **FCC 24.232 (b)(c) Power limits.**

(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.

5.1.4 Conducted Output Power Measurement procedure

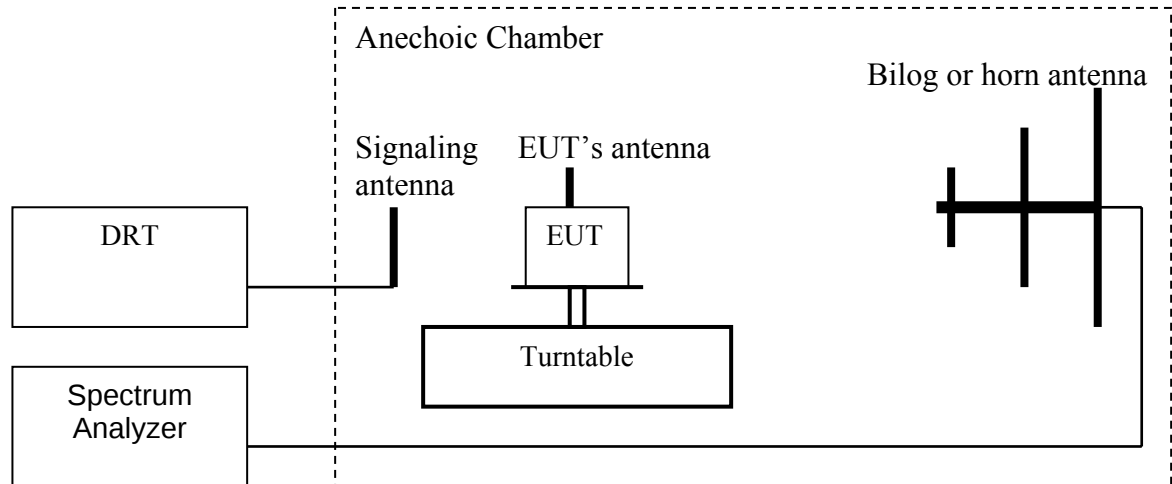
Ref: TIA-603C 2004 2.2.1 Conducted Carrier Output Power Rating



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.

5.1.5 Radiated Output Power Measurement procedure

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



1. Connect the equipment as shown in the above diagram with the EUT's antenna in 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.)

5.1.6 RF Power Output 850MHz band

Limit: Nominal Peak Output Power < 38.45 dBm (7W)

Note: Measurement uncertainty for ERP measurements ± 3 dB

GSM 850: GMSK Mode		
Frequency (MHz)	Conducted Power	Radiated Power
	Peak Power (dBm)	ERP (dBm)
824.2	32.22	29.9
836.4	32.29	31.0
848.8	32.37	31.1

EGPRS 850: 8PSK Mode		
Frequency (MHz)	Conducted Power	Radiated Power
	Peak Power (dBm)	ERP (dBm)
824.2	29.36	26.065
836.4	29.21	26.577
848.8	29.03	25.679

FDD V: UMTS Mode		
Frequency (MHz)	Conducted Power	Radiated Power
	Peak Power (dBm)	ERP (dBm)
826.4	25.80	23.456
836.0	25.72	24.361
846.6	25.95	24.893

5.1.7 RF Power Output 1900MHz band

Limit: Nominal Peak Output Power < 33 dBm (2W)

PAR may not exceed 13dB

Note: Measurement uncertainty for EIRP measurements ± 3 dB

GSM 1900: GMSK Mode		
Frequency (MHz)	Conducted Power	Radiated Power
	Peak Power (dBm)	EIRP (dBm)
1850.2	30.04	30.922
1880.0	29.79	31.244
1909.8	29.41	29.384

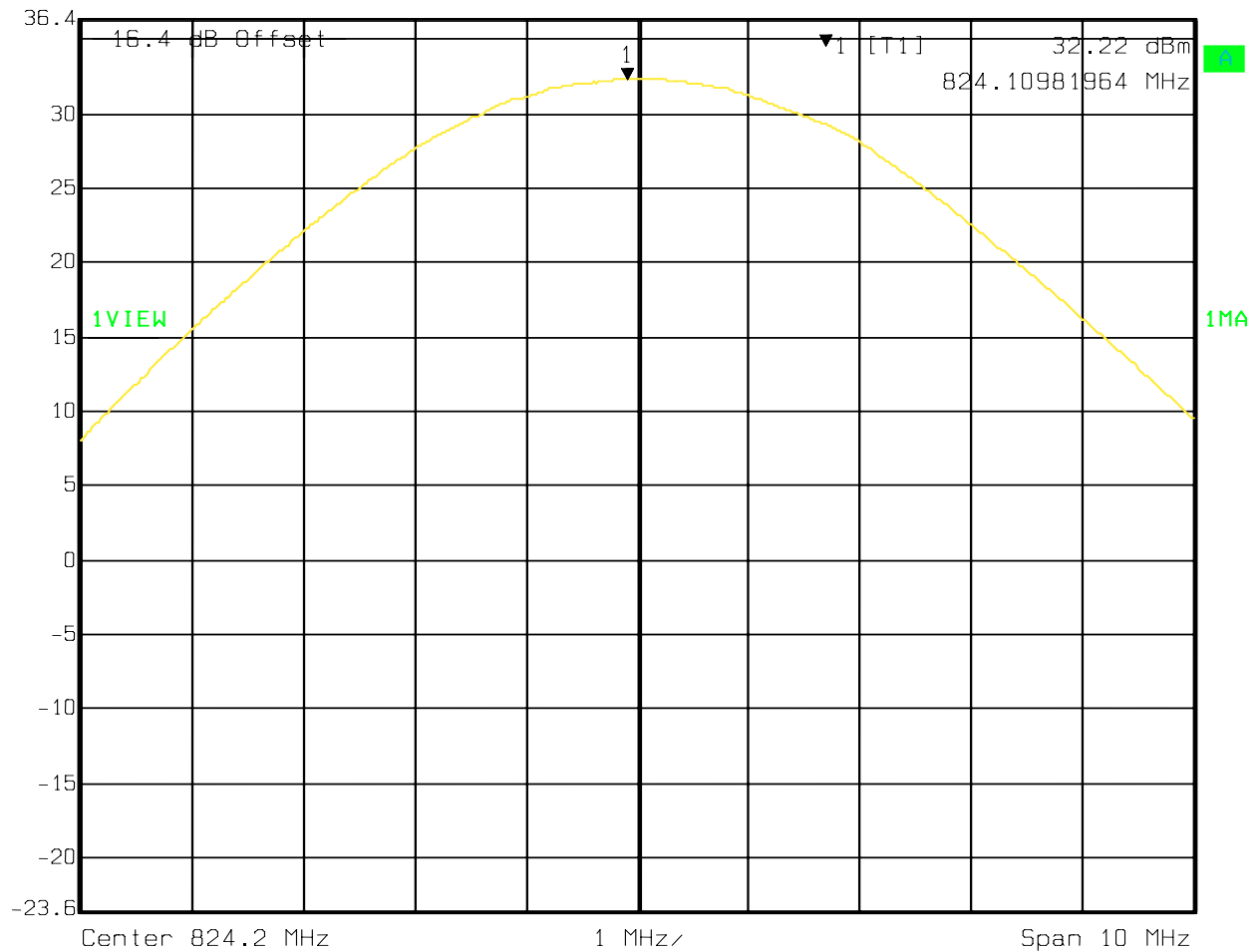
EGPRS 1900: 8PSK Mode		
Frequency (MHz)	Conducted Power	Radiated Power
	Peak Power (dBm)	EIRP (dBm)
1850.2	28.02	29.670
1880.0	27.89	29.255
1909.8	27.69	27.688

FDD II: UMTS Mode		
Frequency (MHz)	Conducted Power	Radiated Power
	Peak Power (dBm)	EIRP (dBm)
1852.4	24.94	26.261
1880.0	25.33	24.218
1907.6	24.99	23.689

5.1.8 Results

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


 Marker 1 [T1] RBW 3 MHz RF Att 50 dB
 Ref Lvl 32.22 dBm VBW 3 MHz
 36.4 dBm 824.10981964 MHz SWT 5 ms Unit dBm

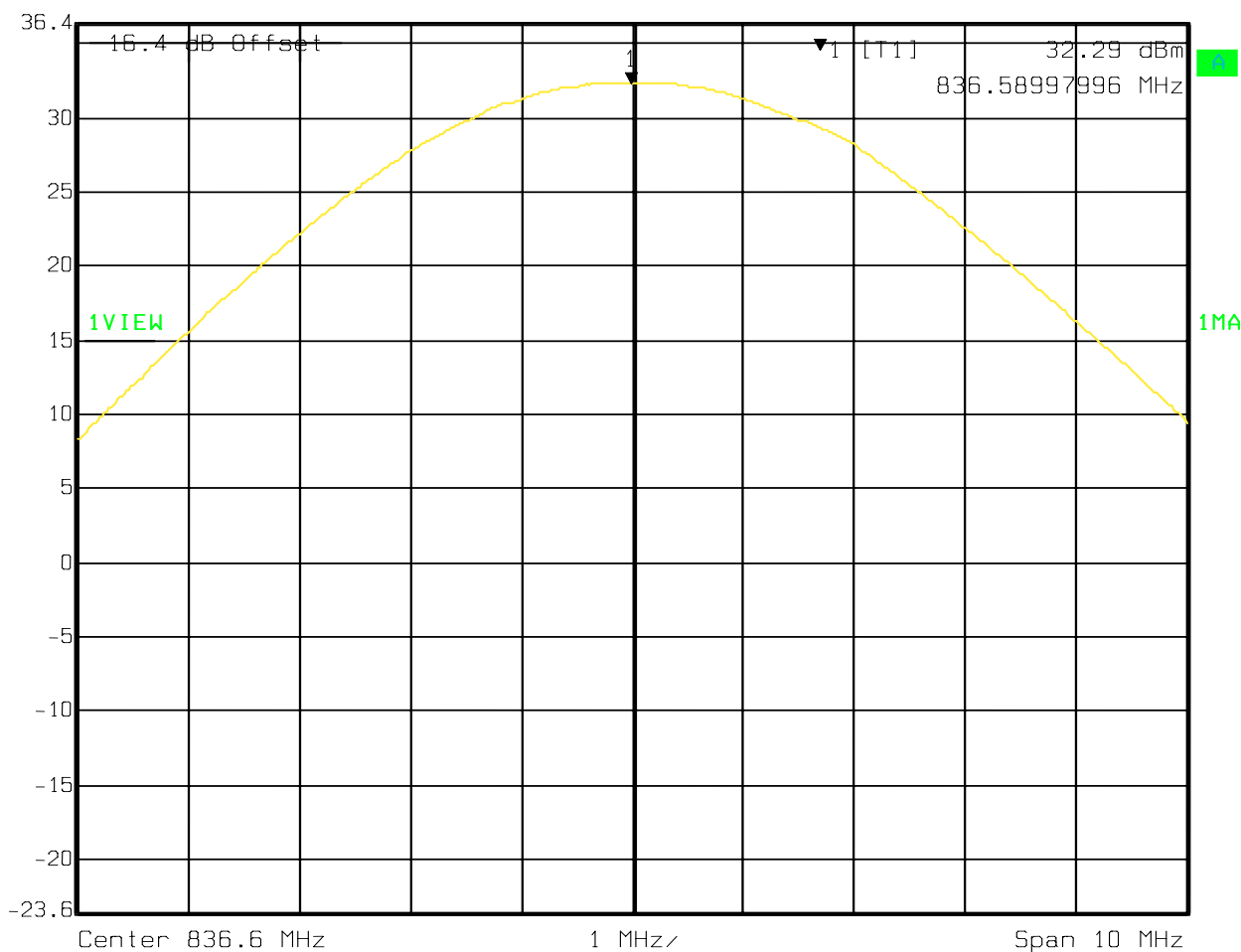


Date: 26.JAN.2010 12:14:47

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



Marker 1 [T1] RBW 3 MHz RF Att 50 dB
 Ref Lvl 32.29 dBm VBW 3 MHz
 36.4 dBm 836.58997996 MHz SWT 5 ms Unit dBm

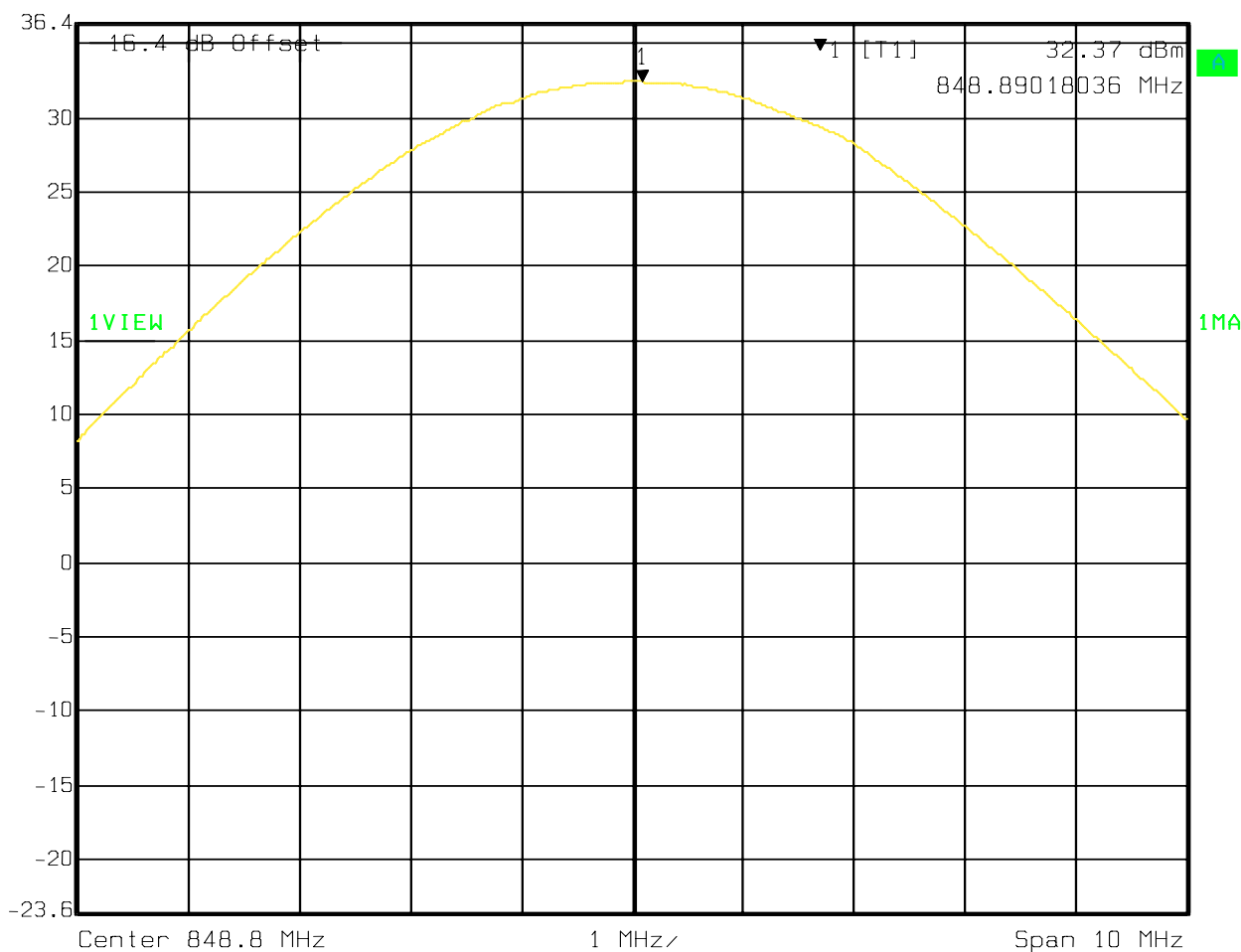


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CONDUCTED PEAK POWER (GSM 850) CHANNEL 251 §22.913(a)



Marker 1 [T1] RBW 3 MHz RF Att 50 dB
 Ref Lvl 32.37 dBm VBW 3 MHz
 36.4 dBm 848.89018036 MHz SWT 5 ms Unit dBm

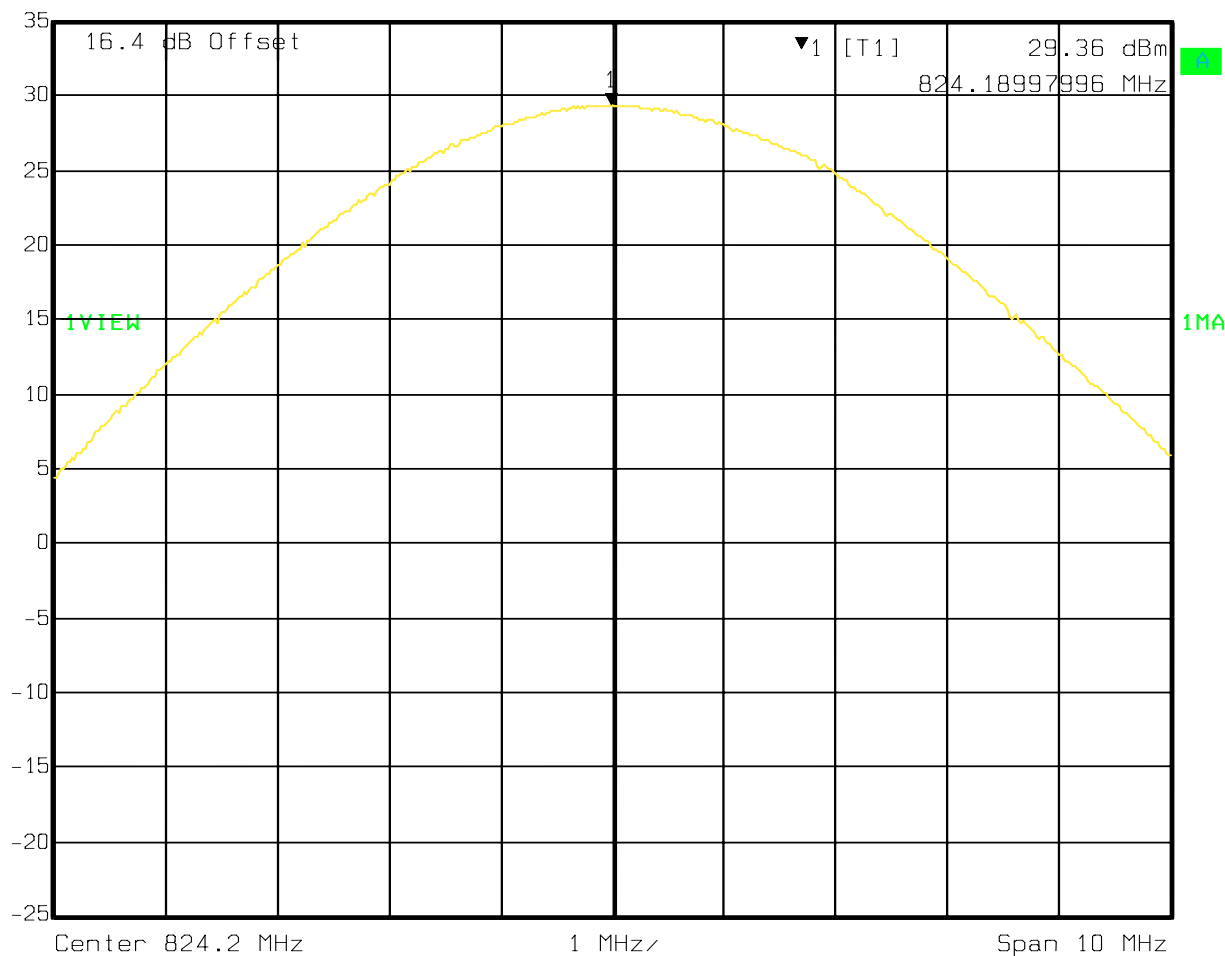


Date: 26.JAN.2010 12:17:42

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



Marker 1 [T1] RBW 3 MHz RF Att 40 dB
 Ref Lvl 29.36 dBm VBW 3 MHz
 35 dBm 824.18997996 MHz SWT 5 ms Unit dBm

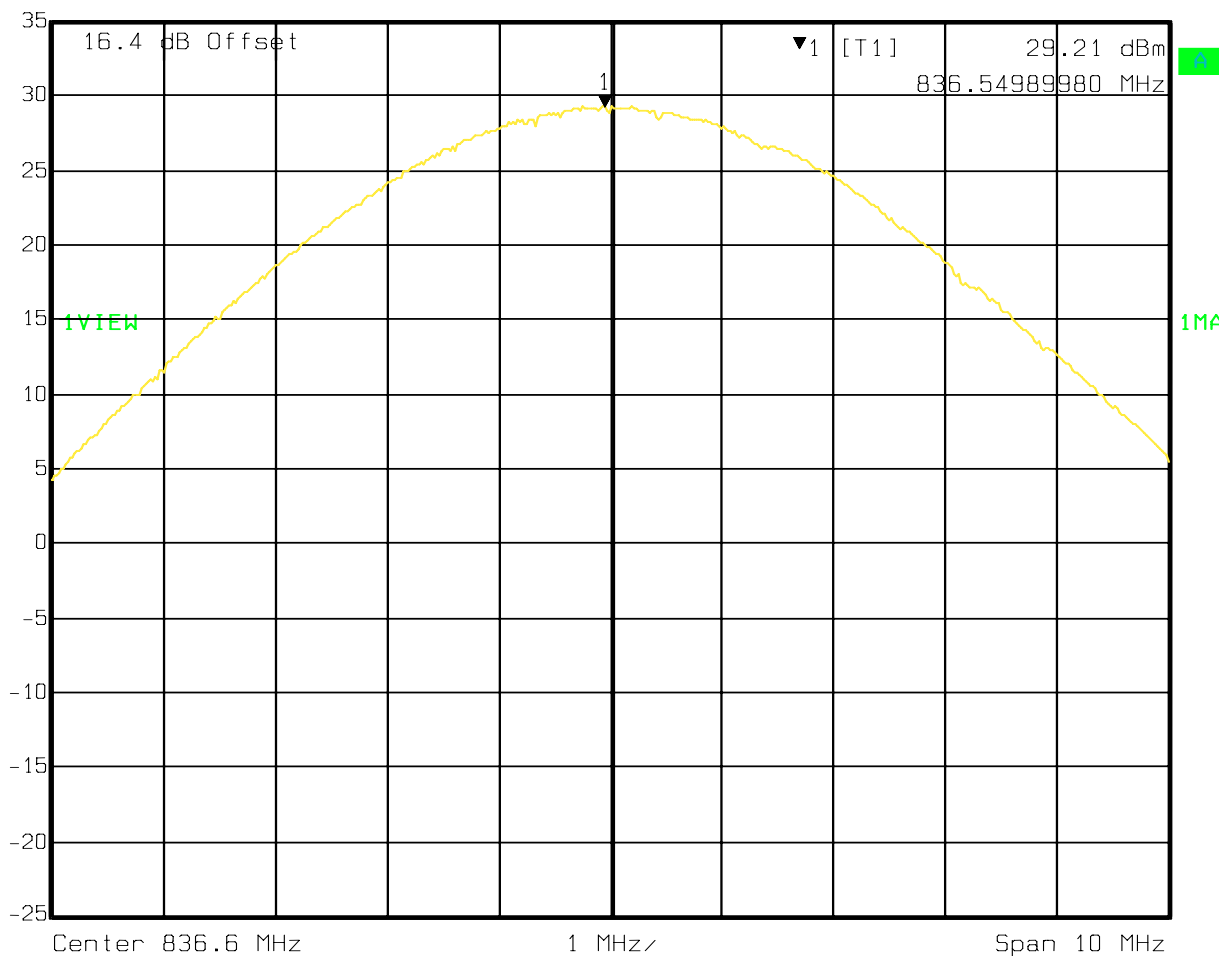


Date: 26.JAN.2010 12:25:24

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



Marker 1 [T1] RBW 3 MHz RF Att 40 dB
 Ref Lvl 29.21 dBm VBW 3 MHz
 35 dBm 836.54989980 MHz SWT 5 ms Unit dBm

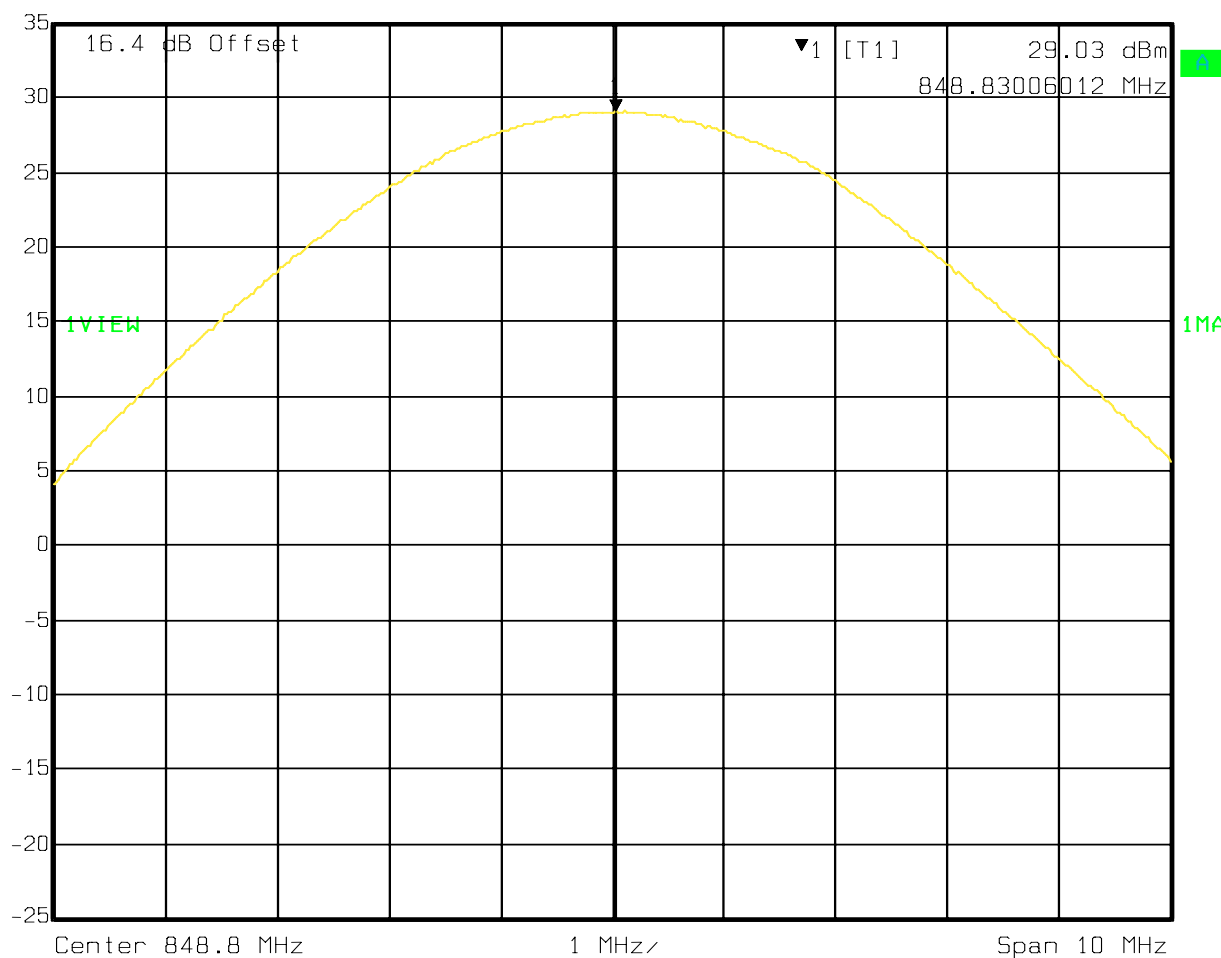


Date: 26.JAN.2010 12:23:28

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



Marker 1 [T1] RBW 3 MHz RF Att 40 dB
 Ref Lvl 29.03 dBm VBW 3 MHz
 35 dBm 848.83006012 MHz SWT 5 ms Unit dBm



Date: 26.JAN.2010 12:21:40

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

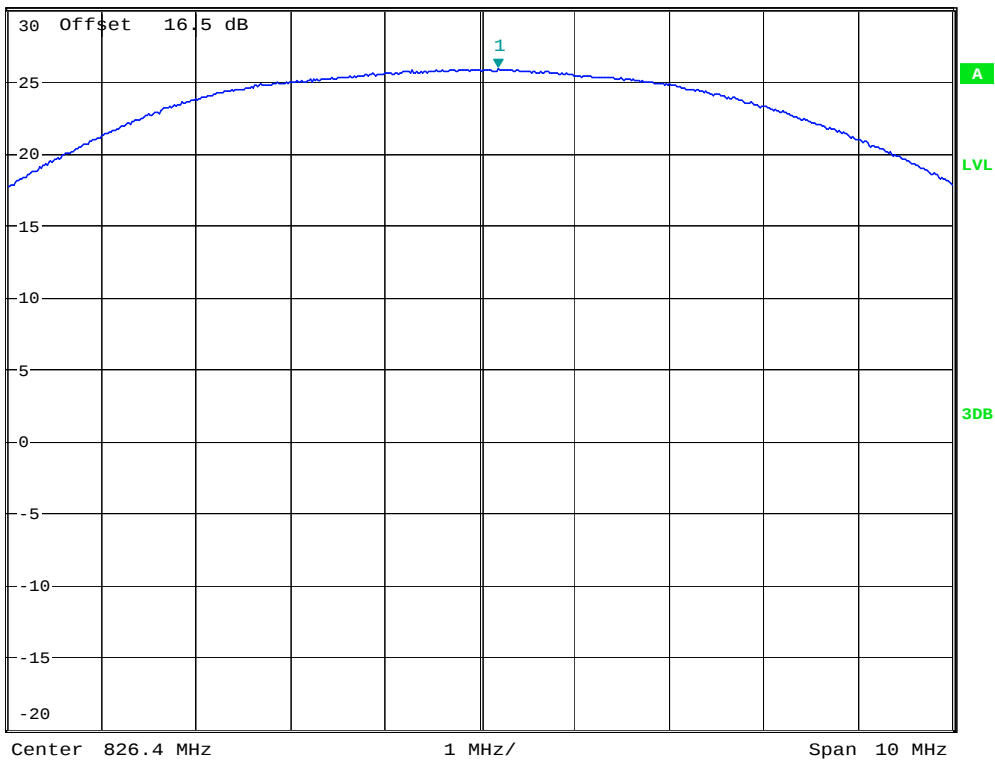


* RBW 5 MHz
 * VBW 10 MHz
 Marker 1 [T1]
 25.80 dBm
 826.592307692 MHz
 SWT 2.5 ms

Ref 30 dBm

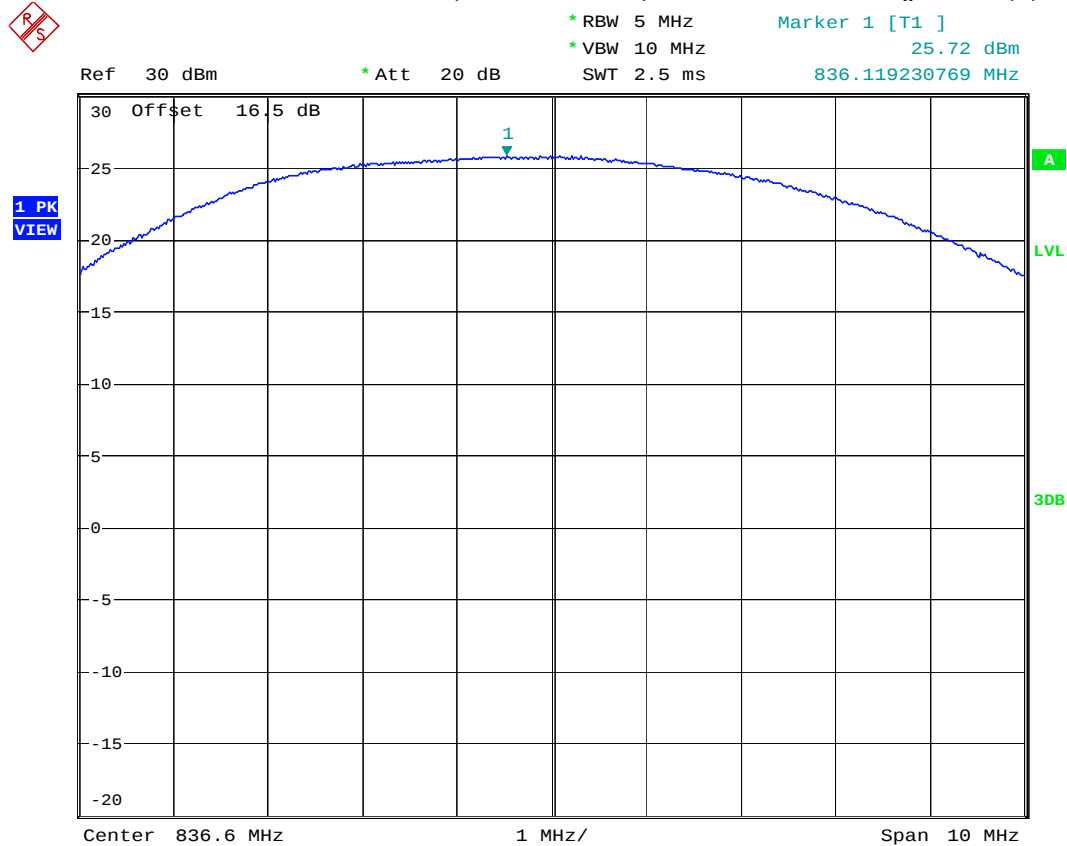
* Att 20 dB

1 PK
 VIEW



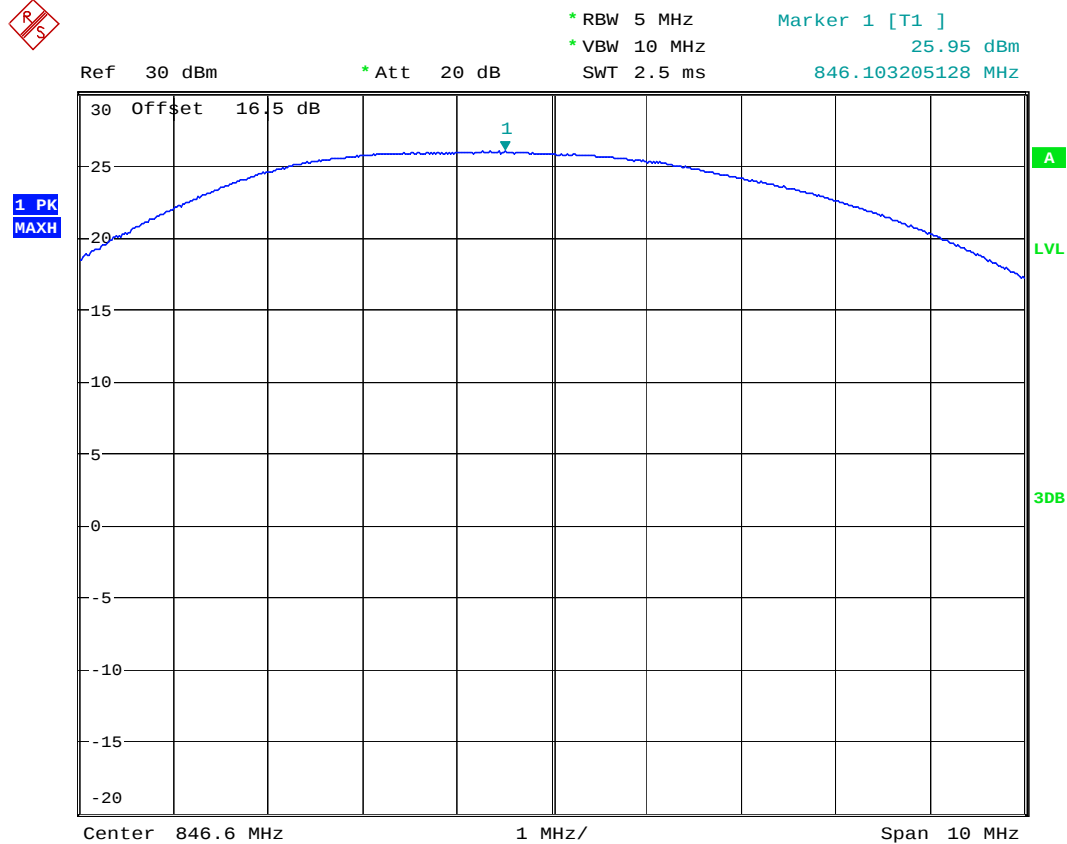
Date: 4.FEB.2010 15:28:15

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



Date: 4.FEB.2010 15:29:04

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



Date: 4.FEB.2010 15:30:13

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



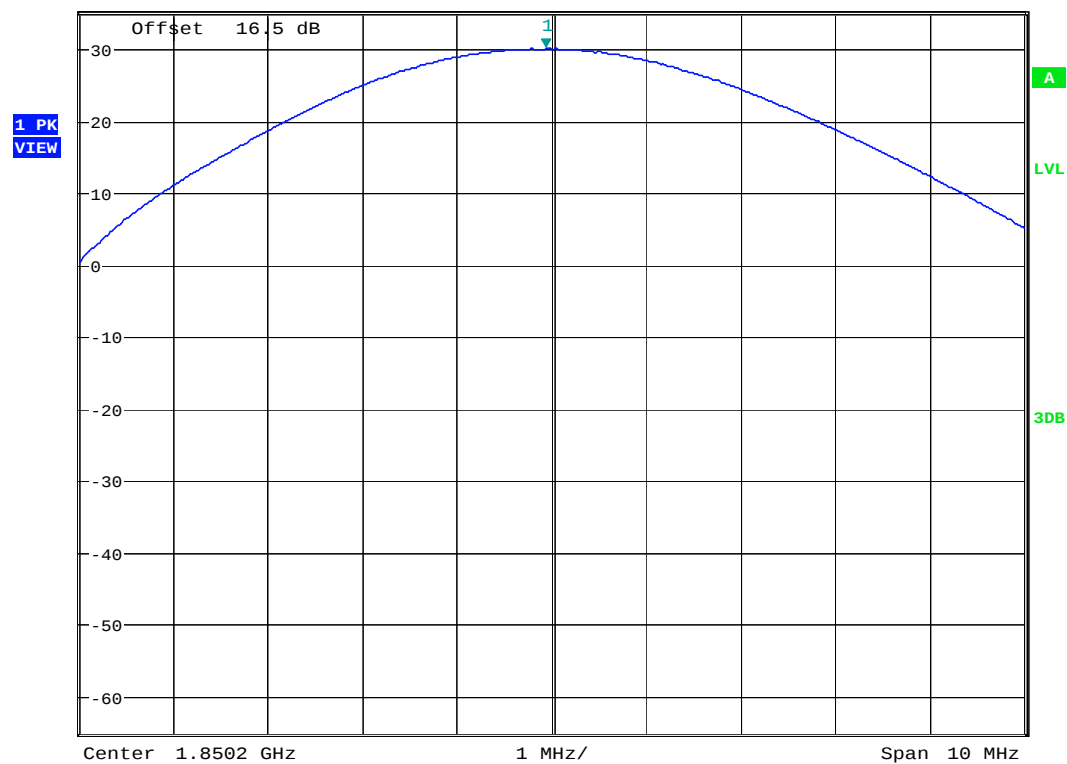
* RBW 3 MHz
 * VBW 3 MHz
 Marker 1 [T1]
 30.04 dBm
 1.850135897 GHz

Ref 35 dBm

Att 45 dB

SWT 2.5 ms

1.850135897 GHz



Date: 4.FEB.2010 11:07:25

CONDUCTED PEAK POWER (PCS-1900) CHANNEL 661 §24.232(b)



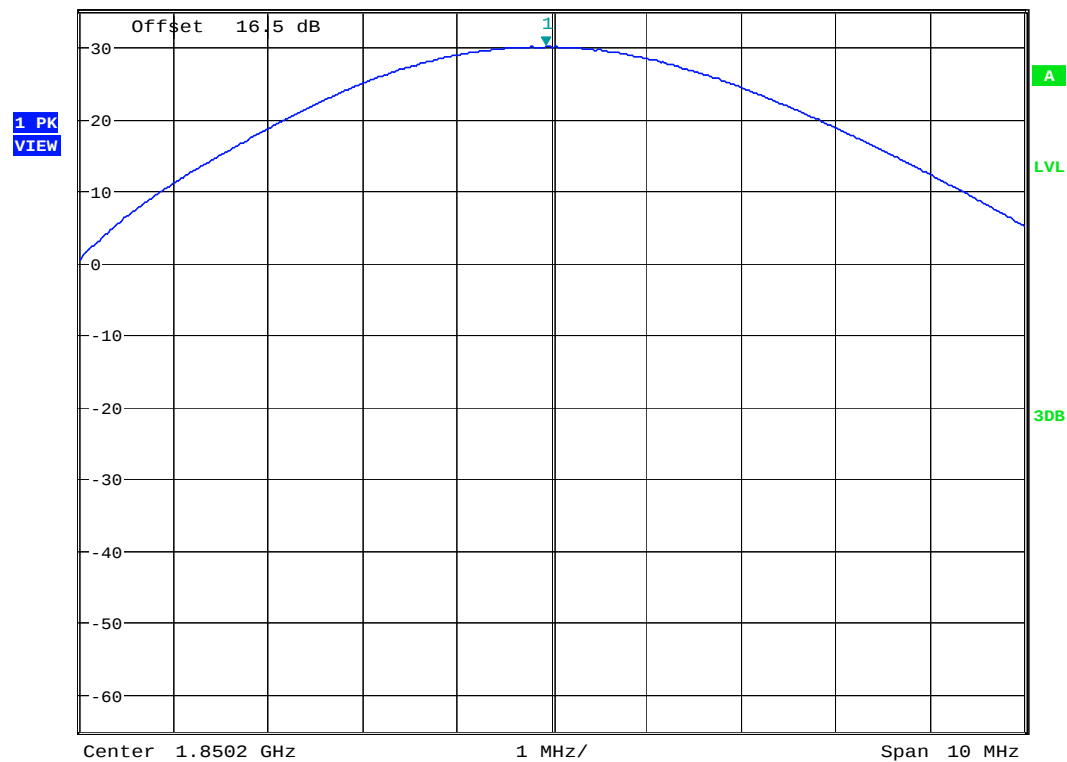
* RBW 3 MHz
 * VBW 3 MHz
 Marker 1 [T1]
 30.04 dBm
 1.850135897 GHz

Ref 35 dBm

Att 45 dB

SWT 2.5 ms

1.850135897 GHz



Date: 4.FEB.2010 11:07:14

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



* RBW 3 MHz
 * VBW 3 MHz
 Marker 1 [T1]
 29.41 dBm
 1.909832051 GHz

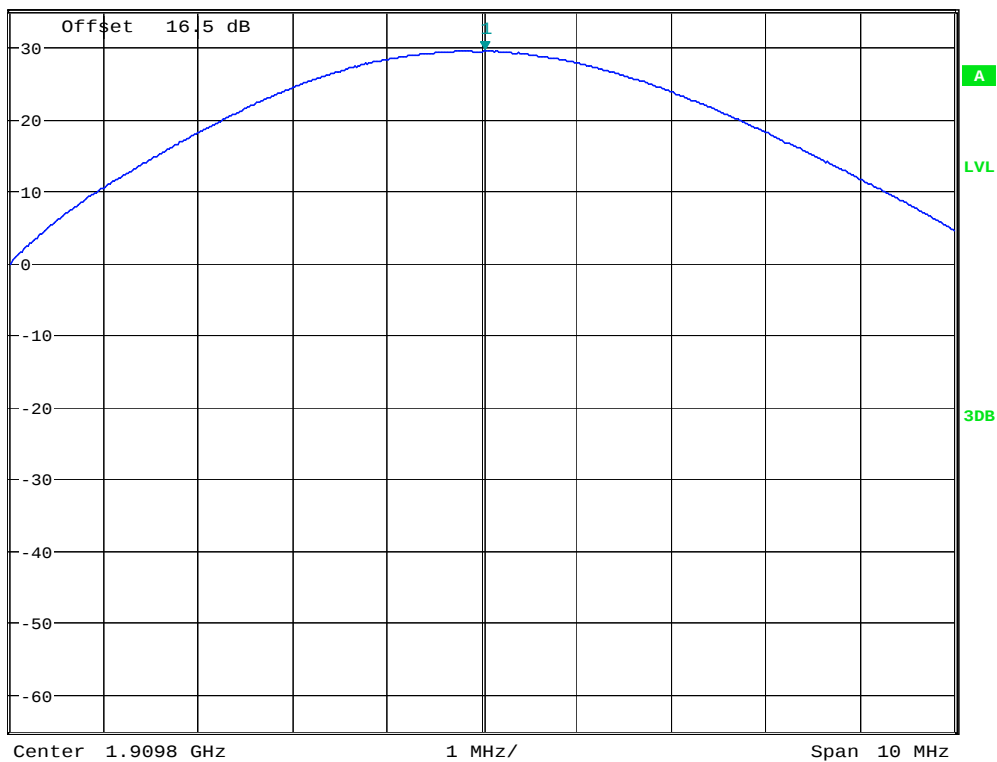
Ref 35 dBm

Att 45 dB

SWT 2.5 ms

1.909832051 GHz

1 PK
 VIEW

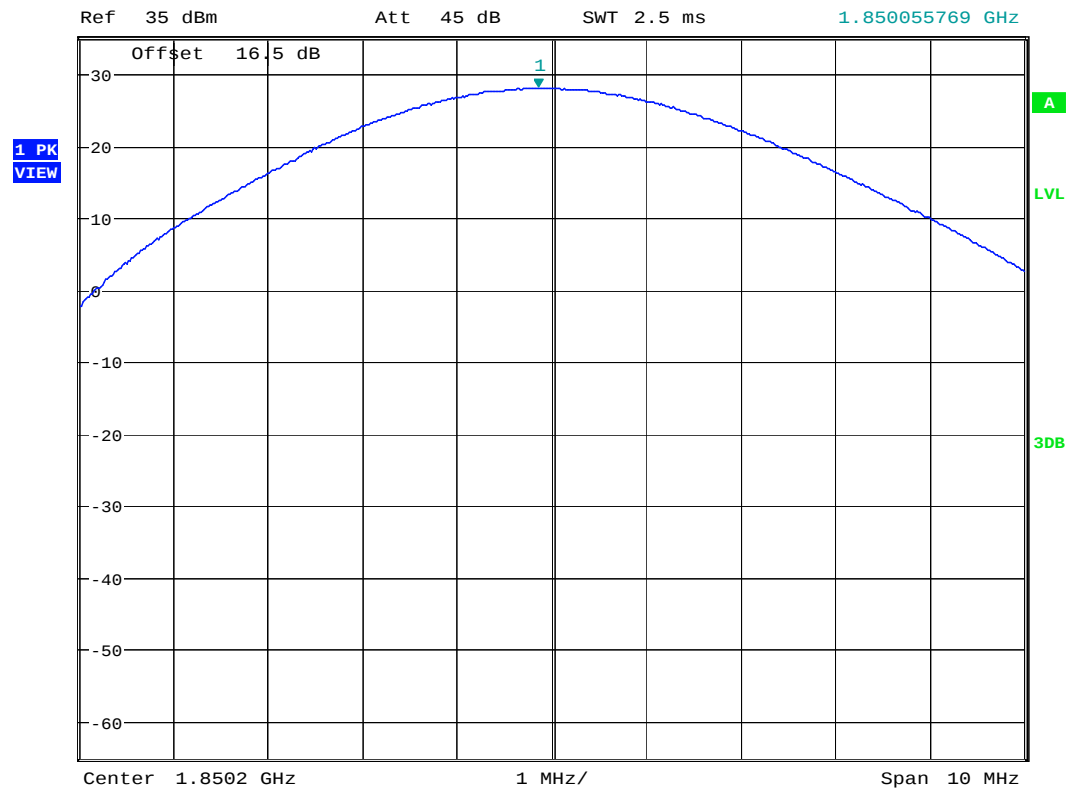


Date: 4.FEB.2010 11:07:50

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



* RBW 3 MHz Marker 1 [T1]
 * VBW 3 MHz 28.02 dBm
 SWT 2.5 ms 1.850055769 GHz



Date: 4.FEB.2010 13:42:40

CONDUCTED PEAK POWER (EGPRS 1900) CHANNEL 661 §24.232(b)



* RBW 3 MHz
 * VBW 3 MHz
 Marker 1 [T1]
 27.89 dBm
 1.880016026 GHz

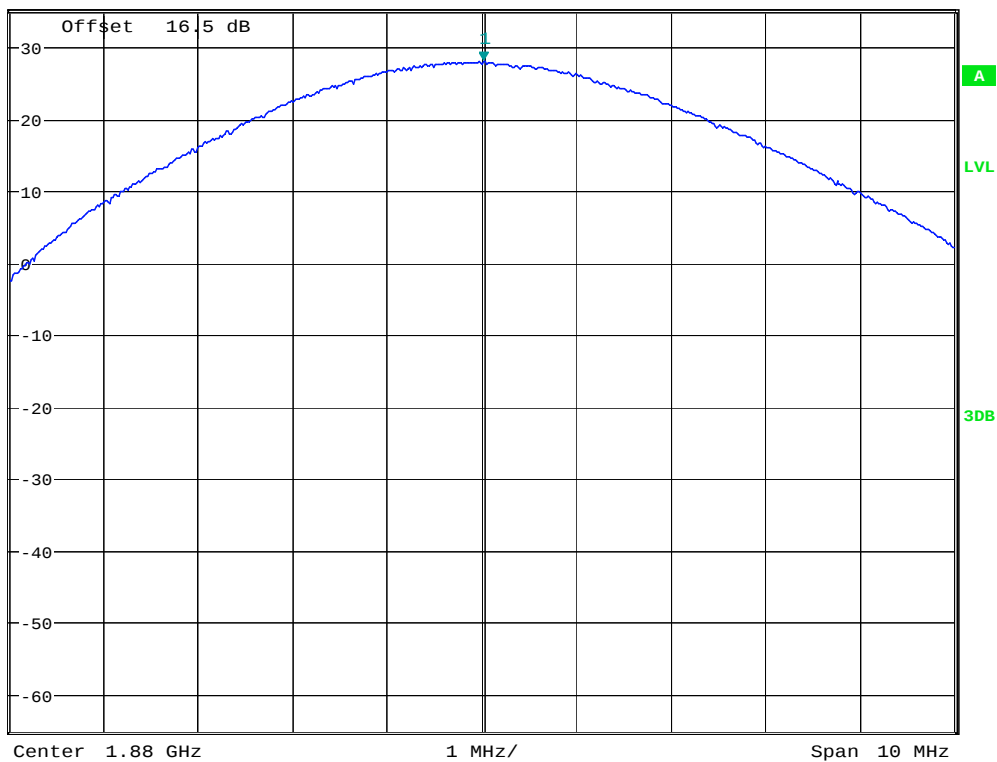
Ref 35 dBm

Att 45 dB

SWT 2.5 ms

1.880016026 GHz

1 PK
 VIEW



Date: 4.FEB.2010 13:43:14

CONDUCTED PEAK POWER (EGPRS 1900) CHANNEL 810 §24.232(b)



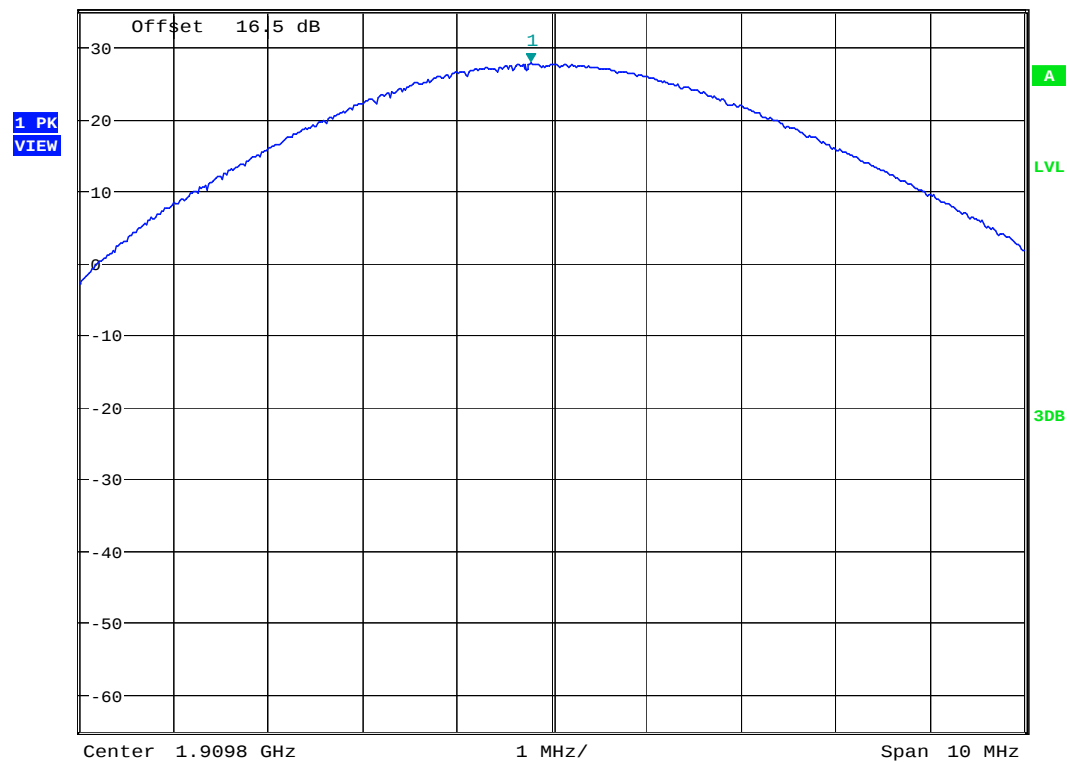
* RBW 3 MHz
 * VBW 3 MHz
 Marker 1 [T1]
 27.69 dBm
 1.909575641 GHz

