



FCC Test Report

Test report no.: EMC_635FCC22-24_2004

FCC Part 22, 24 / RSS 132, 133

Model: FAF-1031011-BV

FCC ID: PY7FF031011

IC ID: 4170B-FF031011



Accredited according to ISO/IEC 17025



FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

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1	General information
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The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. does not assume responsibility for any conclusions and generalisations 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.

TEST REPORT PREPARED BY:**EMC Engineer: Harpreet Sidhu****1.2 Testing laboratory**

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1.3 Details of applicant

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Street : Maplewood, Chineham Business Park
City / Zip Code : Basingstoke, Hampshire RG24 8YB
Country : United Kingdom
Contact : Michael Bower
Telephone : +44 7808 944467
Tele-fax : +44 1252 551697
e-mail : michael.bower@sonyericsson.com

1.4 Application details

Date of receipt test item : 2004-03-08
Date of test : 2004-03-08/17/22, 2004-04-05

1.5 Test item

Manufacturer : Applicant
Marketing Name : GC83
Model No. : FAF-1031011-BV
Description : PC – Card Radio module for GSM 850/1800/1900 MHz
FCC-ID : PY7FF031011
IC-ID : 4170B-FF031011

Additional information

Frequency : 824.2MHz – 848.8MHz for GSM 850,
1850.2MHz – 1909.8MHz for PCS 1900
Type of modulation : GMSK and 8-PSK
Number of channels : 124 for GSM-850, 299 for PCS-1900
Antenna : Detachable external Stub Antenna with hinge, 360°, 50Ω
(unique connector)
Power supply : Powered by the Laptop PC battery via PCMCIA connector
Output power : 27.90dBm (616.6mW) max. ERP for GSM 850
29.06dBm (805.37mW) max. EIRP for PCS 1900
Extreme vol. Limits : Low Voltage: 3.0V / High Voltage = Normal Voltage: 3.6V
Extreme temp. Tolerance : Low Temperature: -30°C / High Temperature: +55 °

1.6 Test standards

FCC Part 22,24 / RSS 132, 133

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2 Technical test**2.1 Summary of test results**

No deviations from the technical specification(s) were ascertained in the course of the tests
Performed

Final Verdict:
(only “passed” if all single measurements are “passed”)

Passed

Technical responsibility for area of testing:

2004-04-29 EMC & Radio Lothar Schmidt (Manager)



Date

Section

Name

Signature

Responsible for test report and project leader:

2004-04-29 EMC & Radio Harpreet Sidhu (EMC Engineer)



Date

Section

Name

Signature

2.2 Test report

TEST REPORT

Test report no.: EMC_635FCC22-24_2004

TEST REPORT REFERENCE

PARAMETER TO BE MEASURED	PARAGRAPH	PAGE
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POWER OUTPUT**§ 22.913(a) / § 24.232 (b)****Summary:**

During the process of testing, the EUT was controlled via Rhode & Schwarz Universal Radio Communication tester (CMU 200) to ensure max. power transmission and proper modulation.

This paragraph contains conducted output power, EIRP & ERP measurements for the EUT.
In all cases, the peak output power is within the specified limits.

Method of Measurements:

The EUT was set up for the max. Output power with pseudo random data modulation.

The power was measured with R&S Spectrum Analyzer ESIB 40 (peak)

These measurements were done at 3 frequencies,

824.2 MHz, 836.6 MHz and 848.8 MHz (bottom, middle and top of operational frequency range) for GSM-850

1850.2 MHz, 1880.0 MHz and 1909.8 MHz (bottom, middle and top of operational frequency range) for PCS-1900

Conducted (GSM-850)**Limits:**

Power Control Level	Nominal Peak Output Power	Tolerance (dB)
5	$\leq 33\text{dBm (2W)}^*$	± 2

*GSM Specification – ETSI EN 300 910 V8.5.0 (2000-07) Section 4.1 {GSM05.05 Version 8.5.0 Release 1999}

Power Measurements:

Frequency (MHz)	Average Power during burst (dBm)
824.2	31.72
836.6	32.03
848.8	32.32

Conducted (PCS-1900)**Limits:**

Power Control Level	Nominal Peak Output Power	Tolerance (dB)
0	$\leq 30\text{dBm (1W)}^*$	± 2

*GSM Specification – ETSI EN 300 910 V8.5.0 (2000-07) Section 4.1 {GSM05.05 Version 8.5.0 Release 1999}

Power Measurements:

Frequency (MHz)	Average Power during burst (dBm)
1850.2	29.12
1880	29.08
1909.8	29.05

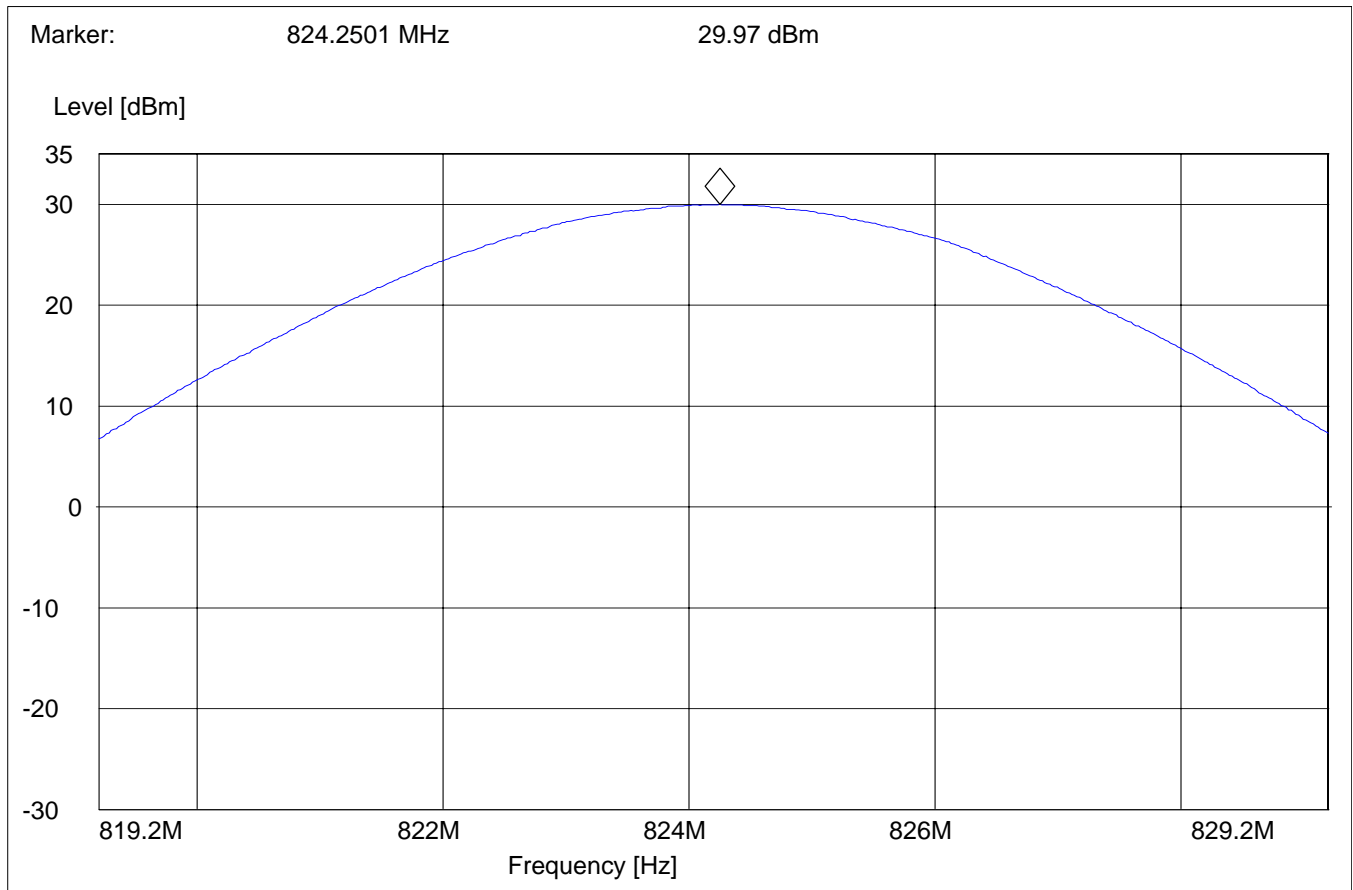
ERP (GSM-850)**§22.913(a)****Limits:**

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

EIRP

Frequency (MHz)	Power Control Level	Burst Peak (dBm)	
		EIRP	ERP
824.2	5	29.97	27.83
836.6	5	30.04	27.90
848.8	5	29.48	27.34
Measurement uncertainty	±0.5 dB		

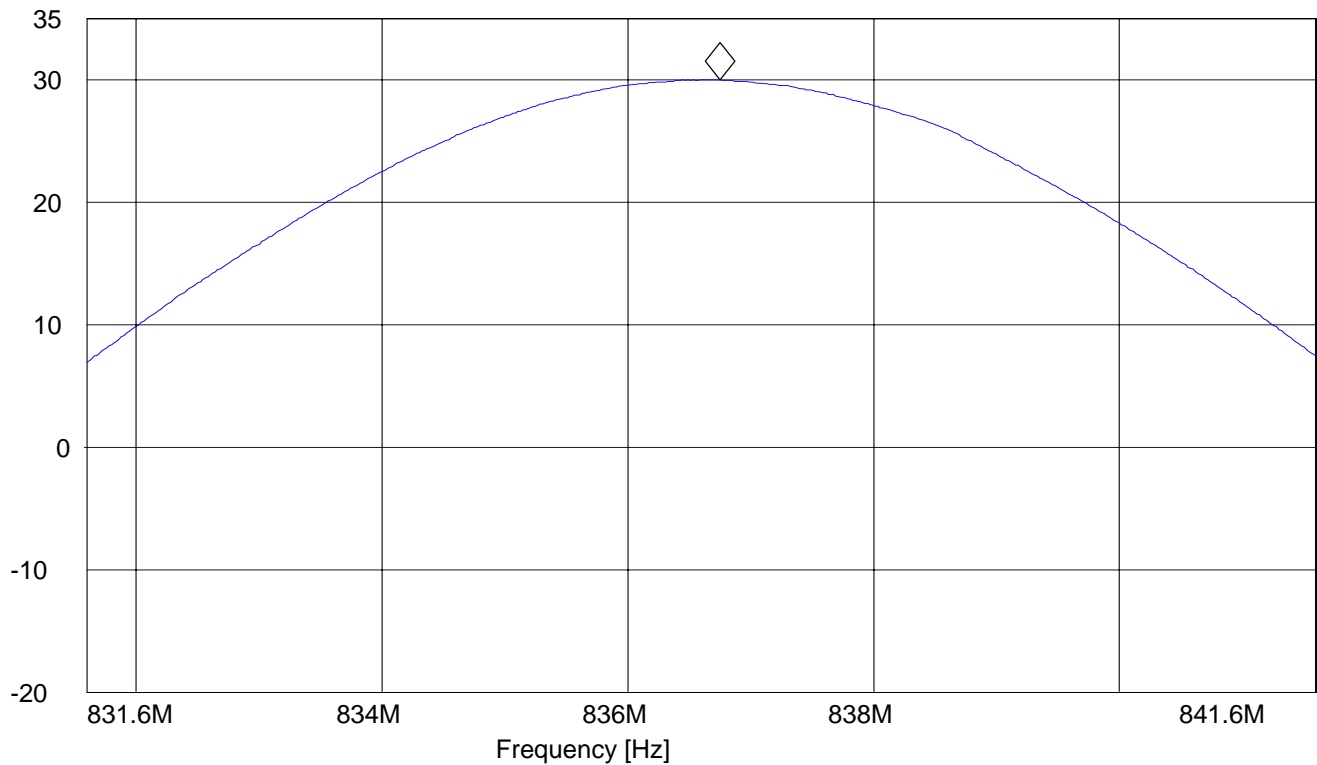
ANALYZER SETTINGS: RBW = VBW = 3MHz

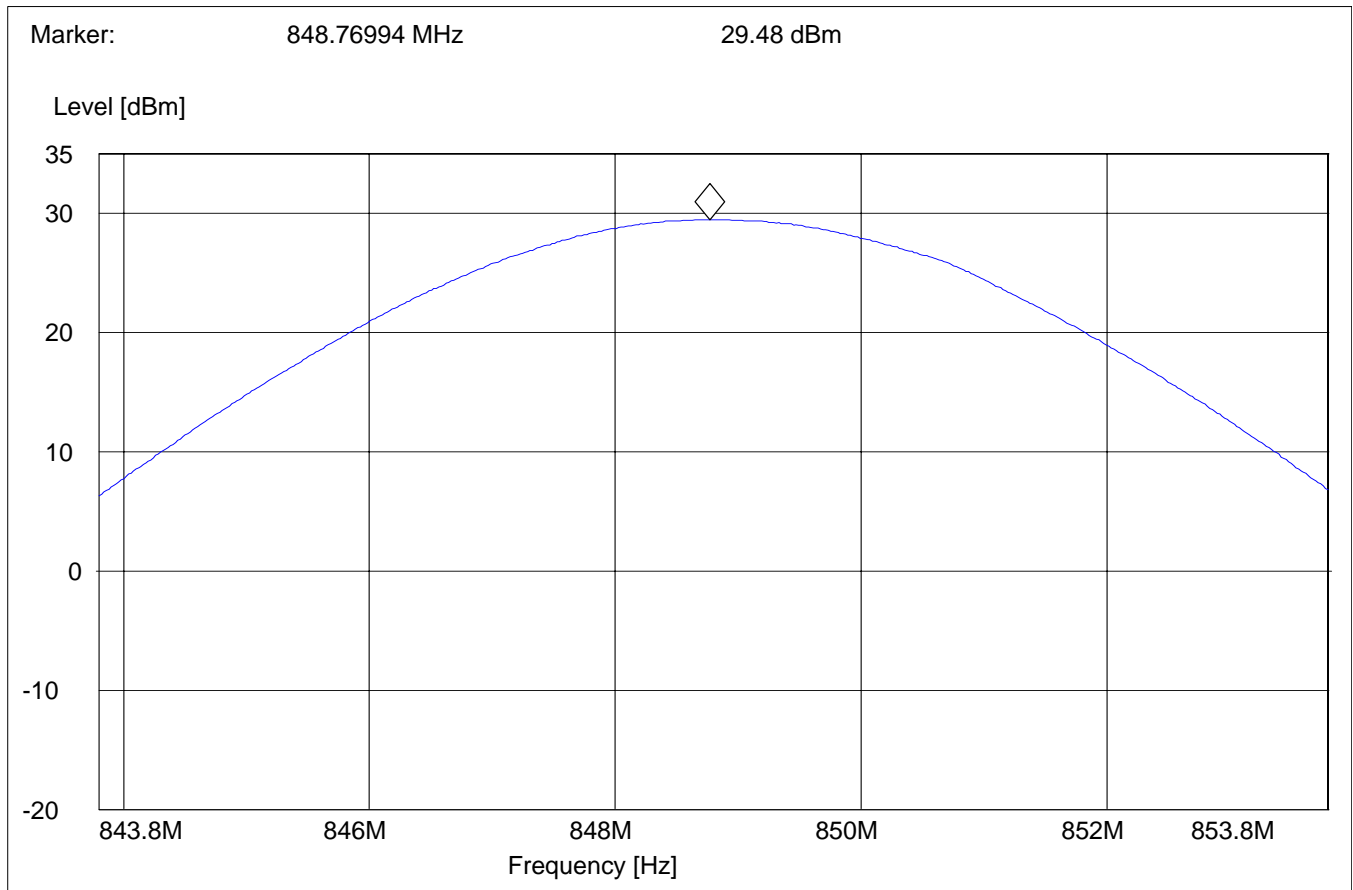
EIRP (GSM-850)
CHANNEL 128**§22.913(a)**

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

Marker: 836.750301 MHz 30.04 dBm

Level [dBm]



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

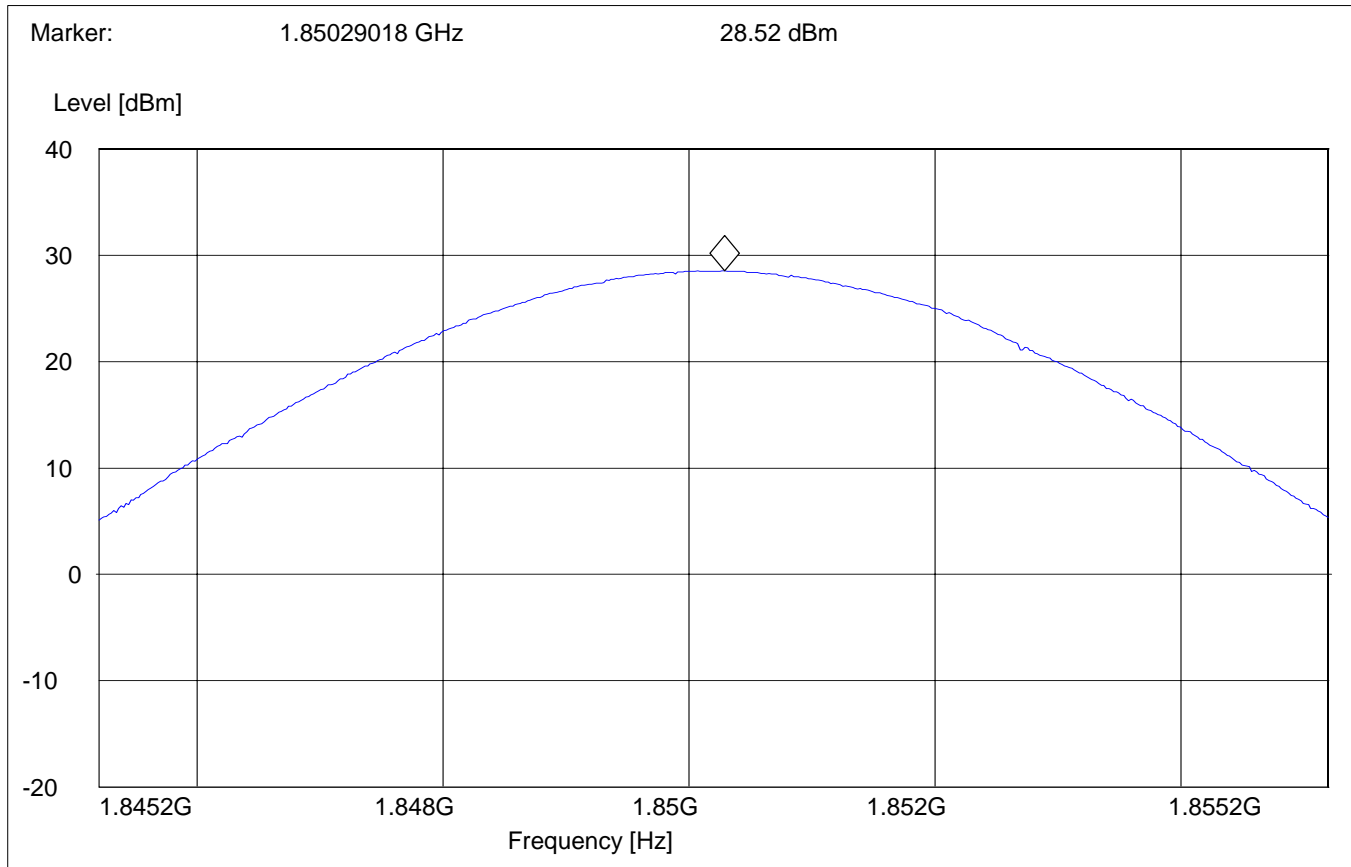
EIRP (PCS-1900)**§24.232(b)****Limits:**

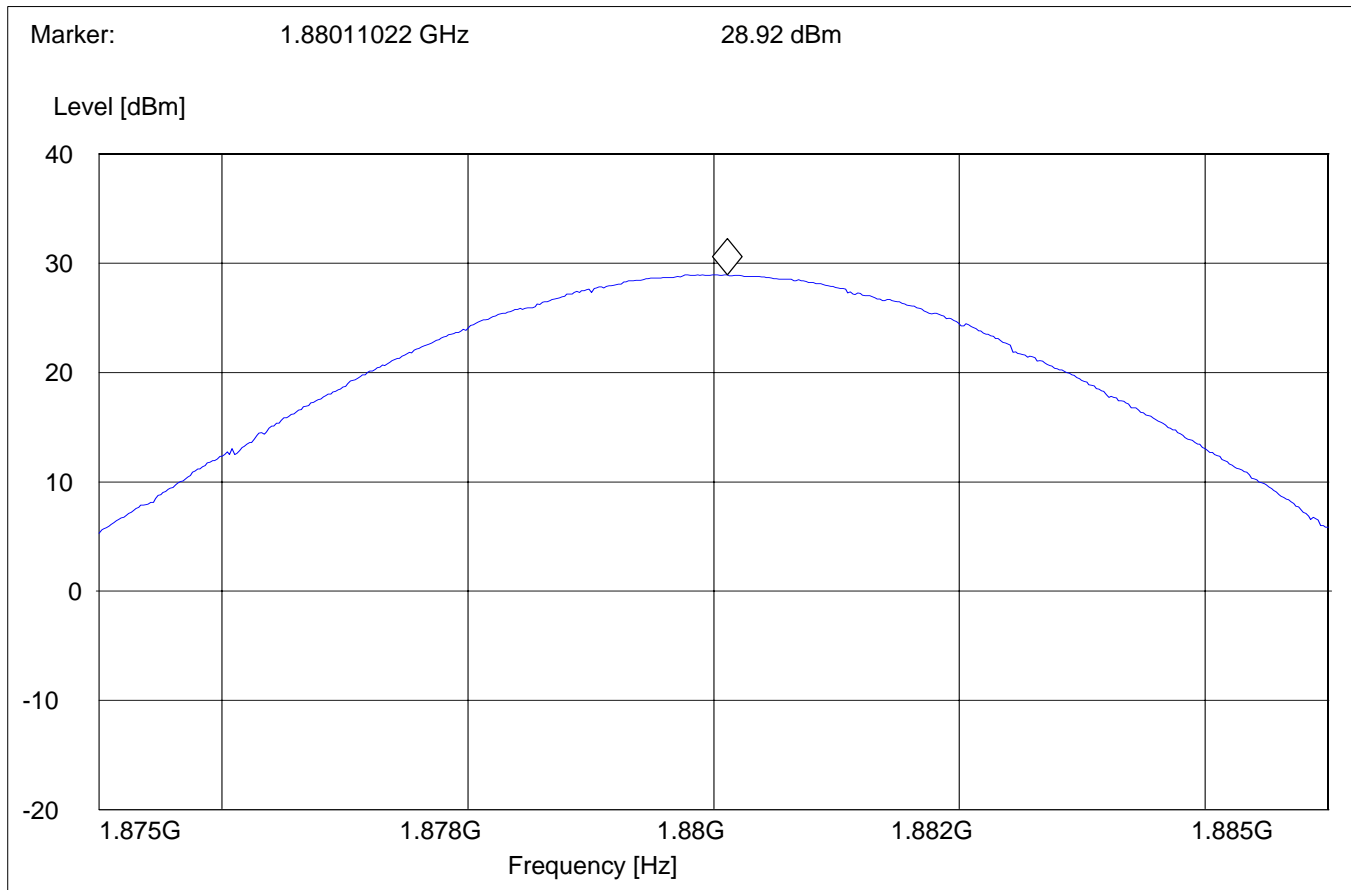
Power Control Level	Burst Peak EIRP
0	≤33dBm (2W)

EIRP

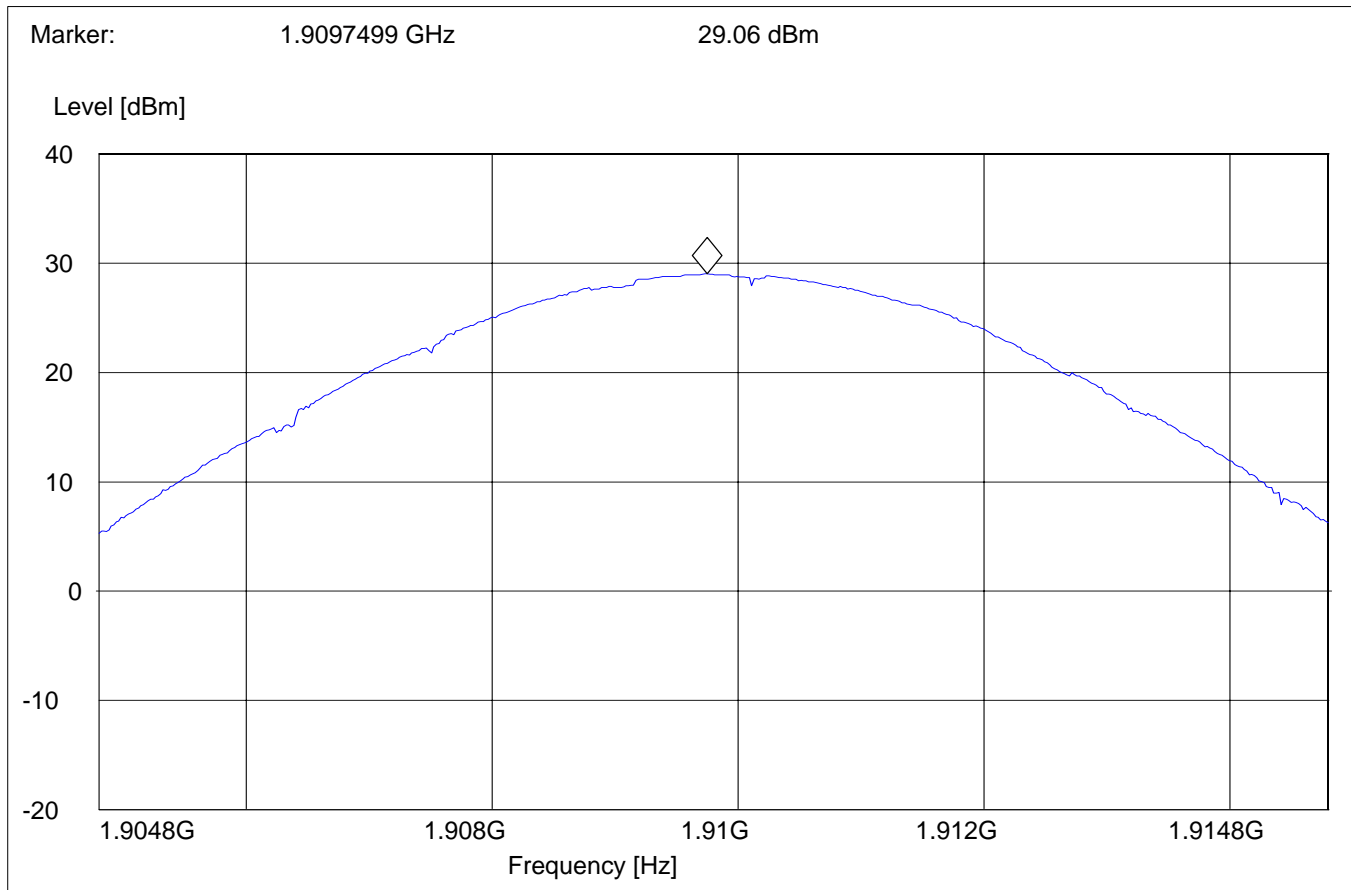
Frequency (MHz)	Power Control Level	Burst Peak (dBm)
		EIRP
1850.2	0	28.52
1880	0	28.92
1909.8	0	29.06
Measurement uncertainty	±0.5 dB	

ANALYZER SETTINGS: RBW = VBW = 3MHz

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

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

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



FREQUENCY STABILITY**§ 2.1055 / § 24.235****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 & 661 for PCS-1900), 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, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, 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 & 661 for PCS-1900), 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, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

Measurement 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 3.0VDC and 3.6VDC, with a nominal voltage of 3.6VDC. 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 -0.16% and +0%. For the purposes of measuring frequency stability these voltage limits are to be used.

For equipment powered by primary supply voltage:

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, 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.

FREQUENCY STABILITY (GSM-850)

AFC FREQ ERROR vs. VOLTAGE

Frequency = 836.6MHz

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
3.0	31	0.037
3.6	46	0.056

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	36	0.04183
-20	40	0.0478
-10	43	0.0513
0	48	0.0573
+10	43	0.0513
+20	46	0.055
+30	35	0.0418
+40	36	0.043
+50	48	0.0573

FREQUENCY STABILITY (GSM-1900)

AFC FREQ ERROR vs. VOLTAGE

Frequency = 1880MHz

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
3.0	33	0.0186
3.6	44	0.0234

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	44	0.0234
-20	40	0.0212
-10	52	0.0276
0	51	0.0271
+10	42	0.0223
+20	46	0.0244
+30	47	0.025
+40	53	0.0281
+50	49	0.0292

OCCUPIED BANDWIDTH**§2.1049(h)(i)****Occupied Bandwidth Results**

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the GSM-850 & GSM-1900 frequency band. Table below lists the measured -20dBc (99%) occupied bandwidths. Spectrum analyzer plots are included on the following pages.

