



# FCC Test Report

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

FOR:

PERSONAL COMPUTER

MODEL #: PCG-4F1L

SONY CORPORATION  
6-7-35, KITASHINAGAWA, SHINAGAWA-KU  
TOKYO 141-001

FCC ID: AK8PCG4F1L  
IC ID: 409B-PCG4F1L

TEST REPORT #: EMC\_1008\_2005\_FCC22/24  
DATE: AUGUST 17, 2005



TTI-P-G 081/94-A0

Accredited according to ISO/IEC 17025



Bluetooth Qualification  
Test Facility  
(BQTF)



FCC listed # 101450  
IC recognized # 3925

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## 1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS132 and RSS133.

| Company          | Description       | Model #  |
|------------------|-------------------|----------|
| SONY CORPORATION | PERSONAL COMPUTER | PCG-4F1L |



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2005-08-17  
Neelesh Raj  
Project Leader



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2005-08-17  
Lothar Schmidt  
Test Lab Manager

## **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<br>Milpitas, CA 95035<br>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:                 | 2005-08-05 to 2005-08-11                               |

### **2.2 Identification of the Client**

|                   |                                             |
|-------------------|---------------------------------------------|
| Applicant's Name: | <b>SONY Corporation</b>                     |
| Street Address:   | <b>6-7-35, Kitashinagawa, Shinagawa-ku,</b> |
| City/Zip Code     | <b>Tokyo 141-0001</b>                       |
| Country           | <b>Japan</b>                                |
| Contact Person:   | <b>Takumi Ozawa</b>                         |
| Phone No.         | <b>81-3-5795-8716</b>                       |
| Fax:              | <b>81-3-5795-8981</b>                       |
| e-mail:           | <b>ozawa@sm.sony.co.jp</b>                  |

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

|                        |                                                          |
|------------------------|----------------------------------------------------------|
| Manufacturer's Name:   | <b>Sony EMCS Corporation</b>                             |
| Manufacturers Address: | <b>5432 Toyoshima, Toyoshima-machi, Minamiazumi-gun,</b> |
| City/Zip Code          | <b>Nagano 399-8282,</b>                                  |
| Country                | <b>Japan</b>                                             |

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

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

|                        |                                                                                |
|------------------------|--------------------------------------------------------------------------------|
| Marketing Name:        | <b>VGC-TX</b>                                                                  |
| Description:           | <b>Personal Computer</b>                                                       |
| Model No:              | <b>PCG-4F1L</b>                                                                |
| FCC ID:                | <b>AK8PCG4F1L</b>                                                              |
| IC ID:                 | <b>409B-PCG4F1L</b>                                                            |
| Frequency Range:       | <b>824.2MHz – 848.8MHz for GSM 850,<br/>1850.2MHz – 1909.8MHz for PCS 1900</b> |
| Type(s) of Modulation: | <b>GMSK</b>                                                                    |
| Number of Channels:    | <b>124 for GSM-850, 299 for PCS-1900</b>                                       |
| Antenna Type:          | <b>GSM: <math>\lambda</math>/monopole (Film Antenna)</b>                       |
| Output Power:          | <b>FCC 22: 139mW ERP @ 836.6MHz<br/>FCC 24: 426mW EIRP @ 1850.2MHz</b>         |

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

All testing was performed on the PCG-4F1L referred to as EUT. During the testing process the GSM antenna was tested in all possible positions and the worst case was determined to be vertical, all data was taken in the worst case configuration.

The EUT carries a pre-certified GSM module with FCC ID# PY7FF031021. This test report contains full radiated testing as per FCC 22/24 on the EUT with the pre-certified GSM module. All conducted measurements are covered under *test report# 2-3875-01-01/05*.

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 and Industry Canada rules RSS132 and RSS133.

## 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.

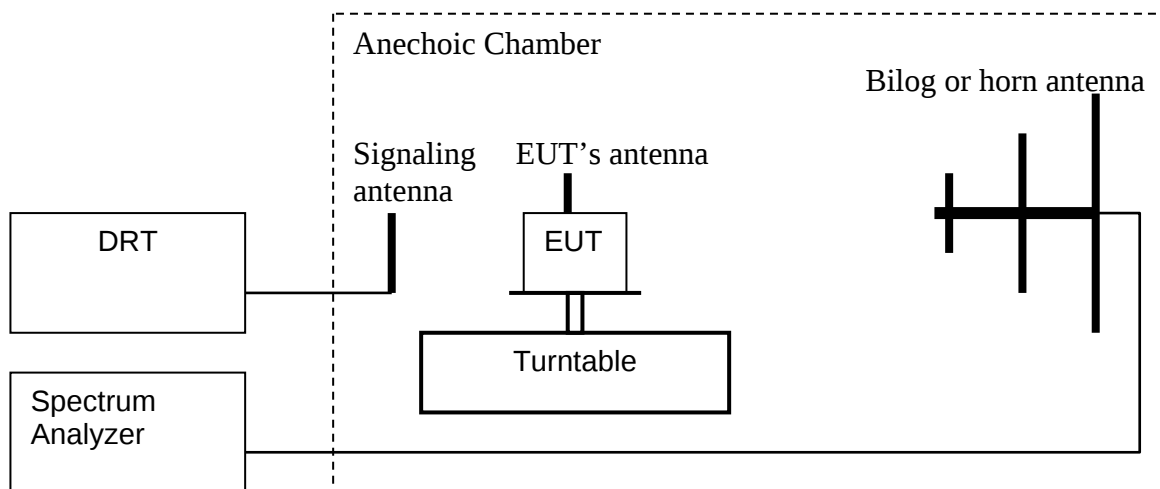
(b) Mobile/portable stations are limited to 2 Watts effective isotropic radiated power (EIRP).

(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:**

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

| Frequency (MHz) | Effective Radiated Power (dBm) |
|-----------------|--------------------------------|
| 824.2           | 20.91                          |
| 836.6           | 21.43                          |
| 848.8           | 20.70                          |

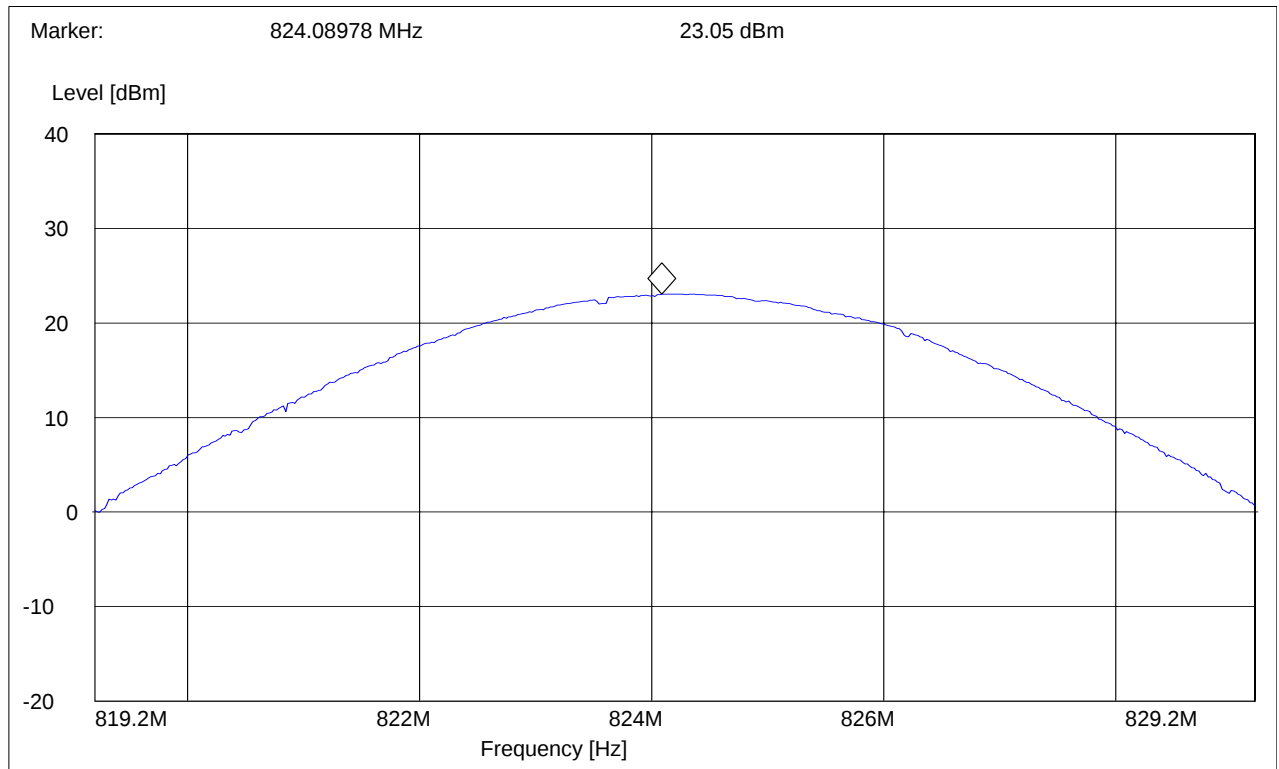
**5.1.5 EIRP Results 1900 MHz band:**

| Power Control Level | Burst Peak EIRP |
|---------------------|-----------------|
| 0                   | ≤33dBm (1W)     |

| Frequency (MHz) | Effective Isotropic Radiated Power (dBm) |
|-----------------|------------------------------------------|
| 1850.2          | 26.29                                    |
| 1880.0          | 25.82                                    |
| 1909.8          | 25.96                                    |

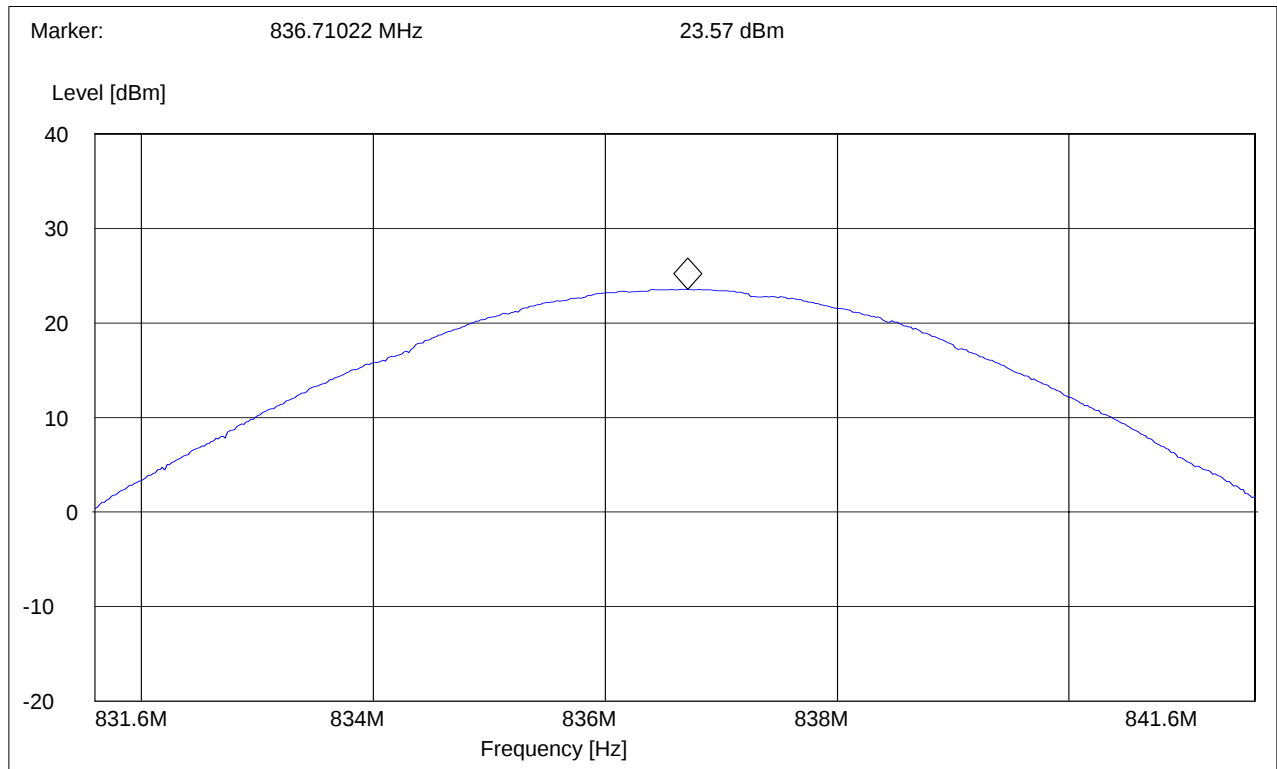
**EIRP (GSM-850)**  
**CHANNEL 128****§22.913(a)**

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
|-----------------|----------------|----------|------------|-------|
| 819.2 MHz       | 829.2 MHz      | Max Peak | Coupled    | 3 MHz |



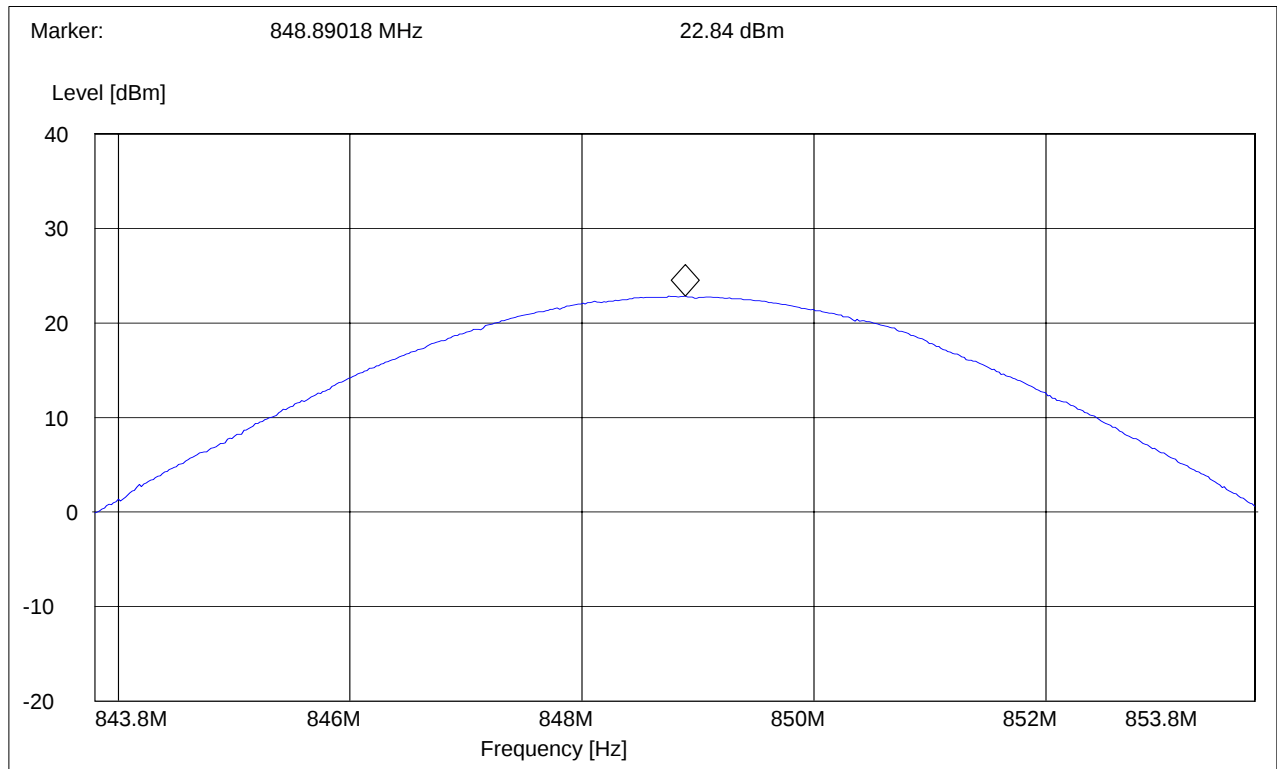
**EIRP (GSM-850)**  
**CHANNEL 190****§22.913(a)**

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
|-----------------|----------------|----------|------------|-------|
| 831.6 MHz       | 841.6 MHz      | Max Peak | Coupled    | 3 MHz |



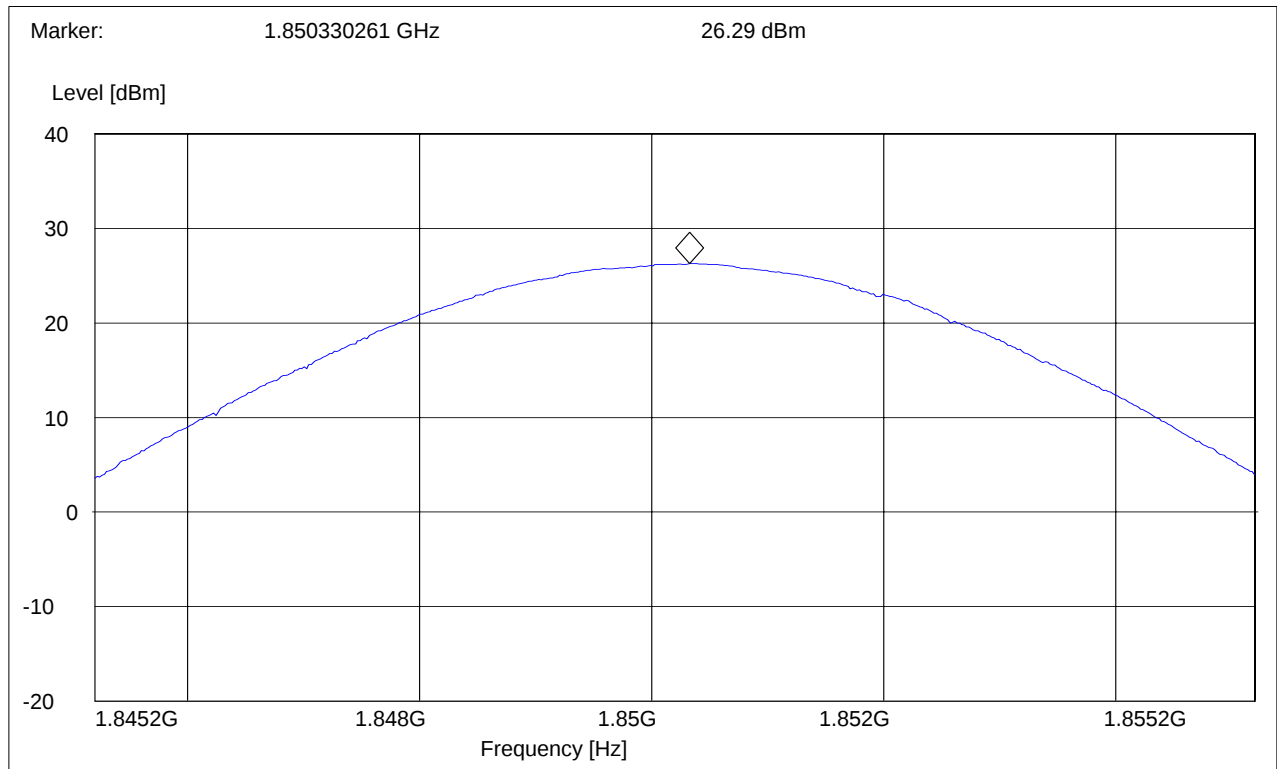
**EIRP (GSM-850)**  
**CHANNEL 251****§22.913(a)**

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
|-----------------|----------------|----------|------------|-------|
| 843.8 MHz       | 853.8 MHz      | Max Peak | Coupled    | 3 MHz |



