# FCC
# RF Test Report

**Product Name: GSM Controller**

**Model Number: AMC000-008**

**Report No: 1411FR13**

**FCC ID：WN7AMC000-08**

Issue by

**A Test Lab Techno Corp.**

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Taiwan Accreditation Foundation accreditation number: 1330

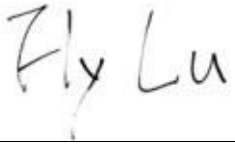
## Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:
China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579. The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 446246 806614 994606(semi anechoic chamber).
The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (VCCI), and the registration number are R-1974(open area test site), R-1966(semi anechoic chamber), C-2117(mains ports conducted interference measurement) and T-180(telecommunication ports conducted interference measurement).
The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A-1, 11177A-2.
TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

| | |
|---|---|
| **Applicant:** | Americhip Inc. |
| **Address:** | 19032 South Vermont Avenue LA CA90248 USA |

| | |
|---|---|
| **Date of Receipt Sample:** | 2014-12-02 |
| **Start Date of Test:** | 2014-12-17 |
| **End Date of Test:** | 2014-12-31 |
| **Issue Date:** | 2015-01-05 |

**Test Result:** Pass

| | | | | | |
|---|---|---|---|---|---|
| Approved By | : |  | Reviewed By | : |  |
| (Manager) | | (Murphy Wang) | (Testing Engineer) | | (Fly Lu) |

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 00 | 05 Jan, 2015 | Initial Issue | |
| | | | |
| | | | |

**CONTENT**

## 1 General Information

### 1.1 Applied Standard

Applied Rules: 47CFRFCC Part02:2013
47CFRFCC Part22:2013
47CFR FCC Part24:2013

Test Method: FCCKDB971168D01 Power Meas License Digital Systems
TIA/EIA 603D: 2010

### 1.2 Test Location

TestLocation1: Shenzhen Academy of Metrology and quality Inspection
Address: No.4 Tongfa Road, Xili Town, Nanshan District, Shenzhen, Guangdong, China

### 1.3 Test Environment Condition

Ambient Temperature: 19.5 to 25°C
Ambient Relative Humidity: 40 to 55%
Atmospheric Pressure: Not applicable

## 2 Test Summary

### 2.1 Cellular Band (824-849MHz paired with 869-894MHz)

| Test Item | FCC Rule No. | Requirements | Verdict |
|---|---|---|---|
| Effective(Isotropic) Radiated Power Output Data | §2.1046, §22.913 | FCC: ERP ≤ 7W. | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §22.917 | ≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917 | FCC: ≤ -13dBm/100kHz, from 9kHz to 10th harmonics but outside authorized operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917 | FCC: ≤ -13dBm/100kHz. | Pass |
| Frequency Stability | §2.1055, §22.355 | ≤ ±2.5ppm. | Pass |
| NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”. | | | |

### 2.2 PCS Band (1850-1915MHz paired with 1930-1995MHz)

| Test Item | FCC Rule No. | Requirements | Verdict |
|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §24.232 | EIRP ≤ 2W | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Pass |
| Band Edges Compliance | §2.1051, §24.238 | ≤ -13dBm/1%*EBW, In 1MHz bands immediately outside and adjacent to The frequency block. | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238 | ≤-13dBm/1MHz, from 9kHz to10th harmonics but outside authorized Operating frequency ranges. | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238 | ≤ -13dBm/1MHz. | Pass |
| Frequency Stability | §2.1055, §24.235 | FCC: within authorized frequency block. | Pass |
| NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”. | | | |

# 3 Description of the Equipment under Test (EUT)

## 3.1 General Description

AMC000-008 is subscriber equipment in the GSM system. The GSM frequency band includes GSM850 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, GSM protocol processing, voice. Externally it provides micro SD card interface and SIM card interface.

## 3.2 EUT Identity

| IMEI Number | |
|---|---|
| SIM 1 | 864244029749362 |

## 3.3 Technical Specification

| Characteristics | Description | |
|---|---|---|
| Radio System Type | ☒GSM | |
| Supported Frequency Range | GSM850 | Transmission(TX): 824 to 849MHz |
| | | Receiving(RX): 869 to 894MHz |
| | GSM1900 | Transmission(TX): 1850 to 1910MHz |
| | | Receiving(RX): 1930 to 1990MHz |
| TX and RX Antenna Ports | TX& RX port: | 1 |
| | TX-only port: | 0 |
| | RX-only port: | 0 |
| Supported Channel Bandwidth Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.) | GSM system: | 200 kHz |
| | GSM850: | 245KGXW |
| | GSM1900: | 248KGXW |

# 4 General Test Conditions/Configurations

## 4.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

| Test Mode | Test Modes Description |
|---|---|
| GSM/TM1 | GSM system, GSM,GMSK modulation |

## 4.2 Test Environment

| Environment Parameter | Selected Values During Tests | |
|---|---|---|
| Relative Humidity | Ambient | |
| Temperature | TN | Ambient |
| Voltage | VL | 3.5V |
| | VN | 3.7V |
| | VH | 4.2V |

NOTE: VL=lower extreme test voltage VN=nominal voltage
VH=upper extreme test voltage TN=normal temperature

## 4.3 Test Frequency

| Test Mode | TX/RX | RF Channel | | |
|---|---|---|---|---|
| | | Low(L) | Middle (M) | High (H) |
| GSM850 | TX | Channel 128 | Channel 190 | Channel 251 |
| | | 824.2 MHz | 836.6 MHz | 848.8 MHz |
| | RX | Channel 128 | Channel 190 | Channel 251 |
| | | 869.2 MHz | 881.6 MHz | 893.8 MHz |
| Test Mode | TX/RX | RF Channel | | |
| | | Low(L) | Middle (M) | High (H) |
| GSM1900 | TX | Channel 512 | Channel 661 | Channel 810 |
| | | 1850.2 MHz | 1880.0 MHz | 1909.8 MHz |
| | RX | Channel 512 | Channel 661 | Channel 810 |
| | | 1930.2 MHz | 1960.0 MHz | 1989.8 MHz |

## 4.4 Main Test Instruments

| Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission & Frequency Stability | | | | | |
|---|---|---|---|---|---|
| Equipment Name | Manufacturer | Model | Serial Number | Cal Date | Cal Period |
| Universal Radio Communication Tester | R & S | CMU200 | 109369 | 08/07/2014 | 1 year |
| MXA Signal Analyzer | Agilent | N9020A | MY53420615 | 05/12/2014 | 1 year |
| 2Way Divider | WOKEN | N/A | 0120A02056002D | 03/19/2014 | 2 year |

| Output Power (Radiated) & Radiated Spurious Emission | | | | | |
|---|---|---|---|---|---|
| Equipment Name | Manufacturer | Model | Serial Number | Cal Date | Cal Period |
| Universal Radio Communication Tester | R & S | CMU200 | SB8501/11 | 01/20/2014 | 1 year |
| EMI Test Receiver | R & S | ESU40 | SB8501/09 | 03/16/2014 | 1 year |
| Bilog Antenna | Schwarzbeck | VULB9163 | SB8501/05 | 01/20/2014 | 1 year |
| Bilog Antenna | Schwarzbeck | VULB9163 | SB8501/04 | 01/20/2014 | 1 year |
| Horn Antenna | R&S | HF906 | SB3435 | 01/20/2014 | 1 year |
| Horn Antenna | R&S | HF906 | SB3436 | 01/20/2014 | 1 year |
| Horn Antenna | AR | AT4560 | SB5392/02 | 01/20/2014 | 1 year |
| Amplifier | R&S | Amplifier(1-18GHz) | SB3435/01 | 03/16/2014 | 1 year |
| Amplifier | R&S | Amplifier(18-40GHz) | SB3435/02 | 03/16/2014 | 1 year |
| Test Software | R&S | EMC32 | N/A | N/A | N/A |
| Signal Generator | Rohde&Schwarz | SMF100A | SB3438 | 03/16/2014 | 1 year |
| Loop Antenna | Schwarzbeck | FMZB1516 | SB3345 | 01/22/2014 | 1 year |

### 4.5 Measurement Uncertainty

For a 95% confidence level (k = 2), the measurement expanded uncertainties for defined systems, in accordance with their commendations of ISO 17025 as following:

| Test Item | | Extended Uncertainty |
|---|---|---|
| Transmit Output Power Data | Power [dBm] | U = 1.2dB |
| Bandwidth | Magnitude[%] | U = 0.2% |
| Band Edge Compliance | Disturbance Power[dBm] | U = 1.2dB |
| Spurious Emissions, Conducted | Disturbance Power[dBm] | U = 1.2dB |
| Field Strength of Spurious Radiation | ERP [dBm] | For 3mChamber:<br>U = 4.6dB (30MHzto1GHz)<br>U = 3.0dB (above1GHz)<br>For10mChamber:<br>U = 4.6dB (30MHzto1GHz)<br>U = 3.0dB (above1GHz) |
| Frequency Stability | Frequency Accuracy [ppm] | U = 0.21ppm |

# 5 Test Result

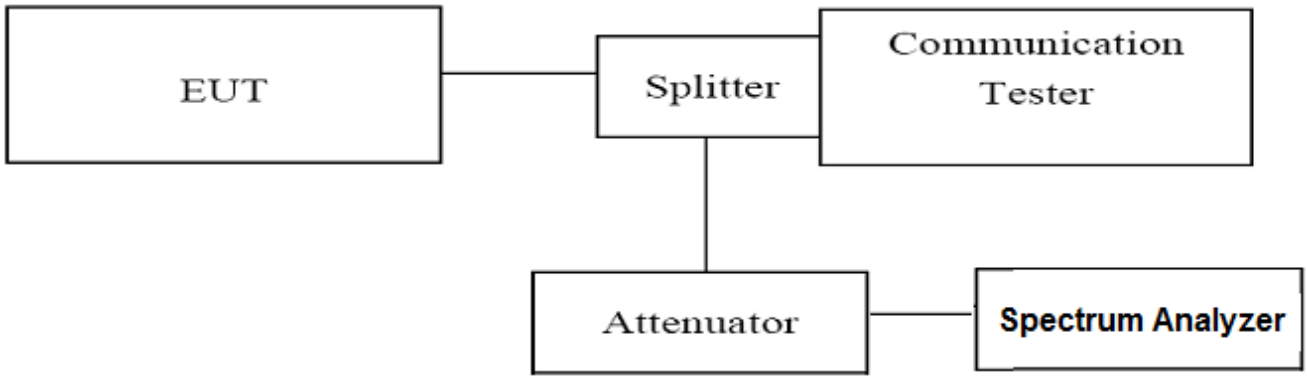
## 5.1 OUTPUT POWER

**TEST APPLICABLE**

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

### 5.1.1. Conducted Output Power

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The EUT was set up for the max output power with pseudo random data modulation.
2. The power was measured with Agilent Spectrum Analyzer N9020A (peak)
3. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

**TEST CONDITION**

| RBW | VBW | Sweep Time | Span |
|---|---|---|---|
| 1MHz | 3MHz | 300ms | 10MHz |

| GSM850 | | | | |
|---|---|---|---|---|
| **Function** | **Power step** | **Nominal Peak output power (dBm)** | **Power &Multislot class** | **Operation class** |
| GSM | 5 | 33dBm(2W) | 4 | / |

| PCS1900 | | | | |
|---|---|---|---|---|
| **Function** | **Power step** | **Nominal Peak output power (dBm)** | **Power &Multislot class** | **Operation class** |
| GSM | 0 | 30dBm(1W) | 1 | / |

**TEST RESULTS**

| GSM/TM1/GSM850(GMSK) | | |
|---|---|---|
| **Frequency (MHz)** | **Power Step** | **Output Power (dBm)** |
| 824.20 | 5 | 32.38 |
| 836.60 | 5 | 32.21 |
| 848.80 | 5 | **32.51** |

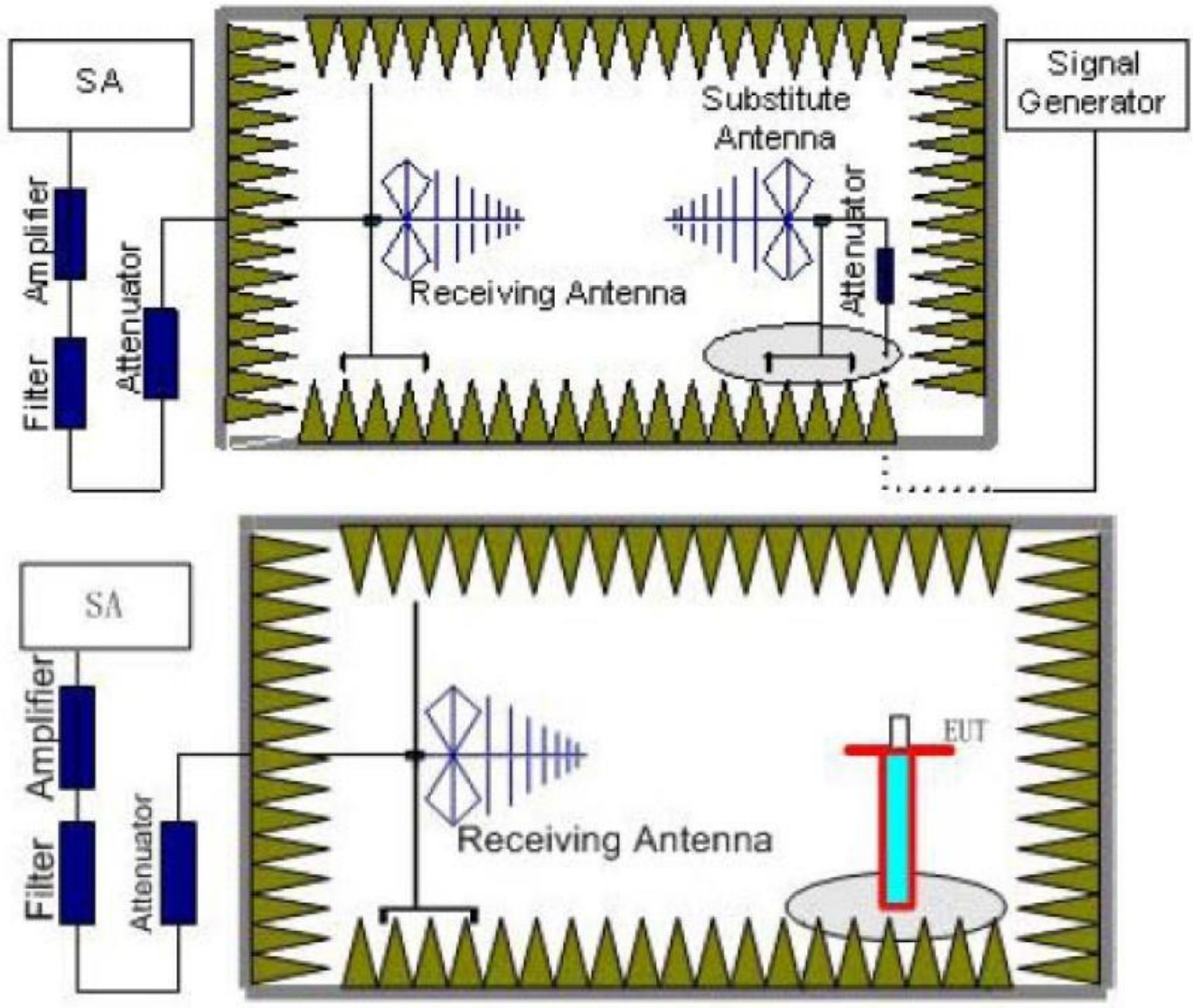
| GSM/TM1/PCS1900(GMSK) | | |
|---|---|---|
| **Frequency (MHz)** | **Power Step** | **Output Power (dBm)** |
| 1850.20 | 0 | 28.89 |
| 1880.00 | 0 | 28.98 |
| 1909.80 | 0 | **29.99** |

### 5.1.2. Radiated Output Power

**TEST DESCRIPTION**

This is the test for the maximum radiated power from the EUT.
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 22.913(a) specifies" The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

**TEST CONFIGURATION**



**TEST PROCEDURE**

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as ($P_r$).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ($P_{Mea}$) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss ($P_{cl}$), the Substitution Antenna Gain ($G_a$) and the Amplifier Gain ($P_{Ag}$) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) =$P_{Mea}$- $P_{Ag}$ - $P_{cl}$ + $G_a$
   We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; the measurement results are amend as described below:
   Power (EIRP) =$P_{Mea}$- $P_{cl}$ + $G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

**TEST LIMIT**

According to 22.913(a) and 24.232(c), the ERP should be not exceeding following table limits:

| GSM850(GPRS850,EDGE850) | | |
|---|---|---|
| **Function** | **Power Step** | **Burst Peak ERP (dBm)** |
| GSM | 5 | ≤38.45dBm (7W) |
| GPRS | 3 | ≤38.45dBm (7W) |

| PCS1900(GPRS1900,EDGE1900) | | |
|---|---|---|
| **Function** | **Power Step** | **Burst Peak EIRP (dBm)** |
| GSM | 0 | ≤33dBm (2W) |
| GPRS | 3 | ≤33dBm (2W) |