-20dBc BANDWIDTH (GSM-850)

Frequency (MHz)	-20dBc Bandwidth (kHz)
824.2	280.56
836.6	284.56
848.8	290.58

-20dBc BANDWIDTH (GSM-1900)

Frequency (MHz)	-20dBc Bandwidth (kHz)
1850.2	276.55
1880	282.56
1909.8	274.54

-20dBc BANDWIDTH CHANNEL 128(GSM-850)



Delta 1 [T1]

RBW 3 kHz

RF Att

30 dB

Ref Lvl

-0.52 dB

VBW 3 kHz

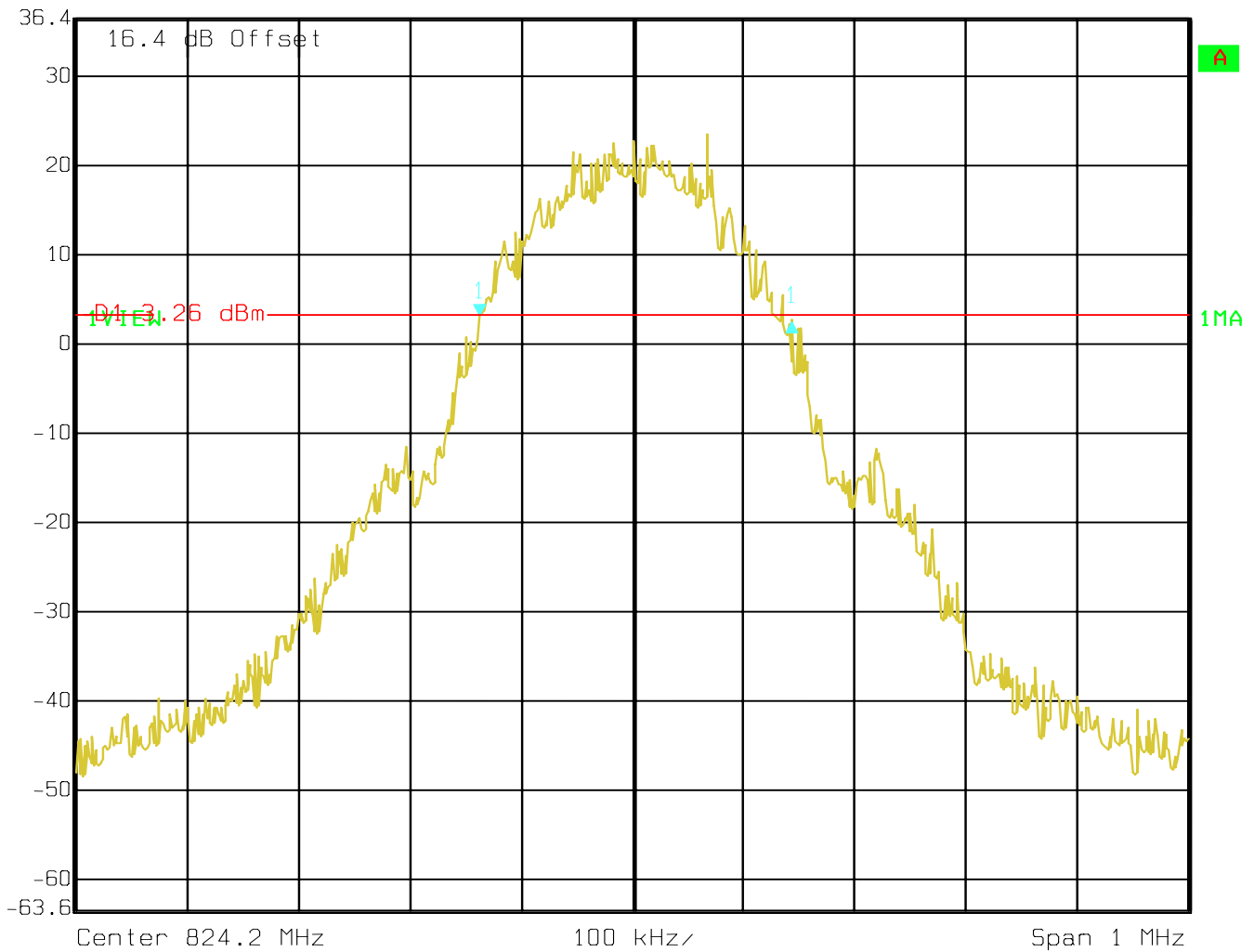
36.4 dBm

280.56112224 kHz

SWT 280 ms

Unit

dBm



Date: 28.APR.2004 08:36:48

-20dBc BANDWIDTH CHANNEL 190(GSM-850)



Delta 1 [T1]

RBW 3 kHz

RF Att 30 dB

Ref Lvl

0.35 dB

VBW 3 kHz

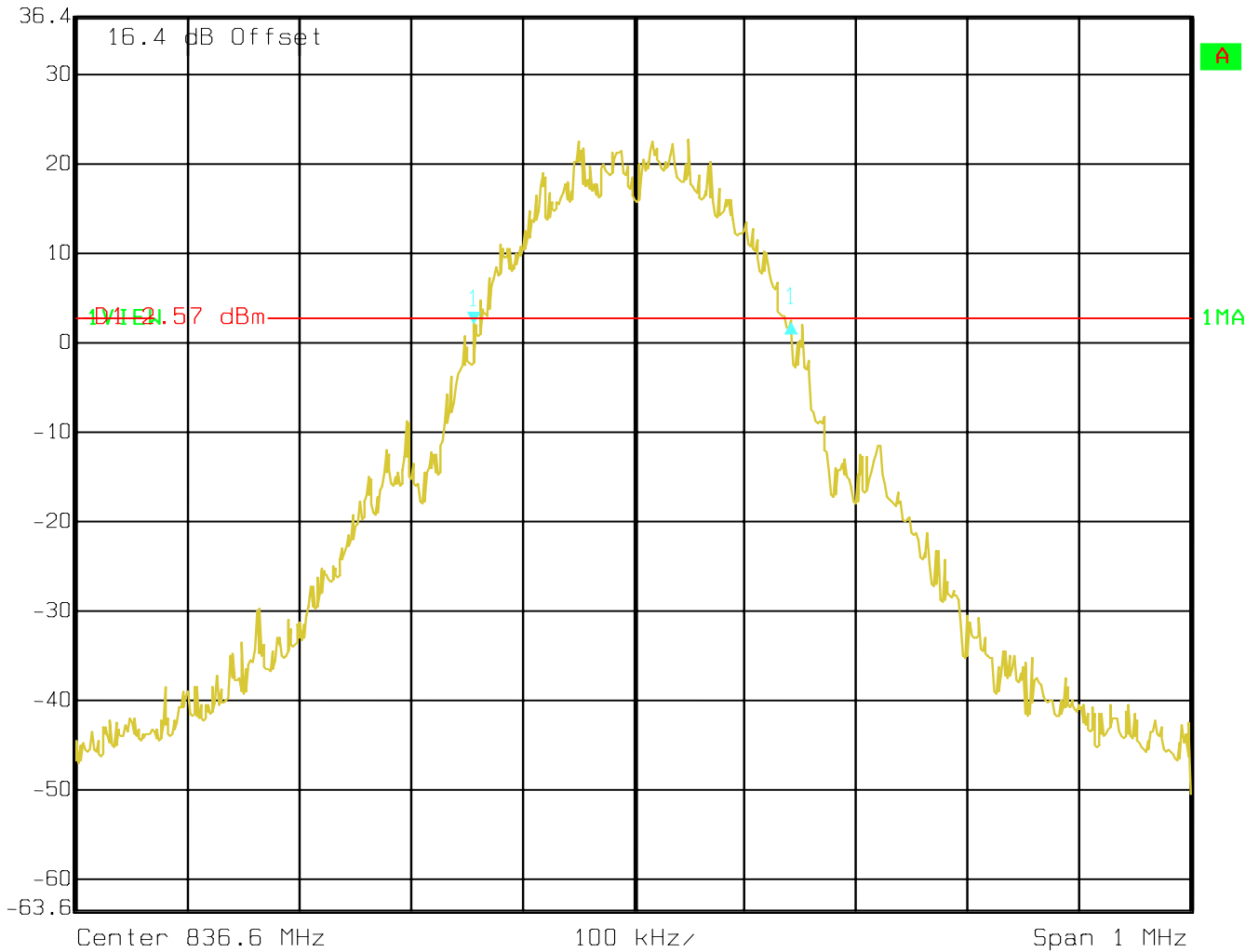
36.4 dBm

284.56913828 kHz

SWT 280 ms

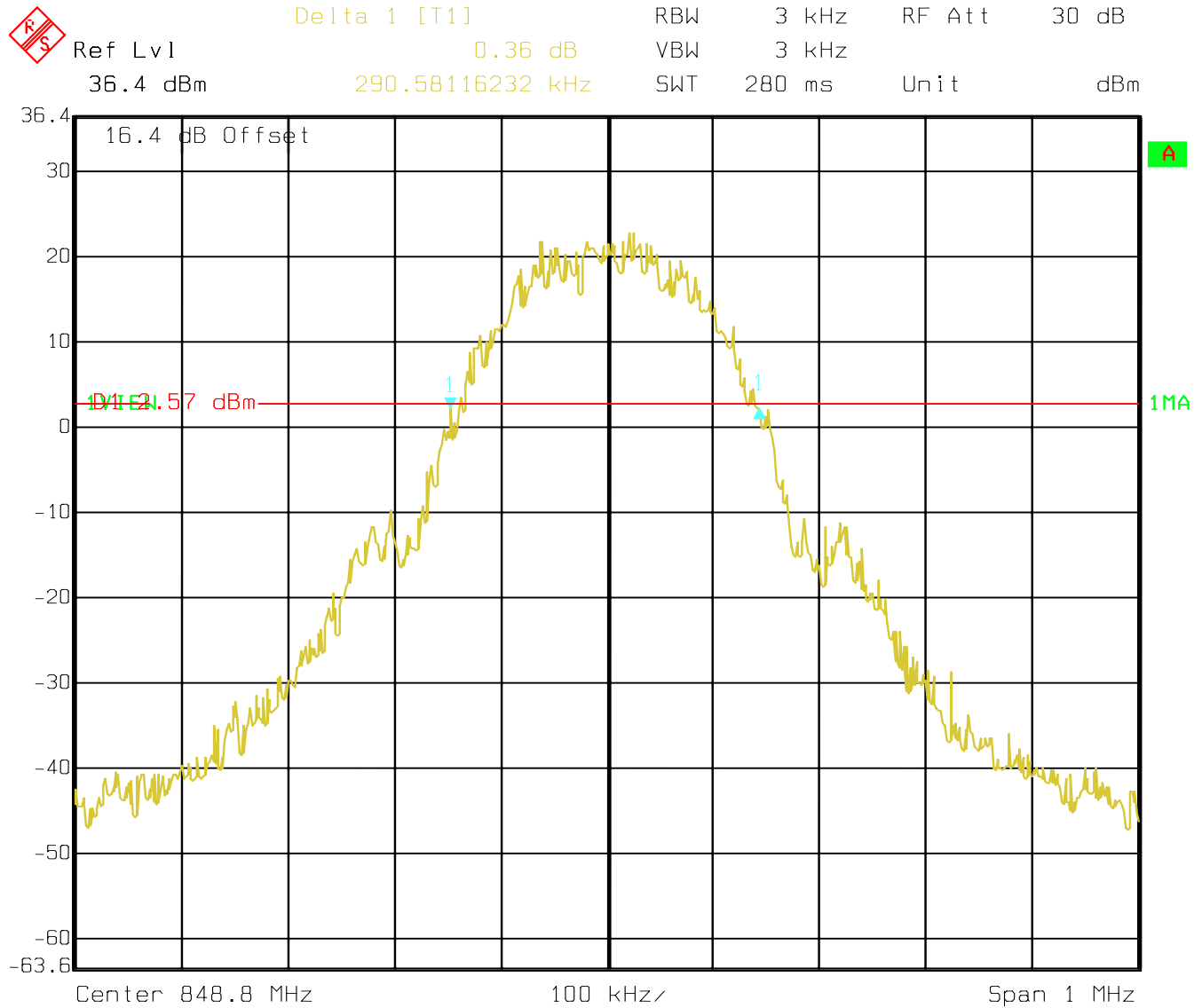
Unit

dBm



Date: 28.APR.2004 08:32:57

-20dBc BANDWIDTH CHANNEL 251(GSM-850)

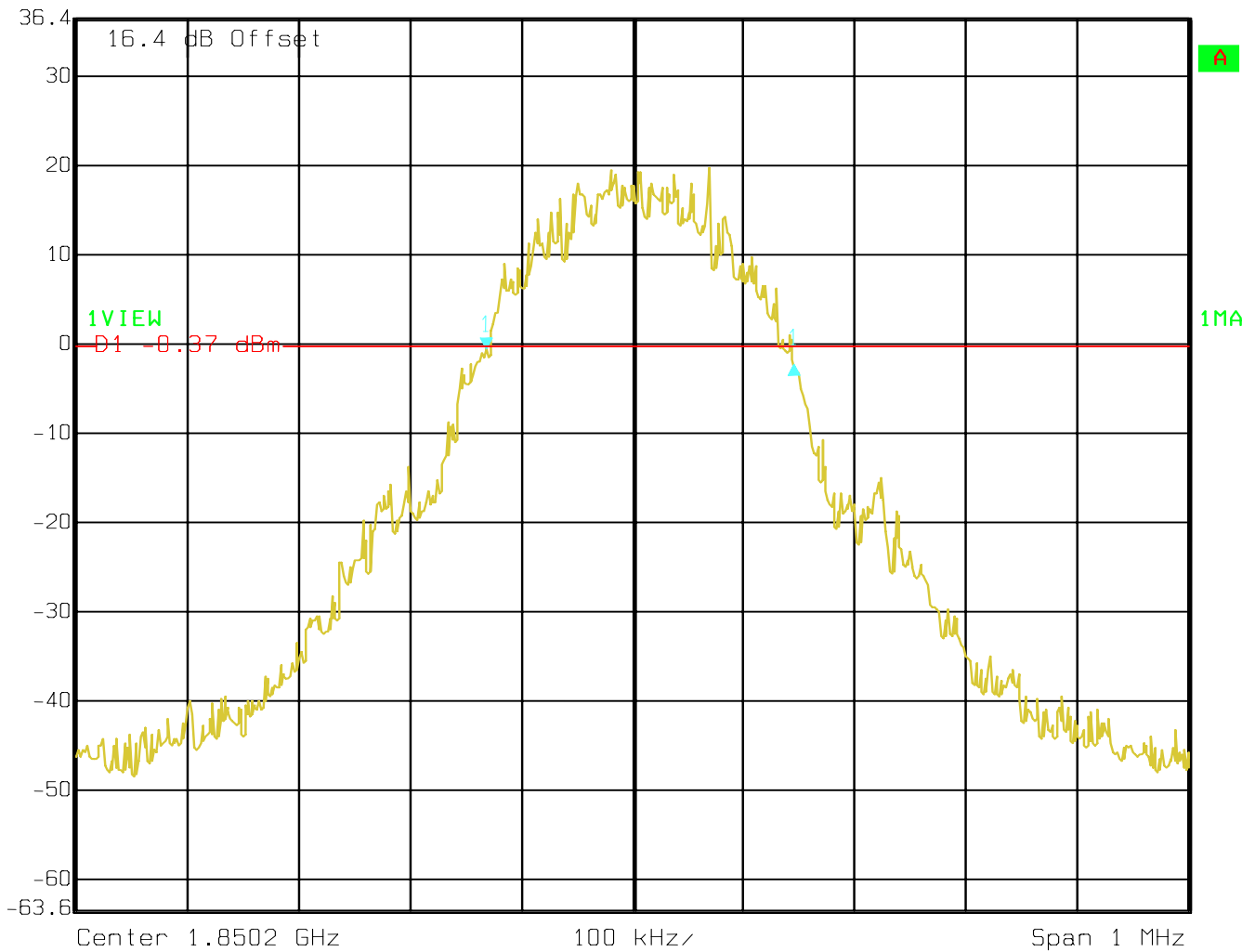


Date: 28.APR.2004 08:29:08

-20dBc BANDWIDTH CHANNEL 512(GSM-1900)



Delta 1 [T1] RBW 3 kHz RF Att 30 dB
 Ref Lvl -1.31 dB VBW 3 kHz
 36.4 dBm 276.55310621 kHz SWT 280 ms Unit dBm

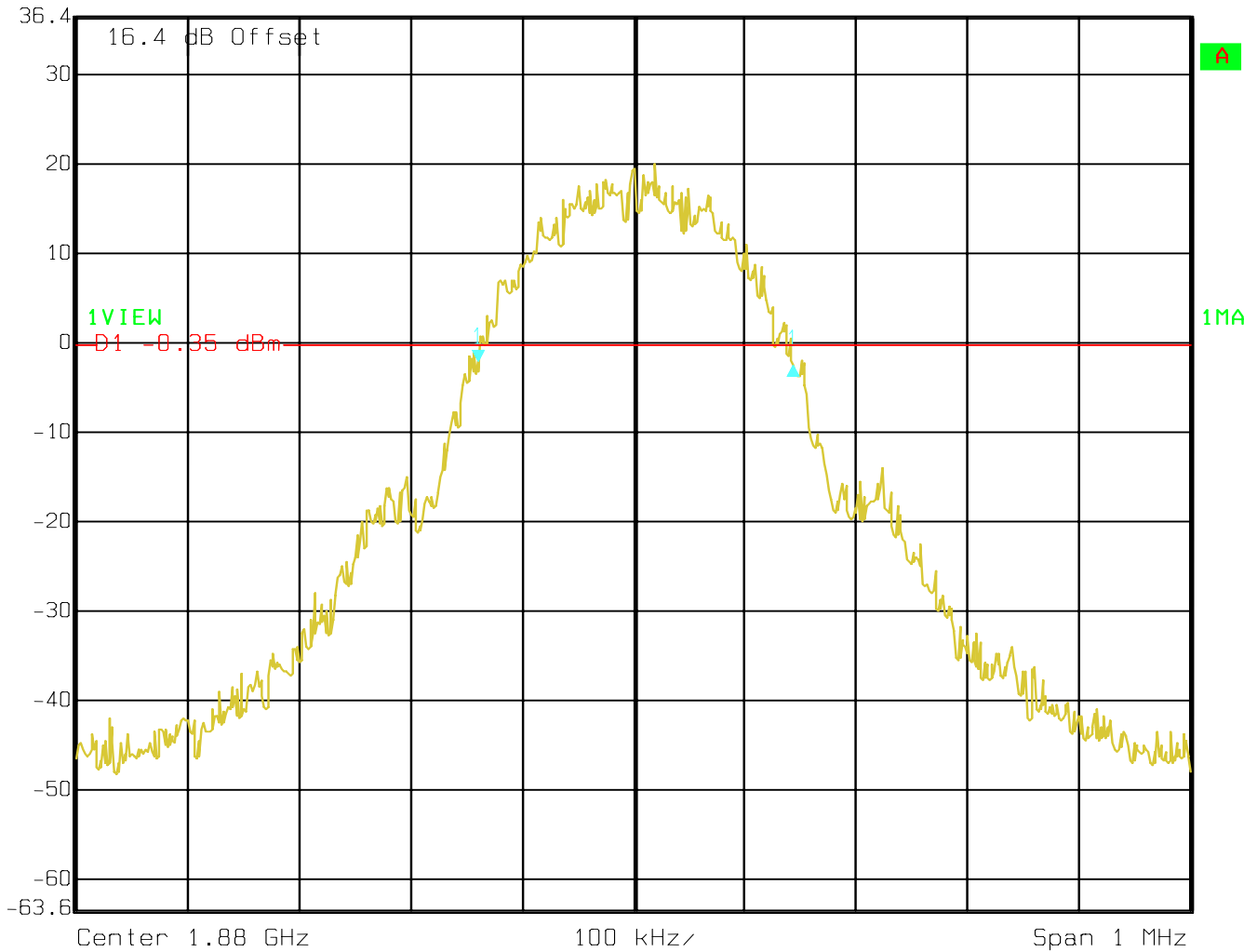


Date: 27.APR.2004 16:29:44

-20dBc BANDWIDTH CHANNEL 661(GSM-1900)



Delta 1 [T1]
 Ref Lvl 36.4 dBm
 Delta 1 [T1] -0.38 dB
 282.56513026 kHz
 RBW 3 kHz
 VBW 3 kHz
 SWT 280 ms
 RF Att 30 dB
 Unit dBm



Date: 27.APR.2004 16:32:50

-20dBc BANDWIDTH CHANNEL 810(GSM-1900)



Delta 1 [T1]

RBW

3 kHz

RF Att

30 dB

Ref Lvl

0.41 dB

VBW

3 kHz

36.4 dBm

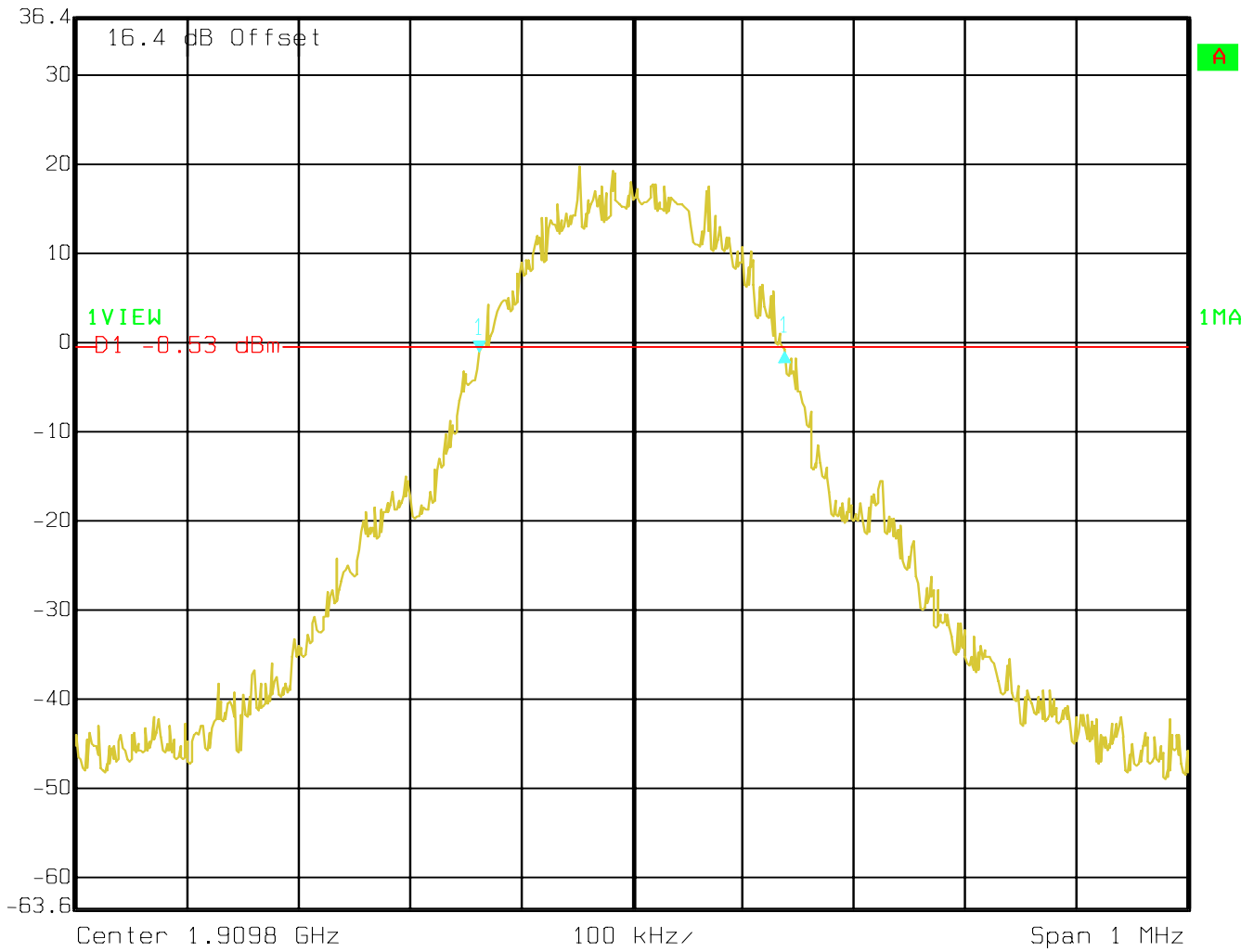
274.54909820 kHz

SWT

280 ms

Unit

dBm



Date: 27.APR.2004 16:36:26

EMISSION BANDWIDTH**§24.238(b)****Emission Bandwidth Results**

Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM-850 & GSM-1900 frequency band. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

-26dBc BANDWIDTH (GSM-850)

Frequency (MHz)	-26 dBc Bandwidth (kHz)
824.2	316.63
836.6	316.63
848.8	318.63

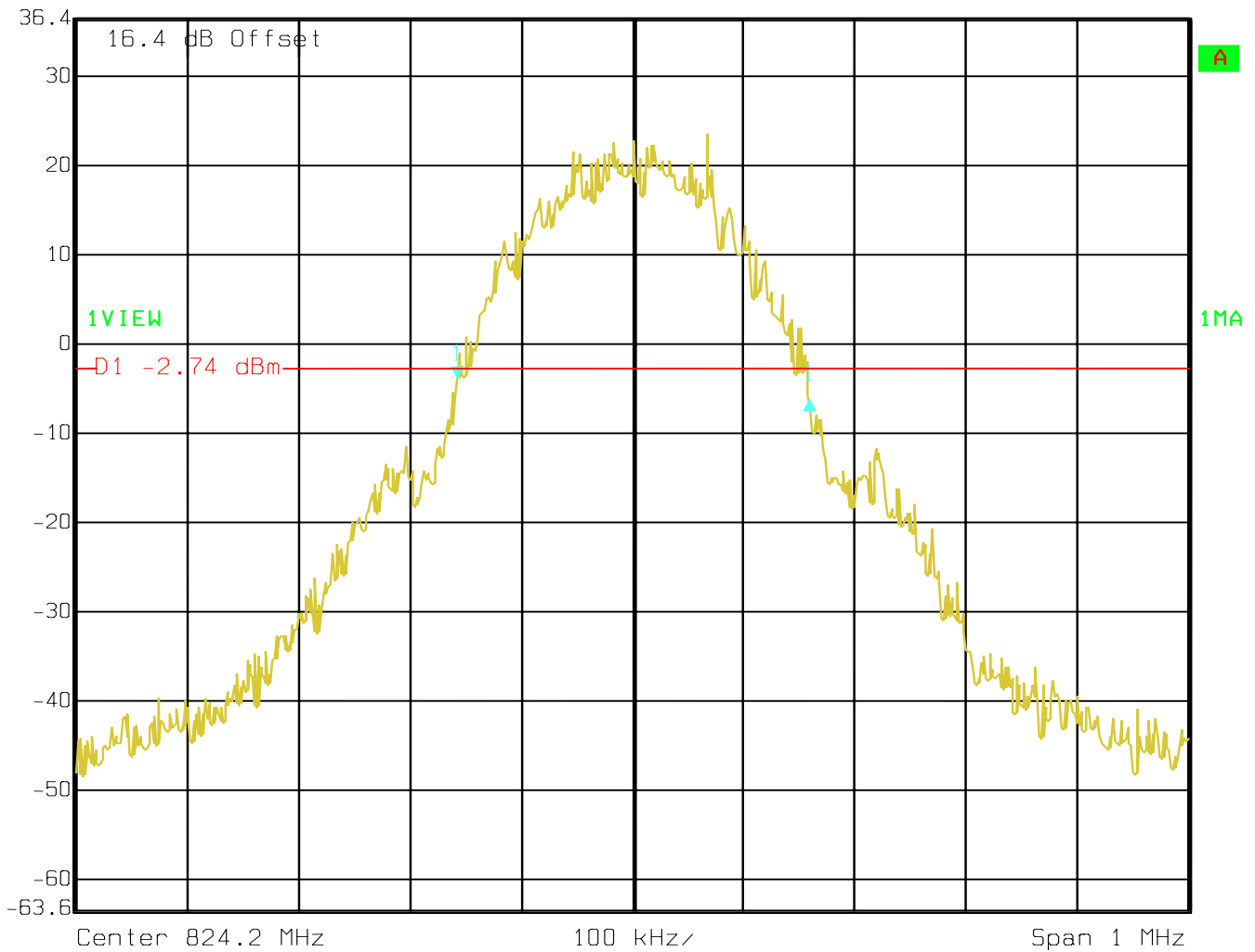
-26dBc BANDWIDTH (GSM-1900)

Frequency (MHz)	-26 dBc Bandwidth (kHz)
1850.2	314.62
1880	314.62
1909.8	310.62

-26dBc BANDWIDTH CHANNEL 128(GSM-850)



Delta 1 [T1]
 Ref Lvl 36.4 dBm
 Delta 1 [T1] -2.21 dB
 316.63326653 kHz
 RBW 3 kHz
 VBW 3 kHz
 RF Att 30 dB
 Unit dBm
 SWT 280 ms

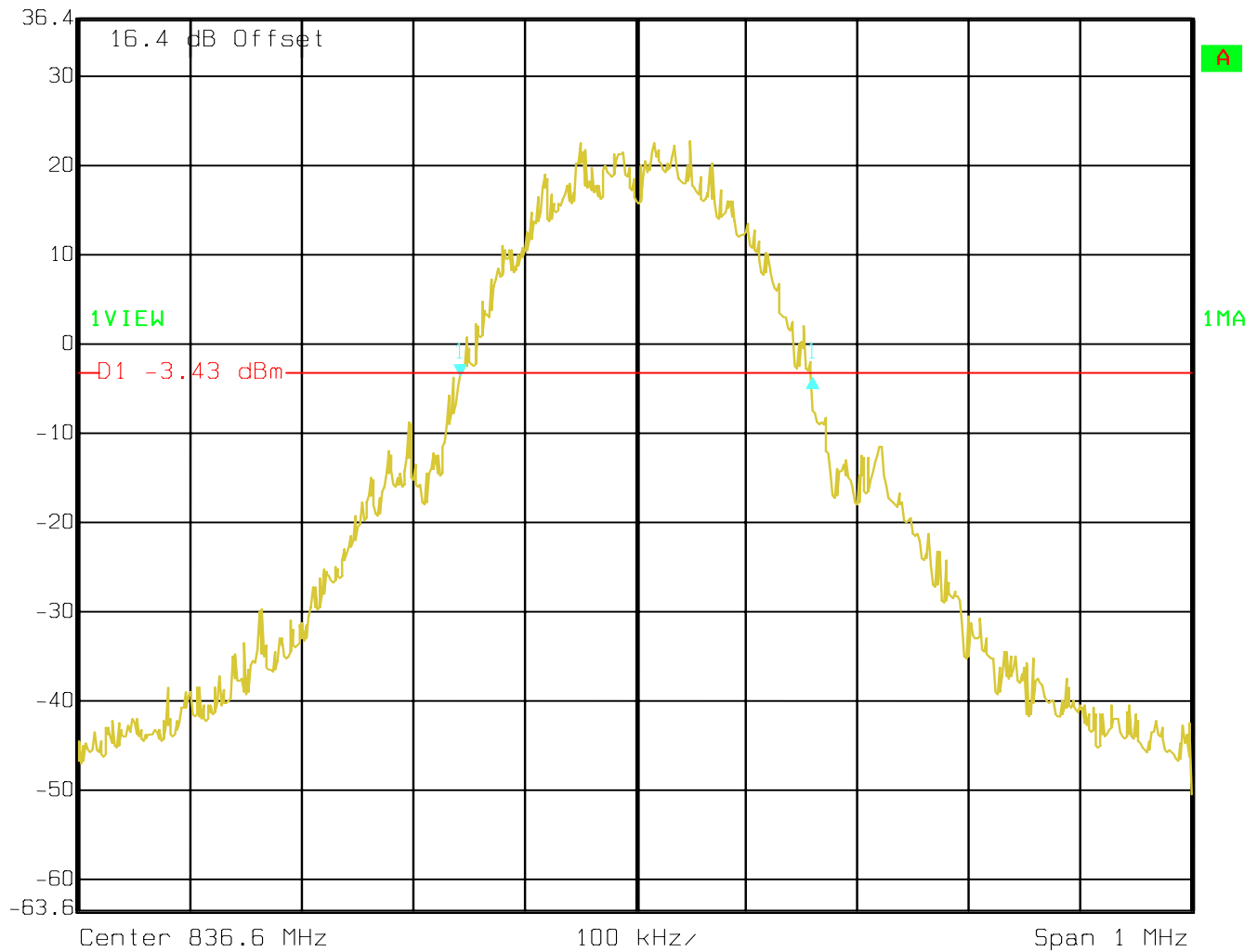


Date: 28.APR.2004 08:38:15

-26dBc BANDWIDTH CHANNEL 190(GSM-850)