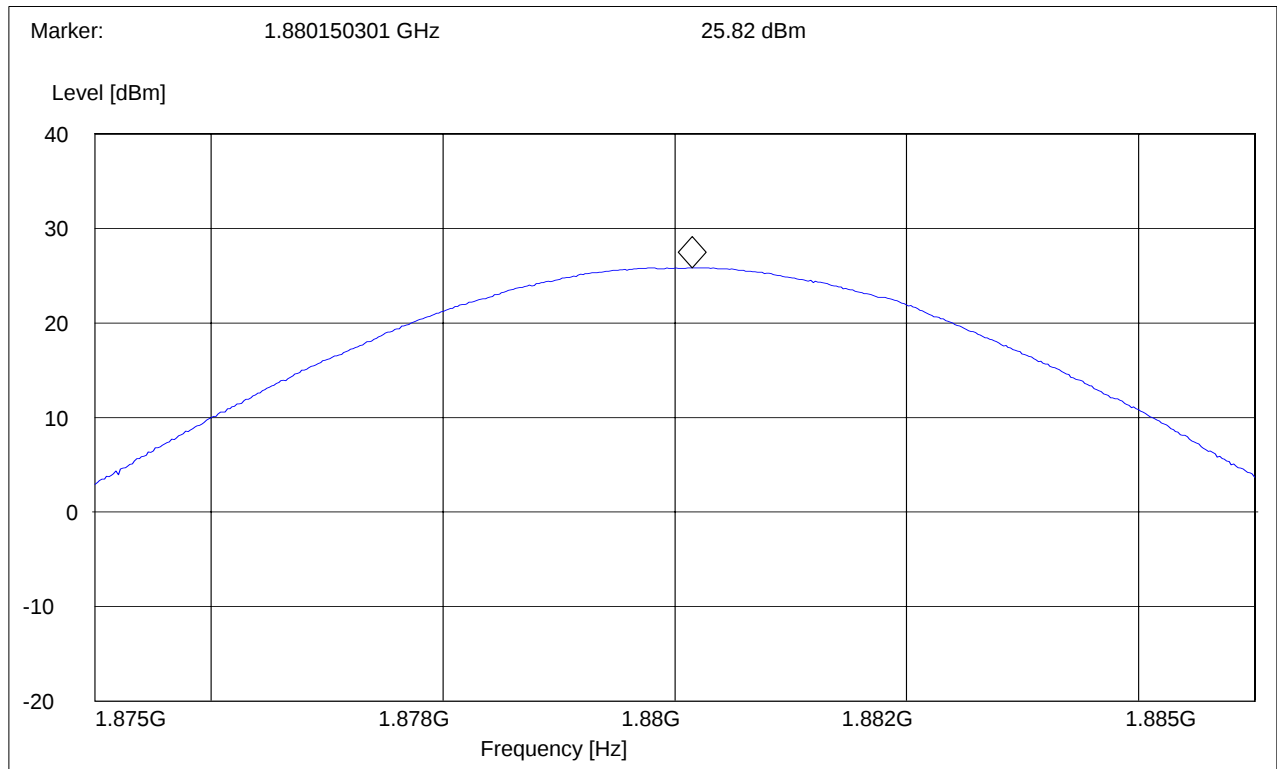
**EIRP (PCS-1900)  
CHANNEL 512****§24.232(b)**

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
|-----------------|----------------|----------|------------|-------|
| 1.8452 GHz      | 1.8552 MHz     | Max Peak | Coupled    | 3 MHz |



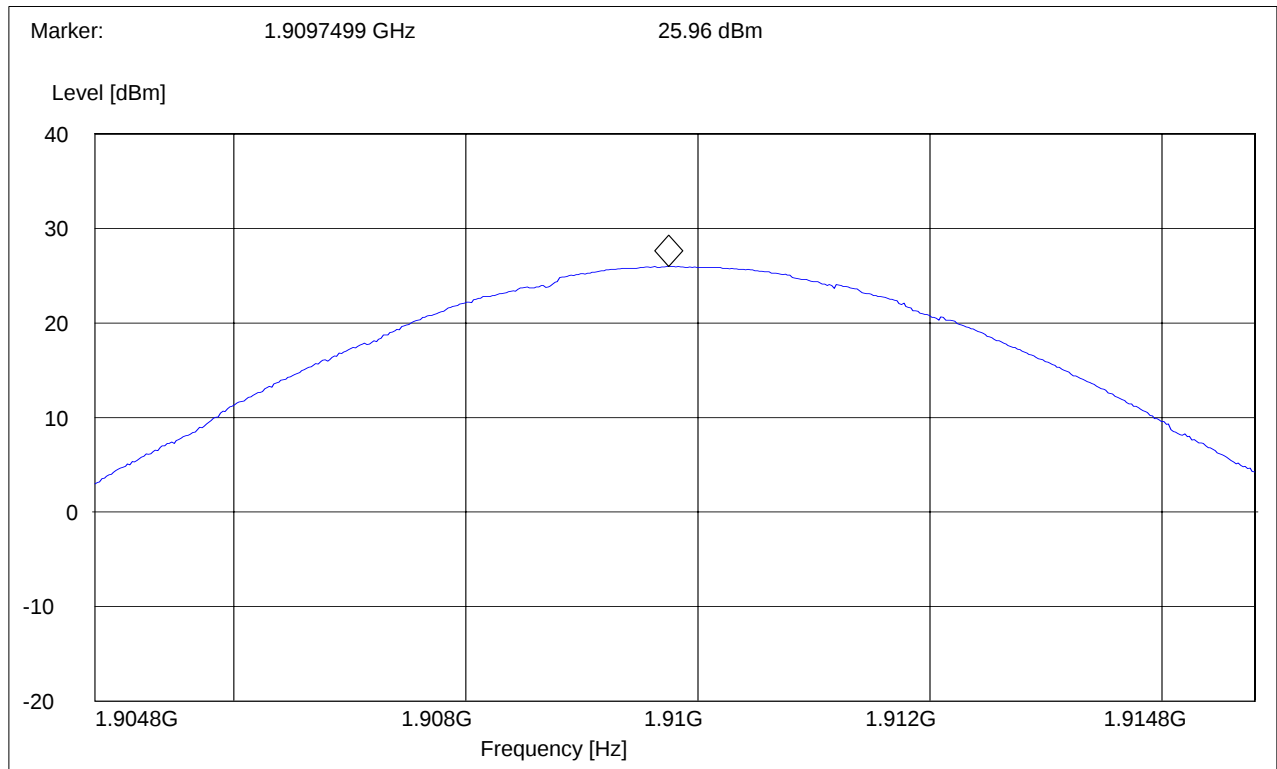
**EIRP (PCS-1900)**  
**CHANNEL 661****§24.232(b)**

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
|-----------------|----------------|----------|------------|-------|
| 1.875 GHz       | 1.885 MHz      | Max Peak | Coupled    | 3 MHz |



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

| Start Frequency | Stop Frequency | Detector | Meas. Time | IF BW |
|-----------------|----------------|----------|------------|-------|
| 1.9048 GHz      | 1.9148 MHz     | Max Peak | Coupled    | 3 MHz |



## 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.

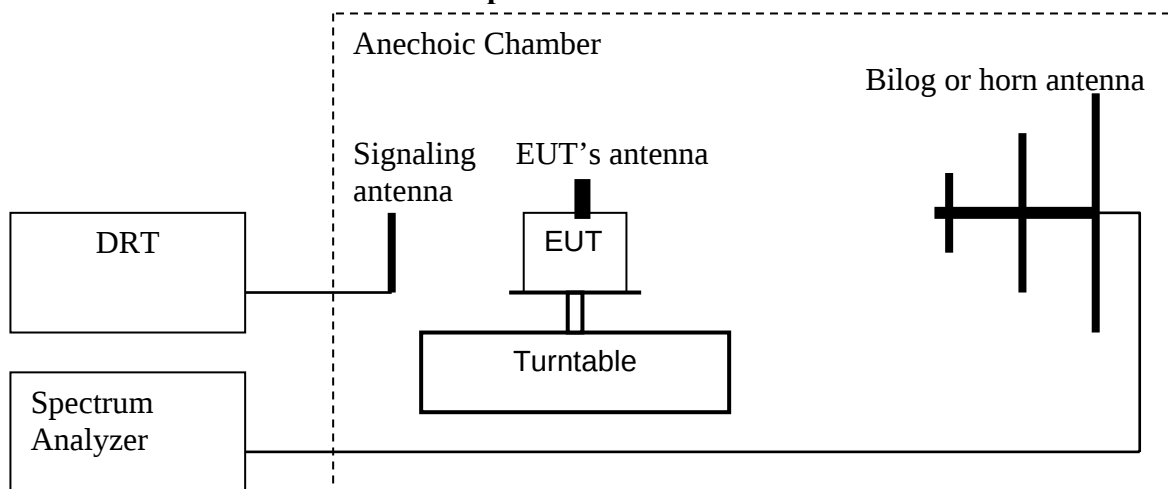
- (b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of 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).  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$ .
7. Determine the level of spurious emissions using the following equation:  

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

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

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

**Spectrum analyzer settings:**

Res B/W: 1 MHz

Vid B/W: 1 MHz

**Measurement Survey:**

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

#### 5.2.4 Radiated out of band emissions results on EUT:

#### RESULTS OF RADIATED TESTS GSM-850:

| Harmonics        | Tx ch-128<br>Freq. (MHz) | Level (dBm) | Tx ch-190<br>Freq. (MHz) | Level (dBm) | Tx ch-251<br>Freq. (MHz) | Level (dBm) |
|------------------|--------------------------|-------------|--------------------------|-------------|--------------------------|-------------|
| 2                | 1648.4                   | -45.06      | 1673.2                   | -43.79      | 1697.6                   | -42.95      |
| 3                | 2472.6                   | -37.71      | 2509.8                   | -39.81      | 2546.4                   | -41.17      |
| 4                | 3296.8                   | -52.67      | 3346.4                   | -45.86      | 3395.2                   | -42.62      |
| 5                | 4121                     | -53.67      | 4183                     | -50.96      | 4244                     | -54.30      |
| 6                | 4945.2                   | -50.14      | 5019.6                   | -49.29      | 5092.8                   | NF          |
| 7                | 5769.4                   | NF          | 5856.2                   | NF          | 5941.6                   | NF          |
| 8                | 6593.6                   | -43.98      | 6692.8                   | -43.40      | 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**

