Advanced
Compliance Laboratory

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# Electromagnetic Emission Compliance Test Report

| | |
|---|---|
| **Equipment Under Test (EUT)** | High Efficiency Power Amplifier HEPA1900V3<br>RF100576 |
| **Applicant** | Andrew Corporation |
| **In Accordance With** | FCC Part 24, Subpart E |
| **Test by** | Advanced Compliance Laboratory, Inc.<br>6 Randolph Way<br>Hillsborough, New Jersey 08844 |
| **Authorized by** | Wei Li<br>Lab Manager |
| **Signature** |  |
| **Date** | May 16, 2008 |
| **AC Lab Report Number** | 0048-080505-01 |

Lab Code:200101-0

**The test result in this report is supported and covered by the NVLAP accreditation.**

## Index

## Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model No.: High Efficiency Power Amplifier HEPA1900V3

Parts No.: RF100576

General: **All measurements are traceable to national standards**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 24, Subpart E.

☒New Submission ☒Production Unit

☐Class II Permissive Change ☐Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

"See Summary of Test Data"

**NVLAP LAB CODE: 200101-0**

## Summary of Test Data

| | | | |
|---|---|---|---|
| **RF Power Output** | 22.913(a) | 500W ERP | N/A* |
| | 24.232(a) | 100W EIRP | Complies** |
| **Occupied Bandwidth (Voice & SAT)** | 2.1049(i) | Mask | N/A* |
| **Occupies Bandwidth (Wideband Data)** | 2.1049(i) | Mask | N/A* |
| **Occupied Bandwidth (Digital)** | 2.1049(i) | Mask | Complies |
| **Spurious Emissions at Antenna Terminals** | 22.917 | -13 dBm | N/A* |
| | 24.238 | -13 dBm | Complies |
| **Field Strength of Spurious Emissions** | 22.917 | -13 dBm | N/A* |
| | 24.238 | -13 dBm E.I.R.P. | Complies |
| **Frequency Stability** | 22.355 | 1.5 ppm | N/A* |
| | 24.235 | 0.05 ppm | N/A* |

* These items are NOT applied to the EUT.
** See page 10.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

| | Prob. Dist. | Uncertainty(dB) | Uncertainty(dB) | Uncertainty(dB) |
|---|---|---|---|---|
| | | 30-1000MHz | 1-6.5GHz | Conducted |
| Combined Std. Uncertainty $u_c$ | norm. | ±2.36 | ±2.99 | ±1.83 |

Wei Li
Lab Manager
Advanced Compliance Lab

Date: May 16, 2008

## Section 2. General Equipment Specification

| | | | | | |
|---|---|---|---|---|---|
| **Supply Voltage** | 48VDC | | | | |
| **Frequency Range** | Cellular | N/A | | | |
| | PCS | DL/ 1930 – 1960 MHz | | | |
| **Modulation** | ☐ CDMA 2000 | ☐ WCDMA | ☒ GSM | ☒ EDGE | ☐ TDMA |
| **Type of Emissions** | F9W | F9W | GXW | G7W | DXW |
| **Rated Power** | 60W average | | | | |
| **Operating Power** | 60W average for GSM<br>45W average for EDGE | | | | |
| **Output Impedance** | 50ohm | | | | |
| **Frequency Translation** | F1-F1 ☒ | F1-F2 ☐ | N/A ☐ | | |
| | Software ☐ | Duplexer Change ☐ | Full Band Coverage ☒ | | |

## DC voltages and DC currents per 2.1033(c)(8)

The input supply to the transmitter was set at 48VDC. The RF power output was measured with the indicated voltage and current applied into the final RF amplifying device(s).

**HEPA1900V3 Amplifier**

RF Output, DC Current and RF Input Power are all average values.
Measured Rated RF output: 47.75dBm ( 160W)
Measured DC voltage: 48.0V
Measured DC current: 4.65A.
Measured Minimum RF output: 5.5dBm (3.5mW)
Measured DC voltage: 48.0V
Measured DC current: 0.96A

## Tune-up procedure per 2.1033(c) (9)

There are no user accessible adjustments or tuning in this amplifier. All necessary adjustments and tuning are performed during manufacture of the product. Any adjustments or tuning after service or repair are done as part of that process as special equipment is required to perform such adjustments.

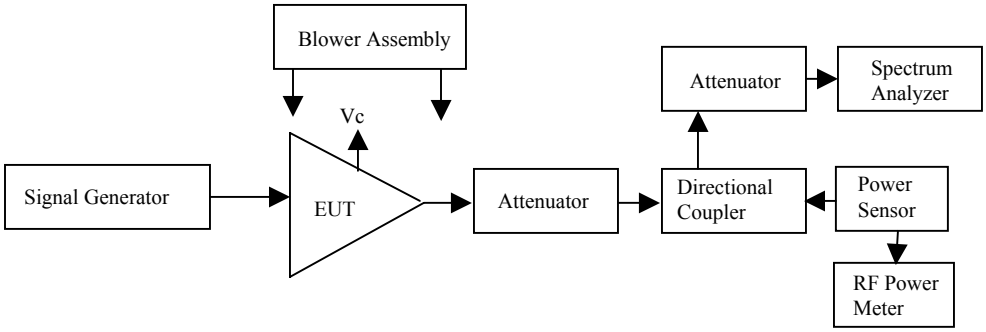
## Description of Operation

This device is a single carrier power amplifier used in BTS in downlink spectrum of 1900MHz PCS band. All measurements shall be made at room temperature and at nominal DC input voltage.

## System Diagram

See Attachment.

## General EUT Setup



## Section 3. RF Output Power

| Name of Test: | *RF Output Power* | Test Standard: | *22.913(a)*<br>*24.232(a)* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 05/05/2008-05/16/2008 |

**Minimum Standard:** Para. No. 22.913(a). The maximum effective radiated power (ERP) of base station transmitters and cellular repeaters must not exceed 500 Watts (57dBm).
Para. No. 24.232(a). The maximum peak output power of base transmitters should not exceed 100 Watts EIRP (50dBm).

**Method of Measurement:** The EUT is a RF amplifier. The manufacturer does not provide an antenna for sale with the product, hence EIRP is not measured nor calculated.

Per 2.1046: The RF Power Output shall be measured at the output connector of the EUT. The output level shall be rated power +1 dB, -3 dB over the PCS frequency band: 1930-1990 MHz. The tolerance range is per TIA/EIA-97-D, Section 4.3.1.3.

Using power meter, power measurements shall be taken at the low band edge, mid, and high band edge frequencies for all modulations listed on Page 5.

**Test Result:** **Complies**

**Test Data:**

## Rated Output Power – Normal Condition

The inputs are set to generate rated average output power and crest factor for the signals intended.

| PCS Band | Channel | Modulation | Power Output (dBm) | Rated Power (dBm) | Tolerance |
|---|---|---|---|---|---|
| Downlink | Low | GSM | 47.58 | 47.78 | -0.20 |
| | Mid | GSM | 47.77 | 47.78 | -0.01 |
| | High | GSM | 47.37 | 47.78 | -0.41 |
| | Low | EDGE | 46.28 | 46.53 | -0.25 |
| | Mid | EDGE | 46.52 | 46.53 | -0.01 |
| | High | EDGE | 46.10 | 46.53 | -0.43 |
| **Total Power at Amplifier RF Input** (dBm) | -0.55/GSM & -1.89/EDGE | | | | |
| **Ref Offset** | Ref offset=Cable&Attenuator&Coupler Attenuation=46.2dB | | | | |

**Conclusion:**

**As indicated on Page 5 & measurement results on Page 9, supported output power per carrier is 60W for GSM and 45W for EDGE, which does not exceed the 100 Watt (50dBm) peak power limit.**

## Section 4. Occupied Bandwidth

| Name of Test: | *Occupied Bandwidth* | Test Standard: | *2.1049(i)* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 05/05/2008-05/16/2008 |

**Minimum Standard:** Not defined by FCC. Input vs. Output.

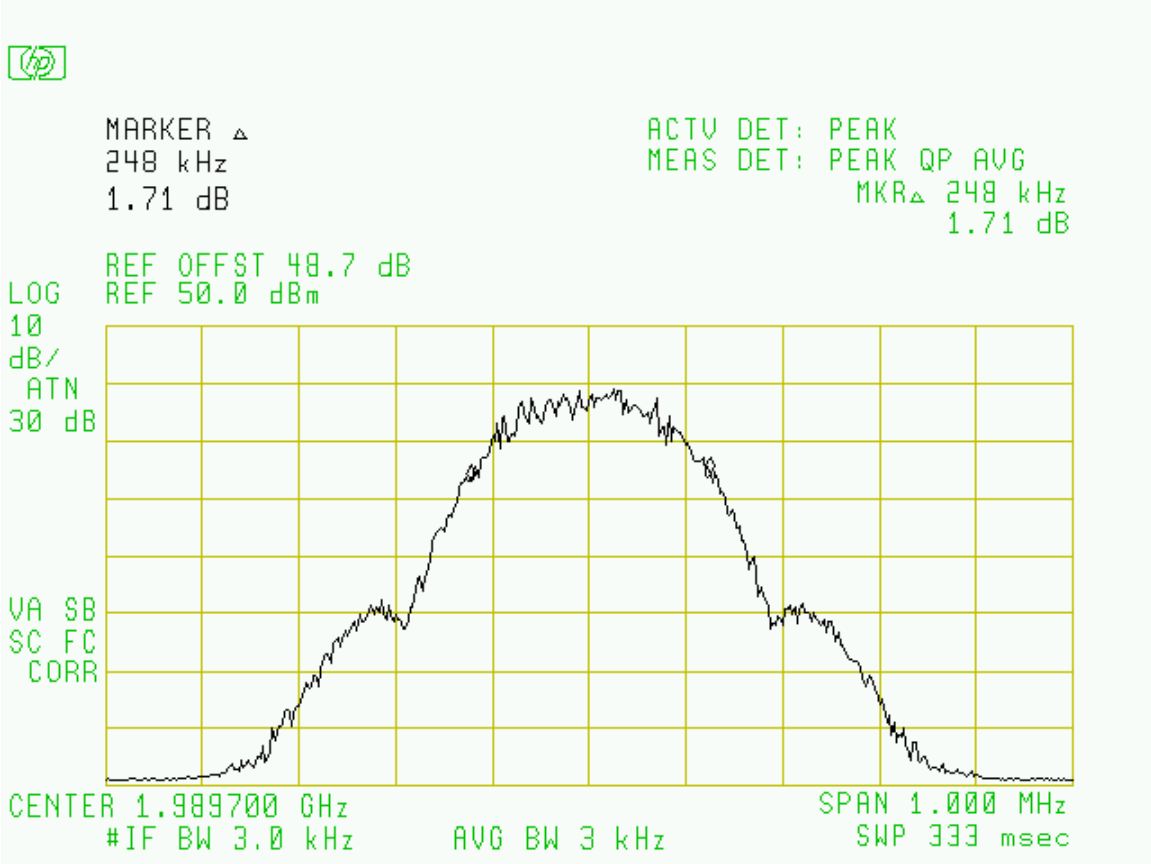
**Method of Measurement:** Spectrum Analyzer Settings:
RBW: CDMA2000 (30 kHz),WCDMA (100KHz), CDMA(30KHz), GSM (3 kHz), EDGE (3KHz), NADC (1 kHz) and CDPD (1 kHz)
VBW: ≥RBW
Span: As required
Sweep: Auto
Input Signal Characteristics: Generated from Signal Generator
RF level: Rated, recommended by manufacturer

