FCC Test Report

FCC Part 22, 24

Model #: A1303
FCC ID: BCGA1303A

Apple Inc.
1 Infinite Loop Mail Stop26A
Cupertino, California 95014
U.S.A

TEST REPORT #: EMC_APPLE_047_09001_FCC22_24_BCGA1303A
DATE: 2009-05-27

Certificate # 2135.01

Bluetooth Qualification Test Facility (BQTF)

LAB CODE 20020328-00

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 ◆ 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

Table of Contents

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 #
Apple Inc.	This device is a GSM and WCDMA smart handset with WiFi, Bluetooth +EDR and iPod and application functions	A1303

Technical responsibility for area of testing:

Date	Section	Name	Signature
2009-05-27	EMC & Radio	Heiko Strehlow (Director Antenna & Regulatory Services)	Heiko Strehlow Digitally signed by Heiko Strehlow DN: cn=Heiko Strehlow, c=US, o=CETECOM Inc., email=heiko.strehlow@cetecomusa.com Date: 2009.05.28 16:22:42 -07'00'

This report is prepared by:

Date	Section	Name	Signature
2009-05-27	EMC & Radio	Marc Douat (Test Lab Manager)	Marc Douat I am the author of this document

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:	**CETECOM Inc.**
Department:	**EMC**
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:	**Marc Douat**
Date of test:	**2009-04-21 to 2009-04-24**

2.2 Identification of the Client

Applicant's Name:	**Apple Inc.**
Address Line 1:	**1 Infinite Loop**
Address Line 2:	**Mail Stop 26A**
City/ Zip Code	**Cupertino, California 95014**
Country:	**USA**
Contact Person:	**Robert Steinfeld**
Phone No.:	**408-974-2618**
Fax:	**408-862-5061**
e-mail:	**steinfe1@apple.com**

2.3 Identification of the Manufacturer

Same as above applicant

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name of EUT (if not same as Model No.)	**iPhone 3G**
Model No.	**A1303**
FCC-ID	**BCGA1303A**
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:	**PIFA**
Max. Output Power:	**Conducted GSM850 GMSK: 32.69dBm, 1858mW** **Conducted GSM850 8PSK: 30.60dBm, 1148mW** **Conducted UMTS FDD5: 28.42dBm, 695.02mW** **Conducted GSM1900 GMSK: 30.60dBm, 1148mW** **Conducted GSM1900 8PSK: 30.55dBm, 1135mW** **Conducted UMTS FDD2: 25.06dBm, 320.63mW** **Radiated GSM850 GMSK:30.96dBm, 1247.38mW** **Radiated GSM850 8PSK; 28.7dBm, 741.31mW** **Radiated UMTS FDD5: 25.37dBm, 344.35mW** **Radiated GSM1900 GMSK: 28.6dBm, 724.44mW** **Radiated GSM1900 8PSK: 26.16dBm, 413.05mW** **Radiated UMTS FDD2: 25.85dBm, 255.86mW**

3.2 Identification of the Equipment Under Test (EUT)

EUT #	TYPE	MANF.	MODEL
1	Radiated Sample	Apple Inc.	A1303
2	Condcuted Sample	Apple Inc.	A1303

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL
1	AC/DC ADAPTER	Flextronics	A1265

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.

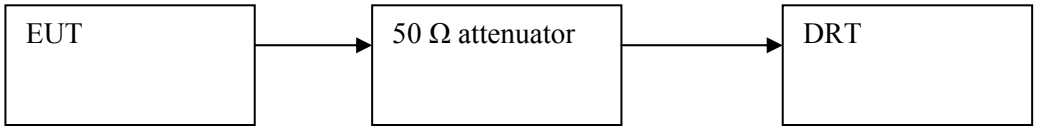
5.1.2.2 FCC 24.232 (b)(c) Power limits.

(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

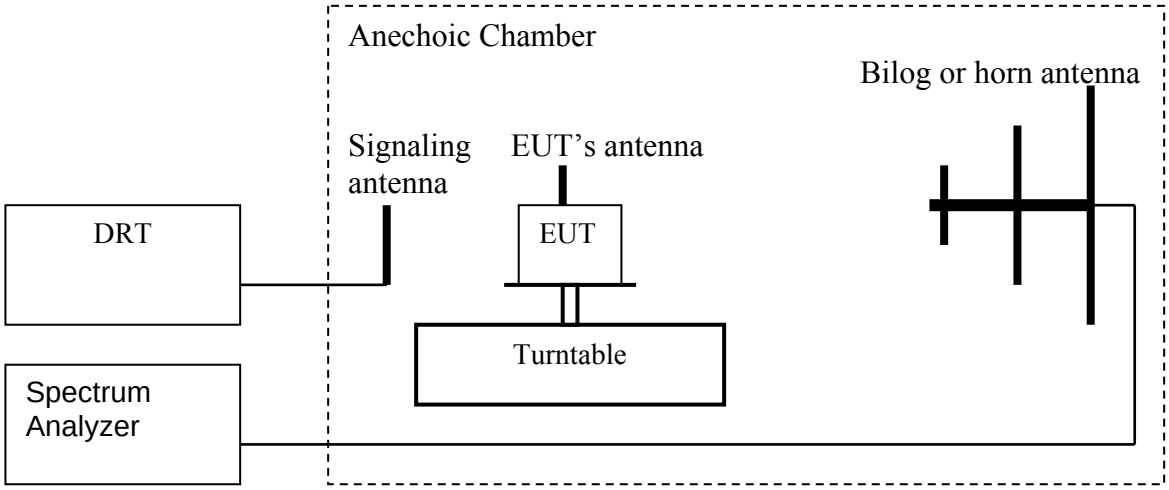
2.2.1 Conducted Carrier Output Power Rating



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 Mmeasurement 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:
   ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band. **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)		
	Peak	Average	Peak to Average ratio(dB)	Peak	Average	Peak to Average ratio(dB)
824.2	32.69	32.53	0.16	30.60	27.62	2.98
836.6	32.64	32.45	0.19	30.54	27.56	2.98
848.8	32.51	32.42	0.09	30.45	27.53	2.92

Frequency (MHz)	Conducted Peak Power (dBm)	
	UMTS FDD5	
	Peak	Average
836.4	28.42	25.40
836.6	27.93	25.14
846.6	28.42	25.36

5.1.6 Conducted Peak Power 1900 MHz band

Frequency (MHz)	Conducted Peak Power (dBm)					
	GSM (GMSK)			EGPRS (8PSK)		
	Peak	Average	Peak to Average ratio(dB)	Peak	Average	Peak to Average ratio(dB)
1850.2	30.60	30.42	0.18	30.55	24.87	5.68
1880.0	30.58	30.39	0.19	30.55	24.87	5.68
1909.8	30.28	30.07	0.21	30.28	24.91	5.37

Frequency (MHz)	Conducted Peak Power (dBm)	
	UMTS FDD2	
	Peak	Average
1852.4	25.06	21.58
1880	25.06	21.70
1907.6	24.20	20.73

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	28.91	26.42
836.6	30.96	27.9
848.8	30.91	28.7

Frequency (MHz)	Effective Radiated Power (dBm)
	UMTS FDD5
836.4	24.3
836.6	24.68
846.6	25.37

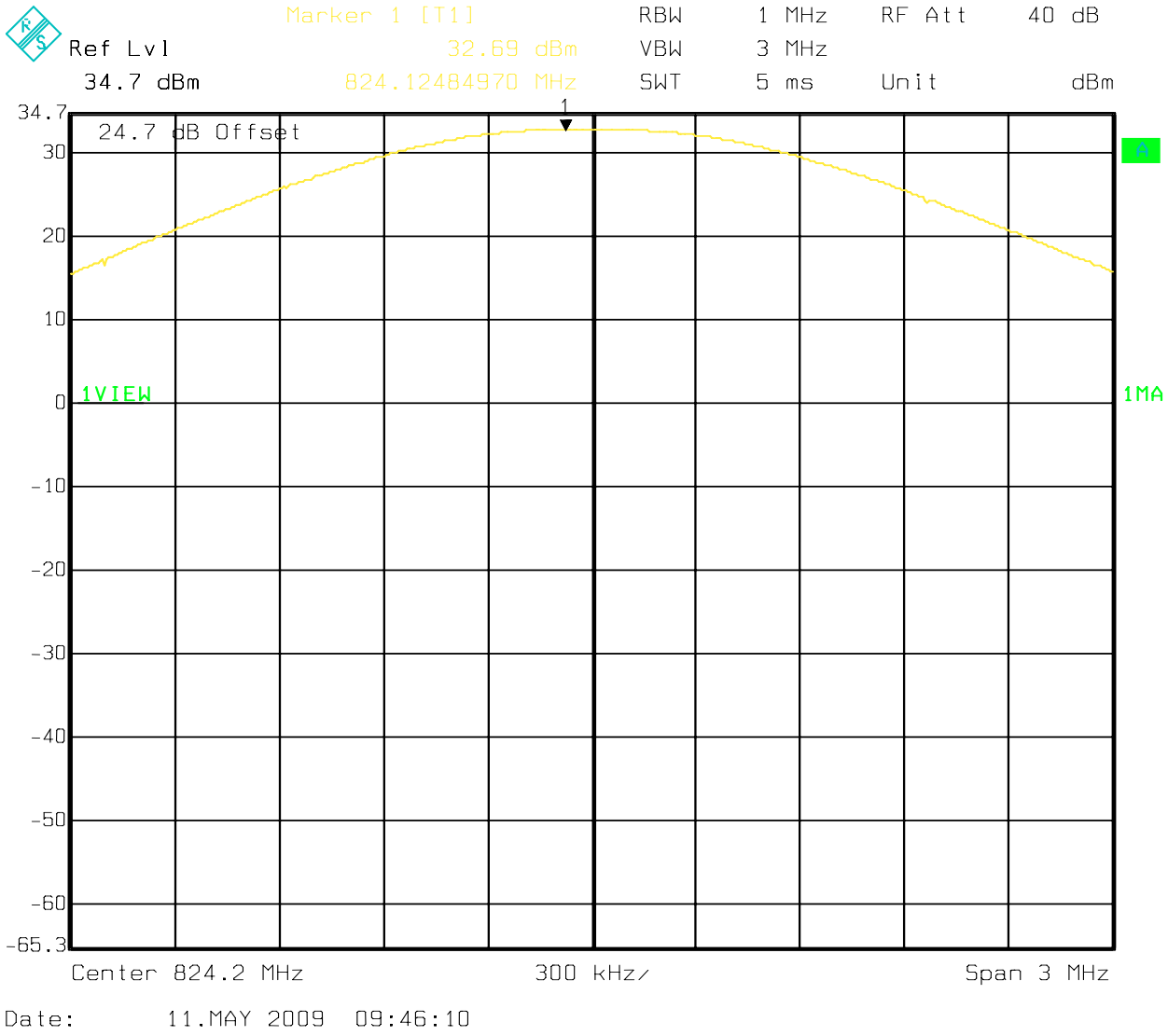
5.1.8 EIRP Results 1900 MHz band:

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

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)	
	GSM (GMSK)	EGPRS (8PSK)
1850.2	28.4	25.62
1880.0	28.6	26.16
1909.8	28.4	25.37

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)
	UMTS FDD2
1852.4	23.35
1880	24.08
1907.6	24

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



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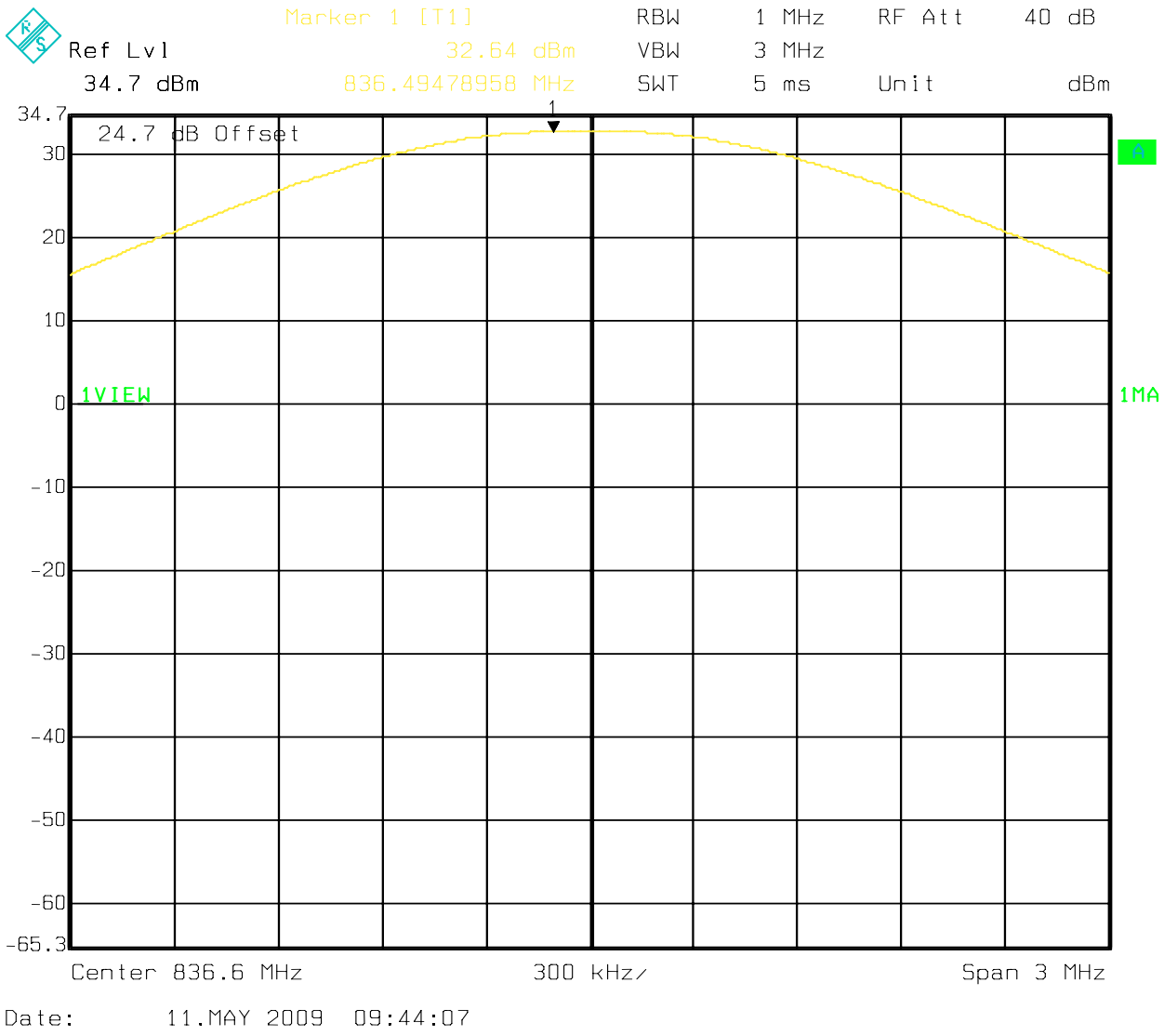

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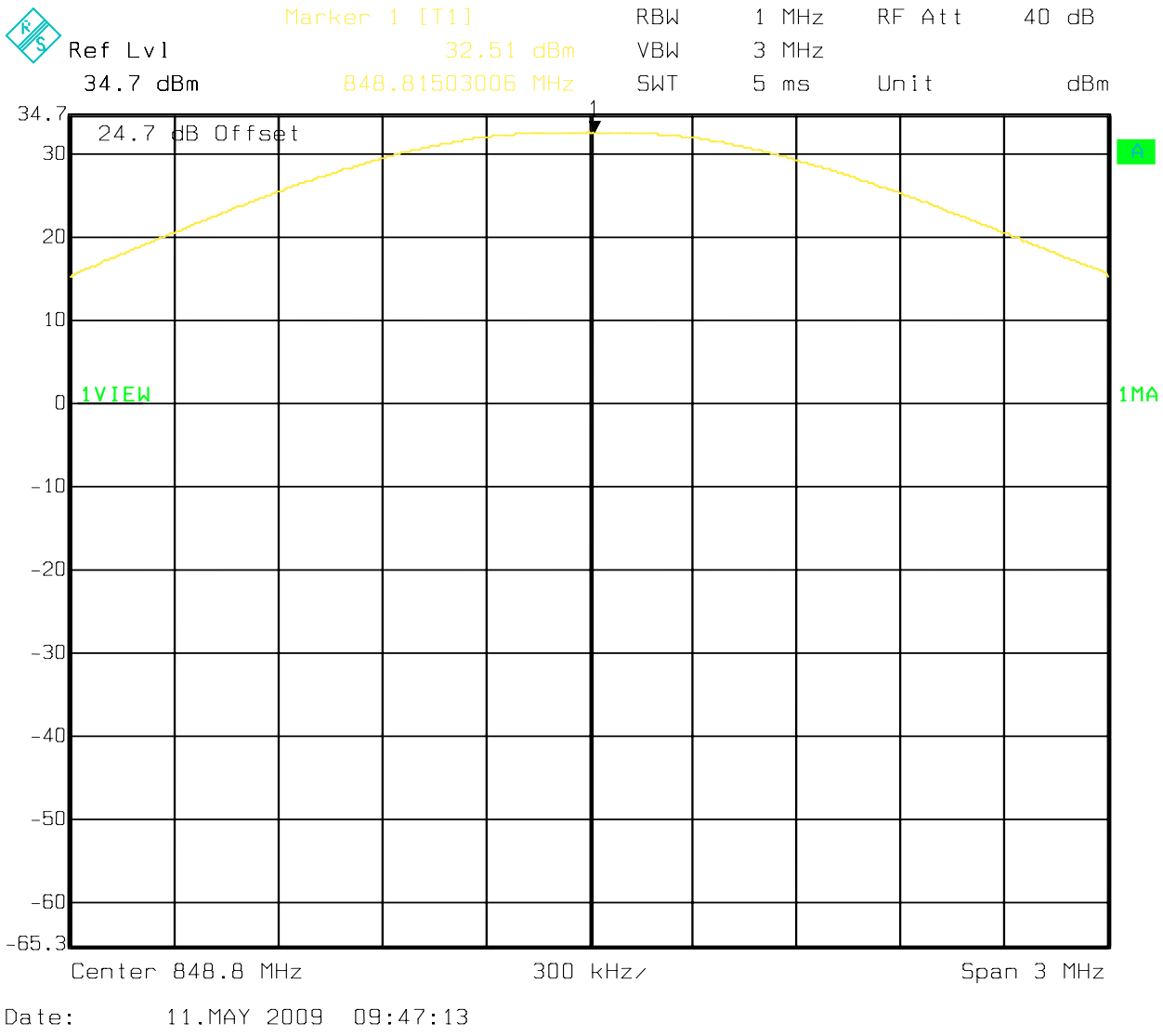

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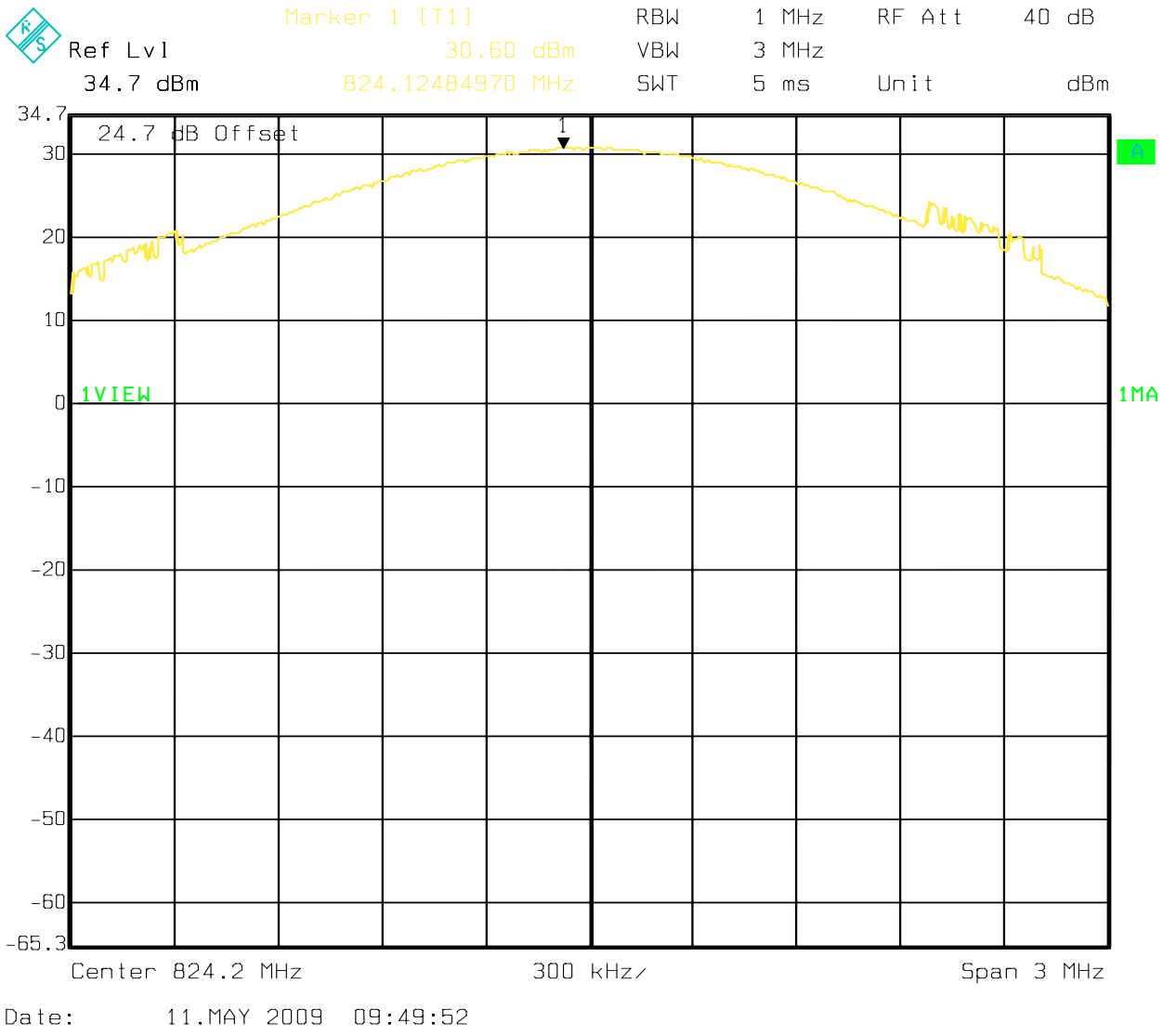

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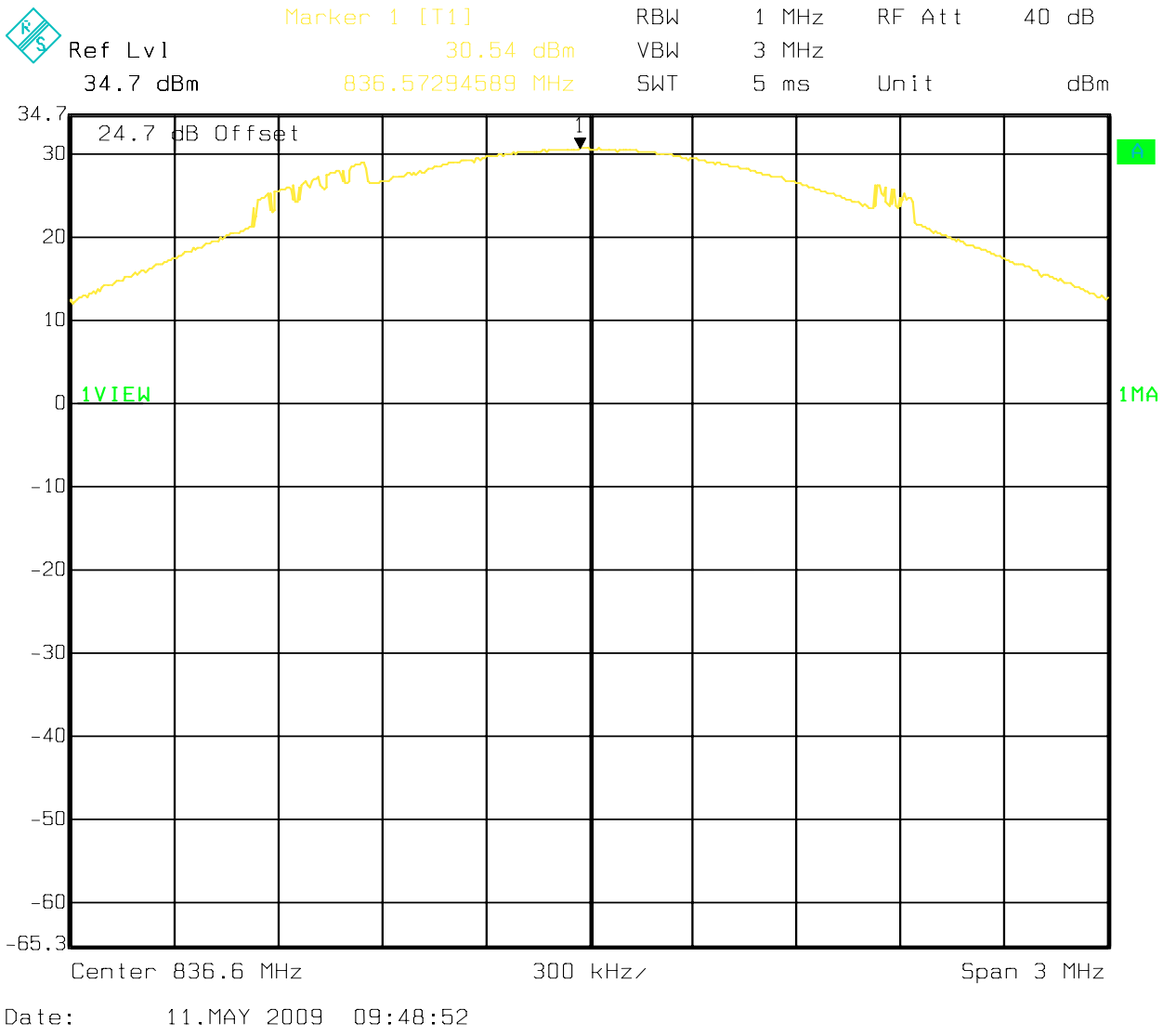

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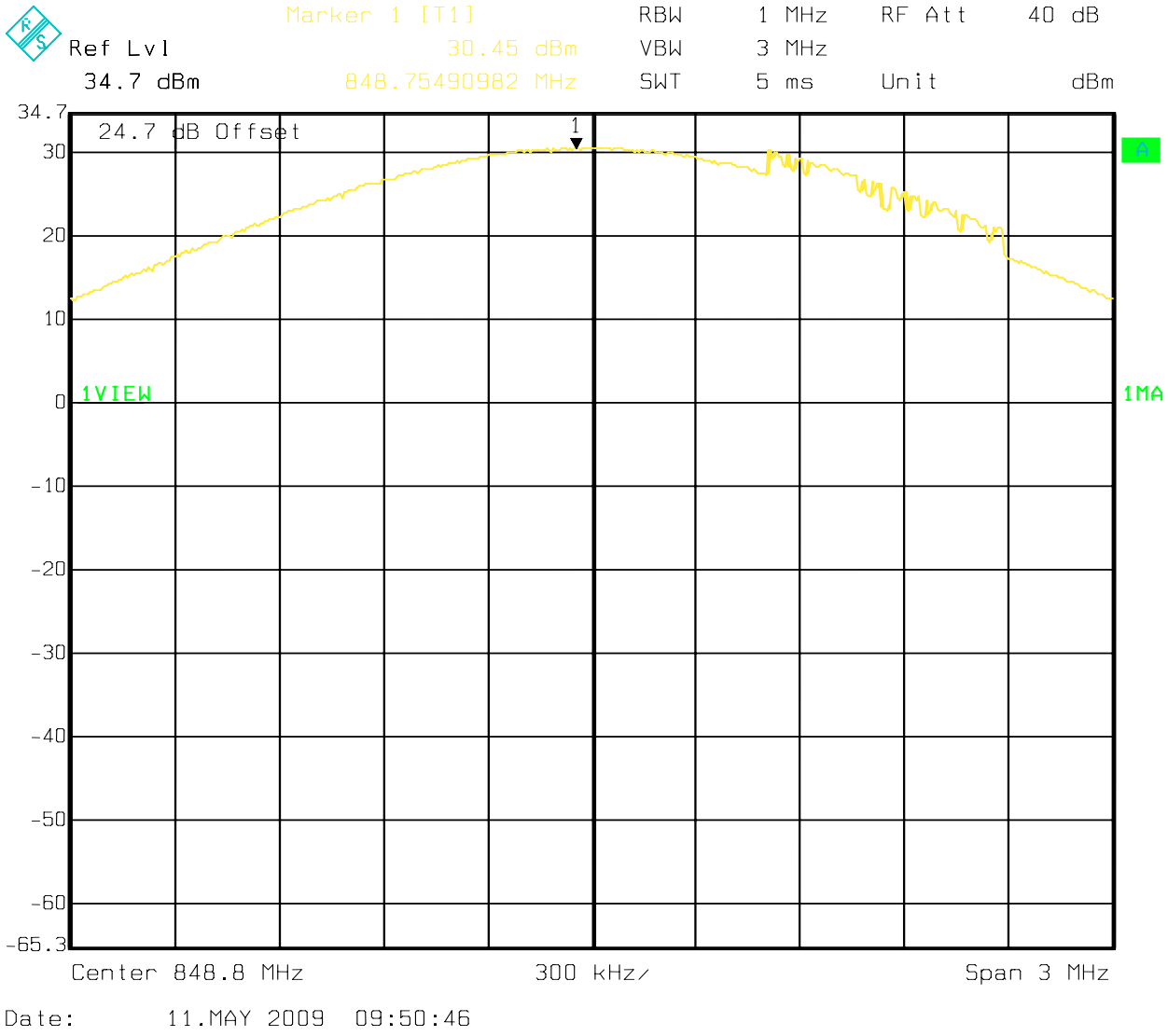
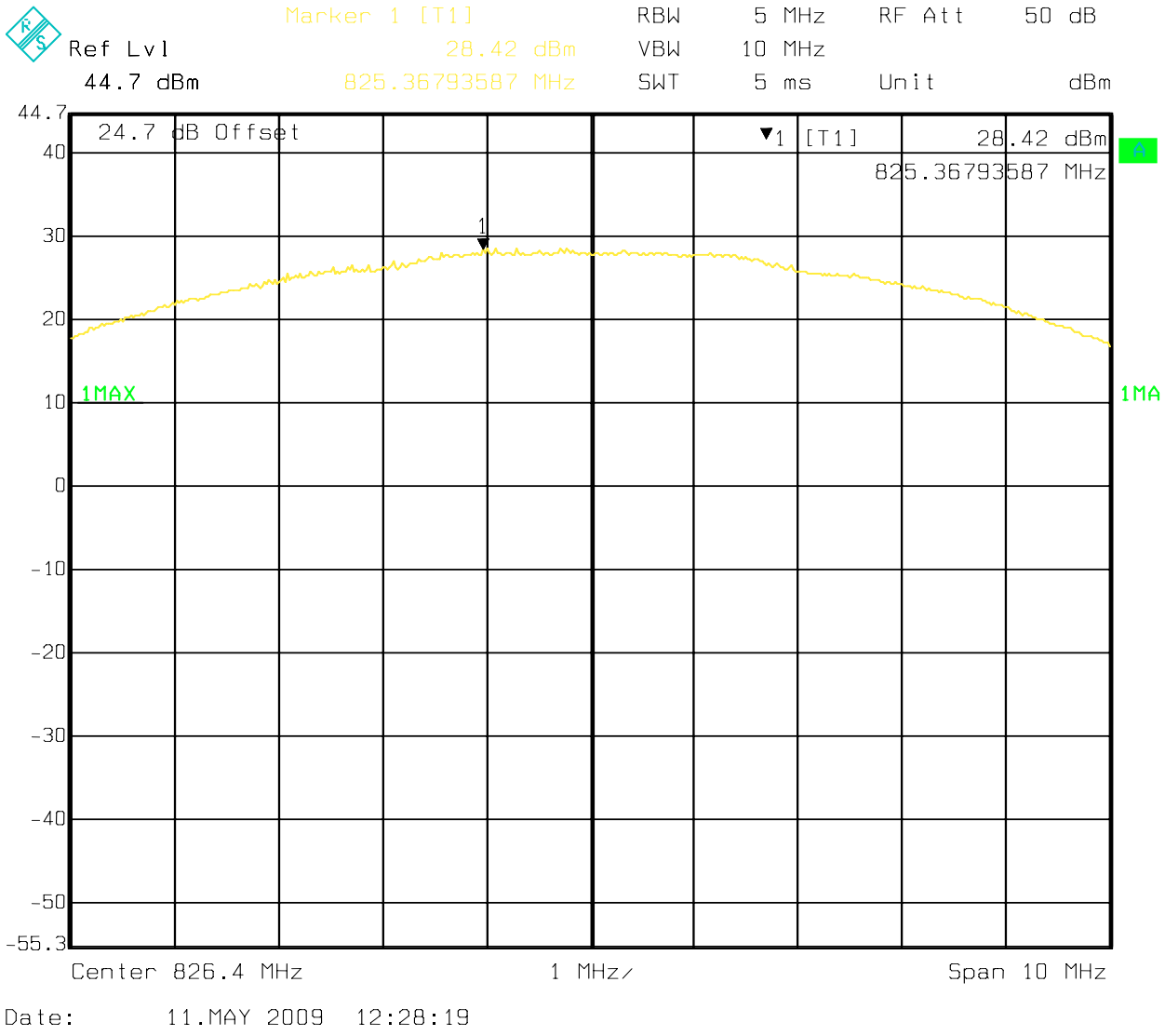


CONDUCTED PEAK POWER (UMTS FDD5) CHANNEL 4132 §22.913(a)



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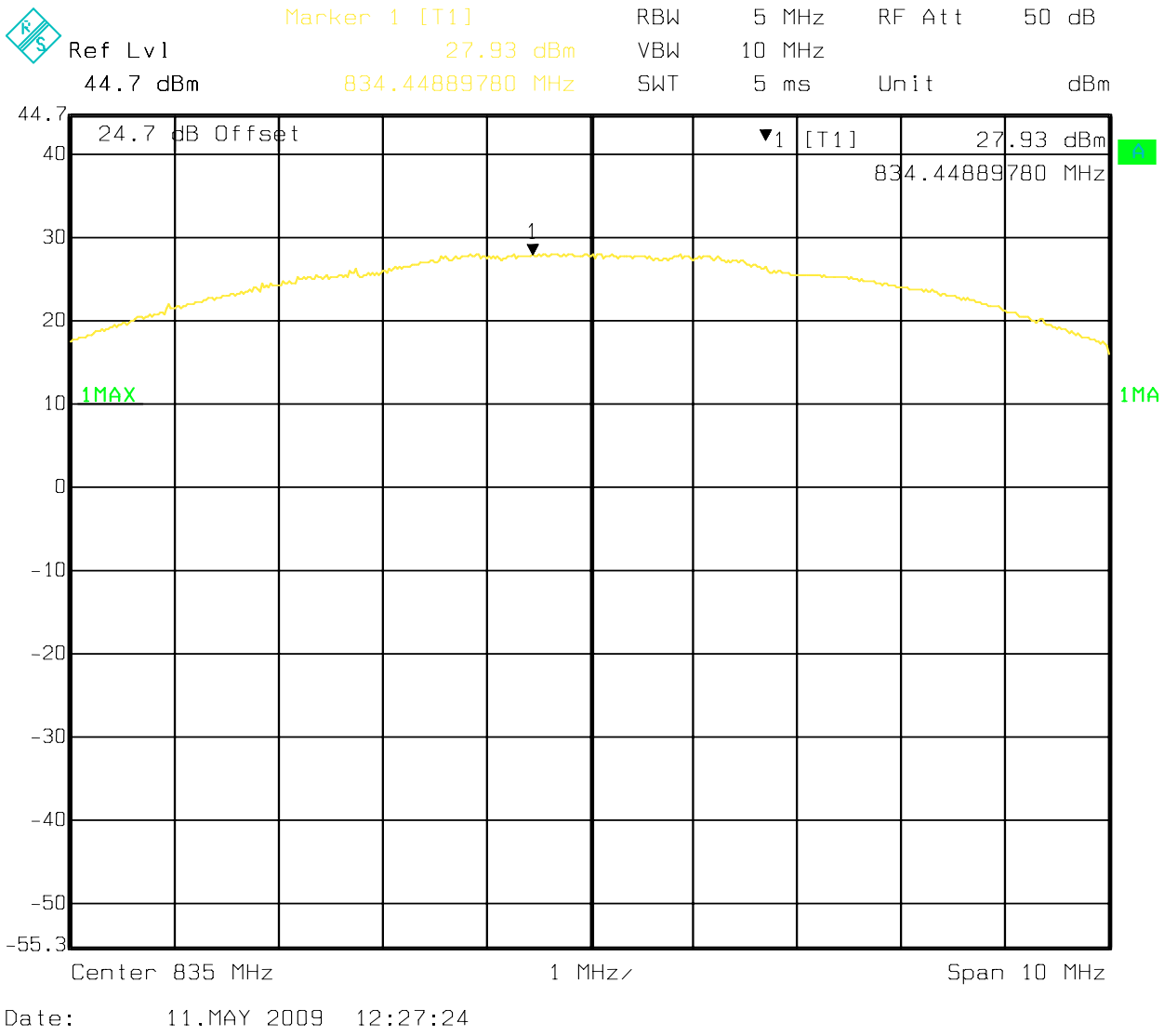

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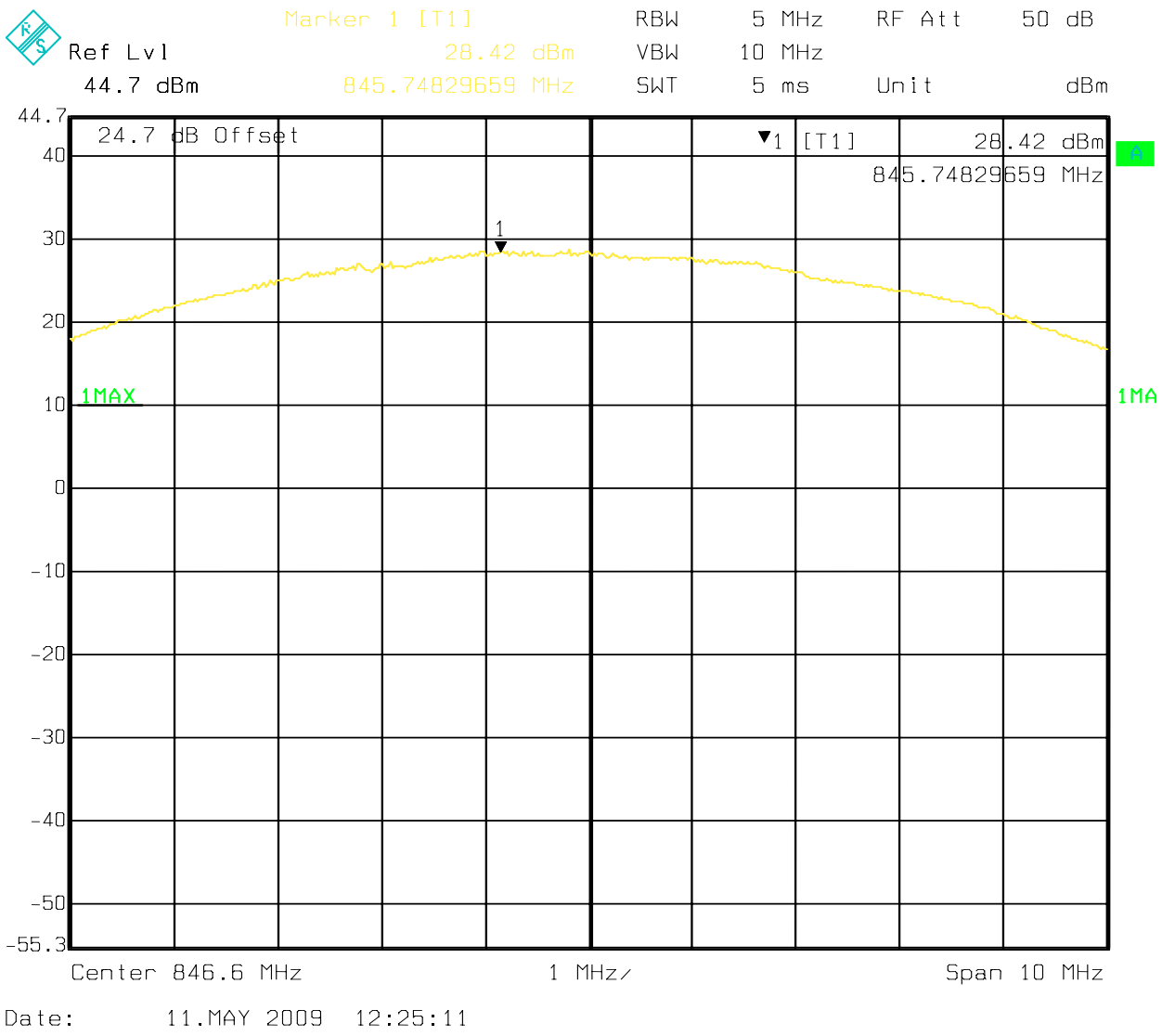

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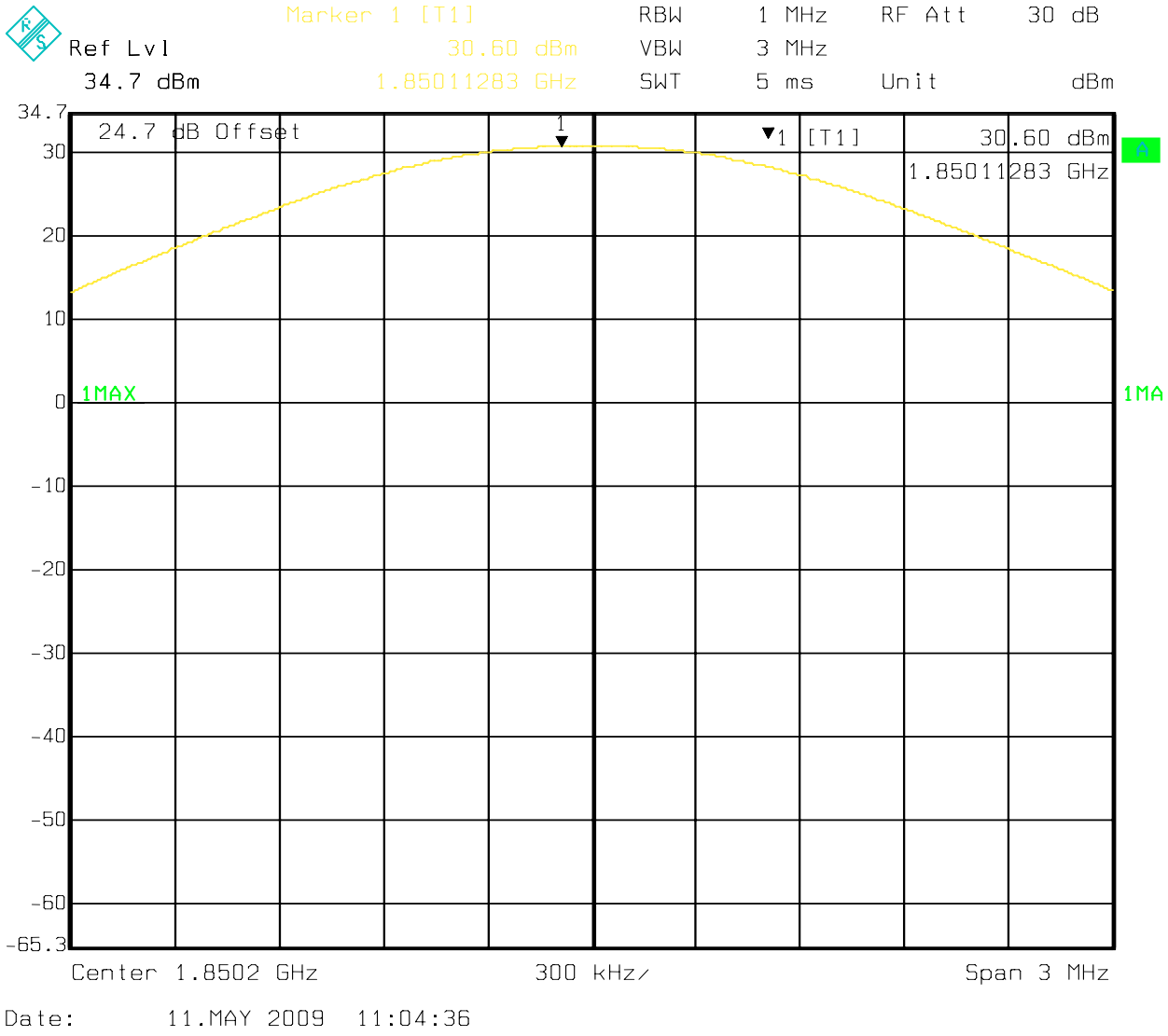
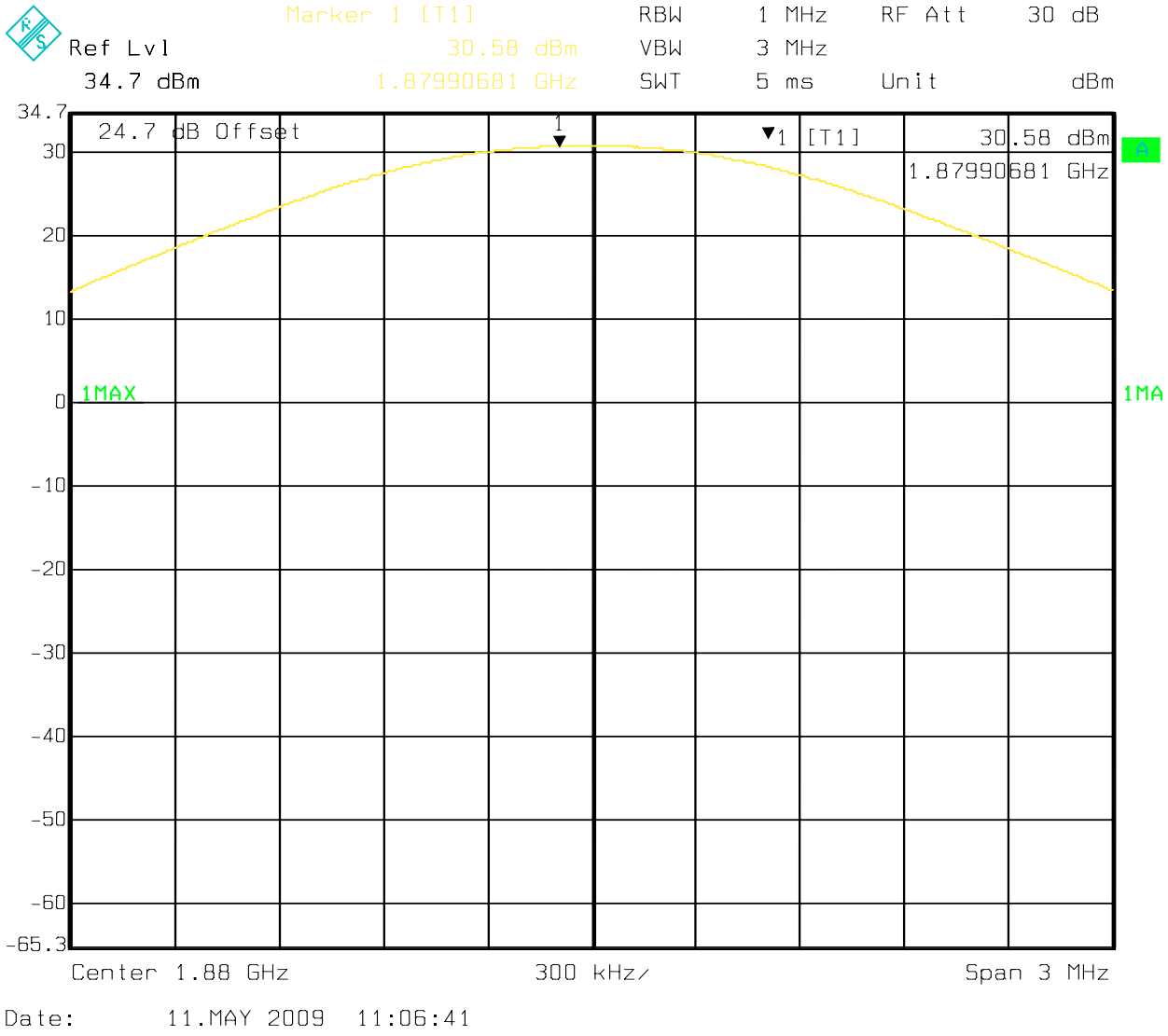


CONDUCTED PEAK POWER (PCS-1900) CHANNEL 661 §24.232(b)



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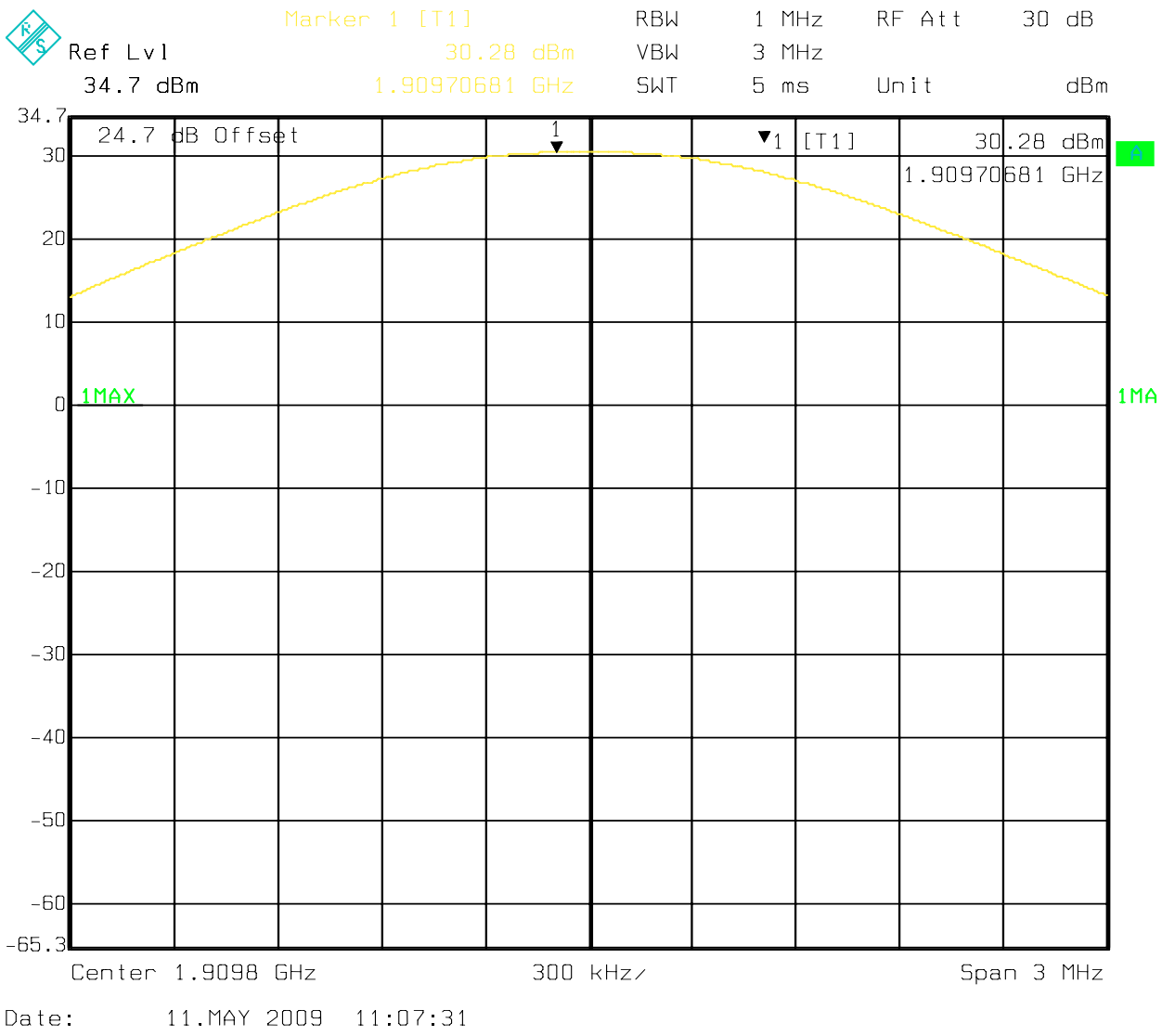

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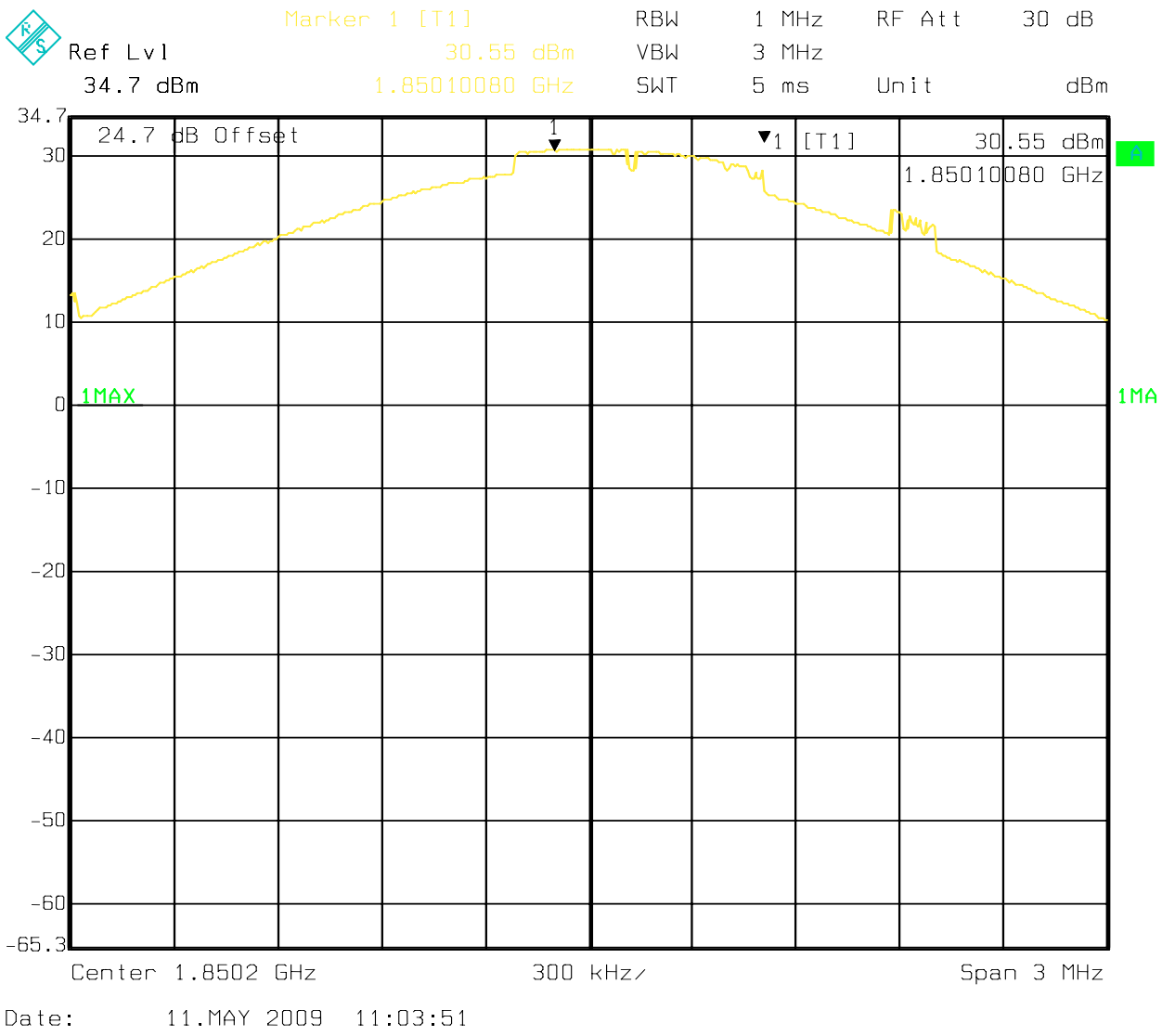
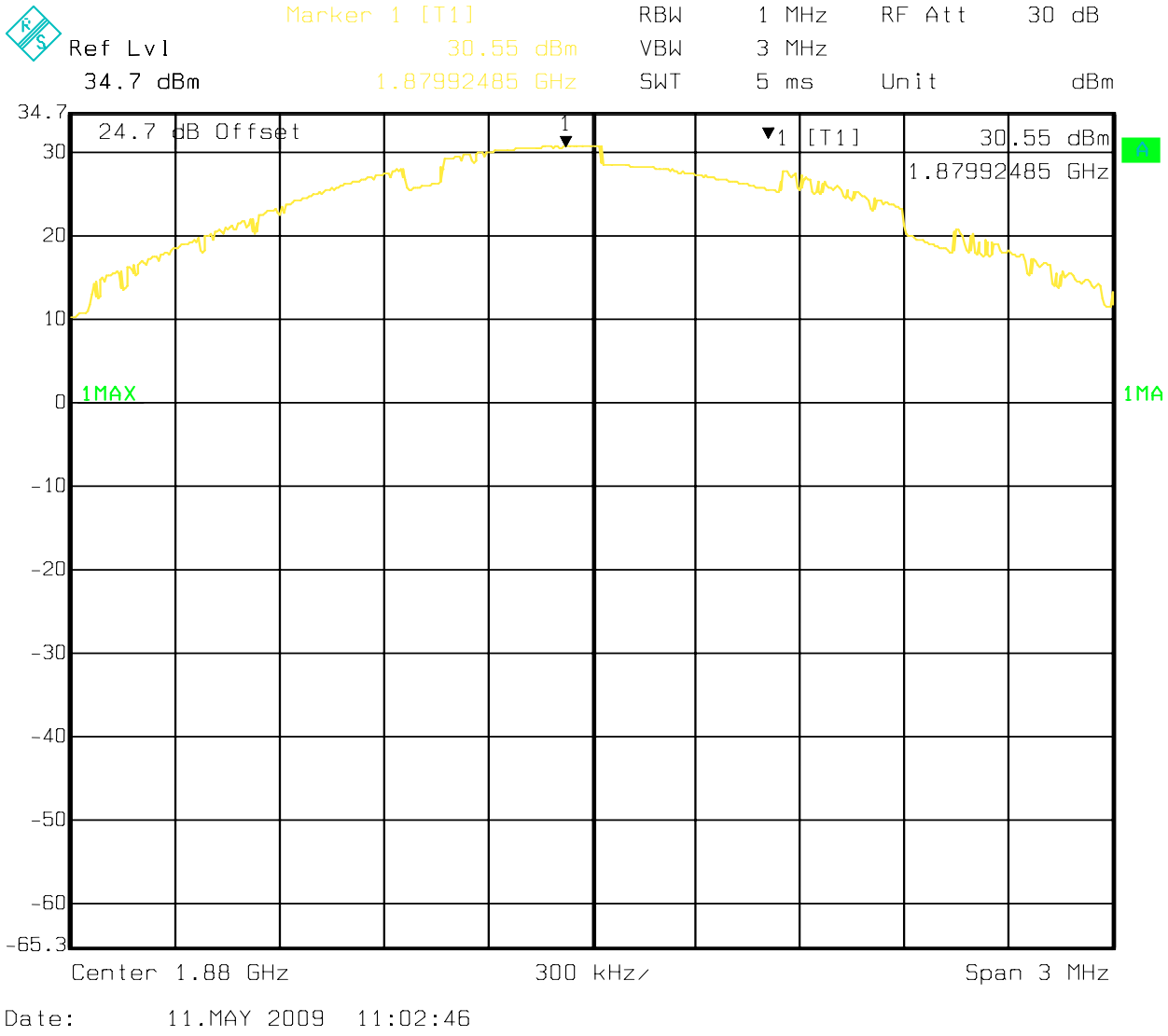


CONDUCTED PEAK POWER (GPRS 1900) CHANNEL 661 §24.232(b)



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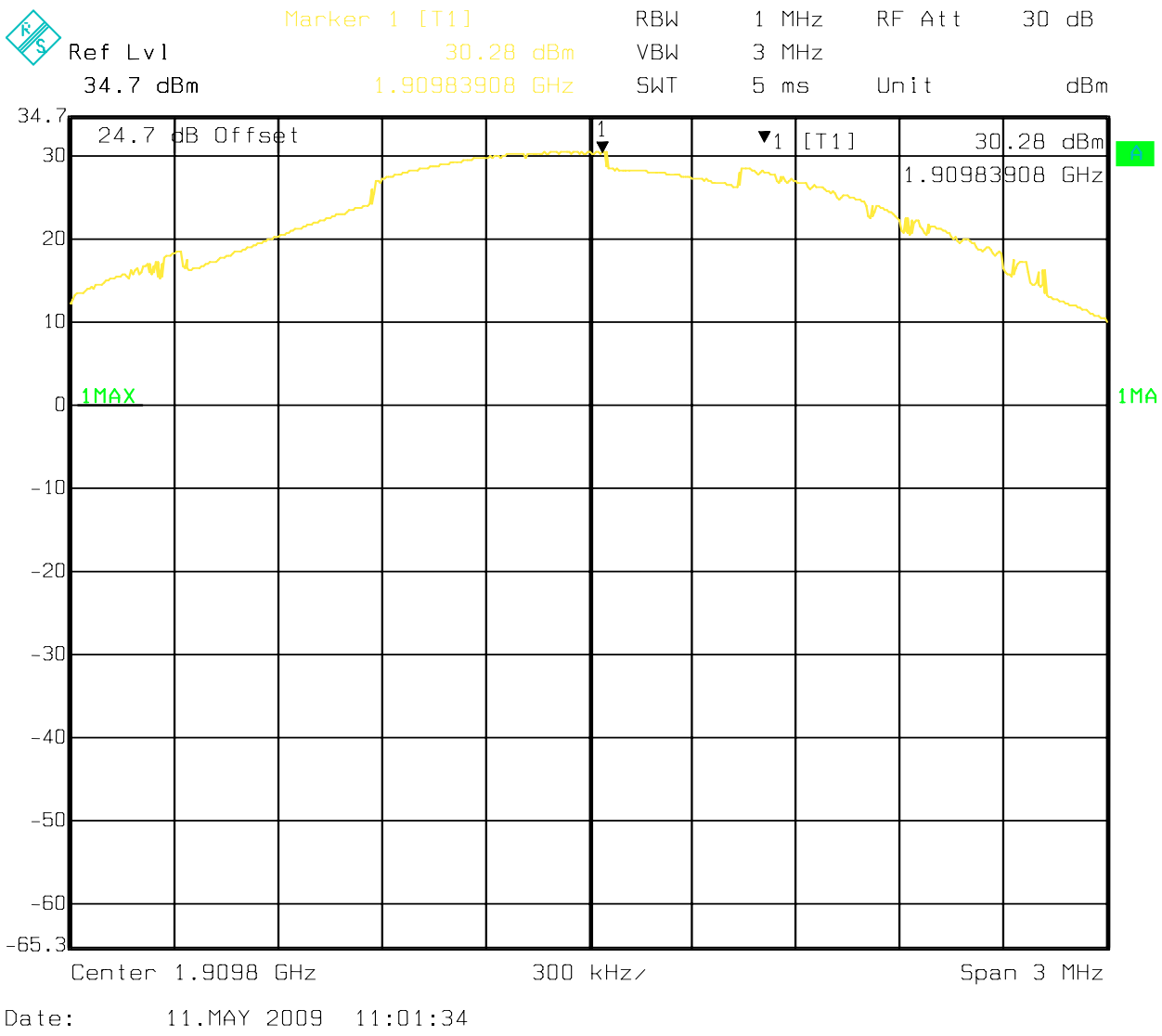

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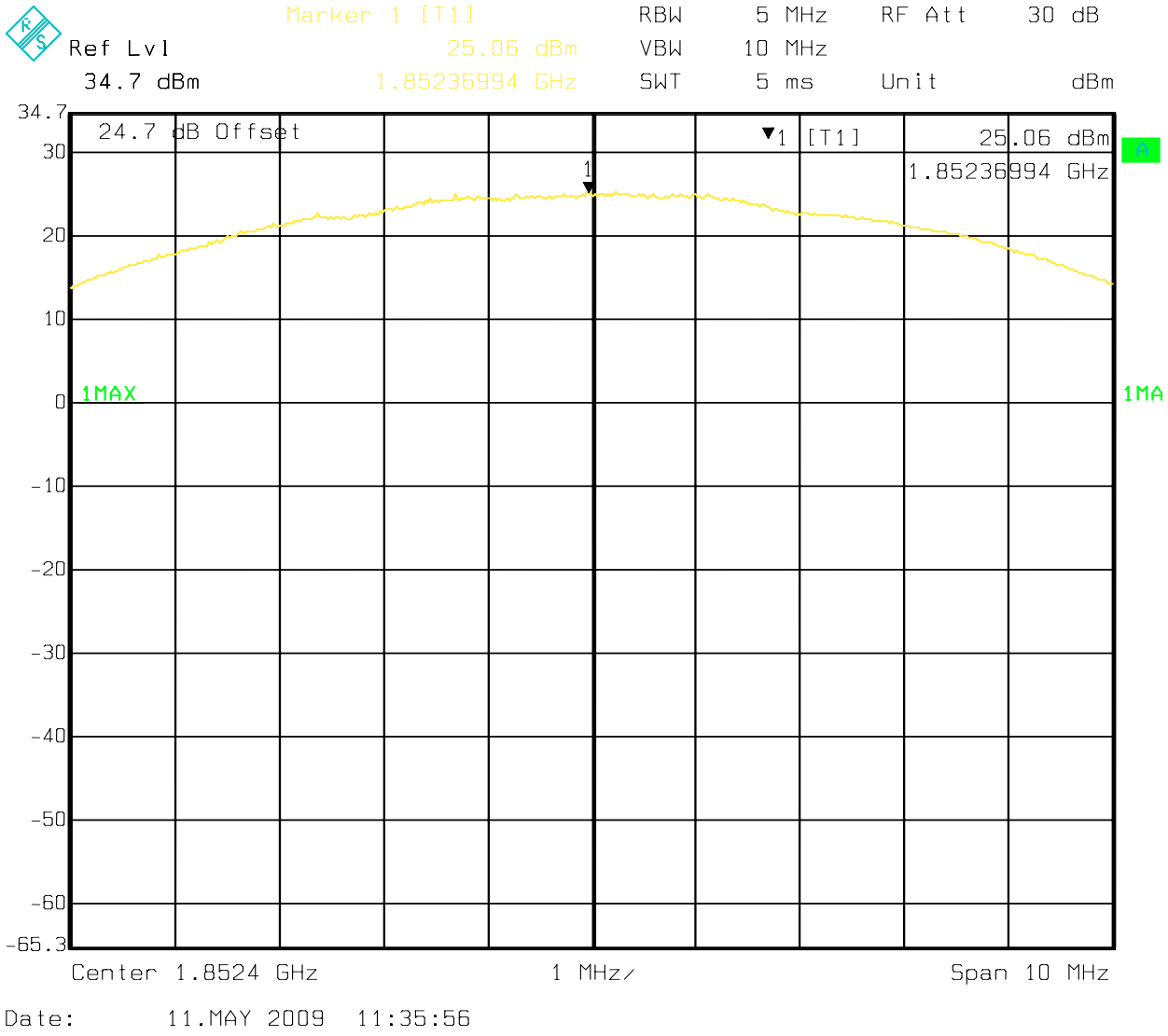

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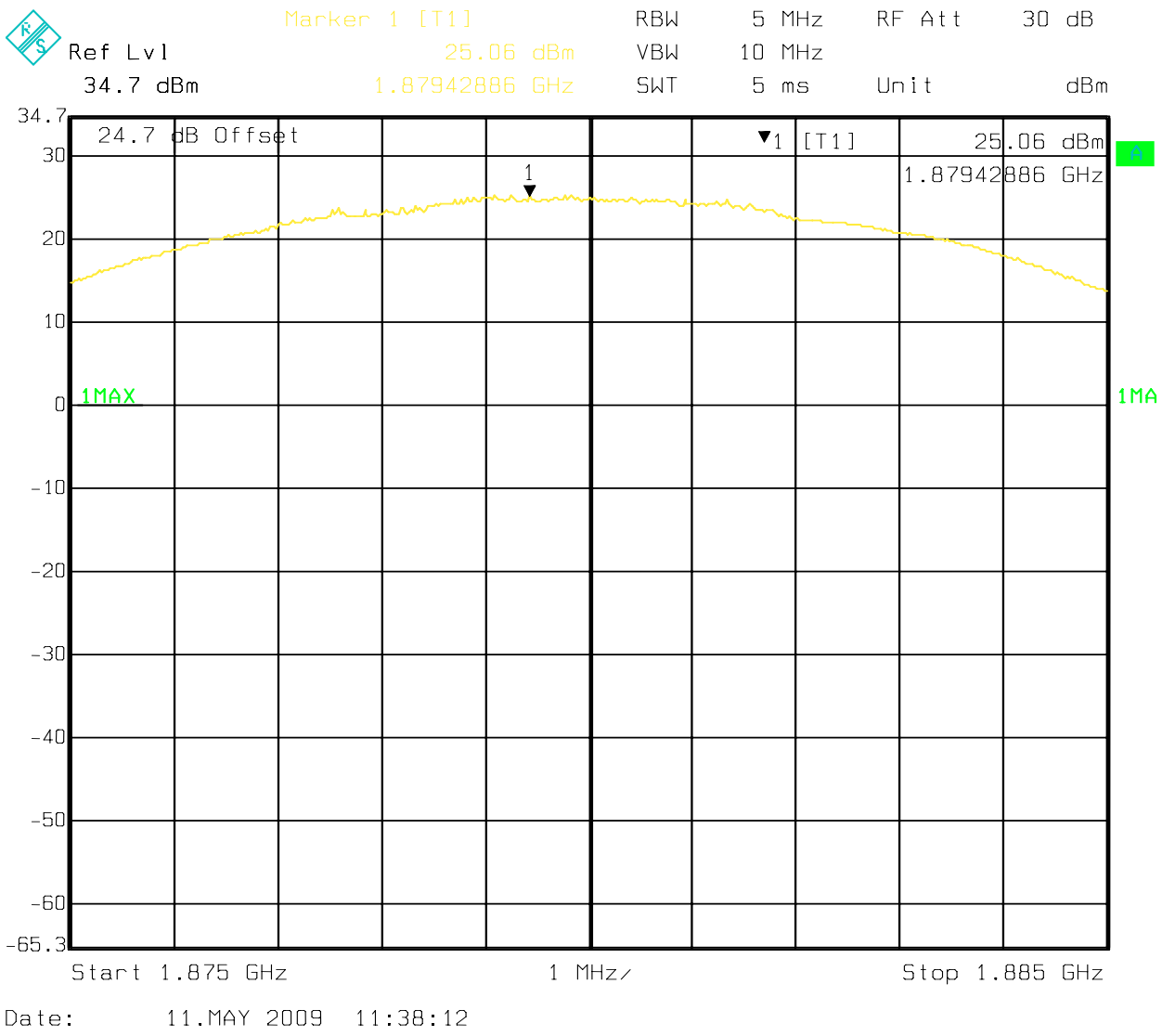