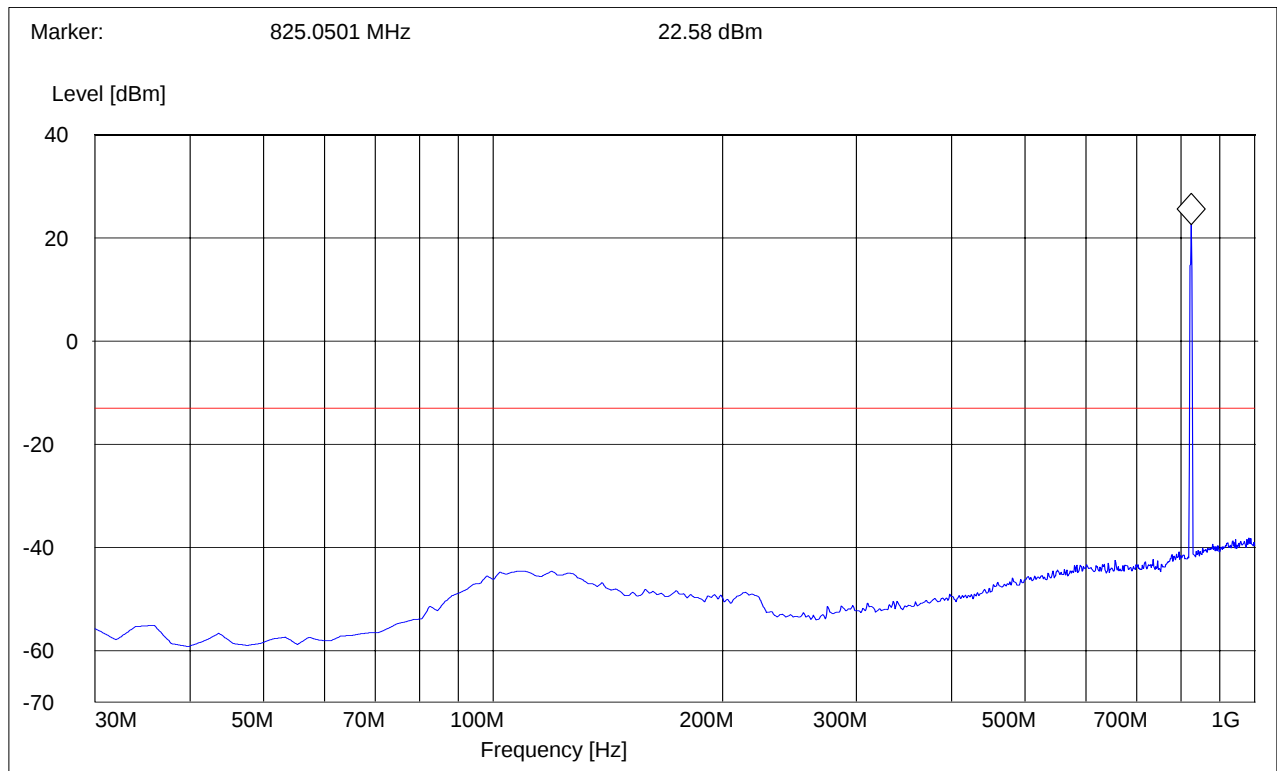
Spurious emission limit -13dBm

**Antenna: vertical*****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**

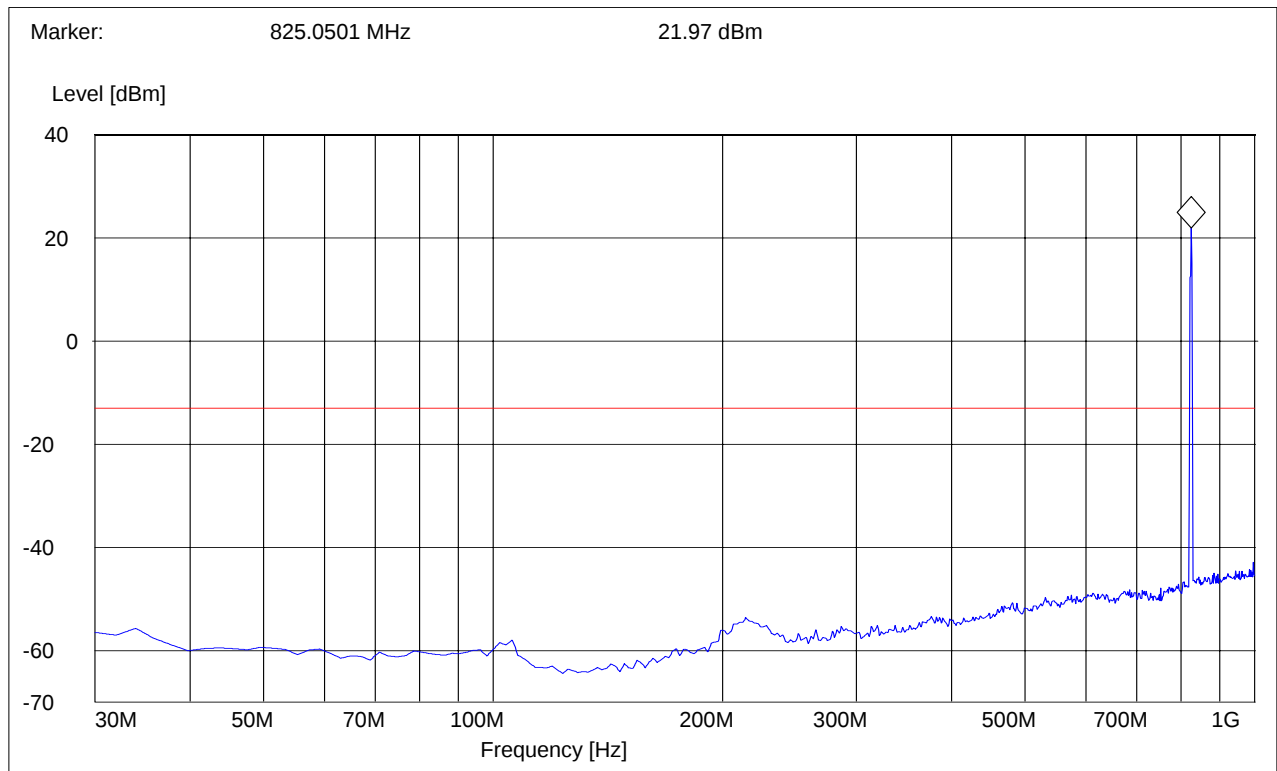
Spurious emission limit -13dBm

**Antenna: horizontal*****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)**

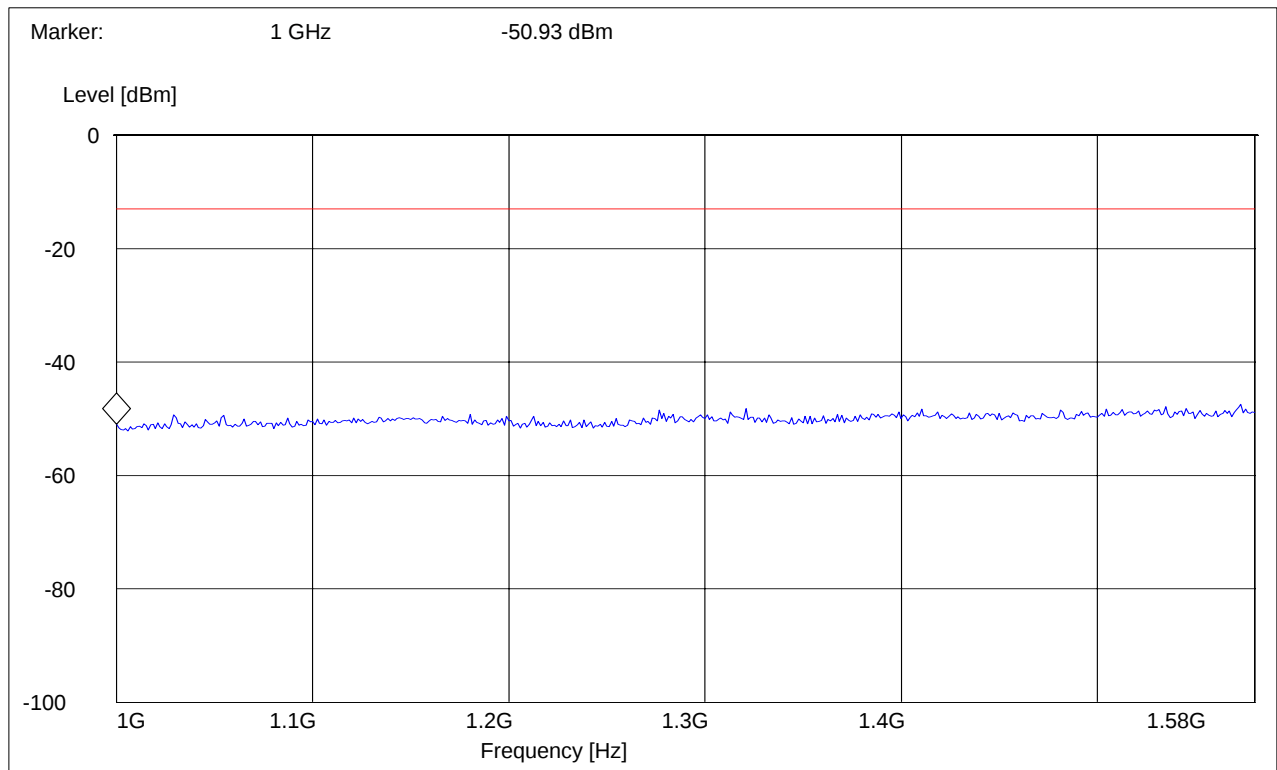


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 824.2MHz: 1GHz – 1.58GHz**

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 |

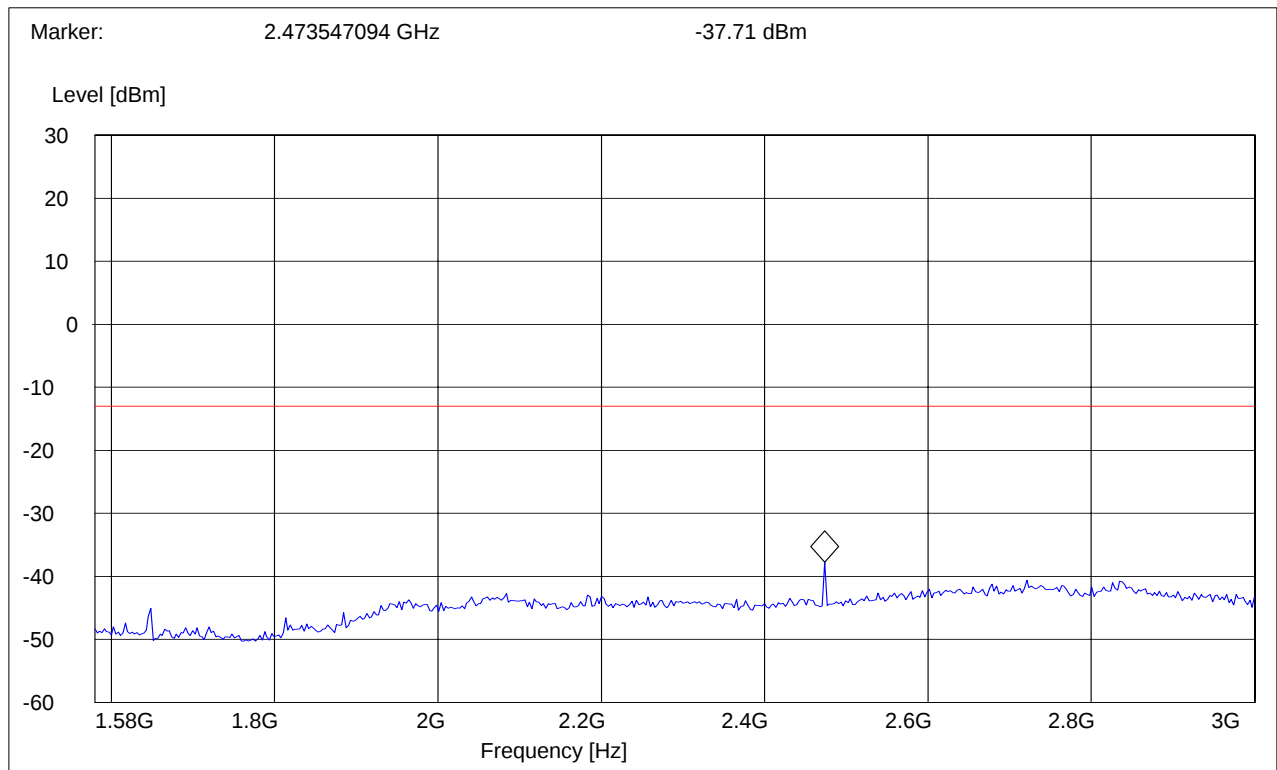


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 824.2MHz: 1.58GHz – 3GHz**

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 |

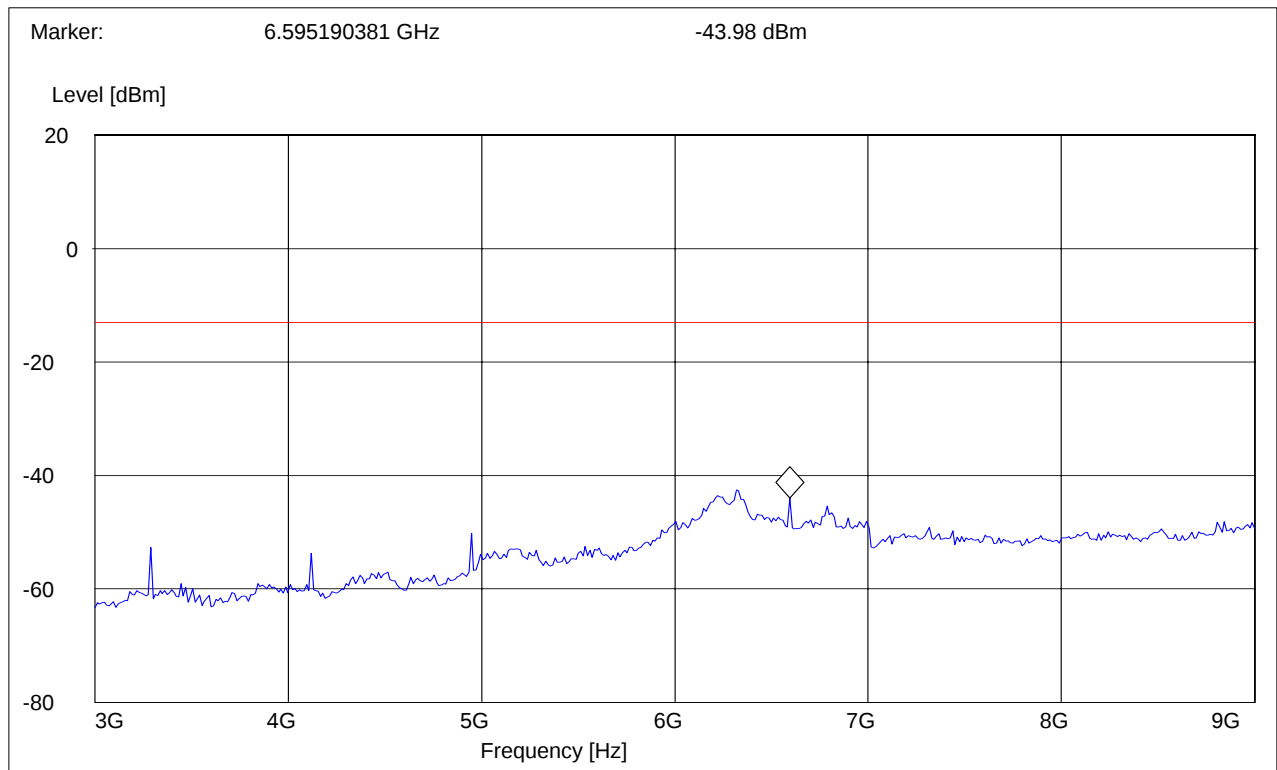


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 824.2MHz: 3GHz – 9GHz**

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 |

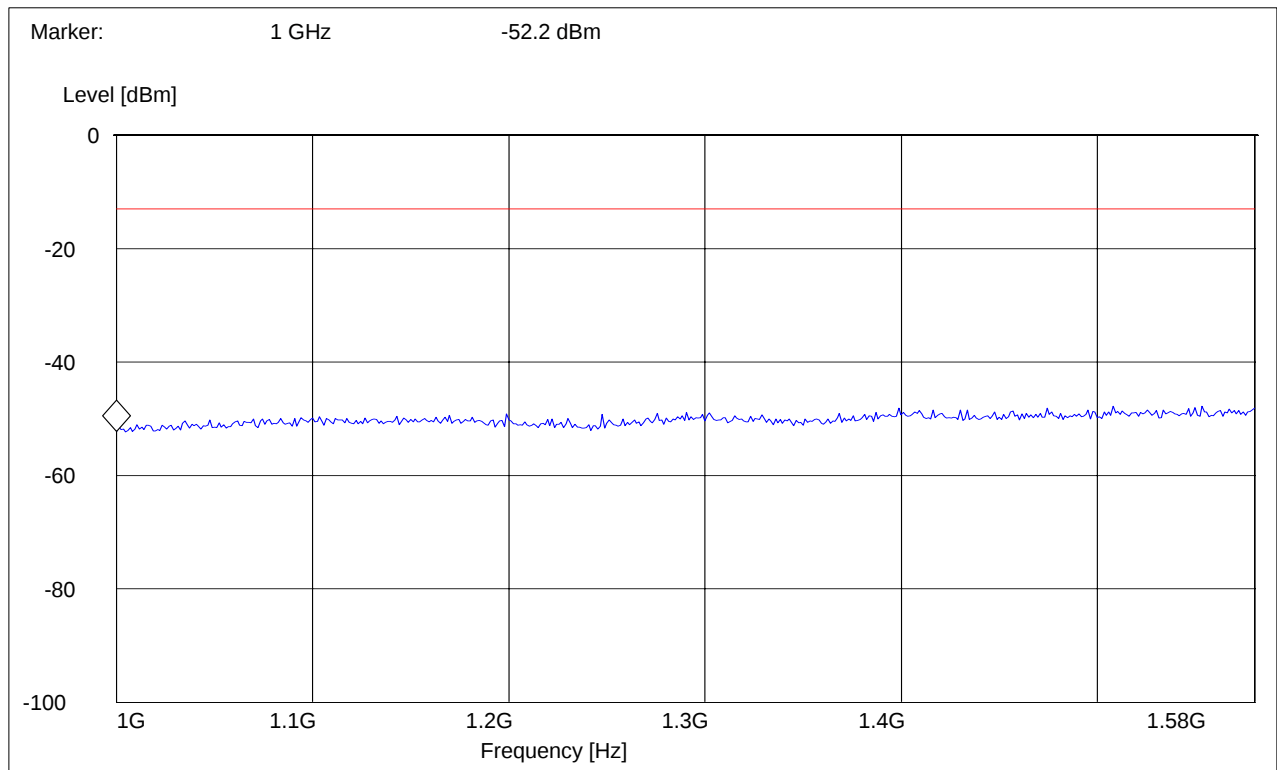


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 836.6MHz: 1GHz – 1.58GHz**

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 |

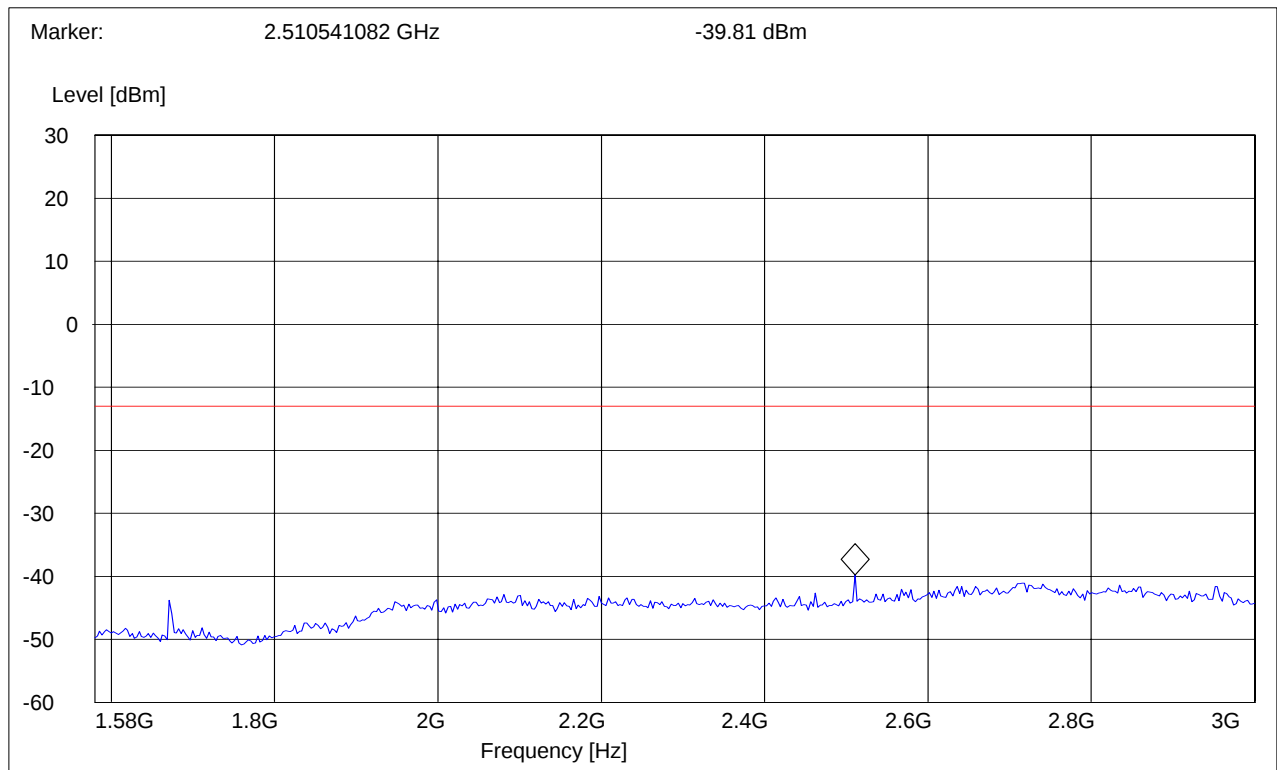


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 836.6MHz: 1.58GHz – 3GHz**

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 |

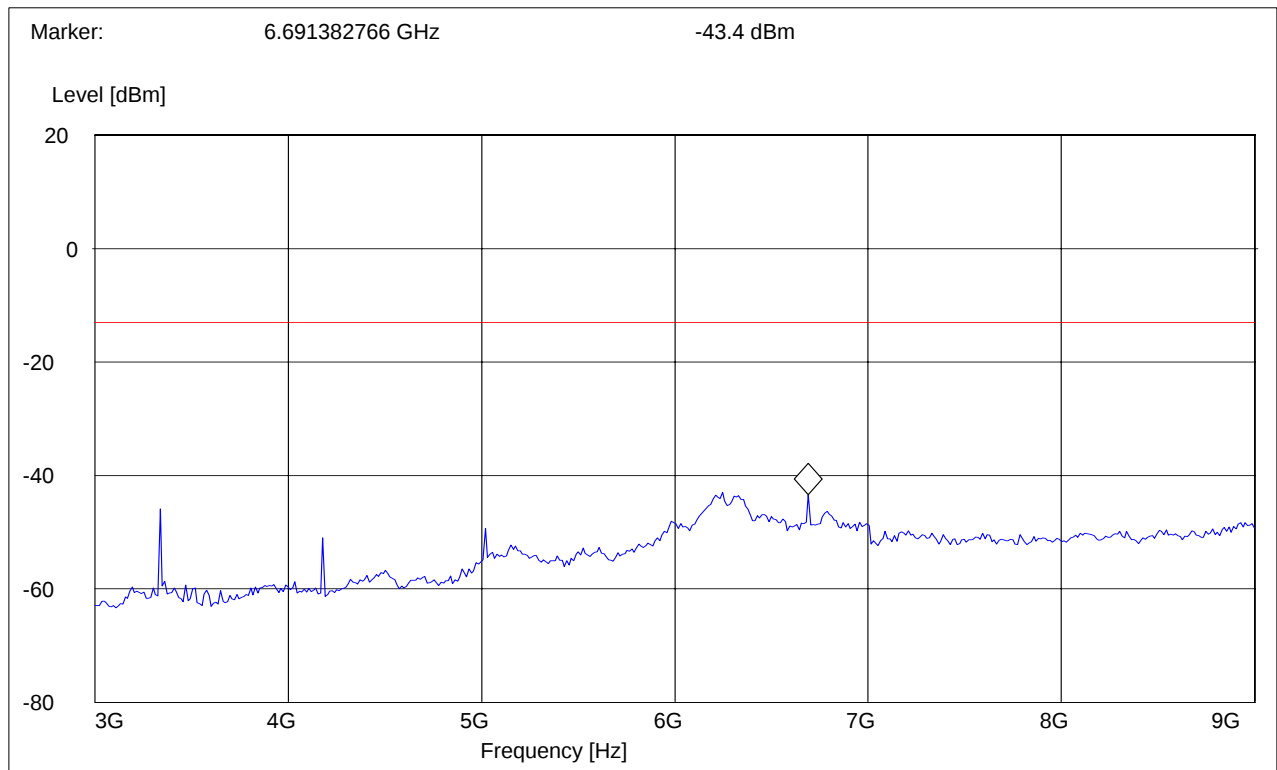


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 836.6MHz: 3GHz – 9GHz**

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 |

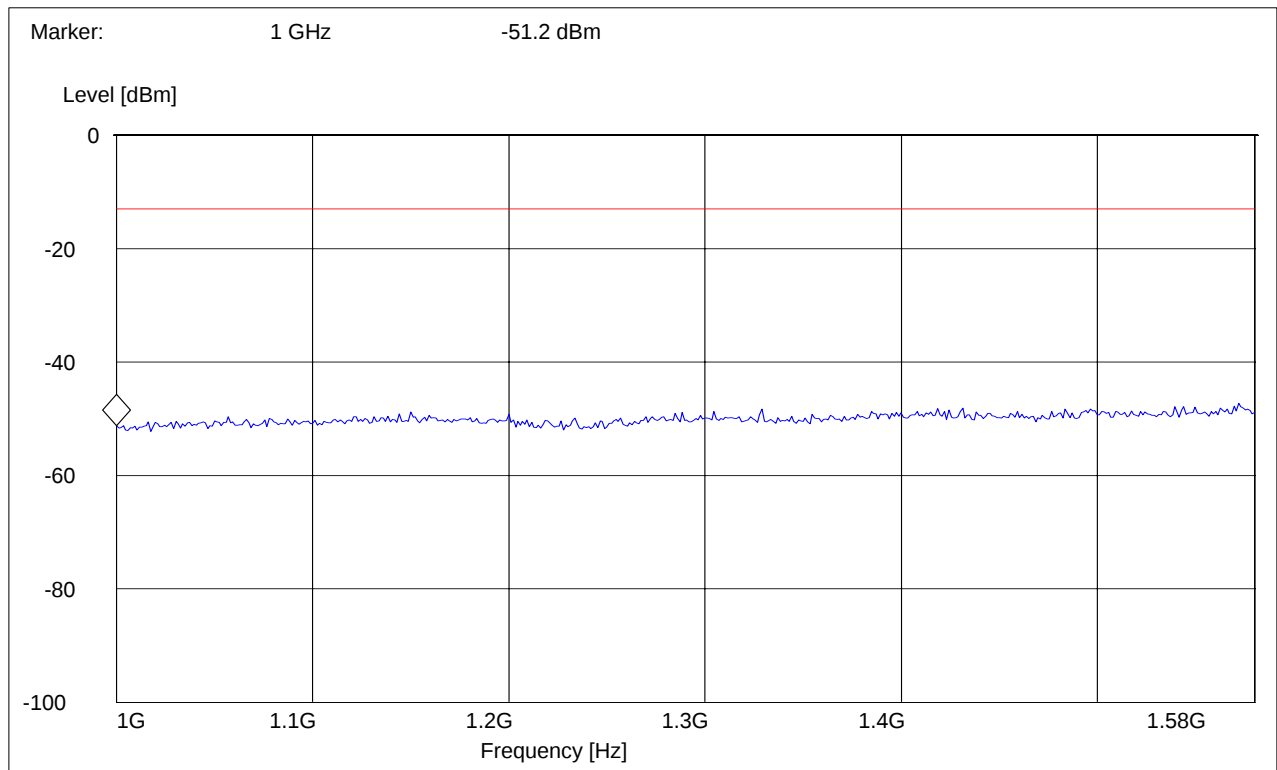


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 848.8MHz: 1GHz – 1.58GHz**

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 |

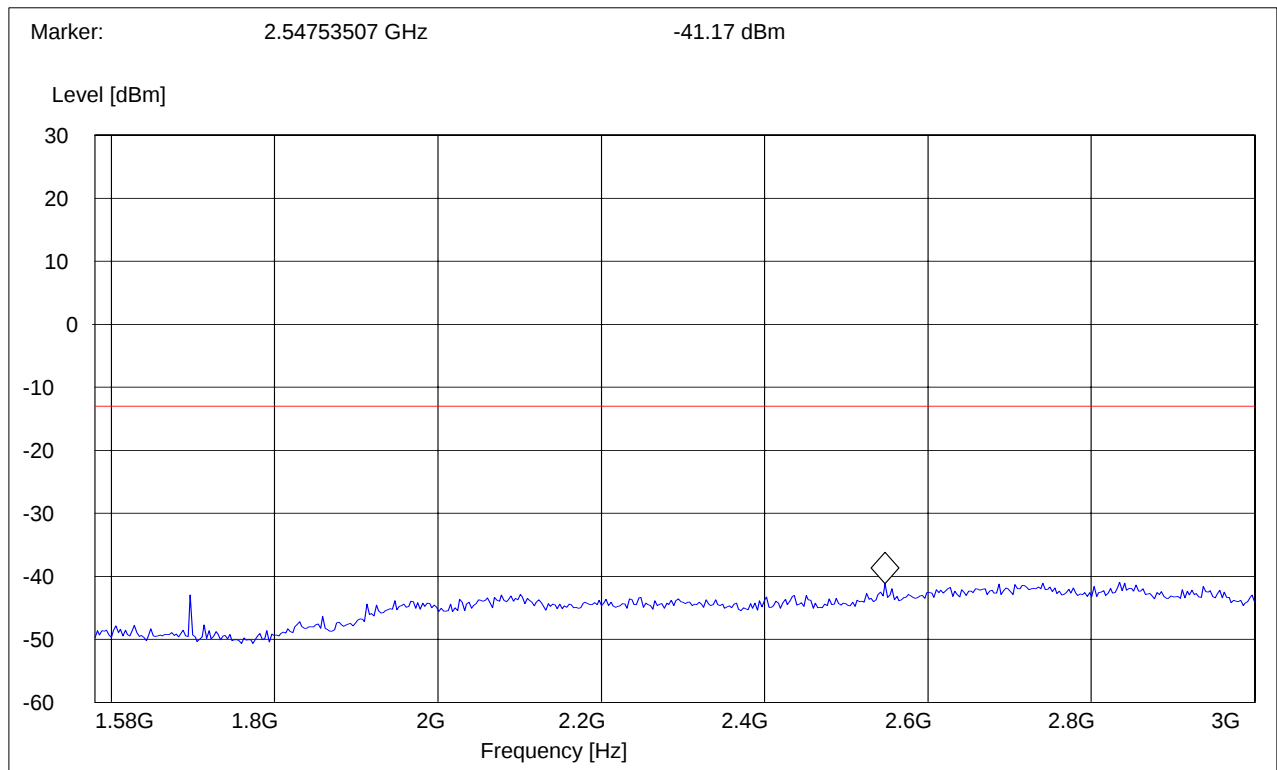


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 848.8MHz: 1.58GHz – 3GHz**

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 |

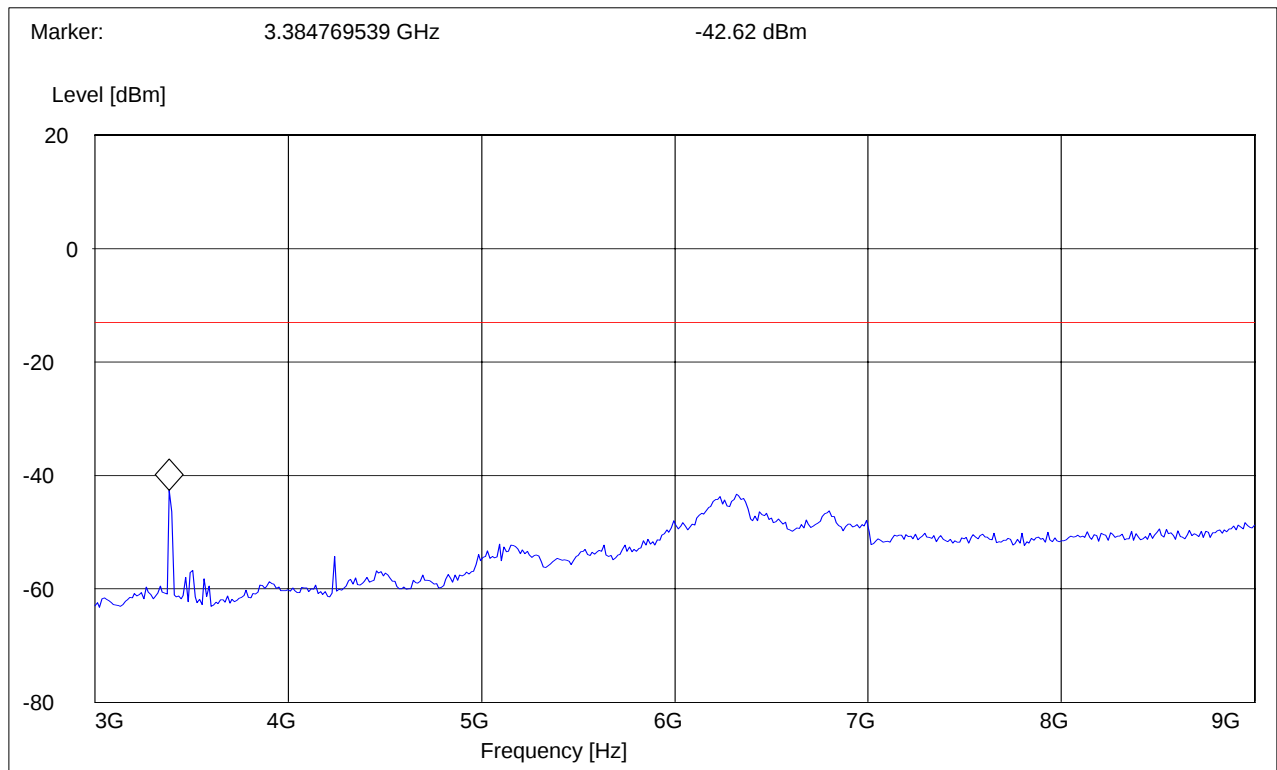


**RADIATED SPURIOUS EMISSIONS (GSM-850)****Tx @ 848.8MHz: 3GHz – 9GHz**

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 |

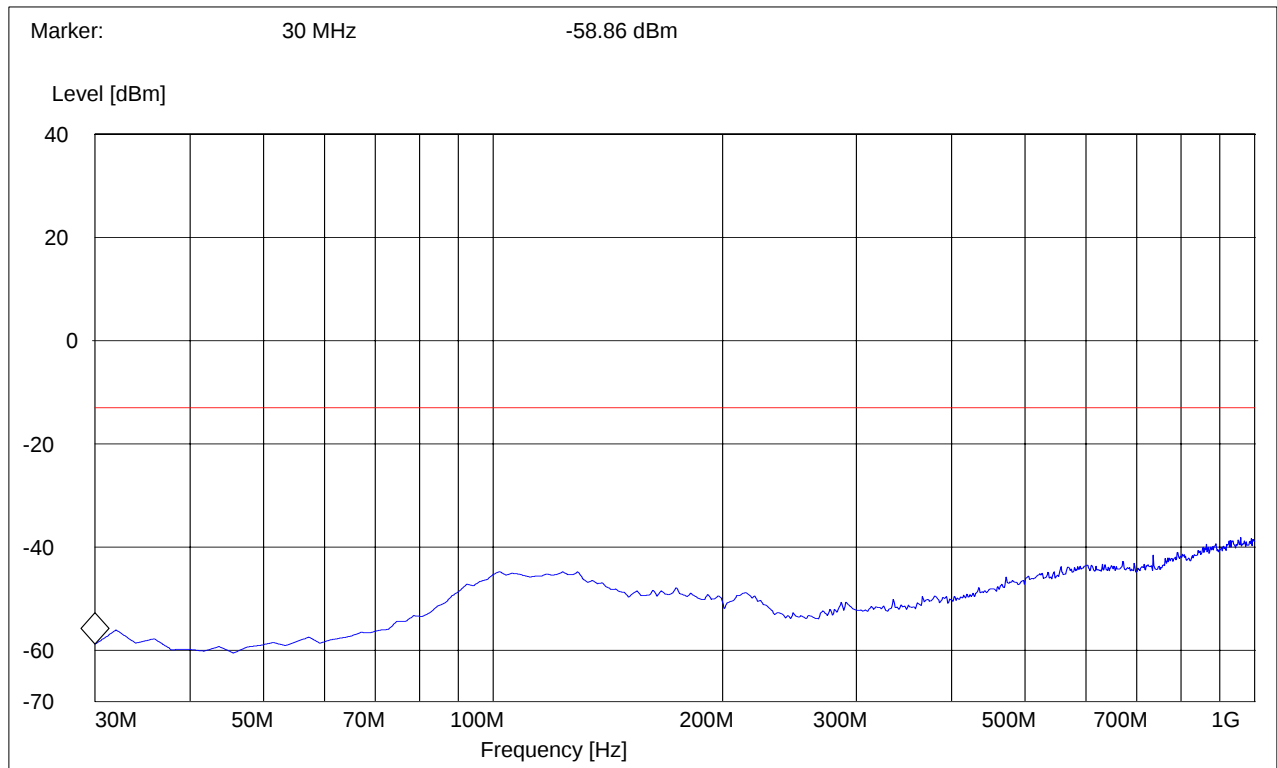