**TEST RESULTS**

| GSM/TM1/GSM850 | | | | | | |
|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **$P_{Mea}$ (dBm)** | **$P_{cl}$ (dB)** | **$G_a$ Antenna Gain (dB)** | **Correction (dB)** | **ERP (dBm)** | **Polarization** |
| 824.20 | 29.21 | 1.50 | 5.28 | 2.15 | 30.84 | H |
| 836.60 | 28.71 | 1.55 | 5.28 | 2.15 | 30.29 | H |
| 848.80 | 29.81 | 1.52 | 5.28 | 2.15 | **31.42** | H |
| 824.20 | 27.32 | 1.50 | 5.28 | 2.15 | 28.95 | V |
| 836.60 | 26.89 | 1.55 | 5.28 | 2.15 | 28.47 | V |
| 848.80 | 27.45 | 1.52 | 5.28 | 2.15 | 29.06 | V |

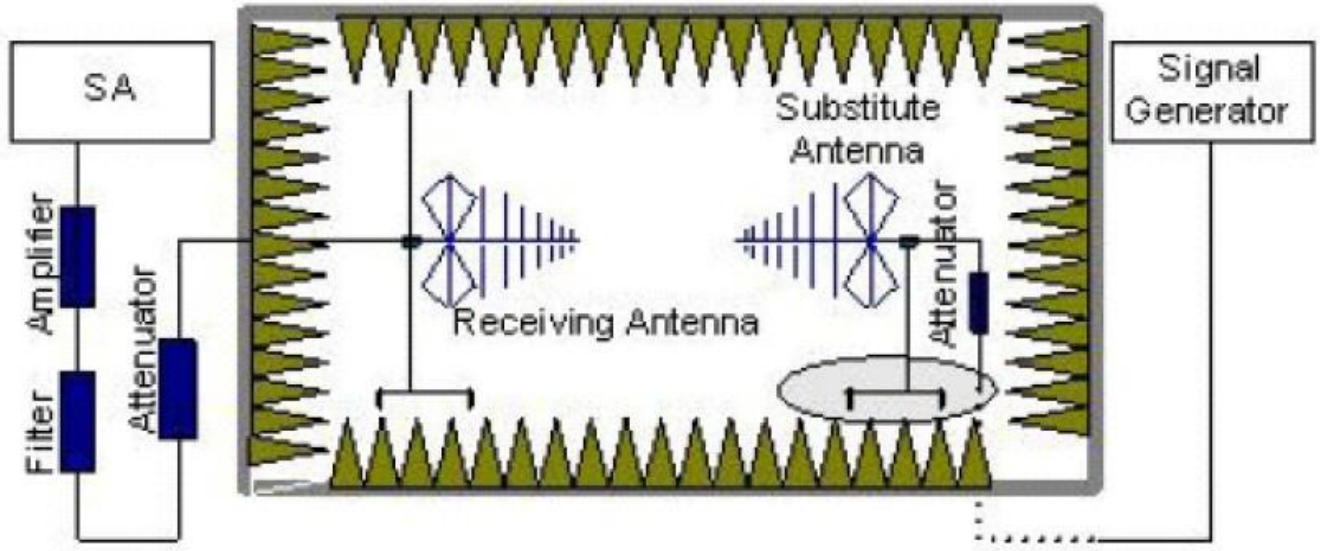
| GSM/TM1/PCS1900 | | | | | | |
|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **$P_{Mea}$ (dBm)** | **$P_{cl}$ (dB)** | **$G_a$ Antenna Gain (dB)** | **Correction (dB)** | **EIRP (dBm)** | **Polarization** |
| 1850.20 | 23.54 | 2.92 | 8.92 | 2.15 | 27.39 | H |
| 1880.00 | 23.47 | 2.79 | 8.92 | 2.15 | 27.45 | H |
| 1909.80 | 23.75 | 2.84 | 8.95 | 2.15 | **27.71** | H |
| 1850.20 | 22.69 | 2.92 | 8.92 | 2.15 | 26.54 | V |
| 1880.00 | 22.61 | 2.79 | 8.92 | 2.15 | 26.59 | V |
| 1909.80 | 22.87 | 2.84 | 8.95 | 2.15 | 26.83 | V |

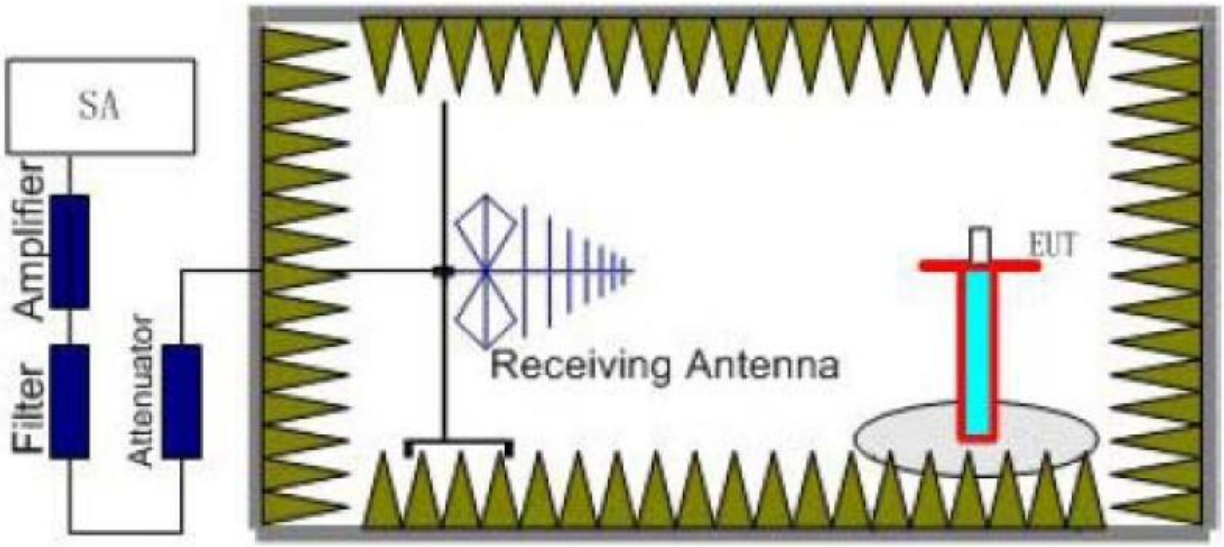
## 5.2 Radiated Spurious Emission

**TEST APPLICABLE**

According to the TIA/EIA 603D:2010 test method, The Receiver or Spectrum was scanned from 9 KHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as ($P_r$).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ($P_{Mea}$) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss ($P_{cl}$), the Substitution Antenna Gain ($G_a$) and the Amplifier Gain ($P_{Ag}$) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP)=$P_{Mea}$- $P_{Ag}$ - $P_{cl}$ + $G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

| Working Frequency | Subrange (GHz) | RBW | VBW | Sweep time (s) |
|---|---|---|---|---|
| TM1/GSM 850 | 0.00009~0.15 | 1KHz | 3KHz | 30 |
| | 0.00015~0.03 | 10KHz | 30KHz | 10 |
| | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1~2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~10 | 1 MHz | 3 MHz | 3 |
| TM1/GSM 1900 | 0.00009~0.15 | 1KHz | 3KHz | 30 |
| | 0.00015~0.03 | 10KHz | 30KHz | 10 |
| | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1~2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~11 | 1 MHz | 3 MHz | 3 |
| | 11~14 | 1 MHz | 3 MHz | 3 |
| | 14~18 | 1 MHz | 3 MHz | 3 |
| | 18~20 | 1 MHz | 3 MHz | 2 |

**TEST LIMITS**

According to 24.238 and 22.917 specify that 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.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

| Frequency | Channel | Frequency Range | Verdict |
|---|---|---|---|
| TM1/GSM 850 | Low | 9KHz-10GHz | PASS |
| | Middle | 9KHz -10GHz | PASS |
| | High | 9KHz -10GHz | PASS |
| TM1/GSM 1900 | Low | 9KHz -20GHz | PASS |
| | Middle | 9KHz -20GHz | PASS |
| | High | 9KHz -20GHz | PASS |

| GSM/TM1/GSM850 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Number: 128 | | | | Test Frequency: 824.20 MHz | | | |
| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit (dBm) | Polarization |
| 1648.40 | -28.36 | 2.40 | 6.77 | 2.15 | -26.14 | -13.00 | H |
| 2472.60 | --- | | | 2.15 | --- | -13.00 | H |
| 1648.40 | -29.74 | 2.40 | 6.77 | 2.15 | -27.52 | -13.00 | V |
| 2472.60 | --- | | | 2.15 | --- | -13.00 | V |

| GSM/TM1/GSM850 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Number: 190 | | | | Test Frequency: 836.60 MHz | | | |
| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit (dBm) | Polarization |
| 1673.20 | -31.78 | 2.40 | 6.77 | 2.15 | -29.56 | -13.00 | H |
| 2509.80 | --- | | | 2.15 | | -13.00 | H |
| 1673.20 | -28.53 | 2.40 | 6.77 | 2.15 | -26.31 | -13.00 | V |
| 2509.80 | --- | | | 2.15 | | -13.00 | V |

| GSM/TM1/GSM850 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Number: 251 | | | | Test Frequency: 848.80 MHz | | | |
| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit (dBm) | Polarization |
| 1697.60 | -29.72 | 2.40 | 6.77 | 2.15 | -27.50 | -13.00 | H |
| 2546.40 | --- | | | 2.15 | --- | -13.00 | H |
| 1697.60 | -28.32 | 2.40 | 6.77 | 2.15 | -26.10 | -13.00 | V |
| 2546.40 | --- | | | 2.15 | --- | -13.00 | V |

| GSM/TM1/PCS1900 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Number: 512 | | | | Test Frequency: 1850.20 MHz | | | |
| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit (dBm) | Polarization |
| 3700.40 | -30.71 | 4.60 | 9.53 | 2.15 | -27.93 | -13.00 | H |
| 5550.60 | --- | | | 2.15 | --- | -13.00 | H |
| 3700.40 | -29.95 | 4.60 | 9.53 | 2.15 | -27.17 | -13.00 | V |
| 5550.60 | --- | | | 2.15 | --- | -13.00 | V |

| GSM/TM1/PCS1900 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Number: 661 | | | | Test Frequency: 1880.00 MHz | | | |
| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit (dBm) | Polarization |
| 3760.00 | -30.30 | 4.60 | 9.53 | 2.15 | -27.52 | -13.00 | H |
| 5640.00 | --- | | | 2.15 | --- | -13.00 | H |
| 3760.00 | -32.78 | 4.60 | 9.53 | 2.15 | -30.0 | -13.00 | V |
| 5640.00 | --- | | | 2.15 | --- | -13.00 | V |

| GSM/TM1/PCS1900 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Number: 810 | | | | Test Frequency: 1909.80 MHz | | | |
| Frequency (MHz) | $P_{Mea}$ (dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit (dBm) | Polarization |
| 3819.60 | -24.33 | 4.60 | 9.53 | 2.15 | -21.55 | -13.00 | H |
| 5729.40 | --- | | | 2.15 | --- | -13.00 | H |
| 3819.60 | -25.92 | 4.60 | 9.53 | 2.15 | -23.14 | -13.00 | V |
| 5729.40 | --- | | | 2.15 | --- | -13.00 | V |

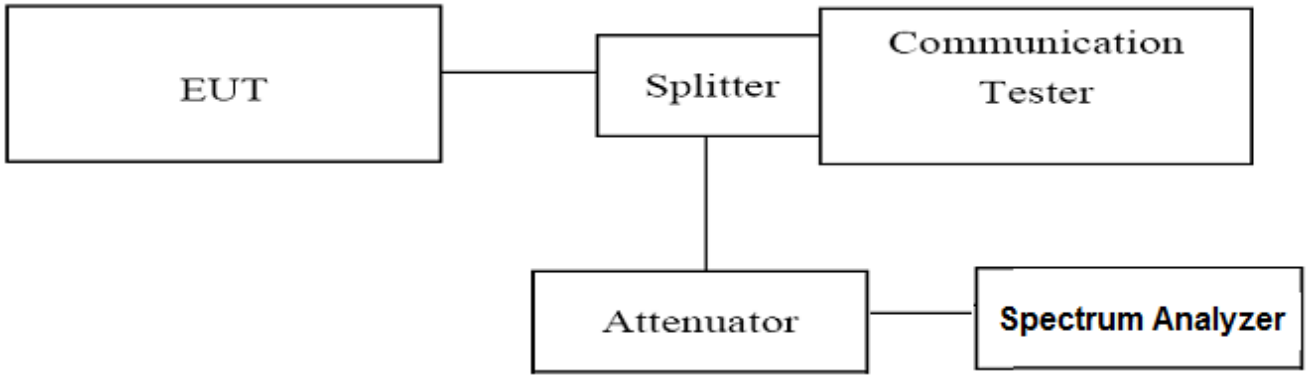
Note: 1. In general, the worst case attenuation requirement shown above was applied.
2. **"---"**means that the emission level is too low to be measured or at least 20 dB down than the limit.

## 5.3 Occupied Bandwidth and Emission Bandwidth

**TEST APPLICABLE**

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. The table below lists the measured 99% BW and 26 dBc BW.

**TEST CONFIGURATION**

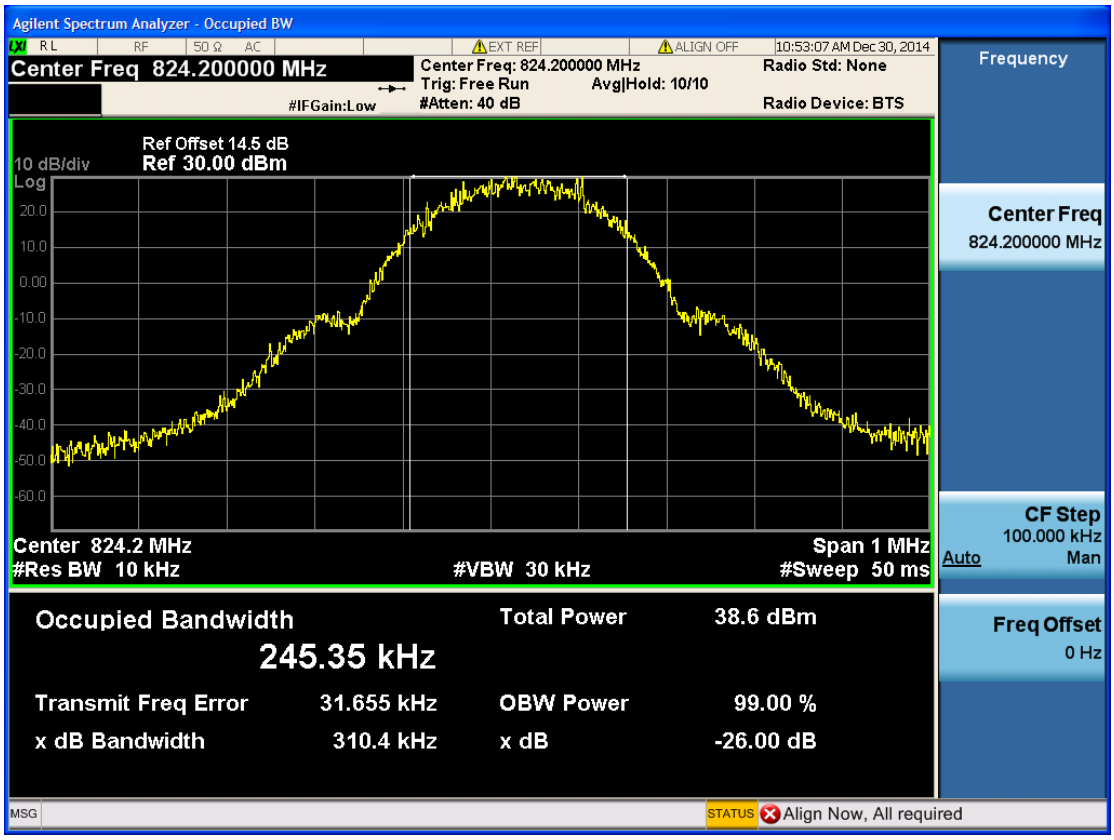



**TEST PROCEDURE**

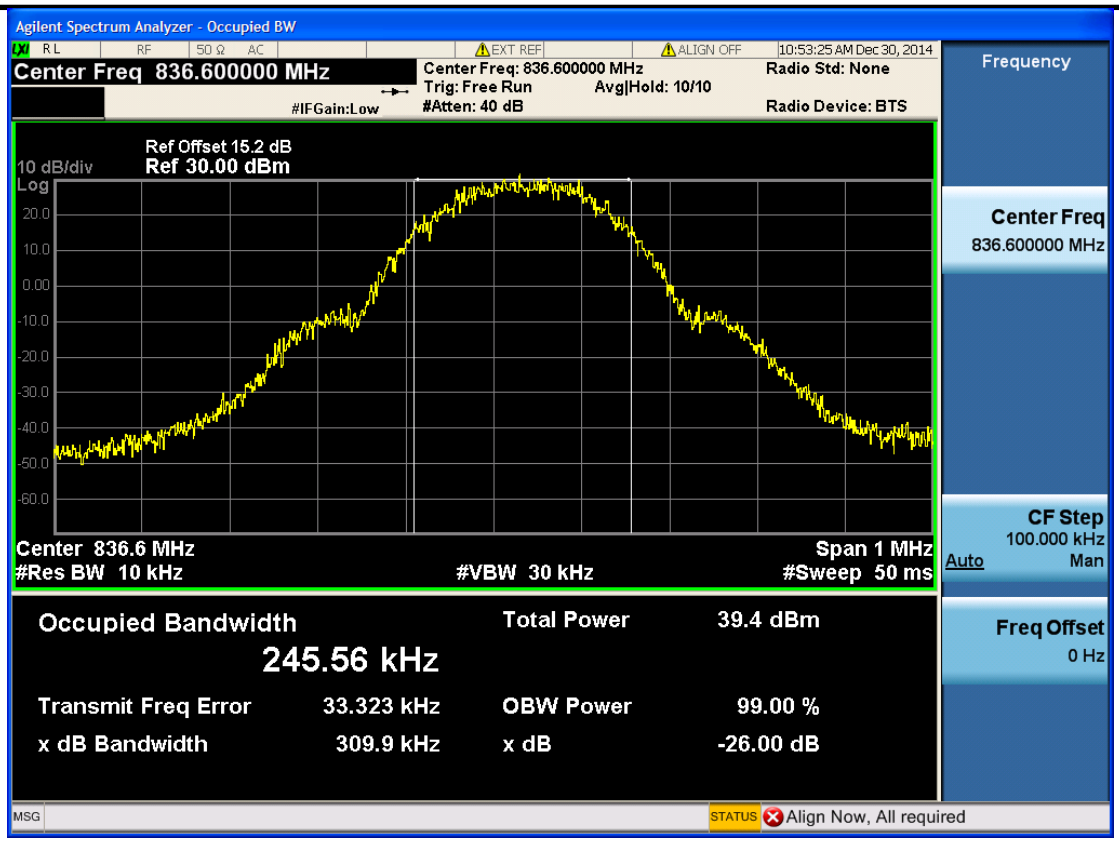
1. The EUT was set up for the max output power with pseudo random data modulation;
2. The Occupied bandwidth was measured with Agilent Spectrum Analyzer N9020A (peak);
3. Set RBW=10KHz,VBW=30KHz,Span=1MHz,SWT=20ms;
4. Stet SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dBc Bandwidth.
5. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