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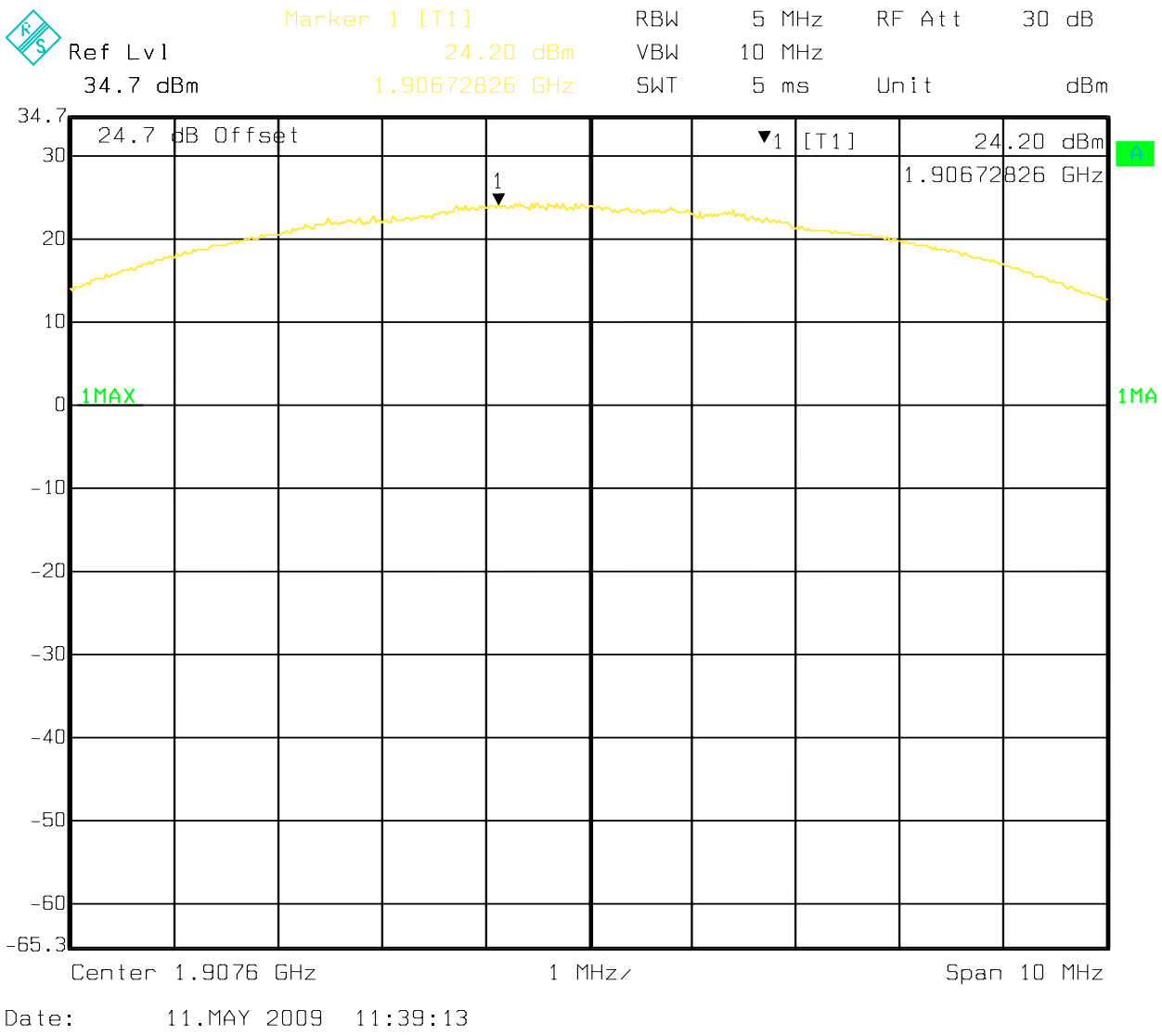
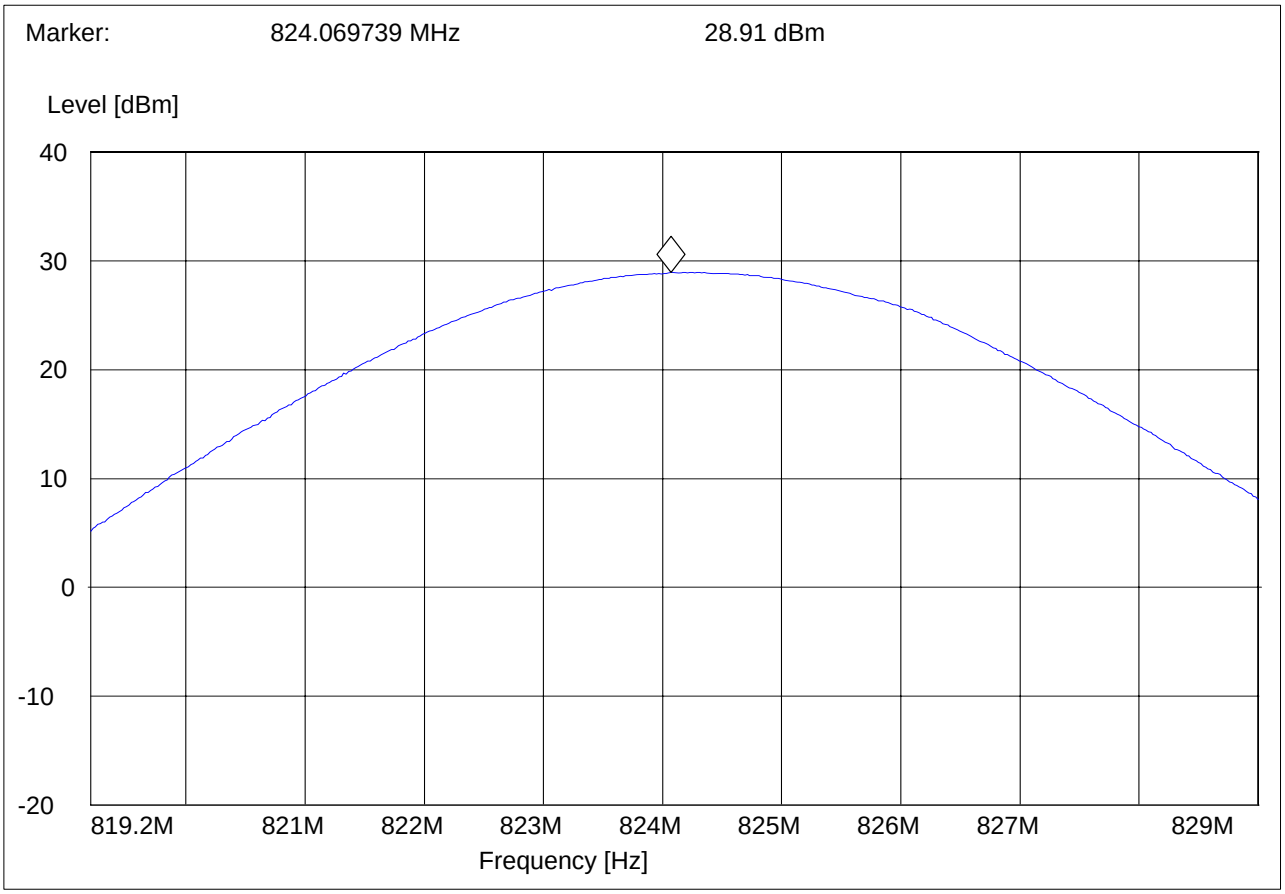


EIRP (GSM 850) CHANNEL 128 §22.913(a)
EUT: A1303
Customer:: Apple
Test Mode: GSM 850
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 850 CH 128 V"

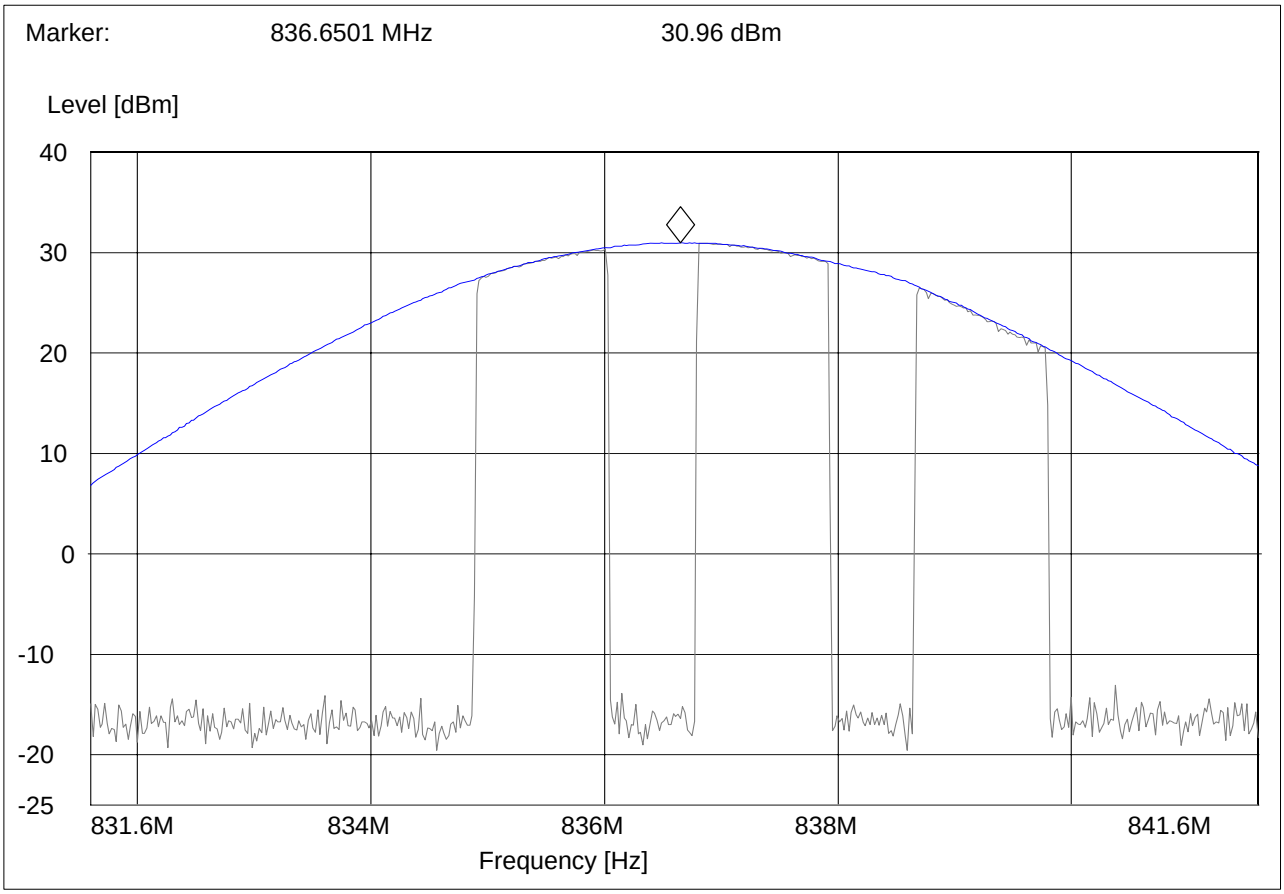
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
819.2 MHz	829.2 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM
		MaxPeak			



EIRP (GSM 850) CHANNEL 190 §22.913(a)
EUT: A1303
Customer:: Apple
Test Mode: GSM 850
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 850 CH 190 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
831.6 MHz	841.6 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM
		MaxPeak			



EIRP (GSM 850) CHANNEL 251 §22.913(a)
EUT: A1303
Customer:: Apple
Test Mode: GSM 850
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 850 CH 251 V"

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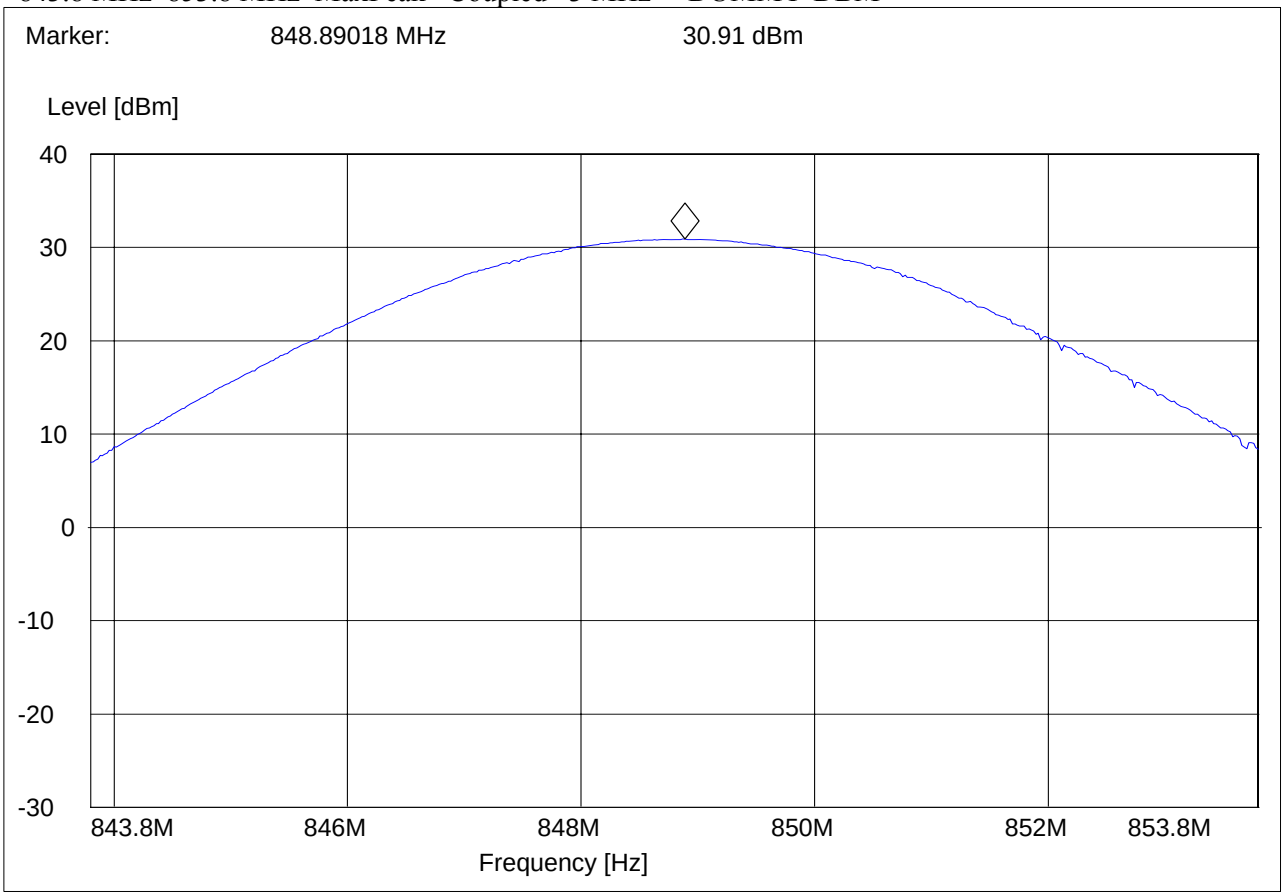
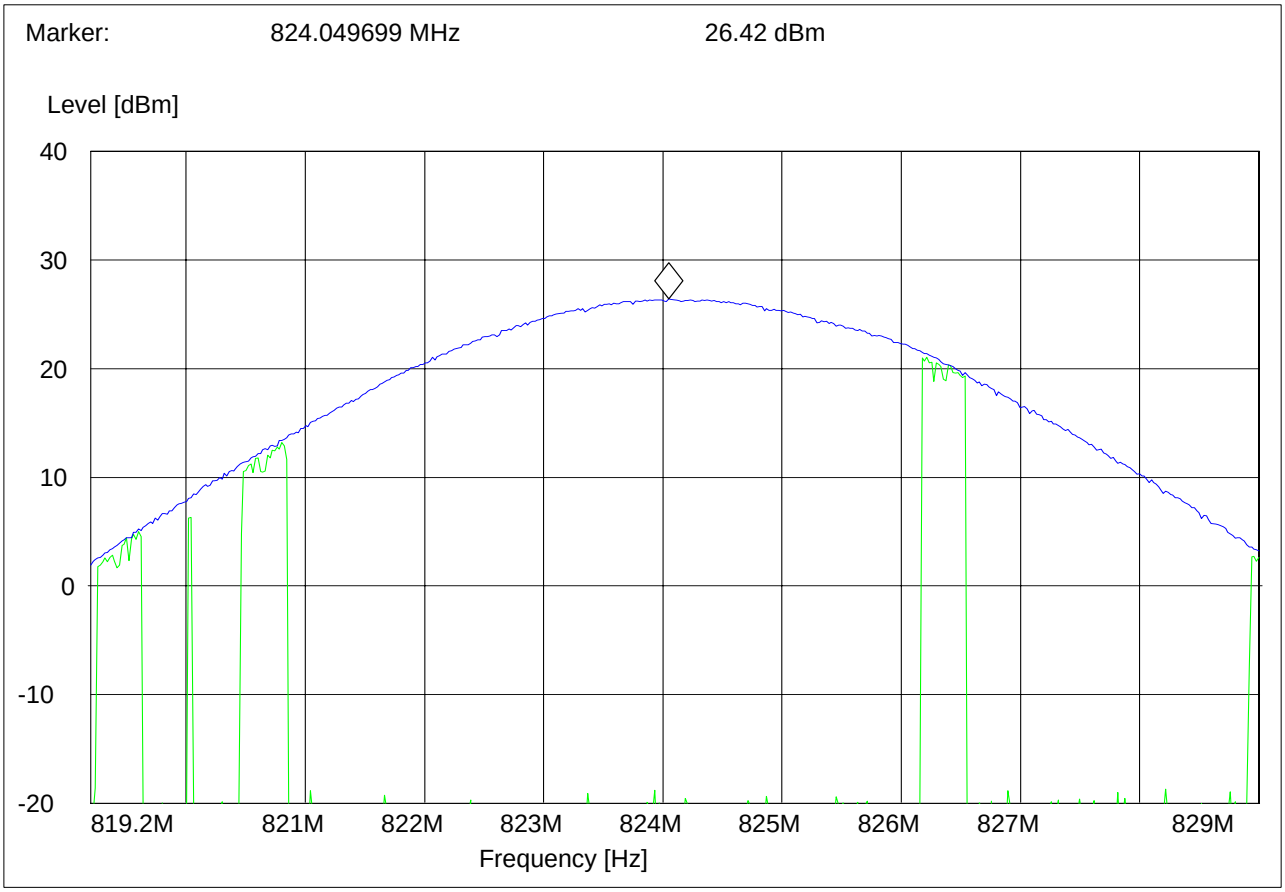


EIRP (EGPRS 850) CHANNEL 128 §22.913(a)

```
EUT:              A1303
Customer::        Apple
Test Mode:        EGPRS 850
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          Internal Battery
Comments:
```

SWEEP TABLE: "EIRP 850 CH 128 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
819.2 MHz	829.2 MHz	MaxPeak MaxPeak	Coupled	3 MHz	DUMMY-DBM

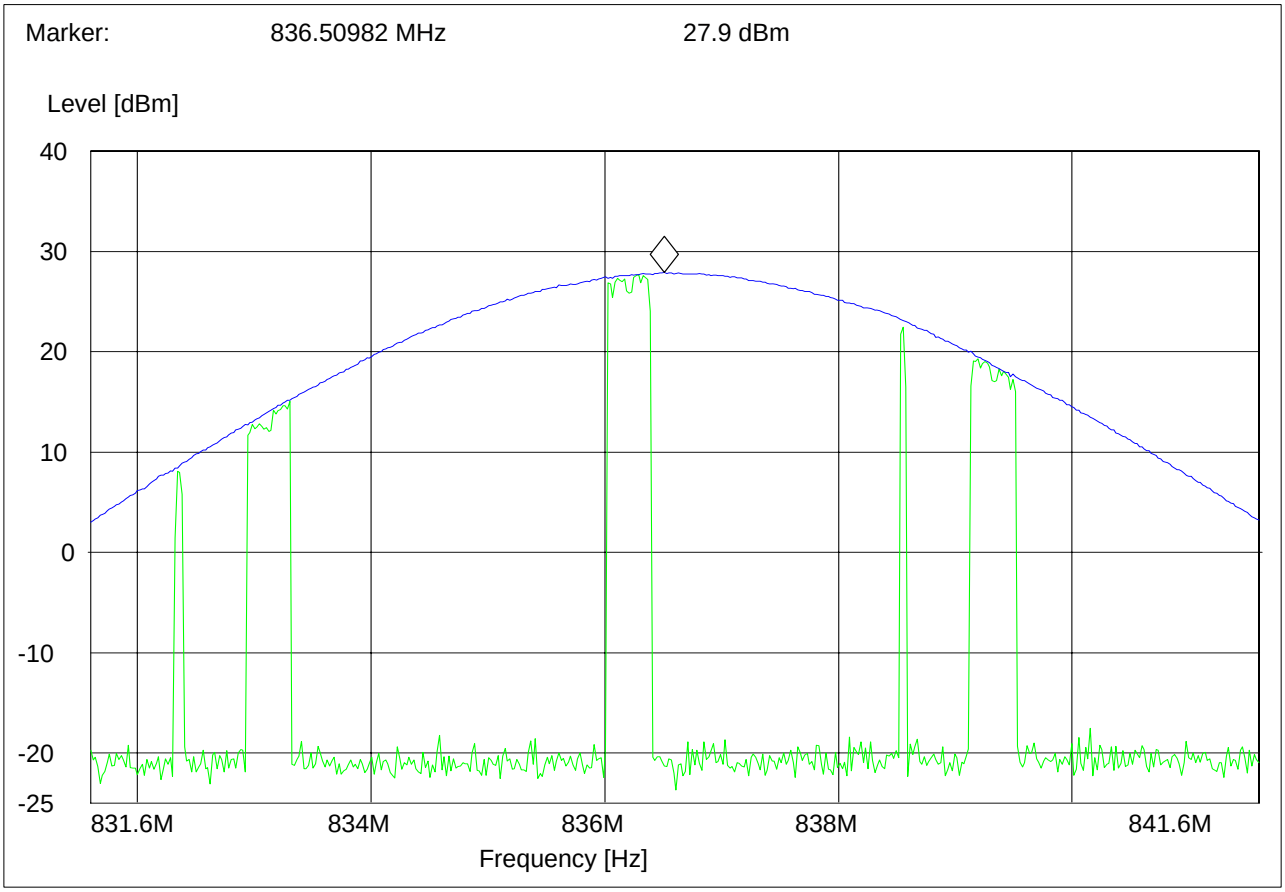


EIRP (EGPRS 850) CHANNEL 190 §22.913(a)

```
EUT:              A1303
Customer::        Apple
Test Mode:        EGPRS 850
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          Internal Battery
Comments:
```

SWEEP TABLE: "EIRP 850 CH 190 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
831.6 MHz	841.6 MHz	MaxPeak MaxPeak	Coupled	3 MHz	DUMMY-DBM

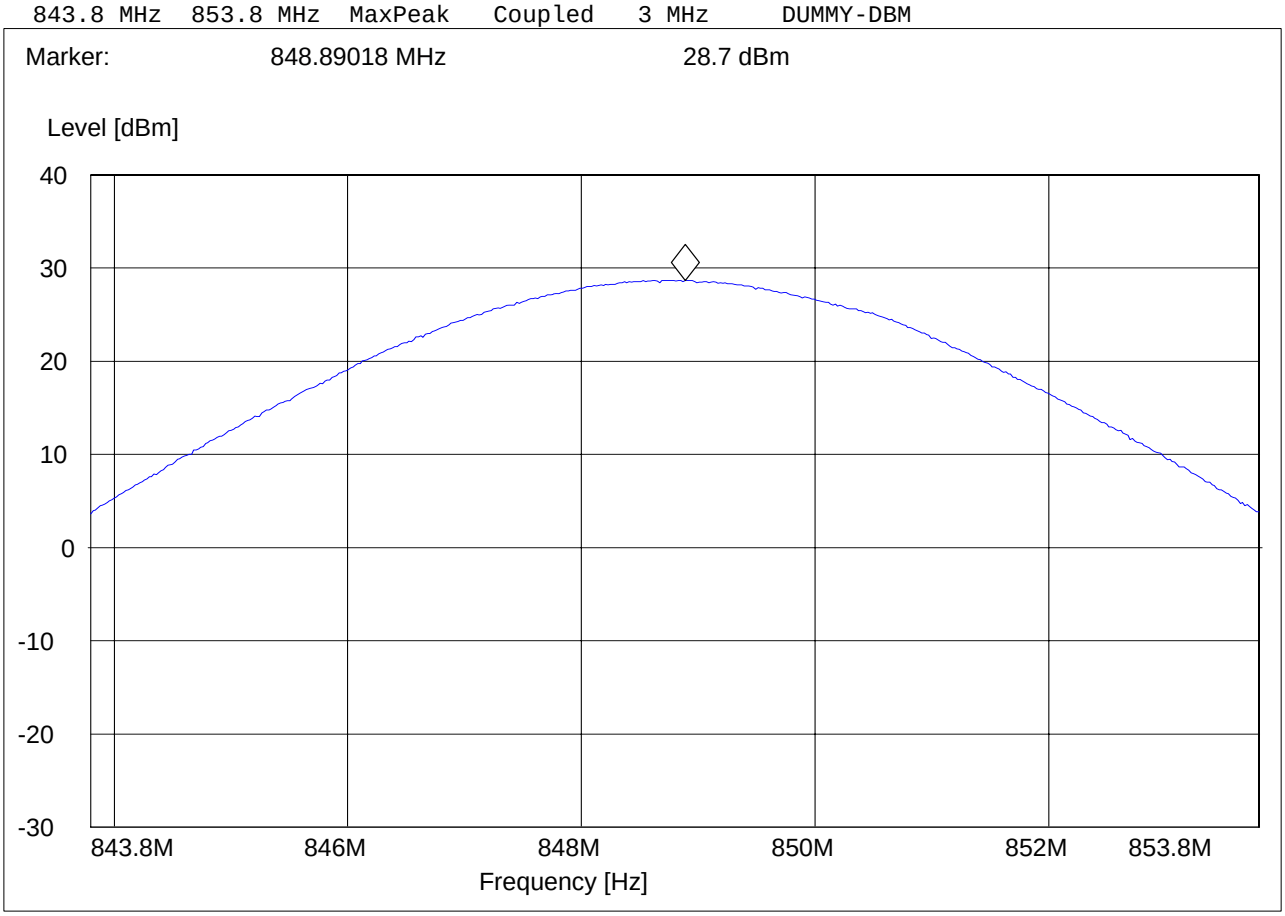


EIRP (EGPRS 850) CHANNEL 251 §22.913(a)

```
EUT:             A1303
Customer::       Apple
Test Mode:       EGPRS 850
ANT Orientation: V
EUT Orientation: V
Test Engineer:   Chris
Voltage:         Internal Battery
Comments:
```

SWEEP TABLE: "EIRP 850 CH 251 V"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
843.8 MHz	853.8 MHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM

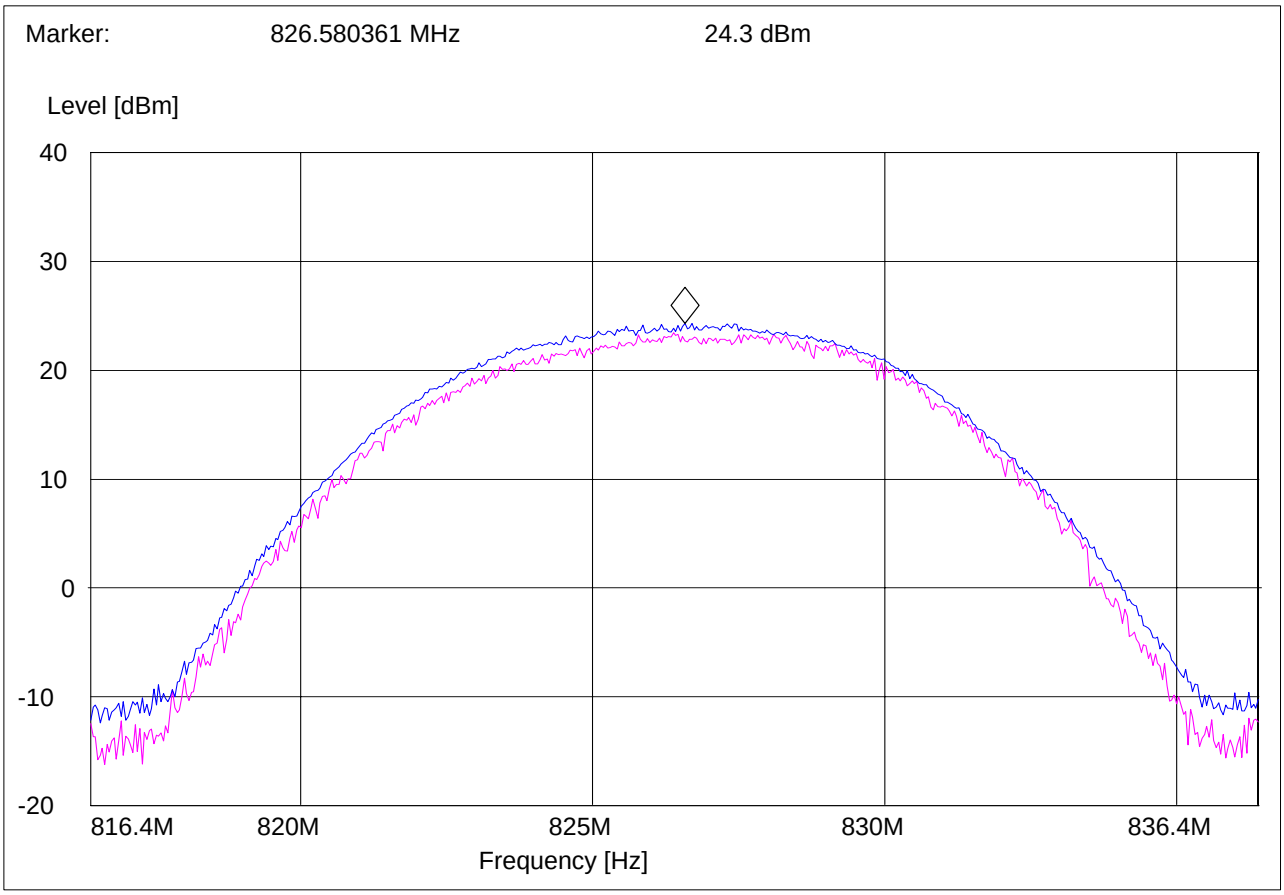


EIRP (UMTS FDD5) CHANNEL 4132 §22.913(a)

EUT: A1303
Customer:: Apple
Test Mode: FDD V
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

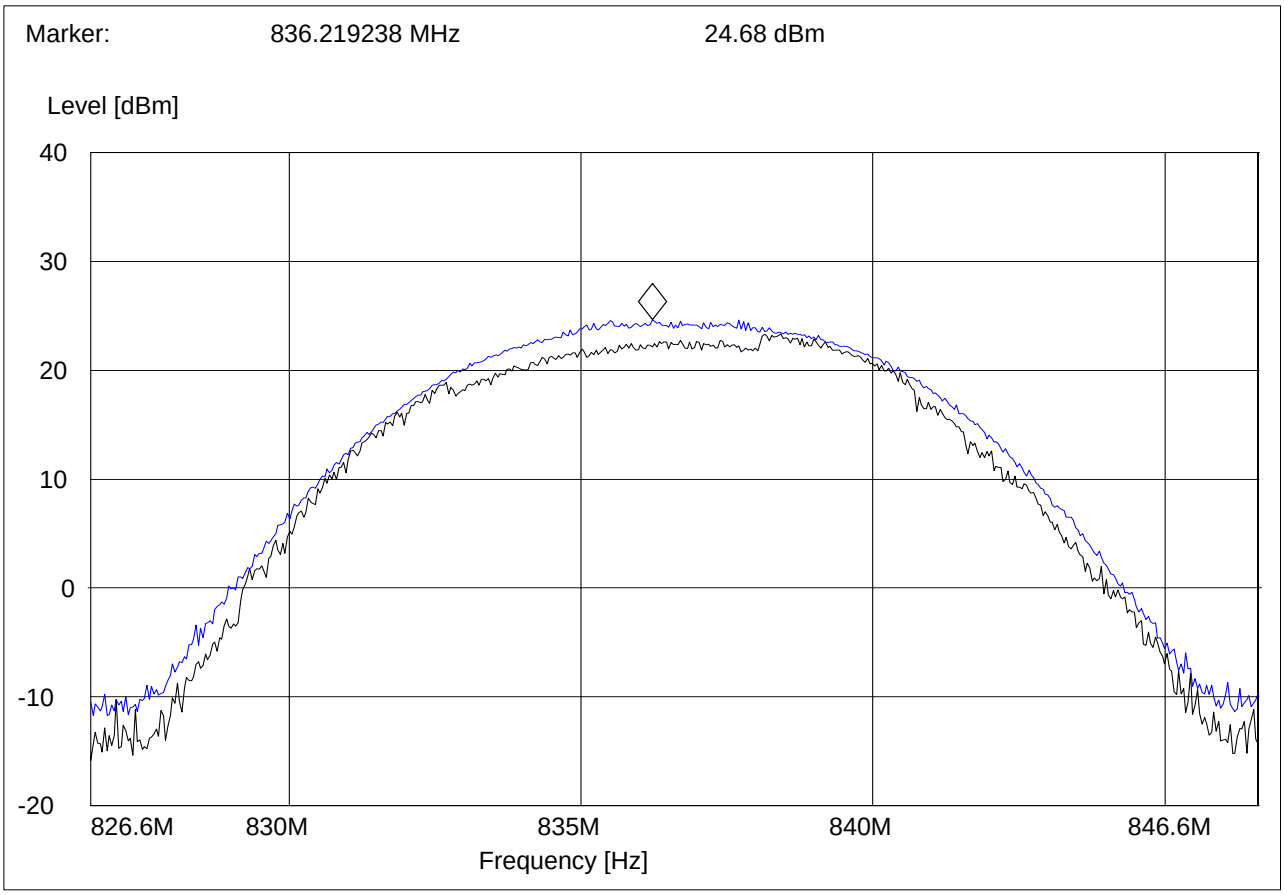


EIRP (UMTS FDD5) CHANNEL 4183 §22.913(a)

EUT: A1303
Customer:: Apple
Test Mode: FDD V
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 850 CH 4183 V"

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

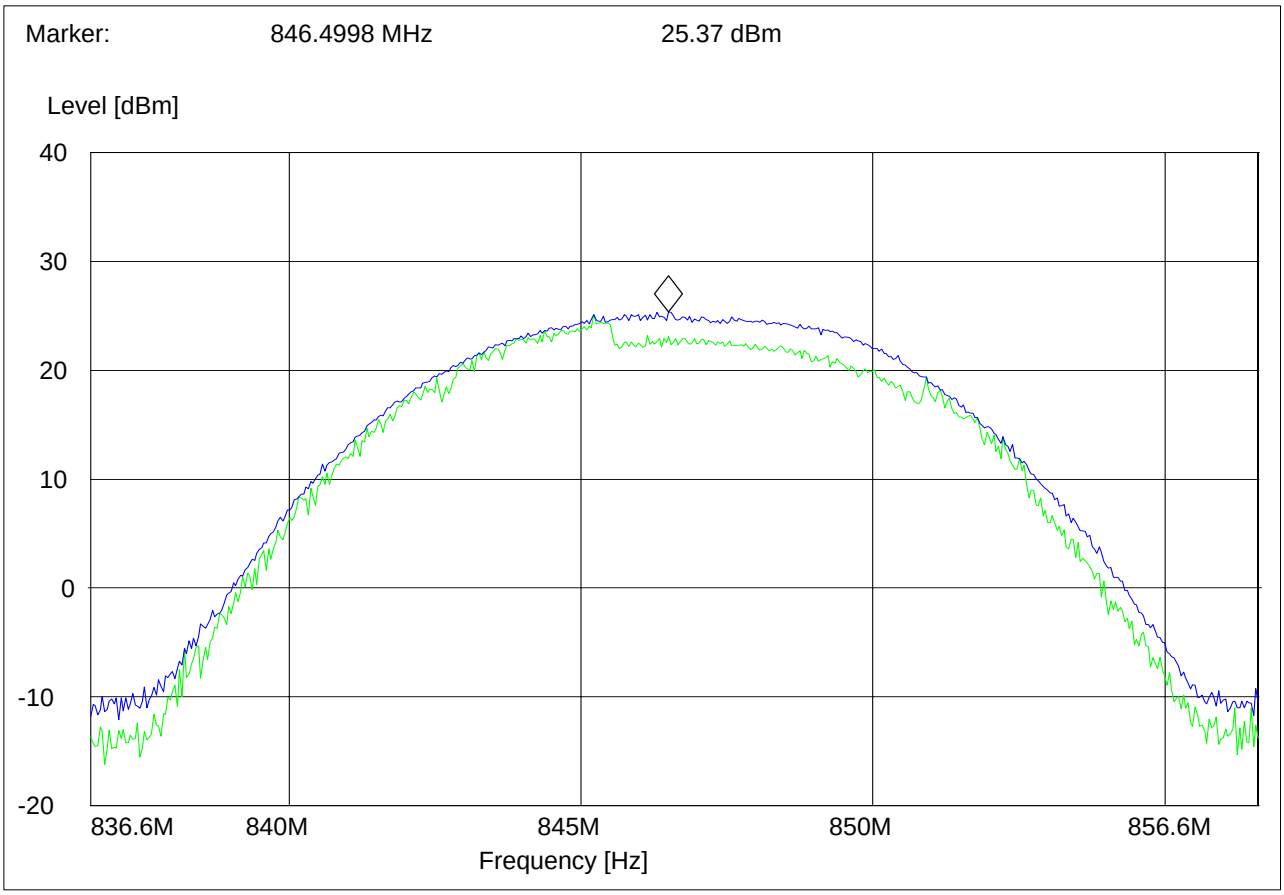


EIRP (UMTS FDD5) CHANNEL 4233 §22.913(a)

EUT: A1303
Customer:: Apple
Test Mode: FDD V
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

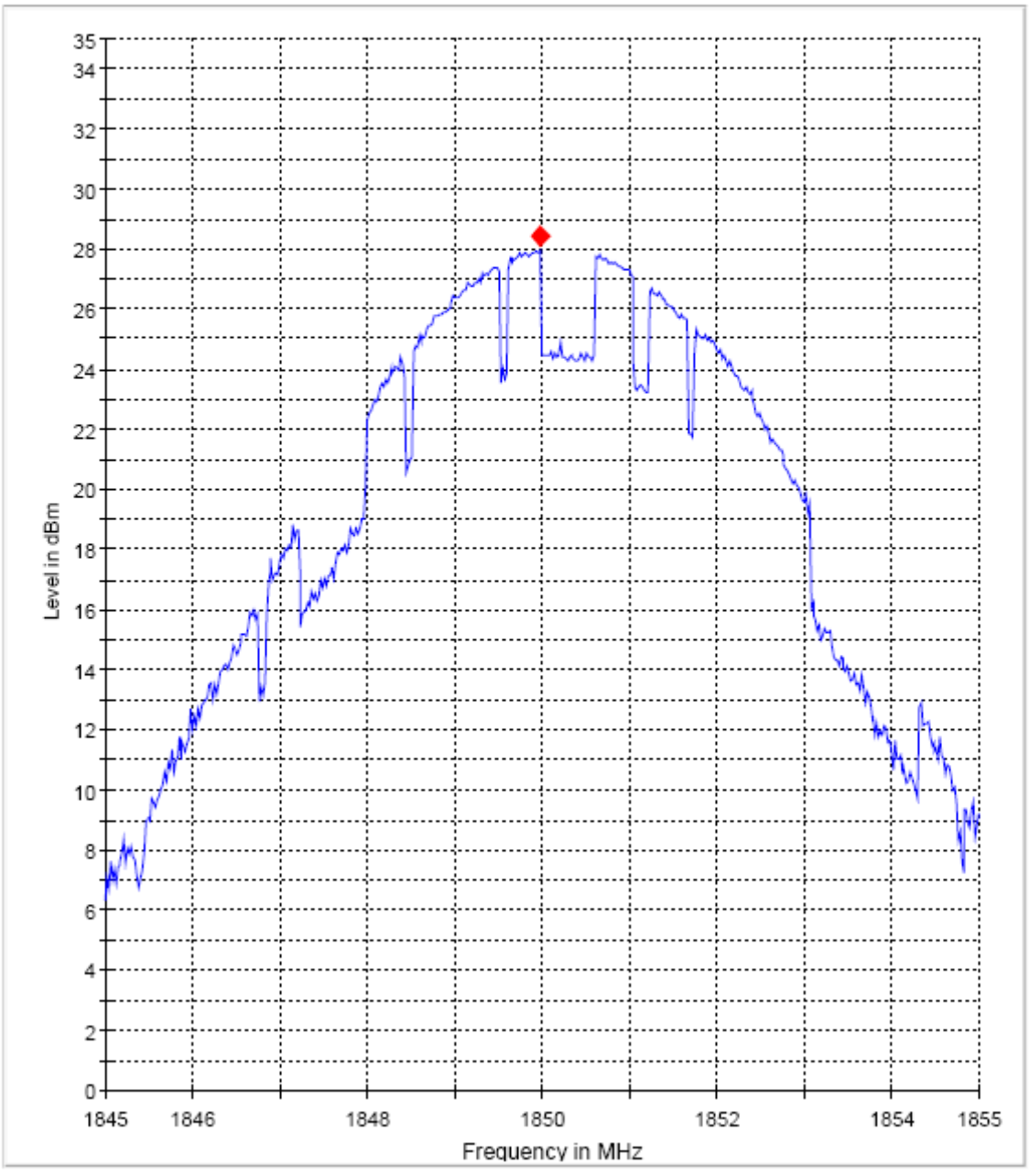


EIRP (PCS-1900) CHANNEL 512 §24.232(b)

Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1849.969940	28.4	20.000	3000.000	120.0	V	185.0	-74.7	

EIRP 1900 CH512

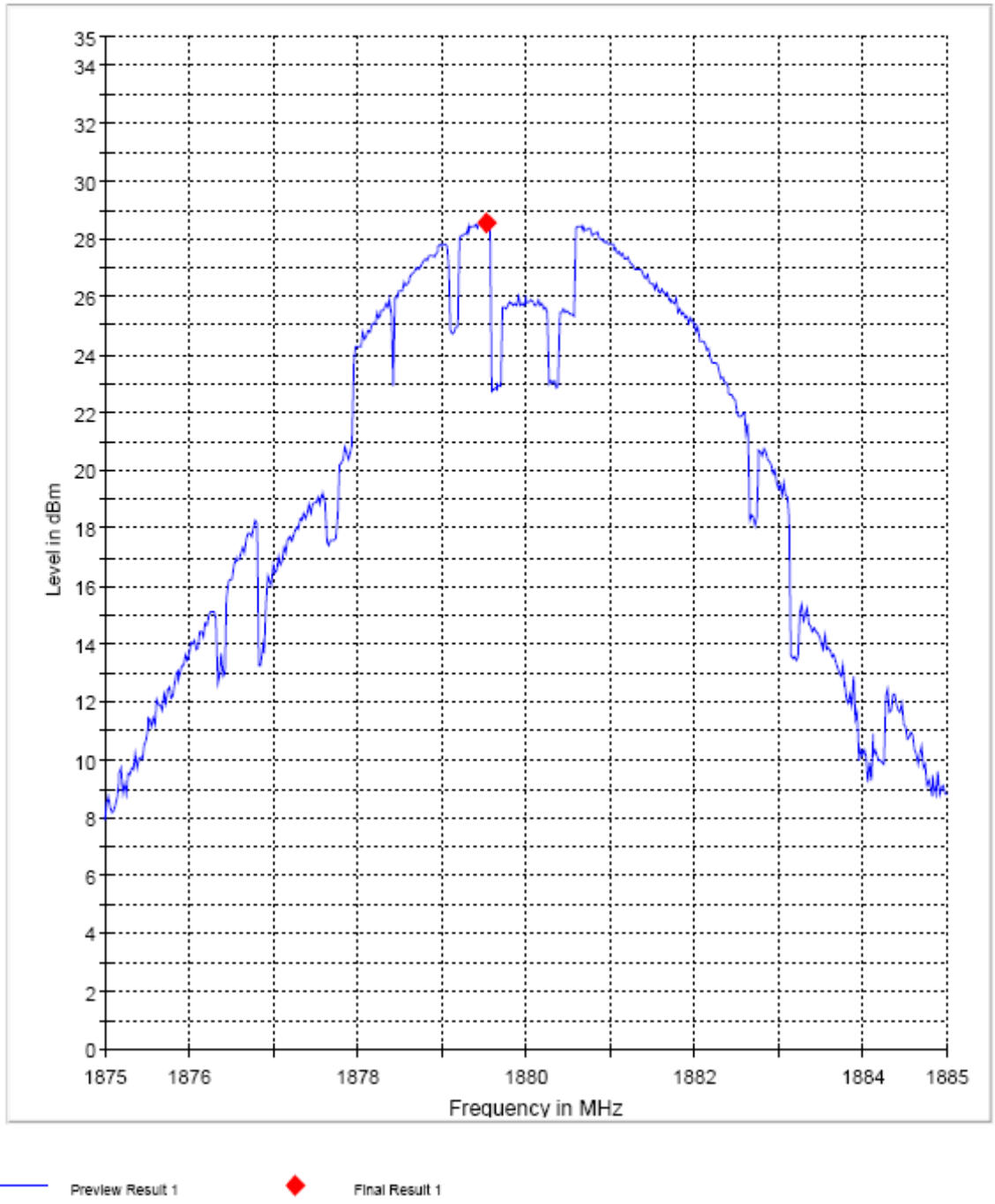


EIRP (PCS-1900) CHANNEL 661 §24.232(b)

Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1879.529058	28.6	20.000	3000.000	139.0	V	175.0	-74.4	

EIRP 1900 CH661

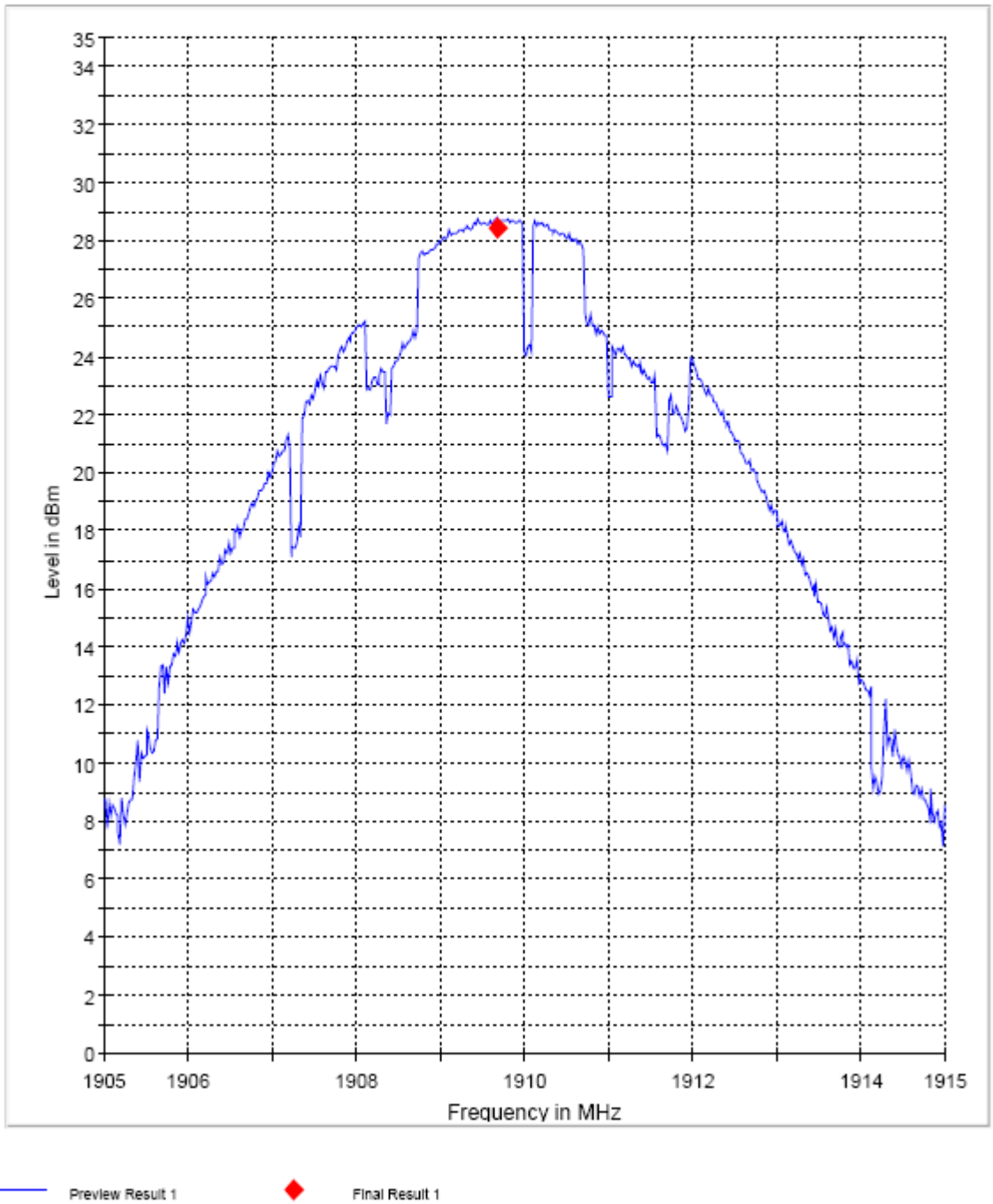


EIRP (PCS-1900) CHANNEL 810 §24.232(b)

Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
1909.689379	28.4	20.000	3000.000	120.0	V	175.0	-74.7	

EIRP 1900 CH810

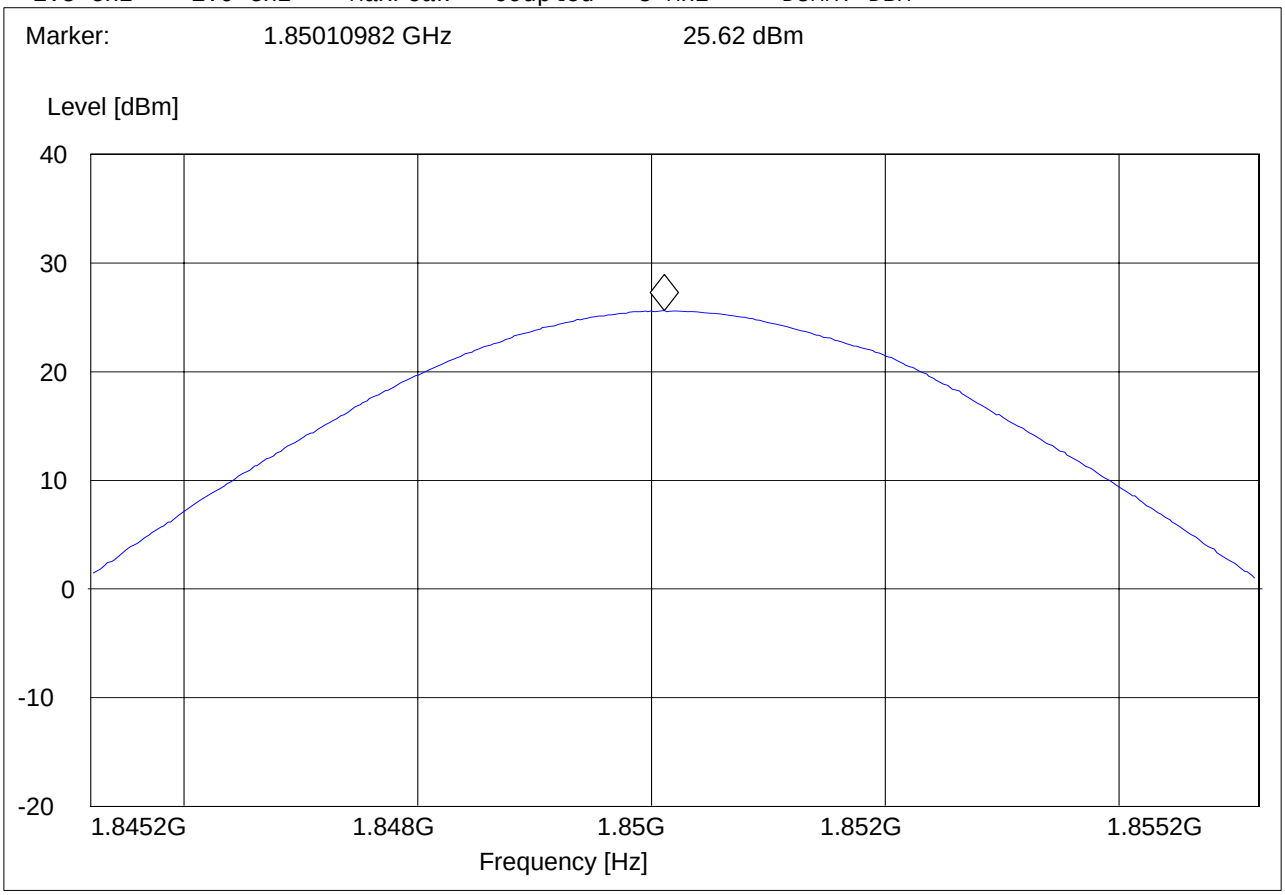


EIRP (EGPRS 1900) CHANNEL 512 §24.232(b)

```
EUT:              A1303
Customer::        Apple
Test Mode:        EGPRS 1900
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          Internal Battery
Comments:
```

SWEEP TABLE: "EIRP 1900 CH512"

```
  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   3 MHz     DUMMY-DBM
```



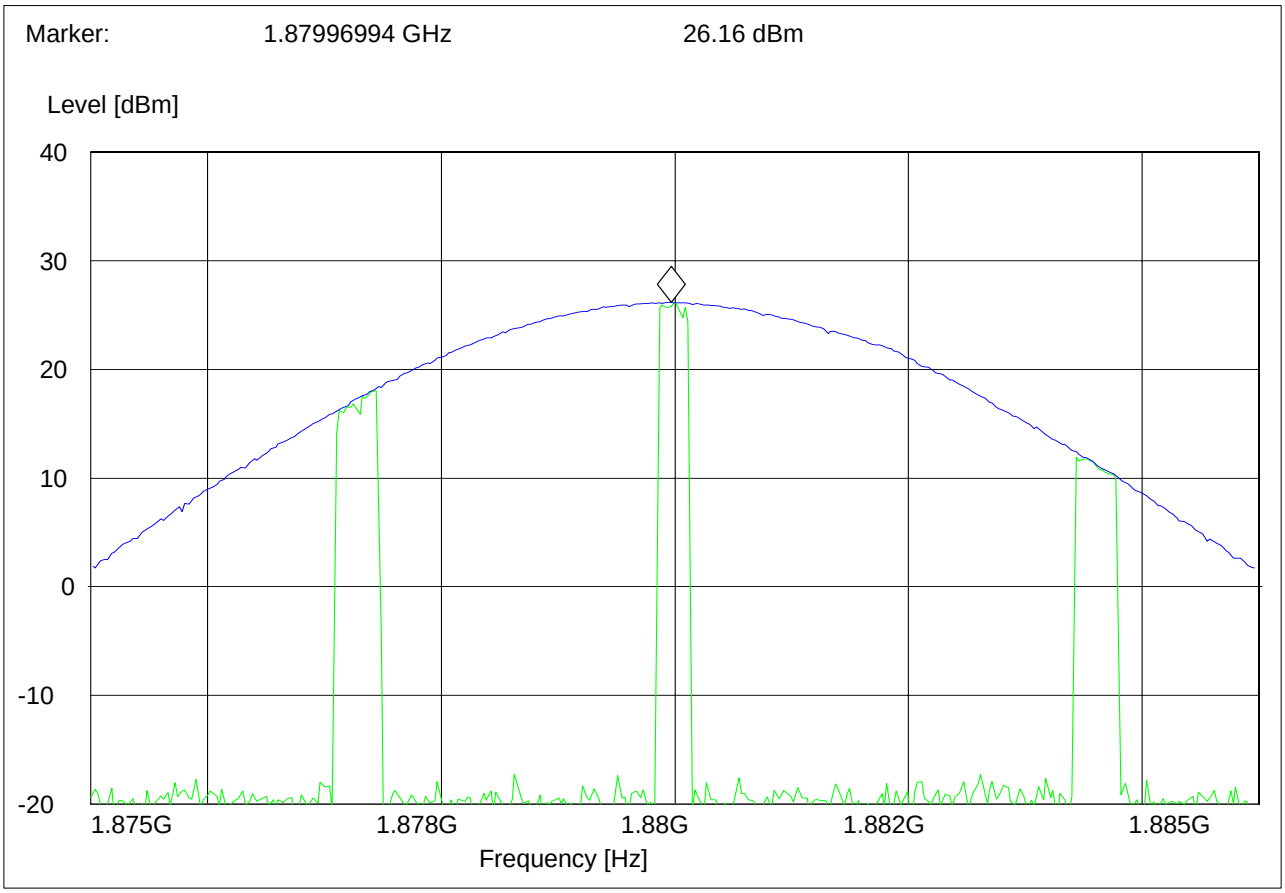
EIRP (EGPRS 1900) CHANNEL 661 §24.232(b)

EUT: A1303
Customer:: Apple
Test Mode: EGPRS 1900
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 1900 CH661"

Short Description: EIRP PCS 1900 for channel-661

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak MaxPeak	Coupled	3 MHz	DUMMY-DBM



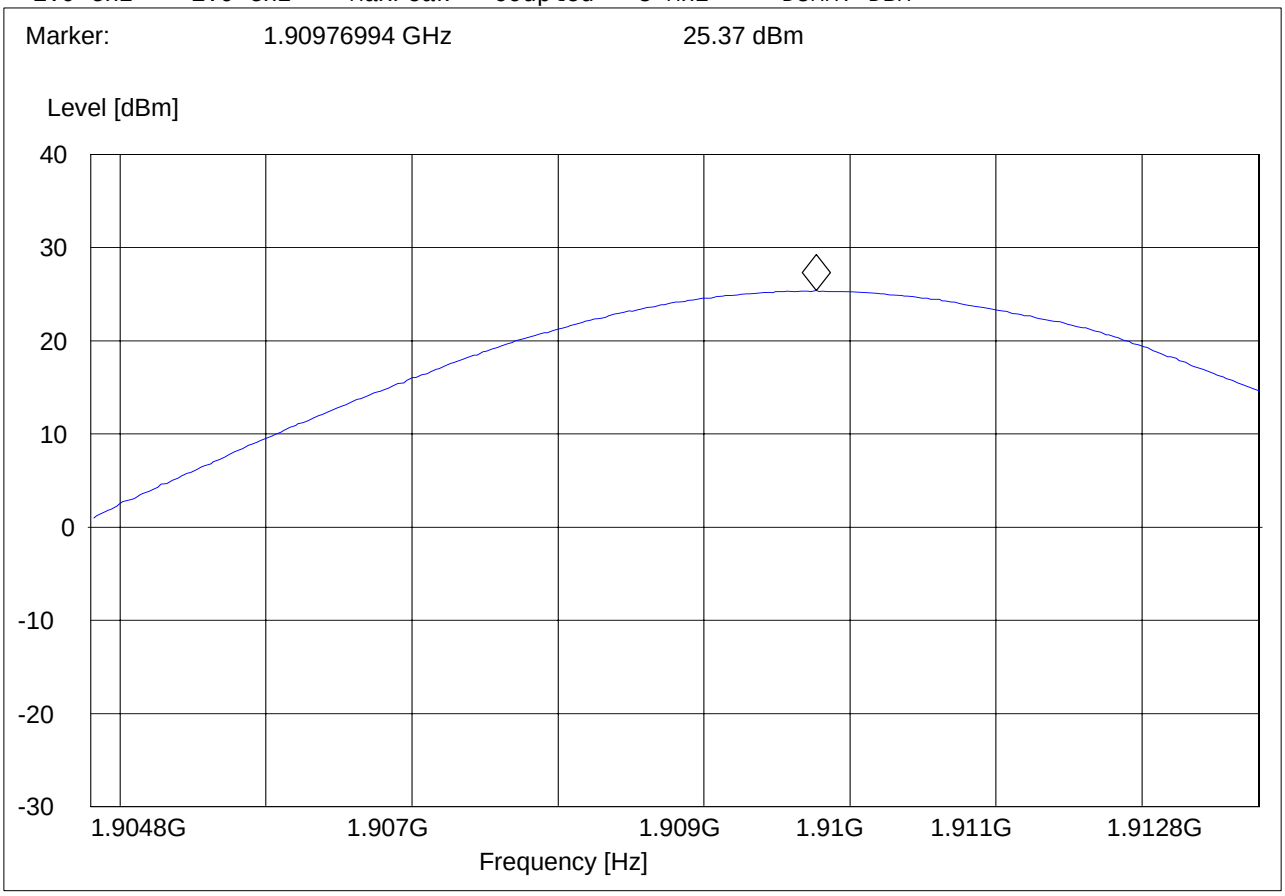
EIRP (EGPRS 1900) CHANNEL 810 §24.232(b)

EUT: A1303
Customer:: Apple
Test Mode: EGPRS 1900
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 1900 CH810"

Short Description: EIRP PCS 1900 for channel-810

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak	Coupled	3 MHz	DUMMY-DBM

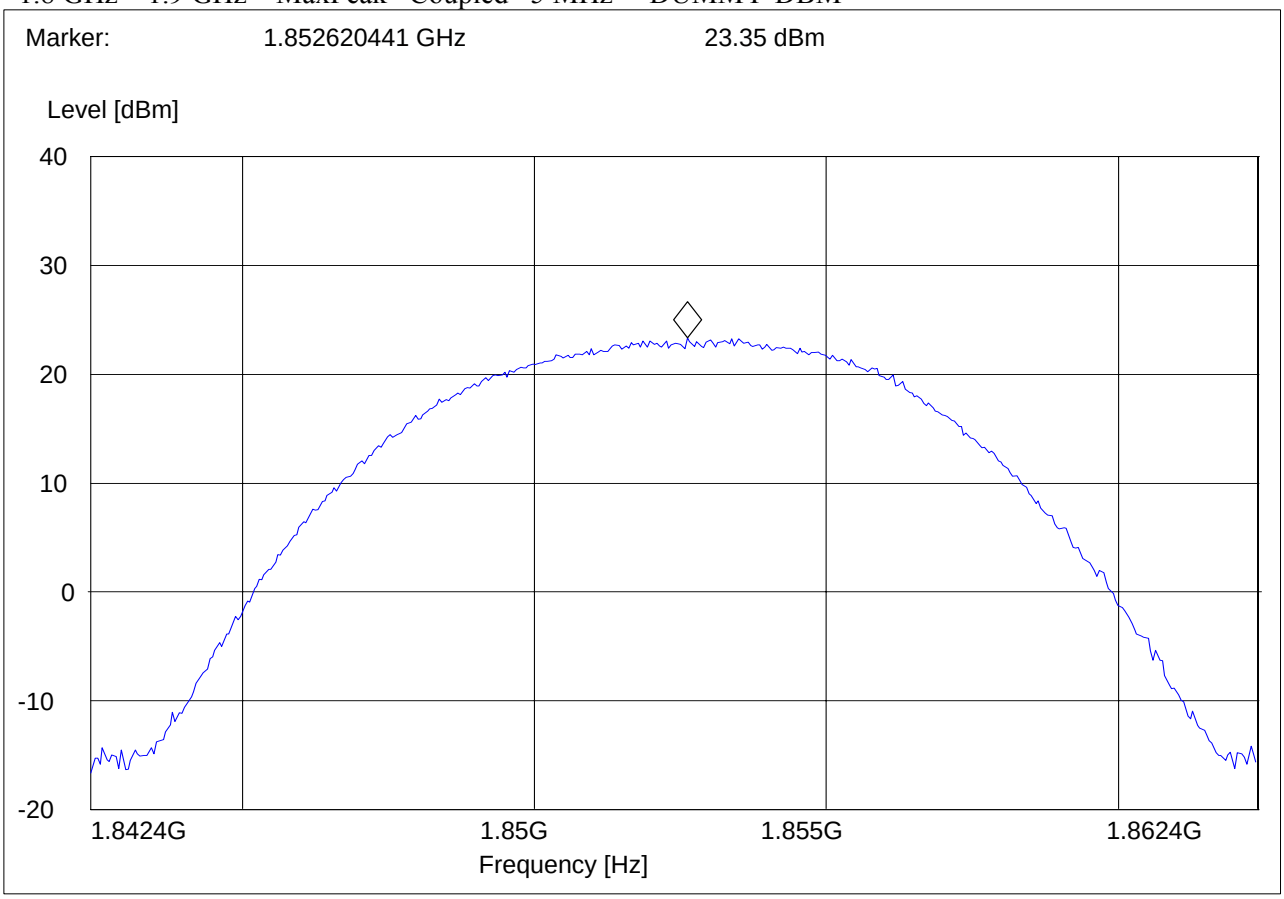


EIRP (UMTS FDD2) CHANNEL 9262 §24.232(b)
EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 1900 CH 9262"

Short Description: EIRP PCS 1900 for channel-512

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.8 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

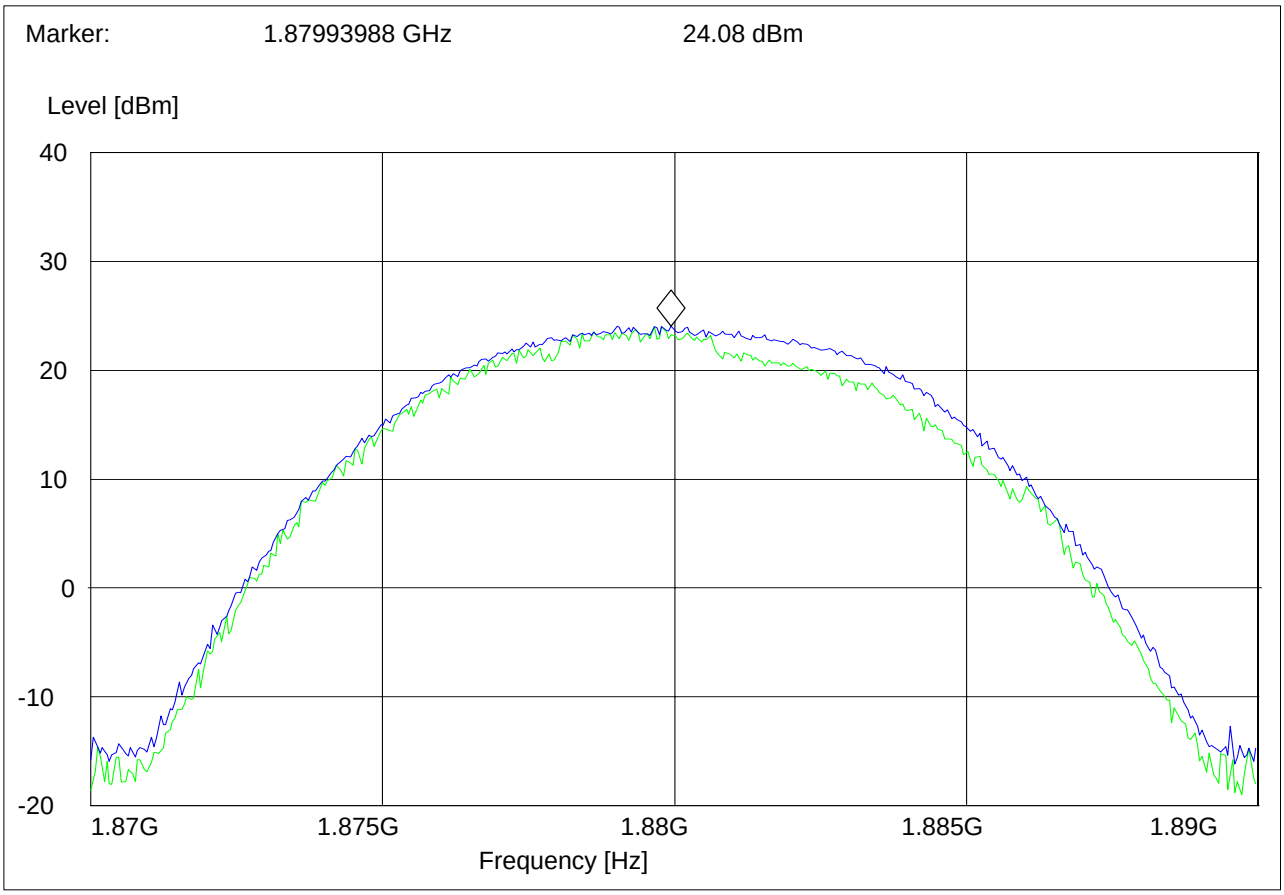


EIRP (UMTS FDD2) CHANNEL 9400 §24.232(b)
EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 1900 CH 9400"

Short Description: EIRP PCS 1900 for channel-661

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak MaxPeak	Coupled	5 MHz	DUMMY-DBM