Delta 1 [T1]
 Ref Lvl 36.4 dBm
 Delta 1 -0.04 dB
 316.63326653 kHz
 RBW 3 kHz
 VBW 3 kHz
 RF Att 30 dB
 Unit dBm
 SWT 280 ms



Date: 28.APR.2004 08:34:10

-26dBc BANDWIDTH CHANNEL 251(GSM-850)



Delta 1 [T1]

RBW

3 kHz

RF Att

30 dB

Ref Lvl

1.30 dB

VBW

3 kHz

36.4 dBm

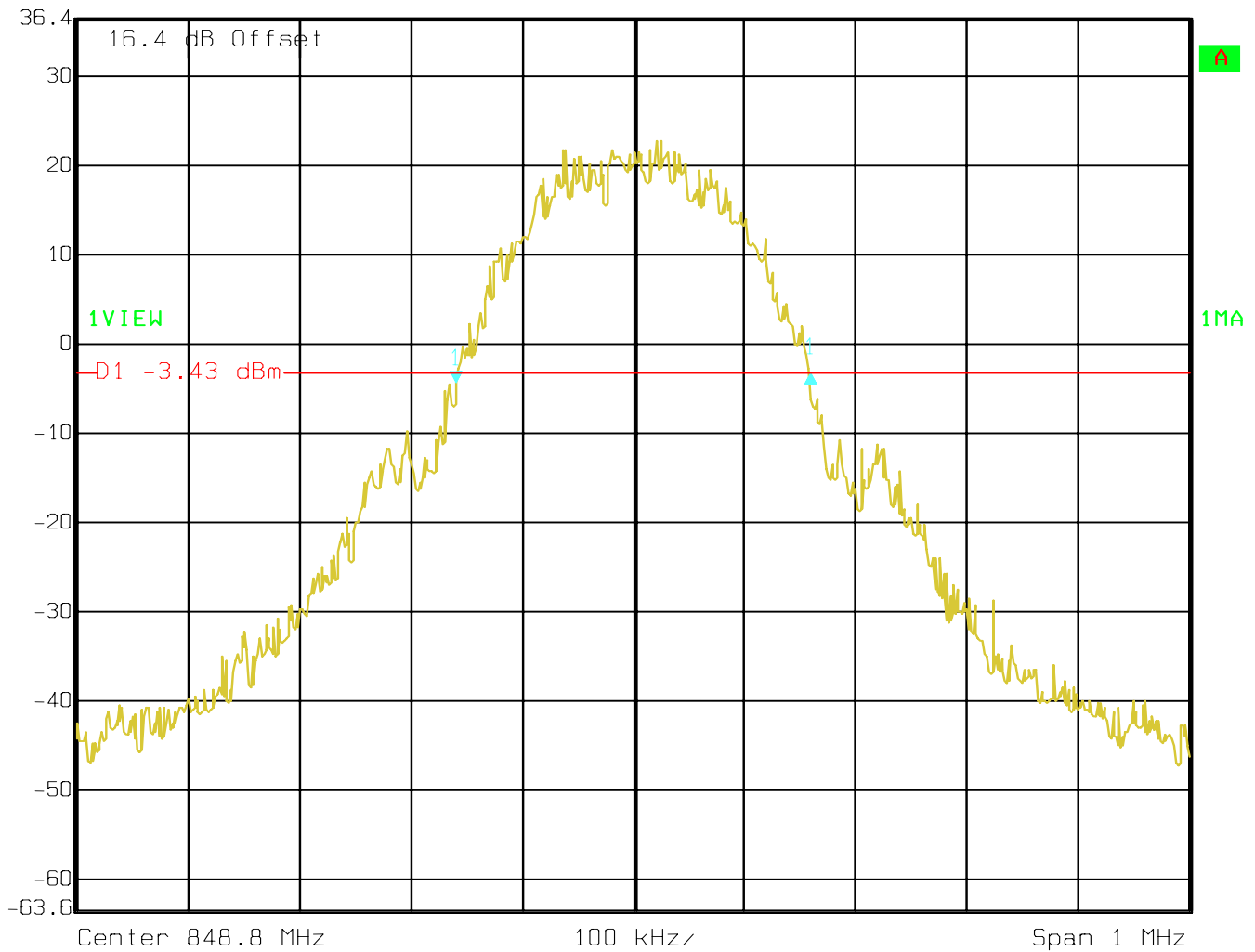
318.63727455 kHz

SWT

280 ms

Unit

dBm



Date: 28.APR.2004 08:30:44

-26dBc BANDWIDTH CHANNEL 512(GSM-1900)



Delta 1 [T1]

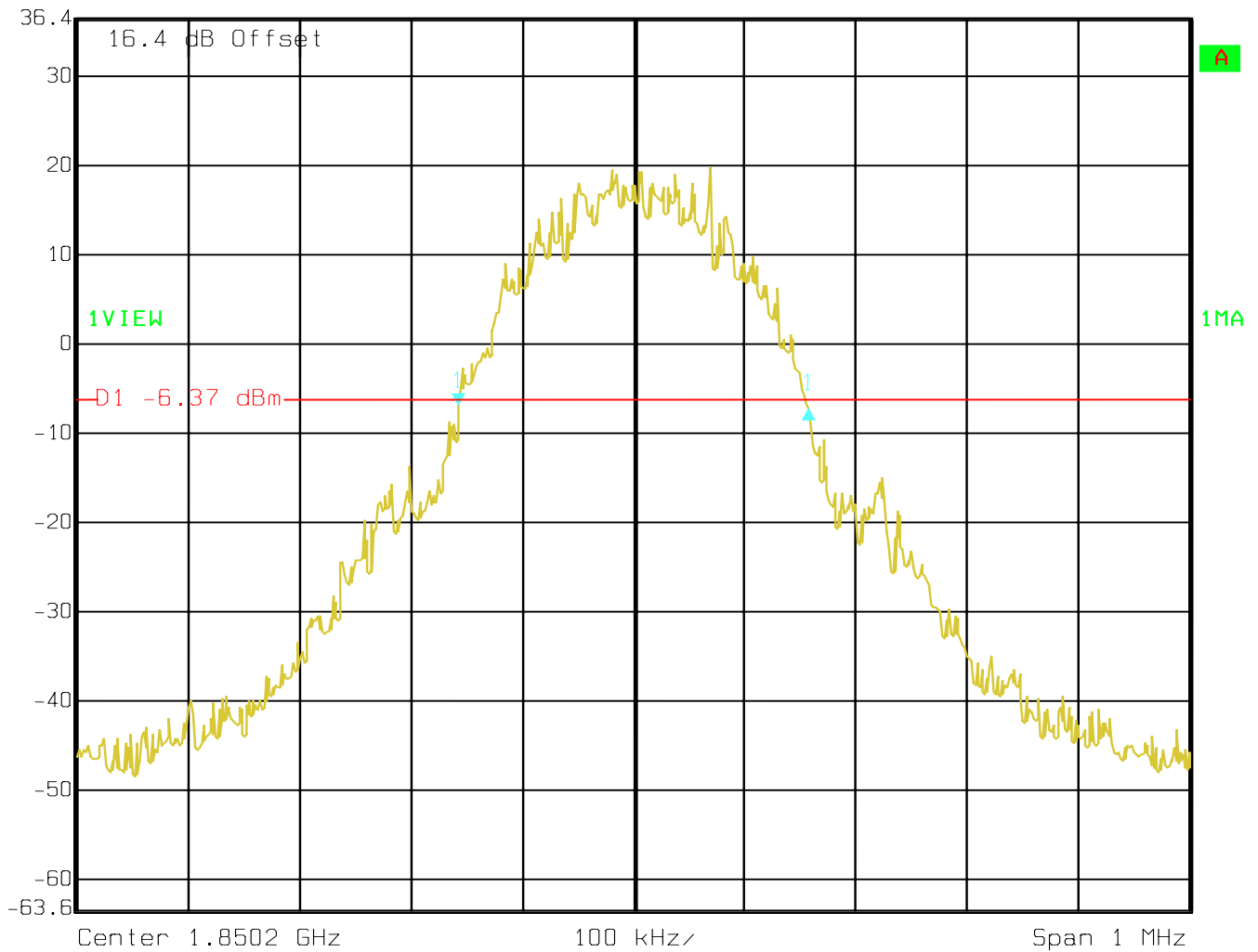
RBW 3 kHz RF Att 30 dB

Ref Lvl -0.16 dB

VBW 3 kHz

36.4 dBm 314.62925852 kHz

SWT 280 ms Unit dBm



Date: 27.APR.2004 16:30:54

-26dBc BANDWIDTH CHANNEL 661(GSM-1900)



Delta 1 [T1]

RBW

3 kHz

RF Att

30 dB

Ref Lvl

-2.97 dB

VBW

3 kHz

36.4 dBm

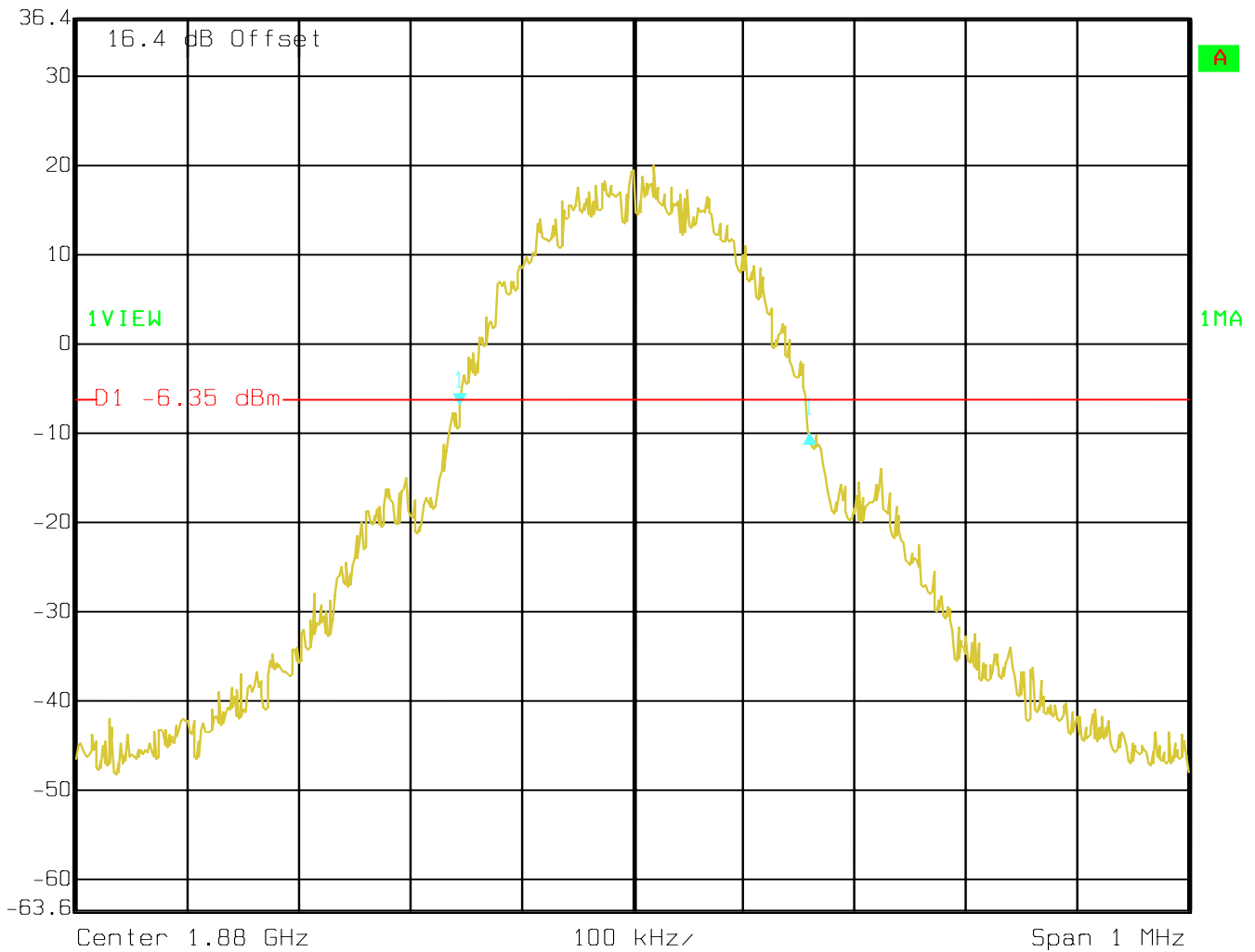
314.62925852 kHz

SWT

280 ms

Unit

dBm



Date: 27.APR.2004 16:33:59

-26dBc BANDWIDTH CHANNEL 810(GSM-1900)



Delta 1 [T1]

RBW 3 kHz RF Att 30 dB

Ref Lvl -0.43 dB

VBW 3 kHz

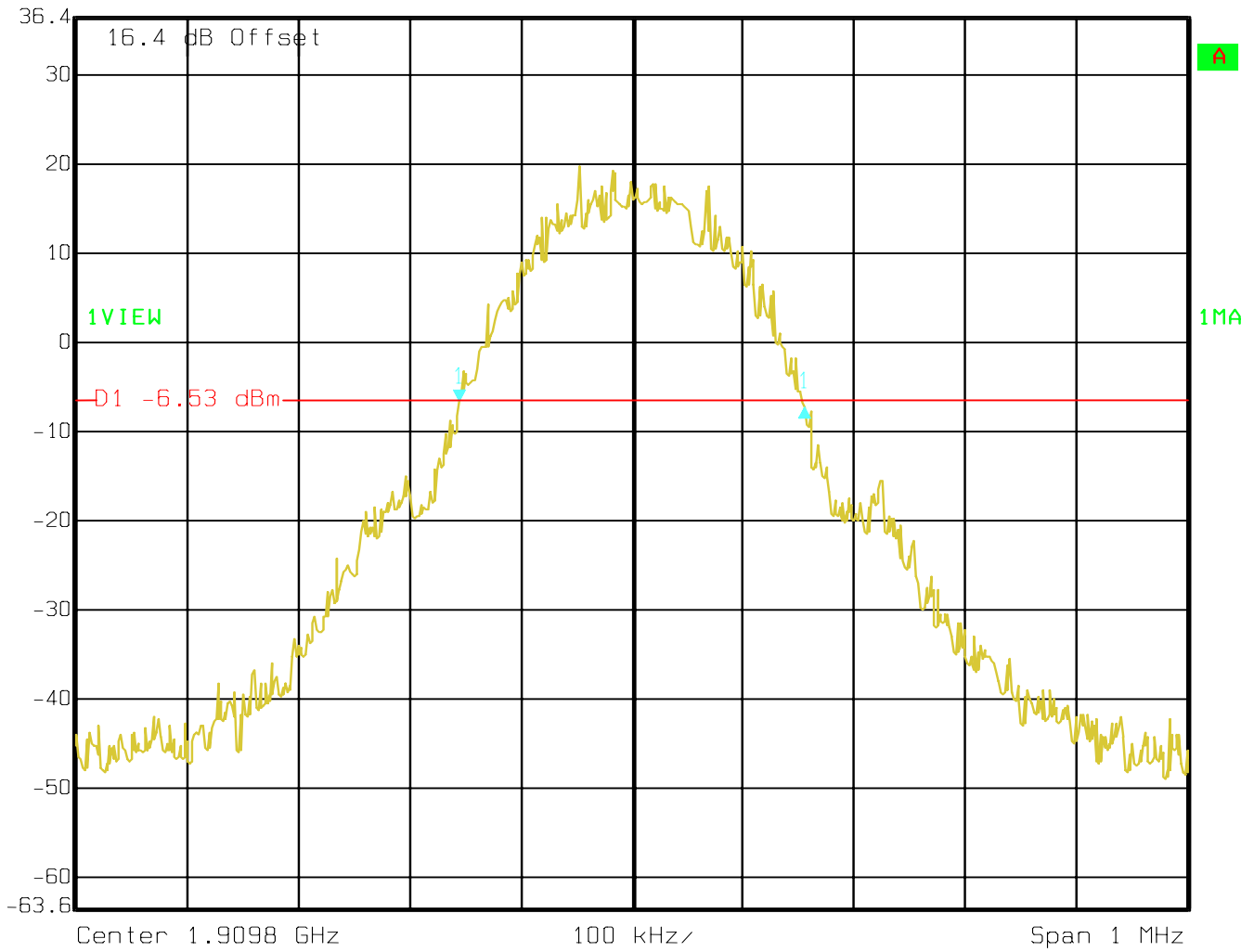
36.4 dBm

310.62124248 kHz

SWT 280 ms

Unit

dBm



Date: 27.APR.2004 16:37:36

EMISSION LIMITS TRANSMITTER**§2.1051 / §24.238****Measurement Procedure:**

The following steps outline the procedure used to measure the radiated emissions from the EUT. The site is constructed in accordance with ANSI C63.4 – 1992 requirements and is recognised by the FCC. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 848.8MHz for GSM-850 & 1910 MHz for PCS-1900. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the GSM-850 & PCS-1900 bands.

The final Radiated emission test procedure is as follows:

- a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50-ohm load.
- c) A double-ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was determined by the substitution method described for ERP measurements.

Measurement Limit:

Sec. 24.238 Emission Limits.

- (a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43 + 10 \log(P)$ dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Measurement Results:

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.

RESULTS OF RADIATED TESTS GSM-850:

nf: noise floor

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	-33.09	1673.2	-33.24	1697.6	-34.31
3	2472.6	-35.54	2509.8	-32.92	2546.4	-31.52
4	3296.8	-41.59	3346.4	-47.21	3395.2	-42.17
5	4121	-43.82	4183	-47.02	4244	-41.05
6	4945.2	-49.14	5019.6	-41.91	5092.8	-37.38
7	5769.4	-50.10	5856.2	-49.32	5941.6	-43.69
8	6593.6	-38.81	6692.8	-40.79	6790.4	-39.27
9	7417.8	nf	7529.4	nf	7639.2	nf
10	8242	nf	8366	nf	8488	nf

RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 30MHz - 1GHz

Spurious emission limit -13dBm

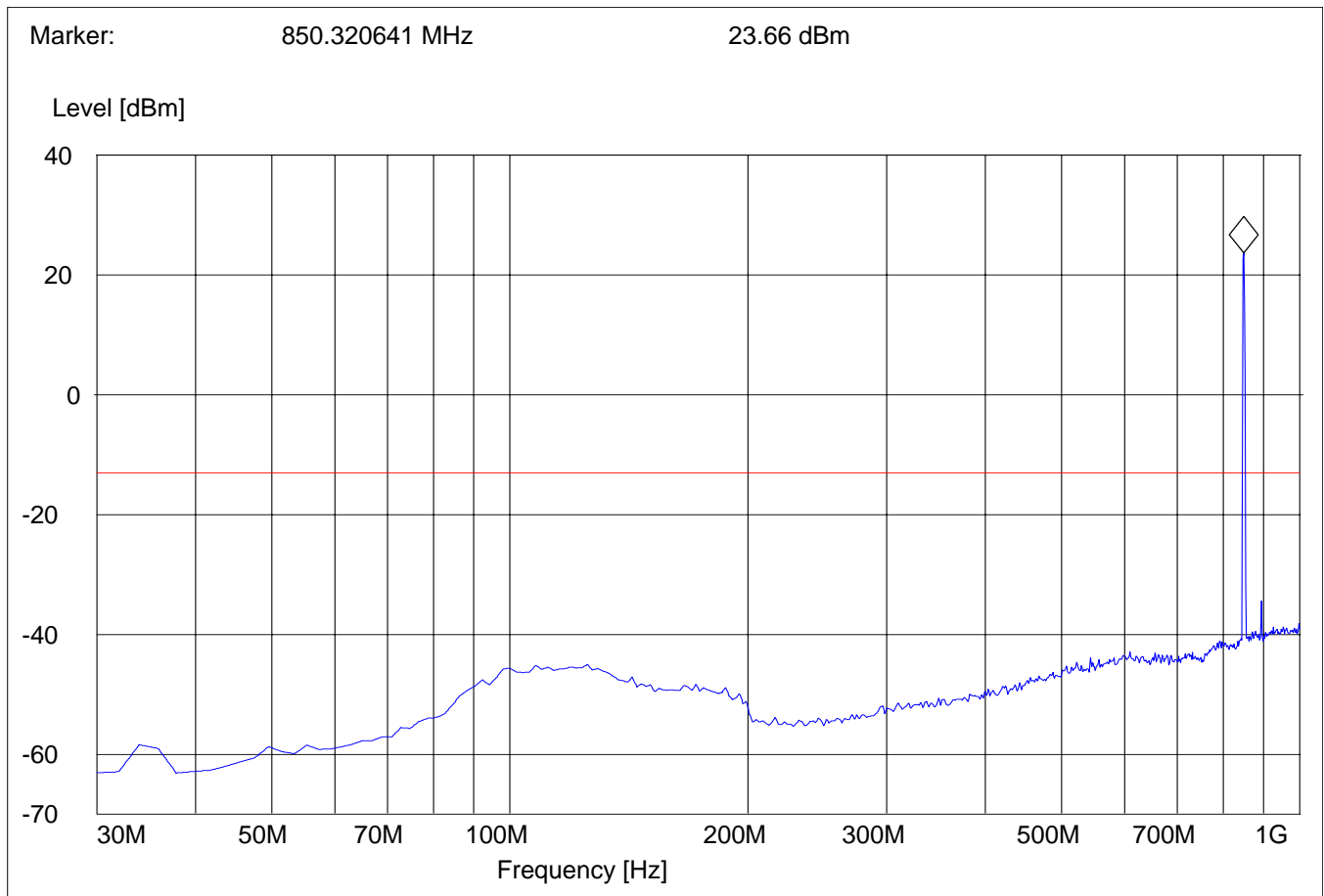
Antenna: vertical

SWEEP TABLE: "FCC 22 Spur 30M-1G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency	Time		
30MHz	1GHz	Max Peak	Coupled	1 MHz

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)



RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 30MHz - 1GHz

Spurious emission limit -13dBm

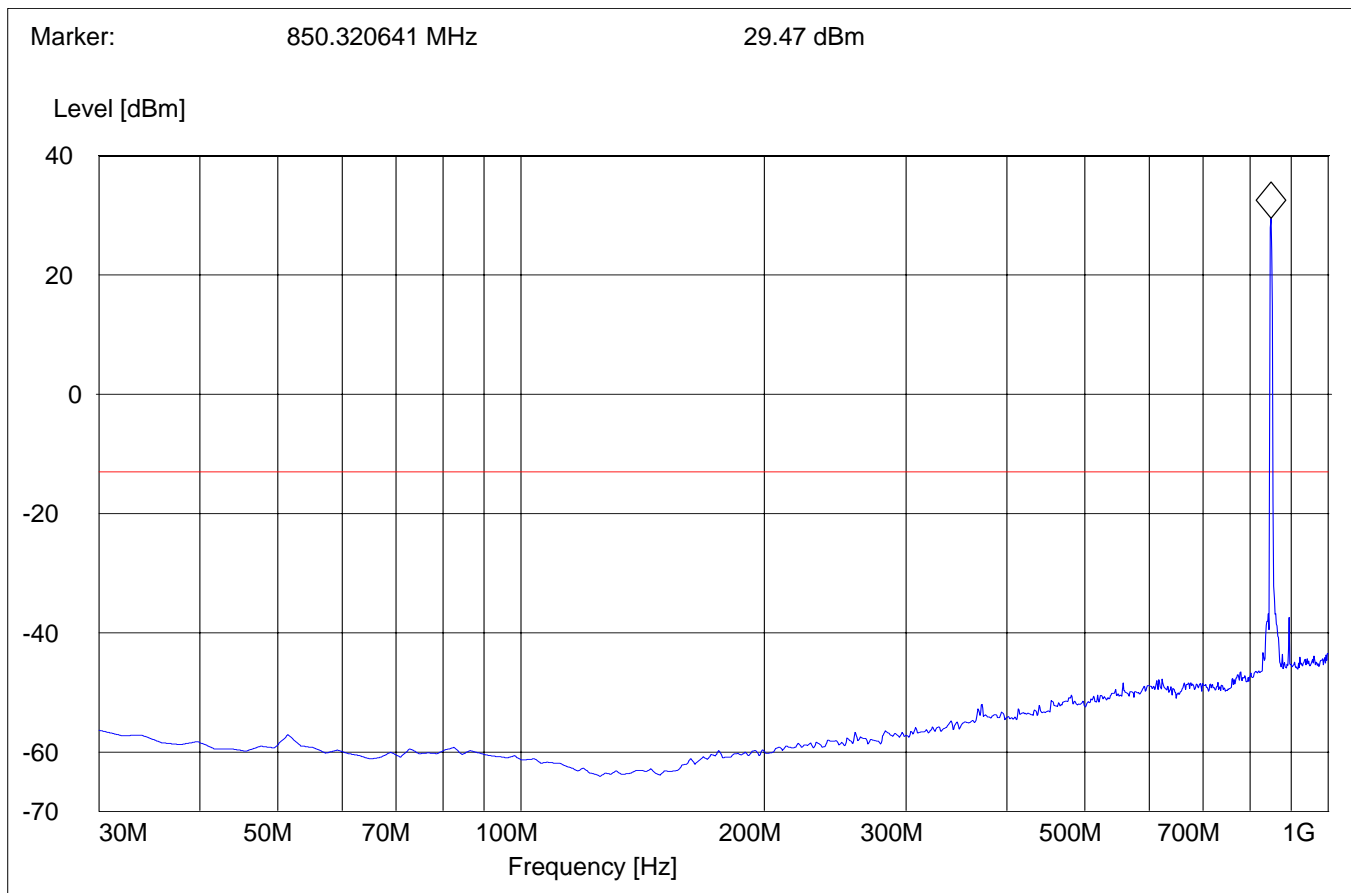
Antenna: horizontal

SWEEP TABLE: "FCC 22 Spur 30M-1G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency	Time		
30MHz	1GHz	Max Peak	Coupled	1 MHz

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)



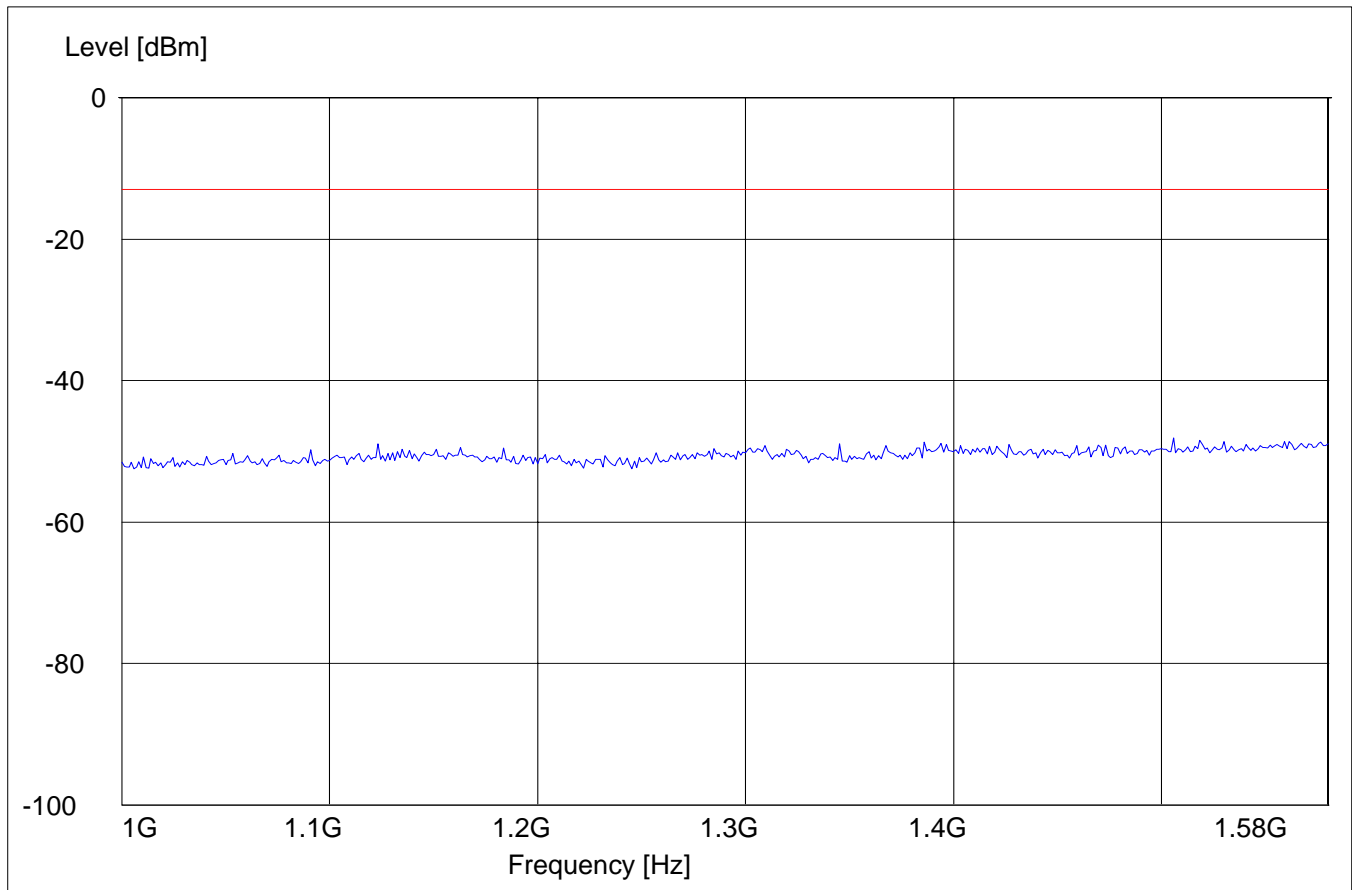
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 1GHz – 1.58GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	1.58GHz	Max Peak	Coupled	1 MHz



