



# FCC Test Report

## FCC Part 22,24 / RSS 132,133

FOR:

DOLPHIN 9500LUP

MODEL #: D9500LUP

HANDHELD PRODUCTS, INC.  
700 VISIONS DRIVE  
SKANEATELES FALLS, NY 13153  
U.S.A

FCC ID: HD59500LUP  
IC ID: 1693B95LUP

TEST REPORT #: HANDHELD\_004\_05002\_D9500\_FCC22/24rev1  
DATE: 2006-01-16



FCC listed # 101450  
IC recognized # 3925

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**Table of Contents**

<b>1 ASSESSMENT .....</b>	<b>3</b>
<b>2 ADMINISTRATIVE DATA.....</b>	<b>4</b>
2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT .....	4
2.2 IDENTIFICATION OF THE CLIENT .....	4
2.3 IDENTIFICATION OF THE MANUFACTURER.....	4
<b>3 EQUIPMENT UNDER TEST (EUT).....</b>	<b>5</b>
3.1 IDENTIFICATION OF THE EQUIPMENT UNDER TEST .....	5
<b>4 SUBJECT OF INVESTIGATION.....</b>	<b>6</b>
<b>5 MEASUREMENTS.....</b>	<b>7</b>
5.1 RADIATED POWER .....	7
5.1.1 <i>FCC 2.1046 Measurements required: RF power output.</i> .....	7
5.1.2 <i>Limits:</i> .....	7
5.1.2.1 FCC 22.913 (a) Effective radiated power limits. ....	7
5.1.2.2 FCC 24.232 (b)(c) Power limits. ....	7
5.1.3 <i>Radiated Output Power Measurement procedure:</i> .....	7
5.1.4 <i>ERP Results 850 MHz band:</i> .....	9
5.1.5 <i>EIRP Results 1900 MHz band:</i> .....	9
5.2 SPURIOUS EMISSIONS RADIATED .....	16
5.2.1 <i>FCC 2.1053 Measurements required: Field strength of spurious radiation.</i> .....	16
5.2.2 <i>Limits:</i> .....	16
5.2.2.1 FCC 22.917 Emission limitations for cellular equipment. ....	16
5.2.2.2 FCC 24.238 Emission limitations for Broadband PCS equipment. ....	16
5.2.3 <i>Radiated out of band measurement procedure:</i> .....	17
5.2.4 <i>Radiated out of band emissions results on EUT:</i> .....	19
5.3 RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-133 .....	50
5.3.1 <i>Receiver Spurious on EUT</i> .....	51
5.4 AC POWERLINE CONDUCTED EMISSIONS § 15.107/207.....	56
5.4.1 <i>Results EUT</i> .....	57
<b>6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS .....</b>	<b>58</b>
<b>7 REFERENCES.....</b>	<b>59</b>
<b>8 BLOCK DIAGRAMS .....</b>	<b>60</b>

## 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 and in compliance with the applicable criteria specified in Industry Canada rules RSS132 and RSS133.**

Company	Description	Model #
<b>HANDHELD PRODUCTS, INC.</b>	<b>DOLPHIN 9500LUP</b>	<b>D9500LUP</b>



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2006-01-19

Lothar Schmidt  
Test Lab Manager

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.

## 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:	Lothar Schmidt
Responsible Project Leader:	Neelesh Raj
Date of test:	2006-01-11 to 2006-01-16

### 2.2 Identification of the Client

Applicant's Name:	<b>HandHeld Products, Inc.</b>
Street Address:	<b>700 Visions Drive</b>
City/Zip Code	<b>Skaneateles Falls, NY 13153</b>
Country	<b>USA</b>
Contact Person:	<b>Naveen Velagapudi</b>
Phone No.	<b>315 685 2931</b>
Fax:	<b>315 685 1210</b>
e-mail:	<b><a href="mailto:naveen.velagapudin@handheld.com">naveen.velagapudin@handheld.com</a></b>

### 2.3 Identification of the Manufacturer

Manufacturer's Name:	<b>HandHeld Products, Inc.</b>
Manufacturers Address:	<b>700 Visions Drive</b>
City/Zip Code	<b>Skaneateles Falls, NY 13153</b>
Country	<b>USA</b>

### **3 Equipment under Test (EUT)**

#### **3.1 Identification of the Equipment under Test**

Marketing Name:	Dolphin 9500LUP
Description:	Dolphin 9500 is a ruggedized handheld computer which can read Barcodes and other Auto ID codes. It contains three different wire less transmitters(Bluetooth, Wireless Lan and GSM/GPRS) to send and receive data.
Model No:	D9500LUP
FCC ID:	HD59500LUP
IC ID:	1693B95LUP
Frequency Range:	824.2MHz – 848.8MHz for GSM 850, 1850.2MHz – 1909.8MHz for PCS 1900
Type(s) of Modulation:	GMSK
Number of Channels:	124 for GSM-850, 299 for PCS-1900
Antenna Type:	EXTERNAL FIXED
Output Power:	FCC 22: 0.185W ERP@836.6 MHz FCC 24: 0.711W EIRP@1880 MHz

TYPE	MANF.	MODEL	FCC ID
HOMEBASE	HANDHELD PRODUCTS, INC.	7900-HB	DoC
AC ADAPTER	AULT INC.	41206341-01	n/a
EXTRA BATTERY	HANDHELD PRODUCTS, INC.	--	DoC

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

The objective of the measurements done by Cetecom Inc. was to measure the performance of the D9500 referred to as EUT as specified by requirements listed in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS132 and RSS133.

The EUT was tested as a handheld device and in the homebase, worst case results are provided in this report. The EUT was maximized in the X,Y, Z positions , all data in report shows the worst case between horizontal and vertical polarization for above 1GHz.

The EUT carries pre-certified Siemens GSM module model# MC46 with FCC ID: QIPMC46. This test report covers full radiated testing as per FCC 22/24 on EUT with GSM module. All conducted measurements for GSM 1900 are covered under *test report# 2-205420436/02* and for GSM850 are covered under *test report# 2\_3350-01-01/03*.

## 5 Measurements

### 5.1 Radiated Power

#### 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.**

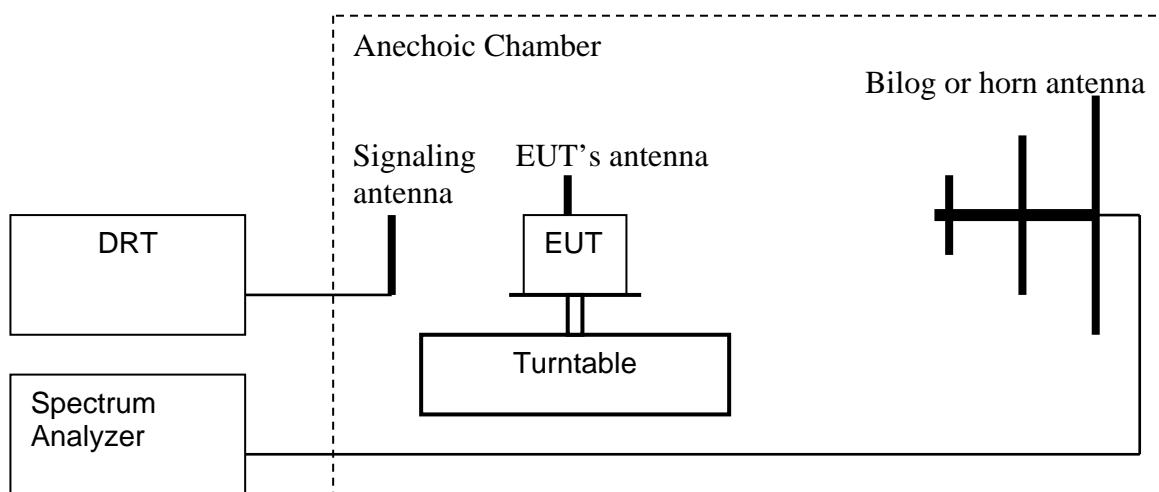
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(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 Radiated Output Power Measurement procedure:

Based on TIA-603B November 2002

#### 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.)

**5.1.4 ERP Results 850 MHz band:**

<b>Power Control Level</b>	<b>Burst Peak ERP</b>
<b>5</b>	<b>≤38.45dBm (7W)</b>

<b>Frequency (MHz)</b>	<b>Effective Radiated Power (dBm)</b>
<b>824.2</b>	<b>22.20</b>
<b>836.6</b>	<b>22.66</b>
<b>848.8</b>	<b>22.51</b>

**5.1.5 EIRP Results 1900 MHz band:**

<b>Power Control Level</b>	<b>Burst Peak EIRP</b>
<b>0</b>	<b>≤33dBm (2W)</b>

<b>Frequency (MHz)</b>	<b>Effective Isotropic Radiated Power (dBm)</b>
<b>1850.2</b>	<b>27.16</b>
<b>1880.0</b>	<b>28.52</b>
<b>1909.8</b>	<b>28.20</b>

**EIRP (GSM 850)  
CHANNEL 128**

§22.913(a)

**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: D9500 MC46

Customer: HHP

Operating Mode: TX ch128

Antenna: V

EUT: V

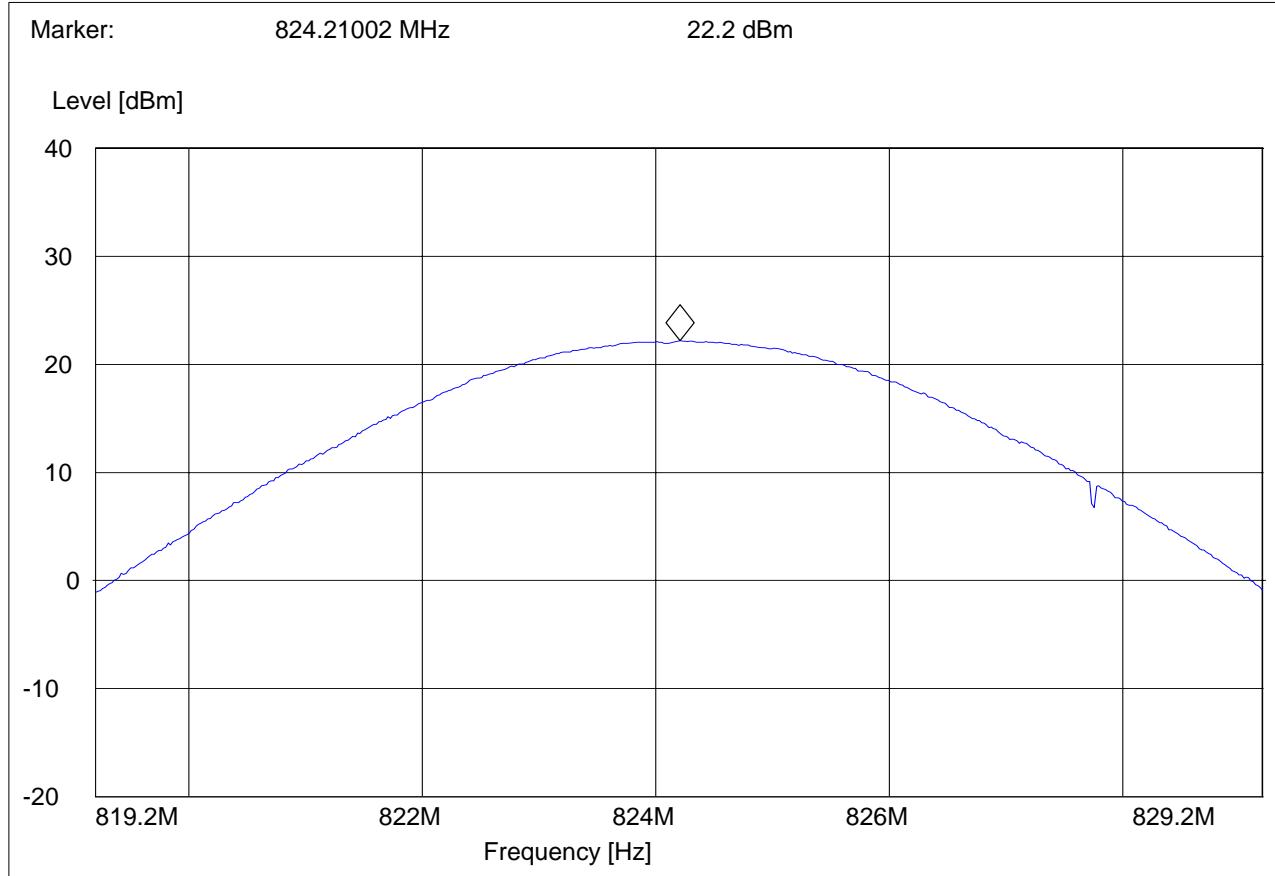
Test operator: Pete

Voltage: Batterey

Sweep: ERP

***SWEEP TABLE: "EIRP 850 CH 128 V"***

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



**EIRP (GSM 850)  
CHANNEL 190**

§22.913(a)

**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: D9500 MC46

Customer: HHP

Operating Mode: TX ch190

Antenna: V

EUT: V

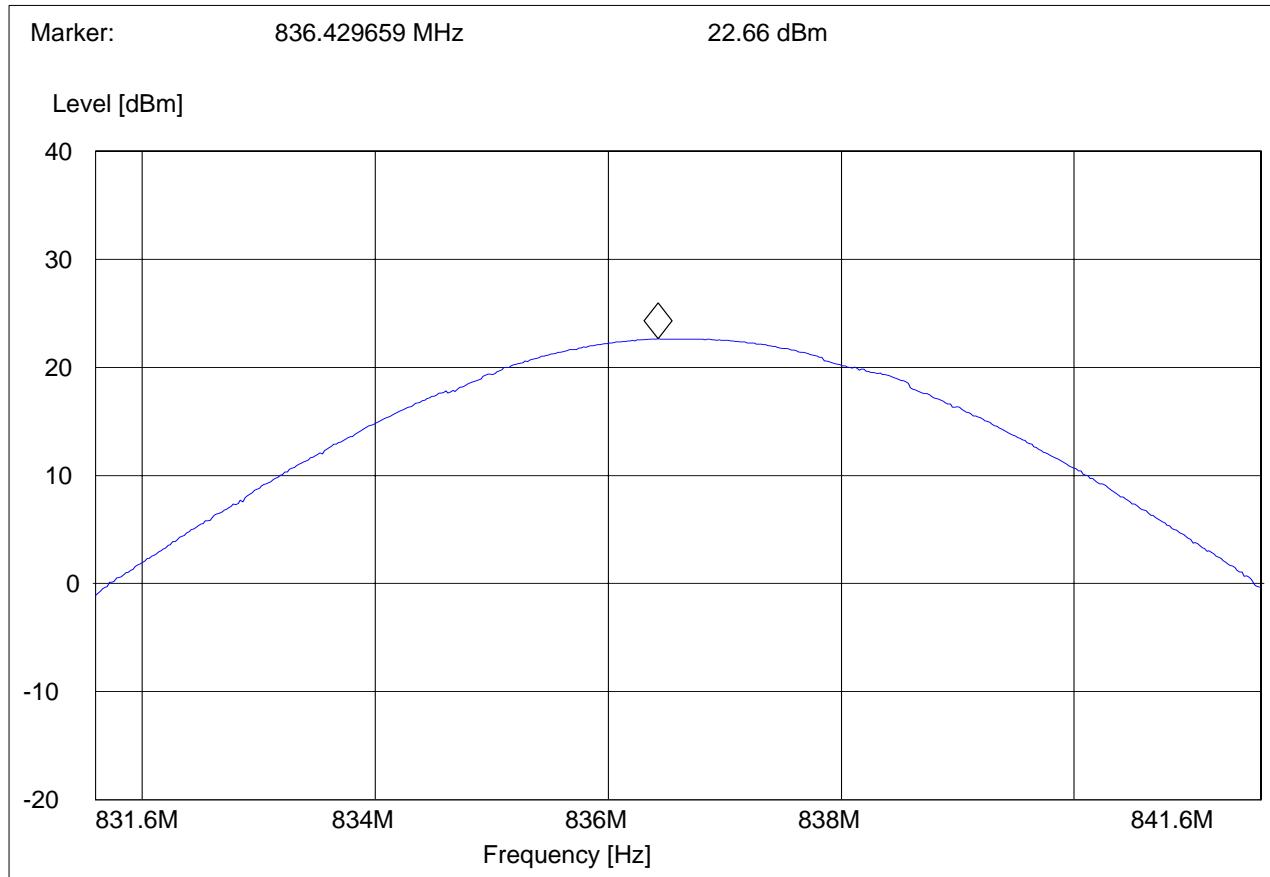
Test operator: Pete

Voltage: Batterey

Sweep: ERP

**SWEEP TABLE: "EIRP 850 CH 190 V"**

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



**EIRP (GSM 850)  
CHANNEL 251**

§22.913(a)

**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: D9500 MC46

Customer: HHP

Operating Mode: TX ch251

Antenna: V

EUT: V

Test operator: Pete

Voltage: Batterey

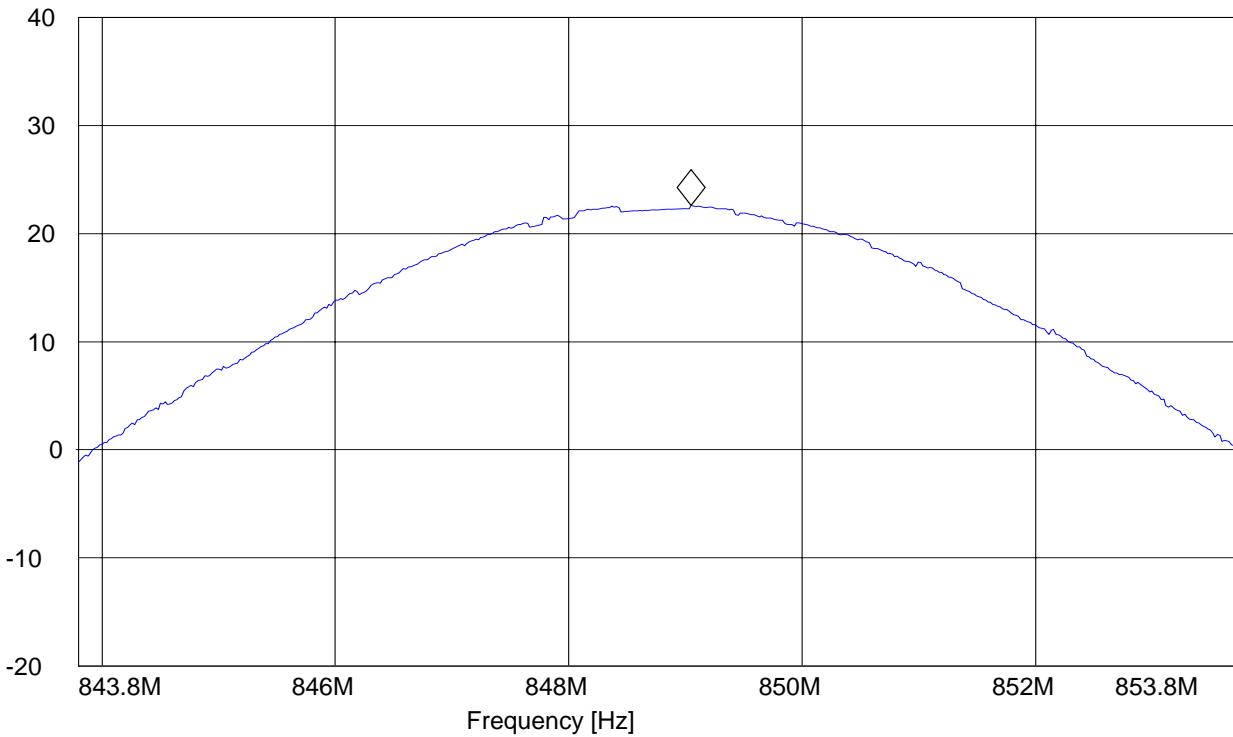
Sweep: ERP

***SWEEP TABLE: "EIRP 850 CH 251 V"***

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

Marker:	849.050501 MHz	22.57 dBm
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Level [dBm]