**RADIATED SPURIOUS EMISSIONS (GSM-850)****IDLE: 30MHz - 1GHz**

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 |

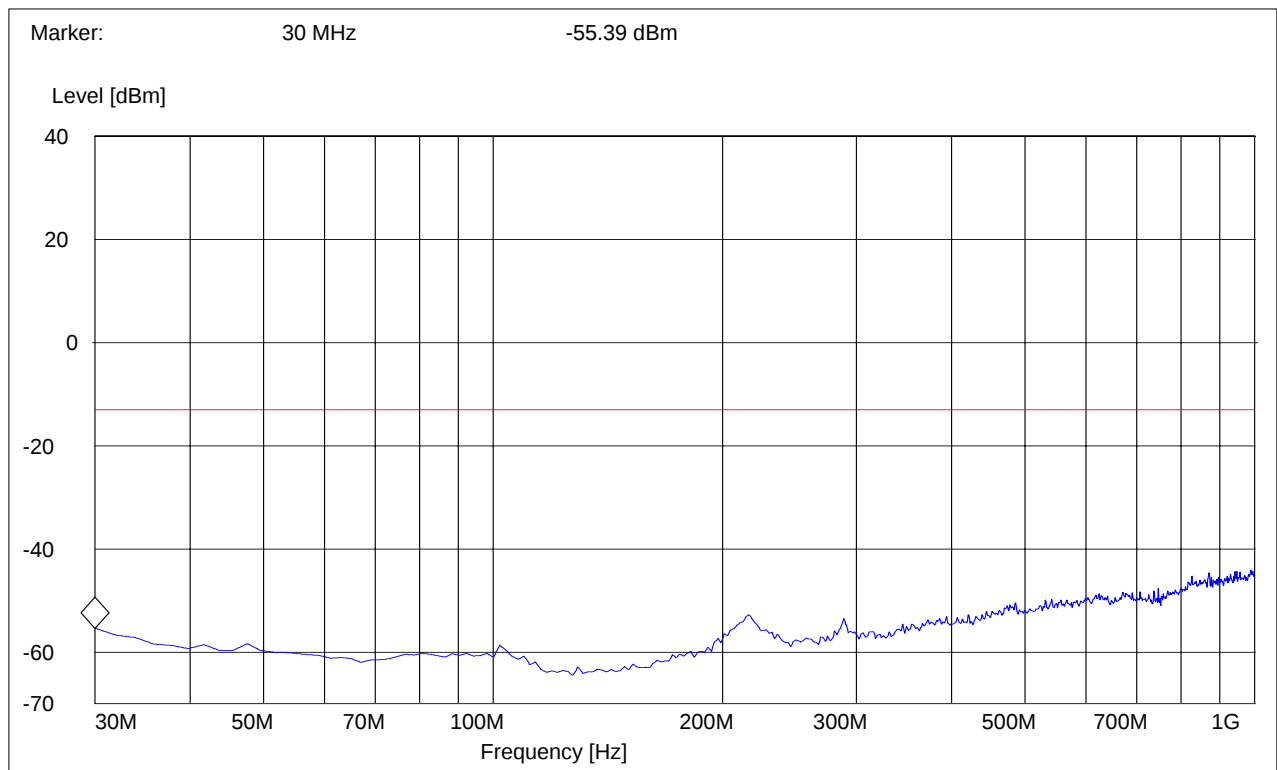


**RADIATED SPURIOUS EMISSIONS (GSM-850)****IDLE: 30MHz - 1GHz**

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 |

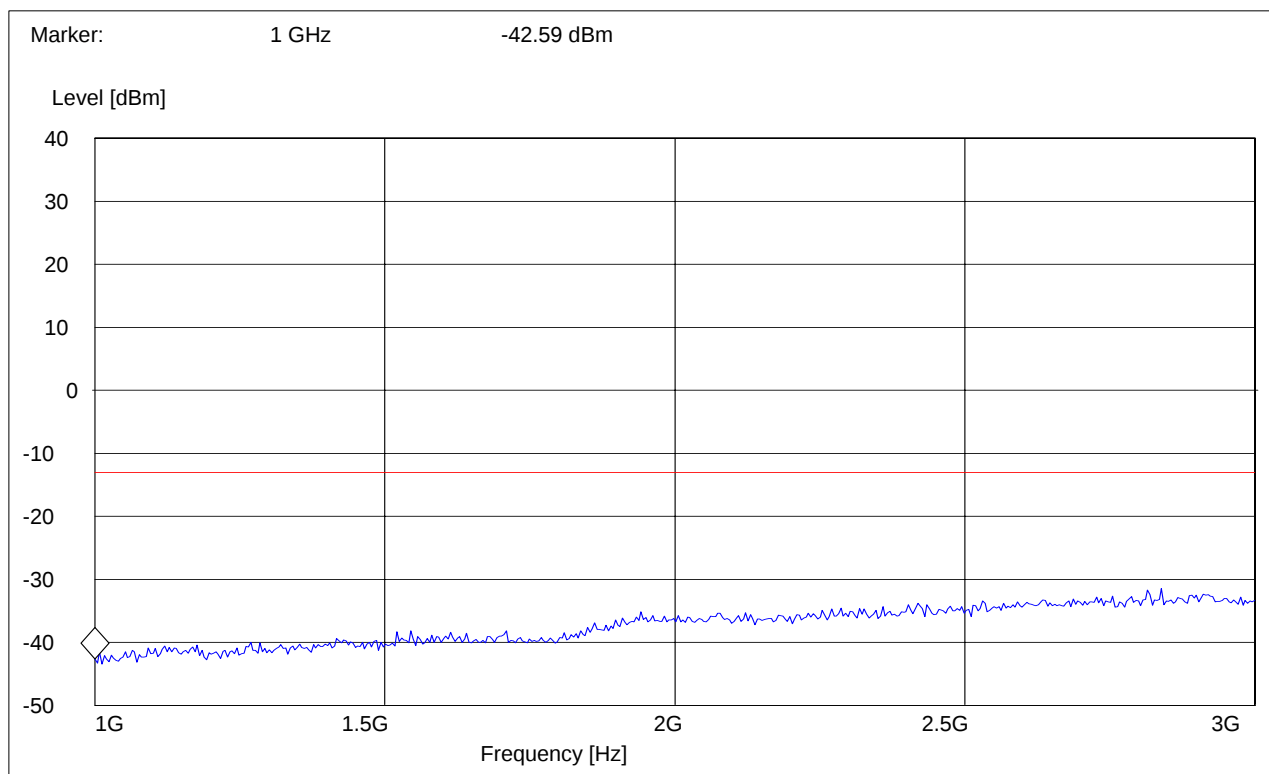


**RADIATED SPURIOUS EMISSIONS (GSM-850)****IDLE: 1GHz – 3GHz**

Spurious emission limit –13dBm

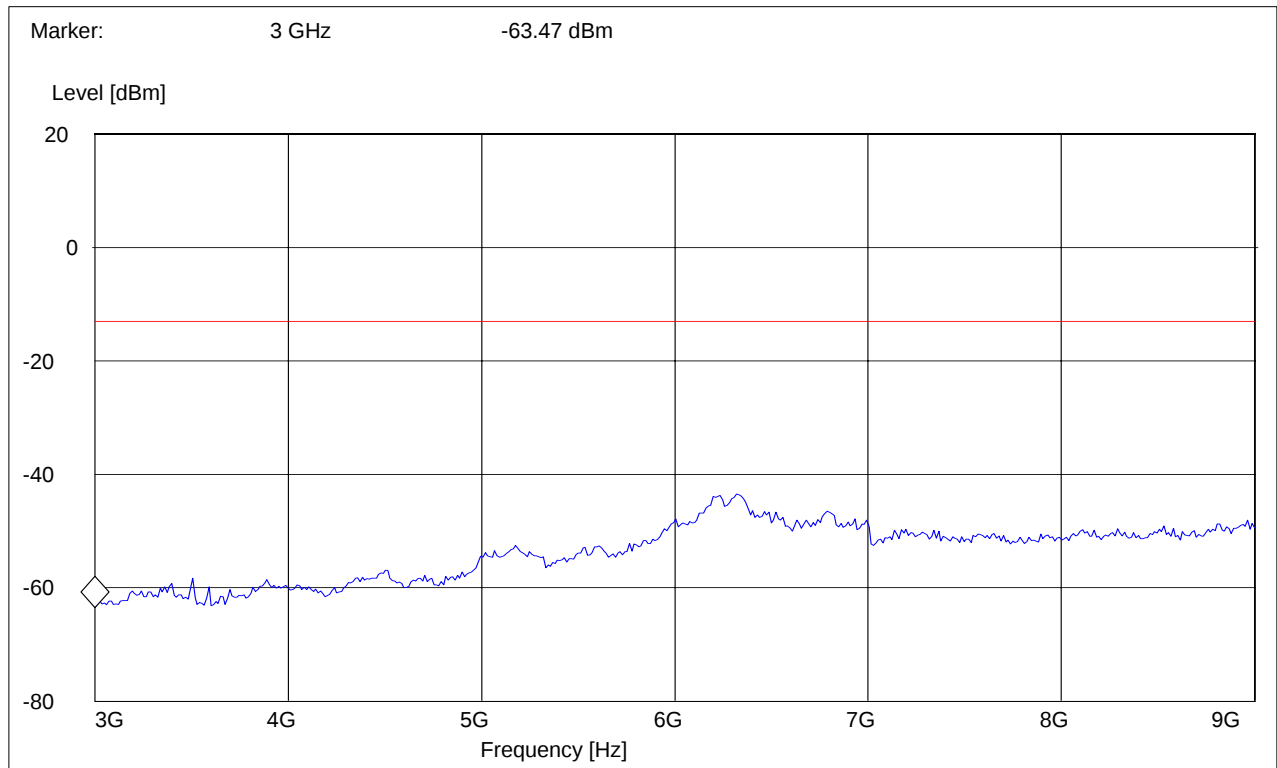
***SWEEP TABLE: "FCC 22 Spur 1-3G"***

| 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*****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 |



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

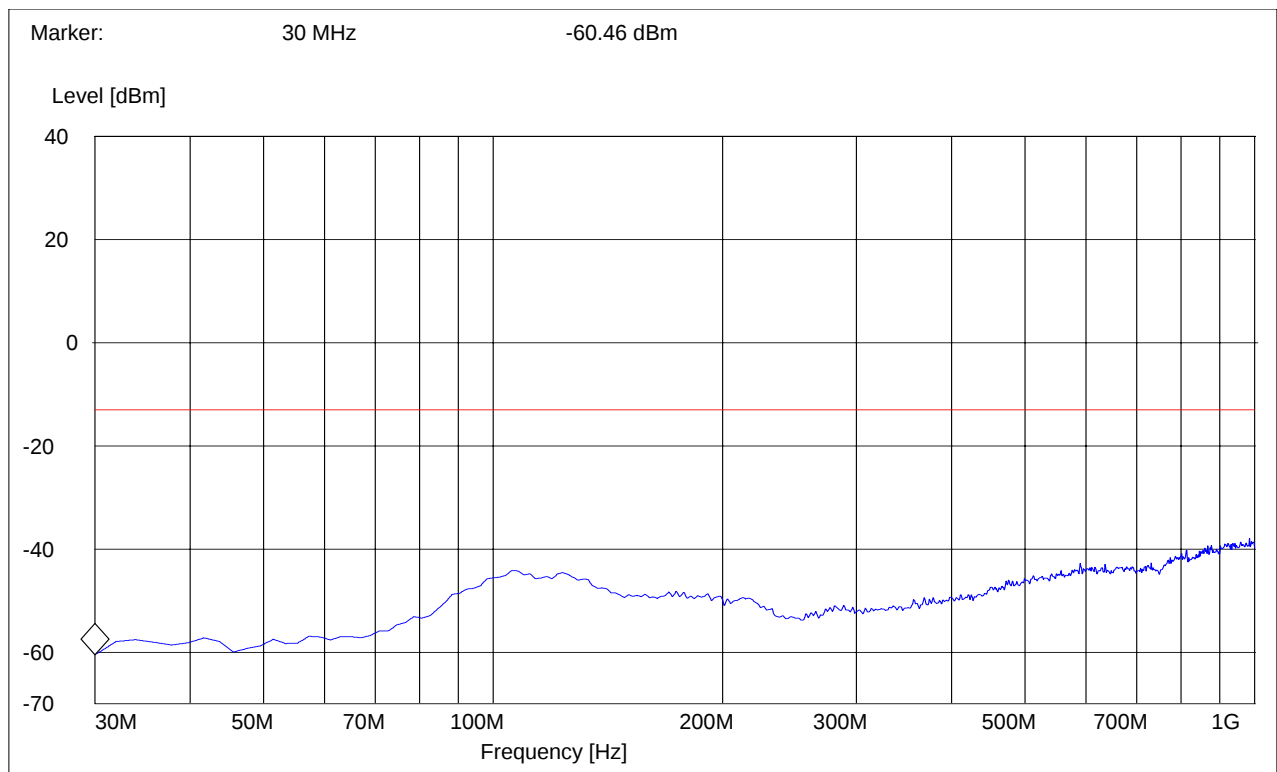
| Harmonic         | Tx ch-512<br>Freq.(MHz) | Level<br>(dBm) | Tx ch-661<br>Freq. (MHz) | Level<br>(dBm) | Tx ch-810<br>Freq. (MHz) | Level<br>(dBm) |
|------------------|-------------------------|----------------|--------------------------|----------------|--------------------------|----------------|
| 2                | 3700.4                  | -45.04         | 3760                     | -44.52         | 3819.6                   | -43.67         |
| 3                | 5550.6                  | -48.07         | 5640                     | -48.19         | 5729.4                   | -50.17         |
| 4                | 7400.8                  | NF             | 7520                     | NF             | 7639.2                   | -46.96         |
| 5                | 9251                    | NF             | 9400                     | -38.7          | 9549                     | -40.99         |
| 6                | 11101.2                 | NF             | 11280                    | NF             | 11458.8                  | -38.44         |
| 7                | 12951.4                 | -42.58         | 13160                    | NF             | 13368.6                  | -40.08         |
| 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**