**TEST RESULTS**

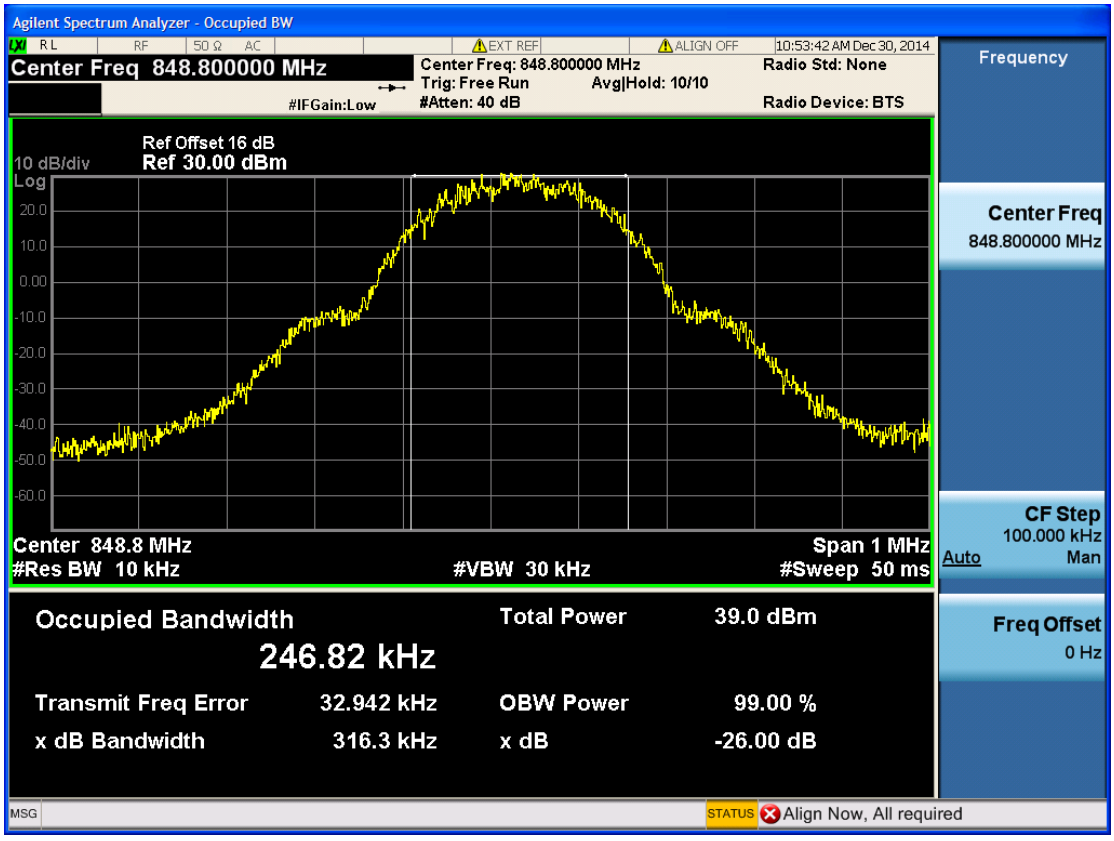
| GSM/TM1/GSM850 | | | | | |
|---|---|---|---|---|---|
| **Channel Number** | **Frequency (MHz)** | **Occupied Bandwidth (99% BW) ( kHz)** | **Emission Bandwidth (26 dBc BW) ( kHz)** | **Refer to Plot** | **Verdict** |
| 128 | 824.20 | 245.35 | 310.4 | Plot 5.3.1 A | PASS |
| 190 | 836.60 | 245.56 | 309.9 | Plot 5.3.1 B | PASS |
| 251 | 848.80 | 246.82 | 316.3 | Plot 5.3.1 C | PASS |




(Plot 5.3.1 A: Channel 128: 824.20MHz @ GSM850)

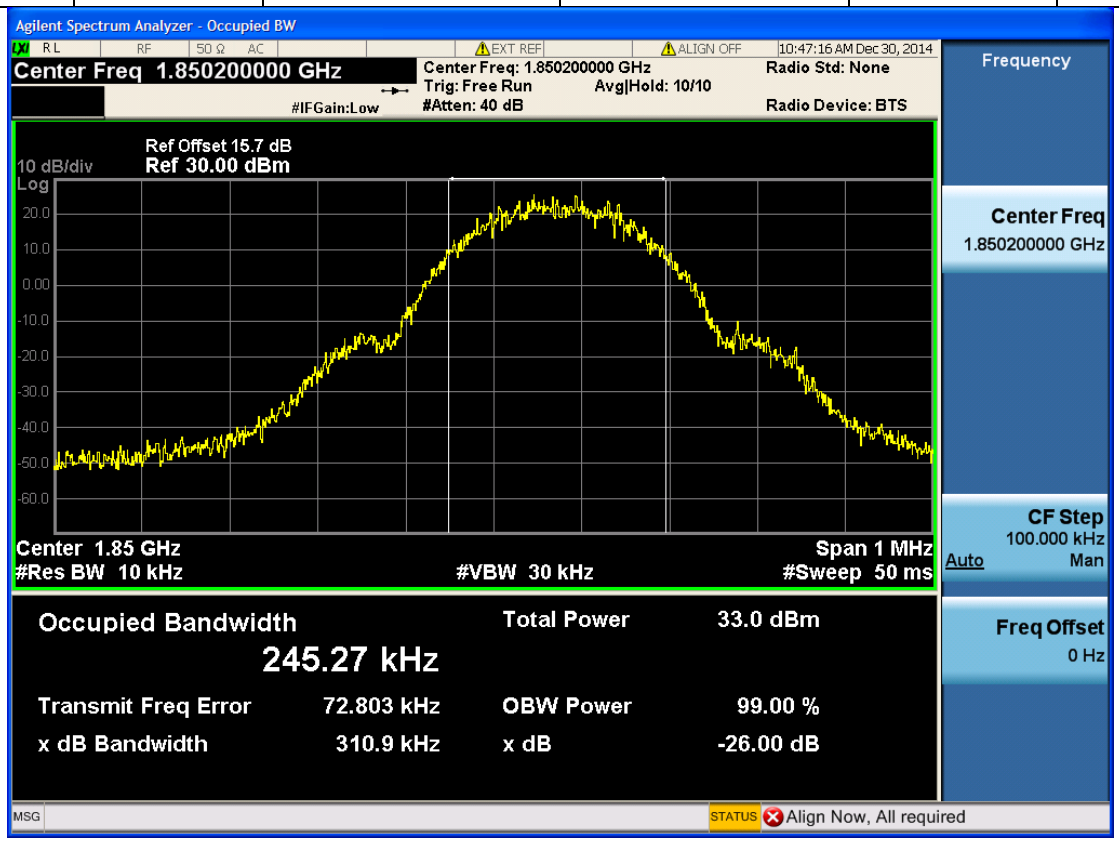



(Plot 5.3.1 B: Channel 190: 836.60MHz @ GSM850)

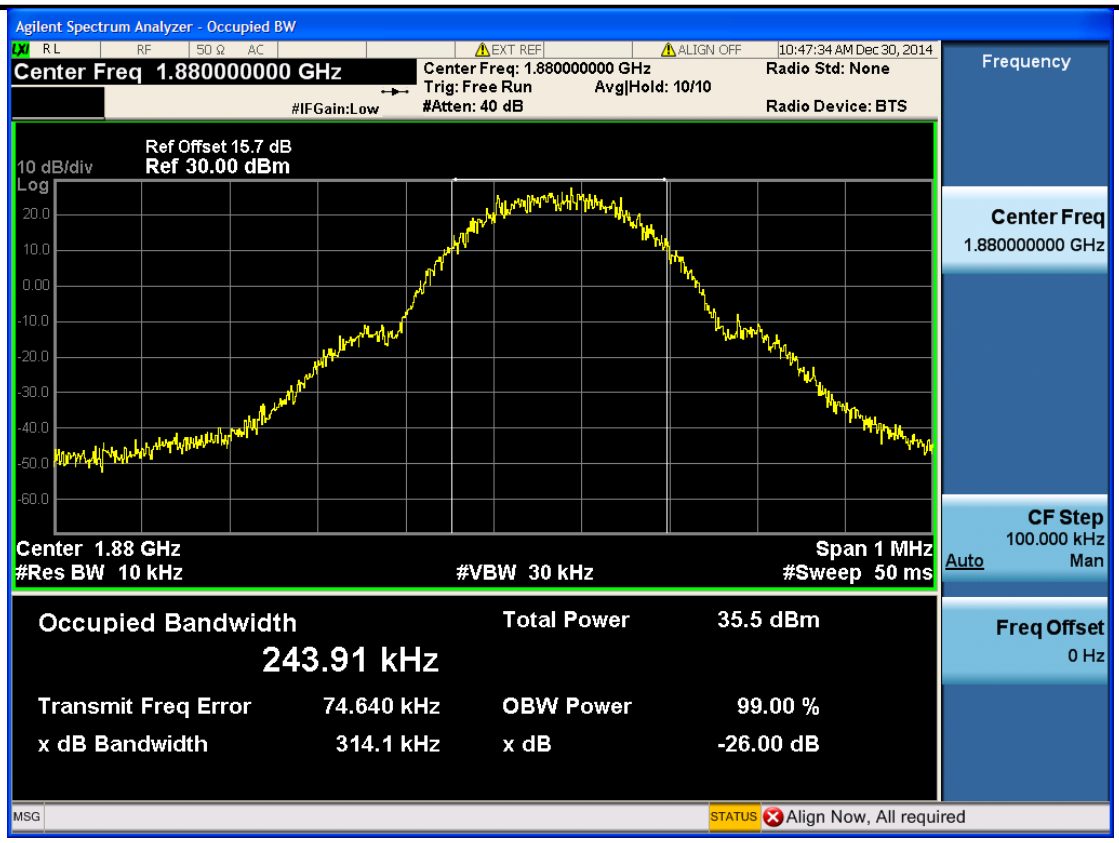



(Plot 5.3.1 C: Channel 251: 848.80MHz @ GSM850)

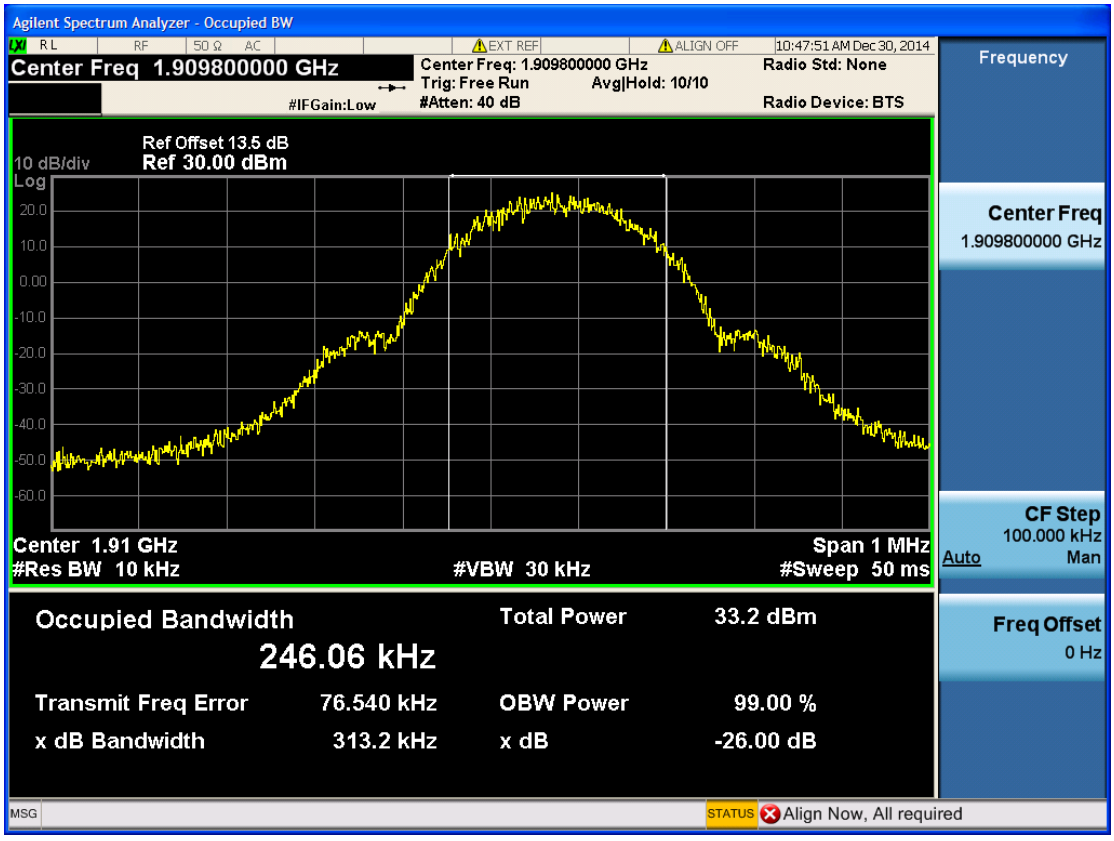
| GSM/TM1/GSM1900 | | | | | |
|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Occupied Bandwidth (99% BW) ( kHz) | Emission Bandwidth (26 dBc BW) ( kHz) | Refer to Plot | Verdict |
| 512 | 1850.20 | 245.27 | 310.9 | Plot 5.3.2 A | PASS |
| 661 | 1880.00 | 243.91 | 314.1 | Plot 5.3.2 B | PASS |
| 810 | 1909.80 | 246.06 | 313.2 | Plot 5.3.2 C | PASS |




(Plot 5.3.2 A: Channel 512:1850.20MHz @ PCS1900)




(Plot 5.3.2 B: Channel 661:1880.00MHz @ PCS1900)



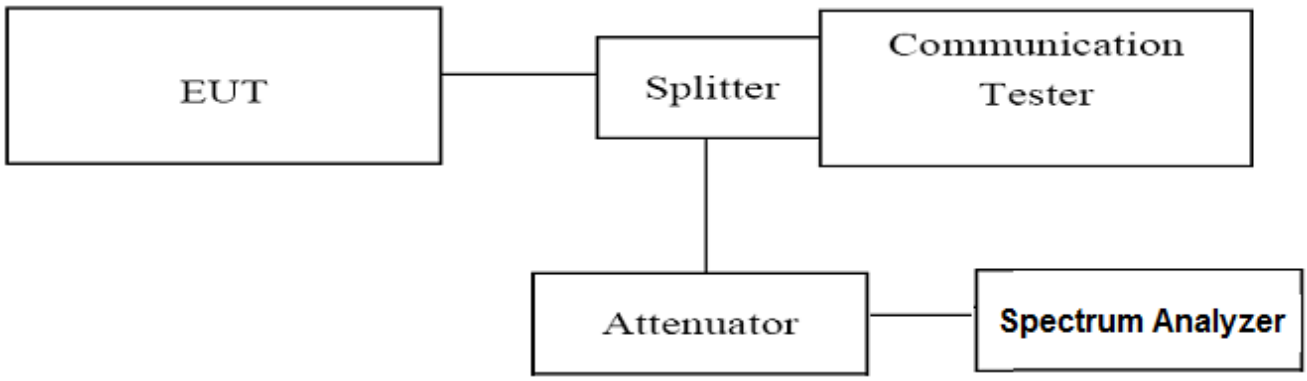

(Plot 5.3.2 C: Channel 810:1909.80MHz @ PCS1900)