**EIRP (PCS-1900)  
CHANNEL 512**

§24.232(b)

**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: D9500 MC46

Customer: HHP

Operating Mode: TX ch512

Antenna: V

EUT: V

Test operator: Pete

Voltage: Batterey

Sweep: EIRP

***SWEEP TABLE: "EIRP 1900 CH512"***

Short Description: EIRP PCS 1900 for channel-512

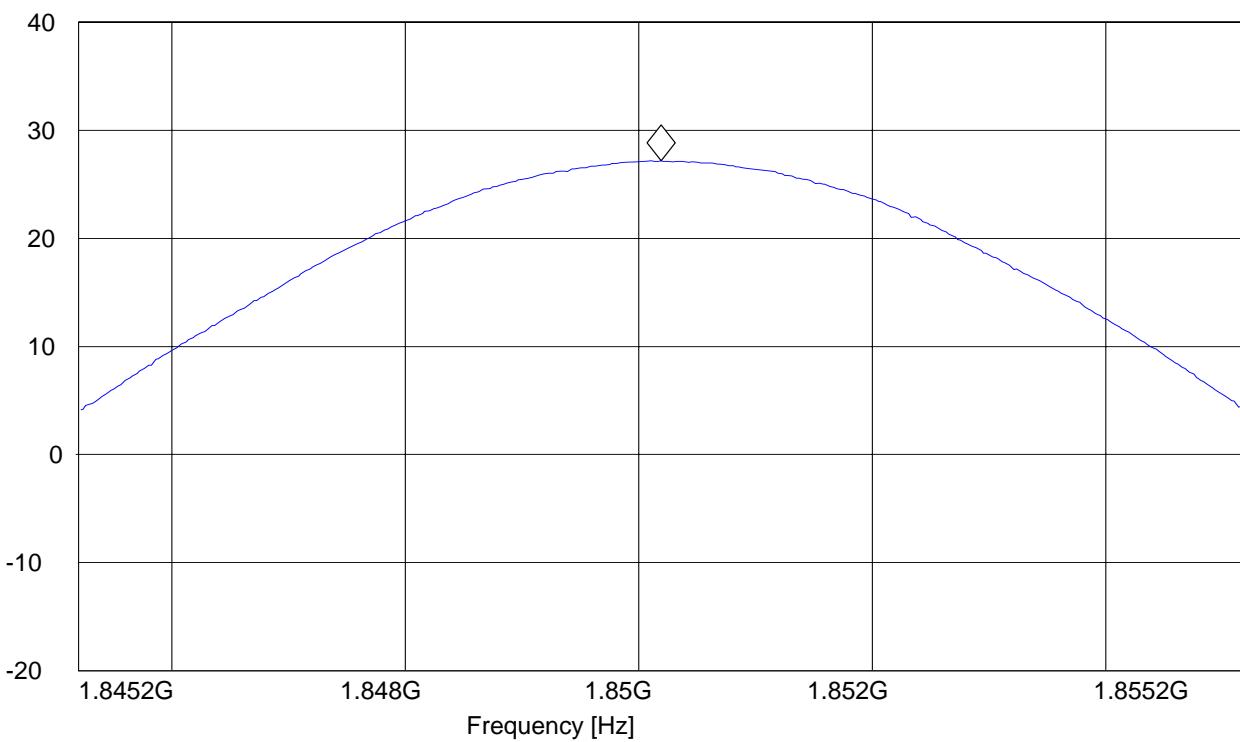
Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.8 GHz 1.9 GHz MaxPeak Coupled 3 MHz DUMMY-DBM

Marker: 1.85018998 GHz 27.16 dBm

Level [dBm]



**EIRP (PCS-1900)  
CHANNEL 661**

§24.232(b)

**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: D9500 MC46

Customer: HHP

Operating Mode: TX ch661

Antenna: V

EUT: V

Test operator: Pete

Voltage: Batterey

Sweep: EIRP

***SWEEP TABLE: "EIRP 1900 CH661"***

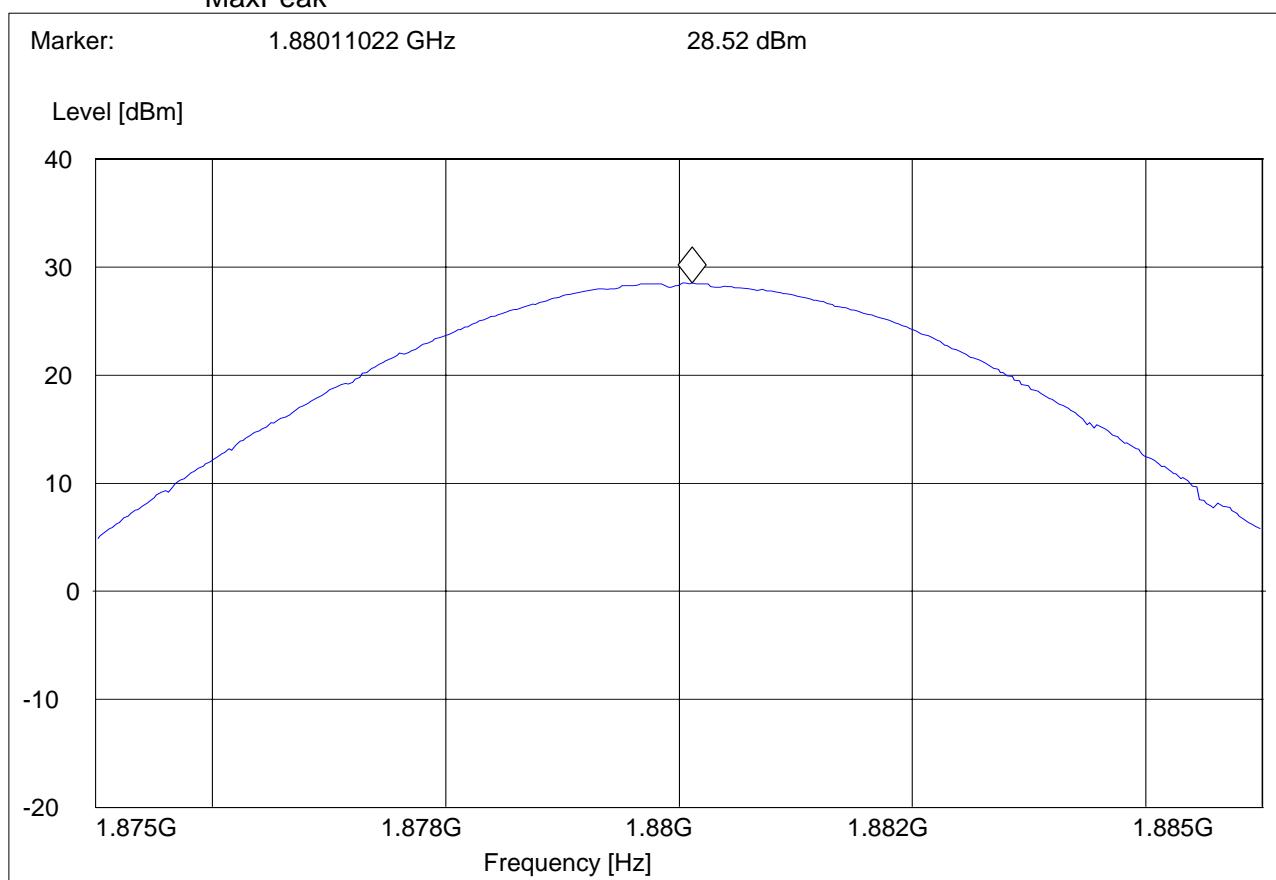
Short Description: EIRP PCS 1900 for channel-661

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

1.9 GHz 1.9 GHz MaxPeak Coupled 3 MHz DUMMY-DBM

MaxPeak



**EIRP (PCS-1900)  
CHANNEL 810**

§24.232(b)

**CETECOM Inc.**  
**411 Dixon Landing Road, Milpitas CA 95035, USA**

EUT / Description: D9500 MC46

Customer: HHP

Operating Mode: TX ch810

Antenna: V

EUT: V

Test operator: Pete

Voltage: Batterey

Sweep: EIRP

***SWEEP TABLE: "EIRP 1900 CH810"***

Short Description: EIRP PCS 1900 for channel-810

Start Stop Detector Meas. IF Transducer

Frequency Frequency Time Bandw.

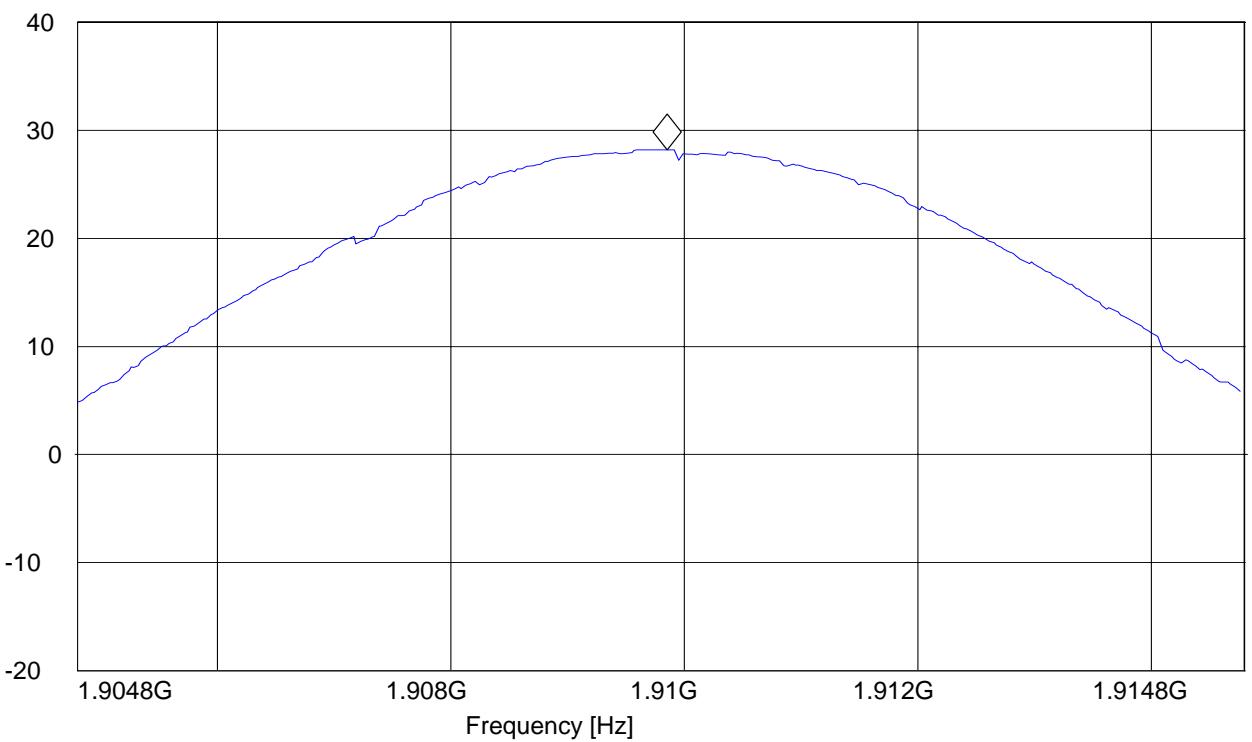
1.9 GHz 1.9 GHz MaxPeak Coupled 3 MHz DUMMY-DBM

Marker:

1.9098501 GHz

28.2 dBm

Level [dBm]



## 5.2 Spurious Emissions Radiated

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

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

### 5.2.2 Limits:

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

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

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

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

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

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

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

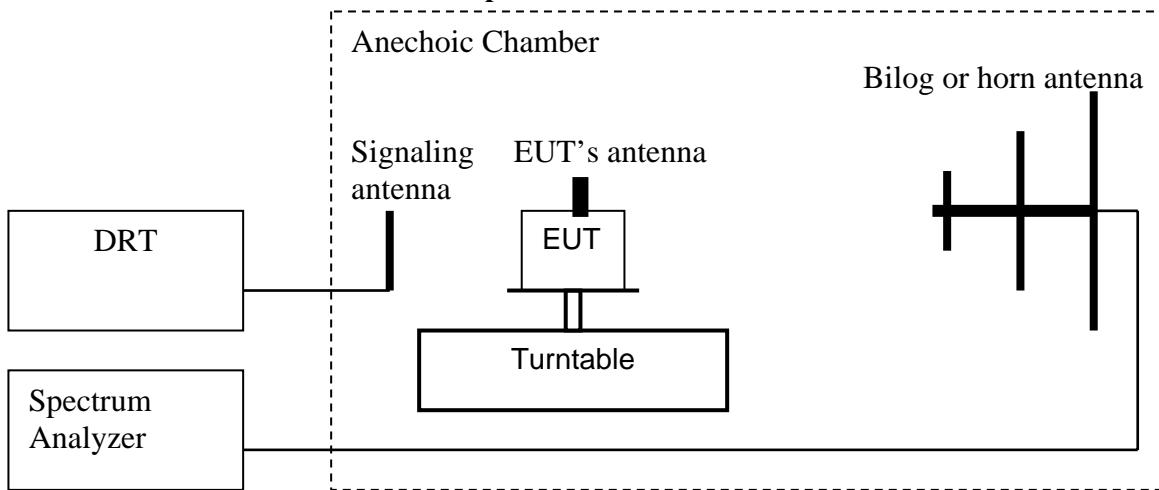
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of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

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

### **5.2.3 Radiated out of band measurement procedure:**

Based on TIA-603B November 2002

#### **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:  

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

$$\text{Spurious (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}$$
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

(note: Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

**Spectrum analyzer settings:**

Res B/W: 1 MHz

Vid B/W: 1 MHz

**Measurement Survey:**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 & PCS-1900 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

**5.2.4 Radiated out of band emissions results on EUT:****RESULTS OF RADIATED TESTS GSM-850:**

Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	<b>1648.4</b>	-31.51	<b>1673.2</b>	-32.74	<b>1697.6</b>	-33.20
3	<b>2472.6</b>	-44.50	<b>2509.8</b>	-44.50	<b>2546.4</b>	-44.66
4	<b>3296.8</b>	-49.17	<b>3346.4</b>	-49.16	<b>3395.2</b>	-48.15
5	<b>4121</b>	-48.86	<b>4183</b>	-48.52	<b>4244</b>	-45.06
6	<b>4945.2</b>	-55.25	<b>5019.6</b>	-53.36	<b>5092.8</b>	NF
7	<b>5769.4</b>	NF	<b>5856.2</b>	NF	<b>5941.6</b>	NF
8	<b>6593.6</b>	NF	<b>6692.8</b>	NF	<b>6790.4</b>	NF
9	<b>7417.8</b>	NF	<b>7529.4</b>	NF	<b>7639.2</b>	NF
10	<b>8242</b>	NF	<b>8366</b>	NF	<b>8488</b>	NF
NF = NOISE FLOOR						