Ref 35 dBm

Att 45 dB

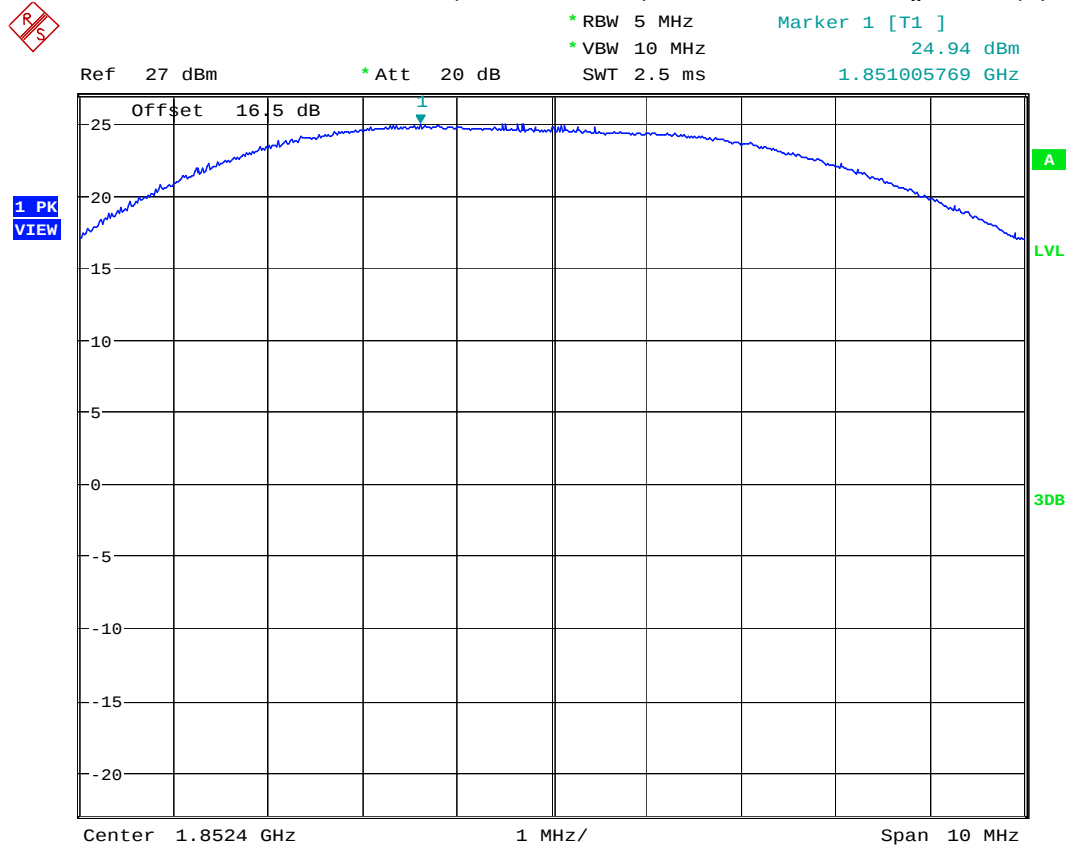
SWT 2.5 ms

1.909575641 GHz



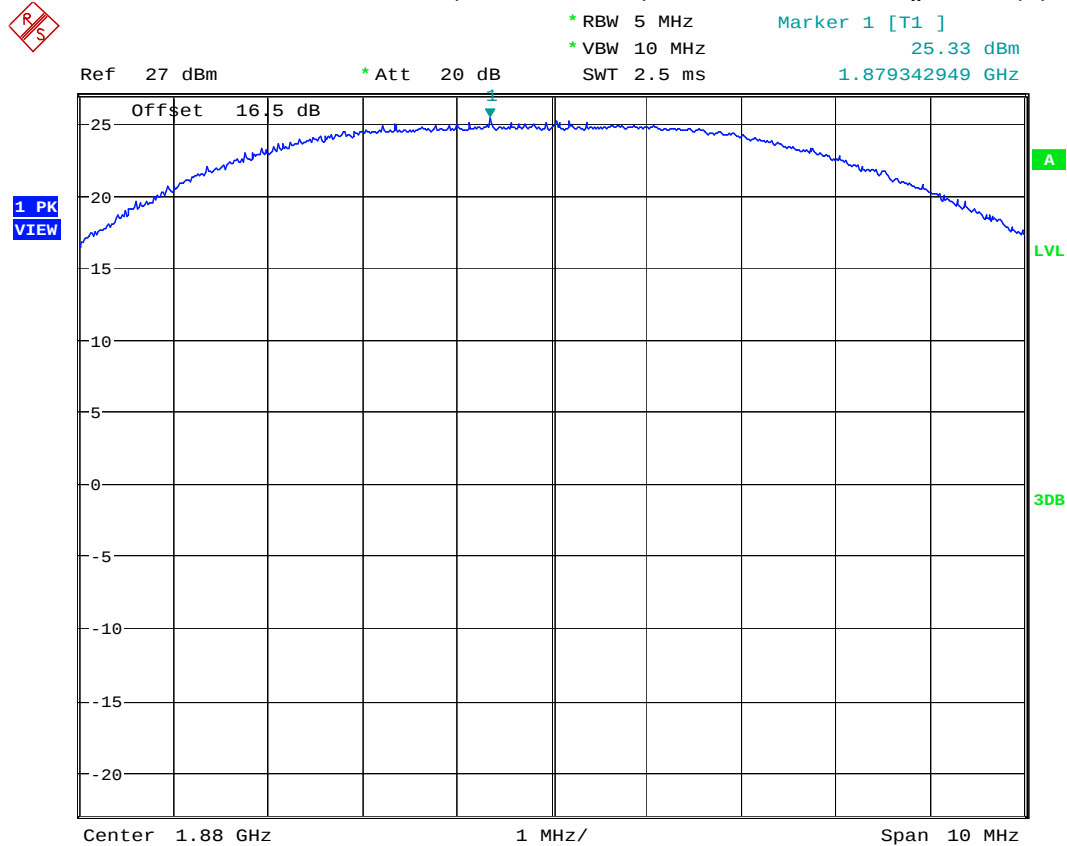
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CONDUCTED PEAK POWER (UMTS FDD2) CHANNEL 9262 §24.232(b)



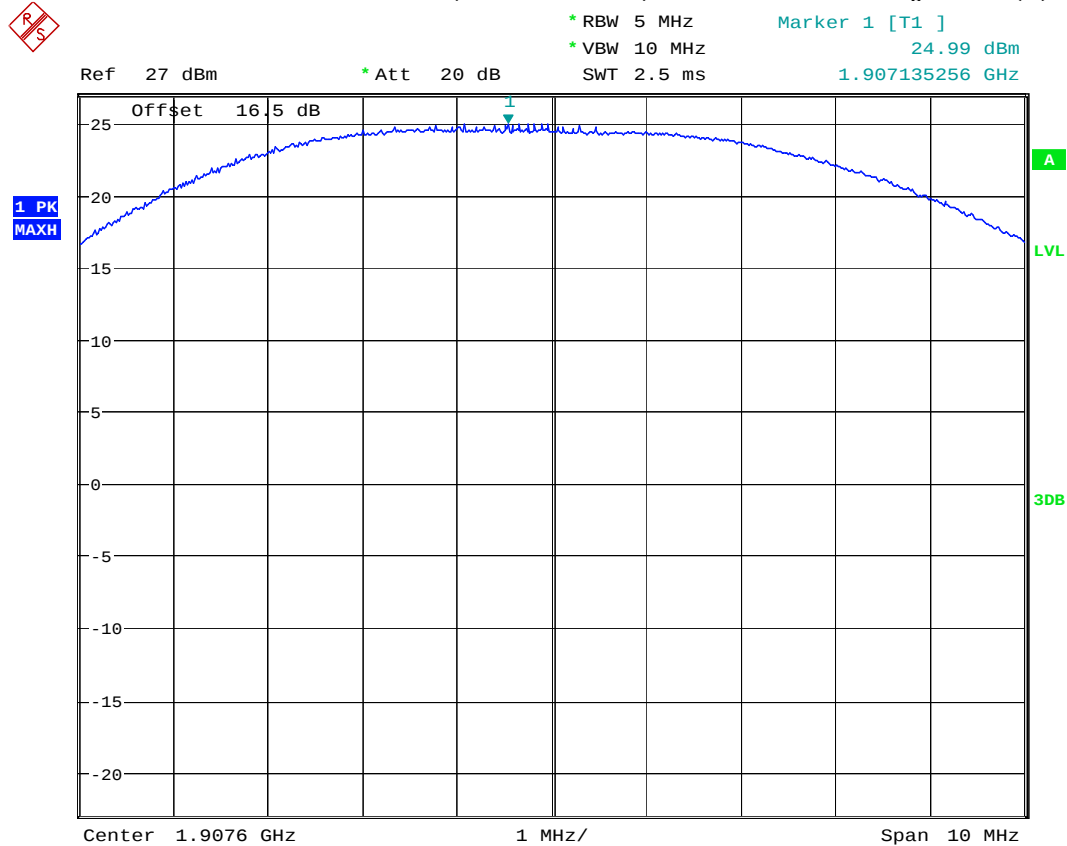
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CONDUCTED PEAK POWER (UMTS FDD2) CHANNEL 9400 §24.232(b)



Date: 4.FEB.2010 14:47:46

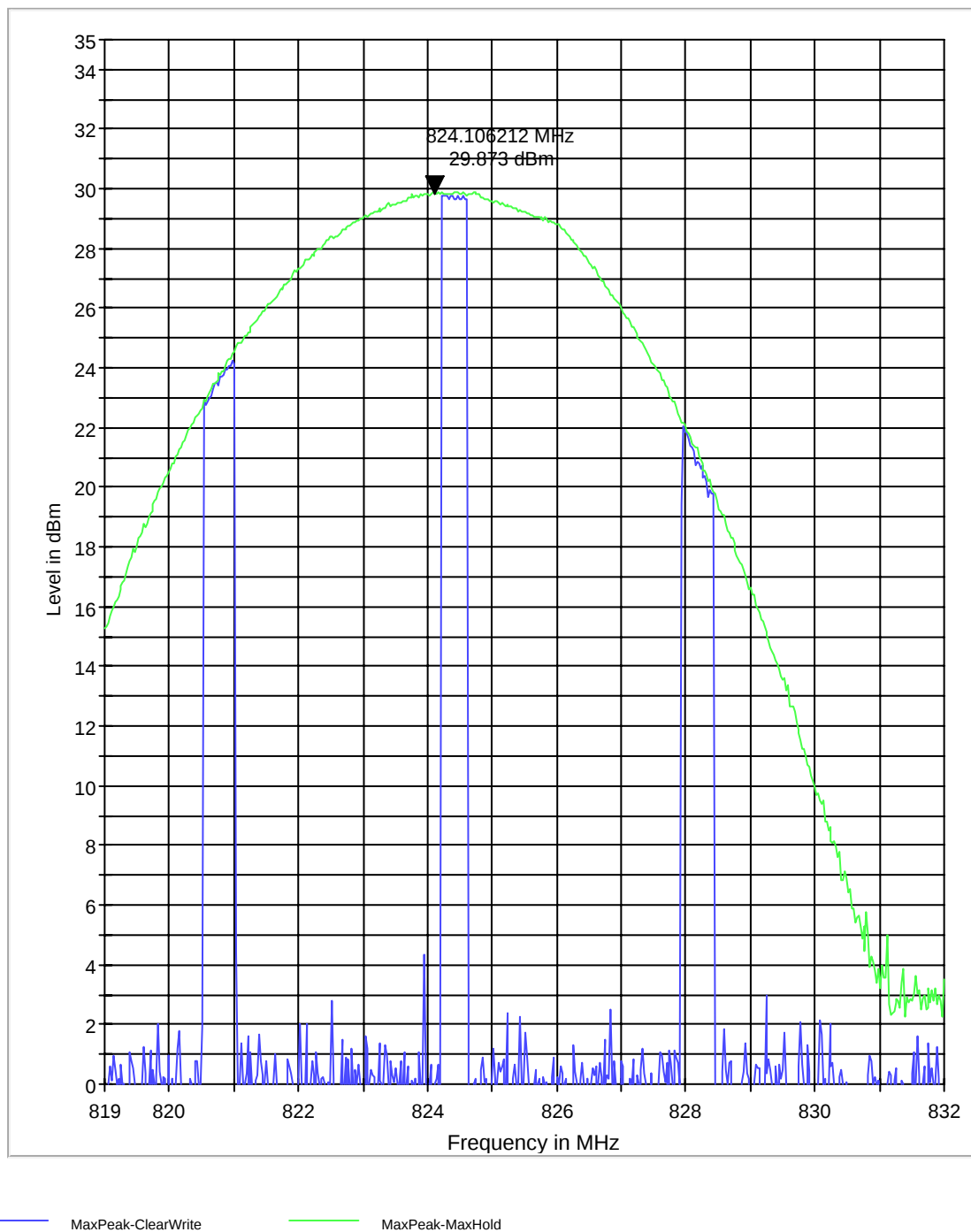
CONDUCTED PEAK POWER (UMTS FDD2) CHANNEL 9538 §24.232(b)



Date: 4.FEB.2010 14:48:45

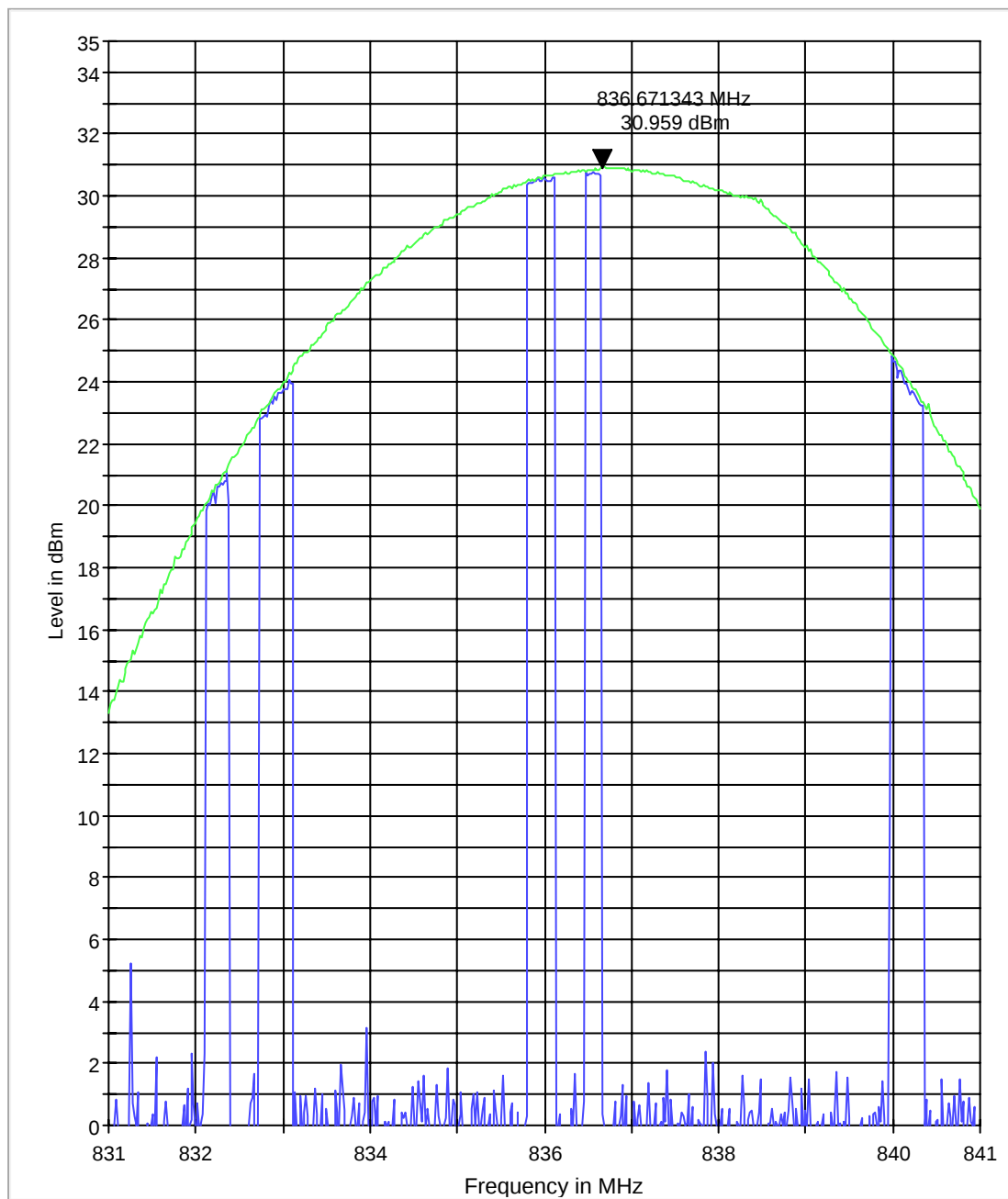
EIRP (GSM 850) CHANNEL 128 §22.913(a)**ERP_L**

ERP 850 L



EIRP (GSM 850) CHANNEL 190 §22.913(a)**ERP_M**

ERP 850 M

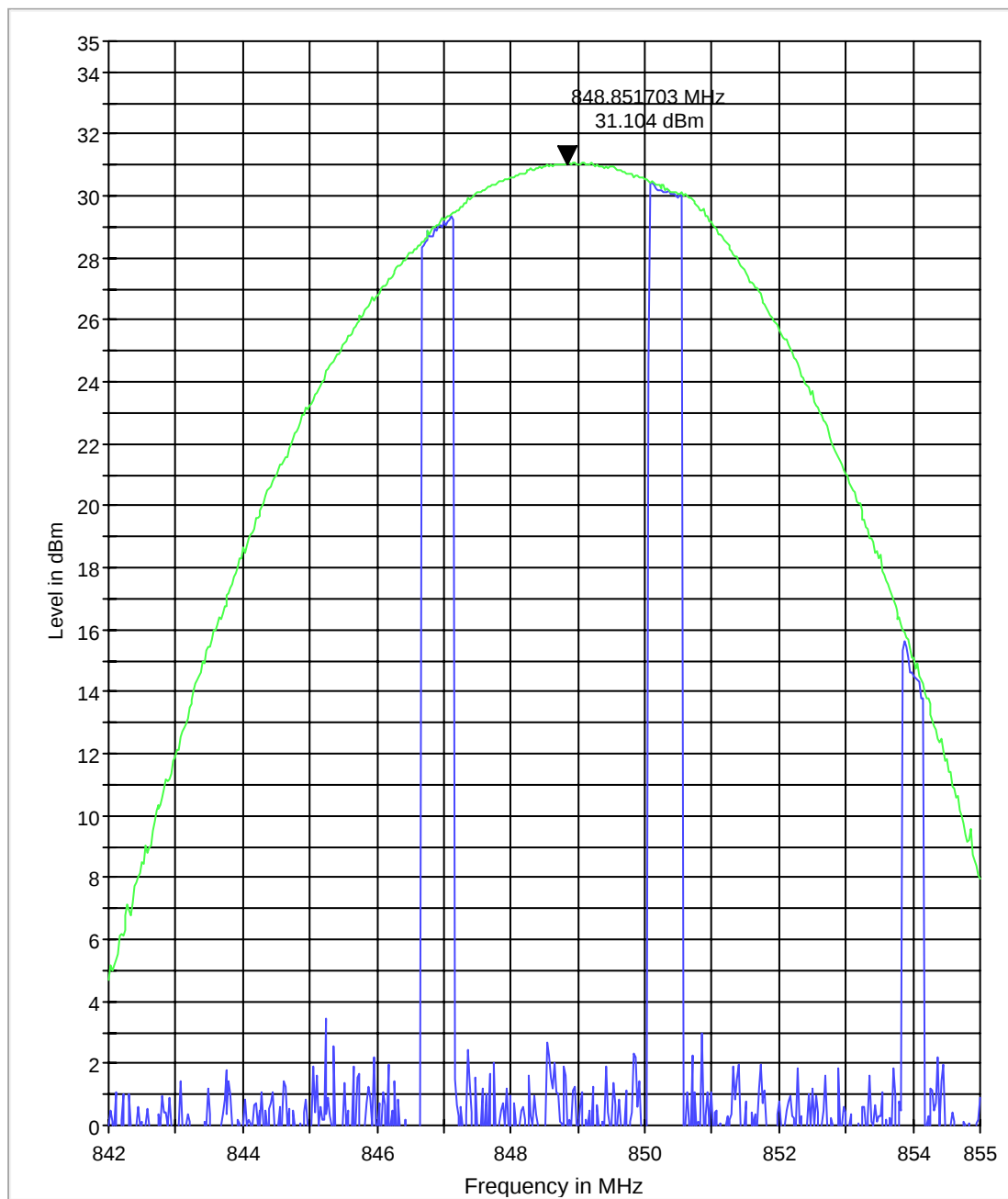


MaxPeak-ClearWrite

MaxPeak-MaxHold

EIRP (GSM 850) CHANNEL 251 §22.913(a)**ERP_H**

ERP 850 H

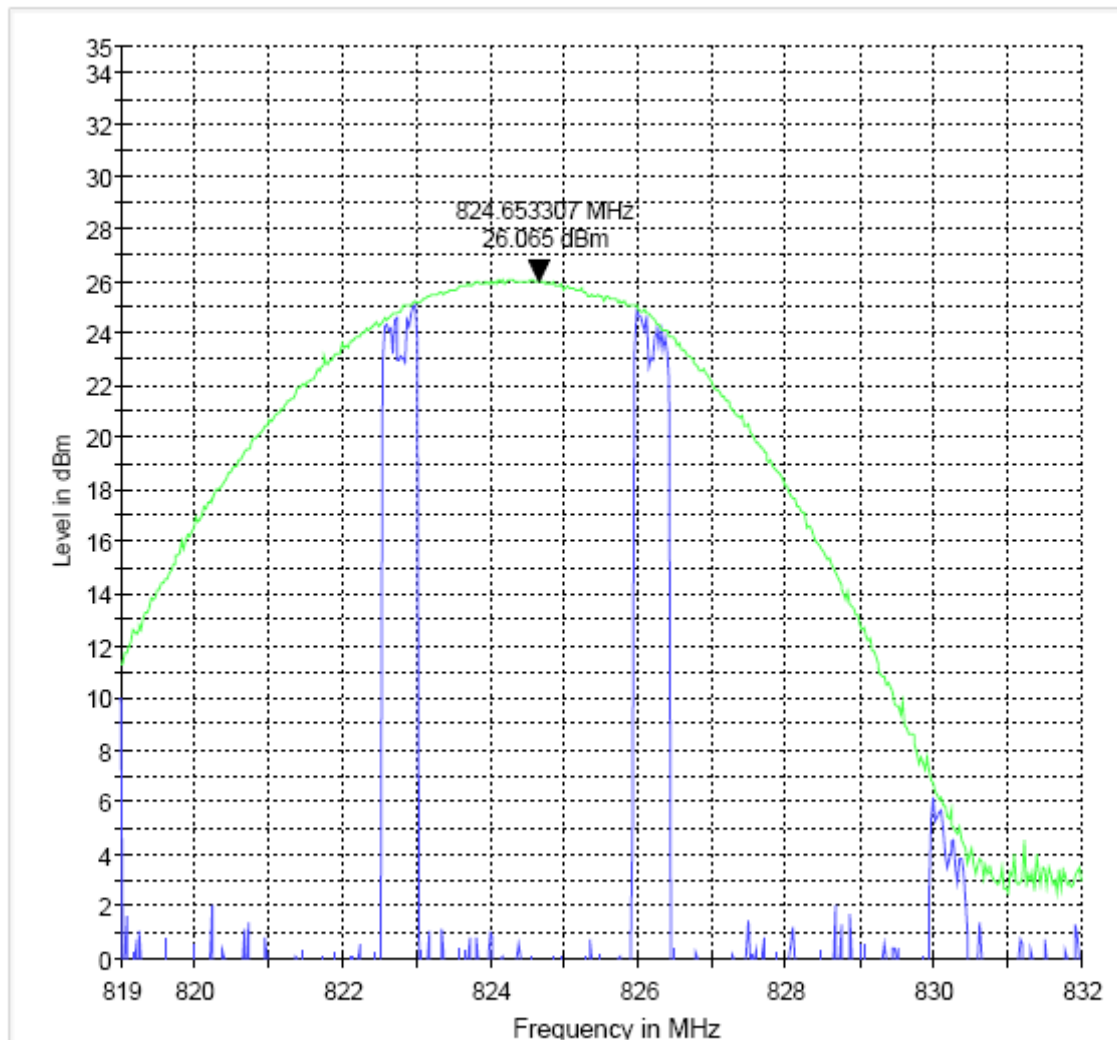


MaxPeak-ClearWrite

MaxPeak-MaxHold

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

ERP 850 L

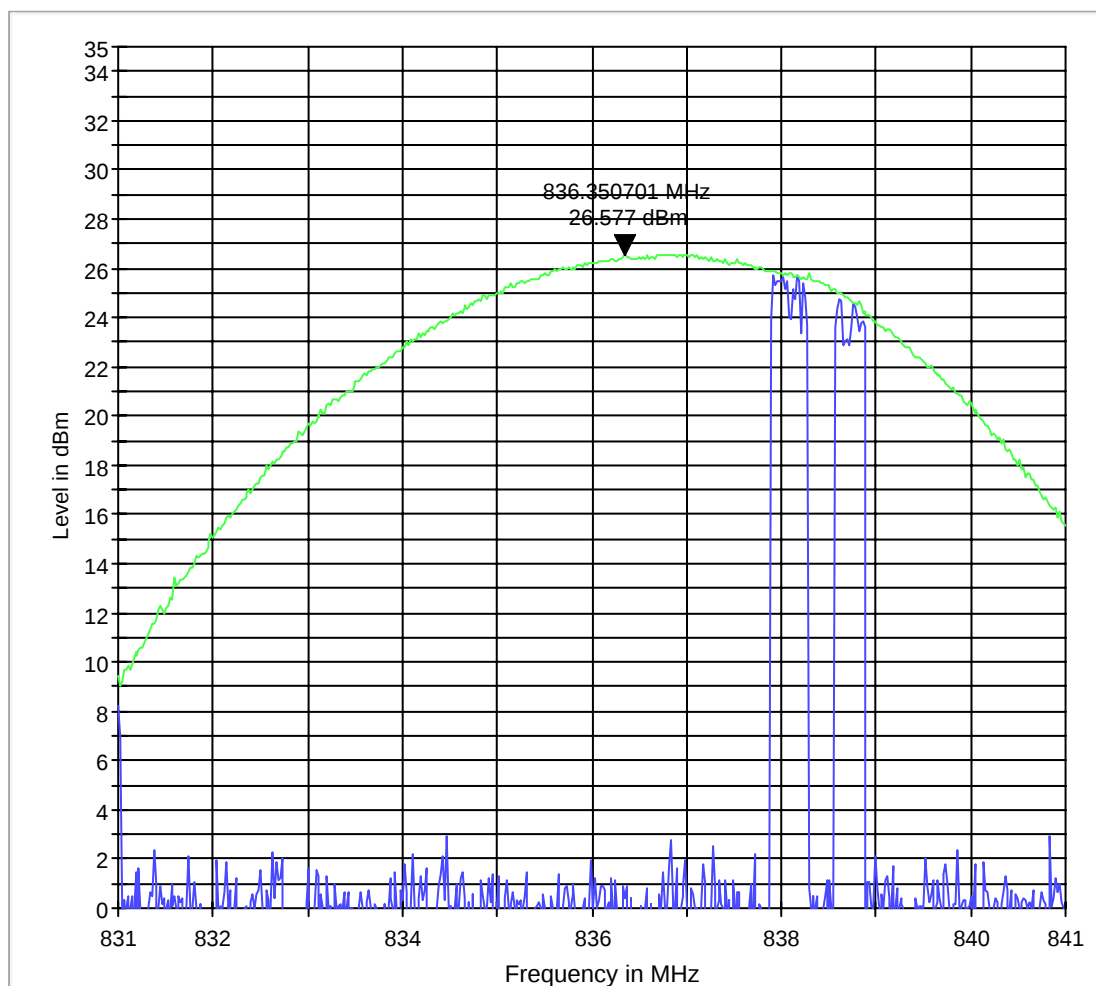


MaxPeak-ClearWrite

MaxPeak-MaxHold

EIRP (EGPRS 850) CHANNEL 190 §22.913(a)

ERP 850 M

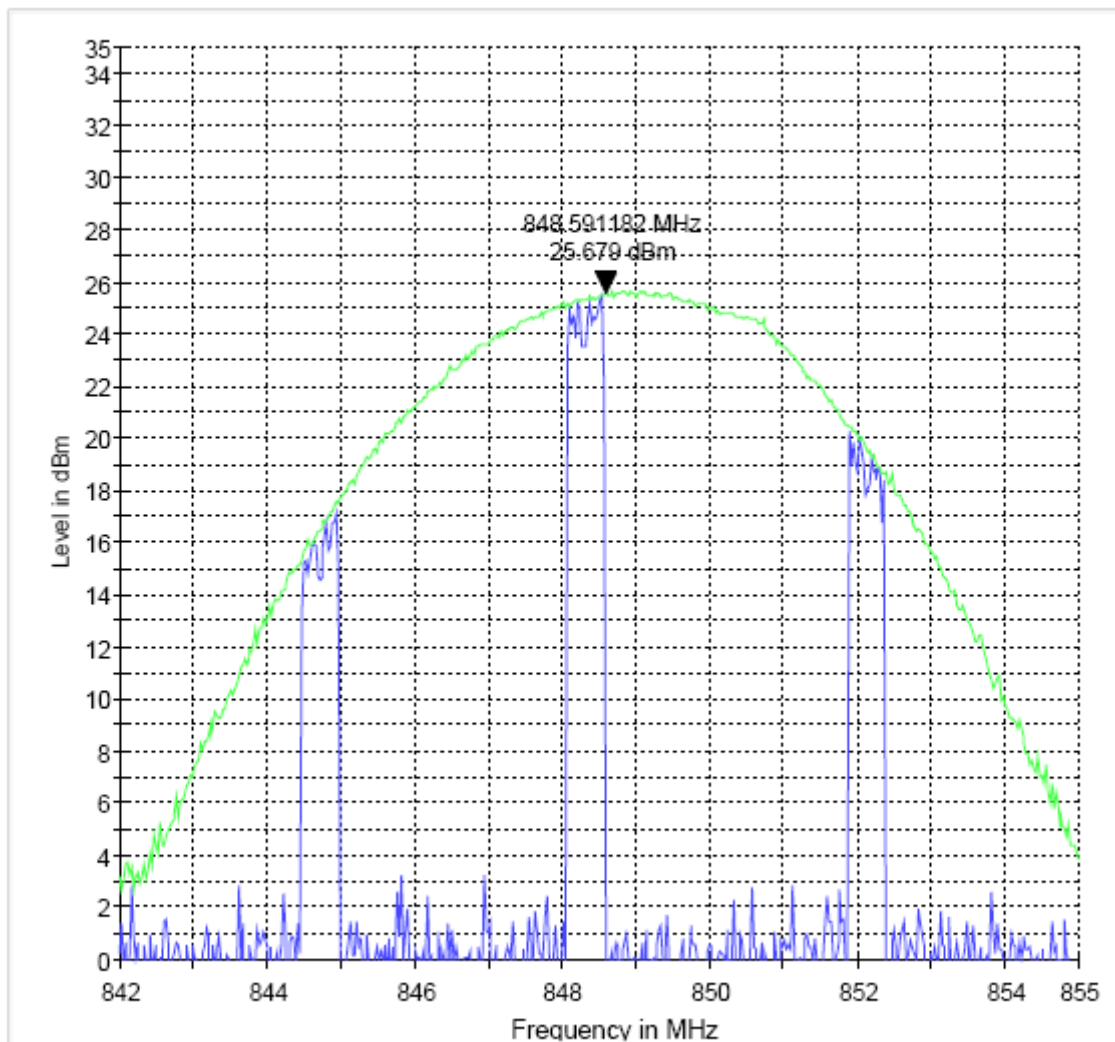


MaxPeak-ClearWrite

MaxPeak-MaxHold

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

ERP 850 H



MaxPeak-ClearWrite

MaxPeak-MaxHold

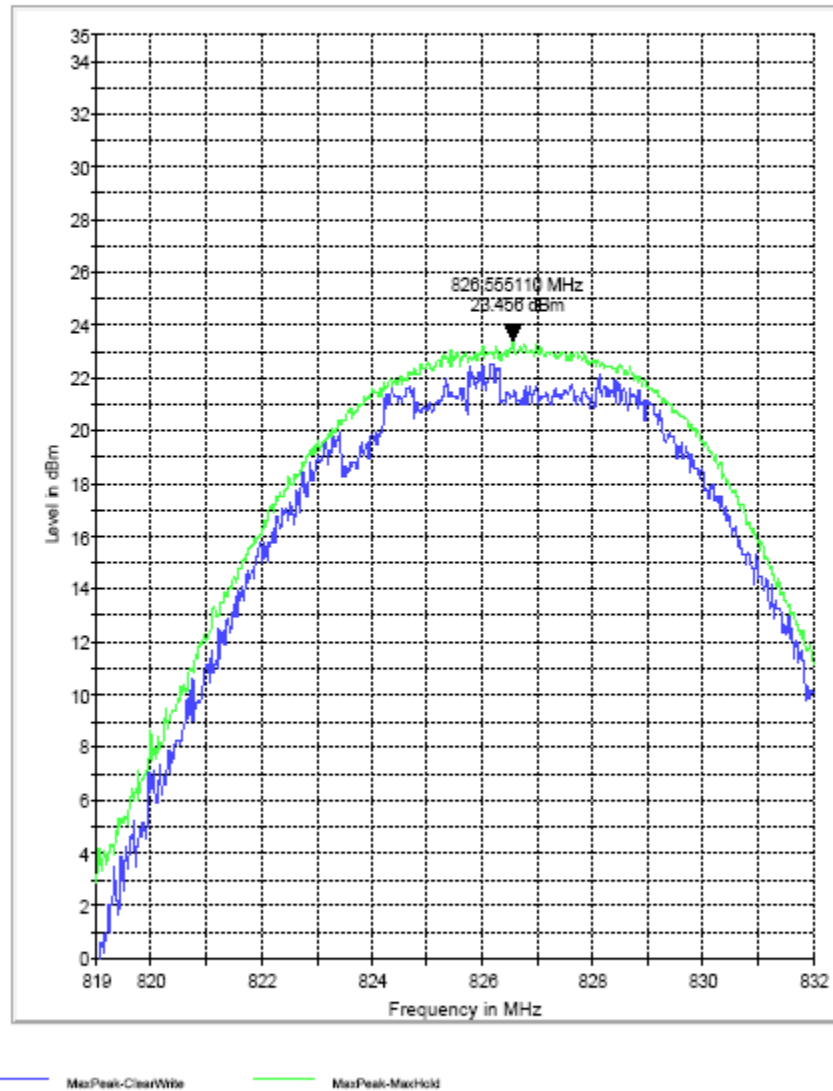
EIRP (UMTS FDD5) CHANNEL 4132 §22.913(a)

EMI Sweep(1)

1 / 1

EMI Sweep(1)

ERP 850 L



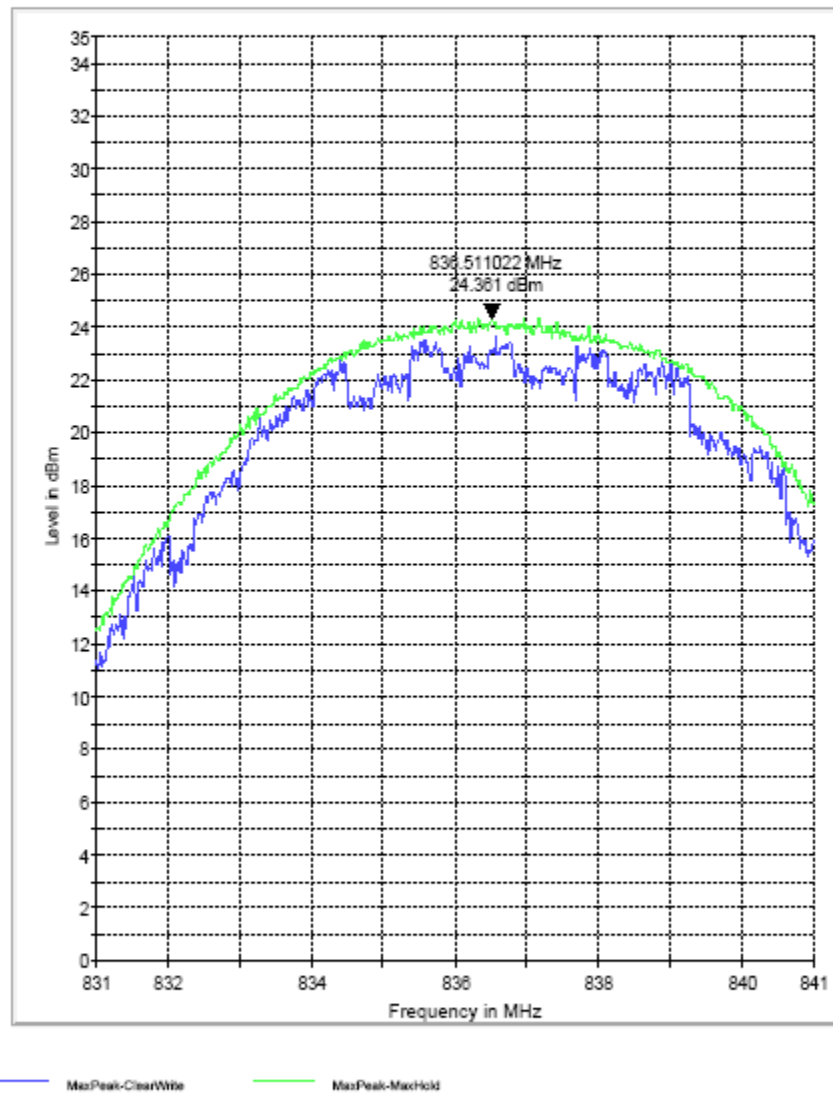
EIRP (UMTS FDD5) CHANNEL 4183 §22.913(a)

EMI Sweep(1)

1 / 1

EMI Sweep(1)

ERP 850 M



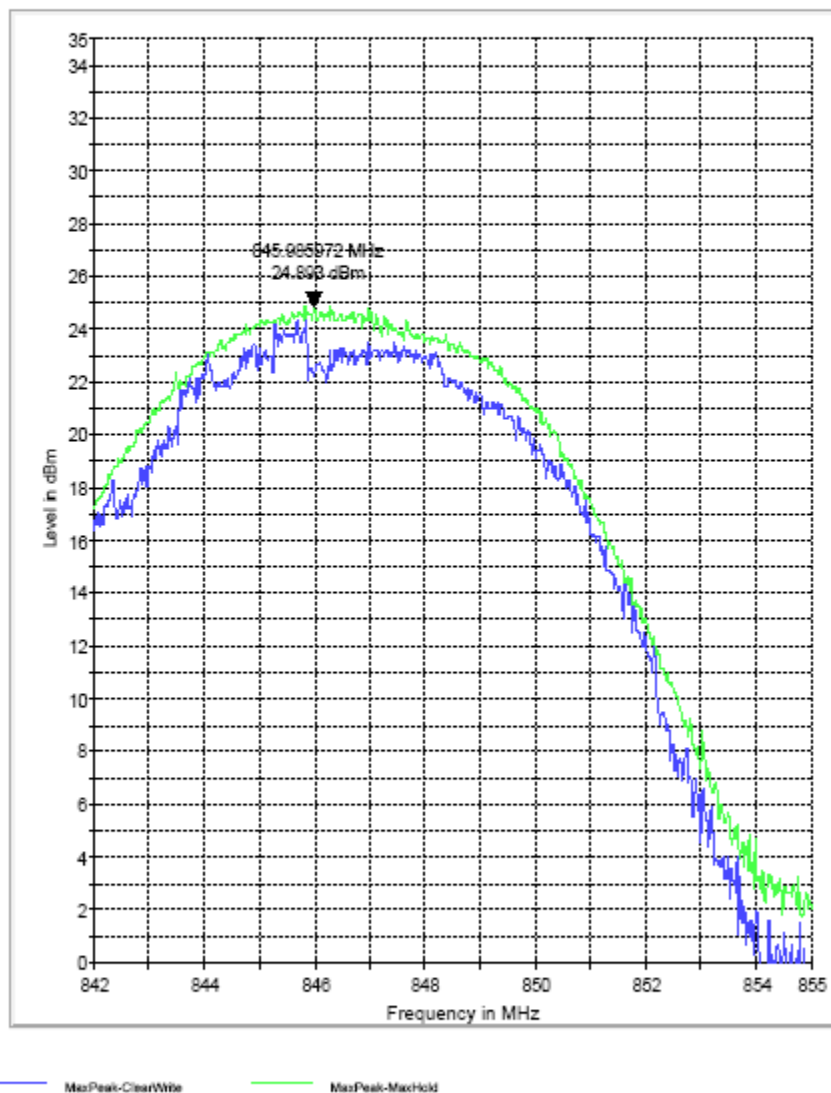
EIRP (UMTS FDD5) CHANNEL 4233 §22.913(a)

EMI Sweep(1)

1 / 1

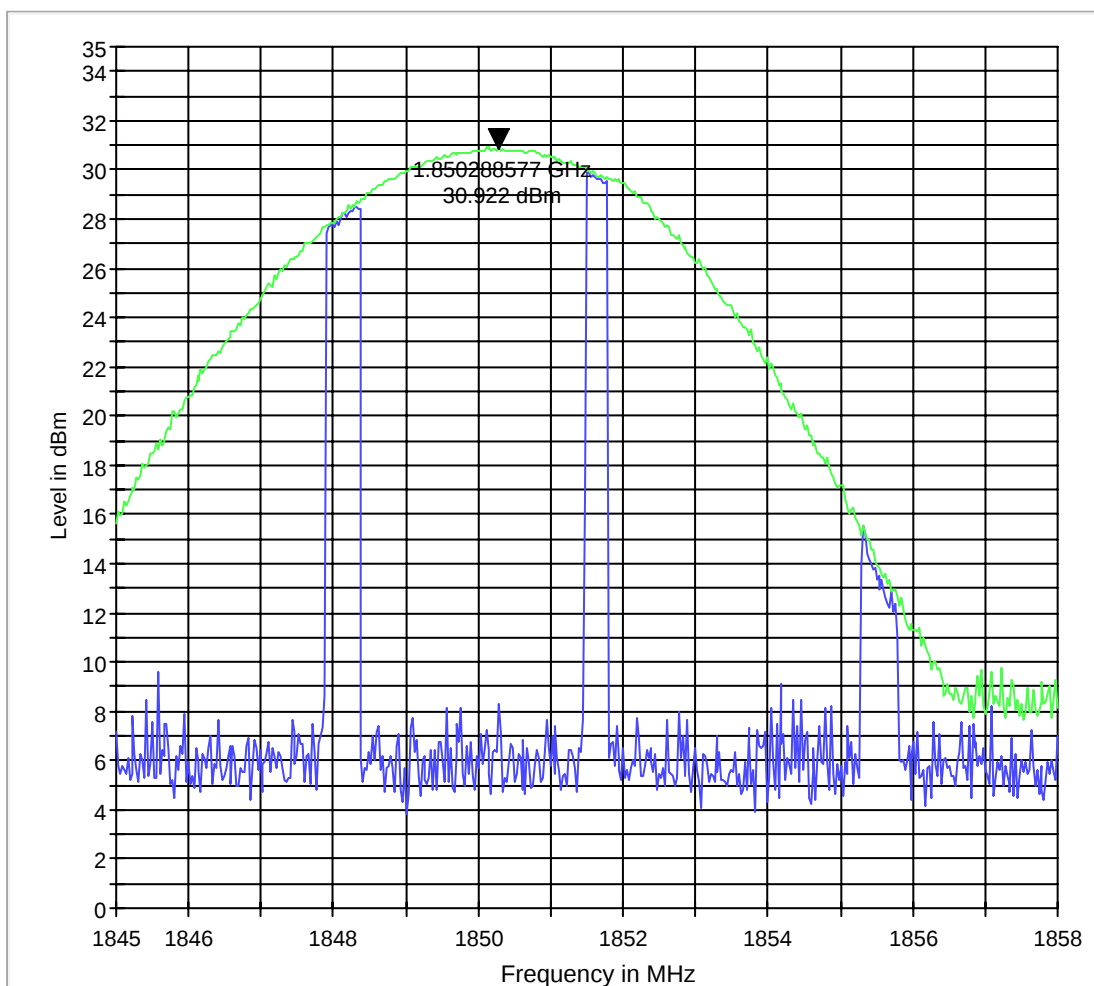
EMI Sweep(1)

ERP 850 H



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

EIRP 1900 L



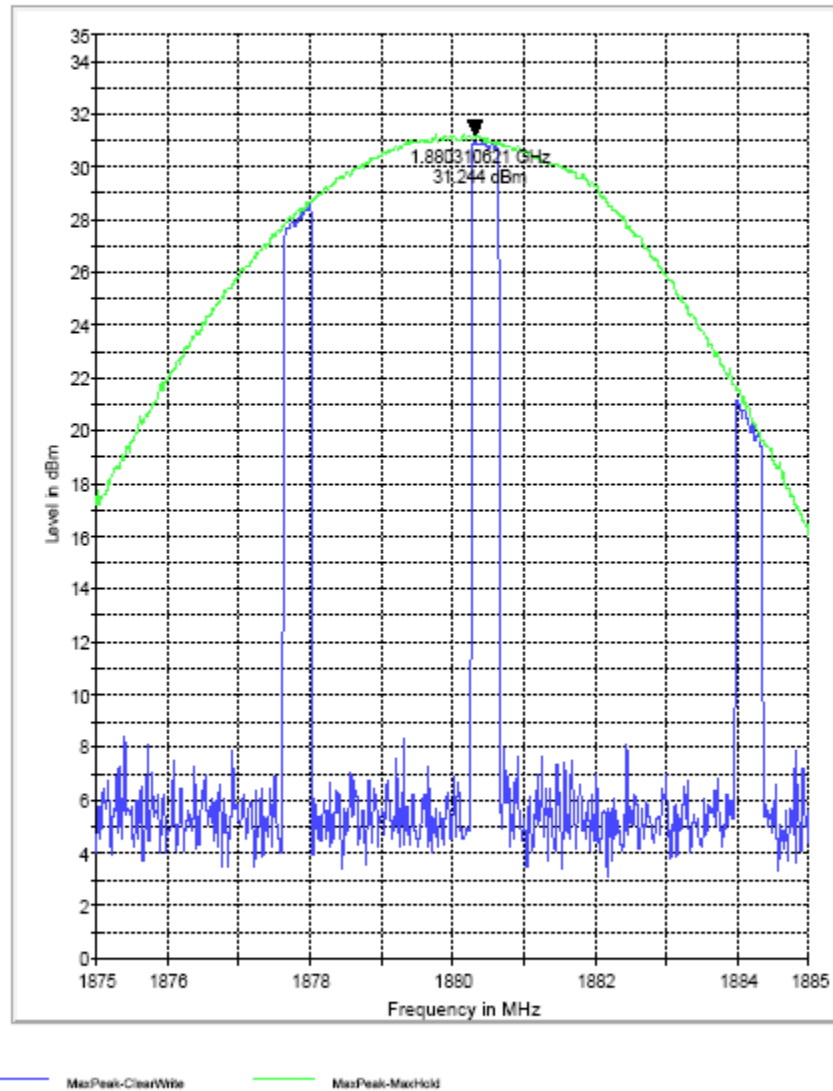
EIRP (PCS-1900) CHANNEL 661 §24.232(b)

EMI Sweep(1)

1 / 1

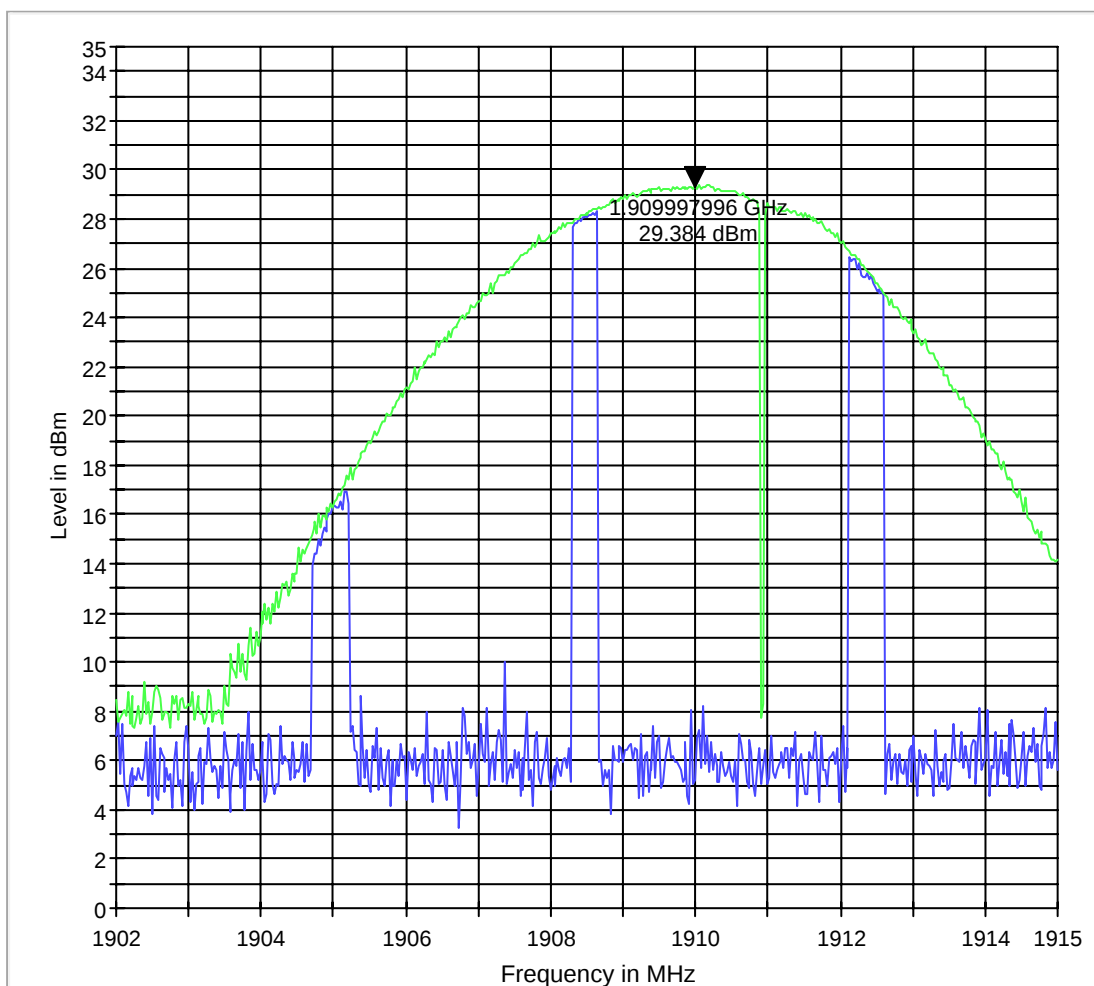
EMI Sweep(1)

EIRP 1900 M



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

EIRP 1900 H



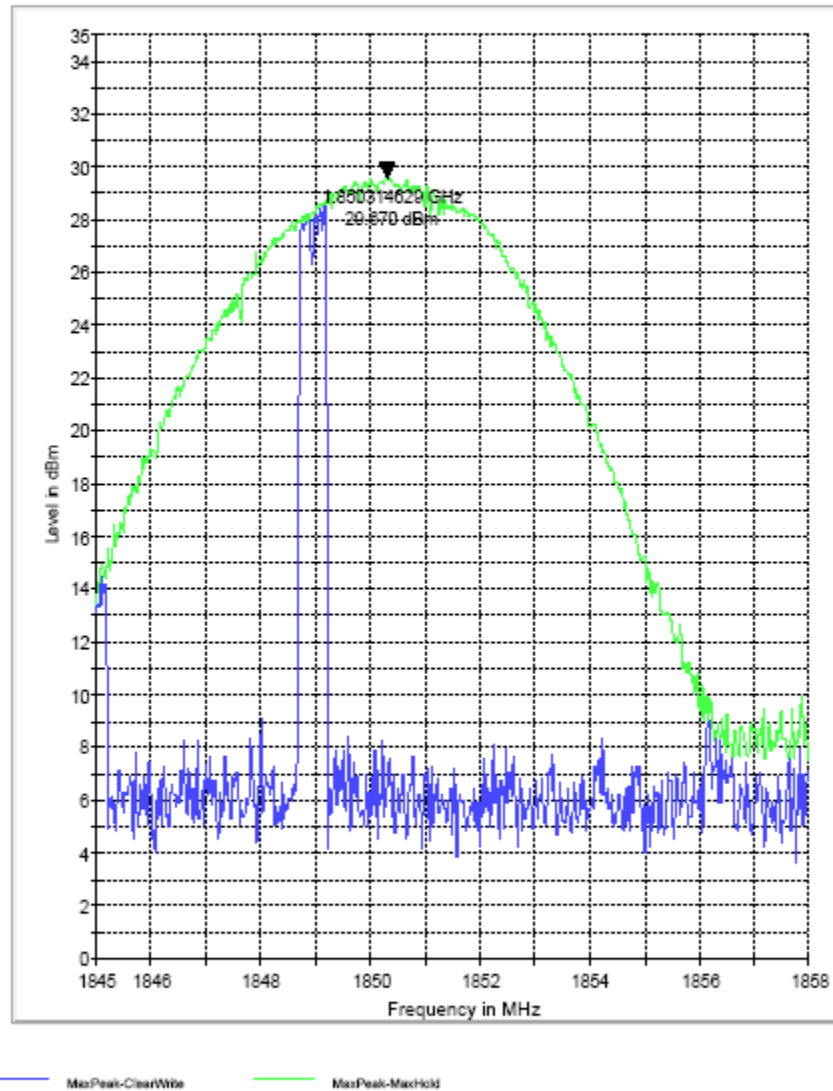
EIRP (EGPRS 1900) CHANNEL 512 §24.232(b)

EMI Sweep(1)

1 / 1

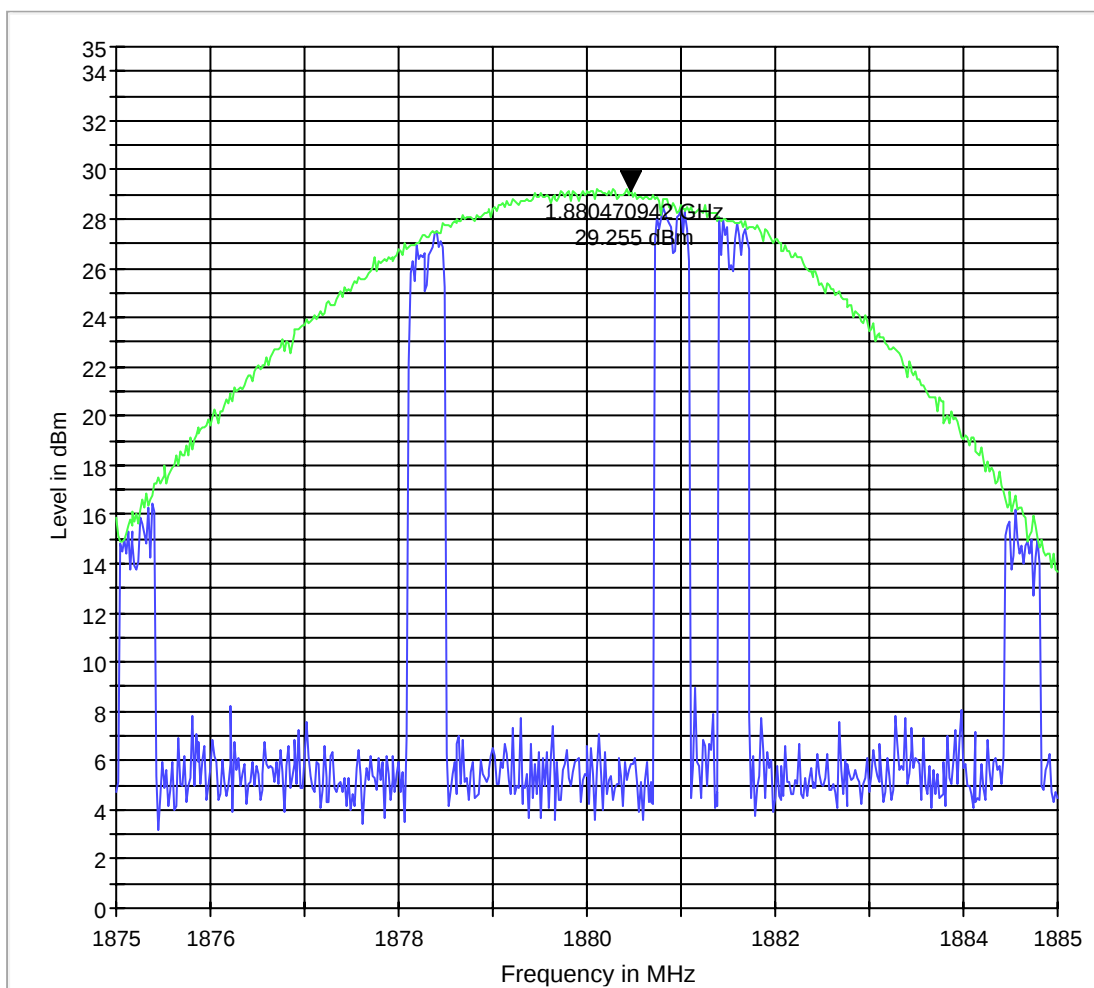
EMI Sweep(1)