Spurious emission limit -13dBm

**Antenna: vertical*****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 |

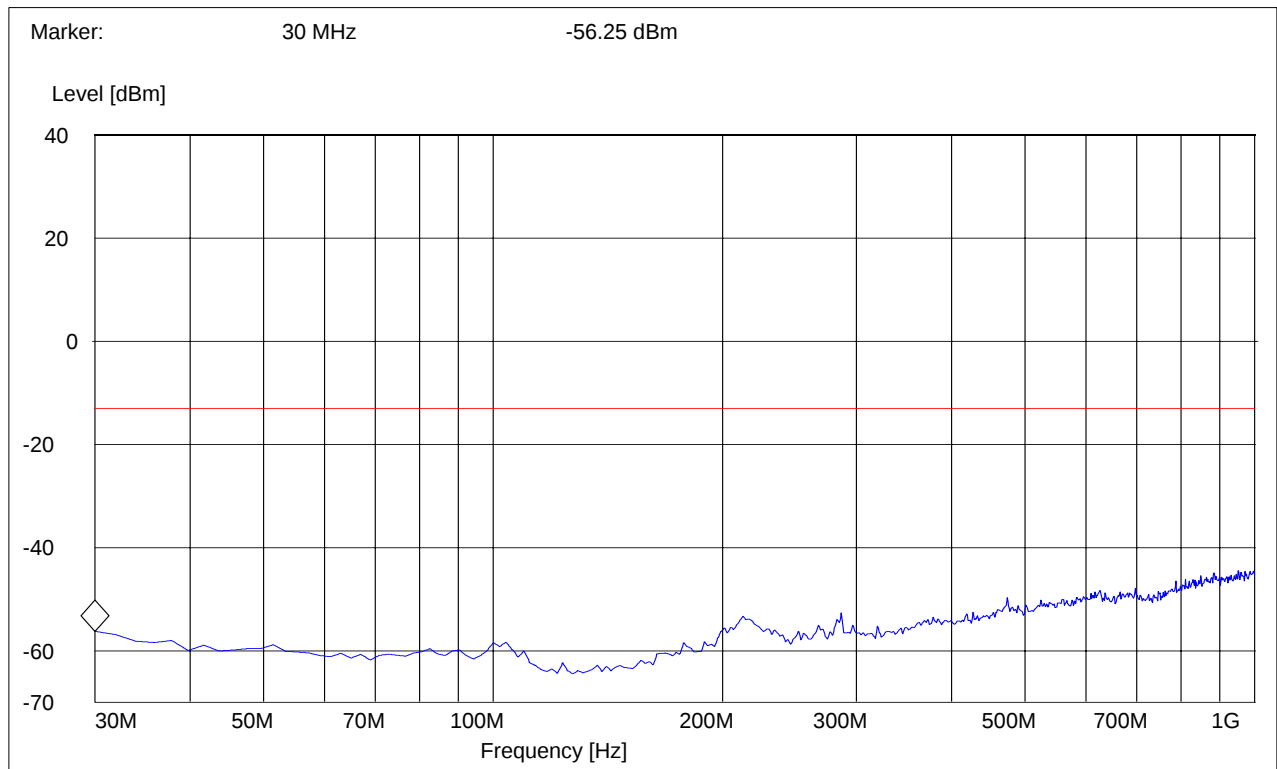
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

**RADIATED SPURIOUS EMISSIONS(PCS 1900)****TX: 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 |

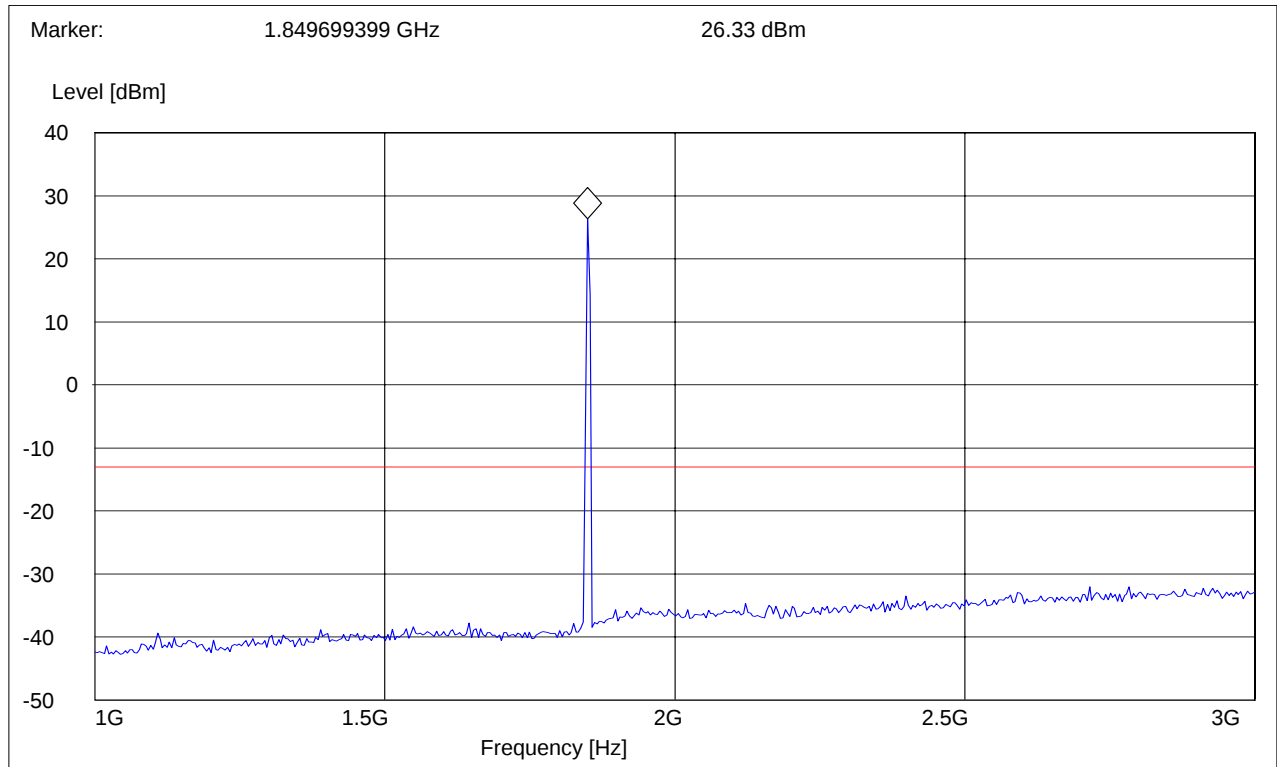
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

**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 |

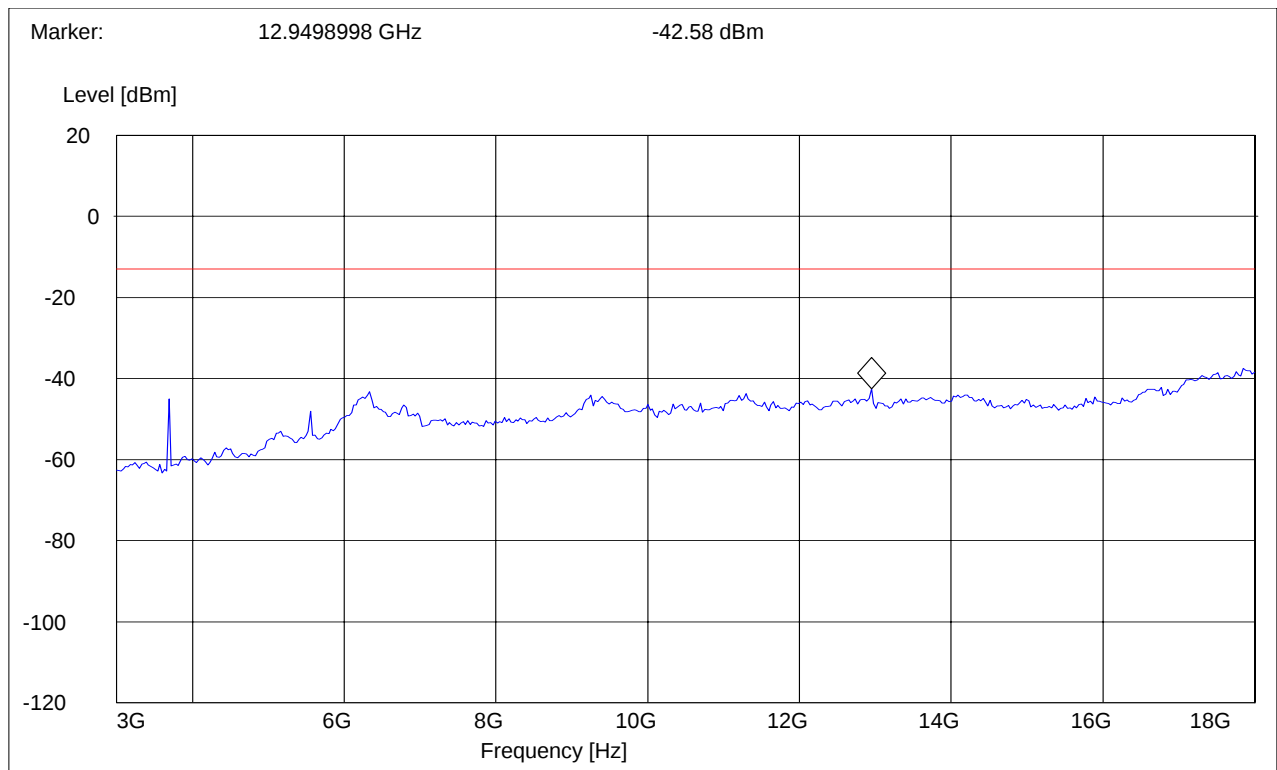
**Note: The peak above the limit line is the carrier freq. at ch-512.**

**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 |

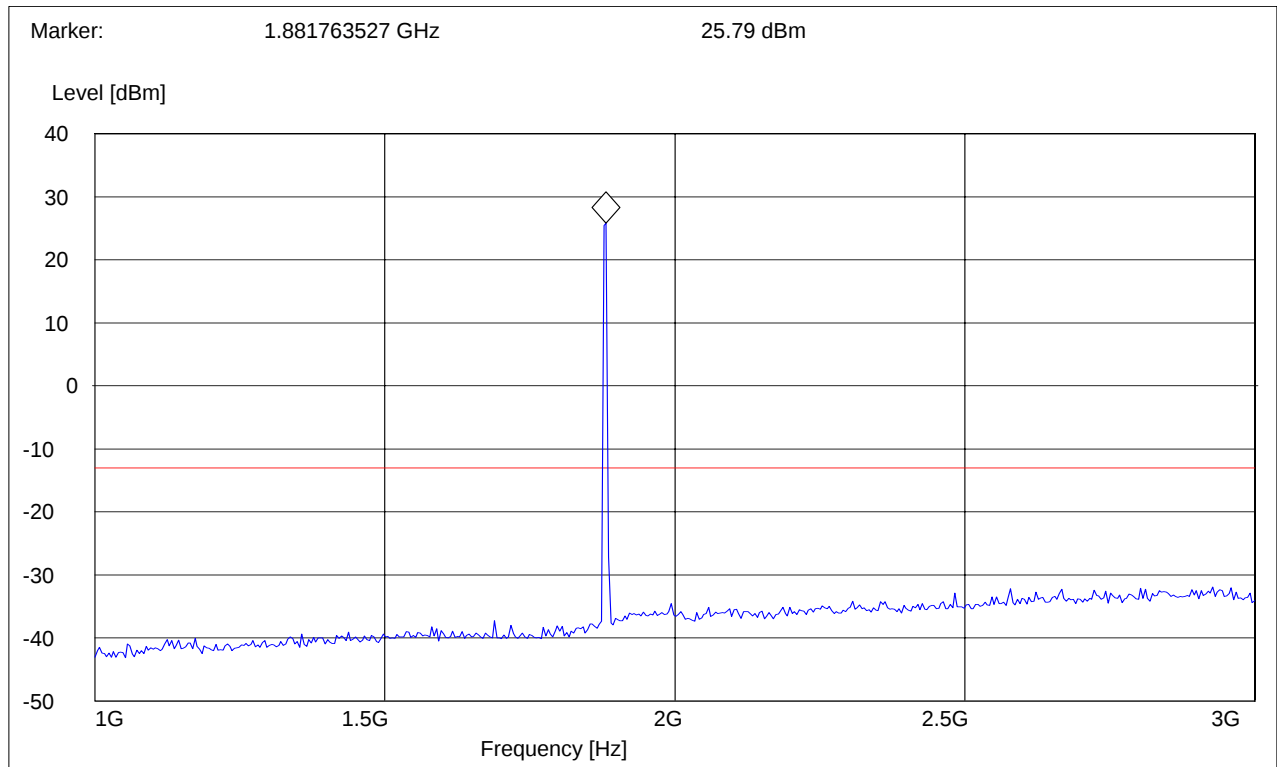


**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1880.0MHz: 1GHz – 3GHz**

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 |

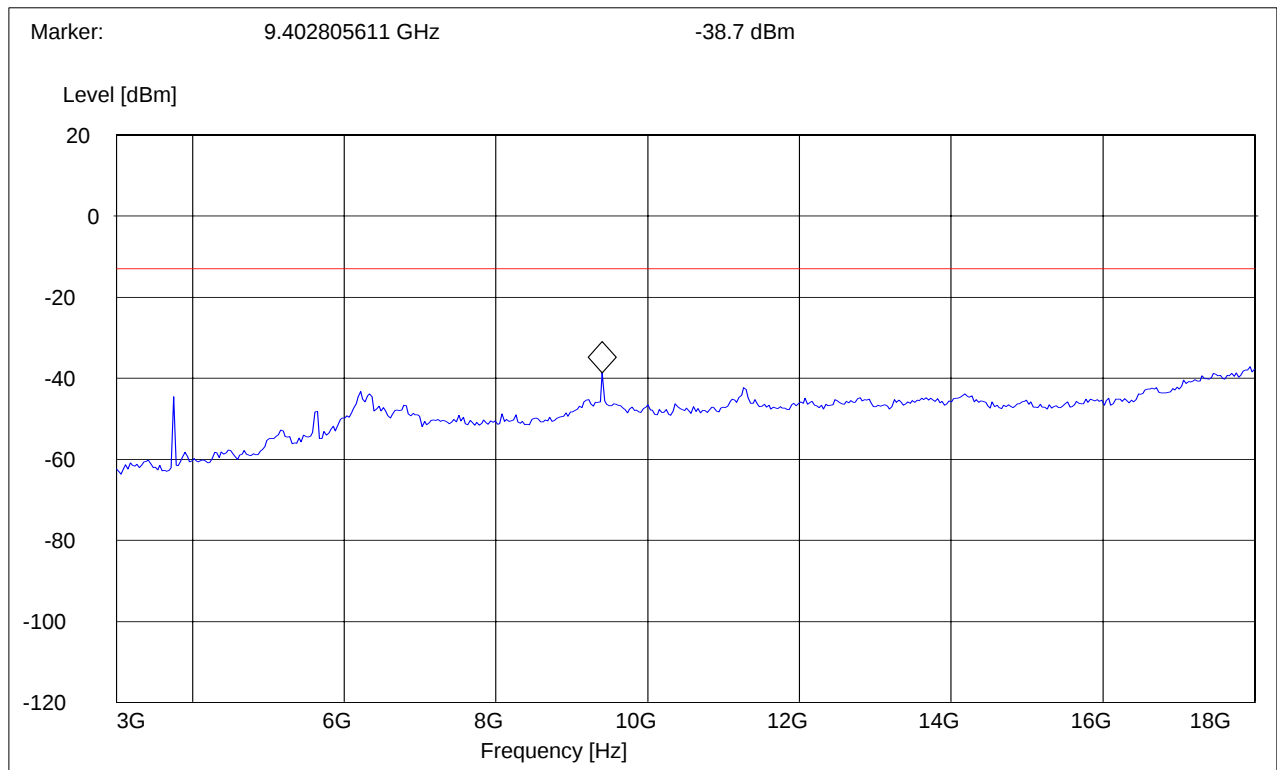
**Note: The peak above the limit line is the carrier freq. at ch-661.**

**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 |



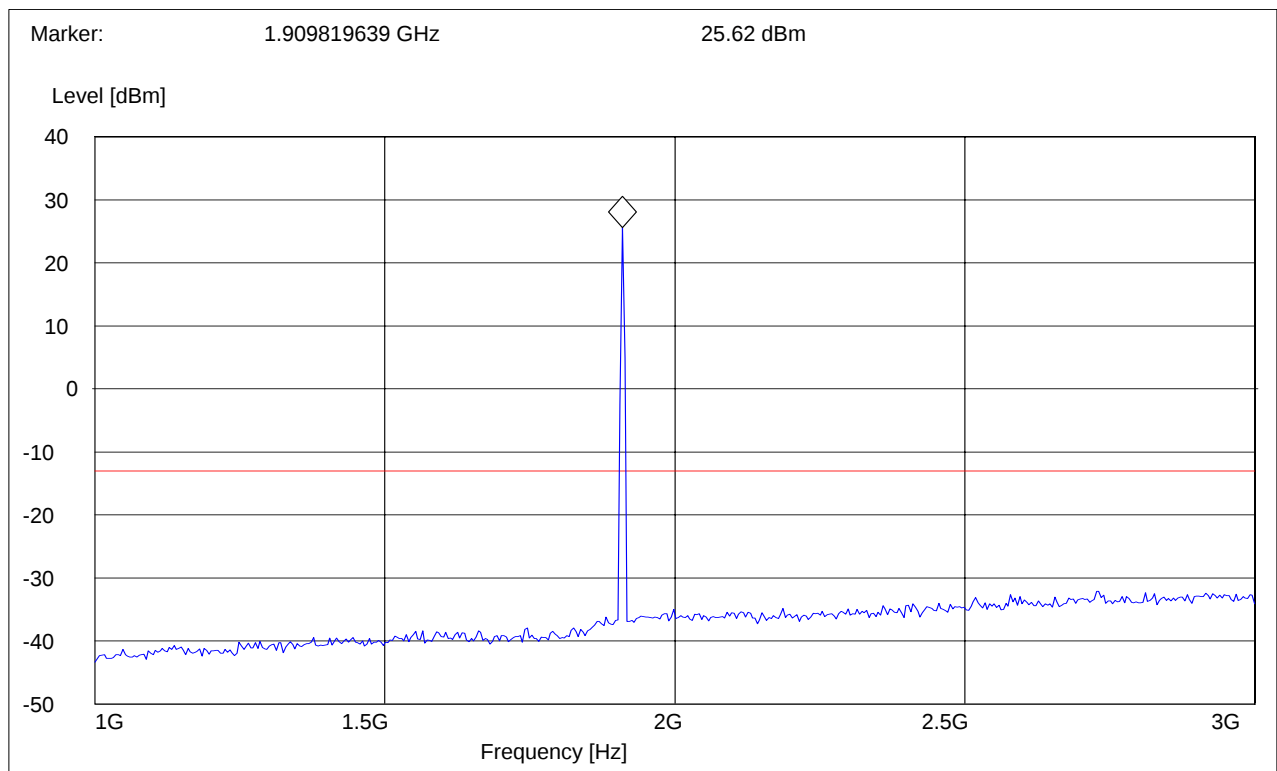
**RADIATED SPURIOUS EMISSIONS(PCS 1900)****Tx @ 1909.8MHz: 1GHz – 3GHz**