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

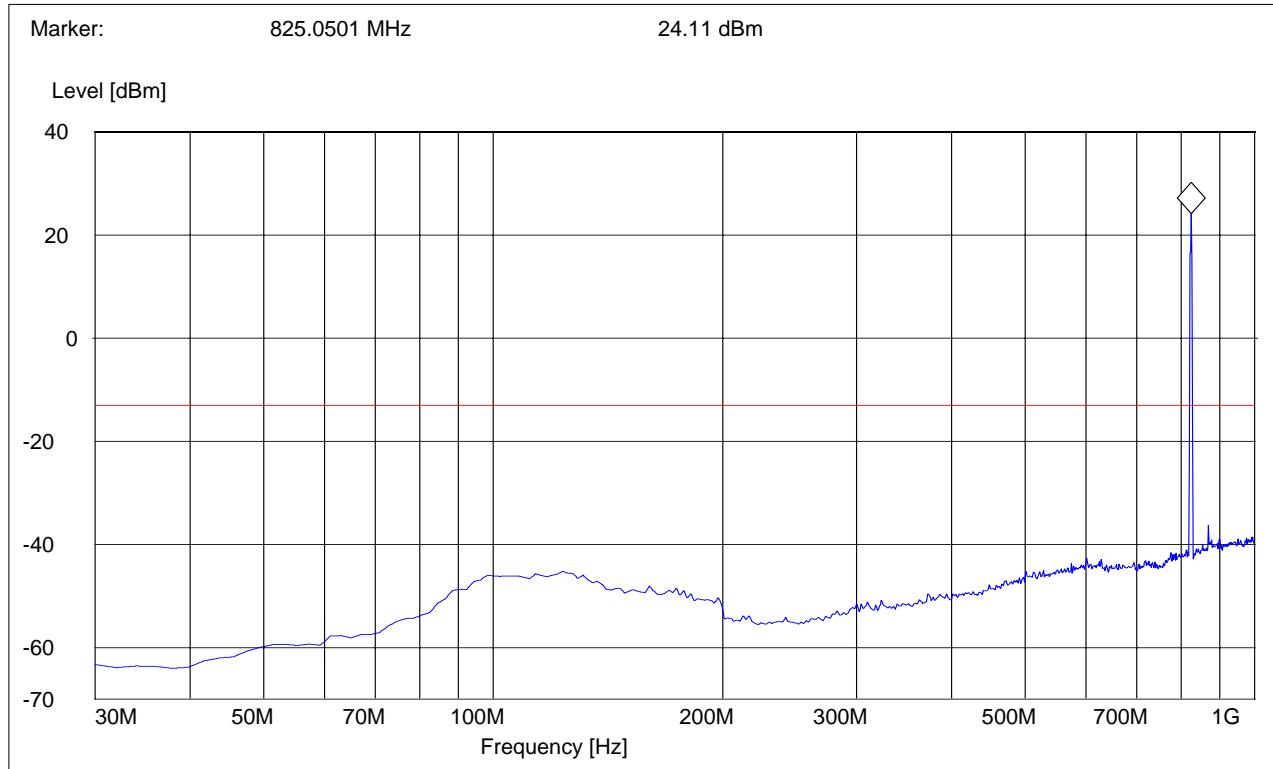
Spurious emission limit –13dBm

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

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

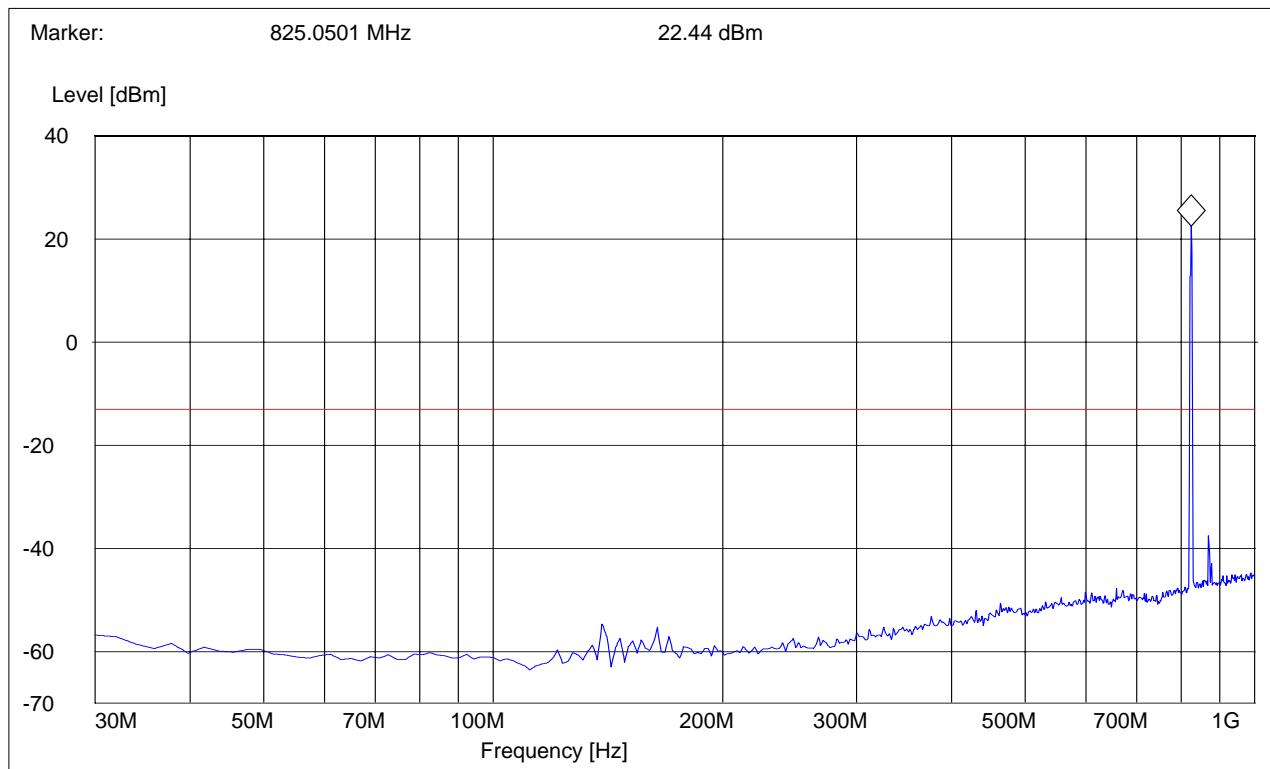
Spurious emission limit –13dBm

**Antenna: horizontal*****SWEET TABLE: "FCC 22 Spur 30M-1G"***

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

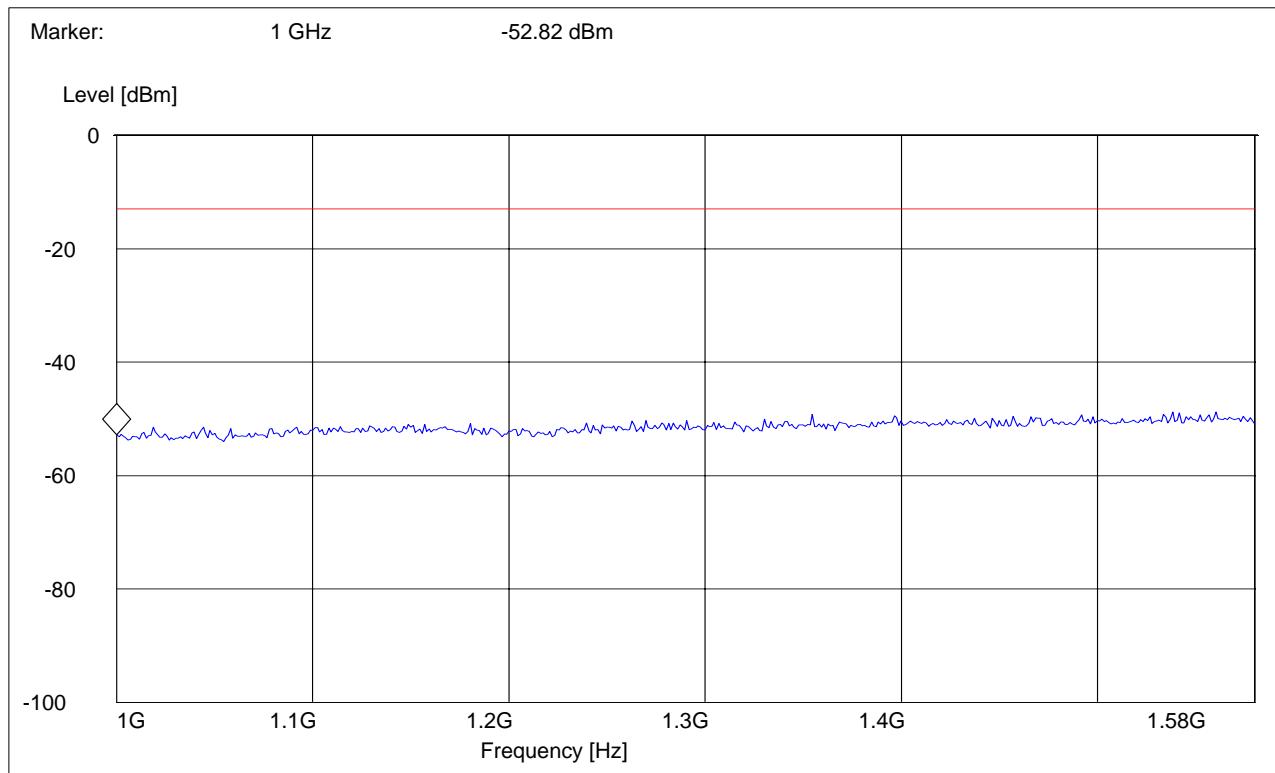


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 824.2MHz: 1GHz – 1.58GHz**

Spurious emission limit –13dBm

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

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

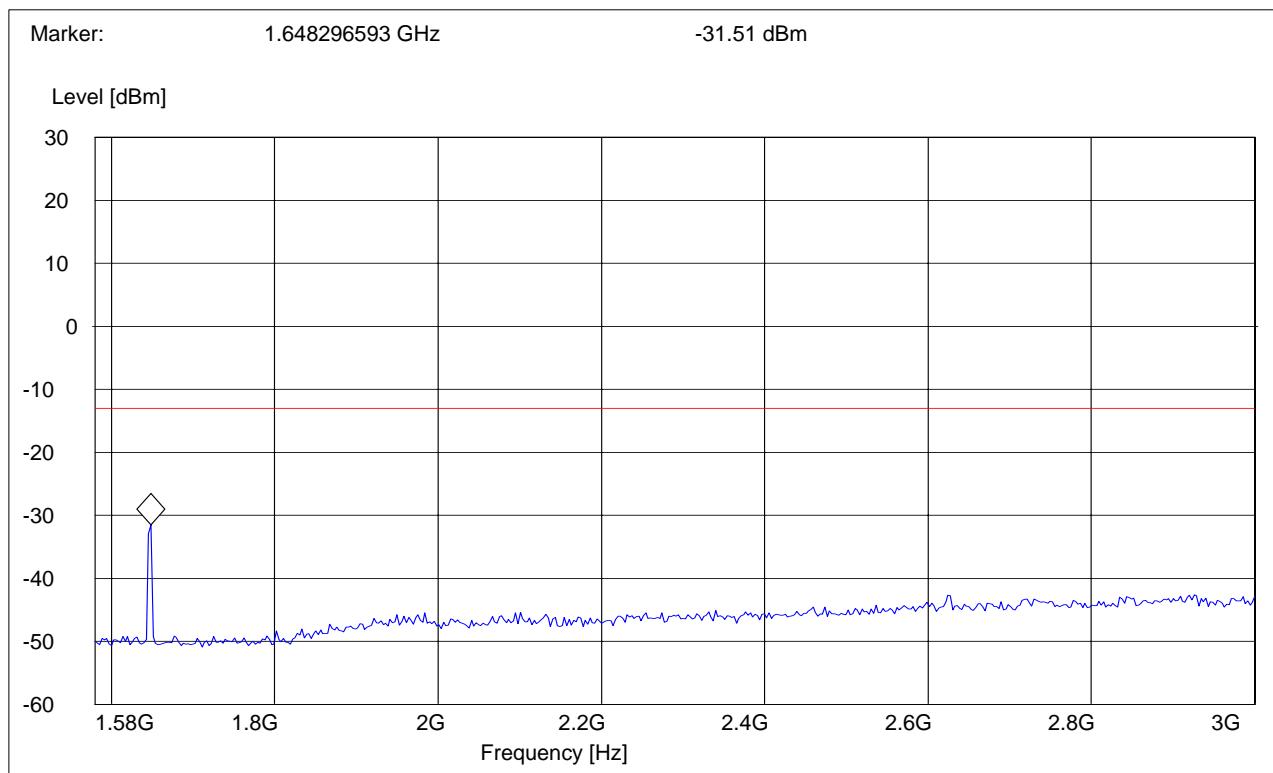


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 824.2MHz: 1.58GHz – 3GHz**

Spurious emission limit –13dBm

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

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

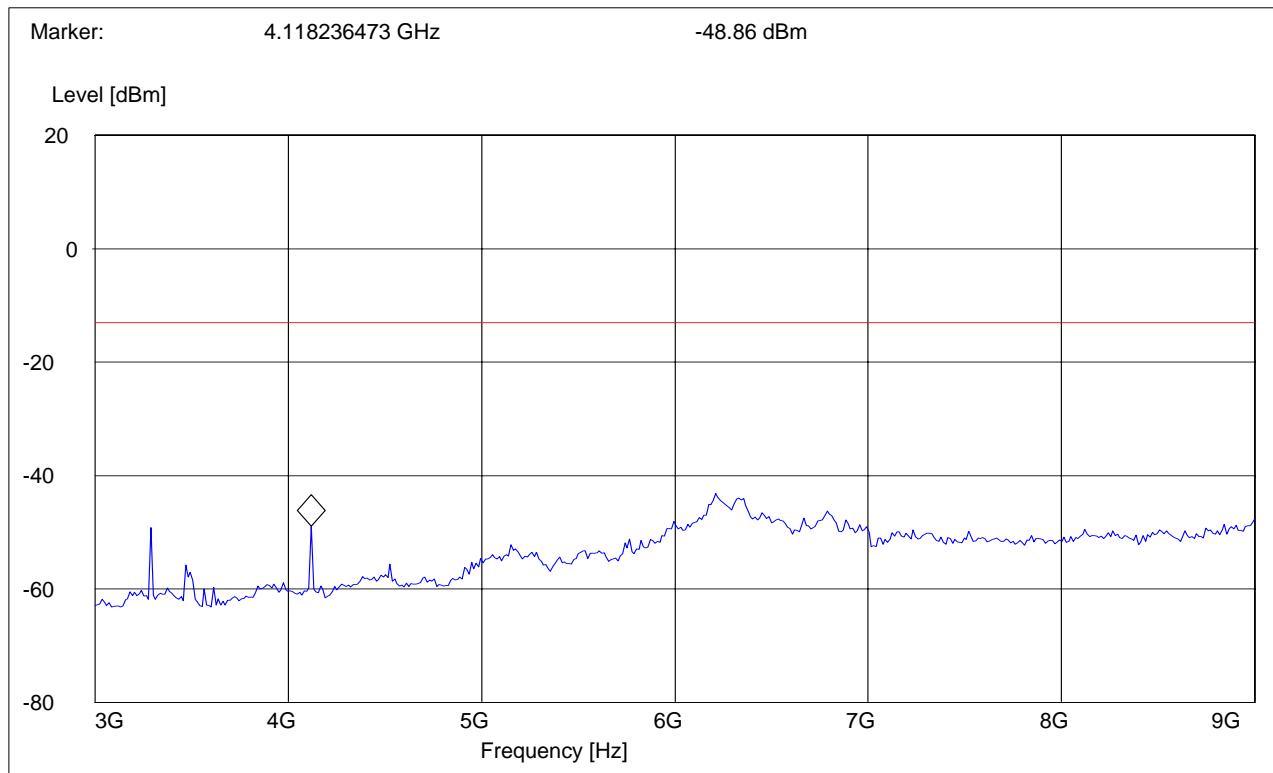


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 824.2MHz: 3GHz – 9GHz**

Spurious emission limit –13dBm

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

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

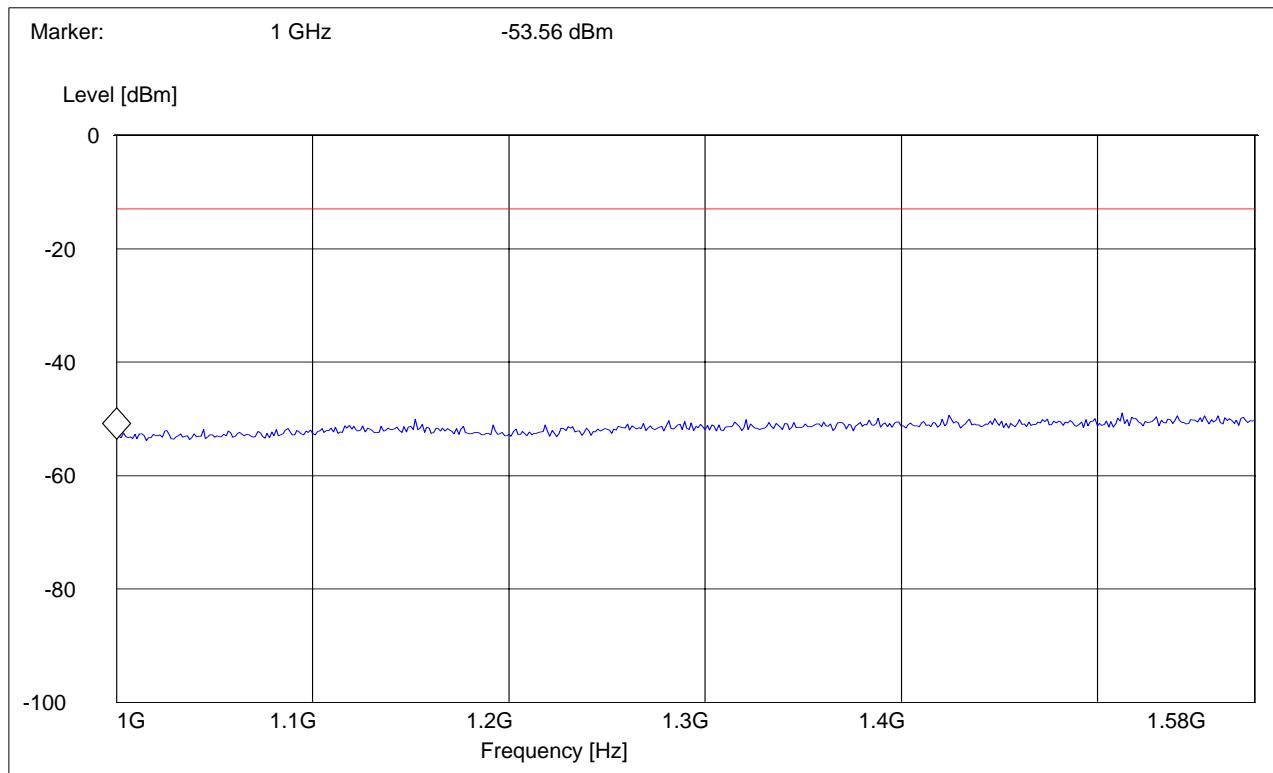


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 836.6MHz: 1GHz – 1.58GHz**

Spurious emission limit –13dBm

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

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

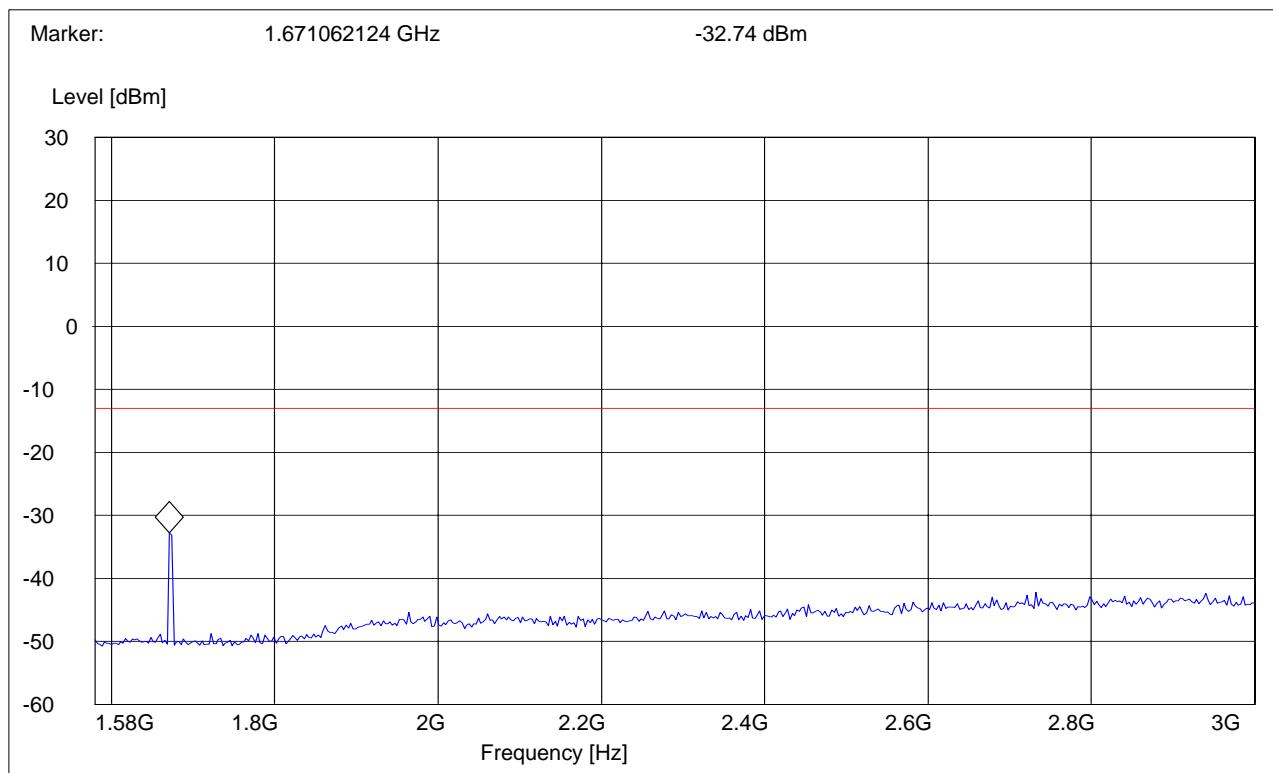


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 836.6MHz: 1.58GHz – 3GHz**

Spurious emission limit –13dBm

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