EIRP 1900 L



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

EIRP 1900 M



MaxPeak-ClearWrite

MaxPeak-MaxHold

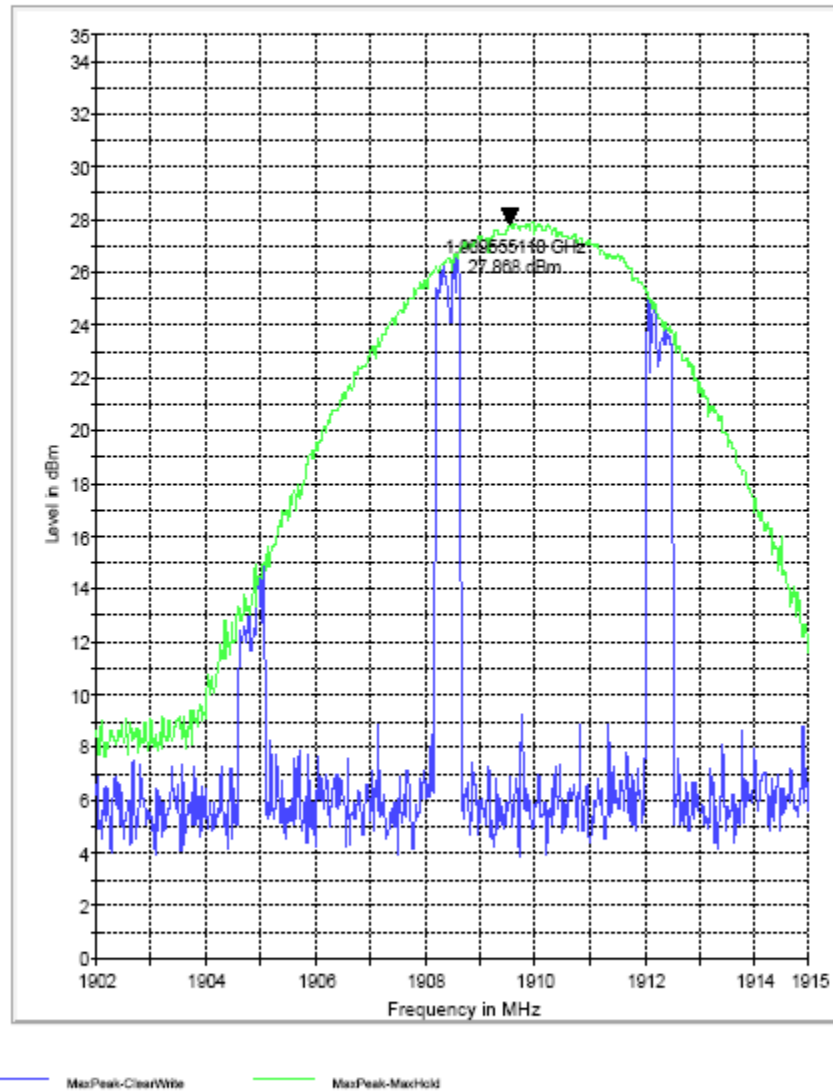
EIRP (EGPRS 1900) CHANNEL 810 §24.232(b)

EMI Sweep(1)

1 / 1

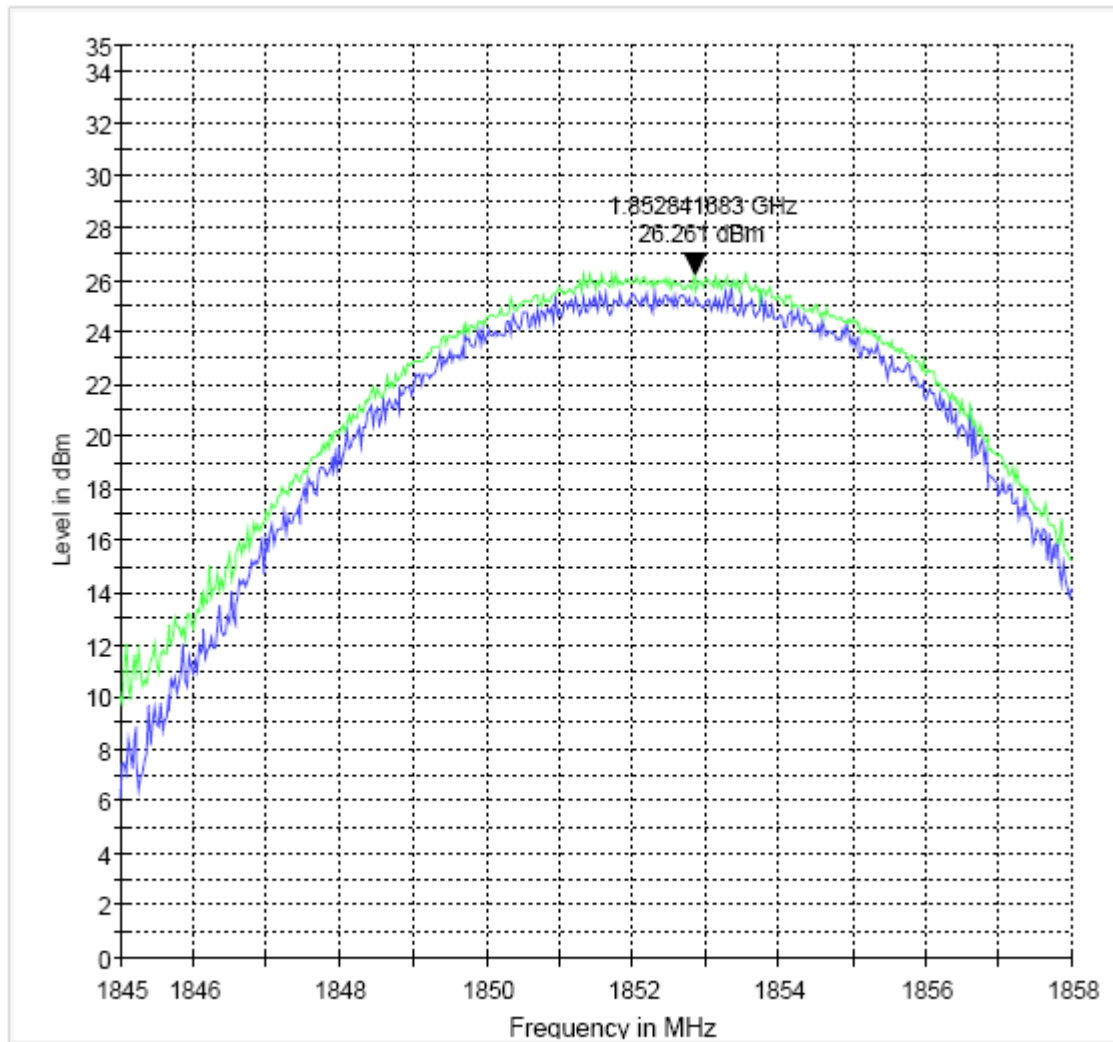
EMI Sweep(1)

EIRP 1900 H



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

EIRP 1900 L

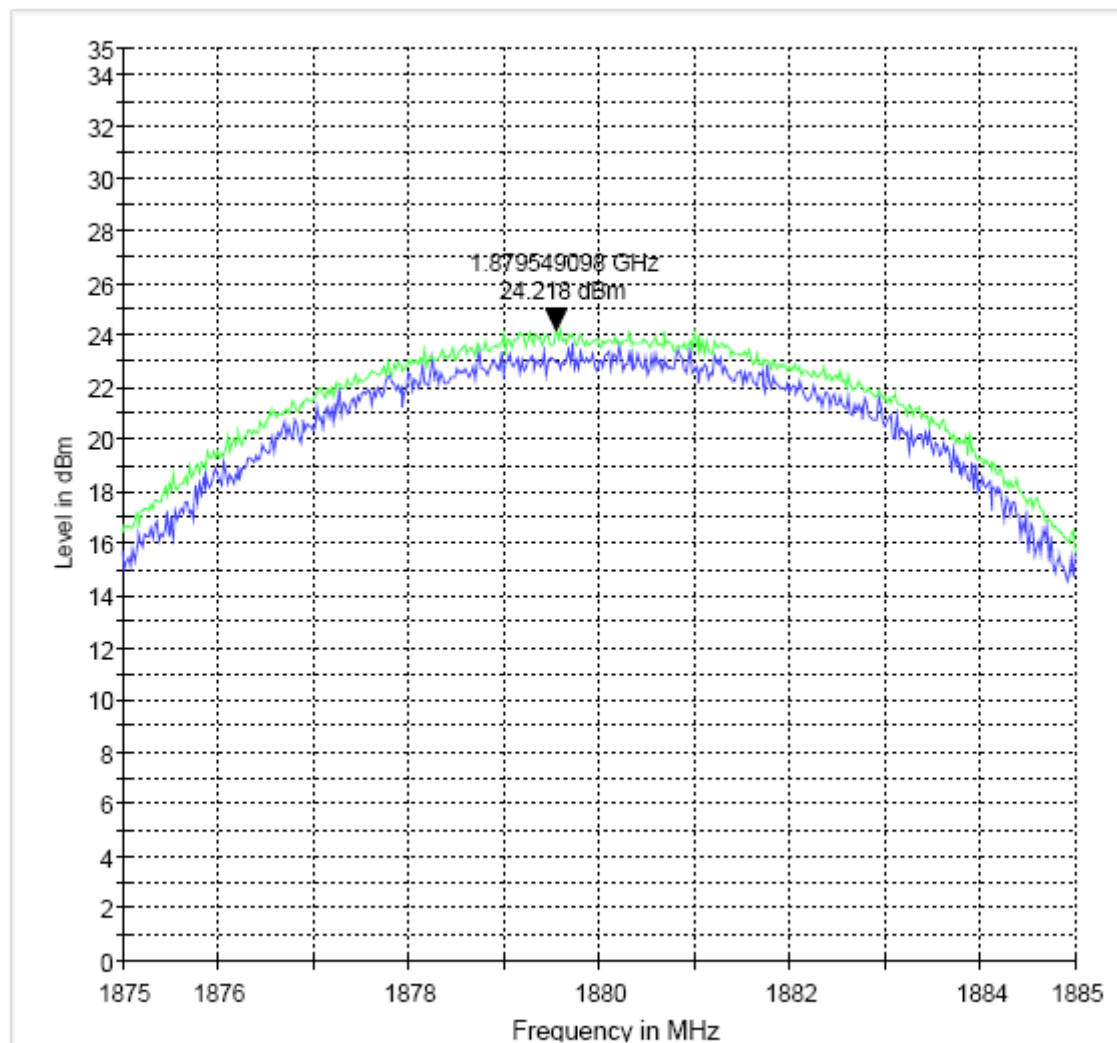


MaxPeak-ClearWrite

MaxPeak-MaxHold

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

EIRP 1900 M

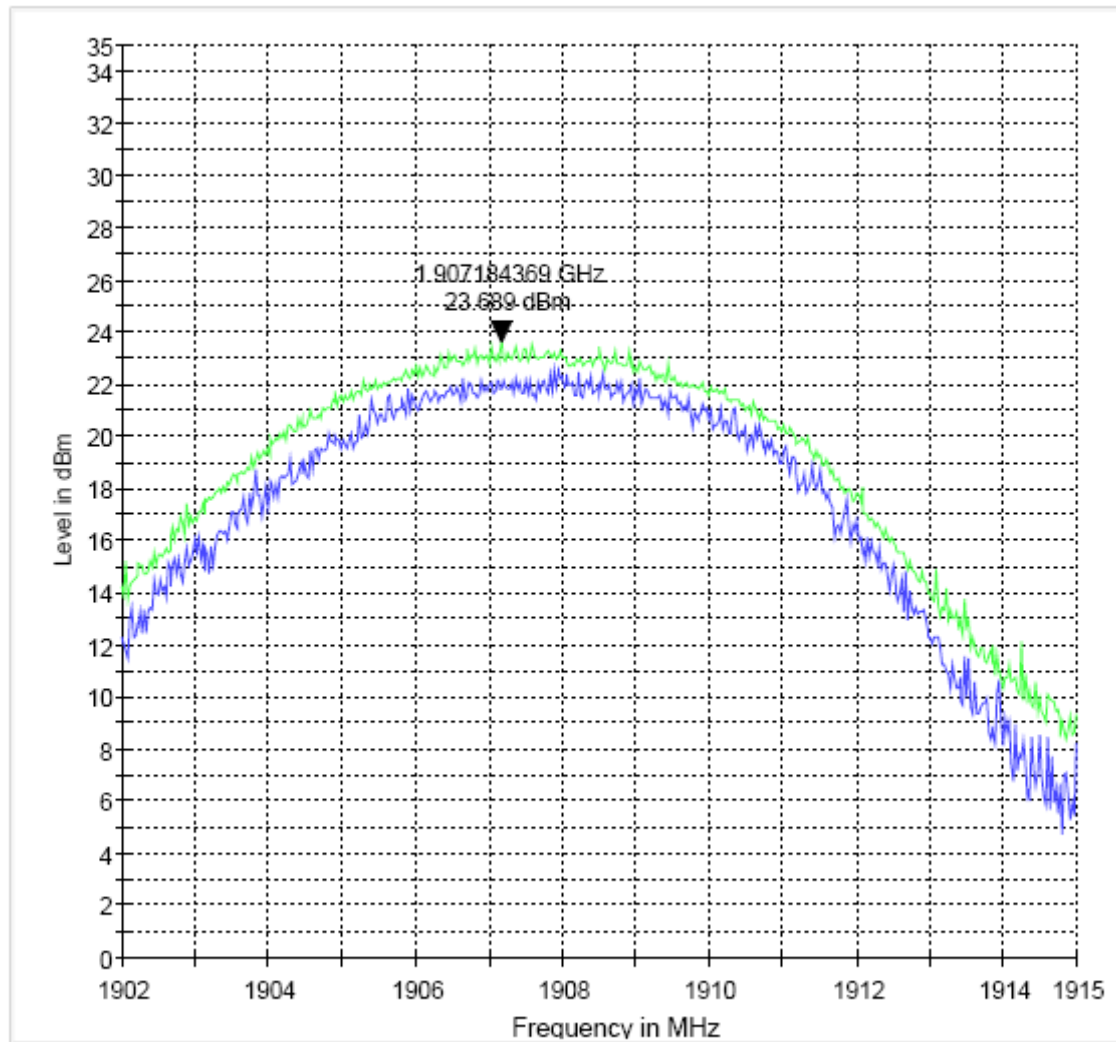


MaxPeak-ClearWrite

MaxPeak-MaxHold

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

EIRP 1900 H



MaxPeak-ClearWrite

MaxPeak-MaxHold

5.2 Occupied Bandwidth/Emission Bandwidth

5.2.1 References

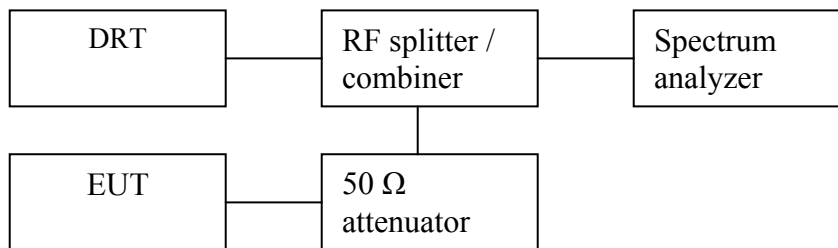
FCC: CFR Part 2.1049, CFR Part 22.917, CFR Part 24.238
IC: RSS 132 Section 4.2; RSS 133 Section 6.5

5.2.2 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.

5.2.3 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.

Spectrum analyzer settings: Measurement bandwidth of at least 1% of the occupied bandwidth.

5.2.4 Occupied/Emission Bandwidth- 850 MHz band

GSM 850: GMSK Mode		
Frequency (MHz)	99% Occupied Bandwidth (kHz)	-26dBc Bandwidth (kHz)
824.2	239.82	310.54
836.4	239.82	307.46
848.8	236.75	310.54

EGPRS 850: 8PSK Mode		
Frequency (MHz)	99% Occupied Bandwidth (kHz)	-26dBc Bandwidth (kHz)
824.2	233.67	301.32
836.4	239.82	313.61
848.8	236.75	301.32

FDD V: UMTS Mode		
Frequency (MHz)	99% Occupied Bandwidth (MHz)	-26dBc Bandwidth (MHz)
826.4	4.18	4.79
836.0	4.15	4.74
846.6	4.13	4.76

5.2.5 Occupied/Emission Bandwidth- 1900 MHz band

GSM 1900: GMSK Mode		
Frequency (MHz)	99% Occupied Bandwidth (kHz)	-26dBc Bandwidth (kHz)
1850.2	238.78	299.68
1880.0	241.99	290.06
1909.8	238.78	294.87

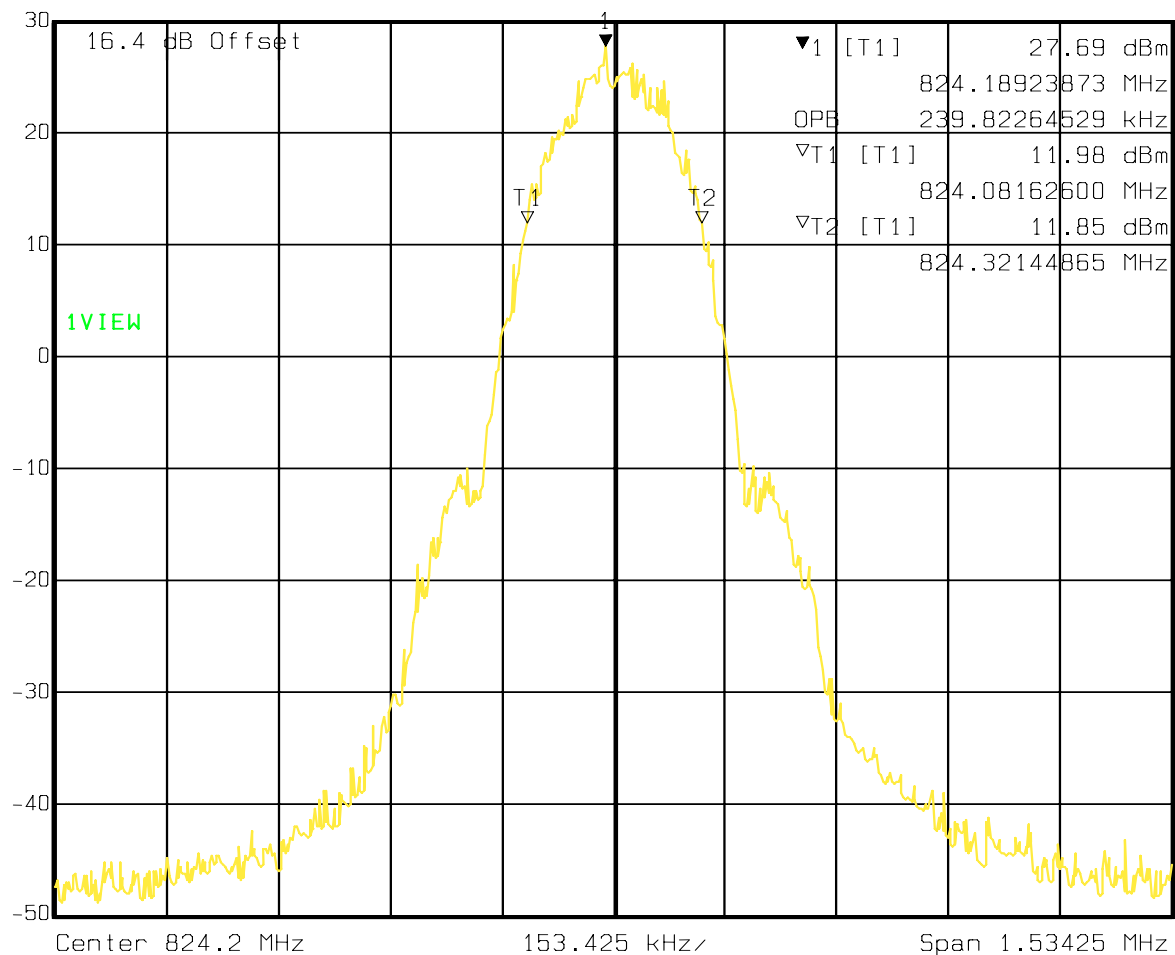
EGPRS 1900: 8PSK Mode		
Frequency (MHz)	99% Occupied Bandwidth (kHz)	-26dBc Bandwidth (kHz)
1850.2	237.18	293.27
1880.0	237.18	307.69
1909.8	238.78	307.69

FDD II: UMTS Mode		
Frequency (MHz)	99% Occupied Bandwidth (MHz)	-26dBc Bandwidth (MHz)
1852.4	4.18	4.74
1880.0	4.15	4.74
1907.6	4.15	4.74

5.2.6 Results

Occupied band Width GSM850 MHz Channel 128 GSM

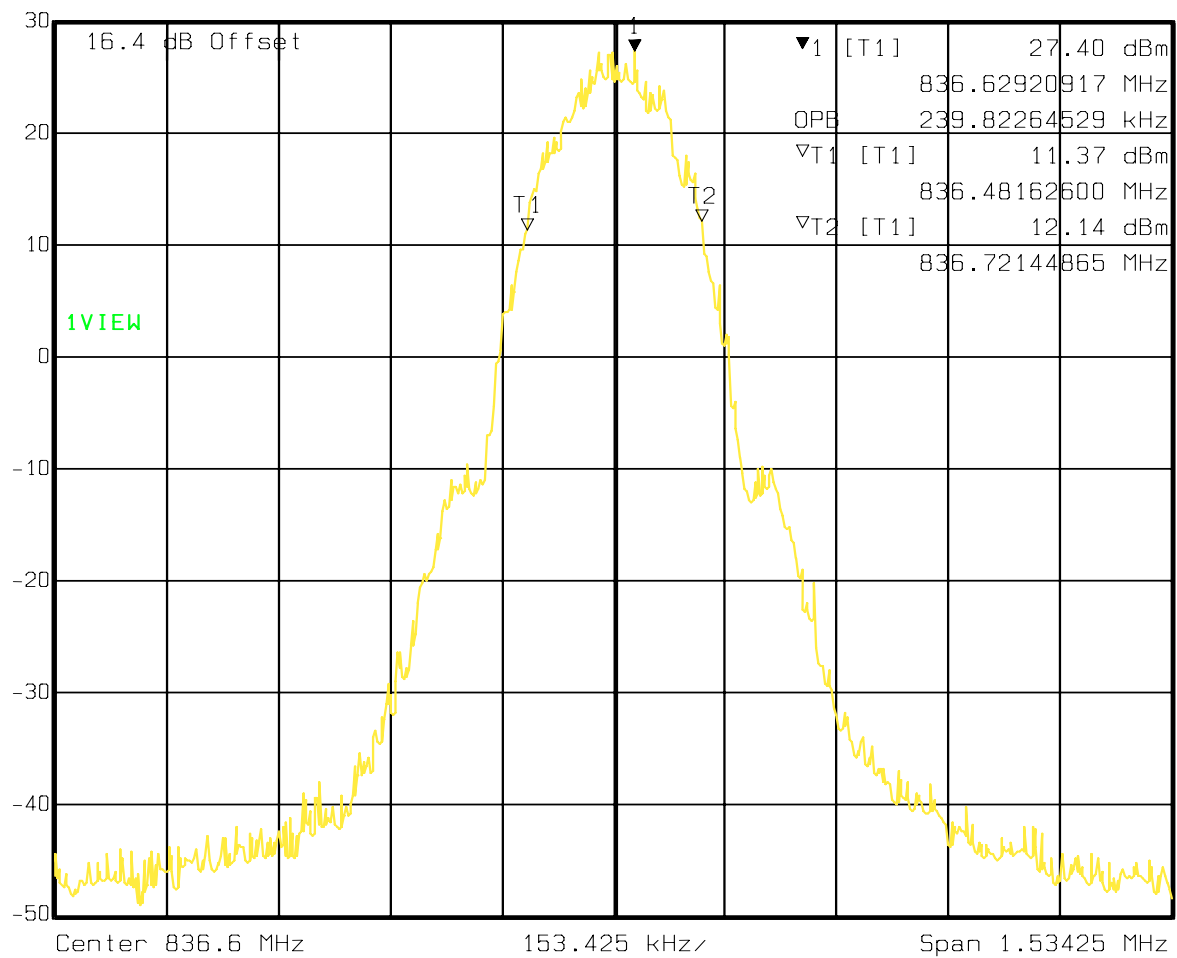
Marker 1 [T1] RBW 5 kHz RF Att 40 dB
Ref Lvl 27.69 dBm VBW 10 kHz
30 dBm 824.18923873 MHz SWT 155 ms Unit dBm



Date: 26.JAN.2010 13:00:18

Occupied band Width GSM850 MHz Channel 190 GSM

Marker 1 [T1] RBW 5 kHz RF Att 40 dB
Ref Lvl 27.40 dBm VBW 10 kHz
30 dBm 836.62920917 MHz SWT 155 ms Unit dBm

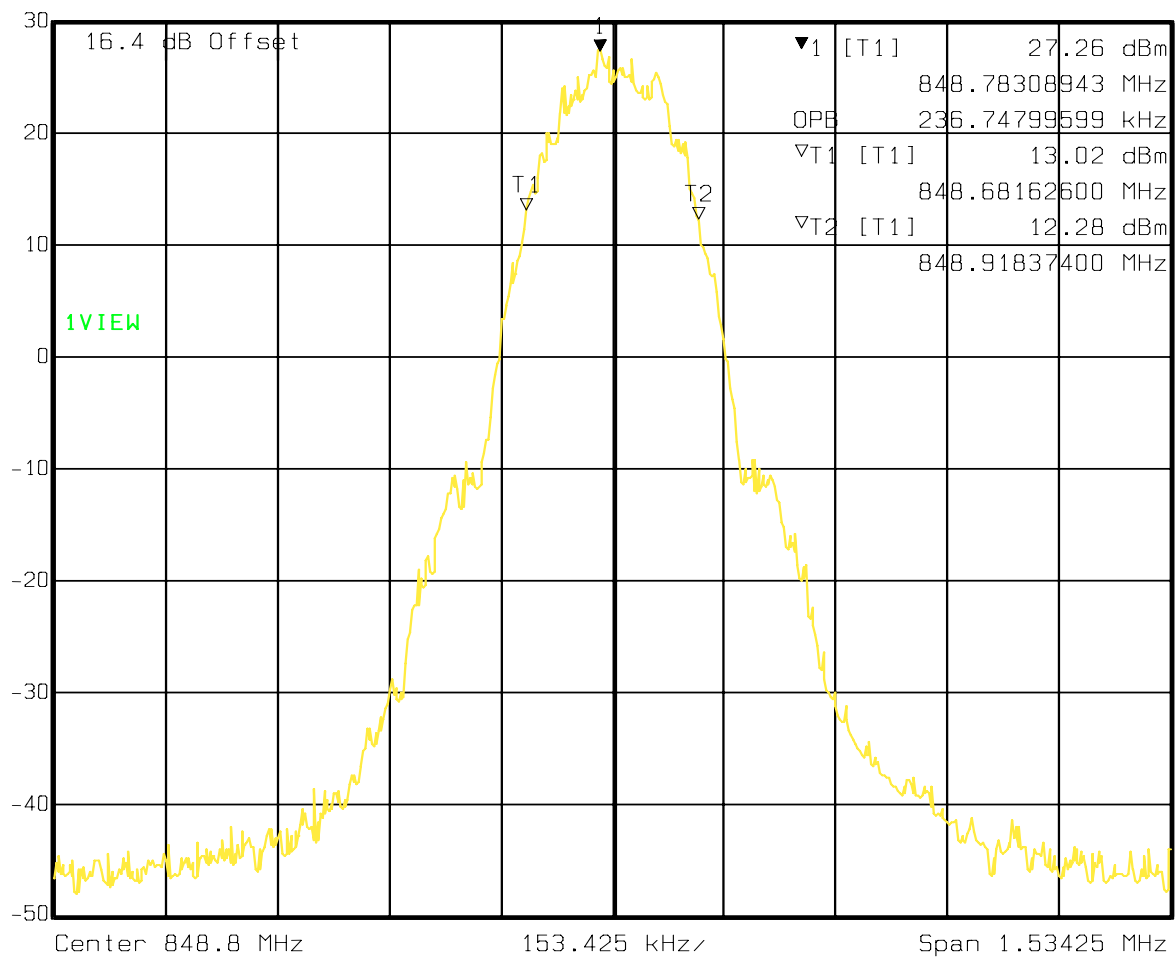


Date: 26.JAN.2010 13:09:15

Occupied band Width GSM850 MHz Channel 251 GSM



Marker 1 [T1] RBW 5 kHz RF Att 40 dB
 Ref Lvl 27.26 dBm VBW 10 kHz
 30 dBm 848.78308943 MHz SWT 155 ms Unit dBm

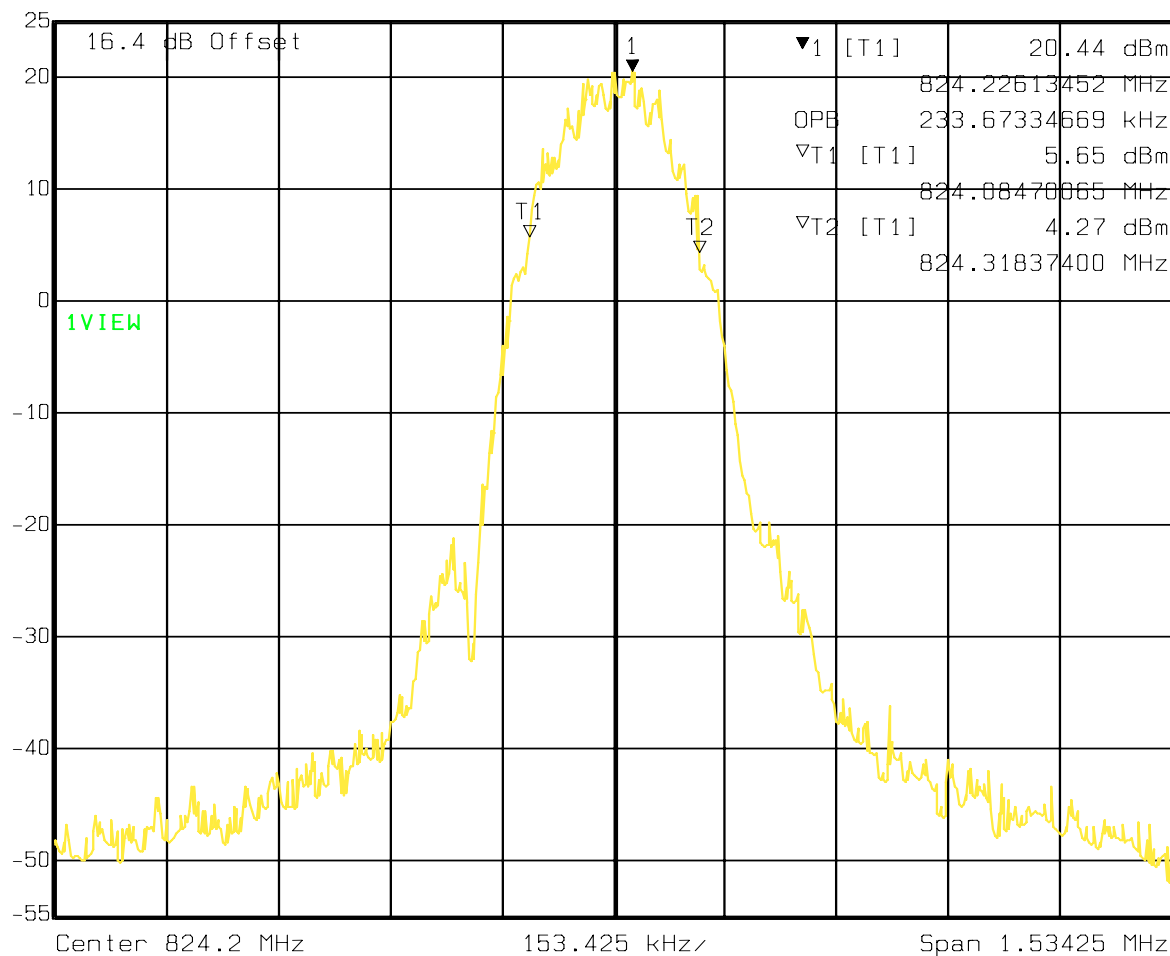


Date: 26.JAN.2010 13:12:30

Occupied band Width GSM850 MHz Channel 128 EGPRS



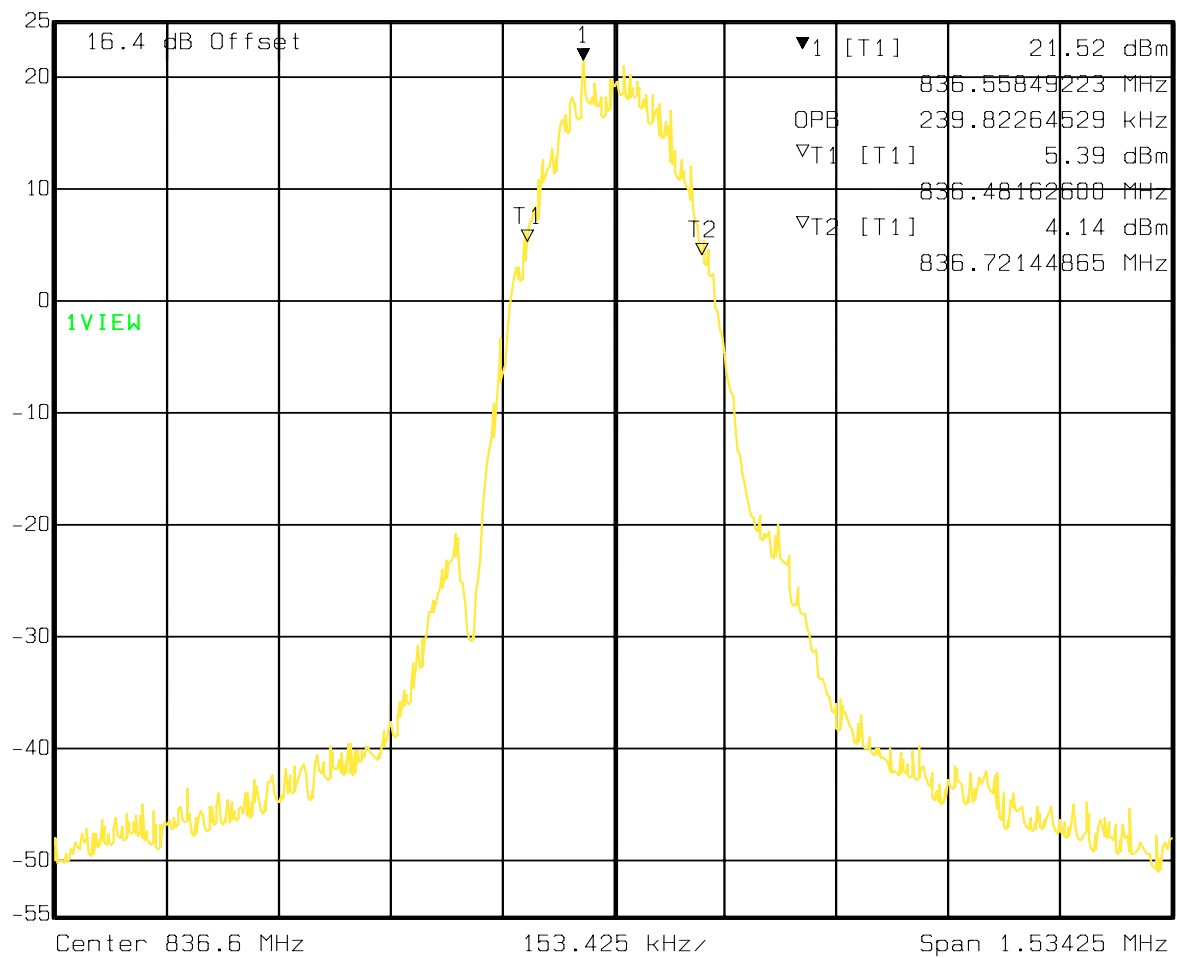
Marker 1 [T1] RBW 5 kHz RF Att 30 dB
 Ref Lvl 20.44 dBm VBW 10 kHz
 25 dBm 824.22613452 MHz SWT 155 ms Unit dBm



Date: 26.JAN.2010 12:56:57

Occupied band Width GSM850 MHz Channel 190 EGPRS

Marker 1 [T1] RBW 5 kHz RF Att 30 dB
Ref Lvl 21.52 dBm VBW 10 kHz
25 dBm 836.55849223 MHz SWT 155 ms Unit dBm

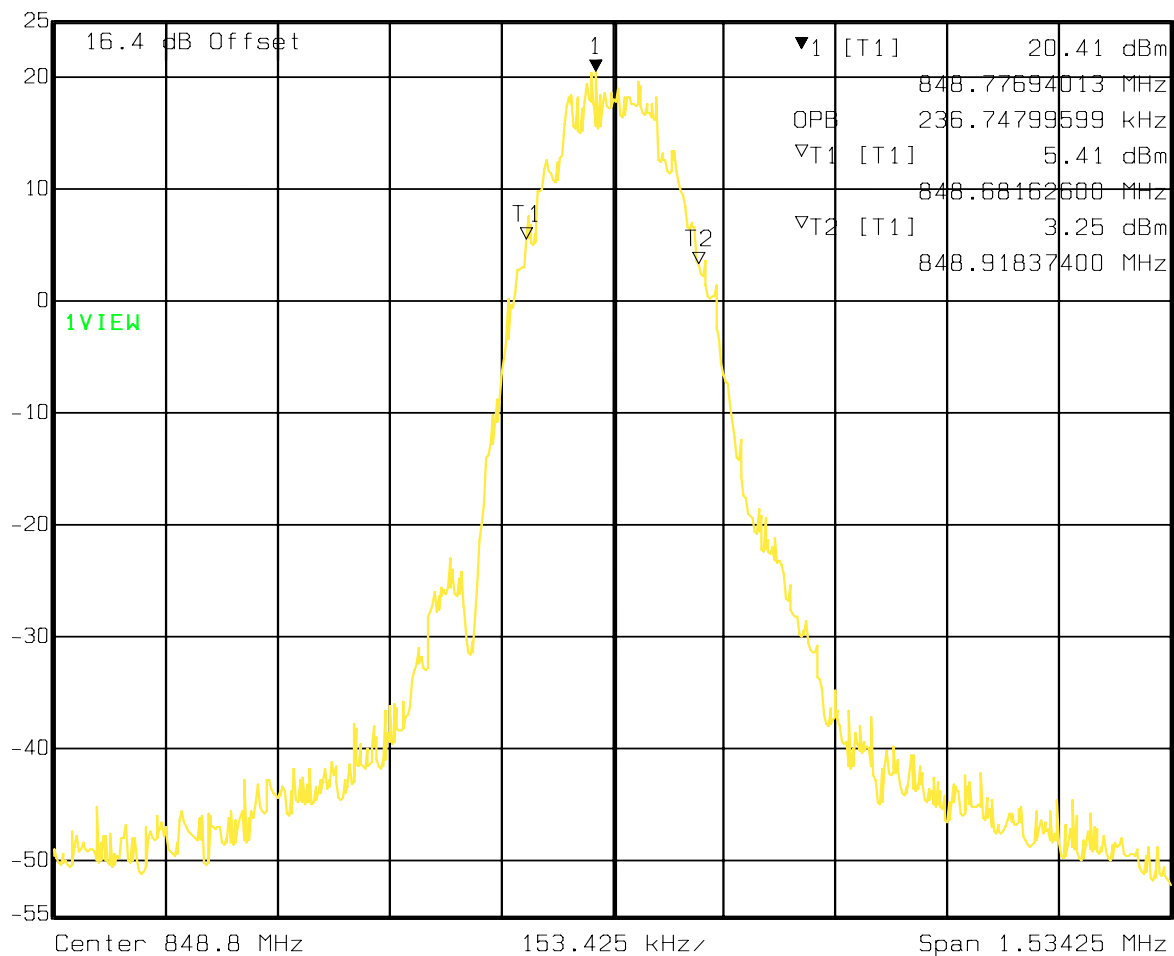


Date: 26.JAN.2010 12:54:25

Occupied band Width GSM850 MHz Channel 251 EGPRS

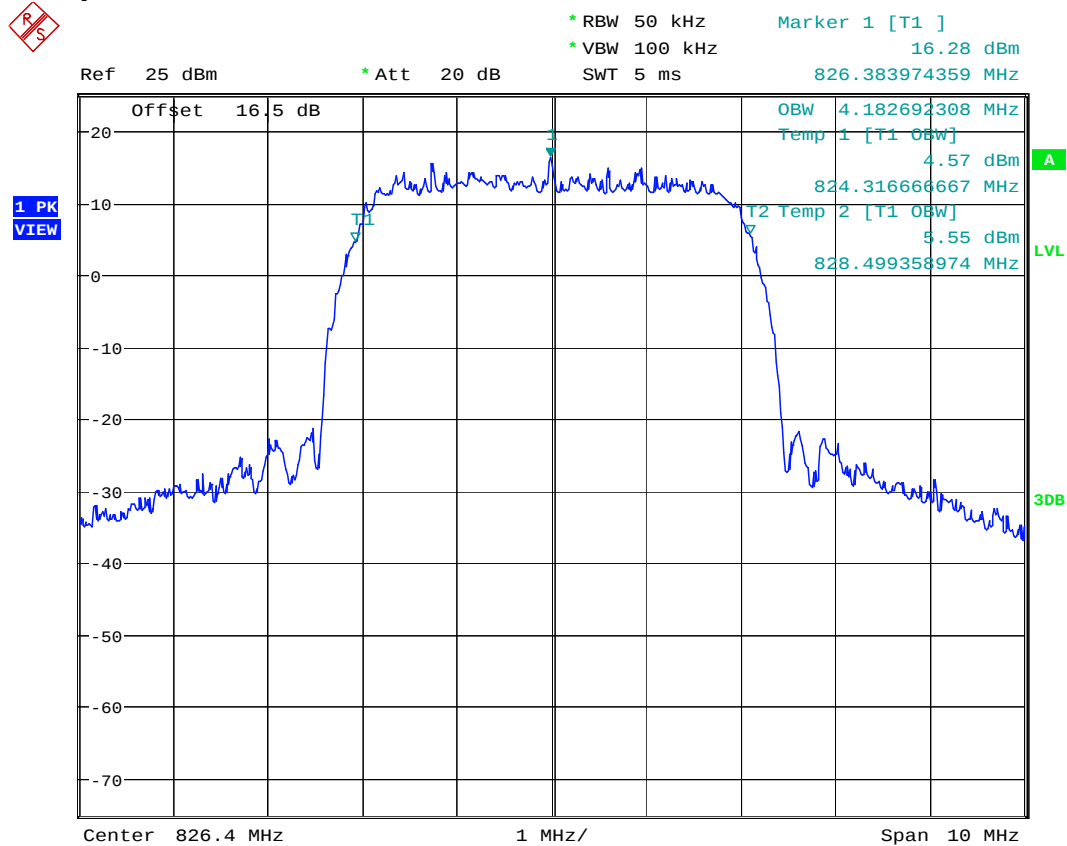


Marker 1 [T1] RBW 5 kHz RF Att 30 dB
 Ref Lvl 20.41 dBm VBW 10 kHz
 25 dBm 848.77694013 MHz SWT 155 ms Unit dBm

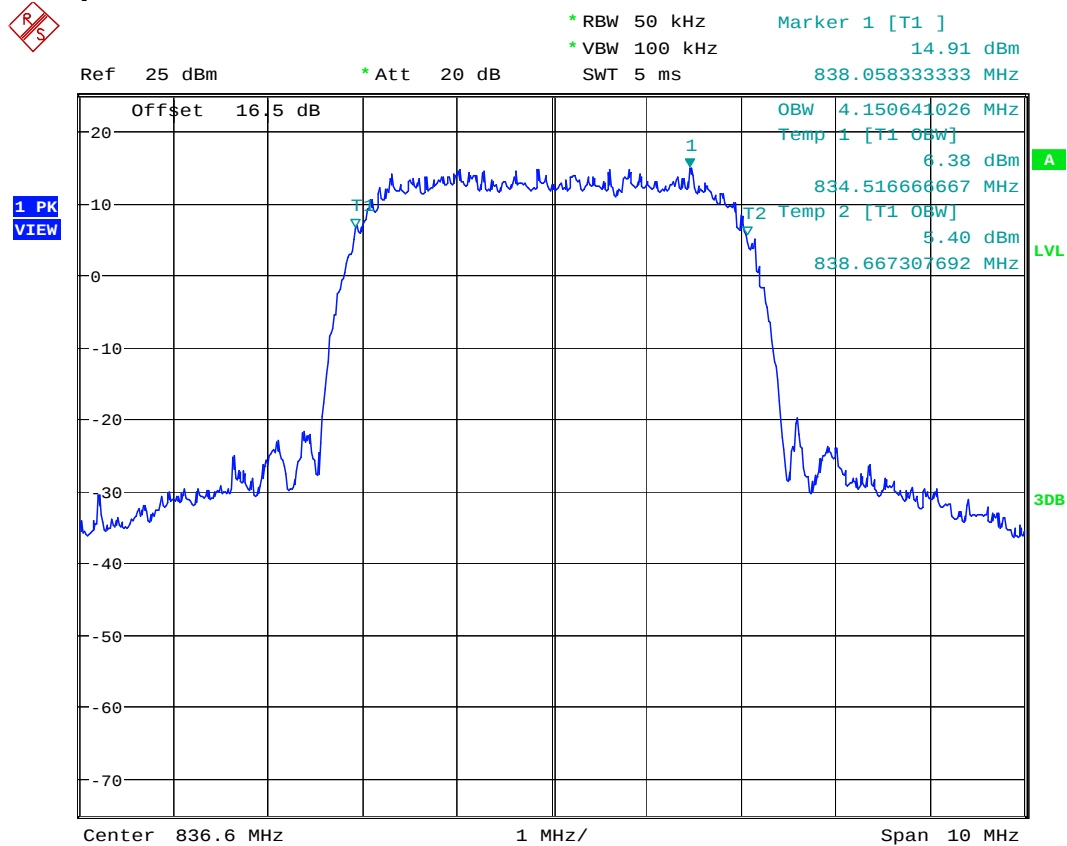


Date: 26.JAN.2010 12:50:59

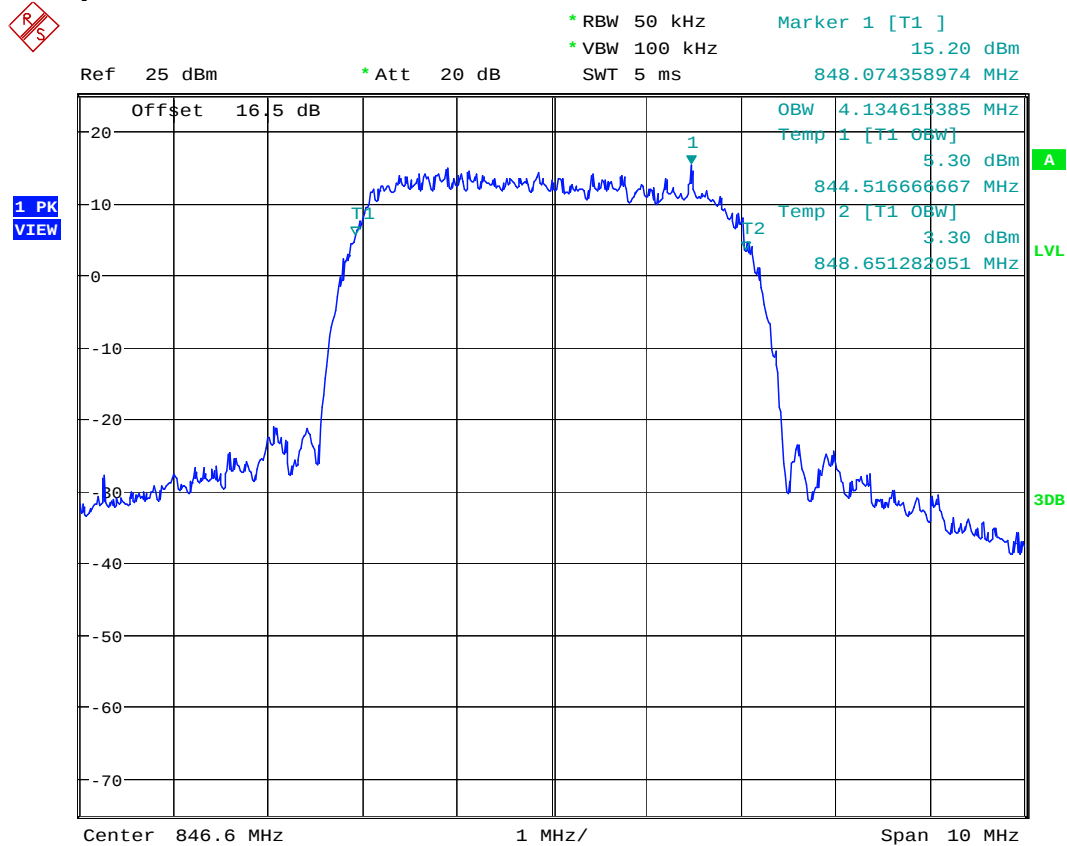
Occupied band Width UMTS FDD5 Channel 4132



Date: 4.FEB.2010 15:12:20

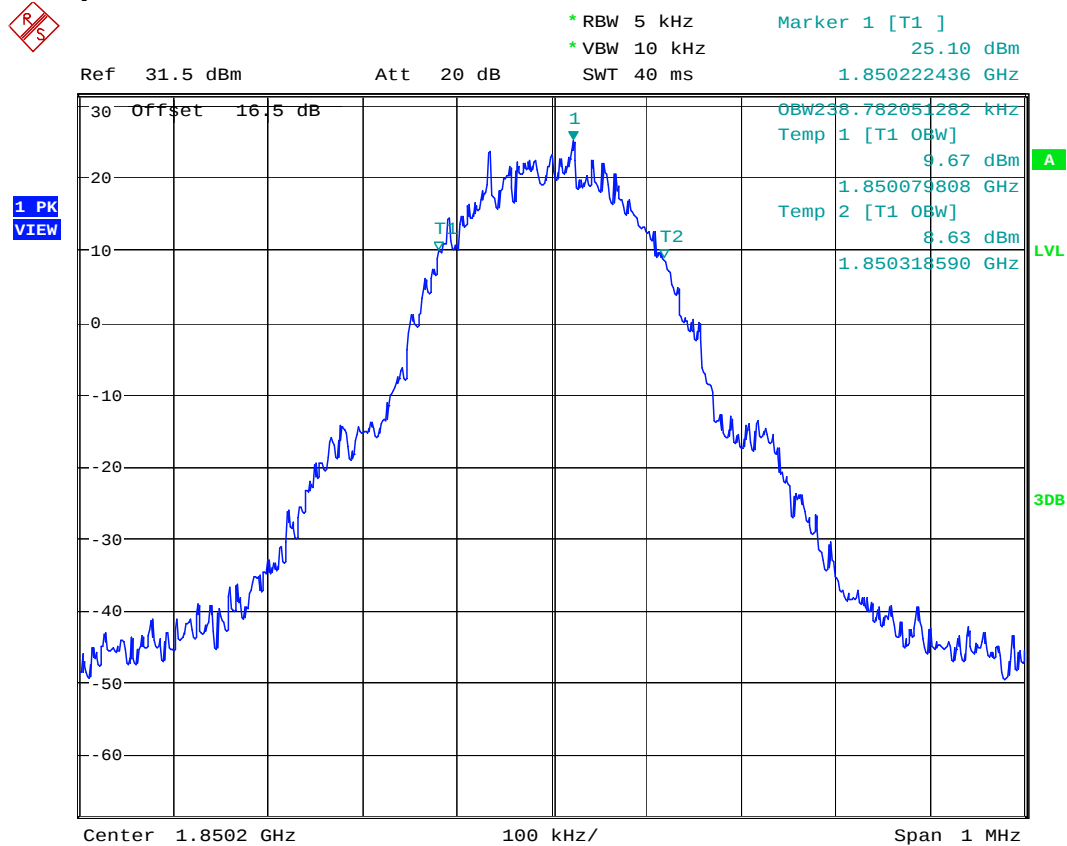
Occupied band Width UMTS FDD5 Channel 4183