## 5.4 BAND EDGE COMPLIANCE

**TEST APPLICABLE**

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

**TEST CONFIGURATION**



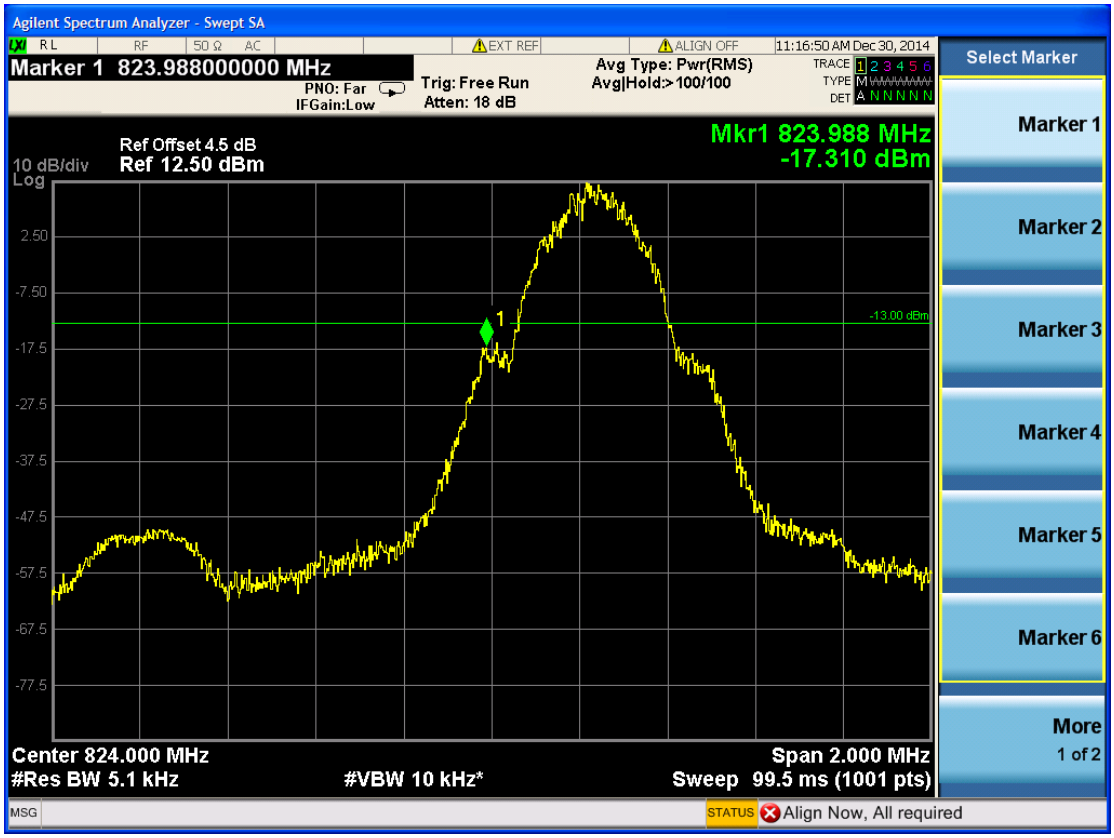

**TEST PROCEDURE**

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Agilent Spectrum Analyzer N9020A (peak);
3. Set RBW=5.1KHz,VBW=10KHz,Span=2MHz,SWT=Auto;
4. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

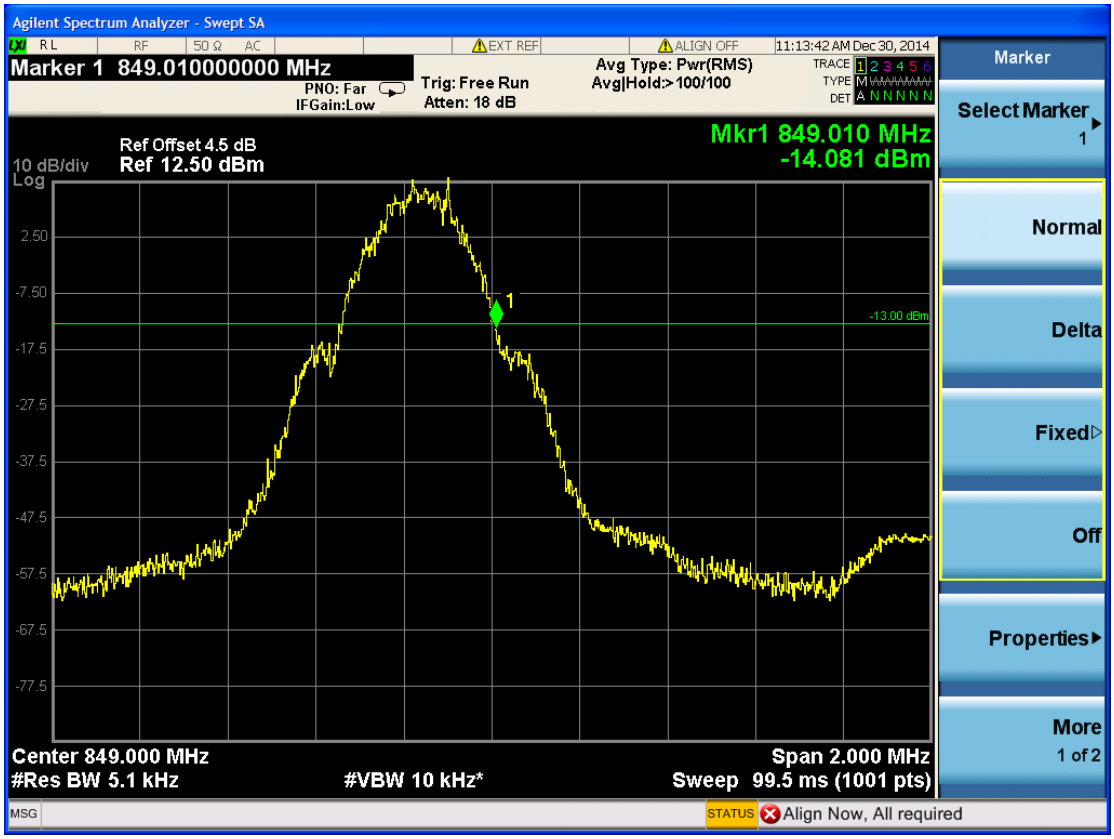
**TEST RESULTS**

| GSM/TM1/GSM850 | | | | | | |
|---|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Refer to Plot | Verdict |
| | | Frequency (MHz) | Values (dBm) | | | |
| 128 | 824.20 | 823.988 | -17.310 | -13.00 | Plot 5.4.1 A | PASS |
| 251 | 848.80 | 849.010 | -14.081 | -13.00 | Plot 5.4.1 B | PASS |

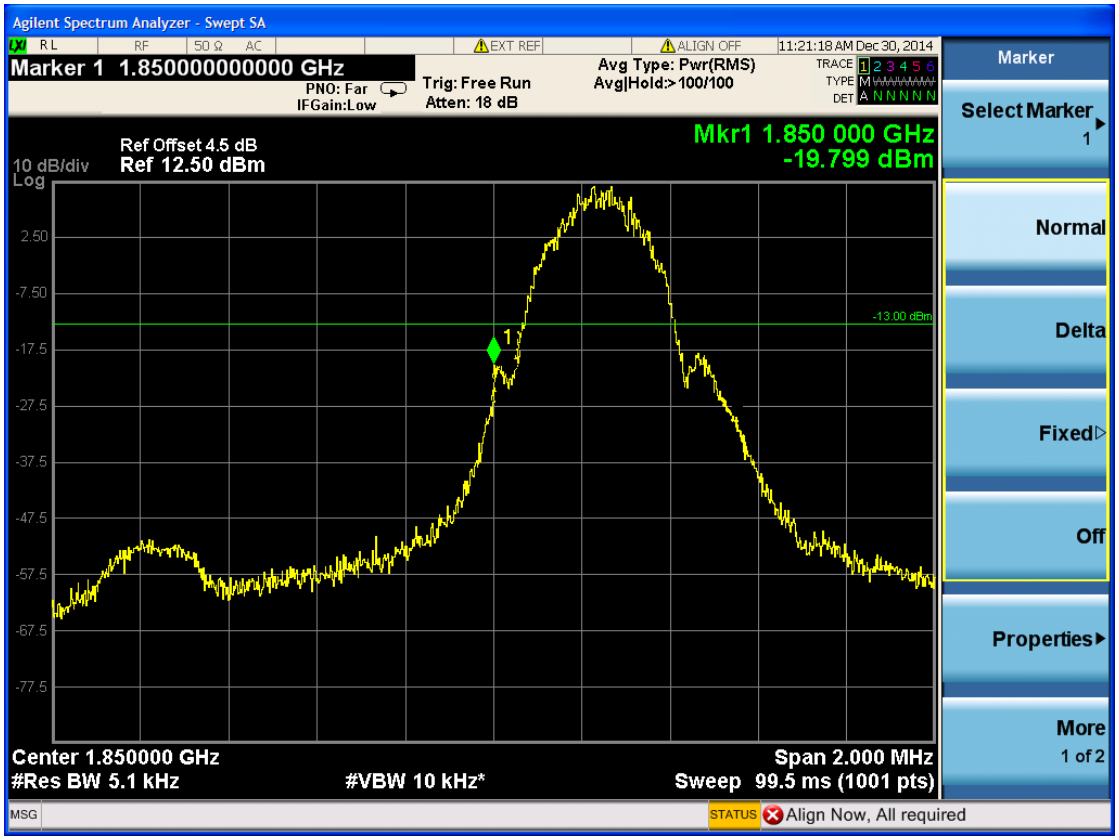
| GSM/TM1/PCS1900 | | | | | | |
|---|---|---|---|---|---|---|
| Channel Number | Frequency (MHz) | Measurement Results | | Limit (dBm) | Refer to Plot | Verdict |
| | | Frequency (MHz) | Values (dBm) | | | |
| 512 | 1850.20 | 1850.000 | -19.799 | -13.00 | Plot 5.4.2 A | PASS |
| 810 | 1909.80 | 1910.044 | -16.293 | -13.00 | Plot 5.4.2 B | PASS |



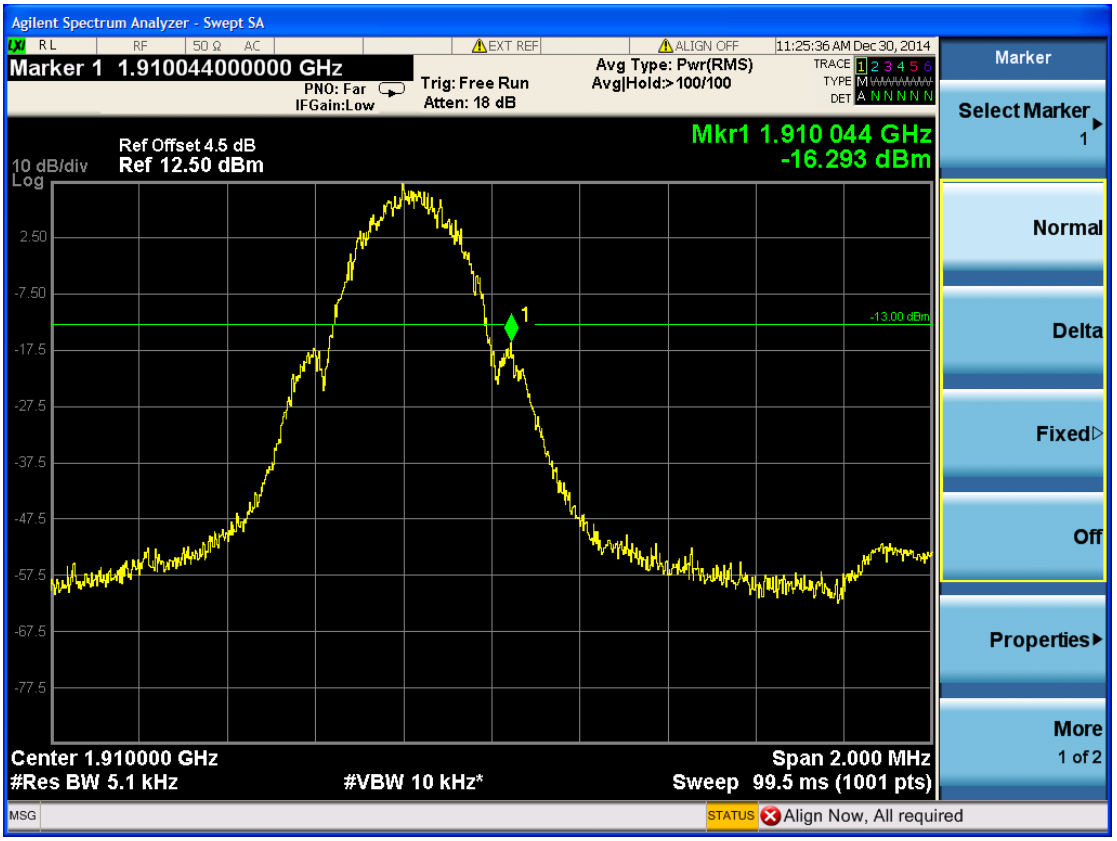

(Plot 5.4.1 A: Channel 128: 824.20MHz @ GSM850)




(Plot 5.4.1 B: Channel 251: 848.80MHz @ GSM850)




(Plot 5.4.2 A: Channel 512: 1850.20MHz @ PCS1900)




(Plot 5.4.2 B: Channel 810: 1909.80MHz @ PCS1900)

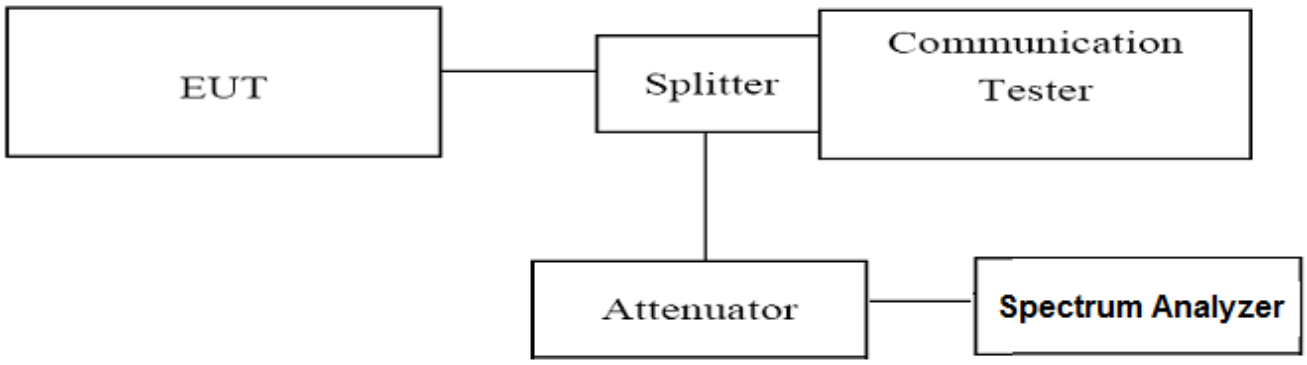
## 5.5 Spurious Emissions on Antenna Port

**TEST APPLICABLE**

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

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 9 KHz to 19.1 GHz, data taken from 9 KHz to 20 GHz. For GSM850, data taken from 9 KHz to 10 GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; if the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give an optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
   The trace mode is set to MaxHold to get the highest signal at each frequency;
   Wait 25 seconds;
   Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

**TEST CONFIGURATION**




**TEST PROCEDURE**

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The power was measured with Agilent Spectrum Analyzer N9020A (peak);
3. These measurements were done at 3 frequencies, 1850.20 MHz, 1880.00 MHz and 1909.80 MHz for PCS1900 band; 824.20 MHz, 836.60 MHz and 848.80 MHz for GSM850 band. (Low, middle and high of operational frequency range).