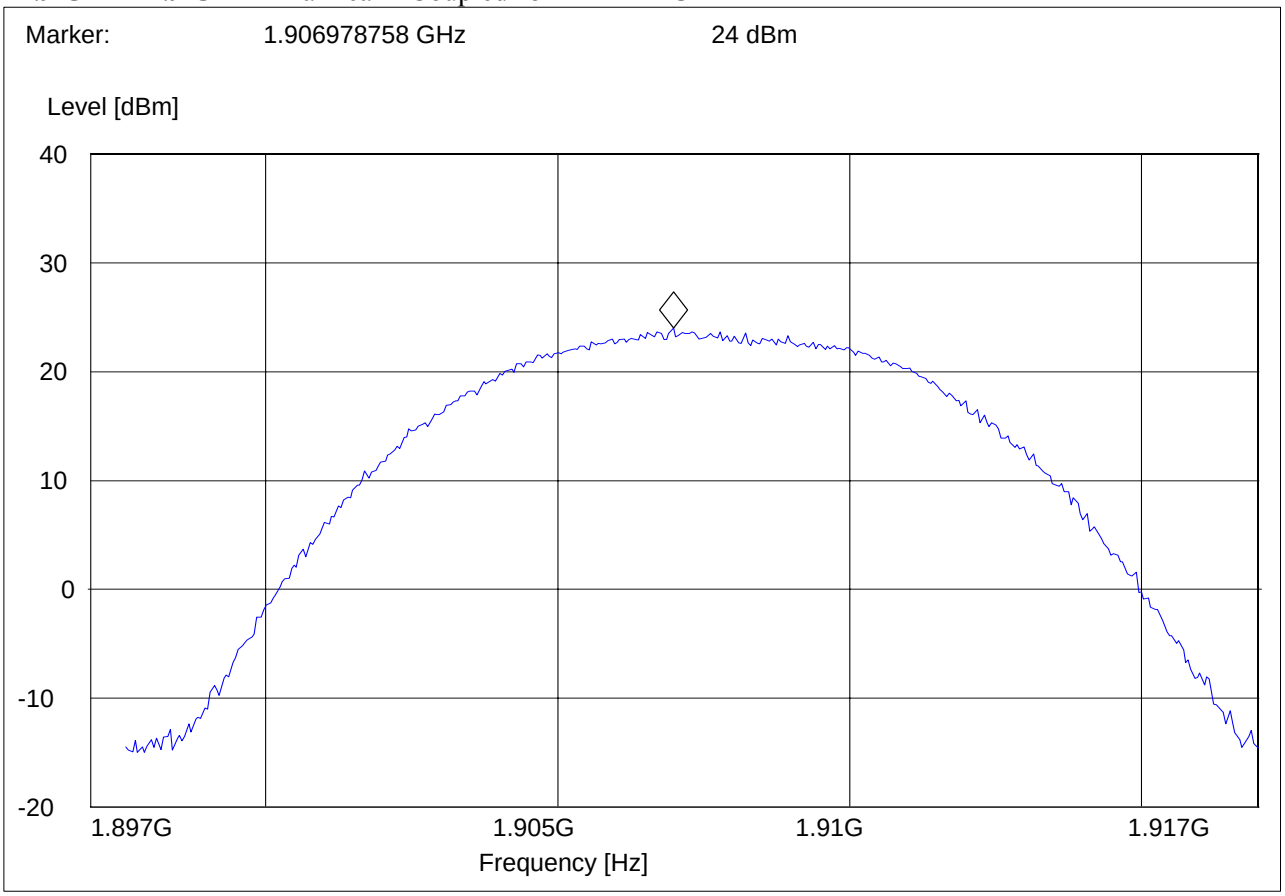


EIRP (UMTS FDD2) CHANNEL 9538 §24.232(b)
EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: Internal Battery
Comments:

SWEEP TABLE: "EIRP 1900 CH 9538"

Short Description: EIRP PCS 1900 for channel-810

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.9 GHz	1.9 GHz	MaxPeak	Coupled	5 MHz	DUMMY-DBM

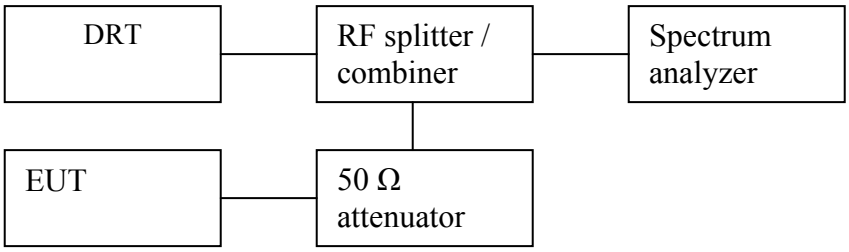


5.2 Occupied Bandwidth/Emission Bandwidth

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	246.493	246.493
836.6	252.505	240.481
848.8	240.481	240.481

Frequency (MHz)	Occupied Bandwidth (MHz)
	UMTS FDD5
836.4	4.168
836.6	4.148
846.6	4.188

5.2.4 Occupied bandwidth results 1900 MHz band:

Frequency (MHz)	Occupied Bandwidth (kHz)	
	GSM	EGPRS
1850.2	244.489	244.489
1880.0	240.481	236.473
1909.8	242.485	240.481

Frequency (MHz)	Occupied Bandwidth (MHz)
	UMTS FDD2
1852.4	4.168
1880	4.148
1907.6	4.148

5.2.5 Emission bandwidth results 850 MHz band.

Frequency (MHz)	Occupied Bandwidth (kHz)	
	GSM	EGPRS
824.2	300.661	318.637
836.6	306.613	312.625
848.8	312.625	306.613

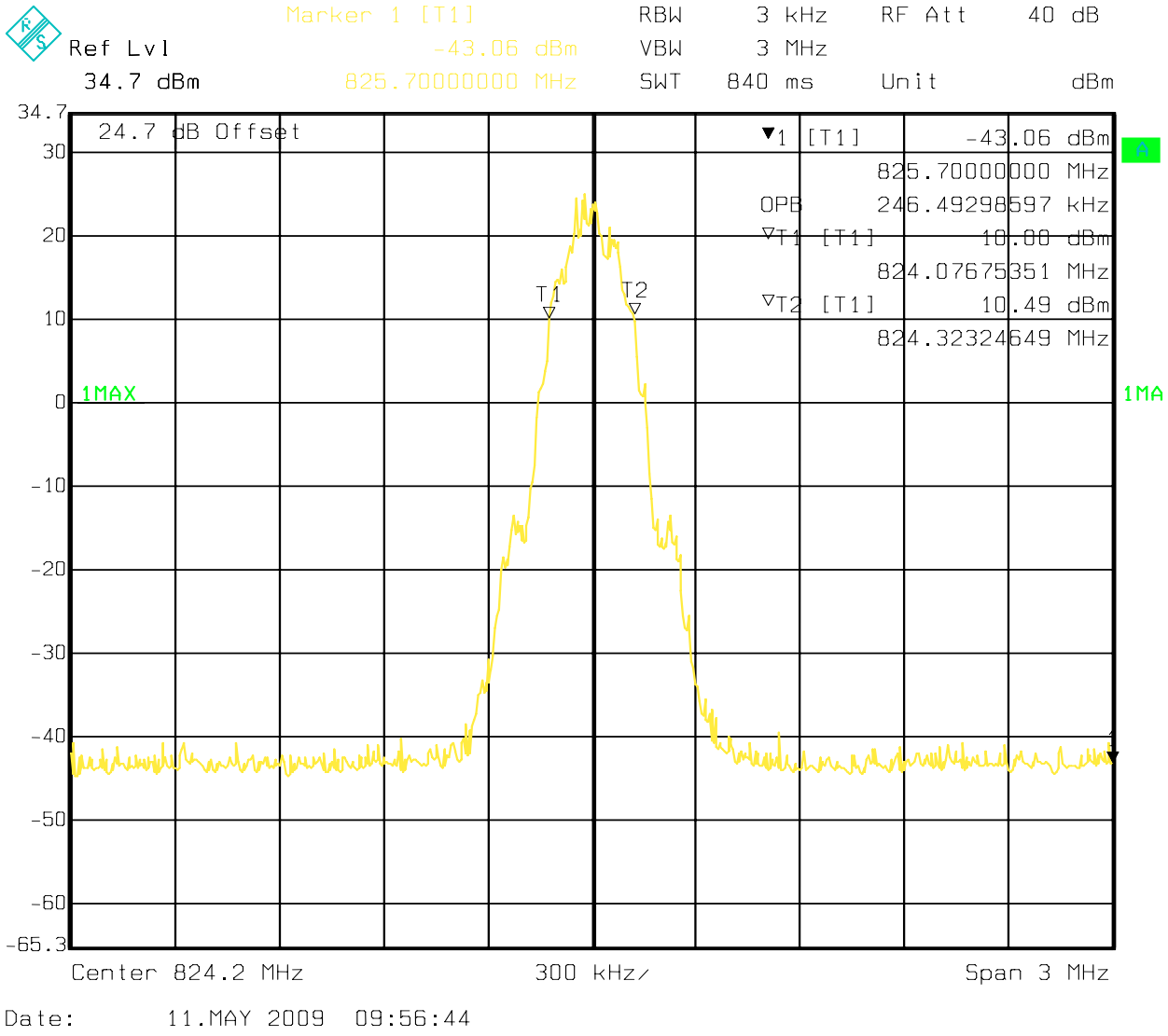
Frequency (MHz)	Emission Bandwidth (MHz)
	UMTS FDD5
836.4	4.689
836.6	4.709
846.6	4.709

5.2.6 Emission bandwidth results 1900 MHz band:

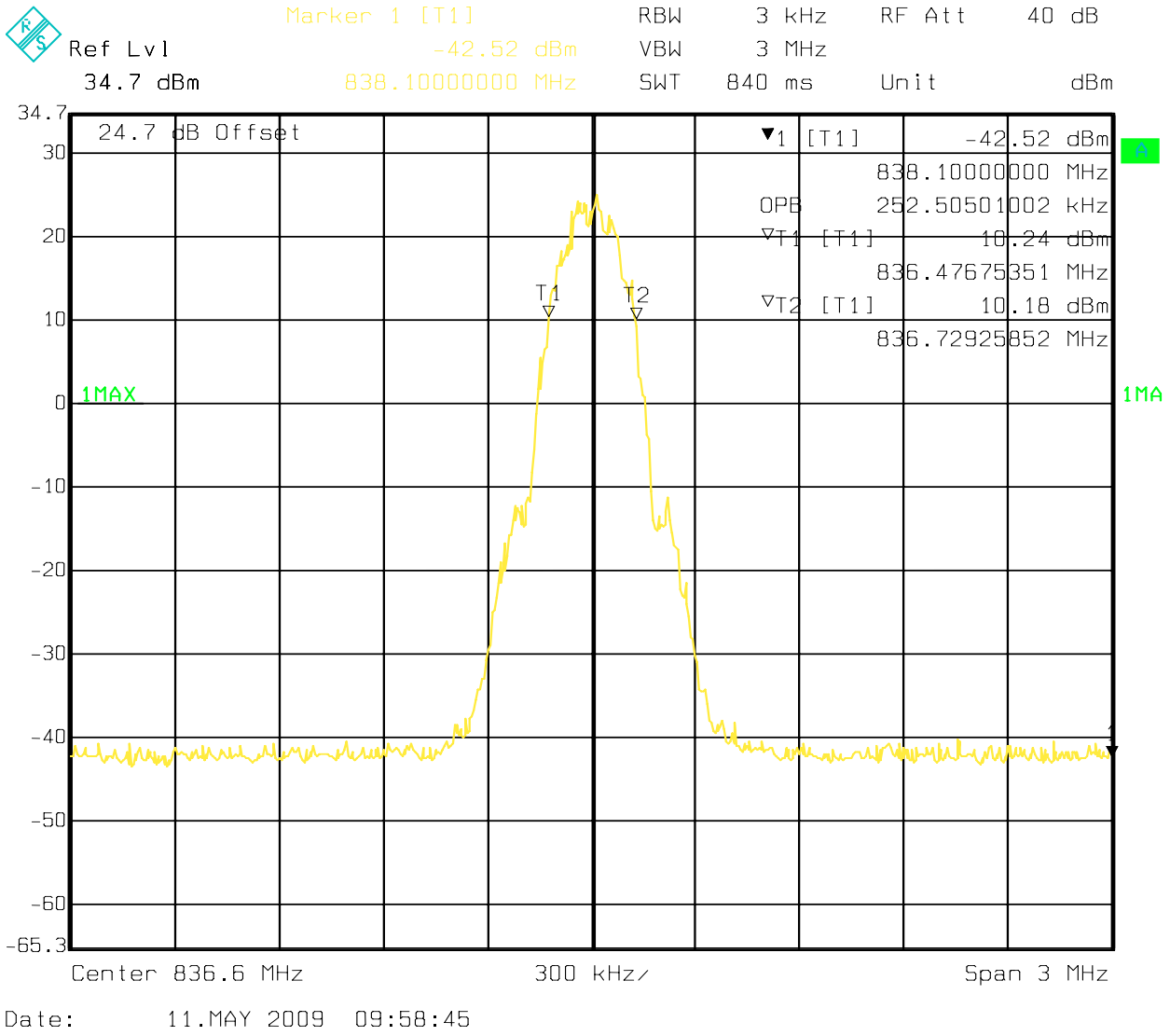
Frequency (MHz)	Occupied Bandwidth (kHz)	
	GSM	EGPRS
1850.2	298.597	304.609
1880.0	300.601	296.593
1909.8	312.625	302.605

Frequency (MHz)	Emission Bandwidth (MHz)
	UMTS FDD2
1852.4	4.629
1880	4.669
1907.6	4.669

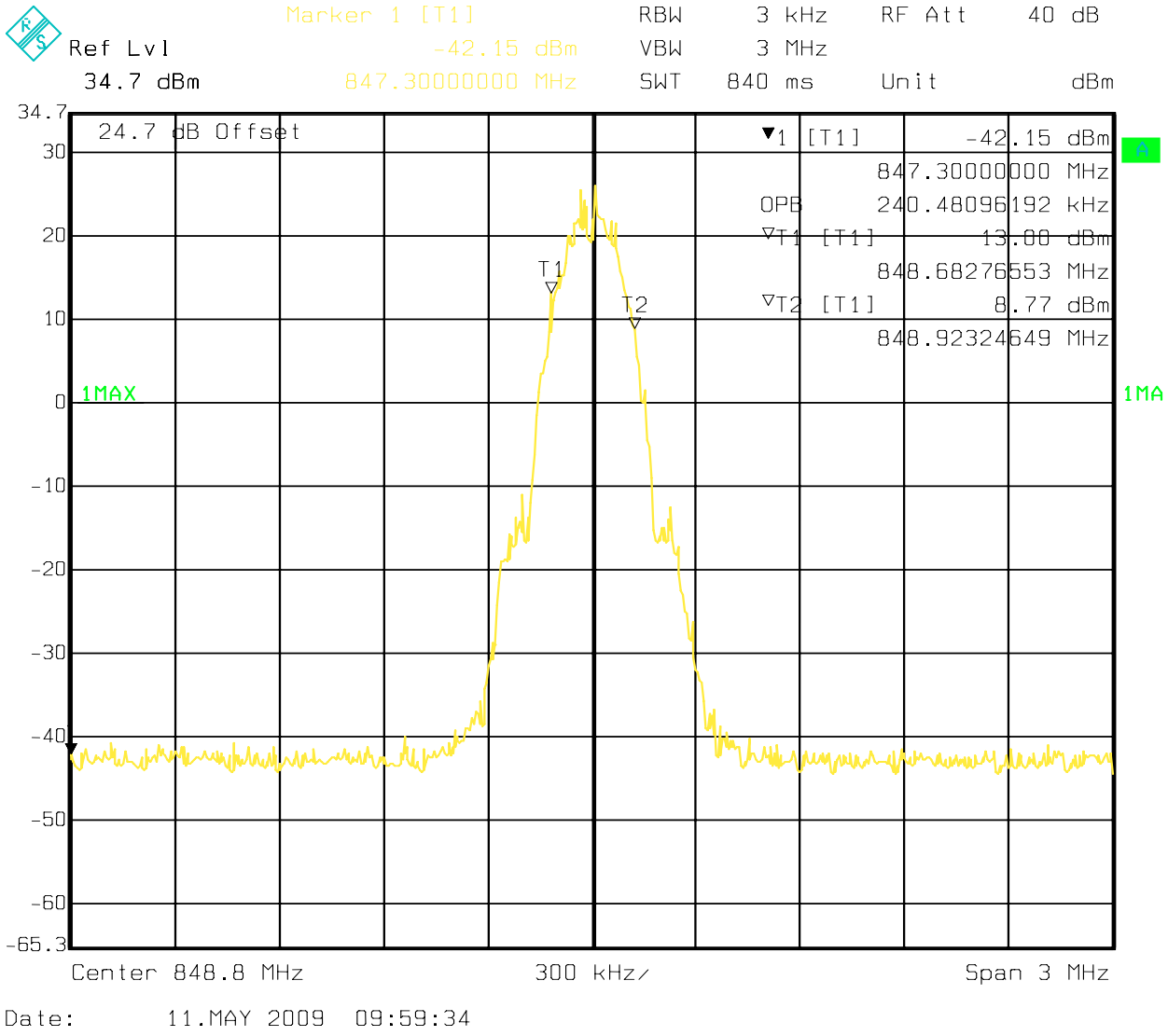
Occupied band Width GSM850 MHz Channel 128 GSM



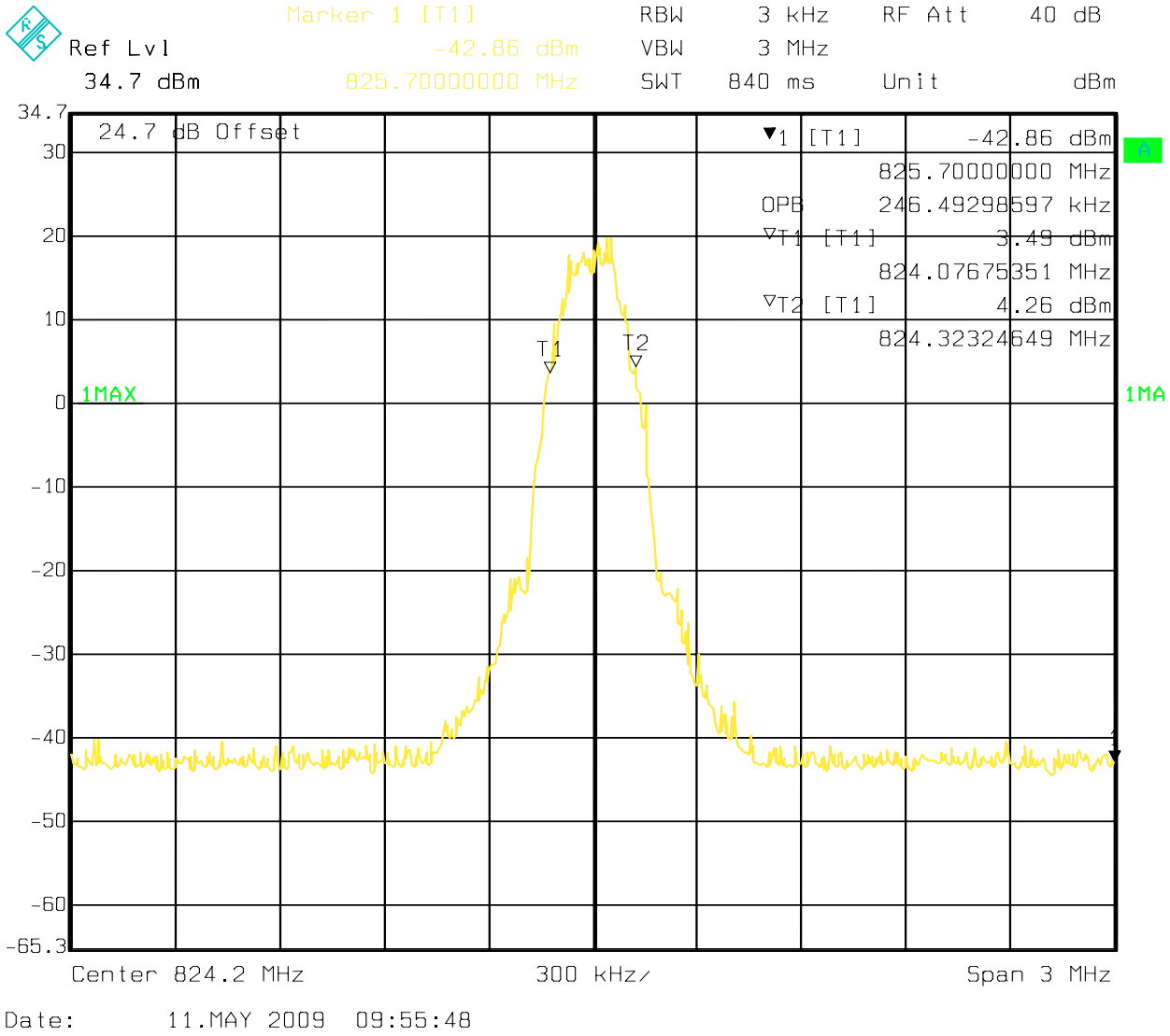
Occupied band Width GSM850 MHz Channel 190 GSM



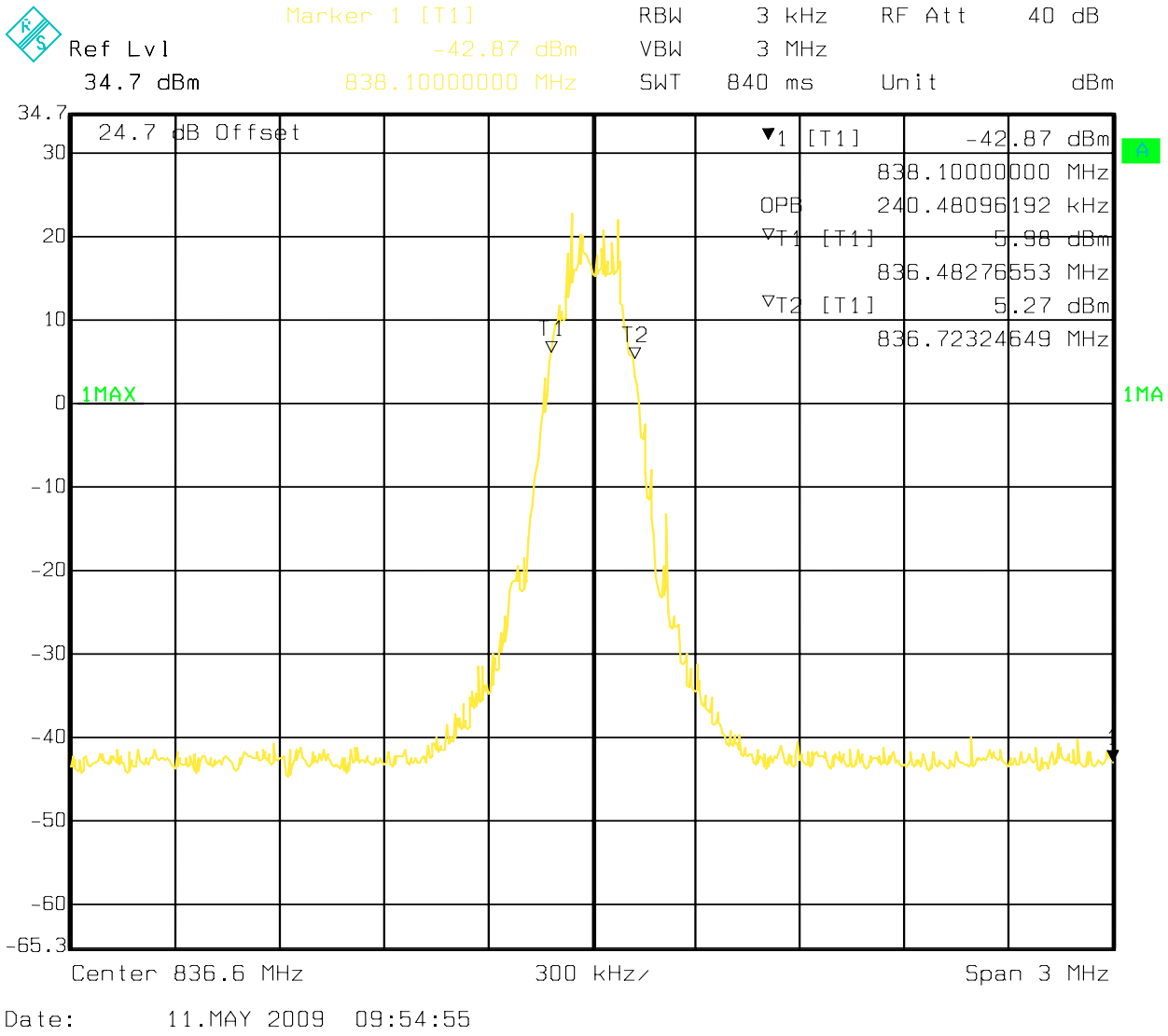
Occupied band Width GSM850 MHz Channel 251 GSM



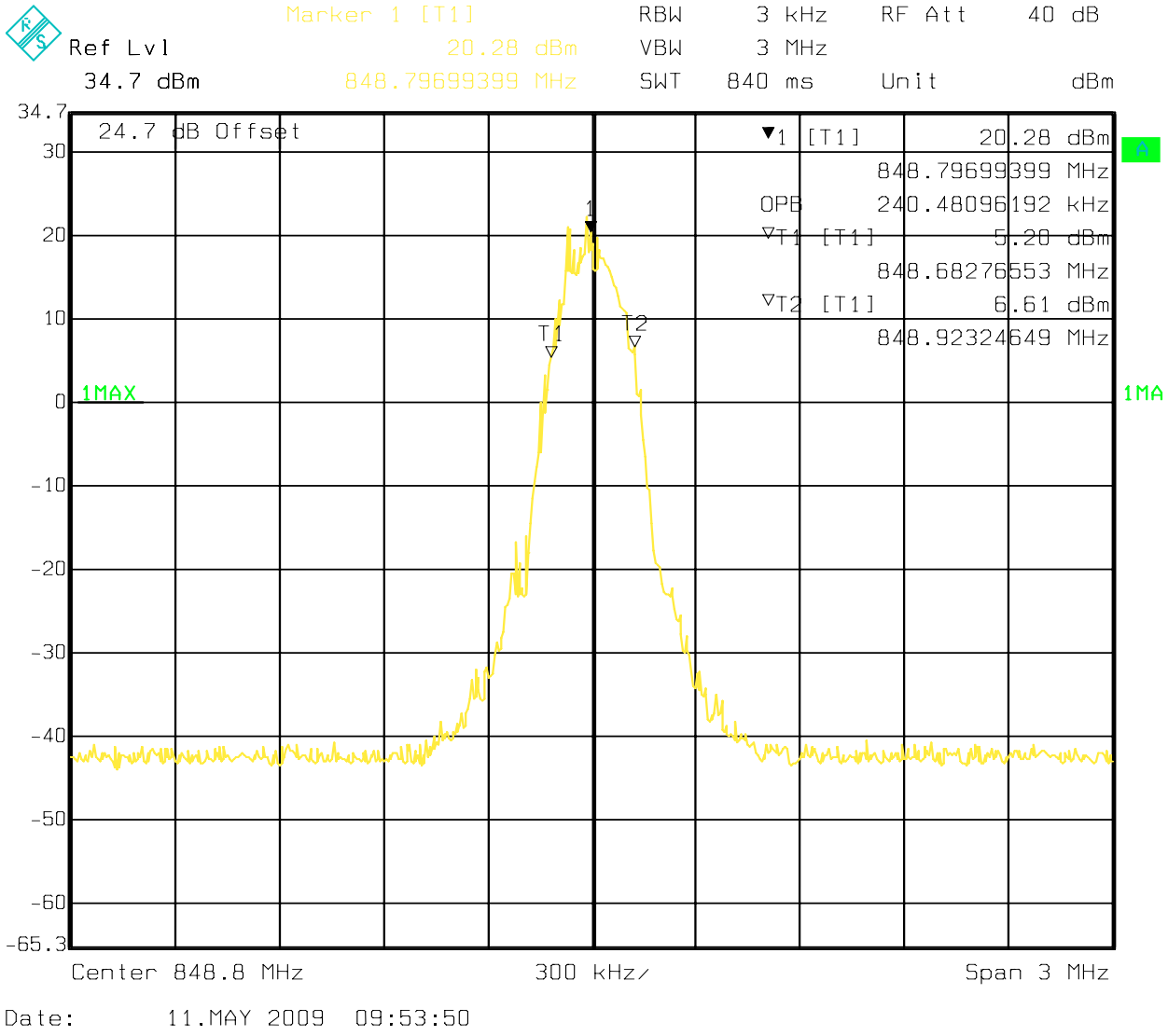
Occupied band Width GSM850 MHz Channel 128 EGPRS



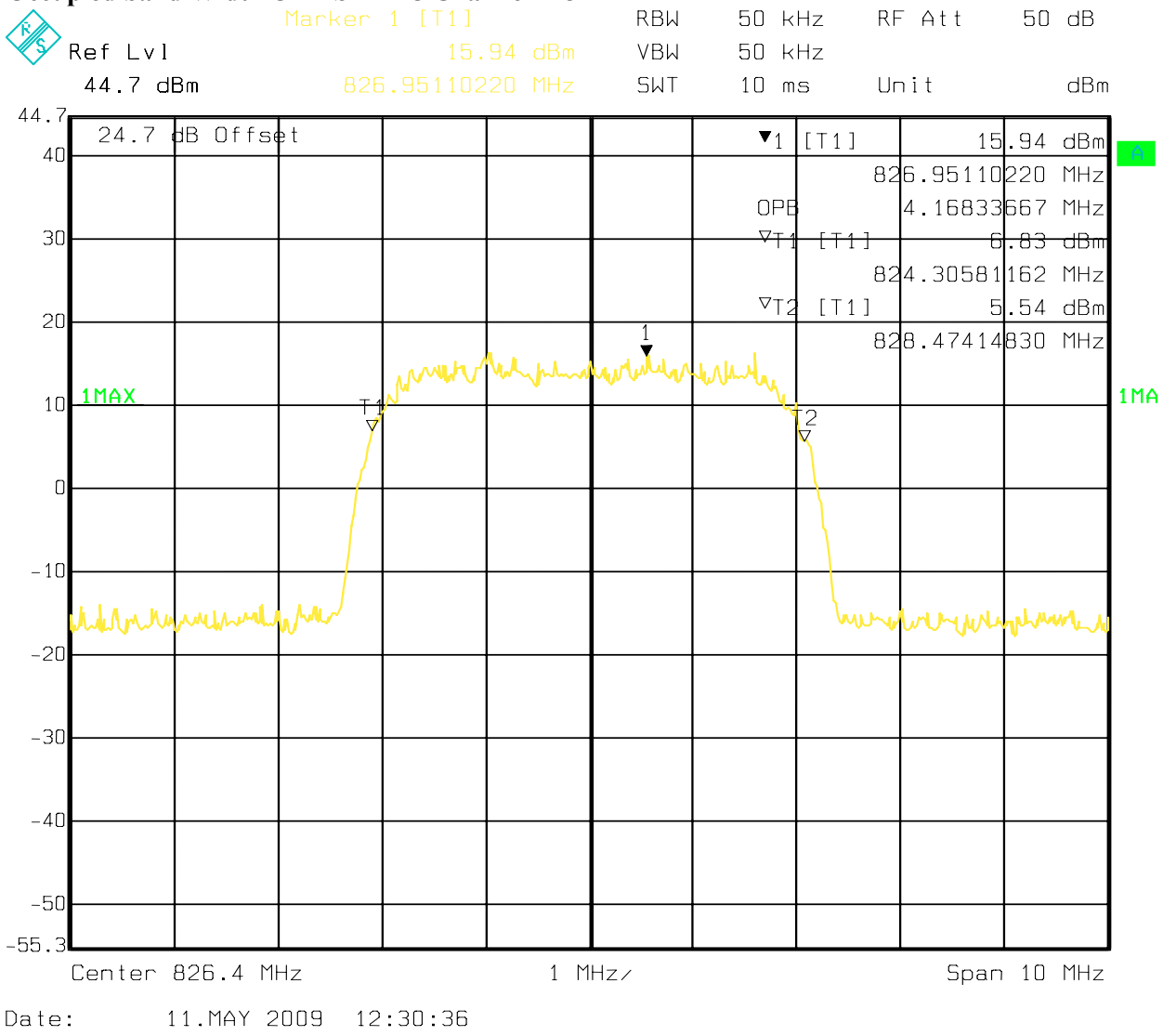
Occupied band Width GSM850 MHz Channel 190 EGPRS



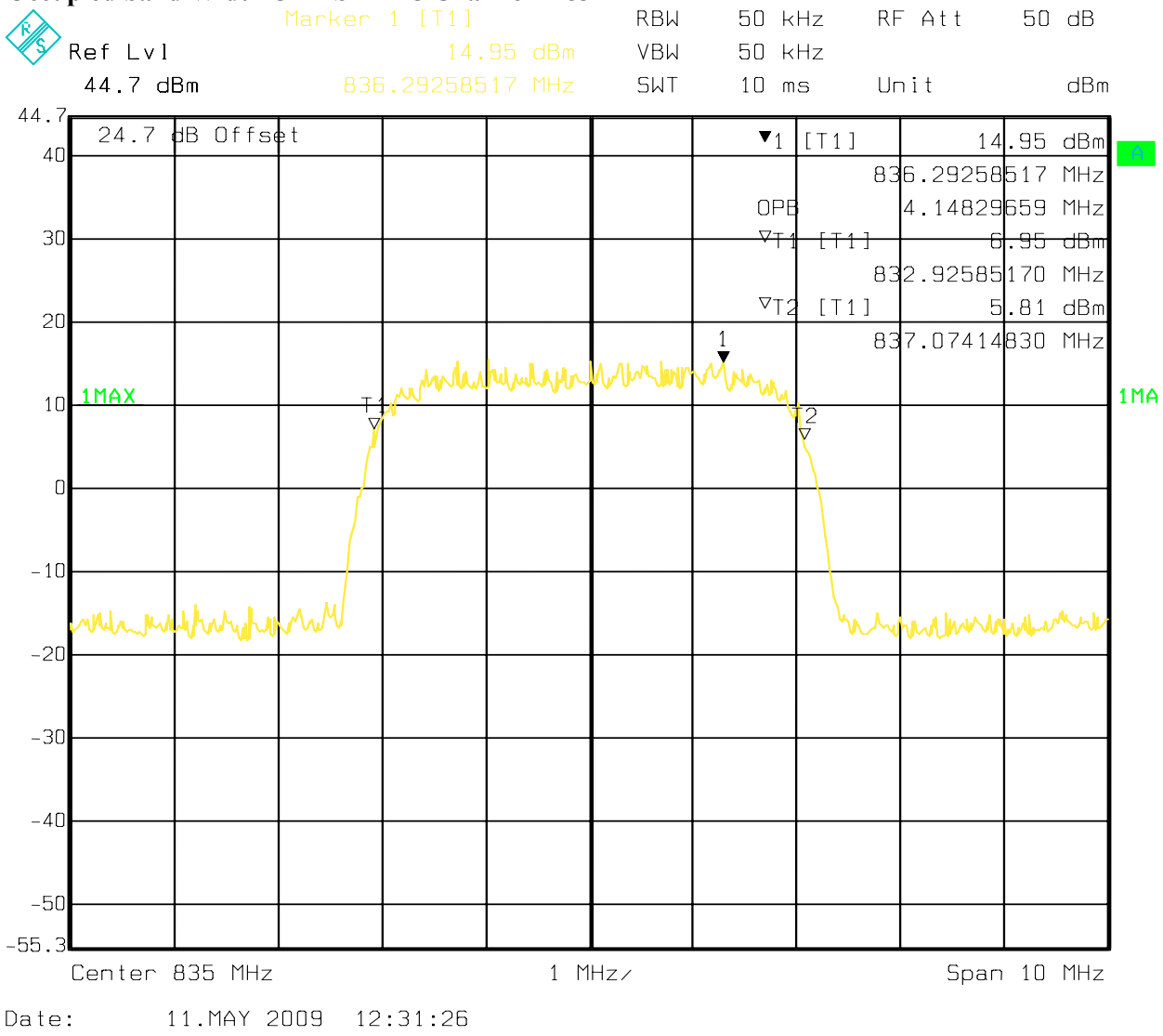
Occupied band Width GSM850 MHz Channel 251 EGPRS



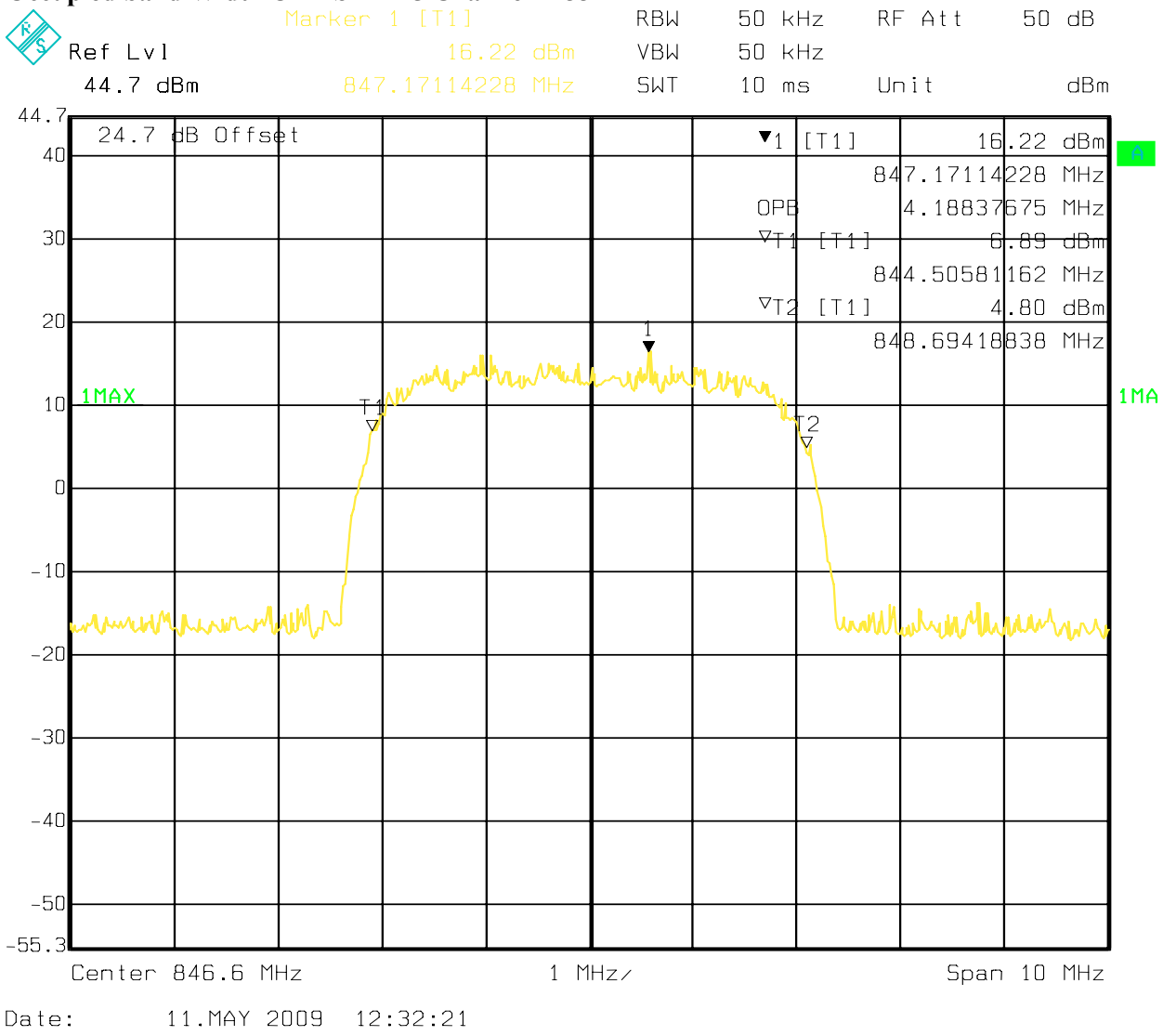
Occupied band Width UMTS FDD5 Channel 4132



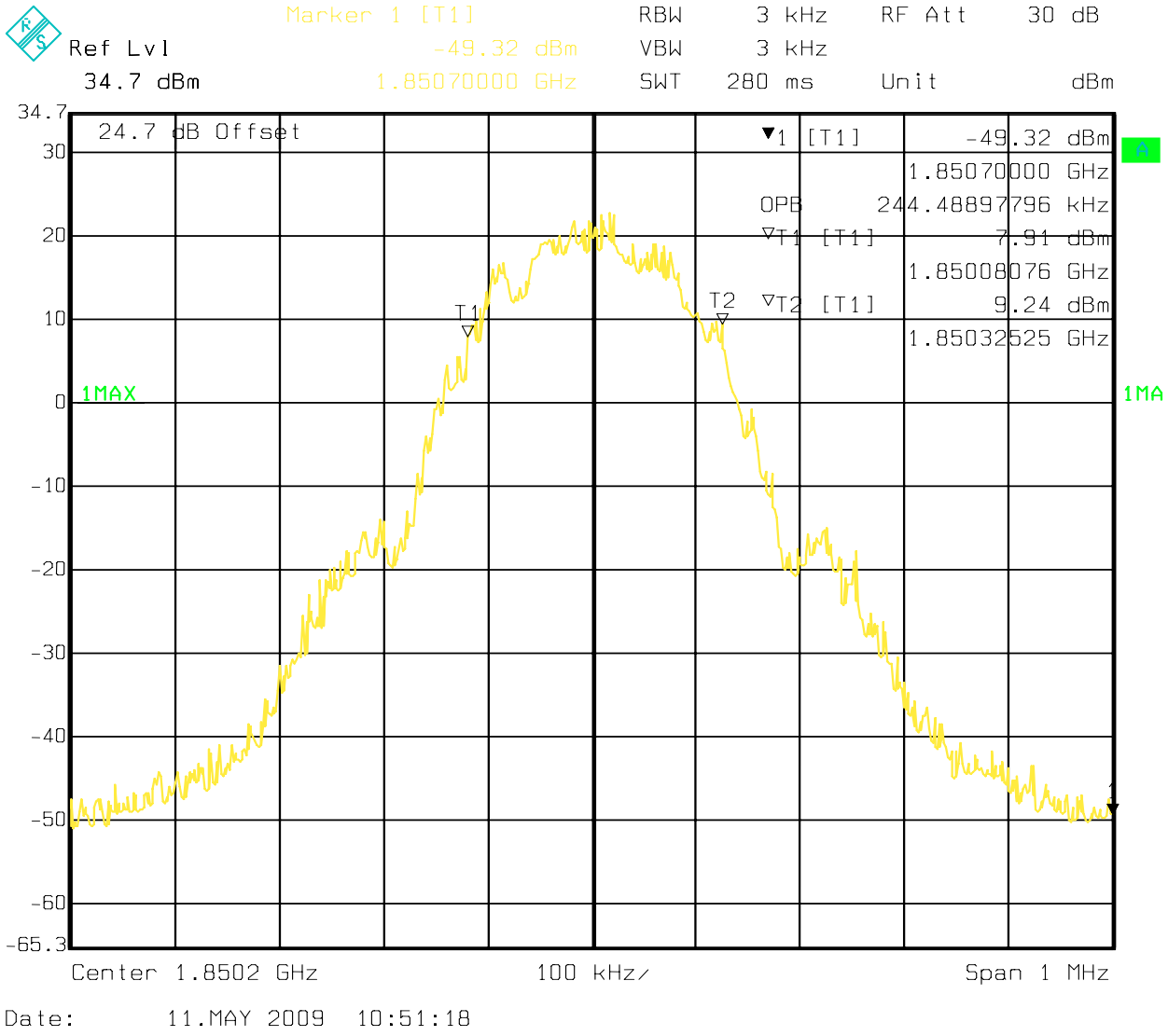
Occupied band Width UMTS FDD5 Channel 4183



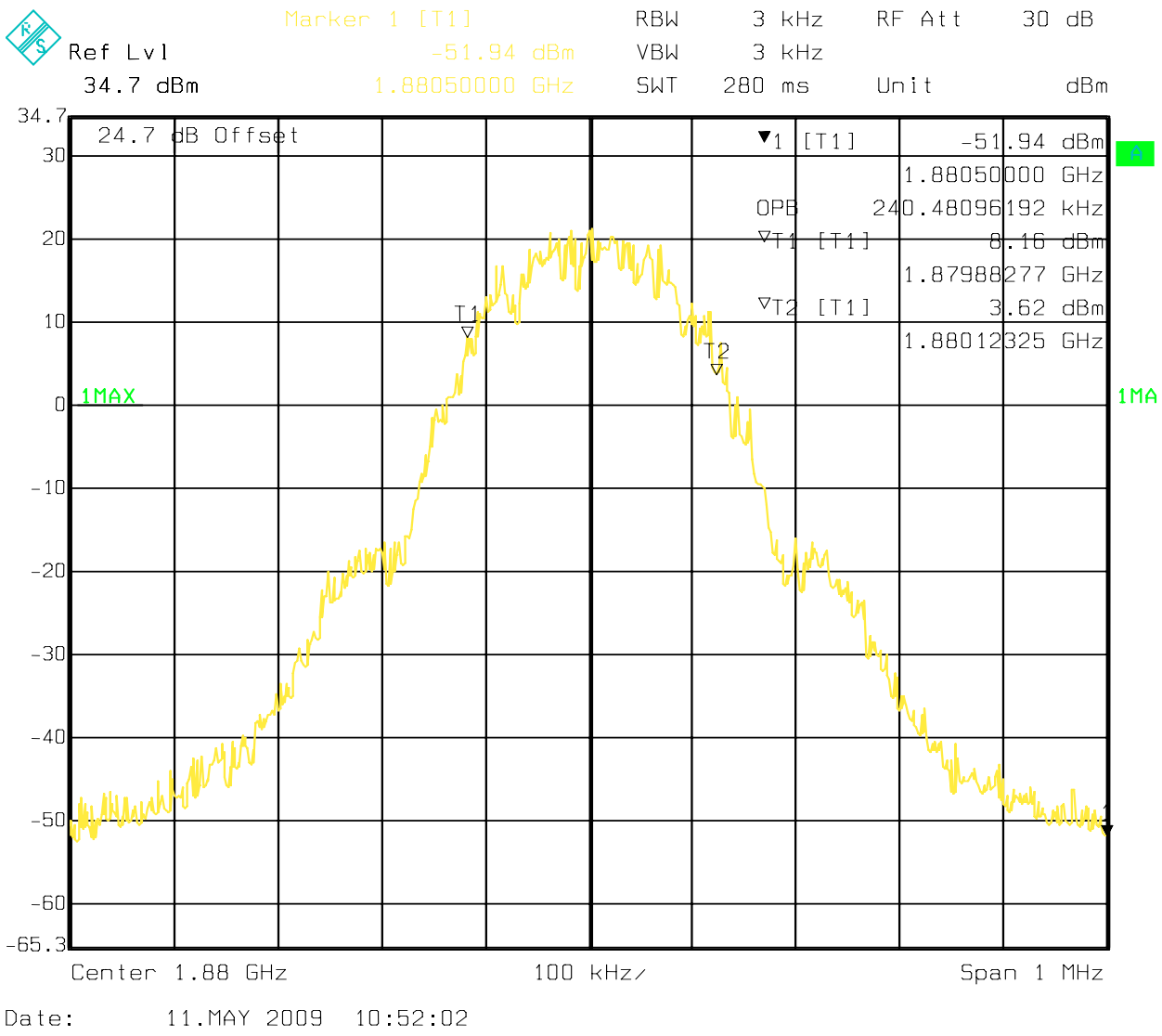
Occupied band Width UMTS FDD5 Channel 4233



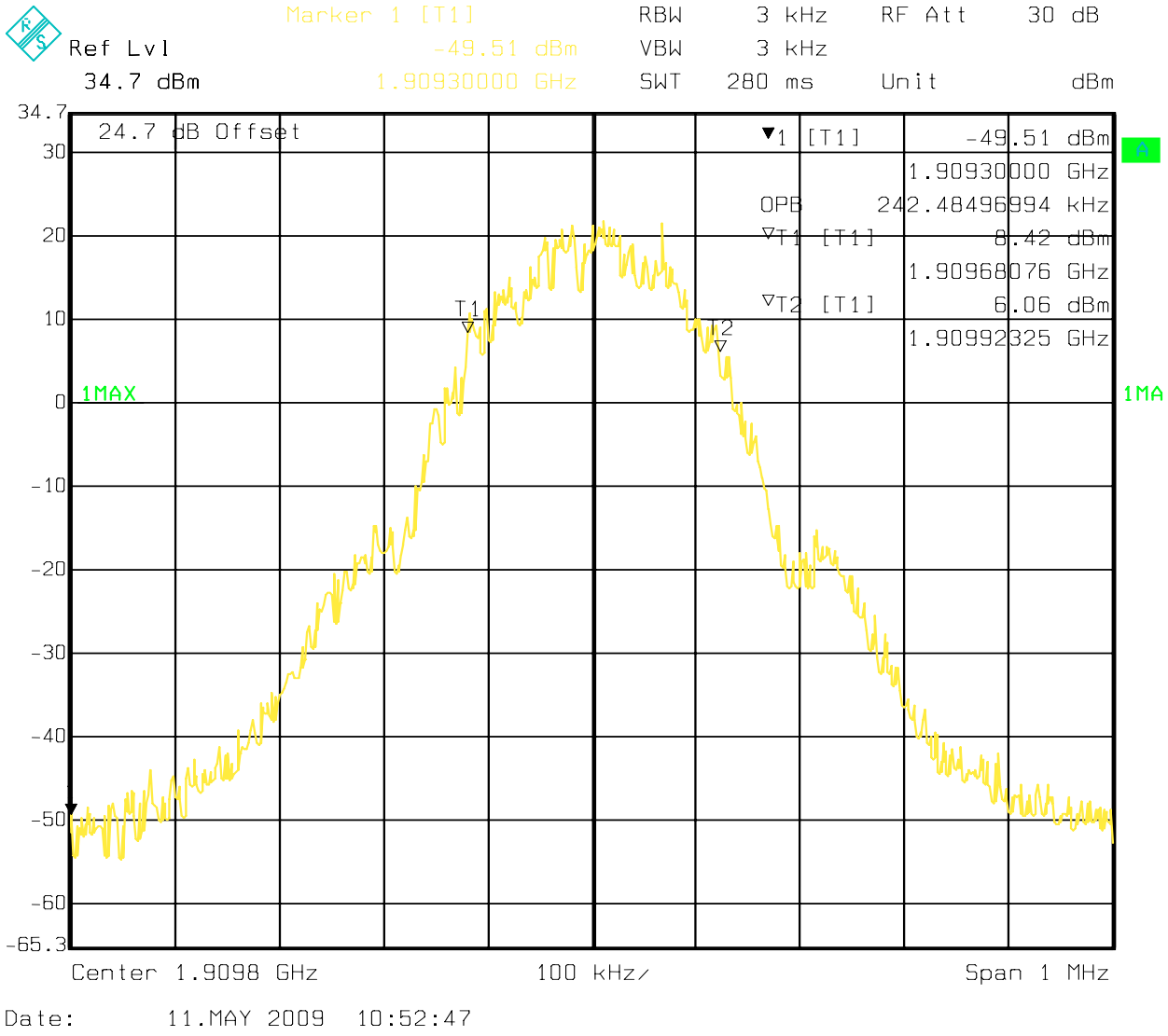
Occupied band Width PCS1900 MHz Channel 512 GSM



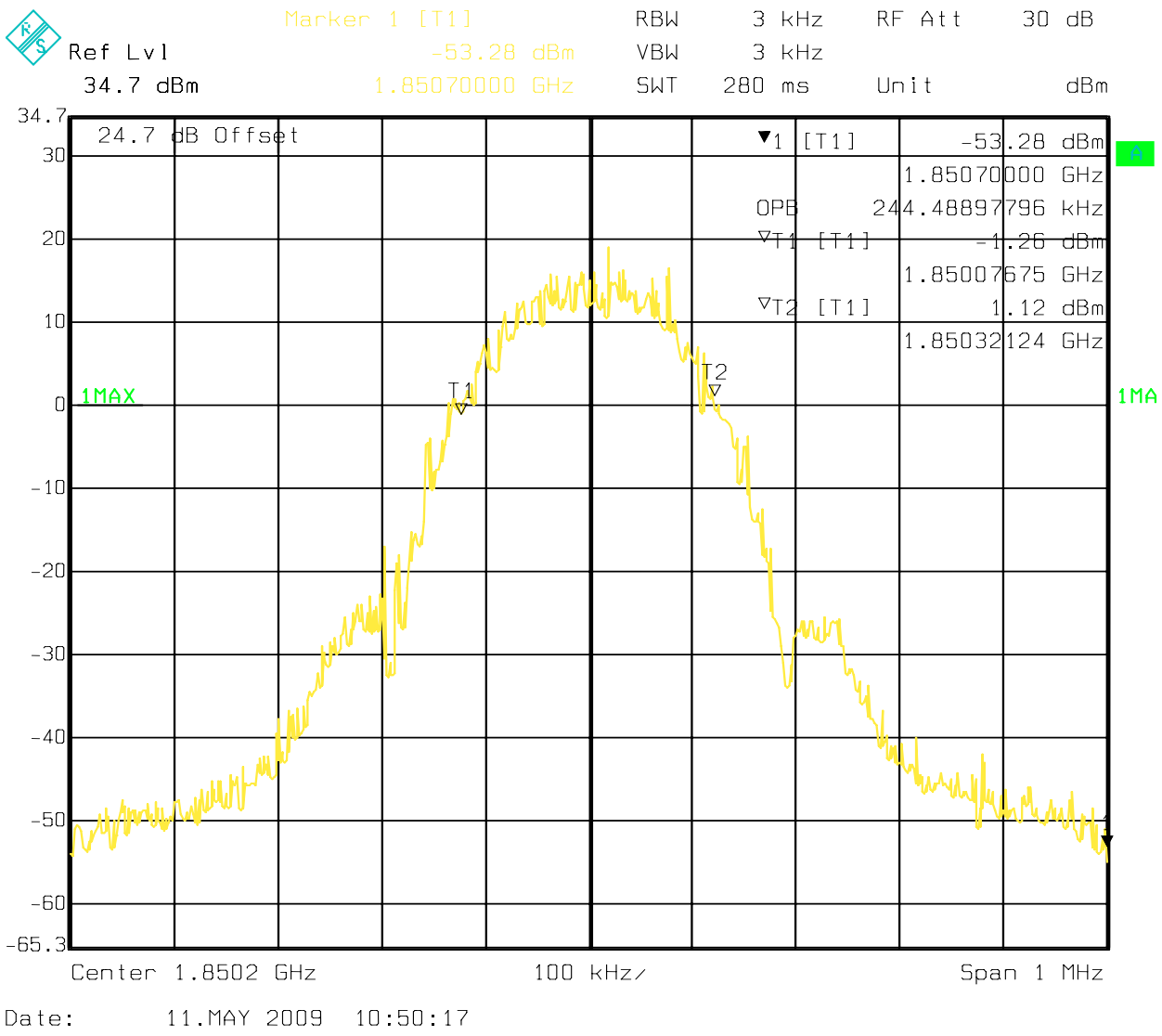
Occupied band Width PCS1900 MHz Channel 661 GSM



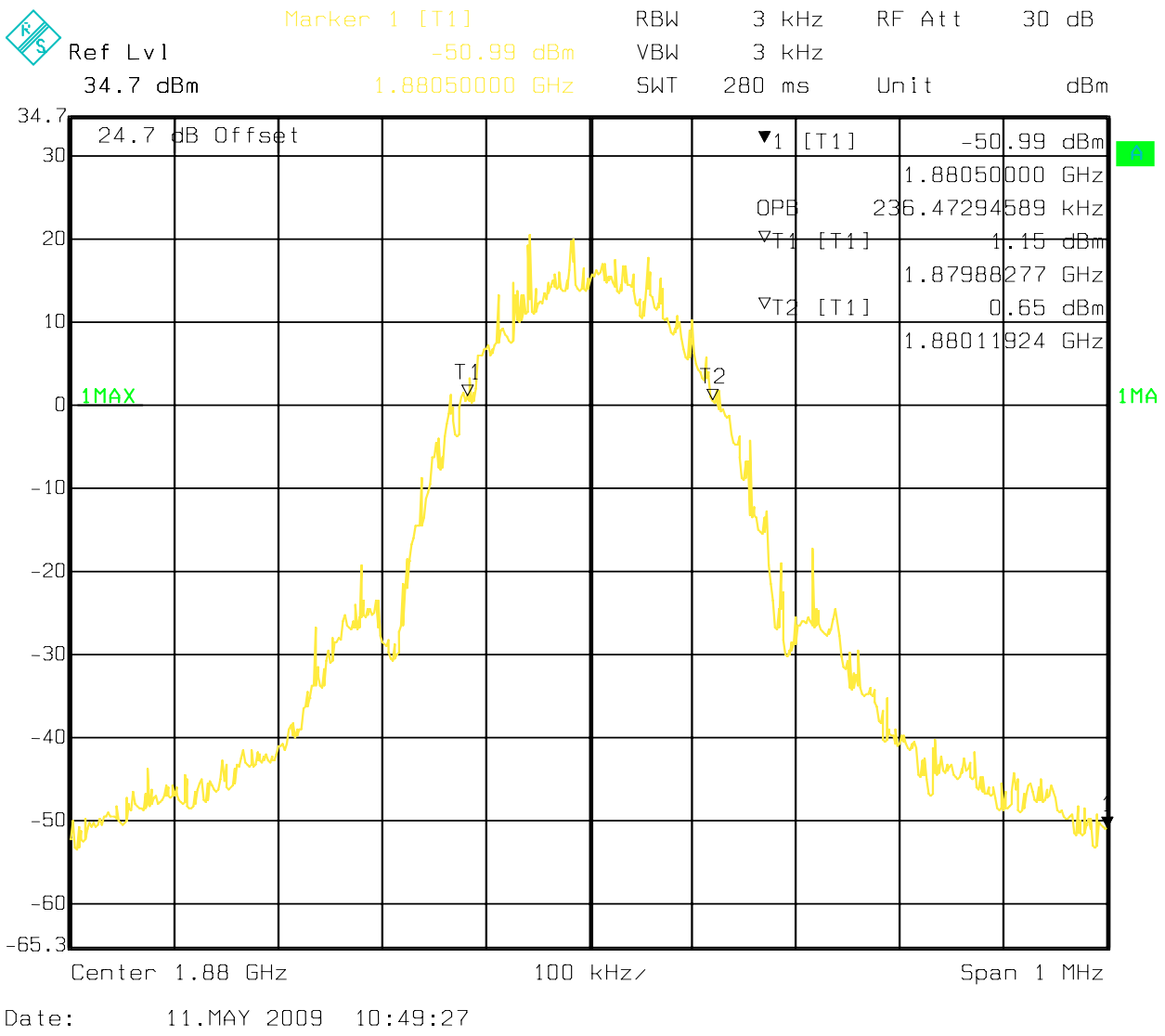
Occupied band Width PCS1900 MHz Channel 810 GSM



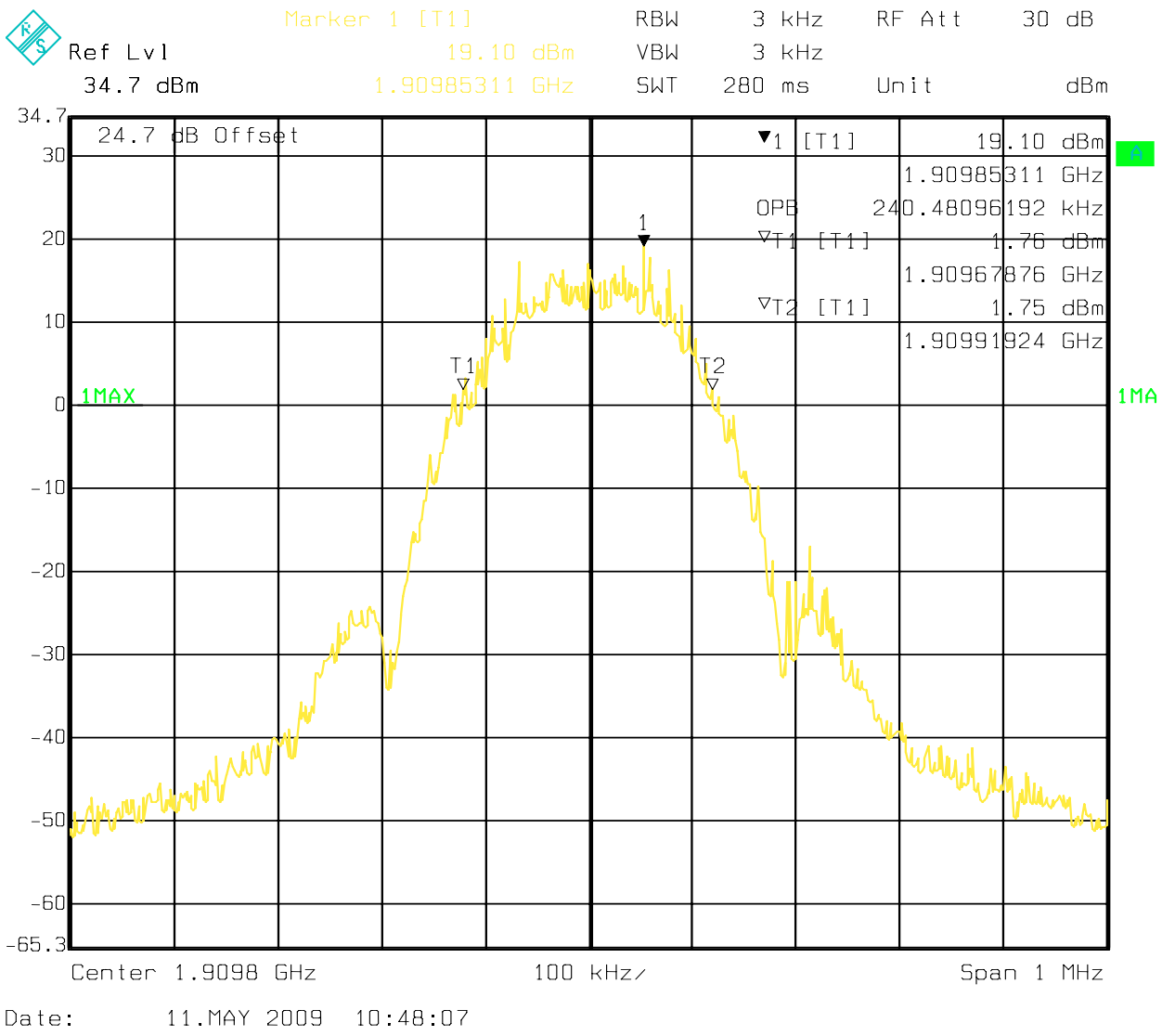
Occupied band Width PCS1900 MHz Channel 512 EGPRS



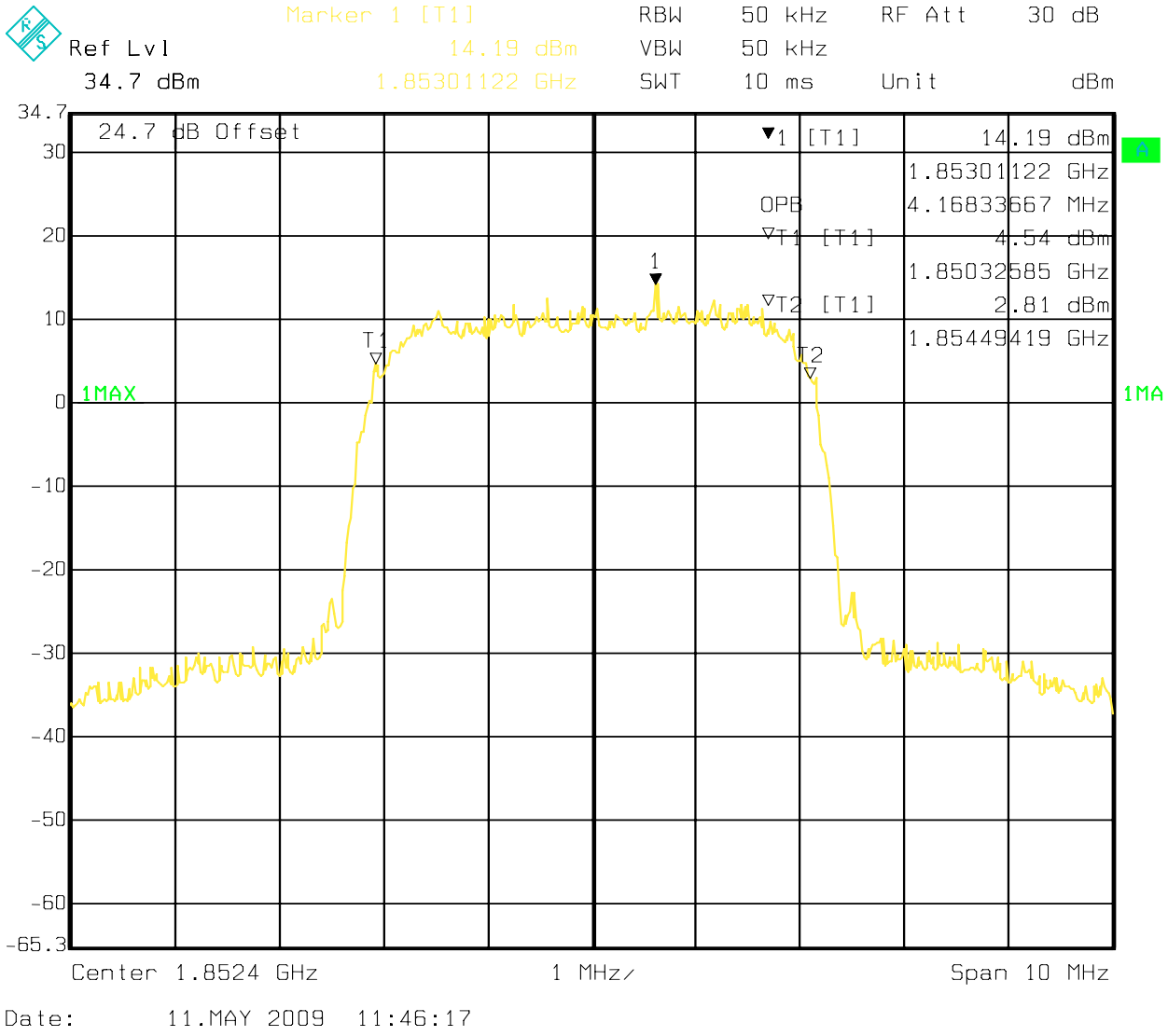
Occupied band Width PCS1900 MHz Channel 661 EGPRS



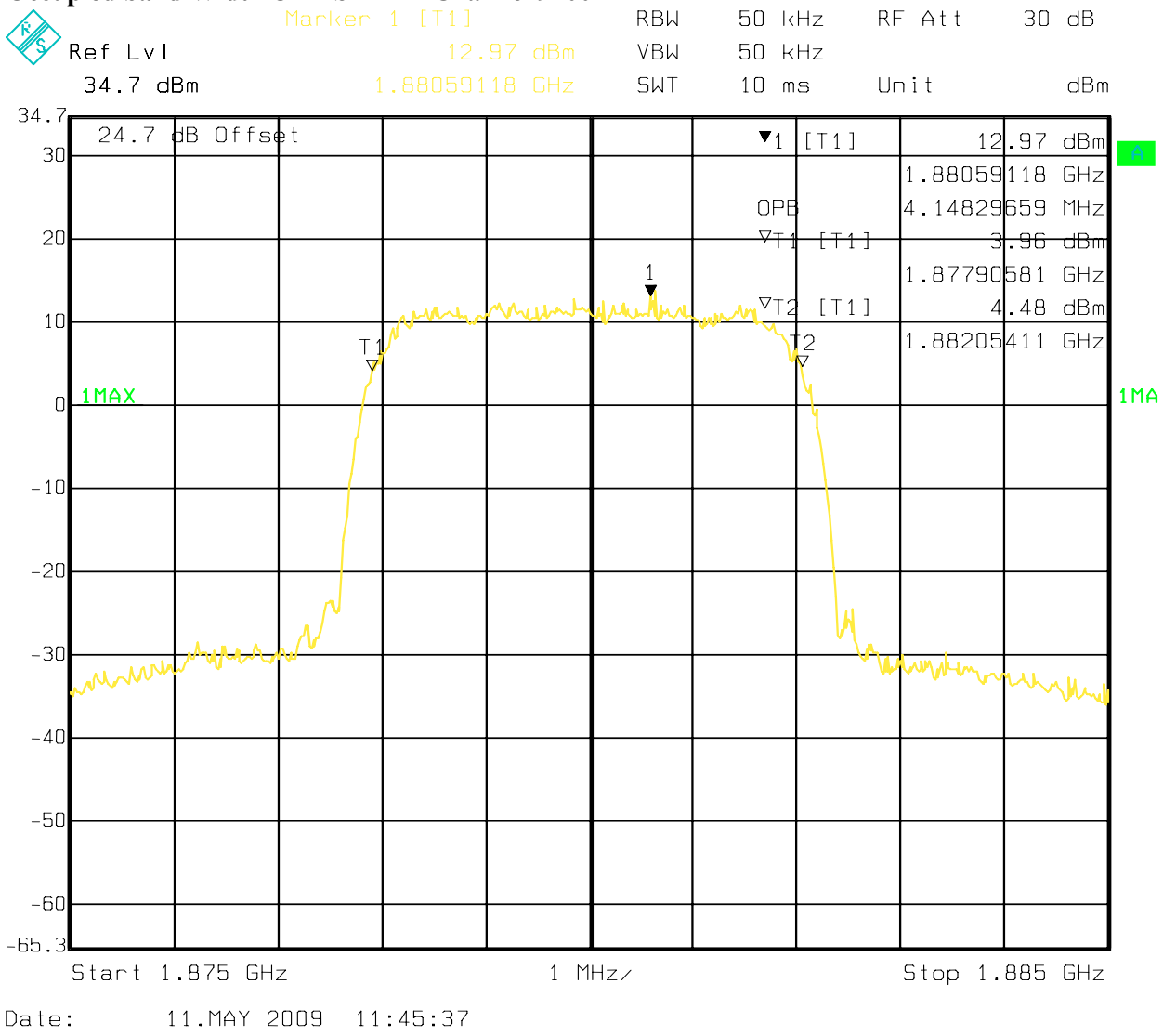
Occupied band Width PCS1900 MHz Channel 810 EGPRS



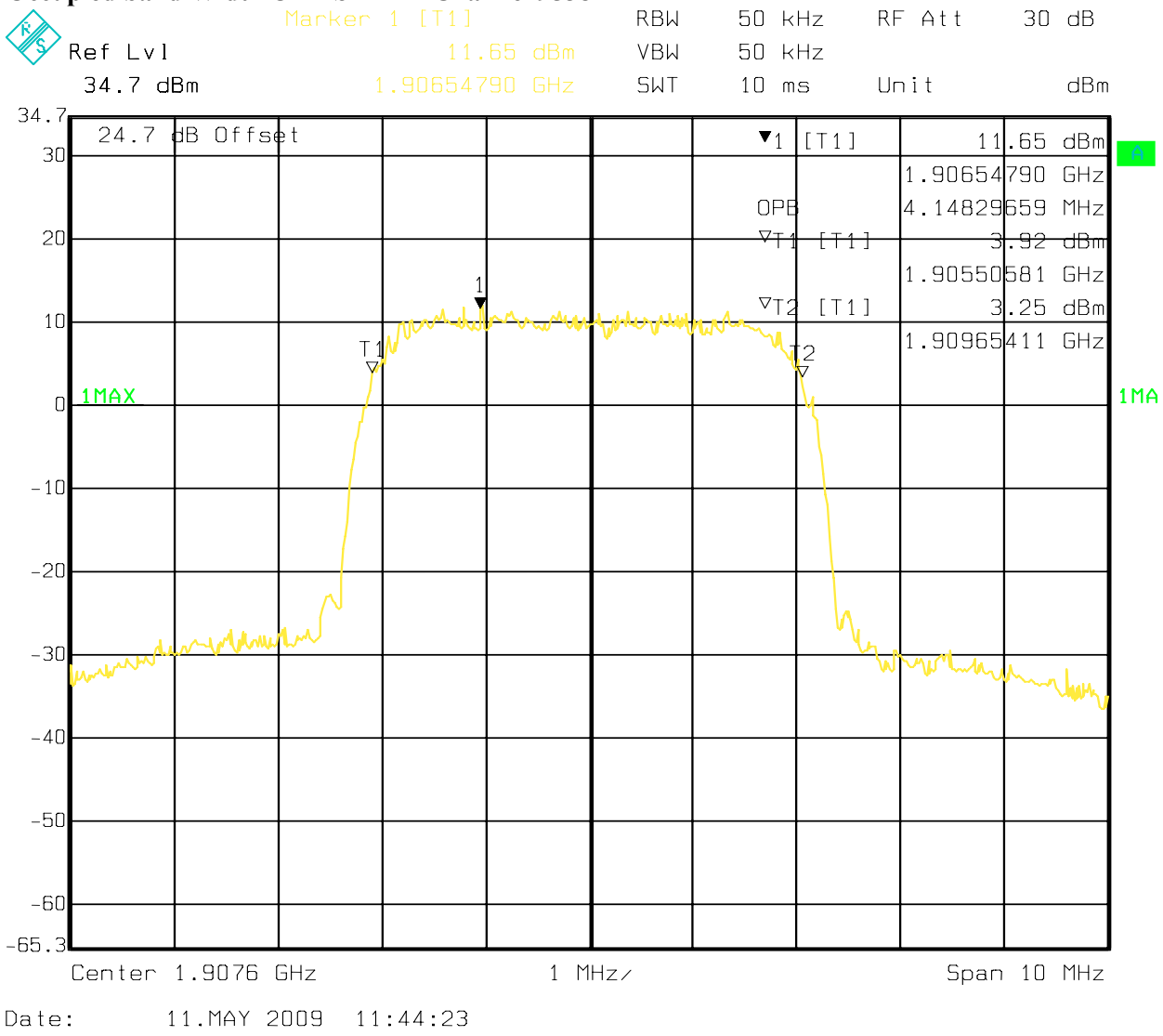
Occupied band Width UMTS FDD2 Channel 9262