Date: 4.FEB.2010 15:14:52

Occupied band Width UMTS FDD5 Channel 4233

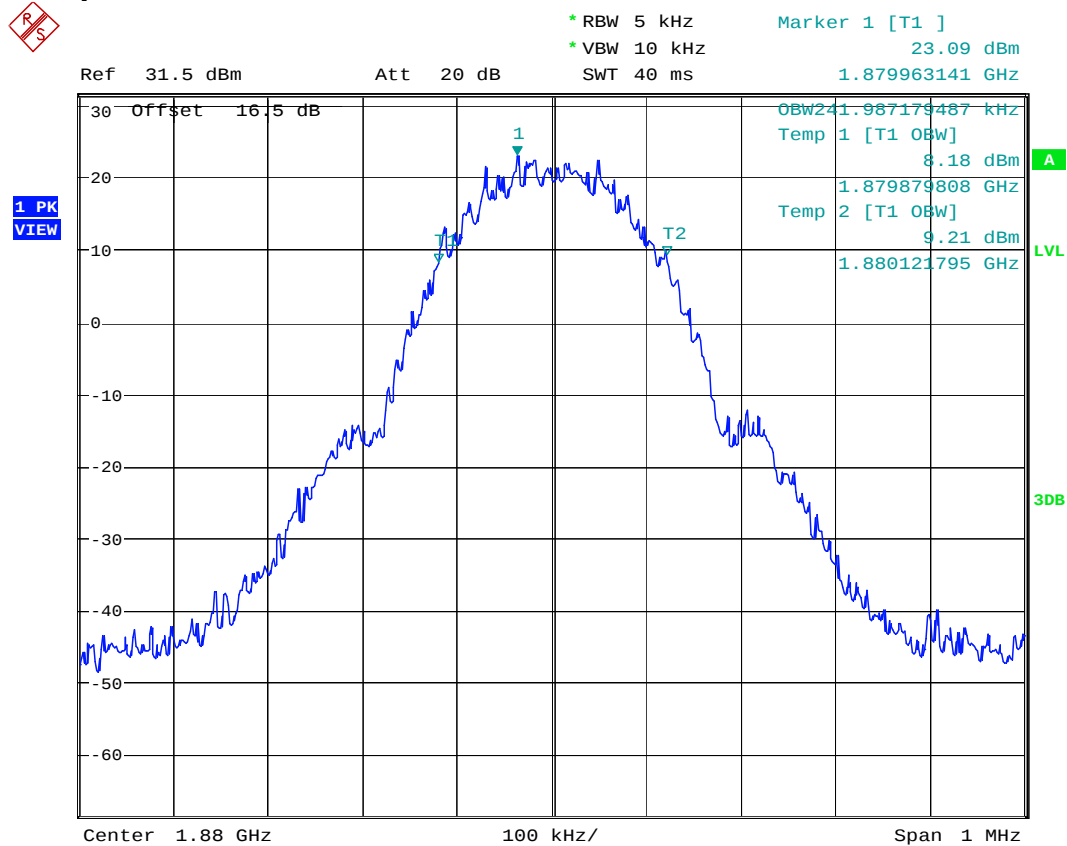
Date: 4.FEB.2010 15:23:34

Occupied band Width PCS1900 MHz Channel 512 GSM



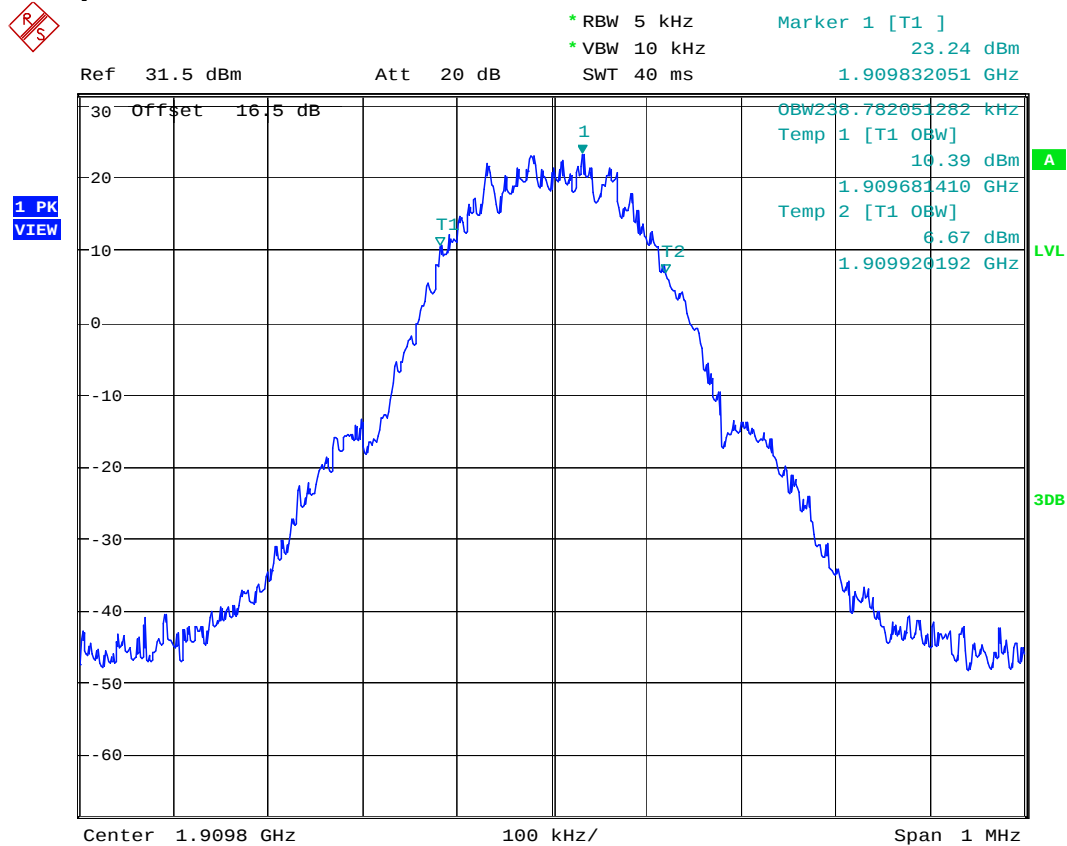
Date: 4.FEB.2010 11:42:33

Occupied band Width PCS1900 MHz Channel 661 GSM



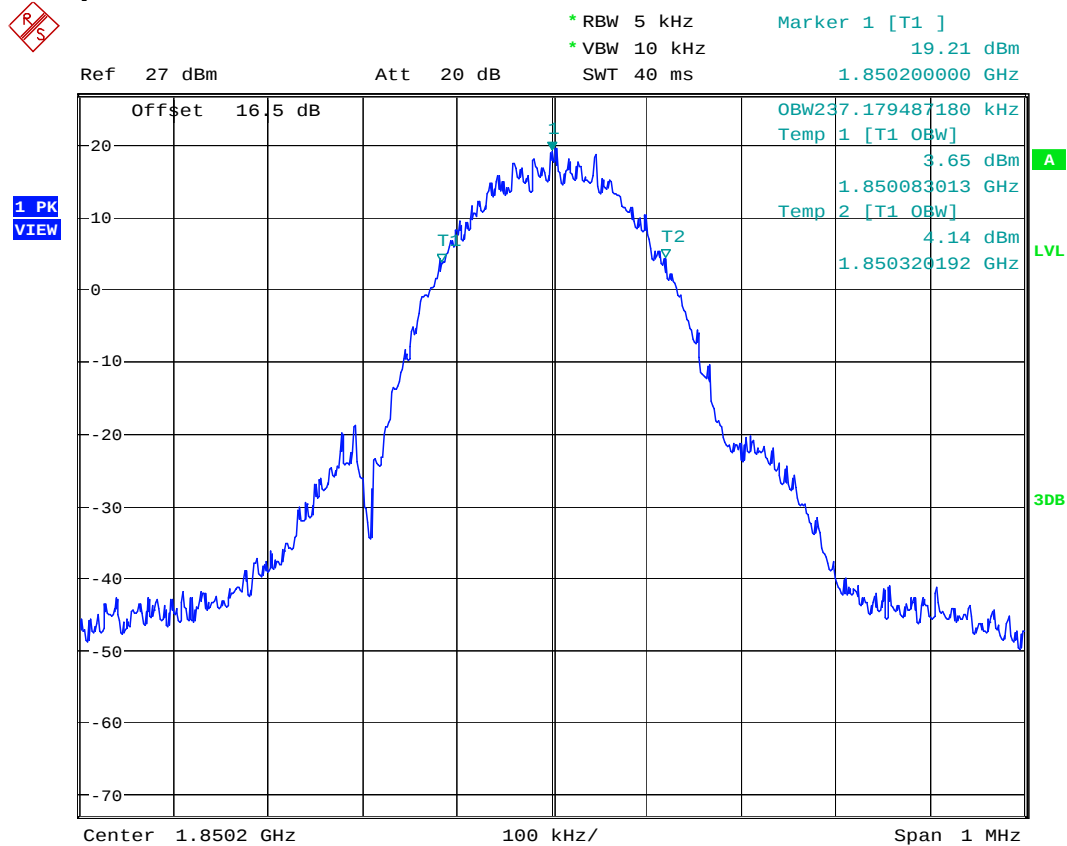
Date: 4.FEB.2010 11:40:45

Occupied band Width PCS1900 MHz Channel 810 GSM



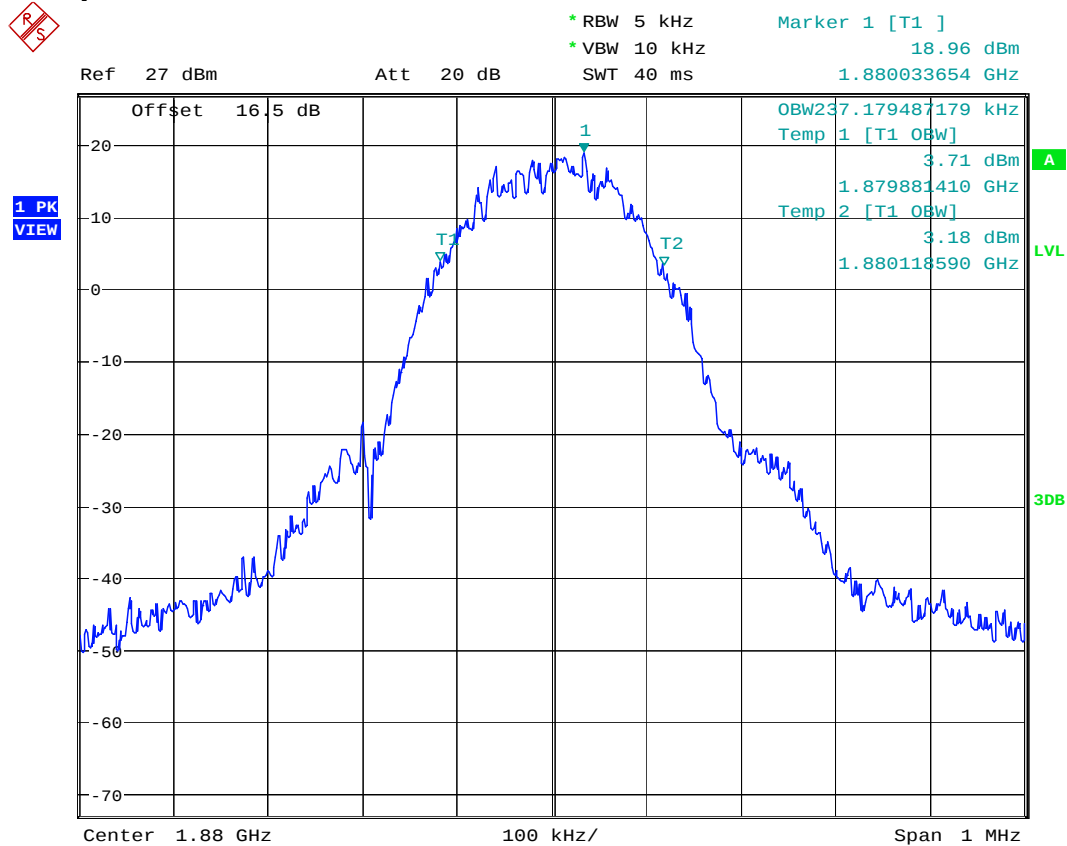
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Occupied band Width PCS1900 MHz Channel 512 EGPRS



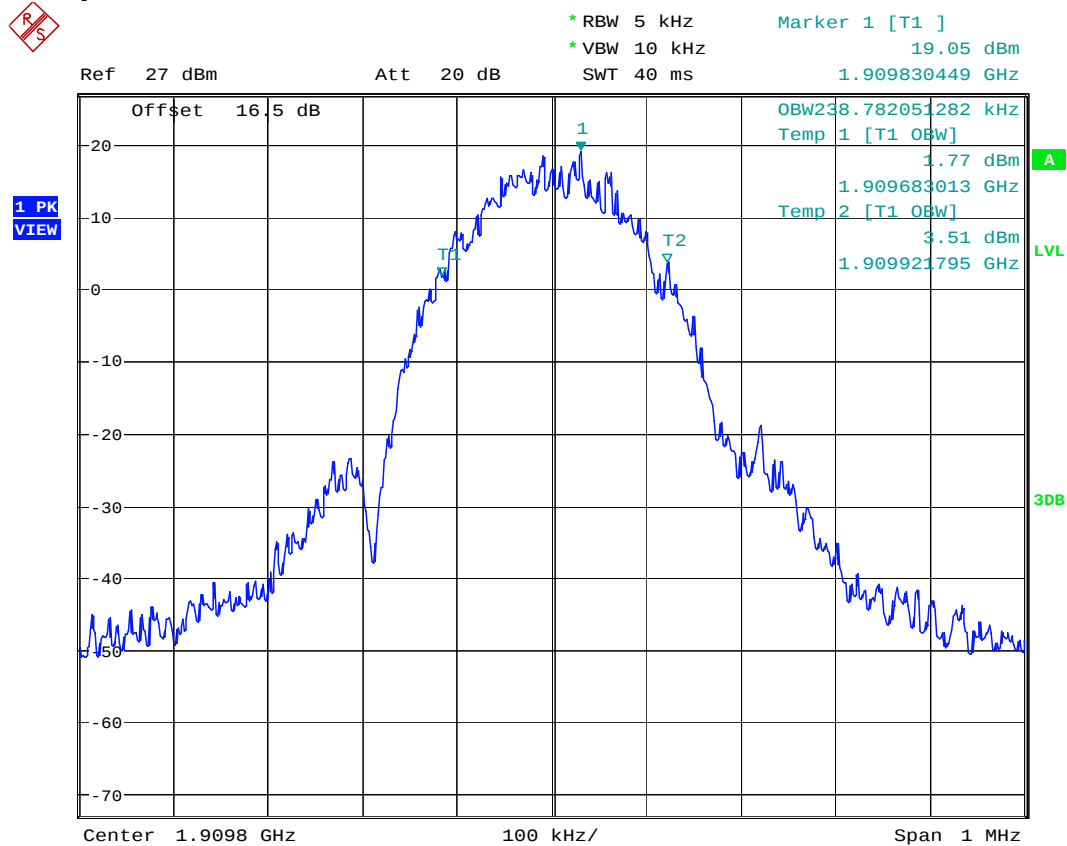
Date: 4.FEB.2010 13:49:17

Occupied band Width PCS1900 MHz Channel 661 EGPRS



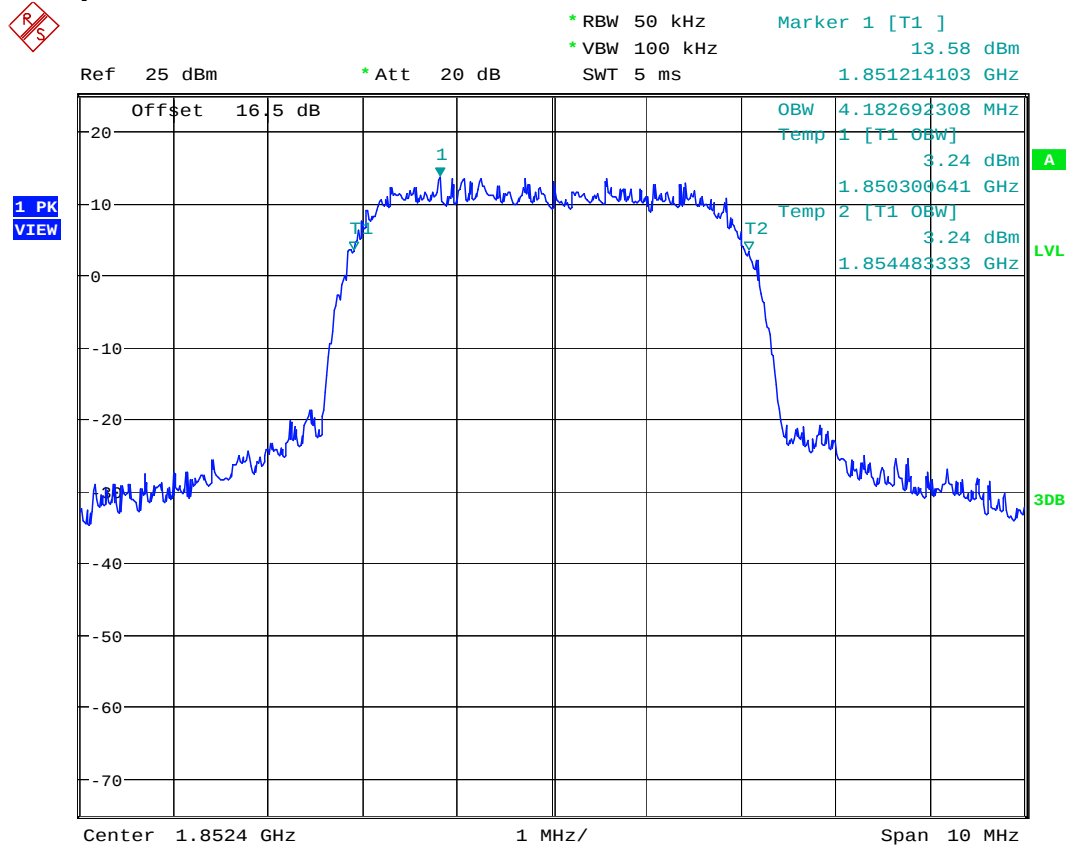
Date: 4.FEB.2010 13:46:55

Occupied band Width PCS1900 MHz Channel 810 EGPRS



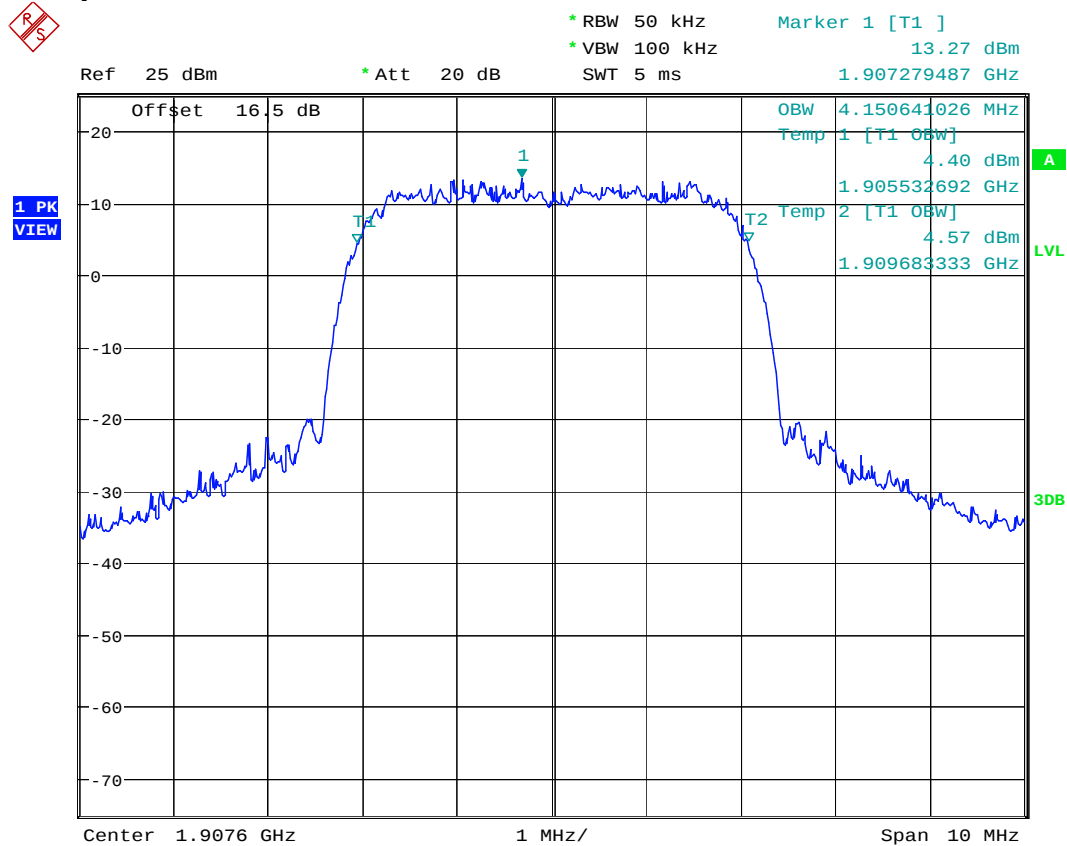
Date: 4.FEB.2010 13:46:14

Occupied band Width UMTS FDD2 Channel 9262



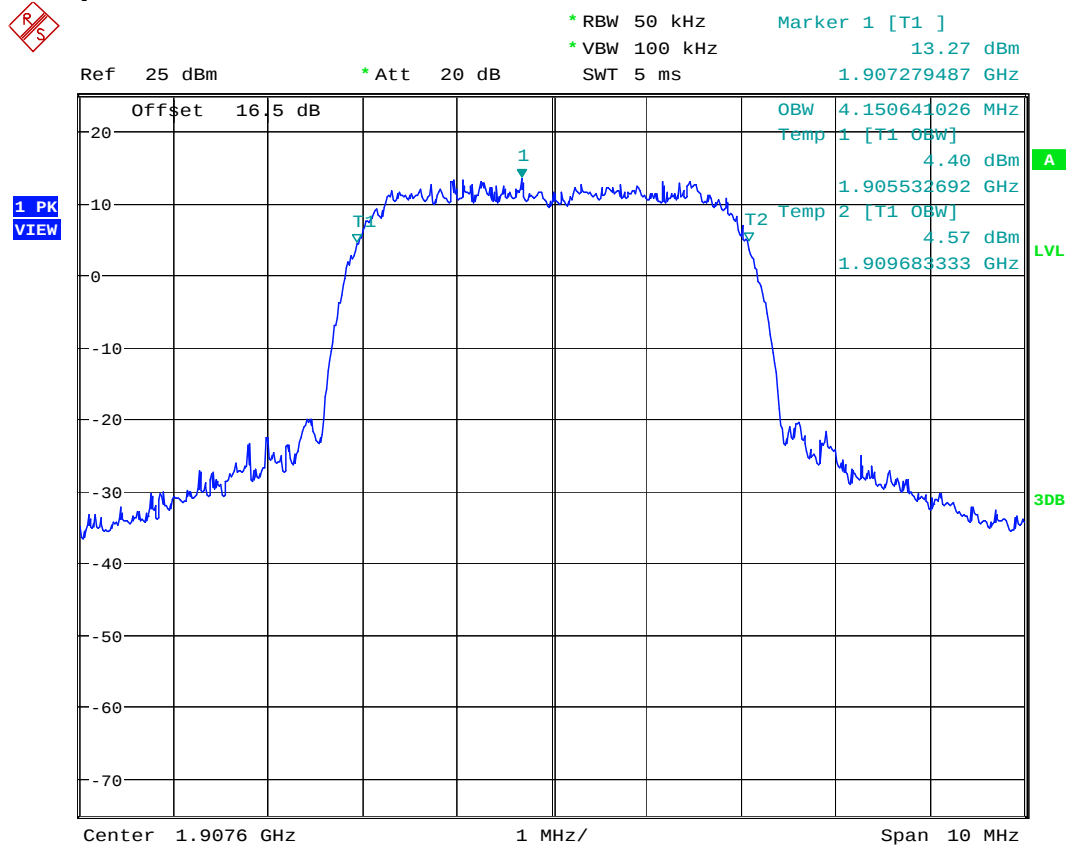
Date: 4.FEB.2010 14:34:00

Occupied band Width UMTS FDD2 Channel 9400



Date: 4.FEB.2010 14:32:38

Occupied band Width UMTS FDD2 Channel 9538

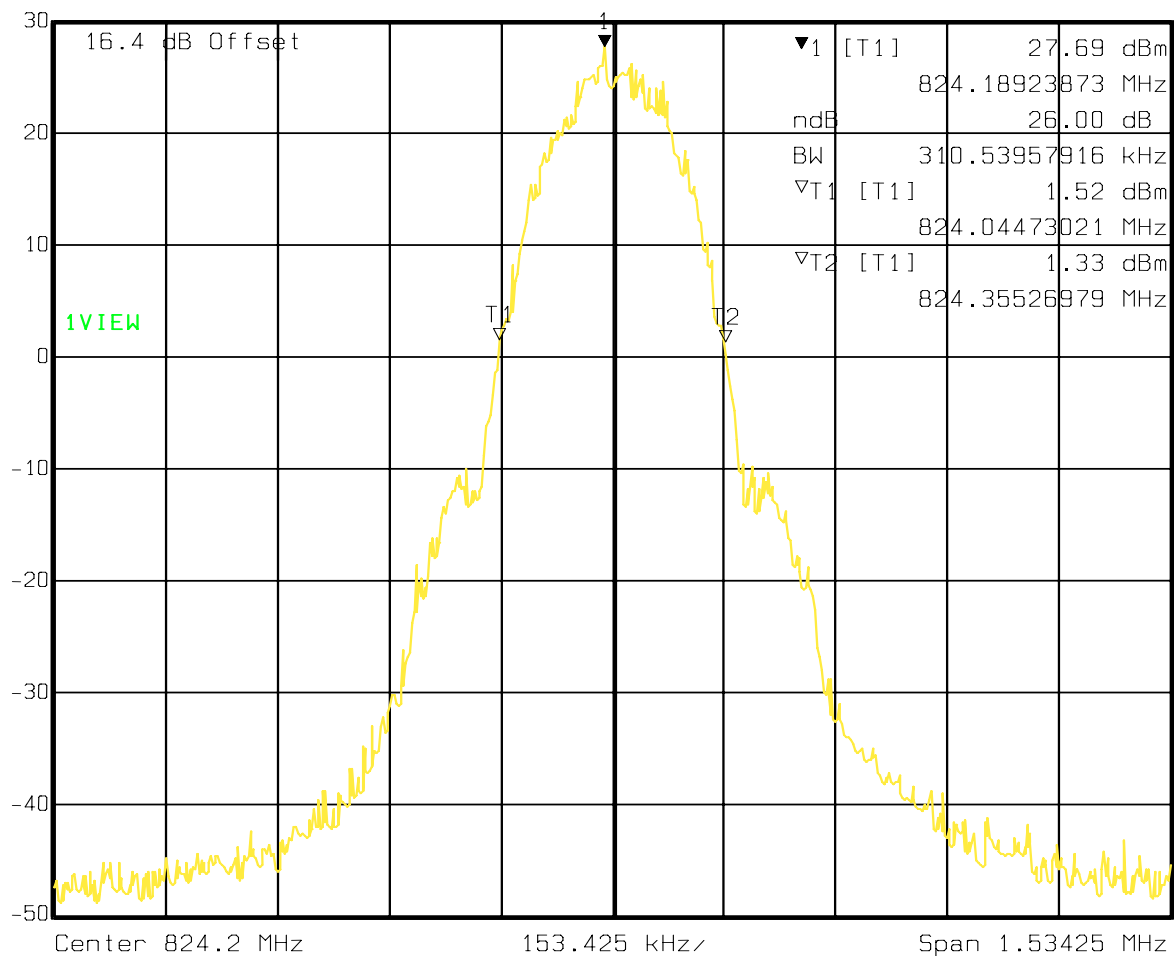


Date: 4.FEB.2010 14:32:38

Emission band Width GSM850 MHz Channel 128 GSM



Ref Lvl 30 dBm
 Marker 1 [T1 ndB] 26.00 dB
 BW 310.53957916 kHz
 RBW 5 kHz
 VBW 10 kHz
 RF Att 40 dB
 SWT 155 ms
 Unit dBm

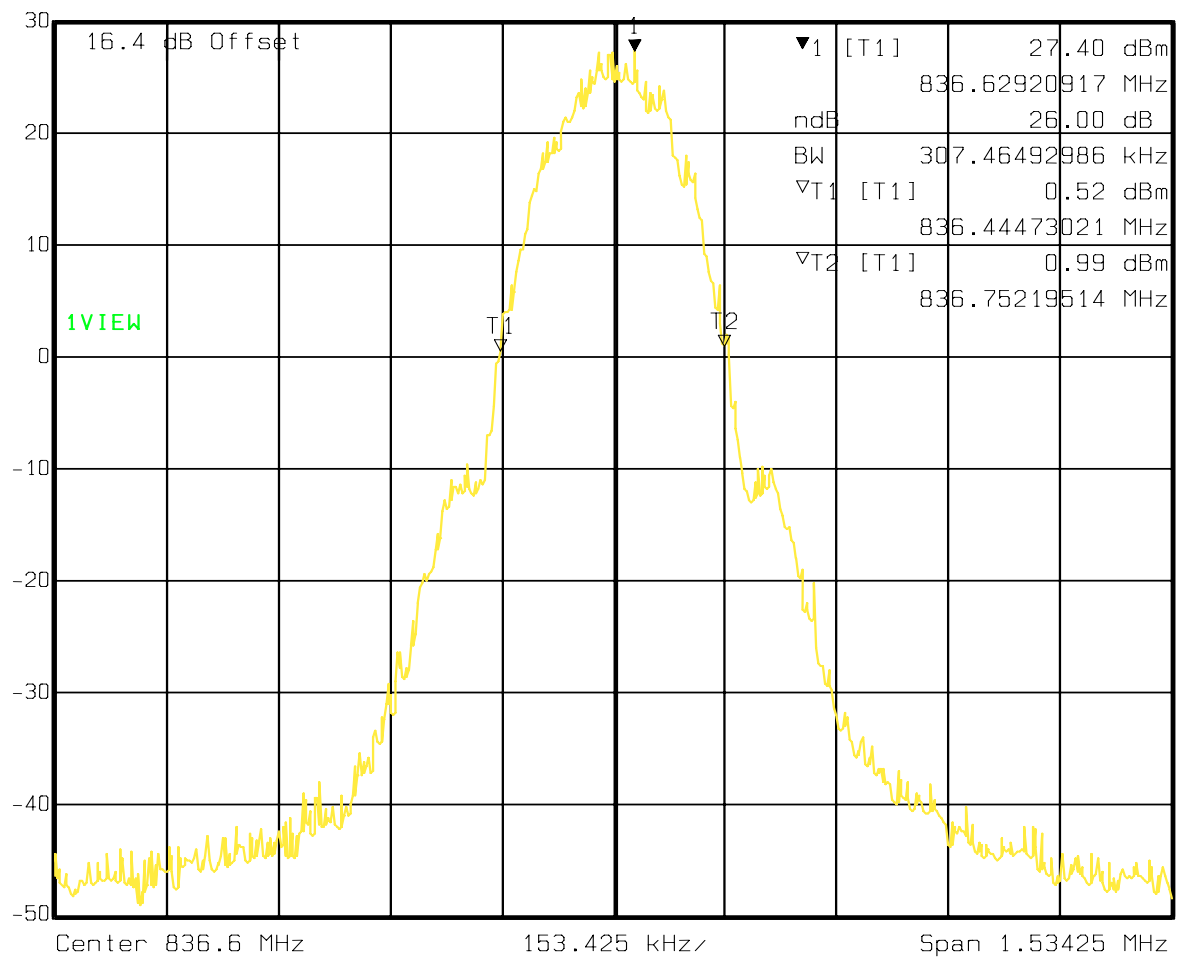


Date: 26.JAN.2010 13:01:47

Emission band Width GSM850 MHz Channel 190 GSM



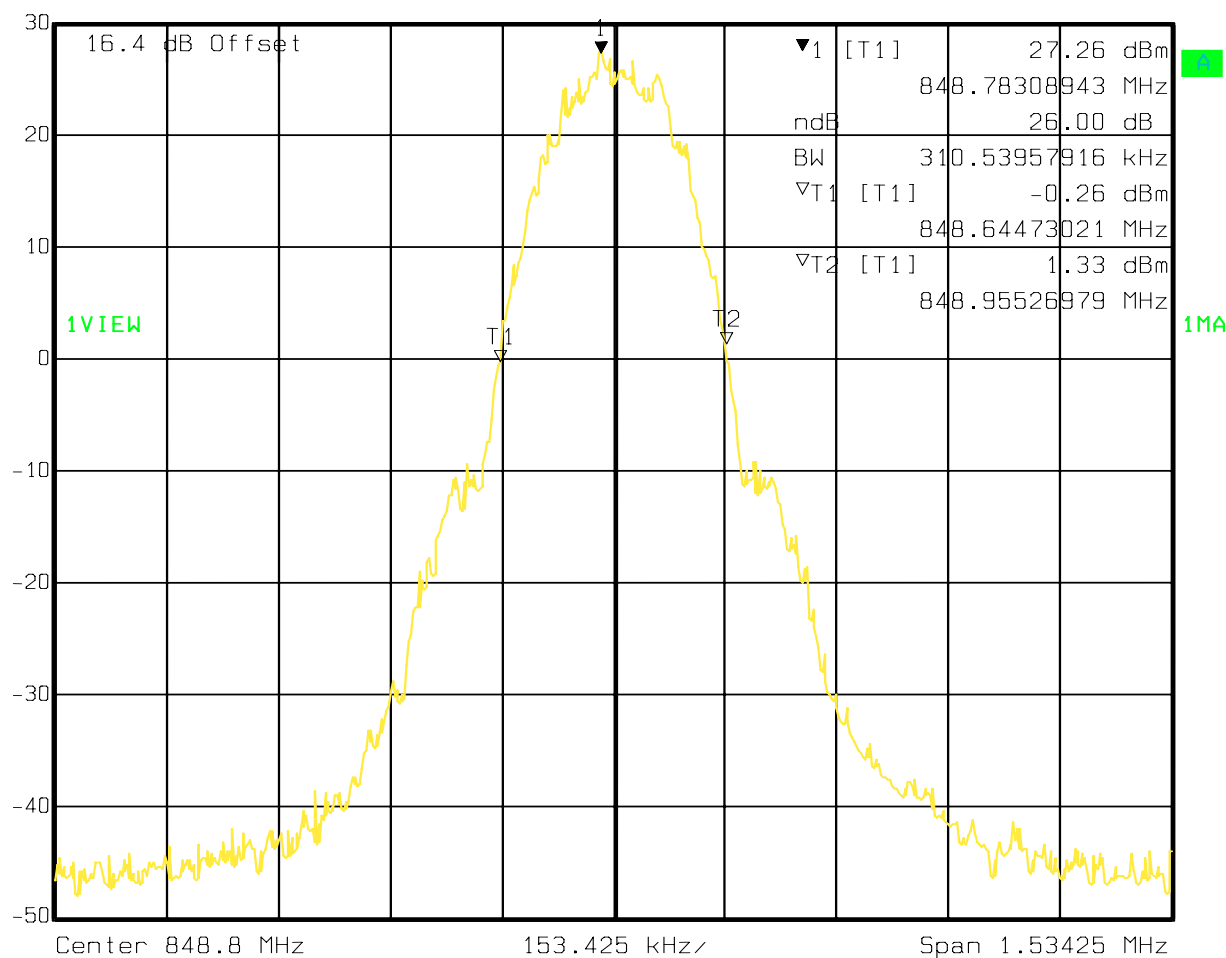
Ref Lvl 30 dBm
 Marker 1 [T1 ndB] 26.00 dB
 BW 307.46492986 kHz
 RBW 5 kHz
 VBW 10 kHz
 RF Att 40 dB
 SWT 155 ms
 Unit dBm



Date: 26.JAN.2010 13:07:37

Emission band Width GSM850 MHz Channel 251 GSM

Ref Lvl 30 dBm
Marker 1 [T1 ndB] 26.00 dB
RBW 5 kHz
RF Att 40 dB
VBW 10 kHz
BW 310.53957916 kHz
SWT 155 ms
Unit dBm

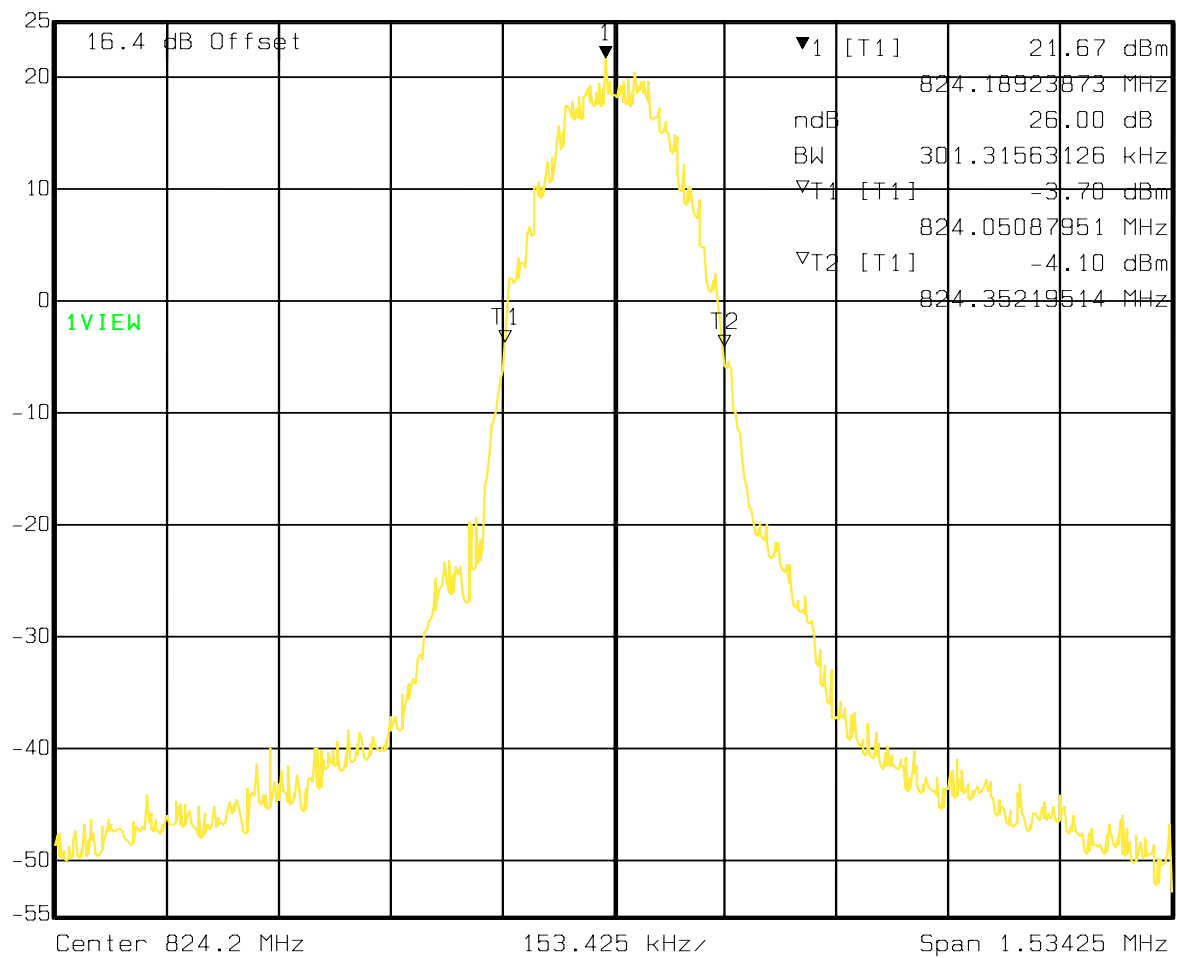


Date: 26.JAN.2010 13:13:59

Emission band Width GSM850 MHz Channel 128 EGPRS



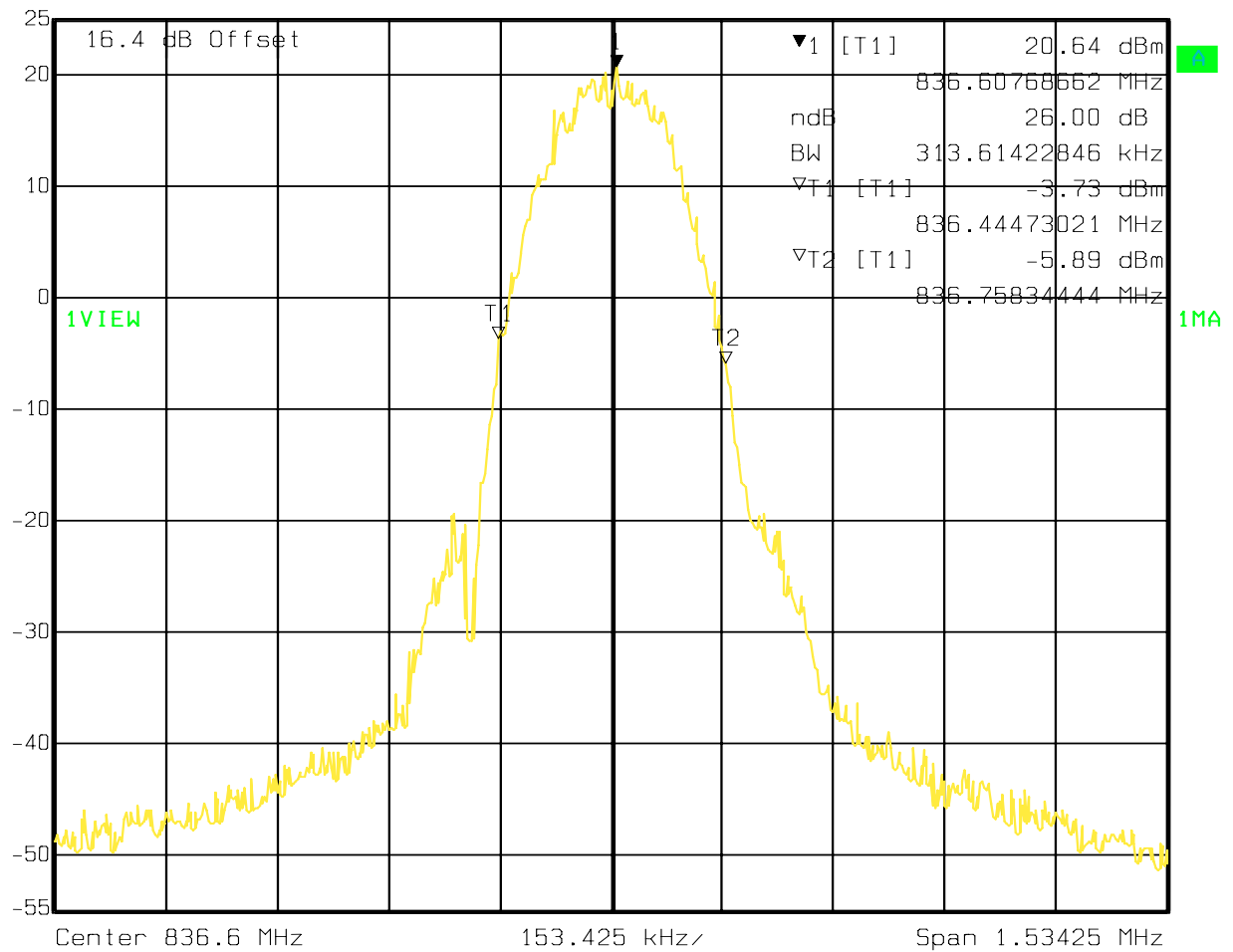
Marker 1 [T1 ndB] RBW 5 kHz RF Att 30 dB
 Ref Lvl ndB 26.00 dB VBW 10 kHz
 25 dBm BW 301.31563126 kHz SWT 155 ms Unit dBm



Date: 26.JAN.2010 12:44:04

Emission band Width GSM850 MHz Channel 190 EGPRS

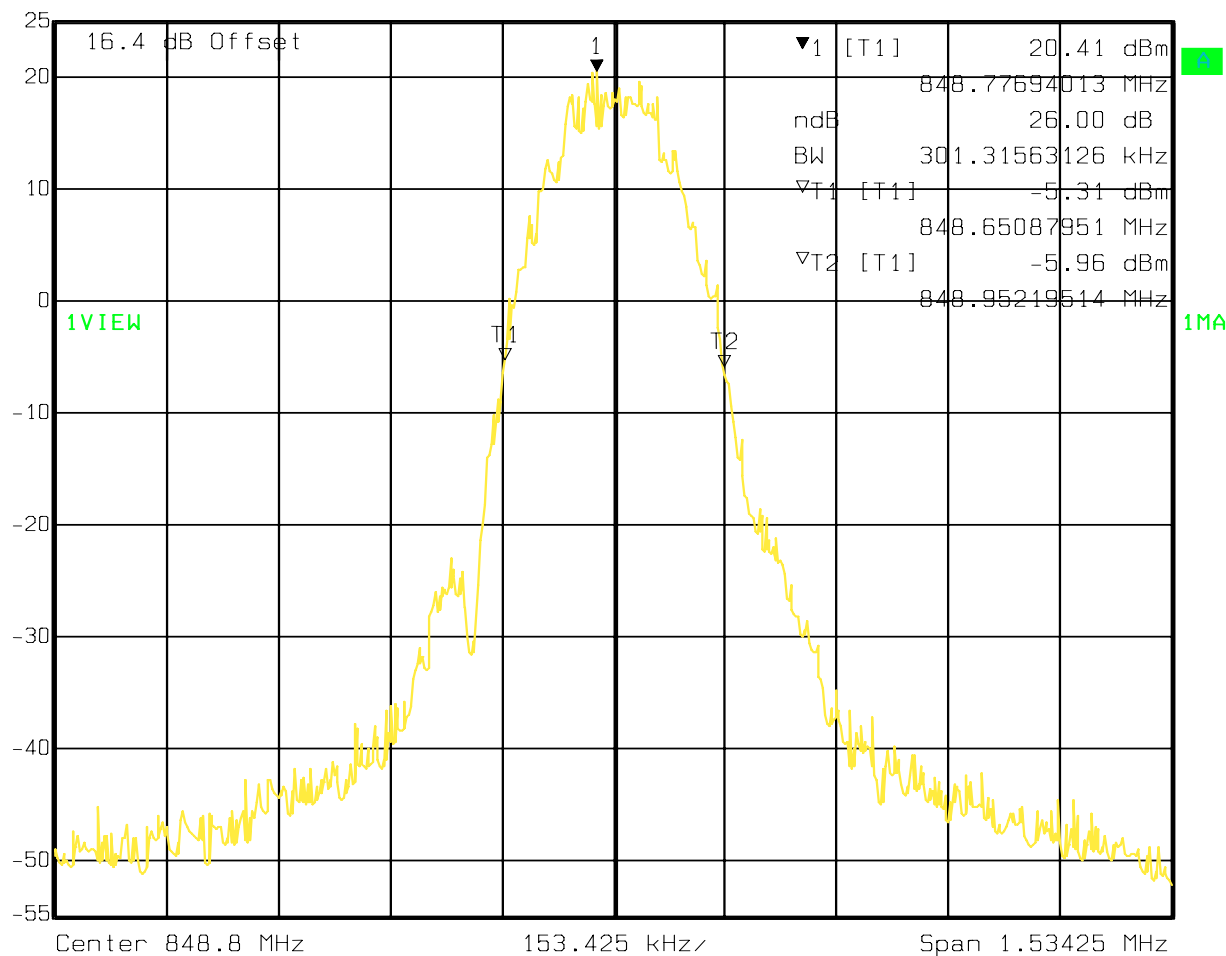
Marker 1 [T1 ndB] RBW 5 kHz RF Att 30 dB
Ref Lvl ndB 26.00 dB VBW 10 kHz
25 dBm BW 313.61422846 kHz SWT 155 ms Unit dBm



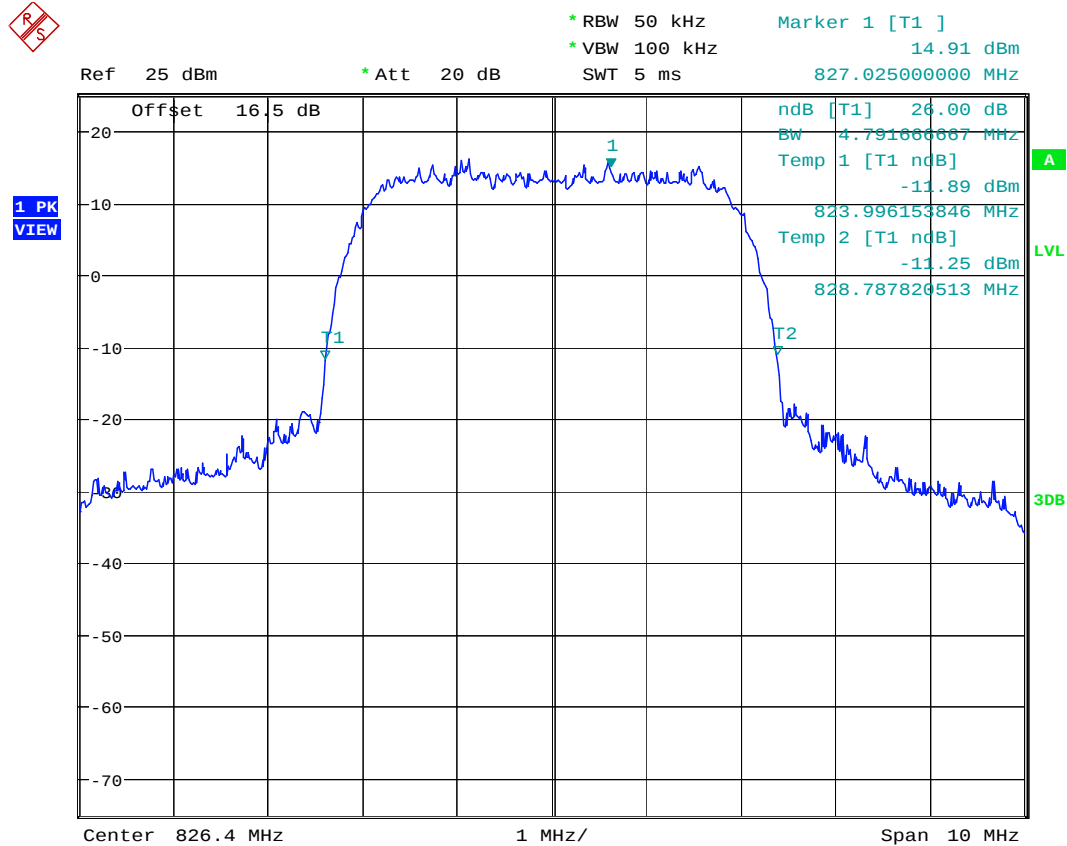
Date: 26.JAN.2010 12:46:33

Emission band Width GSM850 MHz Channel 251 EGPRS

Marker 1 [T1 ndB] RBW 5 kHz RF Att 30 dB
Ref Lvl ndB 26.00 dB VBW 10 kHz
25 dBm BW 301.31563126 kHz SWT 155 ms Unit dBm