**Test Result:** **Complies**

**Test Data:** Attached Plots

| | |
|---|---|
| **Project Number:** | 0048-080505-01 |
| **EUT:** | ANDREW High Efficiency Power Amplifier HEPA1900V3 |
| **PARTS NO.:** | RF100576 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70˚F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Hi-Channel, GSM Modulation** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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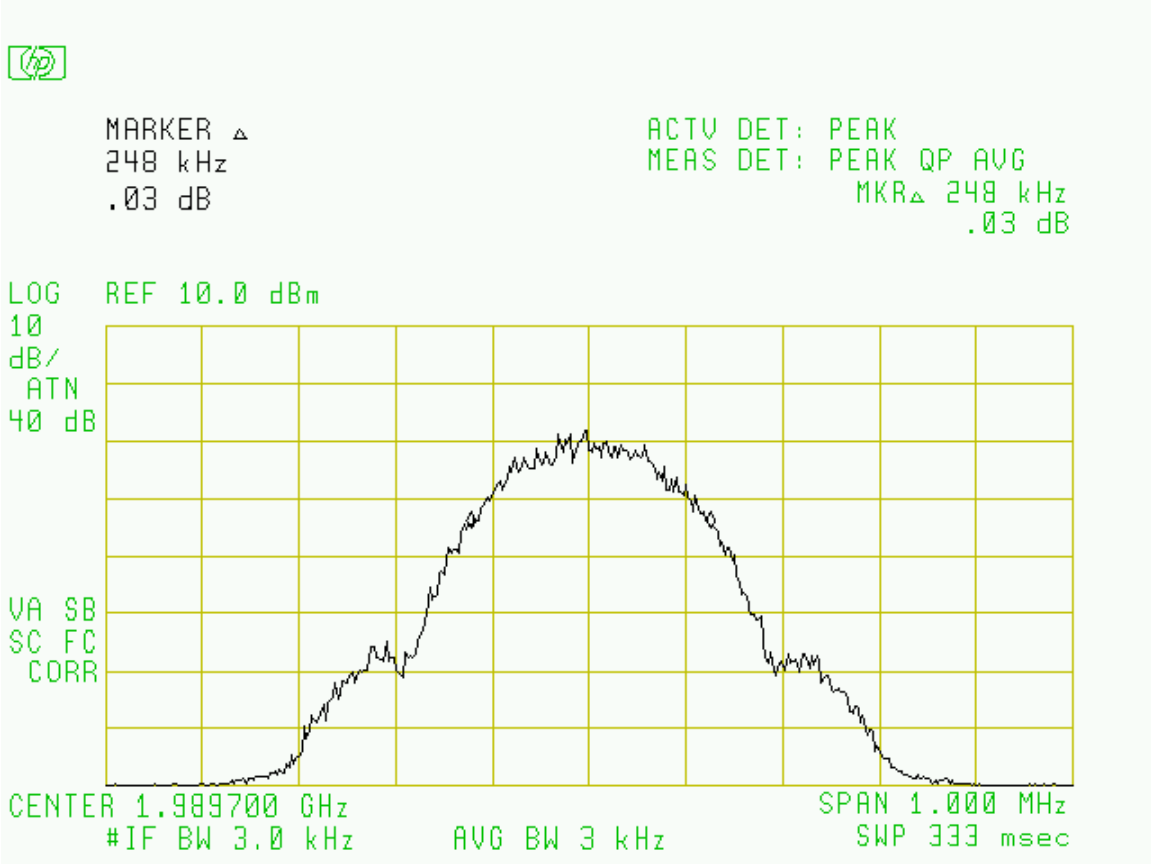

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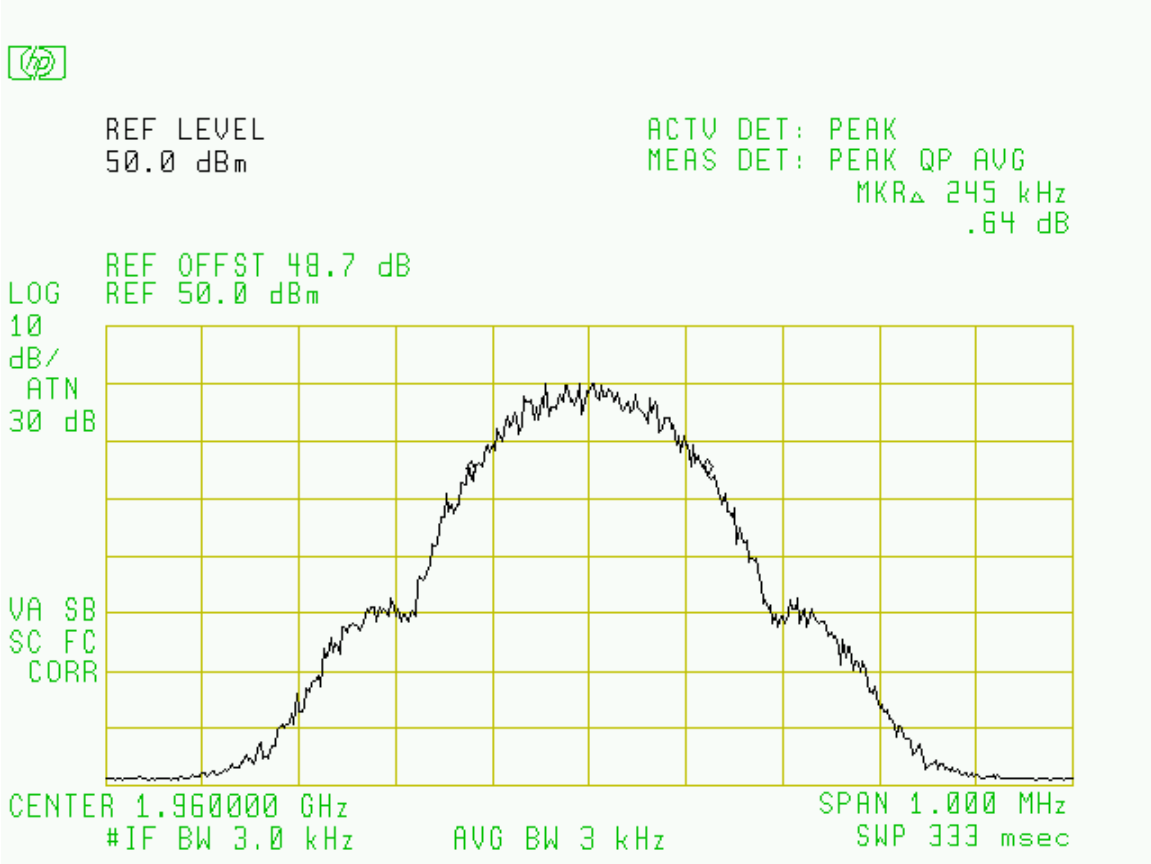
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Mid-Channel, GSM Modulation** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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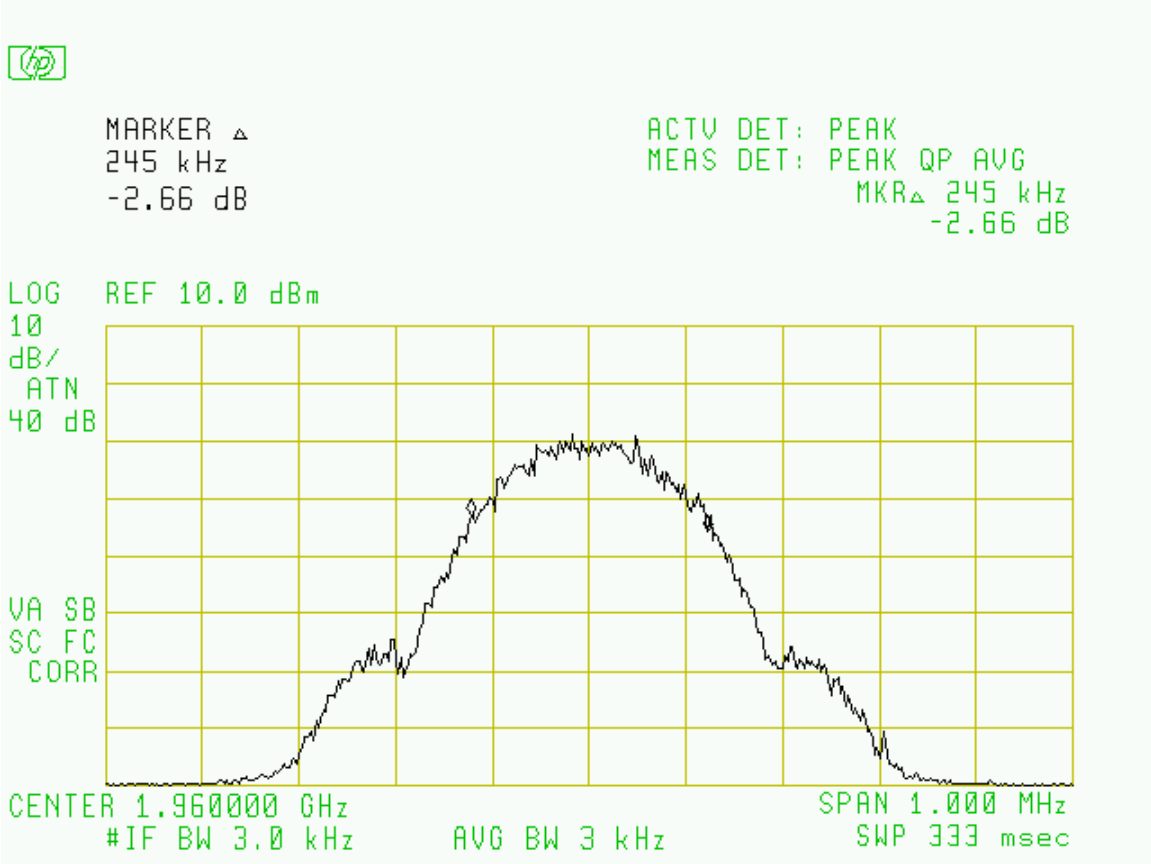