**TEST LIMIT**

Part 24.238 and Part 22.917 specify that 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.
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum

attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

**TEST RESULTS**

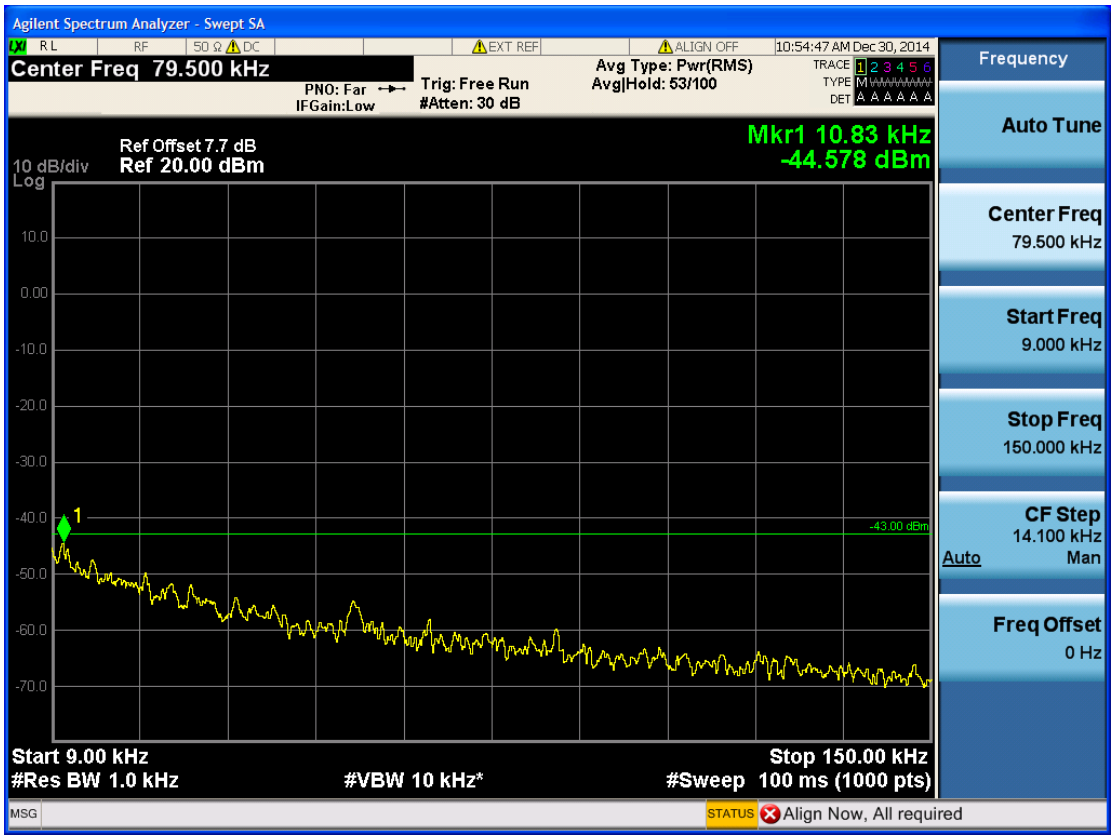
### 5.5.1 For GSM850 Test Results

A. Test Verdict

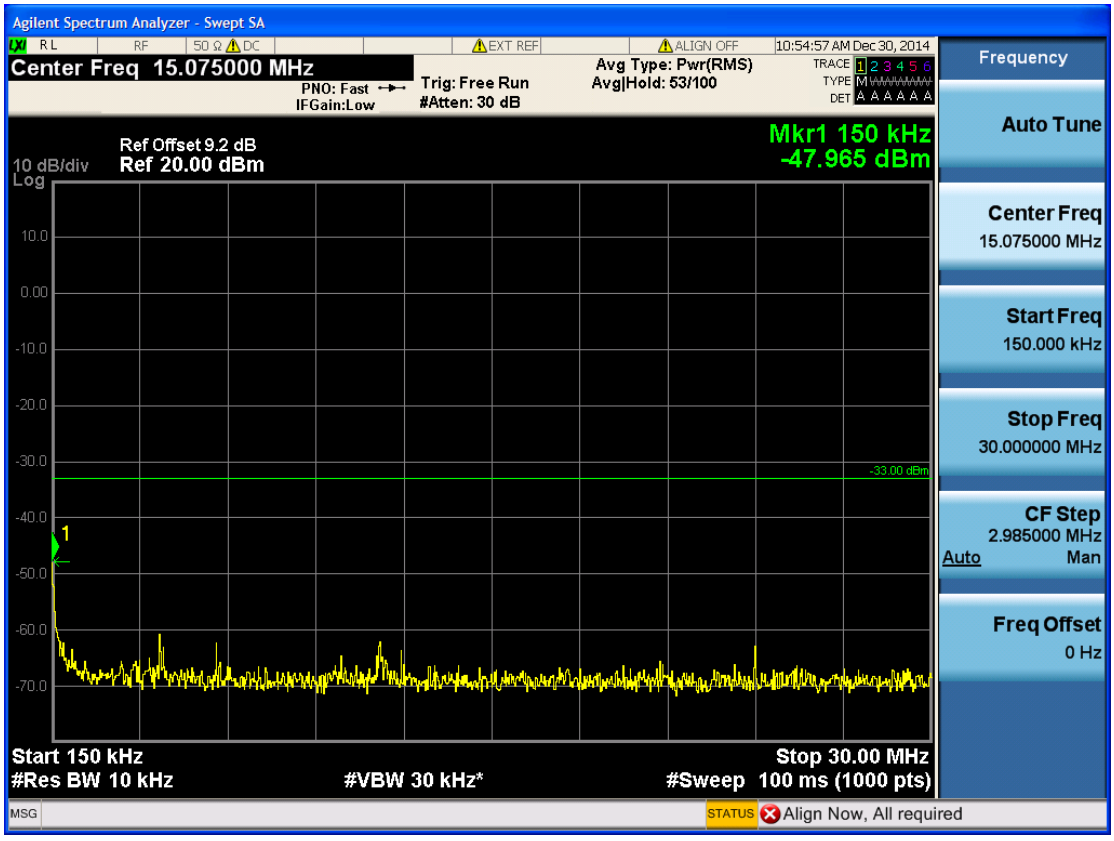
| Test Mode/ Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBm) | Verdict |
|---|---|---|---|---|---|
| GSM/TM1/GSM850 /128 | 824.20 | 9KHz-150KHz | Plot 5.5.1 A1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.1 A2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.1 A3 | -13.00 | PASS |
| | | 1GHz-9GHz | Plot 5.5.1 A4 | -13.00 | PASS |
| GSM/TM1/GSM850 /190 | 836.60 | 9KHz-150KHz | Plot 5.5.1 B1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.1 B2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.1 B3 | -13.00 | PASS |
| | | 1GHz-9GHz | Plot 5.5.1 B4 | -13.00 | PASS |
| GSM/TM1/GSM850 /251 | 8483.80 | 9KHz-150KHz | Plot 5.5.1 C1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.1 C2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.1 C3 | -13.00 | PASS |
| | | 1GHz-9GHz | Plot 5.5.1 C4 | -13.00 | PASS |
| GSM/TM1/GSM850 /Idle | N/A | 9KHz-150KHz | Plot 5.5.1 D1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.1 D2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.1 D3 | -13.00 | PASS |
| | | 1GHz-9GHz | Plot 5.5.1 D4 | -13.00 | PASS |

Note: 1. In general, the worst case attenuation requirement shown above was applied.
2.**"---"** means that the emission level is too low to be measured or at least 20 dB down than the limit.

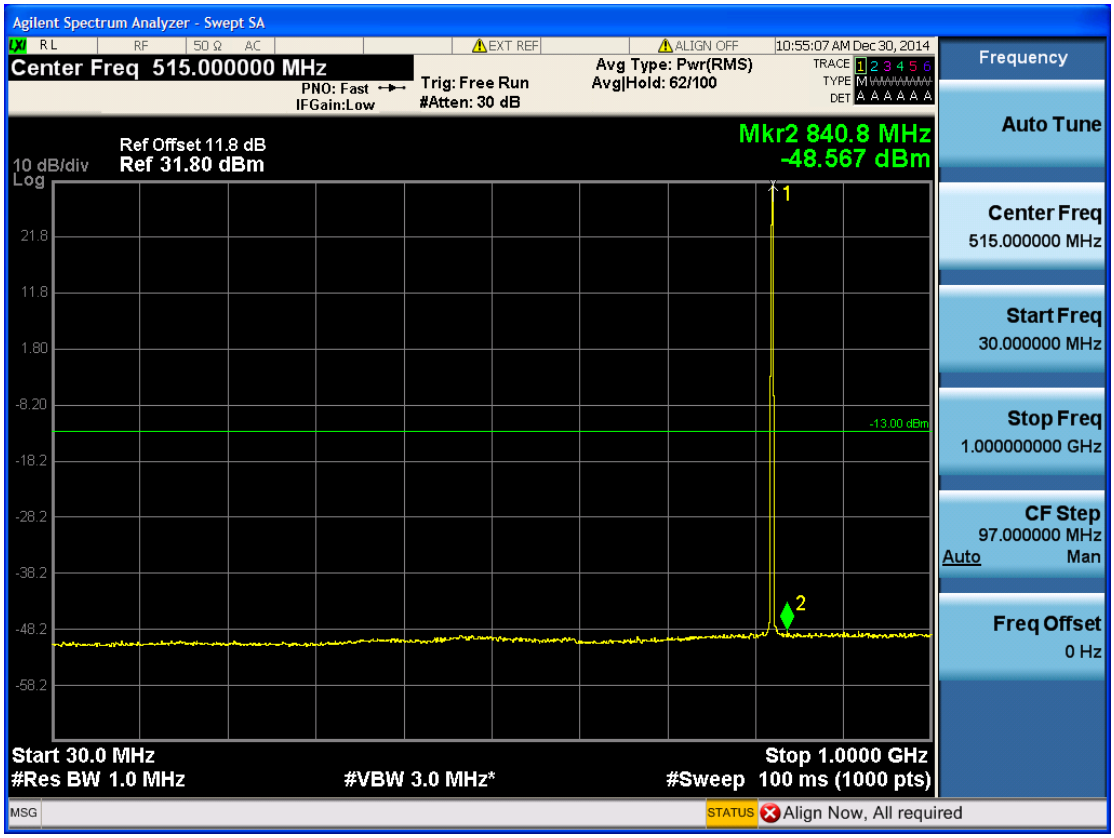
B. Test Plots



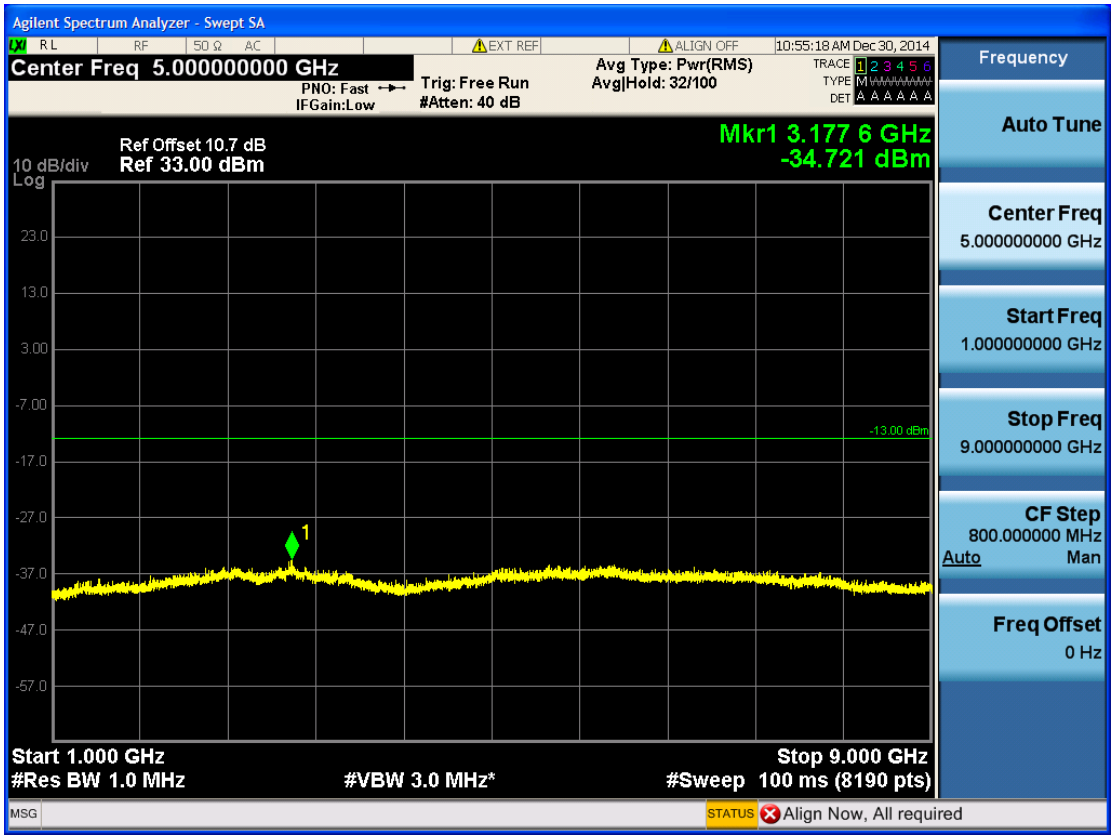

(Plot 5.5.1 A1: Channel 128: 824.20MHz @ Traffic @ GSM850)



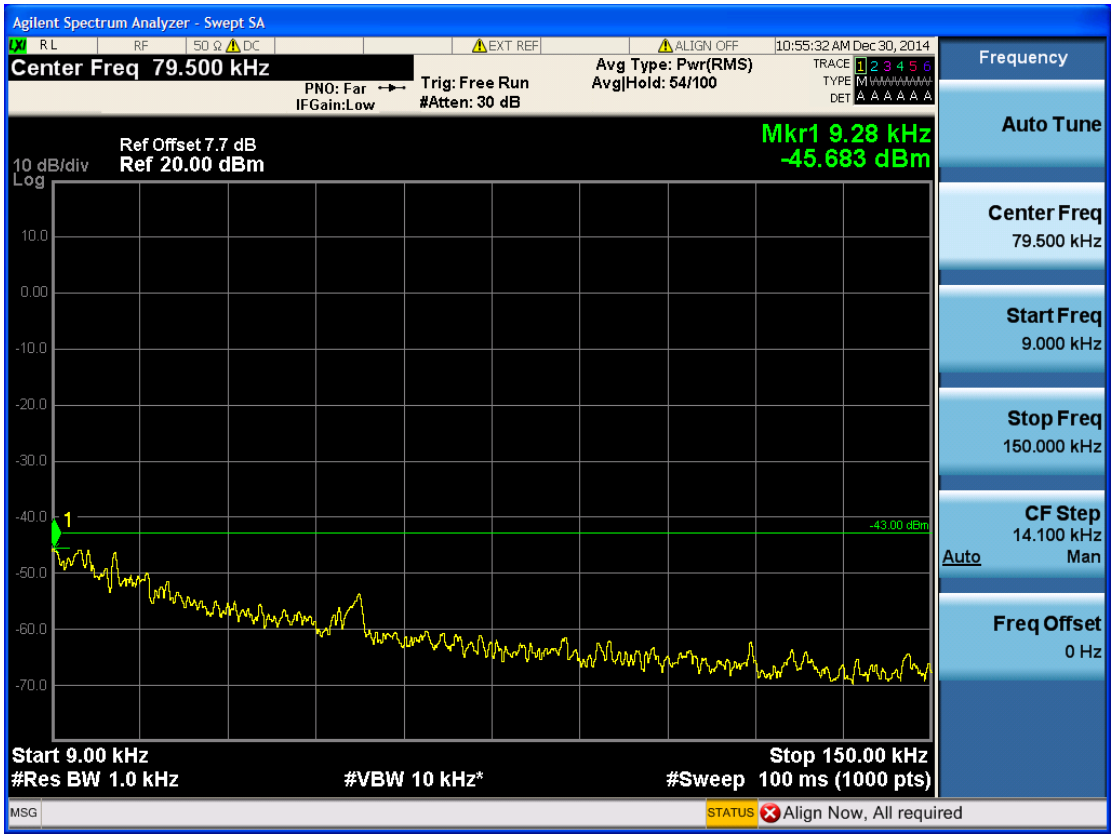

(Plot 5.5.1 A2: Channel 128: 824.20MHz @ Traffic @ GSM850)



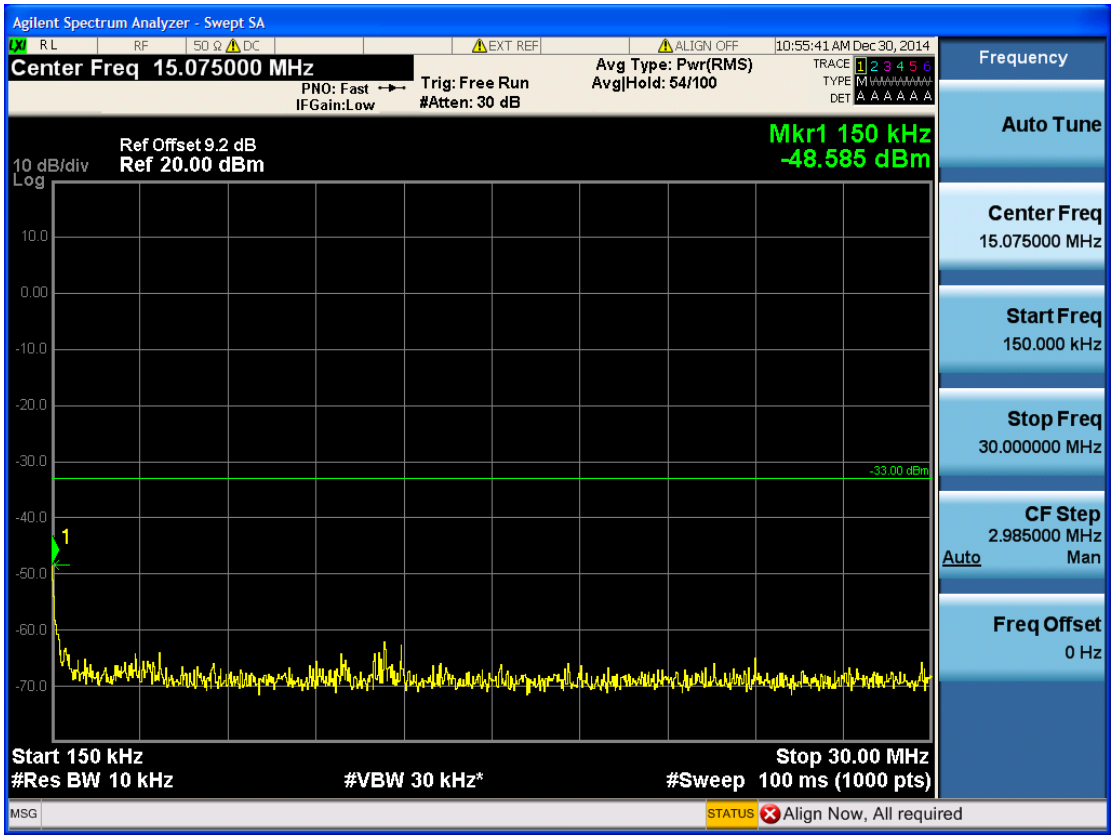

(Plot 5.5.1 A3: Channel 128: 824.20MHz @ Traffic @ GSM850)