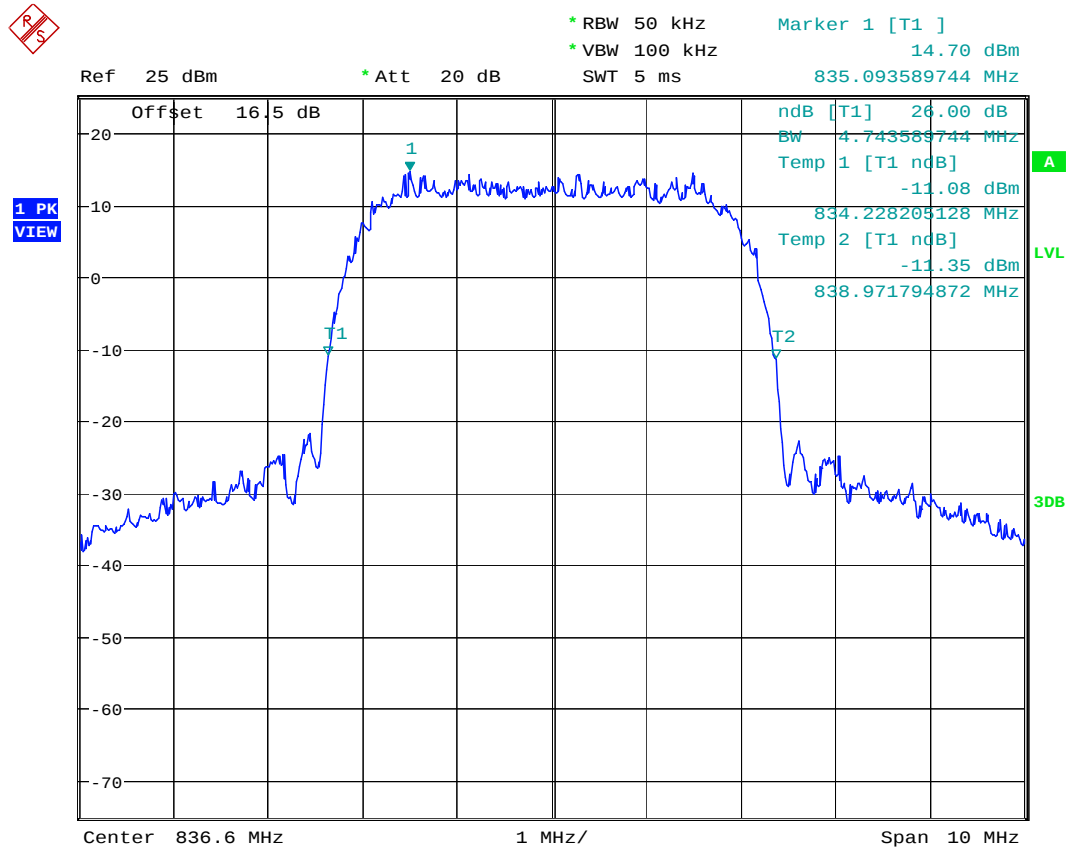


Date: 26.JAN.2010 12:48:32

Emission band Width UMTS FDD5 Channel 4132

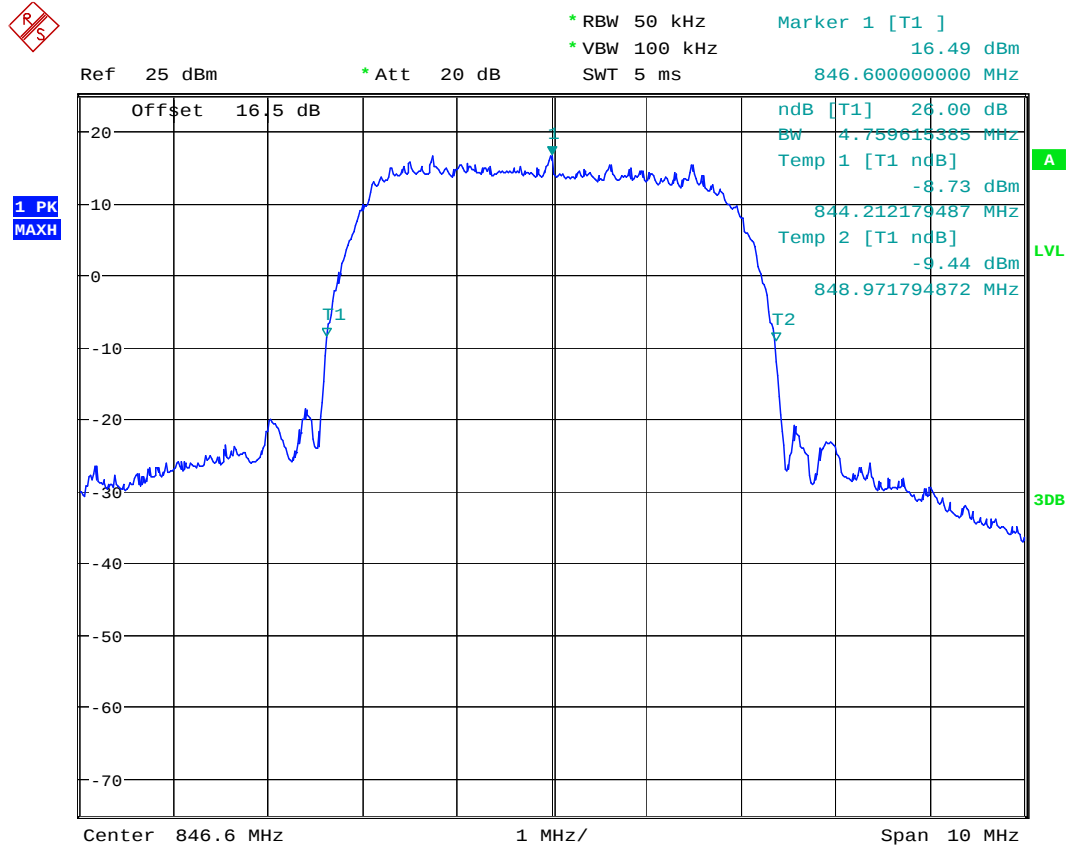
Date: 4.FEB.2010 15:02:12

Emission band Width UMTS FDD5 Channel 4183



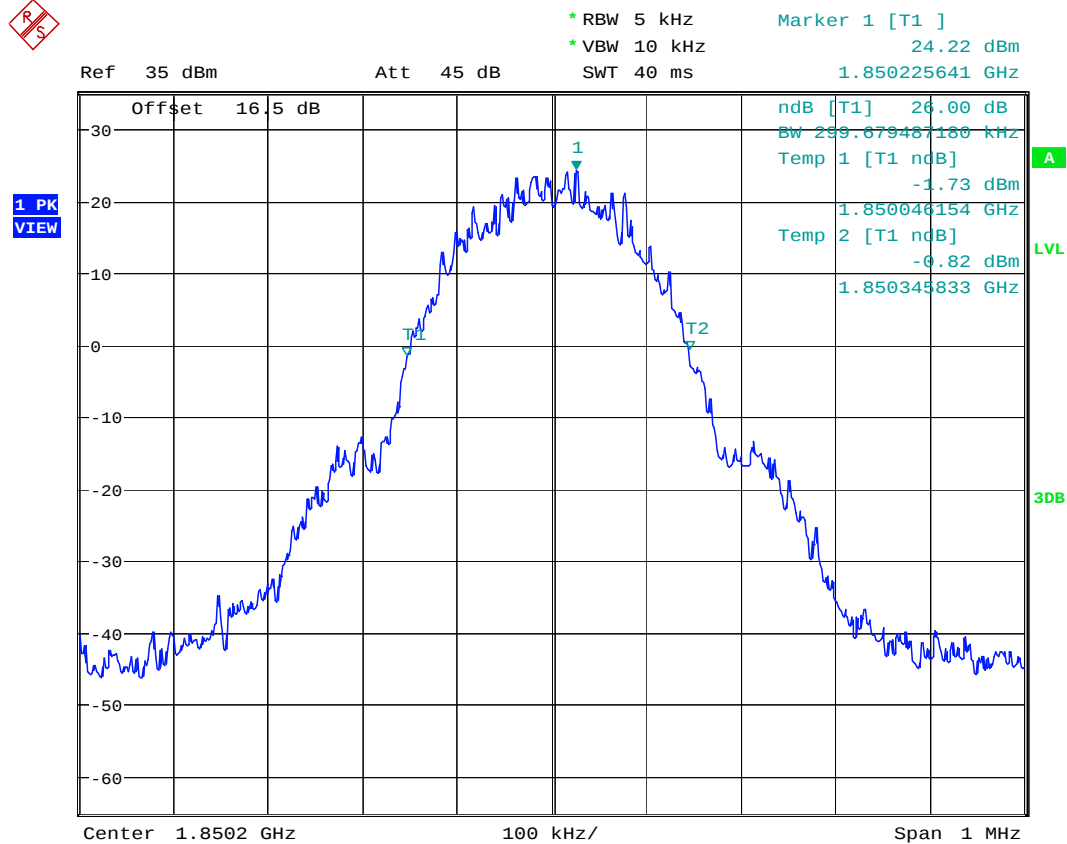
Date: 4.FEB.2010 15:16:35

Emission band Width UMTS FDD5 Channel 4233

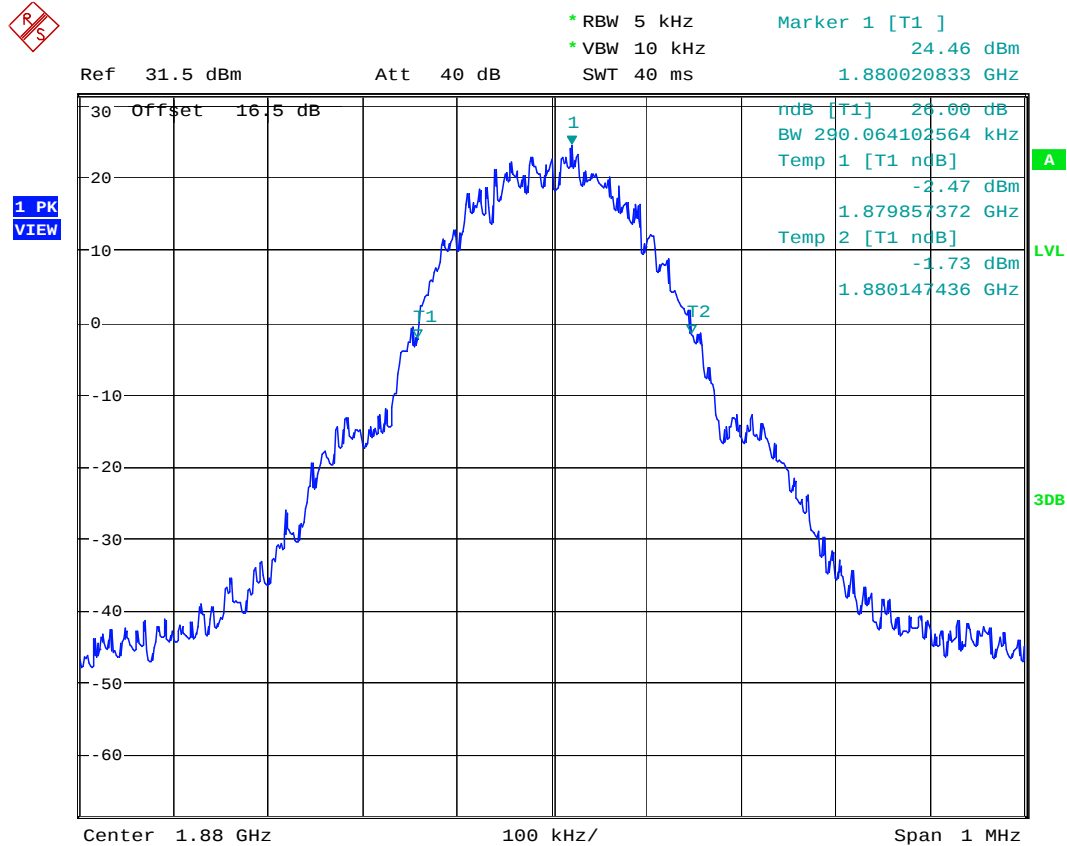


Date: 4.FEB.2010 15:22:47

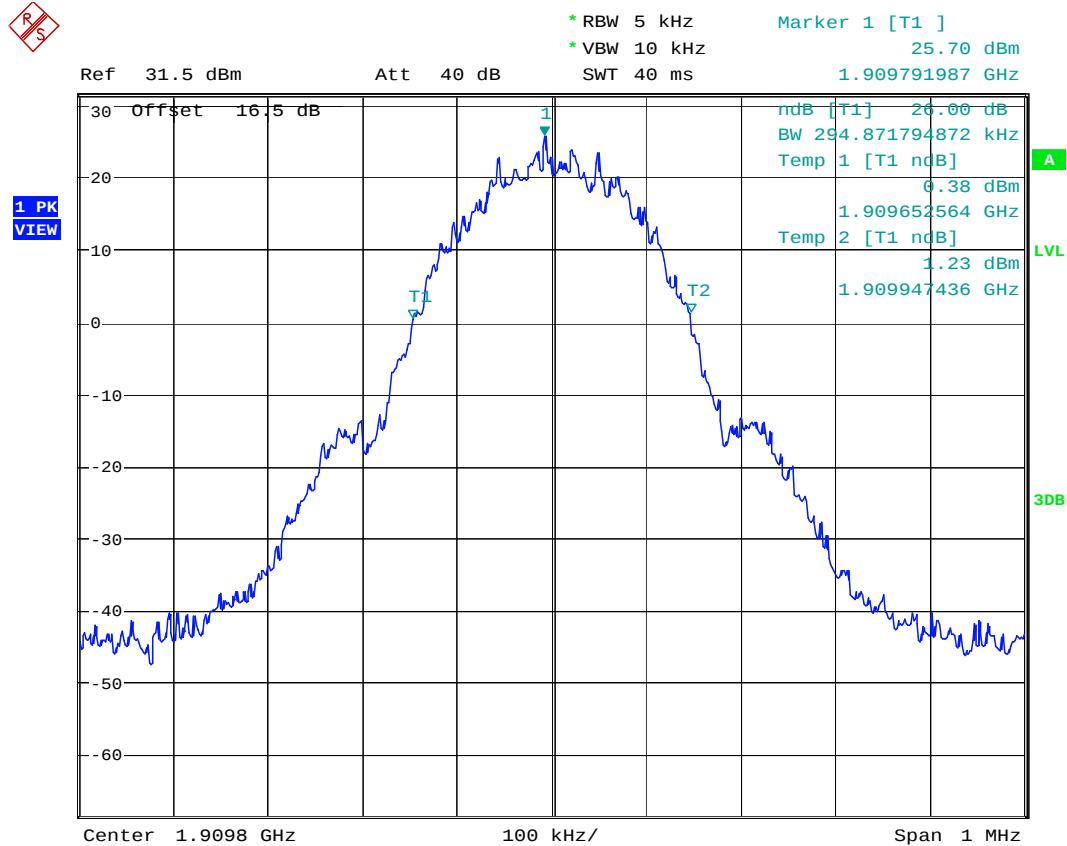
Emission band Width PCS1900 MHz Channel 512 GSM



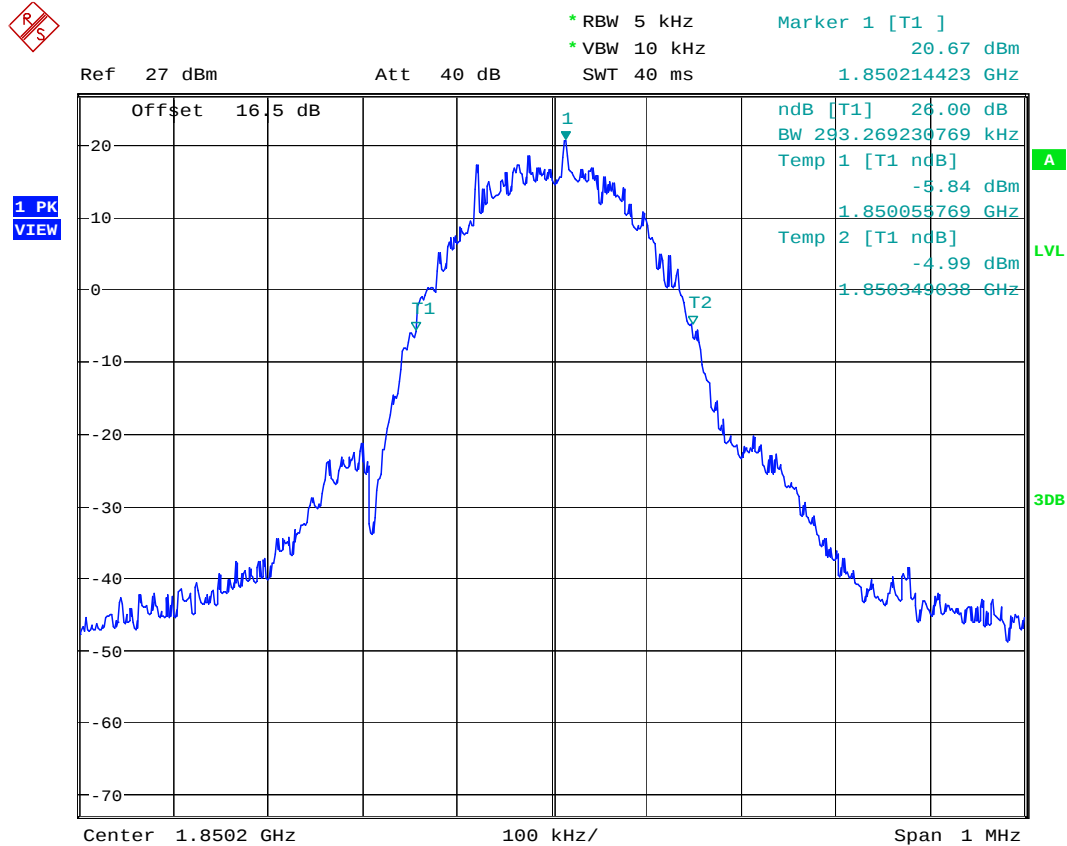
Date: 4.FEB.2010 11:11:47

Emission band Width PCS1900 MHz Channel 661 GSM

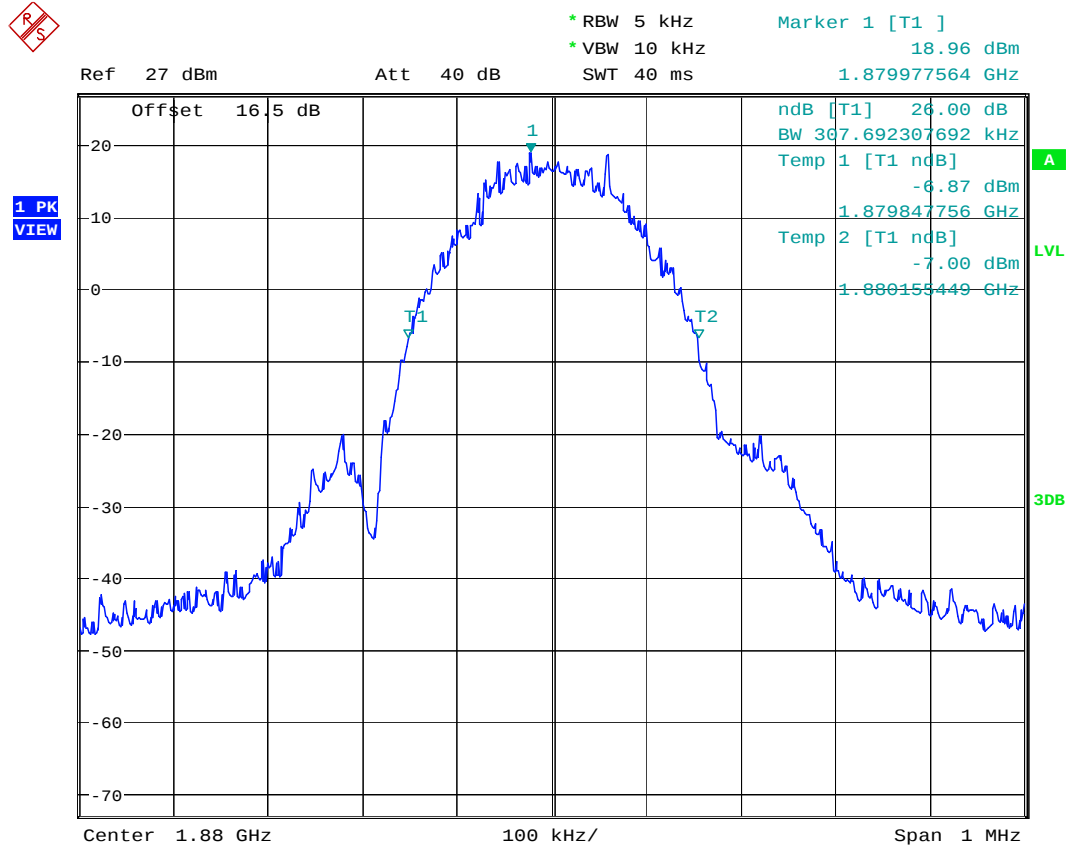
Date: 4.FEB.2010 11:41:31

Emission band Width PCS1900 MHz Channel 810 GSM

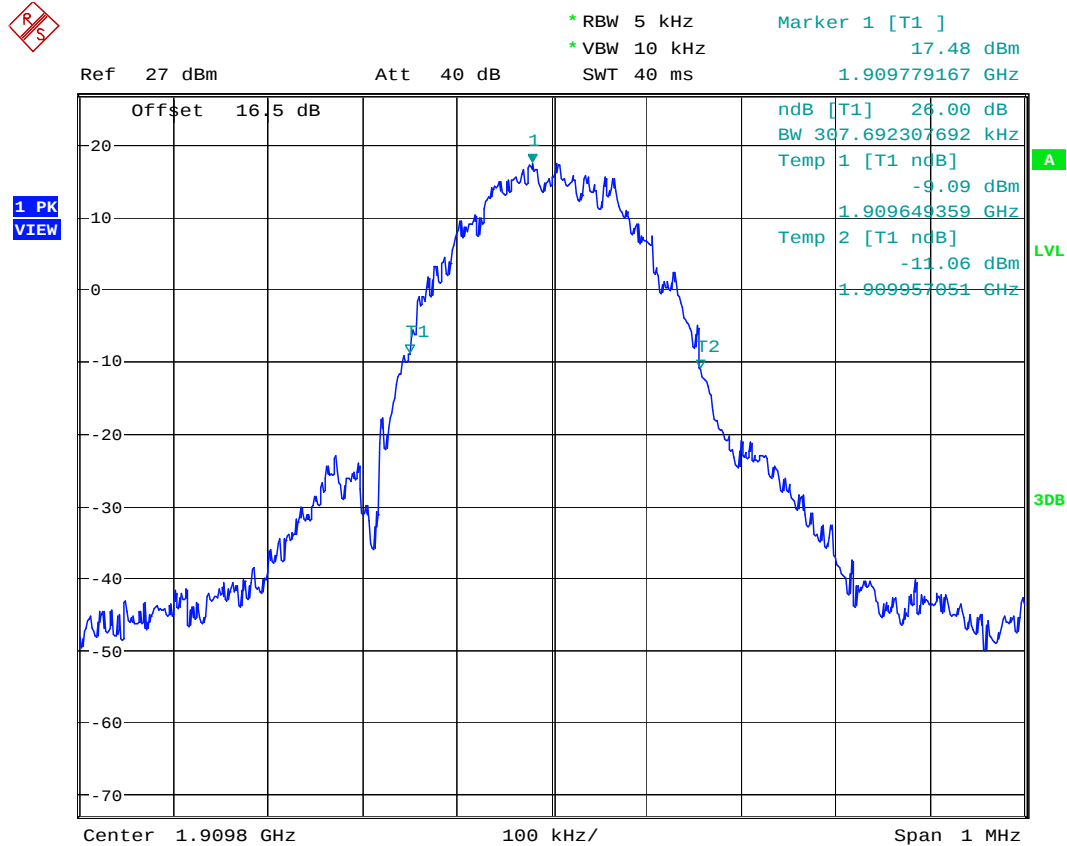
Date: 4.FEB.2010 11:37:30

Emission band Width PCS1900 MHz Channel 512 EGPRS

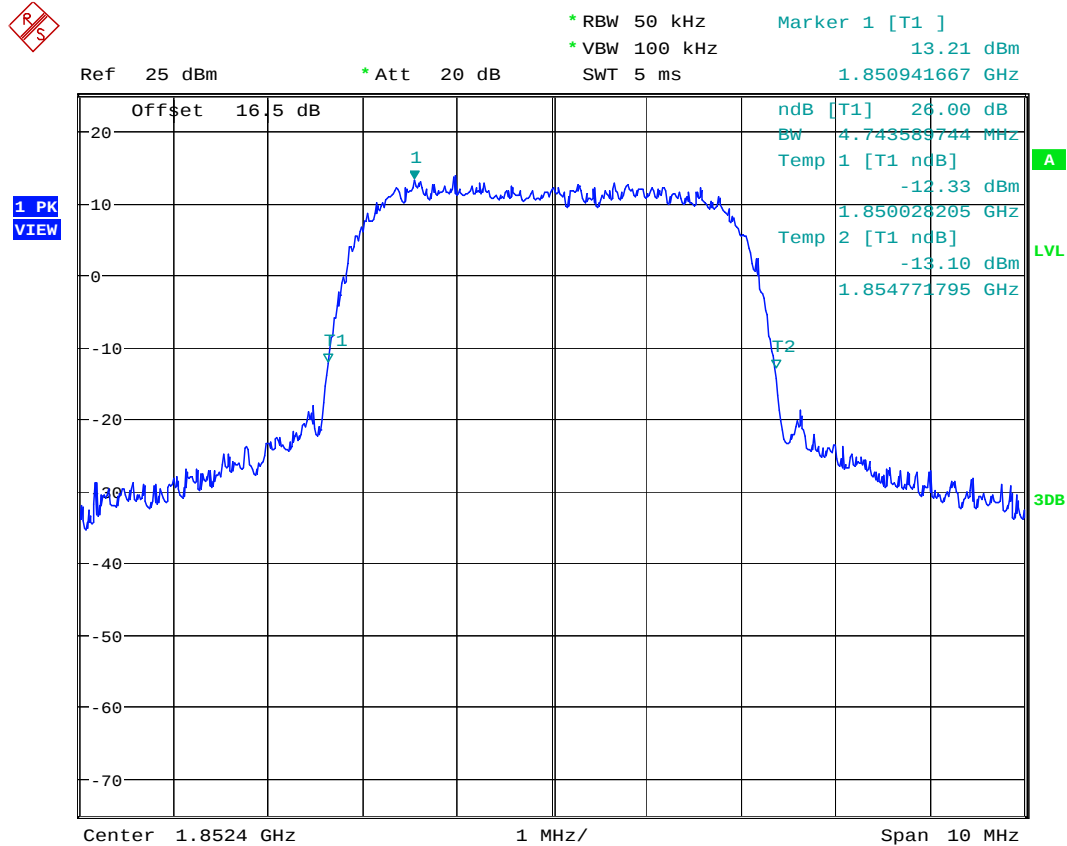
Date: 4.FEB.2010 13:48:38

Emission band Width PCS1900 MHz Channel 661 EGPRS

Date: 4.FEB.2010 13:47:33

Emission band Width PCS1900 MHz Channel 810 EGPRS

Date: 4.FEB.2010 13:45:26

Emission band Width UMTS FDD2 Channel 9262

Date: 4.FEB.2010 14:29:29

Emission band Width UMTS FDD2 Channel 9400



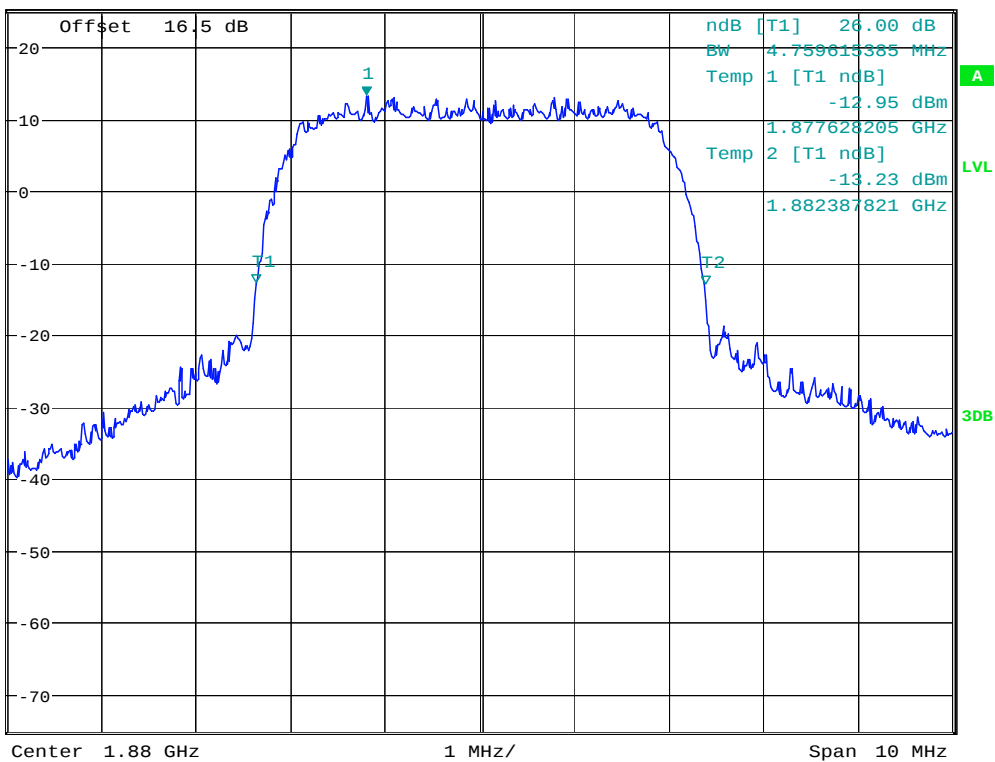
* RBW 50 kHz
* VBW 100 kHz
SWT 5 ms

Marker 1 [T1]
13.13 dBm
1.878798077 GHz

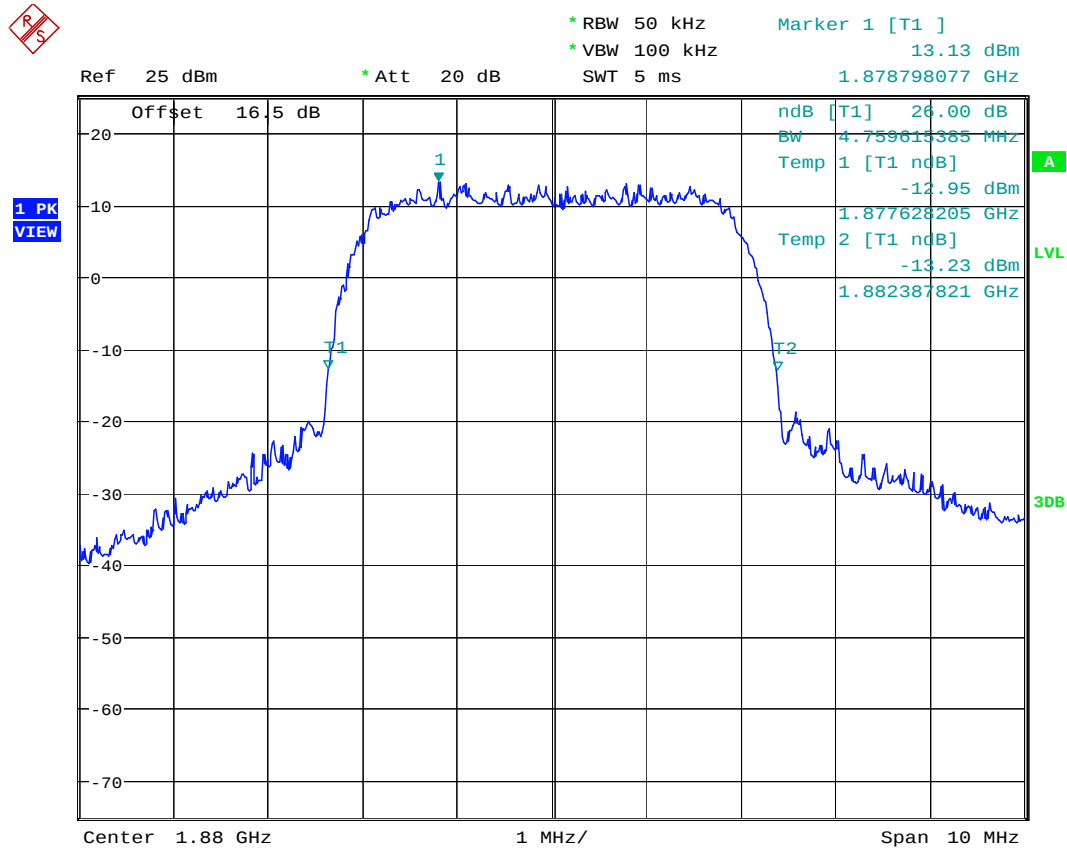
Ref 25 dBm

* Att 20 dB

1 PK
VIEW



Date: 4.FEB.2010 14:30:59

Emission band Width UMTS FDD2 Channel 9538

Date: 4.FEB.2010 14:30:59

5.3 Frequency Stability

5.3.1 References

FCC: CFR Part 2.1055, CFR Part 22.355, CFR Part 24.235

IC: RSS 132 Section 4.3 and 6.3; RSS 133 Section 4.2

5.3.2 Limits

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. 24.235/22.355 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 3.55VDC and 4.15VDC, with a nominal voltage of 3.8VDC. 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. For the purposes of measuring frequency stability these voltage limits are to be used.

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. 24.235/22.355 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.

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 PCS1900 & 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. Re-measure carrier frequency at low and high 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 PCS1900 & 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.

5.3.3 Test Results Frequency Stability (GSM-850): Channel 190 (836.6 MHz)

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Low V: 3.23	2	0.0024
High V: 4.37	-10	-0.0120

§2.1055 (a)(1) AFC FREQ ERROR vs. TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	-9	-0.0108
-20	-11	-0.0132
-10	-11	-0.0132
0	-13	-0.0155
+10	-13	-0.0155
+20	-16	-0.0191
+30	-11	-0.0132
+40	-11	-0.0132
+50	-15	-0.0180

§2.1055 (b)(2) Battery end point

Battery End Point (V DC)	Frequency Error (Hz)	Frequency Error (ppm)
3.21	-12	-0.0143

5.3.4 Test Results Frequency Stability (GSM-1900): Channel 661 (1880.0 MHz)

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Low V: 3.23	-22	-0.0117
High V: 4.37	10	0.0053

§2.1055 (a)(1) AFC FREQ ERROR vs. TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	-13	-0.0069
-20	-16	-0.0085
-10	-12	-0.0064
0	-20	-0.0106
+10	-27	-0.0144
+20	-14	-0.0075
+30	-12	-0.0064
+40	-30	-0.0160
+50	-15	-0.0080

§2.1055 (b)(2) Battery end point

Battery End Point (V DC)	Frequency Error (Hz)	Frequency Error (ppm)
3.12	-27	-0.0144

5.3.5 Test Results Frequency Stability (FDD V): Channel 4183 (836.6 MHz)

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Low V: 3.23	19	0.0227
High V: 4.37	-16	-0.0191

§2.1055 (a)(1) AFC FREQ ERROR vs. TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	-16	-0.0131
-20	21	0.0251
-10	-18	-0.0215
0	24	0.0287
+10	-17	-0.0203
+20	-17	-0.0203
+30	-16	-0.0191
+40	-16	-0.0191
+50	-13	-0.0155

§2.1055 (b)(2) Battery end point

Battery End Point (V DC)	Frequency Error (Hz)	Frequency Error (ppm)
3.12	-17	-0.0203

5.3.6 Test Results Frequency Stability (FDD II): Channel 9400 (1880.0 MHz)

Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)
Low V: 3.23	-25	-0.0133
High V: 4.37	-27	-0.0144

§2.1055 (a)(1) AFC FREQ ERROR vs. TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	-26	-0.0138
-20	-25	-0.0133
-10	-28	-0.0149
0	-26	-0.0139
+10	-29	-0.0154
+20	-28	-0.0149
+30	-28	-0.0149
+40	-26	-0.0139
+50	-29	-0.0154

§2.1055 (b)(2) Battery end point

Battery End Point (V DC)	Frequency Error (Hz)	Frequency Error (ppm)
3.13	-25	-0.0133

5.4 Conducted Spurious Emissions

5.4.1 References

FCC: CFR Part 2.1051, CFR Part 22.917, CFR Part 24.238

IC: RSS 132 Section 4.5 and 6.5; RSS 133 Section 4.4

5.4.2 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.

5.4.3 Limits

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

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

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

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

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

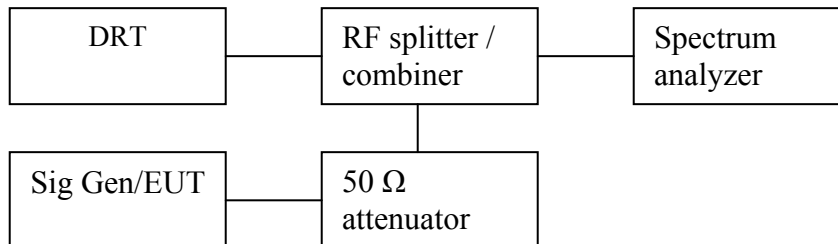
The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

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

carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.4.4 Measurement Procedure -Conducted Out of band Emissions

Ref: TIA-603C 2004 2.2.13 Unwanted Emissions: Conducted Spurious



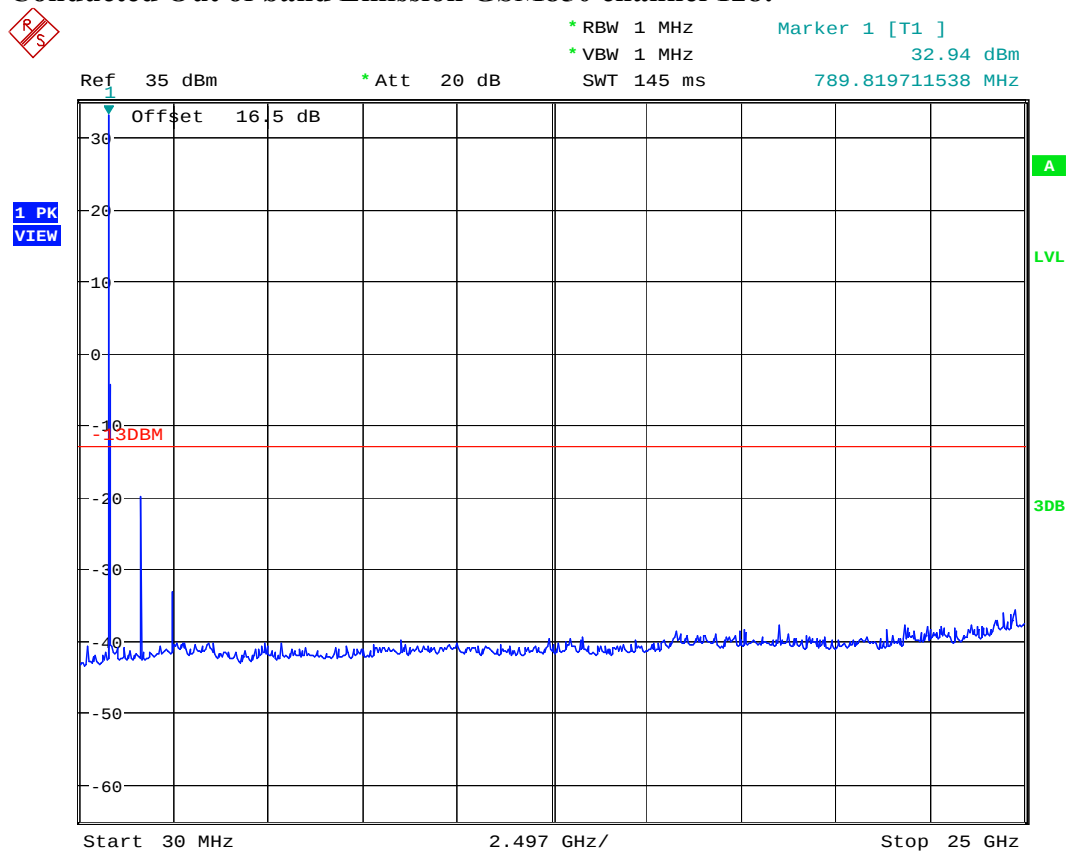
1. Connect the equipment as shown in the above diagram.
 2. Set the spectrum analyzer to measure peak hold with the required settings.
 3. Set the signal generator to a known output power and record the path loss in dB (**LOSS**) for frequencies up to the tenth harmonic of the EUT's carrier frequency. \ **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.)

5.4.5 Test Results- Conducted Out of band Emission

No measurable spurious emissions noted. Emission above the limit in the plots is from EUT uplink.

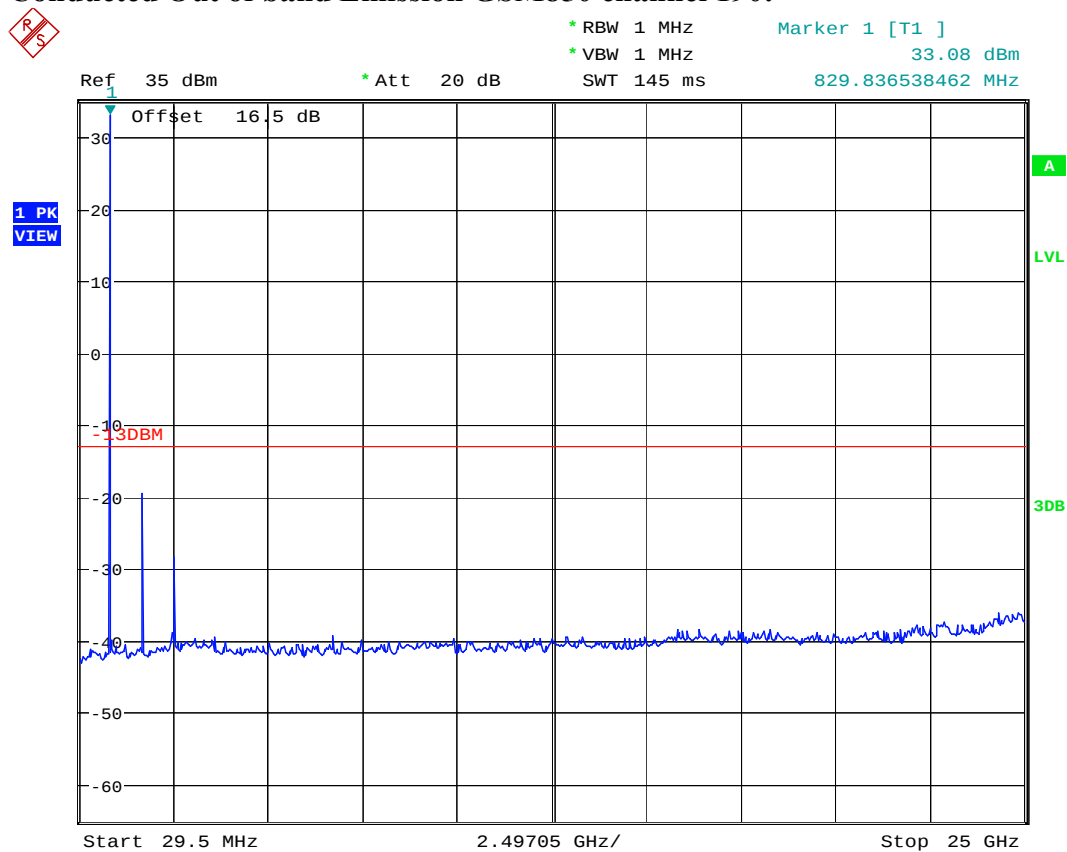
All measurement conducted in GSM and UMTS mode with highest power settings. Plots here show worse case emission for each channel under any modulation.

Band edge measurements are made with RBW at least 1% of -26dBc Bandwidth. Correction factor $10\log(\text{RBW expected to use}/\text{RBW used})$ is added to the measurement as applicable.

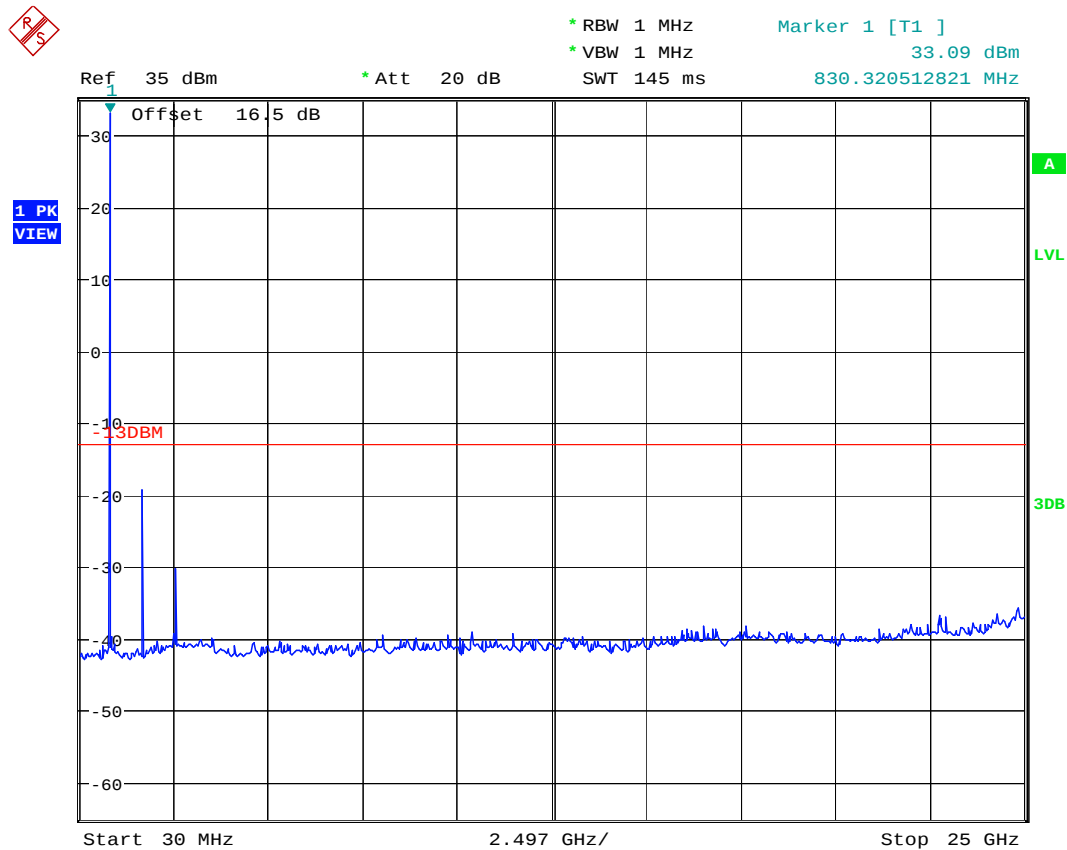
Conducted Out of band Emission GSM850 channel 128:

Date: 4.FEB.2010 14:02:09

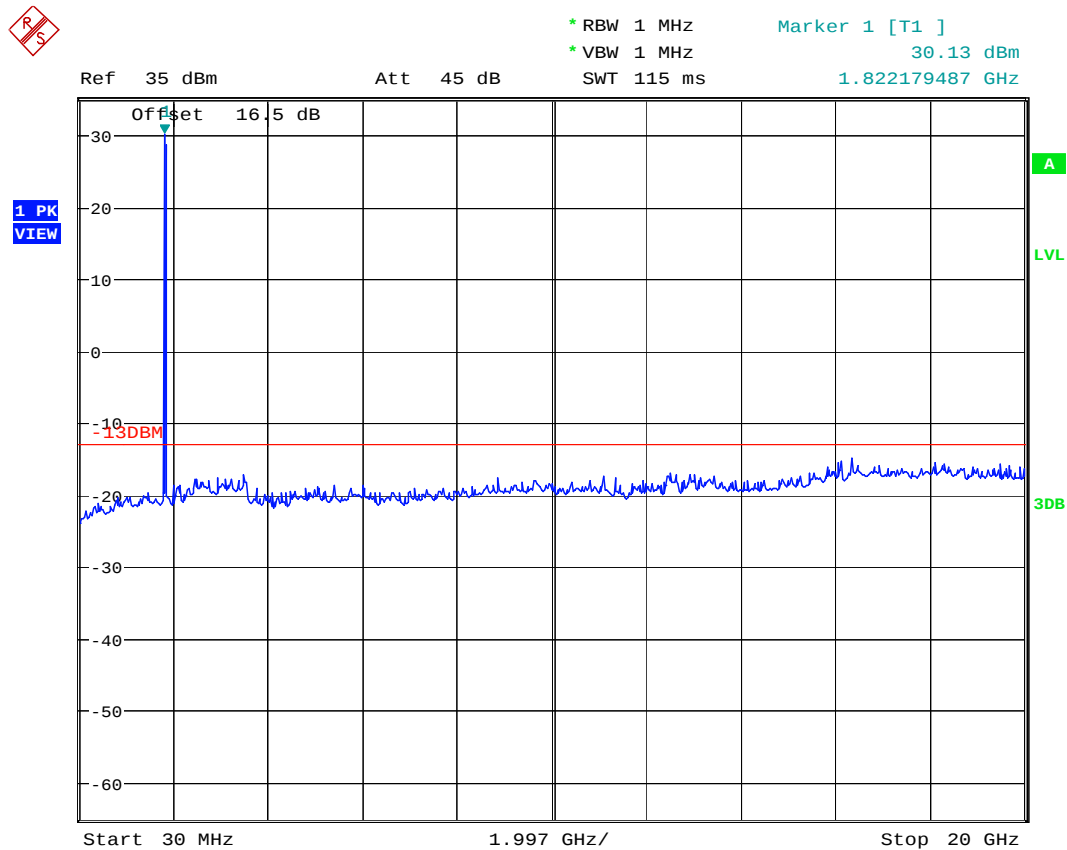
Conducted Out of band Emission GSM850 channel 190:



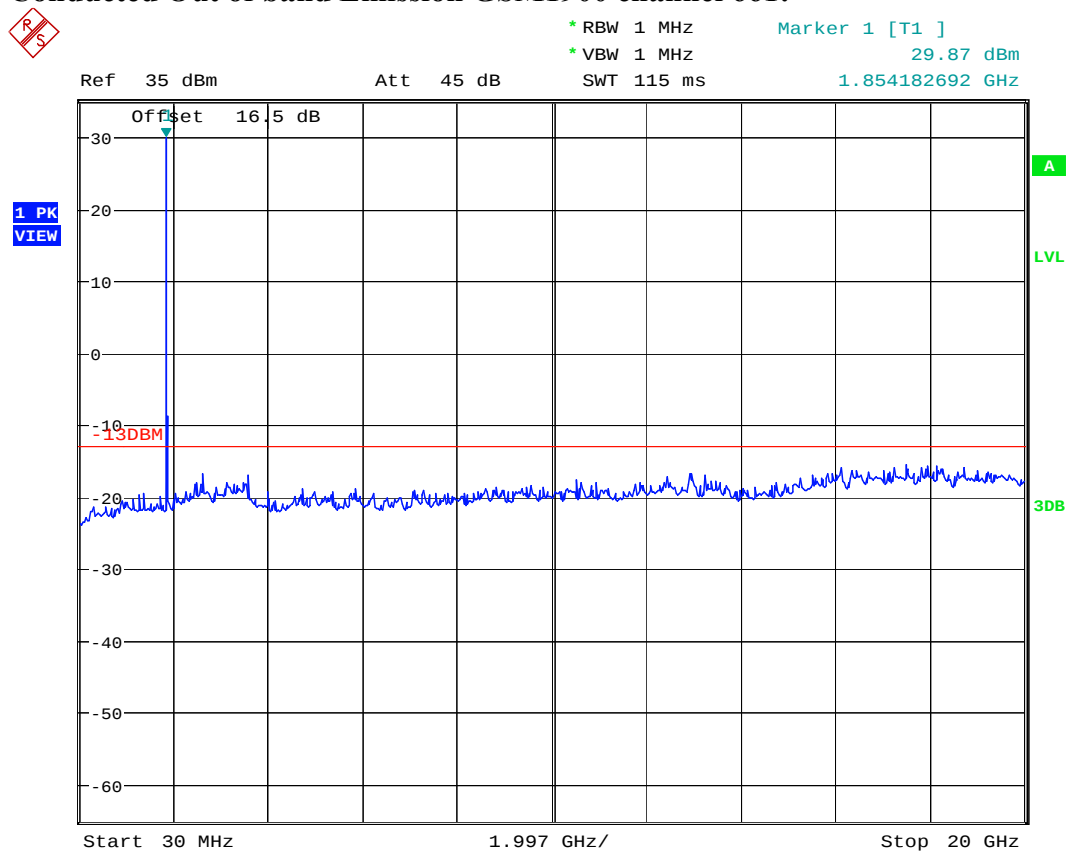
Date: 4.FEB.2010 13:59:29

Conducted Out of band Emission GSM850 channel 251:

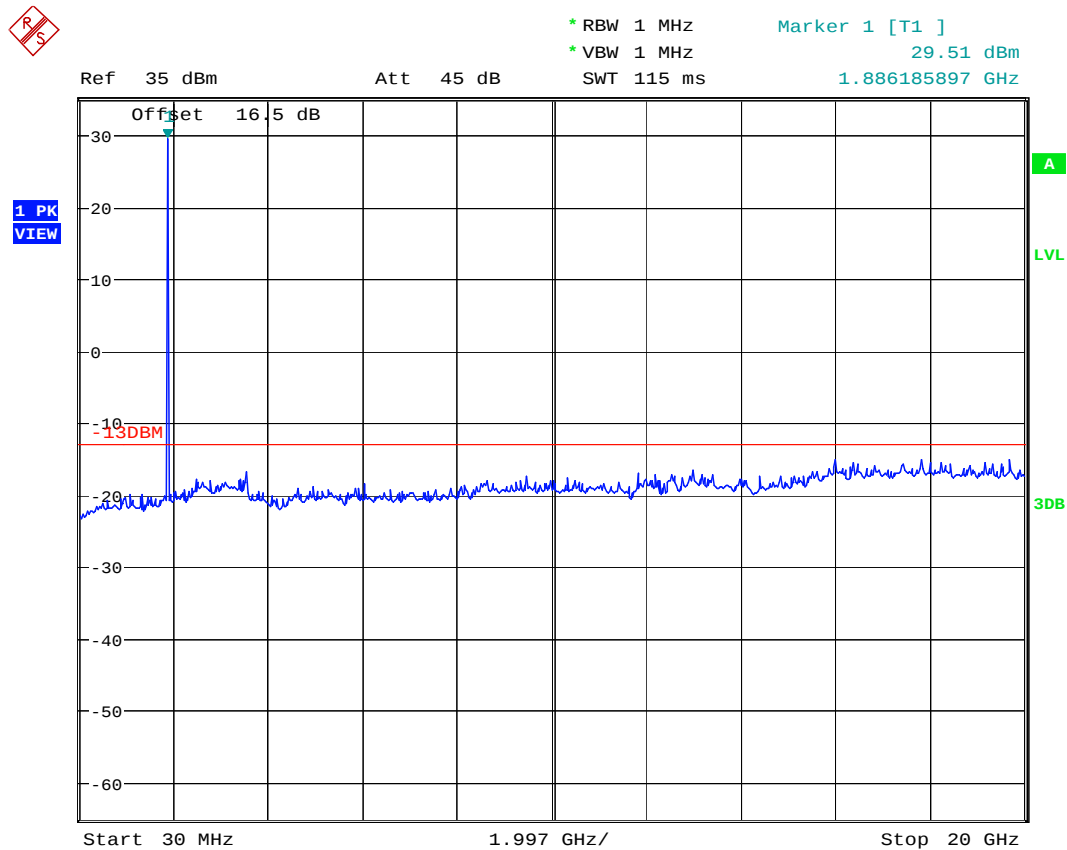
Date: 4.FEB.2010 14:02:35

Conducted Out of band Emission GSM1900 channel 512:

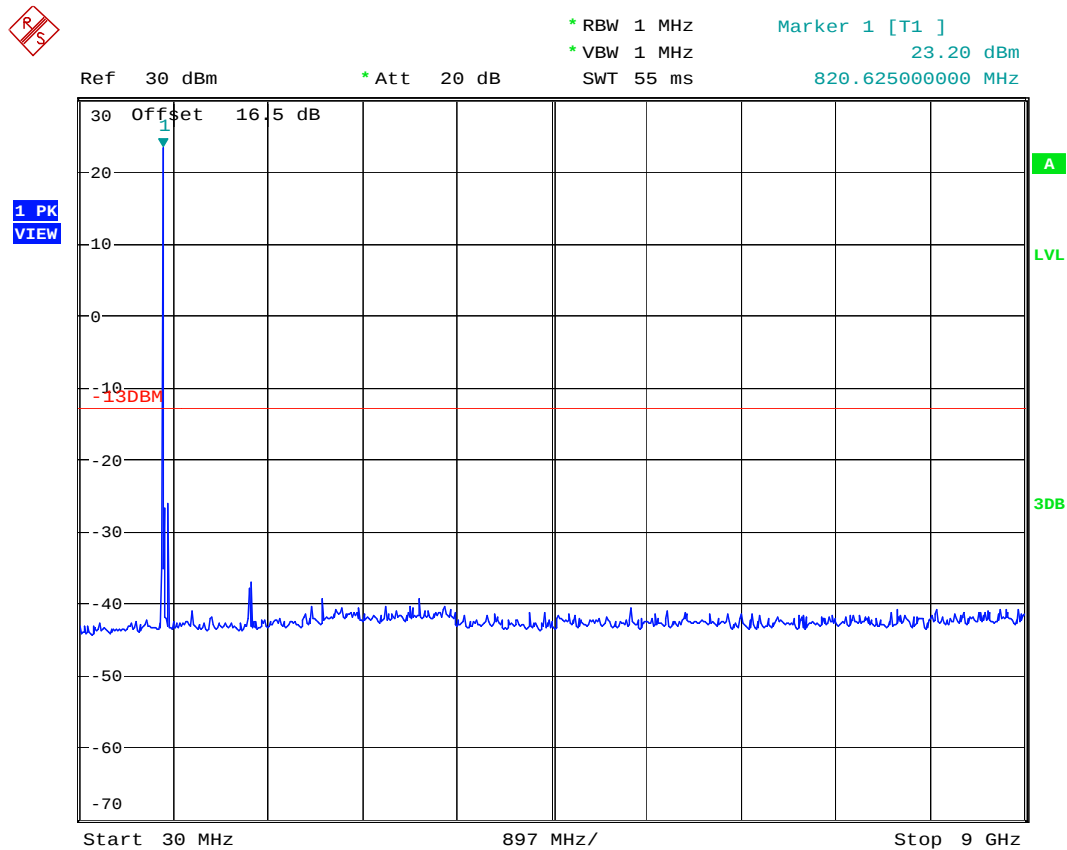
Date: 4.FEB.2010 13:39:28

Conducted Out of band Emission GSM1900 channel 661:

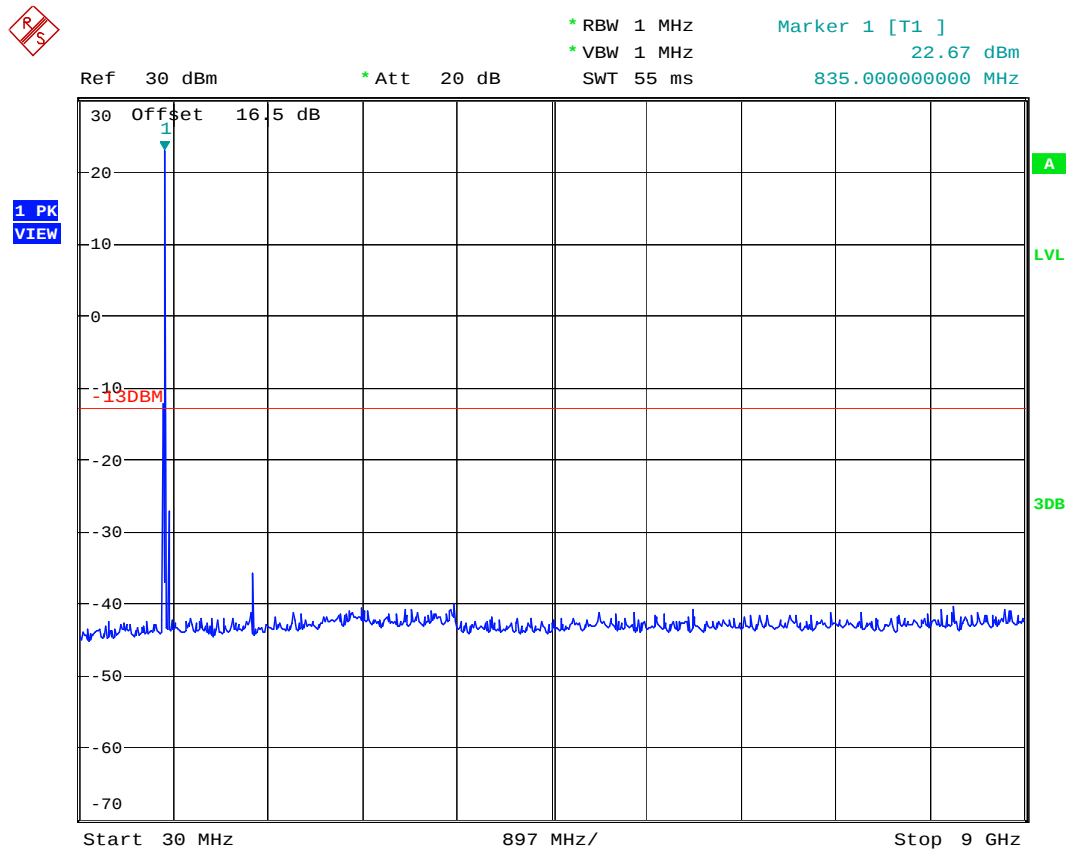
Date: 4.FEB.2010 13:38:58

Conducted Out of band Emission GSM1900 channel 810:

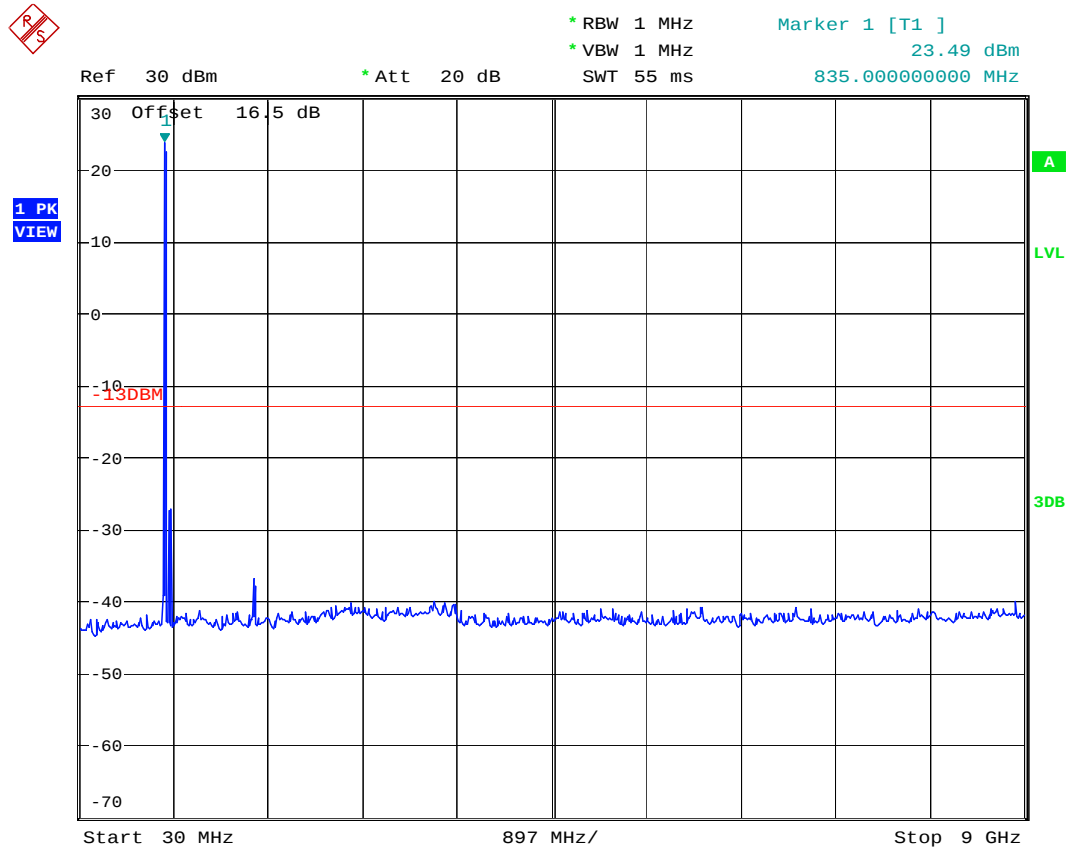
Date: 4.FEB.2010 13:40:00

Conducted Out of band Emission UMTS FDD5 channel 4132:

Date: 4.FEB.2010 15:33:43

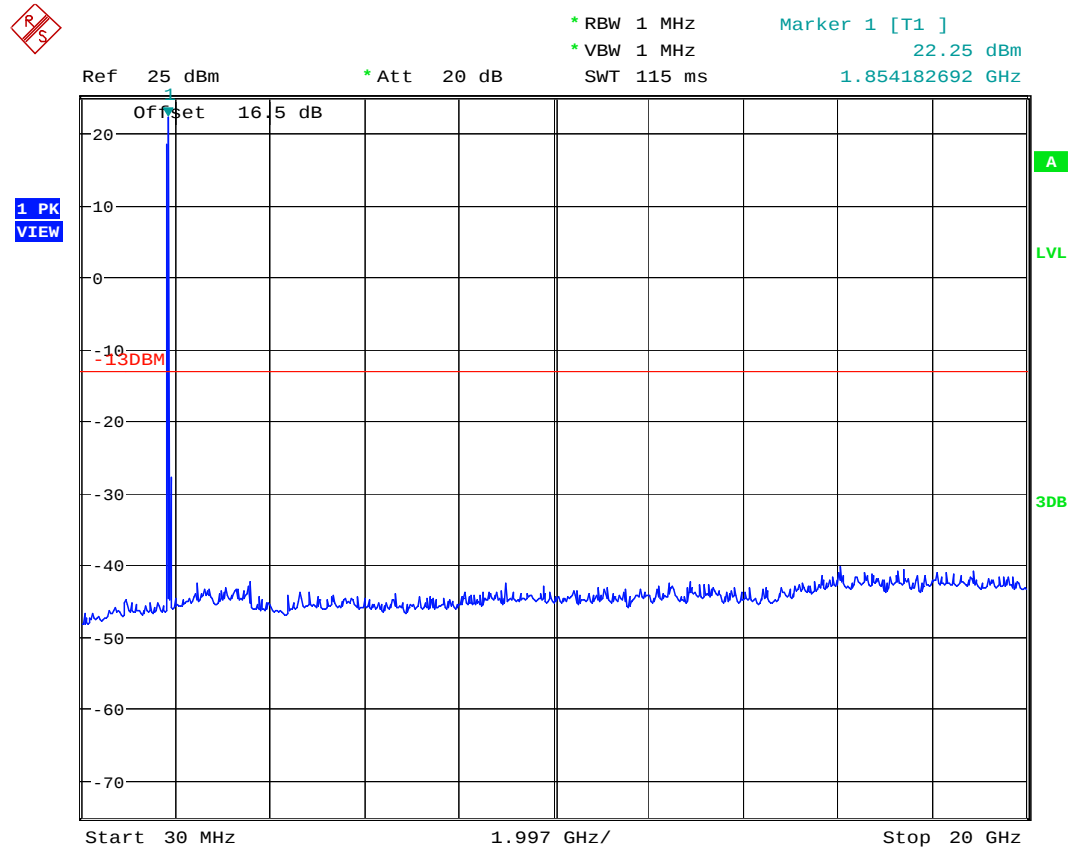
Conducted Out of band Emission UMTS FDD5 channel 4183:

Date: 4.FEB.2010 15:32:31

Conducted Out of band Emission UMTS FDD5 channel 4233:

Date: 4.FEB.2010 15:31:35

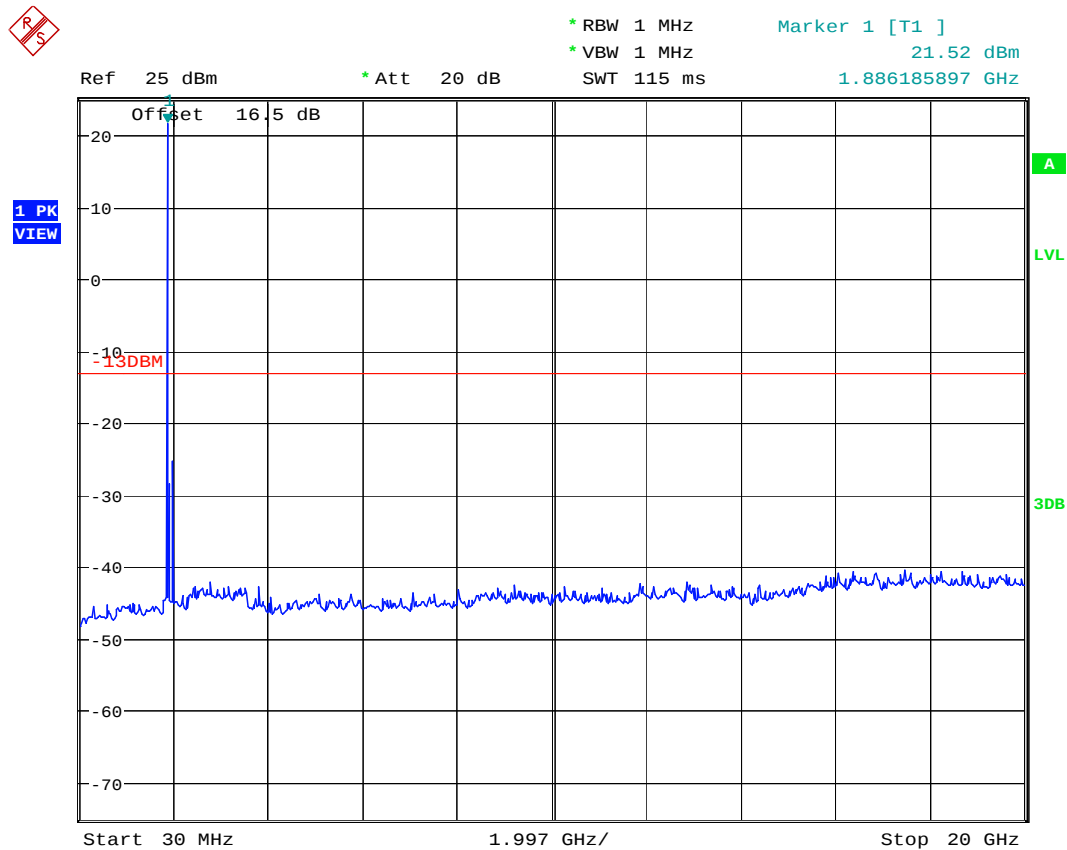
Conducted Out of band Emission UMTS FDD2 channel 9262:



Date: 4.FEB.2010 14:37:58

Conducted Out of band Emission UMTS FDD2 channel 9400:

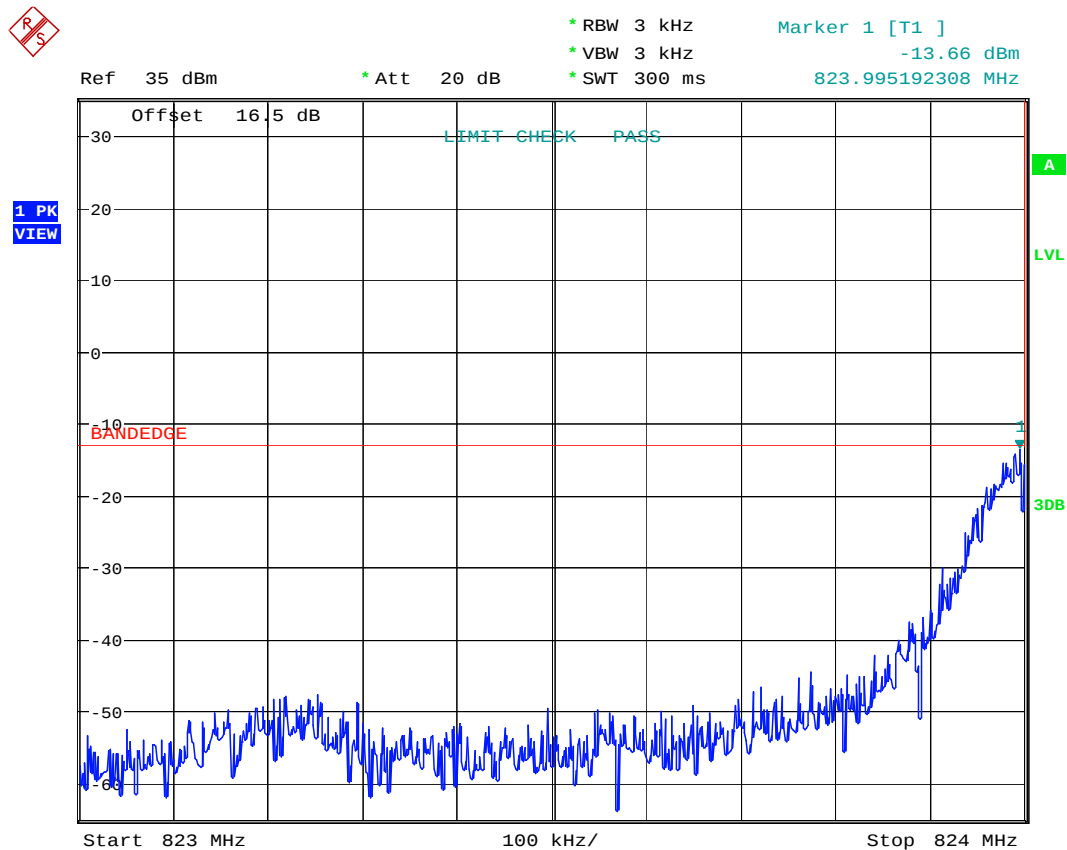
Date: 4.FEB.2010 14:37:32

Conducted Out of band Emission UMTS FDD2 channel 9538:

Date: 4.FEB.2010 14:38:16

Lower Band Edge GSM850 GSM

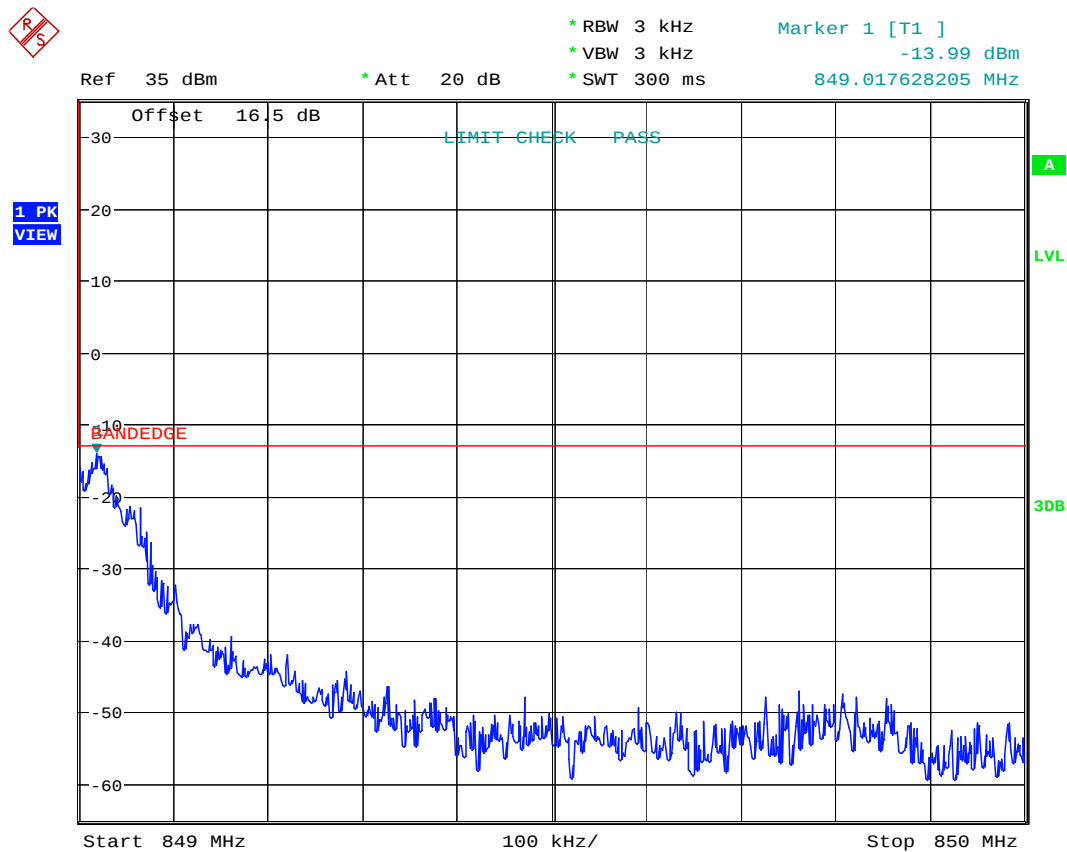
*Correction factor $10\log(3.1/3) = 0.142$ must be added to the peak emission. Final peak value is -13.51dBm.



Date: 4.FEB.2010 14:09:56

Upper Band Edge GSM850 GSM

***Correction factor $10\log(3.1/3) = 0.142$ must be added to the peak emission. Final peak value is -13.848dBm.**



Date: 4.FEB.2010 14:10:50

Lower Band Edge GSM850 EGPRS



* RBW 5 kHz

Marker 1 [T1]

* VBW 10 kHz

-21.66 dBm

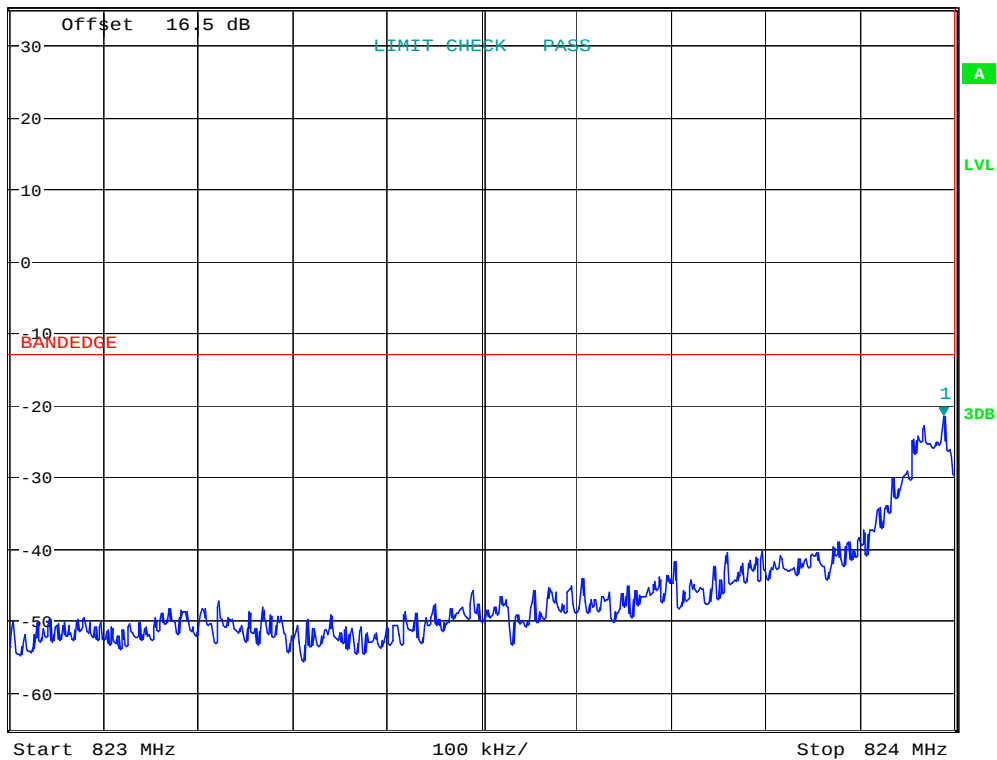
SWT 40 ms

823.988782051 MHz

Ref 35 dBm

* Att 20 dB

1 PK
VIEW



Date: 4.FEB.2010 14:15:44

Upper Band Edge GSM850 EGPRS



* RBW 5 kHz

Marker 1 [T1]

* VBW 10 kHz

-20.64 dBm

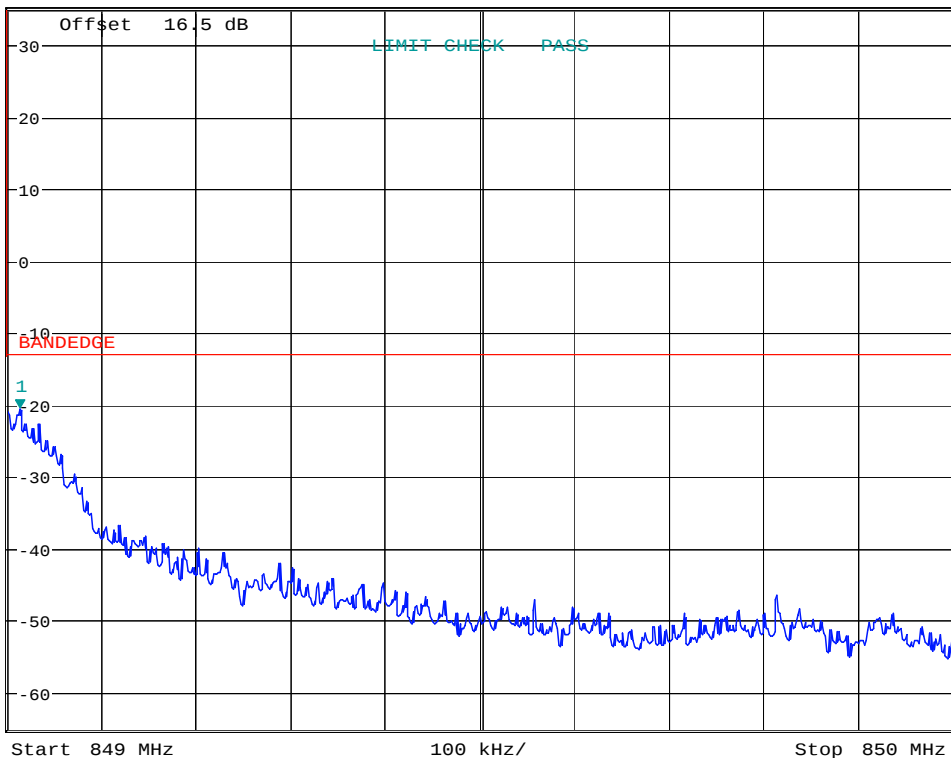
SWT 40 ms

849.012820513 MHz

Ref 35 dBm

* Att 20 dB

1 PK
VIEW



Date: 4.FEB.2010 14:15:02

Lower Band Edge GSM1900 GSM



* RBW 5 kHz

Marker 1 [T1]

* VBW 10 kHz

-14.48 dBm

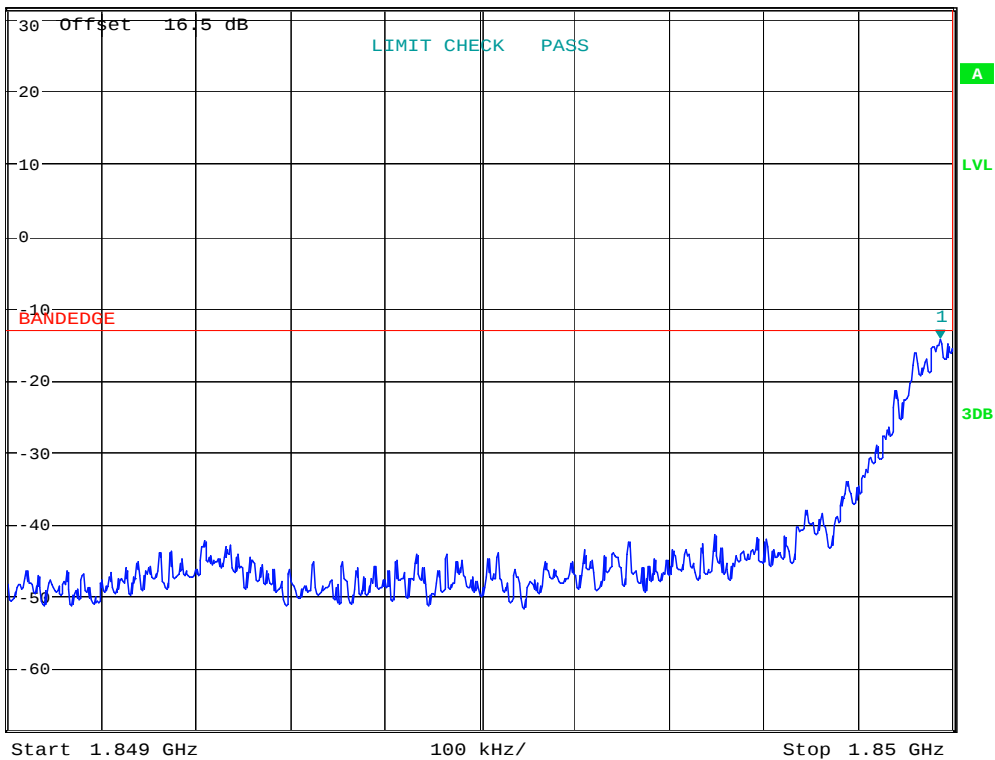
SWT 40 ms

1.849987179 GHz

Ref 31.5 dBm

Att 40 dB

1 PK
VIEW



Date: 4.FEB.2010 11:32:54

Upper Band Edge GSM1900 GSM



* RBW 5 kHz

Marker 1 [T1]

* VBW 10 kHz

-13.29 dBm

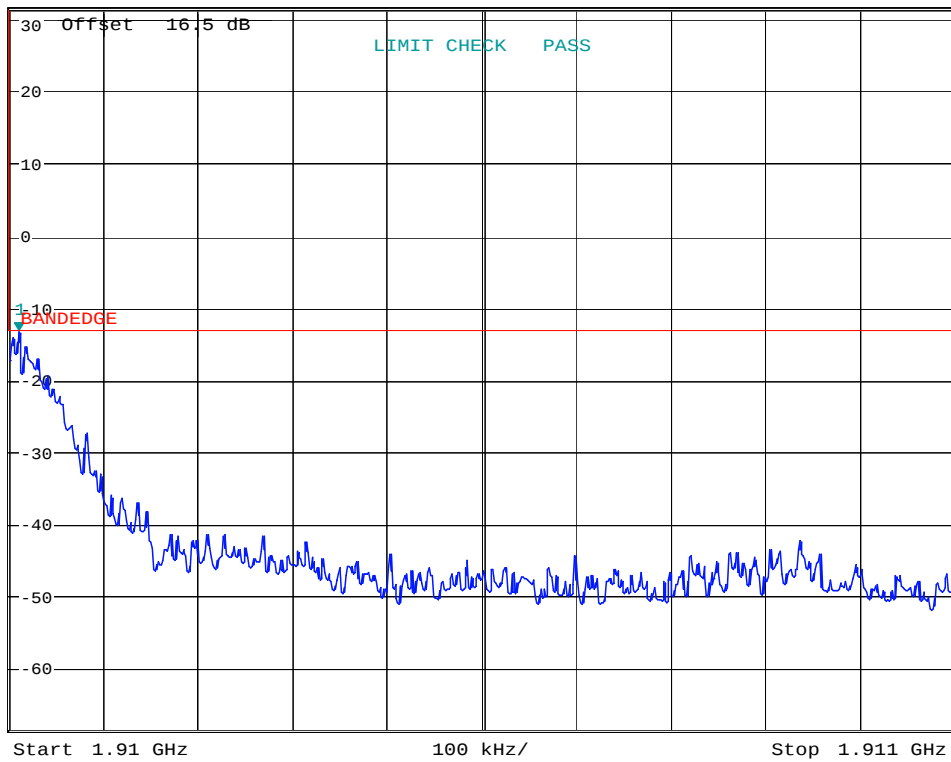
SWT 40 ms

1.910009615 GHz

Ref 31.5 dBm

Att 40 dB

1 PK
VIEW



Date: 4.FEB.2010 11:34:08

Lower Band Edge GSM1900 EGPRS



* RBW 5 kHz

Marker 1 [T1]

* VBW 10 kHz

-22.43 dBm

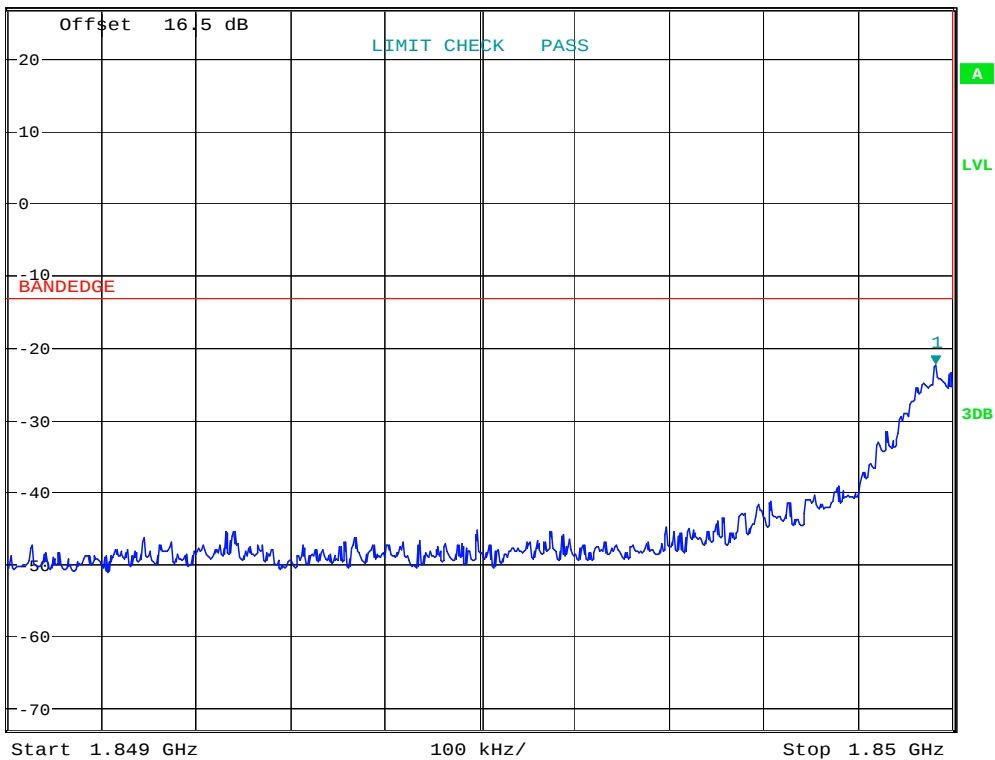
SWT 40 ms

1.849982372 GHz

Ref 27 dBm

Att 40 dB

1 PK
VIEW



Date: 4.FEB.2010 13:50:22

Upper Band Edge GSM1900 EGPRS

* RBW 5 kHz

Marker 1 [T1]

* VBW 10 kHz

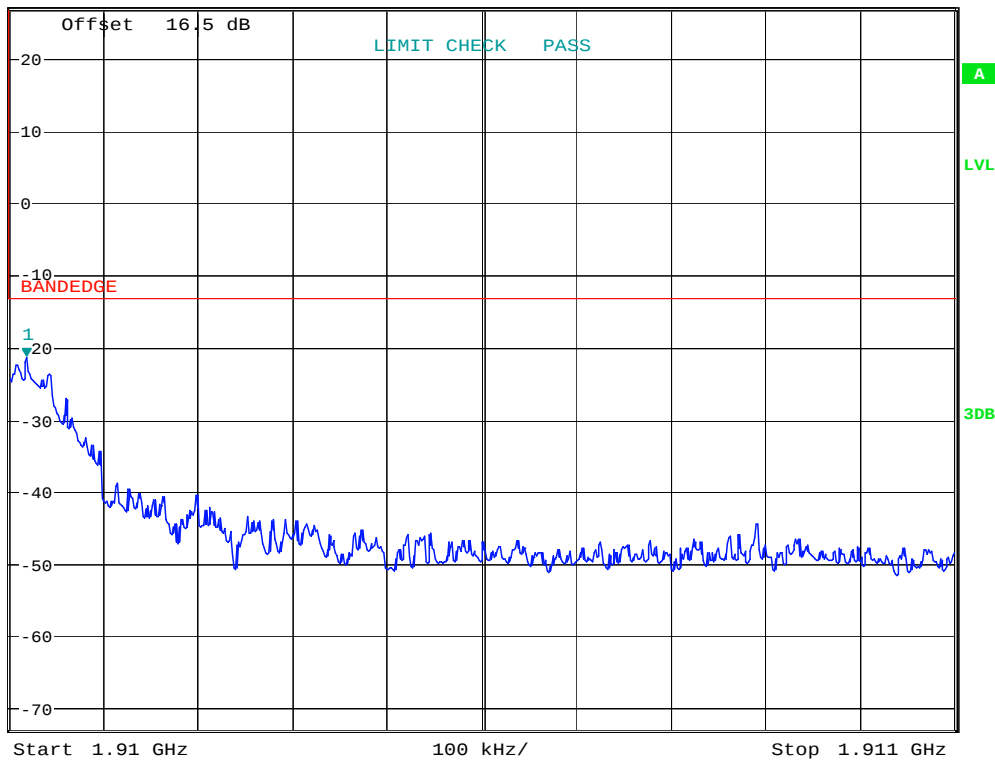
-21.51 dBm

SWT 40 ms

1.910017628 GHz

Ref 27 dBm

Att 40 dB

1 PK
VIEW

Date: 4.FEB.2010 13:51:08

Lower Band Edge UMTS FDD5



* RBW 50 kHz

Marker 1 [T1]

* VBW 100 kHz

-14.07 dBm

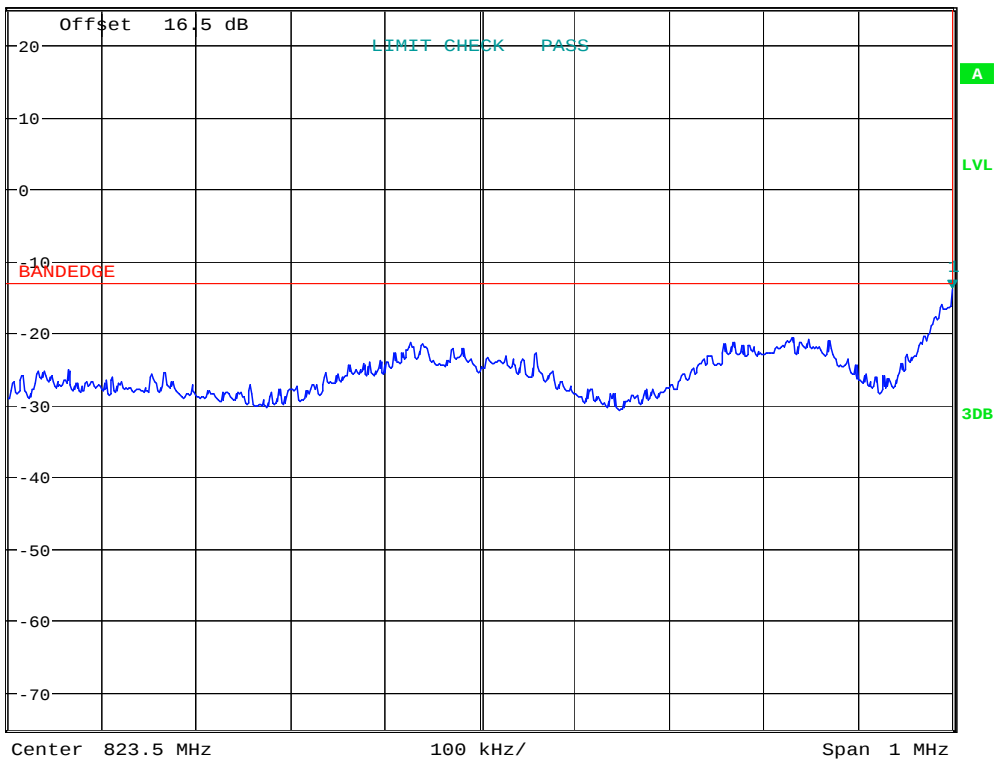
SWT 2.5 ms

824.000000000 MHz

Ref 25 dBm

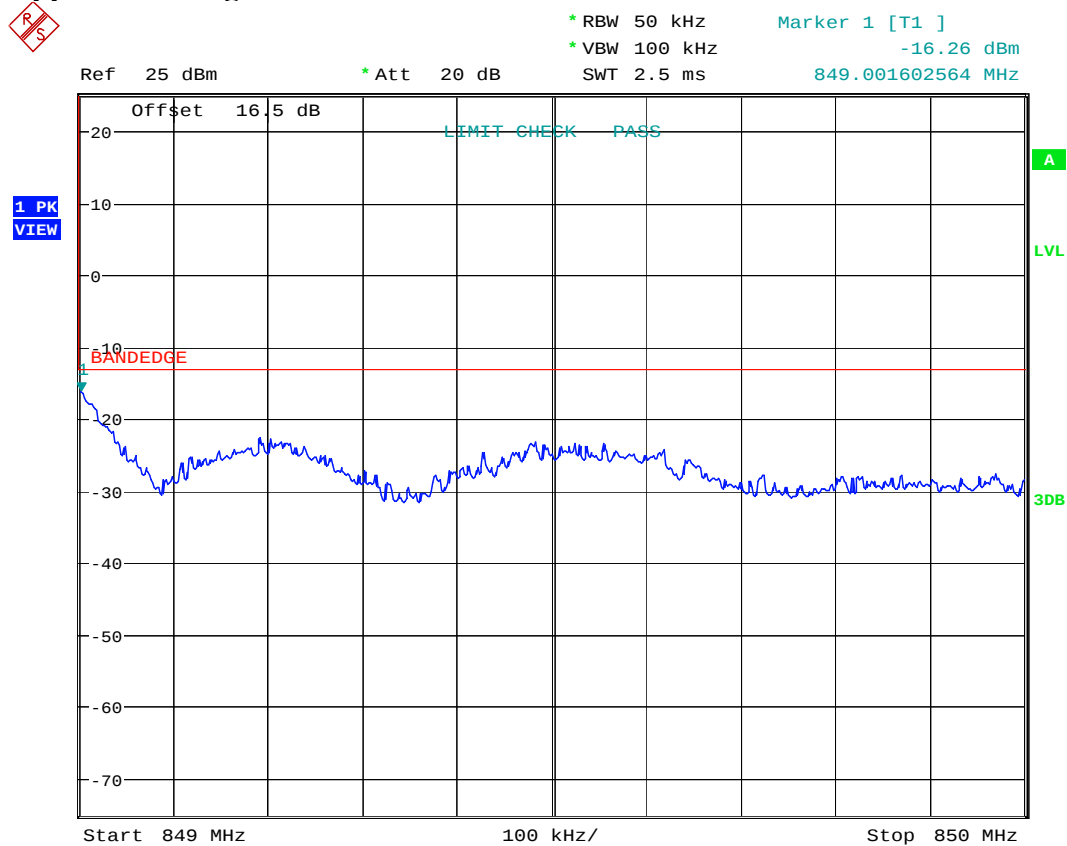
* Att 20 dB

1 PK
VIEW



Date: 4.FEB.2010 15:25:09

Upper Band Edge UMTS FDD5



Date: 4.FEB.2010 15:26:33

Lower Band Edge UMTS FDD2



* RBW 50 kHz
* VBW 100 kHz
SWT 2.5 ms

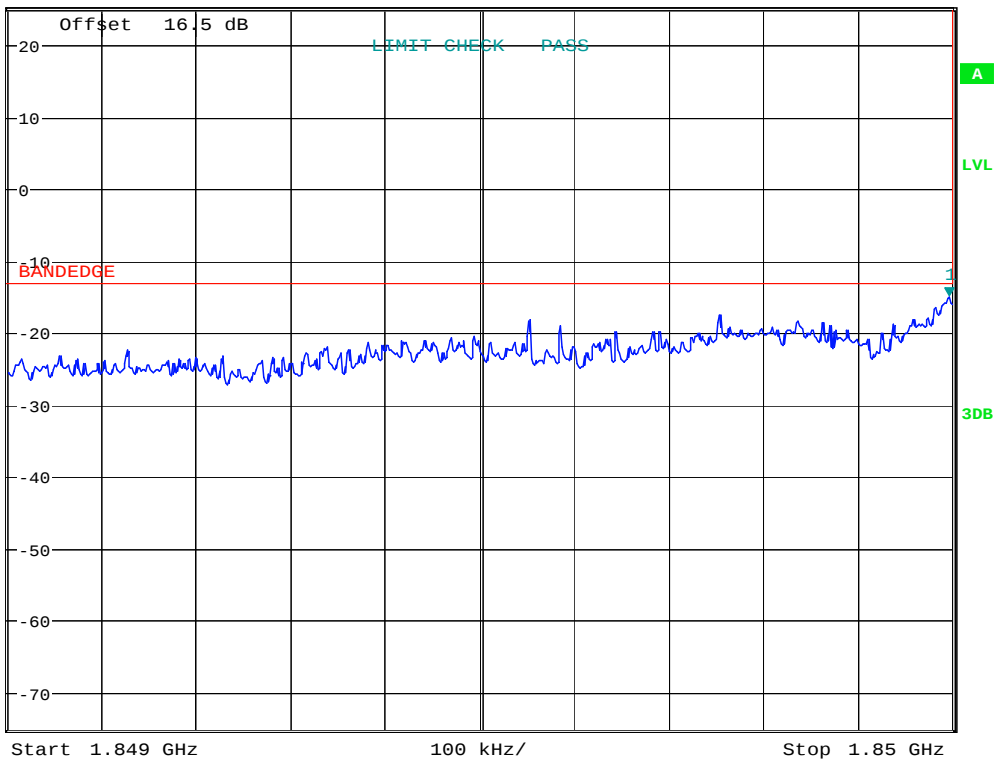
Marker 1 [T1]
-14.95 dBm
1.849996795 GHz

Ref 25 dBm

* Att 20 dB

Offset 16.5 dB

1 PK
VIEW



Date: 4.FEB.2010 14:44:19

Upper Band Edge UMTS FDD2



* RBW 50 kHz

Marker 1 [T1]

* VBW 100 kHz

-17.11 dBm

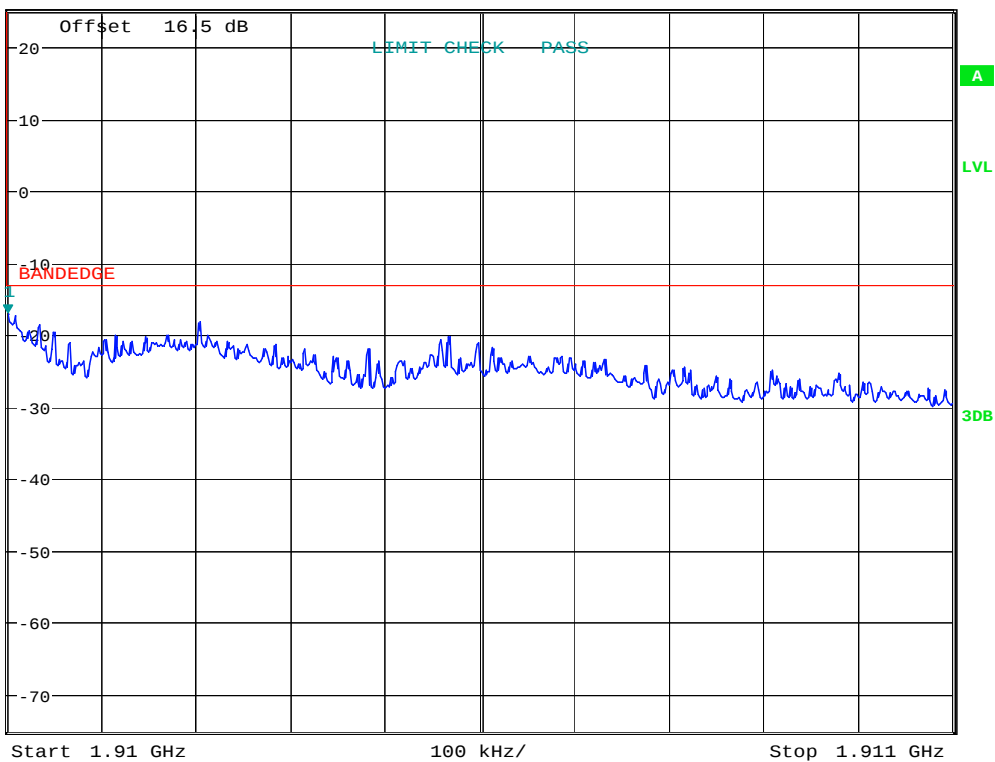
SWT 2.5 ms

1.910000000 GHz

Ref 25 dBm

* Att 20 dB

1 PK
VIEW



Date: 4.FEB.2010 14:42:44

5.5 Spurious Emissions Radiated

5.5.1 References

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

IC: RSS 132 Section 4.5 and 6.5; RSS 133 Section 4.4

5.5.2 FCC 2.1053 Measurements required: Field strength of spurious radiation.

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

5.5.3 Limits:

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

5.5.3.1 FCC 22.917 Emission limitations for cellular equipment.

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

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

5.5.3.2 FCC 24.238 Emission limitations for Broadband PCS equipment.

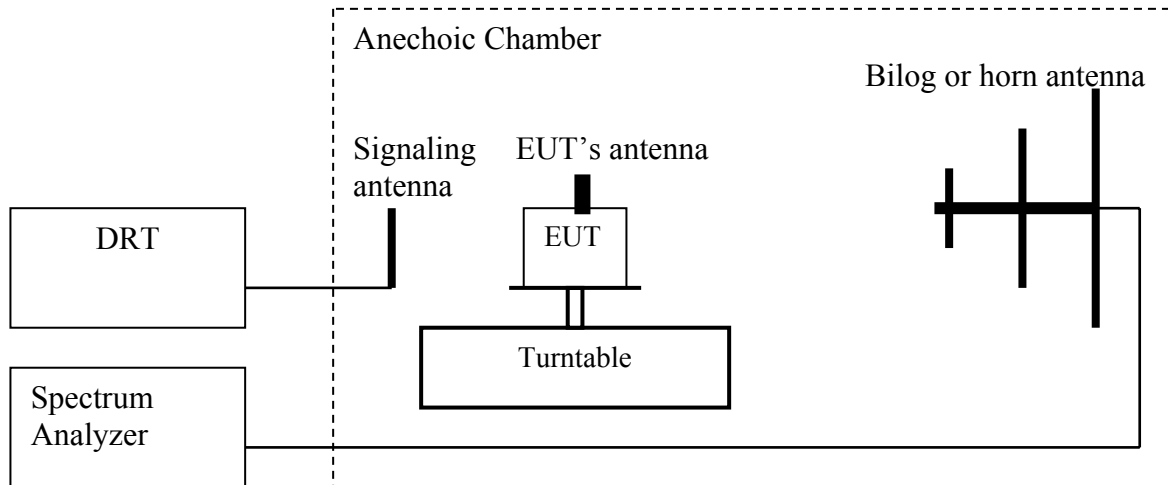
The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

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

carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.5.4 Radiated out of band measurement procedure:

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



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

Spectrum analyzer settings: RBW=VBW=1MHz

Measurement Survey:

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

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 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. All measurements are done in horizontal and vertical polarization; the plots show the worst case where it is not indicated otherwise.

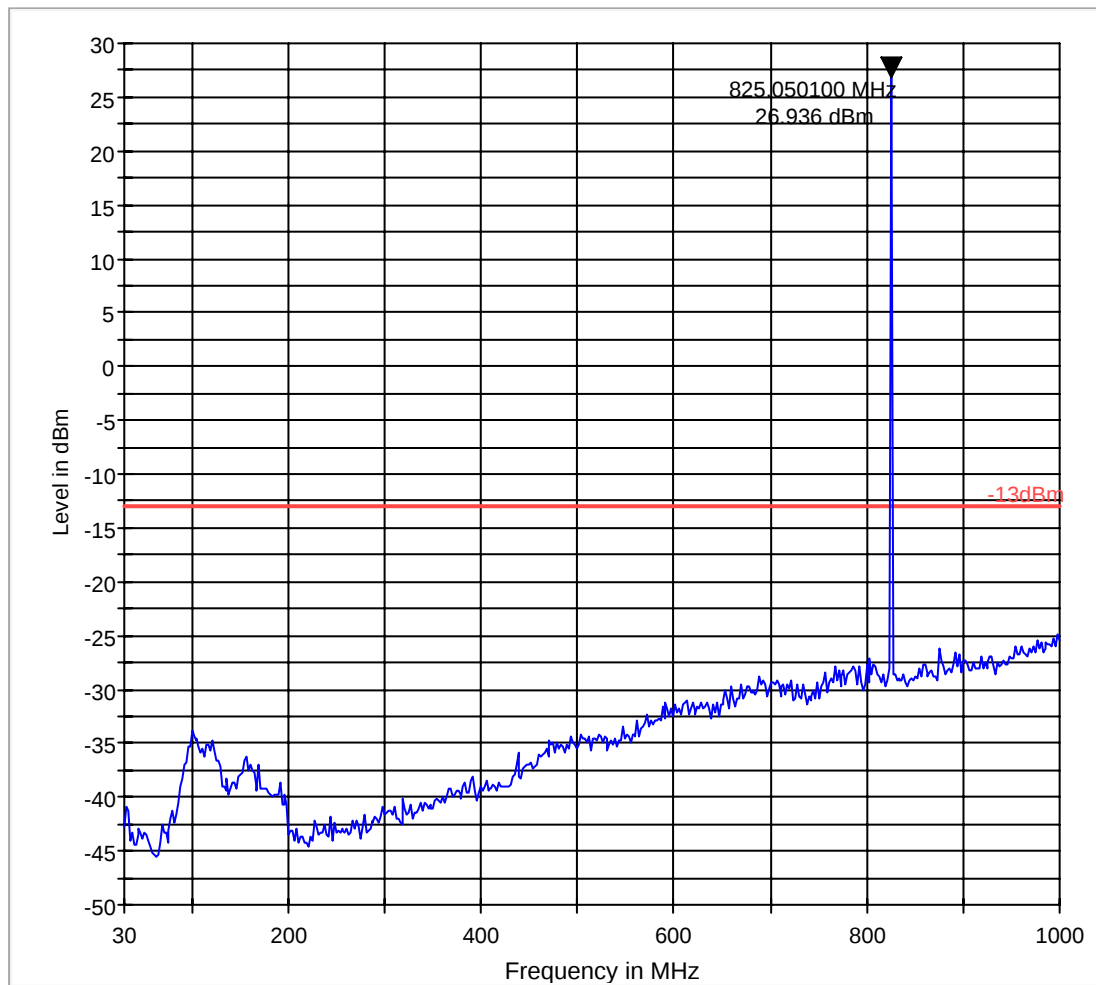
Unless mentioned otherwise, the peaks in the plots are from the carrier frequency.

Radiated emissions measurements were made also with UMTS FDD mode where the EUT supports such technology.