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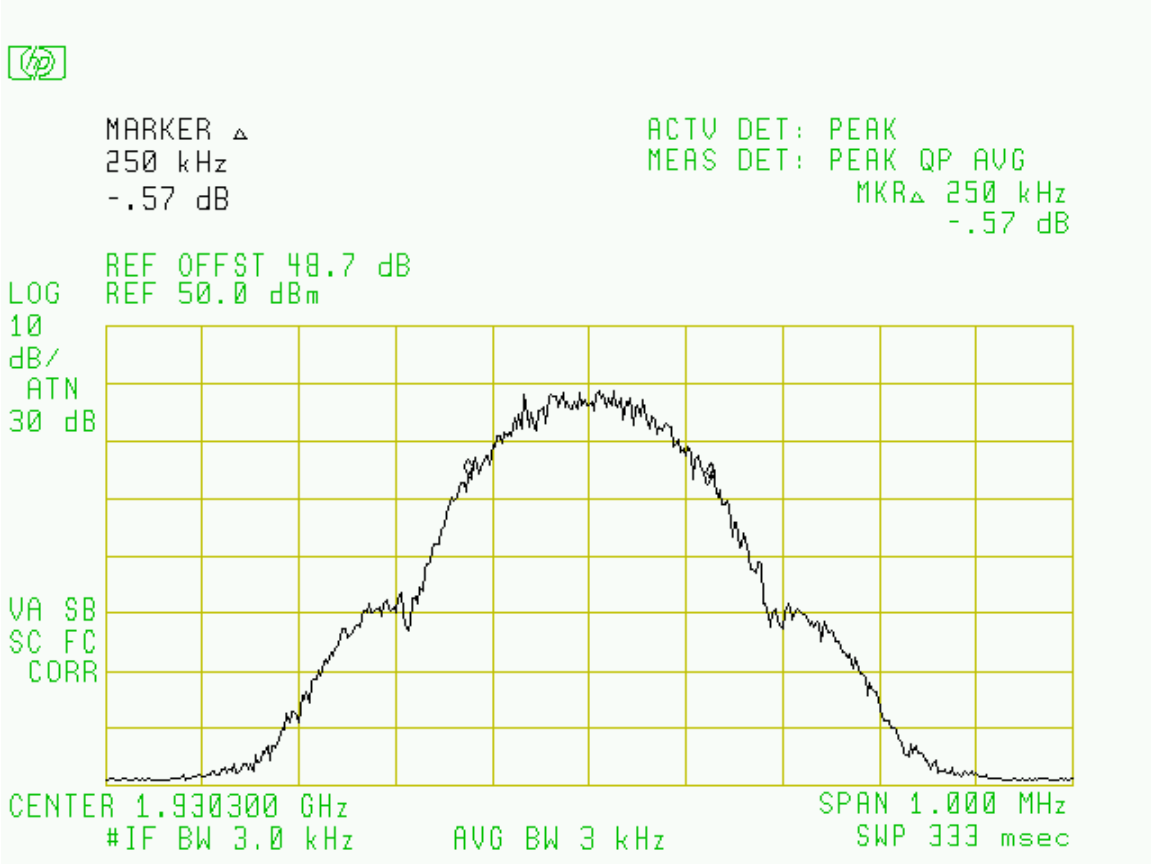
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Low-Channel, GSM Modulation** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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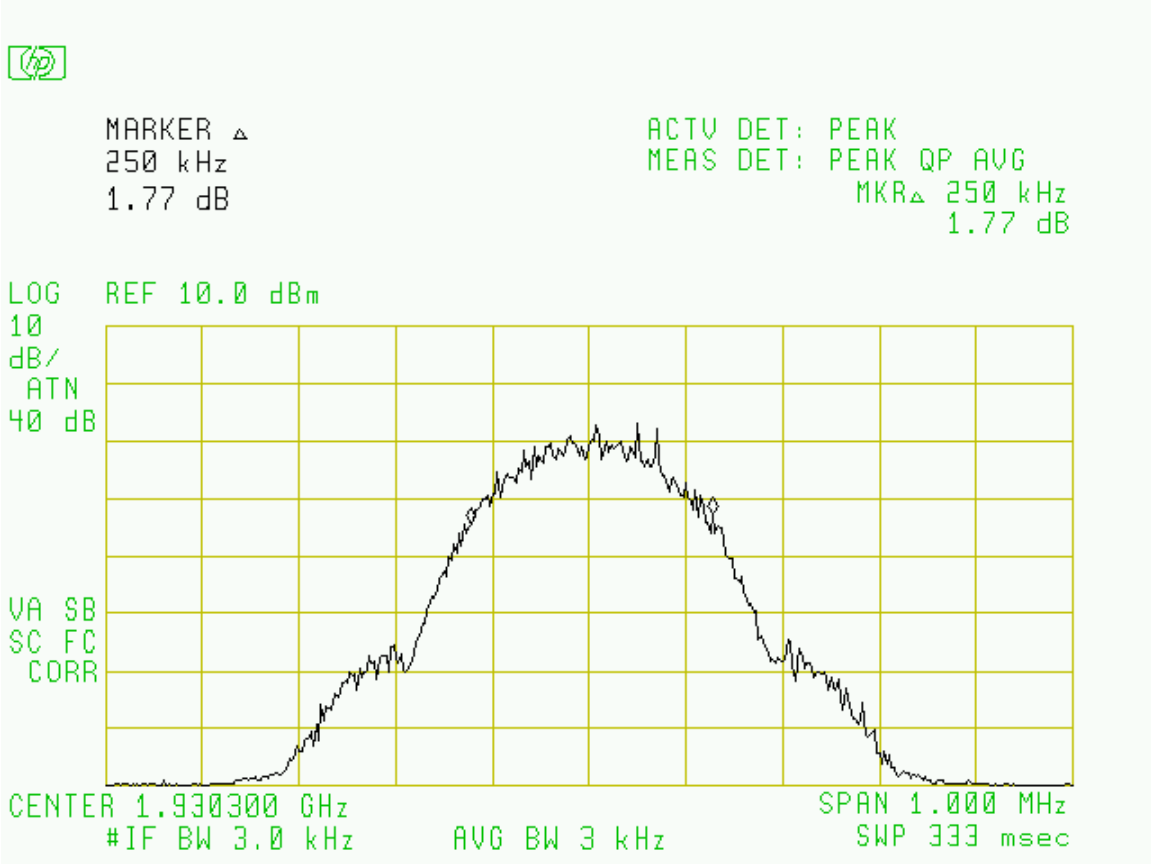

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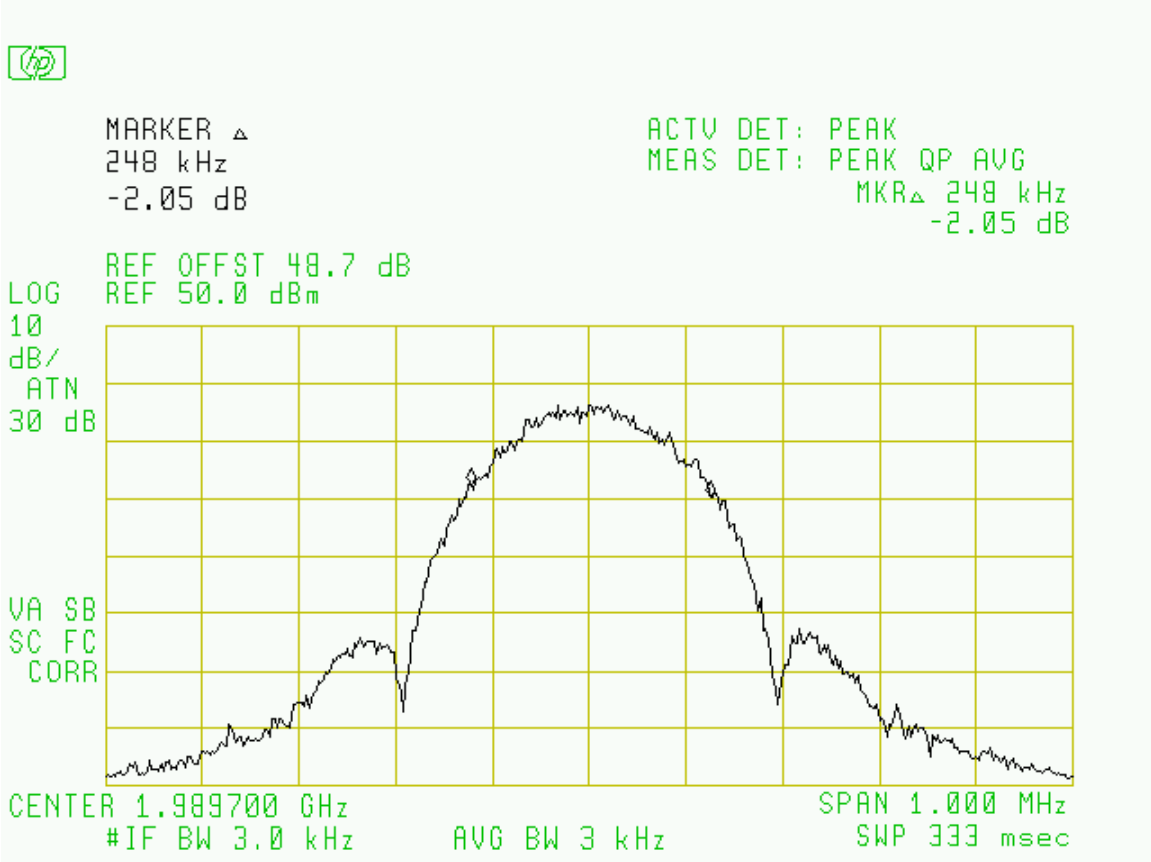
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Hi-Channel, EDGE Modulation** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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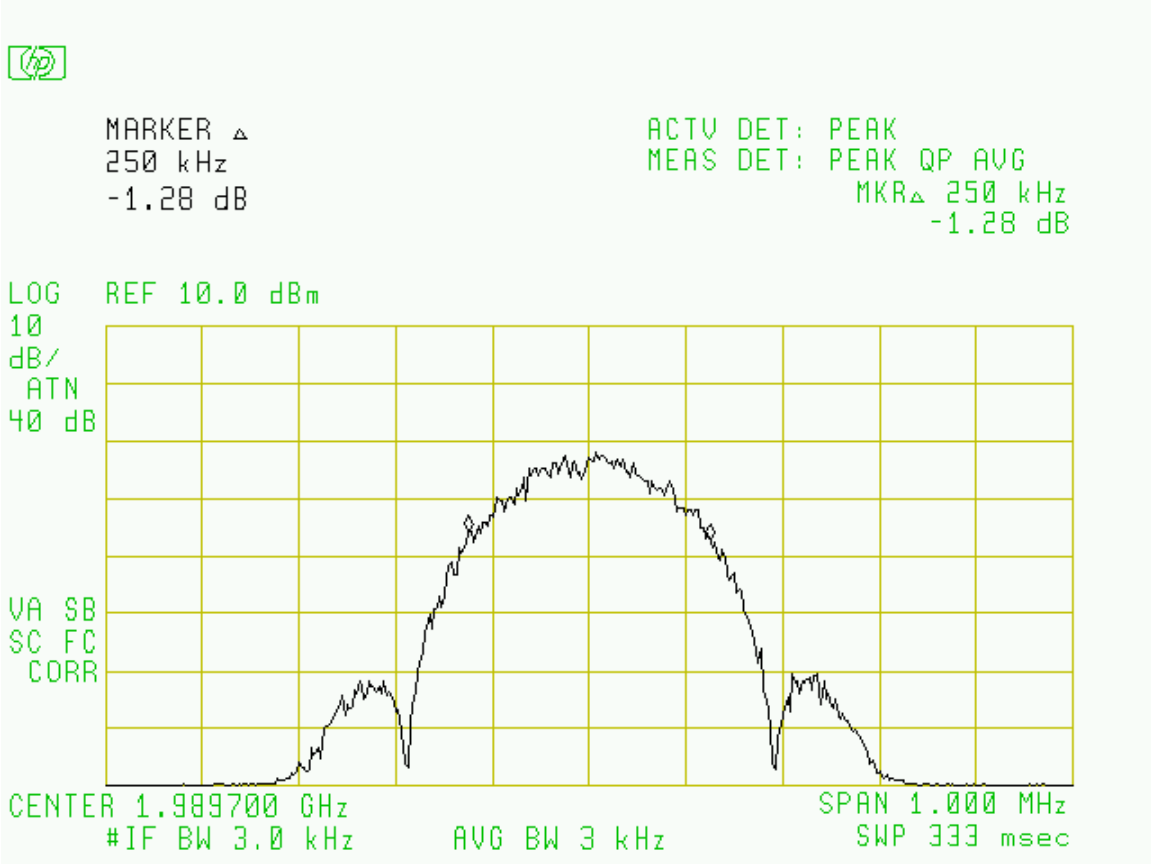
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Hi-Channel, EDGE Modulation** |
| **Configuration:** | Input: SG |