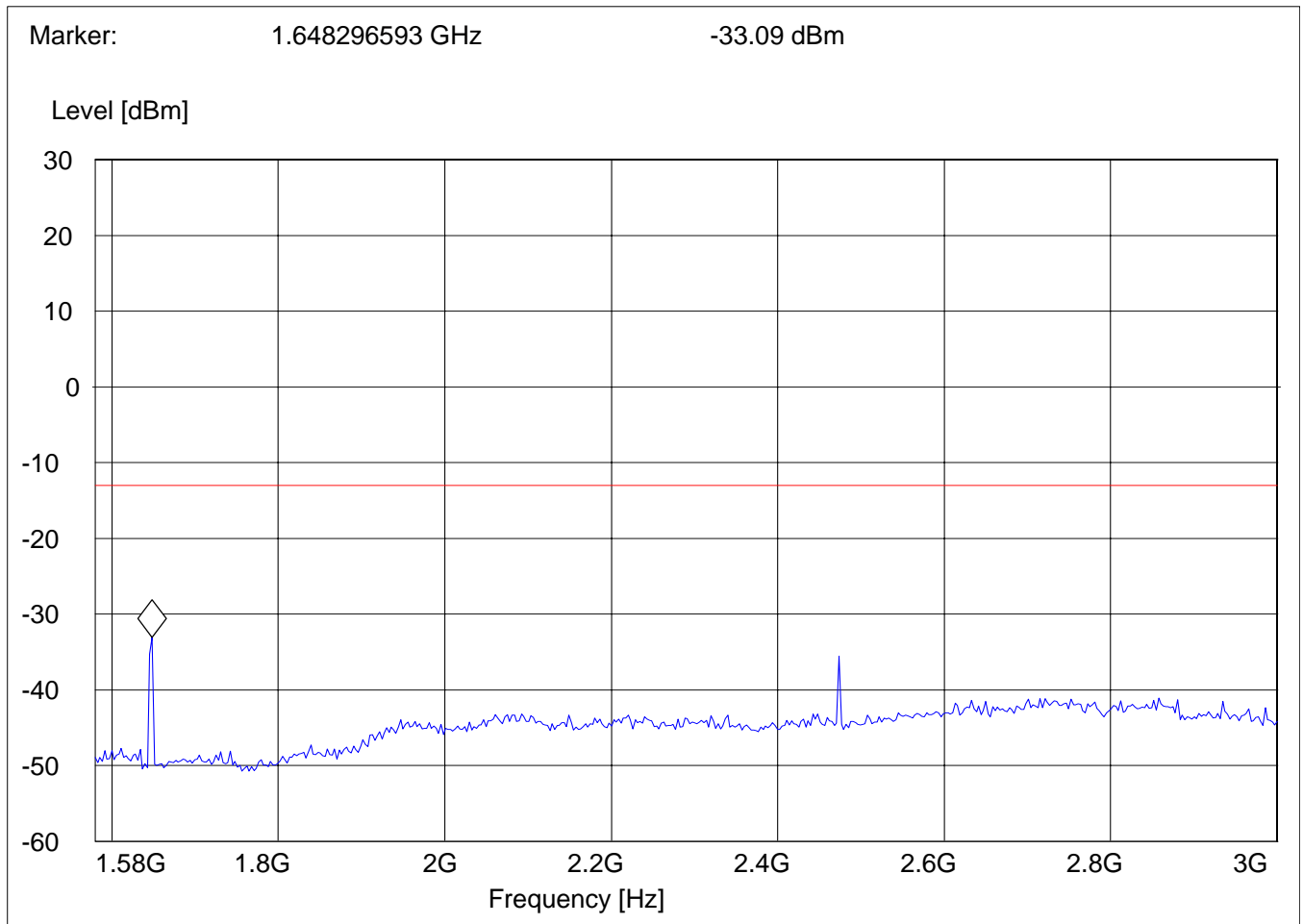
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 1.58GHz – 3GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency	Time		
1.58GHz	3GHz	Max Peak	Coupled	1 MHz



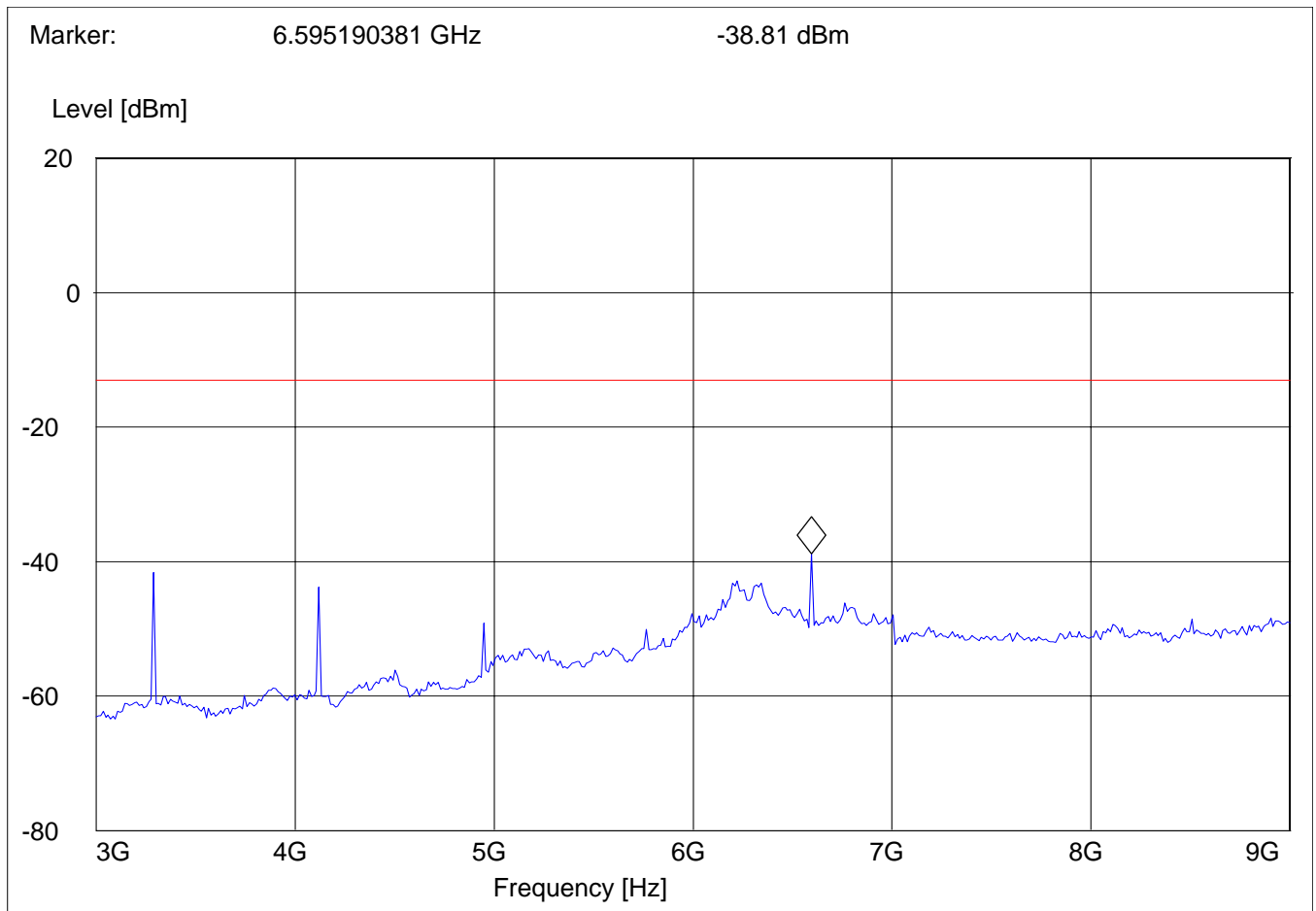
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 3GHz – 9GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	9GHz	Max Peak	Coupled	1 MHz



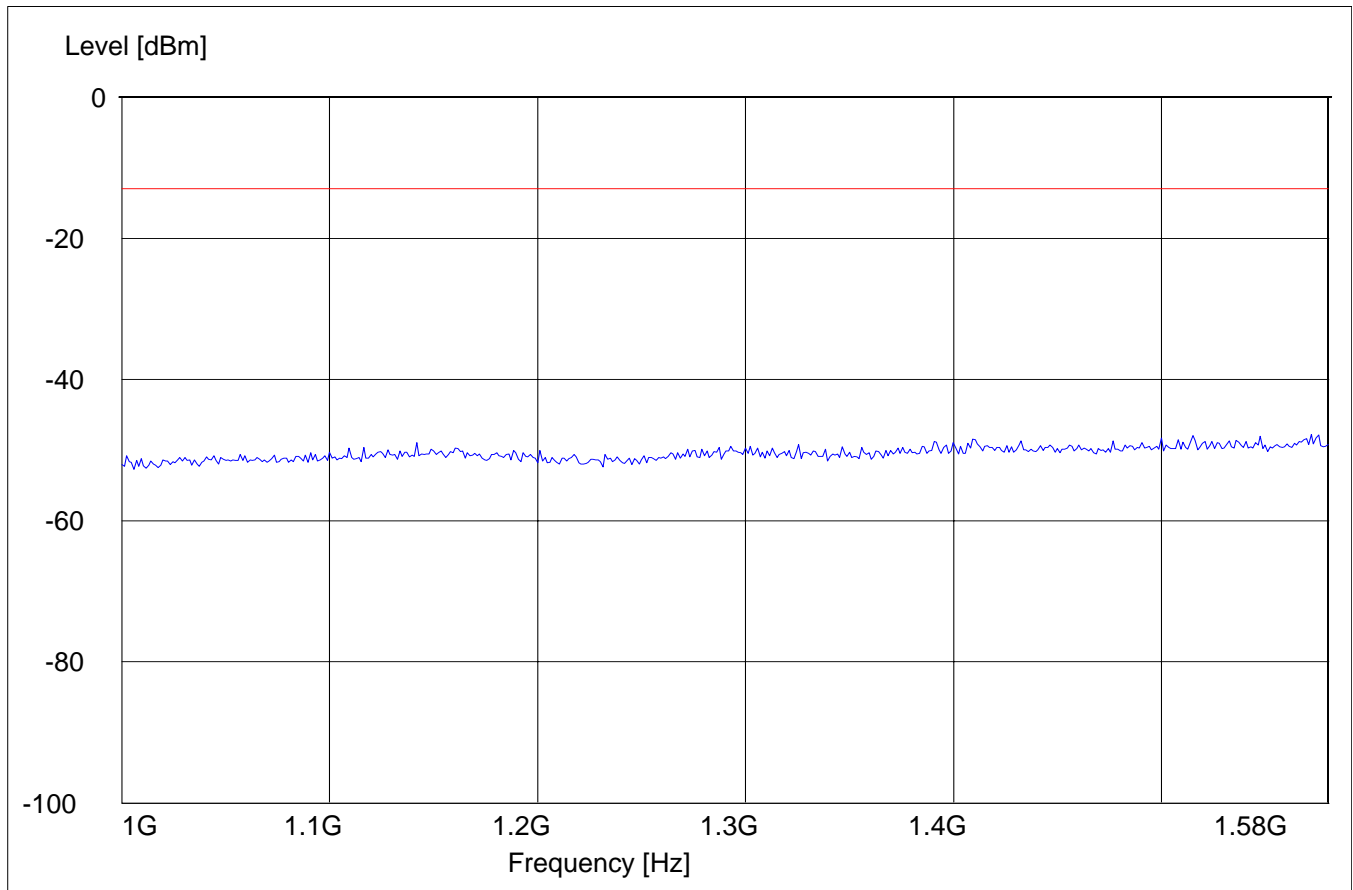
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 1GHz – 1.58GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	1.58GHz	Max Peak	Coupled	1 MHz



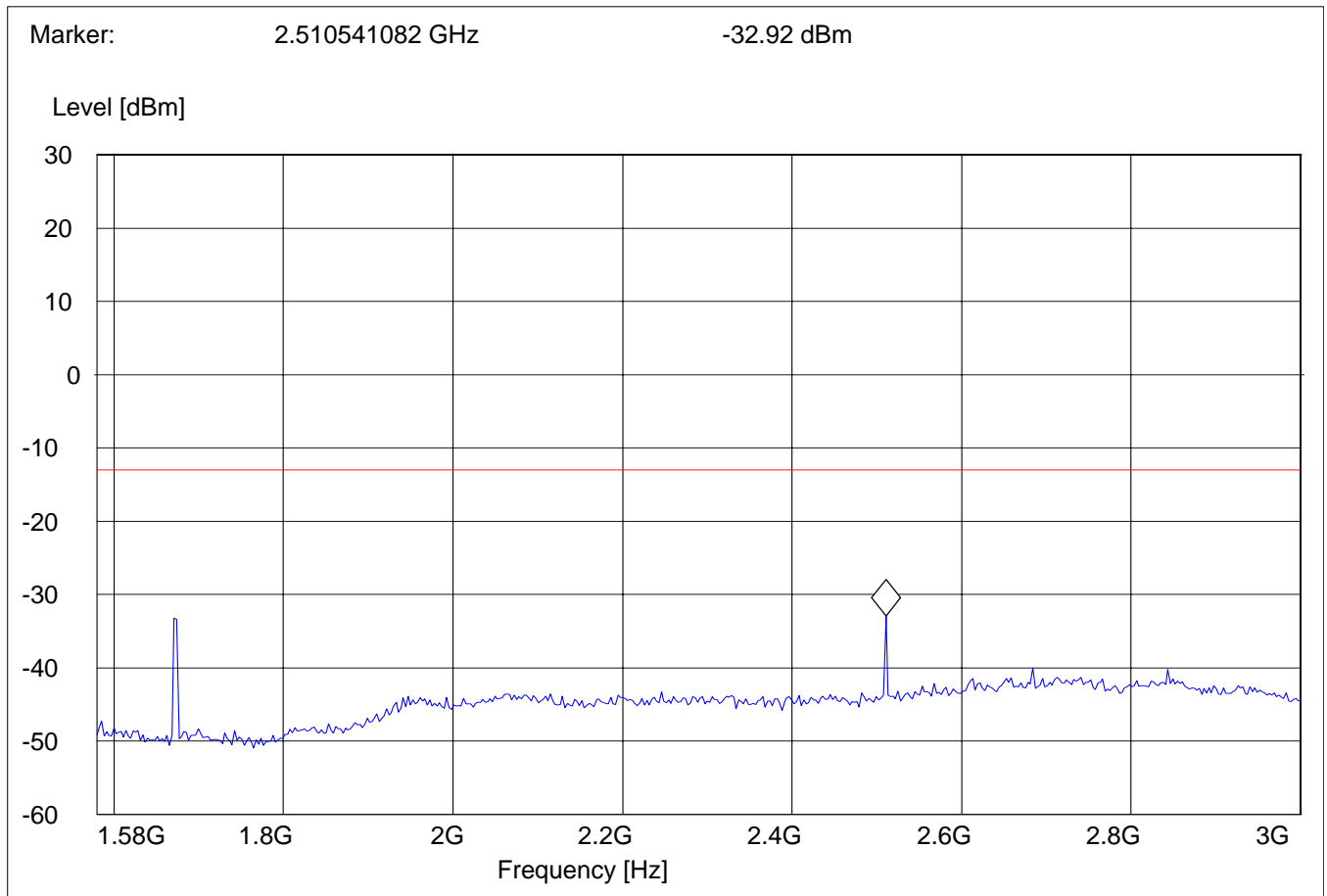
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 1.58GHz – 3GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency	Time		
1.58GHz	3GHz	Max Peak	Coupled	1 MHz



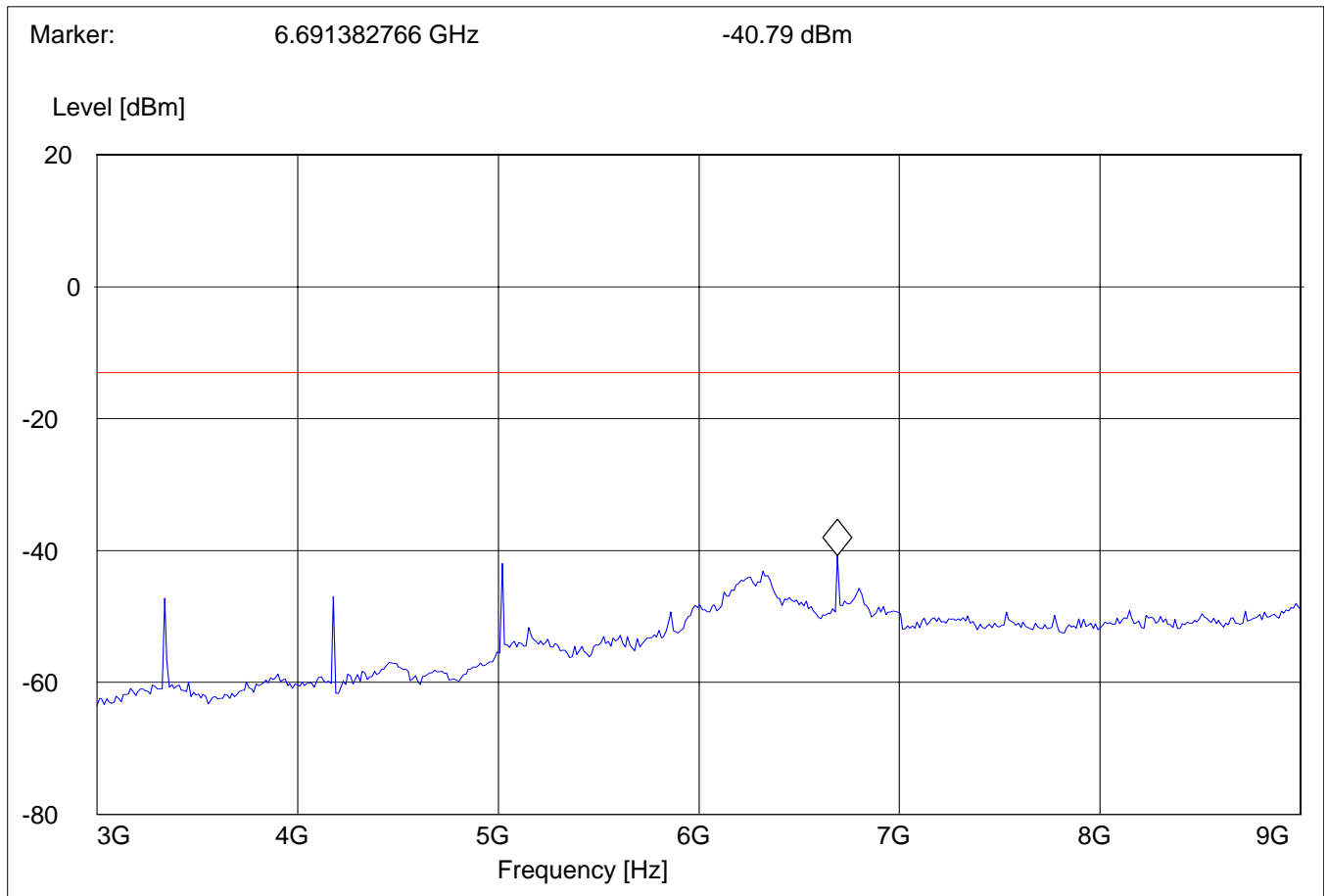
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 3GHz – 9GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	9GHz	Max Peak	Coupled	1 MHz



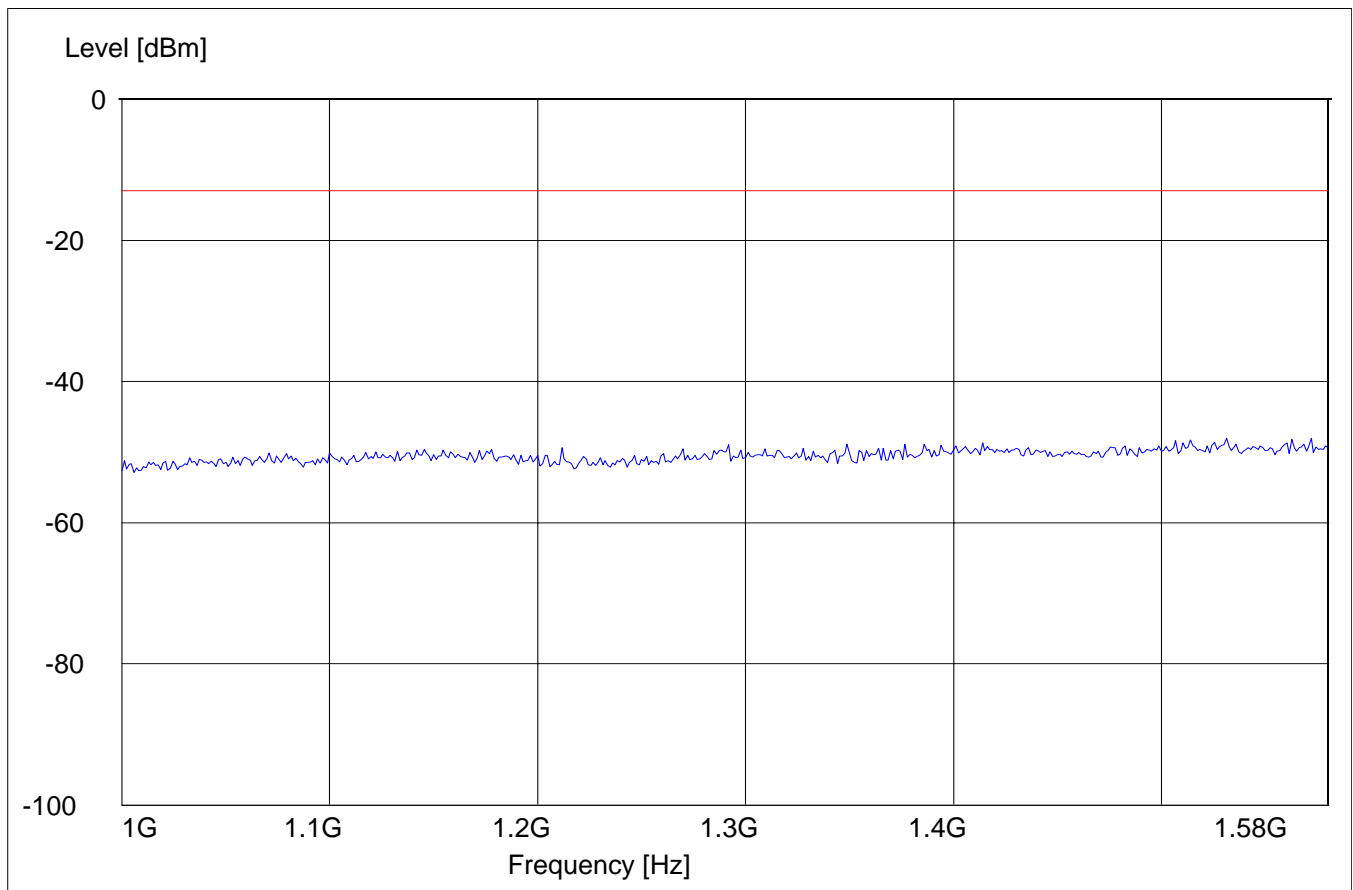
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 1GHz – 1.58GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	1.58GHz	Max Peak	Coupled	1 MHz



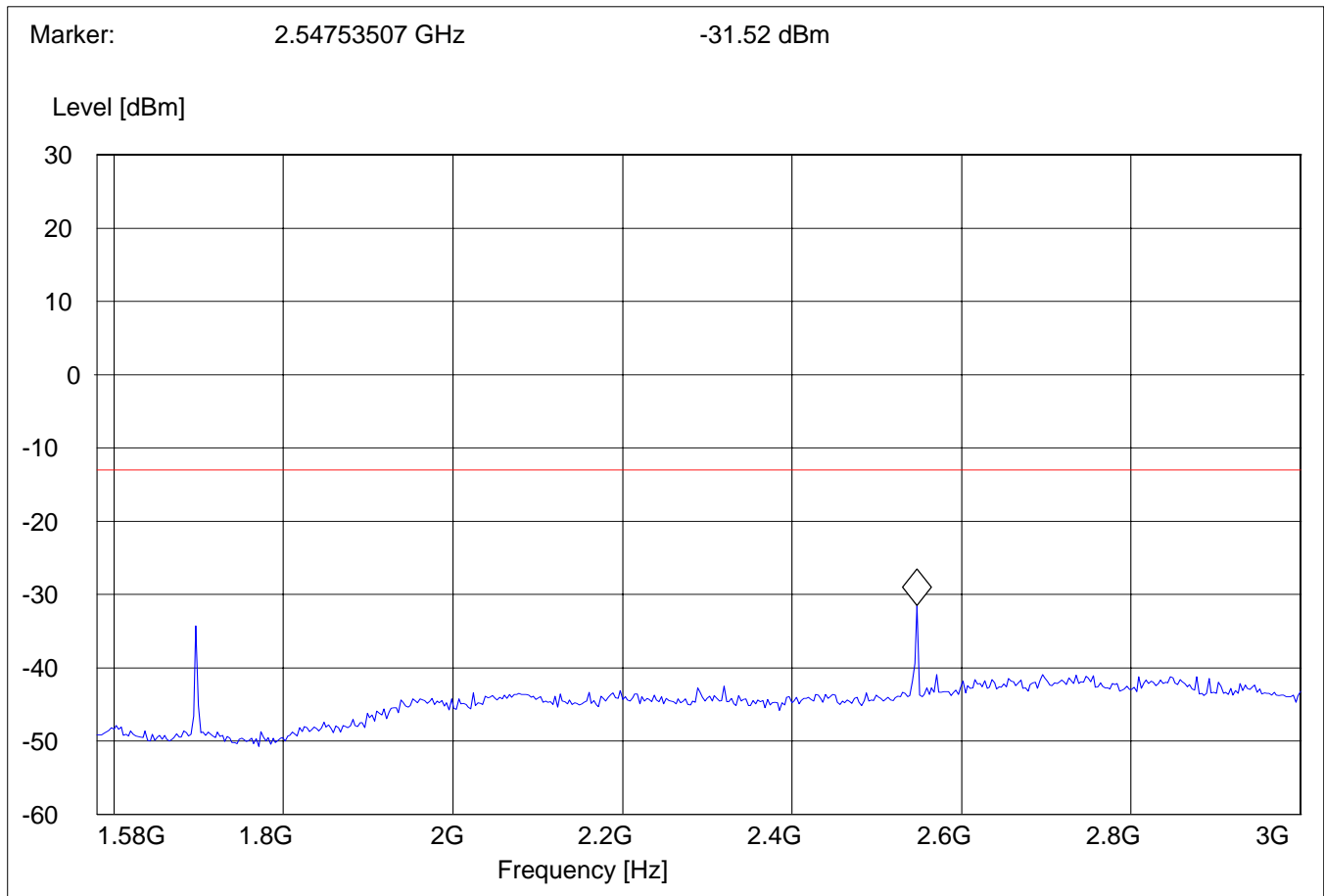
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 1.58GHz – 3GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency	Time		
1.58GHz	3GHz	Max Peak	Coupled	1 MHz



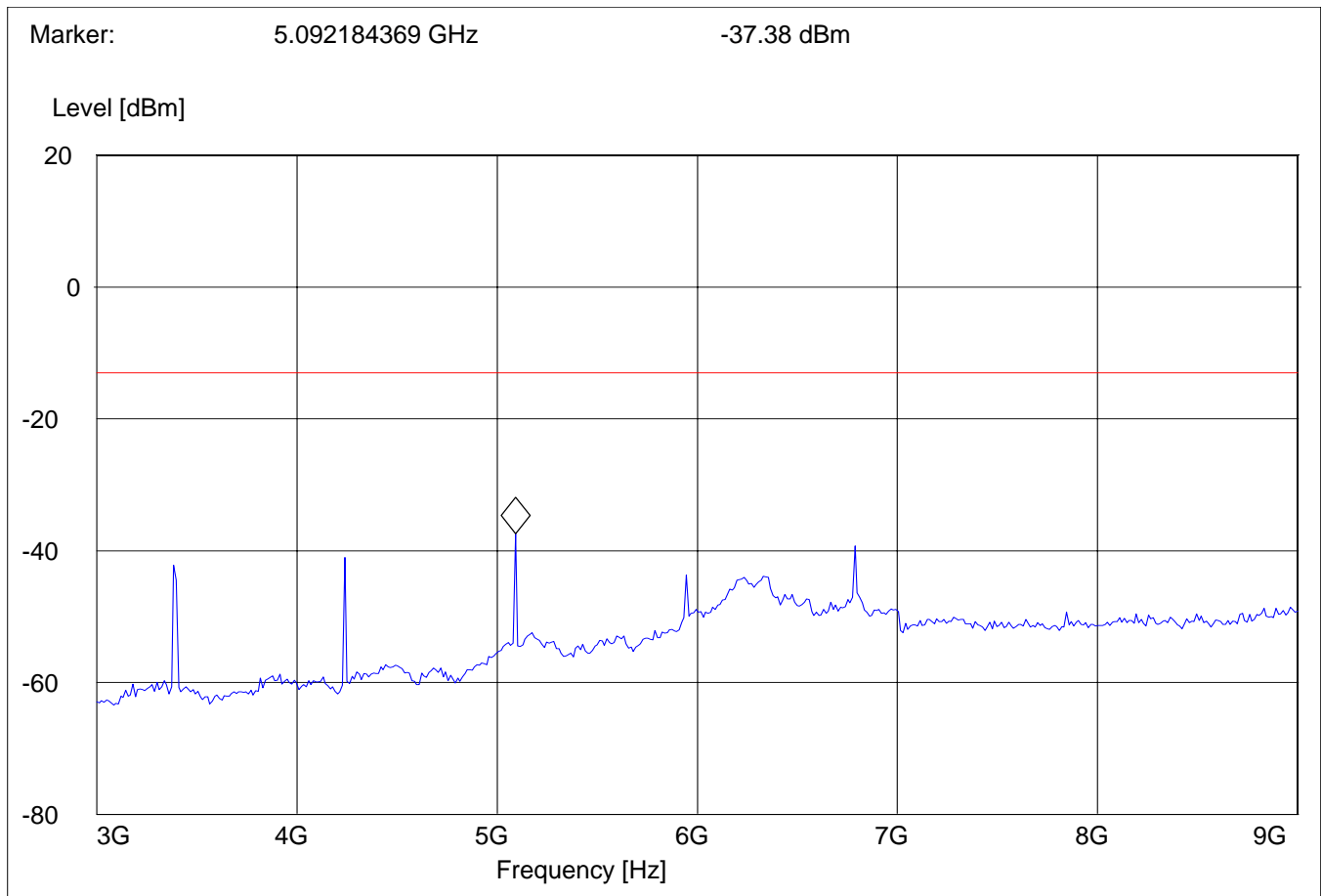
RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 3GHz – 9GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	9GHz	Max Peak	Coupled	1 MHz