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

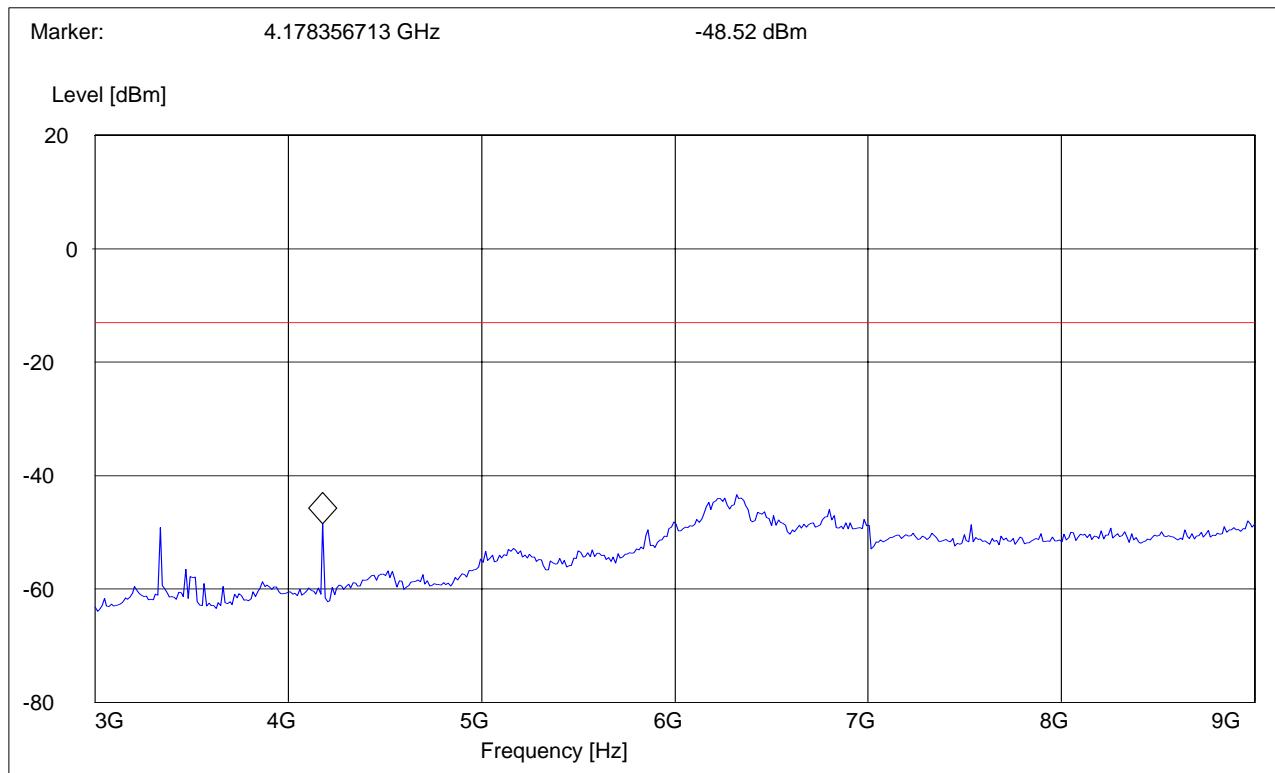


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 836.6MHz: 3GHz – 9GHz**

Spurious emission limit –13dBm

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

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

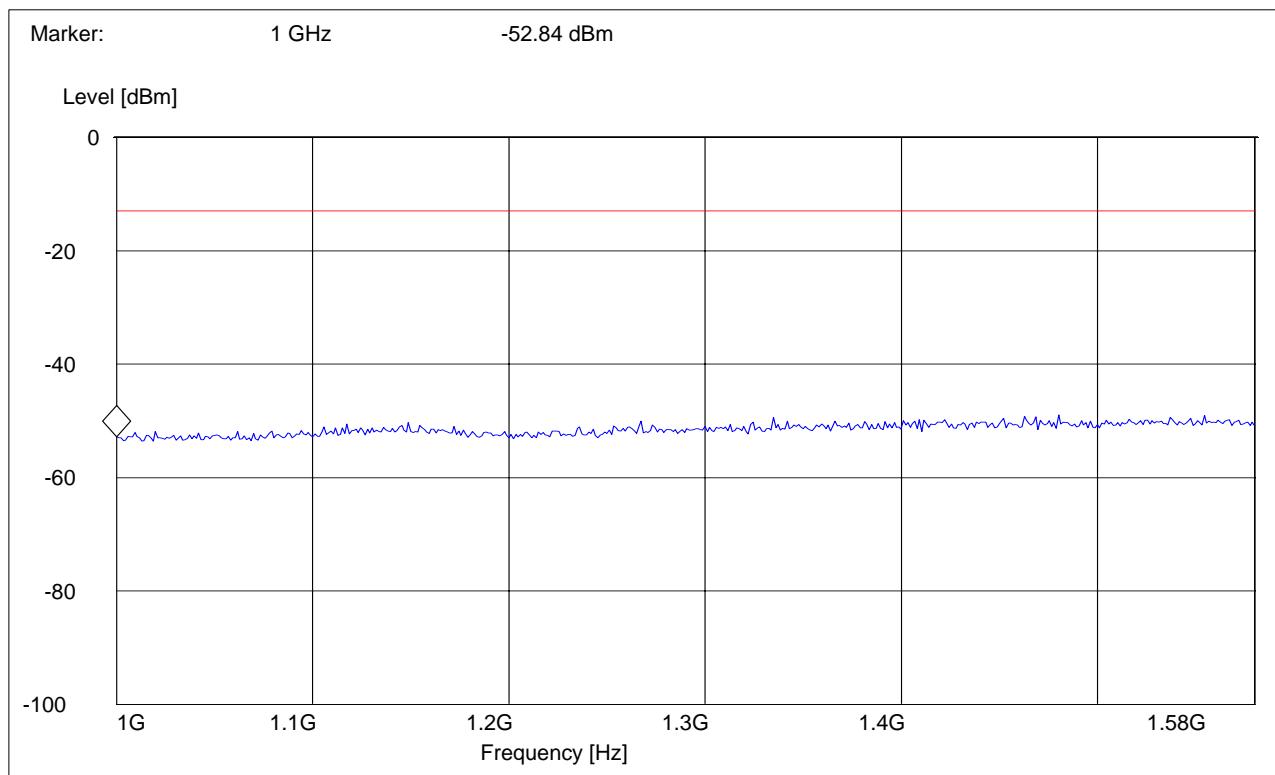


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 848.8MHz: 1GHz – 1.58GHz**

Spurious emission limit –13dBm

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

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

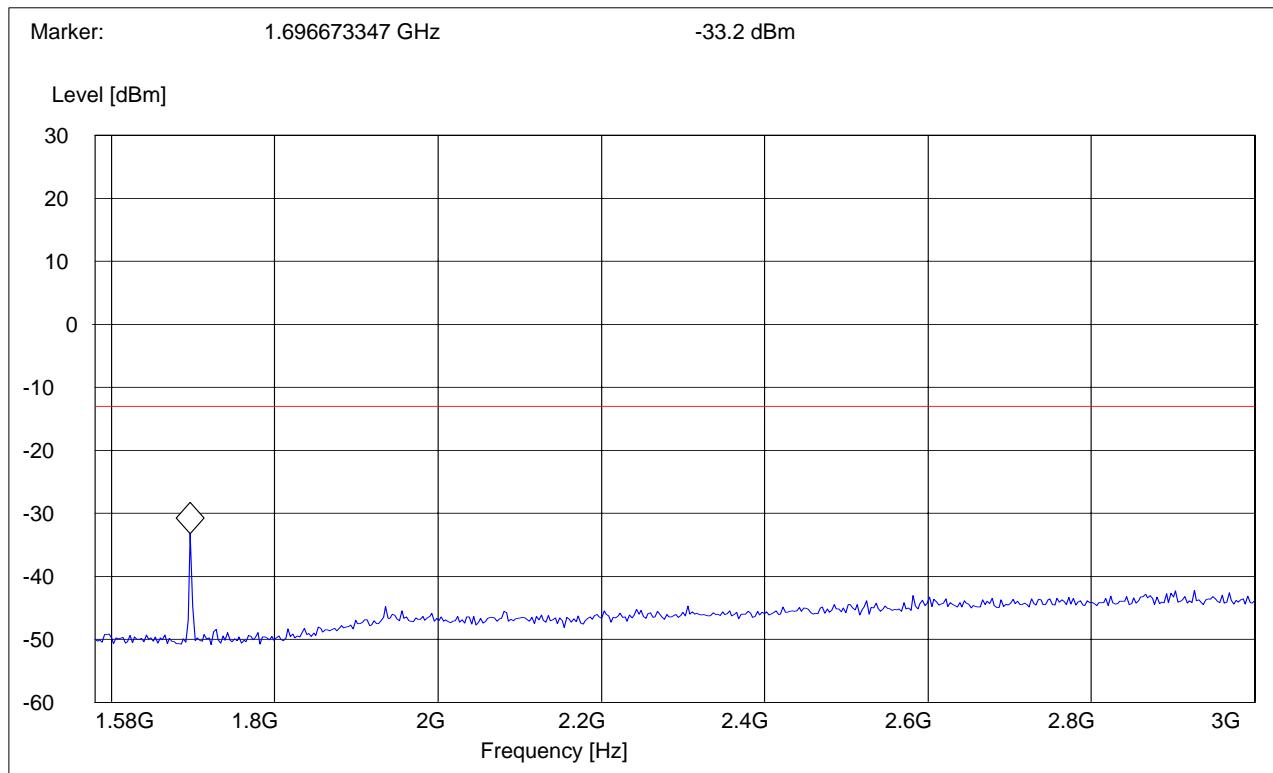


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 848.8MHz: 1.58GHz – 3GHz**

Spurious emission limit –13dBm

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

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

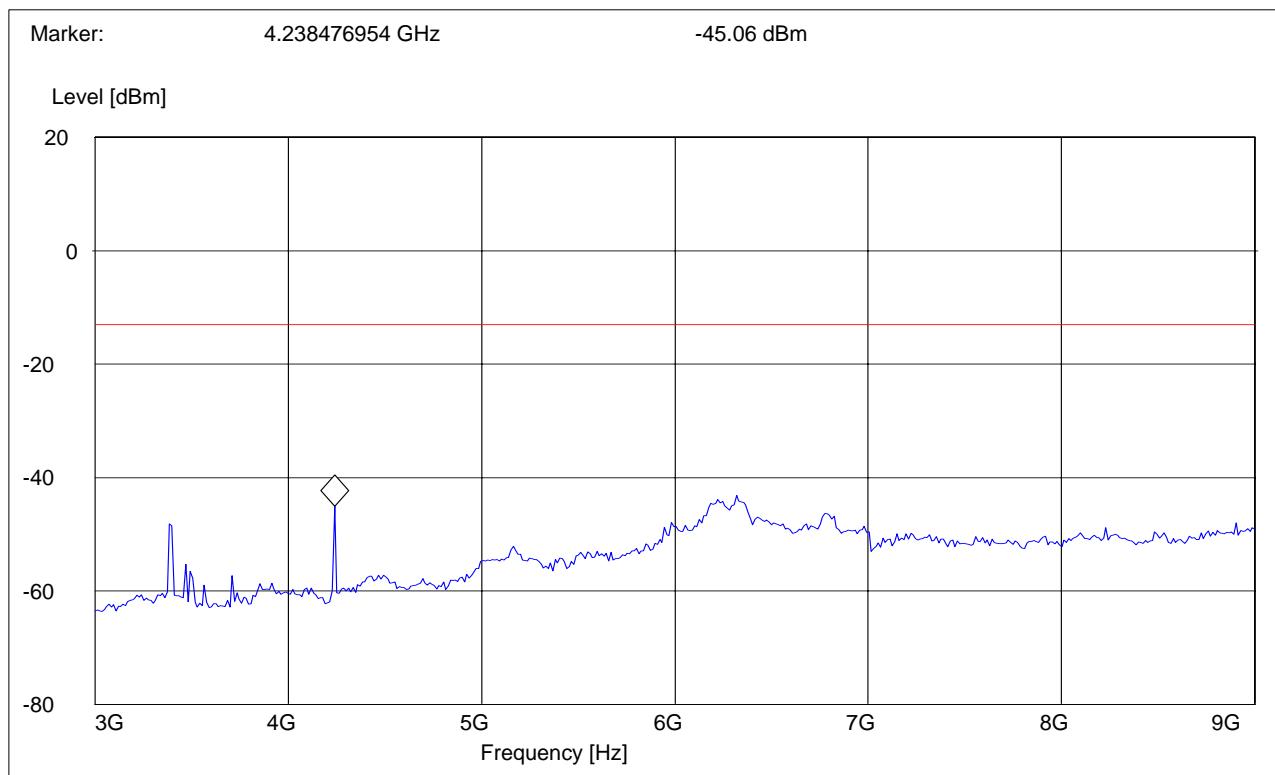


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 848.8MHz: 3GHz – 9GHz**

Spurious emission limit –13dBm

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

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

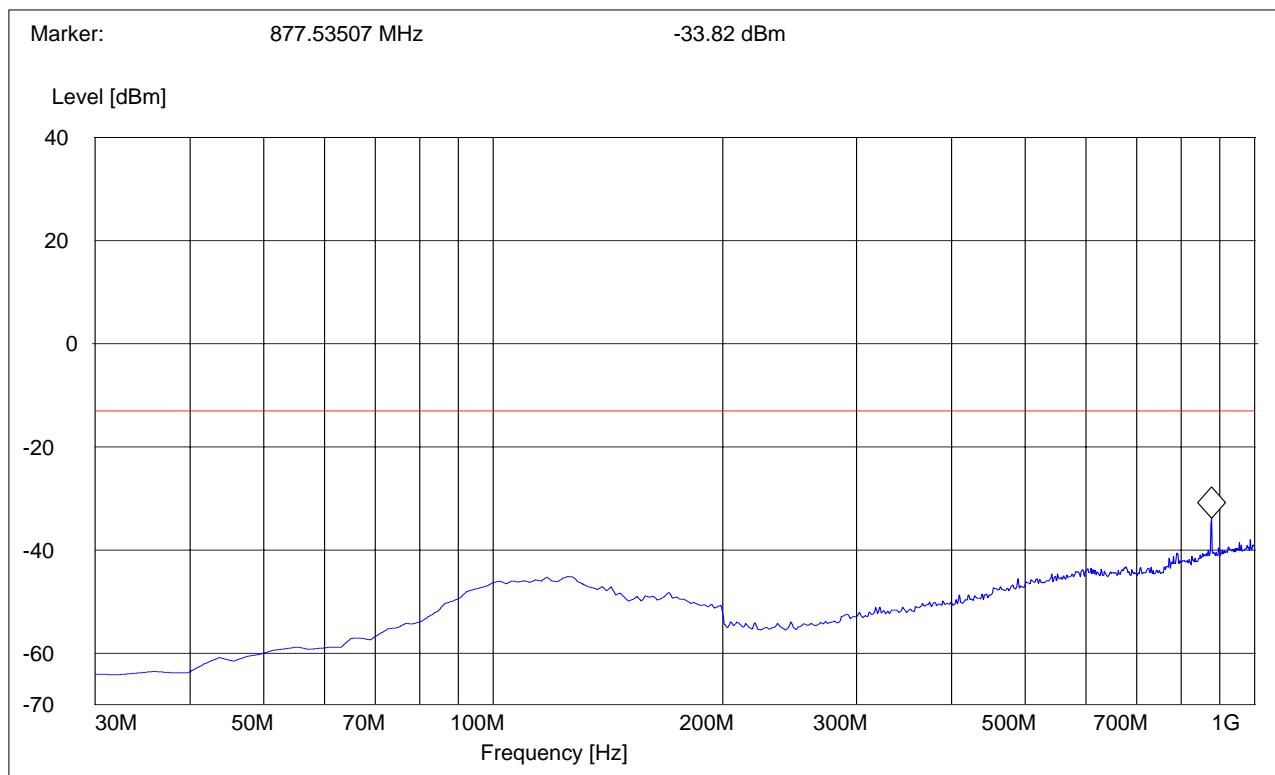


**RADIATED SPURIOUS EMISSIONS (GSM-850)****IDLE: 30MHz - 1GHz**

Spurious emission limit –13dBm

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

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



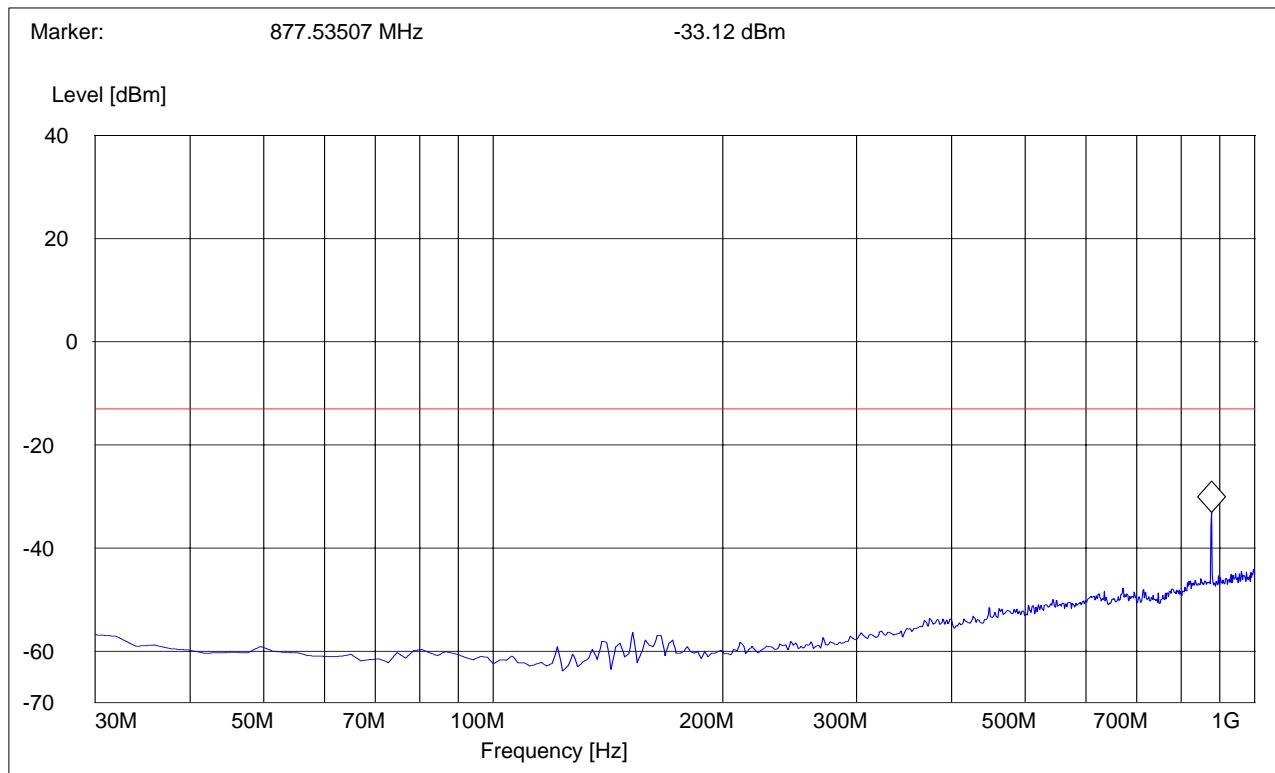
\*MARKER IS BASESTATION

**RADIATED SPURIOUS EMISSIONS (GSM-850)****IDLE: 30MHz - 1GHz**

Spurious emission limit -13dBm

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

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



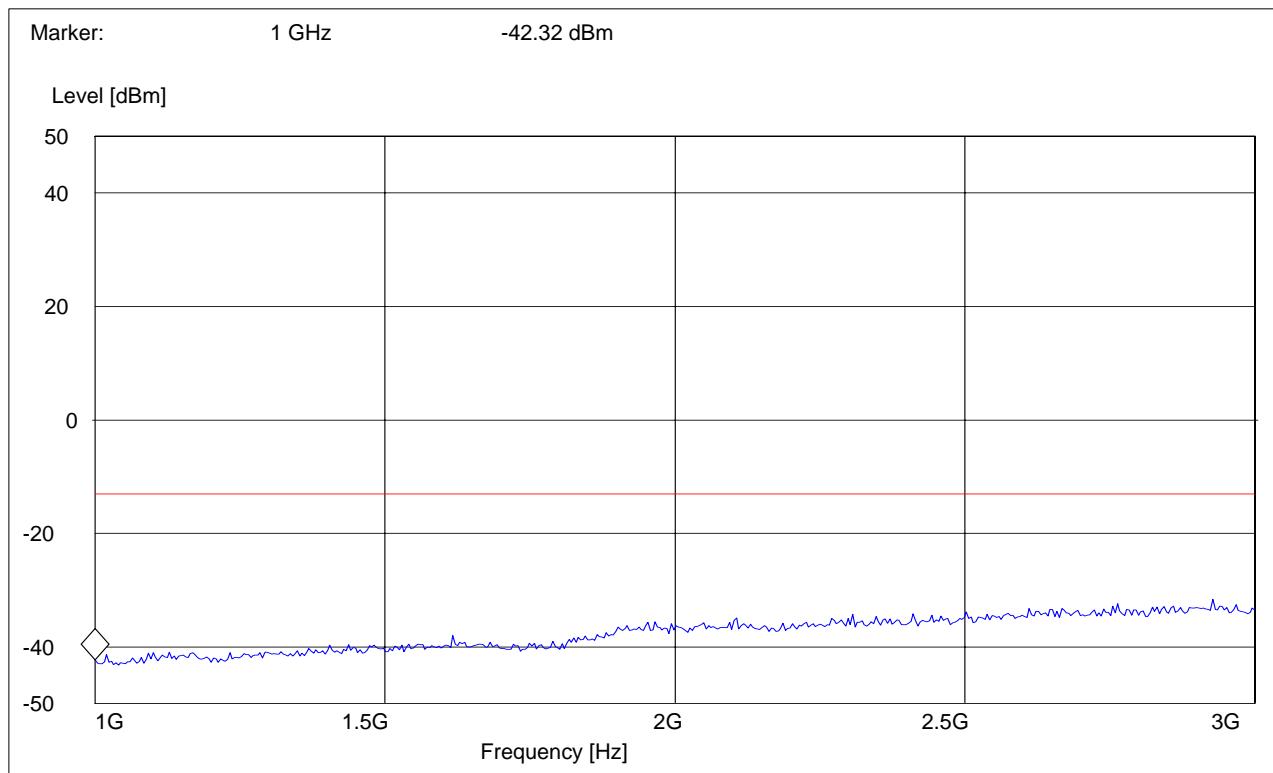
\*MARKER IS BASESTATION