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| **Temperature:** | 70˚F |
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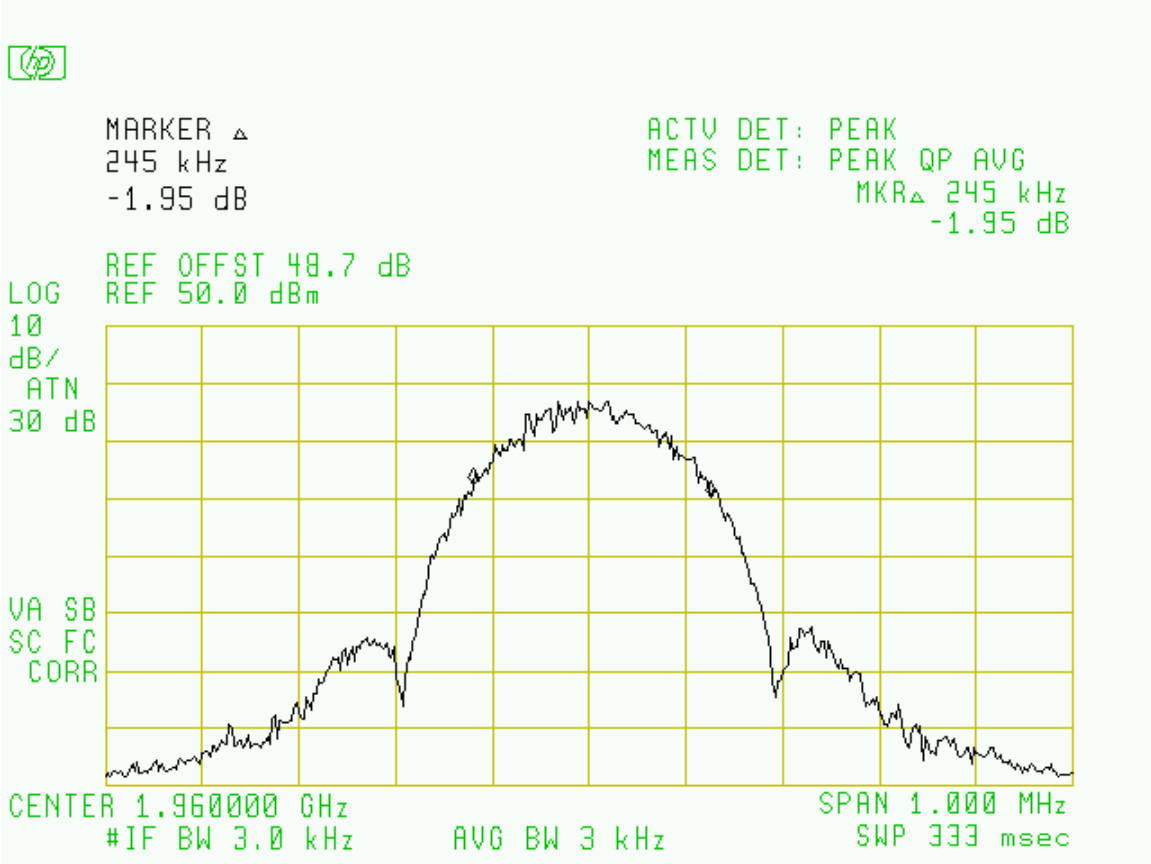
|---|---|
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Mid-Channel, EDGE Modulation** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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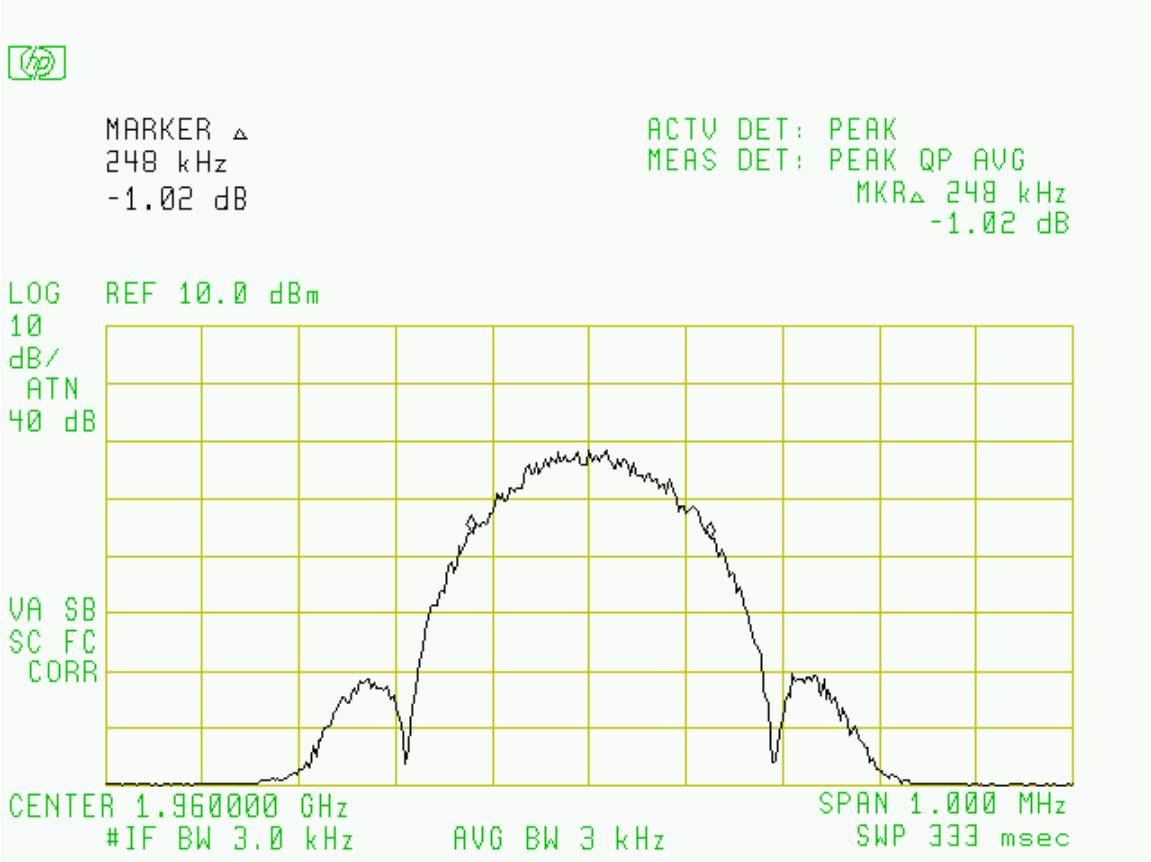
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Mid-Channel, EDGE Modulation** |
| **Configuration:** | Input: SG |



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| **Temperature:** | 70˚F |
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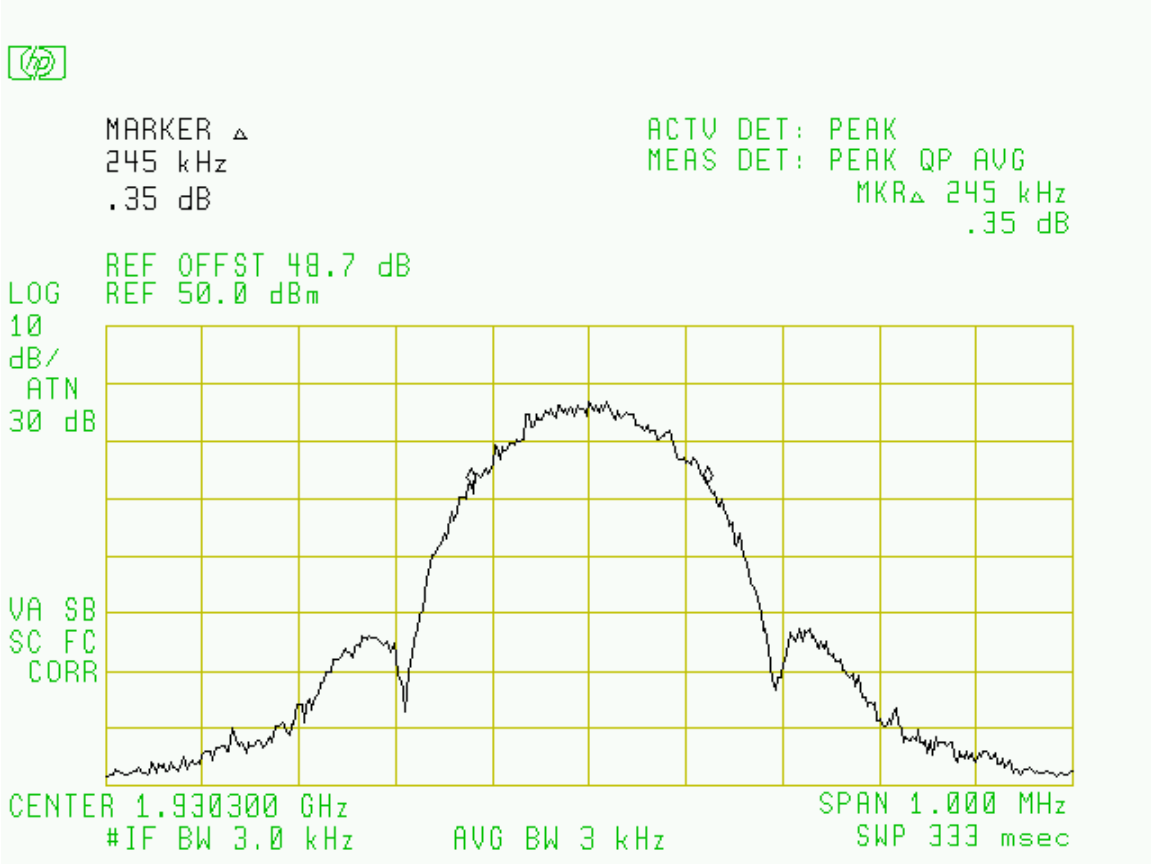
| **Section:** | **Occupied Bandwidth: PCS Bands** |
| **Plot Name:** | **Downlink, Low-Channel, EDGE Modulation** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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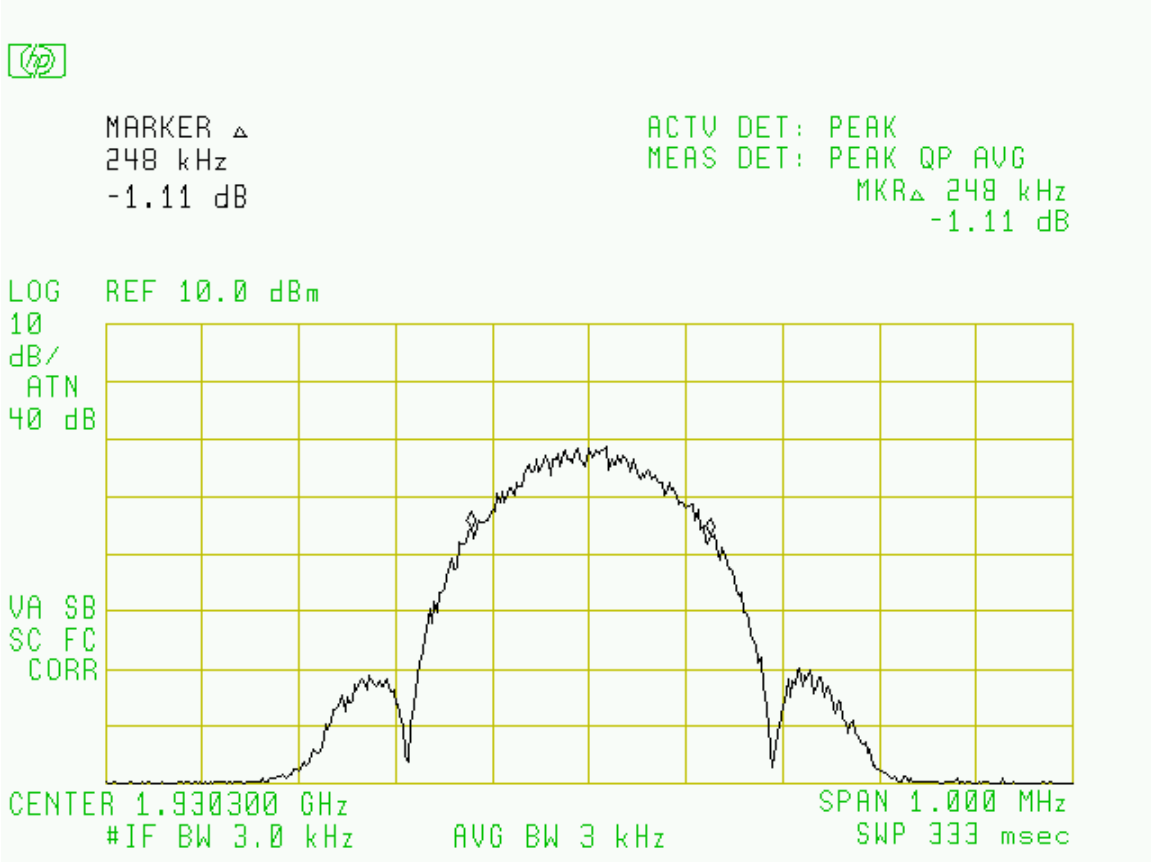
| **Plot Name:** | **Downlink, Low-Channel, EDGE Modulation** |
| **Configuration:** | Input: SG |



## Section 5. Spurious Emissions at Antenna Terminals

| Name of Test: | *Spurious Emissions at Antenna Terminals* | Test Standard: | *22.917 24.238(a)* |
|---|---|---|---|
| Tested By: | WEI LI<br>EDWARD LEE | Test Date: | 05/05/2008-05/16/2008 |

**Minimum Standard:** Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute power.
Para. No. 24.238(a). The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not less than 43+10 log (mean output power in watts) dBc below the mean power output outside a licensee's frequency block (-13dBm).