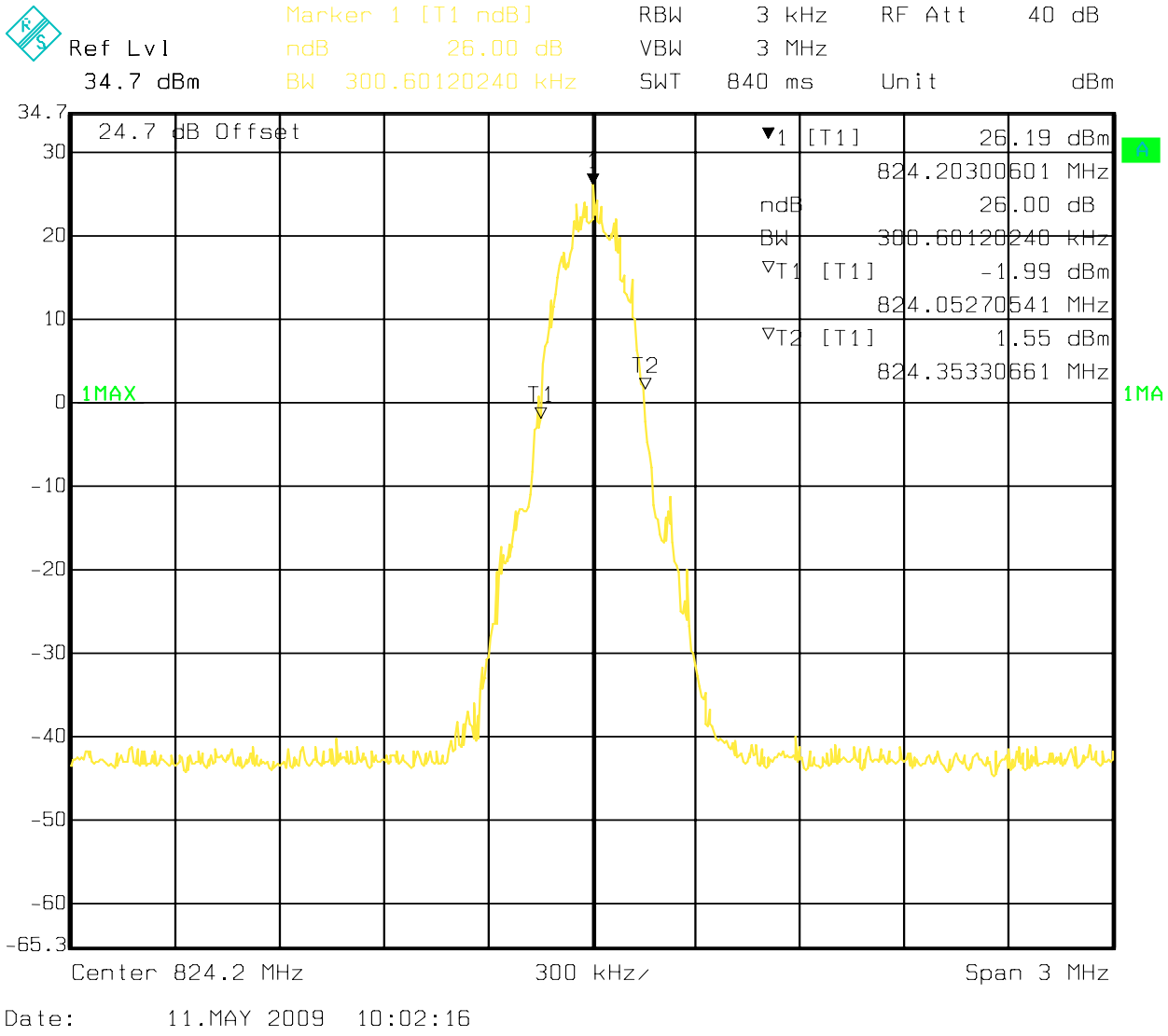
Occupied band Width UMTS FDD2 Channel 9400



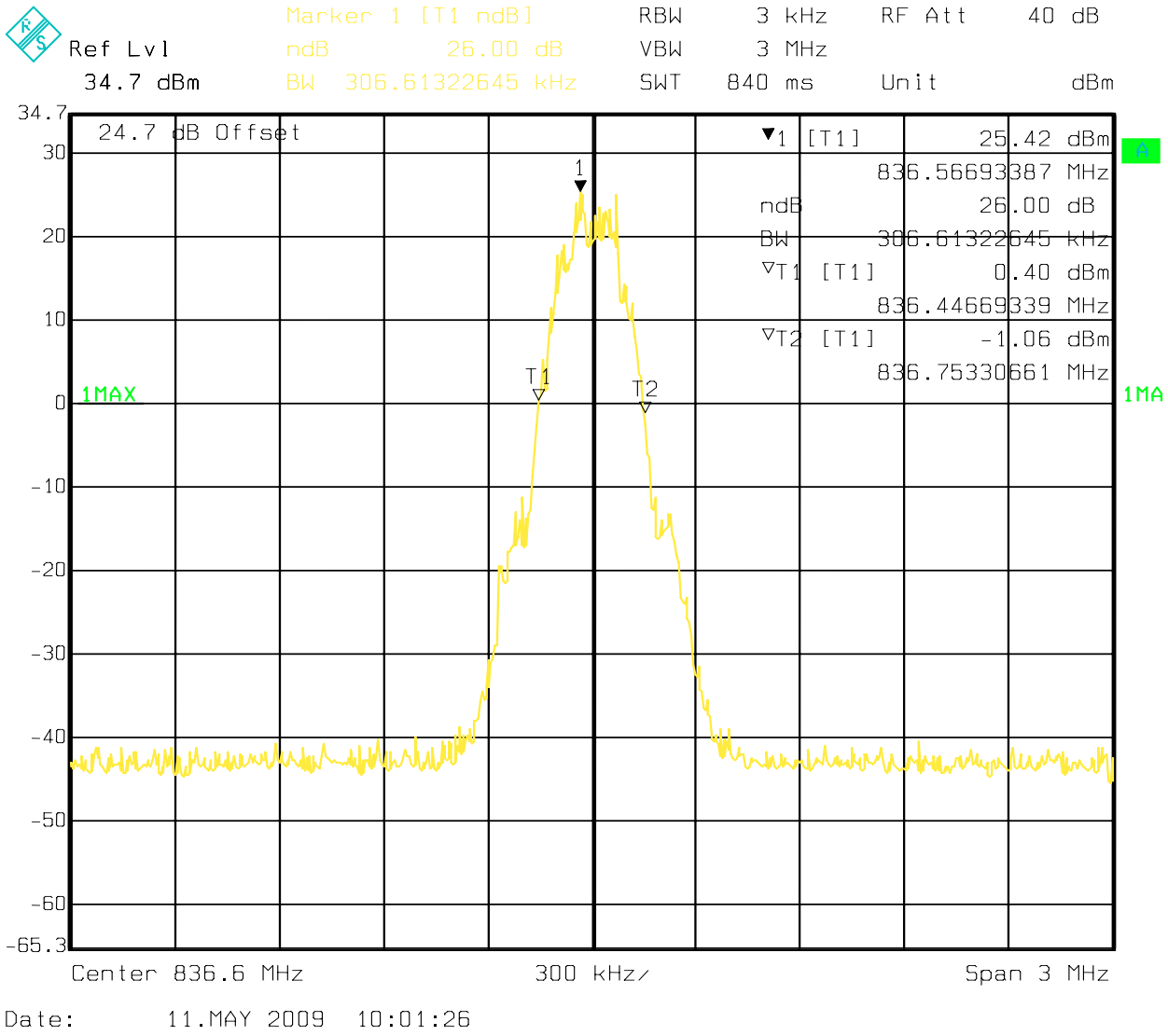
Occupied band Width UMTS FDD2 Channel 9538



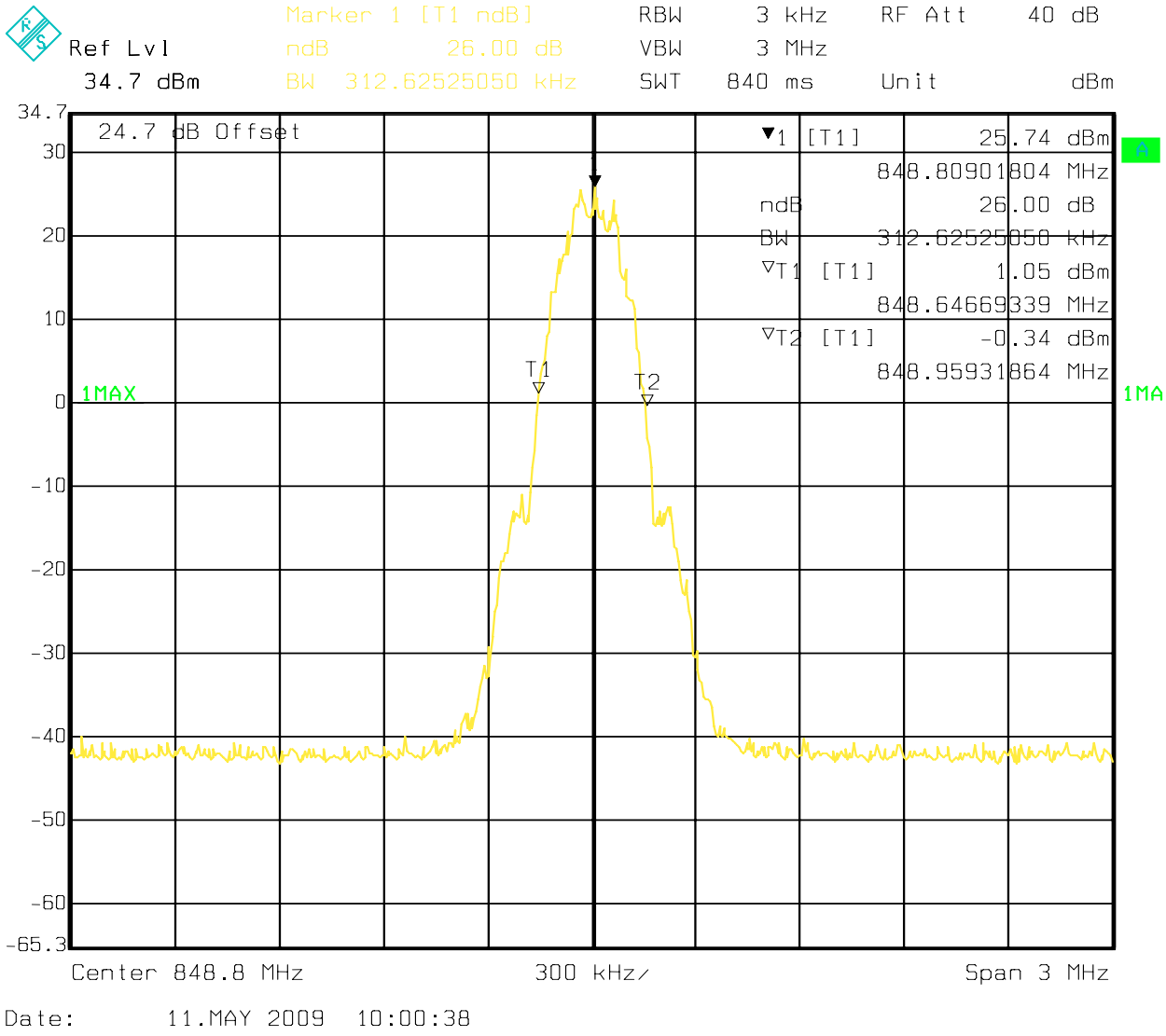
Emission band Width GSM850 MHz Channel 128 GSM



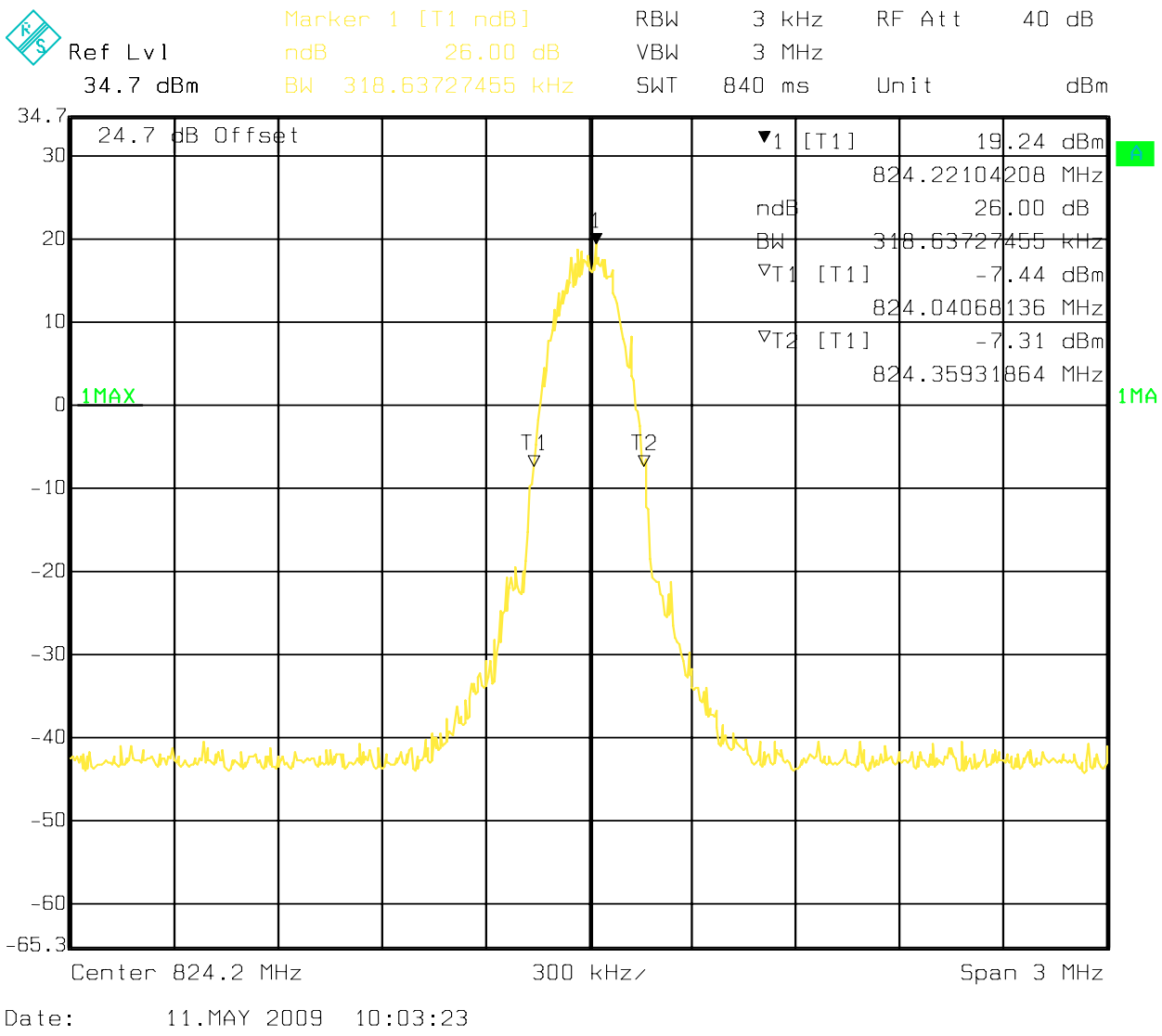
Emission band Width GSM850 MHz Channel 190 GSM



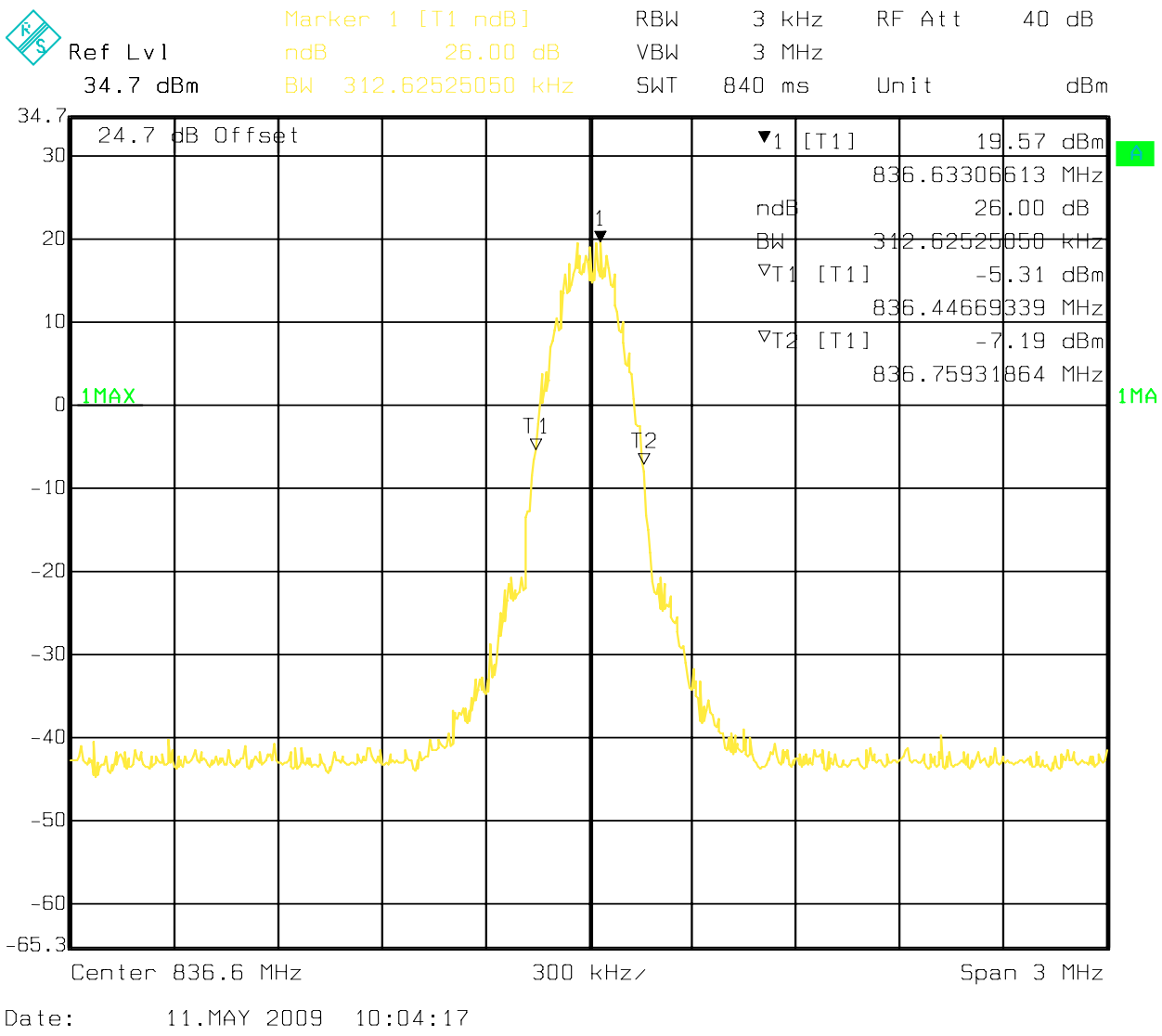
Emission band Width GSM850 MHz Channel 251 GSM



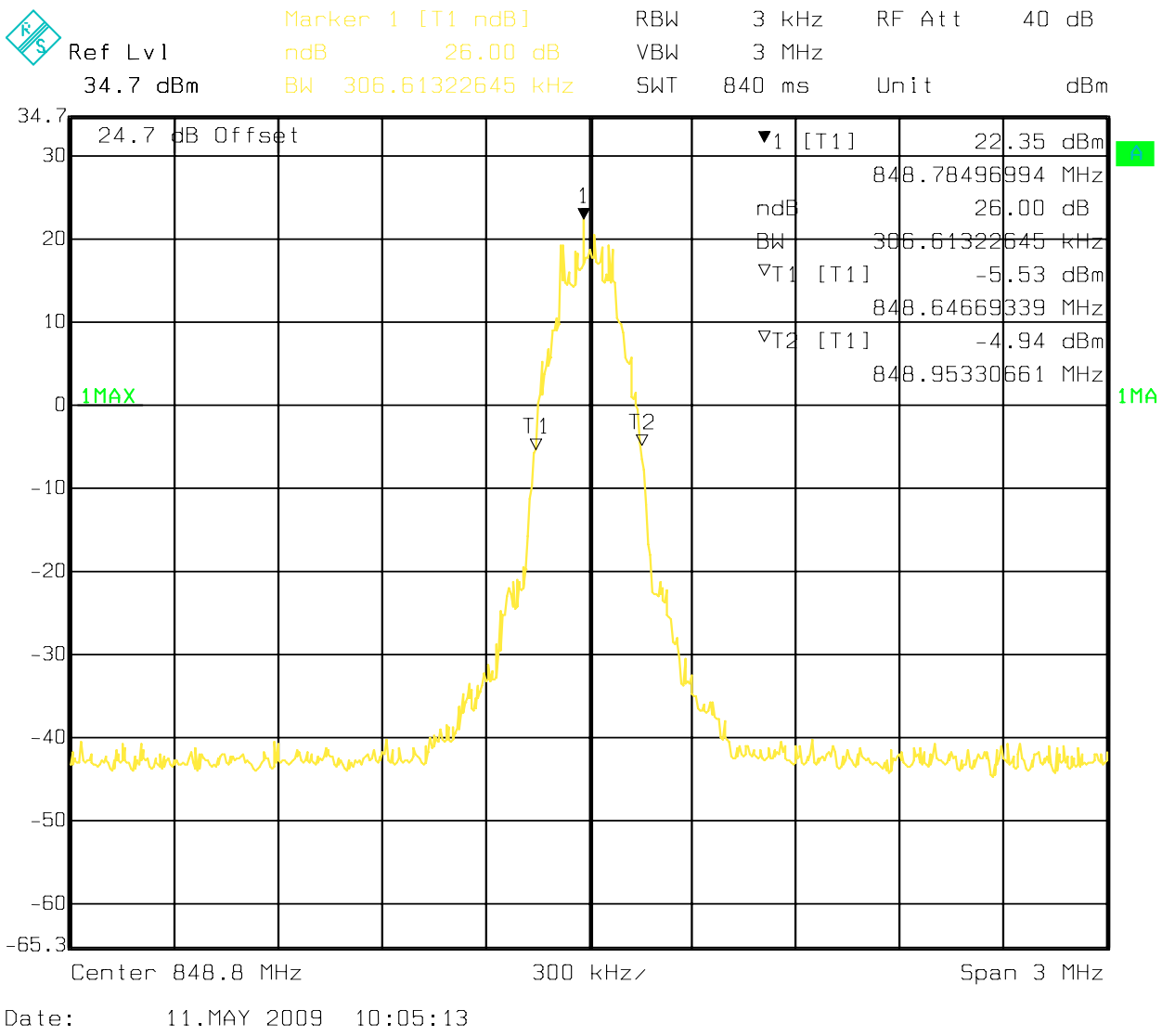
Emission band Width GSM850 MHz Channel 128 EGPRS



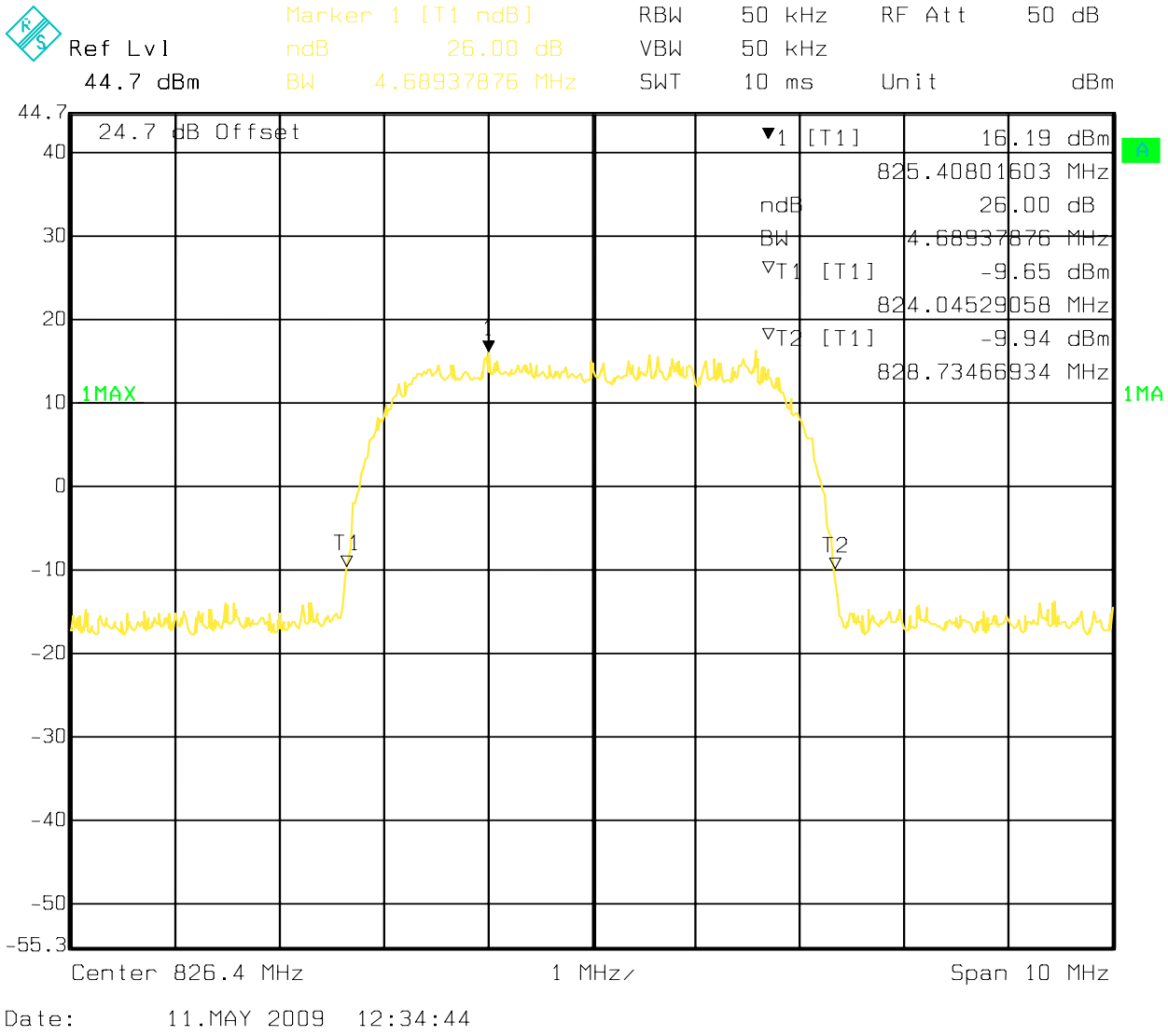
Emission band Width GSM850 MHz Channel 190 EGPRS



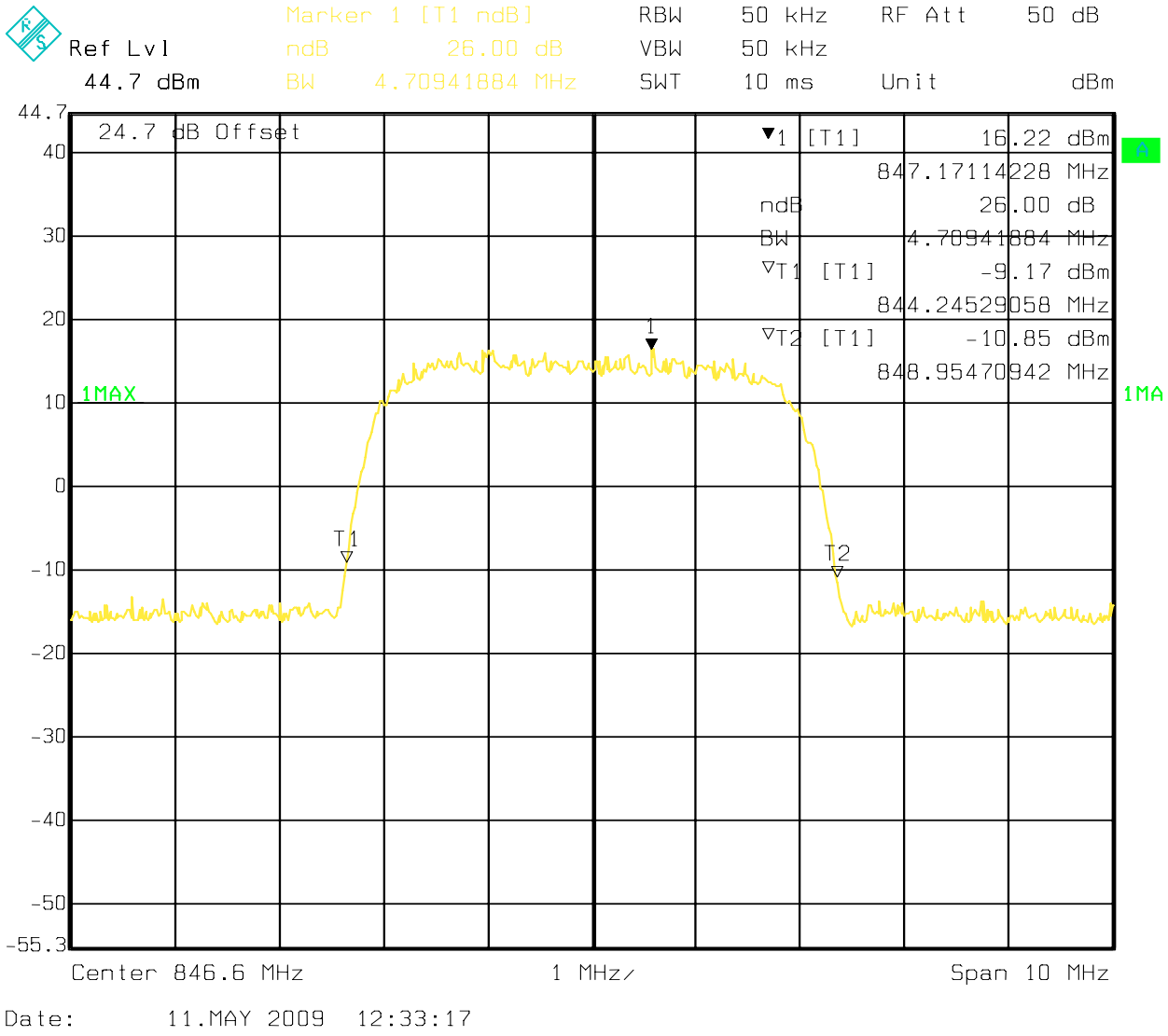
Emission band Width GSM850 MHz Channel 251 EGPRS



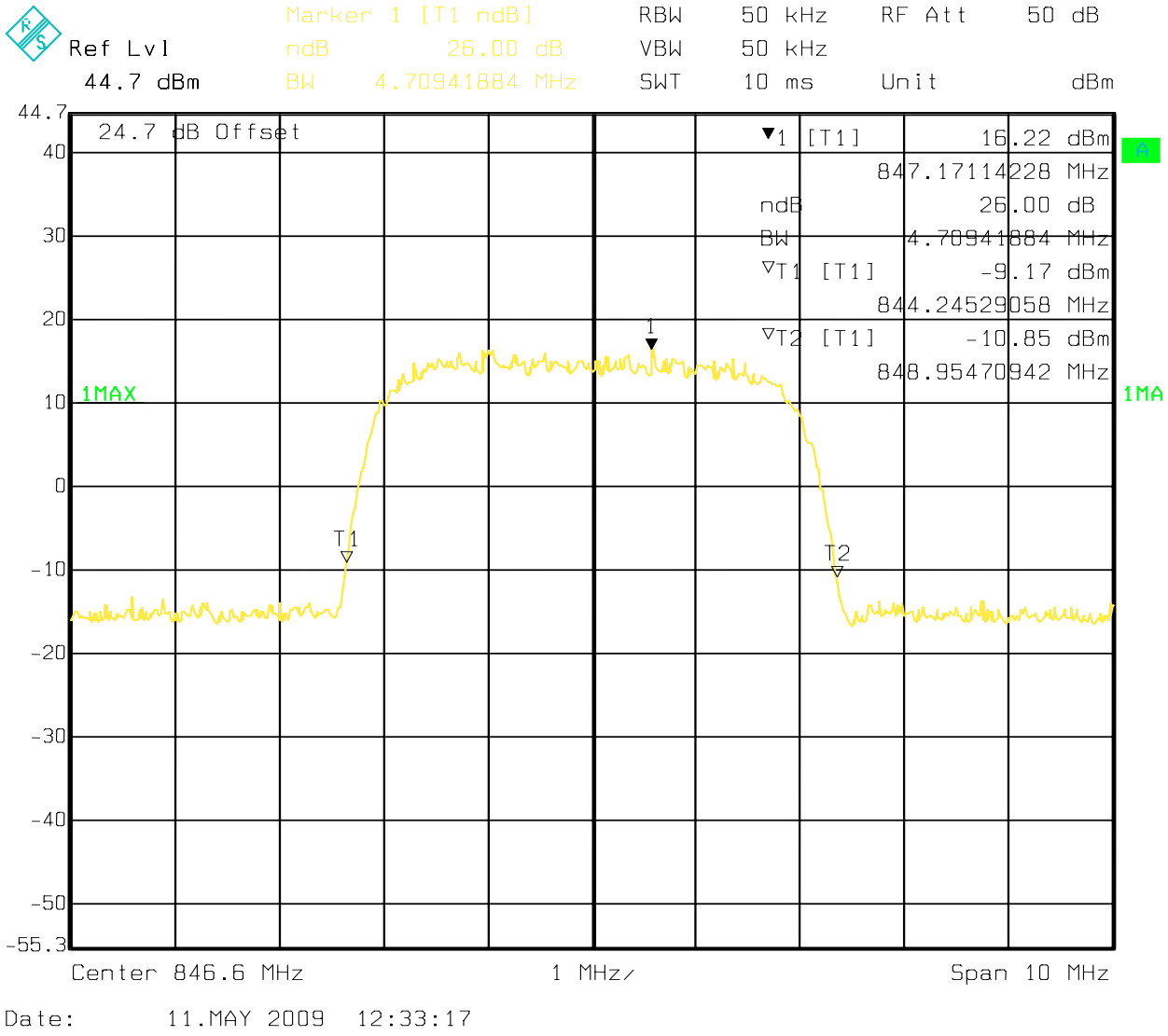
Emission band Width UMTS FDD5 Channel 4132



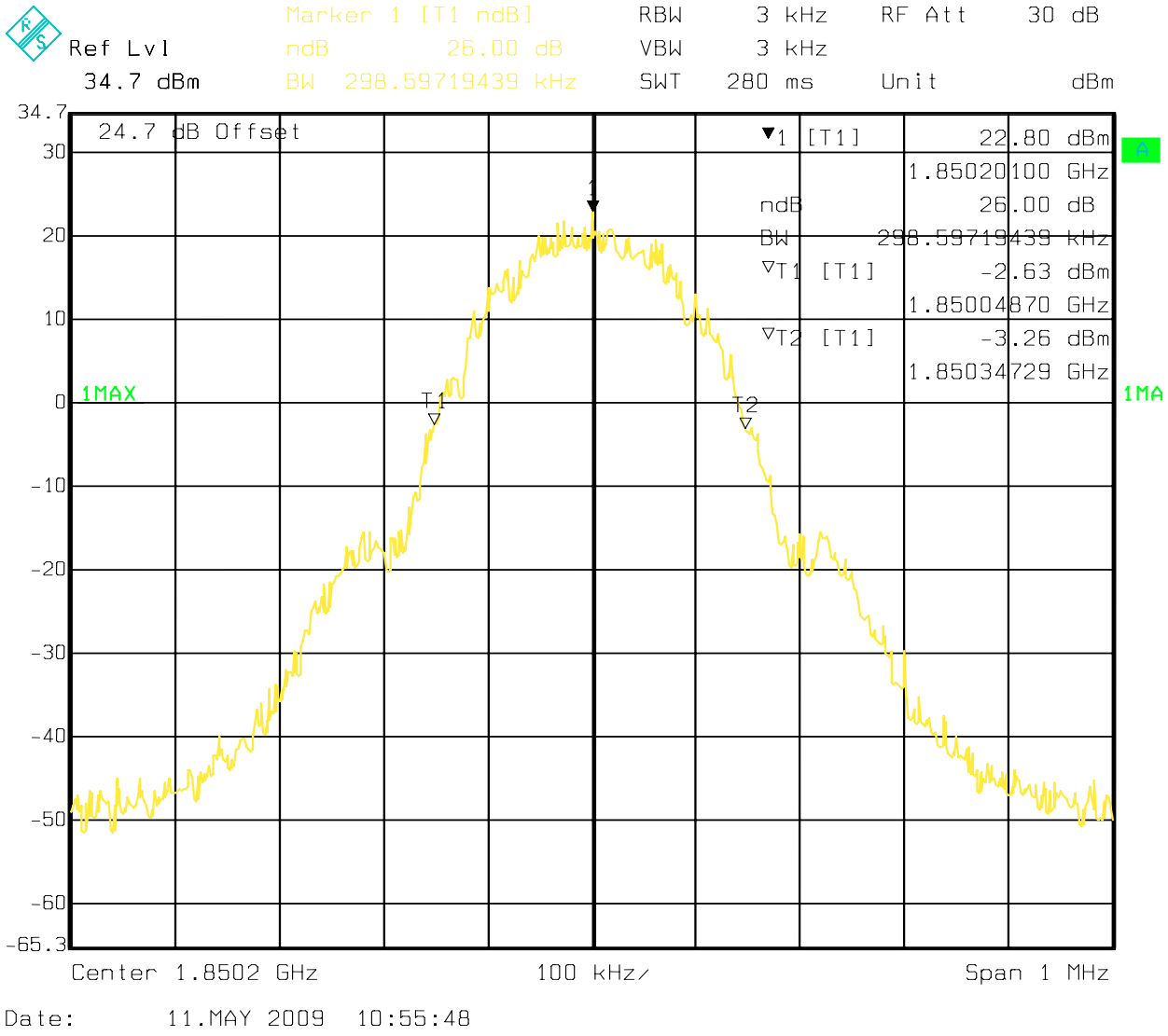
Emission band Width UMTS FDD5 Channel 4183



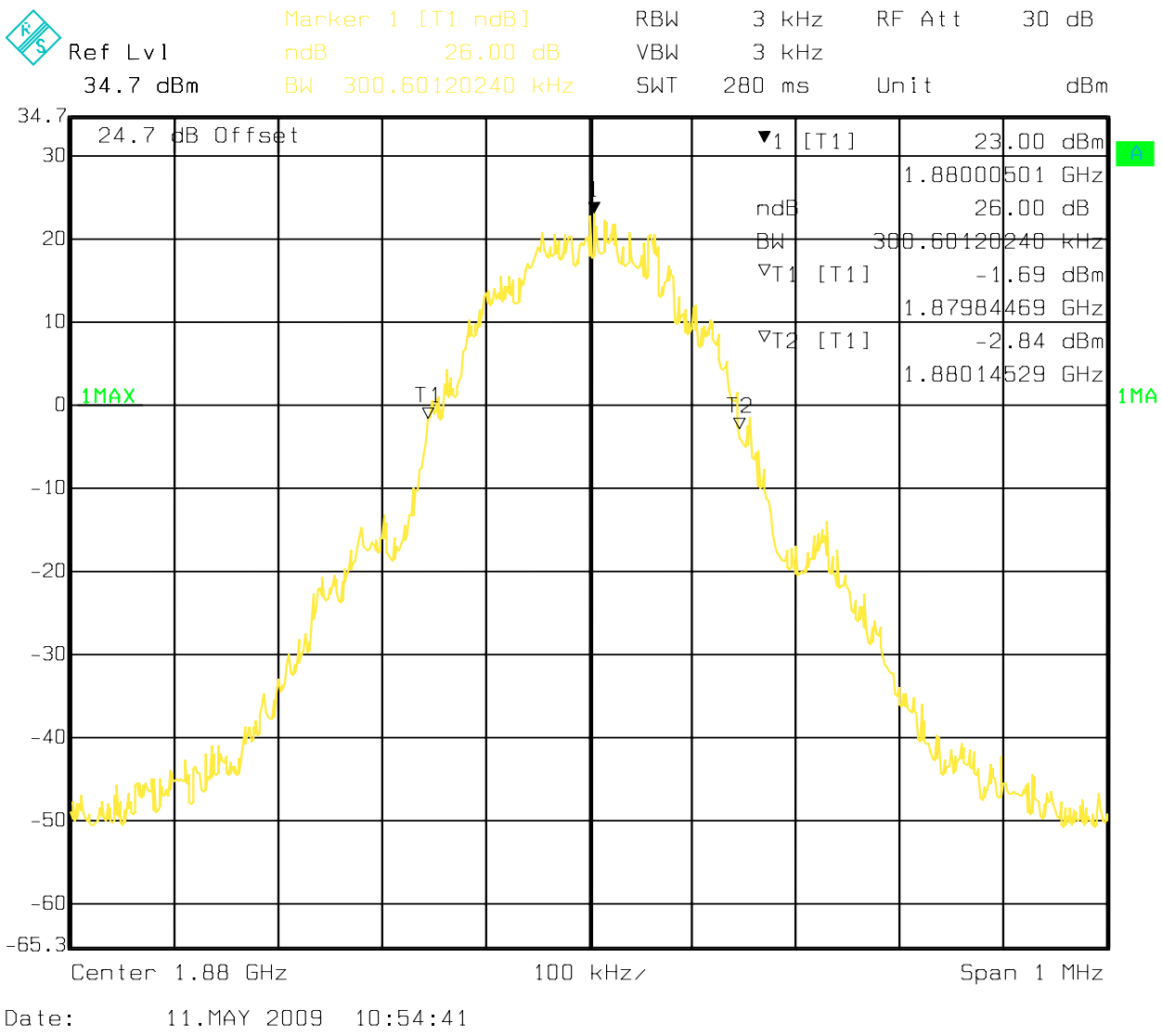
Emission band Width UMTS FDD5 Channel 4233



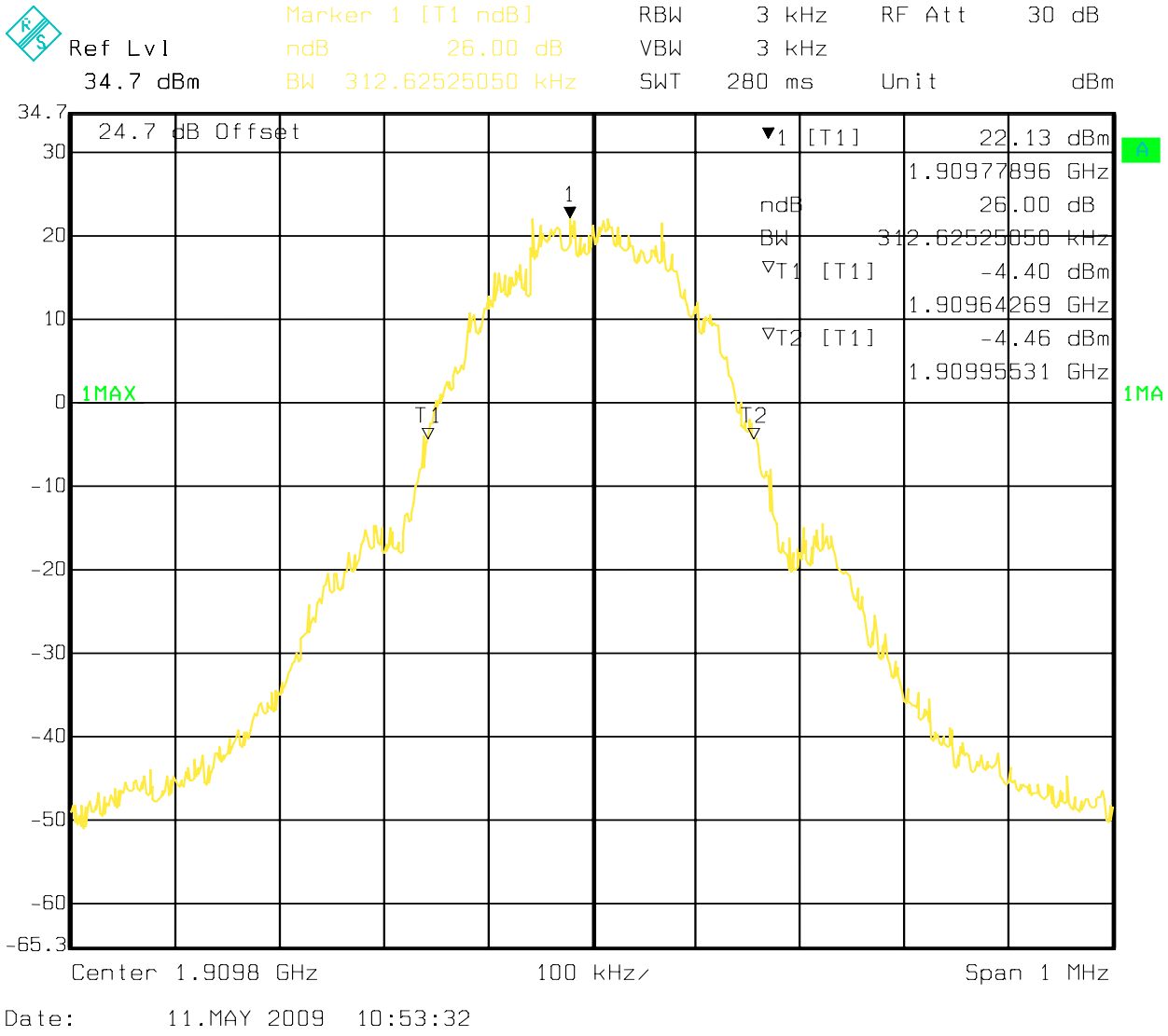
Emission band Width PCS1900 MHz Channel 512 GSM



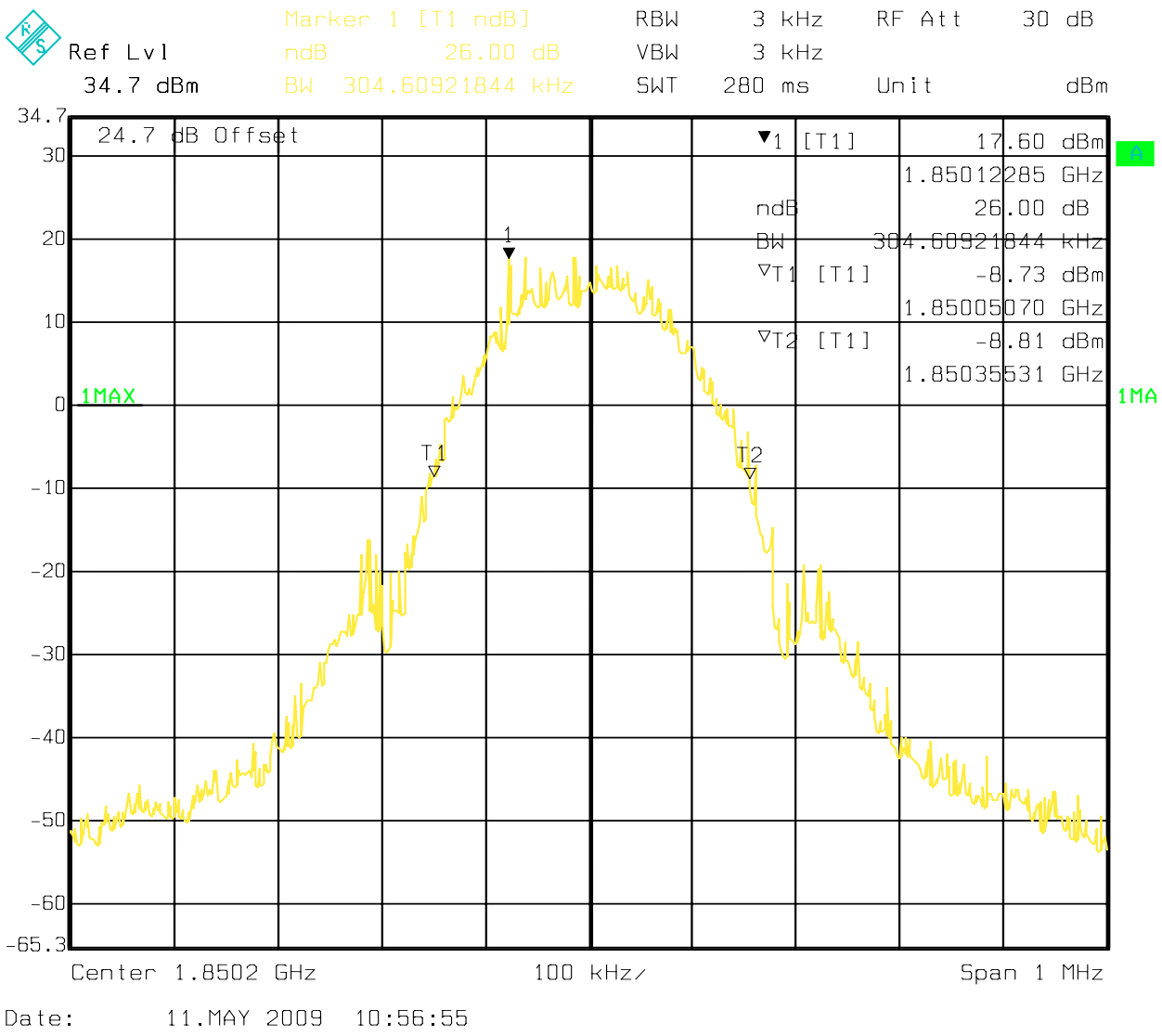
Emission band Width PCS1900 MHz Channel 661 GSM



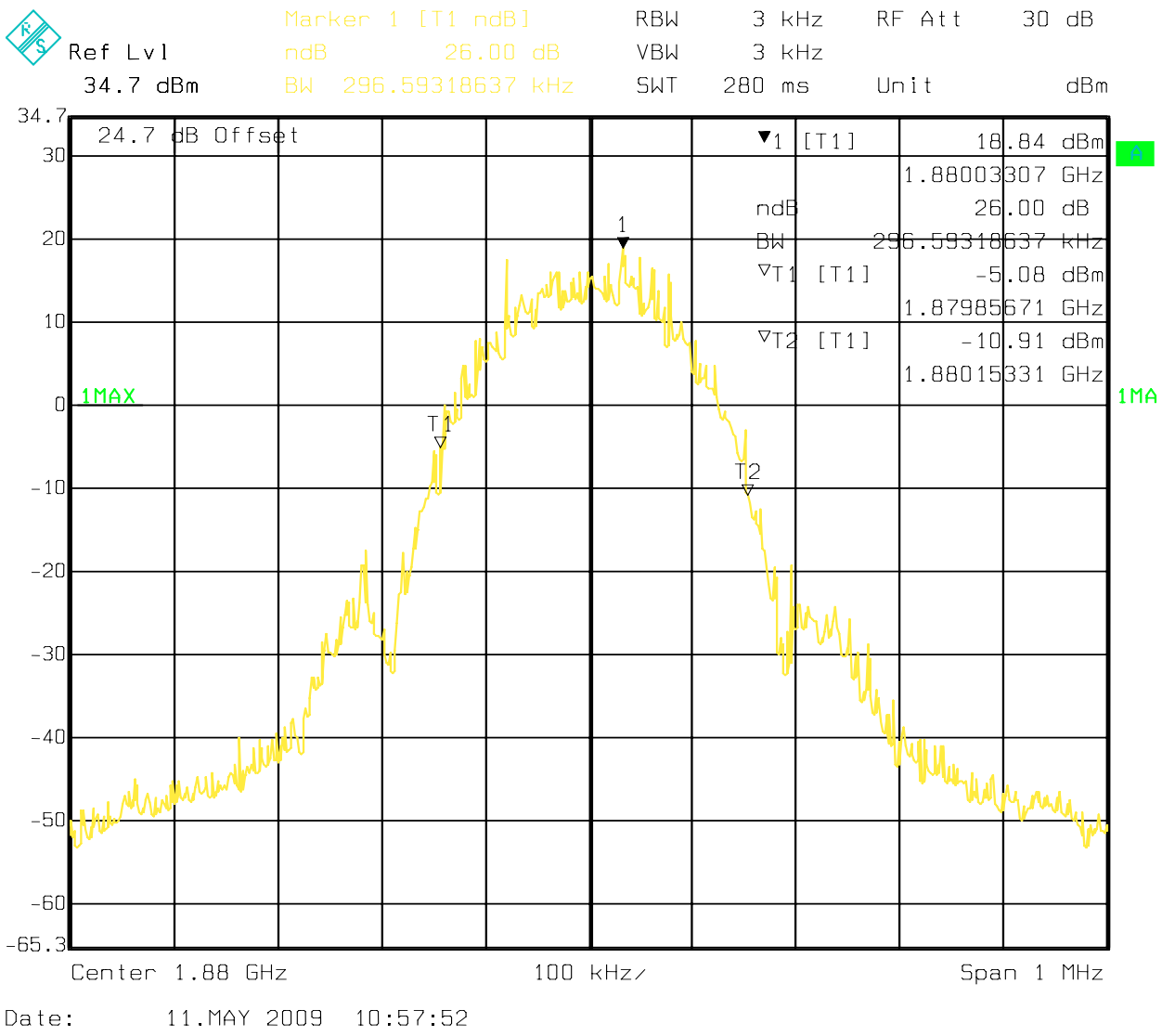
Emission band Width PCS1900 MHz Channel 810 GSM



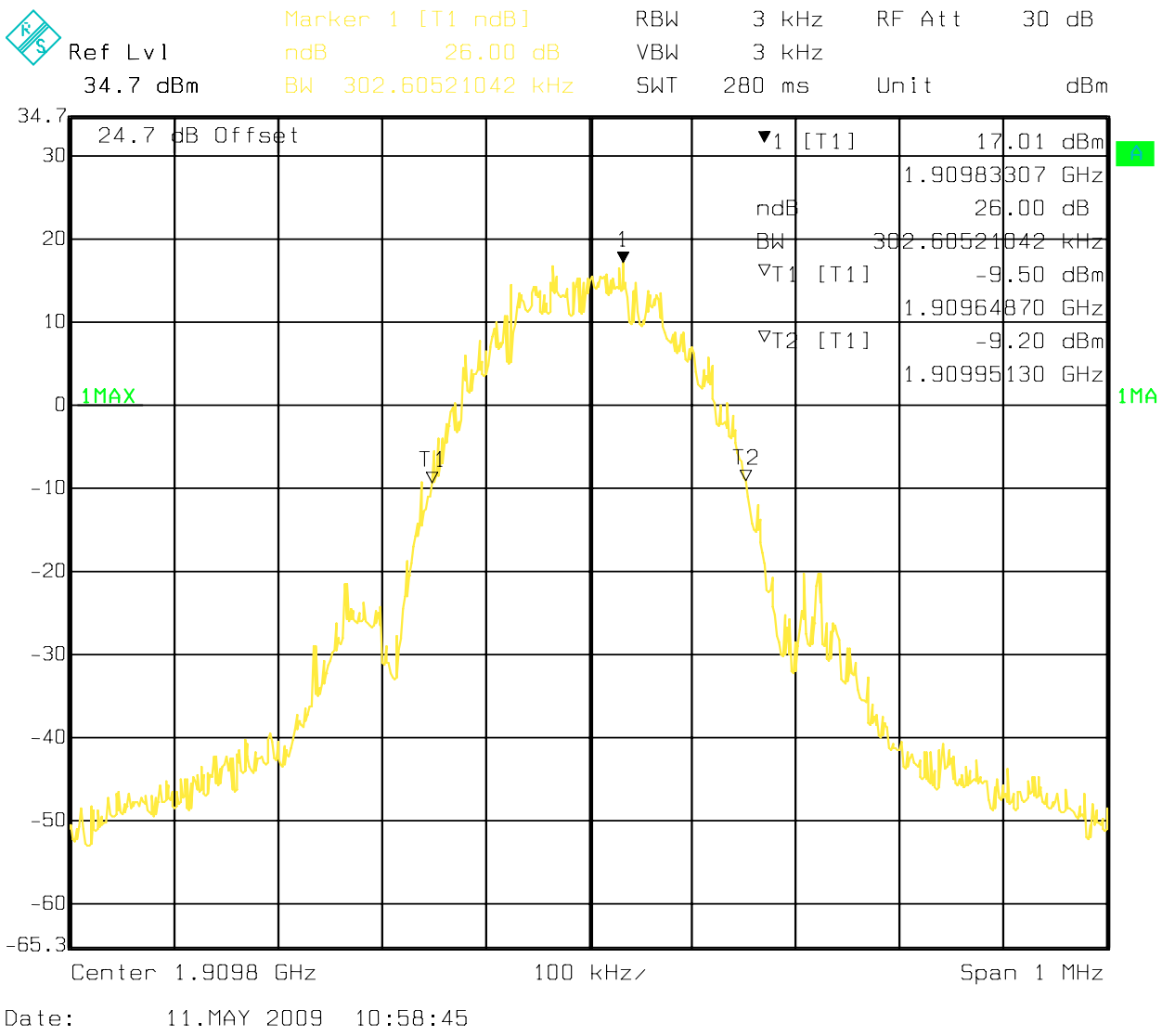
Emission band Width PCS1900 MHz Channel 512 EGPRS



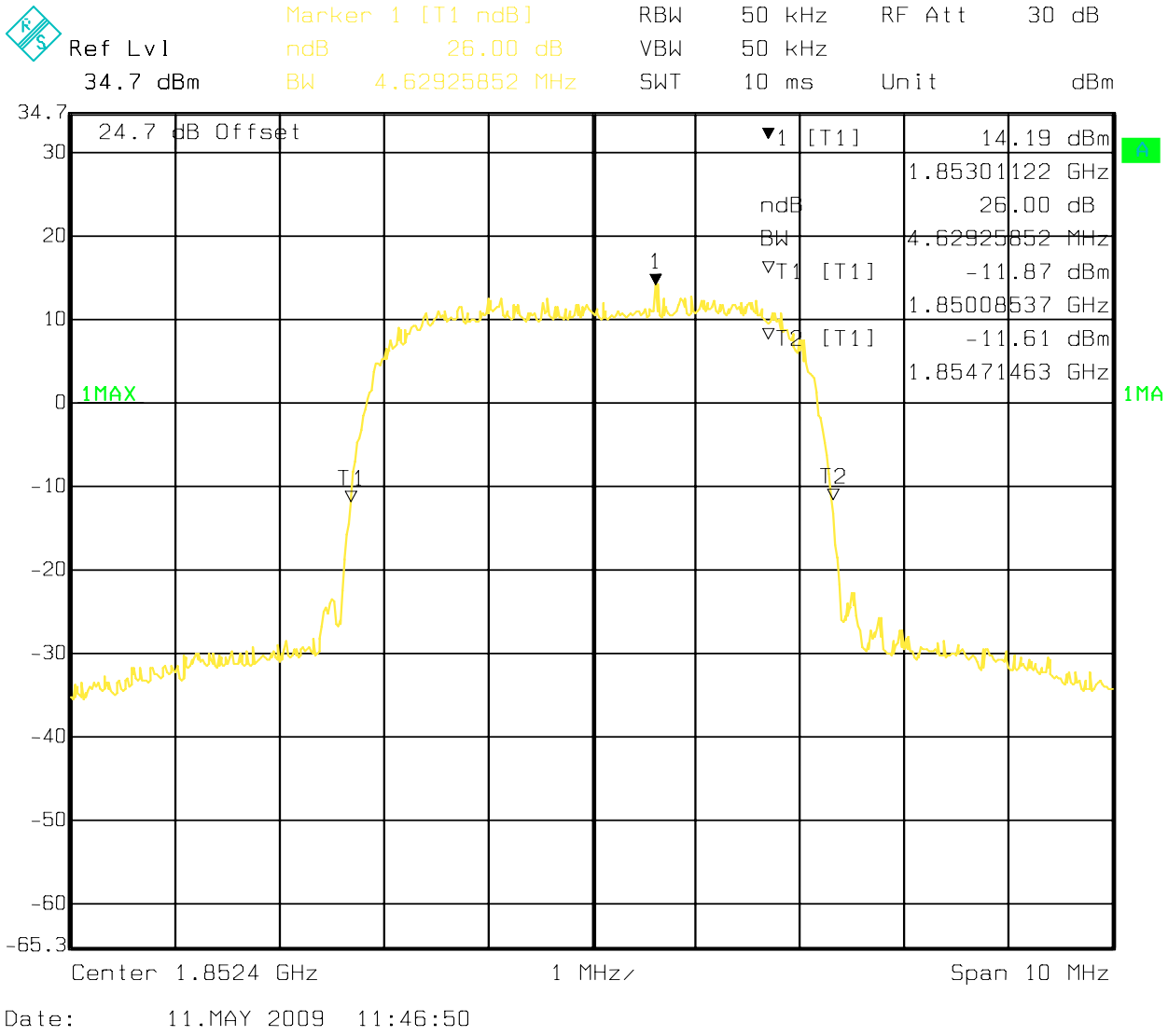
Emission band Width PCS1900 MHz Channel 661 EGPRS



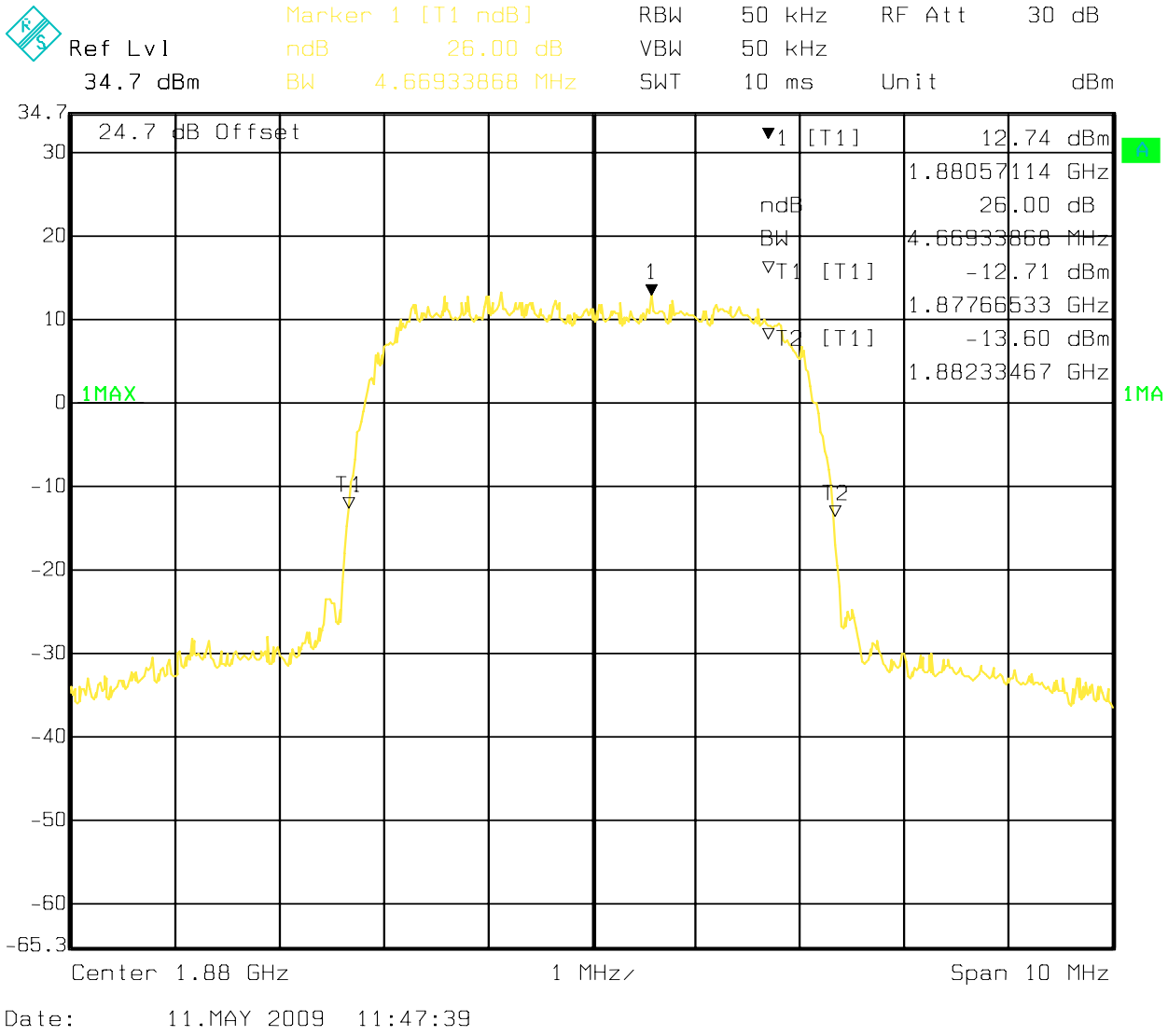
Emission band Width PCS1900 MHz Channel 810 EGPRS



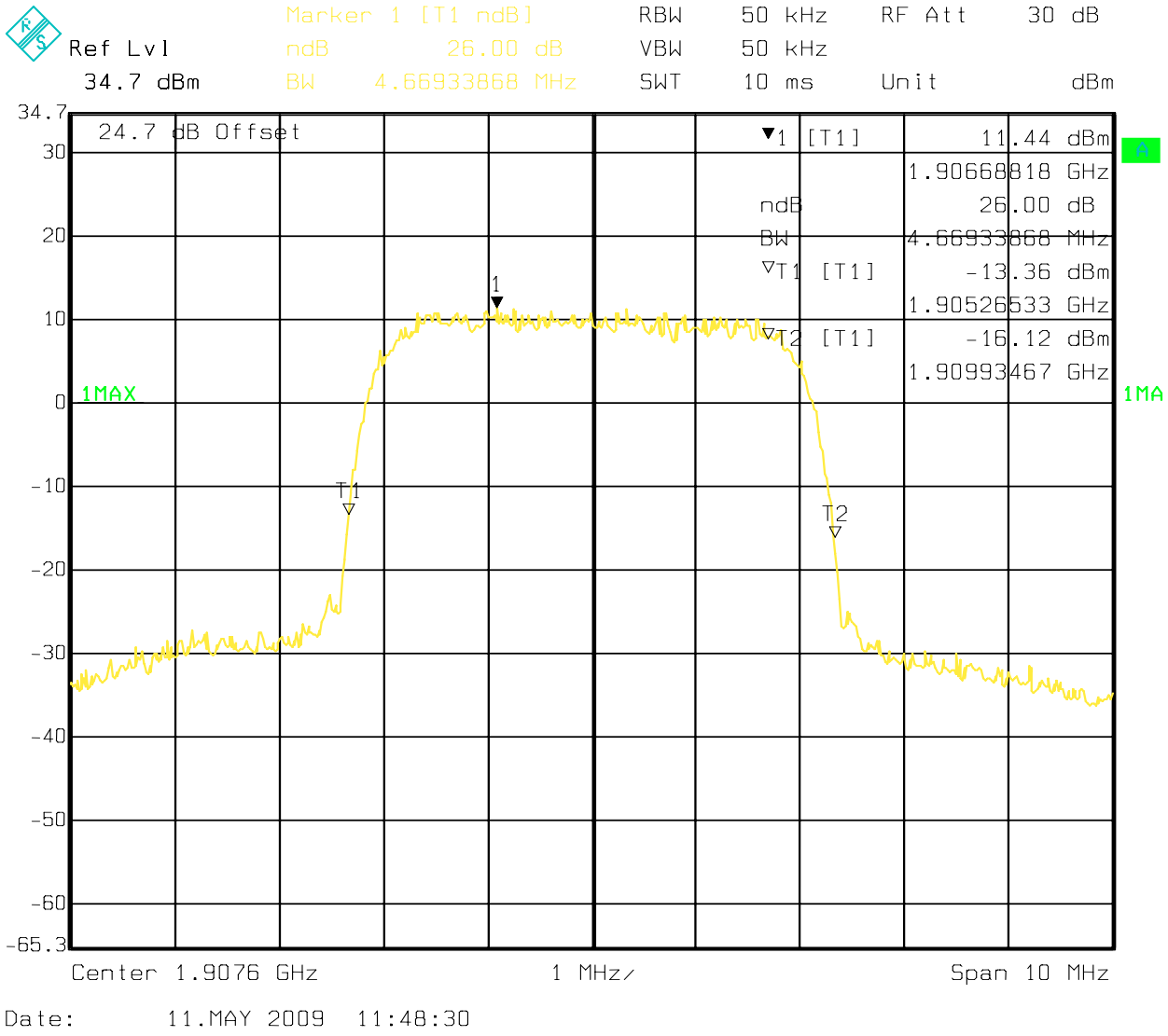
Emission band Width UMTS FDD2 Channel 9262



Emission band Width UMTS FDD2 Channel 9400



Emission band Width UMTS FDD2 Channel 9538



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 0.1Volt 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.:	-24	-0.028687544
High vol.:	-23	-0.02749223

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

Channel No. 190	836.6MHz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	27	-0.032273487
-20	28	0.033468802
-10	28	0.033468802
0	33	0.039445374
+10	-27	0.032273487
+20	-23	-0.02749223
+30	-25	-0.029882859
+35	21	0.025101601
+50	-19	0.022710972

§2.1055 (b)(2)
Battery end point

Channel No. 190	836.6MHz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
2.9 V	-70	-0.037234042

5.3.3 Test Results Frequency Stability (GSM-1900)

Channel No. 661	1880MHz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:	44	0.023404255
High vol.:	47	0.025

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

Channel No. 661	1880MHz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	50	0.026595744
-20	70	0.037234042
-10	68	0.036170212
0	56	0.029787234
+10	44	0.023404255
+20	47	0.025
+30	59	0.031382978
+35	34	0.018085106
+50	36	0.019148936

§2.1055 (b)(2)
Battery end point

Channel No. 661	1880MHz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
2.8	-83	-0.044148936

5.3.4 Test Results Frequency Stability (UMTS FDD5)

Channel No. 4183	836.6Hz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:	13	0.015539086
High vol.:	12	0.0251

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

Channel No. 4183	836.6Hz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	13	0.015539086
-20	11	0.013148458
-10	12	0.0251
0	11	0.013148458
+10	14	0.016734401
+20	12	0.0251
+30	14	0.016734401
+35	11	0.013148458
+50	13	0.015539086

§2.1055 (b)(2)
Battery end point

Channel No. 4183	836.6Hz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
2.8	28	0.033468802

5.3.5 Test Results Frequency Stability (UMTS FDD2)

Channel No. 9400	1880MHz	
Voltage (V)	Freq. Error (Hz)	Freq. Error (ppm)
Low vol.:	-30	-0.015957446
High vol.:	-22	-0.011702127

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

Channel No. 9400	1880MHz	
Temperature (°C)	Freq. Error (Hz)	Freq. Error (ppm)
-30	-25	-0.013297872
-20	-9	-0.004787234043
-10	-26	-0.013829787
0	-27	-0.014361702
+10	-28	-0.014893617
+20	-22	-0.011702127
+30	-29	-0.015425531
35	-30	-0.015957446
+50	-32	-0.0170211276

§2.1055 (b)(2)
Battery end point

Channel No. 9400	1880MHz	
Battery End-Point (Vdc) (Note1)	Freq. Error (Hz)	Freq. Error (ppm)
2.8	37	0.019680851

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.