RESULTS OF RADIATED TESTS PCS-1900:

nf = noise floor

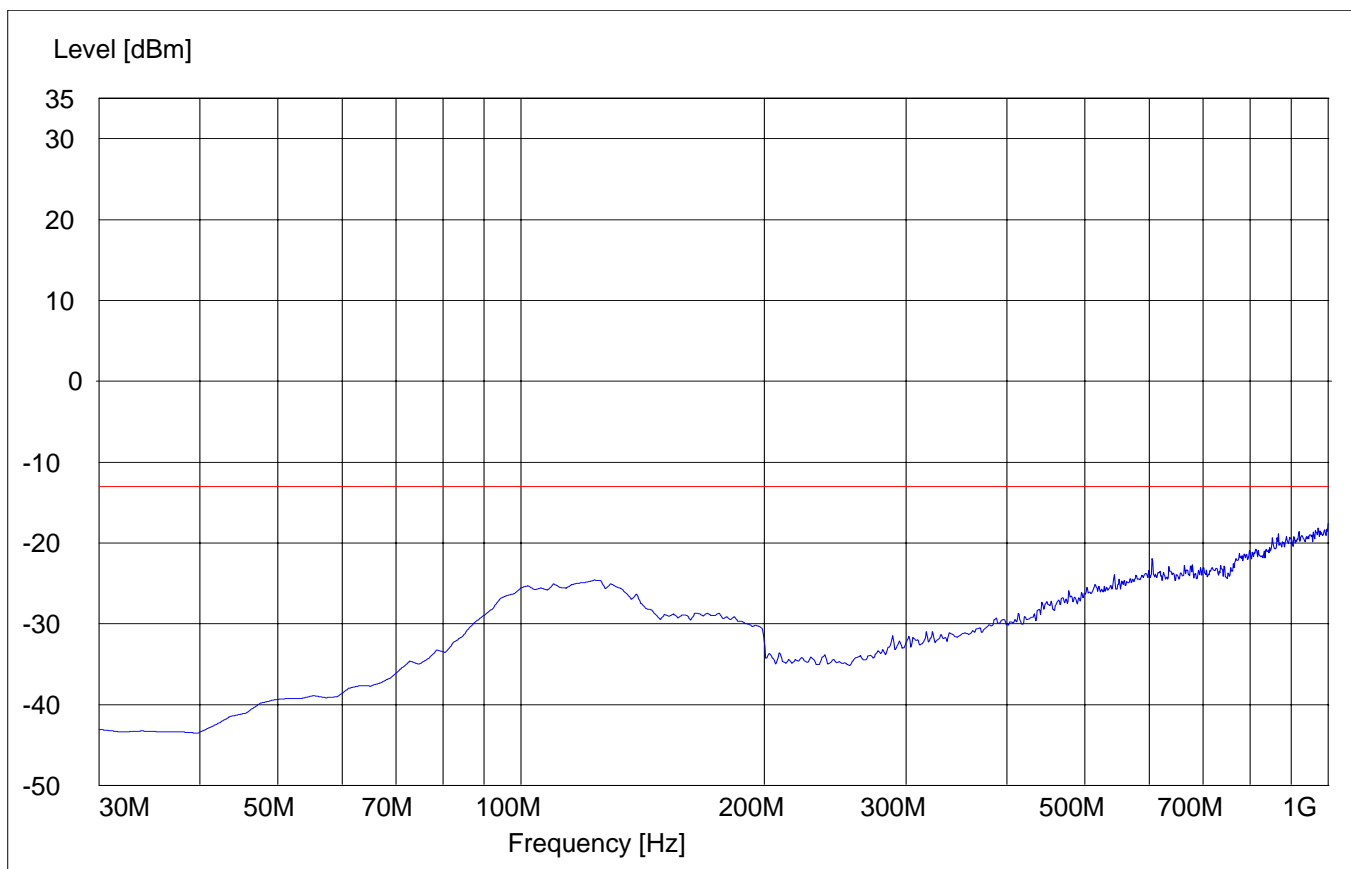
Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	3700.4	-41.03	3760	-39.92	3819.6	-41.60
3	5550.6	-33.71	5640	-33.87	5729.4	-34.39
4	7400.8	-46.92	7520	-45.72	7639.27	-51.78
5	9251	-36.53	9400	-32.57	9549	-36.49
6	11101.2	-29.59	11280	-29.18	11458.8	-28.68
7	12951.4	-35.28	13160	-38.10	13369.6	-38.23
8	14801.6	-36.12	15040	-41.25	15278.4	-44.30
9	16651.8	-32.15	16920	-43.07	17188.2	-40.62
10	18502	-33.74	18800	-34.75	19098	-35.16

RADIATED SPURIOUS EMISSIONS**Antenna: vertical****Tx @ 1850.2MHz: 30MHz - 1GHz**

Spurious emission limit -13dBm

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

<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
30MHz	1GHz	Max Peak	Coupled	1 MHz

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

RADIATED SPURIOUS EMISSIONS

Antenna: horizontal

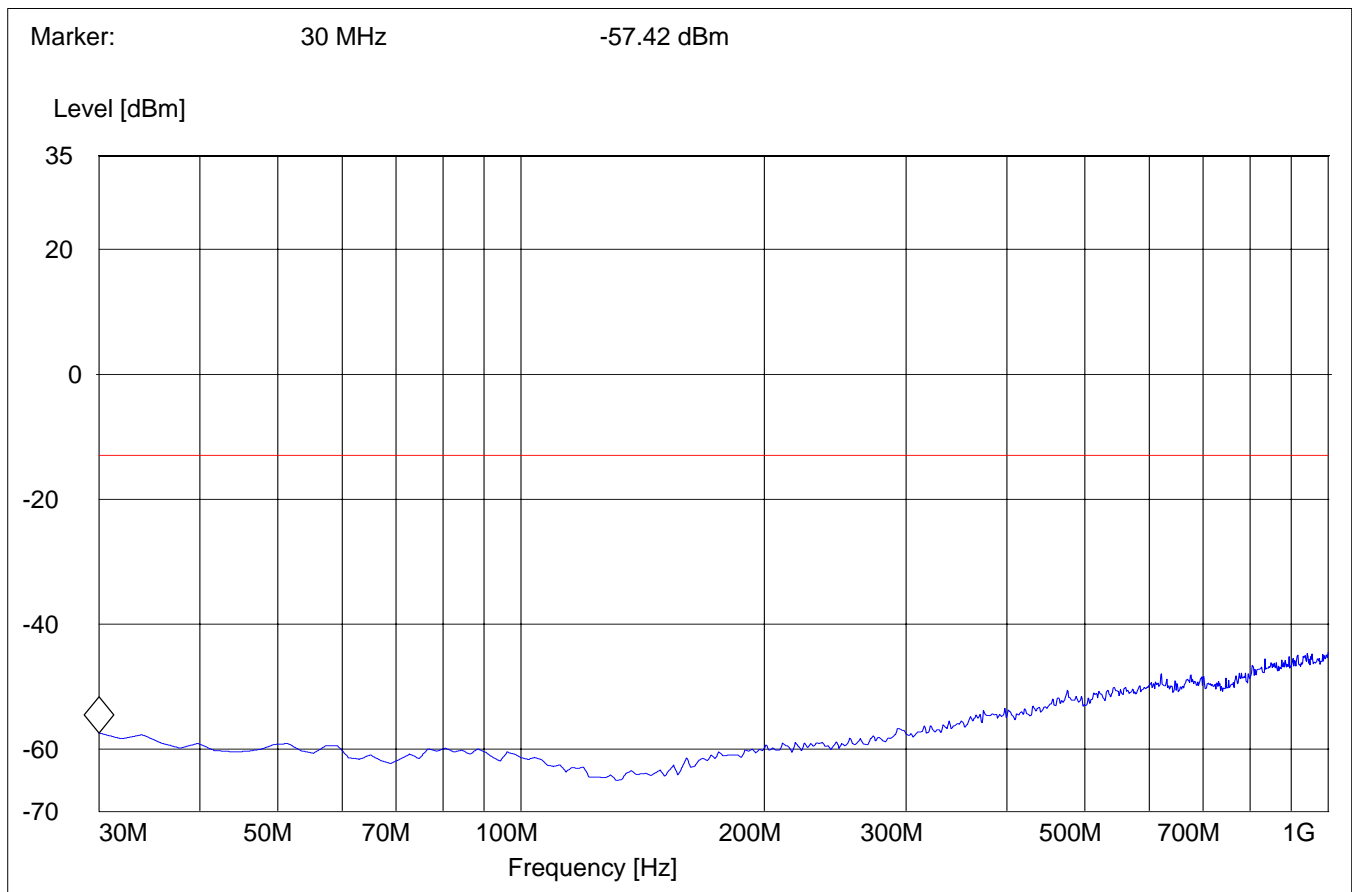
Tx @ 1850.2MHz: 30MHz - 1GHz

Spurious emission limit -13dBm

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

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
30MHz	1GHz	Max Peak	Coupled	1 MHz

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



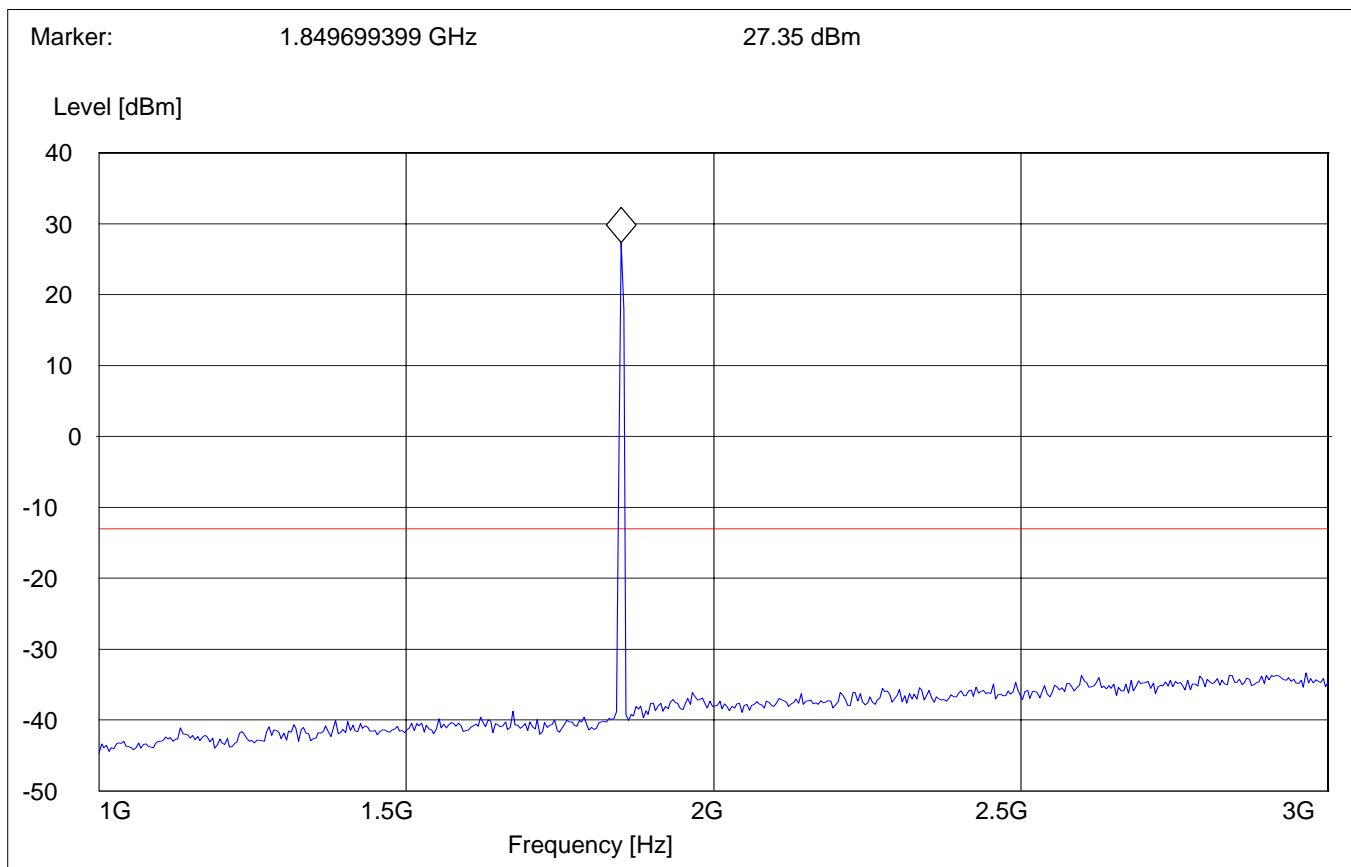
RADIATED SPURIOUS EMISSIONS**Tx @ 1850.2MHz: 1GHz – 3GHz**

Spurious emission limit -13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	3GHz	Max Peak	Coupled	1 MHz

Note: The peak above the limit line is the carrier freq. at ch-512.



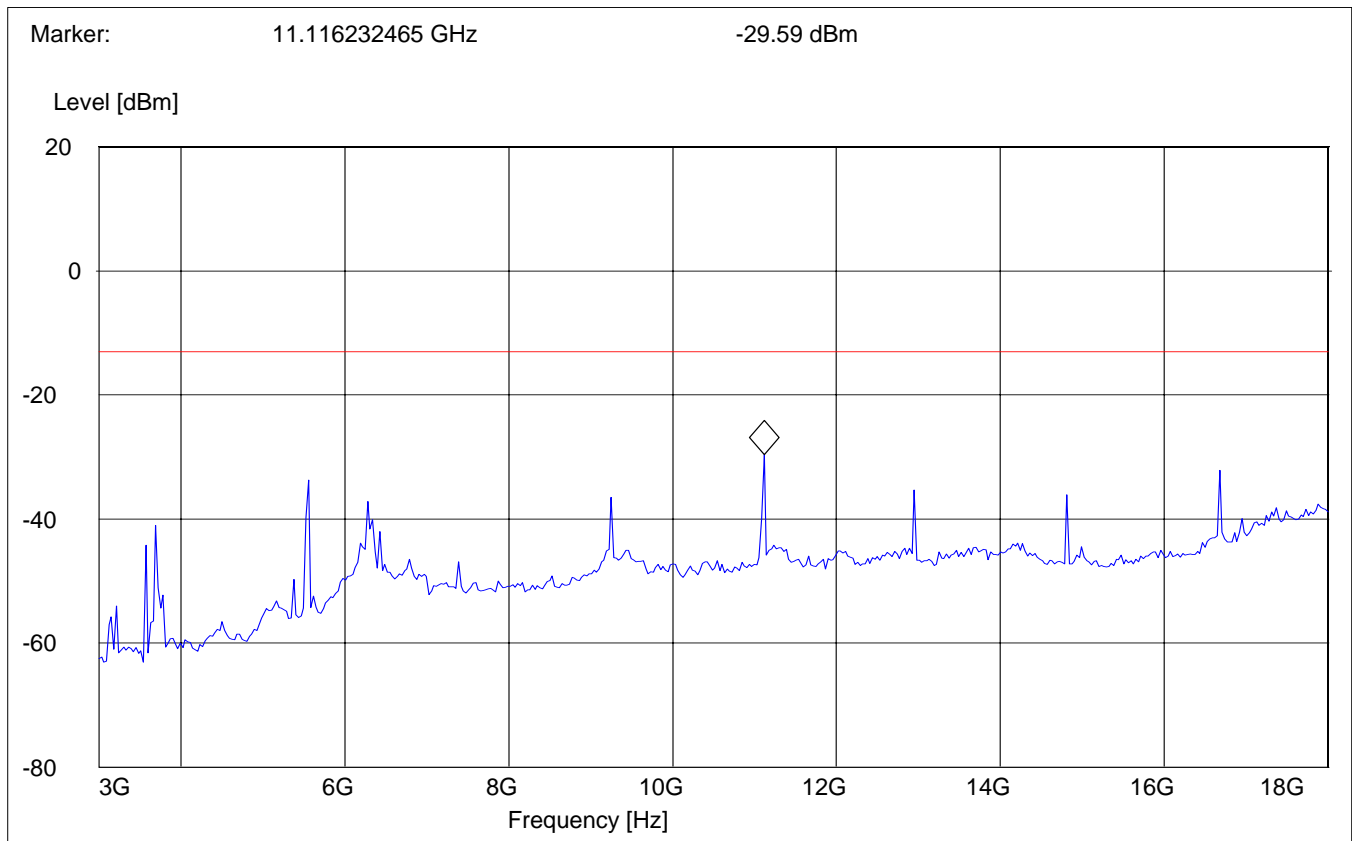
RADIATED SPURIOUS EMISSIONS

Tx @ 1850.2MHz: 3GHz – 18GHz

Spurious emission limit -13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	18GHz	Max Peak	Coupled	1 MHz



RADIATED SPURIOUS EMISSIONS

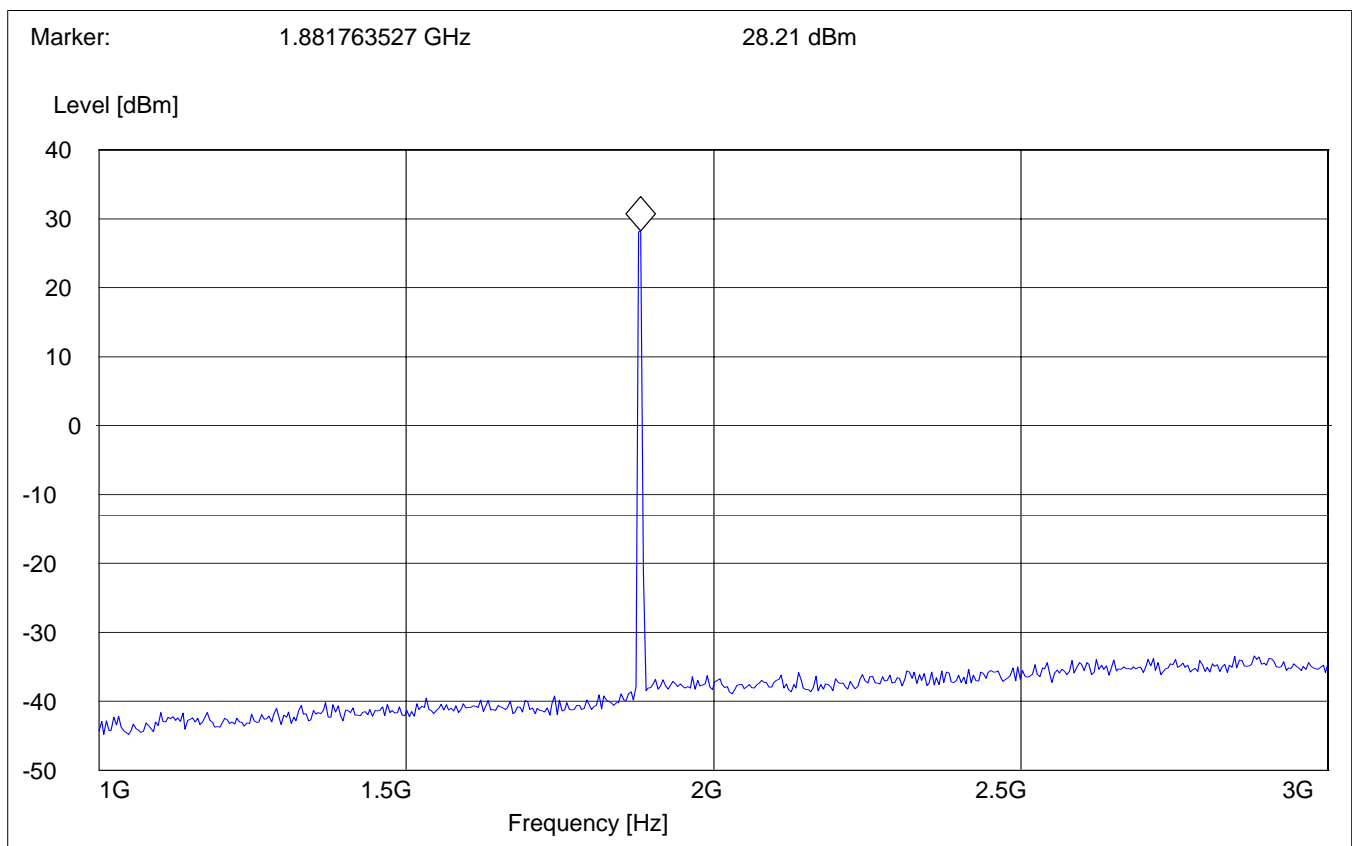
Tx @ 1880MHz: 1GHz – 3GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	3GHz	Max Peak	Coupled	1 MHz

Note: The peak above the limit line is the carrier freq. at ch-661.



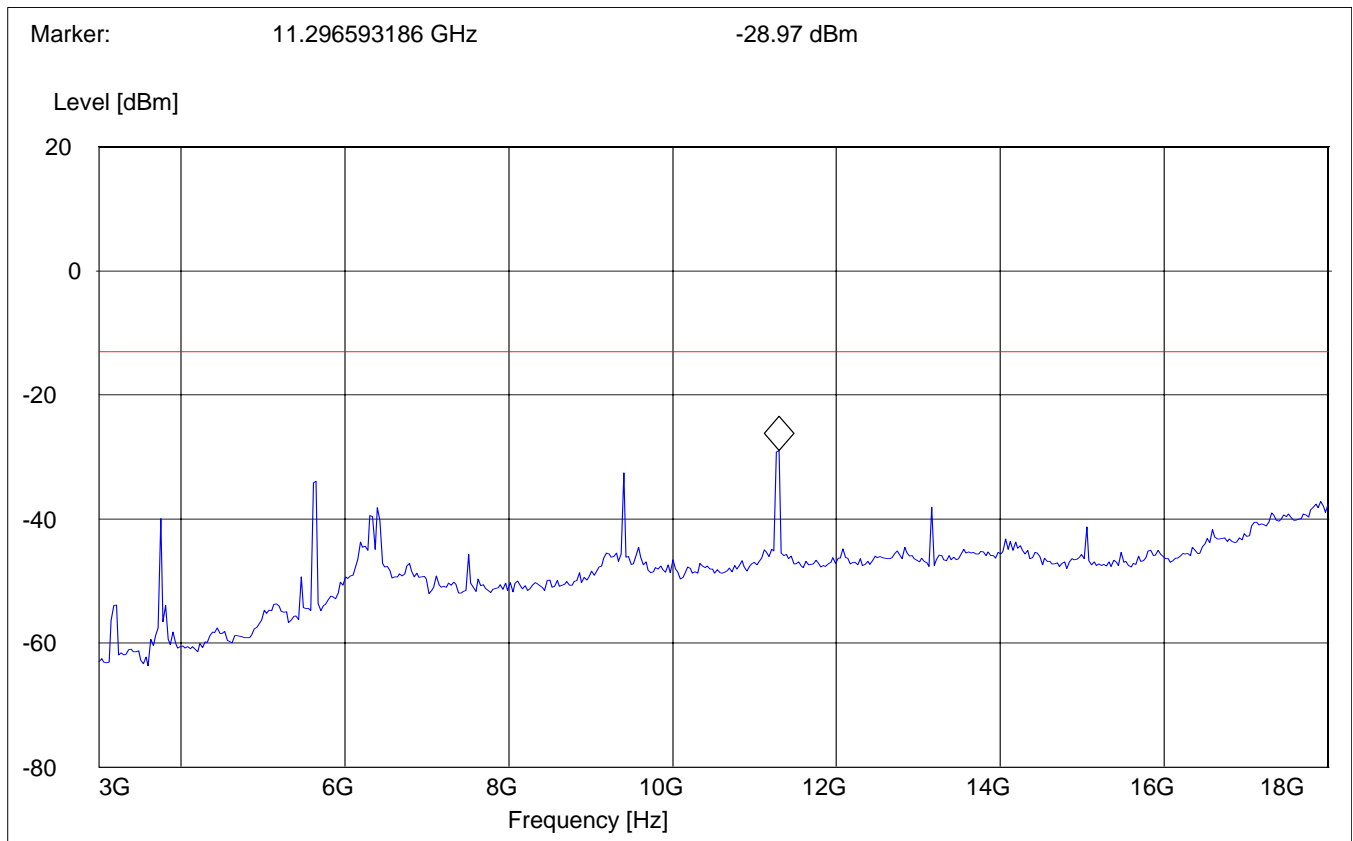
RADIATED SPURIOUS EMISSIONS

Tx @ 1880MHz: 3GHz – 18GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	18GHz	Max Peak	Coupled	1 MHz



RADIATED SPURIOUS EMISSIONS

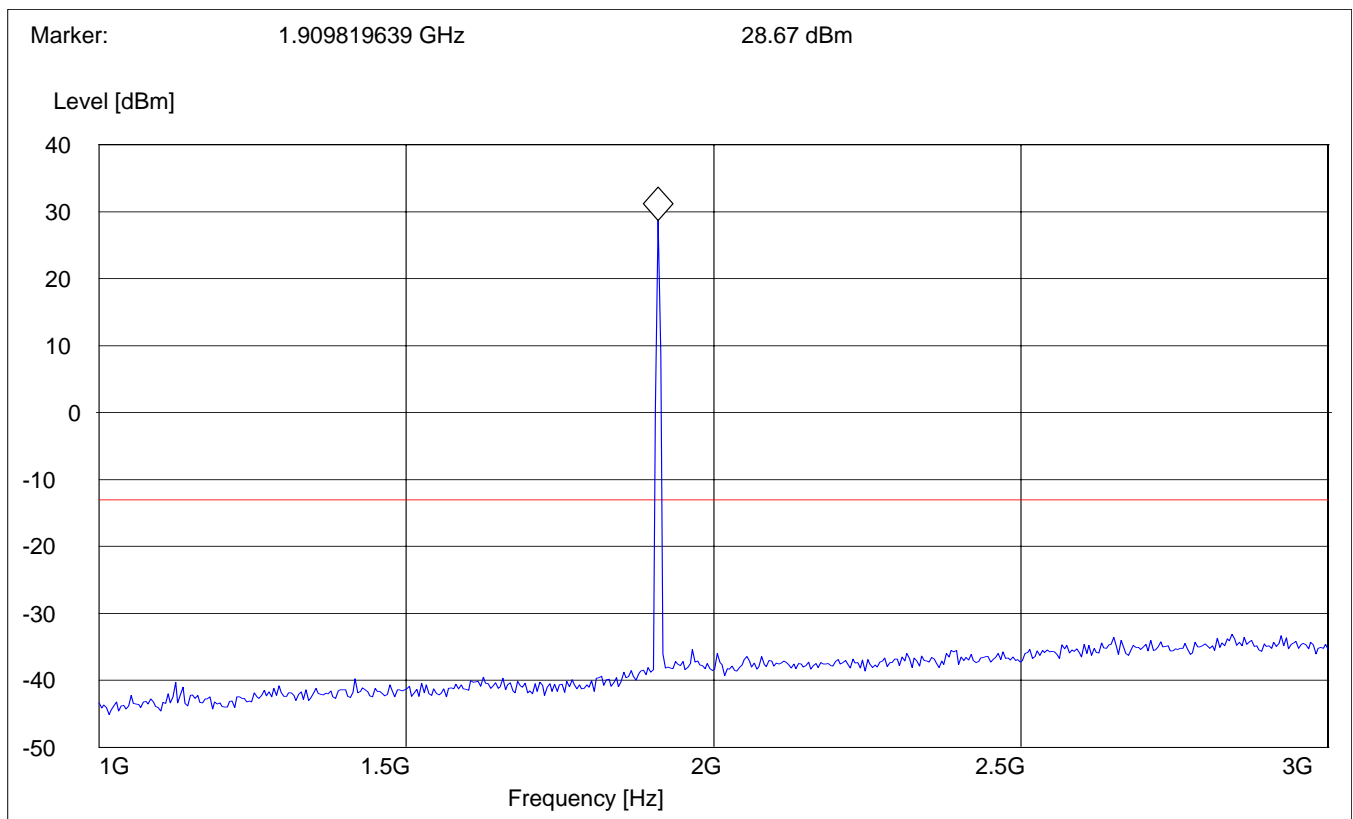
Tx @ 1909.8MHz: 1GHz – 3GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW/VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz

Note: The peak above the limit line is the carrier freq. at ch-810.