**Method of Measurement:** Spectrum Analyzer Settings:
RBW: 100 kHz. As required for digital modulations.
RBW: 1MHz. When frequency is located above 1GHz.
VBW: >=RBW
Start Frequency: 9KHz or Lowest Clock Frequency
Stop Frequency: 10 GHz (Cellular), 20GHz (PCS)
Sweep: Auto
Using in-band filter if needed.
For Inter-modulation measurement: Three RF signals set as inputs. The frequencies of RF signals shall be within the repeater's operating band: two signals will close to each other at the lower band edge; the third will be close to upper band edge. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer (CDMA/WCDAM:40W &GSM/EDGE/TDMA:25W), is reached.

* Out of band plots show nearly identical noise floor readings for the frequency ranges below 1GHz.

**Test Result:** **Complies**

**Test Data:** Attached Plots

| | |
|---|---|
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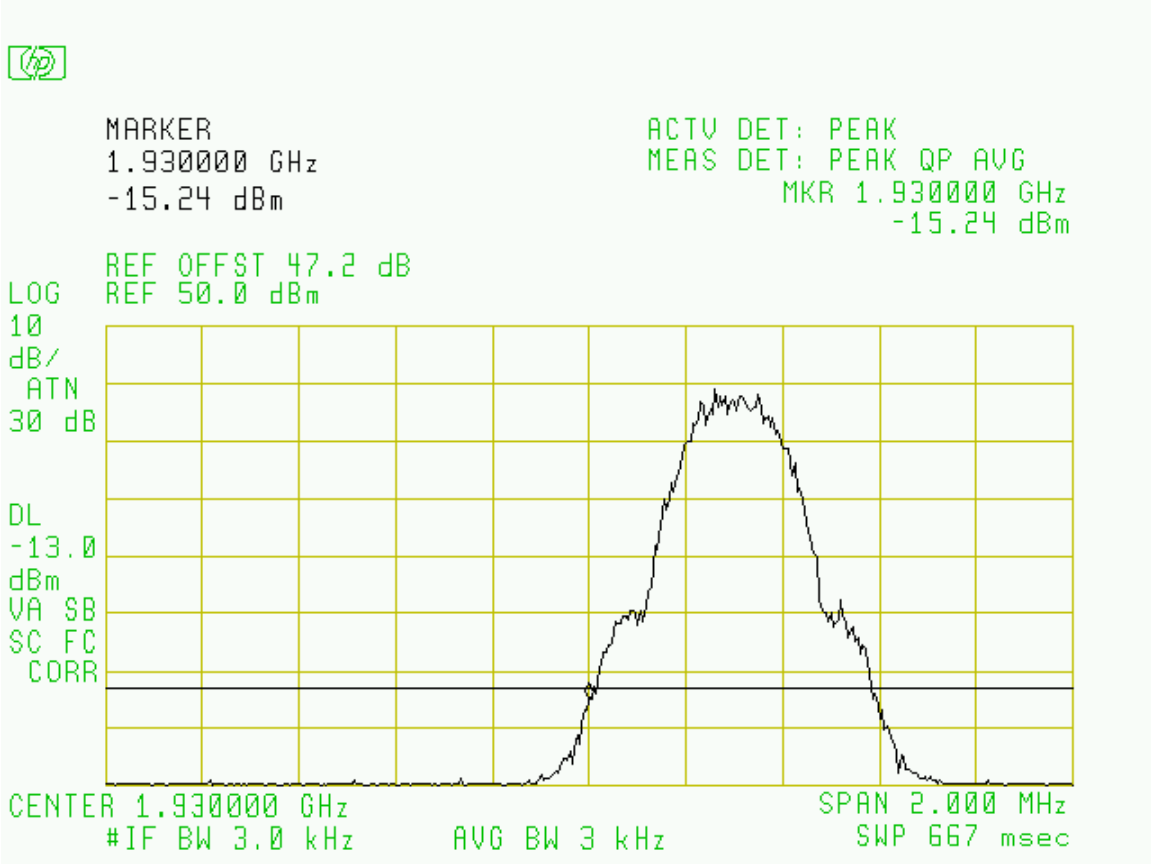
| **PARTS NO.:** | RF100576 |
| **Tested By:** | Edward Lee |
| **Temperature:** | 70˚F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / GSM Modulation** |
| **Plot Name:** | **Downlink, Low-Chn, Lower Bandedge** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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| **PARTS NO.:** | RF100576 |
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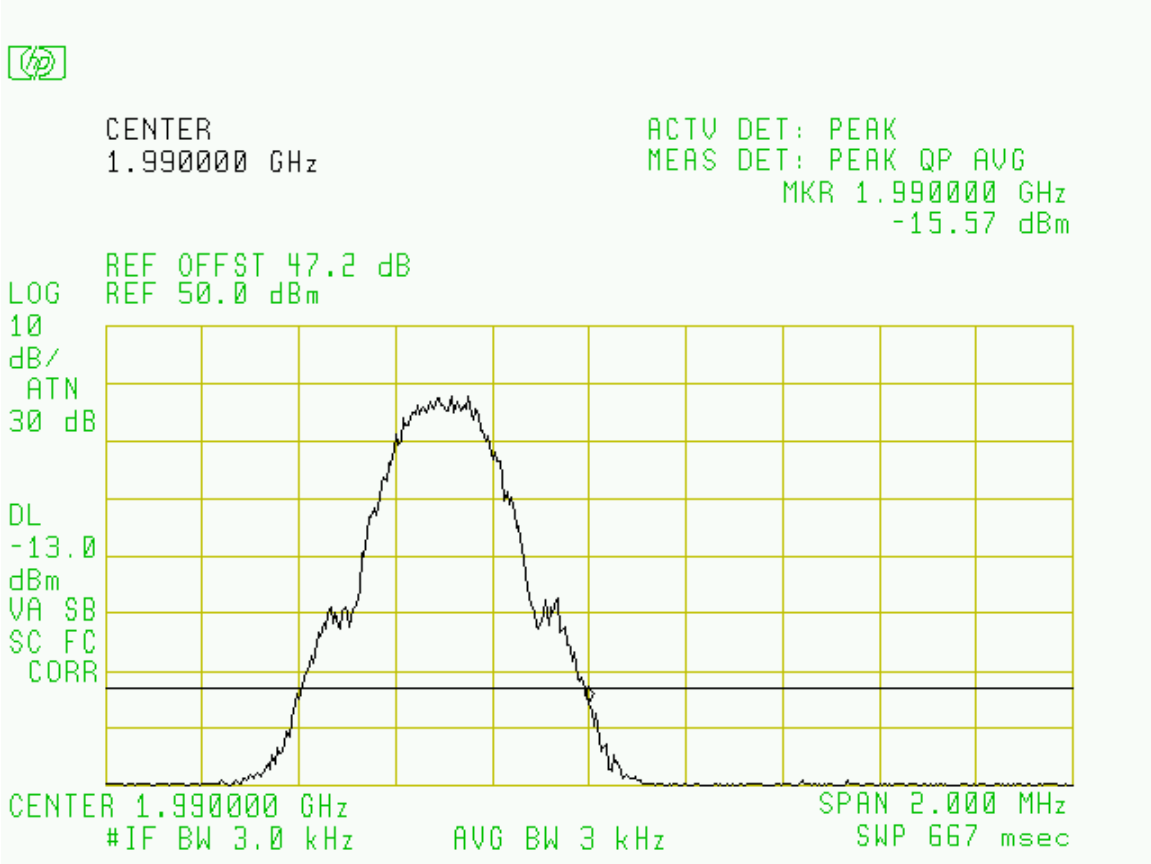
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / GSM Modulation** |
| **Plot Name:** | **Downlink, Hi-Chn, Upper Bandedge** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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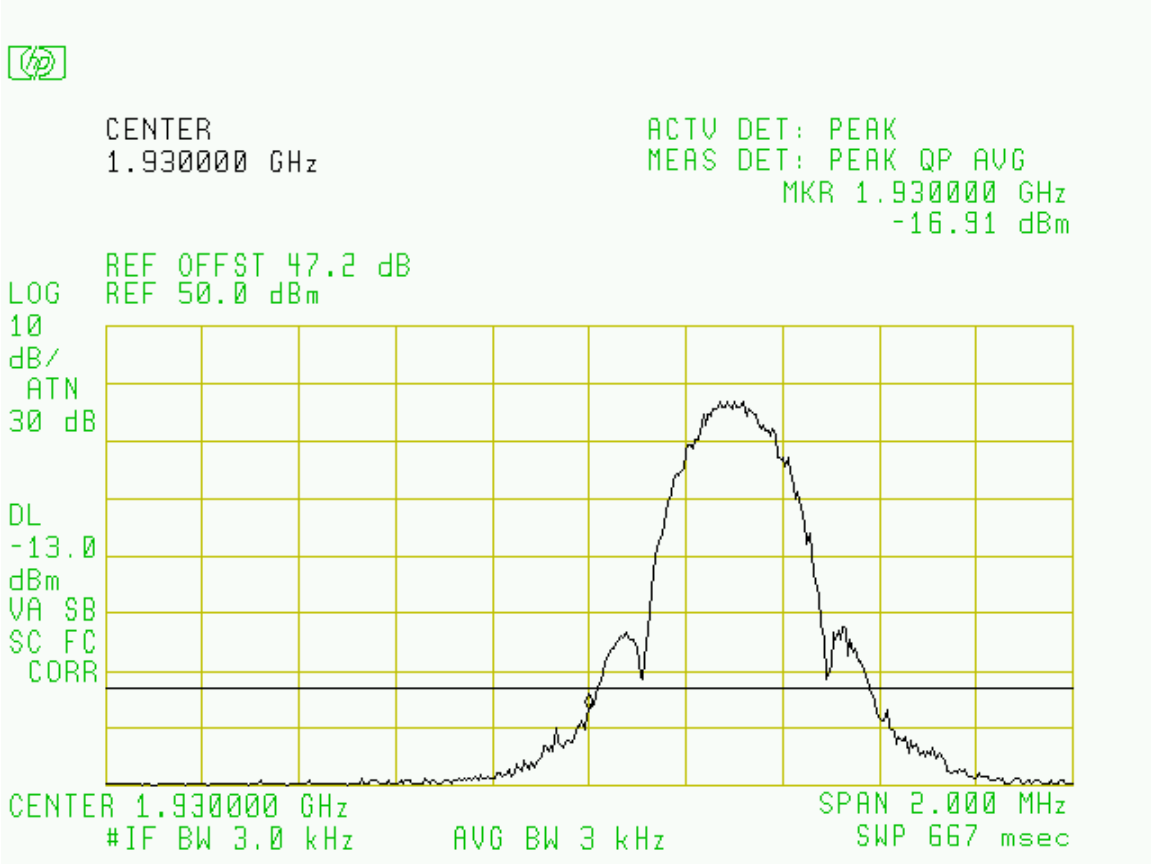
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / EDGE Modulation** |
| **Plot Name:** | **Downlink, Low-Chn, Lower Bandedge** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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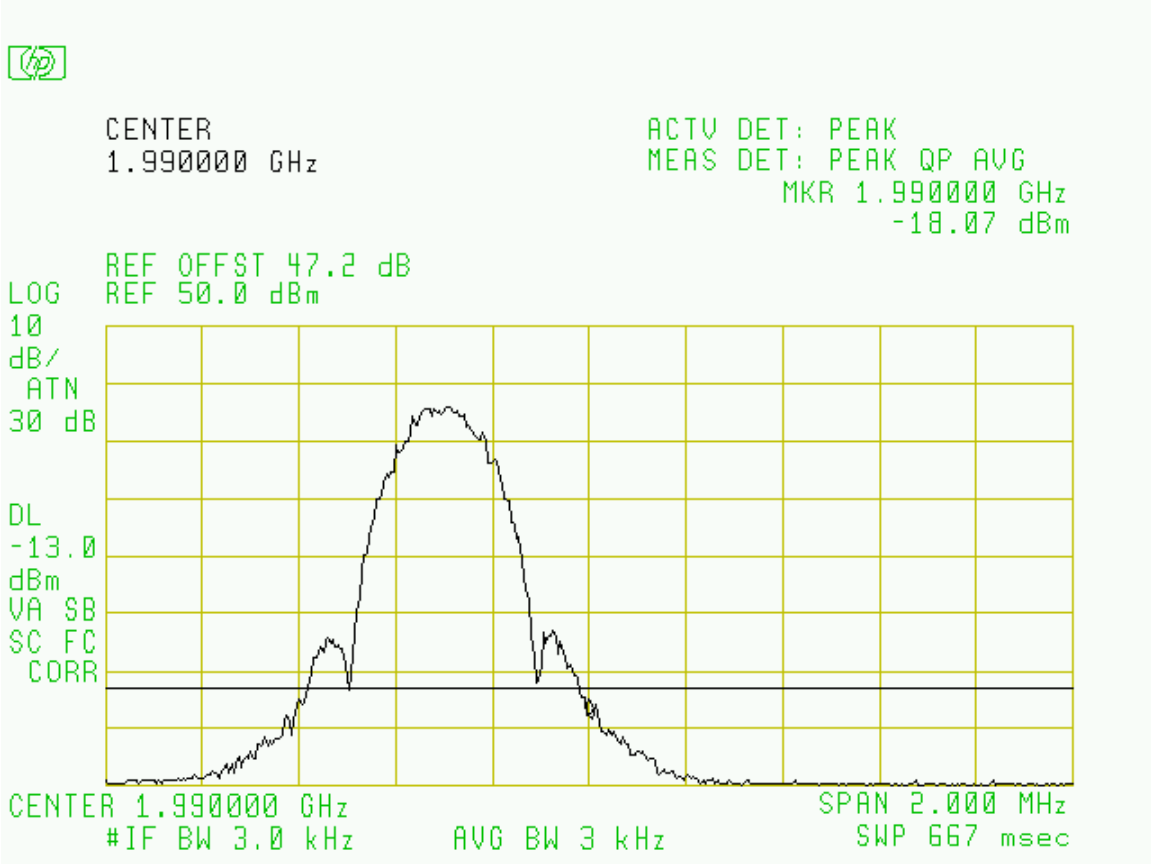
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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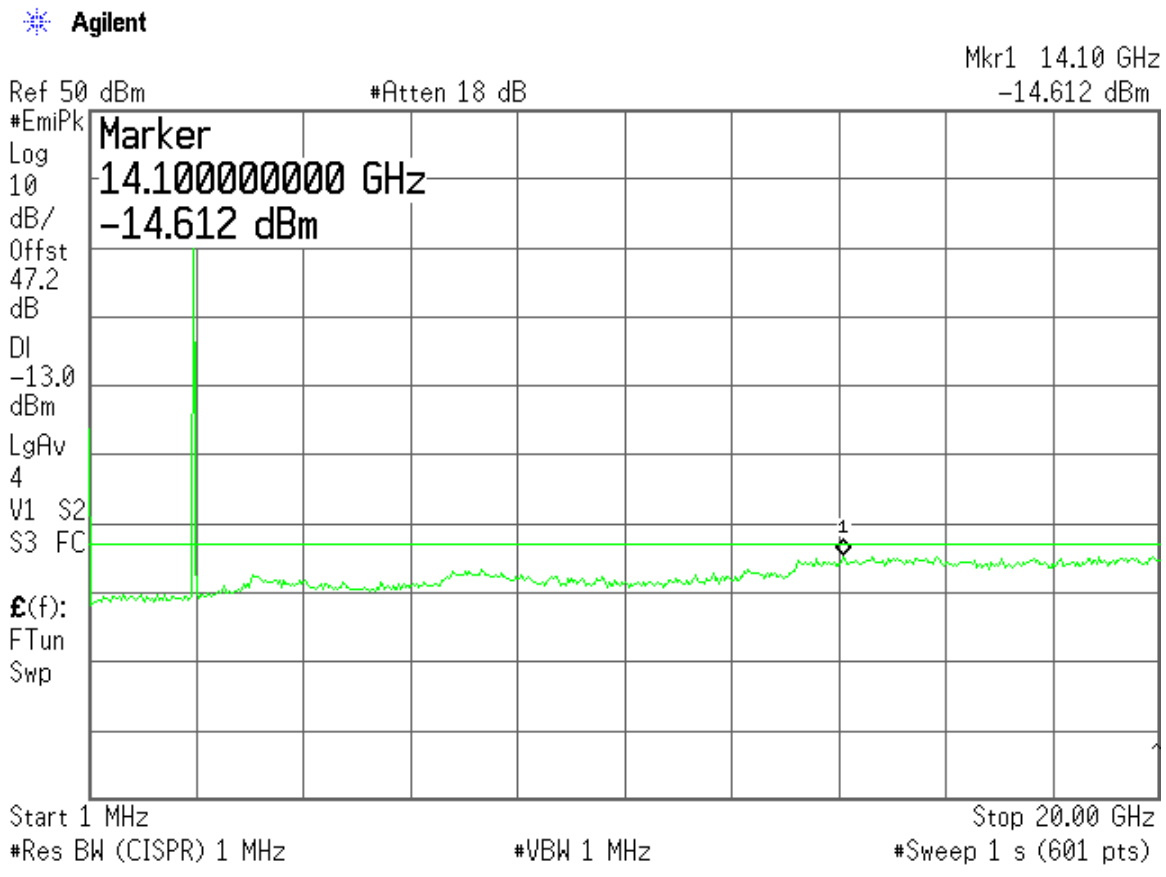
| **Plot Name:** | **Downlink, L-CH** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