**RADIATED SPURIOUS EMISSIONS (GSM-850)****IDLE: 1GHz – 3GHz**

Spurious emission limit –13dBm

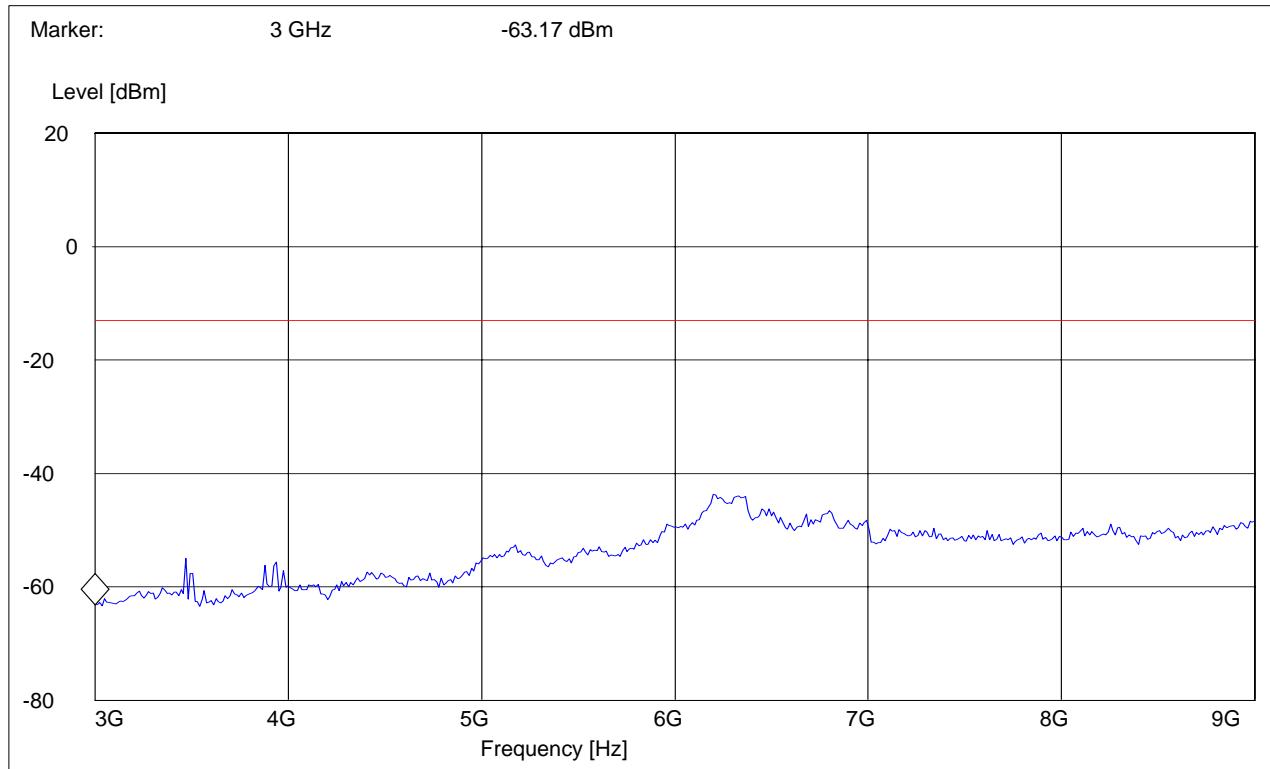
***SWEEP TABLE: "FCC 22 Spur 1-3G"***

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



**RADIATED SPURIOUS EMISSIONS (GSM-850)  
IDLE: 3GHz – 9GHz*****SWEET TABLE: "FCC 22 Spur 3-9G"***

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



**RESULTS OF RADIATED TESTS PCS-1900:**

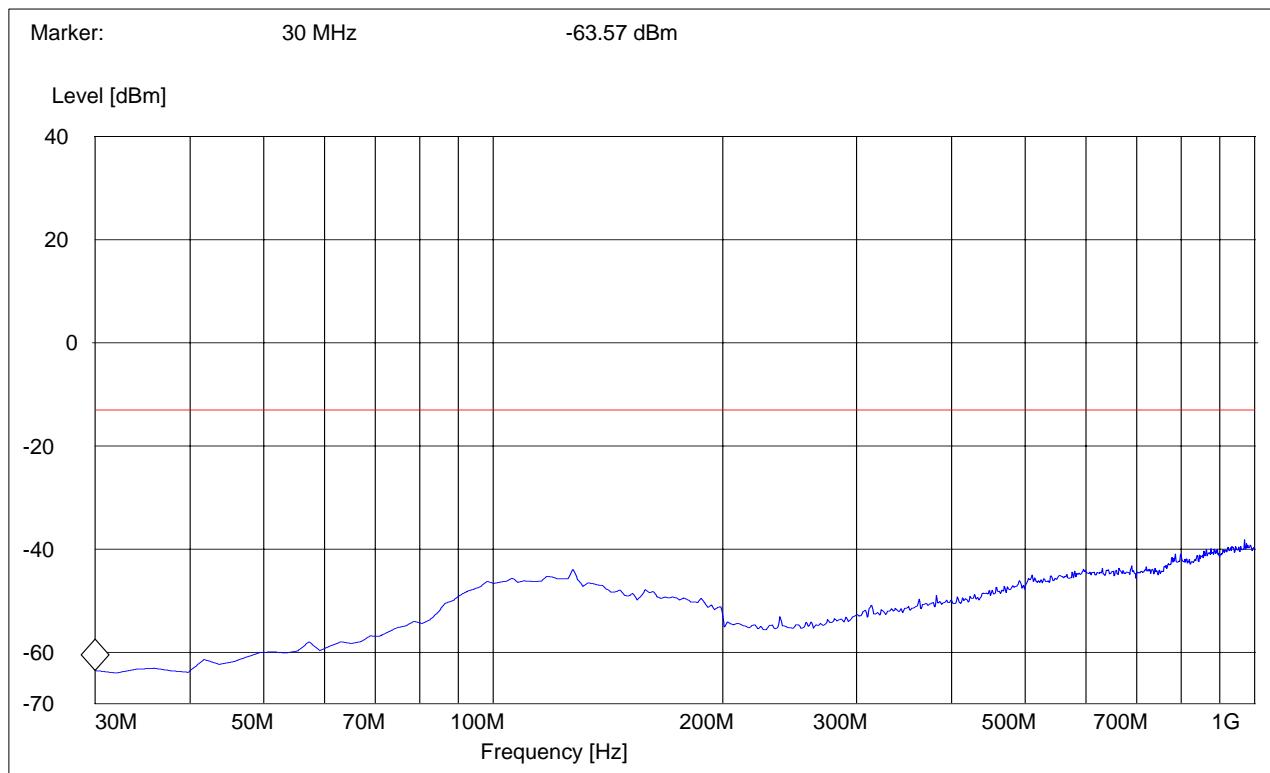
Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	<b>3700.4</b>	-37.77	<b>3760</b>	-35.25	<b>3819.6</b>	-38.36
3	<b>5550.6</b>	-35.24	<b>5640</b>	-41.79	<b>5729.4</b>	-46.53
4	<b>7400.8</b>	-46.71	<b>7520</b>	-46.85	<b>7639.2</b>	-45.12
5	<b>9251</b>	-38.12	<b>9400</b>	-42.16	<b>9549</b>	NF
6	<b>11101.2</b>	-33.38	<b>11280</b>	-38.69	<b>11458.8</b>	-41.36
7	<b>12951.4</b>	-42.61	<b>13160</b>	NF	<b>13368.6</b>	NF
8	<b>14801.6</b>	NF	<b>15040</b>	NF	<b>15278.4</b>	NF
9	<b>16651.8</b>	NF	<b>16920</b>	NF	<b>17188.2</b>	NF
10	<b>18502</b>	NF	<b>18800</b>	NF	<b>19098</b>	NF
NF = NOISE FLOOR						

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

Spurious emission limit –13dBm

**Antenna: vertical*****SWEET TABLE: "FCC 24 Spur 30M-1G"***

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

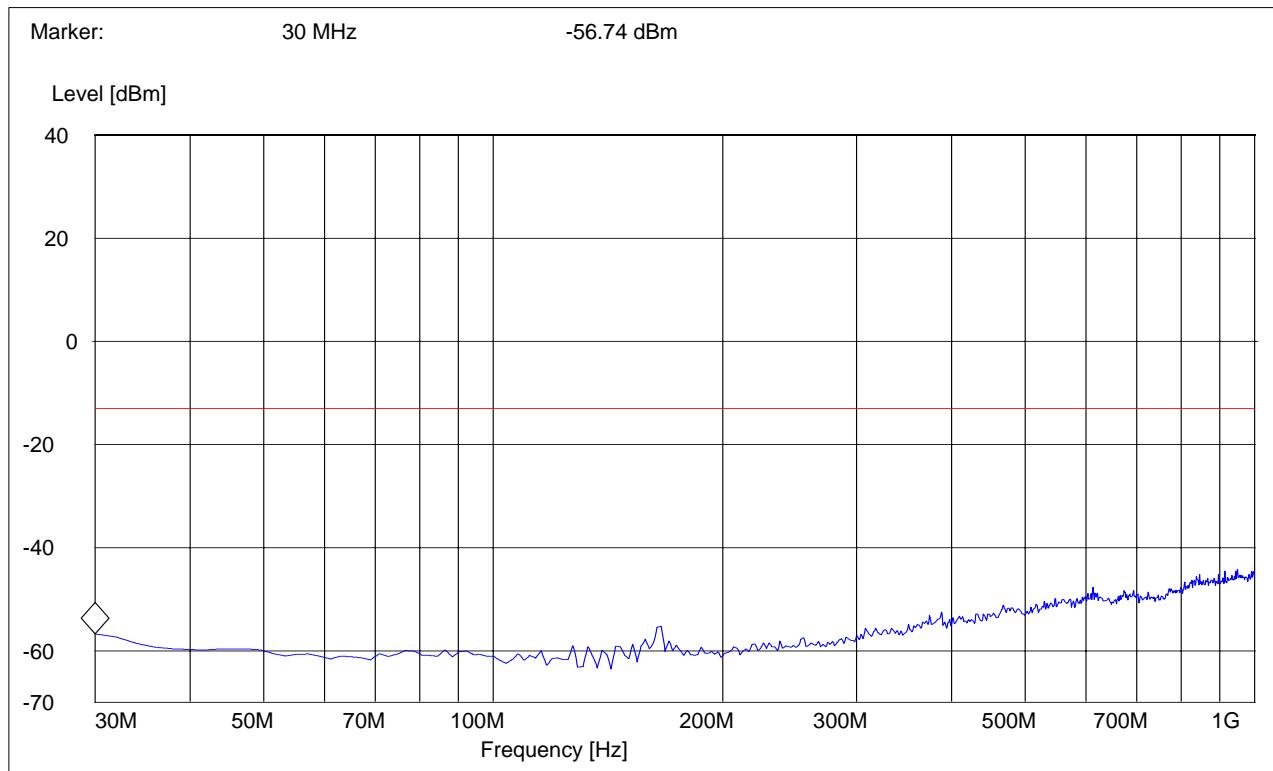
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

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

Spurious emission limit –13dBm

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

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

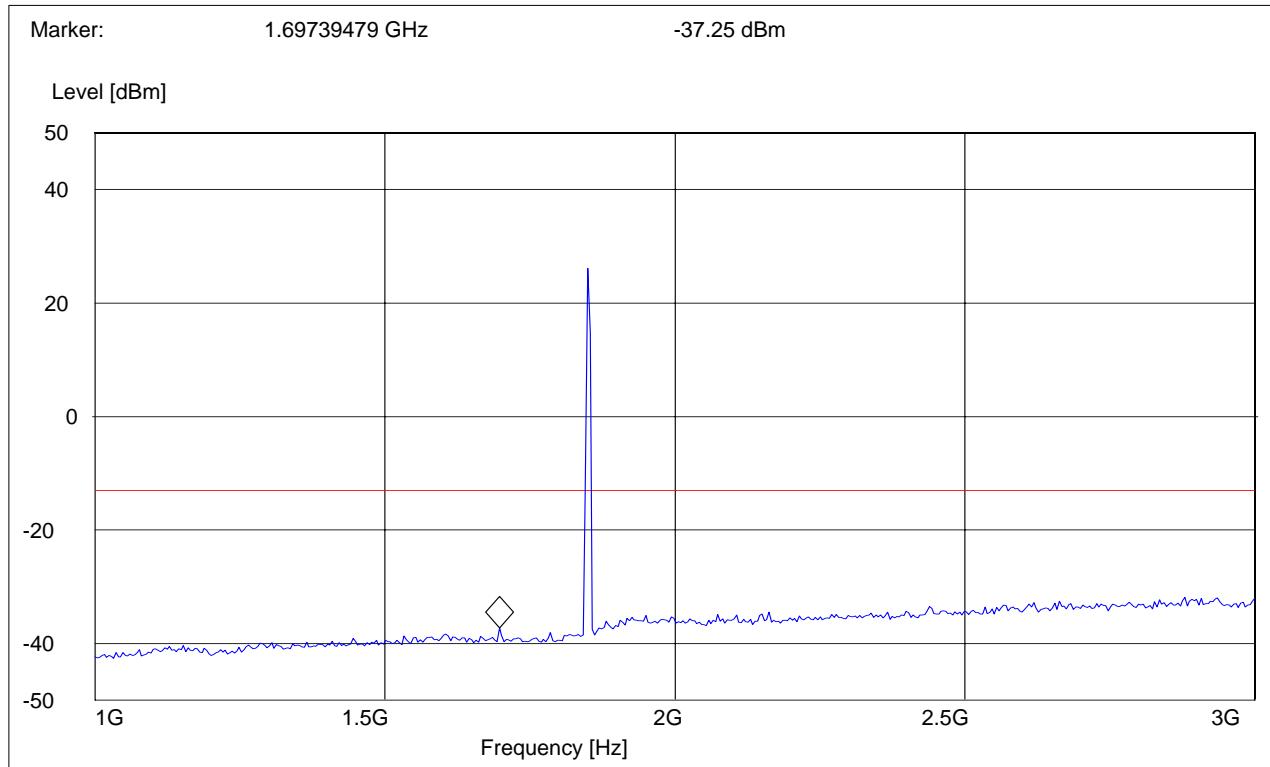
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1850.2MHz: 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	1 MHz