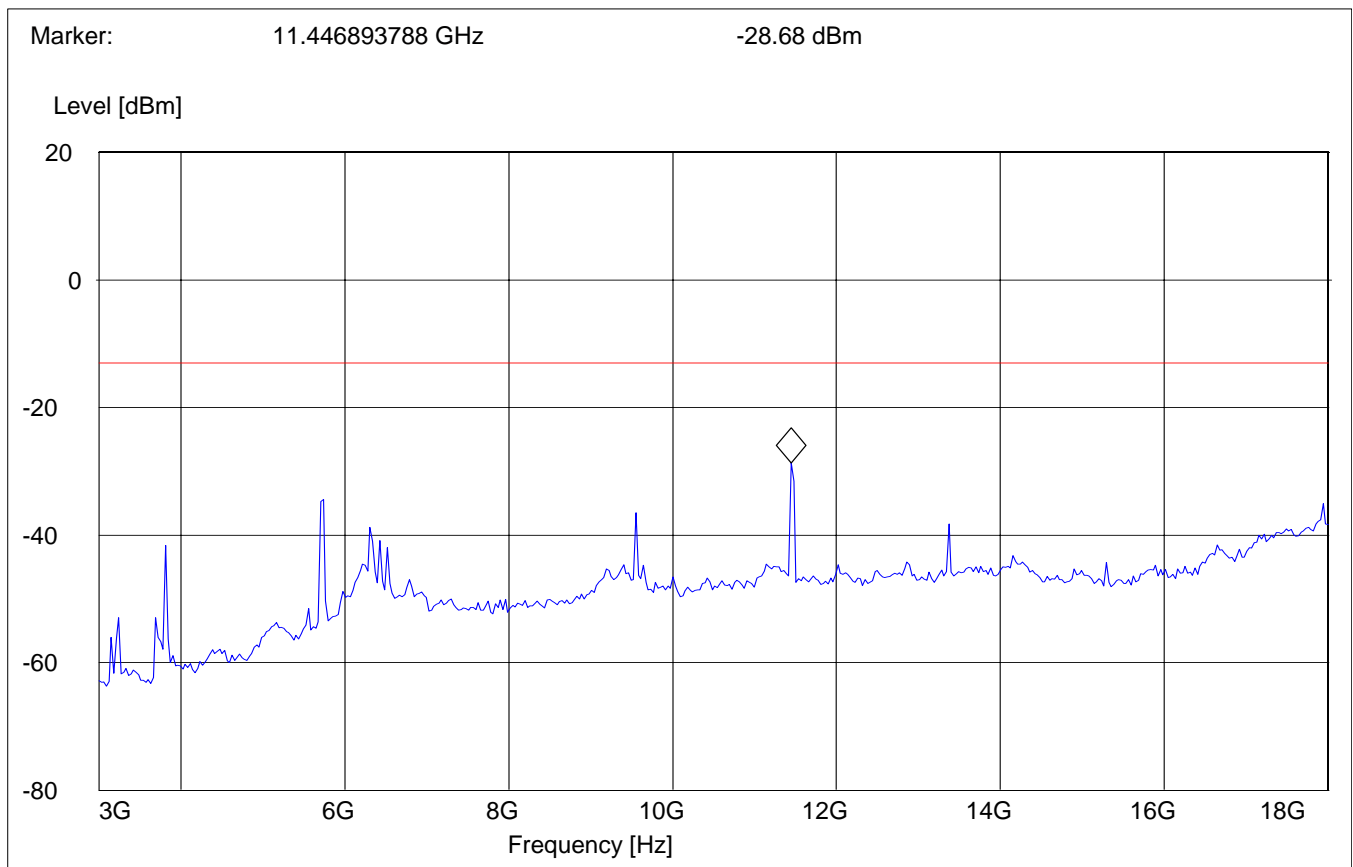
RADIATED SPURIOUS EMISSIONS

Tx @ 1909.8MHz: 3GHz – 18GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW/VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz



RADIATED SPURIOUS EMISSIONS

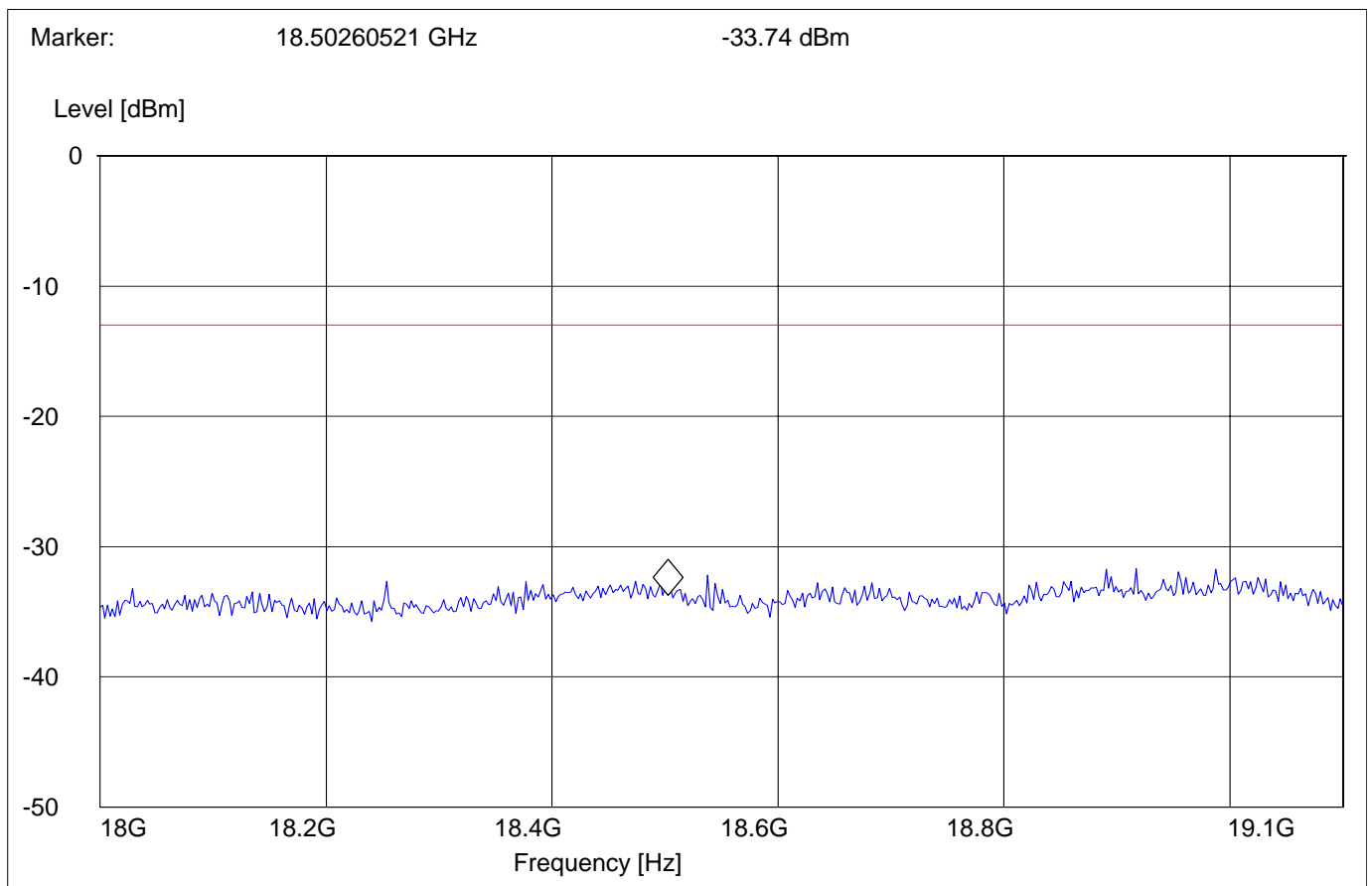
18GHz – 19.1GHz

Spurious emission limit –13dBm

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

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
18GHz	19.1GHz	Max Peak	Coupled	1 MHz

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

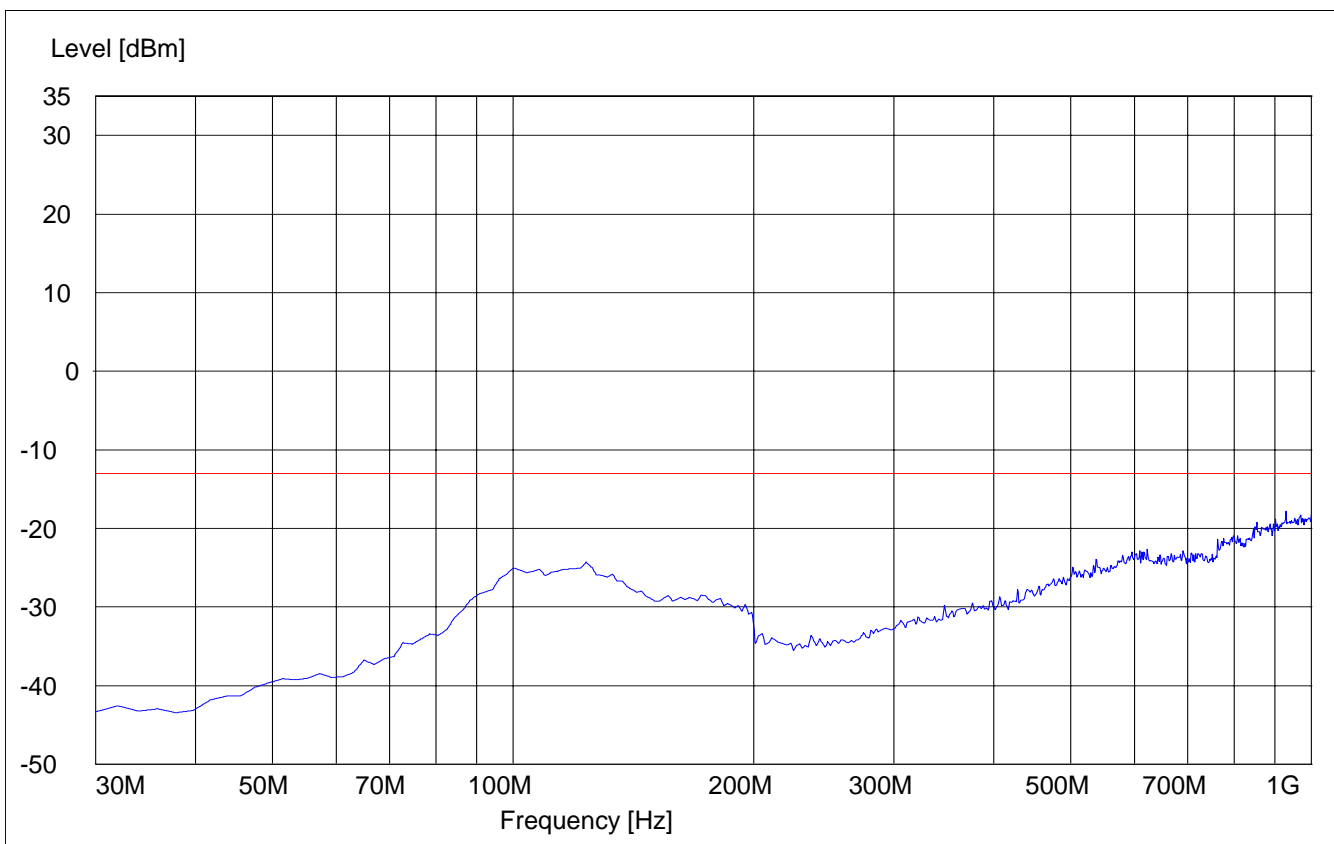


RADIATED SPURIOUS EMISSIONS (IDLE MODE)**EUT in Idle Mode: 30MHz – 1GHz**

Spurious emission limit –13dBm

(worst-case plot valid for both polarities)***SWEEP TABLE: "FCC 24 Spur 30M-1G"***

<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
30MHz	1GHz	Max Peak	Coupled	1 MHz



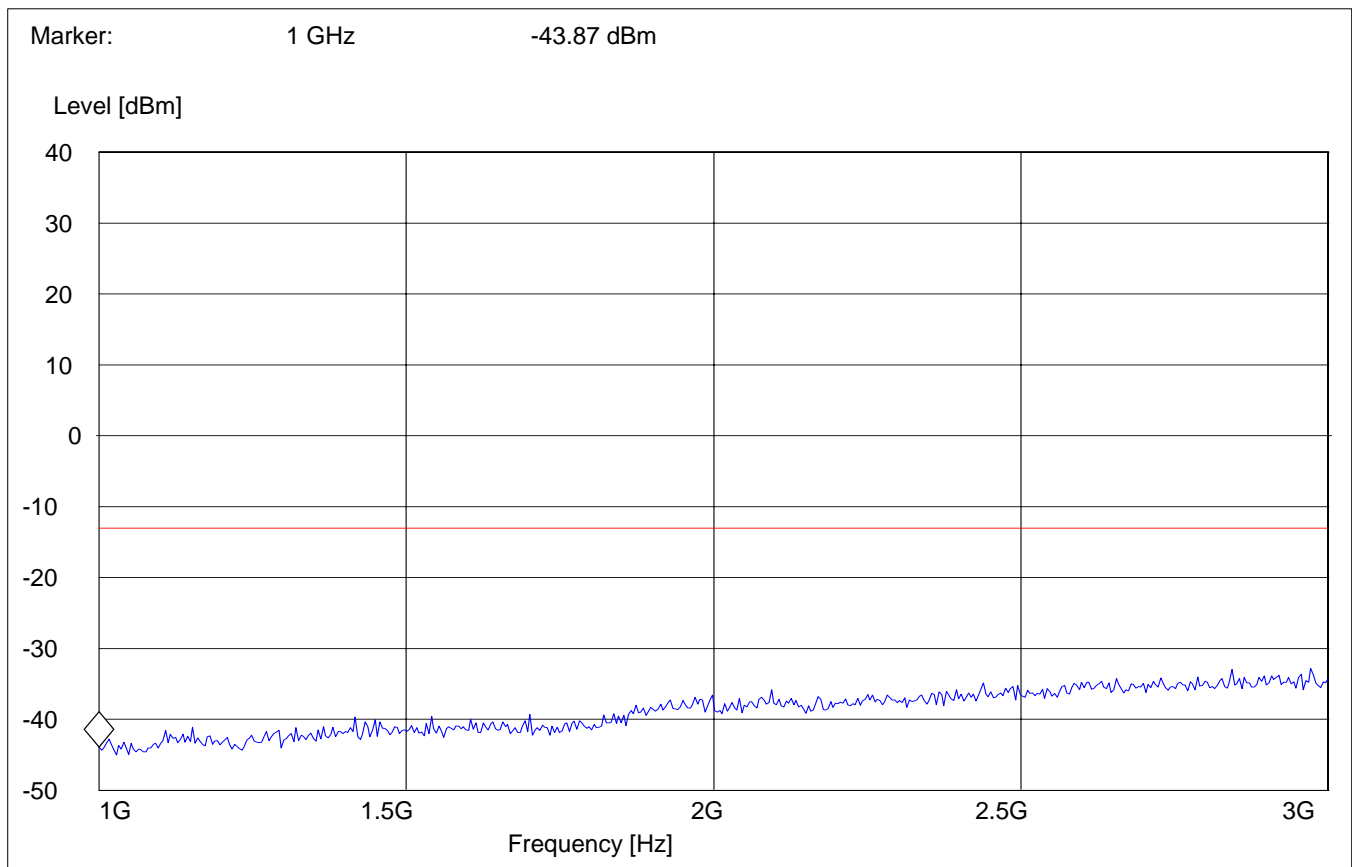
RADIATED SPURIOUS EMISSIONS

EUT in Idle Mode: 1GHz – 3GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	3GHz	Max Peak	Coupled	1 MHz



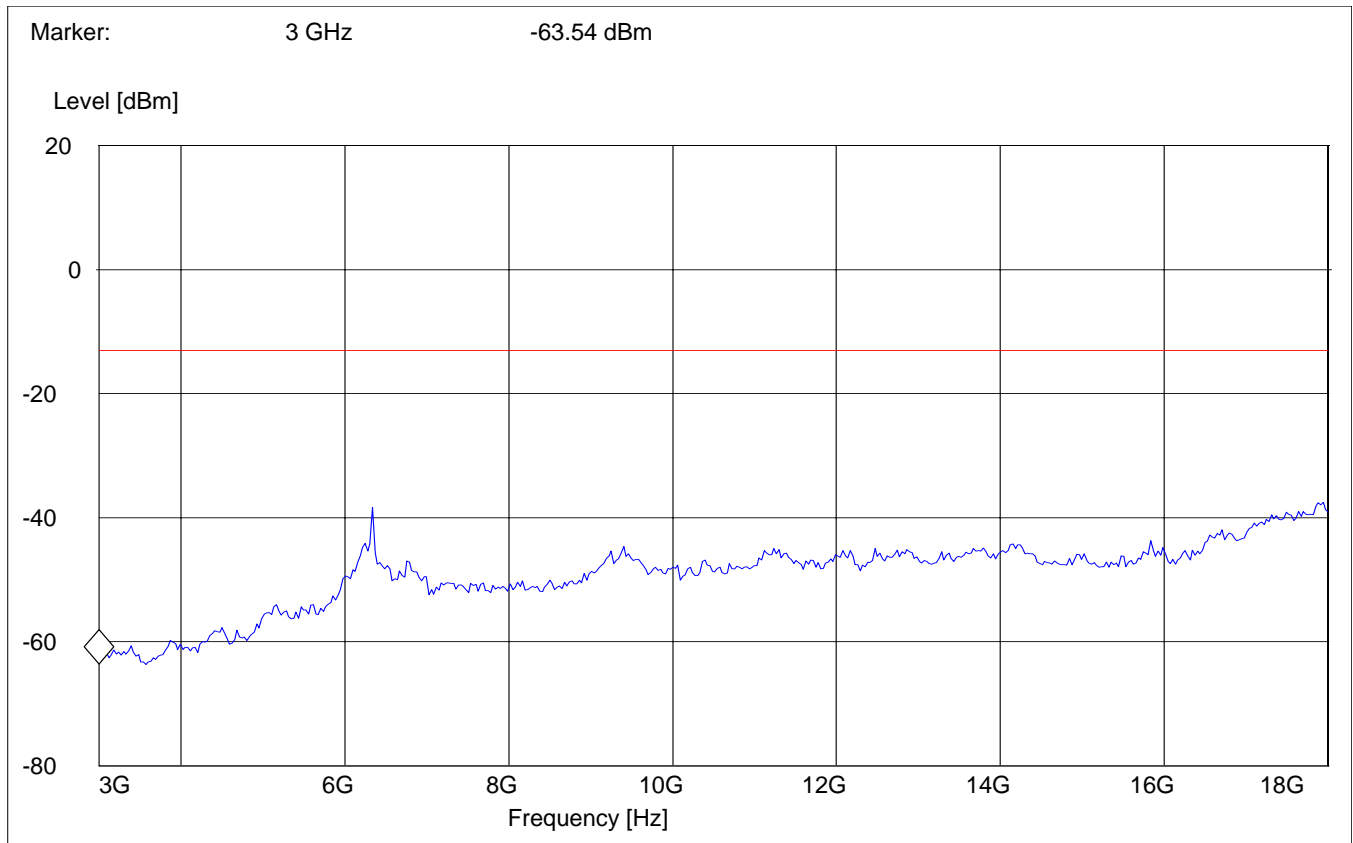
RADIATED SPURIOUS EMISSIONS

EUT in Idle Mode: 3GHz – 18GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 24 spuri 3-18G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	18GHz	Max Peak	Coupled	1 MHz



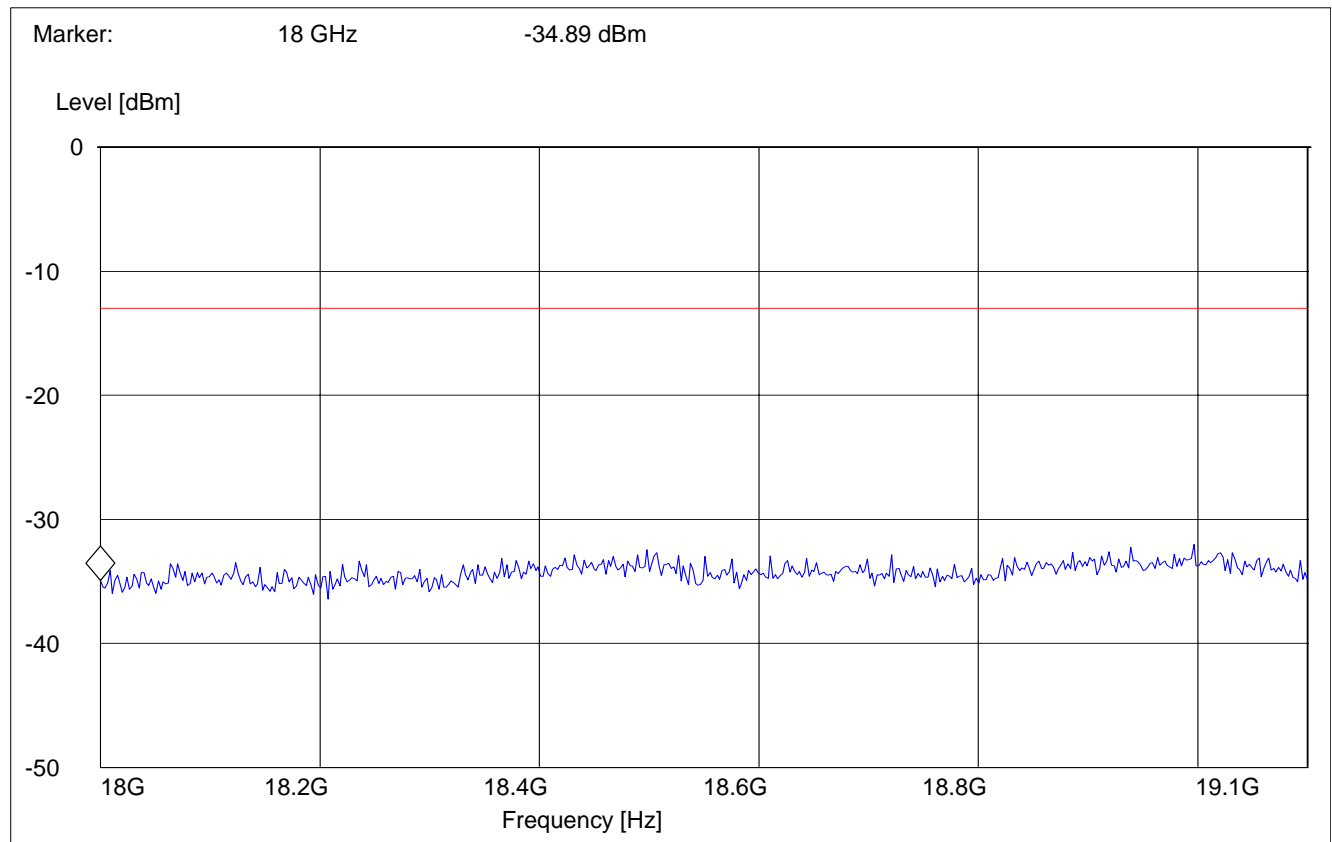
RADIATED SPURIOUS EMISSIONS

EUT in Idle Mode: 18GHz – 19.1GHz

Spurious emission limit –13dBm

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

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency	Time		
18GHz	19.1GHz	Max Peak	Coupled	1 MHz



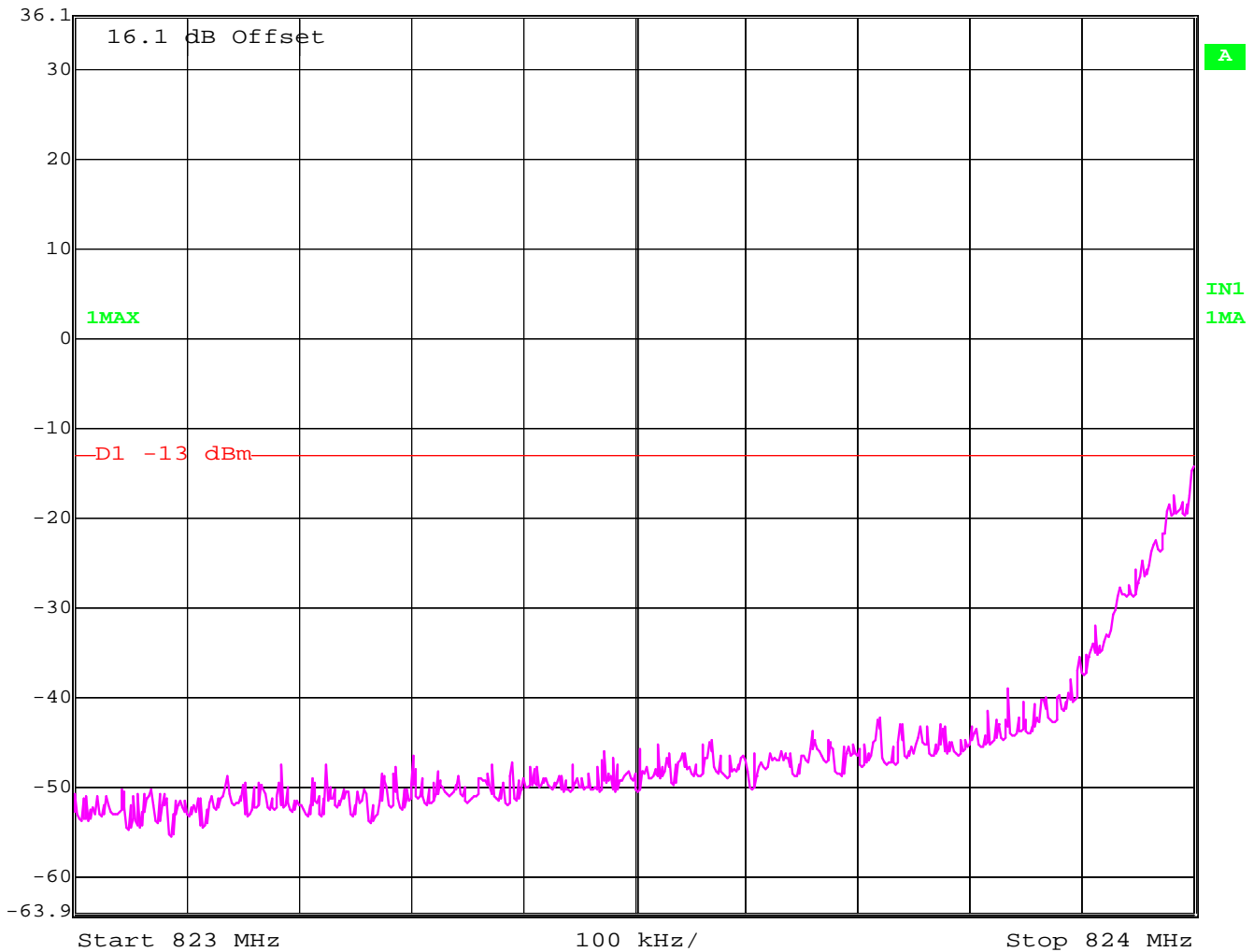
LOW BAND EDGE BLOCK-1 (A* Low + A) (GSM-850)
(Conducted)
CH-128

§2.1049, §22.917(b)



Ref Lvl
 36.1 dBm

RBW 3 kHz RF Att 30 dB
 VBW 3 kHz
 SWT 280 ms Unit dBm



HIGH BAND EDGE BLOCK-4 (B*) (GSM-850)
(Conducted)
CH-251

§2.1049, §22.917(b)



Marker 1 [T1]

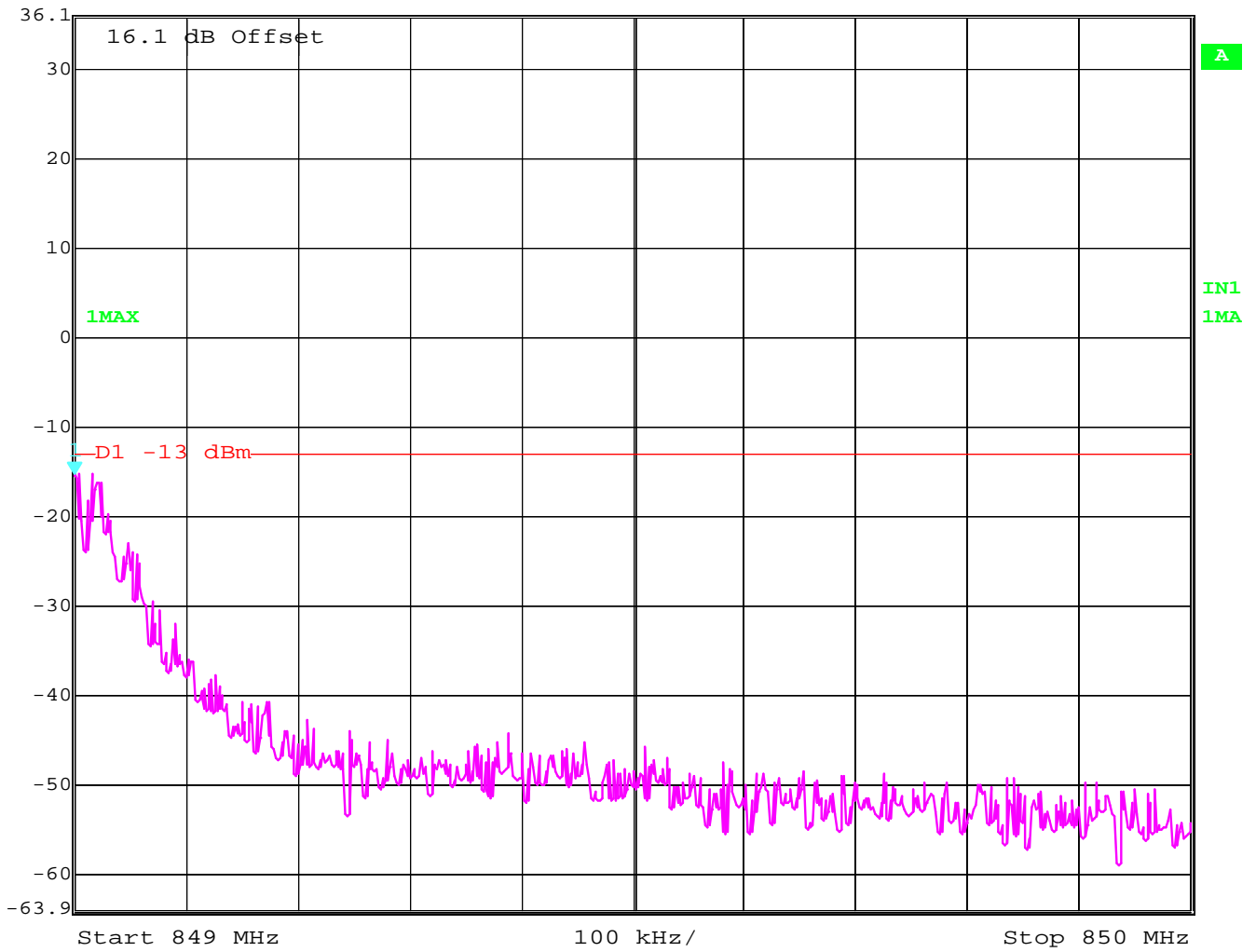
RBW 3 kHz RF Att 30 dB

Ref Lvl -15.28 dBm

VBW 3 kHz

36.1 dBm 849.00000000 MHz

SWT 280 ms Unit dBm



LOW BAND EDGE BLOCK-A (PCS-1900)
(Conducted)
CH-512

§2.1049, §24.238 (a)(b)