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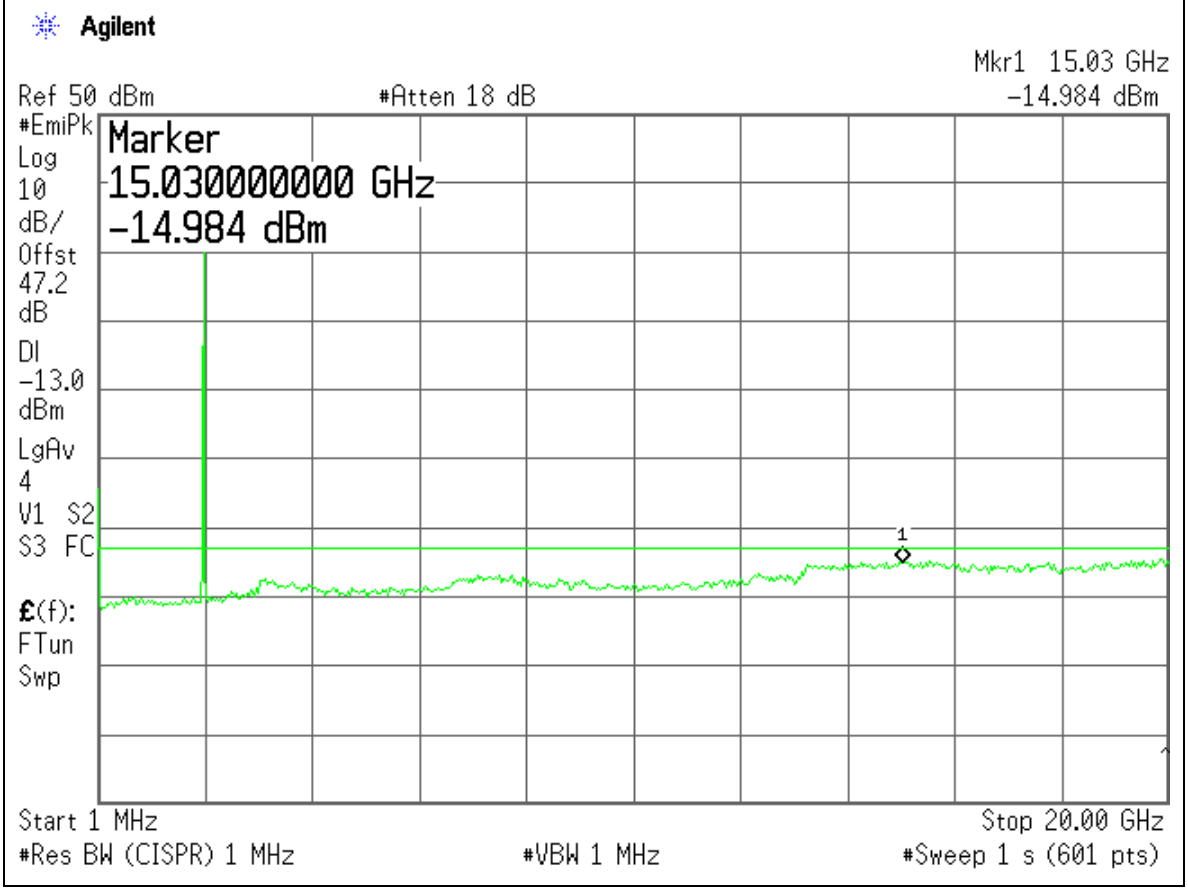
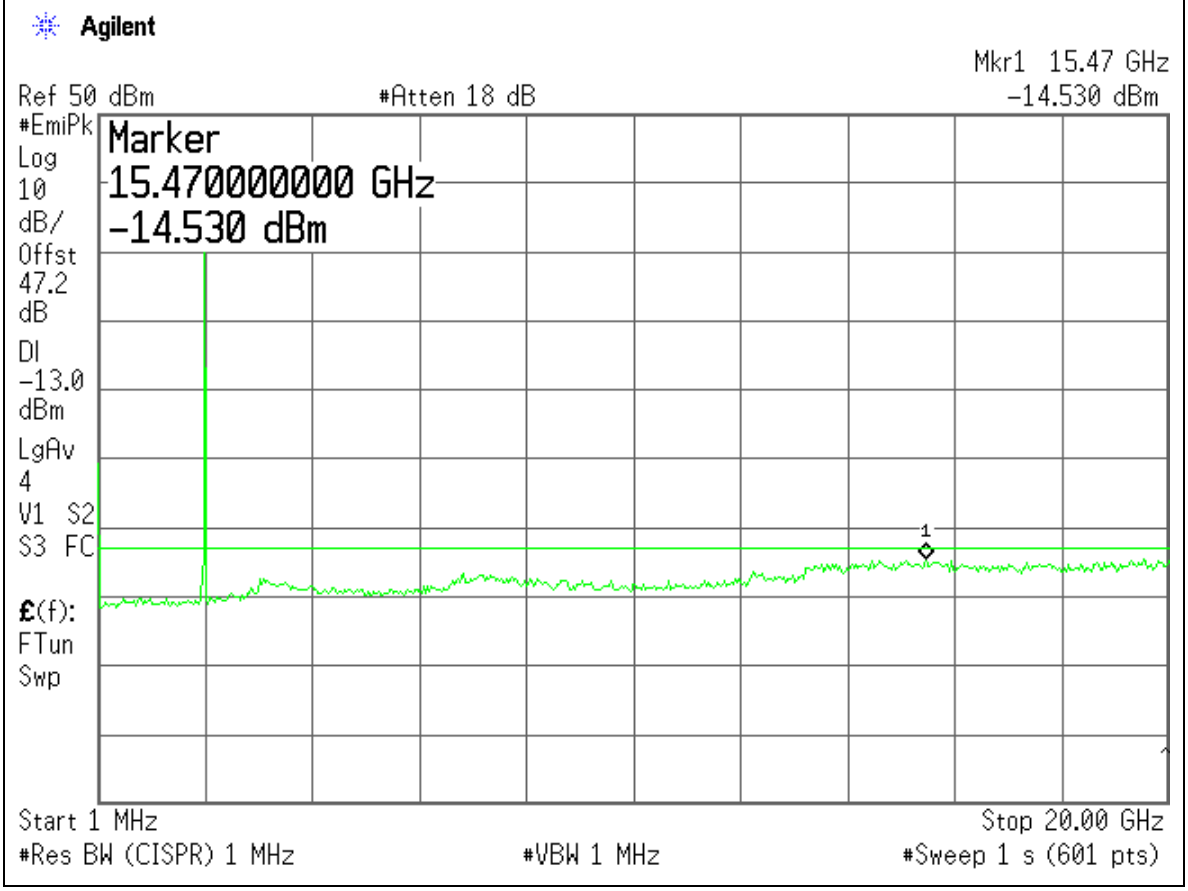
|---|---|
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / GSM Modulation** |
| **Plot Name:** | **Downlink, M-CH** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