[illegible]

Radiated Spurious Emissions (GSM-850) Tx: 30MHz – 1GHz**Low Channel*****Peak over the limit is carrier frequency**

FCC 22 30-1000MHz



— -13dBm.LimitLine

— Preview Result 1

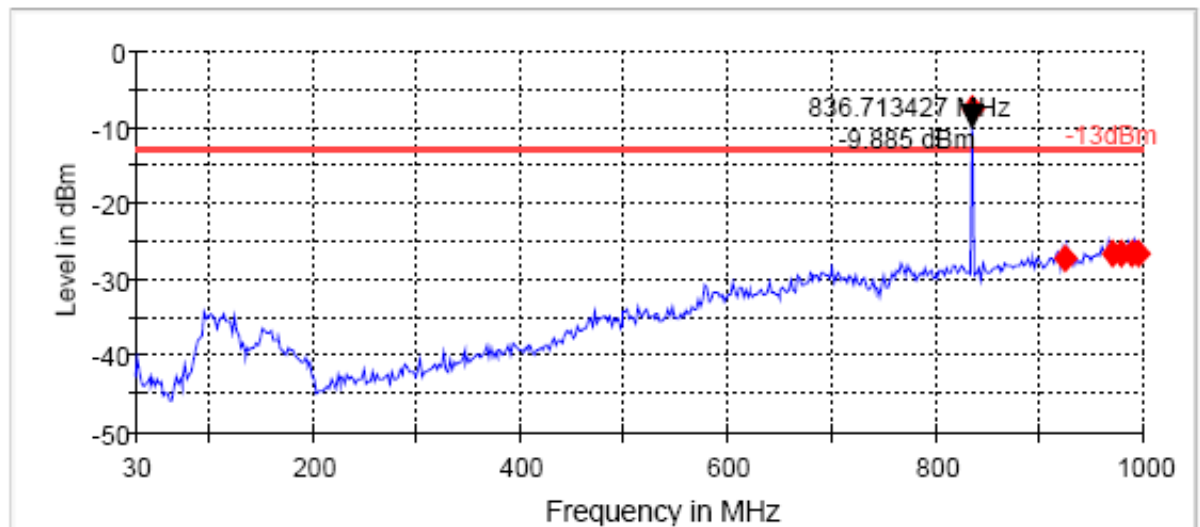
Mid Channel

*Peak over the limit is carrier frequency

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)
836.537368	-7.5	20.000	100.000	120.0	V	250.0	-70.5	-5.5	-13.0
924.570203	-27.2	20.000	100.000	120.0	H	68.0	-70.0	14.2	-13.0
969.986684	-26.5	20.000	100.000	120.0	H	112.0	-69.6	13.5	-13.0
980.158177	-26.6	20.000	100.000	162.0	V	202.0	-69.3	13.6	-13.0
989.391012	-26.5	20.000	100.000	120.0	H	257.0	-69.3	13.5	-13.0
995.040080	-26.6	20.000	100.000	120.0	V	197.0	-68.7	13.6	-13.0

FCC 22 30-1000MHz



— -13dBm.LimitLine

— Preview Result 1

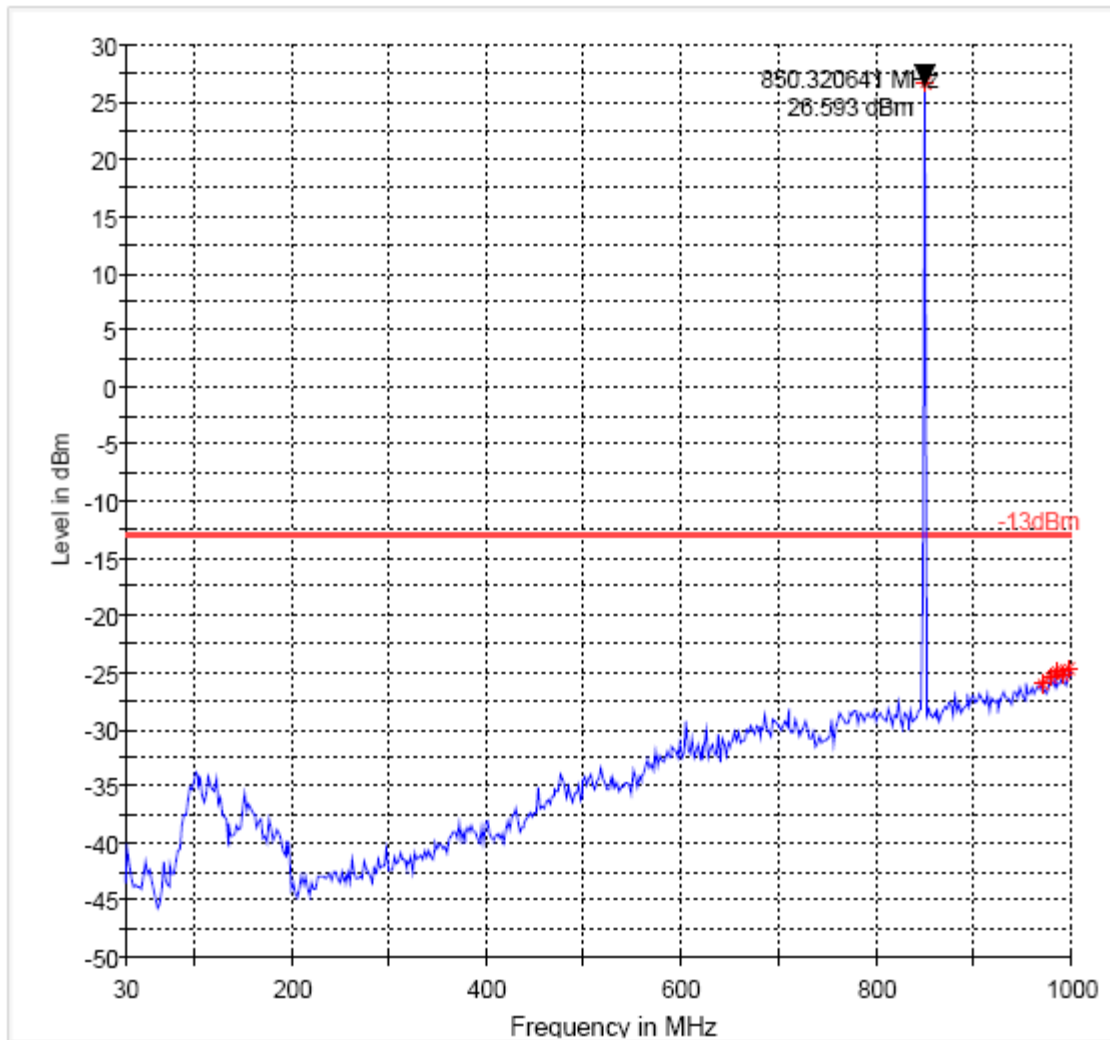


◆ Final Result 1

High Channel

*Peak over the limit is carrier frequency

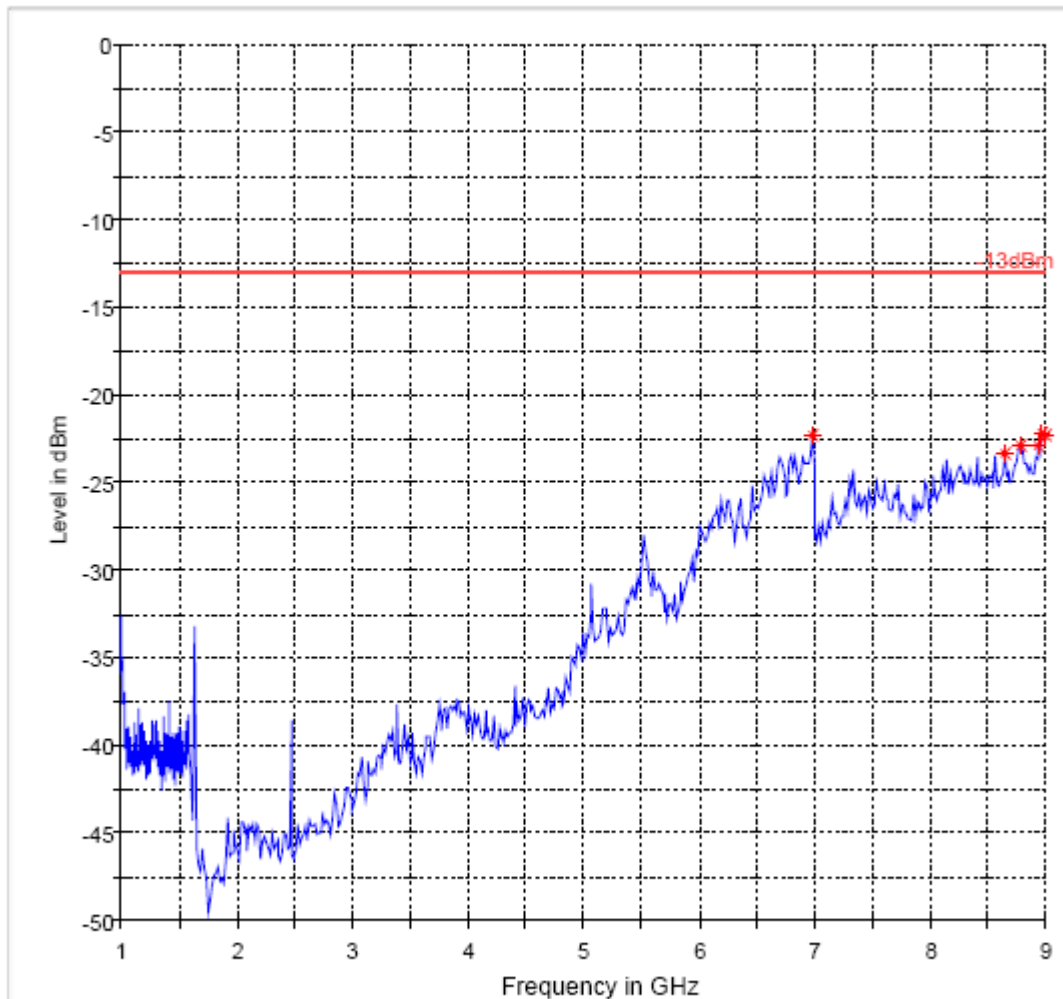
FCC 22 30-1000MHz



— -13dBm.LimitLine — Preview Result 1 * Data Reduction 1 [1]

Radiated Spurious Emissions (GSM-850): 1GHz – 9GHz
Low Channel

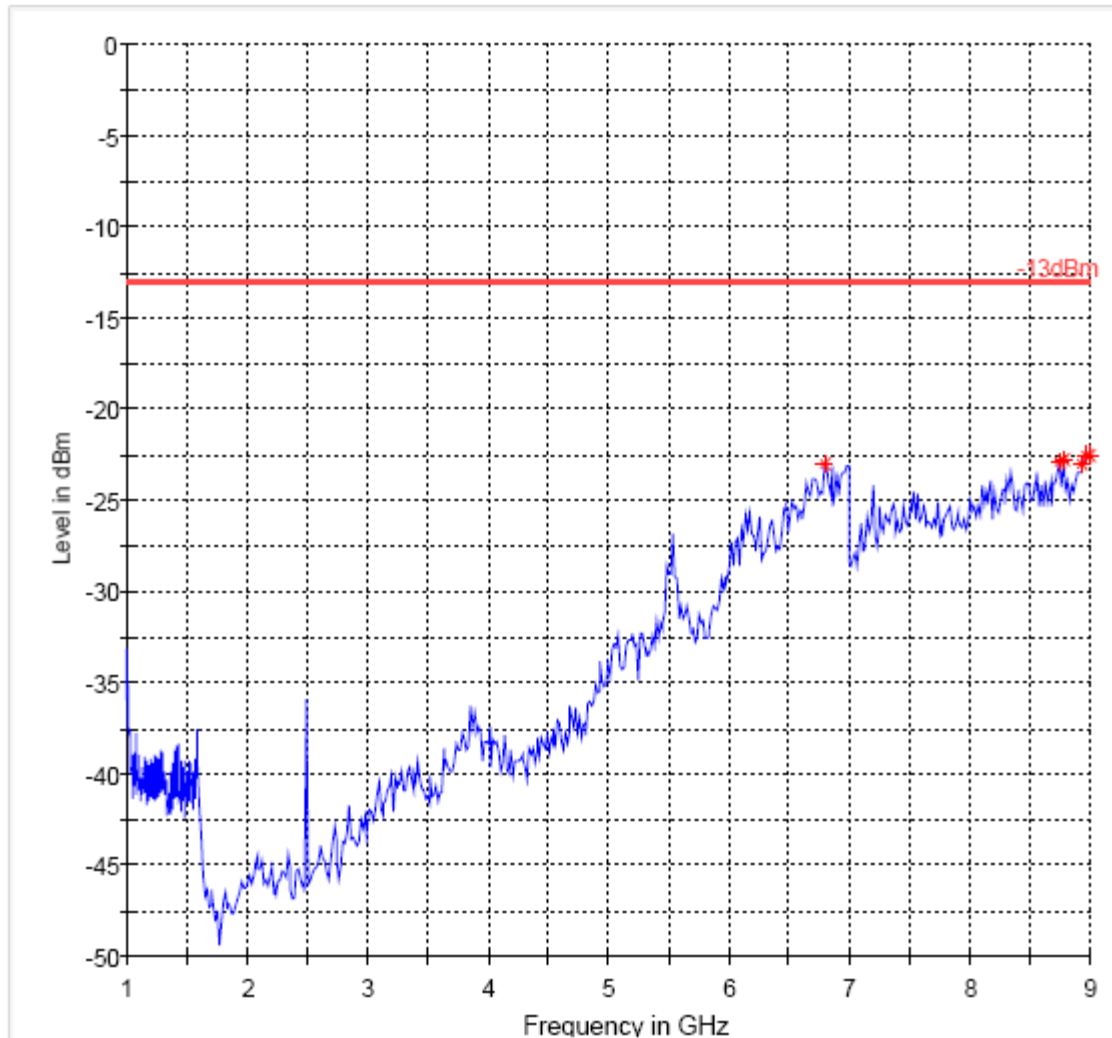
FCC 22 1-9GHz



— -13dBm Limit Line — Preview Result 1 * Data Reduction 1 [2]

Mid Channel

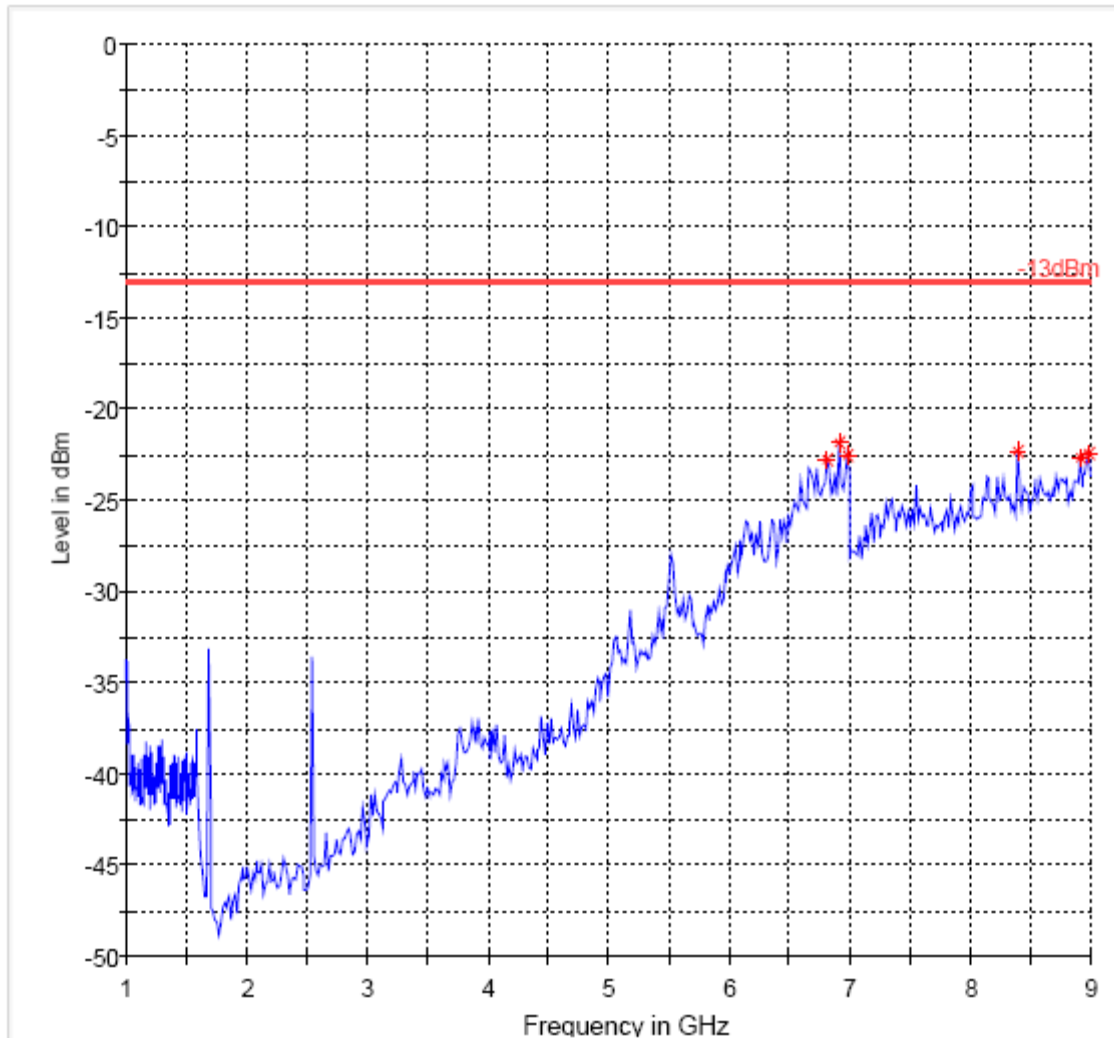
FCC 22 1-9GHz



— -13dBm.LimitLine — Preview Result 1 * Data Reduction 1 [2]

High Channel

FCC 22 1-9GHz



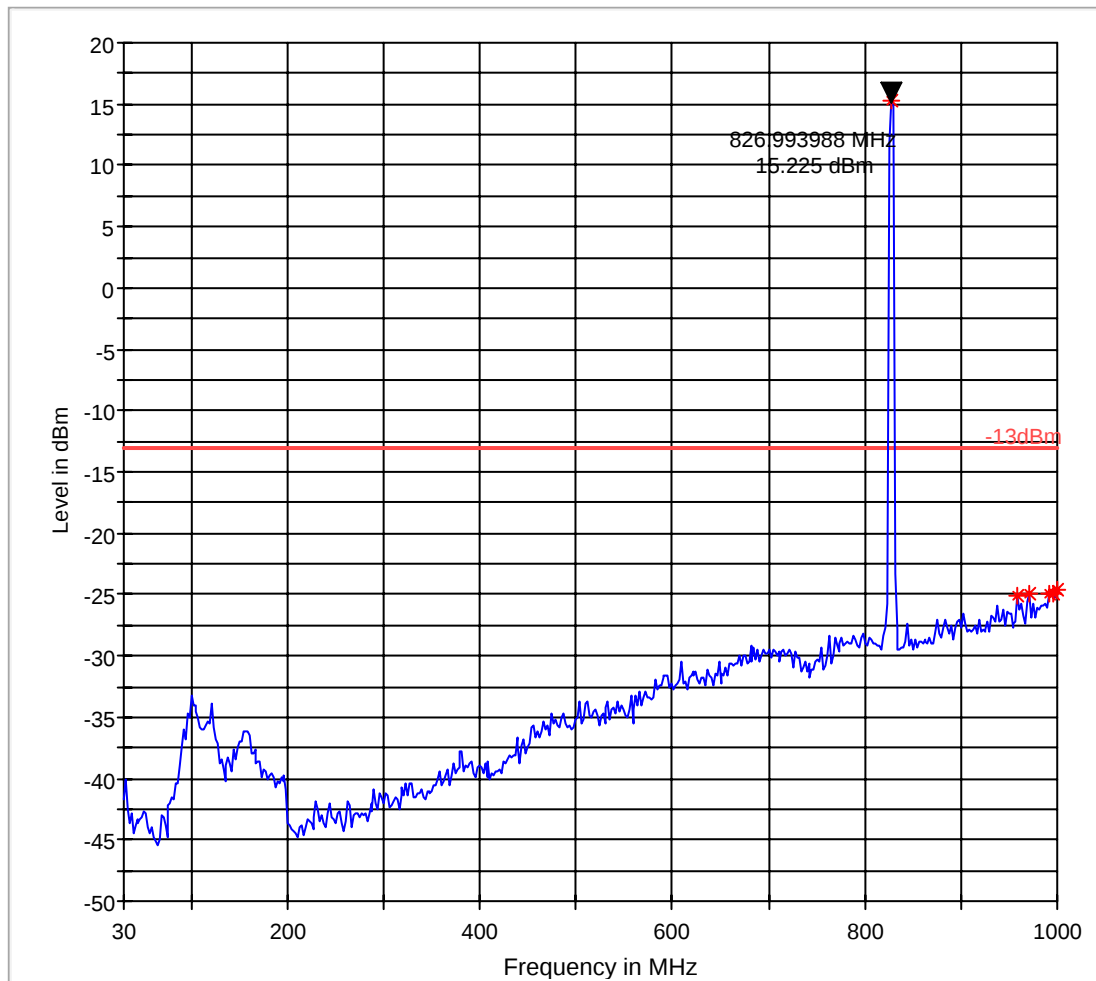
— -13dBm.LimitLine — Preview Result 1 * Data Reduction 1 [2]

5.5.5.2 Test Results Transmitter Spurious Emission UMTS FDDV

[illegible]

Radiated Spurious Emissions (UMTS FDDV) Tx: 30MHz – 1GHz**Low Channel*****Peak over the limit is the carrier frequency**

FCC 22 30-1000MHz



— -13dBm.LimitLine

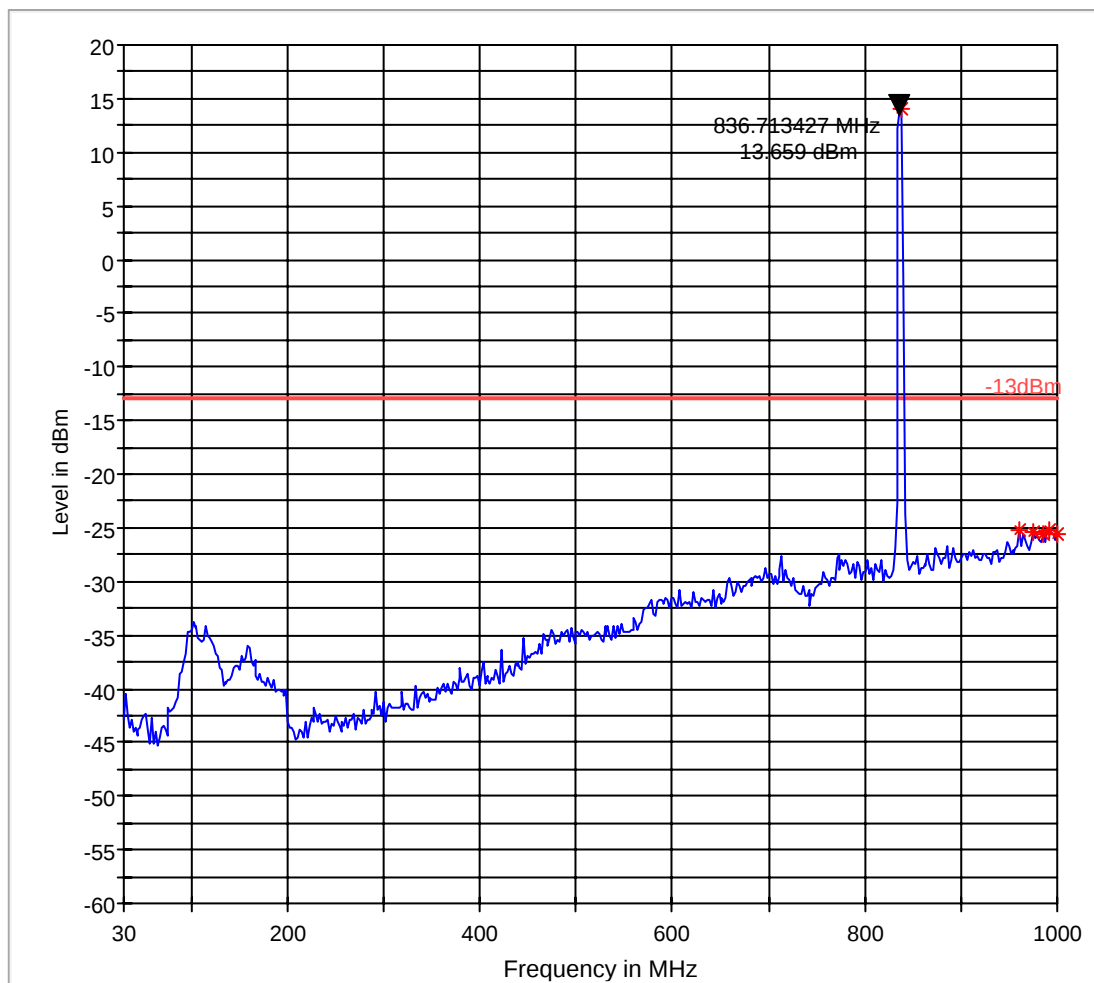
— Preview Result 1

*

Data Reduction 1 [1]

Mid Channel***Peak over the limit is the carrier frequency**

FCC 22 30-1000MHz



-13dBm.LimitLine

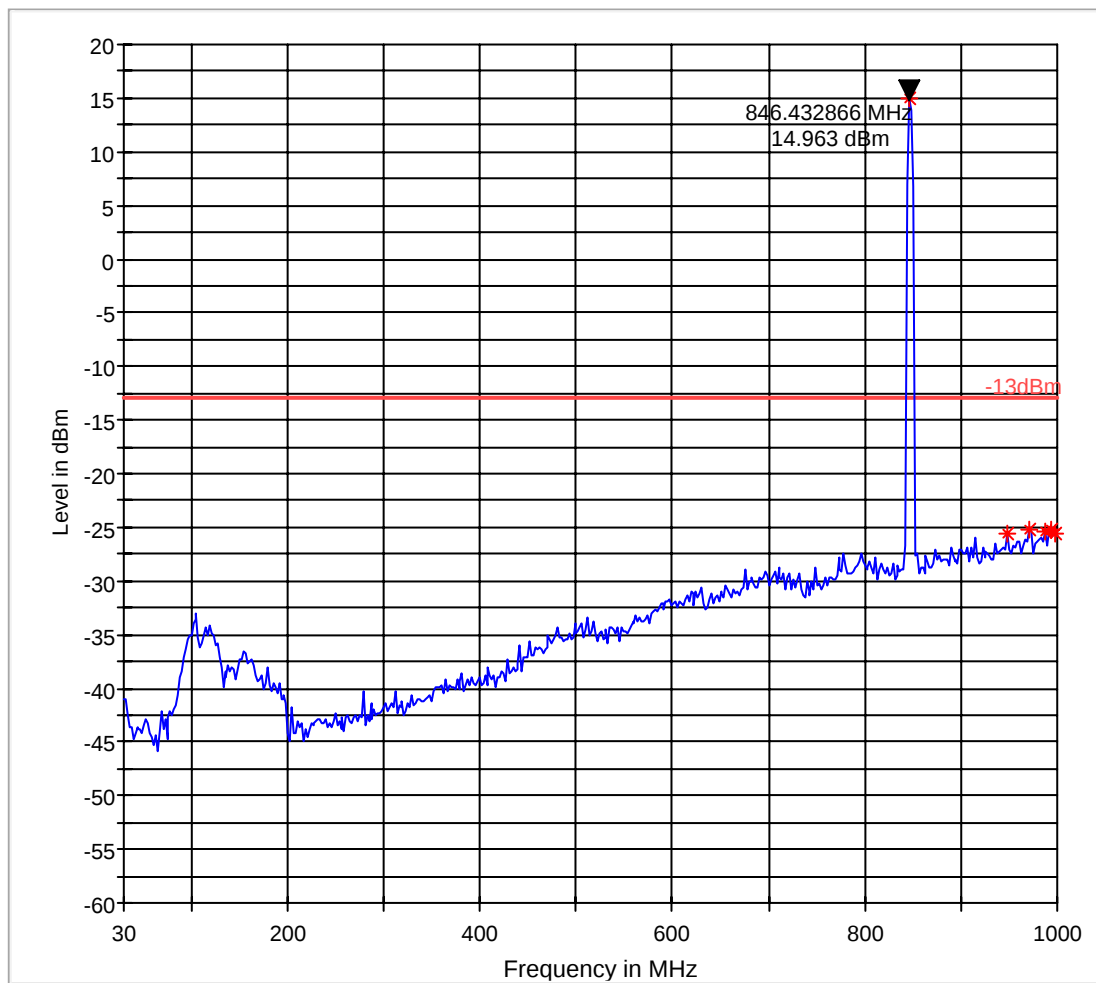
Preview Result 1

*

Data Reduction 1 [1]

High Channel***Peak over the limit is the carrier frequency**

FCC 22 30-1000MHz



-13dBm.LimitLine

Preview Result 1

*

Data Reduction 1 [1]

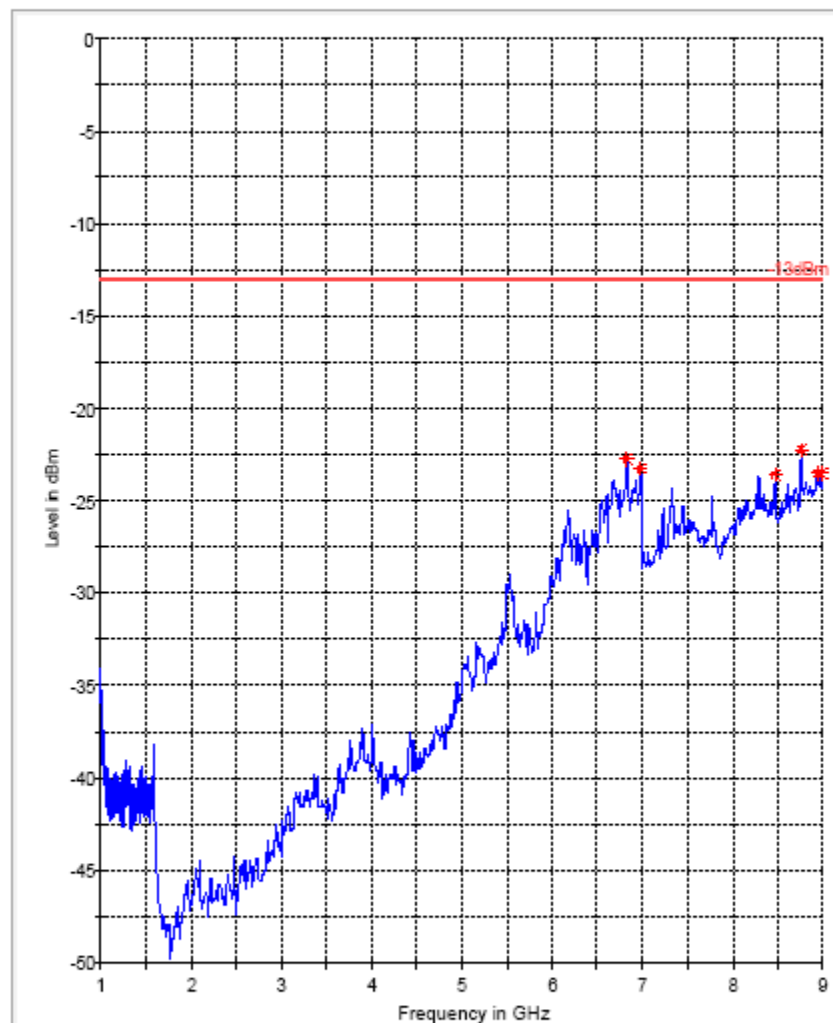
Radiated Spurious Emissions (UMTS FDDV) Tx: 1GHz – 9GHz
Low Channel

EMI Auto Test(1)

1 / 1

EMI Auto Test(1)

FCC 22 1-9GHz



-13dBm Limit Line

Preview Result 1

*

Data Reduction 1 (2)

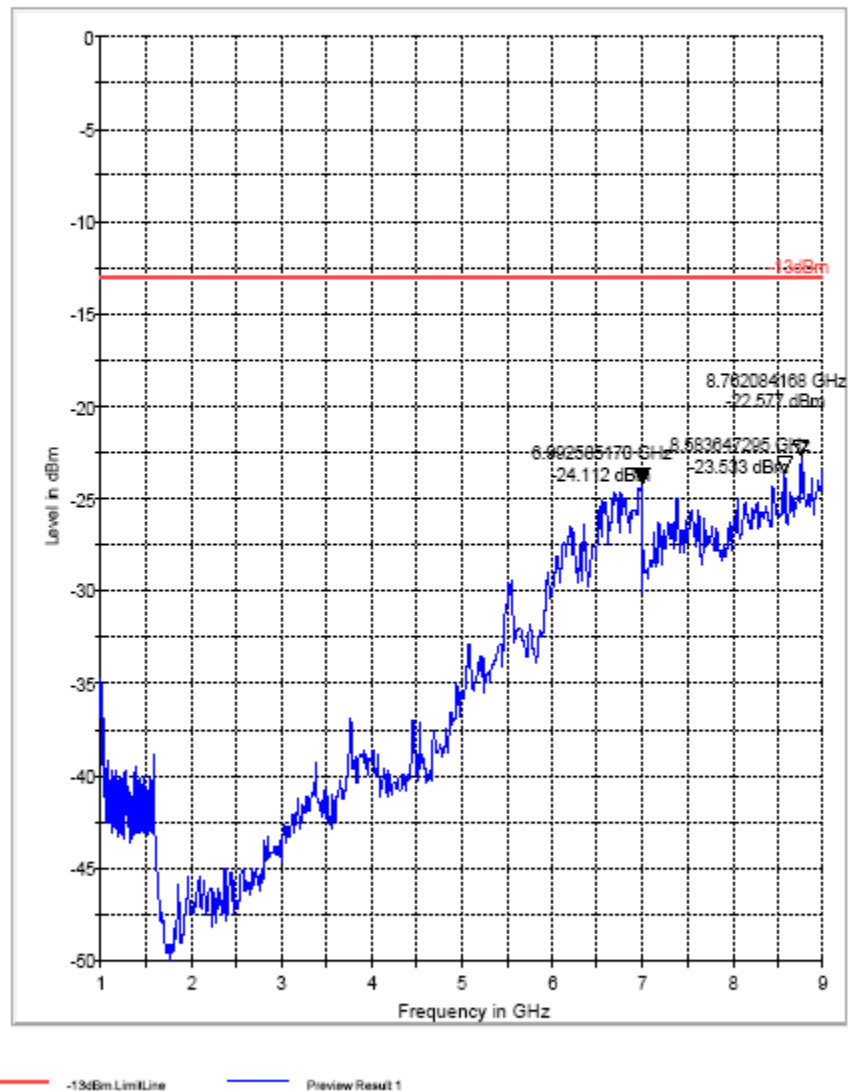
Mid Channel

EMI Auto Test(1)

1 / 1

EMI Auto Test(1)

FCC 22 1-9GHz



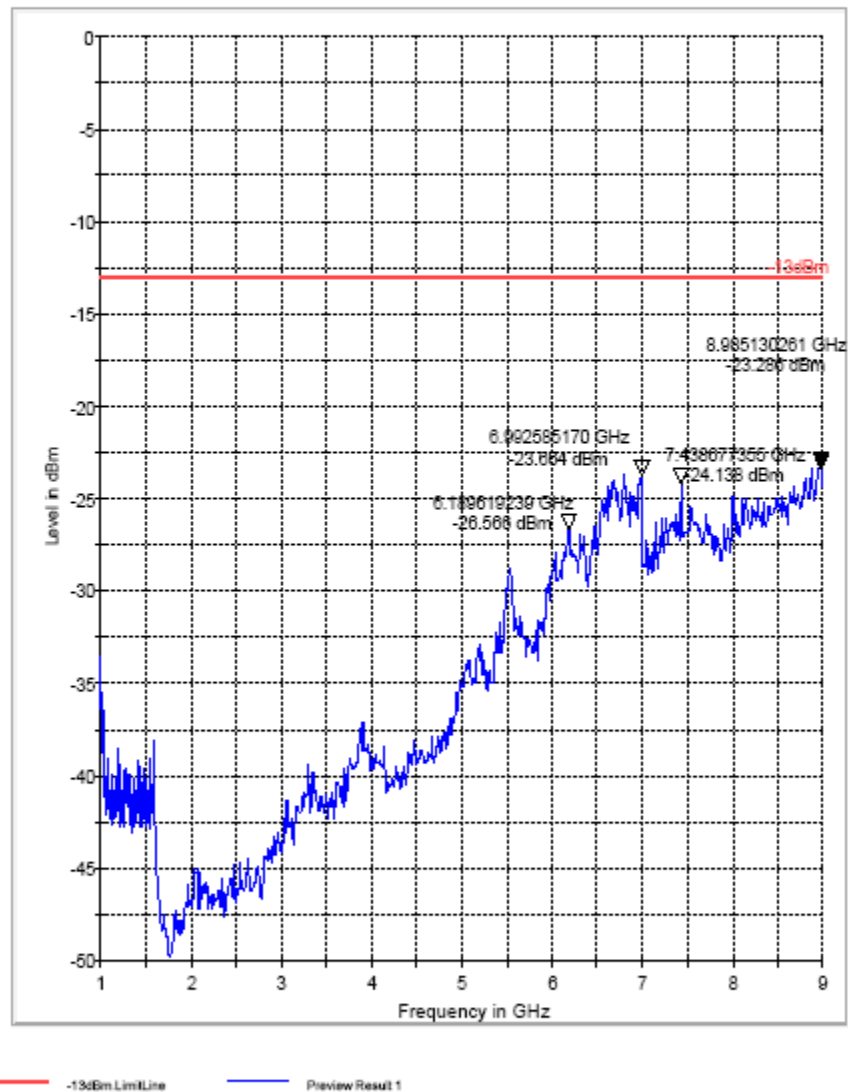
High Channel

EMI Auto Test(1)

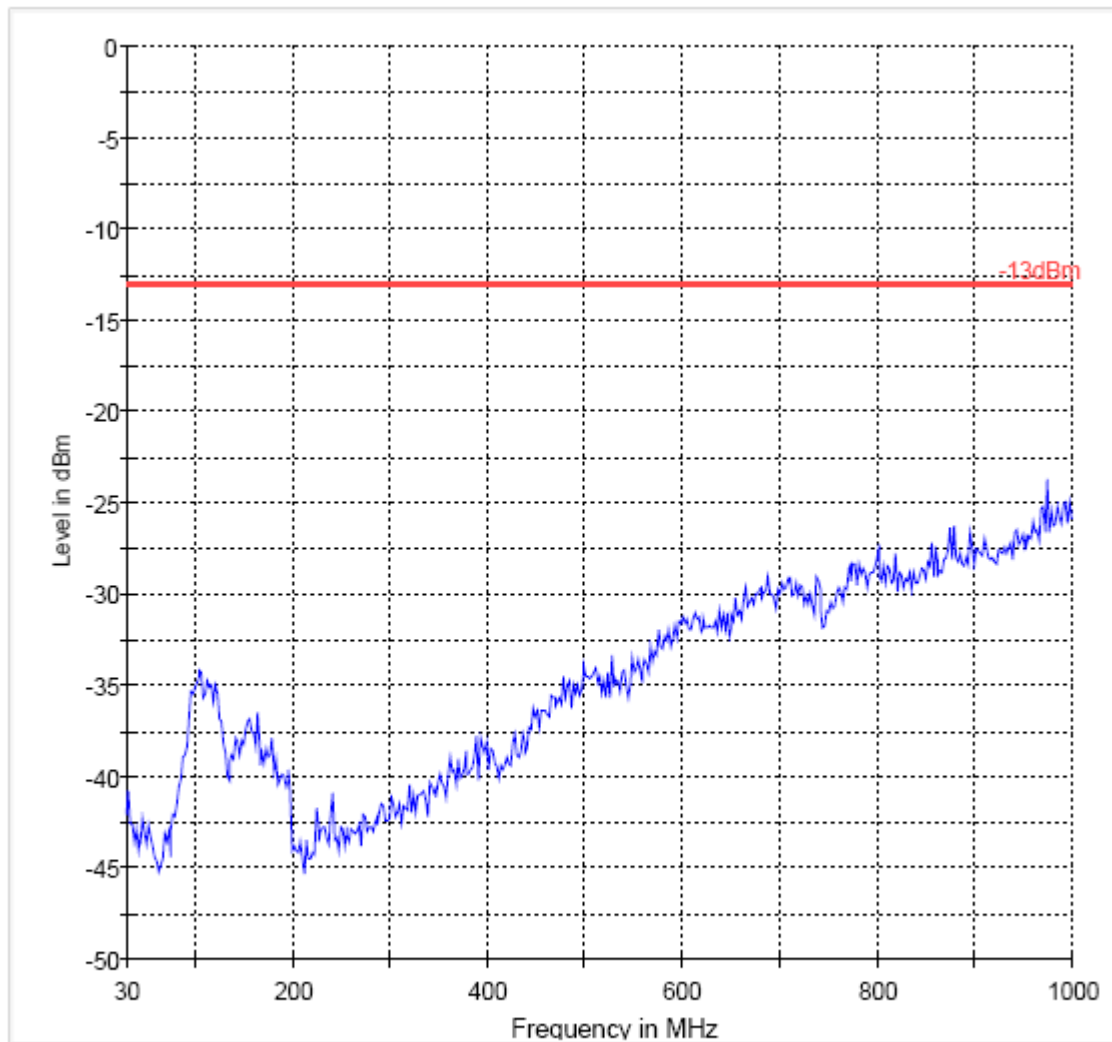
1 / 1

EMI Auto Test(1)

FCC 22 1-9GHz



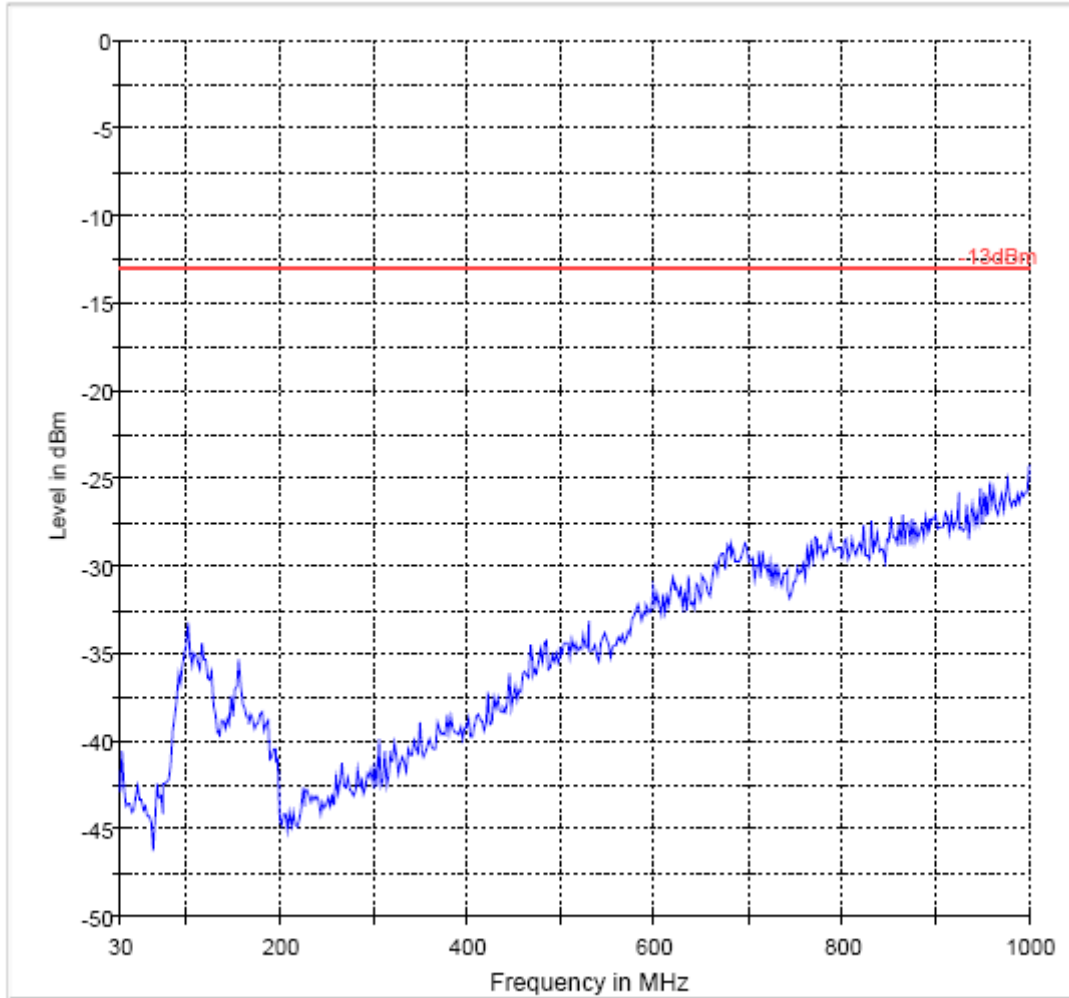
[illegible]

Radiated Spurious Emissions (PCS 1900) Tx: 30MHz – 1GHz**Low Channel**

-13dBm.LimitLine

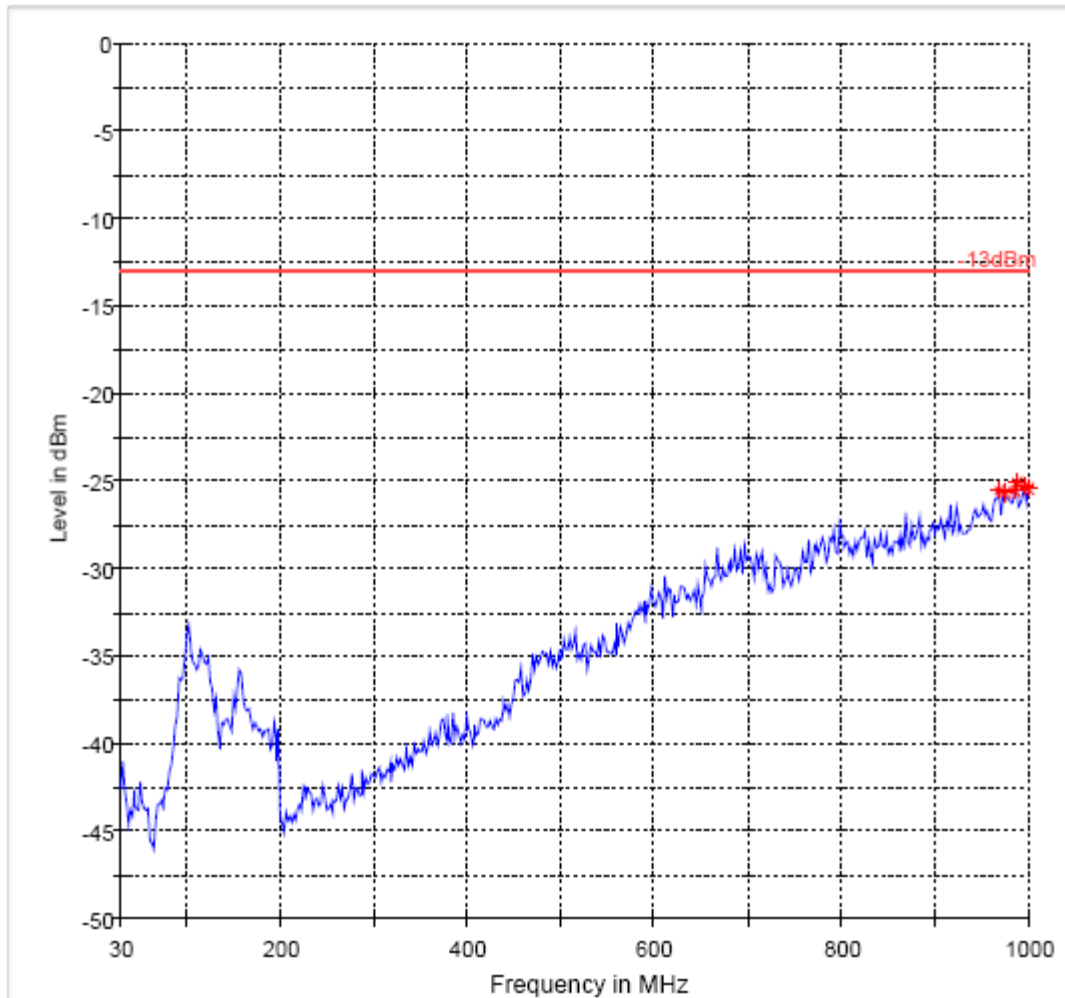
Preview Result 1

Mid Channel



— -13dBm.LimitLine — Preview Result 1

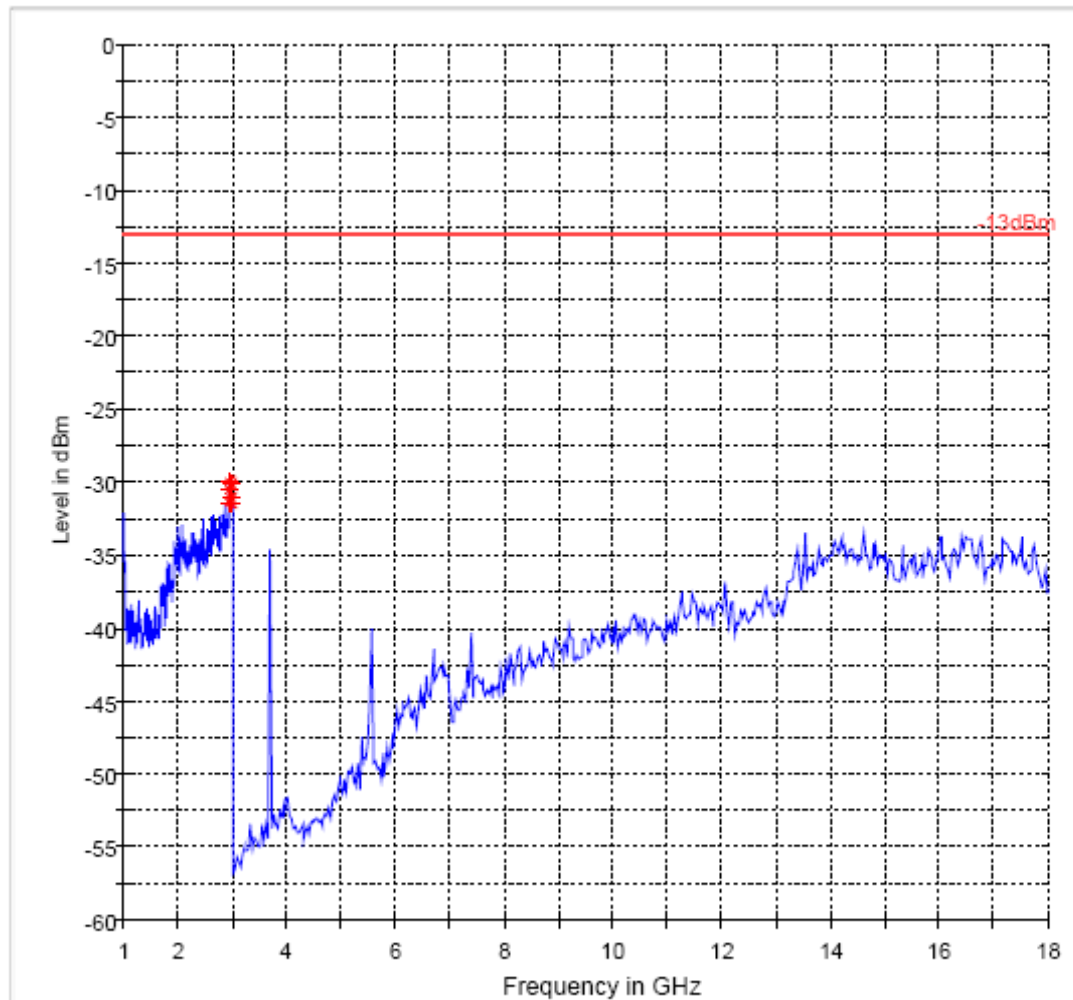
High Channel



— -13dBm.LimitLine — Preview Result 1 * Data Reduction 1 [1]

**Radiated Spurious Emissions (PCS 1900) Tx: 1GHz – 18GHz
Low Channel**

FCC 24 1-18GHz



-13dBm.LimitLine

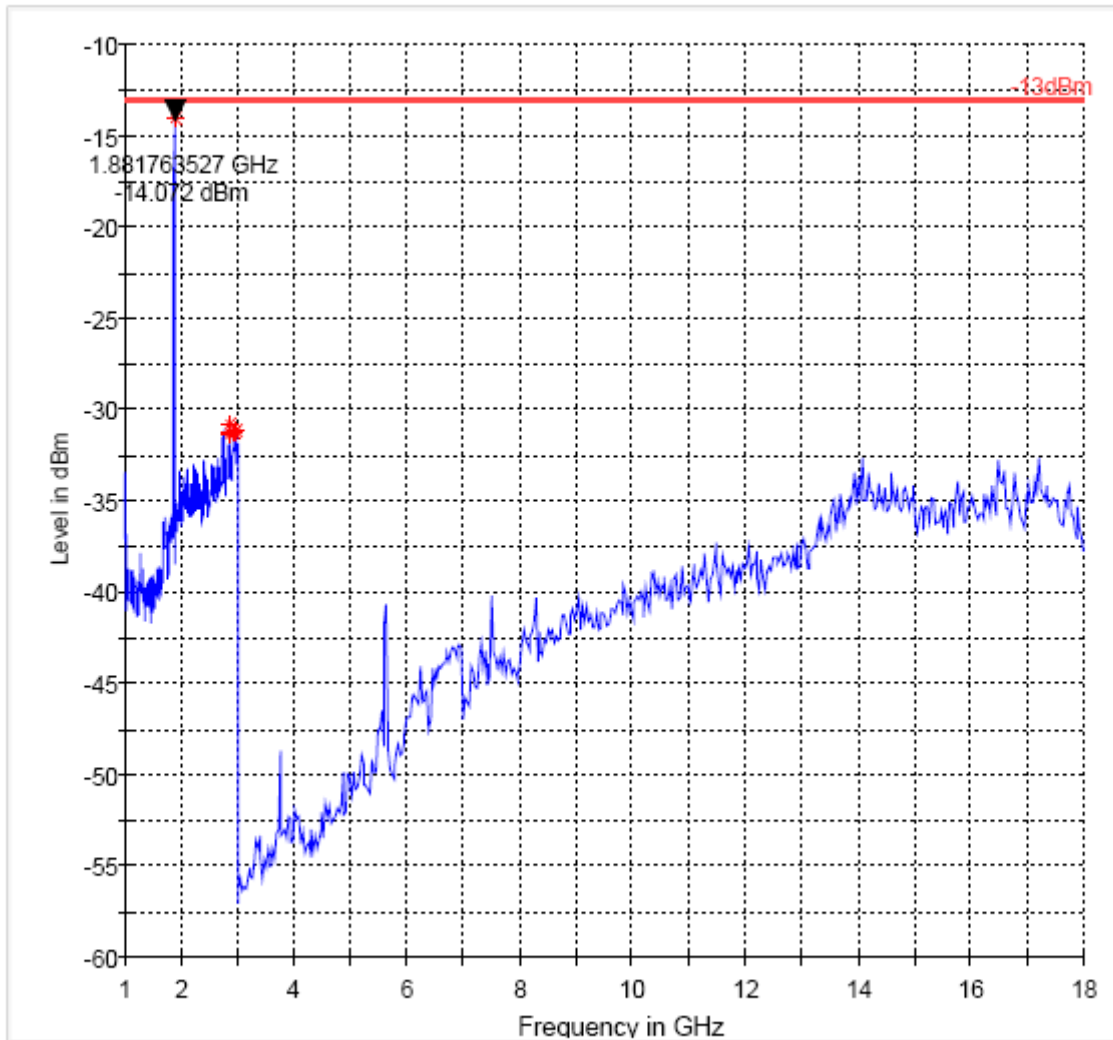
Preview Result 1

*

Data Reduction 1 [2]

Mid Channel

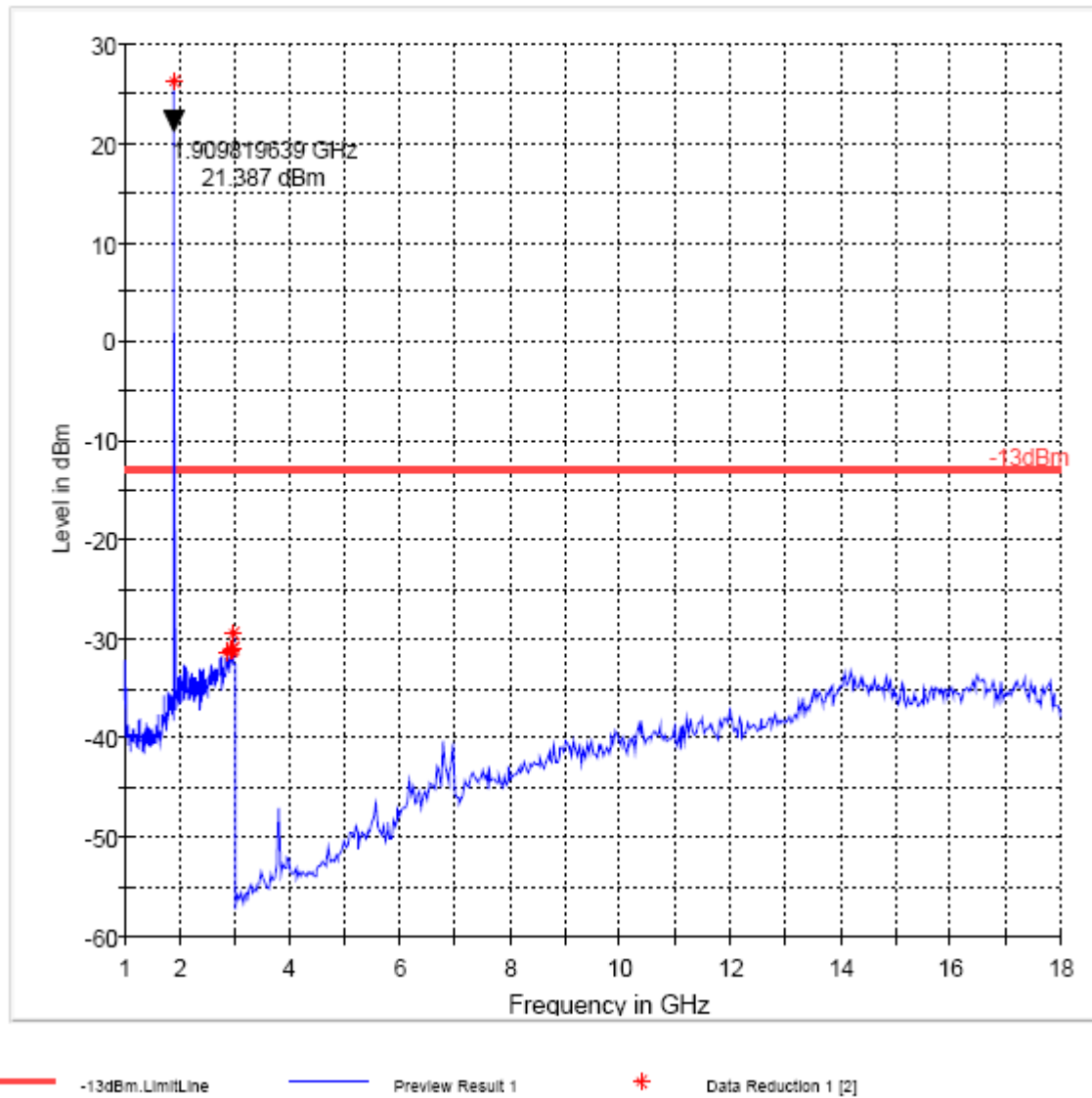
FCC 24 1-18GHz

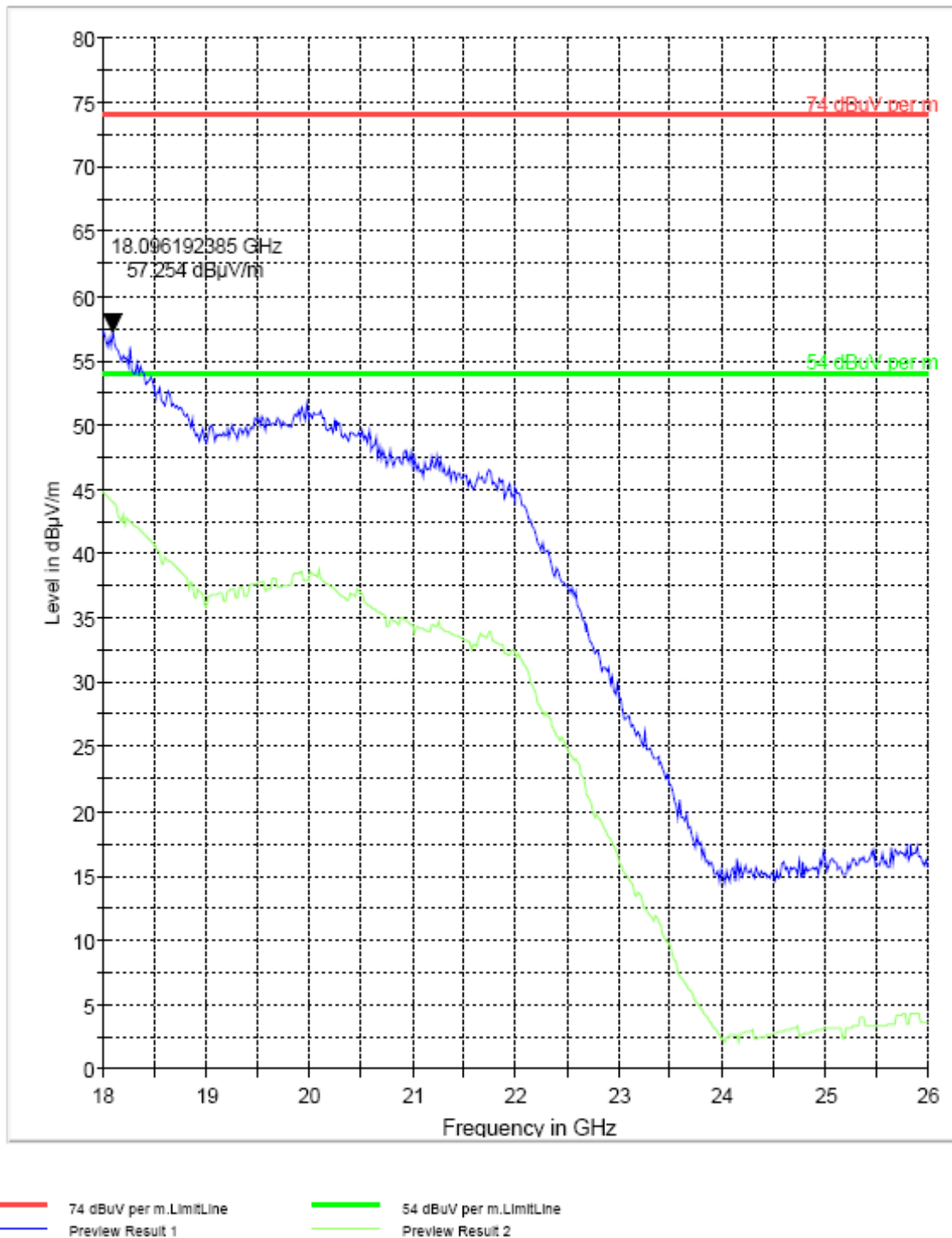


— -13dBm.LimitLine — Preview Result 1 * Data Reduction 1 [2]