Marker 1 [T1]

RBW 3 kHz RF Att 30 dB

Ref Lvl -15.37 dBm

VBW 3 kHz

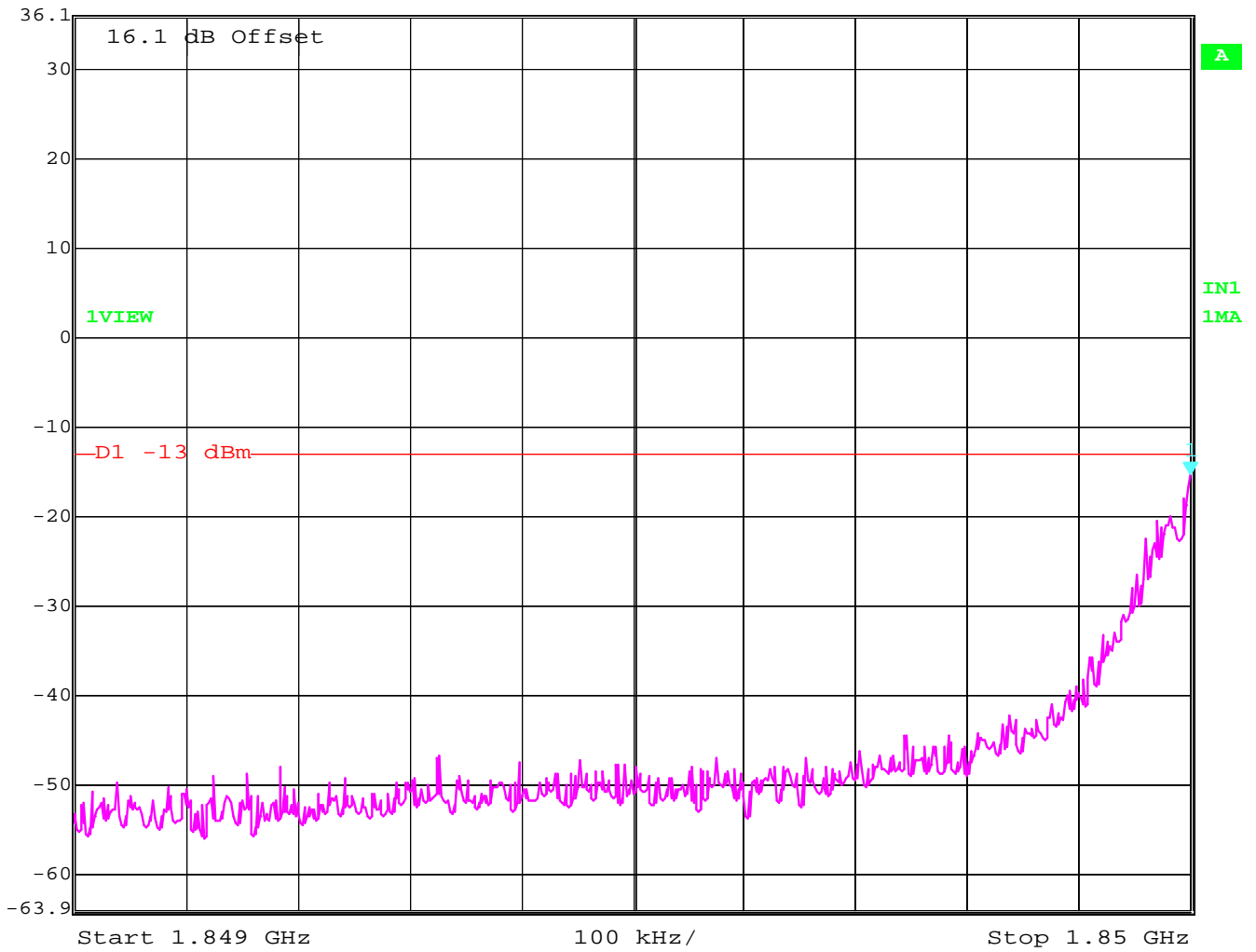
36.1 dBm

1.85000000 GHz

SWT 280 ms

Unit

dBm



HIGH BAND EDGE BLOCK-C (PCS-1900)
(Conducted)
CH-810

§2.1049, §24.238 (a)(b)



Marker 1 [T1]

RBW 3 kHz RF Att 30 dB

Ref Lvl -19.98 dBm

VBW 3 kHz

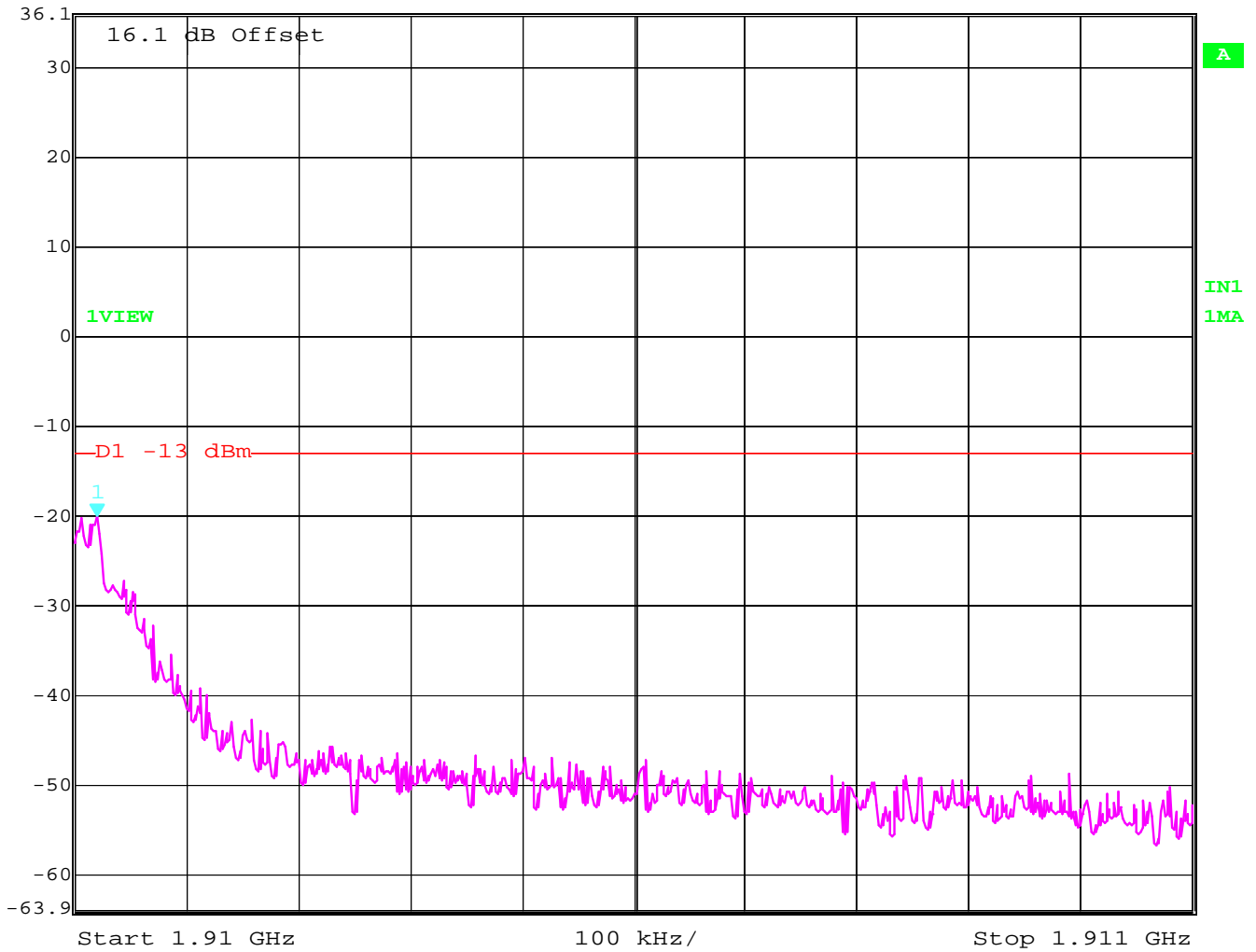
36.1 dBm

1.91002004 GHz

SWT 280 ms

Unit

dBm



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

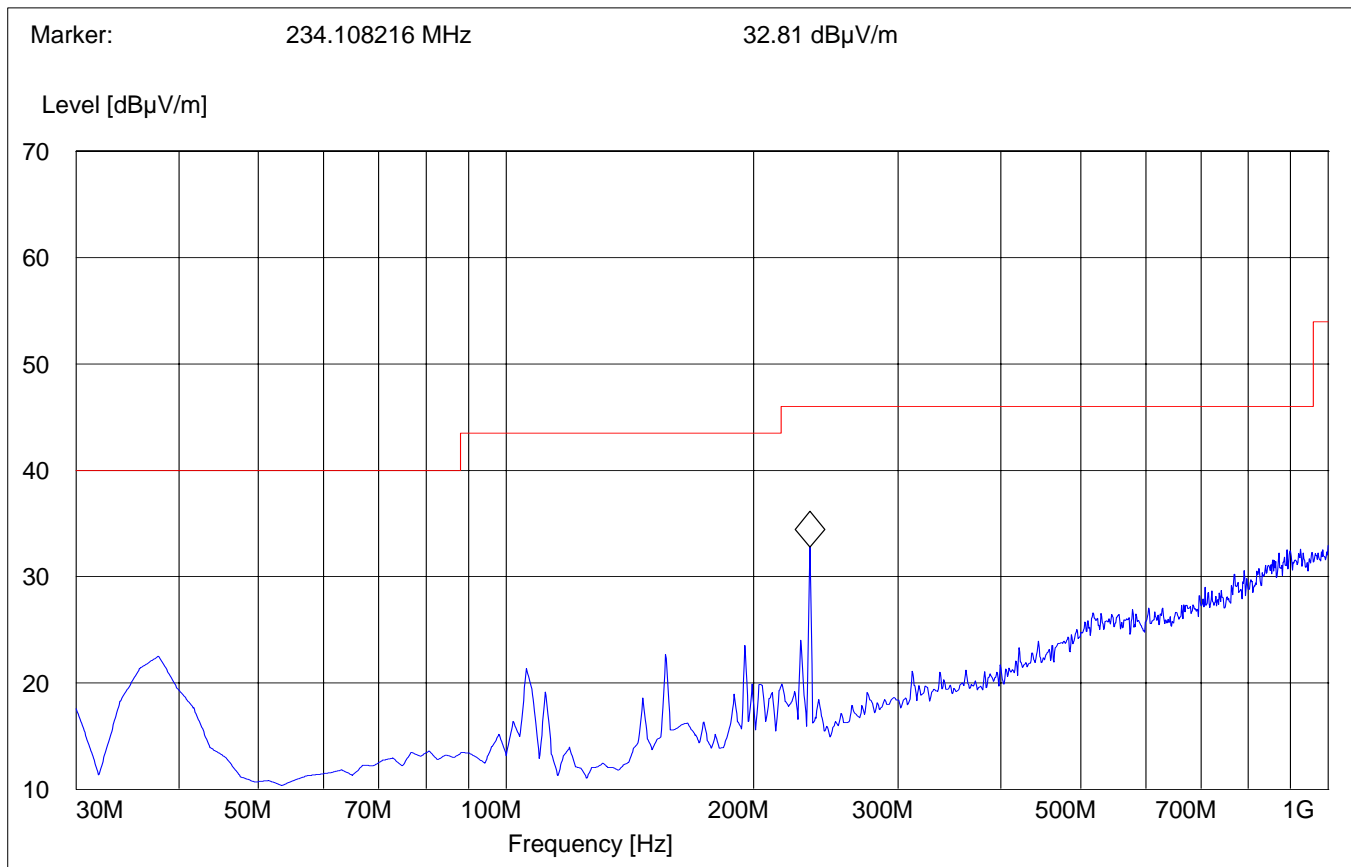
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18GHz and 19.1GHz very short cable connections to the antenna was used to minimize the noise level.
2. Receiver radiated emissions were performed for both 850/1900 bands, but only worst case plots are submitted in the test report.

Limits**SUBCLAUSE § 15.209**

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

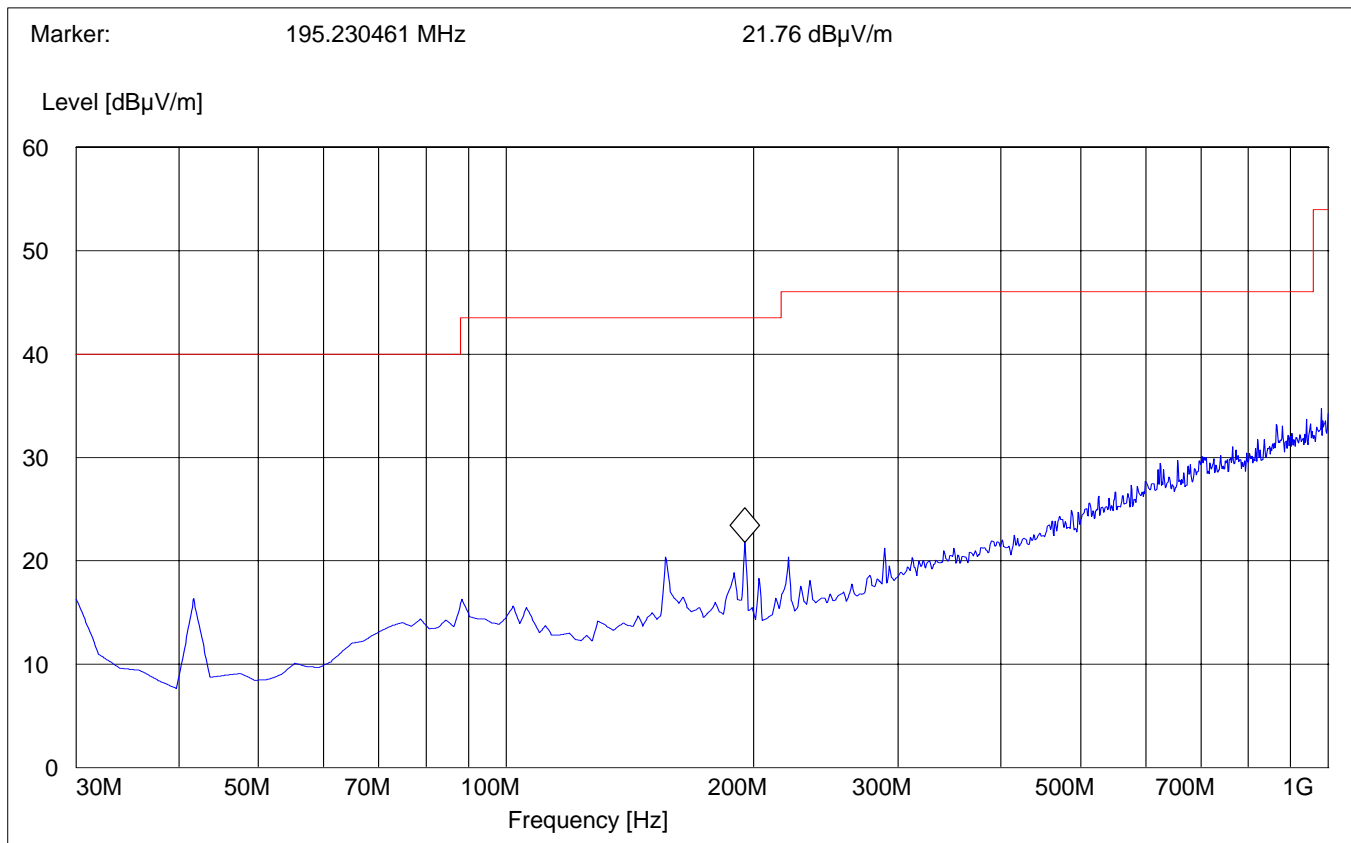
RECEIVER RADIATED EMISSIONS**EUT in Idle Mode: 30MHz – 1GHz****Antenna: vertical****SWEEP TABLE: "FCC 15 Spur 30M-1G"**

<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
30MHz	1GHz	Max Peak	Coupled	100KHz



RECEIVER RADIATED EMISSIONS**EUT in Idle Mode: 30MHz – 1GHz****Antenna: horizontal****SWEEP TABLE: "FCC 15 Spur 30M-1G"**

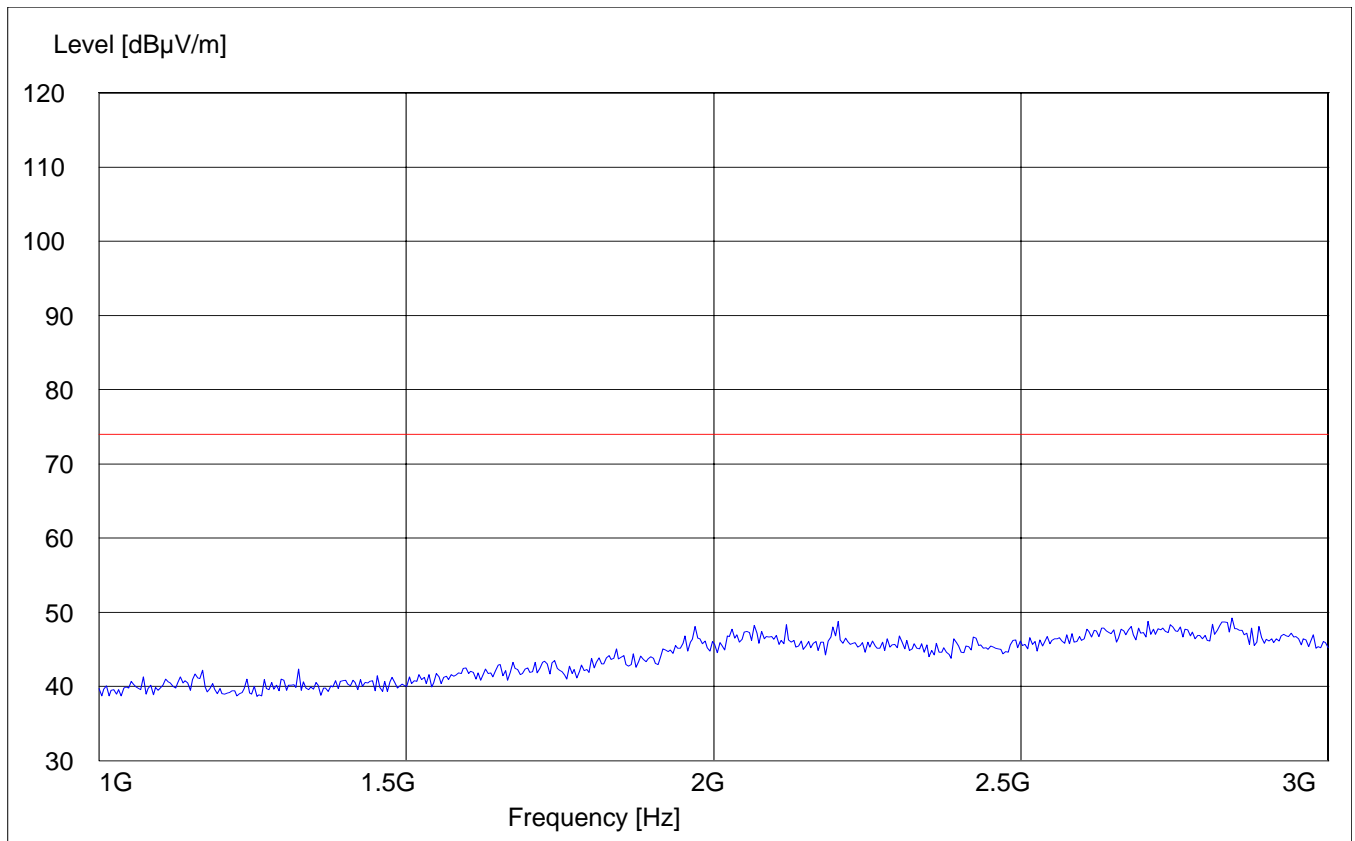
<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
30MHz	1GHz	Max Peak	Coupled	100KHz



RECEIVER RADIATED EMISSIONS **EUT in Idle Mode: 1GHz – 3GHz**

SWEEP TABLE: "FCC 15 Spuri 1-3G"

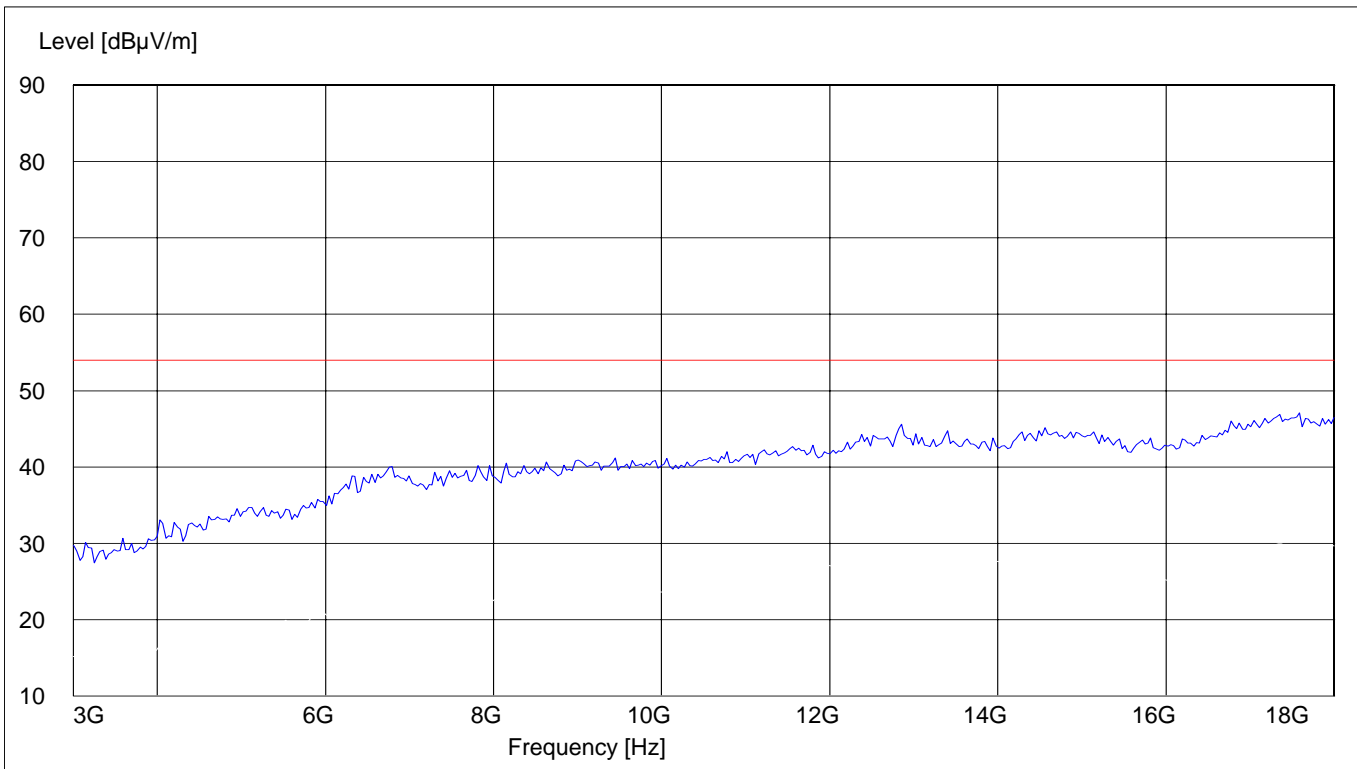
<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
1GHz	3GHz	Max Peak	Coupled	1 MHz



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 3GHz – 18GHz

SWEEP TABLE: "FCC 15 spuri 3-18G"

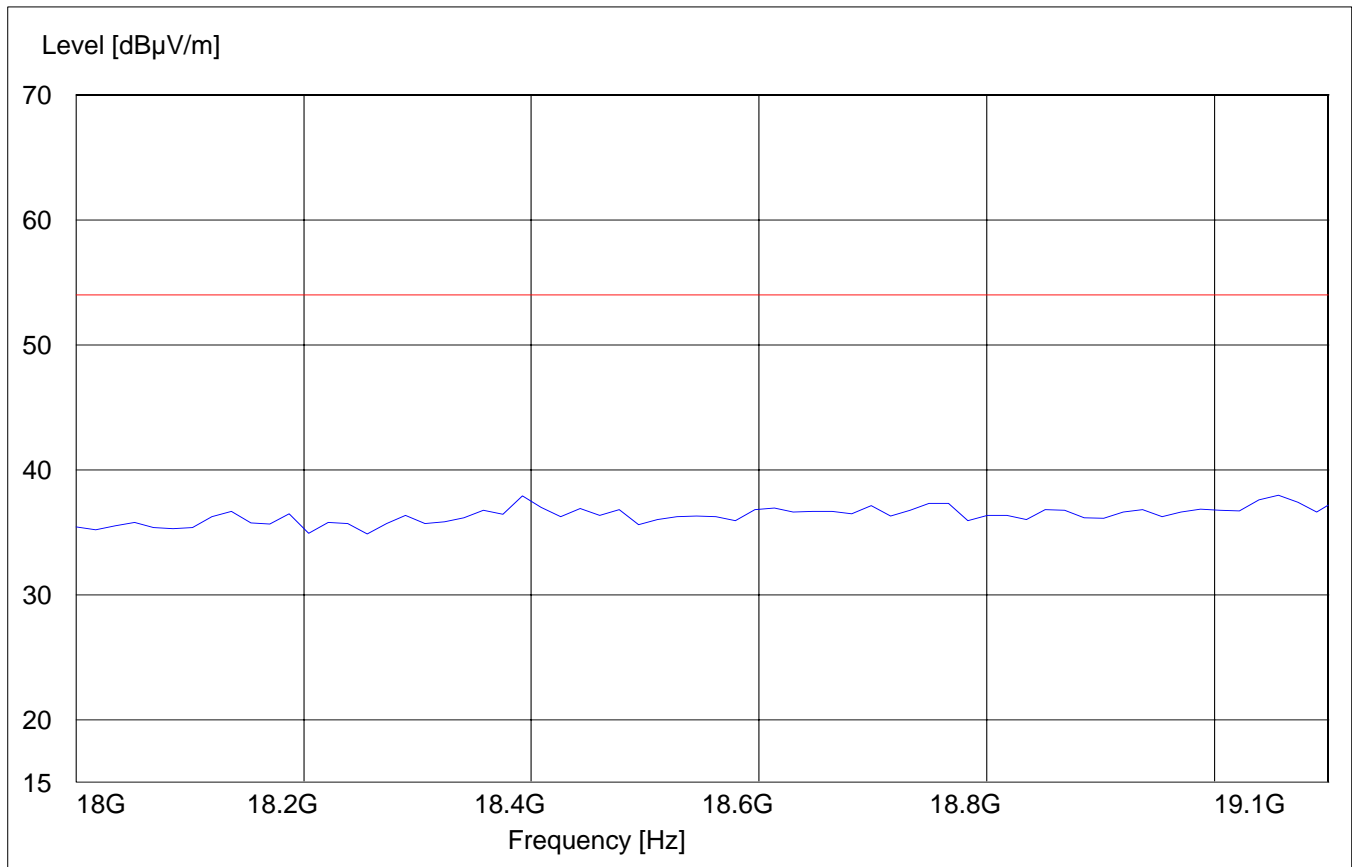
<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
3GHz	18GHz	Max Peak	Coupled	1 MHz



RECEIVER RADIATED EMISSIONS EUT in Idle Mode: 18GHz – 19.1GHz

SWEEP TABLE: "FCC 15 spuri 18-19.1G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
18GHz	19.1GHz	Max Peak	Coupled	1 MHz



CONDUCTED SPURIOUS EMISSIONS**§ 2.1057 / §24.238****Measurement Procedure:**

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment under test, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz for PCS-1900 and 30 MHz – 9 GHz for GSM-850.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

GSM-850 Transmitter

Channel	Frequency
128	824.2 MHz
190	836.6 MHz
251	848.8 MHz

PCS-1900 Transmitter

Channel	Frequency
512	1850.2 MHz
661	1880.0 MHz
810	1909.8 MHz

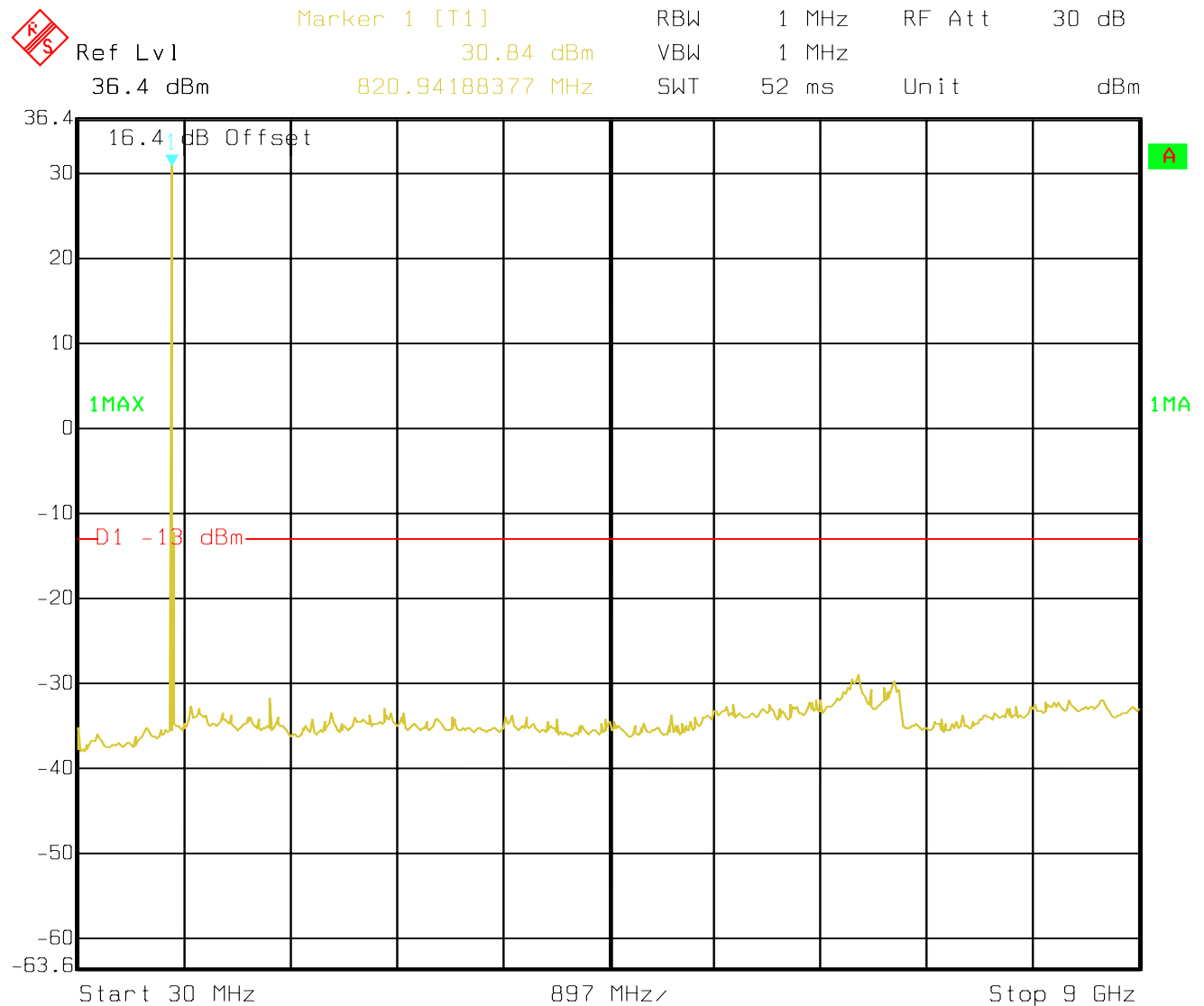
Measurement Limit:

Sec. 24.238 Emission Limits.