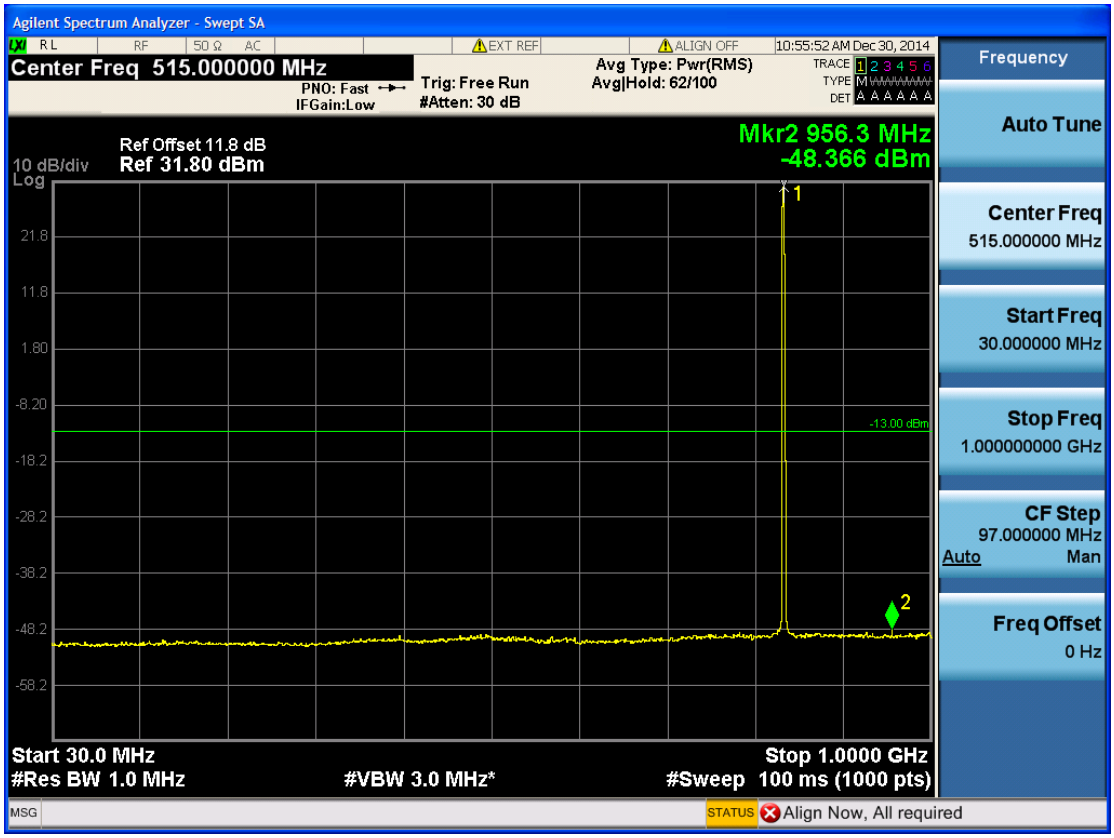

(Plot 5.5.1 A4: Channel 128: 824.20MHz @ Traffic @ GSM850)




(Plot 5.5.1 B1: Channel 190: 836.60MHz @ Traffic @ GSM850)

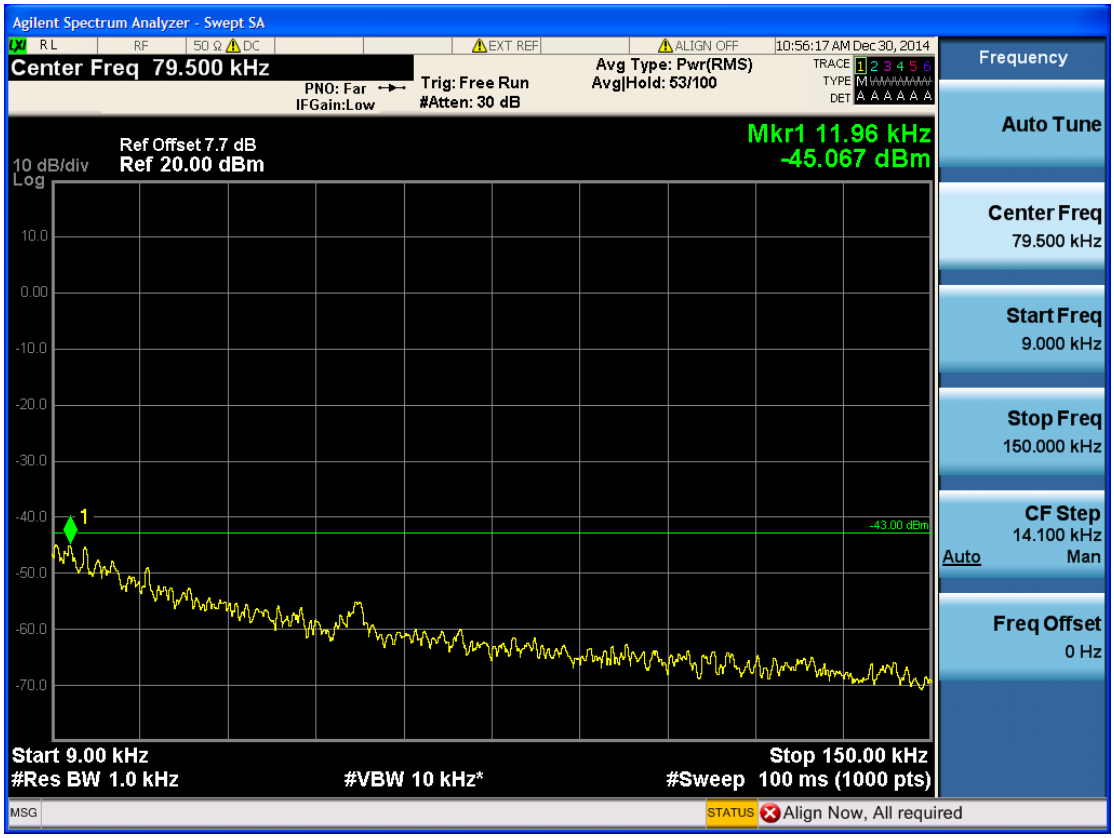



(Plot 5.5.1 B2: Channel 190: 836.60MHz @ Traffic @ GSM850)

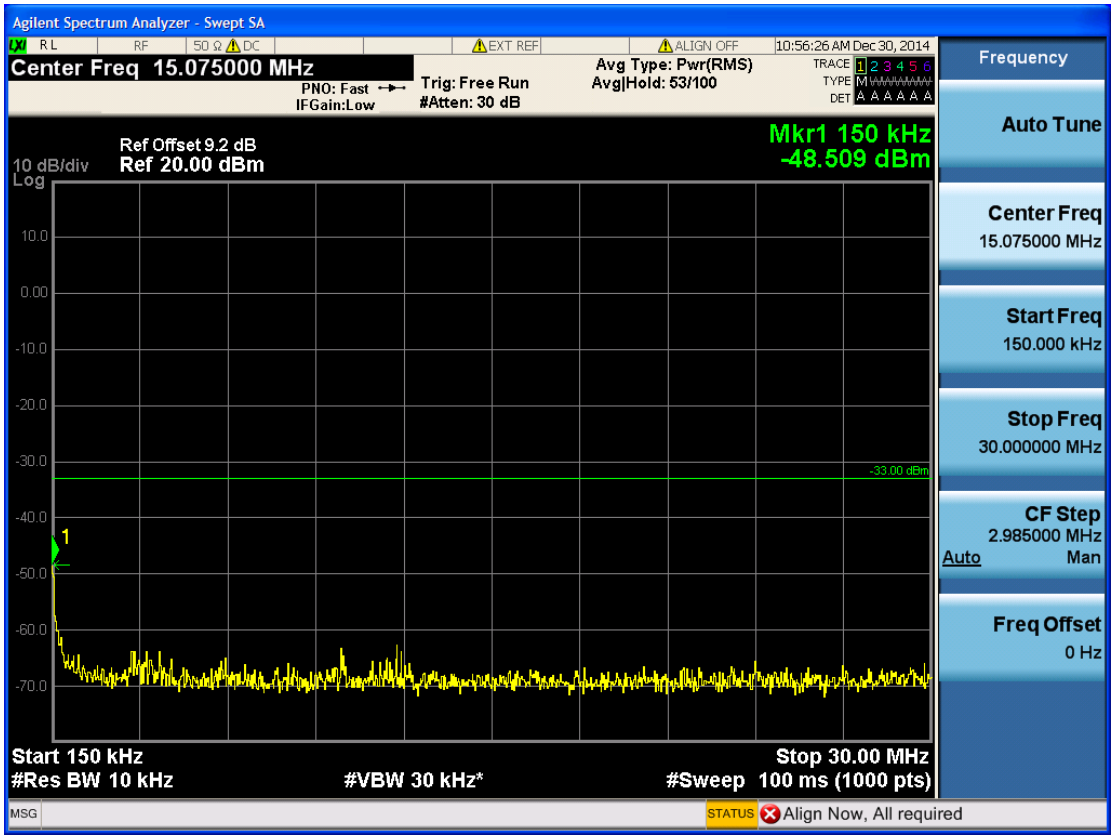



(Plot 5.5.1 B3: Channel 190: 836.60MHz @ Traffic @ GSM850)

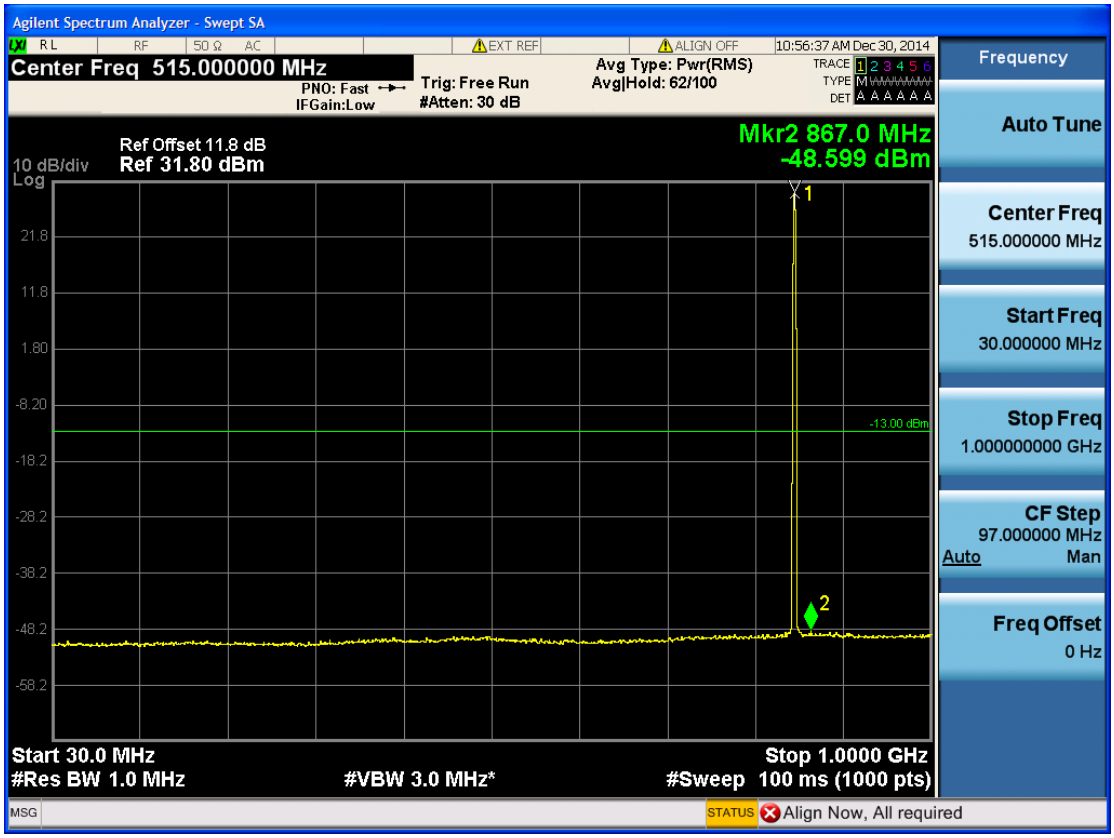

(Plot 5.5.1 B4: Channel 190: 836.60MHz @ Traffic @ GSM850)



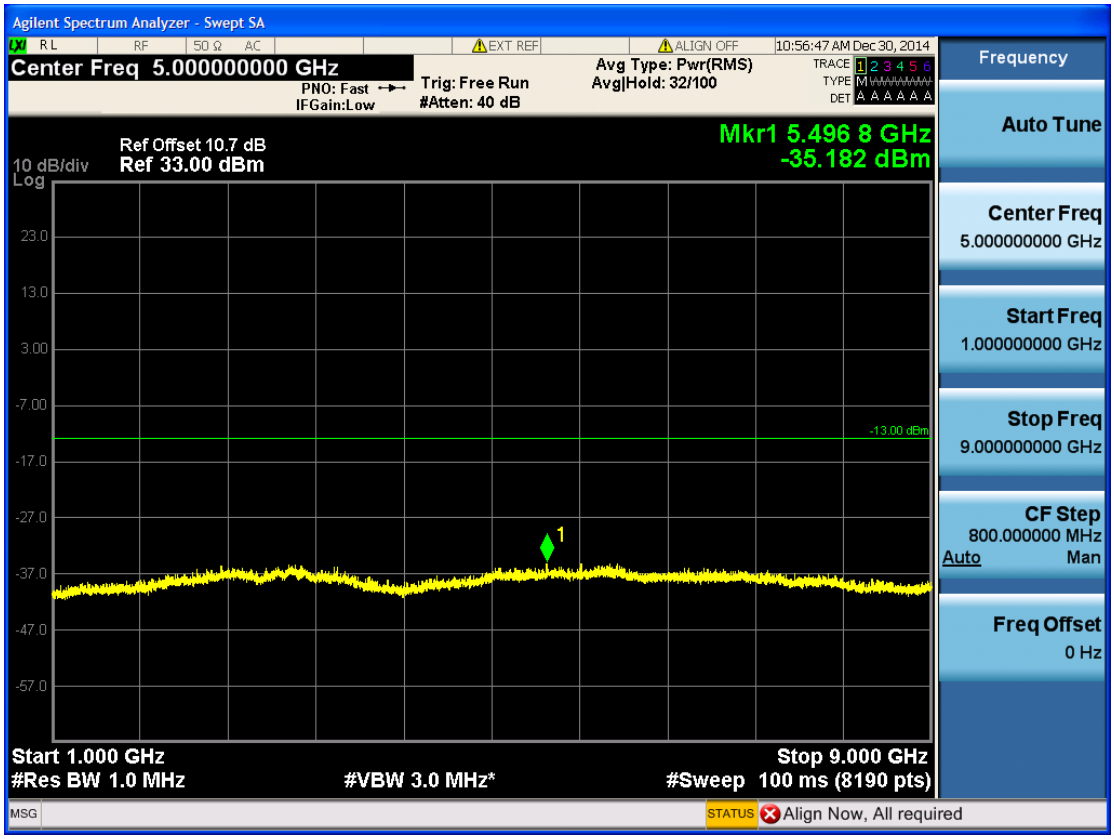

(Plot 5.5.1 C1: Channel 251: 848.80MHz @ Traffic @ GSM850)




(Plot 5.5.1 C2: Channel 251: 848.80MHz @ Traffic @ GSM850)