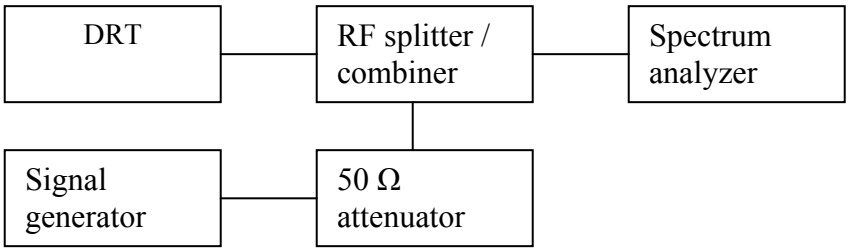
(a) *Out of band emissions*. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(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.

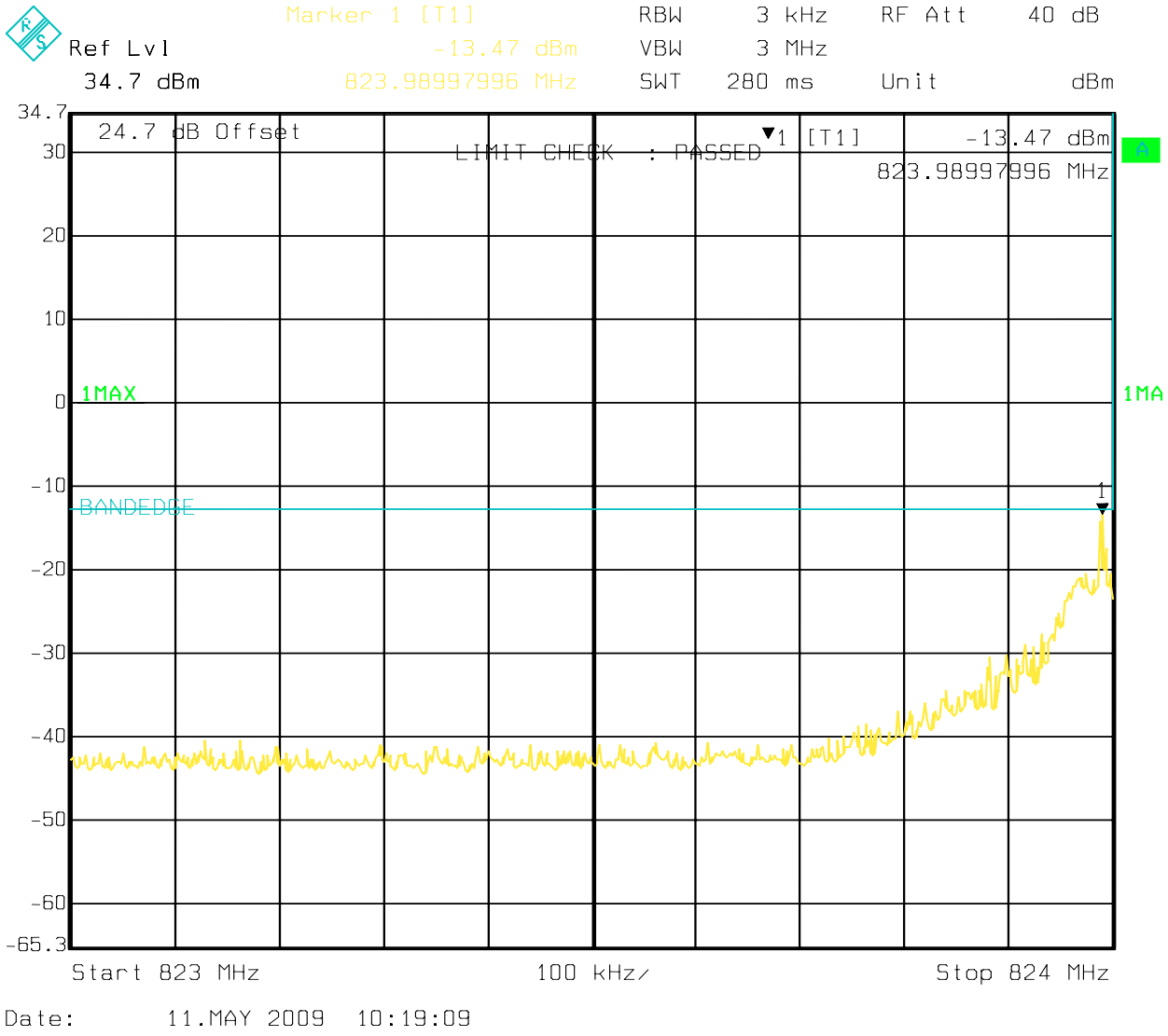
(**note:** Step 3 above is performed prior to testing and **LOSS** is recorded by test software. Steps 2, 6, and 7 above are performed with test software.)

5.4.4 Test Results: Conducted Out of band Emission:

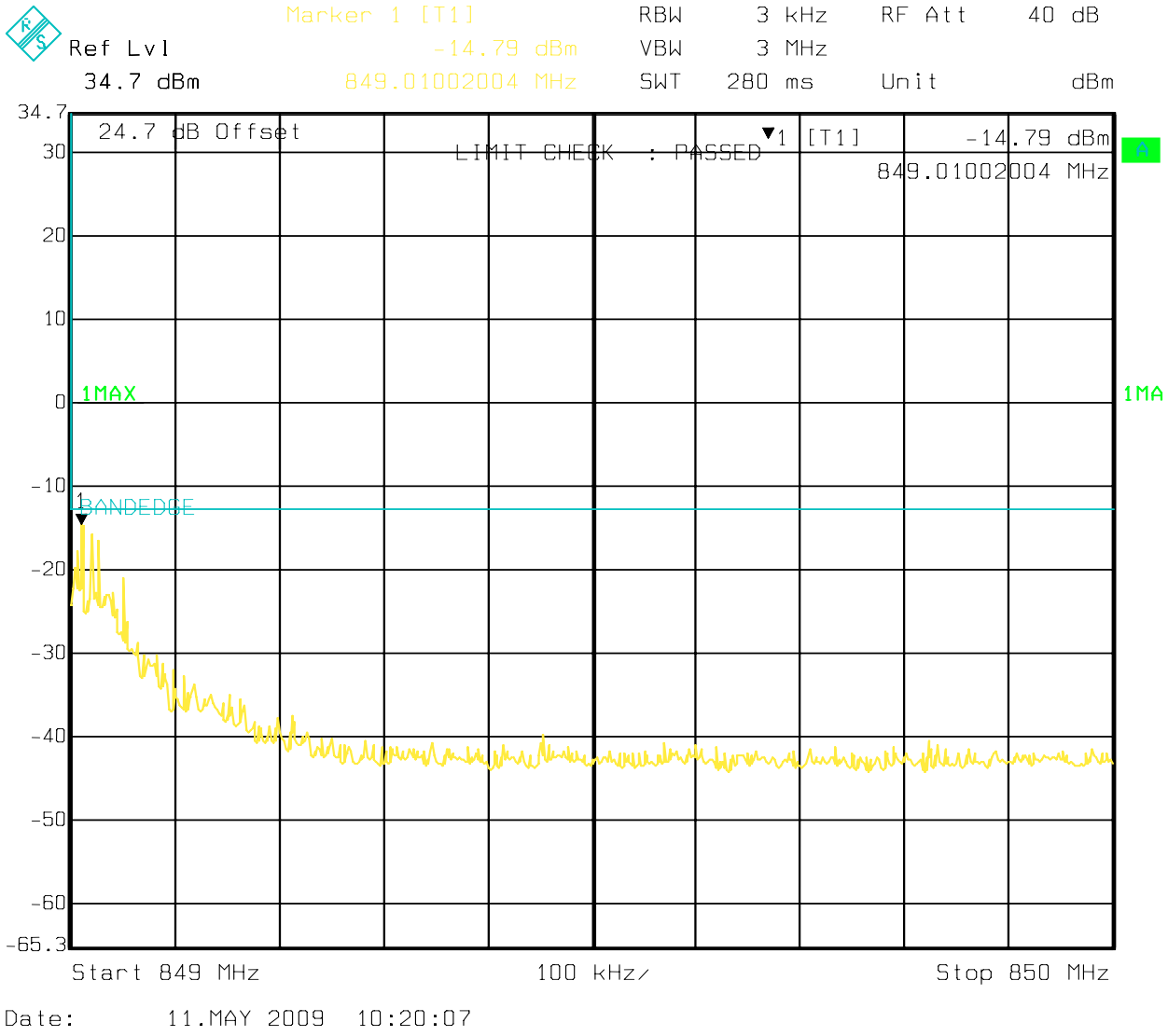
No measurable emissions noted. See plots.

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

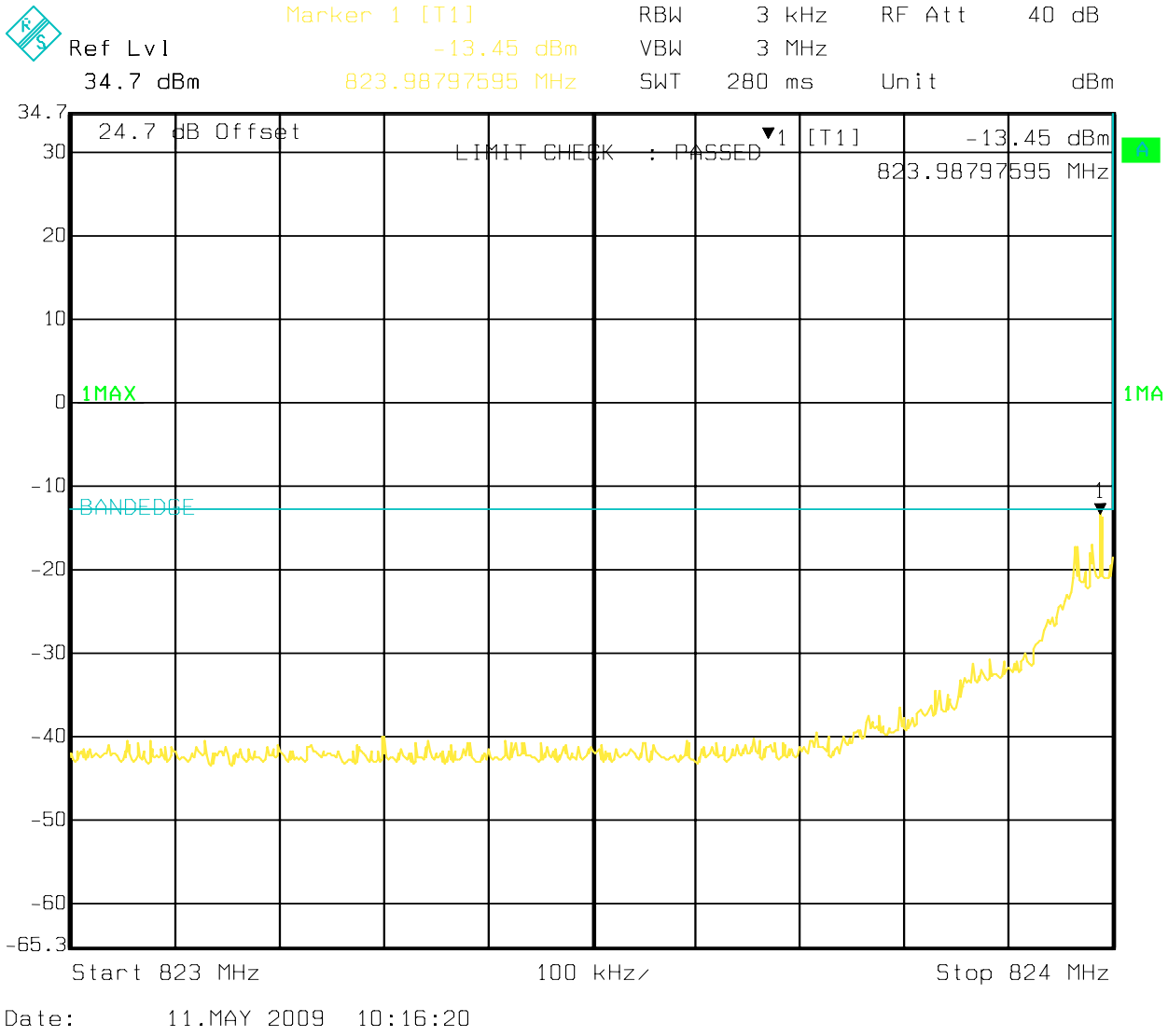
Lower Band Edge GSM850 GSM



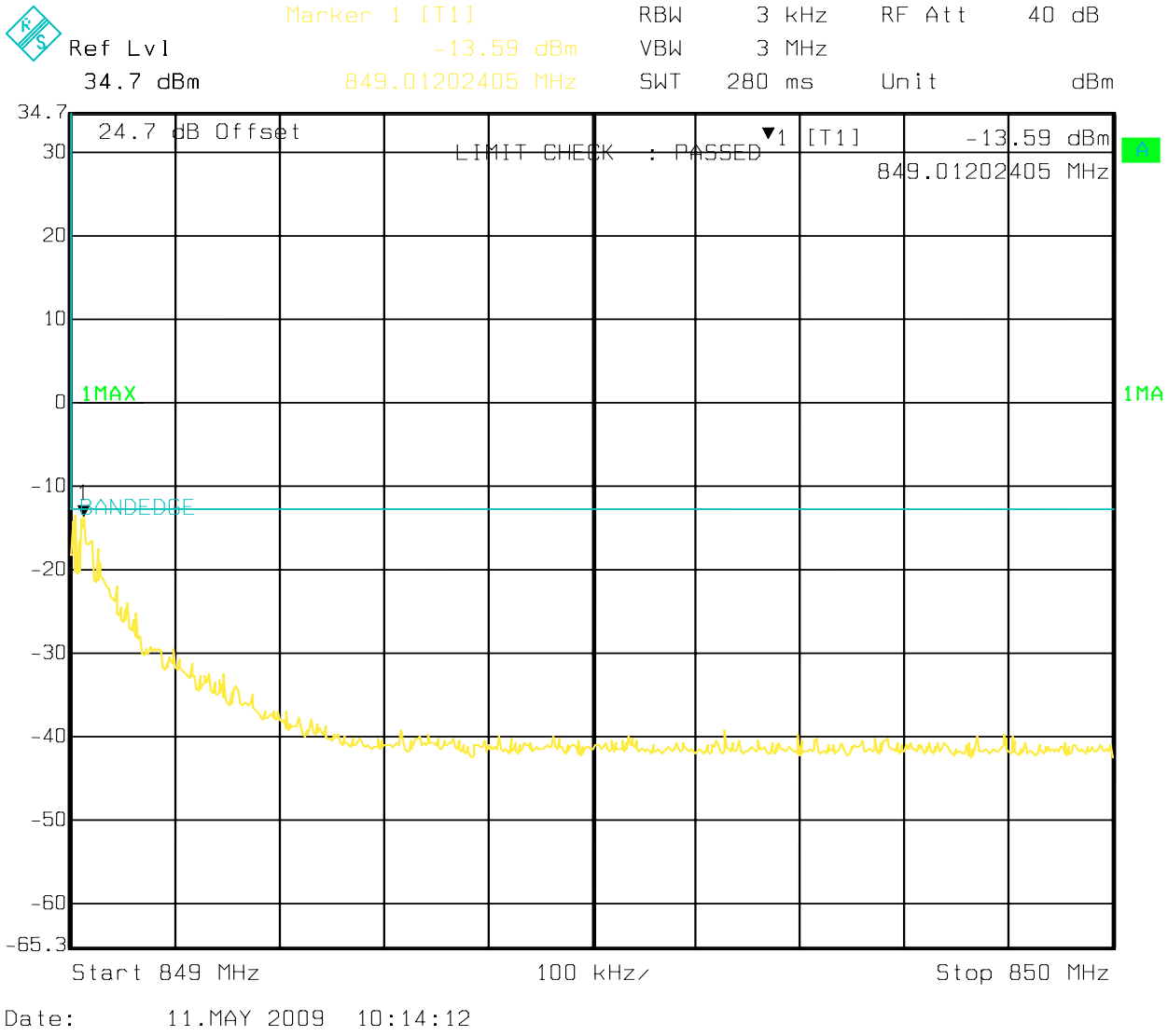
Upper Band Edge GSM850 GSM



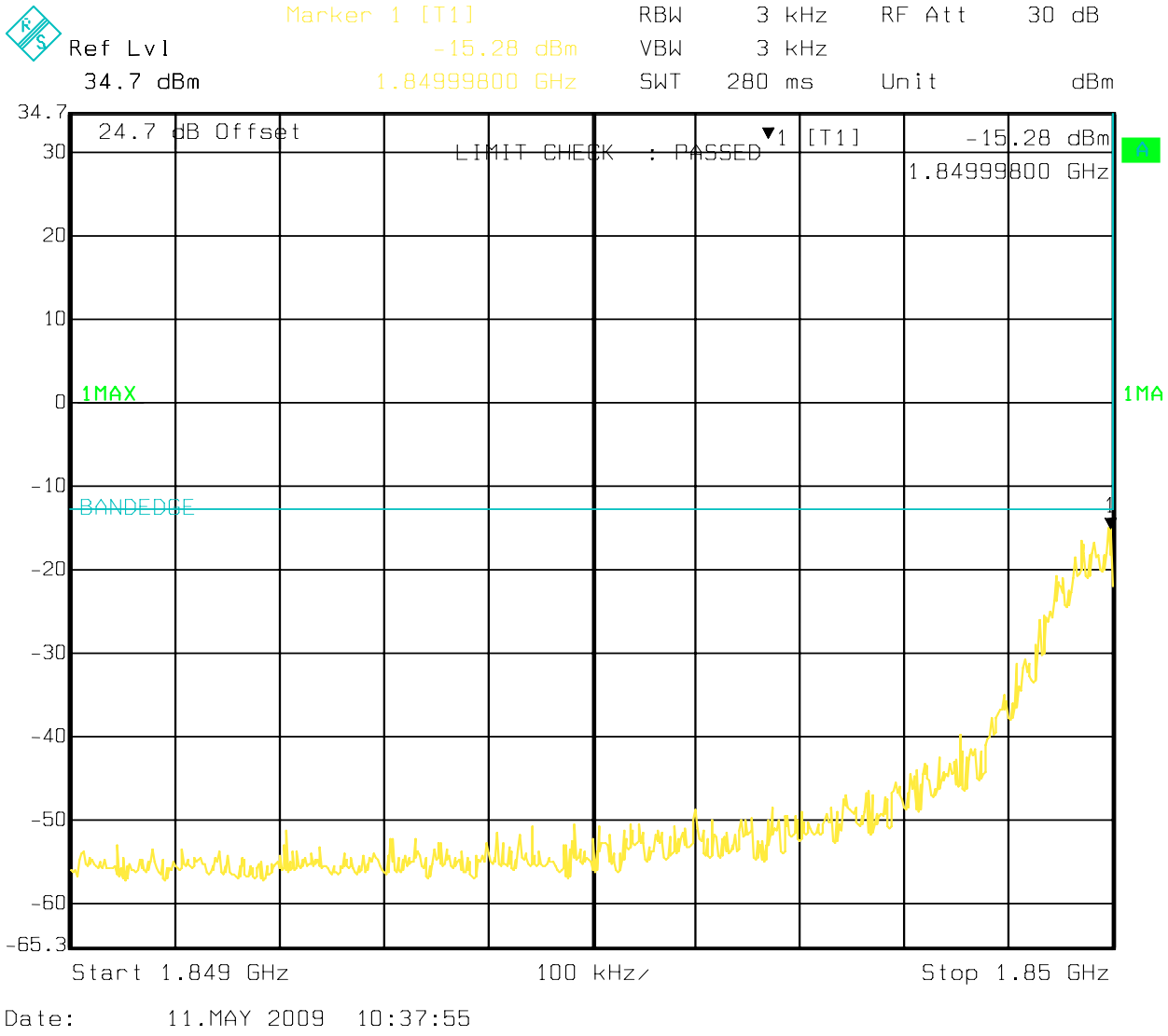
Lower Band Edge GSM850 EGPRS



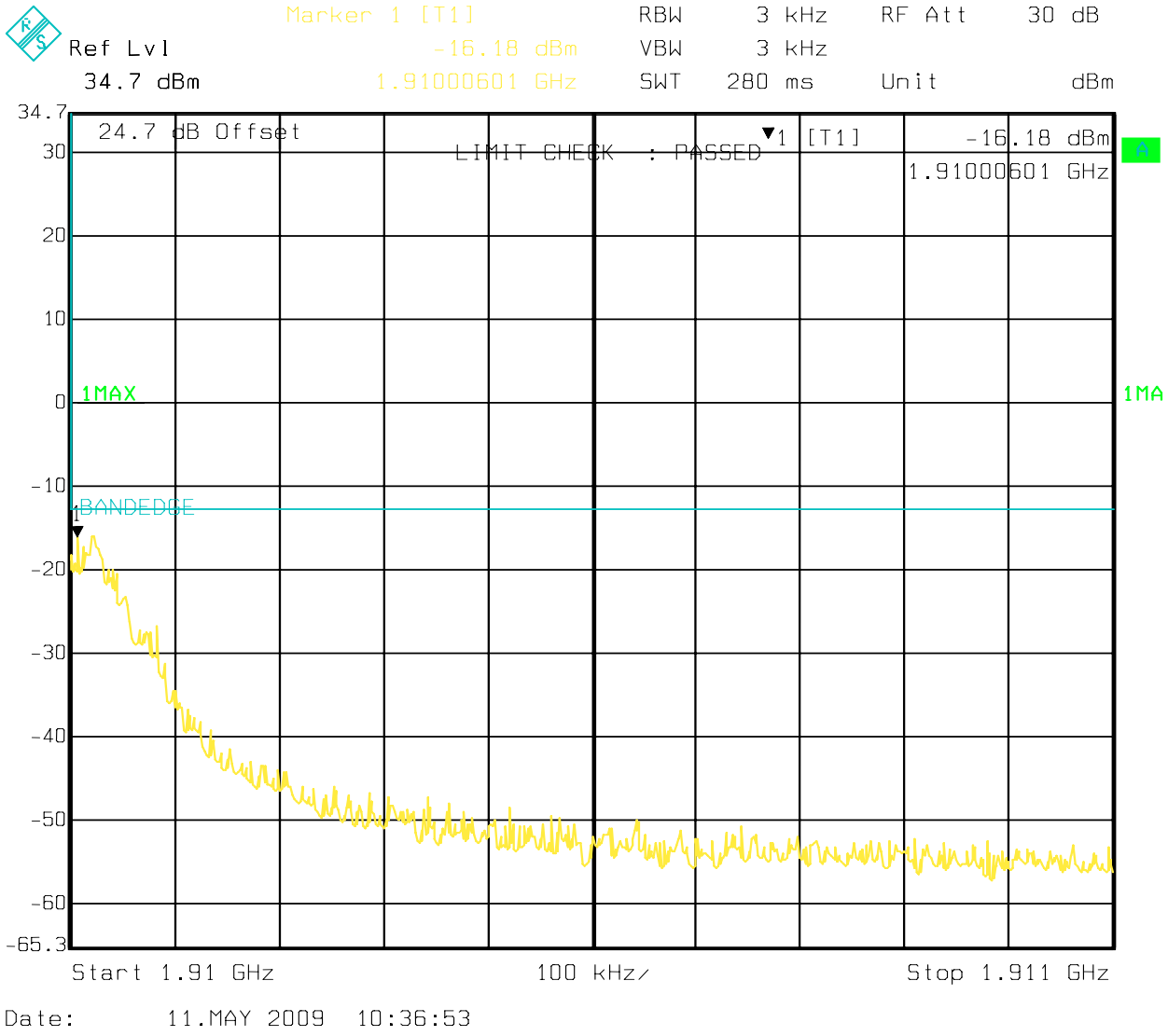
Upper Band Edge GSM850 EGPRS



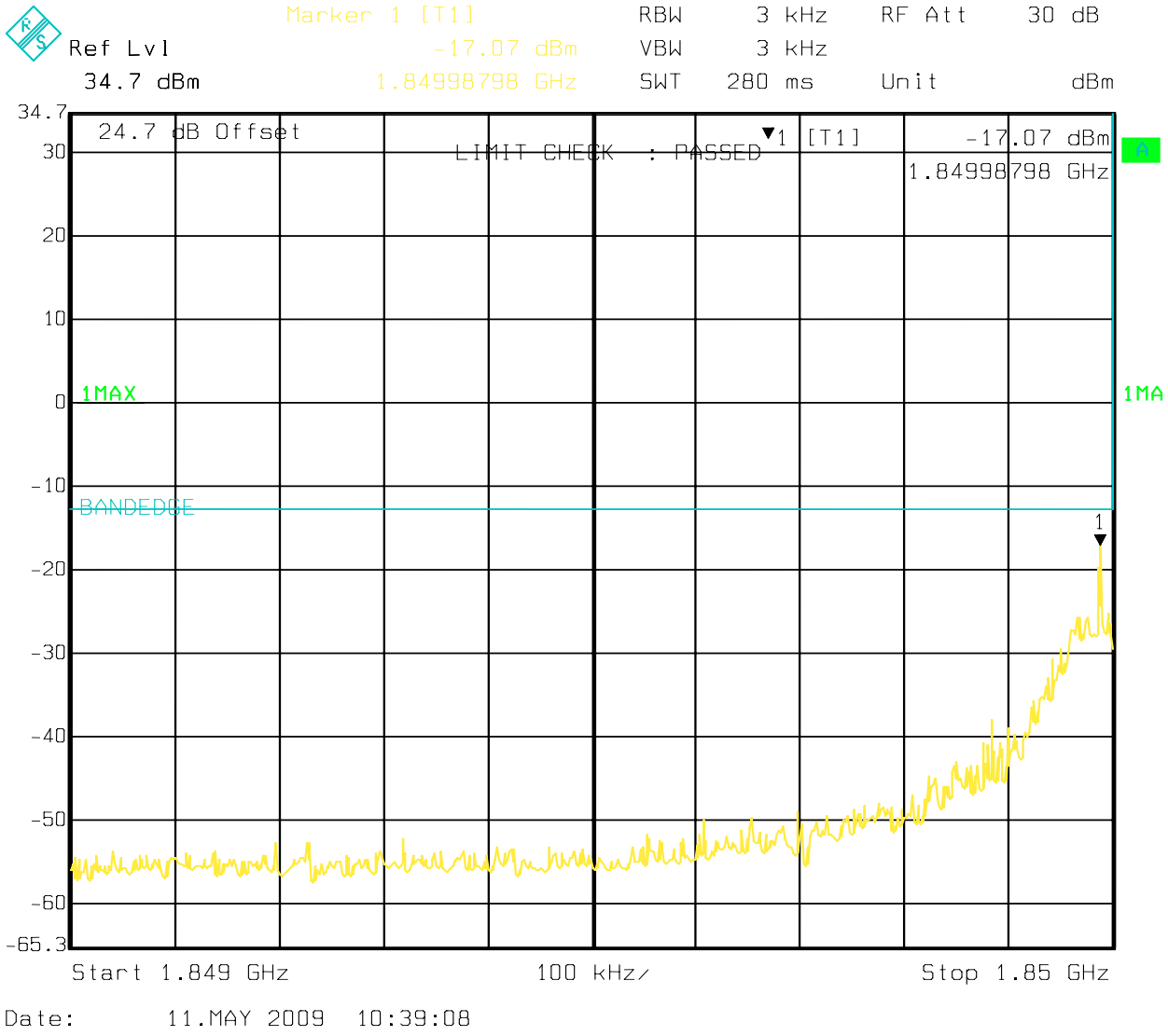
Lower Band Edge GSM1900 GSM



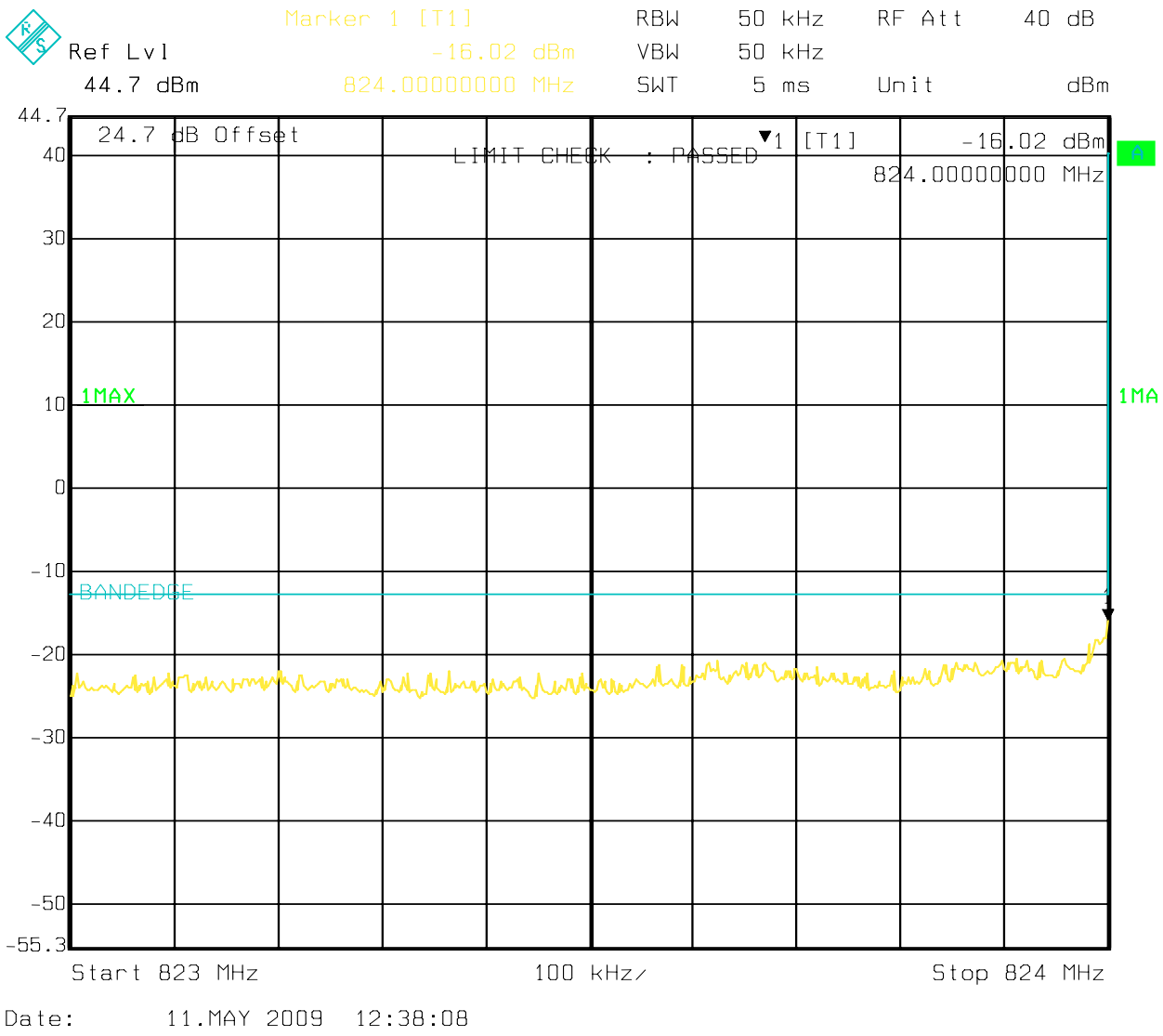
Upper Band Edge GSM1900 GSM



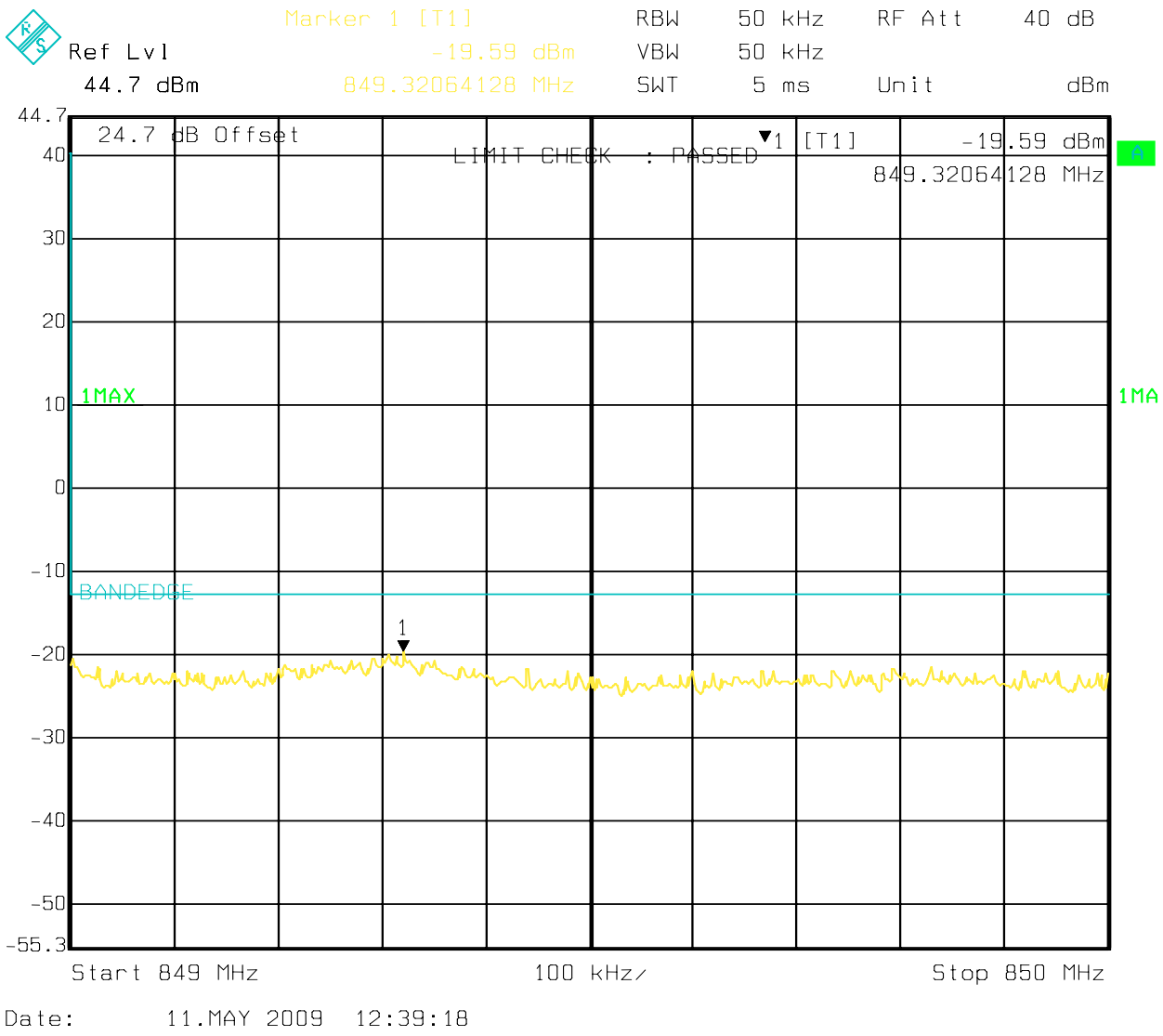
Lower Band Edge GSM1900 EGPRS



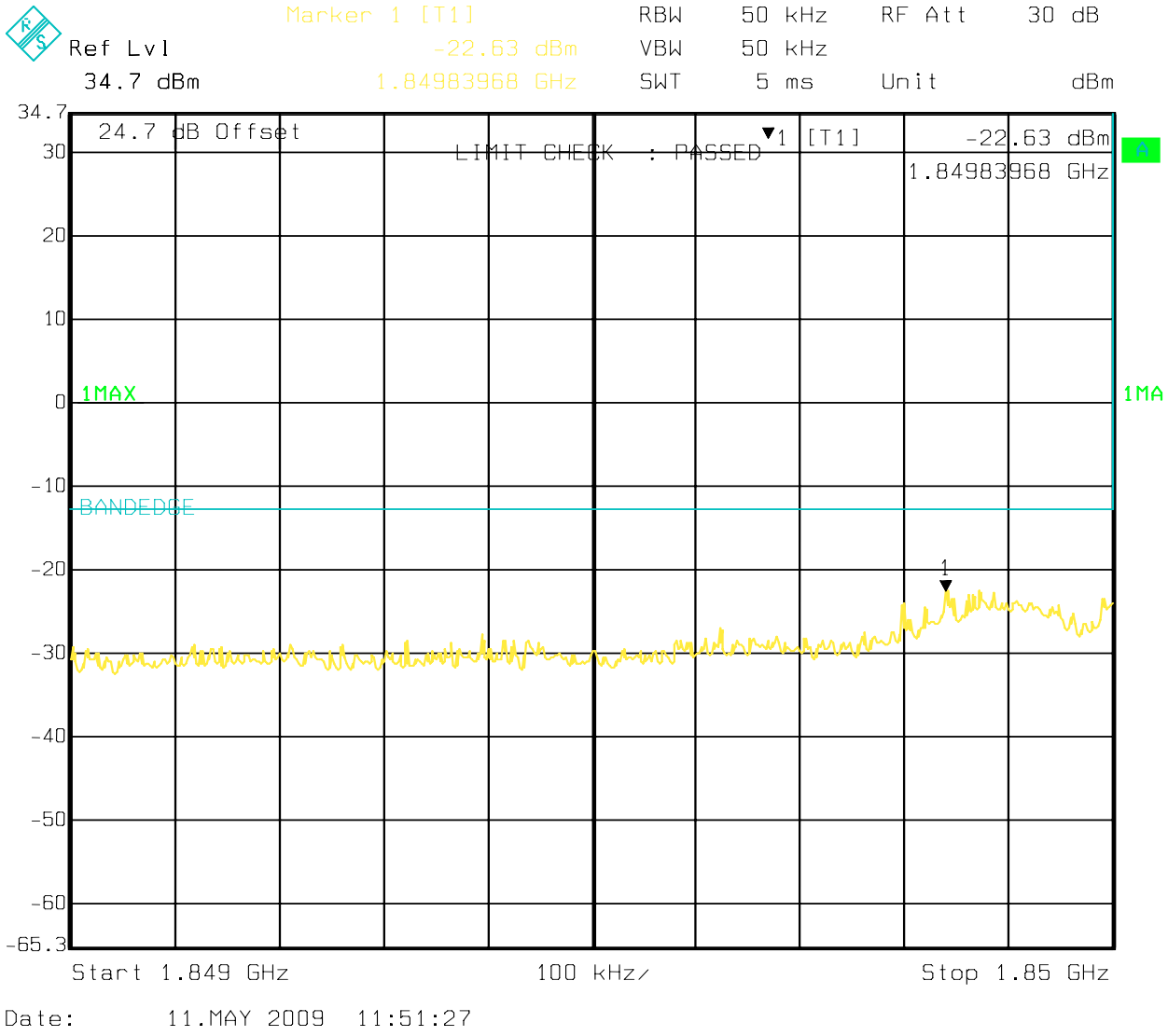
Lower Band Edge UMTS FDD5



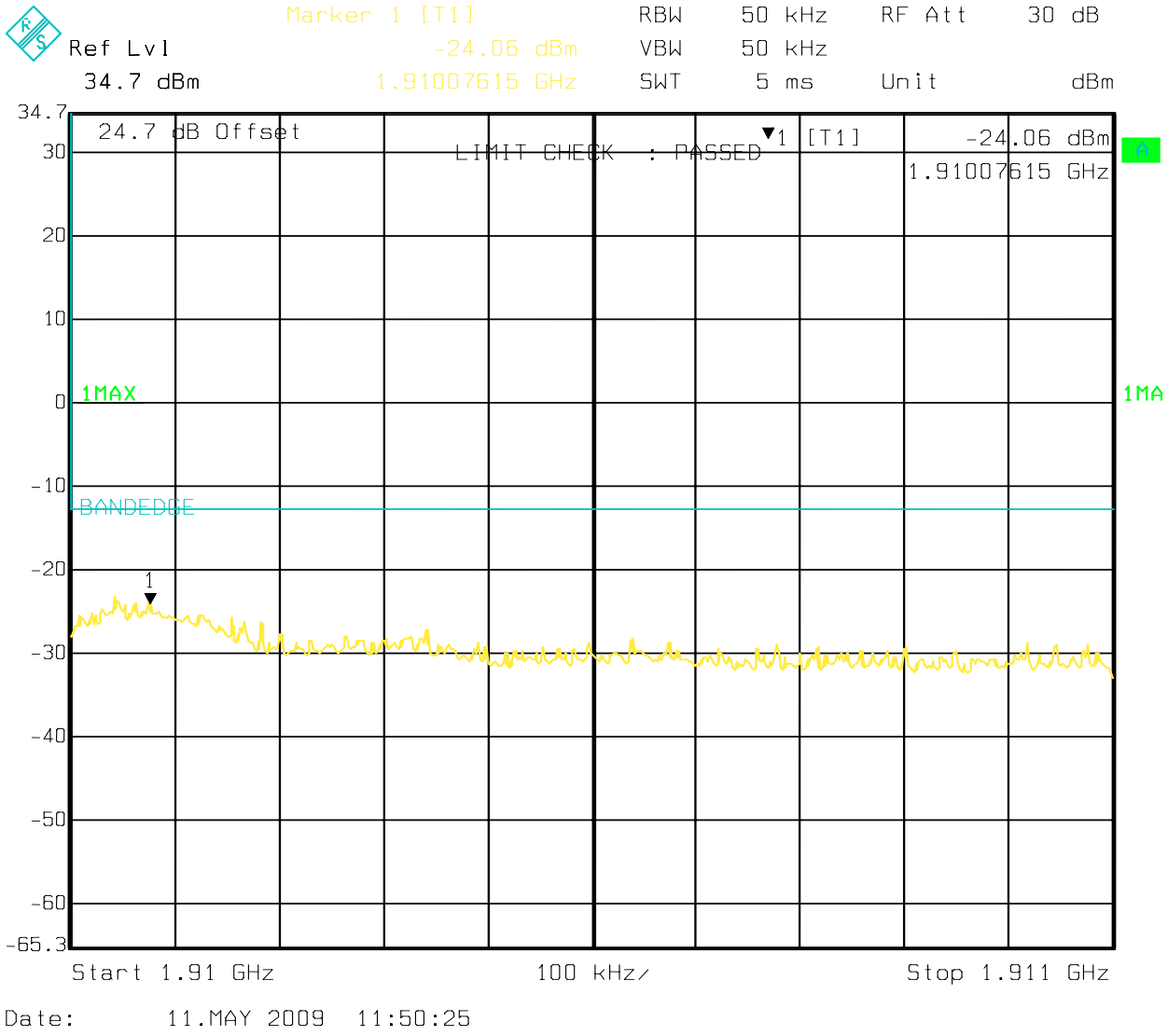
Upper Band Edge UMTS FDD5



Lower Band Edge UMTS FDD2

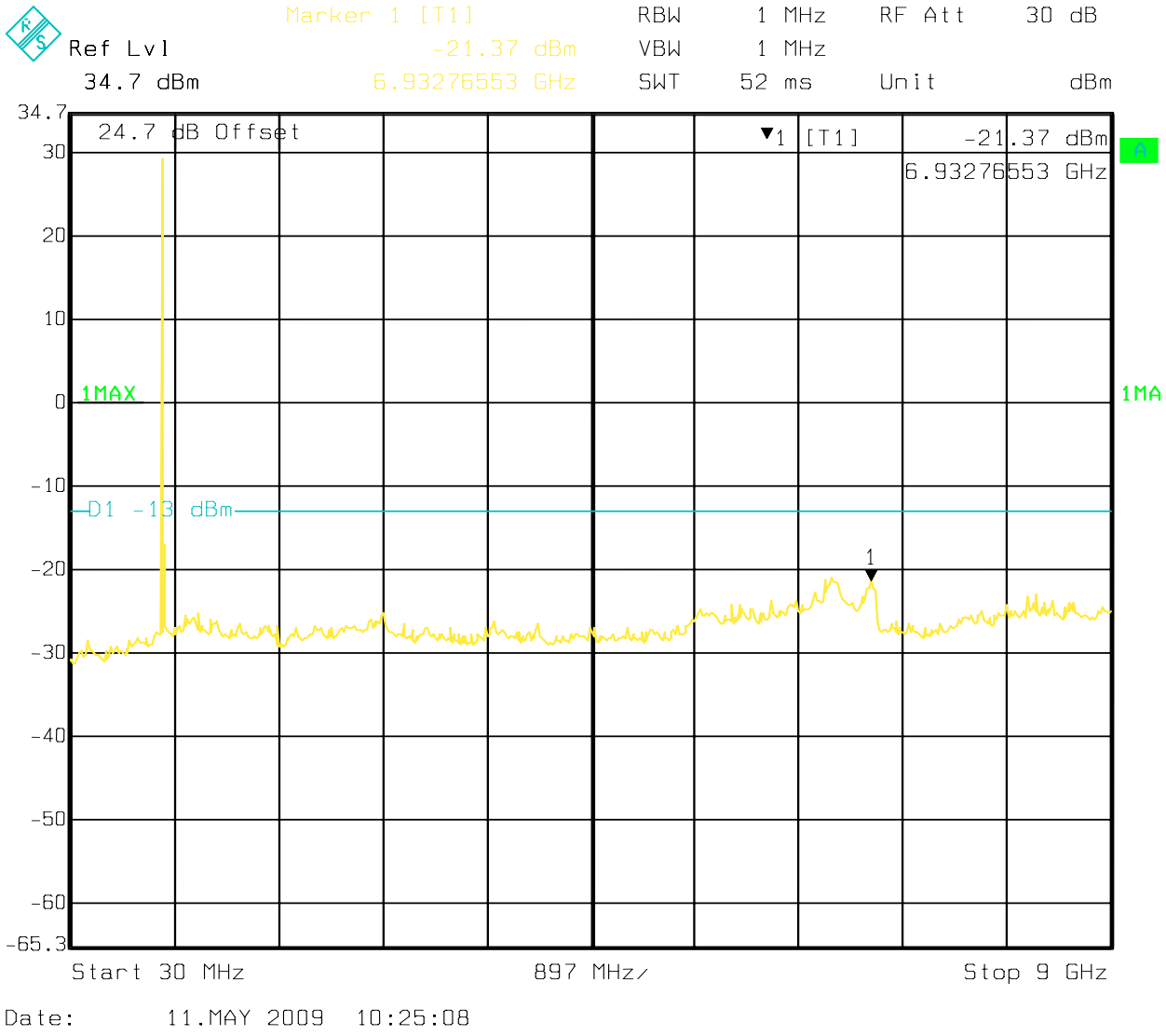


Upper Band Edge UMTS FDD2

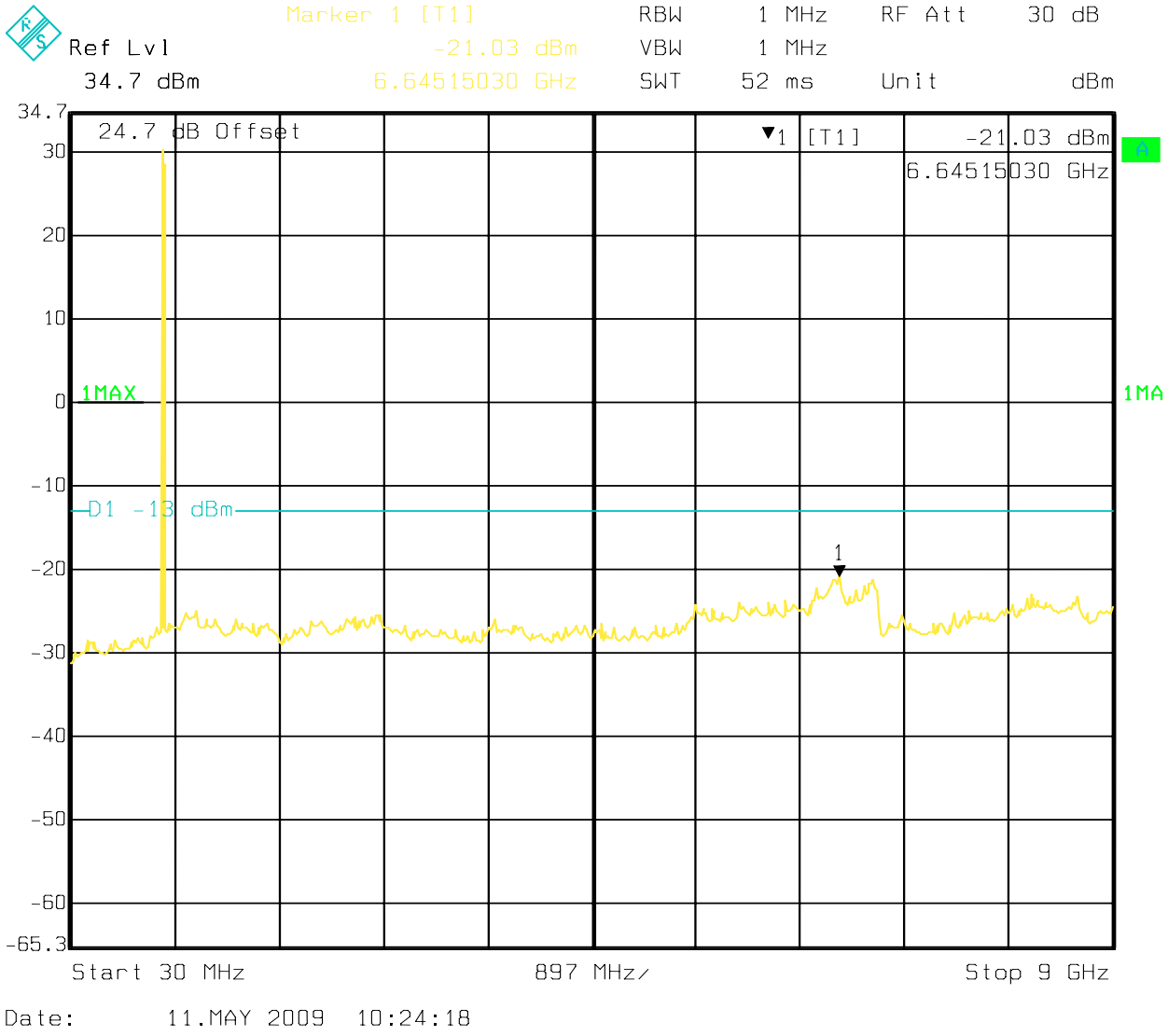


Conducted Out of band Emission GSM850 channel 128:

(Note that emission above limit is mobile station uplink.)

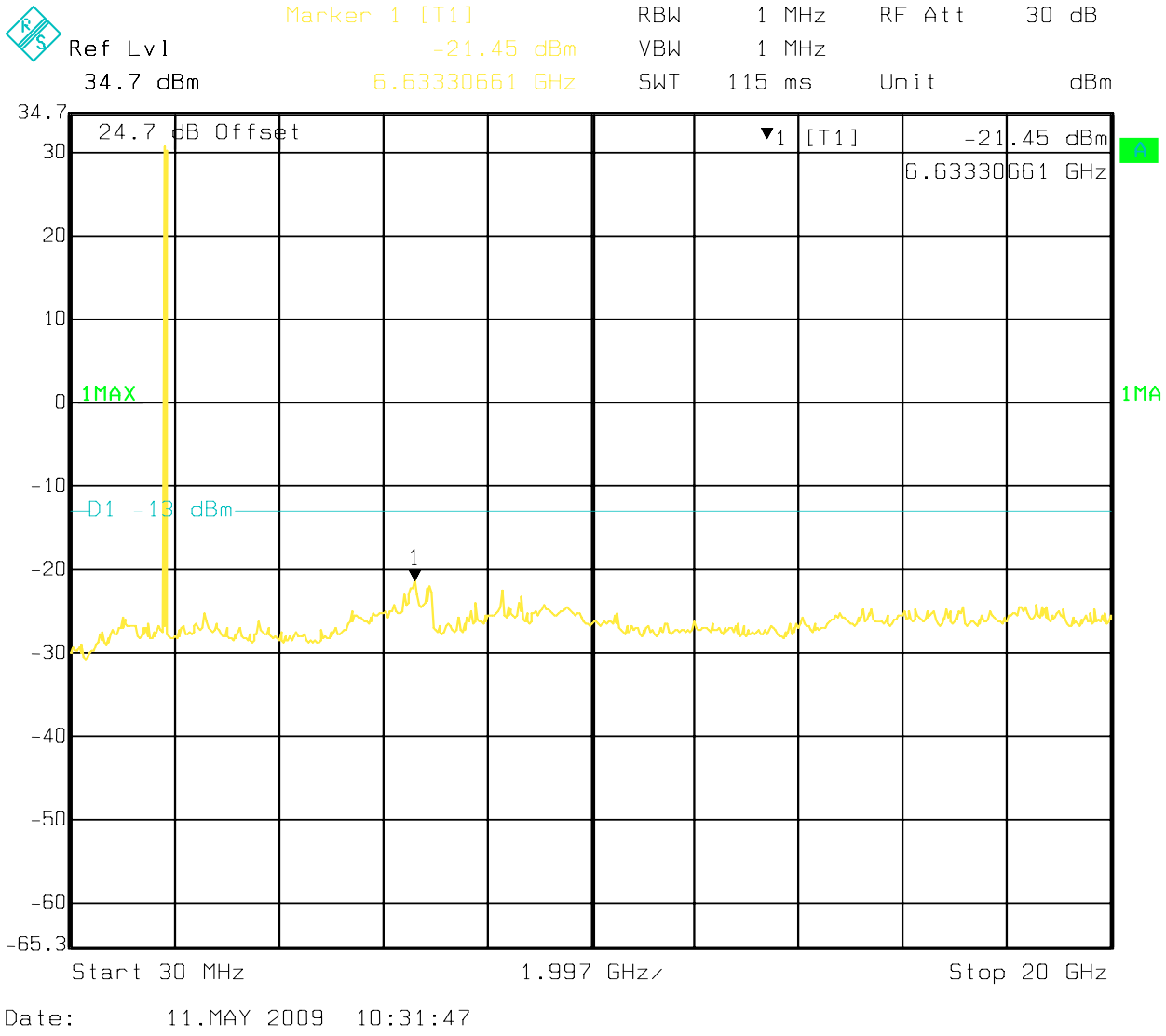


Conducted Out of band Emission GSM850 channel 190:
(Note that emission above limit is mobile station uplink.)



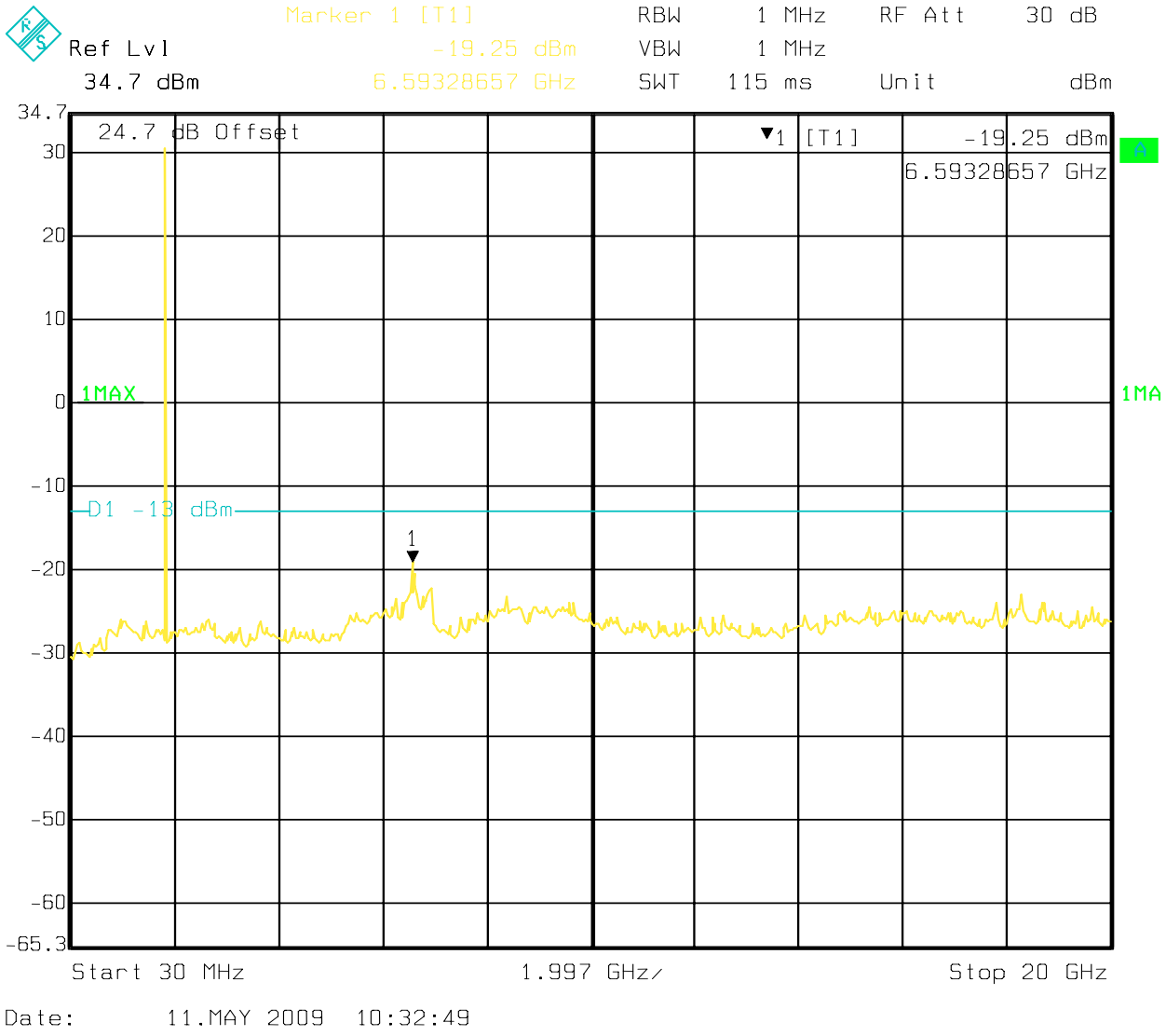
Conducted Out of band Emission GSM850 channel 251:

(Note that emission above limit is mobile station uplink.)



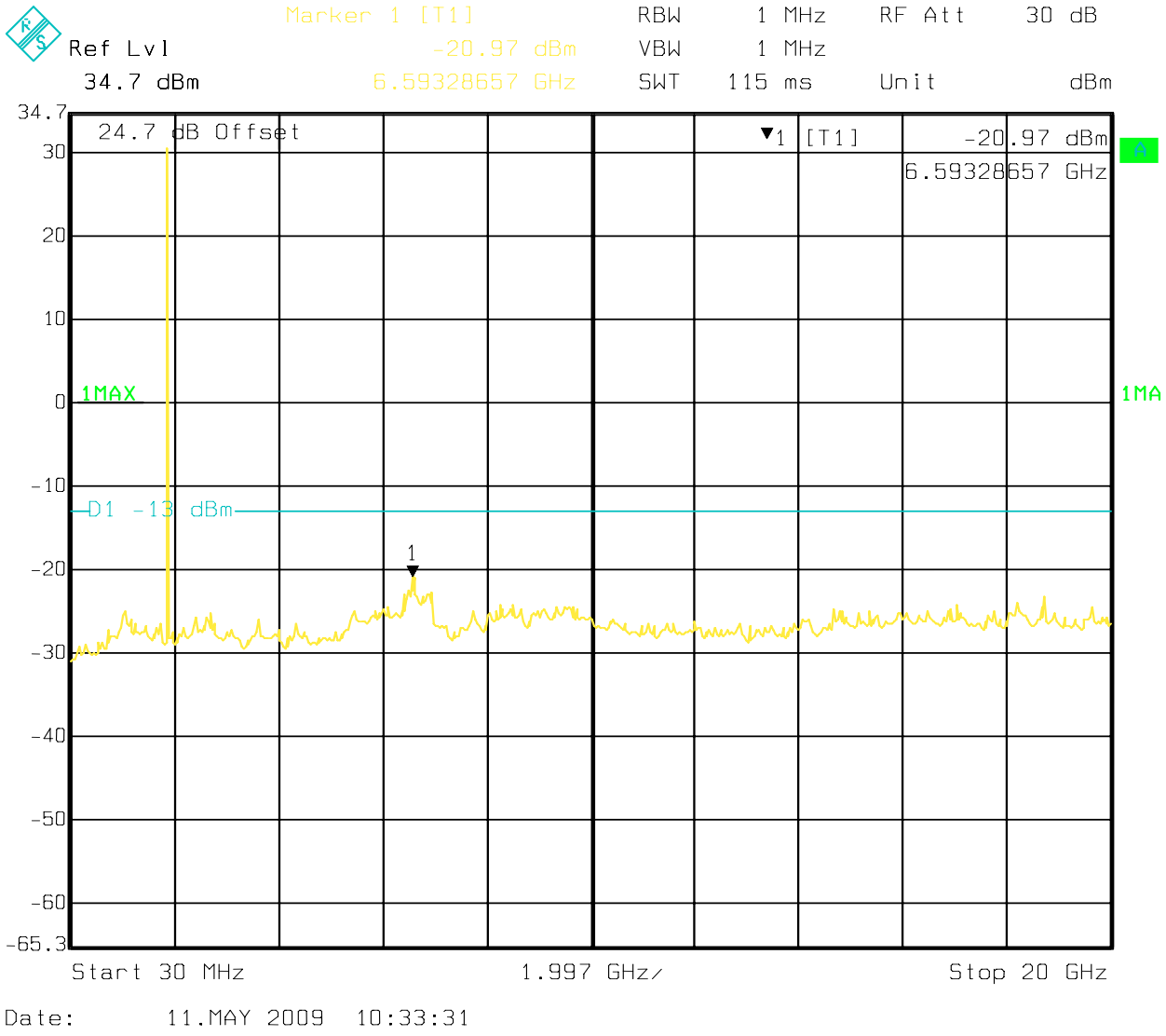
Conducted Out of band Emission GSM1900 channel 512:

(Note that marked emission is mobile station uplink.)



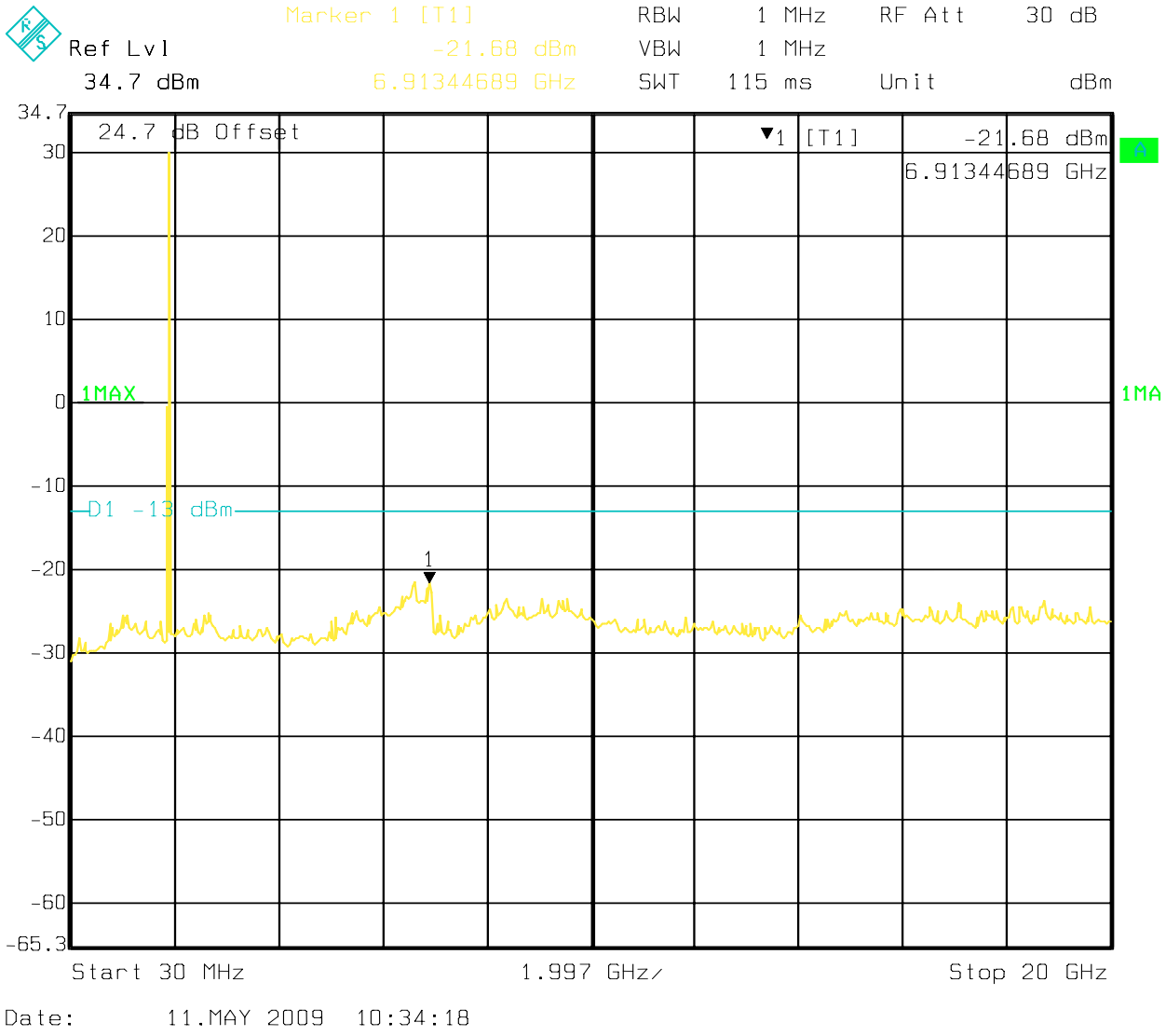
Conducted Out of band Emission GSM1900 channel 661:

(Note that emission above limit is mobile station uplink.)



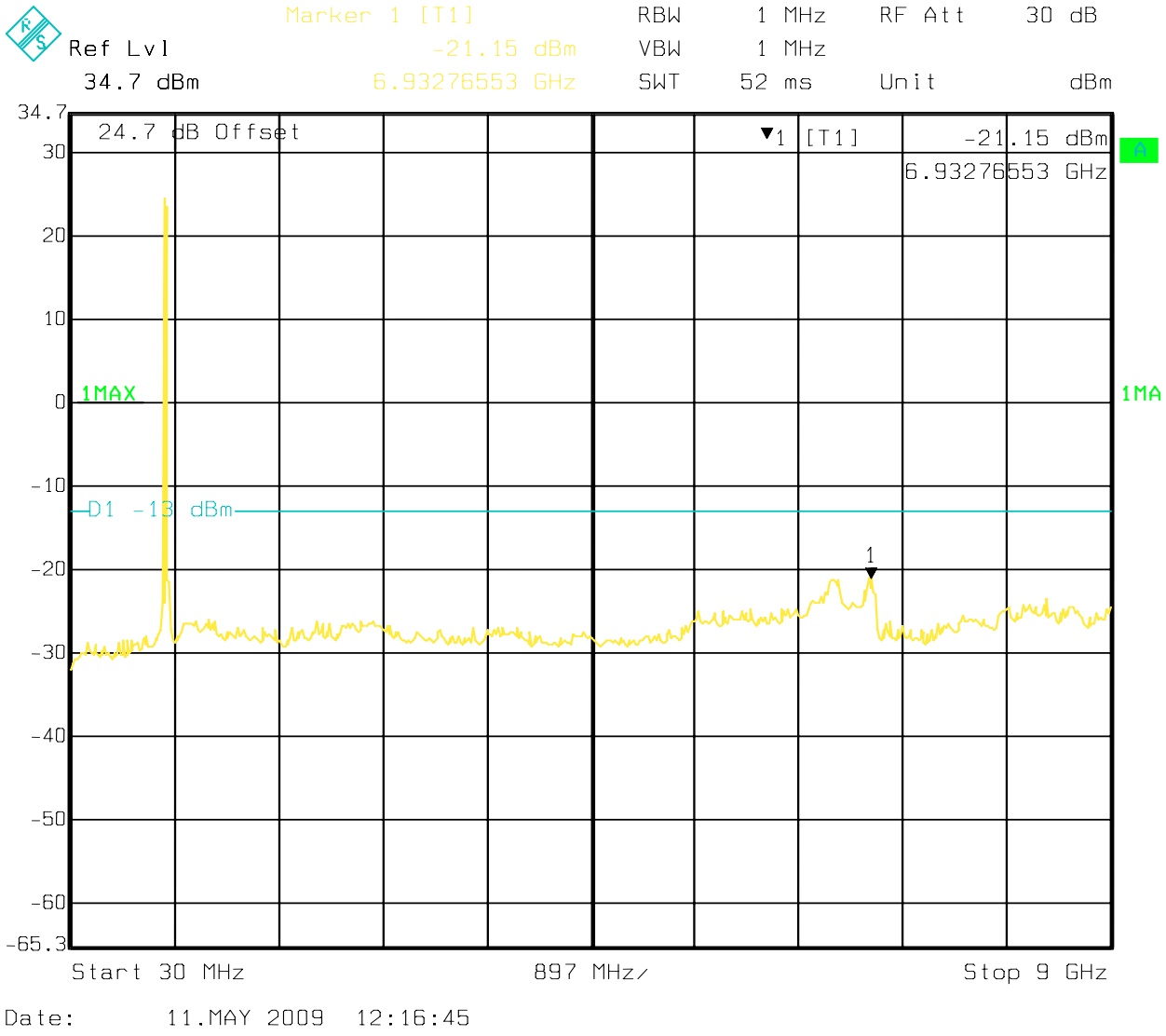
Conducted Out of band Emission GSM1900 channel 810:

(Note that emission above limit is mobile station uplink.)