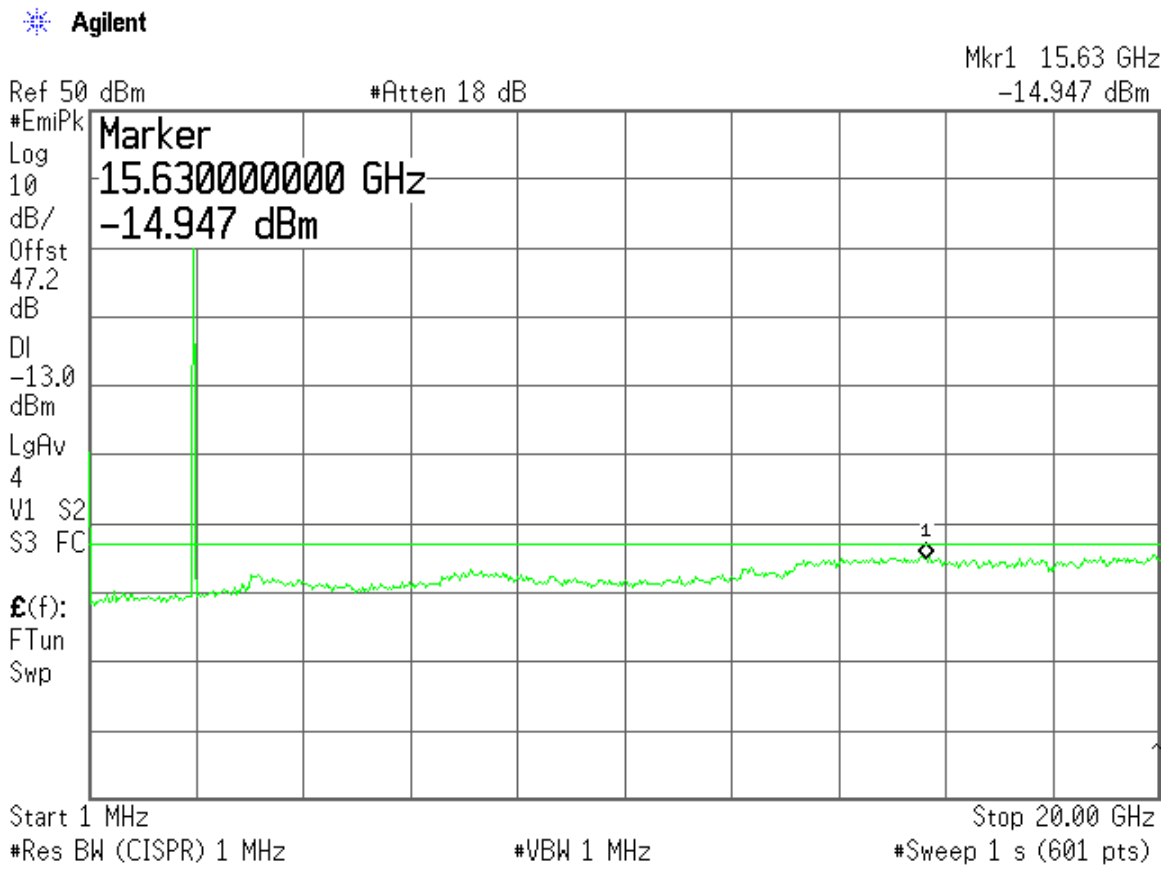
| | |
|---|---|
| **Project Number:** | 0048-080505-01 |
| **EUT:** | ANDREW High Efficiency Power Amplifier HEPA1900V3 |
| **PARTS NO.:** | RF100576 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / GSM Modulation** |
| **Plot Name:** | **Downlink, H-CH** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



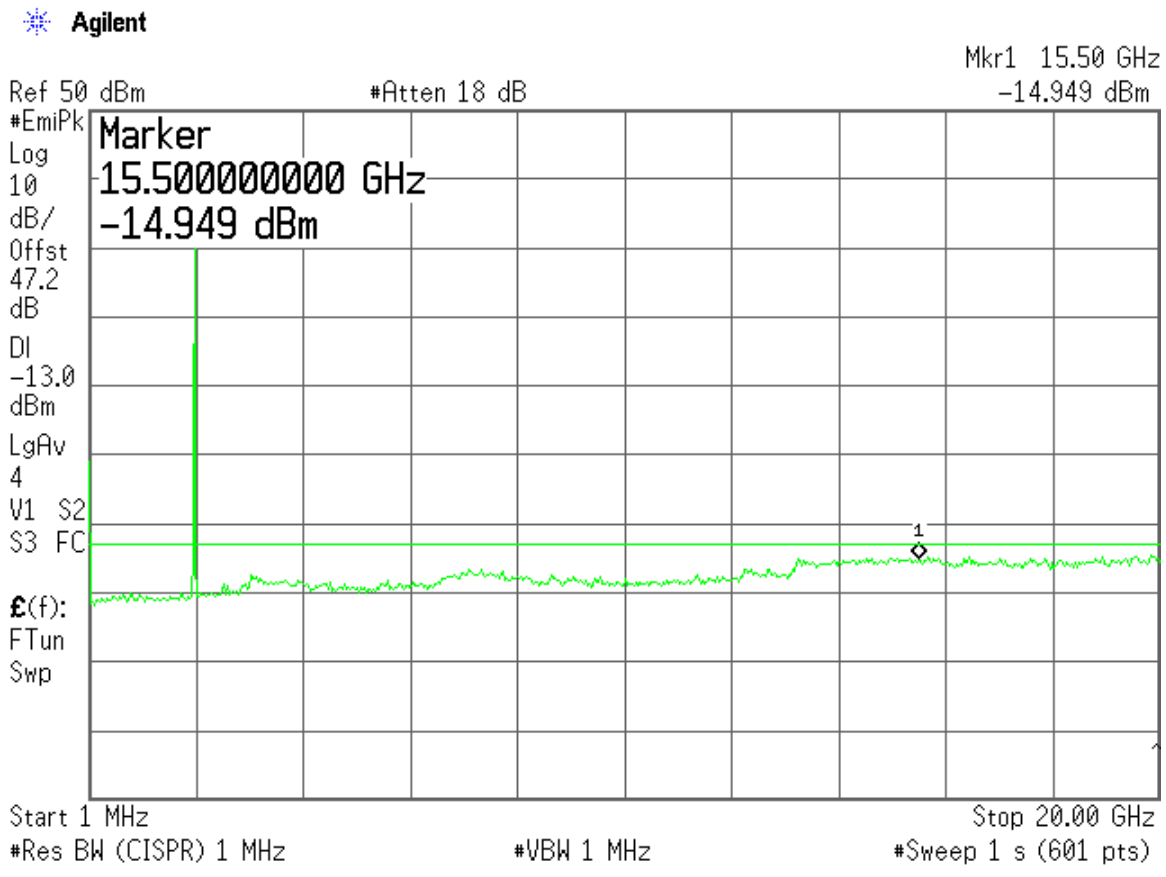
| | |
|---|---|
| **Project Number:** | 0048-080505-01 |
| **EUT:** | ANDREW High Efficiency Power Amplifier HEPA1900V3 |
| **PARTS NO.:** | RF100576 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / EDGE Modulation** |
| **Plot Name:** | **Downlink, L-CH** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



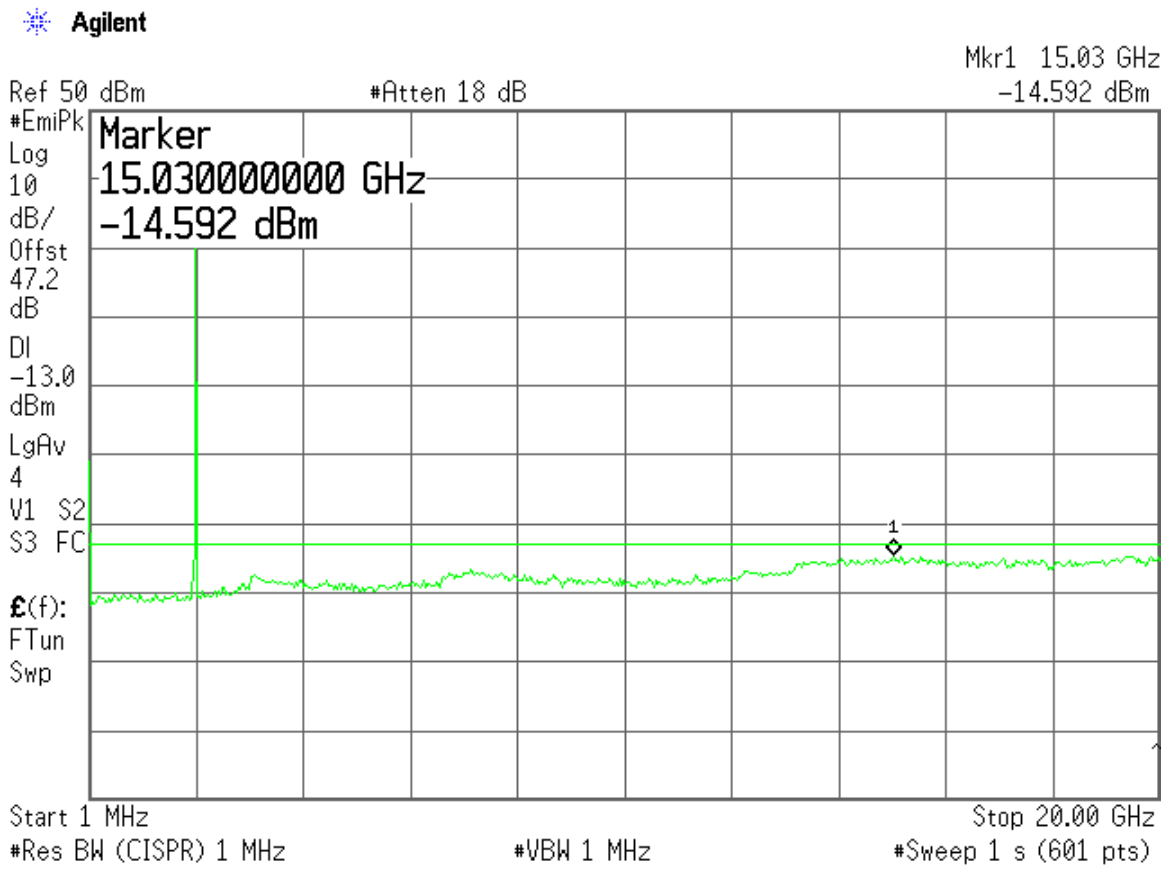
| | |
|---|---|
| **Project Number:** | 0048-080505-01 |
| **EUT:** | ANDREW High Efficiency Power Amplifier HEPA1900V3 |
| **PARTS NO.:** | RF100576 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / EDGE Modulation** |
| **Plot Name:** | **Downlink, M-CH** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



| | |
|---|---|
| **Project Number:** | 0048-080505-01 |
| **EUT:** | ANDREW High Efficiency Power Amplifier HEPA1900V3 |
| **PARTS NO.:** | RF100576 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Spurious Emissions at RF Output Port: PCS Bands / EDGE Modulation** |
| **Plot Name:** | **Downlink, H-CH** |
| **Configuration:** | Input: SG, Output Port: EUT RF OUTPUT |



## Section 6. Field Strength of Spurious

| Name of Test: | *Field Strength of Spurious* | Test Standard: | *22.917*<br>*24.238* |
|---|---|---|---|
| Tested By: | EDWARD LEE | Test Date: | 05/05/2008-05/16/2008 |

**Minimum Standard:** Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute power. Para. No. 24.238(a). The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instrction manual and/or alignment procedure, shall not less than 43+10 log (mean output power in watts) dBc below the mean power output outside a licensee's frequency block (-13dBm).