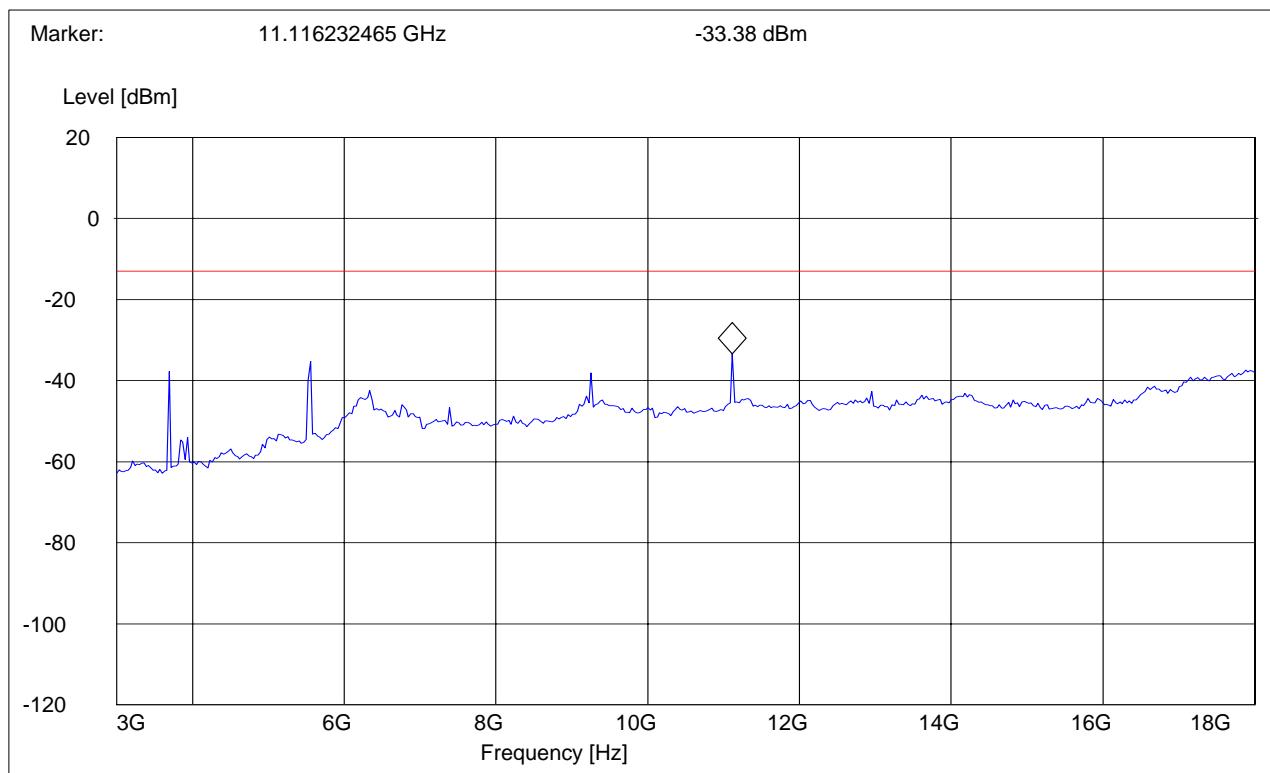
**Note: The peak above the limit line is the carrier freq. at ch-512.**

**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1850.2MHz: 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	1 MHz

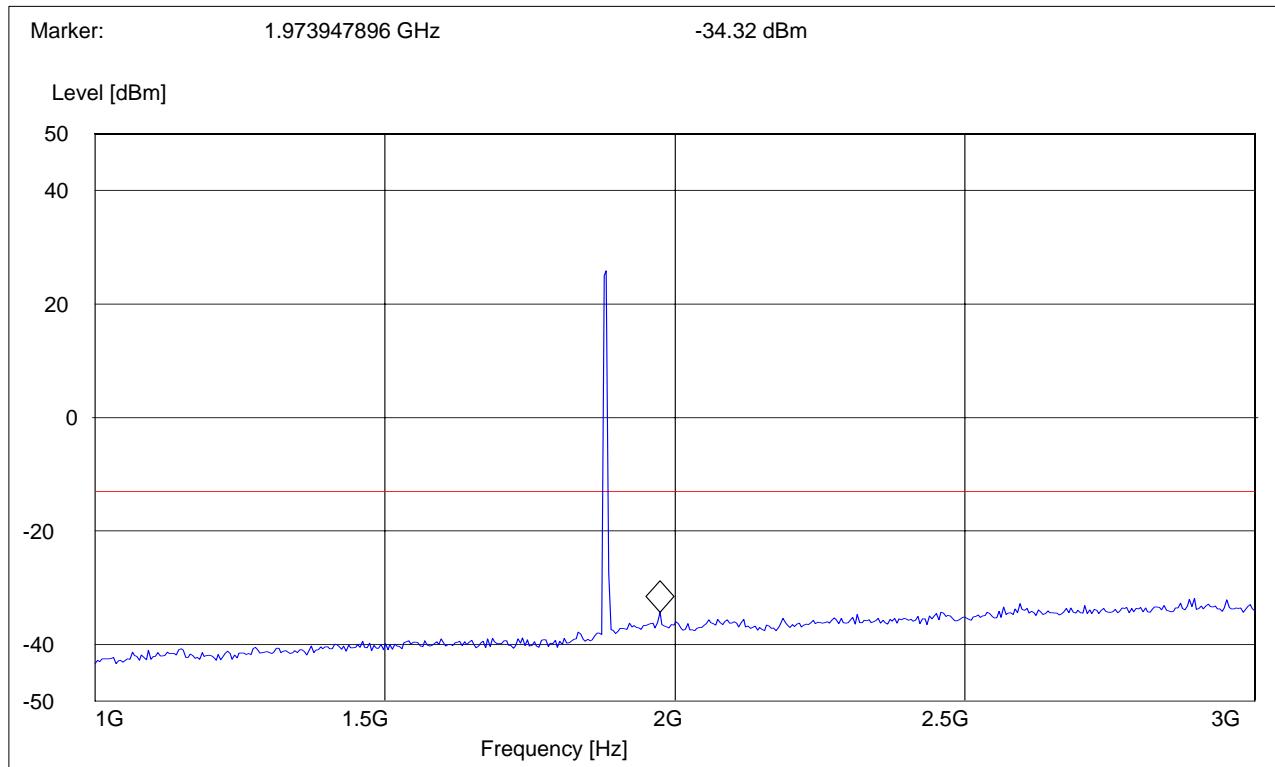


**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1880.0MHz: 1GHz – 3GHz**

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	1 MHz

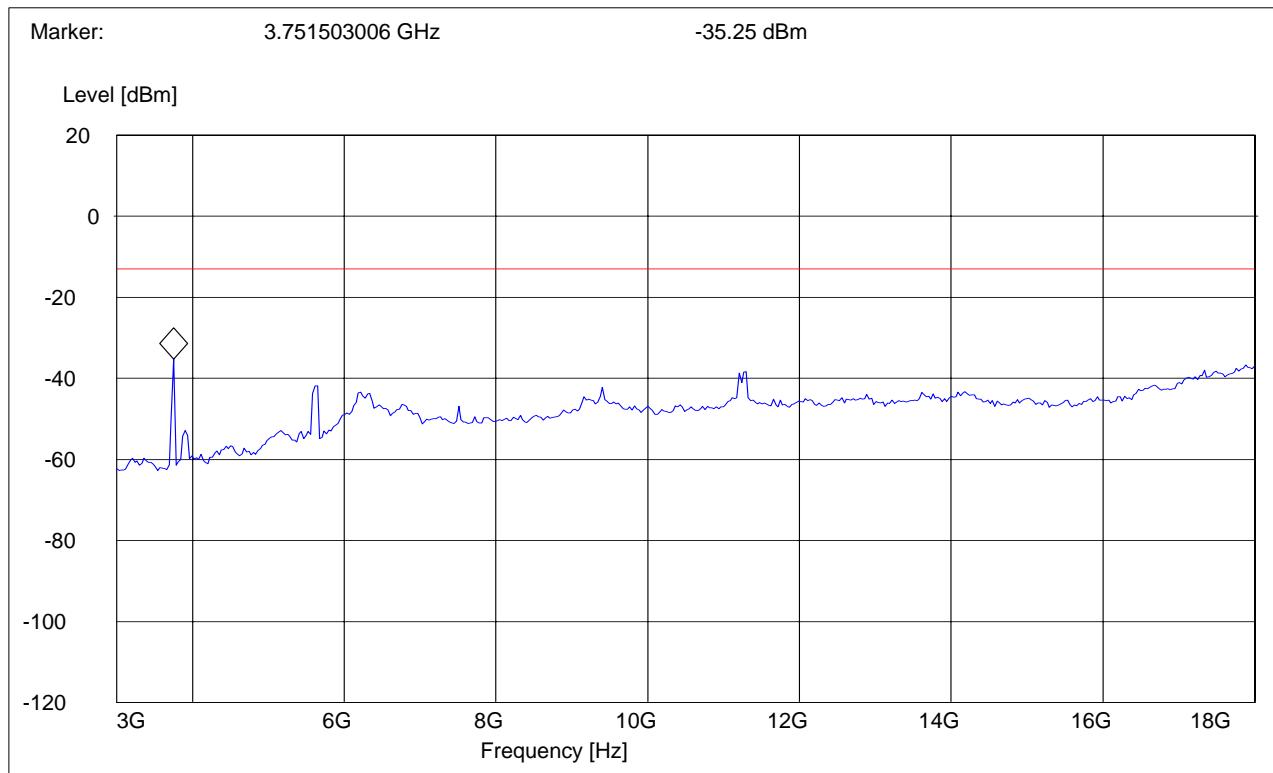
**Note: The peak above the limit line is the carrier freq. at ch-661.**

**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1880.0MHz: 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	1 MHz

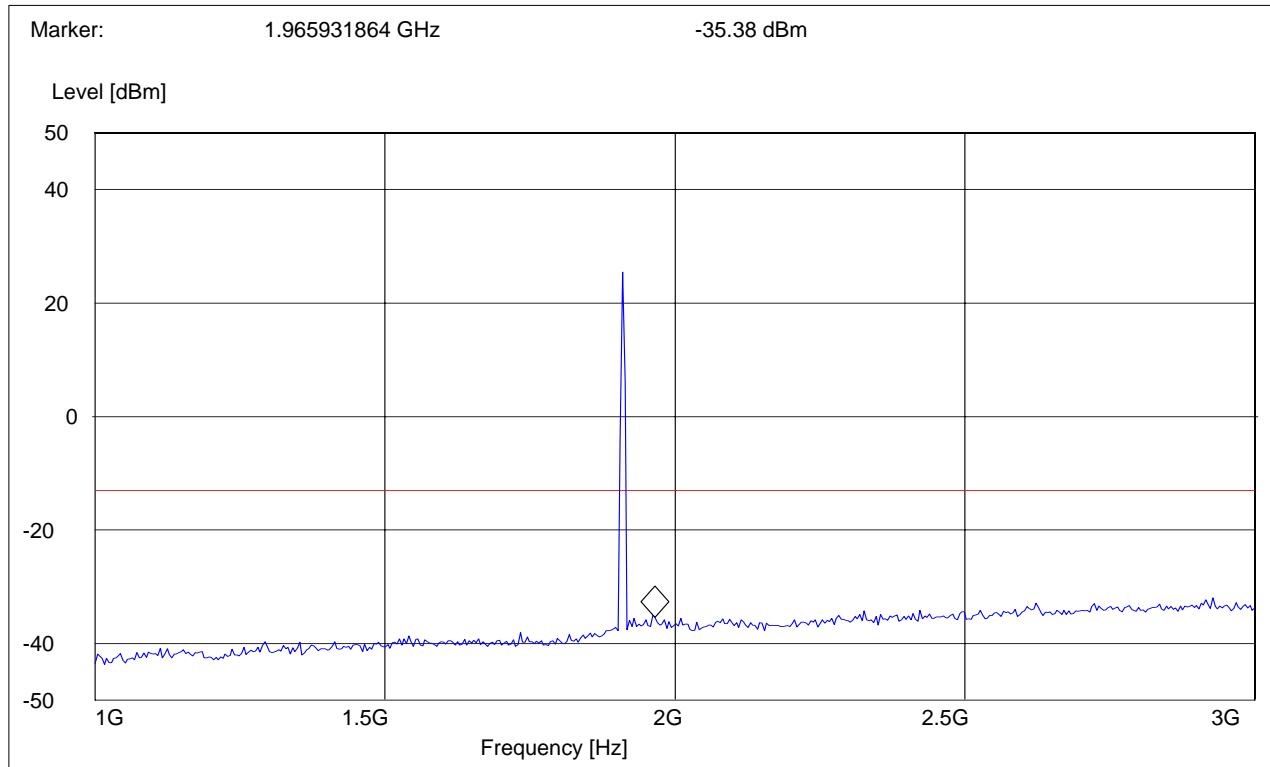


**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1909.8MHz: 1GHz – 3GHz**

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	1 MHz

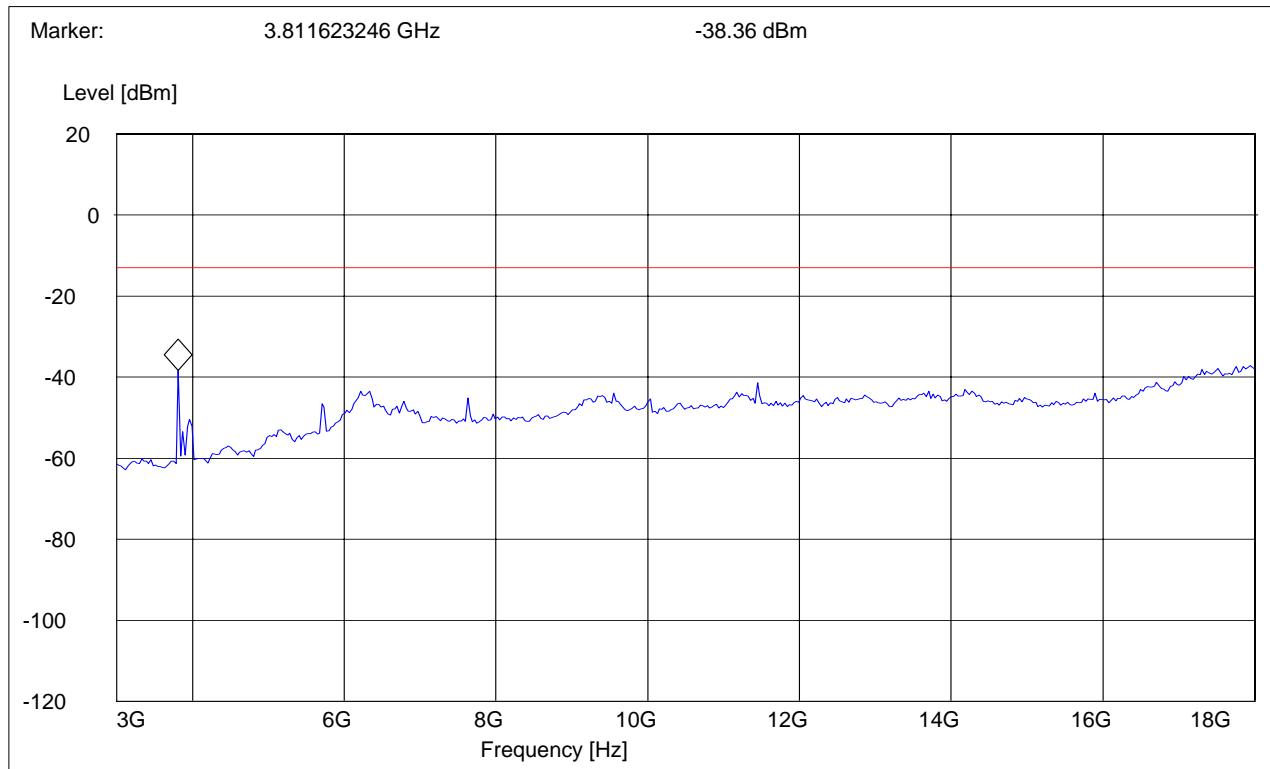
**Note: The peak above the limit line is the carrier freq. at ch-810.**