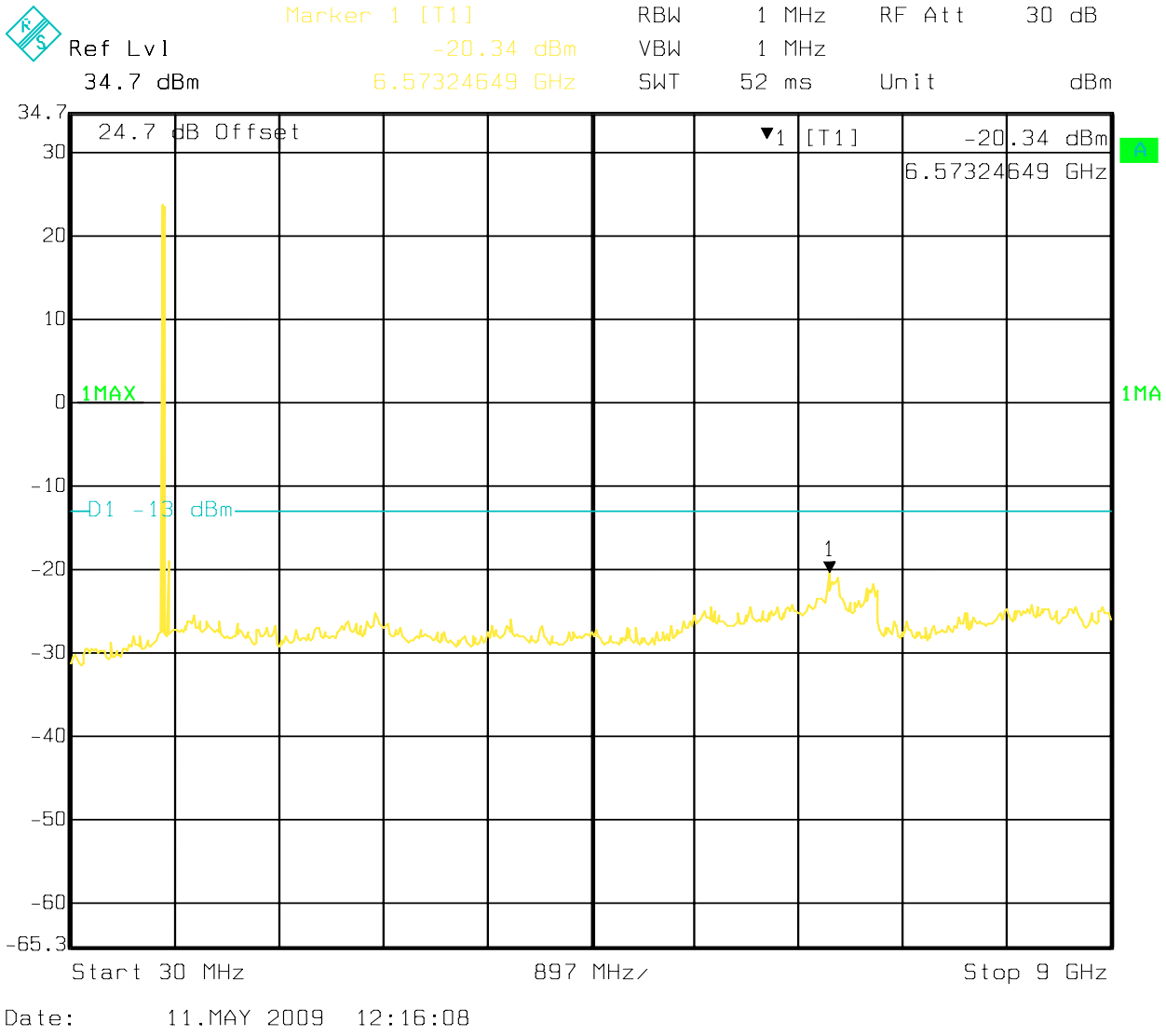
Conducted Out of band Emission UMTS FDD5 channel 4132:

(Note that emission above limit is mobile station uplink.)



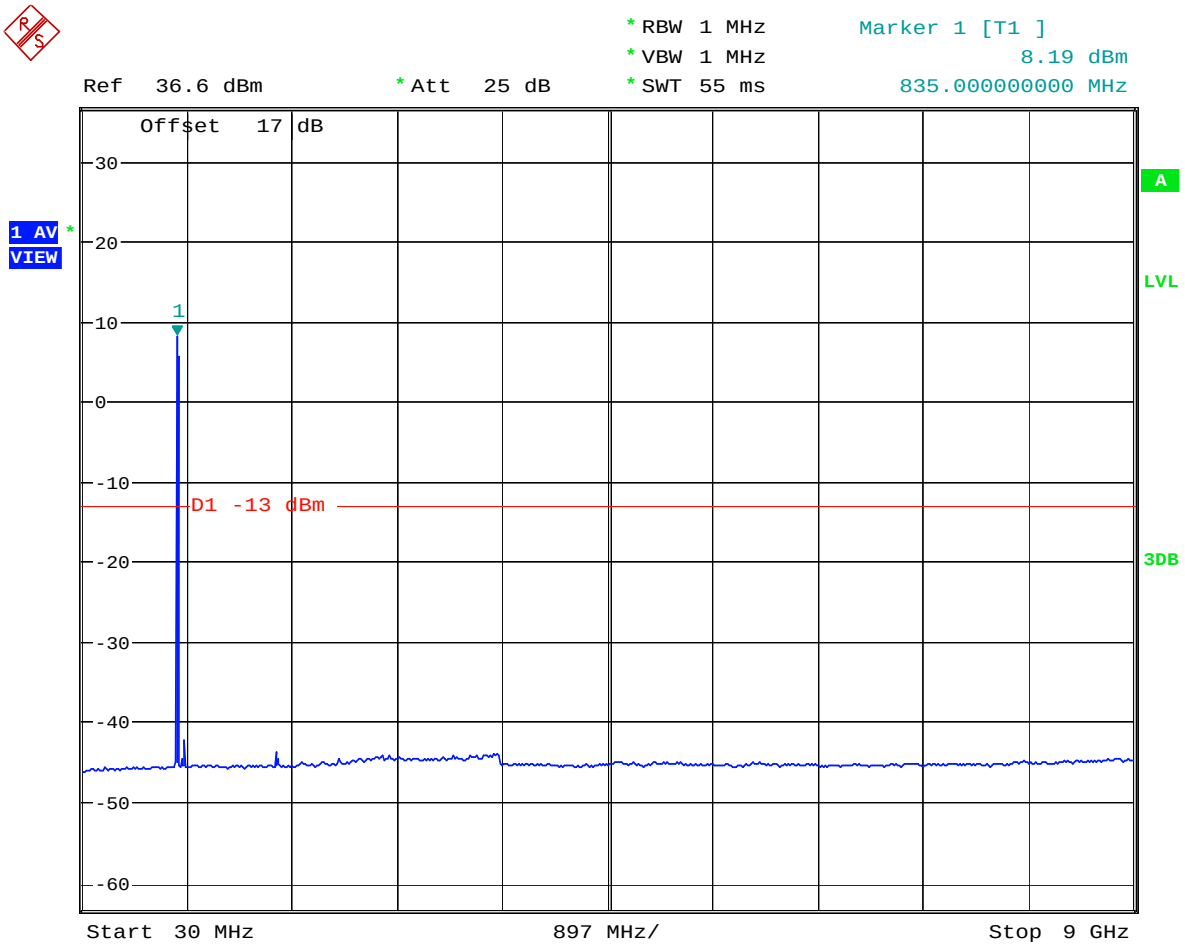
Conducted Out of band Emission UMTS FDD5 channel 4183:

(Note that emission above limit is mobile station uplink.)



Conducted Out of band Emission UMTS FDD5 channel 4233:

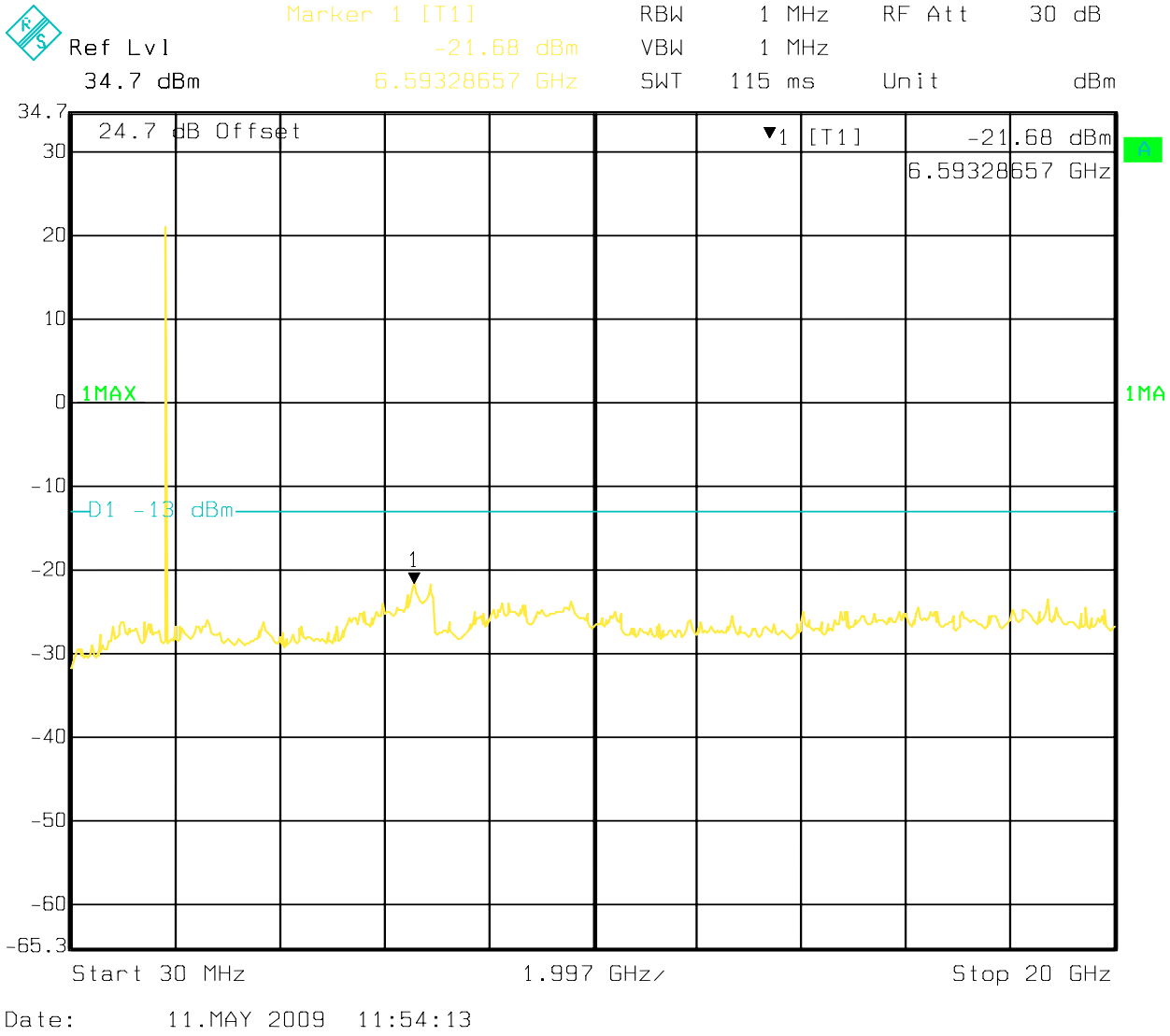
(Note that marked emission is mobile station uplink.)



Date: 19.MAY.2009 17:07:57

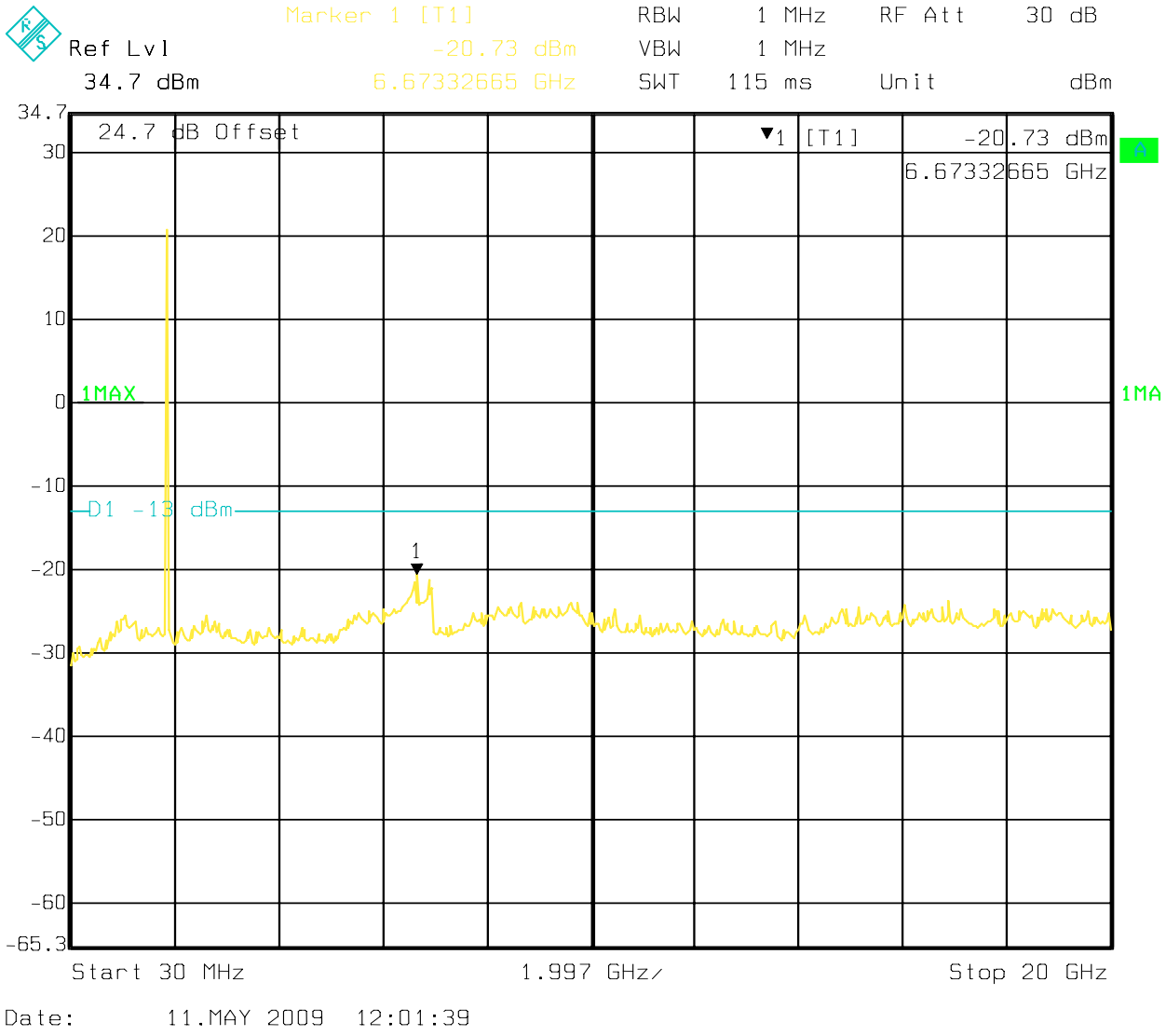
Conducted Out of band Emission UMTS FDD2 channel 9262:

(Note that marked emission is mobile station uplink.)



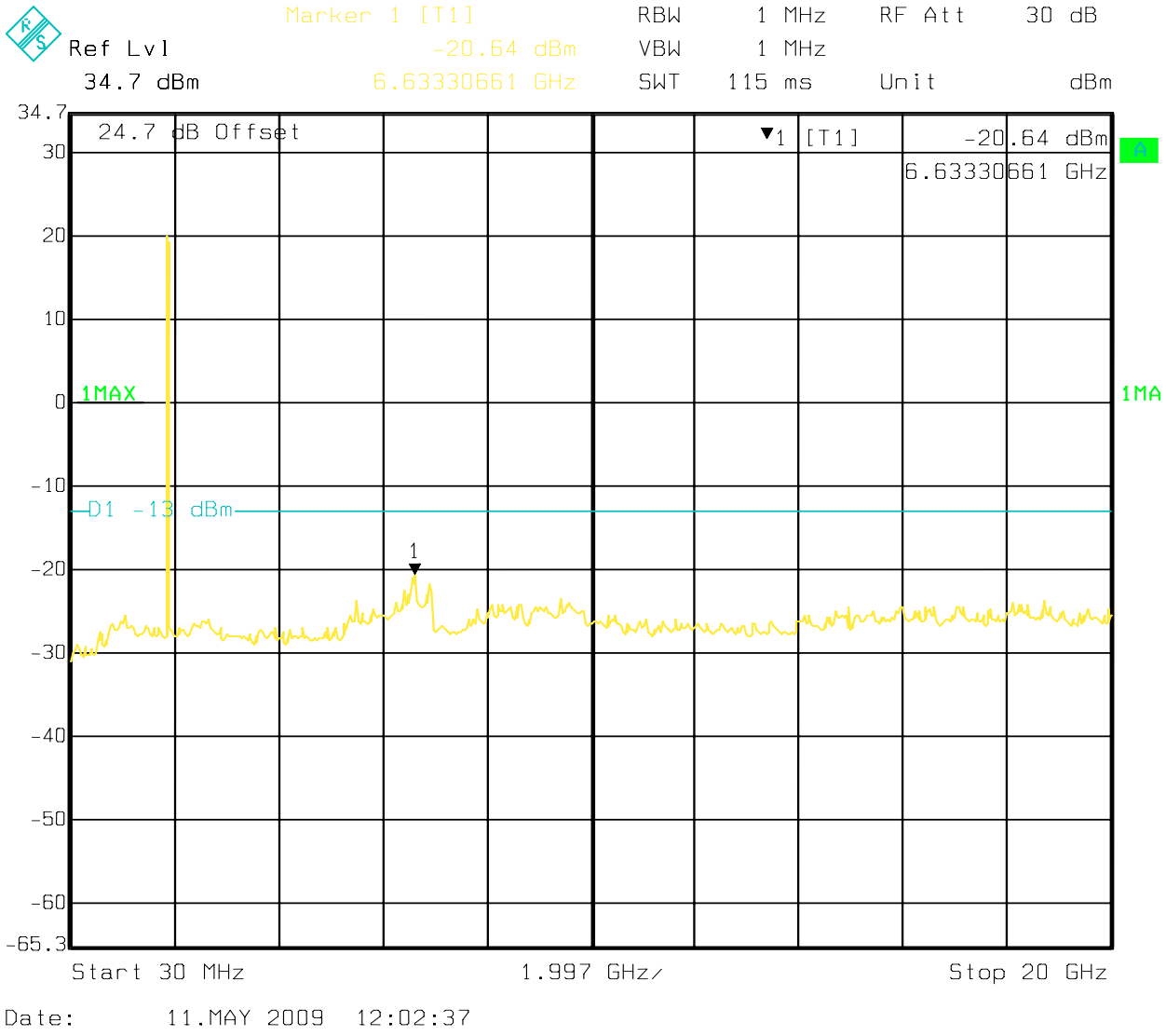
Conducted Out of band Emission UMTS FDD2 channel 9400:

(Note that marked emission is mobile station uplink.)

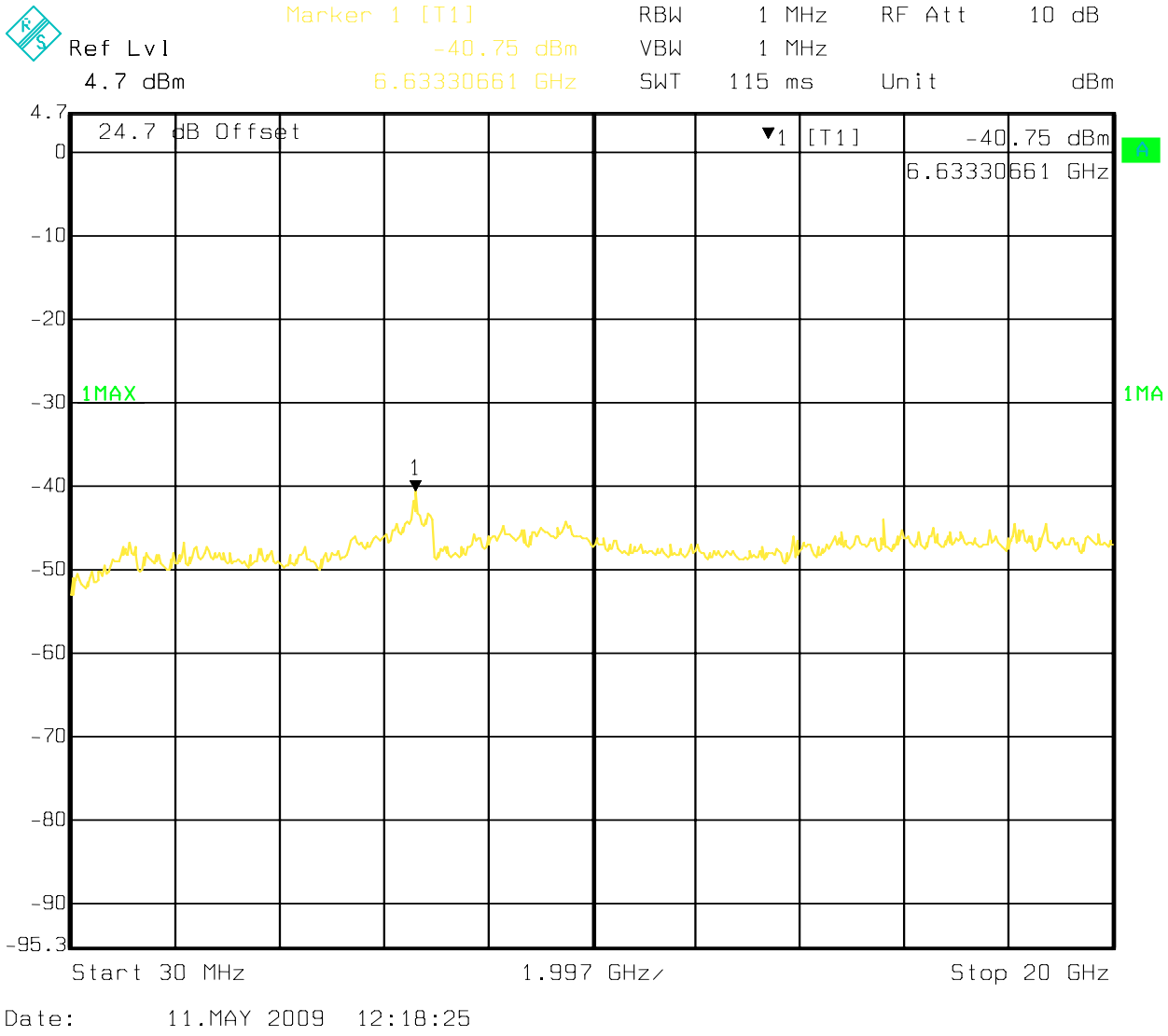


Conducted Out of band Emission UMTS FDD2 channel 9538:

(Note that marked emission is mobile station uplink.)



Conducted Out of band Emission Receiver Mode



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.

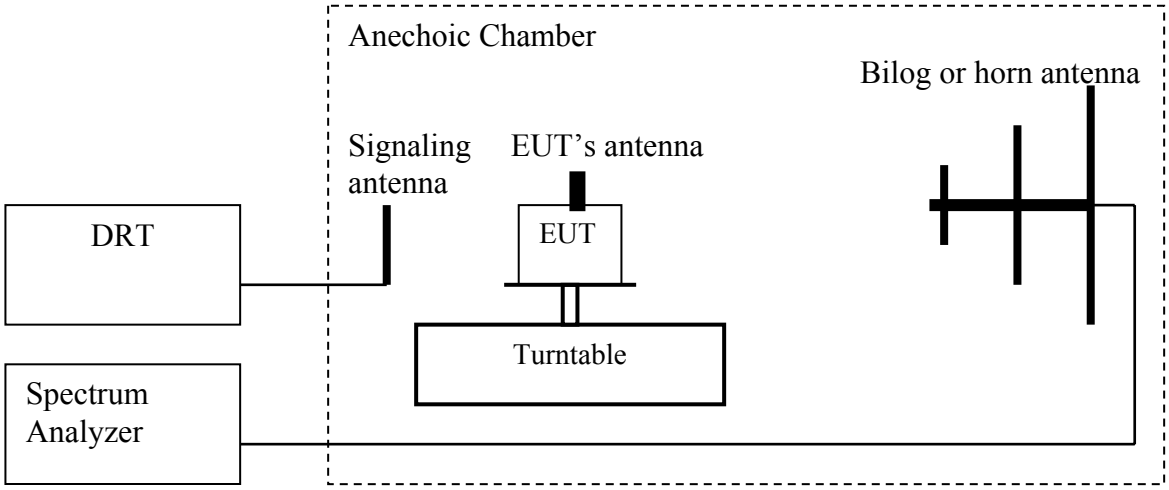
(b) Measurement procedure. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the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

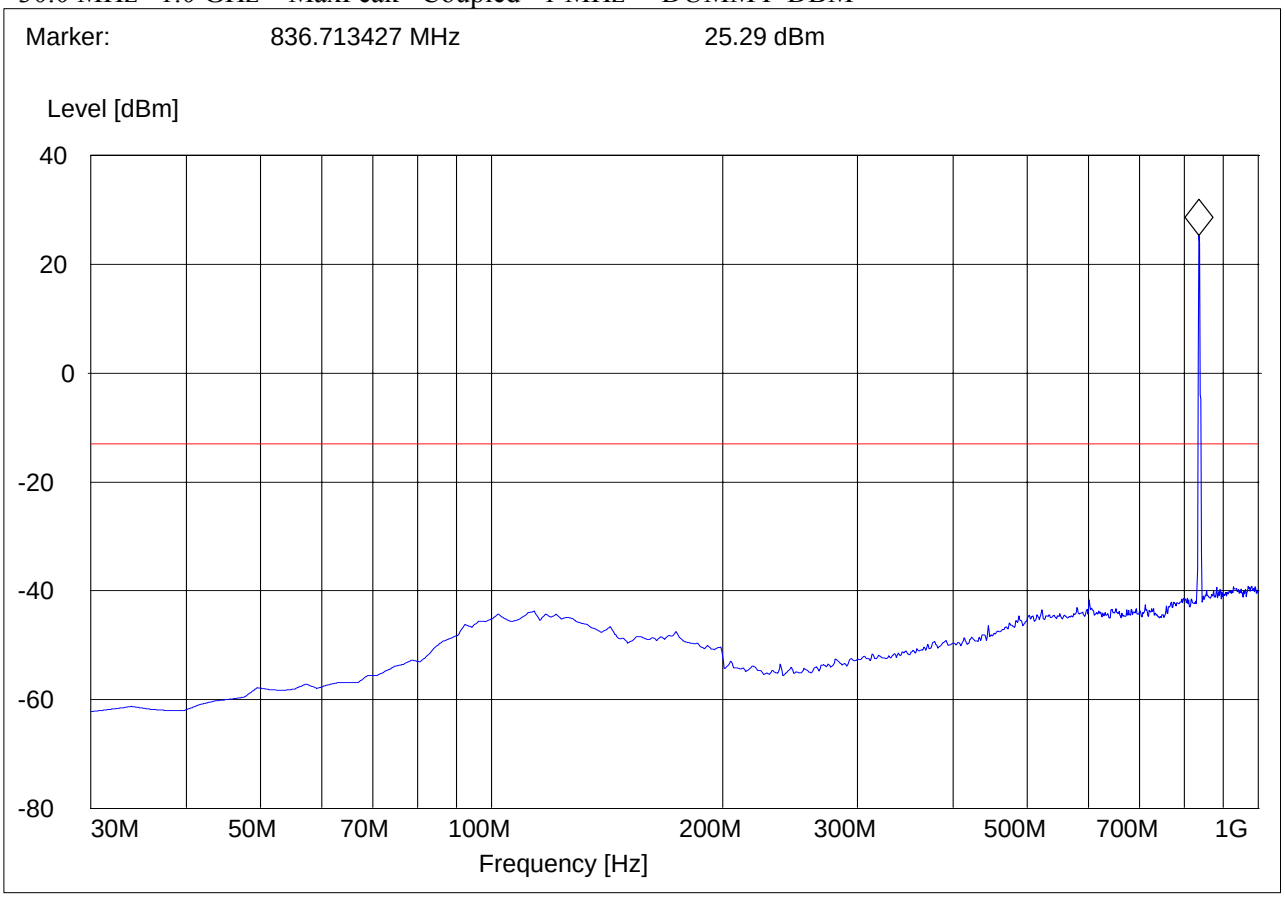
Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	**1648.4**	NF	**1673.2**	NF	**1697.6**	NF
3	**2472.6**	NF	**2509.8**	NF	**2546.4**	NF
4	**3296.8**	NF	**3346.4**	NF	**3395.2**	NF
5	**4121**	NF	**4183**	NF	**4244**	NF
6	**4945.2**	NF	**5019.6**	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
Antenna: vertical

Note:
1.The peak above the limit line is the carrier freq.
2.This plot is valid for low, mid & high channels (worst-case plot)
EUT: A1303
Customer:: Apple
Test Mode: GSM 850 CH 190
ANT Orientation: V
EUT Orientation: V
Test Engineer: Sam
Voltage: FCC AC
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

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

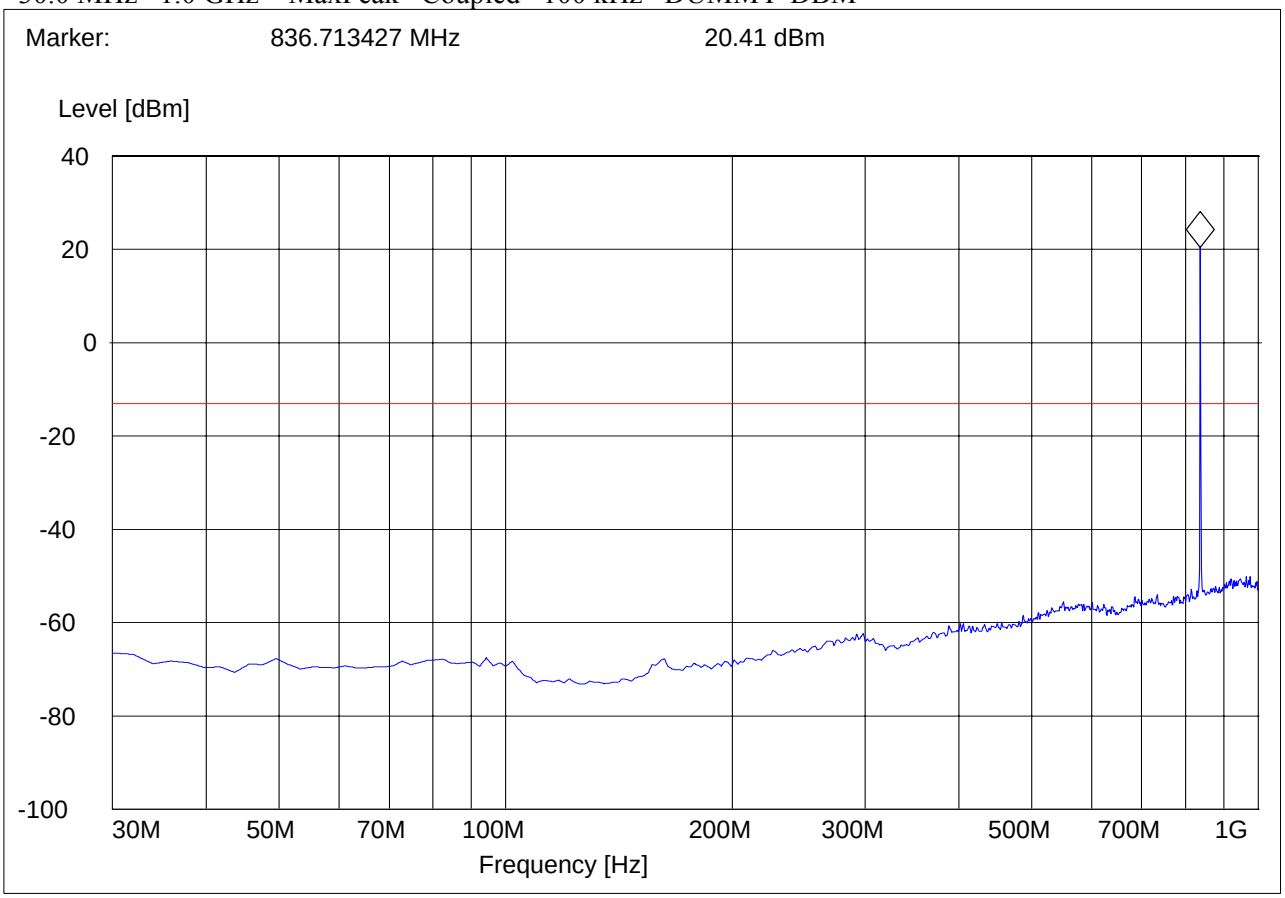


RADIATED SPURIOUS EMISSIONS (GSM-850)TX: 30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: horizontal

Note:
1.The peak above the limit line is the carrier freq.
2.This plot is valid for low, mid & high channels (worst-case plot)
EUT: A1303
Customer:: Apple
Test Mode: GSM 850 CH 190
ANT Orientation: H
EUT Orientation: V
Test Engineer: Sam
Voltage: FCC AC
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



RADIATED SPURIOUS EMISSIONS (GSM-850) CHANNEL 128 Tx : 1GHz – 18GHz

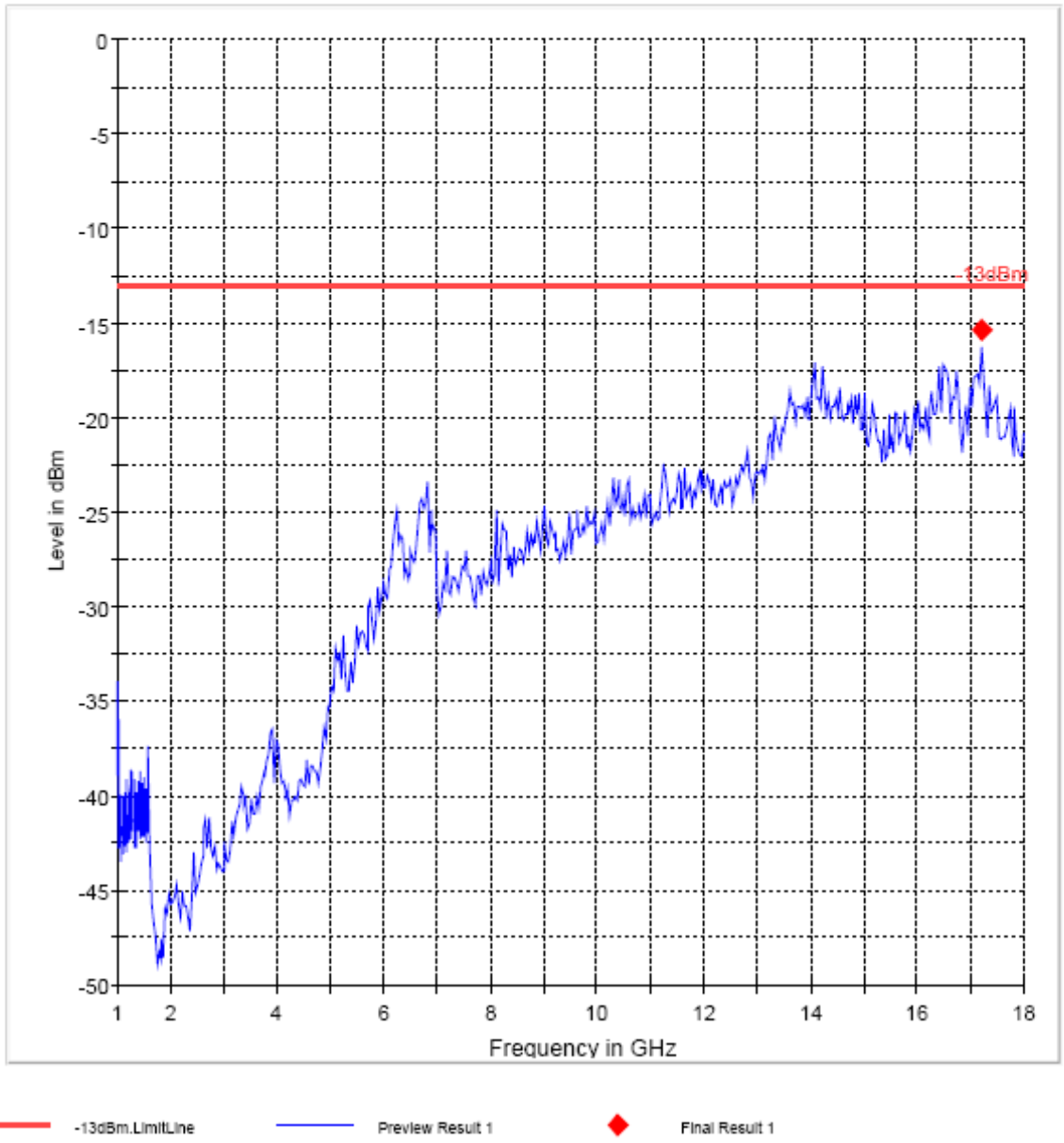
Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
17210.260521	-15.3	1000.000	1000.000	120.0	H	0.0	-47.9	2.3	-13.0

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

Frequency (MHz)	Comment
17210.260521	

FCC 22 1-18GHz



RADIATED SPURIOUS EMISSIONS (GSM-850) Tx CHANNEL 190: 1GHz – 18GHz

Channel 190

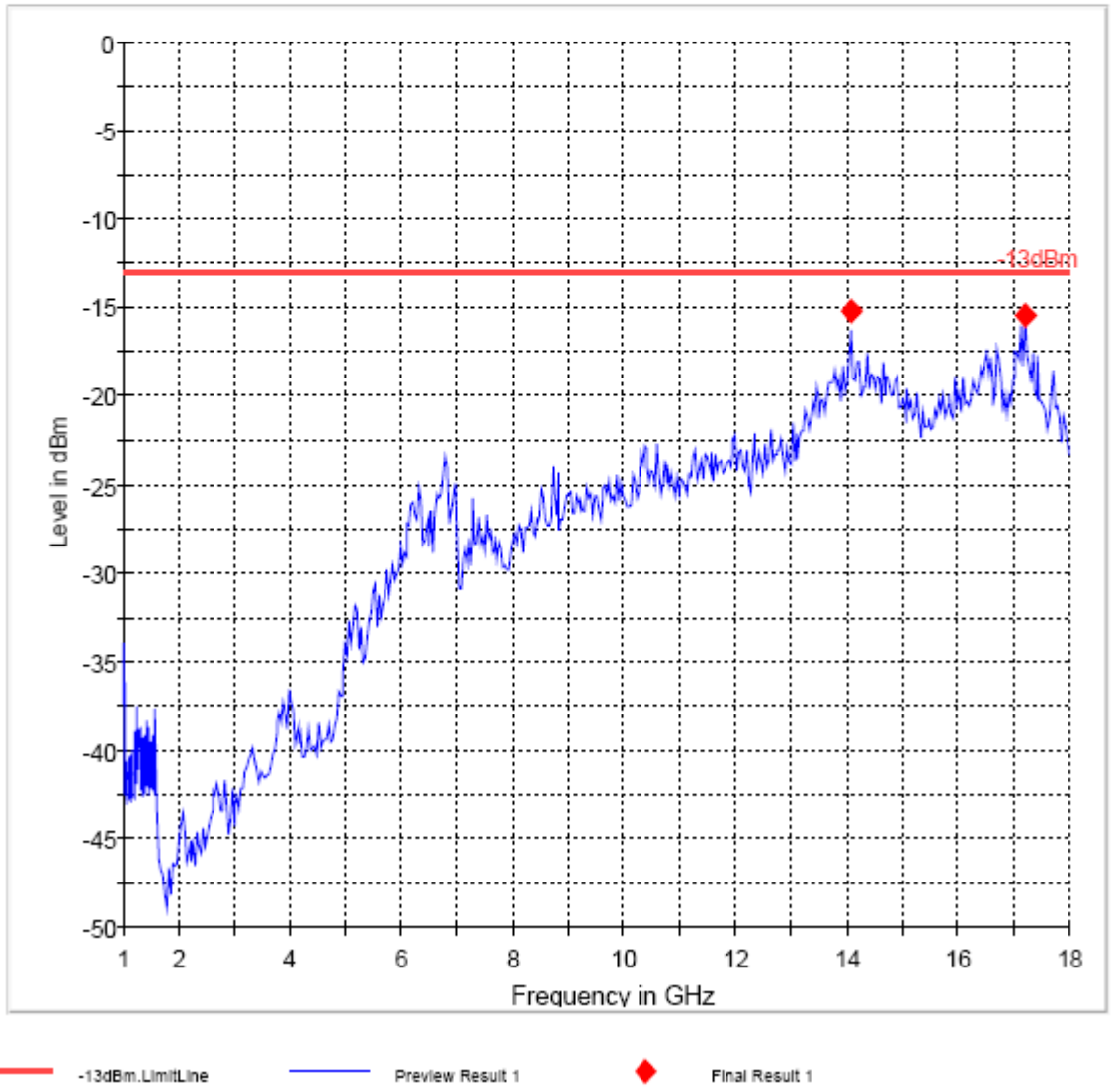
Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
14084.208417	-15.2	1000.000	1000.000	177.0	H	84.0	-49.4	2.2	-13.0
17210.260521	-15.4	1000.000	1000.000	161.0	H	50.0	-47.9	2.4	-13.0

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

Frequency (MHz)	Comment
14084.208417	
17210.260521	

FCC 22 1-18GHz



RADIATED SPURIOUS EMISSIONS (GSM-850) Tx CHANNEL 251: 1GHz – 18GHz

Channel 251

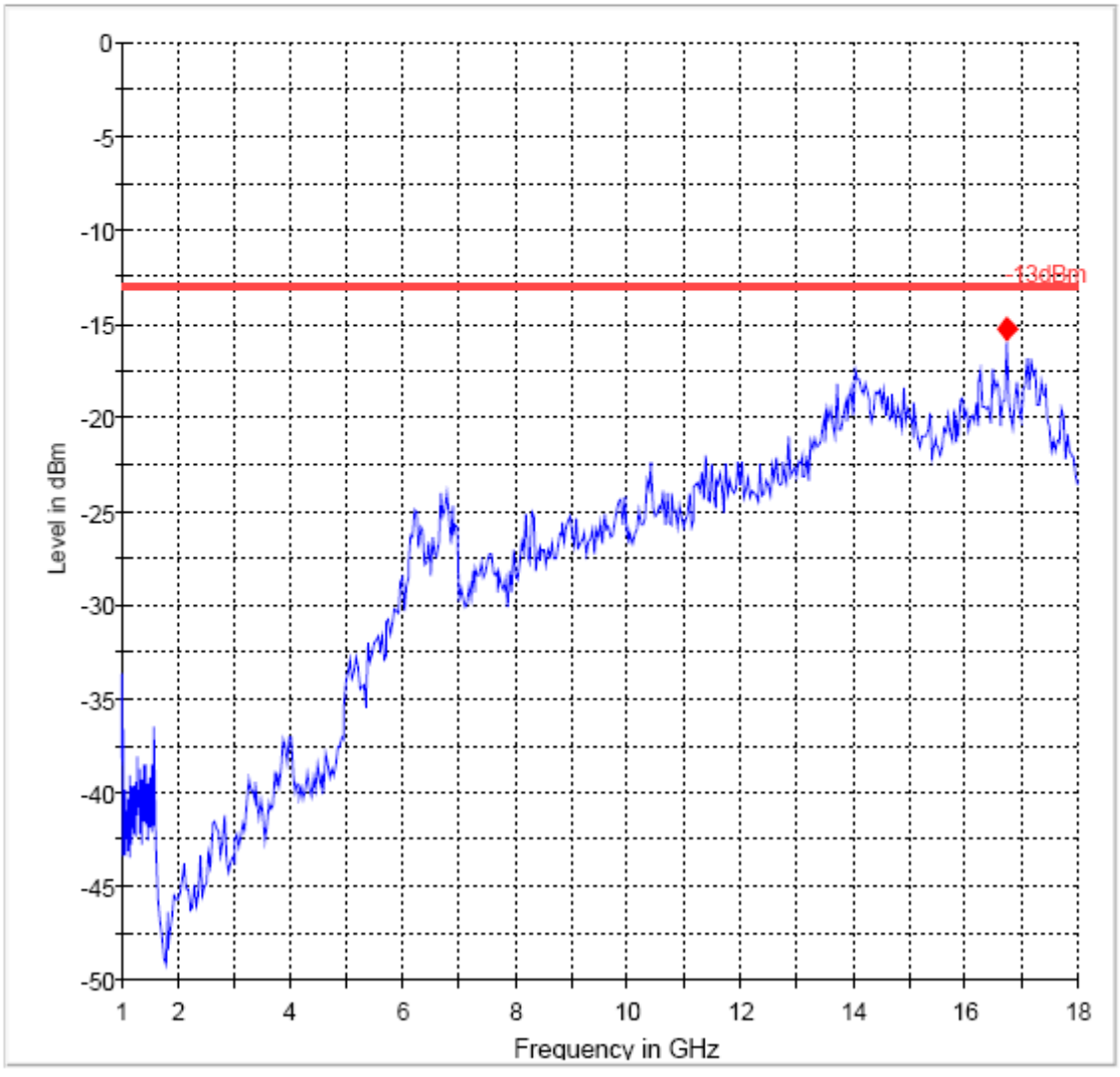
Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
16749.579158	-15.3	1000.000	1000.000	120.0	H	0.0	-46.6	2.3	-13.0

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

Frequency (MHz)	Comment
16749.579158	

FCC 22 1-18GHz



5.5.4.2 Test Results Transmitter Spurious Emission UMTS FDD5

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

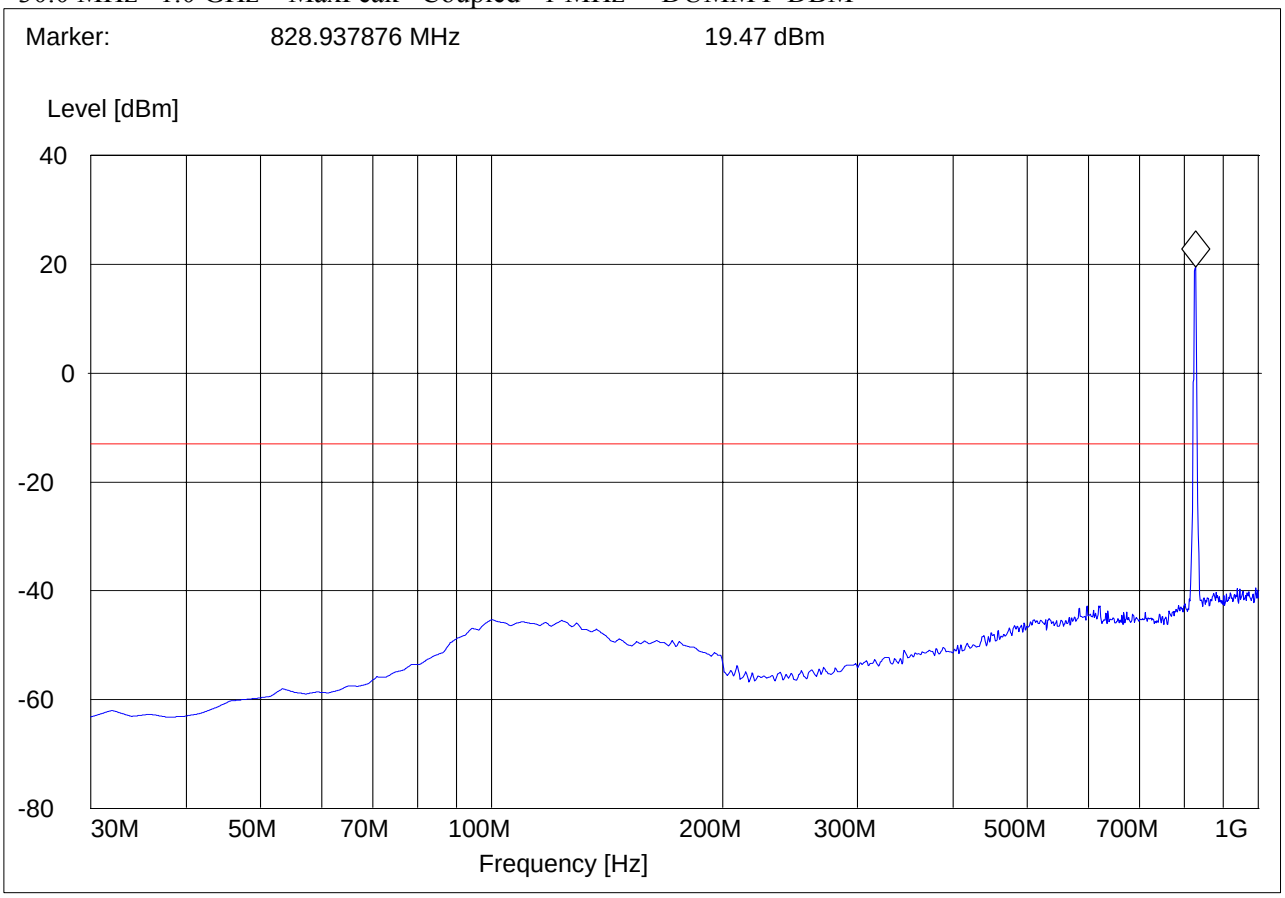
RADIATED SPURIOUS EMISSIONS (UMTS FDD5) TX: 30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: vertical

Note:
1.The peak above the limit line is the carrier freq.
2.This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD V
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

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



RADIATED SPURIOUS EMISSIONS (UMTS FDD5) TX: 30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: Horizontal
Note:

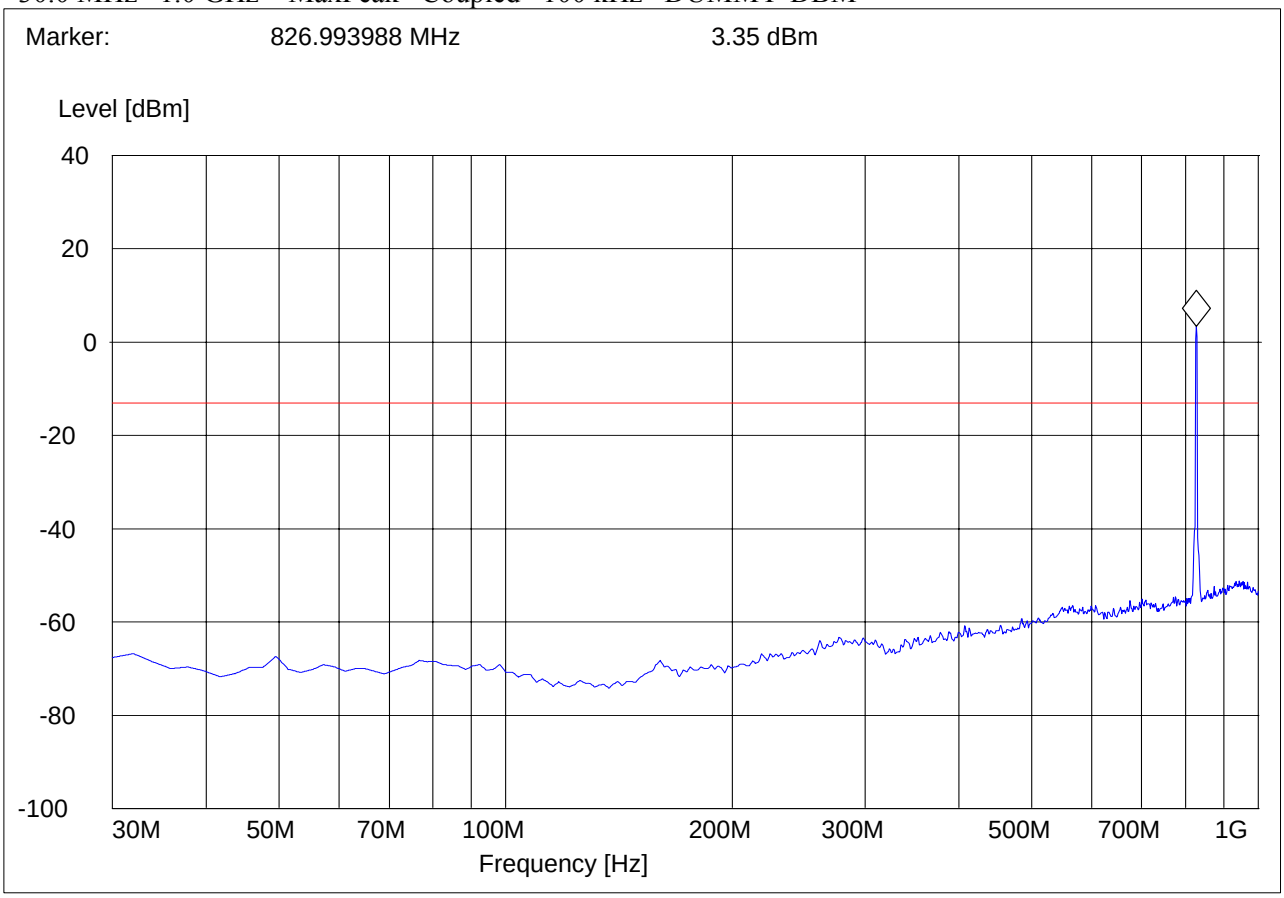
1.The peak above the limit line is the carrier freq.

2.This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD V
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_H"

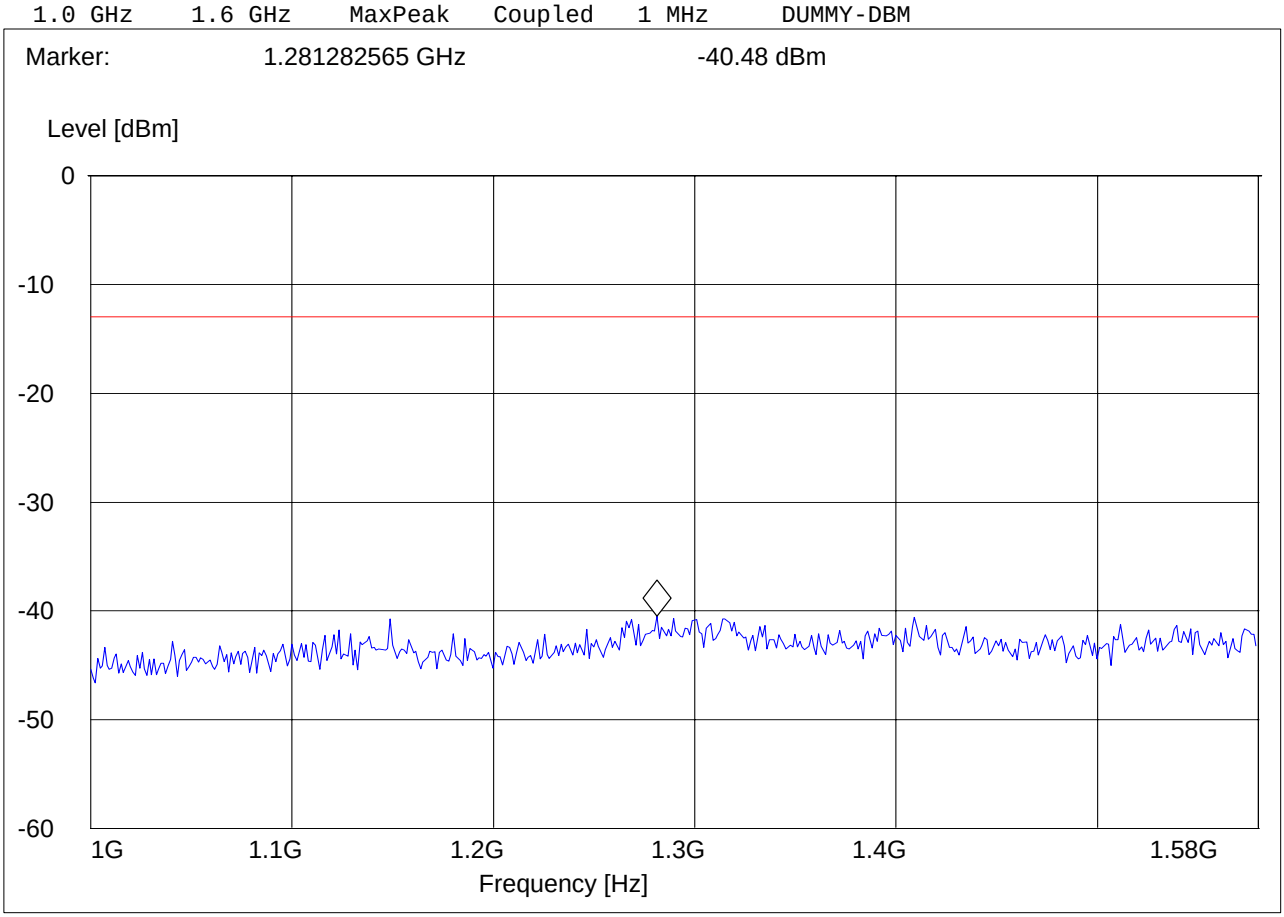
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



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

EUT: A1303
Customer:: Apple
Test Mode: FDD V ch 4132
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments:
SWEEP TABLE: "FCC 22Spuri 1-1.58G"

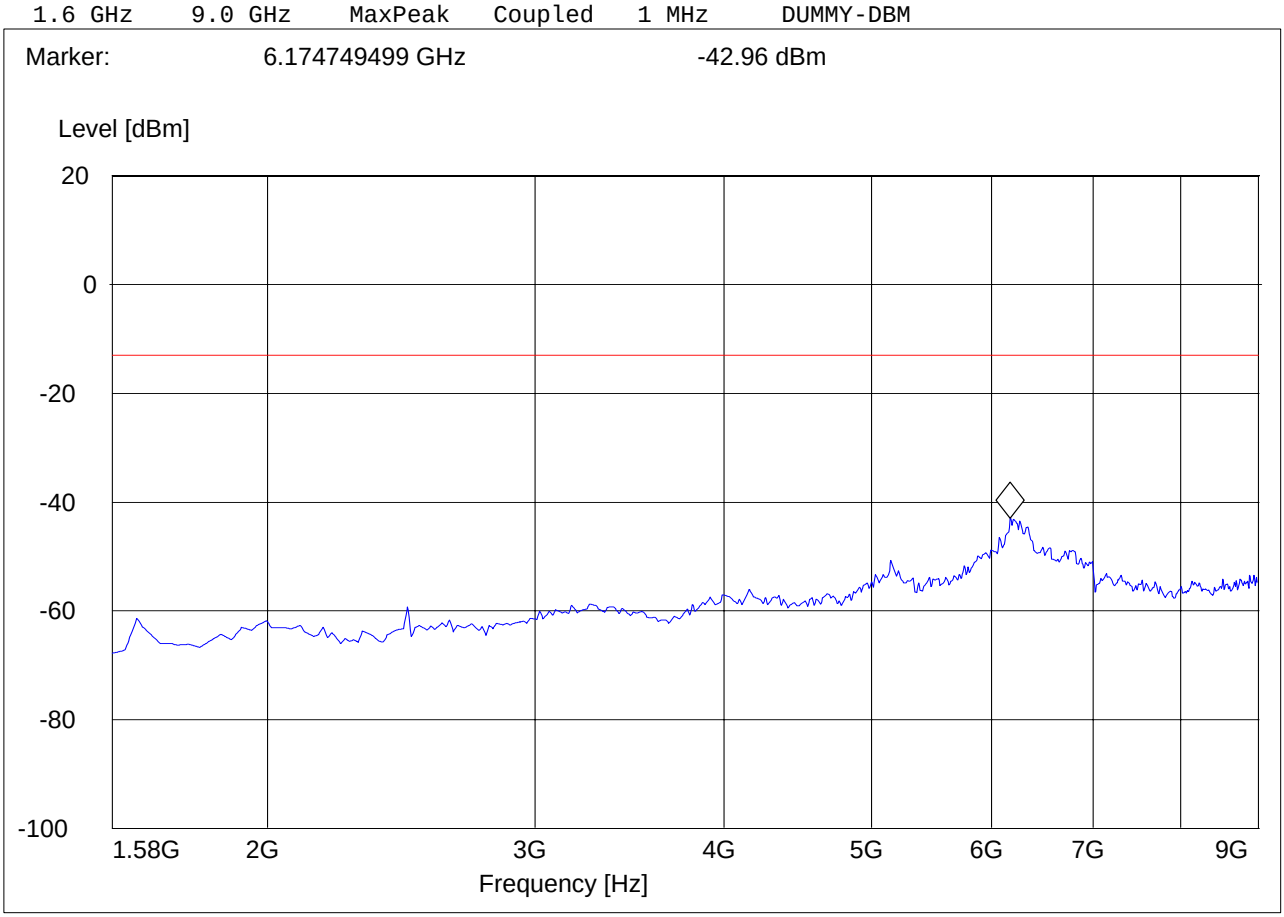
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.0 GHz	1.6 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM



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

EUT: A1303
Customer:: Apple
Test Mode: FDD V CH 4132
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments:
SWEEP TABLE: "FCC 22Spuri 1.58-9G"

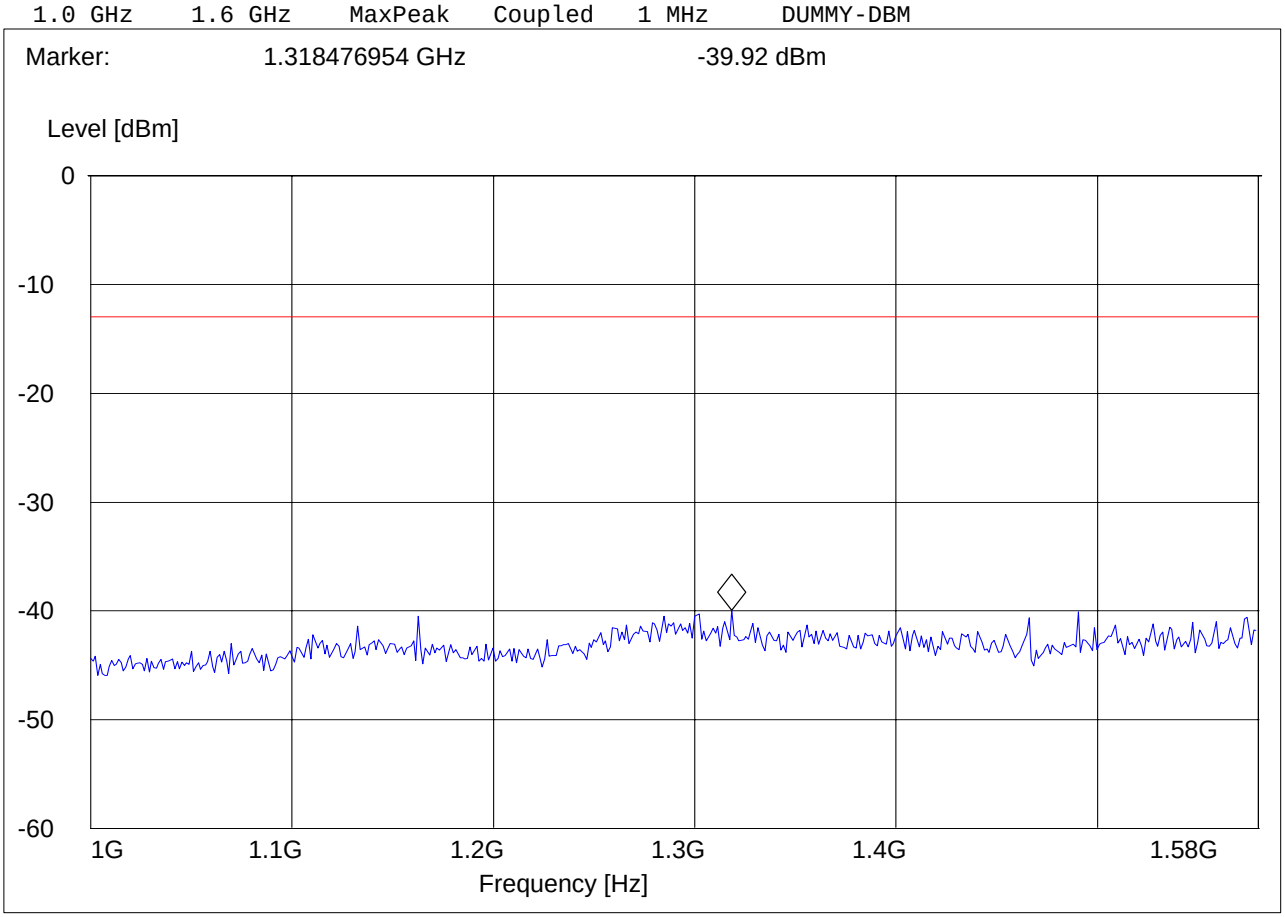
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM



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

EUT: A1303
Customer:: Apple
Test Mode: FDD V
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
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

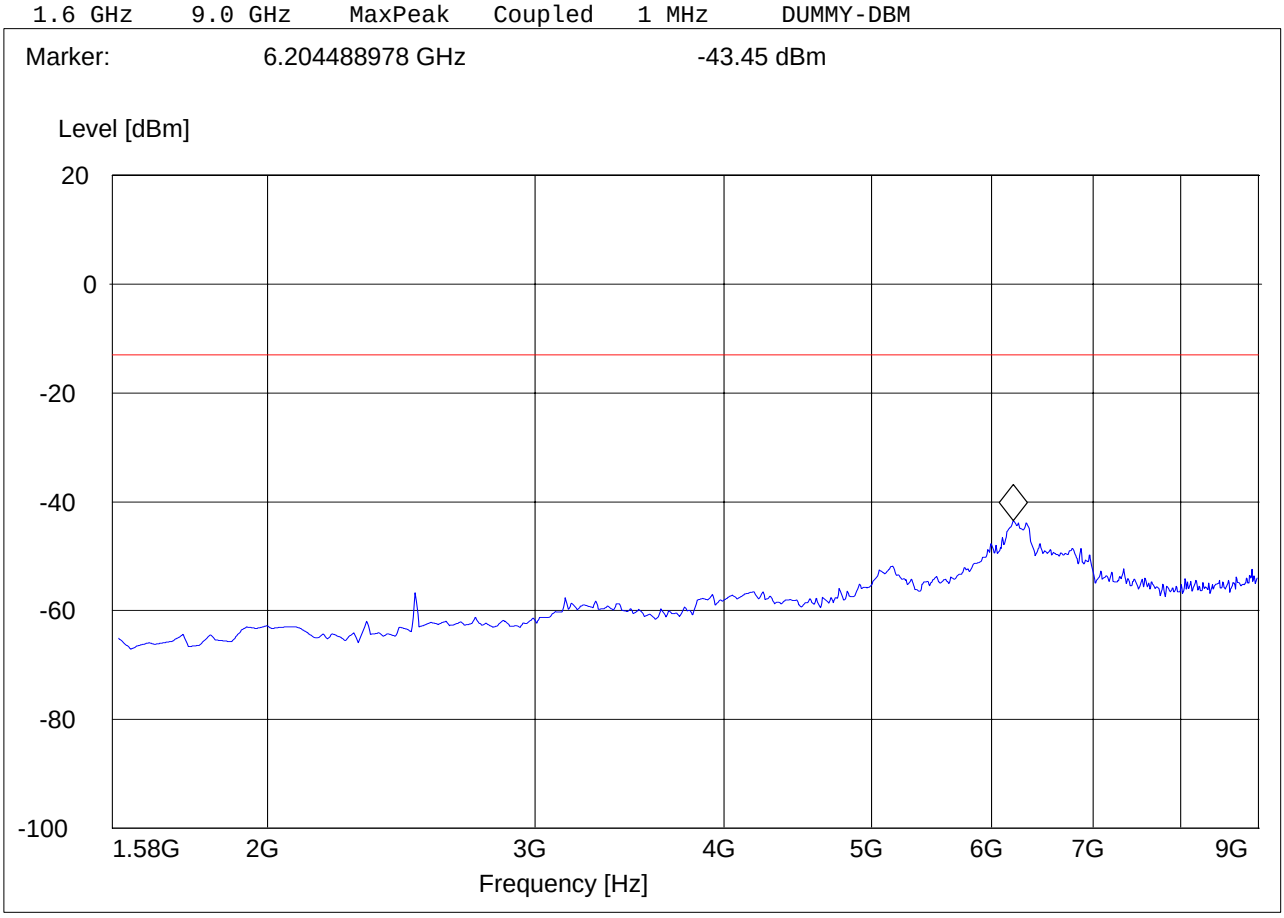


RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4183: 1.58GHz – 9GHz

```
EUT:              A1303
Customer::        Apple
Test Mode:        FDD V channel 4183
ANT Orientation:  H
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          FCC AC Adapter
Comments:
```

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

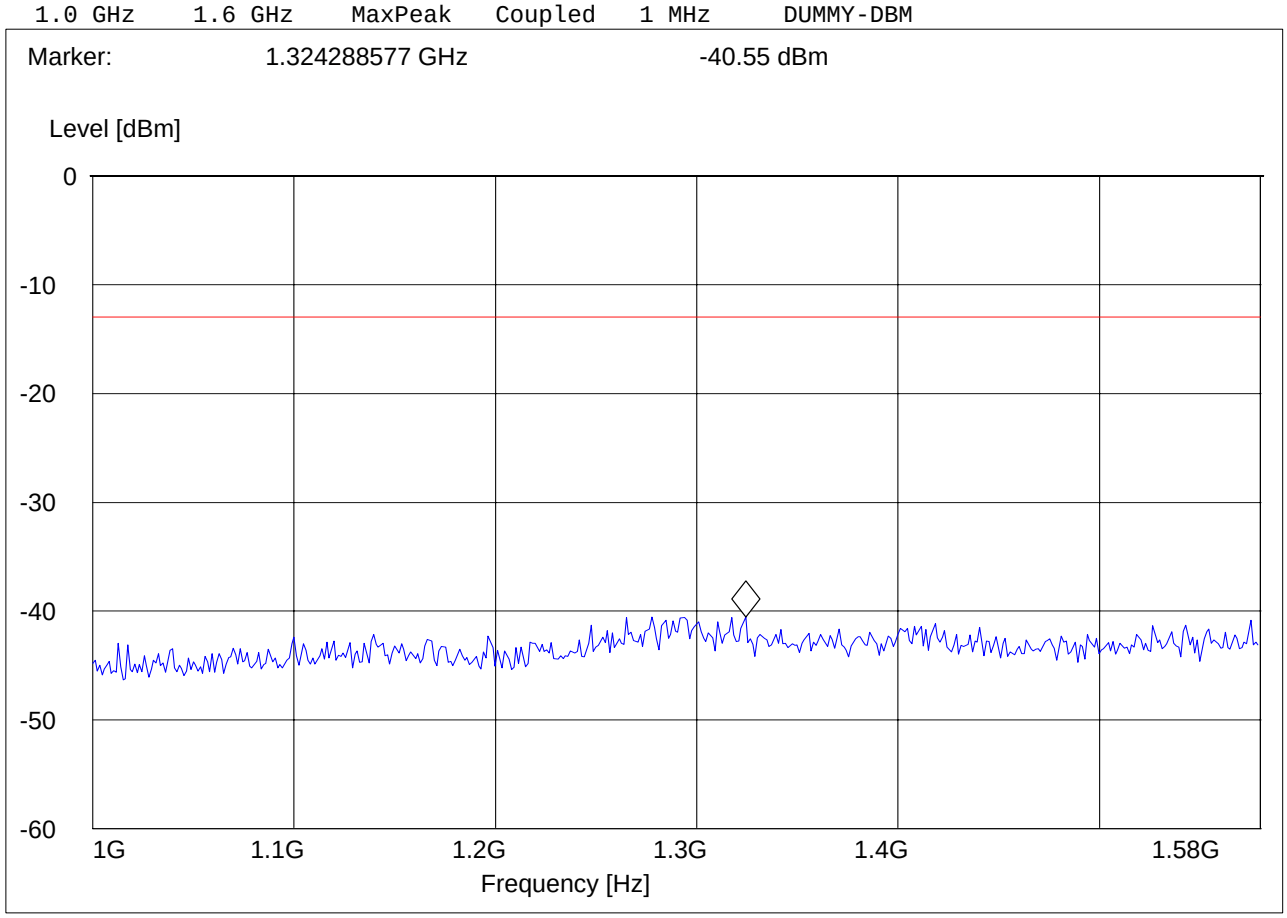
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
1.6 GHz	9.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM



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

EUT: A1303
Customer:: Apple
Test Mode: FDD V **CHANNEL 4233**
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
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

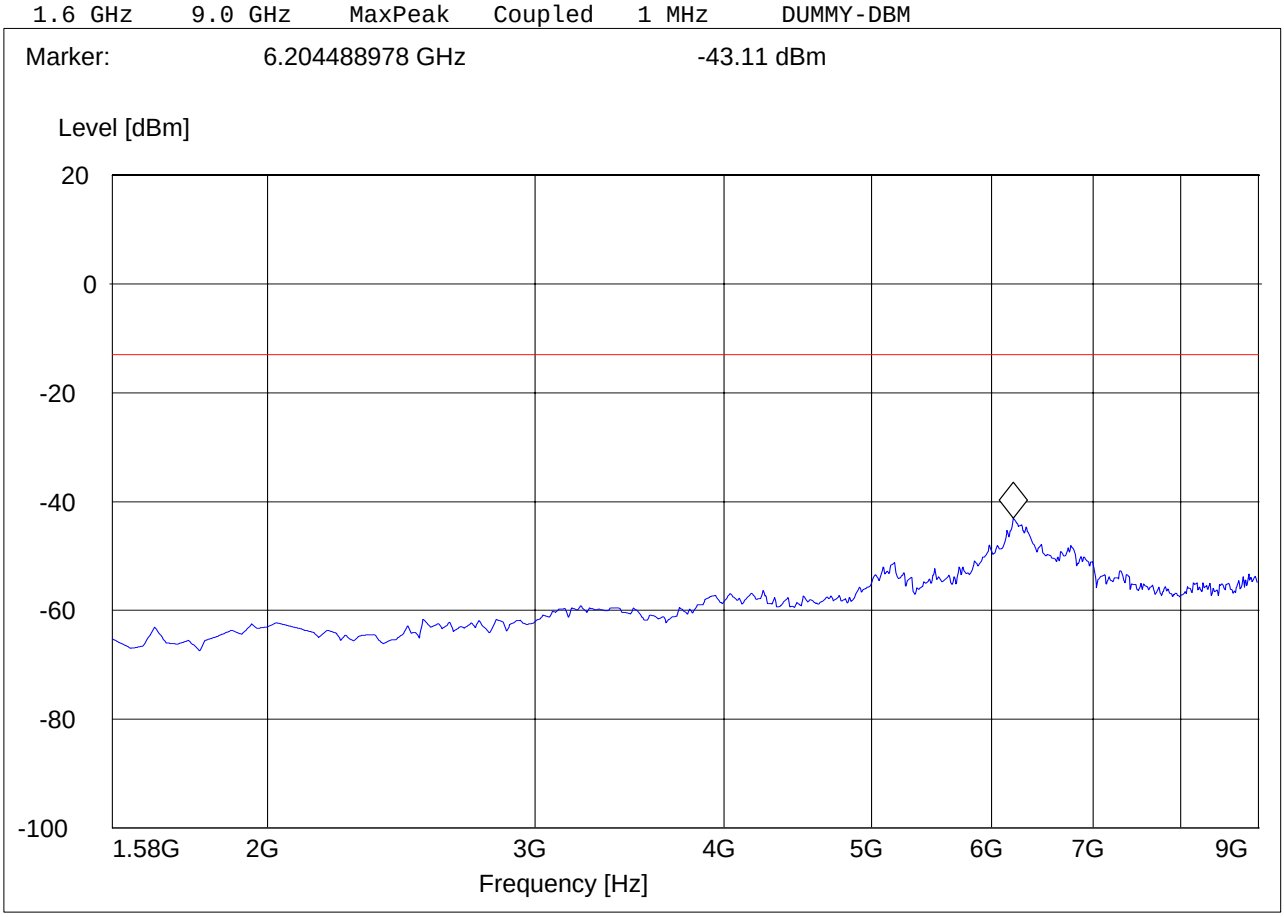


RADIATED SPURIOUS EMISSIONS (UMTS FDD5) Tx CHANNEL 4233: 1.58GHz –9GHz

EUT: A1303
Customer:: Apple
Test Mode: FDD V **CHANNEL 4233**
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
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



5.5.4.3 Test Results Transmitter Spurious Emission PCS-1900:

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

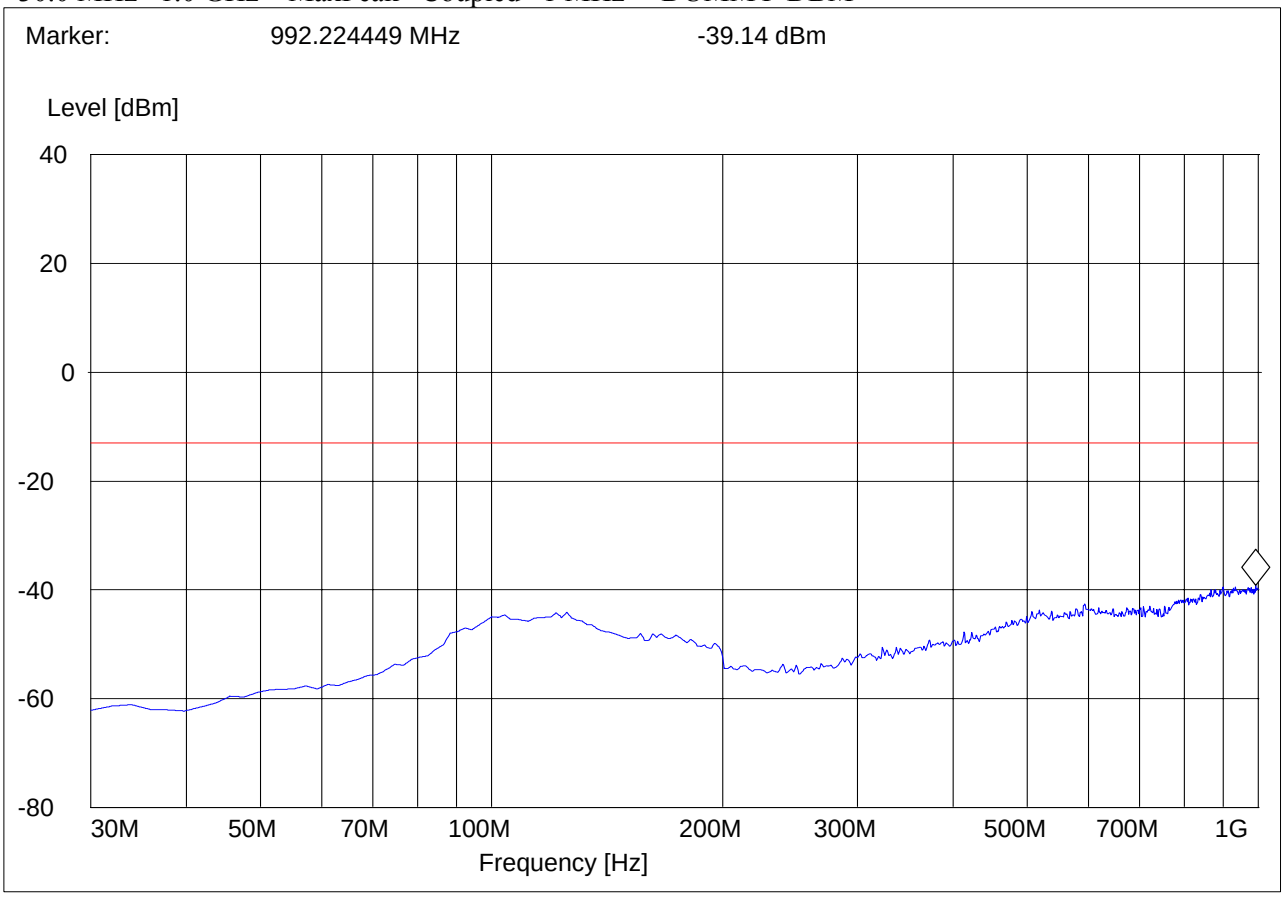
RADIATED SPURIOUS EMISSIONS(PCS 1900) TX: 30MHz - 1GHz
Antenna: Vertical
Note:

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

EUT: A1303
Customer:: Apple
Test Mode: GSM 1900 CH 661
ANT Orientation: V
EUT Orientation: V
Test Engineer: Sam
Voltage: FCC AC
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

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



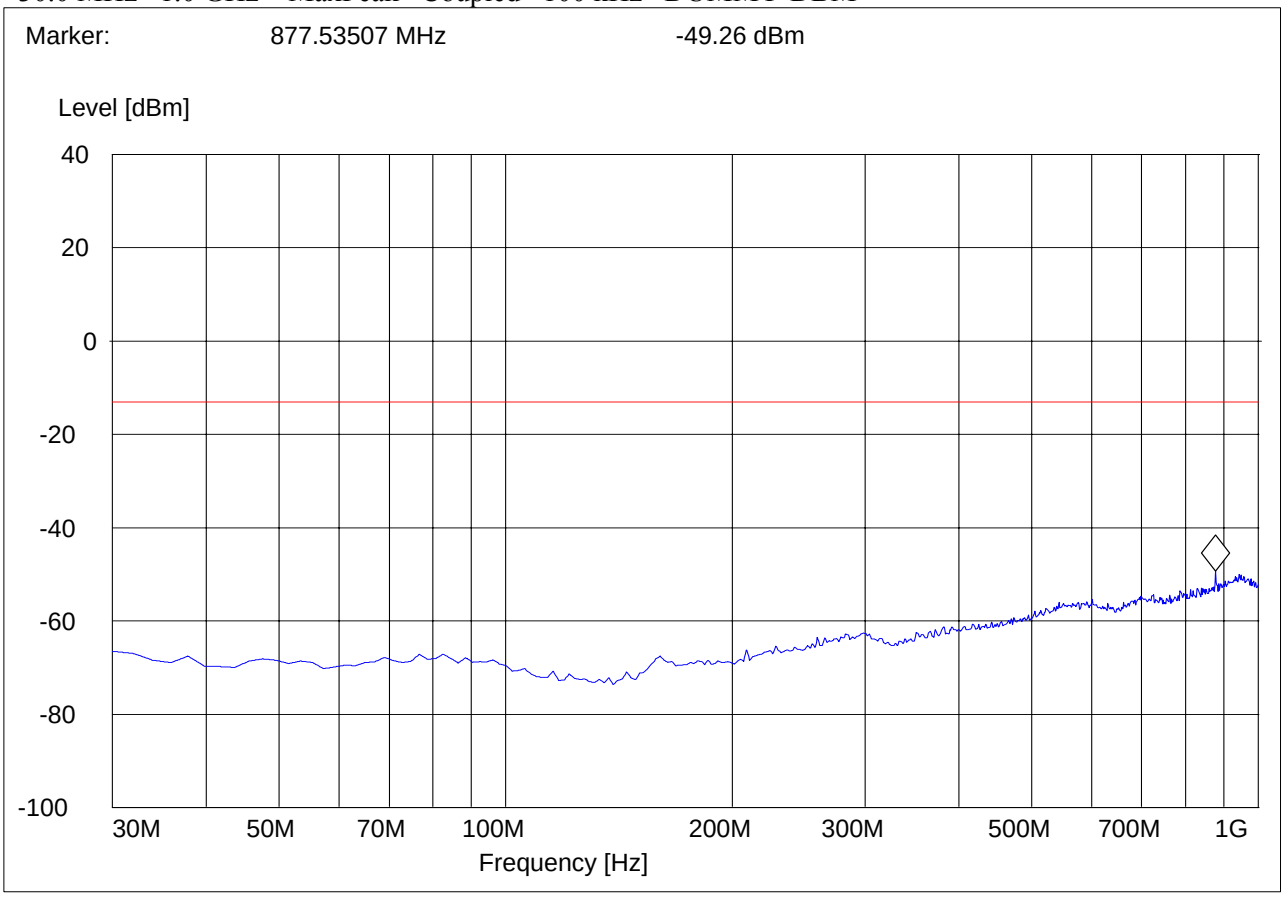
RADIATED SPURIOUS EMISSIONS(PCS 1900) TX: 30MHz - 1GHz
Antenna: Horizontal
Note:

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

EUT: A1303
Customer:: Apple
Test Mode: GSM 1900 CH 661
ANT Orientation: H
EUT Orientation: V
Test Engineer: Sam
Voltage: FCC AC
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



RADIATED SPURIOUS EMISSIONS(PCS 1900) Tx CHANNEL 512: 1GHz – 3GHz

Channel 512

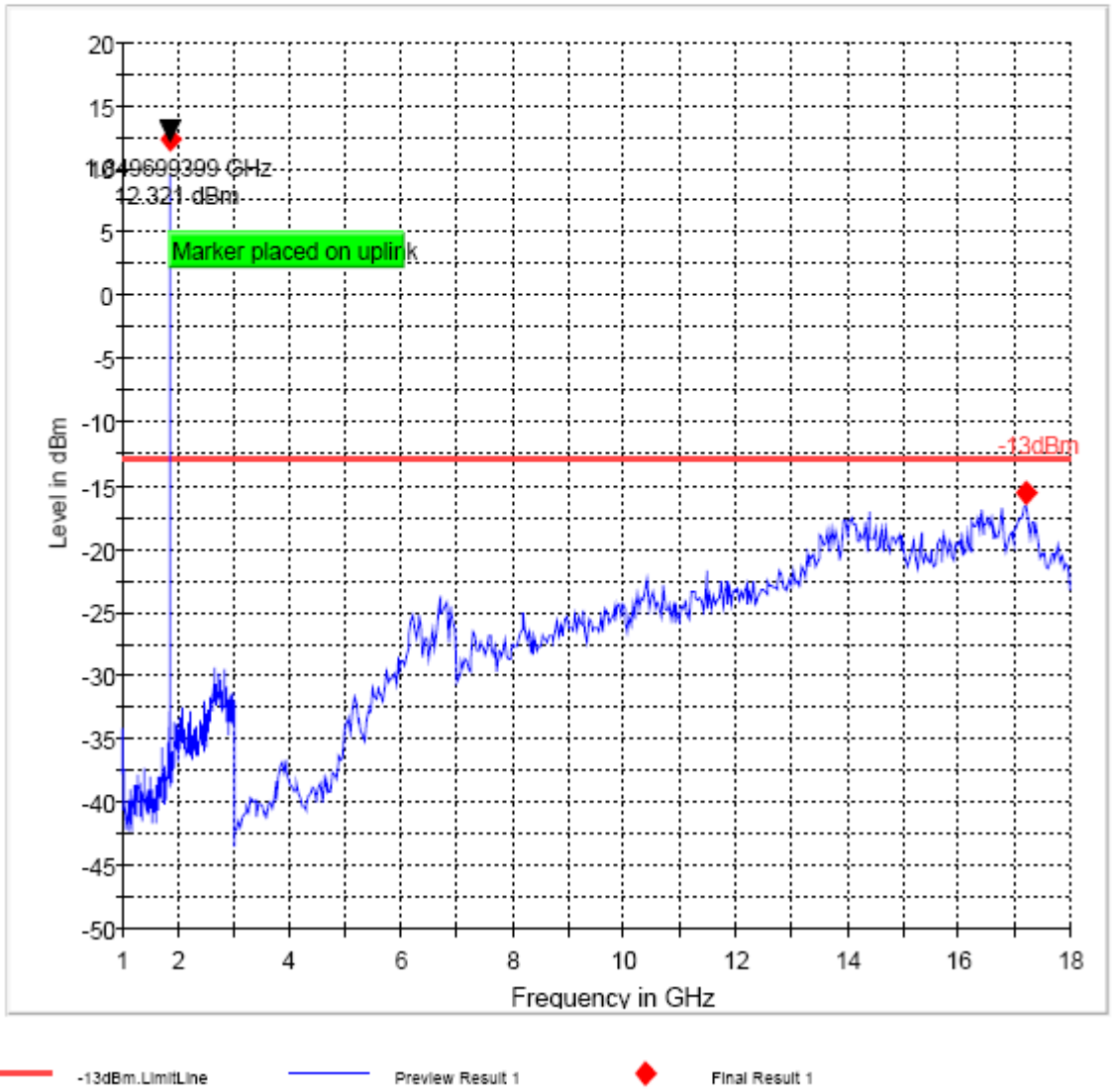
Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1849.699399	12.3	1000.000	1000.000	120.0	H	223.0	-71.0	-25.3	-13.0
17218.436874	-15.6	1000.000	1000.000	200.0	H	189.0	-48.3	2.6	-13.0

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

Frequency (MHz)	Comment
1849.699399	
17218.436874	

FCC 24 1-18GHz



RADIATED SPURIOUS EMISSIONS(PCS 1900) Tx CHANNEL 661: 1GHz – 18GHz

Channel 661

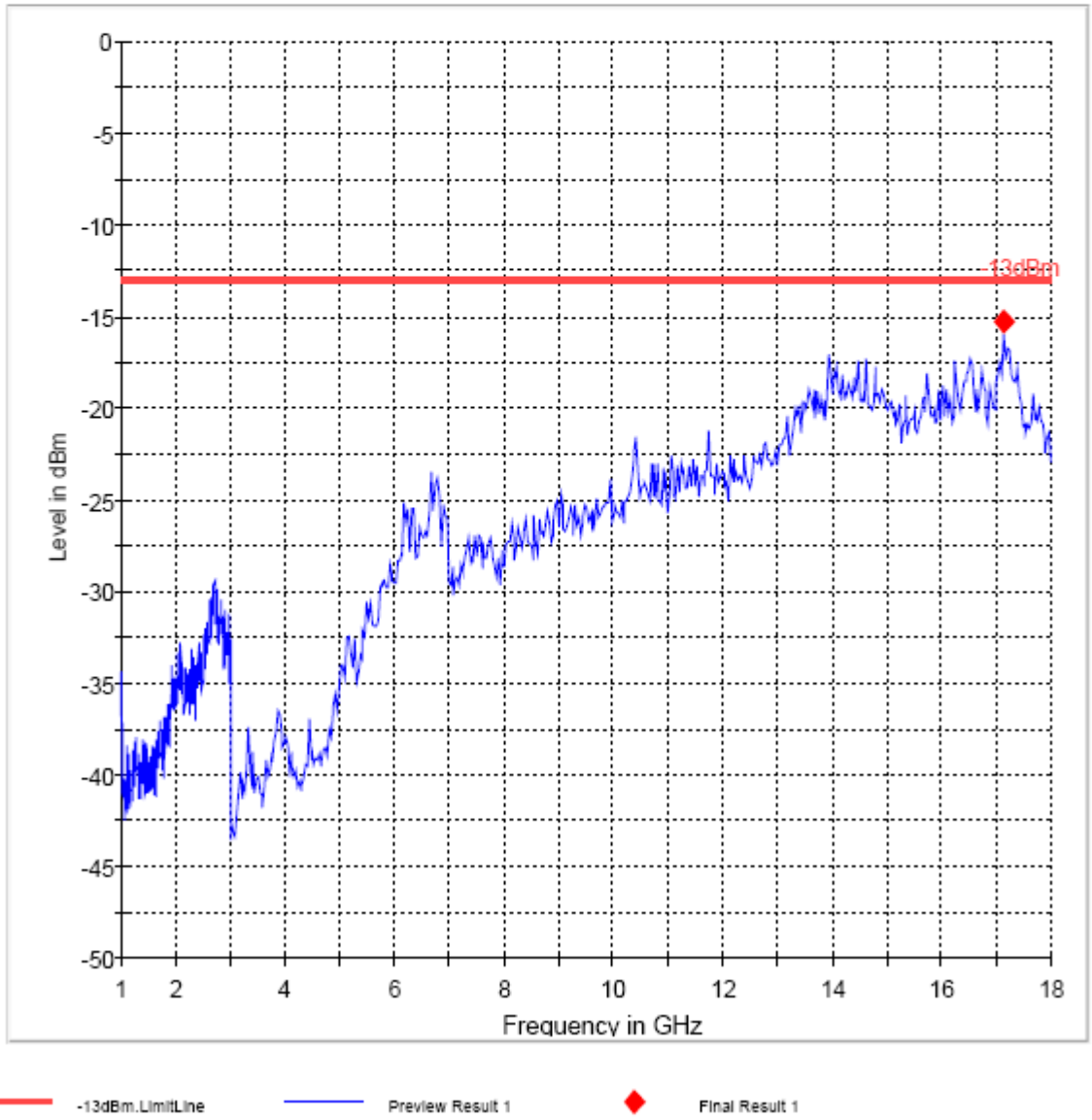
Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
17128.256513	-15.3	1000.000	1000.000	191.0	H	305.0	-49.3	2.3	-13.0

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

Frequency (MHz)	Comment
17128.256513	

FCC 24 1-18GHz



RADIATED SPURIOUS EMISSIONS (PCS 1900) Tx CHANNEL 810: 1GHz – 18GHz

Channel 810

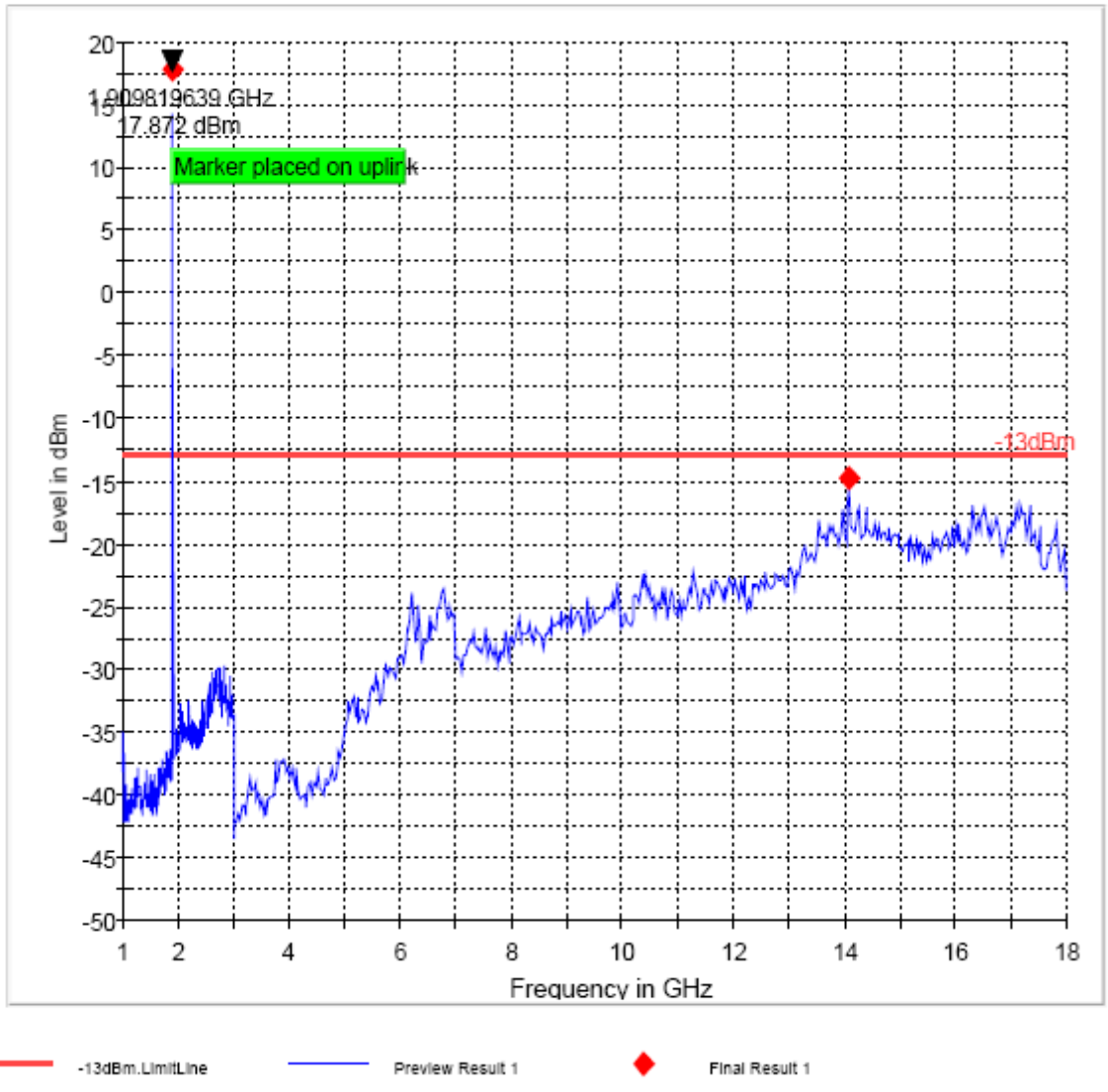
Final Result 1

Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1909.819639	17.9	1000.000	1000.000	120.0	H	203.0	-71.0	-30.9	-13.0
14092.184369	-14.8	1000.000	1000.000	120.0	H	201.0	-49.0	1.8	-13.0

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

Frequency (MHz)	Comment
1909.819639	
14092.184369	

FCC 24 1-18GHz



5.5.4.4 Test Results Transmitter Spurious Emission UMTS FDD2:

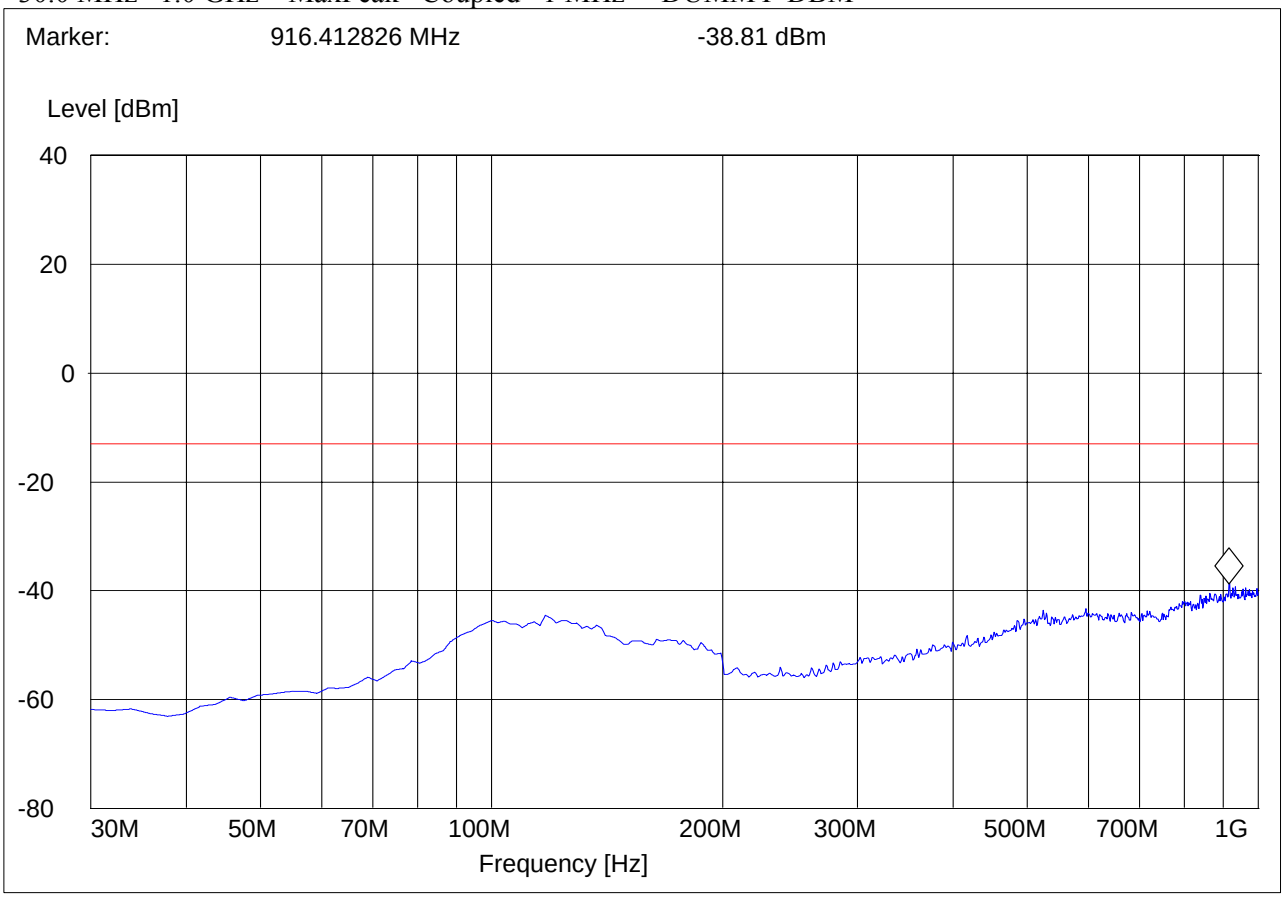
Harmonics	Tx ch-9262 **Freq. (MHz)**	Level (dBm)	Tx ch-9400 **Freq. (MHz)**	Level (dBm)	Tx ch-9538 **Freq. (MHz)**	Level (dBm)
2	**3704.8**	NF	**3760**	NF	**3815.2**	NF
3	**5557.2**	NF	**5640**	NF	**5722.8**	NF
4	**7409.6**	NF	**7520**	NF	**7630.4**	NF
5	**9262**	NF	**9400**	NF	**9538**	NF
6	**11114.4**	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

RADIATED SPURIOUS EMISSIONS (UMTS FDD2) TX: 30MHz - 1GHz
Antenna: Vertical
Note:
1.This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD II CH 9262
ANT Orientation: V
EUT Orientation: V
Test Engineer: Sam
Voltage: FCC AC
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_V"

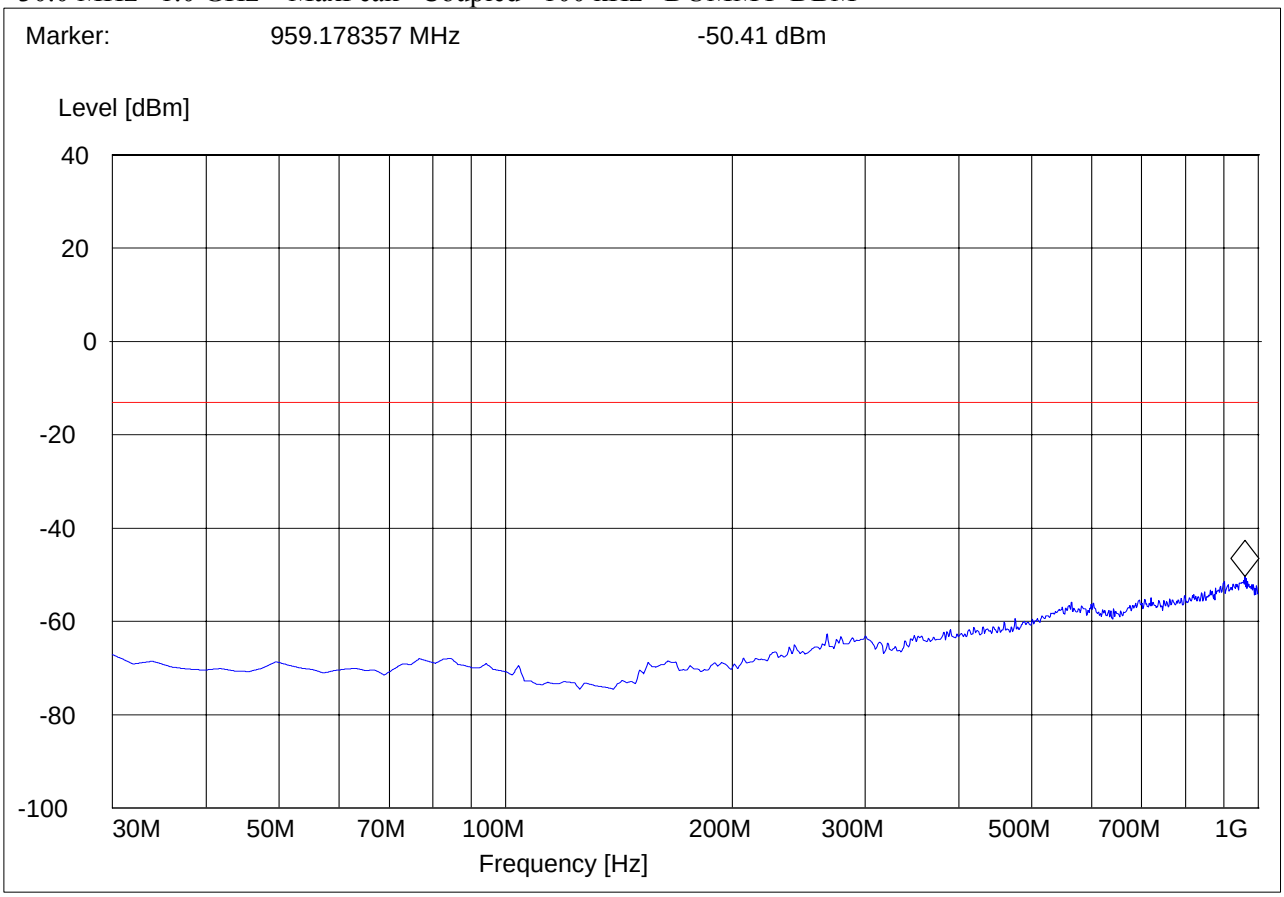
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	1 MHz	DUMMY-DBM



RADIATED SPURIOUS EMISSIONS(UMTS FDD2) TX: 30MHz - 1GHz
Antenna: Horizontal
Note:
1.This plot is valid for low, mid & high channels (worst-case plot)
EUT: A1303
Customer:: Apple
Test Mode: FDD II CH 9262
ANT Orientation: H
EUT Orientation: V
Test Engineer: Sam
Voltage: FCC AC
Comments:

SWEEP TABLE: "FCC 24 Spur 30M-1G_H"

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM

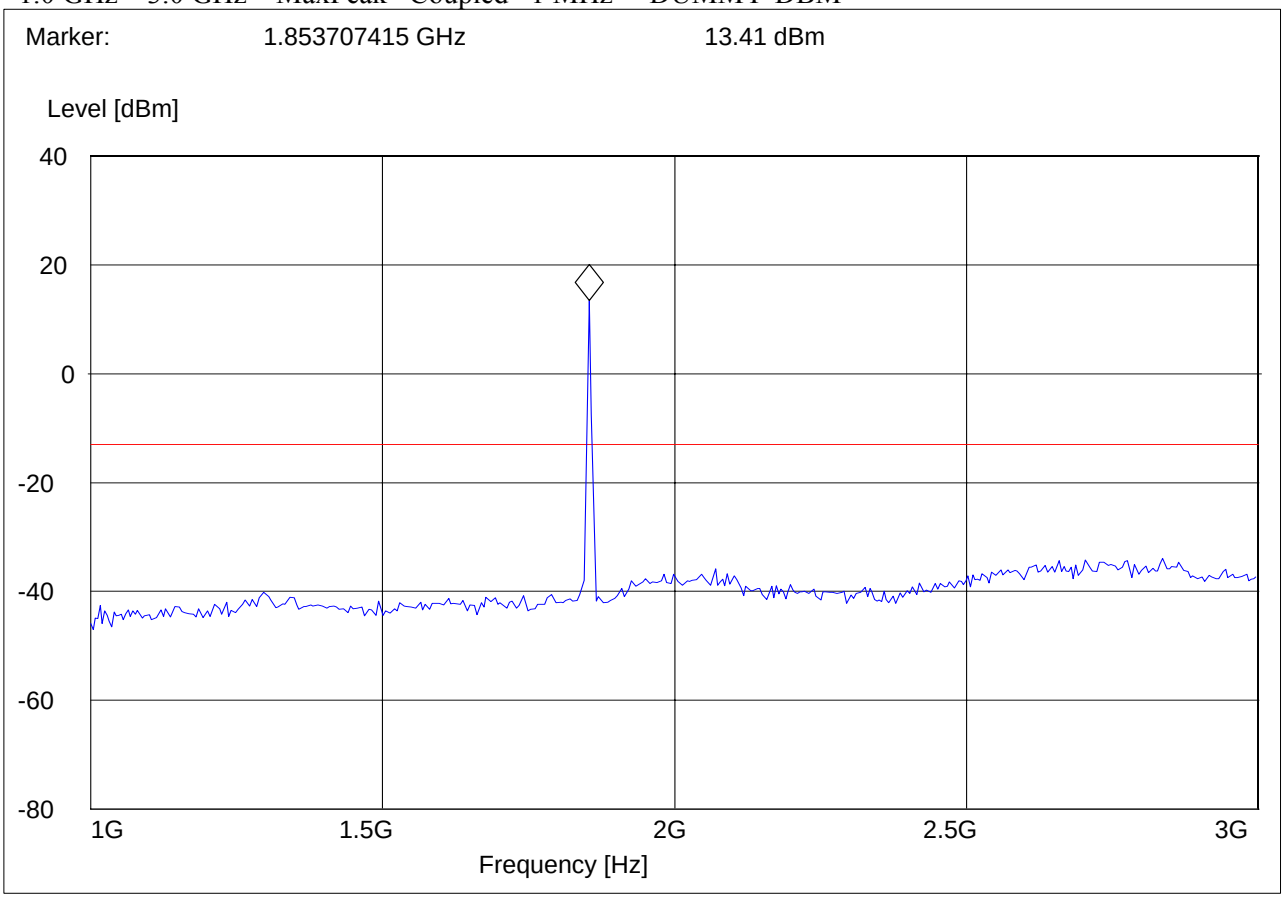


RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9262: 1GHz – 3GHz
Note: The peak above the limit line is the carrier freq. at ch-9262.

EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments:

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

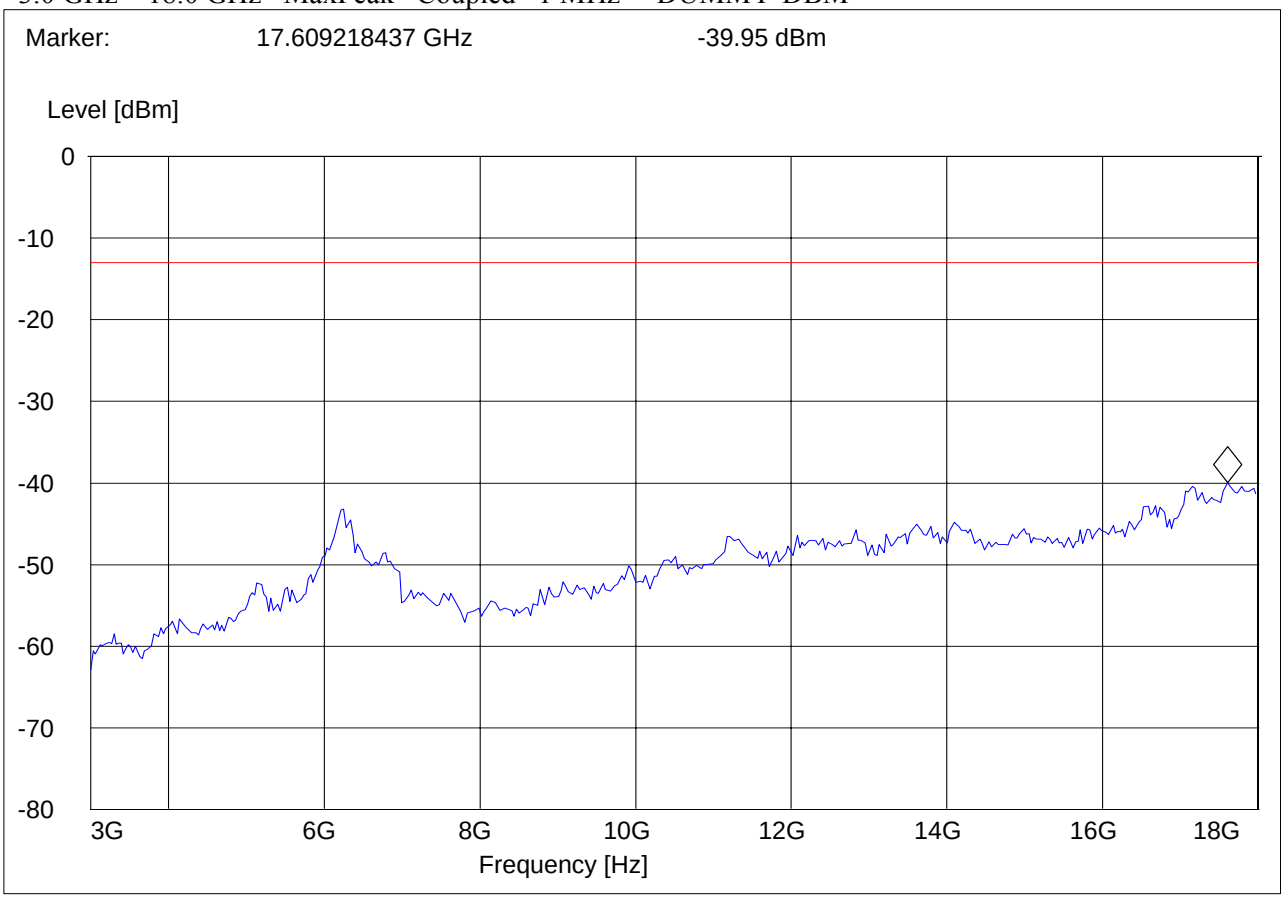


RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9262: 3GHz – 18GHz

EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
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

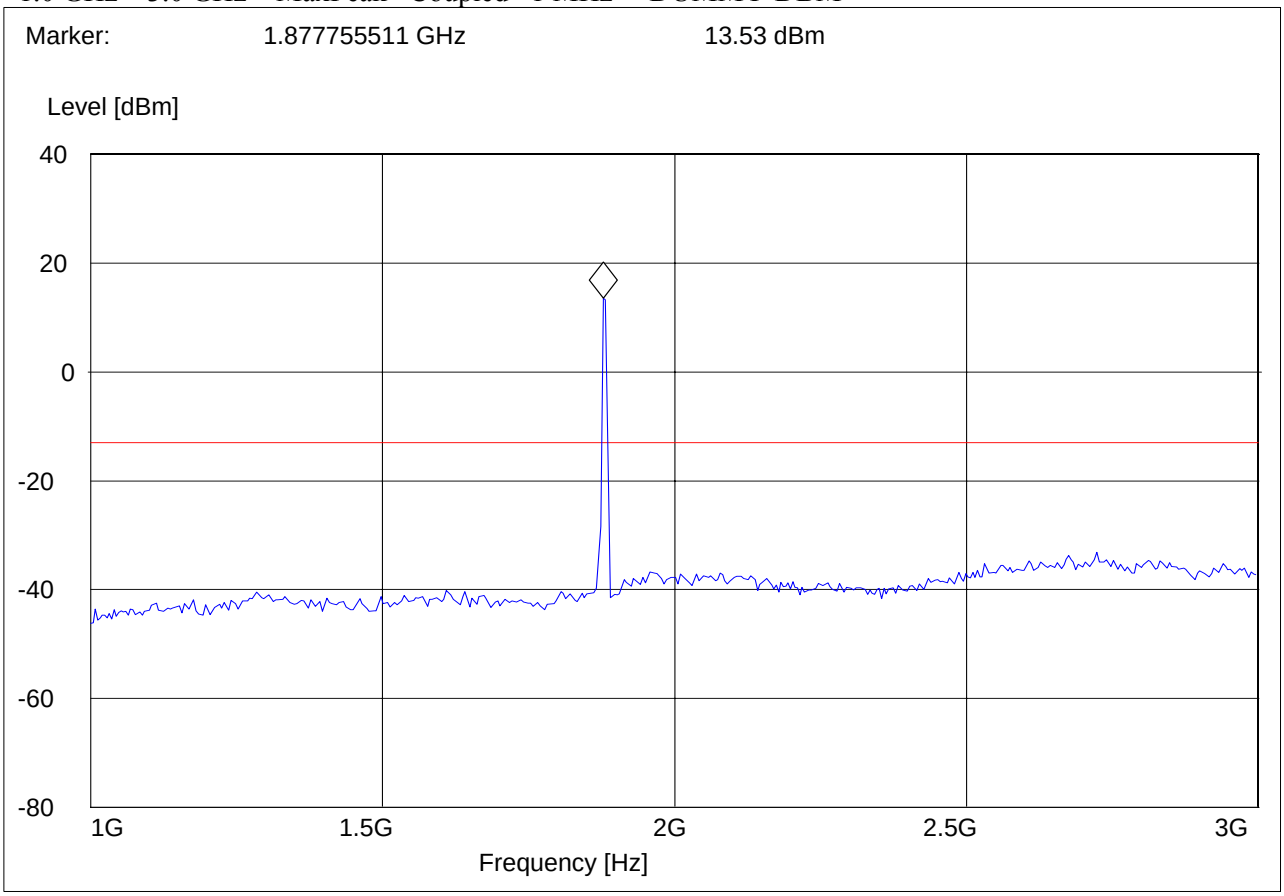


RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9400: 1GHz – 3GHz

EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments:

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

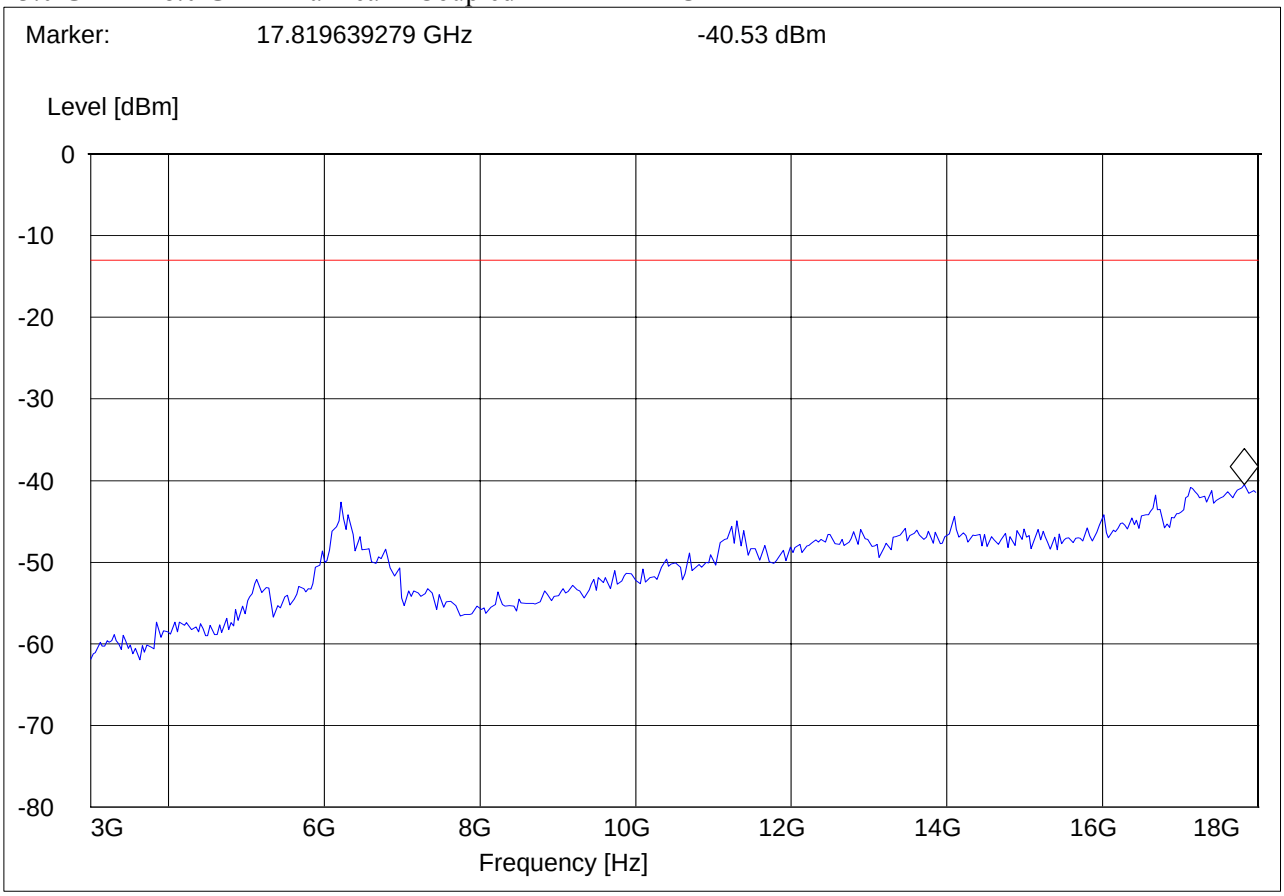


RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL9400: 3GHz – 18GHz

EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
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

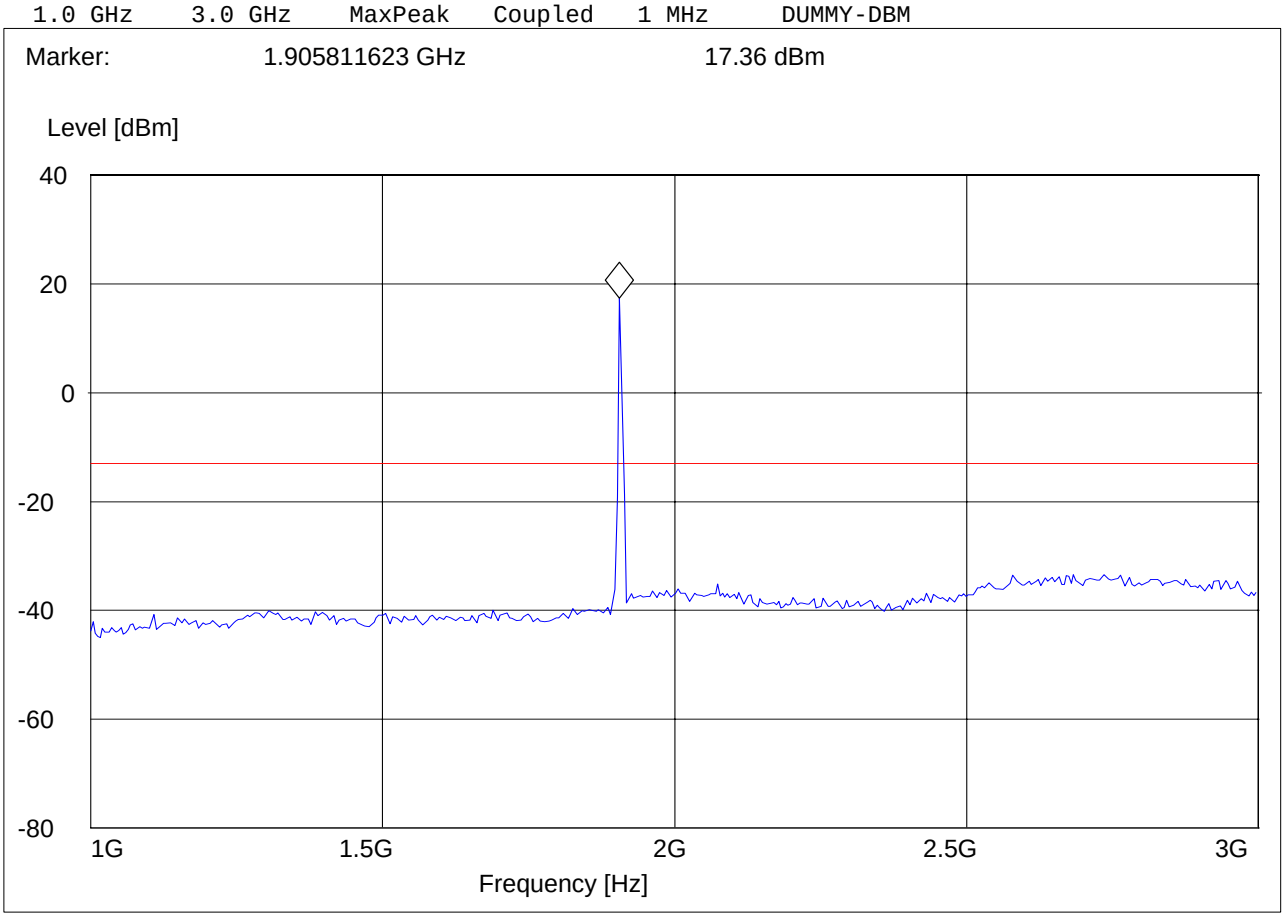


RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9538: 1GHz – 3GHz

```
EUT:             A1303
Customer::       Apple
Test Mode:       FDD II
ANT Orientation: V
EUT Orientation: V
Test Engineer:   Chris
Voltage:         FCC AC Adapter
Comments:
```

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

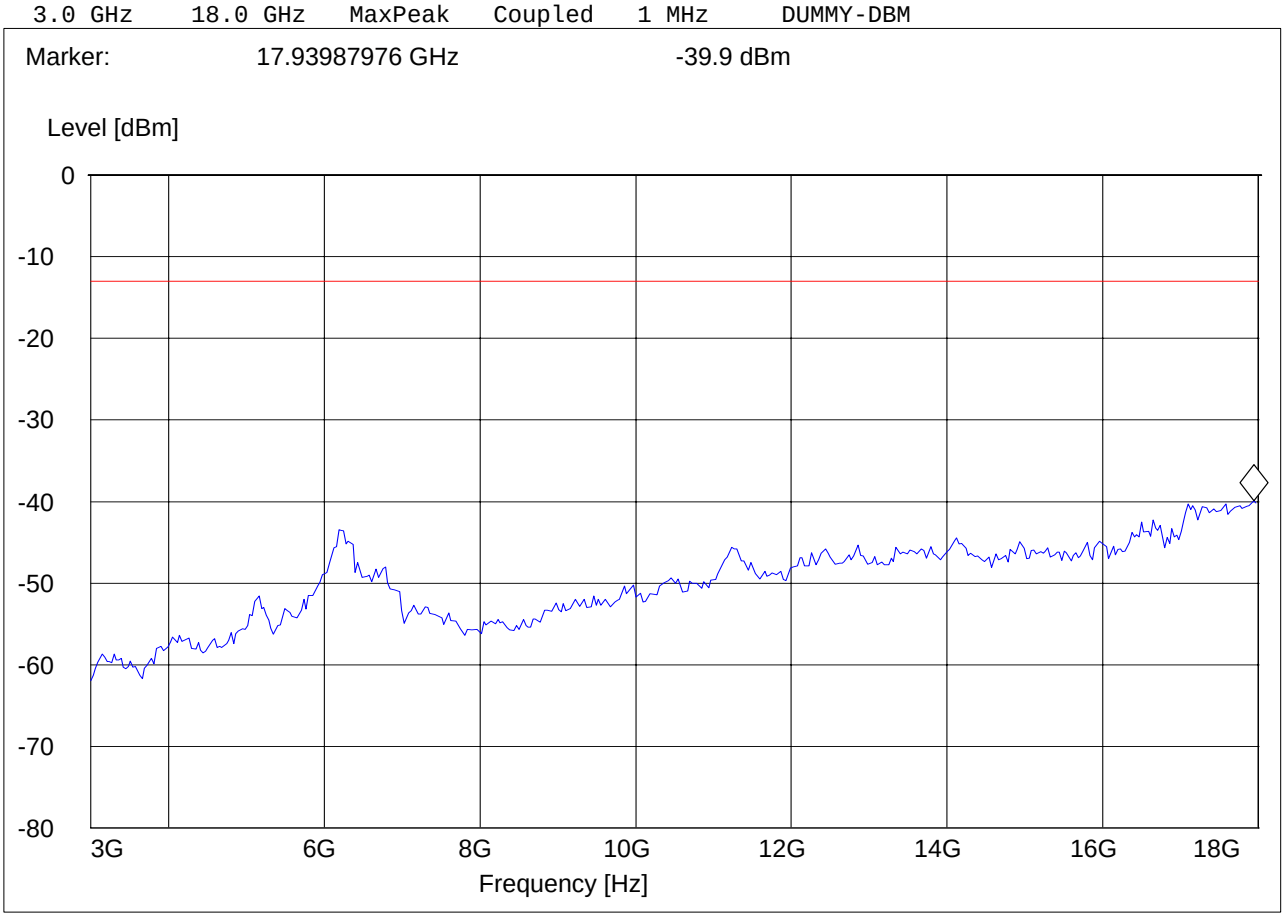


RADIATED SPURIOUS EMISSIONS(UMTS FDD2) Tx CHANNEL 9538: 3GHz – 18GHz

```
EUT:              A1303
Customer::        Apple
Test Mode:        FDD II
ANT Orientation:  V
EUT Orientation:  V
Test Engineer:    Chris
Voltage:          FCC AC Adapter
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



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

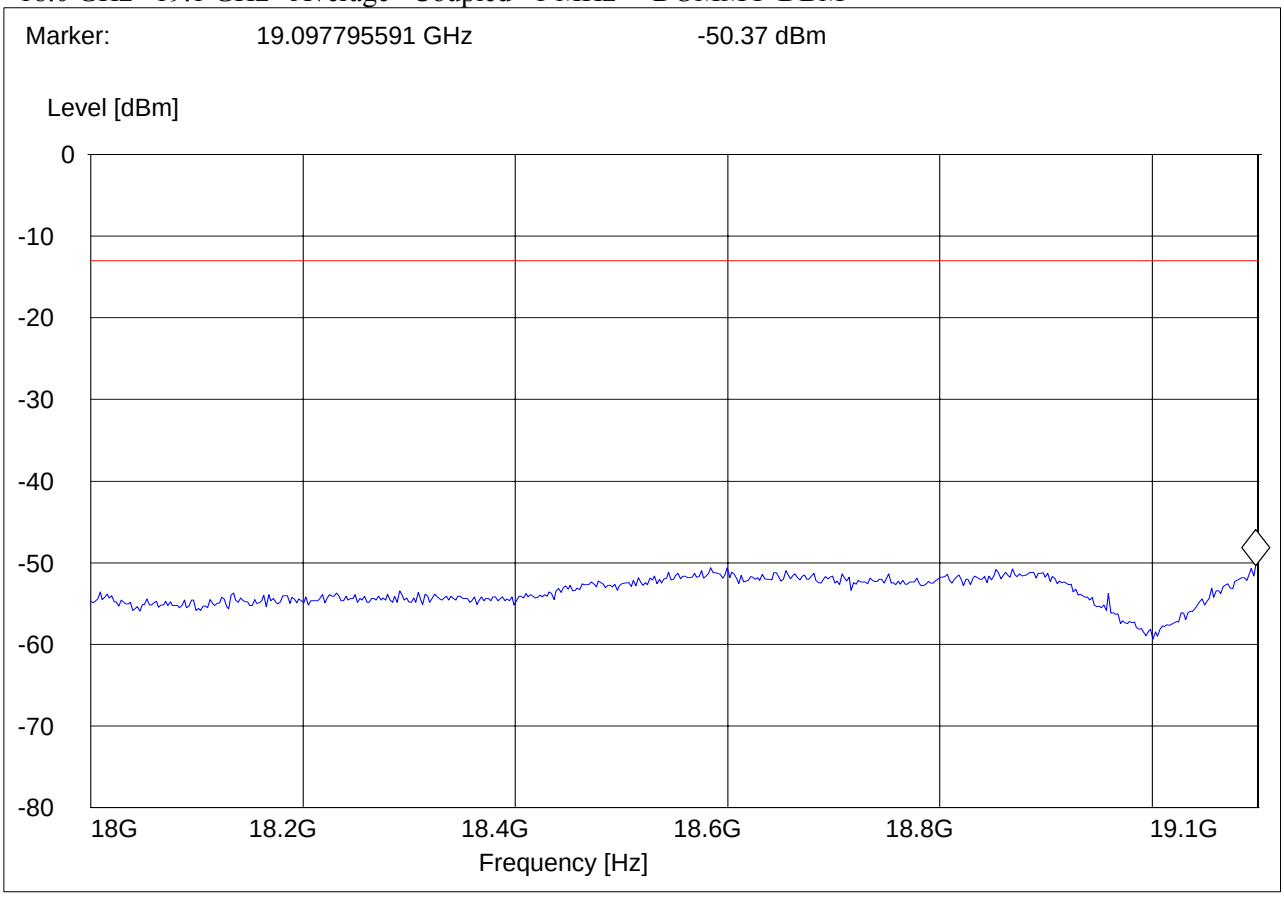
Note:

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

EUT: A1303
Customer:: Apple
Test Mode: FDD II
ANT Orientation: H
EUT Orientation: V
Test Engineer: Chris
Voltage: FCC AC Adapter
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



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.

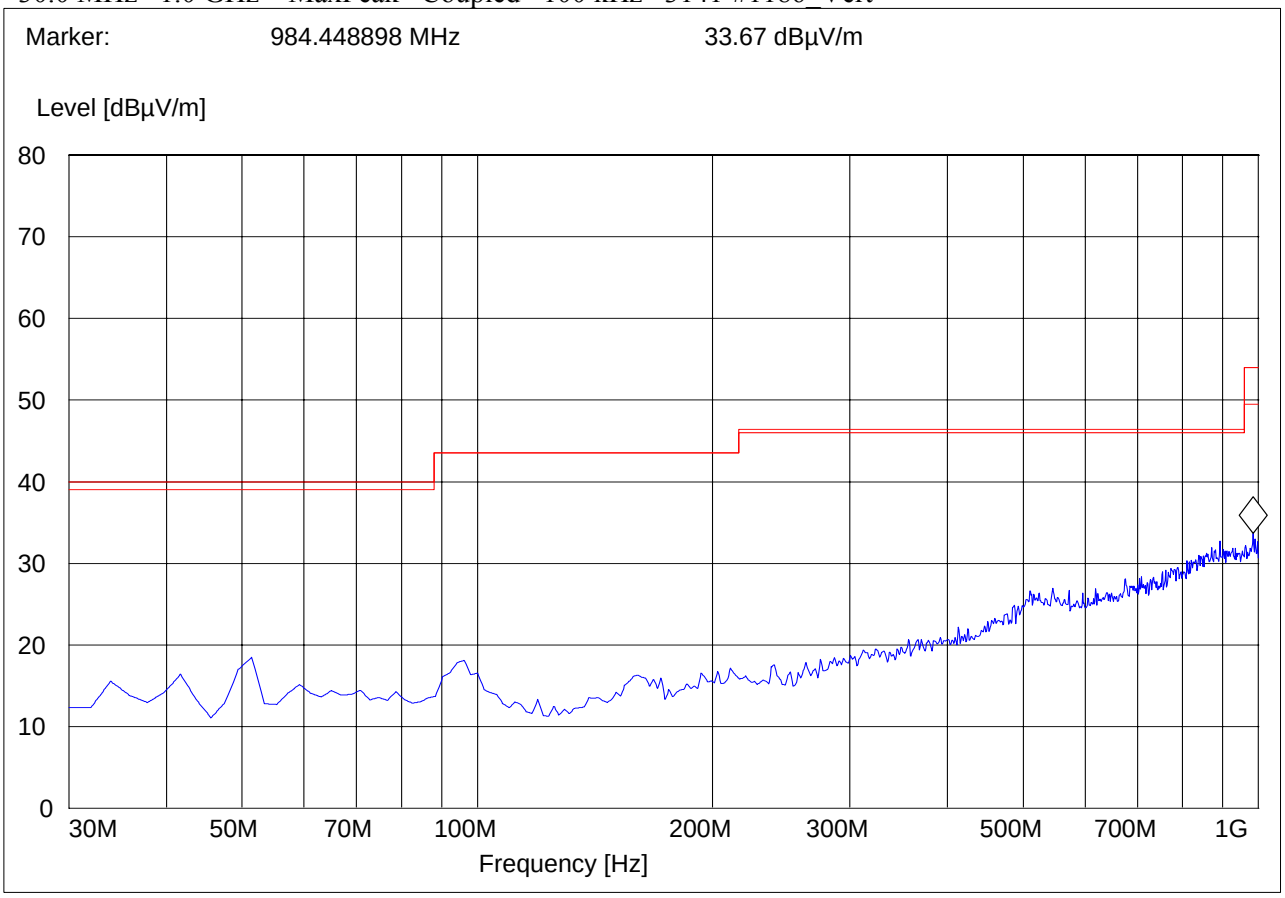
5.5.5.1 Test Results Receiver Spurious Emission GSM850

30M-1GHz, Antenna Vertical
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD II RX
ANT Orientation: V
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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

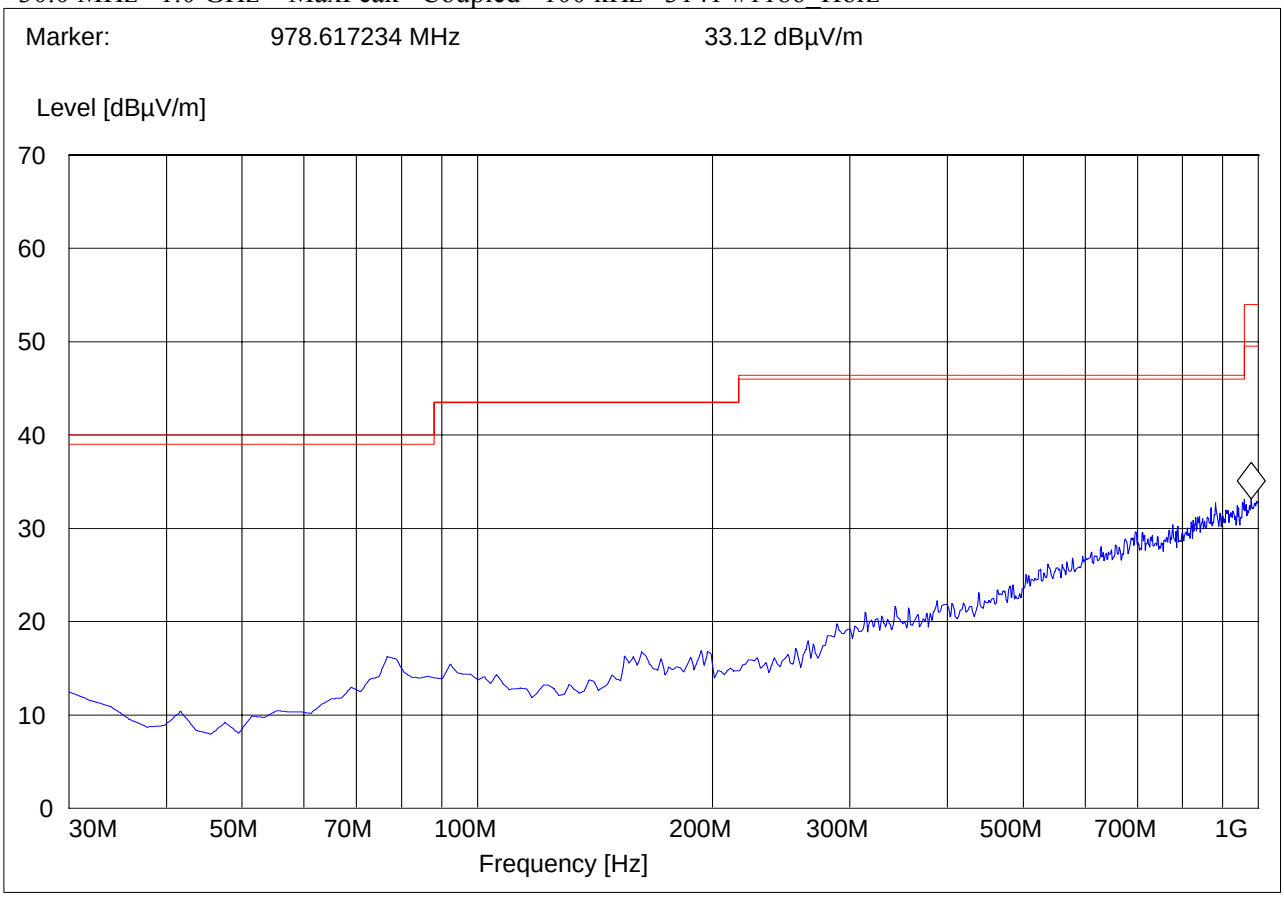


Receiver Spurious Emission GSM850 30M-1GHz, Antenna Horizontal
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD II RX
ANT Orientation: H
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

SWEEP TABLE: "CANDA RE_30M-1G_Hor"

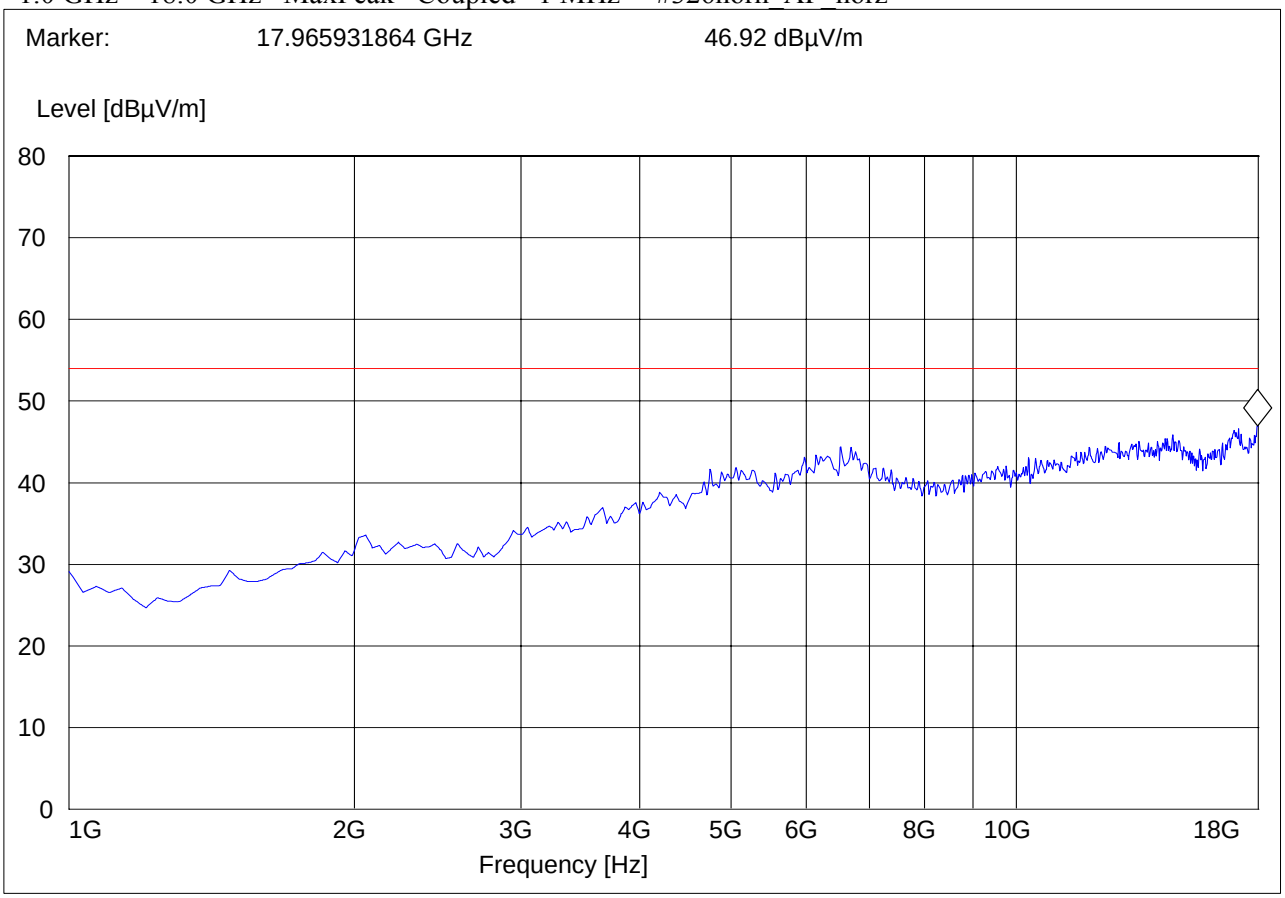
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186_Horz



Receiver Spurious Emission GSM850 1-18GHz

This plot is valid for low, mid & high channels (worst-case plot)
EUT / Description: A1303
Customer: Apple
Operation Mode: GSM 850 Rx
ANT Orientation: : H
EUT Orientation:: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments::
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



5.5.5.2 Test Results Receiver Spurious Emission UMTS FDD5

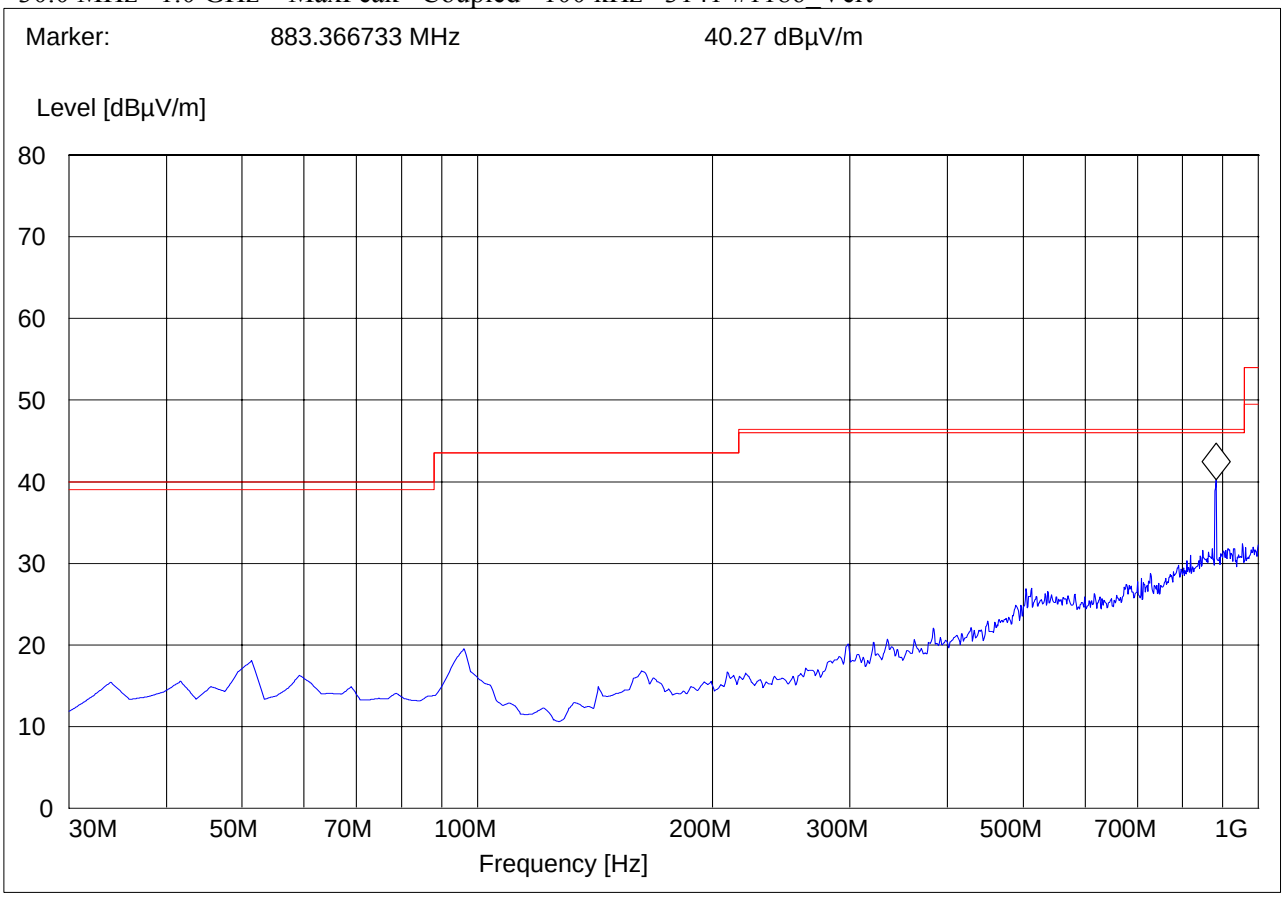
30M-1GHz, Antenna Vertical

This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD V RX
ANT Orientation: V
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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

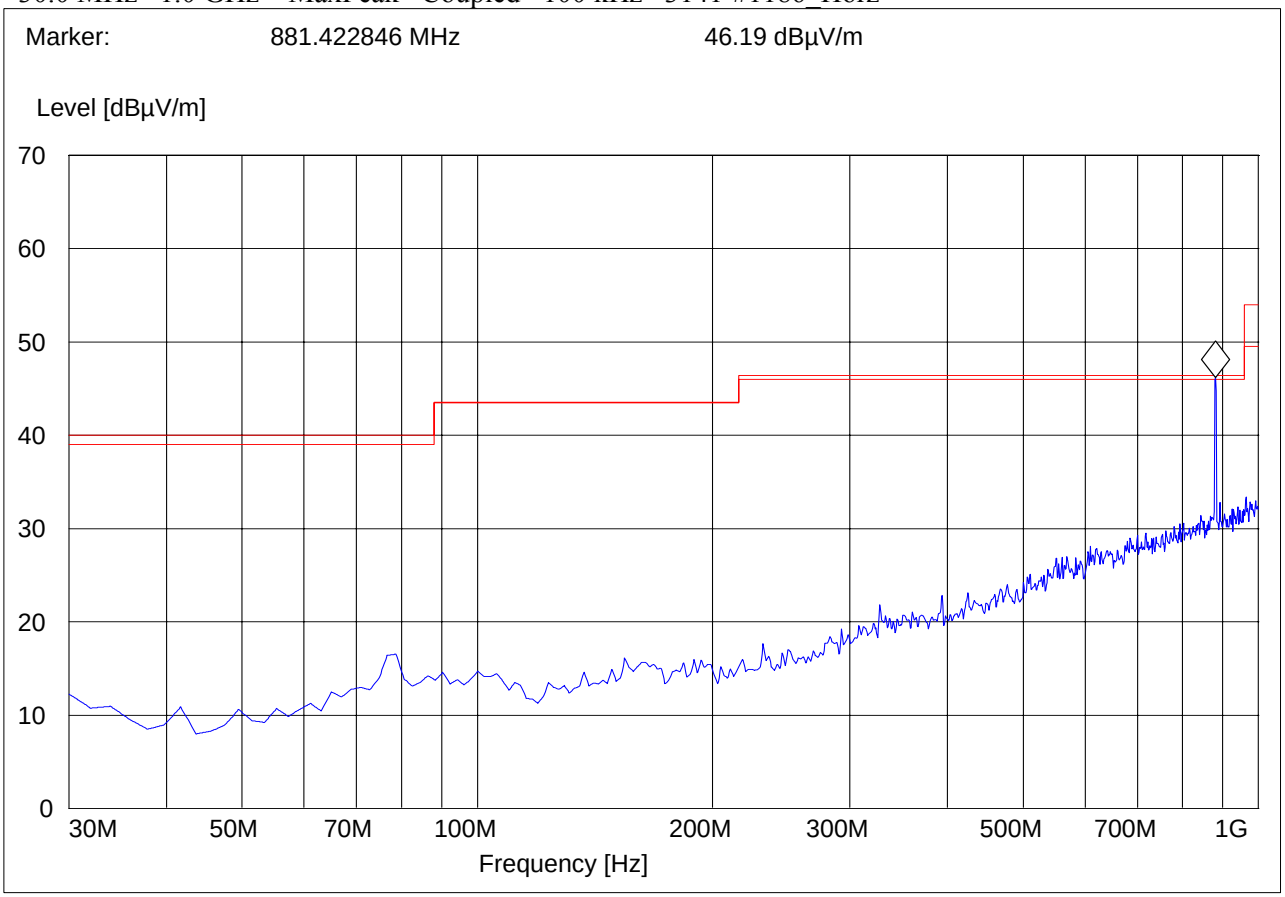


Receiver Spurious Emission UMTS FDD5 30M-1GHz, Antenna Horizontal
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD V RX
ANT Orientation: H
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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



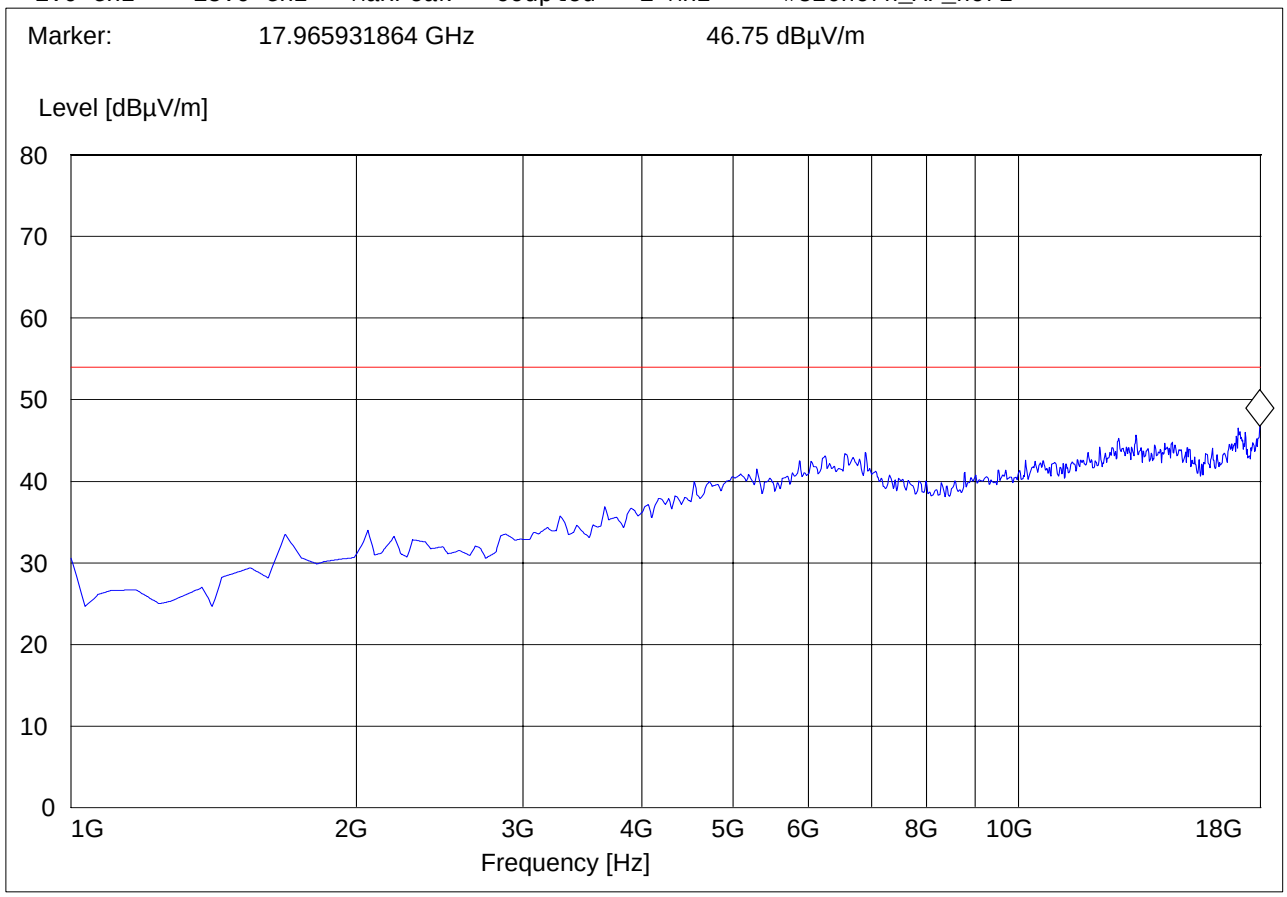
Receiver Spurious Emission UMTS FDD5 1-18GHz
This plot is valid for low, mid & high channels (worst-case plot
CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