Spurious emission limit –13dBm

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

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

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

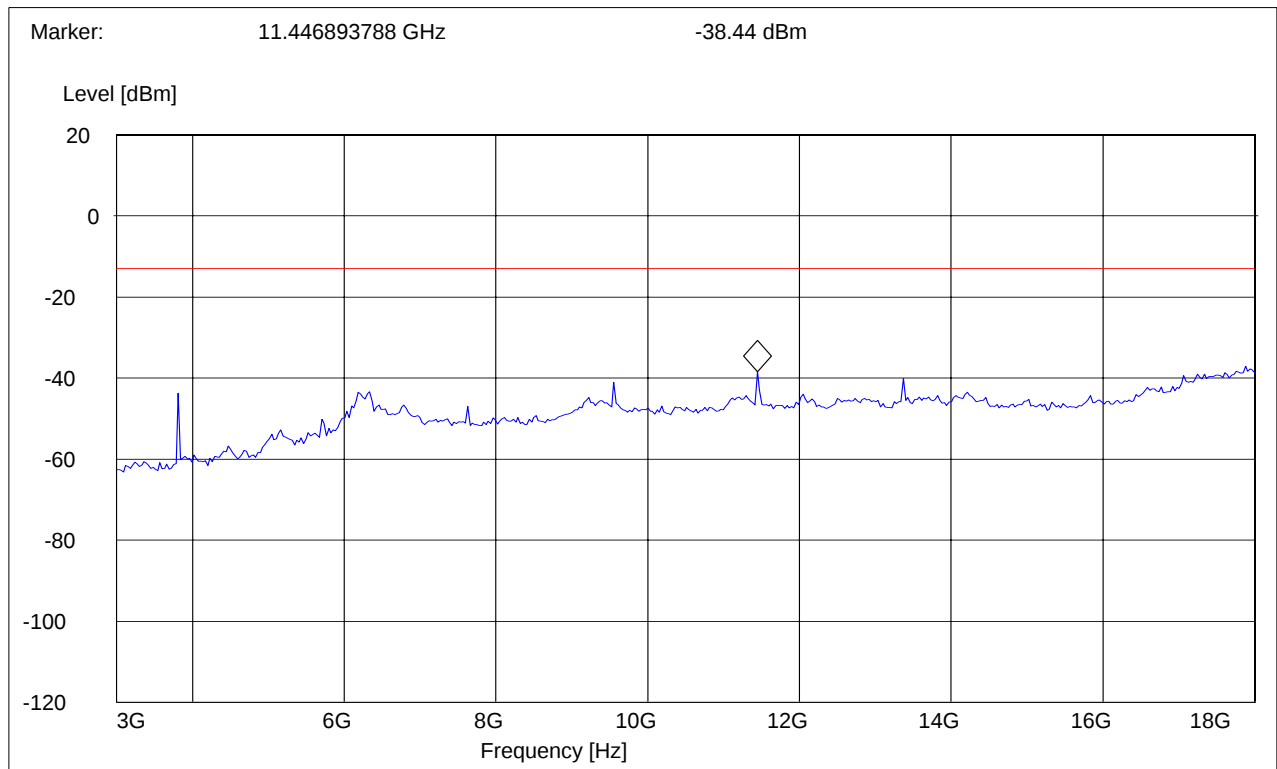
**Note: The peak above the limit line is the carrier freq. at ch-810.**

**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 |

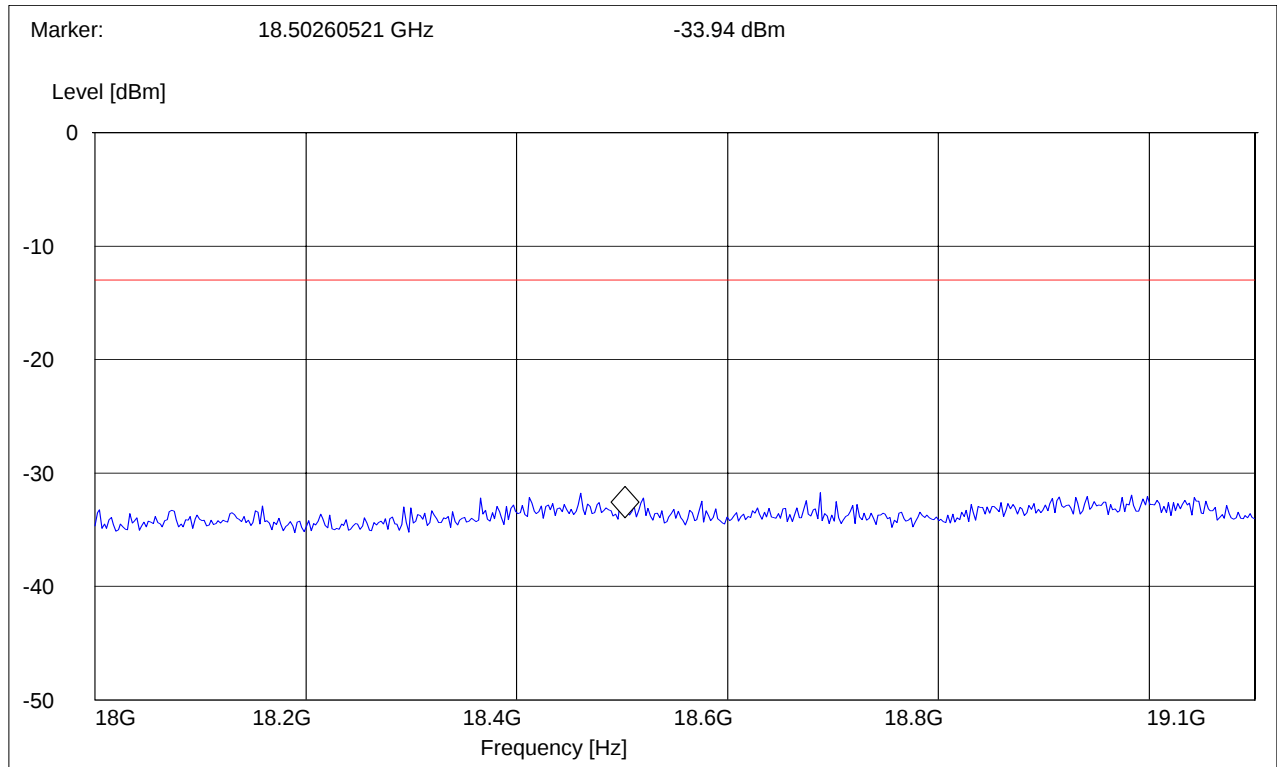


**RADIATED SPURIOUS EMISSIONS(PCS 1900)****18GHz – 19.1GHz**

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 |

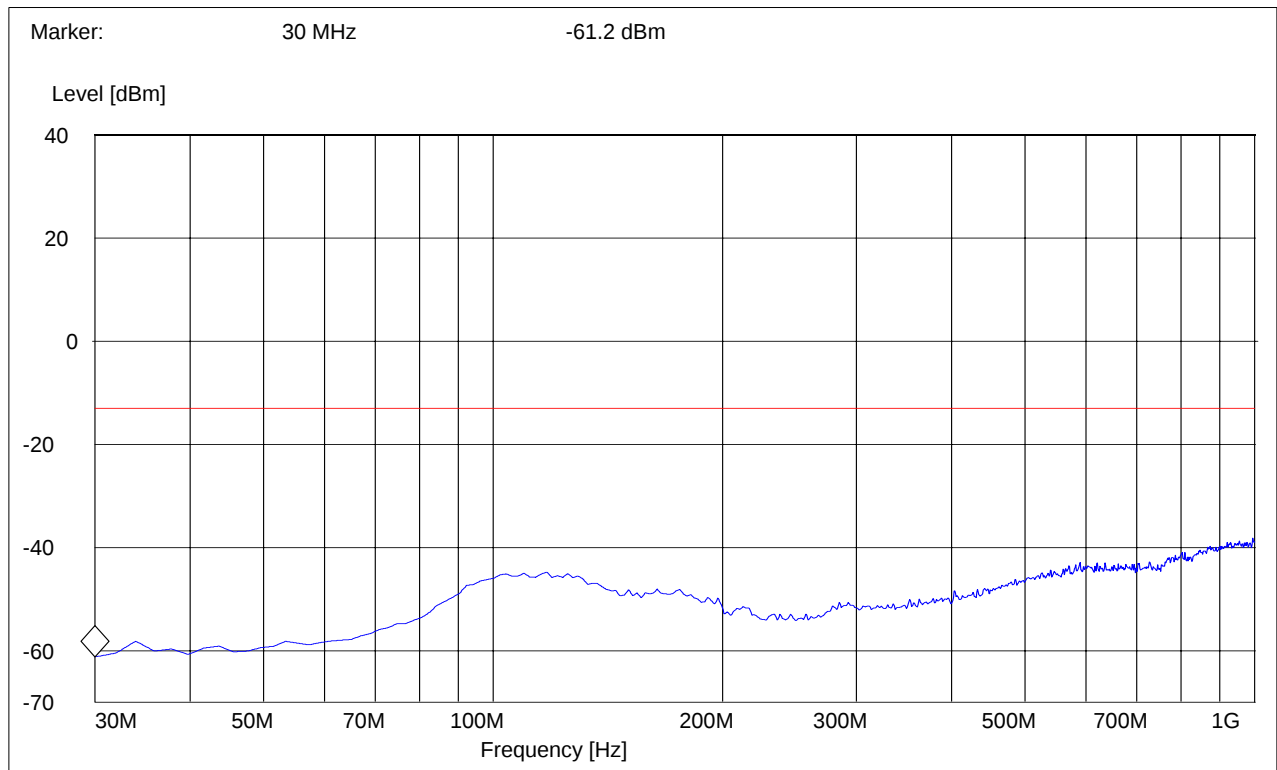
**Note: This plot is valid for low, mid & high channels (worst-case plot)**