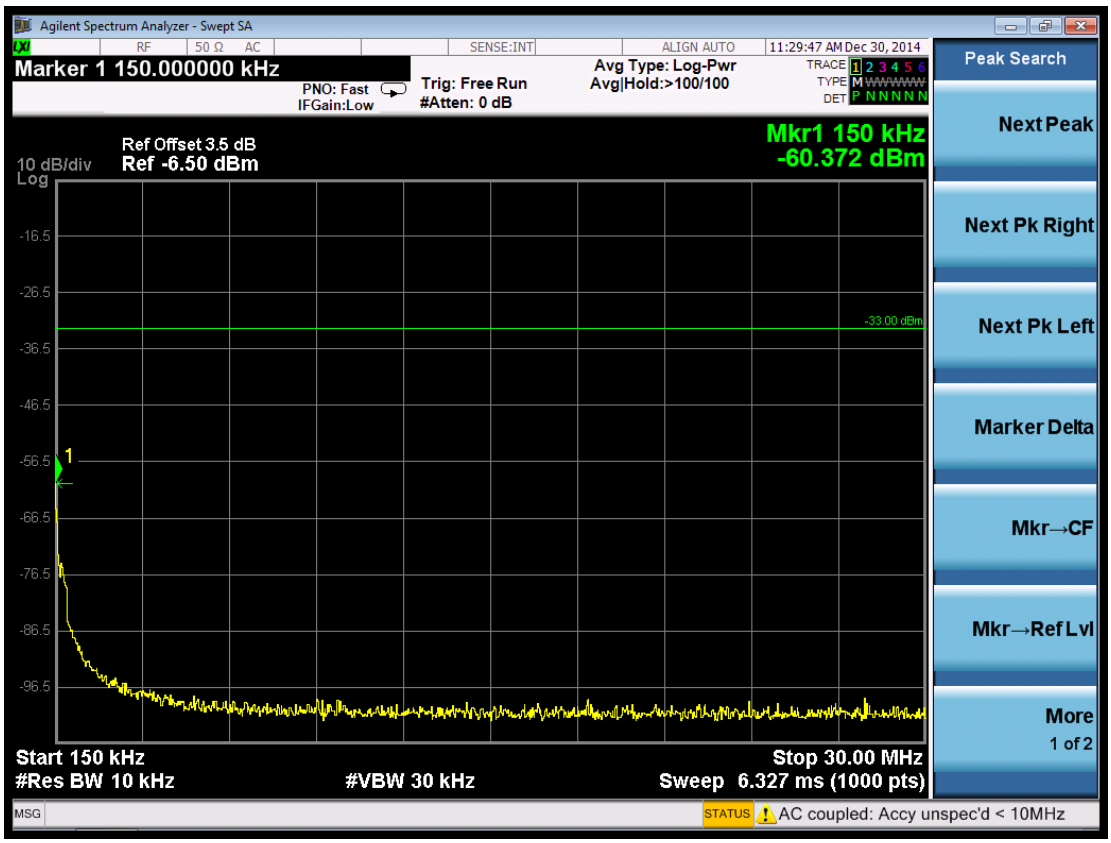



(Plot 5.5.1 C3: Channel 251: 848.80MHz @ Traffic @ GSM850)

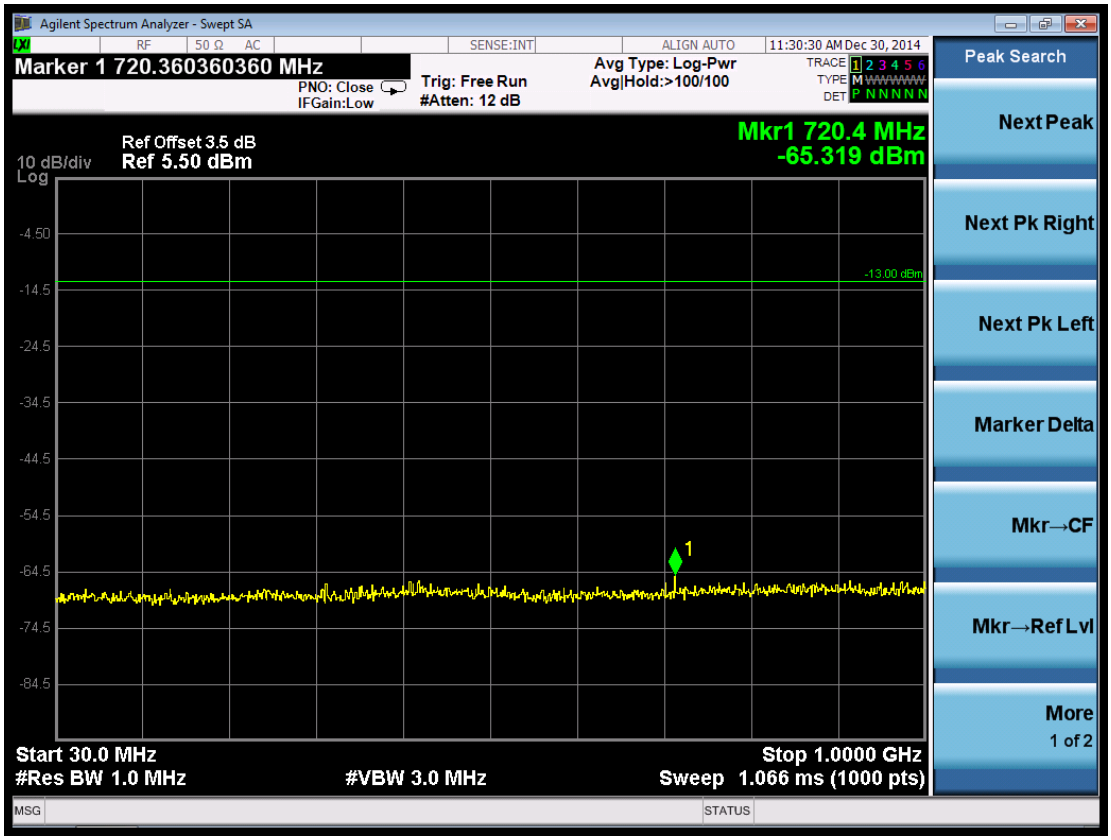



(Plot 5.5.1 C4: Channel 251: 848.80MHz @ Traffic @ GSM850)

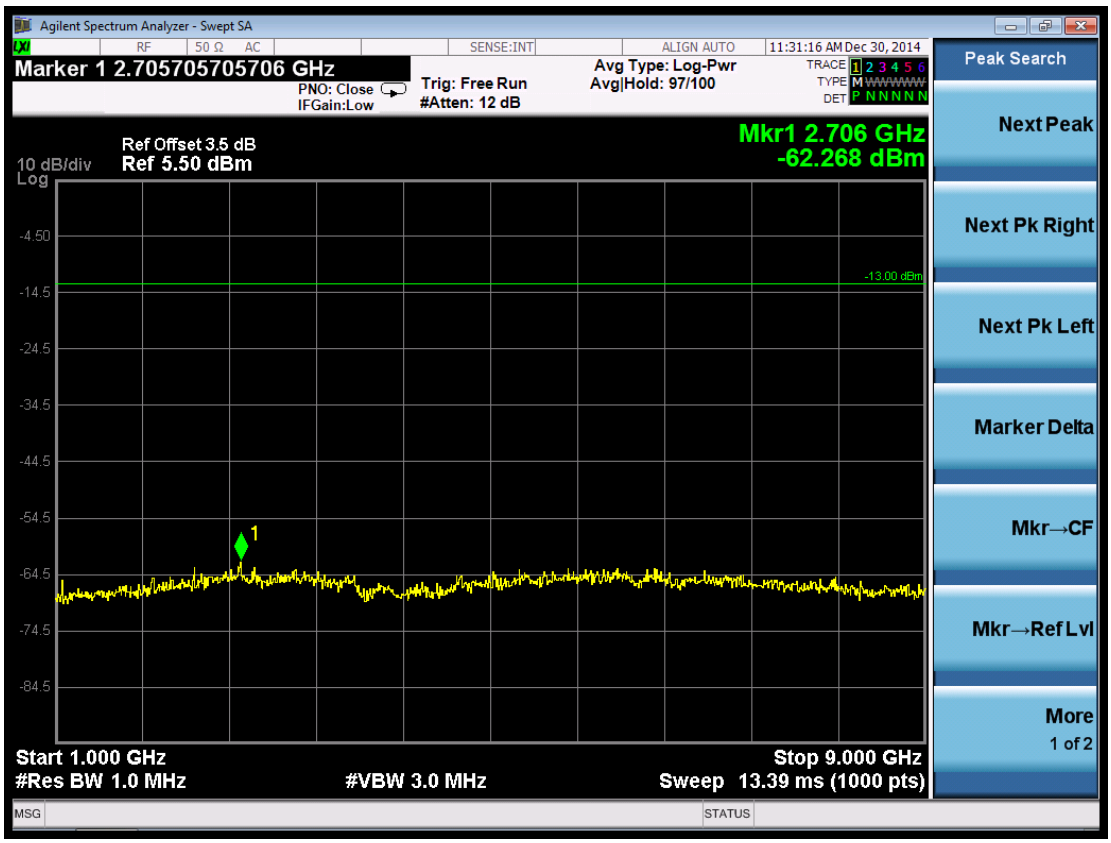

(Plot 5.5.1 D1 A1: Idle @ GSM850)




(Plot 5.5.1 D2: Idle @ GSM850)




(Plot 5.5.1 D3: Idle @ GSM850)




(Plot 5.5.1 D4: Idle @ GSM850)

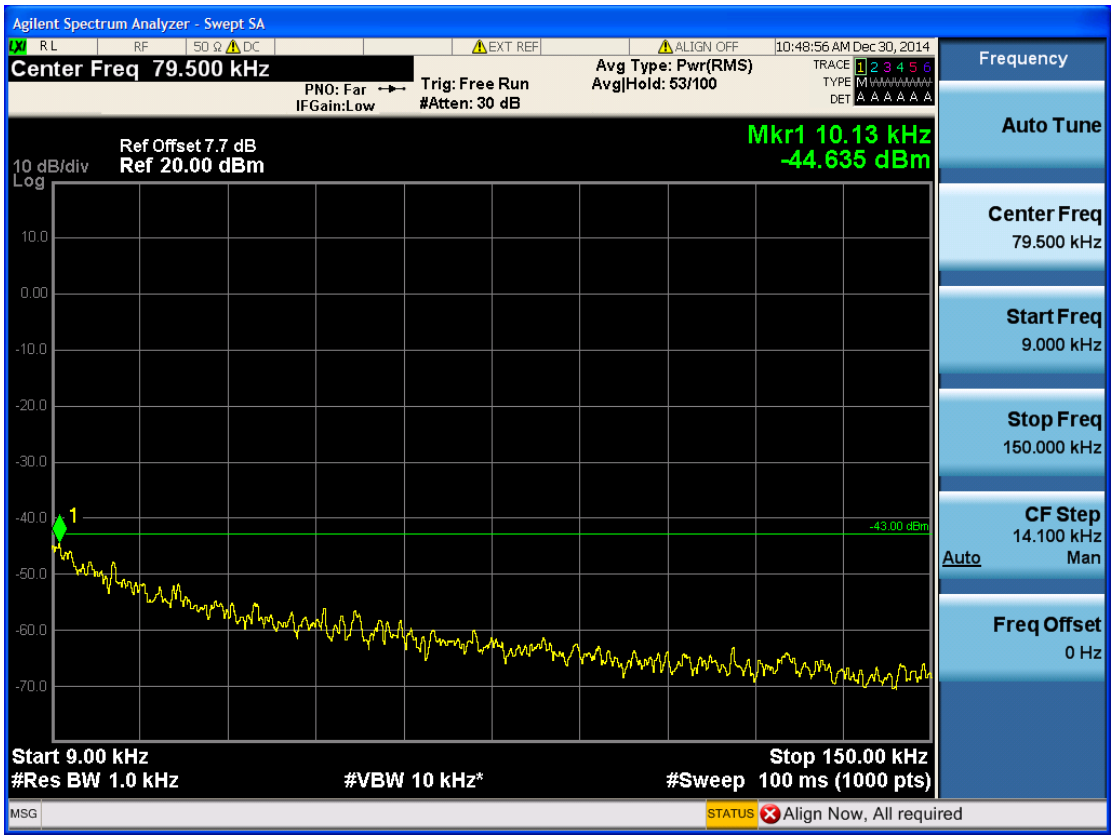
### 5.5.2 For GSM1900 Test Results

A. Test Verdict

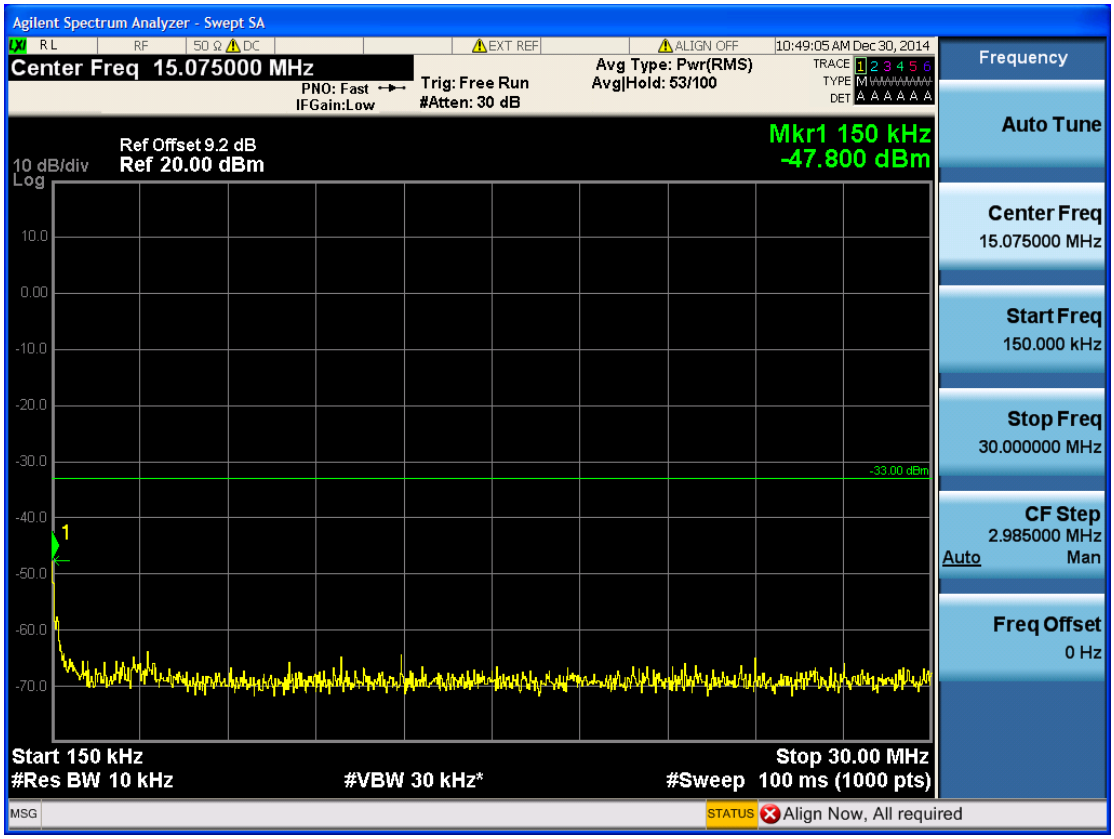
| Test Mode/ Channel | Frequency (MHz) | Frequency Range | Refer to Plot | Limit (dBm) | Verdict |
|---|---|---|---|---|---|
| GSM/TM1/GSM1900 /512 | 1850.20 | 9KHz-150KHz | Plot 5.5.2 A1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.2 A2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.2 A3 | -13.00 | PASS |
| | | 1GHz-7GHz | Plot 5.5.2 A4 | -13.00 | PASS |
| | | 7GHz-13.6GHz | Plot 5.5.2 A5 | -13.00 | PASS |
| | | 13.6GHz-20GHz | Plot 5.5.2 A6 | -13.00 | PASS |
| GSM/TM1/GSM1900 /661 | 1880.00 | 9KHz-150KHz | Plot 5.5.2 B1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.2 B2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.2 B3 | -13.00 | PASS |
| | | 1GHz-7GHz | Plot 5.5.2 B4 | -13.00 | PASS |
| | | 7GHz-13.6GHz | Plot 5.5.2 B5 | -13.00 | PASS |
| | | 13.6GHz-20GHz | Plot 5.5.2 B6 | -13.00 | PASS |
| GSM/TM1/GSM1900 /810 | 1909.80 | 9KHz-150KHz | Plot 5.5.2 C1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.2 C2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.2 C3 | -13.00 | PASS |
| | | 1GHz-7GHz | Plot 5.5.2 C4 | -13.00 | PASS |
| | | 7GHz-13.6GHz | Plot 5.5.2 C5 | -13.00 | PASS |
| | | 13.6GHz-20GHz | Plot 5.5.2 C6 | -13.00 | PASS |
| GSM/TM1/GSM1900 /Idle | N/A | 9KHz-150KHz | Plot 5.5.2 D1 | -13.00 | PASS |
| | | 150KHz-30MHz | Plot 5.5.2 D2 | -13.00 | PASS |
| | | 30MHz-1GHz | Plot 5.5.2 D3 | -13.00 | PASS |
| | | 1GHz-7GHz | Plot 5.5.2 D4 | -13.00 | PASS |
| | | 7GHz-13.6GHz | Plot 5.5.2 D5 | -13.00 | PASS |
| | | 13.6GHz-20GHz | Plot 5.5.2 D6 | -13.00 | PASS |

Note: 1. In general, the worse case attenuation requirement shown above was applied.
2.**"---"** means that the emission level is too low to be measured or at least 20 dB down than the limit.