```
EUT / Description: A1303
Customer:          Apple
Operation Mode:    FDD V Rx
ANT Orientation: : H
EUT Orientation::  V
Test Engineer:     Chris
Voltage:           FCC AC Adapter
Comments::
```

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



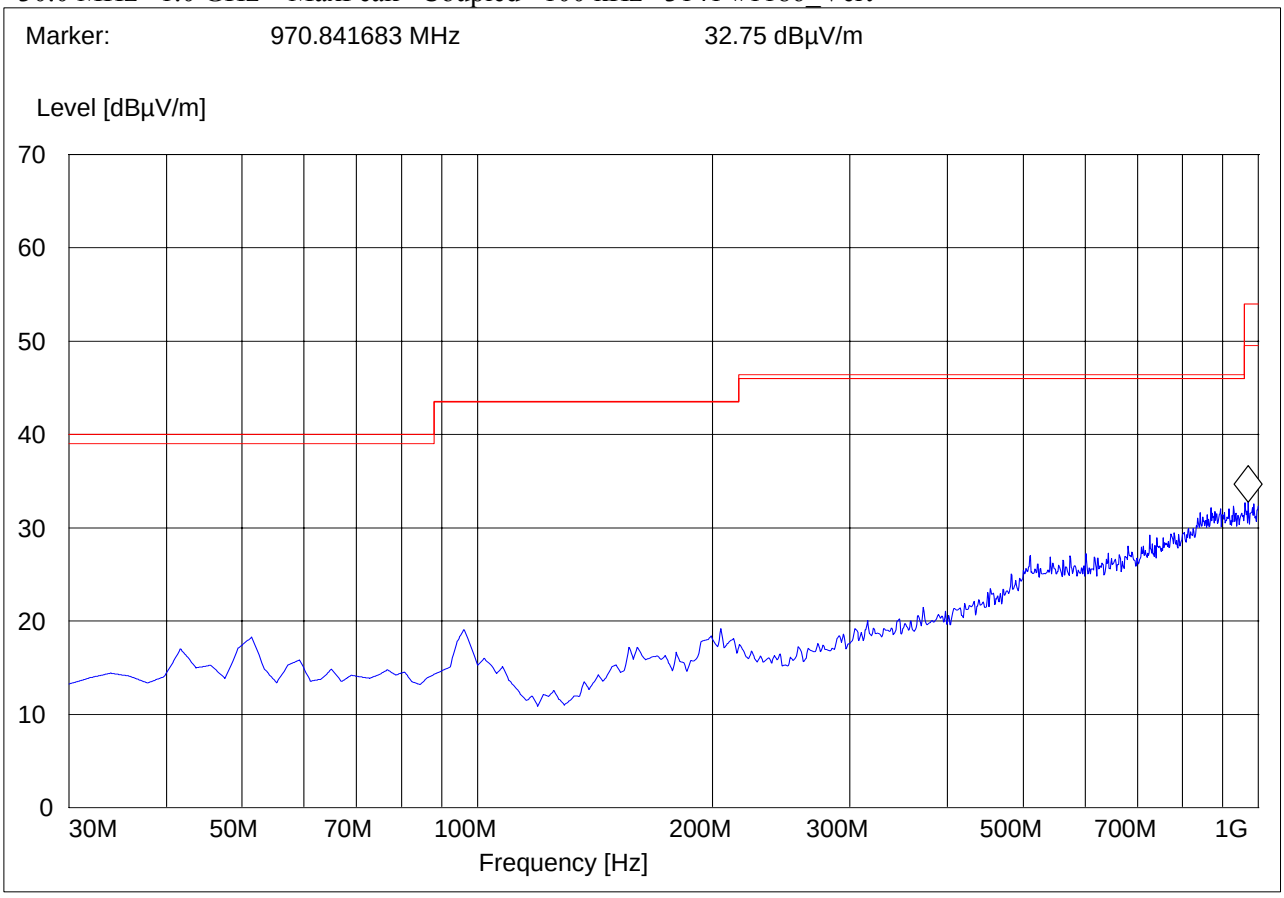
5.5.5.3 Test Results Receiver Spurious Emission GSM1900

30M-1GHz, Antenna Vertical
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: GSM 1900 RX
ANT Orientation: V
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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

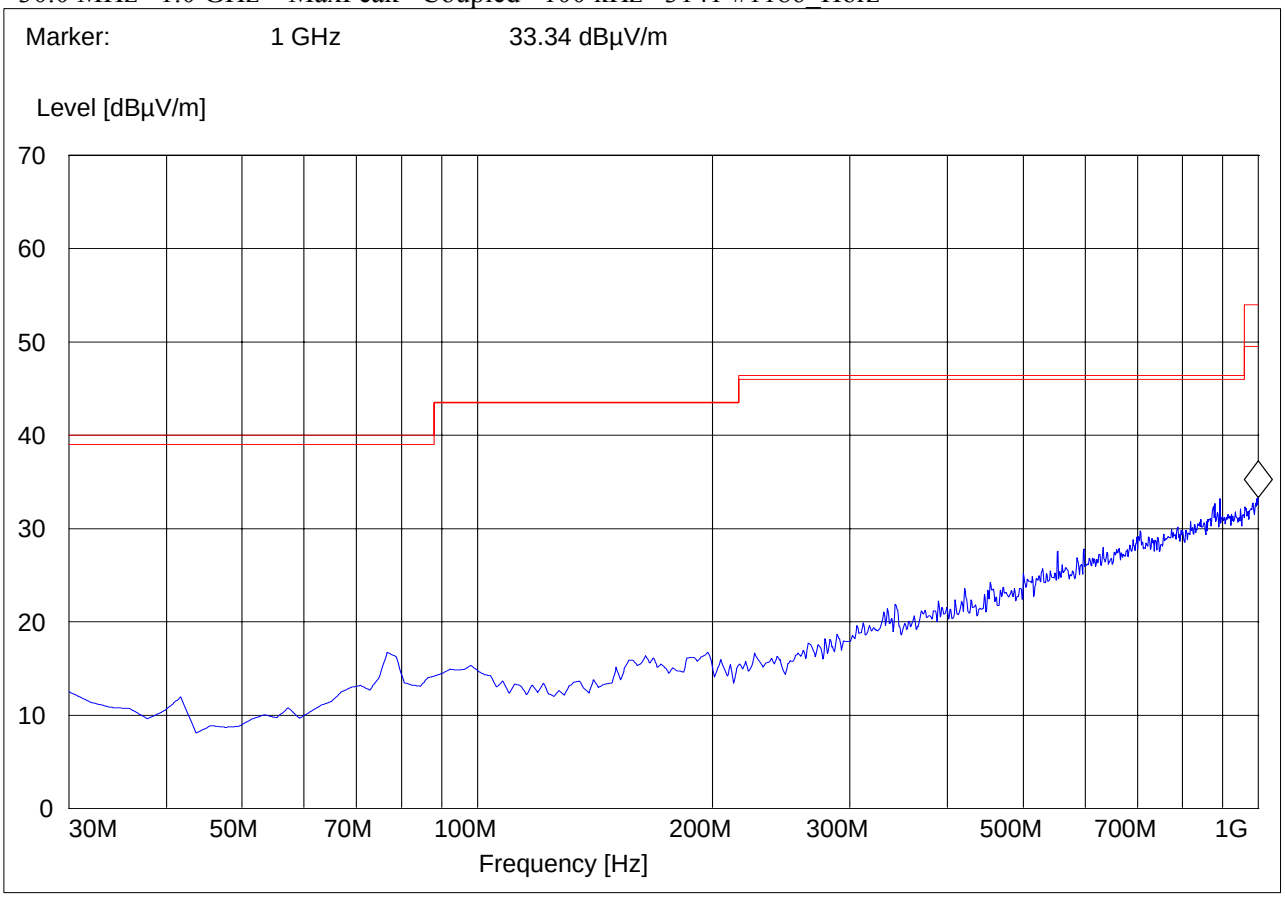


Receiver Spurious Emission GSM1900 30M-1GHz, Antenna Horizontal
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: GSM 1900 RX
ANT Orientation: H
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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

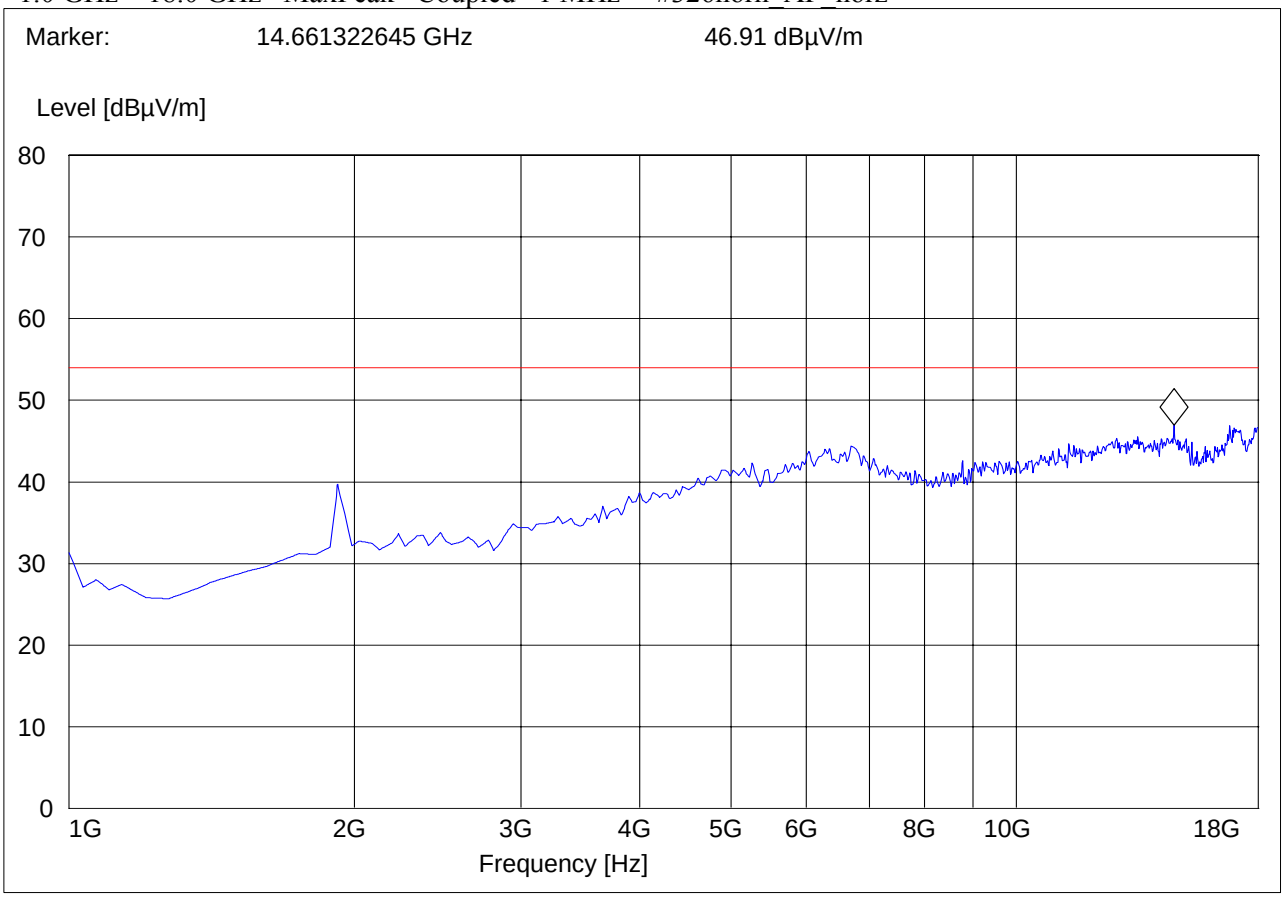


Receiver Spurious Emission GSM1900 1-18GHz

This plot is valid for low, mid & high channels (worst-case plot)

EUT / Description: A1303
Customer: Apple
Operation Mode: GSM 1900 Rx
ANT Orientation: : H
EUT Orientation:: V
Test Engineer: Chris
Voltage: FCC AC Adapter
Comments::
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



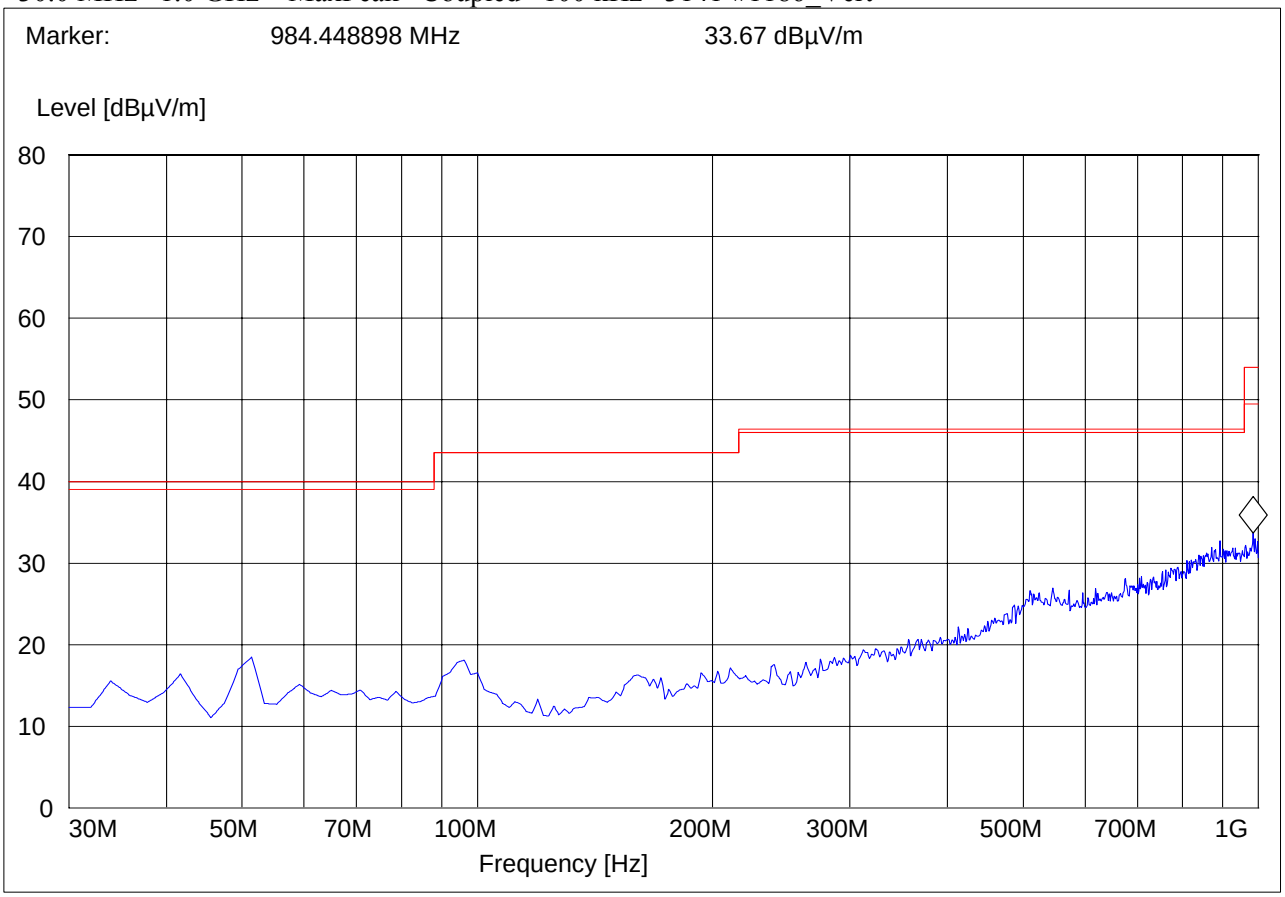
5.5.5.4 Test Results Receiver Spurious Emission UMTS FDD2

30M-1GHz, Antenna Vertical
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD II RX
ANT Orientation: V
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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

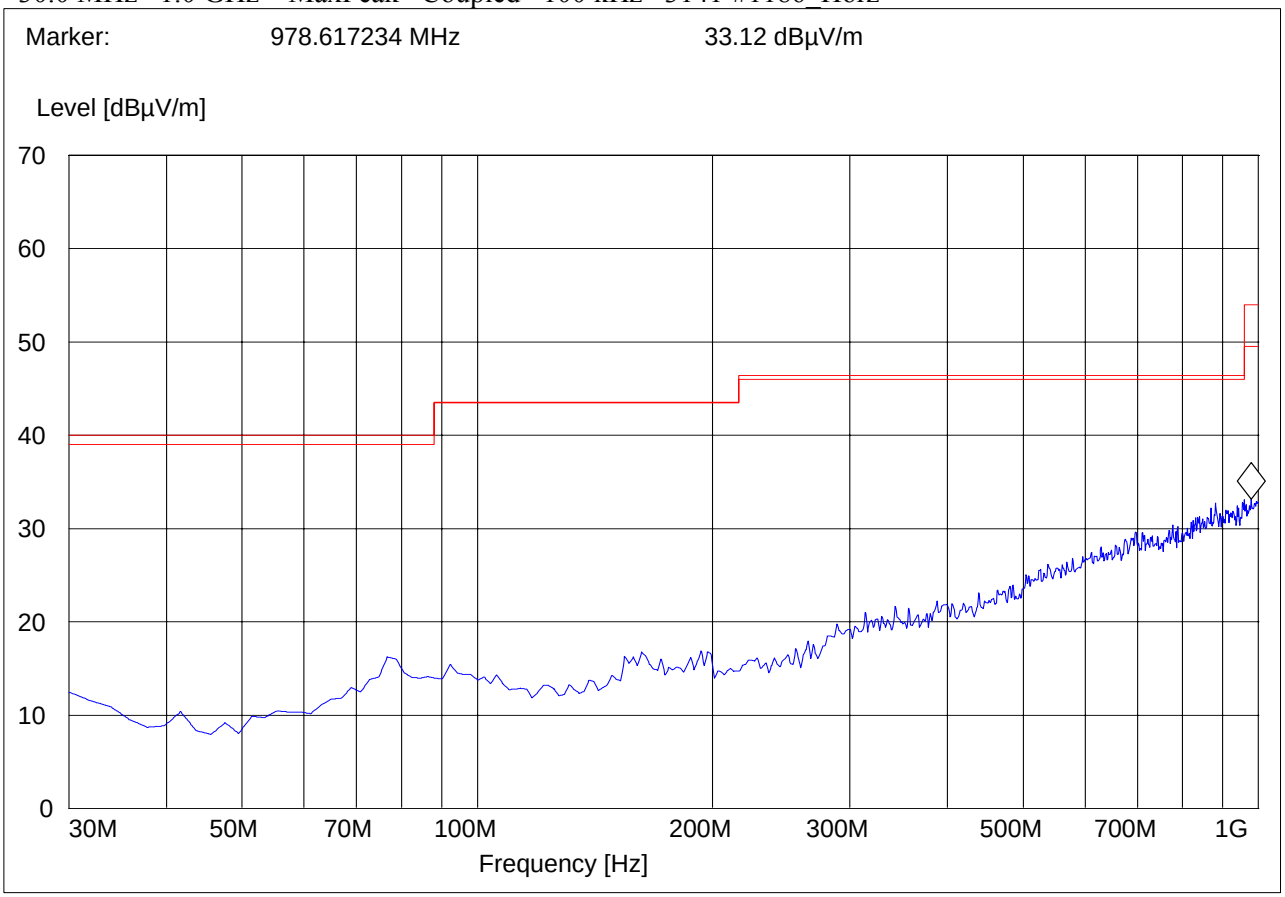


Receiver Spurious Emission UMTS FDD2 30M-1GHz, Antenna Horizontal
This plot is valid for low, mid & high channels (worst-case plot)

EUT: A1303
Customer:: Apple
Test Mode: FDD II RX
ANT Orientation: H
EUT Orientation: V
Test Engineer: SAM
Voltage: AC
Comments: FCC Adapter

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



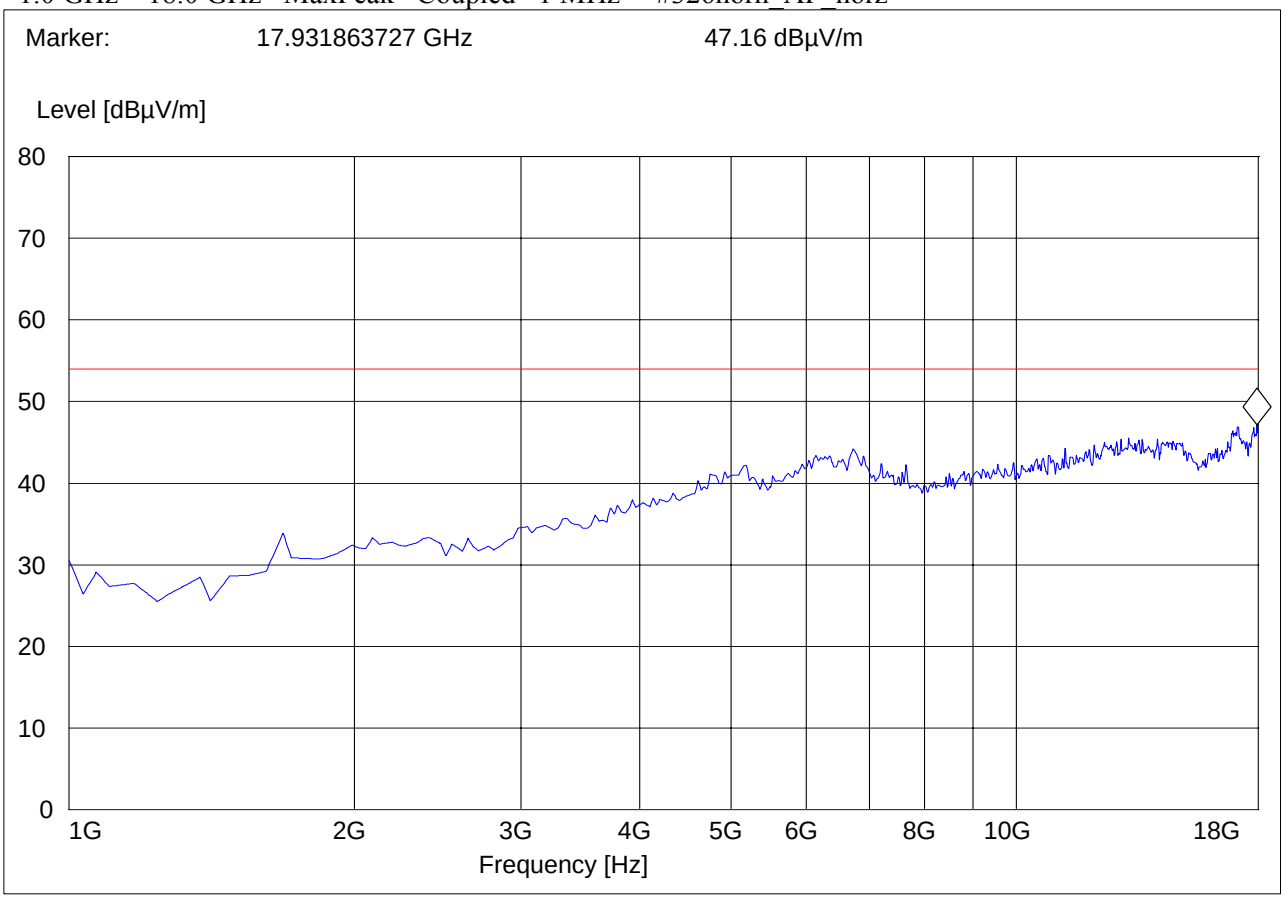
Receiver Spurious Emission UMTS FDD2: 1-18GHz
CETECOM Inc.

411 Dixon Landing Road; Milpitas, CA 95035

EUT / Description: A1303
Customer: Apple
Operation Mode: FDD V Rx
ANT Orientation: : H
EUT Orientation:: V
Test Engineer: Chris
Voltage: FCC AC Adapter

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



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 µH/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.

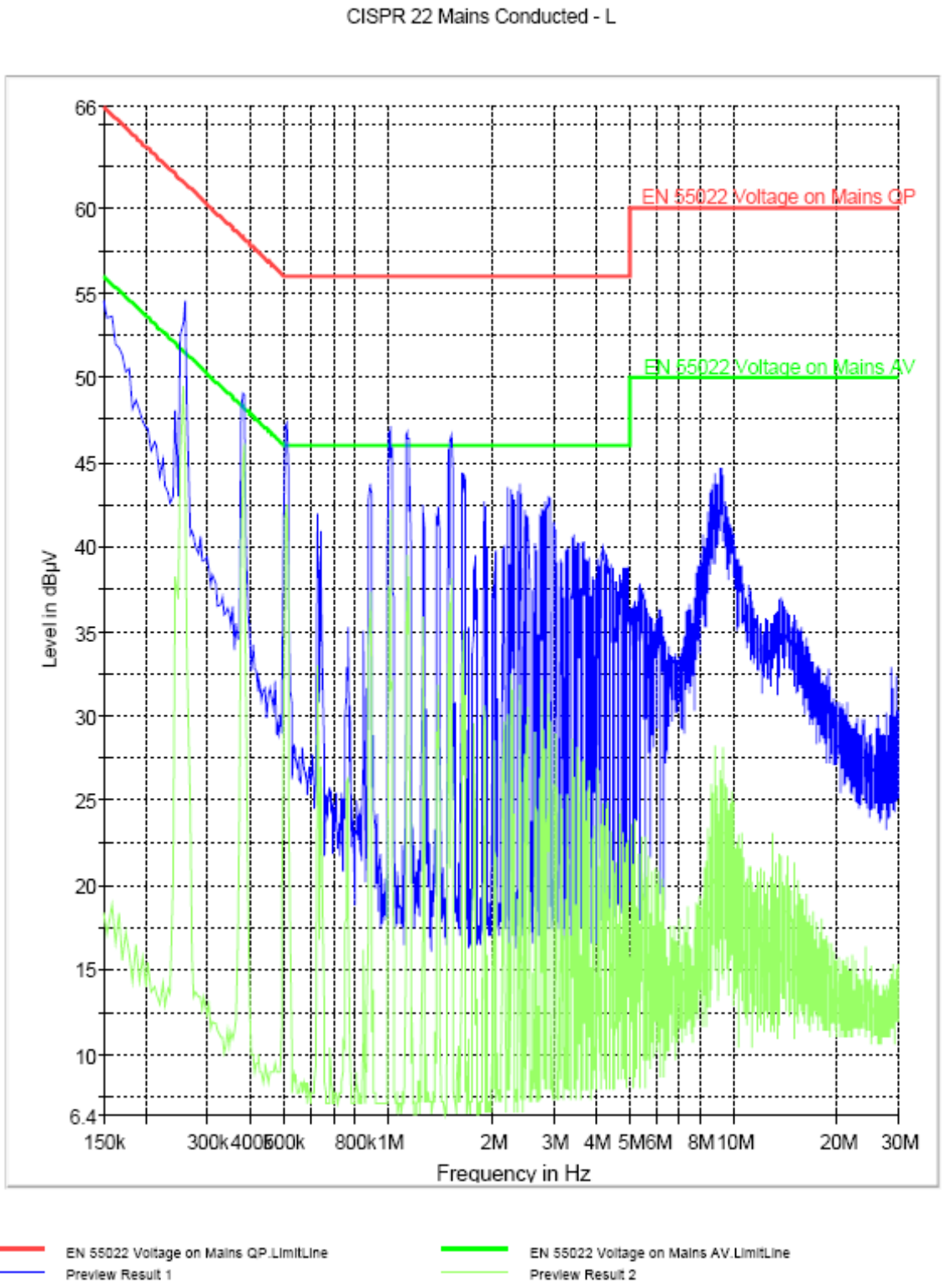
Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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

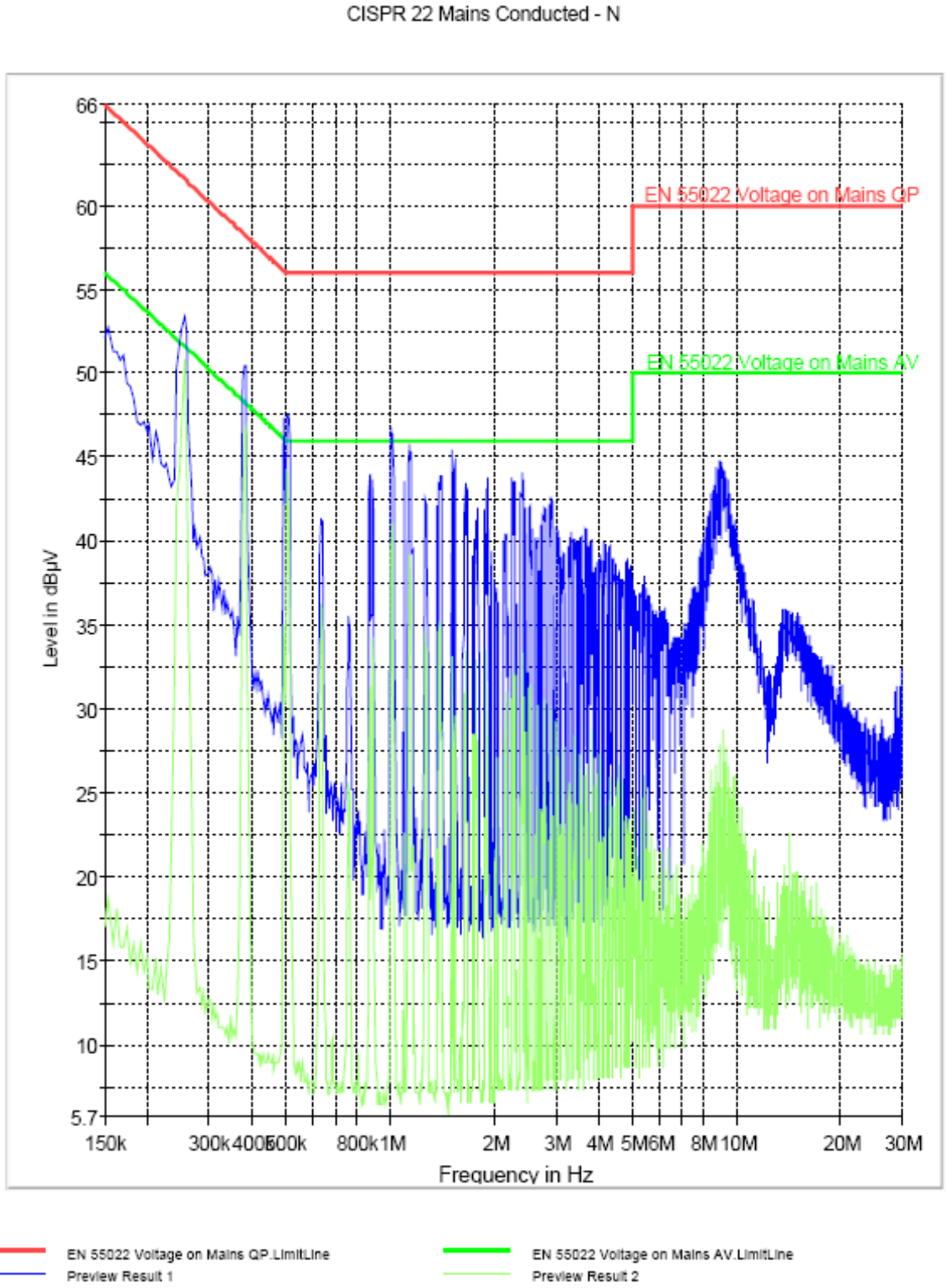
LINE 850 TX

Line



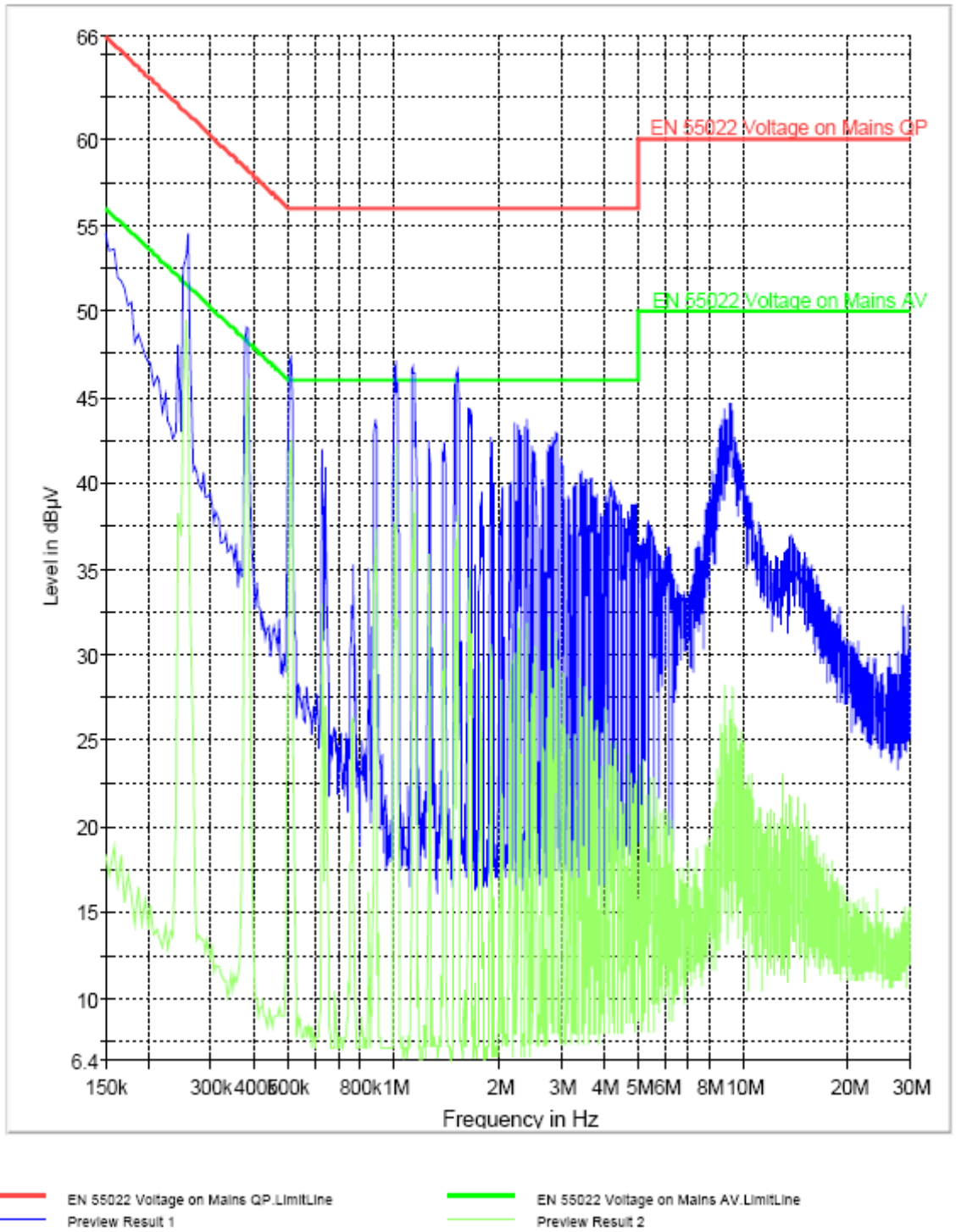
NEUTRAL 850 TX

Neutral



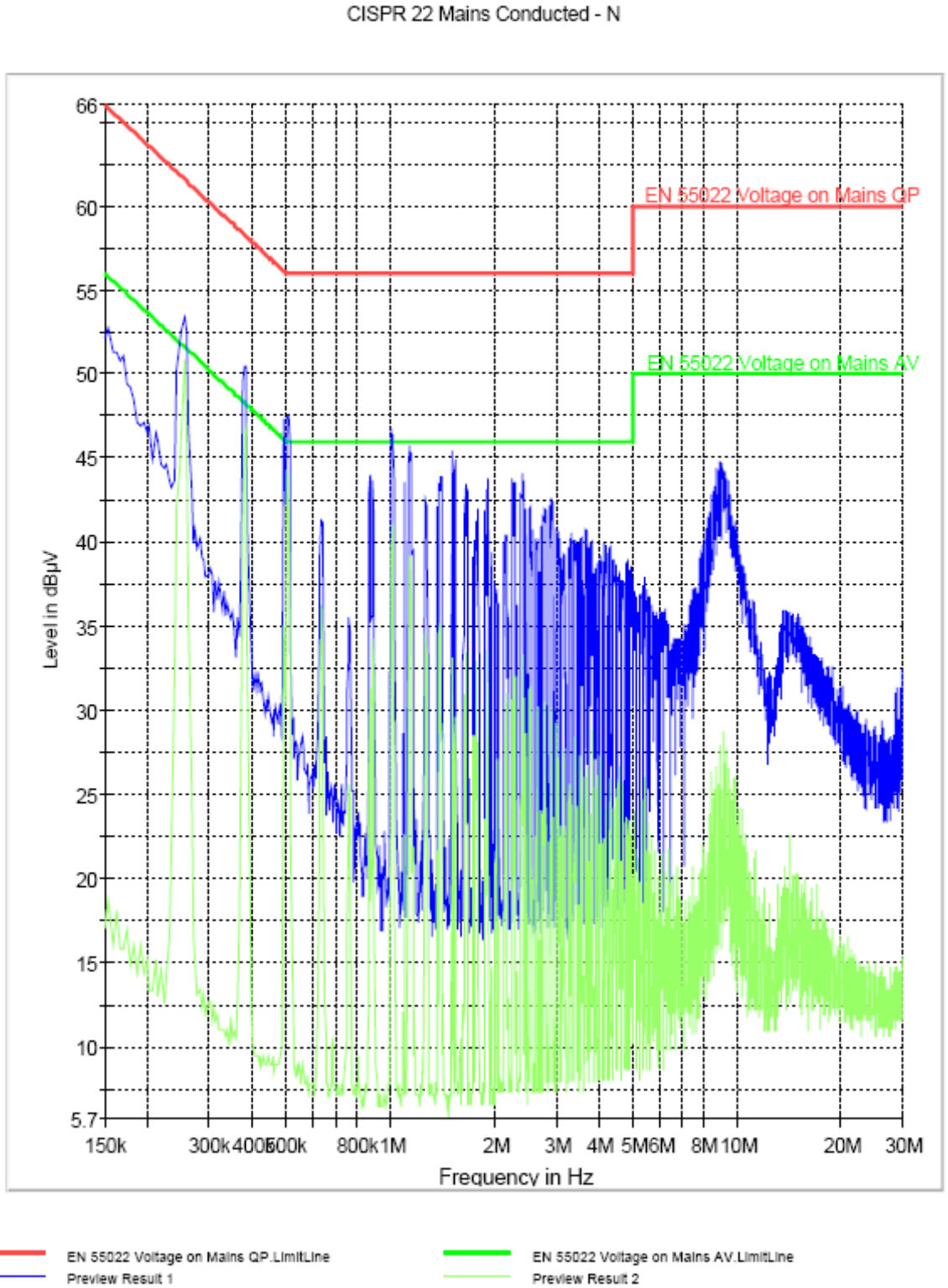
LINE WCDMA FDDV TX

Line



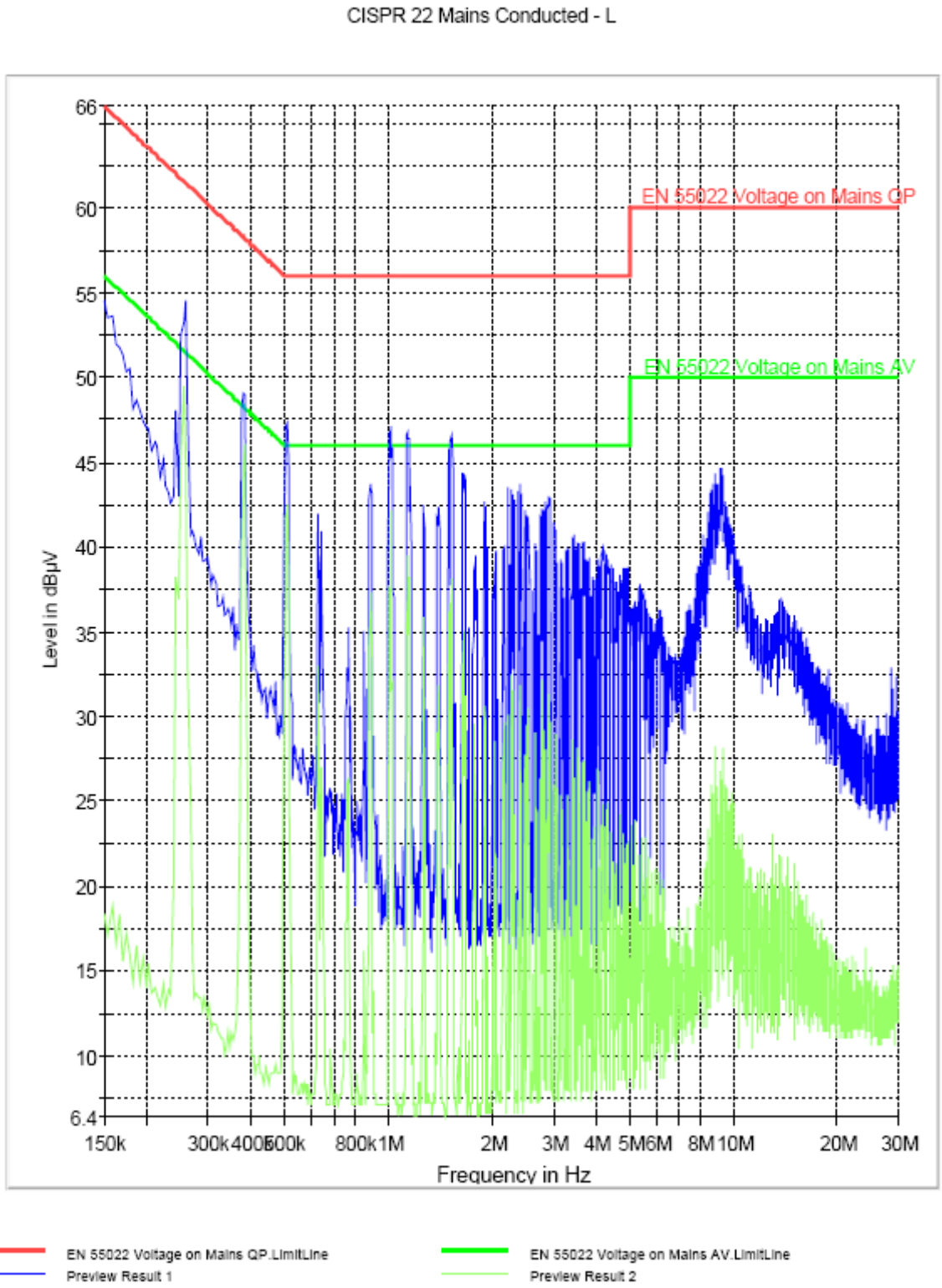
NEUTRAL WCDMA FDD V

Neutral



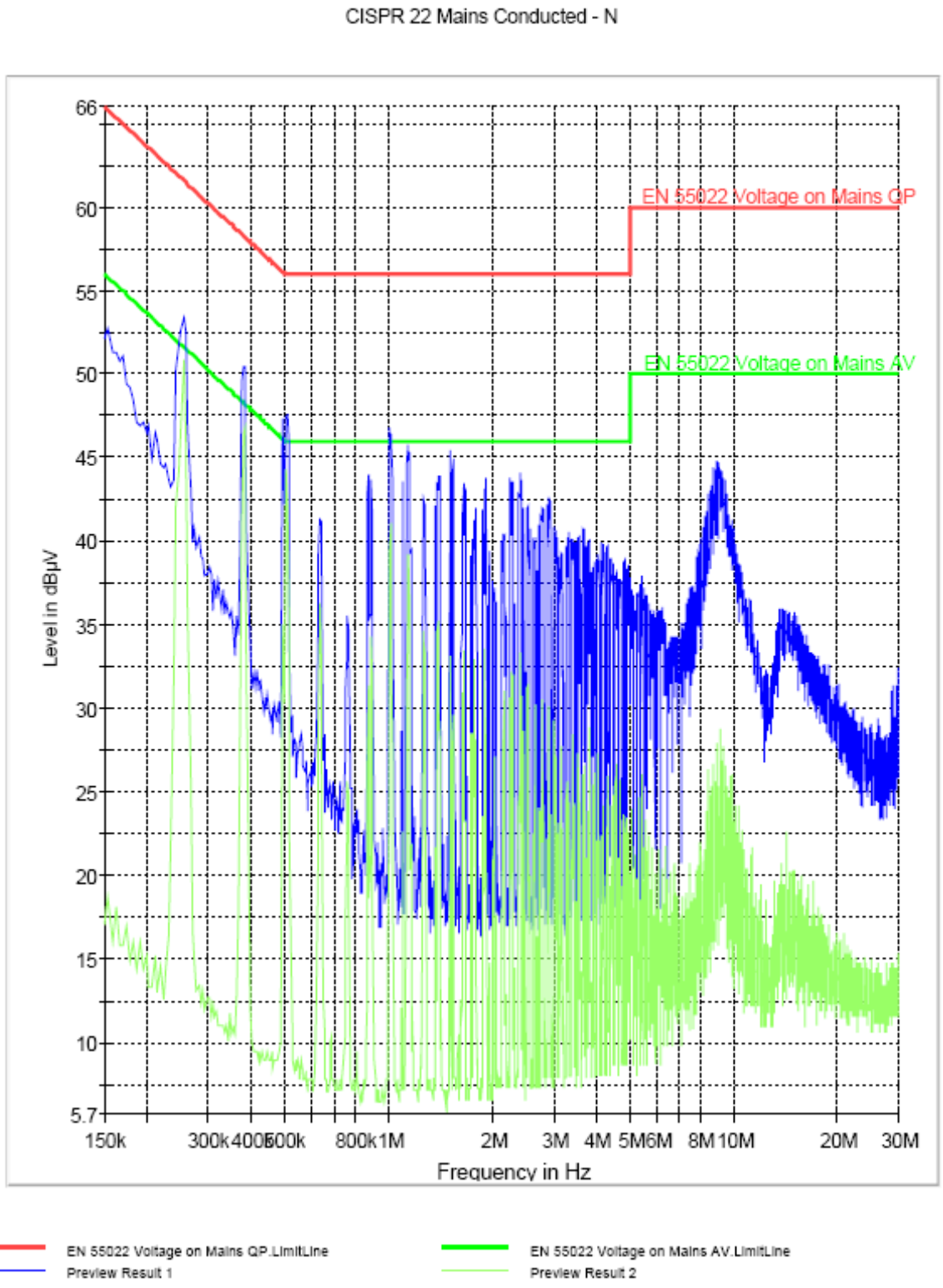
LINE GSM 1900 TX

Line



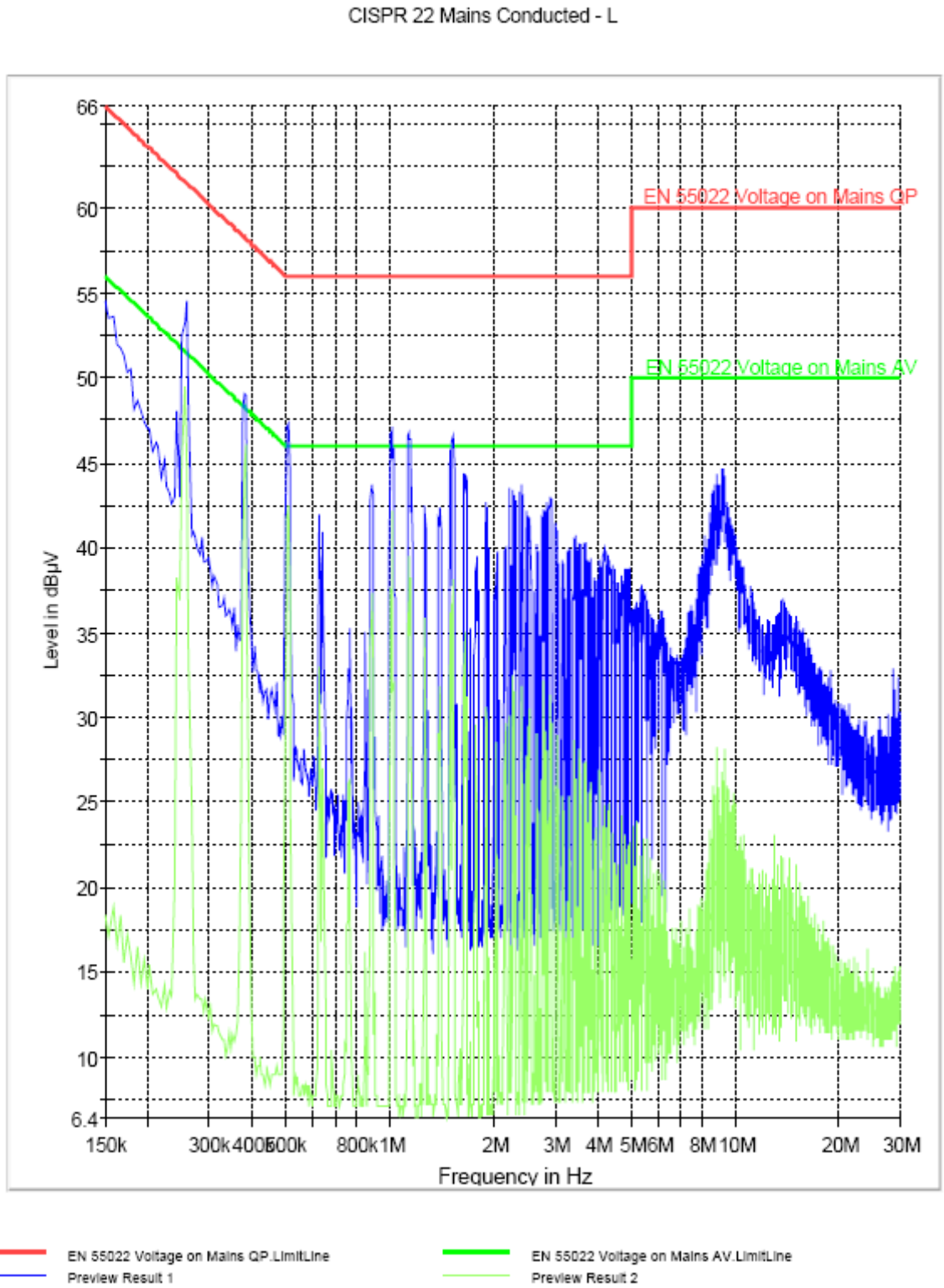
NEUTRAL GSM 1900 TX

Neutral



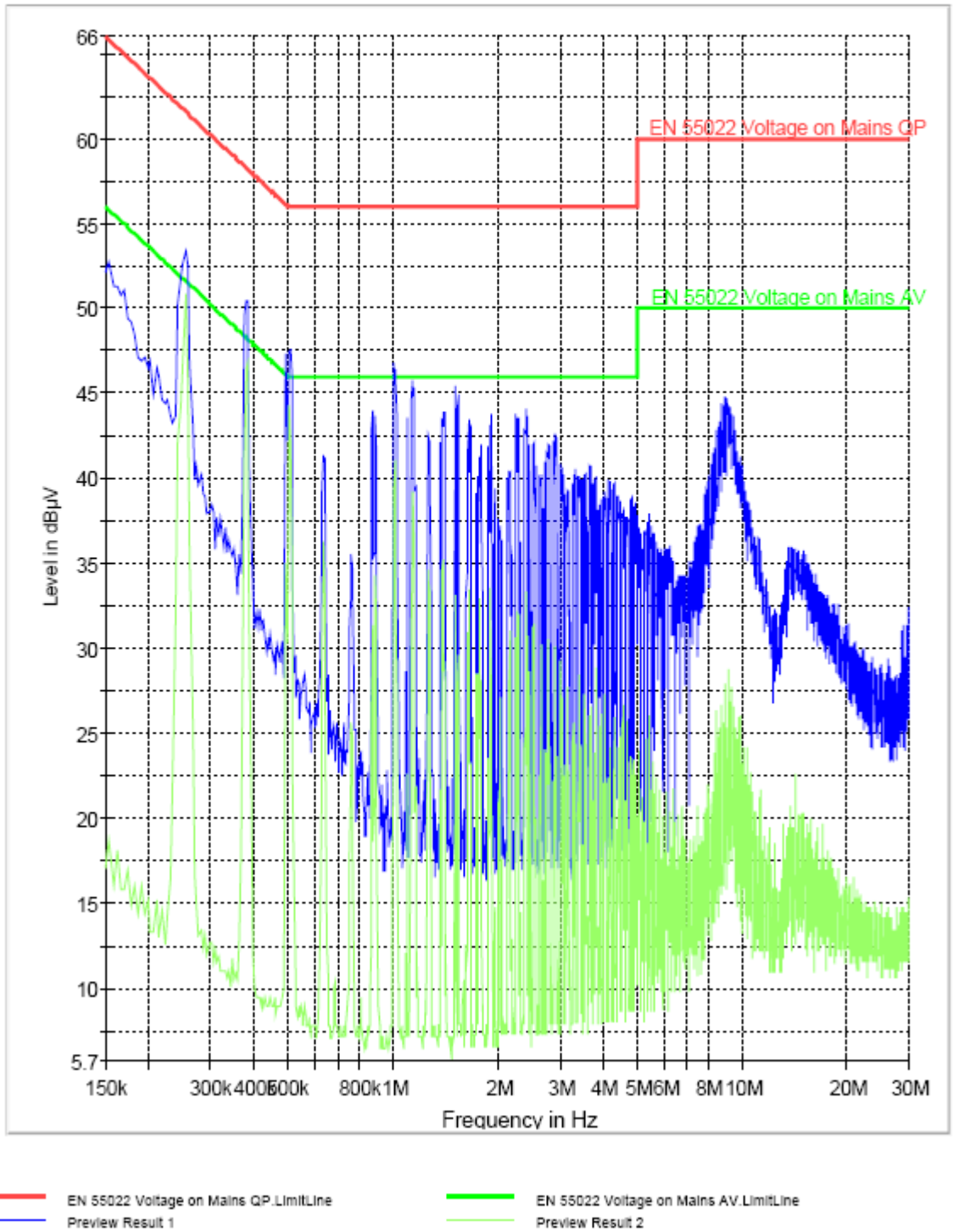
LINE FDD II RX

Line



NEUTRAL FDD II RX

Neutral



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	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 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.

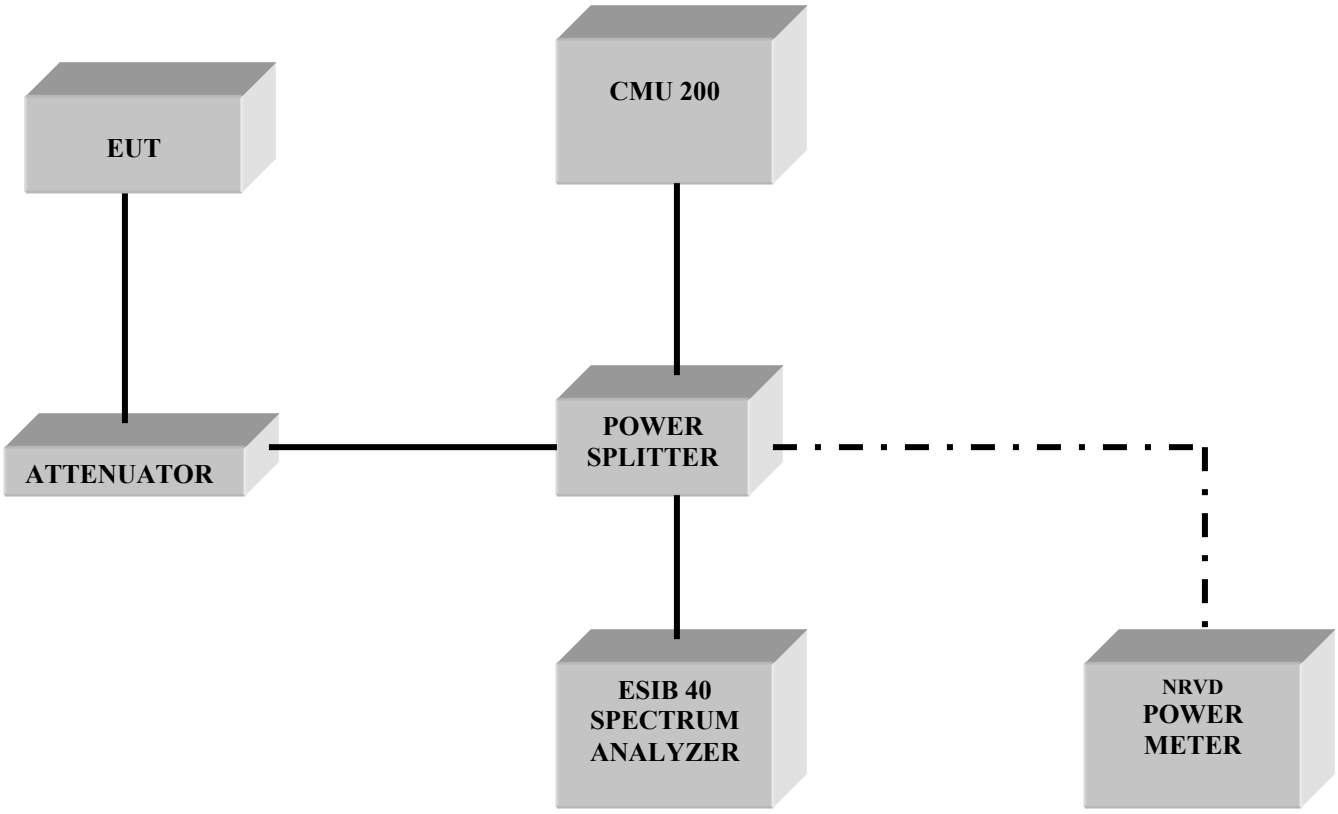
FCC Report and order 02-229 September 24, 2002.

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