**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 |

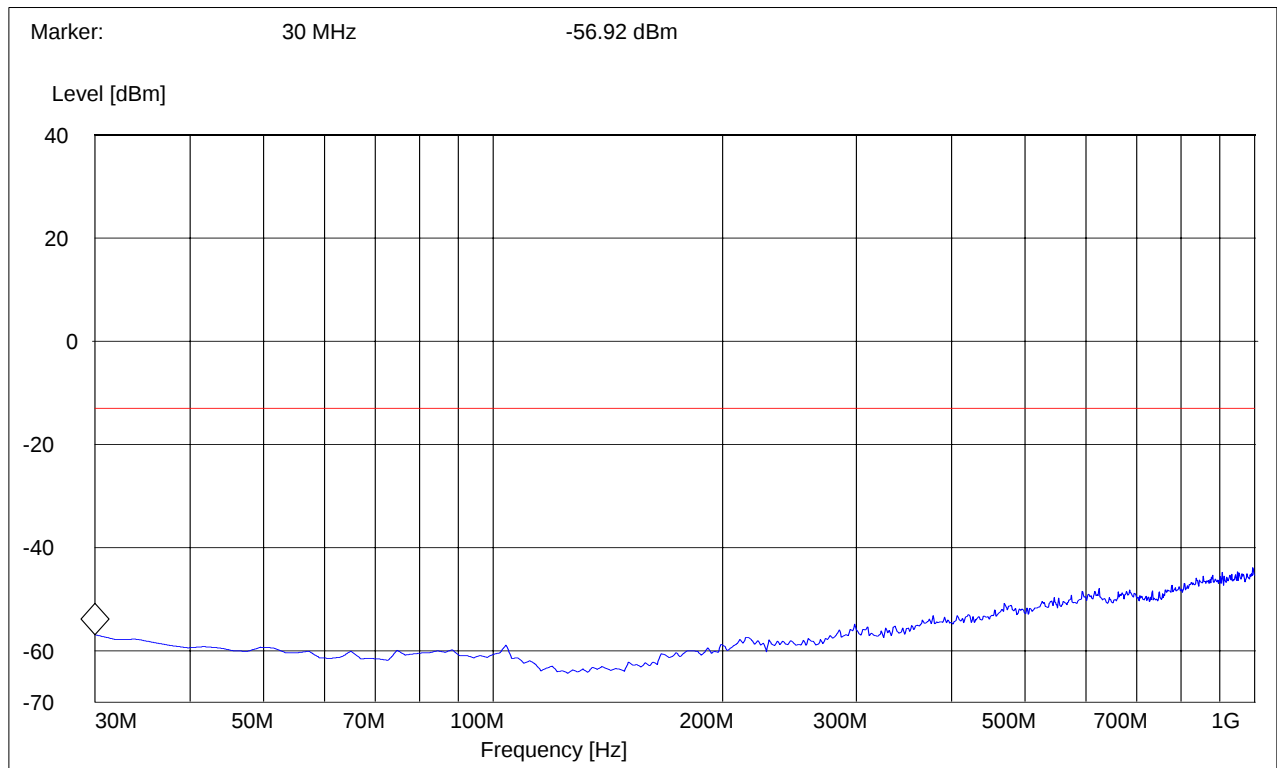


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 30MHz – 1GHz**

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 |

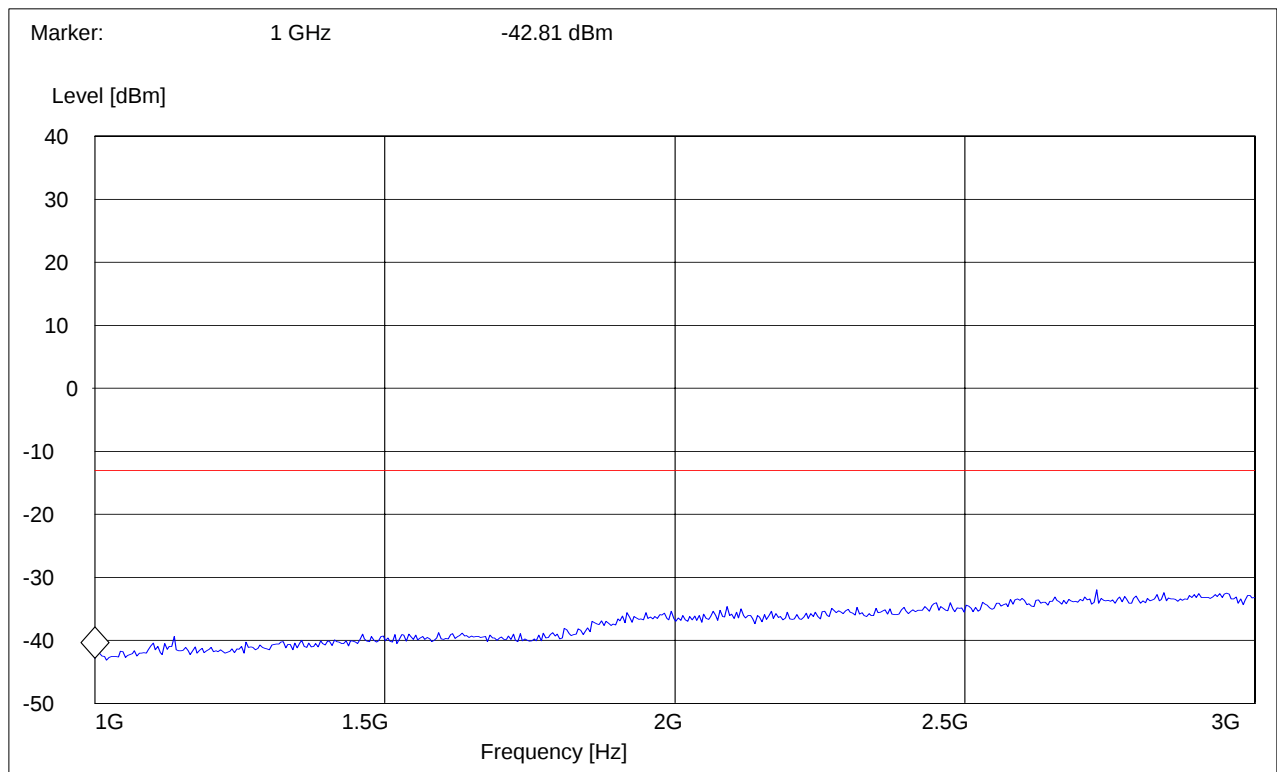


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 1GHz – 3GHz**

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 |

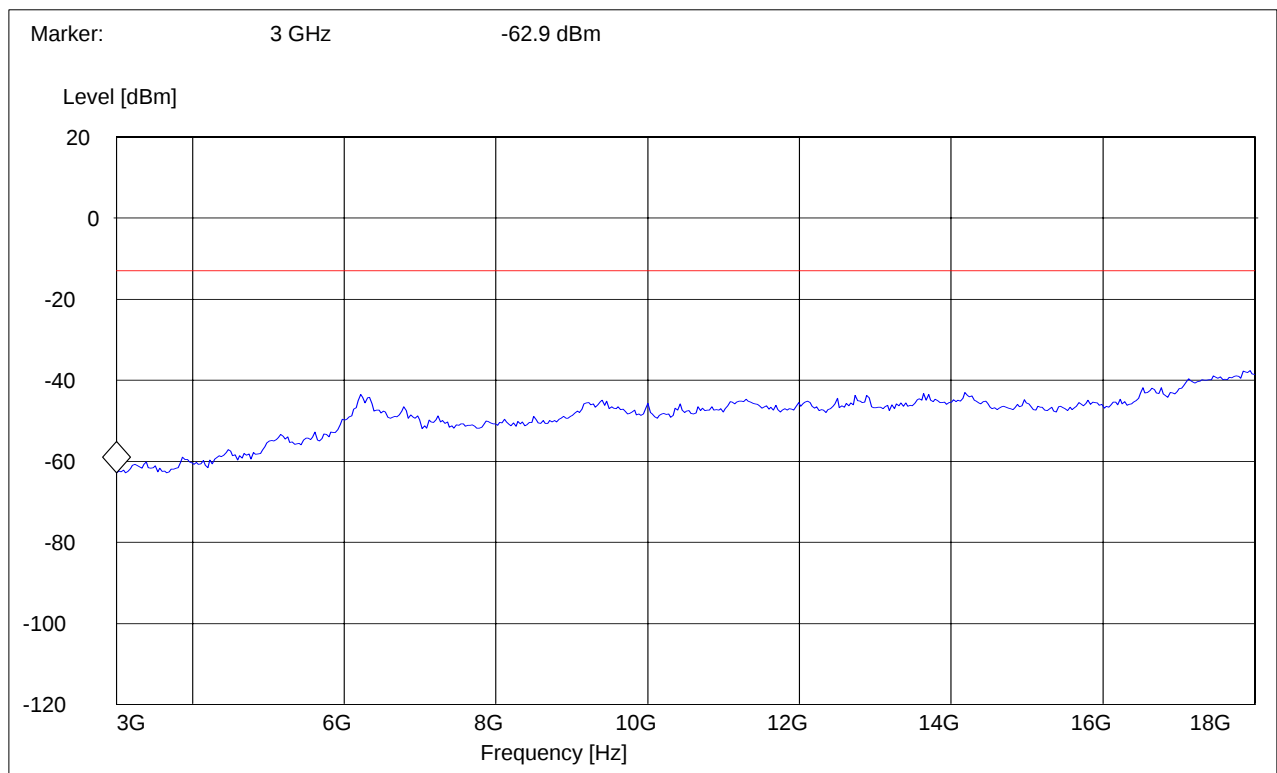


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 3GHz – 18GHz**

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 |

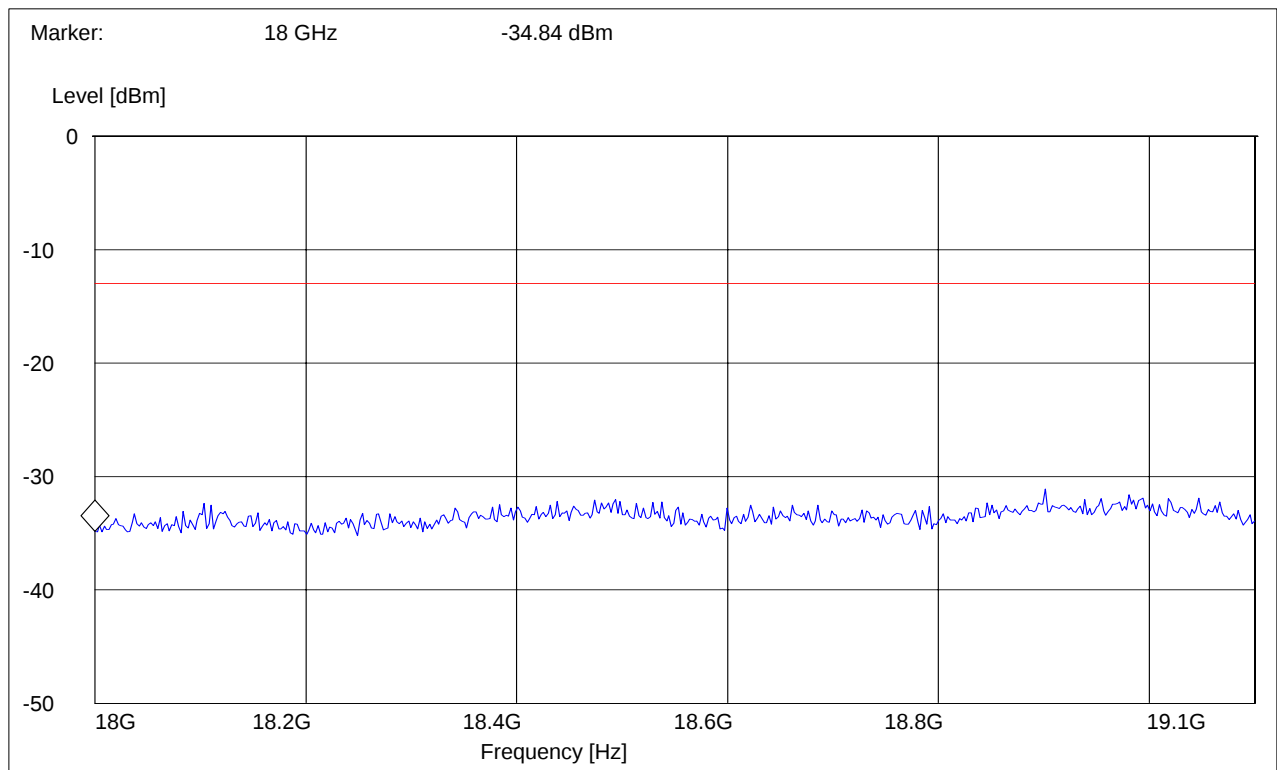


**RADIATED SPURIOUS EMISSIONS (IDLE MODE)****EUT in Idle Mode: 18GHz – 19.1GHz**

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:**

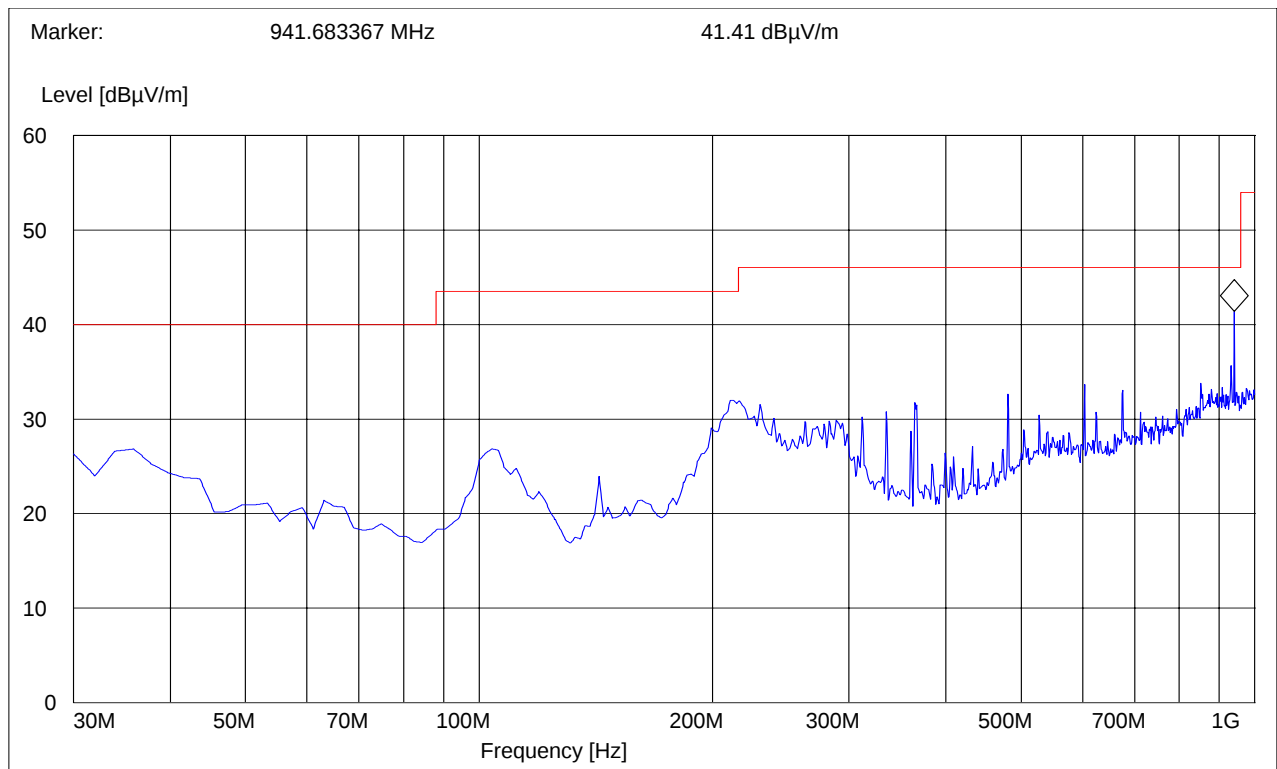
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the 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 (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                        |

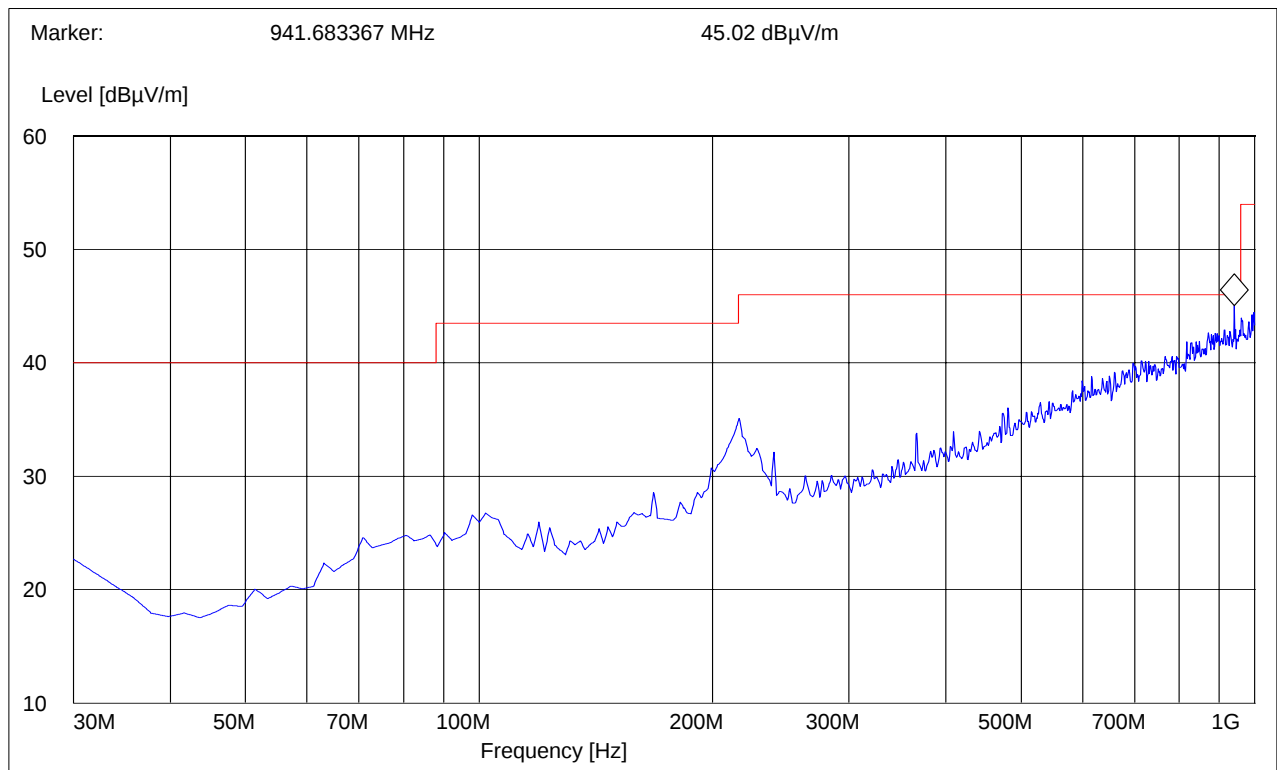
**5.3.1 Receiver Spurious on EUT****RECEIVER RADIATED EMISSIONS****EUT in Idle Mode: 30MHz – 1GHz****Antenna: vertical****SWEEP TABLE: "FCC Spur 30M-1G"**

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



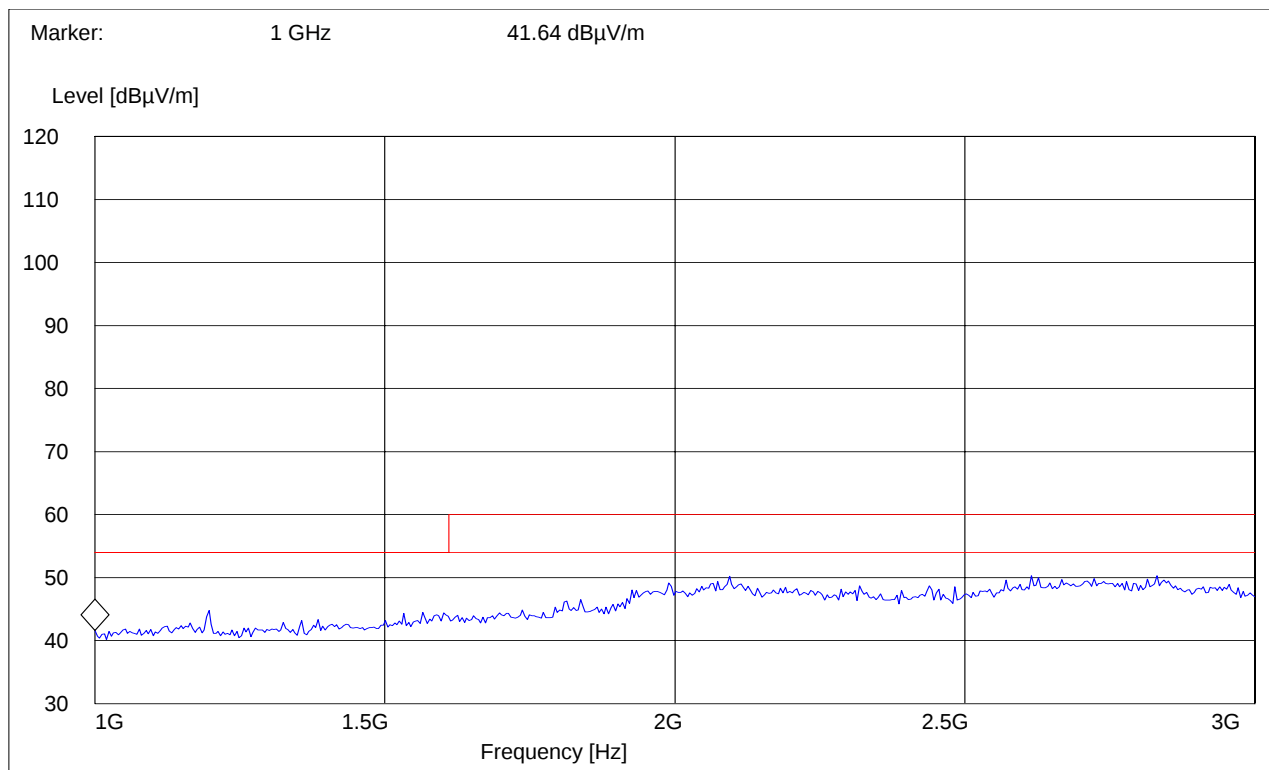
**RECEIVER RADIATED EMISSIONS****EUT in Idle Mode: 30MHz – 1GHz****Antenna: horizontal****SWEEP TABLE: "FCC Spur 30M-1G"**

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



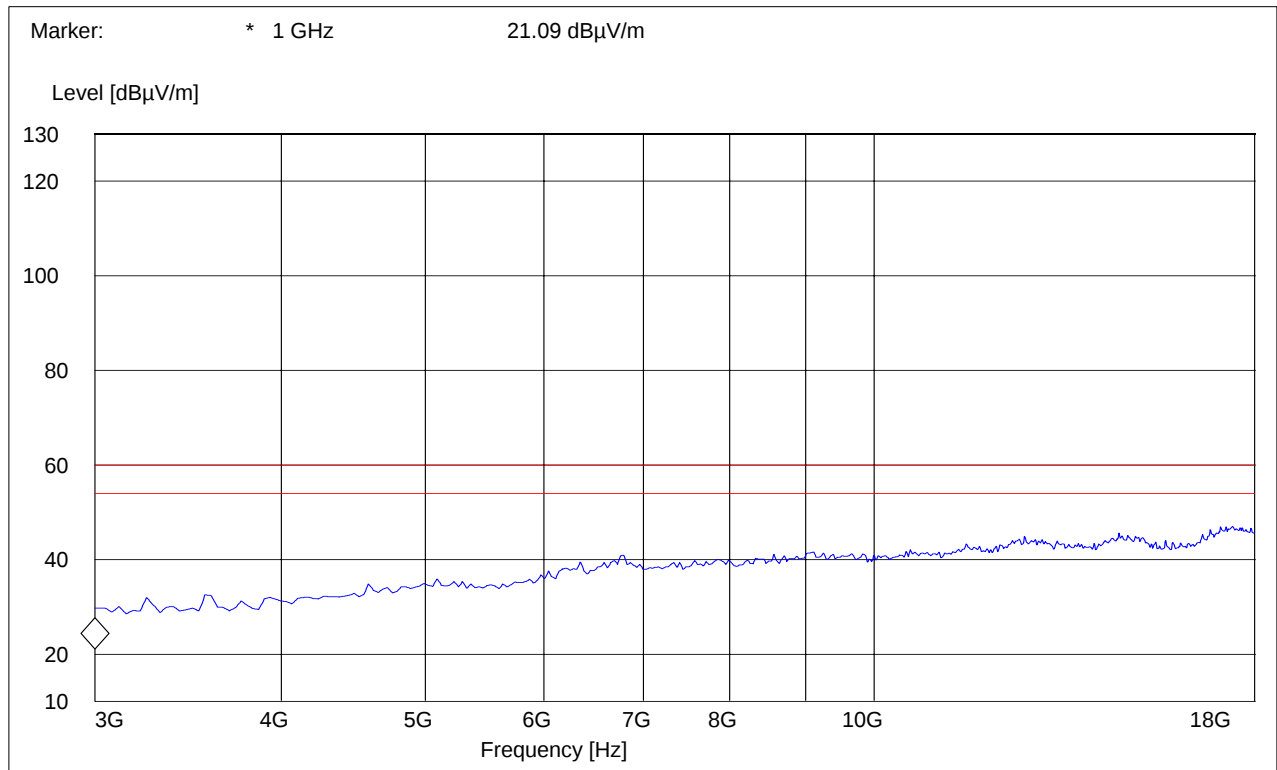
**RECEIVER RADIATED EMISSIONS****EUT in Idle Mode: 1GHz – 3GHz*****SWEEP TABLE: "FCC Spuri 1-3G"***

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



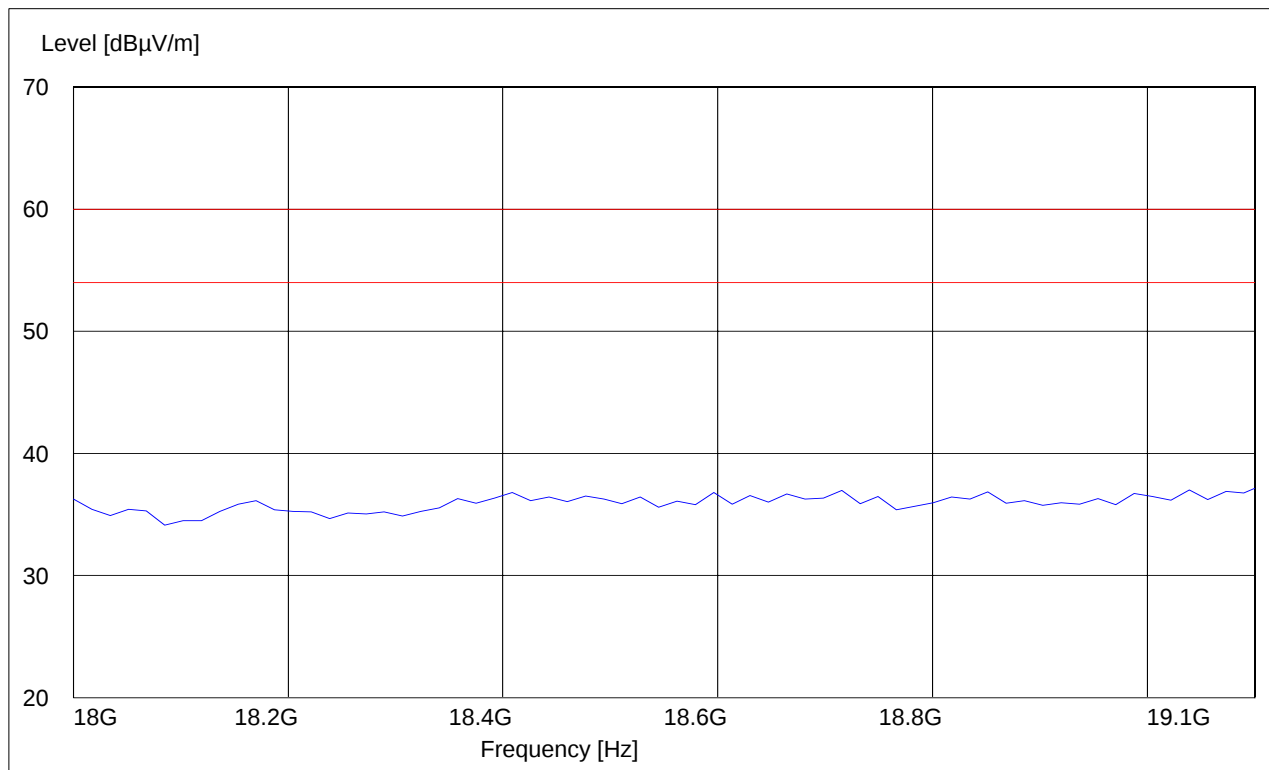
**RECEIVER RADIATED EMISSIONS****EUT in Idle Mode: 3GHz – 18GHz*****SWEEP TABLE: "FCC spuri 3-18G"***

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



**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 |

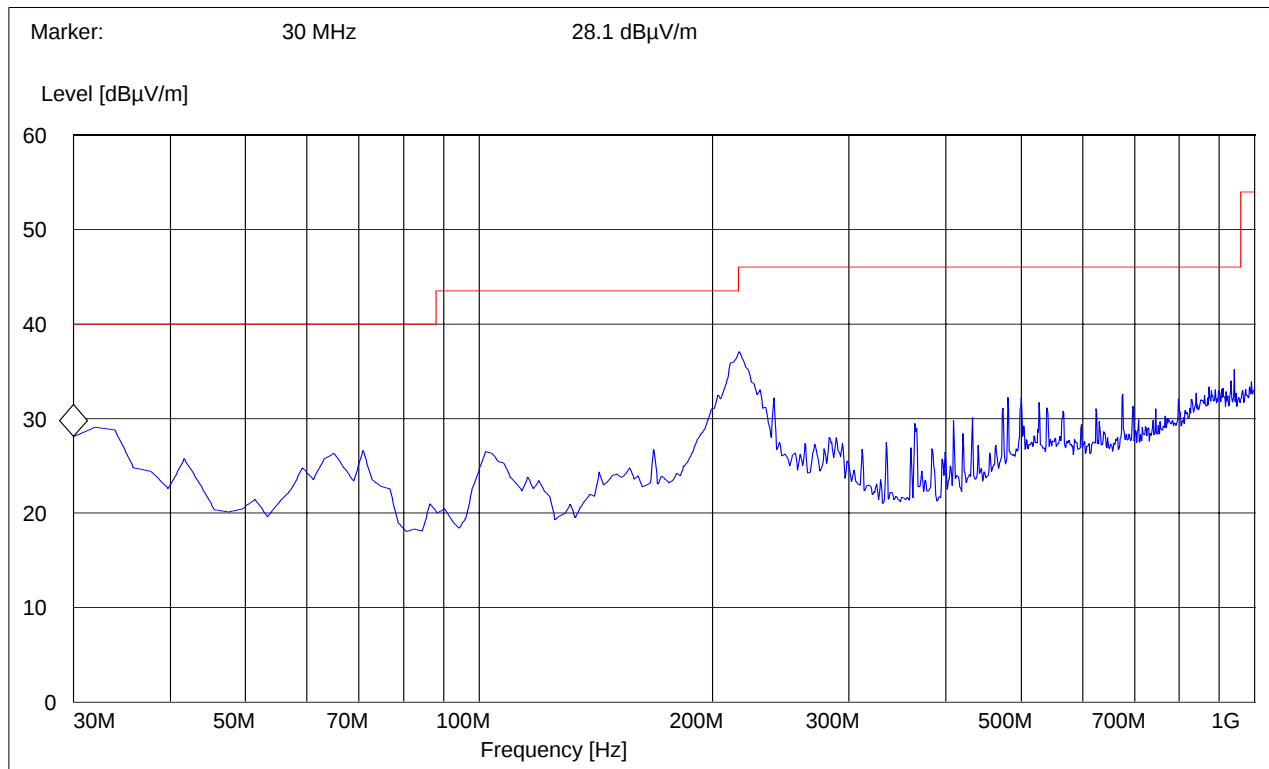


#### **5.4 Co-location**

All Co-location testing was performed with the EUT transmitting in the PCS band (1850.2MHz) and the EUT transmitting in Bluetooth mode(2402MHz). These channels were deemed worst case due to there EIRP readings. All testing was performed using FCC 15.247 procedures/limits.