High Channel

FCC 24 1-18GHz



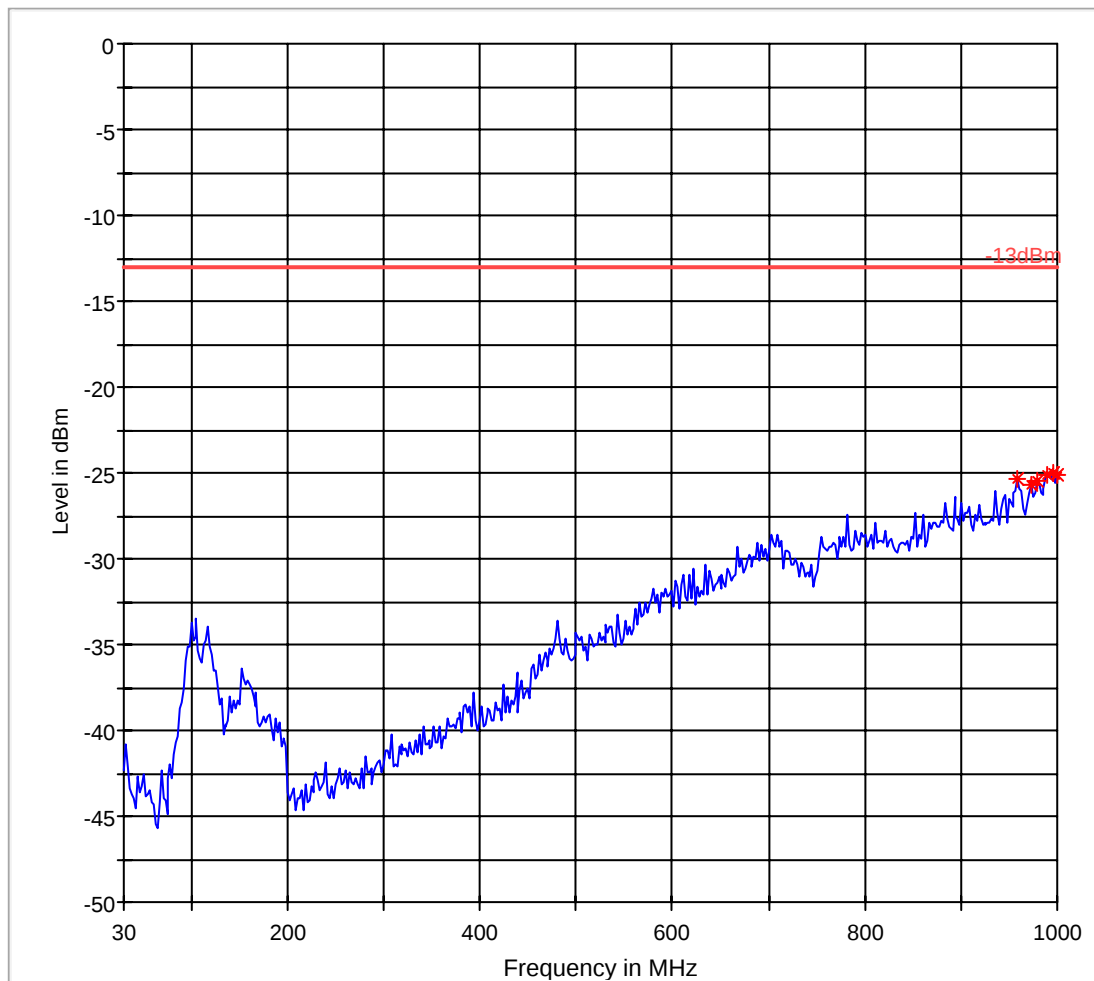
Radiated Spurious Emissions (PCS 1900) Tx: 18GHz – 19.1GHz***Represents worst case of all channels**

5.5.5.4 Test Results Transmitter Spurious Emission UMTS FDD2:

Harmonic	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
1	1852.4	-	1880.0	-	1907.6	-
2	3704.8	NF	3760	NF	3815.2	NF
3	5557.2	NF	5640	NF	5722.8	NF
4	7409.6	NF	7520	NF	7630.4	NF
5	9262	NF	9400	NF	9538	NF
6	11114.4	NF	11280	NF	11445.6	NF
7	12966.8	NF	13160	NF	13353.2	NF
8	14819.2	NF	15040	NF	15260.8	NF
9	16671.6	NF	16920	NF	17168.4	NF
10	18524	NF	18800	NF	19076	NF
NF= Noise Floor						

Radiated Spurious Emissions (UMTS FDDII) Tx: 30MHz – 1GHz
Low Channel

FCC 22 30-1000MHz



-13dBm.LimitLine

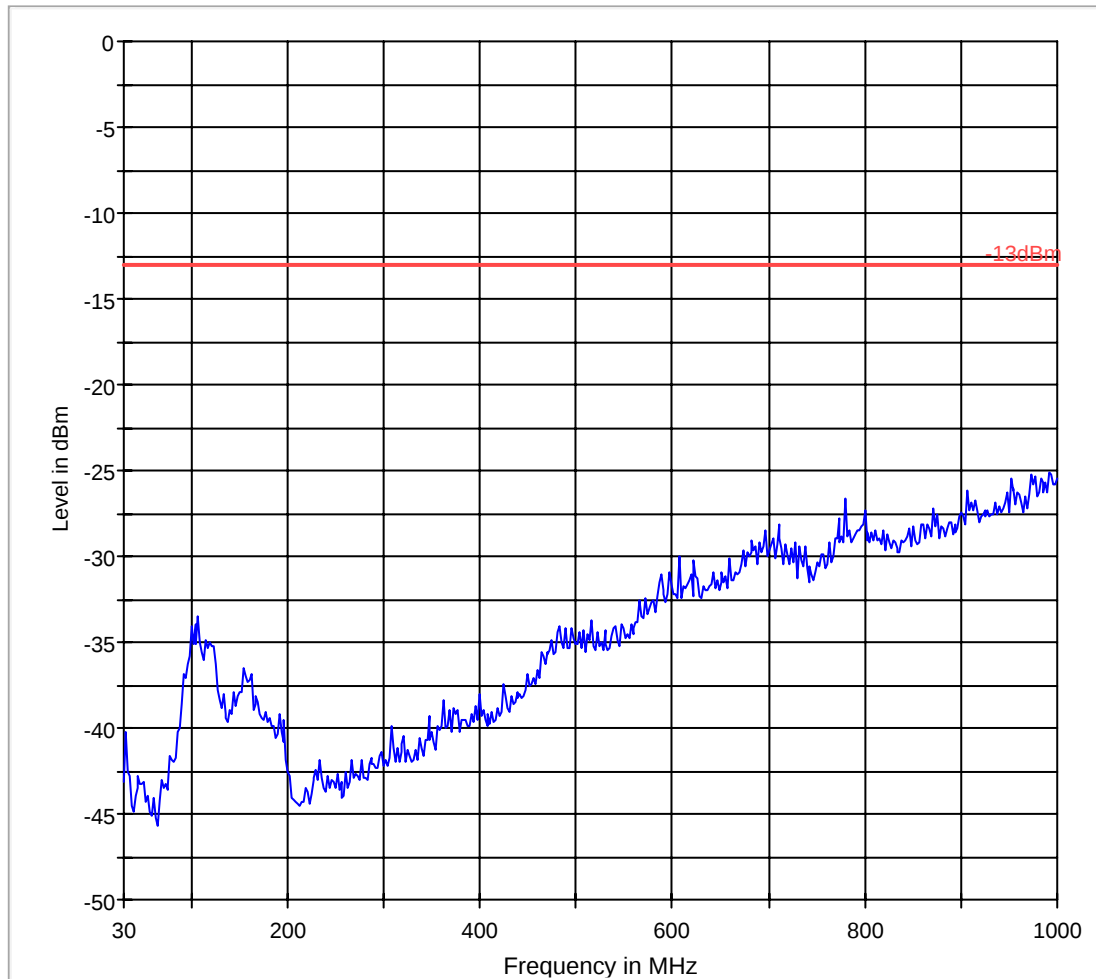
Preview Result 1

*

Data Reduction 1 [1]

Mid Channel

FCC 22 30-1000MHz

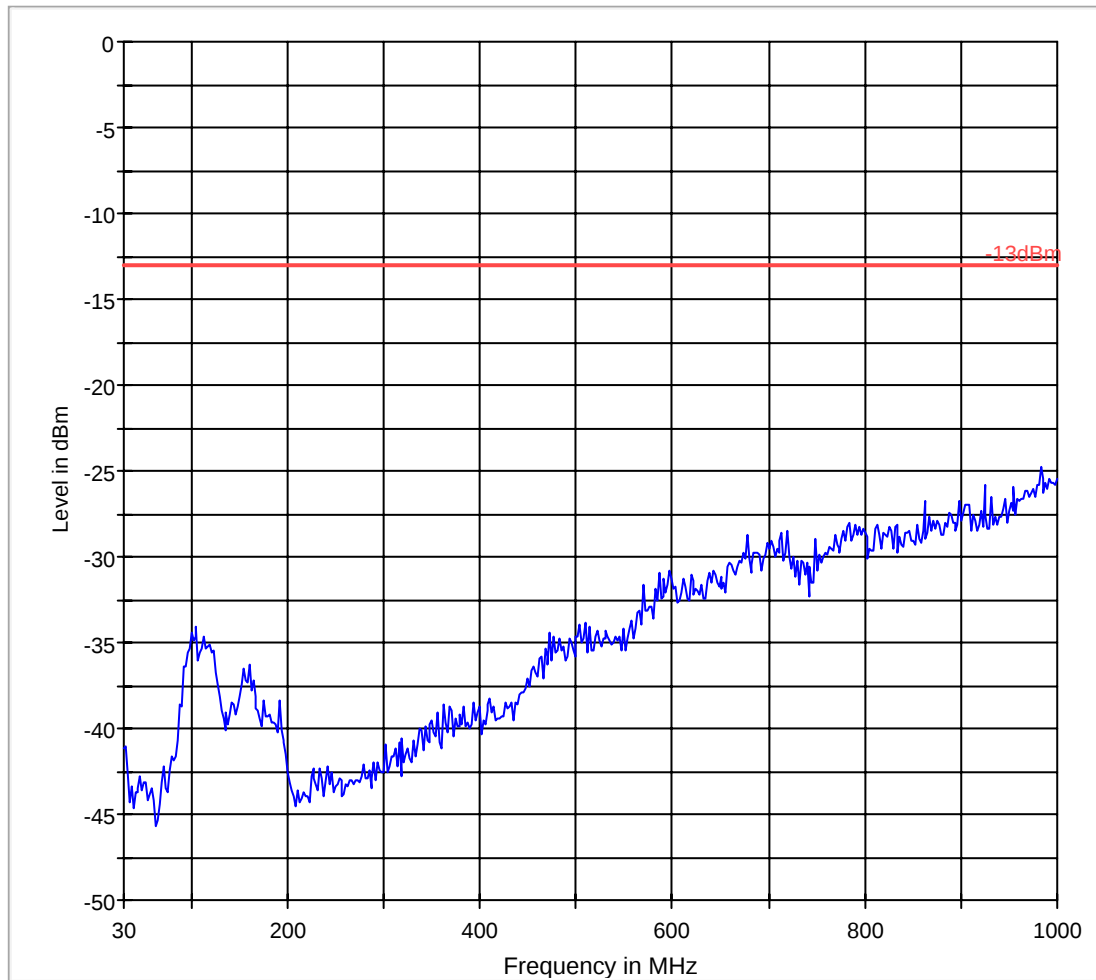


— -13dBm.LimitLine

— Preview Result 1

High Channel

FCC 22 30-1000MHz

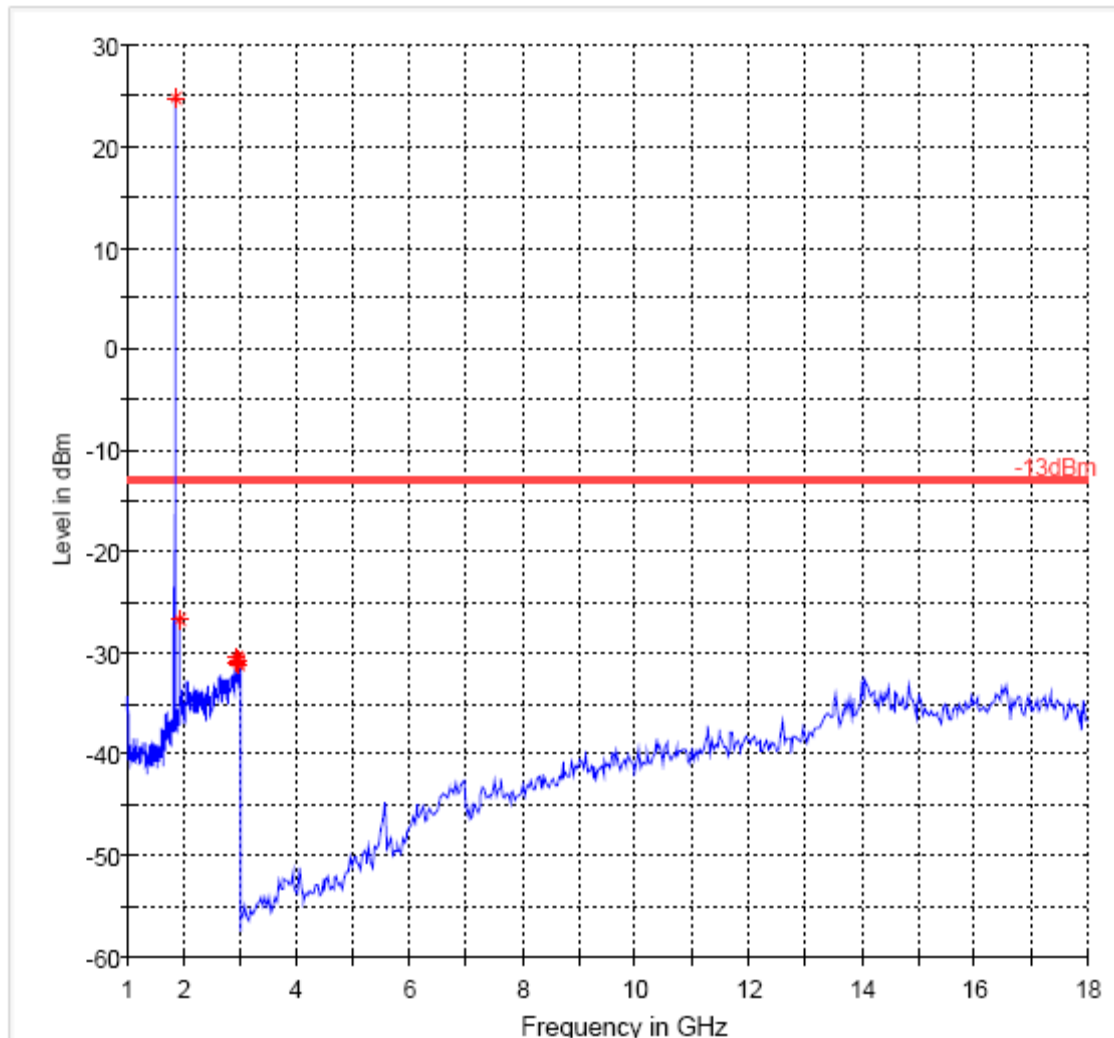


-13dBm.LimitLine

Preview Result 1

Radiated Spurious Emissions (UMTS FDDII) Tx: 1GHz –18GHz**Low Channel*****Peak over the limit is the carrier frequency**

FCC 24 1-18GHz



-13dBm.LimitLine

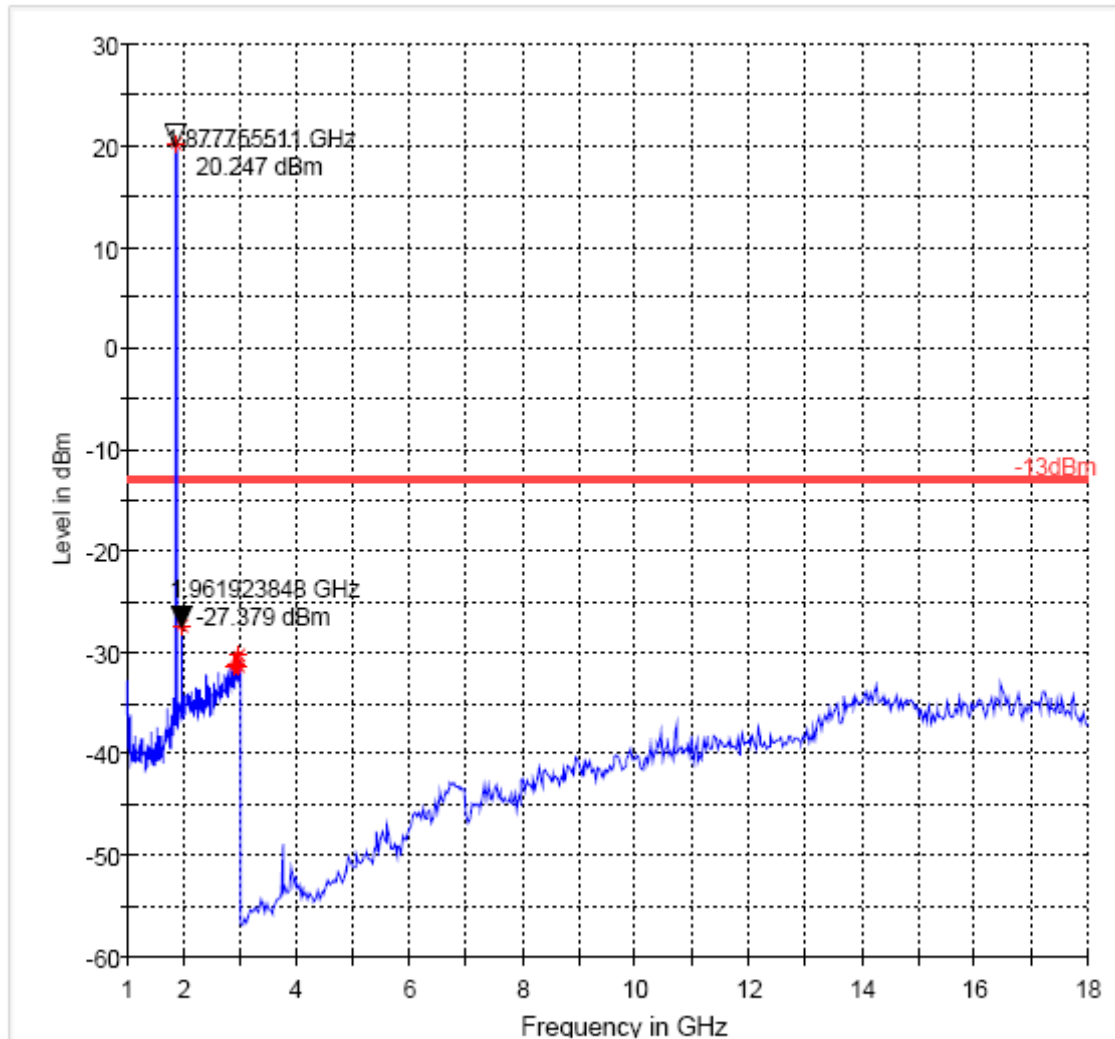
Preview Result 1

*

Data Reduction 1 [2]

Mid Channel***Peak over the limit is the carrier frequency**

FCC 24 1-18GHz



— -13dBm.LimitLine — Preview Result 1 * Data Reduction 1 [2]

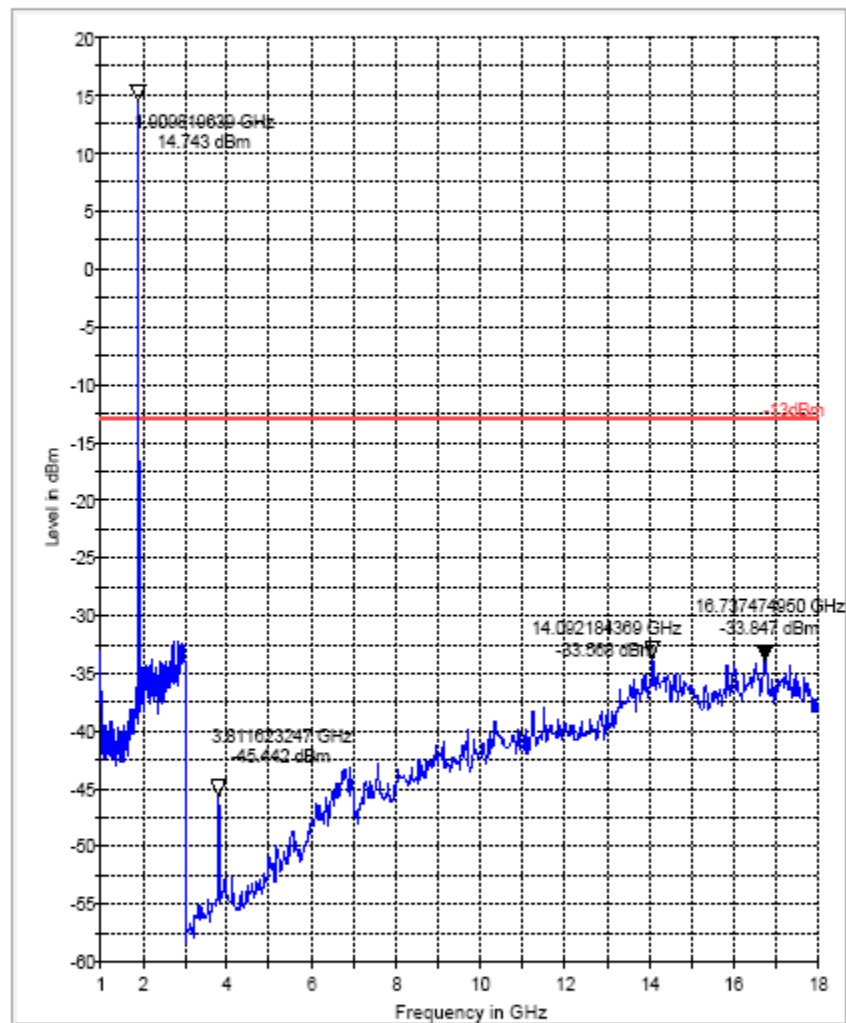
High Channel***Peak over the limit is the carrier frequency**

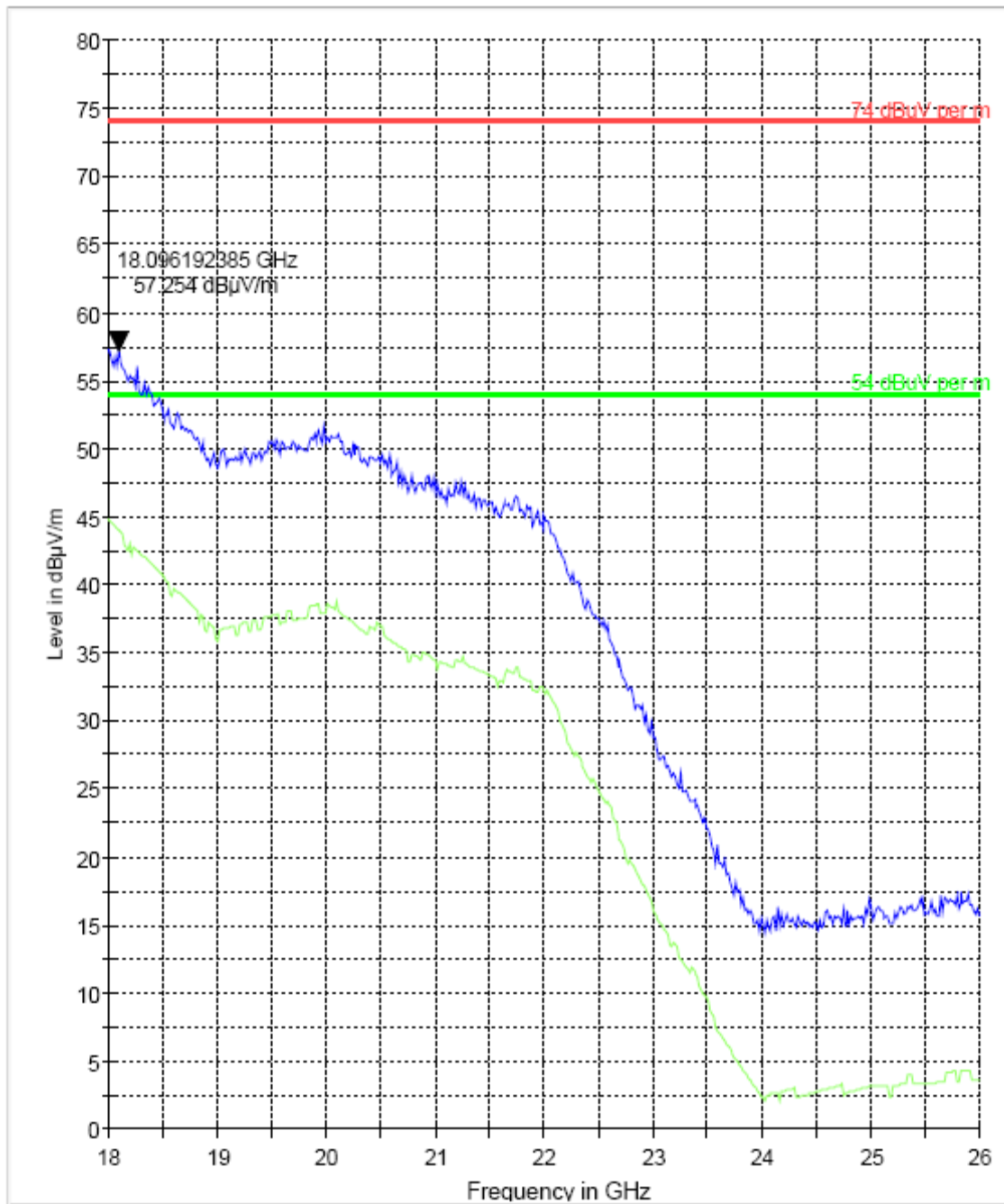
EMI Auto Test(1)

1 / 1

EMI Auto Test(1)

FCC 24 1-18GHz



Radiated Spurious Emissions (UMTS FDDII) Tx: 18GHz –19.1GHz***Plot represents worst case of all channels**

74 dBuV per m.LimitLine
Preview Result 1

54 dBuV per m.LimitLine
Preview Result 2

5.5.6 Radiated out of band emissions results on EUT- Receive Mode:**5.5.6.1 References**

FCC: CFR Part 15.109, 2.1053

IC: RSS 132 Section 4.6 and 6.6

5.5.6.2 §15.109 Radiated emission limits- Unintentional Radiators:

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

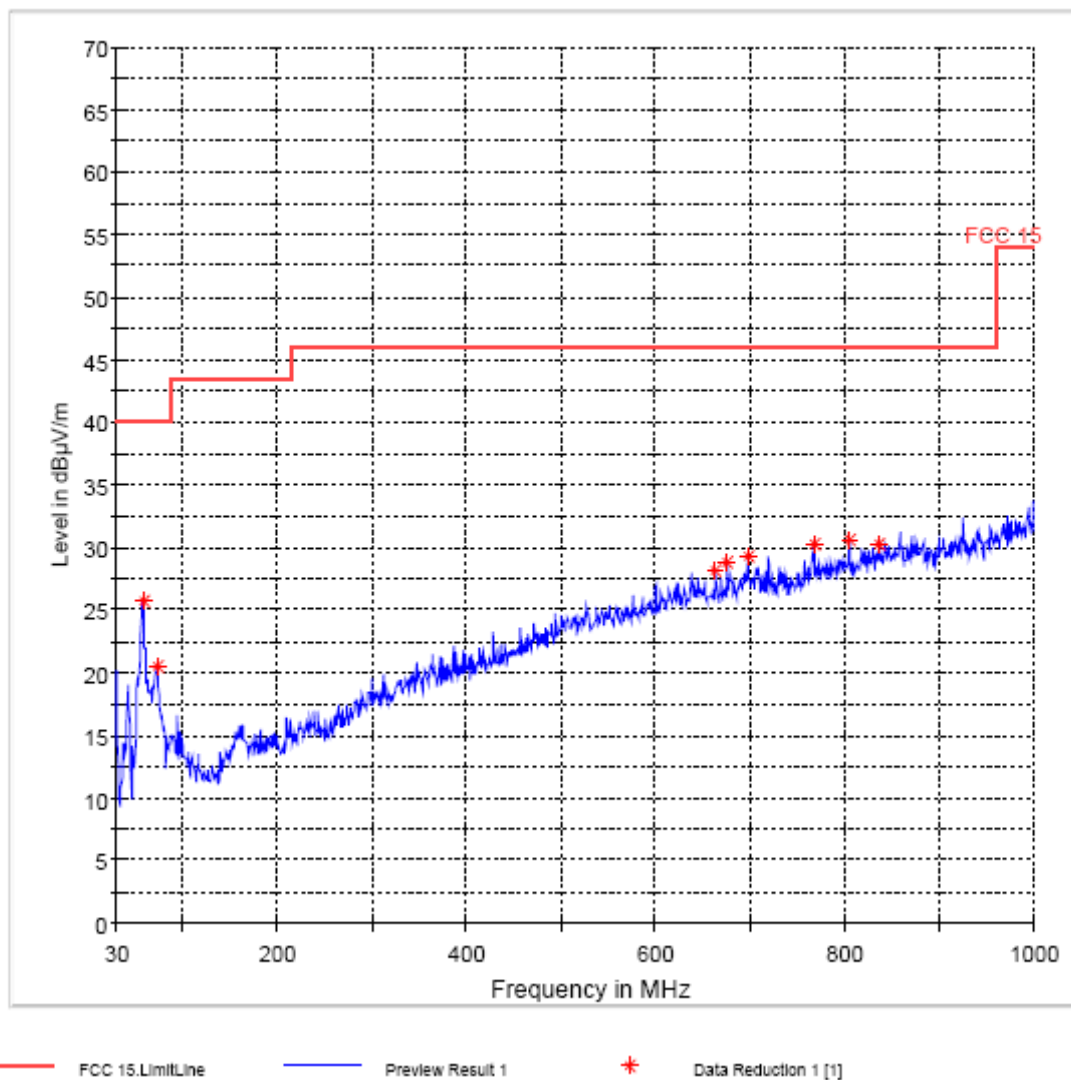
Frequency of emission (MHz)	Field strength (μV/m)
30–88	100 (40dBμV/m)
88–216	150 (43.5 dBμV/m)
216–960	200 (46 dBμV/m)
Above 960	500 (54 dBμV/m)

(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of emission (MHz)	Field strength (μV/m)
30–88	90
88–216	150
216–960	210
Above 960	300

5.5.6.3 Results

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

5.5.6.4 Test Results Receiver Spurious Emission**Receive Mode: 30MHz-1GHz**

Receive Mode: 1GHz-18GHz

EMI Auto Test(1)

1 / 1

EMI Auto Test(1)

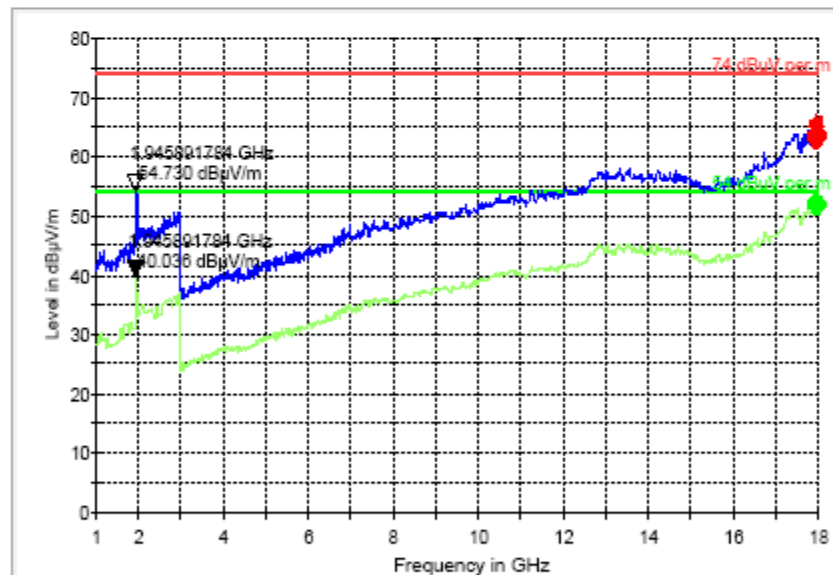
Final Result 1

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Elevation (deg)	Corr. (dB)	Margin (dB)
17923.843060	63.0	20.000	1000.000	145.0	H	158.0	45.0	29.0	11.0
17935.272505	63.6	20.000	1000.000	145.0	V	193.0	90.0	29.6	10.4
17947.432775	63.1	20.000	1000.000	120.0	V	158.0	90.0	30.0	10.9
17953.090282	63.7	20.000	1000.000	120.0	V	8.0	0.0	30.1	10.3
17956.959622	63.4	20.000	1000.000	120.0	V	14.0	45.0	30.1	10.6
17994.127069	63.7	20.000	1000.000	120.0	V	70.0	90.0	29.8	10.3

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

Frequency (MHz)	Limit (dBμV/m)	Comment
17923.843060	74.0	
17935.272505	74.0	
17947.432775	74.0	
17953.090282	74.0	
17956.959622	74.0	
17994.127069	74.0	

FCC 15 1-18GHz



5.6 AC Power Line Conducted Emissions

5.6.1 §15.207 Conducted limits- Intentional Radiators:

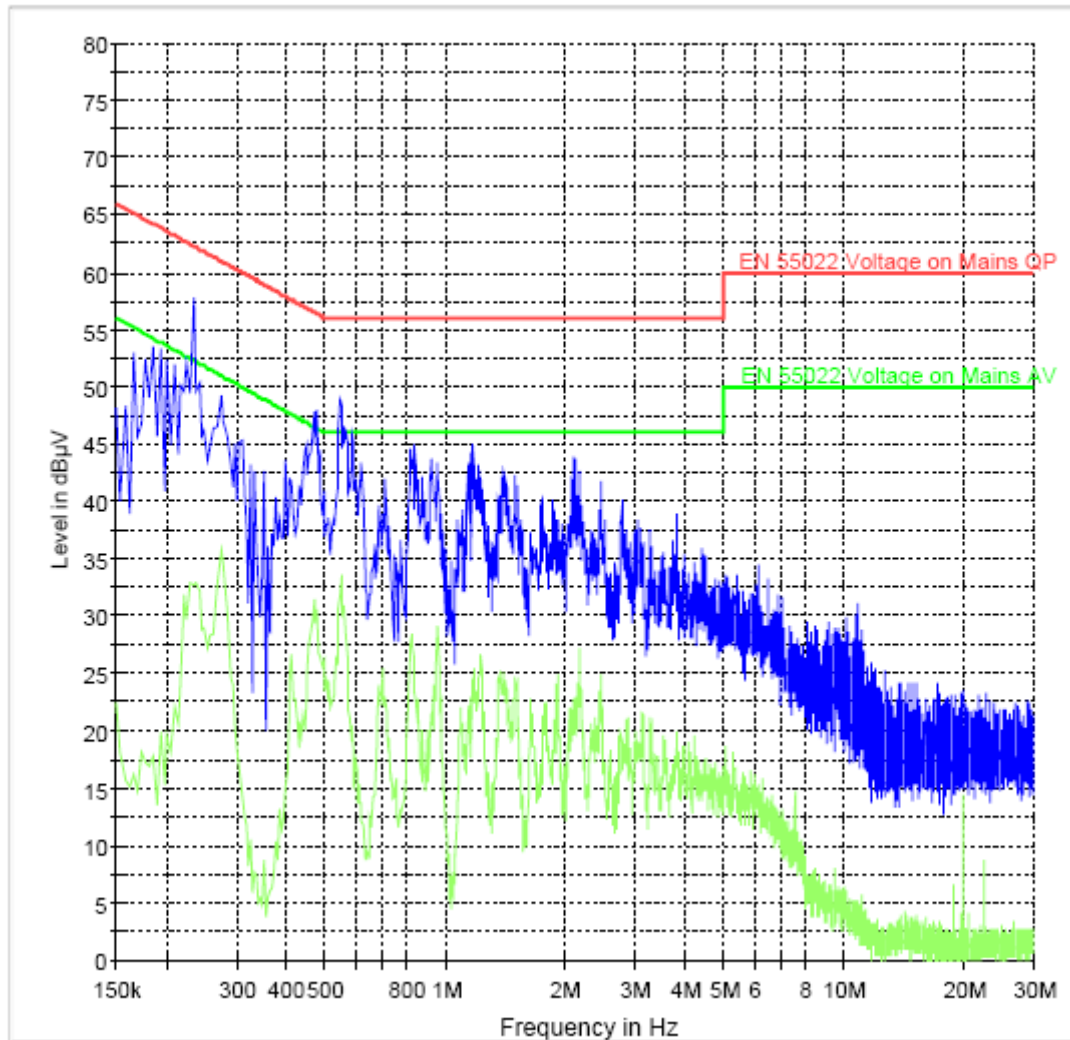
(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ 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.

Frequency of emission (MHz)	Conducted limit (dB μ 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 the logarithm of the frequency.

Analyzer Settings: RBW = 10KHz; VBW = 10KHz

5.6.2 Test Results: PCS 1900 Transmit



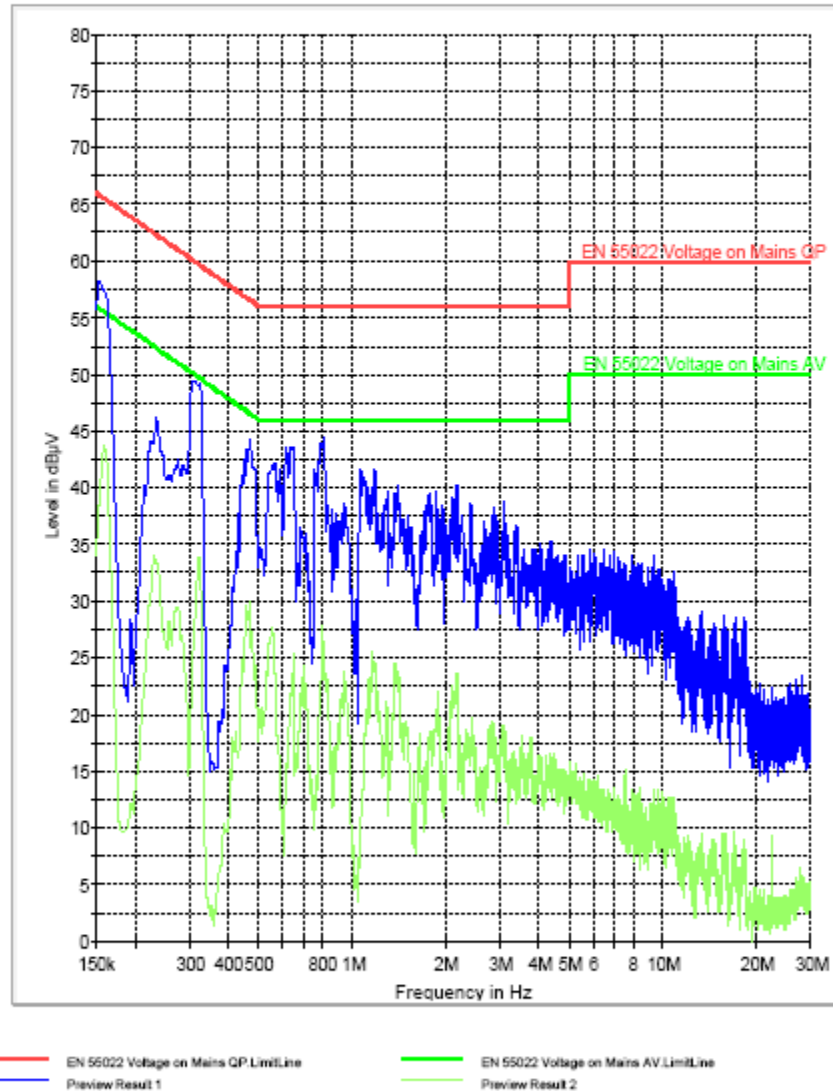
FDD V Transmit

EMI Auto Test(1)

1 / 1

EMI Auto Test(1)

CISPR 22 Mains Conducted



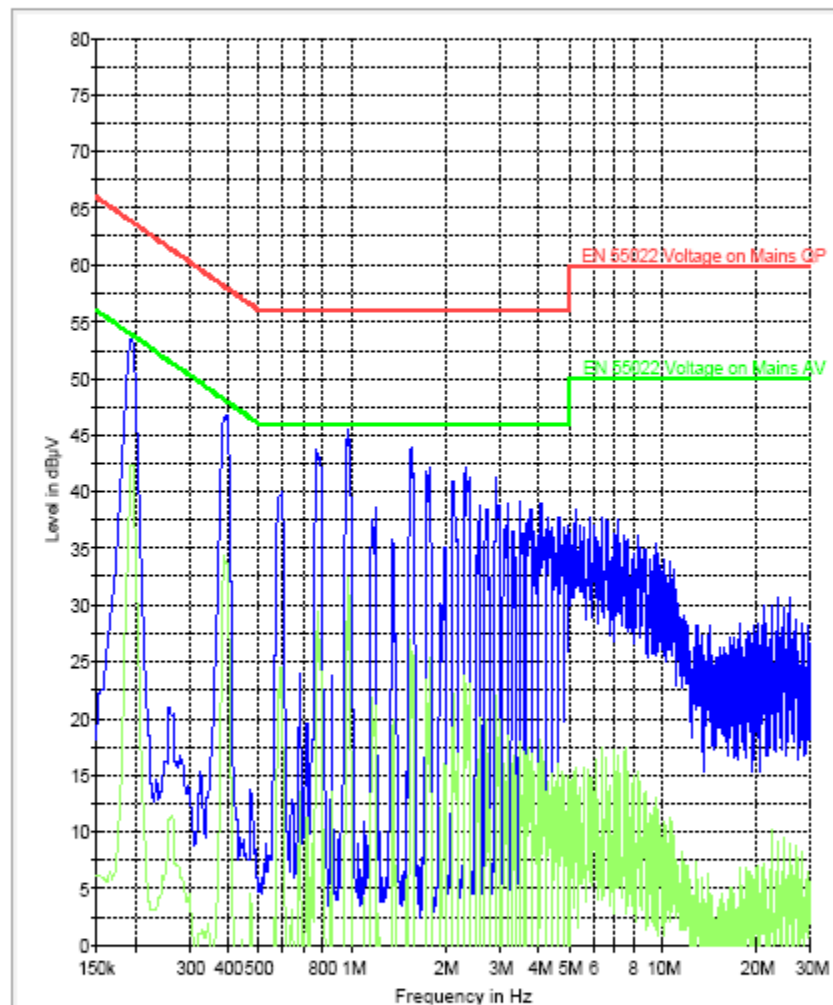
Receive

EMI Auto Test(1)

1 / 1

EMI Auto Test(1)

CISPR 22 Mains Conducted



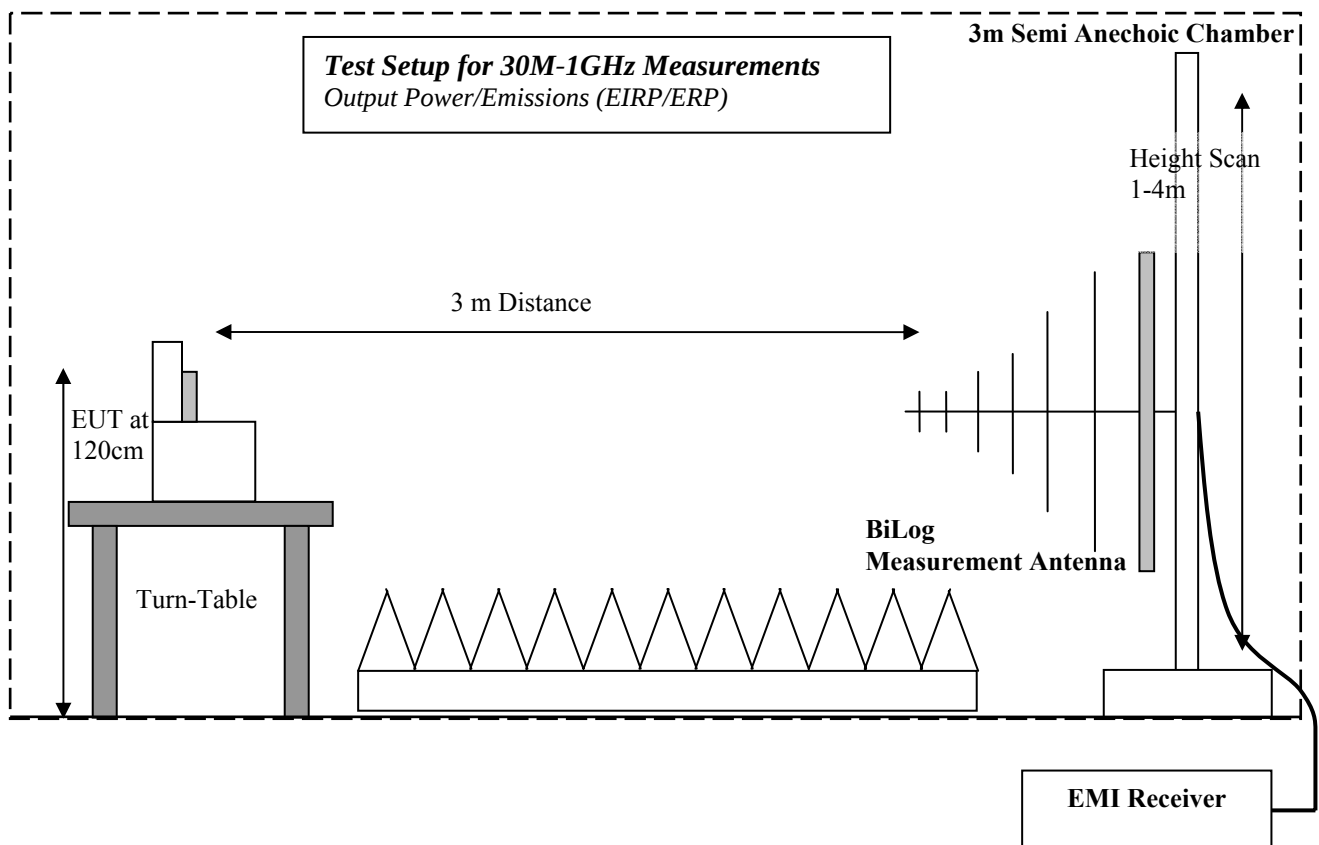
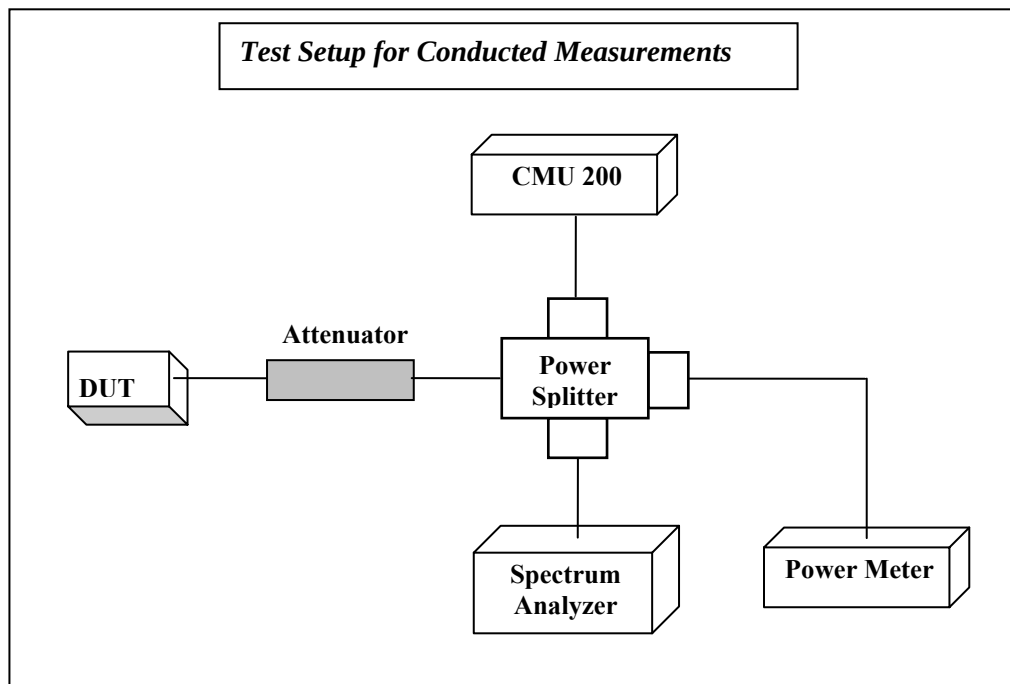
EN 55022 Voltage on Mains QP Limit Line
Preview Result 1

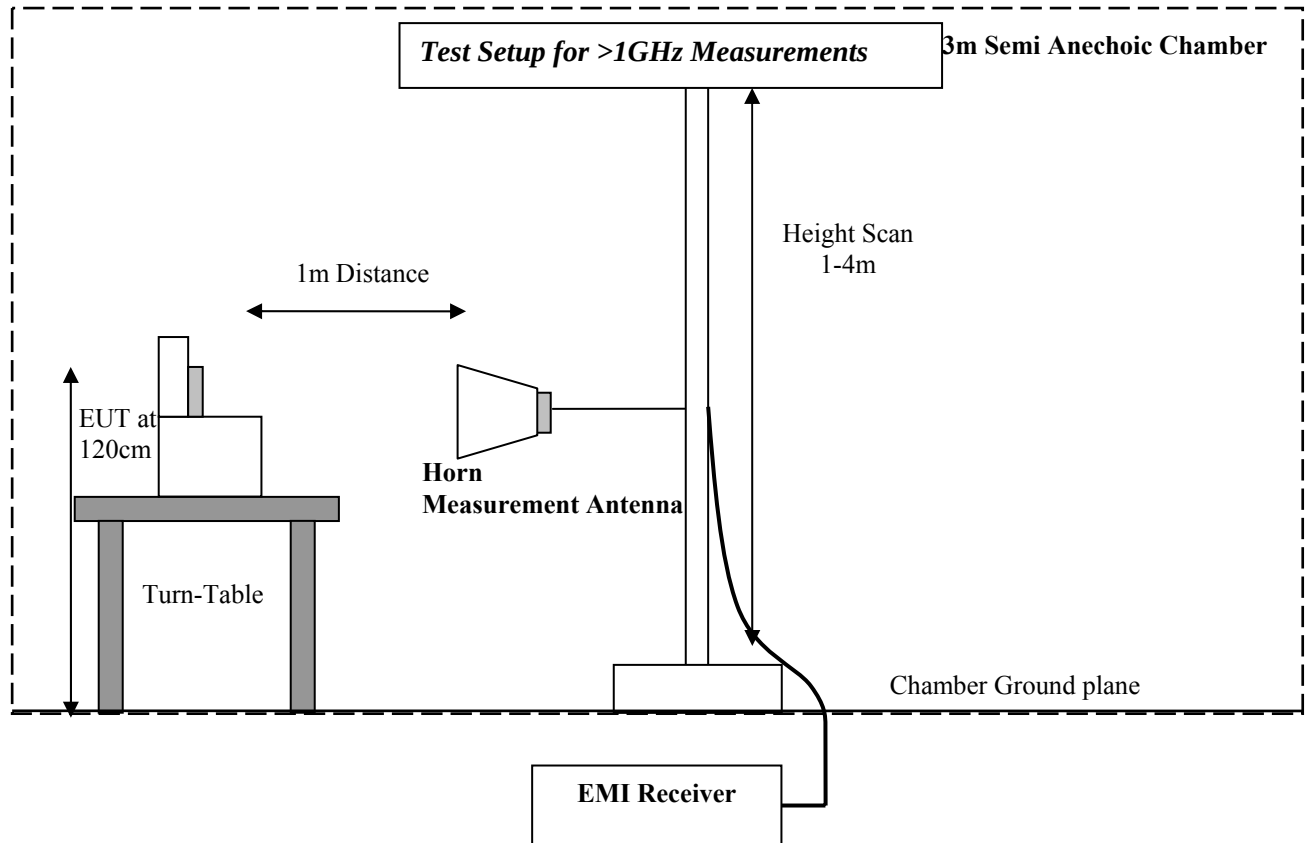
EN 55022 Voltage on Mains AV Limit Line
Preview Result 2

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	May 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	Voltsch	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 Block Diagrams





8 Revision History

Date	Report Name	Changes to report	Report prepared by
2010-04-07	EMC_001_09003_FCC22_24	Original Report	Satya Radhakrishna