**RADIATED SPURIOUS EMISSIONS(PCS 1900)****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	1 MHz

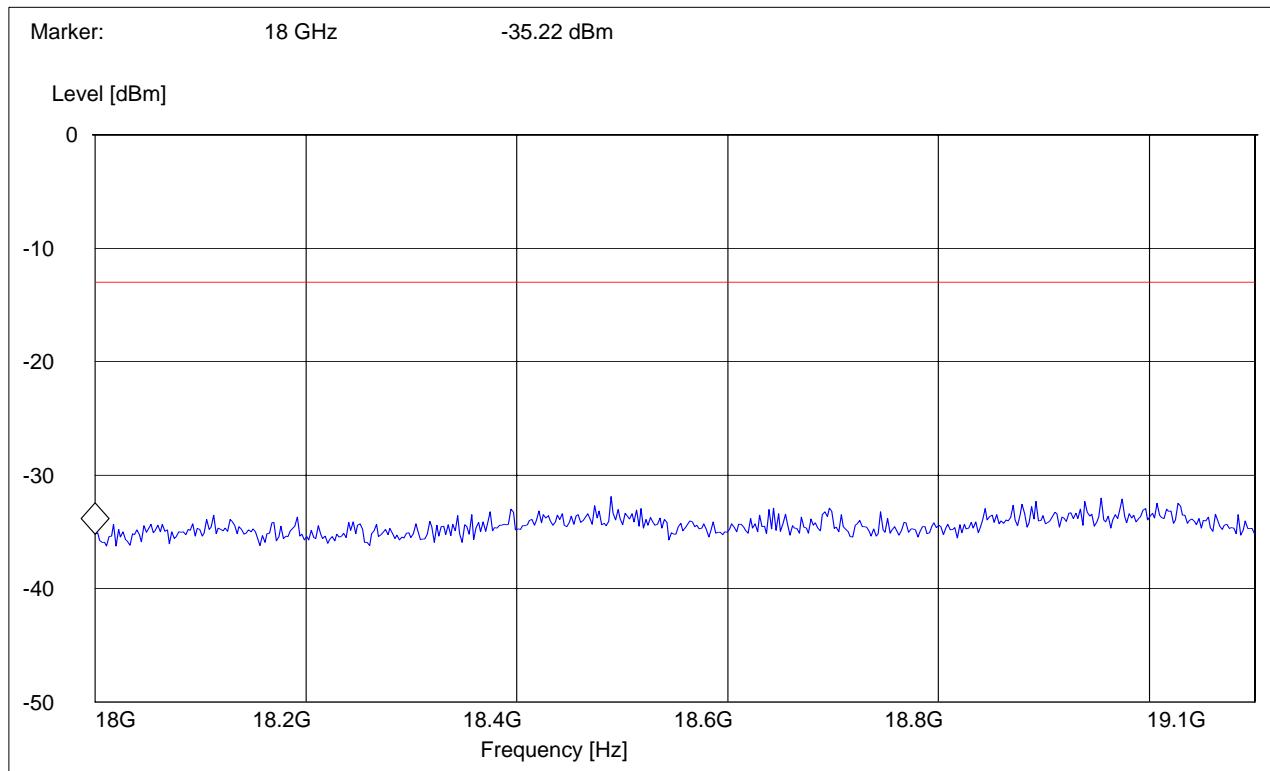


**RADIATED SPURIOUS EMISSIONS(PCS 1900)****18GHz – 19.1GHz**

Spurious emission limit –13dBm

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

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

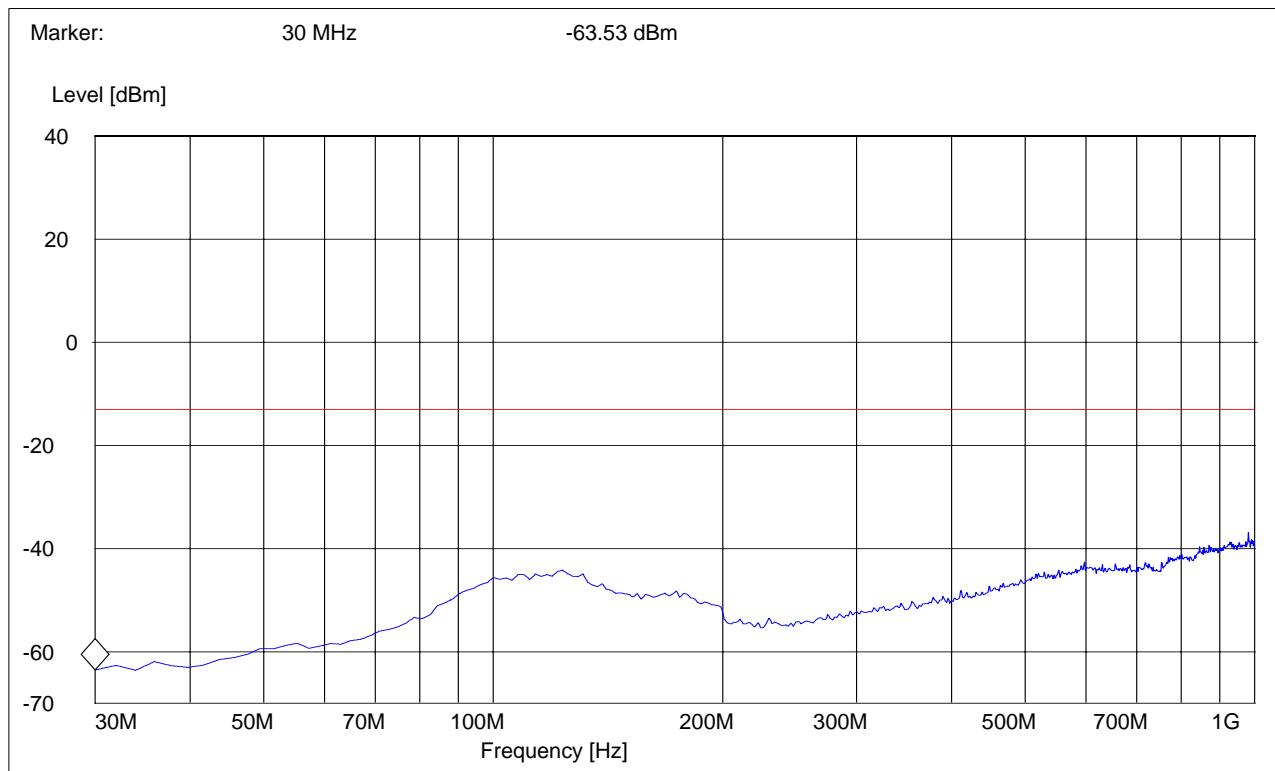
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

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

Spurious emission limit –13dBm

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

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

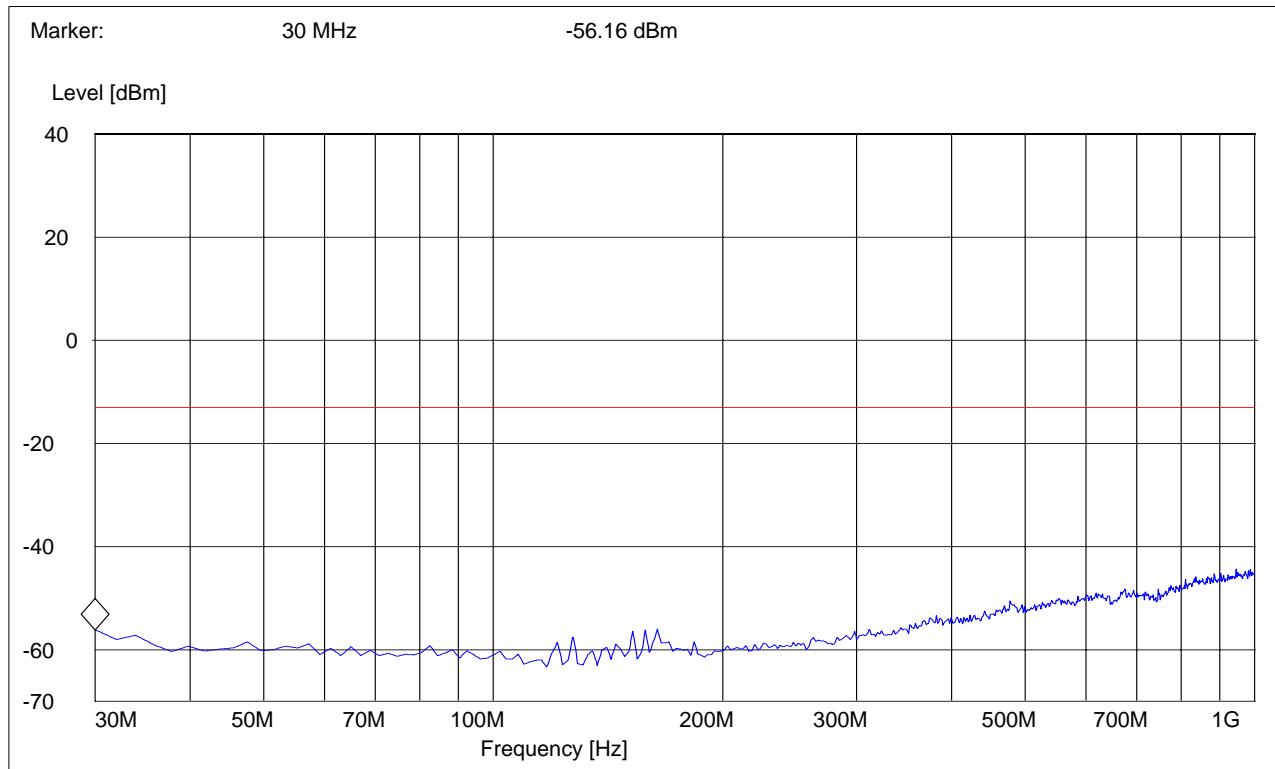


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 30MHz – 1GHz**

Spurious emission limit –13dBm

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

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

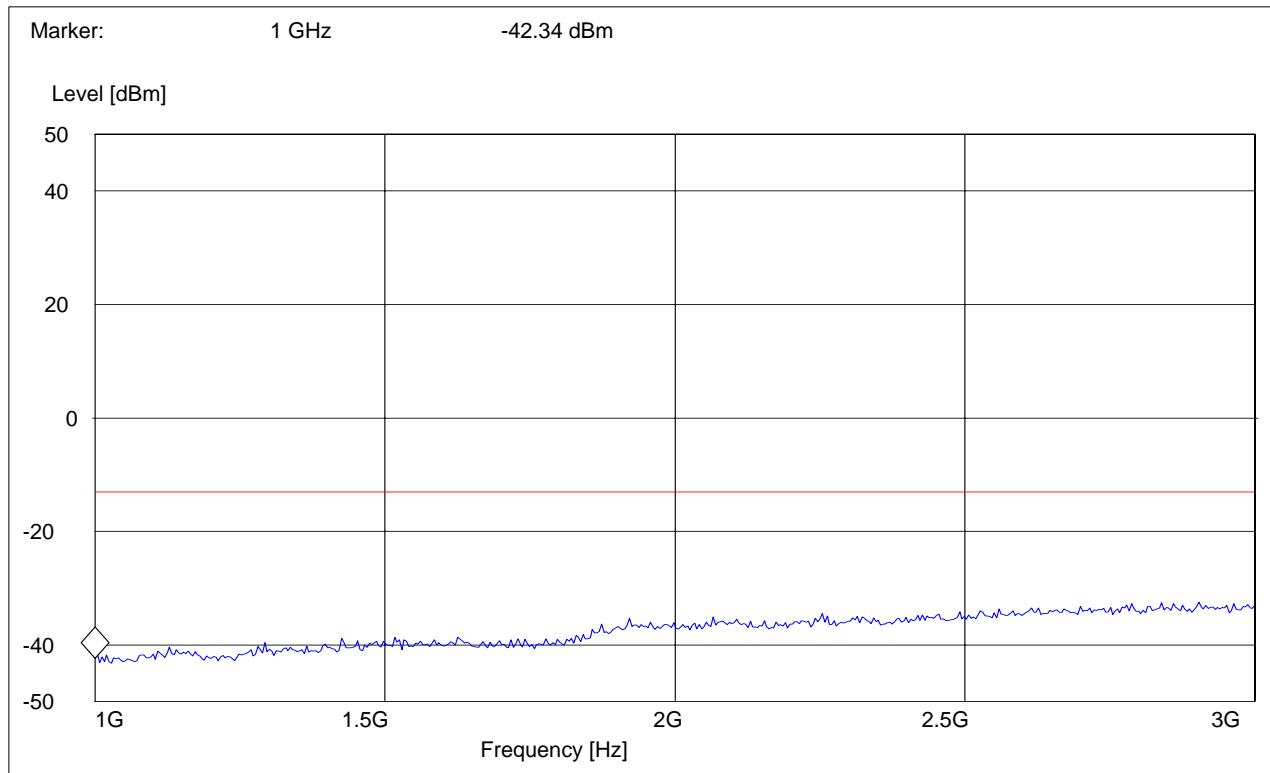


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 1GHz – 3GHz**

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	1 MHz

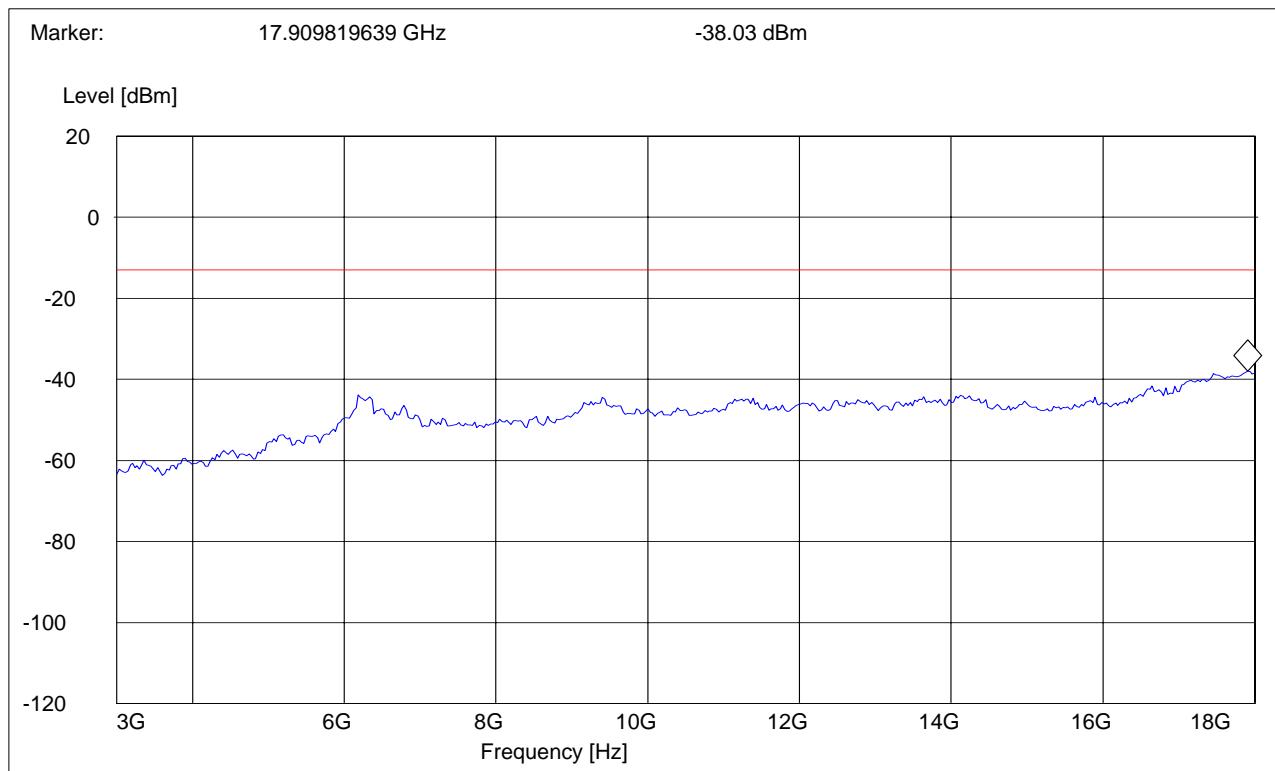


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 3GHz – 18GHz**

Spurious emission limit –13dBm

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

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

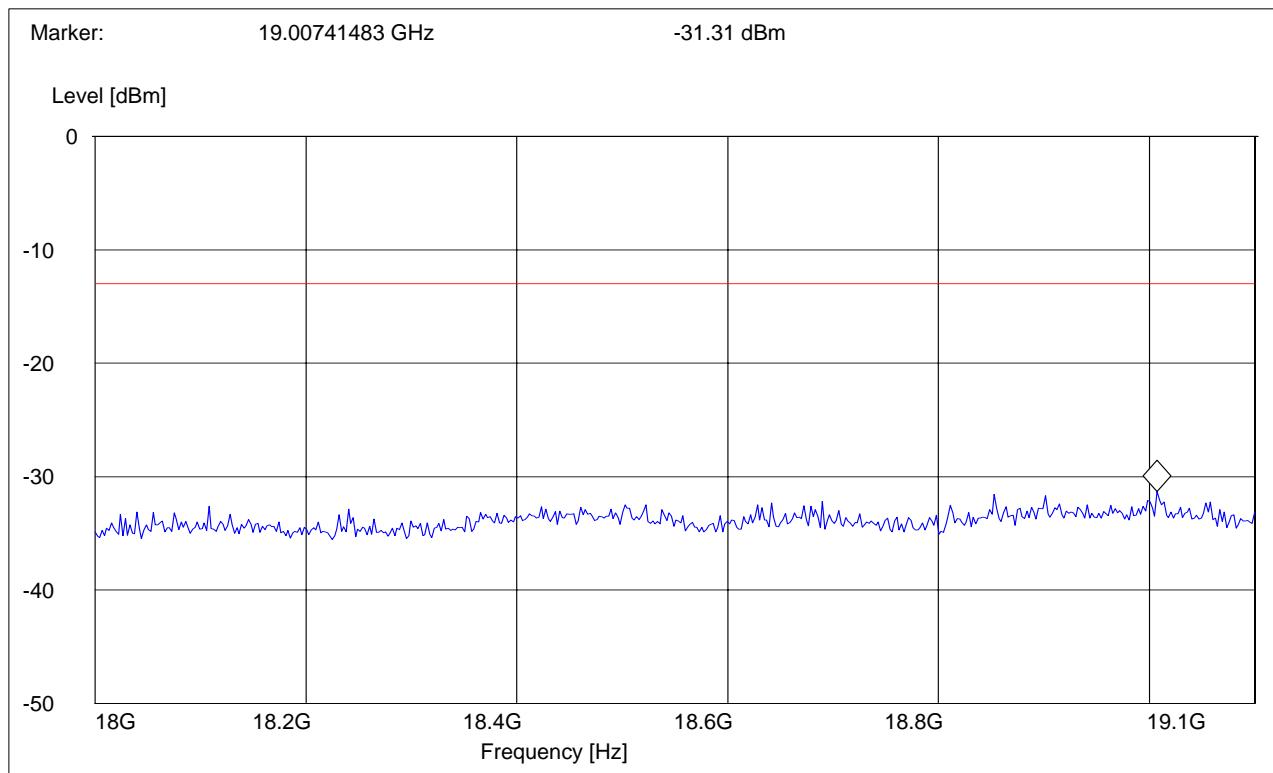


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 18GHz – 19.1GHz**

Spurious emission limit –13dBm

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

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



**5.3 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 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the noise level.
2. Receiver radiated emissions were done on both 850/1900 bands, but only worst-case plots are submitted in the test reports.