**Method of Measurement:** TIA/EIA-603-1992, Section 2.2.12
The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting ERP is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

Per FCC Requirements, the antenna substitution method can be replaced by using following calculation to yield the required limit criteria WHEN the max. level of measured spurious emissions is 30dB below the limit.

**Test Result:** **Complies**

**Test Data:** See Attached Table(s)

| Configuration | PCS |
|---|---|
| Band | Downlink |
| Channel | Low |

| Freq. (MHz) | H,V | SA Reading (dBuV) | SG Reading (dBm) | CL (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 3860.6 | V | 54.9 | -61 | 1.8 | 9.6 | -53.2 | -13 | -40.2 |
| 5790.9 | V | 57.0 | -62 | 2.4 | 10.8 | -53.6 | -13 | -40.6 |
| 7721.2 | V | 52.8 | -66 | 2.8 | 10.6 | -58.2 | -13 | -45.2 |
| 9651.5* | V | 43.5 | -76 | 3.1 | 10.9 | -68.2 | -13 | -55.2 |
| 11581.8* | V | 43.9 | -78 | 3.4 | 12.1 | -69.3 | -13 | -56.3 |
| 13512.1* | V | 44.5 | -78 | 3.9 | 12.1 | -69.8 | -13 | -56.8 |
| 15442.4* | V | 46.0 | -77 | 4.2 | 14.9 | -66.3 | -13 | -53.3 |
| 17372.7* | V | 47.5 | -72 | 4.5 | 10.6 | -65.9 | -13 | -52.9 |
| 19303.0* | V | 48.2 | -71 | 4.8 | 8 | -67.8 | -13 | -54.8 |
| 3860.6 | H | 57.2 | -58 | 1.8 | 9.6 | -50.2 | -13 | -37.2 |
| 5790.9 | H | 56.4 | -63 | 2.4 | 10.8 | -54.6 | -13 | -41.6 |
| 7721.2 | H | 56.1 | -63 | 2.8 | 10.6 | -55.2 | -13 | -42.2 |
| 9651.5* | H | 44.0 | -75 | 3.1 | 10.9 | -67.2 | -13 | -54.2 |

**NOTE:**
*** Measured noise floor**
**SA:** Spectrum Analyzer
**SG:** Signal Generator
**CL: SMA** cable loss (6ft)

**H=horizontal and V=vertical**
**EIRP =** SG reading - CL + Gain (dBi)
**Margin =** EIRP – Limit

| Configuration | PCS |
|---|---|
| Band | Downlink |
| Channel | Mid |

| Freq. (MHz) | H,V | SA Reading (dBuV) | SG Reading (dBm) | CL (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 3920 | V | 62.5 | -55 | 1.8 | 9.6 | -47.2 | -13 | -34.2 |
| 5880 | V | 49.3 | -68 | 2.4 | 10.8 | -59.6 | -13 | -46.6 |
| 7840 | V | 57.3 | -63 | 2.8 | 10.6 | -55.2 | -13 | -42.2 |
| 9800* | V | 43.5 | -76 | 3.1 | 10.9 | -68.2 | -13 | -55.2 |
| 11760* | V | 43.7 | -78 | 3.4 | 12.1 | -69.3 | -13 | -56.3 |
| 13720* | V | 44.3 | -78 | 3.9 | 12.1 | -69.8 | -13 | -56.8 |
| 15680* | V | 45.9 | -77 | 4.2 | 14.9 | -66.3 | -13 | -53.3 |
| 17640* | V | 47.7 | -72 | 4.5 | 10.6 | -65.9 | -13 | -52.9 |
| 19600* | V | 48.3 | -71 | 4.8 | 8 | -67.8 | -13 | -54.8 |
| 3920 | H | 65.0 | -52 | 1.8 | 9.6 | -44.2 | -13 | -31.2 |
| 5880 | H | 51.6 | -67 | 2.4 | 10.8 | -58.6 | -13 | -45.6 |
| 7840 | H | 54.4 | -66 | 2.8 | 10.6 | -58.2 | -13 | -45.2 |
| 9800* | H | 44.1 | -76 | 3.1 | 10.9 | -68.2 | -13 | -55.2 |

**NOTE:**
*** Measured noise floor**
**SA:** Spectrum Analyzer
**SG:** Signal Generator
**CL: SMA** cable loss (6ft)

**H=horizontal and V=vertical**
**EIRP =** SG reading - CL + Gain (dBi)
**Margin =** EIRP - Limit

| Configuration | PCS |
|---|---|
| Band | Downlink |
| Channel | High |

| Freq. (MHz) | H,V | SA Reading (dBuV) | SG Reading (dBm) | CL (dB) | Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 3979.4 | V | 67.5 | -51 | 1.8 | 9.7 | -43.1 | -13 | -30.1 |
| 5969.1 | V | 53.7 | -66 | 2.4 | 10.9 | -57.5 | -13 | -44.5 |
| 7958.8 | V | 58.2 | -61 | 2.8 | 10.2 | -53.6 | -13 | -40.6 |
| 9948.5* | V | 43.5 | -76 | 3.1 | 10.9 | -68.2 | -13 | -55.2 |
| 11938.2* | V | 43.8 | -78 | 3.4 | 12.0 | -69.4 | -13 | -56.4 |
| 13928.6* | V | 44.7 | -78 | 3.9 | 11.8 | -70.1 | -13 | -57.1 |
| 15917.6* | V | 46.2 | -77 | 4.2 | 15.5 | -65.7 | -13 | -52.7 |
| 17907.3* | V | 47.3 | -72 | 4.5 | 9.8 | -66.7 | -13 | -53.7 |
| 19897.0* | V | 47.9 | -71 | 4.8 | 7.8 | -68 | -13 | -55 |
| 3979.4 | H | 60.8 | -58 | 1.8 | 9.7 | -50.1 | -13 | -37.1 |
| 5969.1 | H | 55.3 | -65 | 2.4 | 10.9 | -56.5 | -13 | -43.5 |
| 7958.8 | H | 54.5 | -65 | 2.8 | 10.2 | -57.6 | -13 | -44.6 |
| 9948.5* | H | 44.1 | -76 | 3.1 | 10.9 | -68.2 | -13 | -55.2 |

**NOTE:**
*** Measured noise floor**
**SA:** Spectrum Analyzer
**SG:** Signal Generator
**CL: SMA** cable loss (6ft)

**H=horizontal and V=vertical**
**EIRP =** SG reading - CL + Gain (dBi)
**Margin =** EIRP - Limit

## Section 7. Frequency Stability

| Name of Test: | *Frequency Stability* | Test Standard: | *2.1055 22.355&24.235* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 05/05/2008-05/16/2008 |

**Minimum Standard:** Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

TABLE C–1.—FREQUENCY TOLERANCE FOR TRANSMITTERS IN THE PUBLIC MOBILE SERVICES

| Frequency range (MHz) | Base, fixed (ppm) | Mobile ≤3 watts (ppm) | Mobile <=3 watts (ppm) |
|---|---|---|---|
| 25 to 50 ..... | 20.0 | 20.0 | 50.0 |
| 50 to 450 ..... | 5.0 | 5.0 | 50.0 |
| 450 to 512 ..... | 2.5 | 5.0 | 5.0 |
| 821 to 896 ..... | 1.5 | 2.5 | 2.5 |
| 928 to 929 ..... | 5.0 | n/a | n/a |
| 929 to 960 ..... | 1.5 | n/a | n/a |
| 2110 to 2220 ..... | 10.0 | n/a | n/a |

Para No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**Method of Measurement:** Frequency Stability With Voltage Variation:
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +25 degrees Celsius for at least 15 minutes. Set SA resolution bandwidth low enough (30Hz) to obtain the desired frequency resolution. (Using frequency counter method: The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10MHz ref, in of the signal generator). With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

**Test Result:** **Complies**

**Test Data:** See Attached Table(s)

Not Applicable

## Section 8. Test Equipment List

| Manufacture | Model | Serial No. | Description | Cal Due dd/mm/yy |
|---|---|---|---|---|
| HP | HP8546A | 3448A00290 | EMI Receiver | 15/09/08 |
| HP | E4432B | US38220355 | 250K-3GHz Signal Generator | 15/07/08 |
| EMCO | 3104C | 9307-4396 | 20-300MHz Biconical Antenna | 15/09/08 |
| EMCO | 3146 | 9008-2860 | 200-1000MHz Log-Periodic Antenna | 09/02/09 |
| Fischer Custom | LIPARTS NO.-2 | 900-4-0008 | Line Impedance Stabilization Networks | 15/09/08 |
| Fischer Custom | LIPARTS NO.-2 | 900-4-0009 | Line Impedance Stabilization Networks | 23/08/08 |
| EMCO | 6502 | 2665 | 10KHz-30MHz Active Loop Antenna | 27/02/09 |
| EMCO | 3115 | 4945 | Double Ridge Guide Horn Antenna | 13/09/08 |
| R&S | ESPI | 100018 | EMI Receiver | 16/07/08 |
| HP | 8569B | 2607A02802 | 1GHz-22GHz Spectrum Analyzer | 10/02/09 |
| Delta Design | 5900C | 0-67-26 | Temperature Chamber | 24/03/09 |
| HP | E8254A | US42110367 | Signal Generator | 23/03/09 |
| Electro-Metrics | RGA-15 | 8-95 | Double Ridge Guide Horn Antenna | 10/02/09 |
| EMCO | 3116 | 4943 | Double Ridge Guide Horn Antenna | 11/01/09 |
| Scientific-Atlanta | 12A-18 | 441 | Wave Guide Horn Antenna | 04/08/08 |
| HP | 4419A | US37292112 | RF Power Meter w/ Sensor Probe | 20/07/08 |
| Chamber | GD-32-33 | LN2 | Temperature Chamber | 28/07/08 |
| HP | 6032A | 3323A-09526 | System Power Supply | 01/07/08 |
| Agilent | E4438C | US41460731 | ESG Vector Signal Generator | 01/07/08 |
| Agilent | E4438C | US41460771 | ESG Vector Signal Generator | 01/07/08 |
| Agilent | E4438C | US41460400 | ESG Vector Signal Generator | 01/07/08 |
| Agilent | E4440A | US40420700 | 3Hz-26.5GHz Spectrum Analyzer | 12/05/09 |
| Lorch Microwave | 5NF-800/1000-S | AC3 | Notch Filter | |
| Lorch Microwave | 5NF-1800/2200-S | AE10 | Notch Filter | |
| RES-NET | RFA500NFF30 | 0108 | 30dB in-line Power Attenuator | |