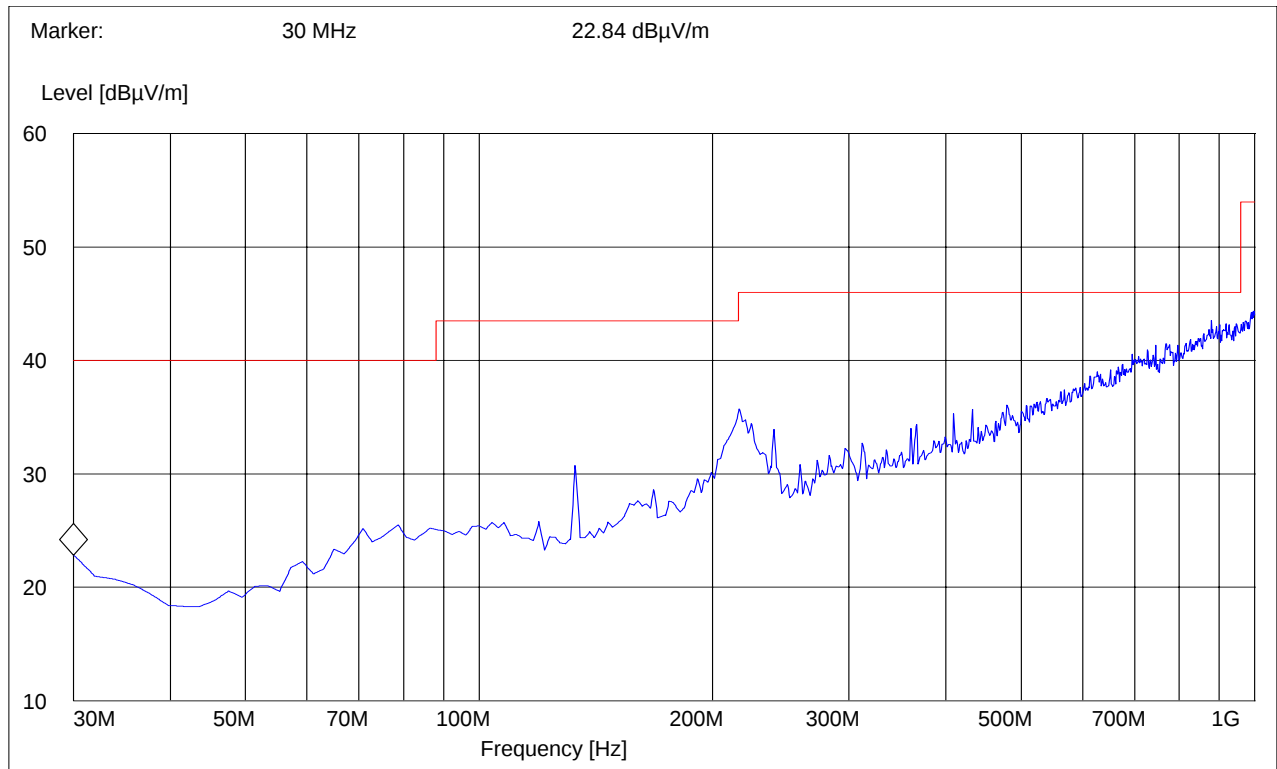
**5.4.1 Results****30MHz – 1GHz****Antenna: vertical**

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



**30MHz – 1GHz****Antenna: horizontal**

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

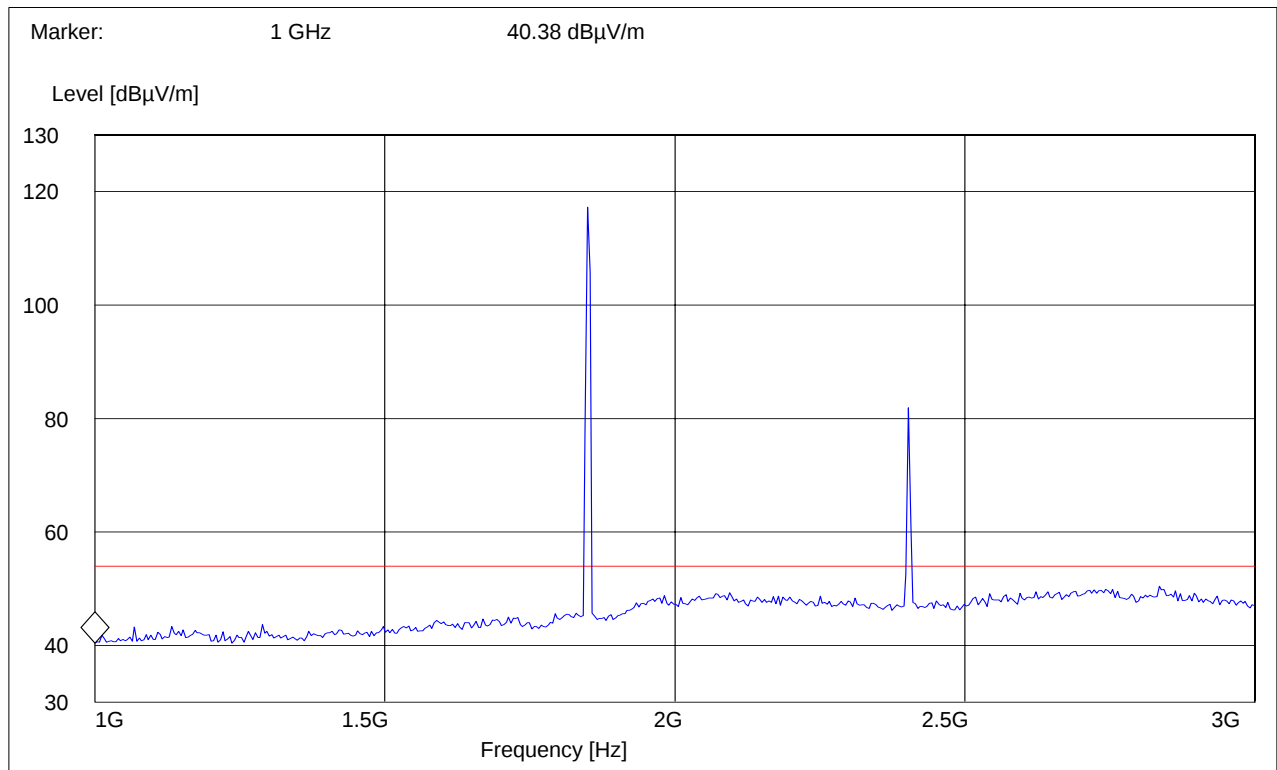


**1-3GHz**

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

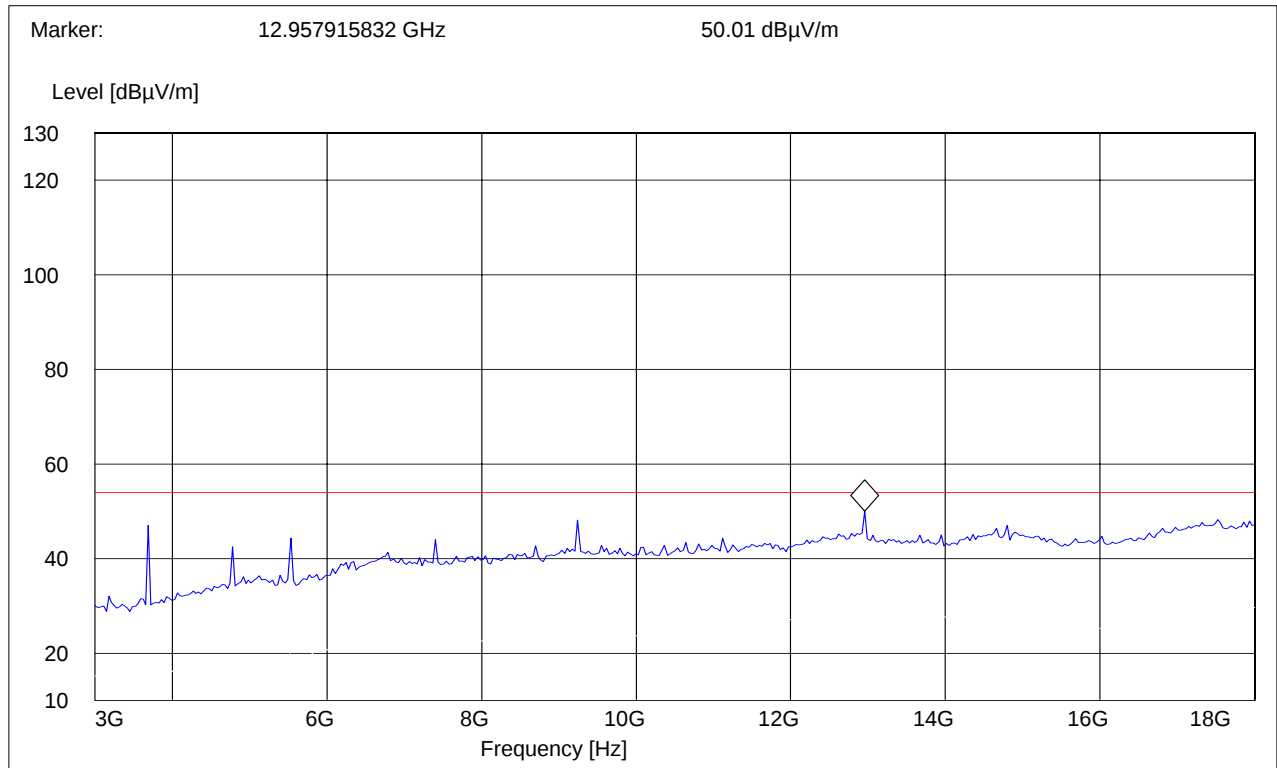
**Note: The peaks above the limit line is the carrier freq of the Bluetooth and PCS transmitter.**

**Note: Peak Reading vs. Average limit**



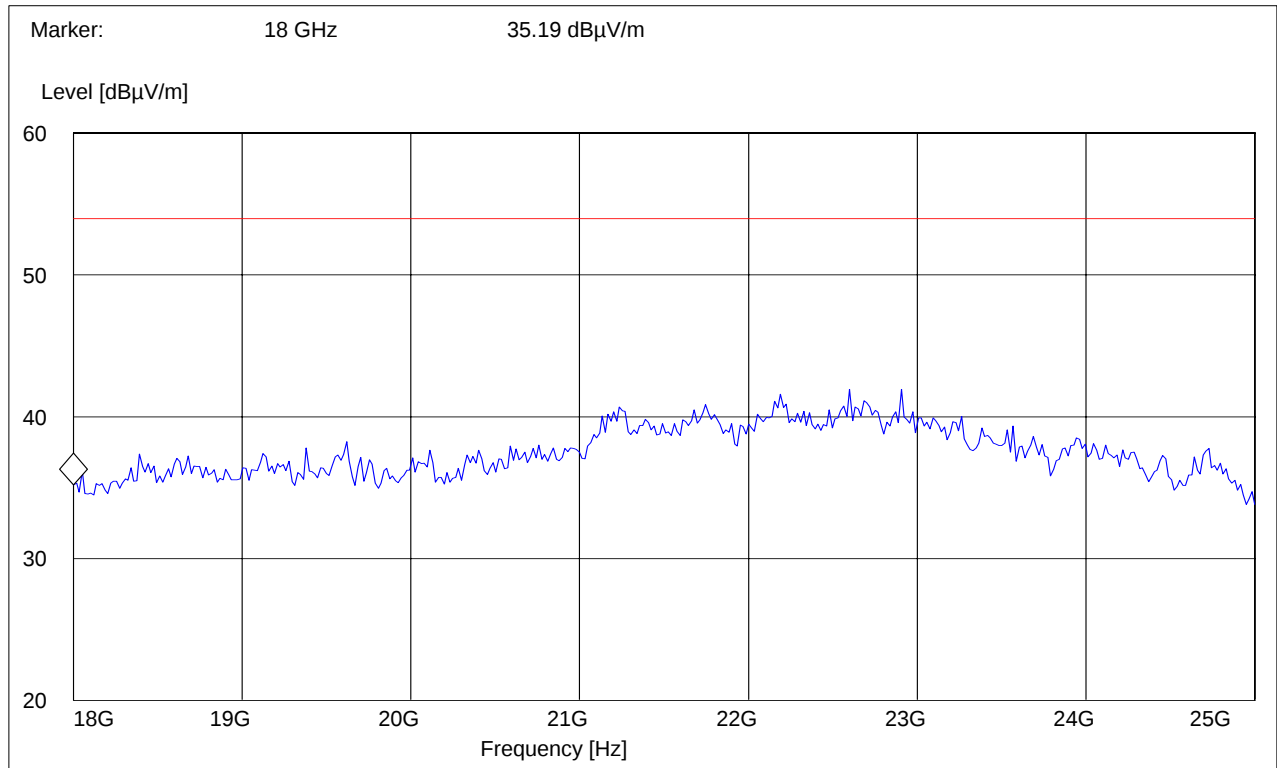
**3-18GHz**

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

**Note: Peak Reading vs. Average limit**

**18-25GHz**

| Start Frequency | Stop Frequency | Detector | Meas. Time | RBW   | VBW   |
|-----------------|----------------|----------|------------|-------|-------|
| 18GHz           | 25GHz          | Max Peak | Coupled    | 1 MHz | 1 MHz |

**Note: Peak Reading vs. Average limit**

**5.5 AC POWERLINE CONDUCTED EMISSIONS****§ 15.107/207**

Measured with AC/DC power adapter by SONY model#VGP-AC16V8

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**

Conducted Emissions were done on both 850/1900 bands, but only worst-case plots are submitted in the test reports. The following results were done with the PCS and Bluetooth transmitters operating simultaneously.

### 5.5.1 Results EUT

LISN

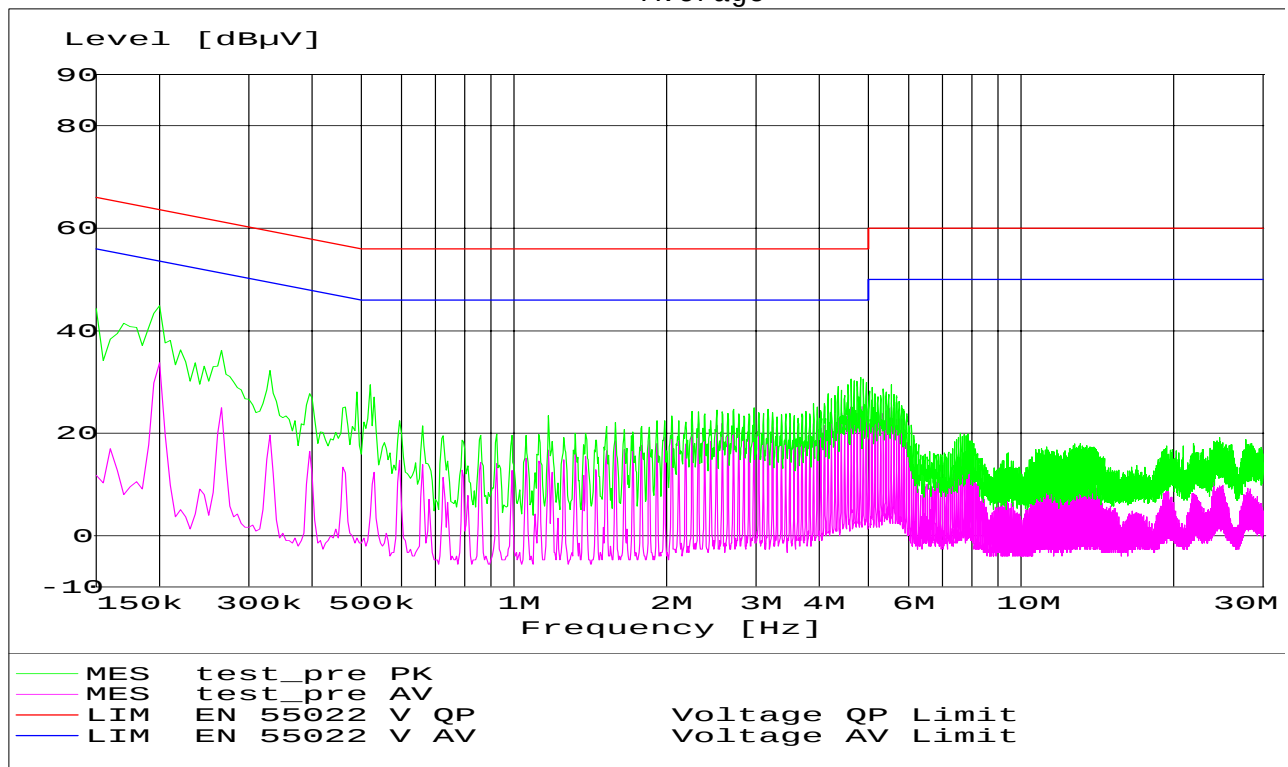
411 Dixon Landing Road, CA 95035

EUT / Description: viao  
 Manufacturer: sony  
 Test mode: co-lo(pcs1900@1850.2mhz and bluetooth@2402mhz)  
 Test Engineer: Neelesh  
 Phase: L & N  
 Comment: 110 volt

Start of Test: 8/11/2005 / 12:50:43PM

SCAN TABLE: "EN 55022 Voltage"

| Short Description: |           |         | EN 55022 Voltage |         |        |      |
|--------------------|-----------|---------|------------------|---------|--------|------|
| Start              | Stop      | Step    | Detector         | Meas.   | IF     |      |
| Transducer         |           |         |                  |         |        |      |
| Frequency          | Frequency | Width   |                  | Time    | Bandw. |      |
| 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**

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

## **7 References**

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