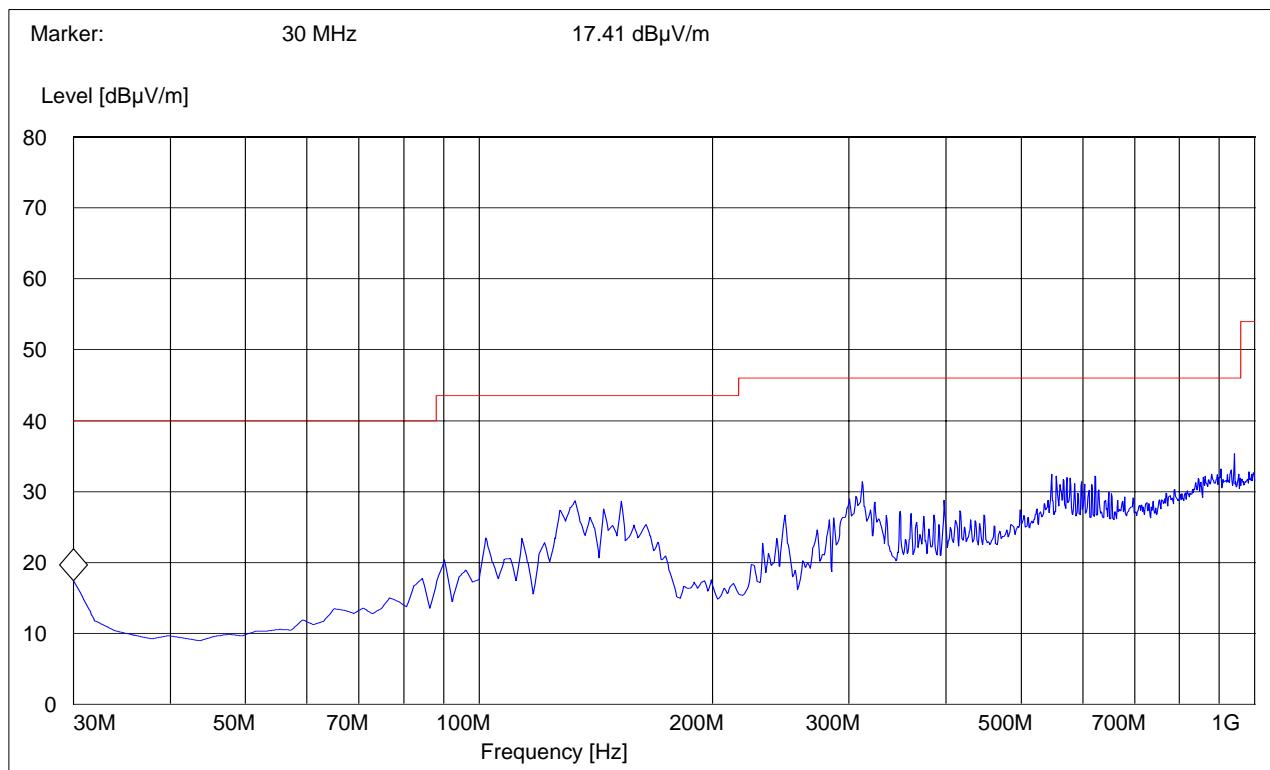
**Limits****SUBCLAUSE § RSS-133**

Frequency (MHz)	Field strength ( $\mu$ V/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

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

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

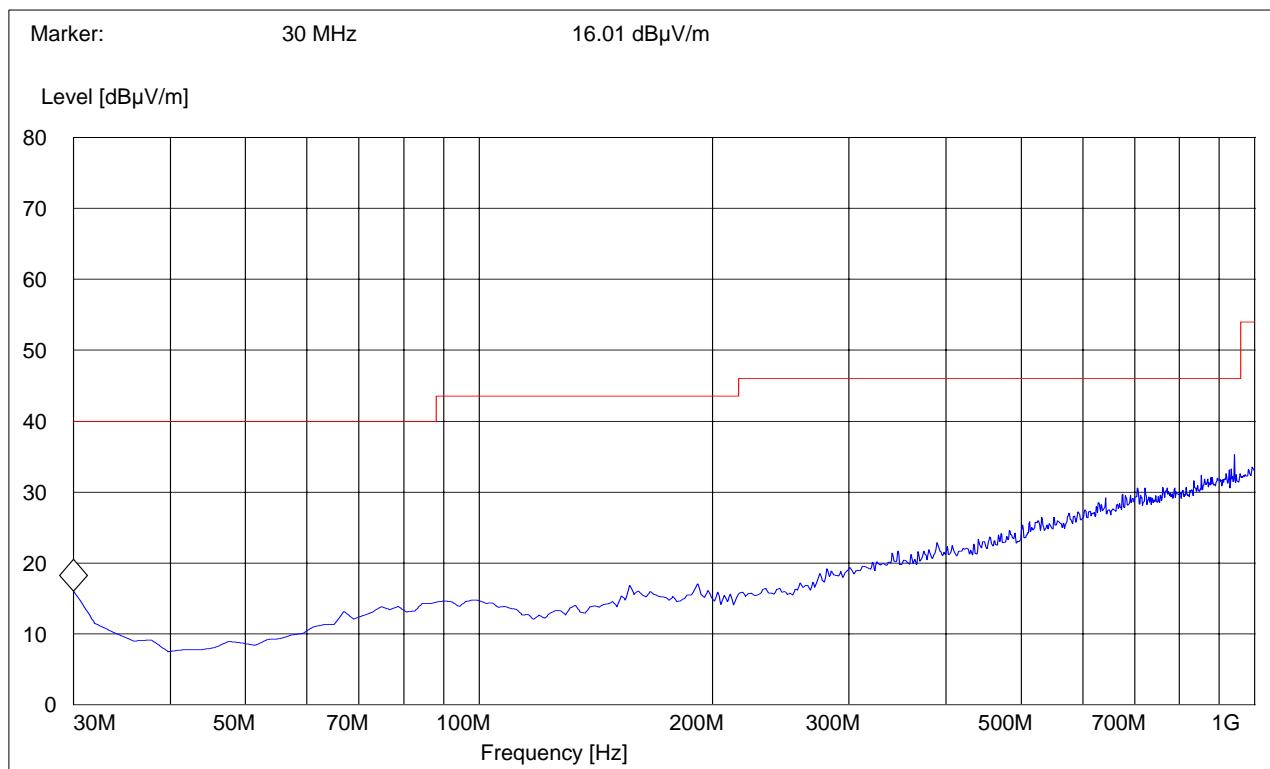
NOTE: PEAK READING VS. QUASI-PEAK LIMIT



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

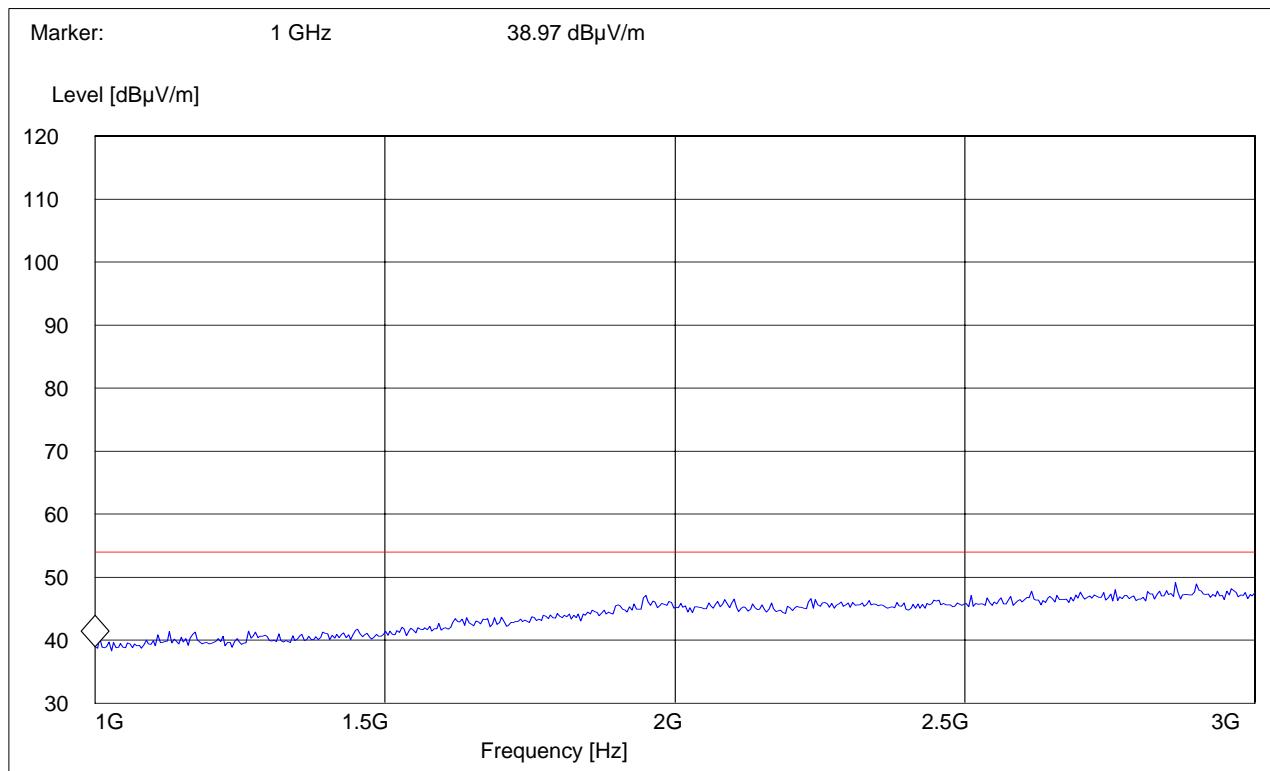
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

NOTE: PEAK READING VS. QUASI-PEAK LIMIT



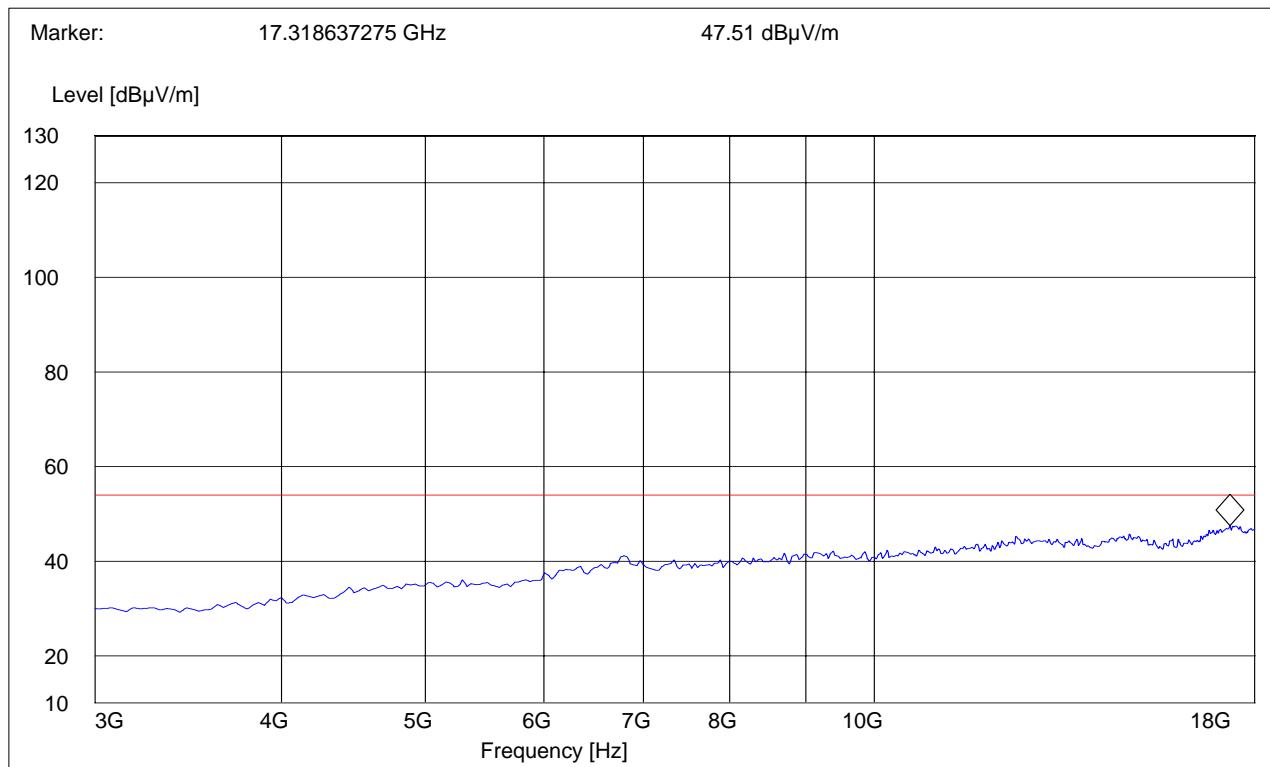
**RECEIVER RADIATED EMISSIONS****EUT in Idle Mode: 1GHz – 3GHz****Note: marked peak is downlink from the base station*****SWEEP TABLE: "FCC Spuri 1-3G"***

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

**NOTE: PEAK READING VS. AVERAGE LIMIT**

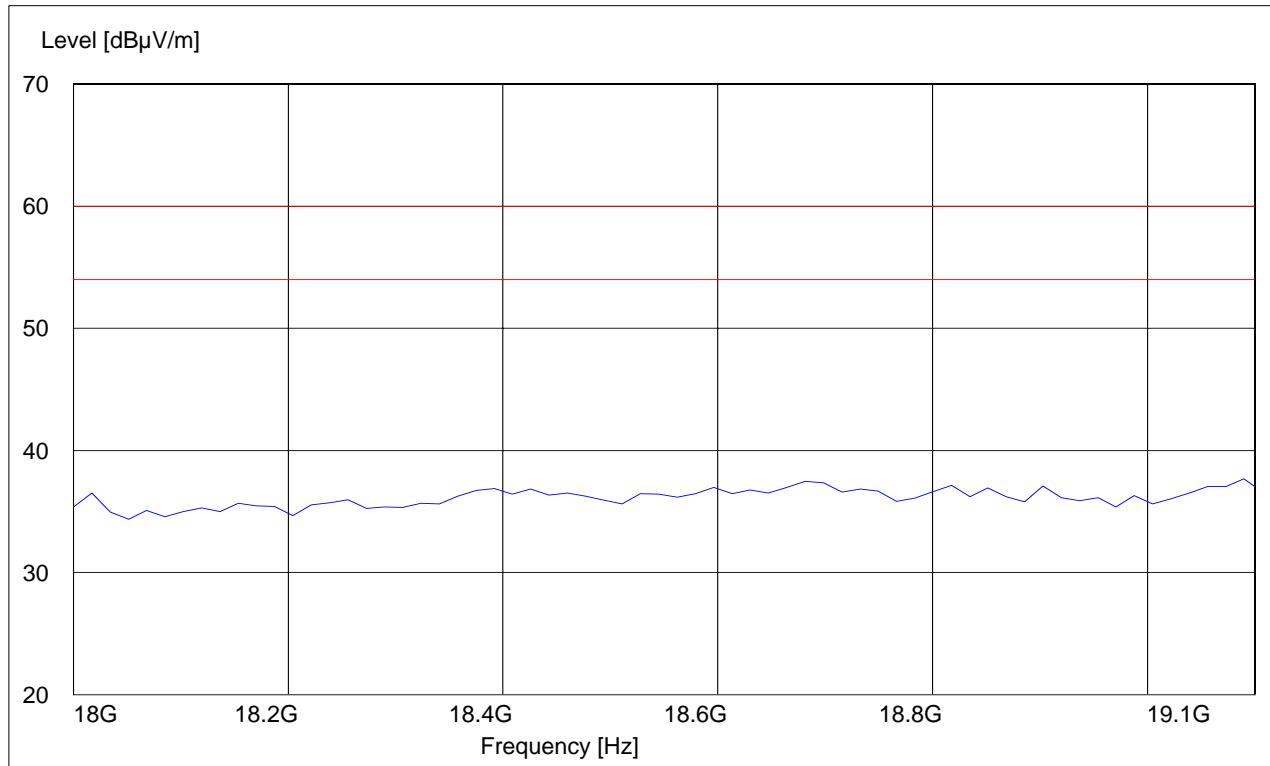
**RECEIVER RADIATED EMISSIONS**  
**EUT in Idle Mode: 3GHz – 18GHz*****SWEET TABLE: "FCC spuri 3-18G"***

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

**NOTE: PEAK READING VS. AVERAGE LIMIT**

**RECEIVER RADIATED EMISSIONS**  
**EUT in Idle Mode: 18GHz – 19.1GHz*****SWEEP TABLE: "FCC spuri 18-19.1G"***

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



**5.4 AC POWERLINE CONDUCTED EMISSIONS****§ 15.107/207****Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)****Limit**

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

\* Decreases with logarithm of the frequency

**ANALYZER SETTINGS: RBW = 10KHz****VBW = 10KHz**

**Prescans were performed on both 850/1900 bands, full testing on the worst-case band is submitted in the test report.**

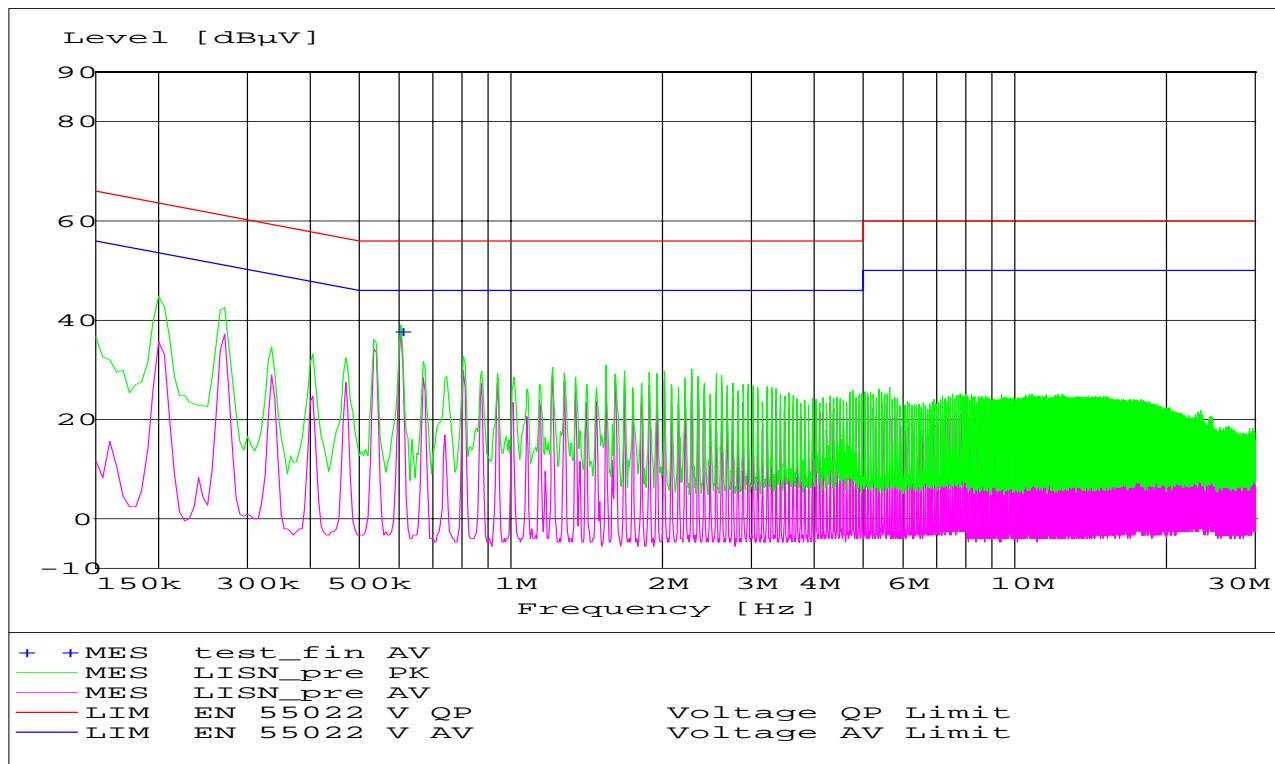
**5.4.1 Results EUT****LISN****411 Dixon Landing Road, CA 95035**

EUT / Description: d9500 mc46  
 Manufacturer: hhp  
 Test mode: PCS 1900 traffic channel-661  
 Test Engineer: Neelesh  
 Phase: L & N  
 Comment: 110 volt

Start of Test: 1/16/2006 / 8:41:55AM

**SCAN TABLE: "EN 55022 Voltage"**

Short Description:			EN 55022 Voltage			
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**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 2006	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	August 2006	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/01 1	May 2006	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008 .02	May 2006	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2006	1 year
06	Horn Antenna (1- 18GHz)	SAS-200/571	AH Systems	325	June 2006	1 year
07	Horn Antenna (18- 26.5GHz)	3160-09	EMCO	1240	June 2006	1 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	May 2006	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 2006	1 year
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2006	1 year
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/00 8	May 2006	1 year
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2006	1 year

## **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-B-2003 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard November 7, 2002.

## 8 BLOCK DIAGRAMS

### Radiated Testing

#### ANECHOIC CHAMBER