- (a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43 + 10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

CONDUCTED SPURIOUS EMISSIONS CHANNEL 128 (GSM-850) 30MHz – 9GHz

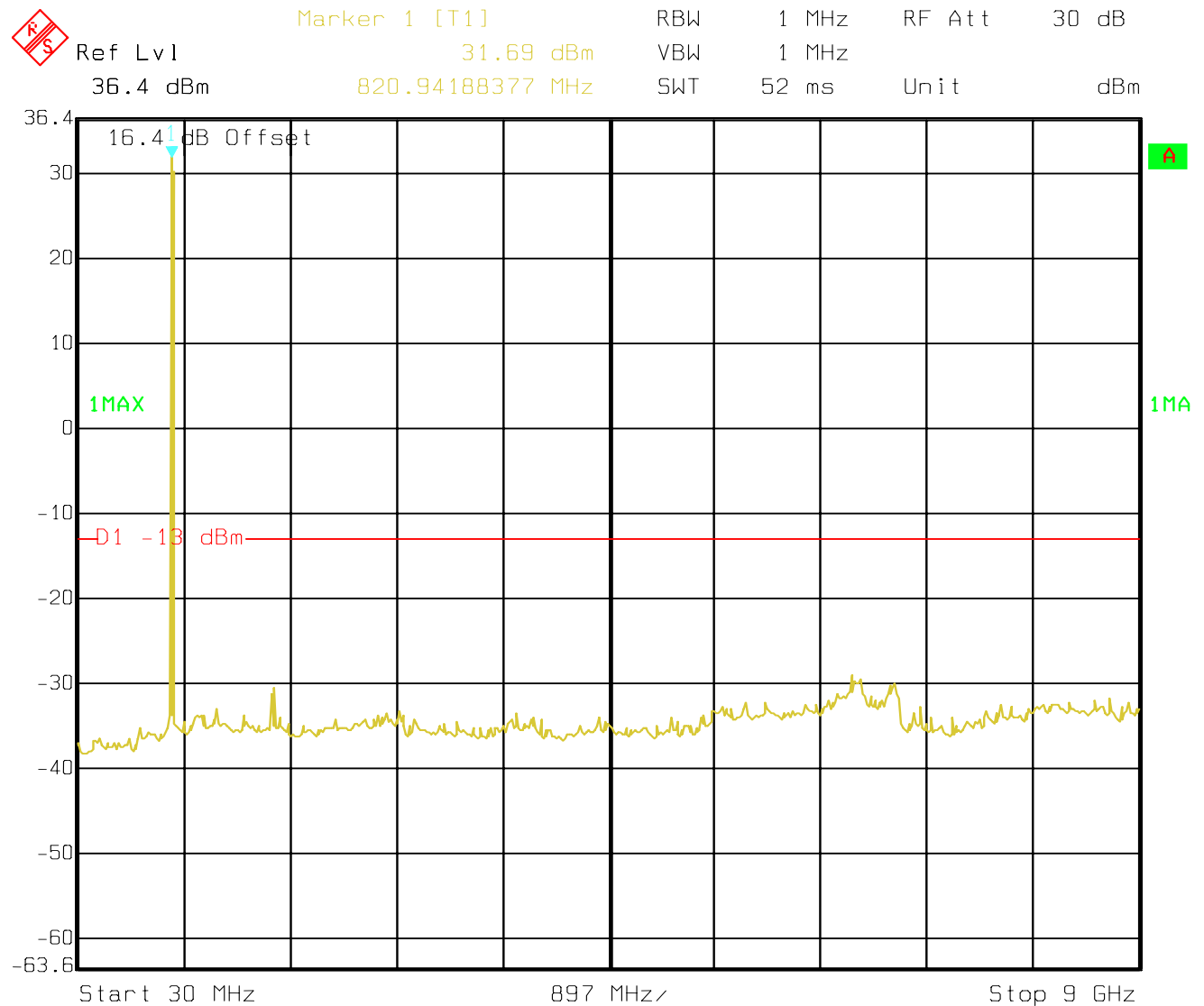
Note: The peak above the limit line is the carrier freq. at ch-128.



Date: 28.APR.2004 08:43:29

CONDUCTED SPURIOUS EMISSIONS CHANNEL 190 (GSM-850) 30MHz – 9GHz

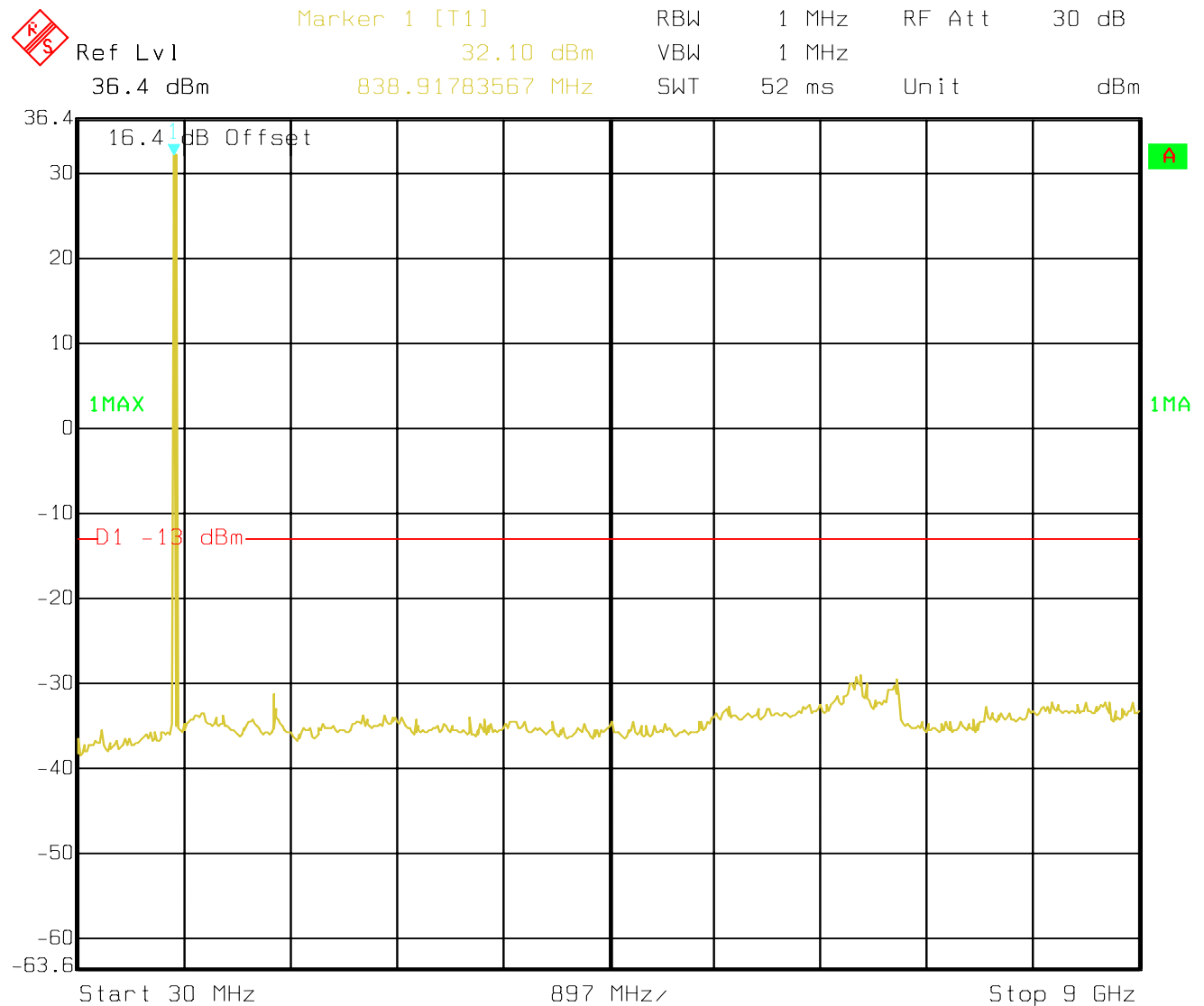
Note: The peak above the limit line is the carrier freq. at ch-190.



Date: 28.APR.2004 08:45:11

CONDUCTED SPURIOUS EMISSIONS CHANNEL 251 (GSM-850) 30MHz – 9GHz

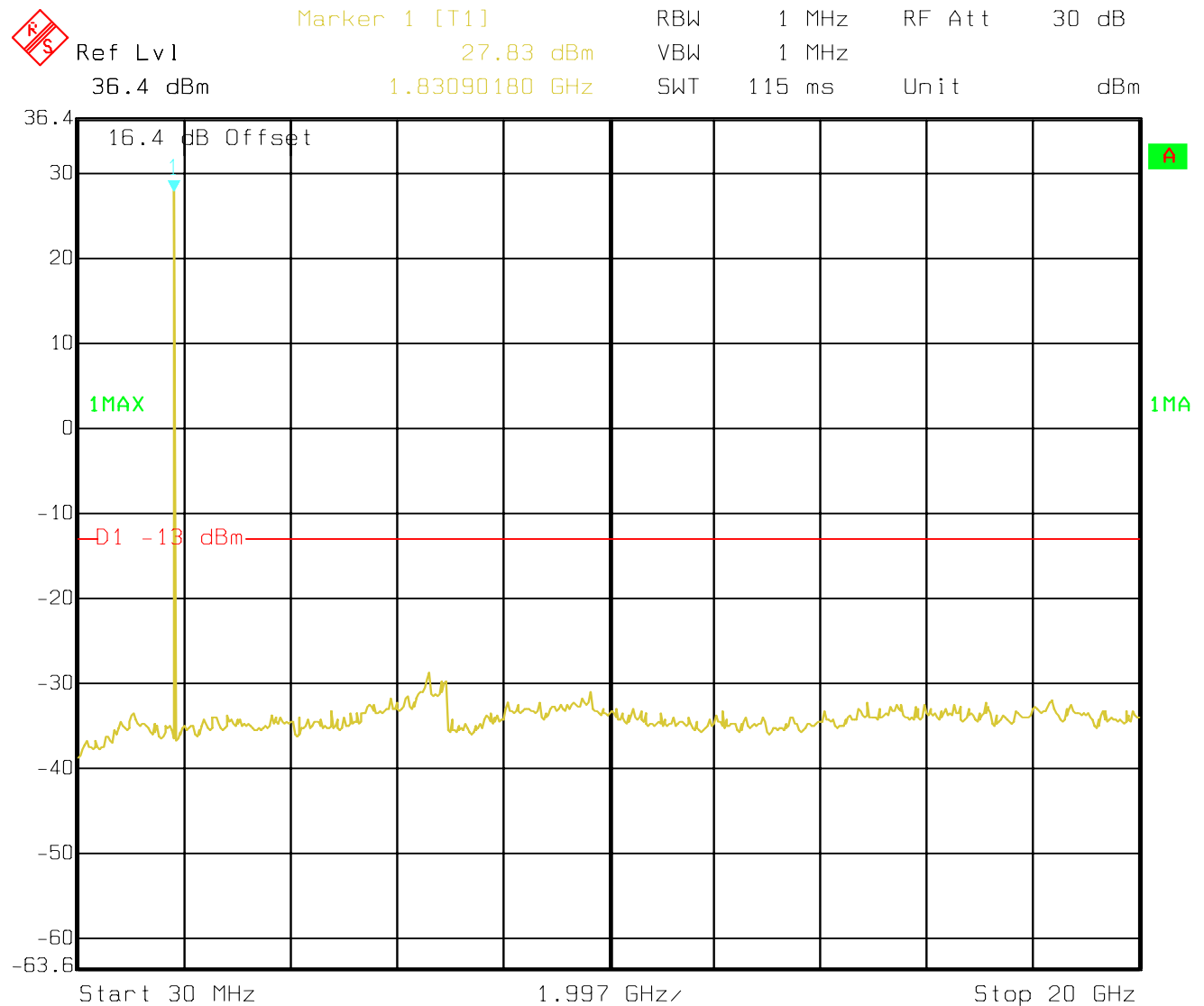
Note: The peak above the limit line is the carrier freq. at ch-251.



Date: 28.APR.2004 08:47:09

CONDUCTED SPURIOUS EMISSIONS CHANNEL 512 (PCS-1900) 30MHz – 20GHz

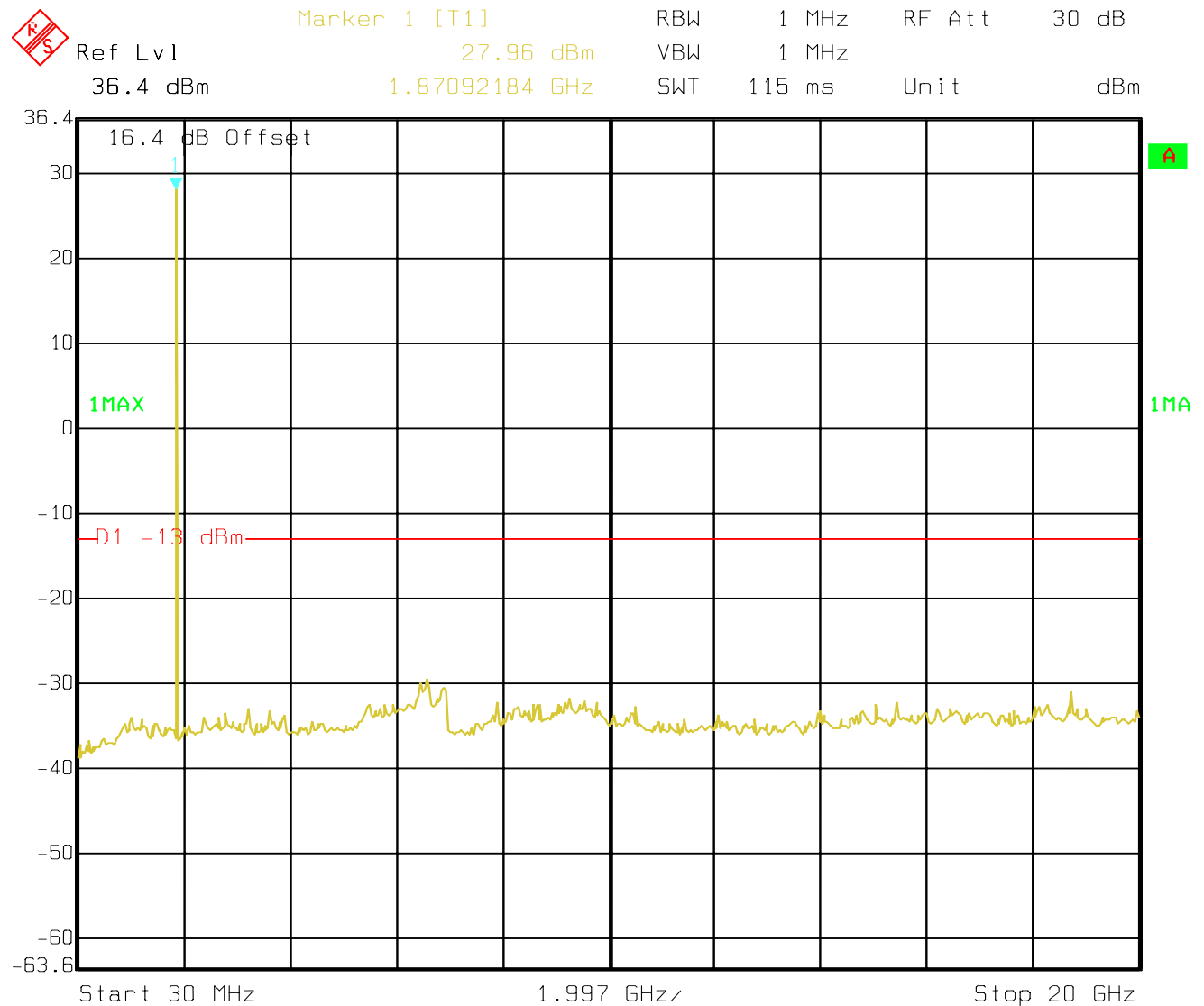
Note: The peak above the limit line is the carrier freq. at ch-512.



Date: 27.APR.2004 16:18:53

CONDUCTED SPURIOUS EMISSIONS CHANNEL 661 (PCS-1900) 30MHz – 20GHz

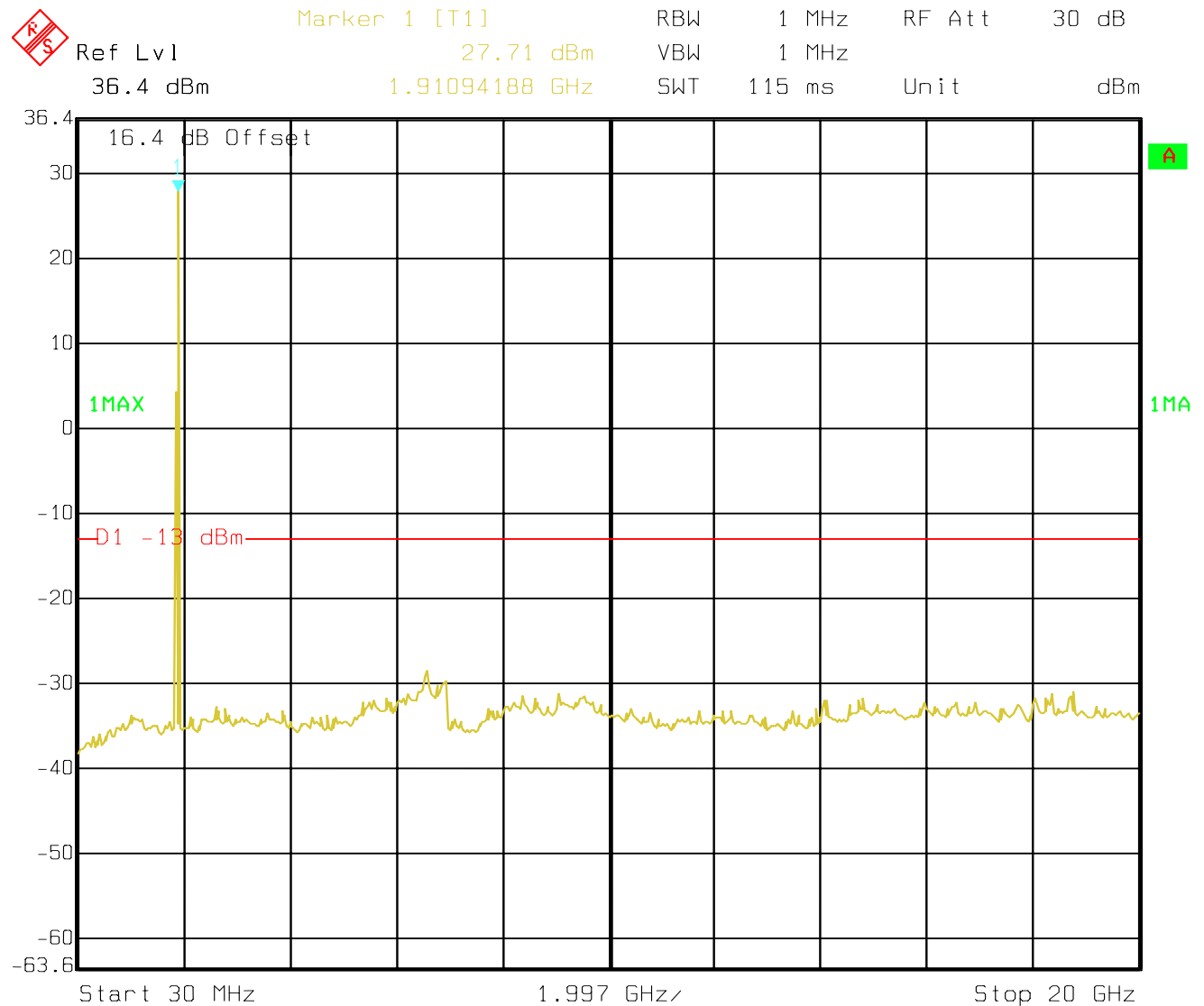
Note: The peak above the limit line is the carrier freq. at ch-661.



Date: 27.APR.2004 16:18:03

CONDUCTED SPURIOUS EMISSIONS CHANNEL 810 (PCS-1900) 30MHz – 20GHz

Note: The peak above the limit line is the carrier freq. at ch-810.



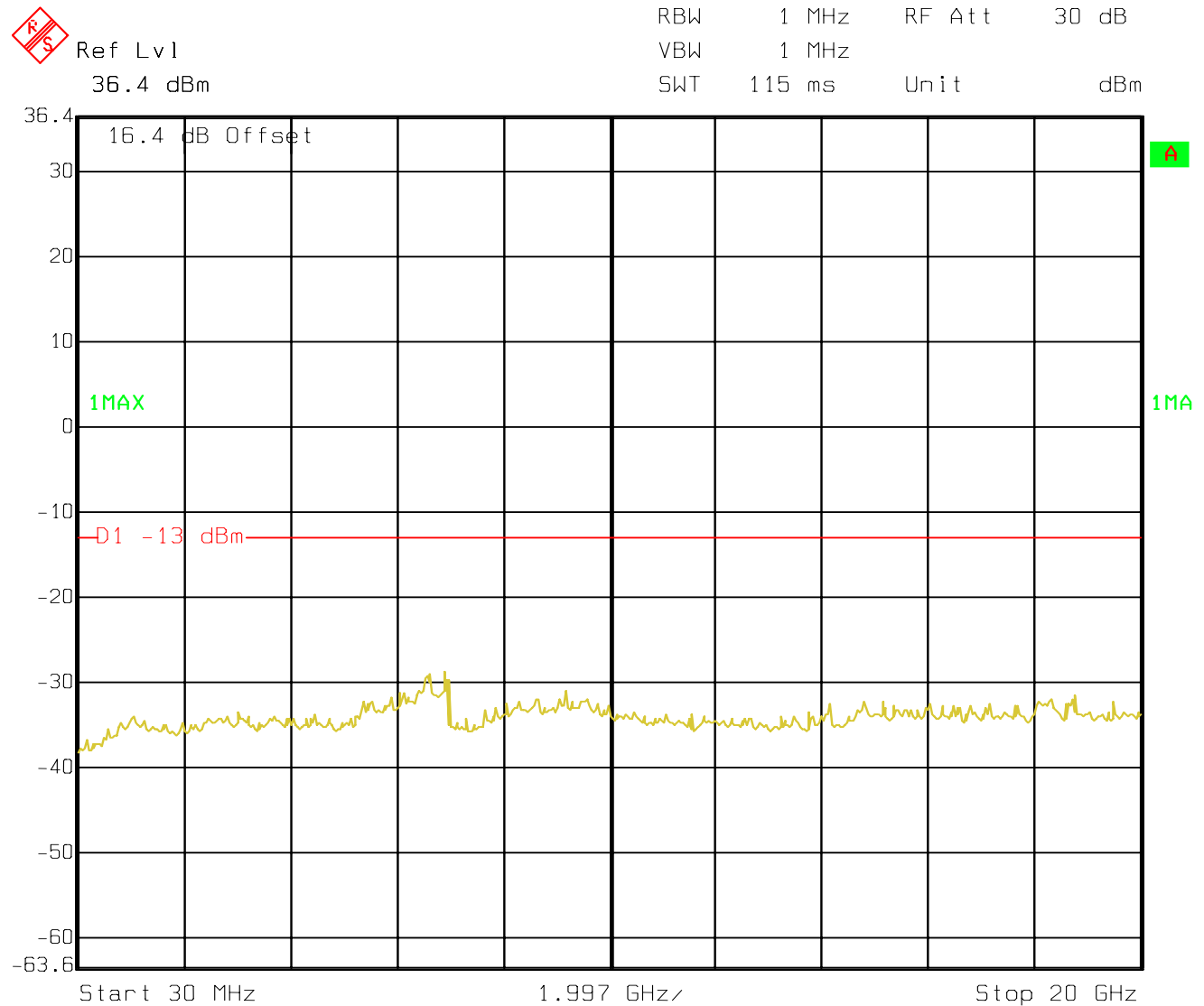
Date: 27.APR.2004 16:15:56

CONDUCTED SPURIOUS EMISSIONS

Idle Mode

30MHz – 20GHz

Note: This plot is valid for both GSM-850/1900 bands. (Worst-case plot)



Date: 27.APR.2004 16:19:55

CONDUCTED EMISSIONS

§ 15.107/207

Measured with AC/DC power adapter

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

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

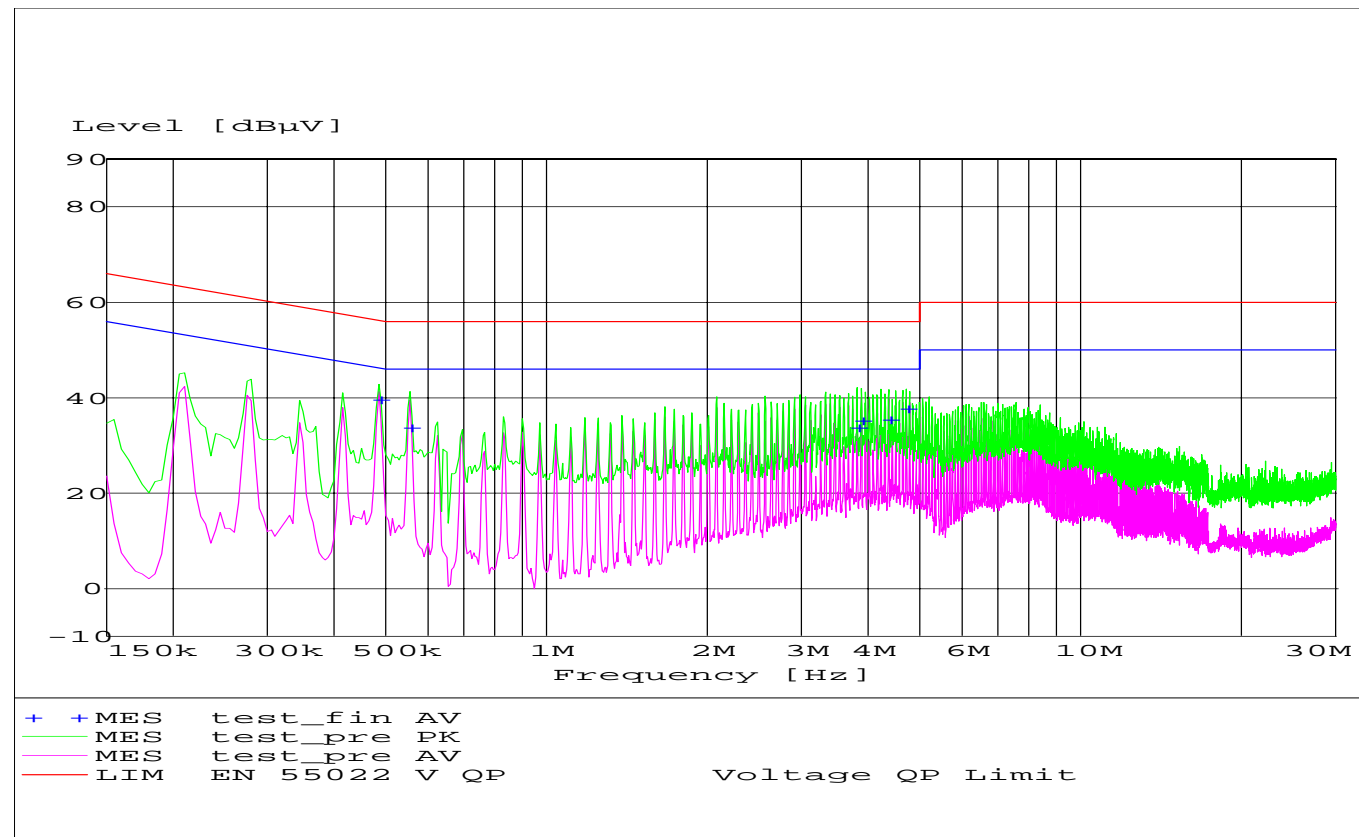
* Decreases with logarithm of the frequency

ANALYZER SETTINGS: RBW = 10KHz

VBW = 10KHz

MEASUREMENT RESULT:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.485000	39.60	0.0	46	6.7	L1	GND
0.555000	33.80	0.0	46	12.2	L1	GND
3.815000	33.80	0.0	46	12.2	L1	GND
3.885000	35.20	0.0	46	10.8	L1	GND
4.370000	35.50	0.0	46	10.5	L1	GND
4.715000	37.80	0.0	46	8.2	L1	GND



TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
05	Biconilog Antenna	3141	EMCO	0005-1186
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
08	Power Splitter	11667B	Hewlett Packard	645348
09	Climatic Chamber	VT4004	Voltsch	G1115
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307
12	Pre-Amplifier	JS4-00102600	Miteq	00616
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06

BLOCK DIAGRAMS
Radiated Testing**ANECHOIC CHAMBER**