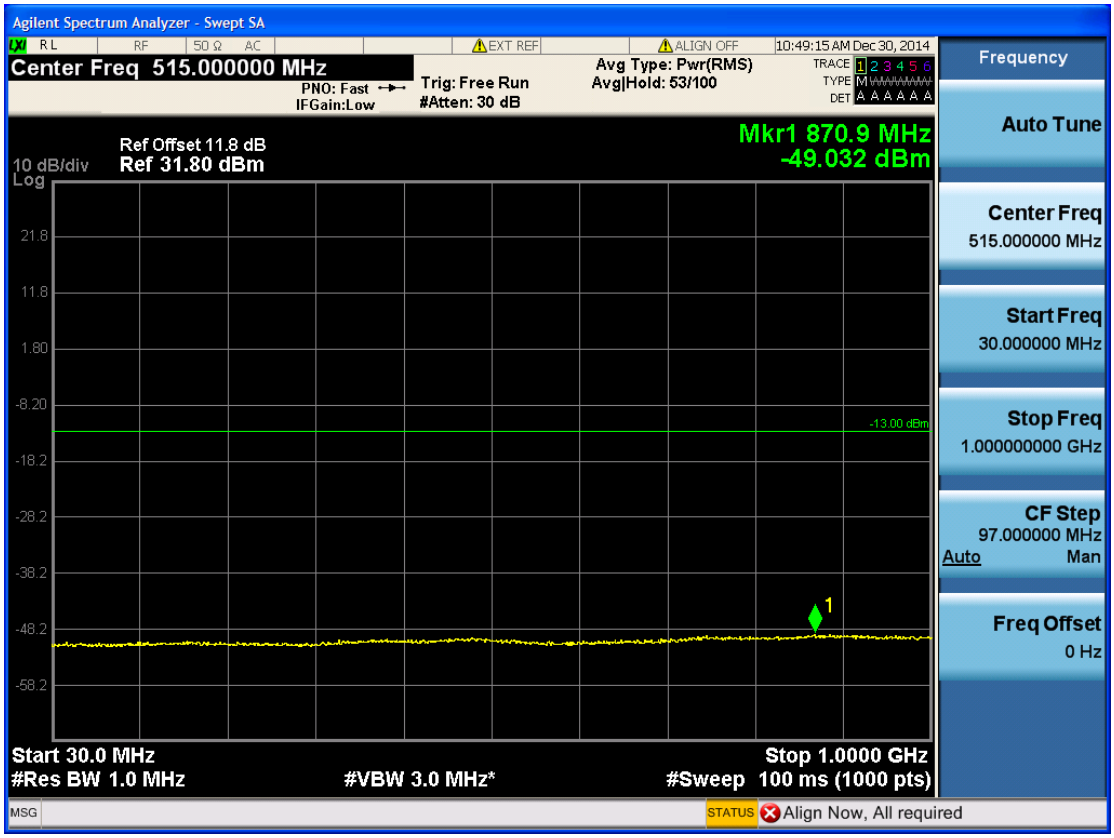
B. Test Plots




(Plot 5.5.2 A1: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

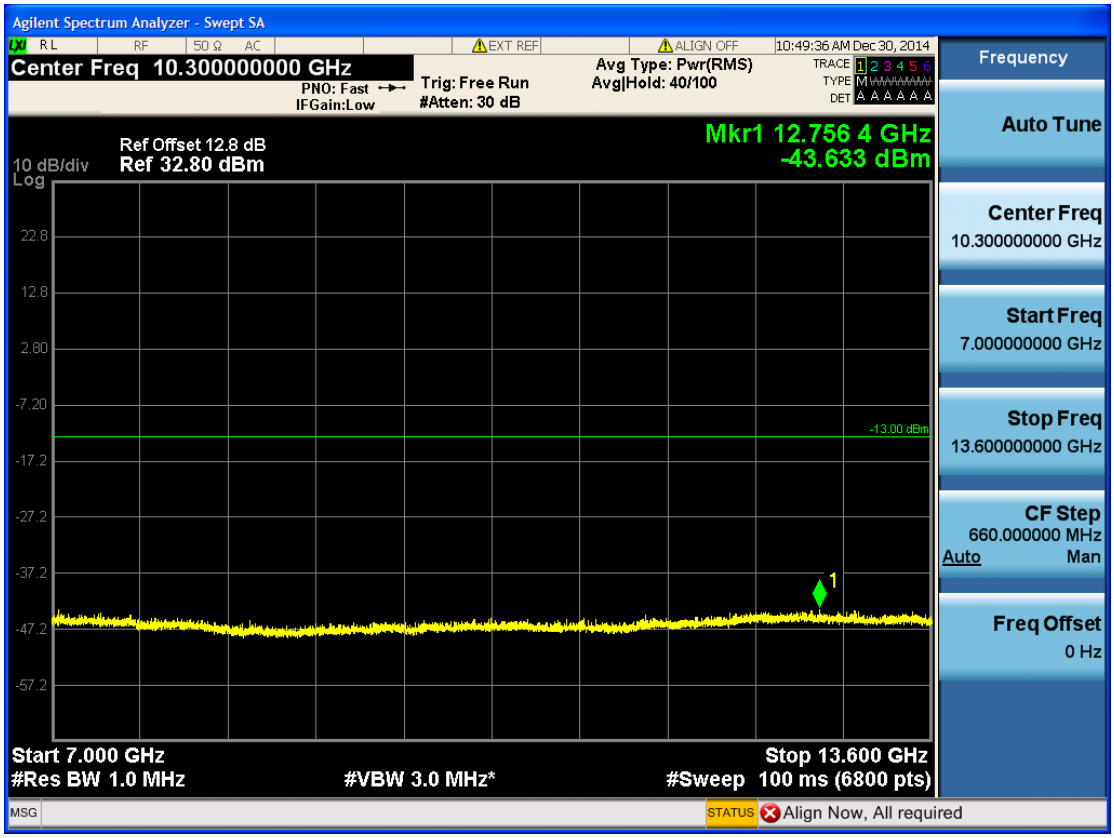



(Plot 5.5.2 A2: Channel 512: 1850.20MHz @ Traffic @ PCS1900)



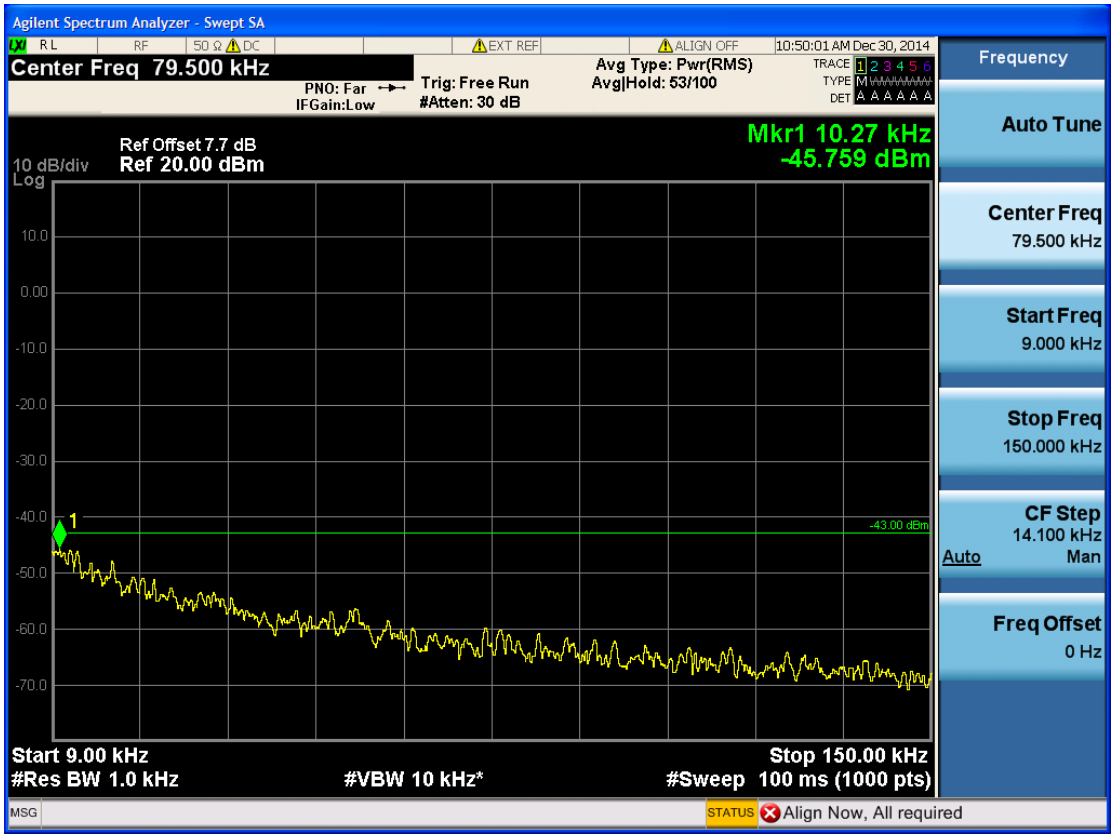

(Plot 5.5.2 A3: Channel 512: 1850.20MHz @ Traffic @ PCS1900)


(Plot 5.5.2 A4: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

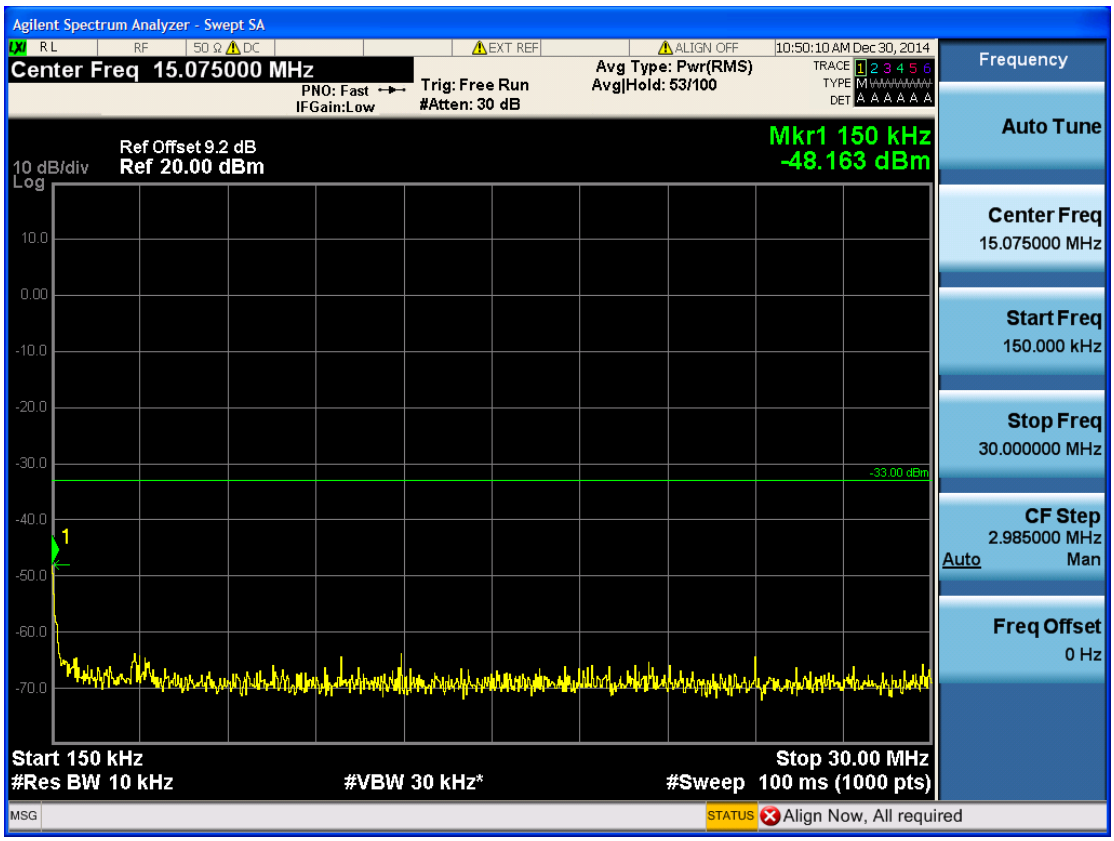



(Plot 5.5.2 A5: Channel 512: 1850.20MHz @ Traffic @ PCS1900)

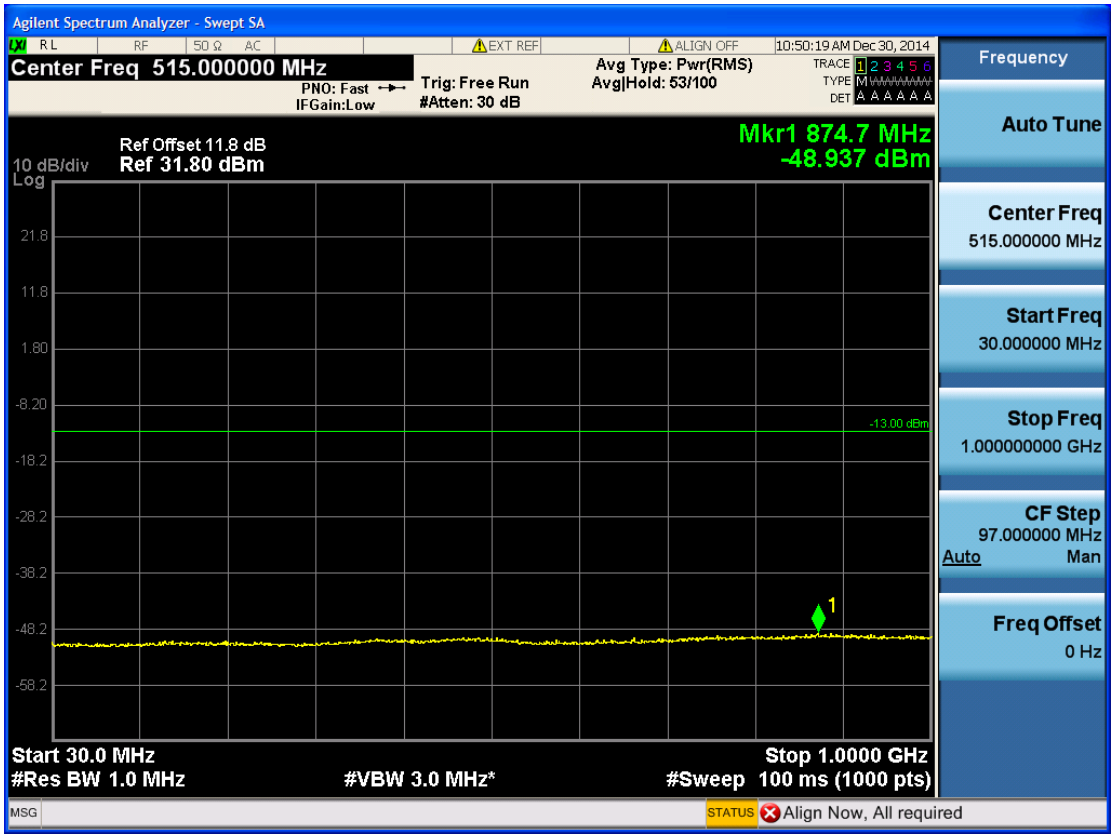

(Plot 5.5.2 A6: Channel 512: 1850.20MHz @ Traffic @ PCS1900)



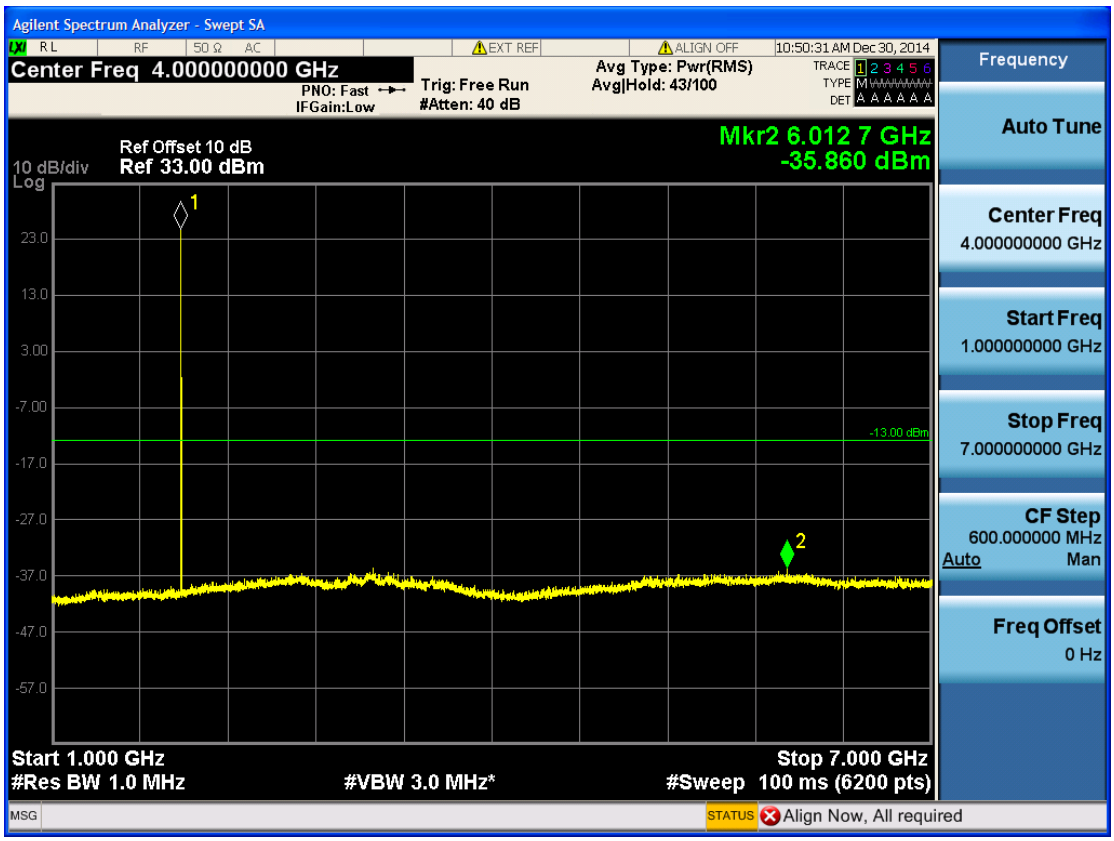

(Plot 5.5.2 B1: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



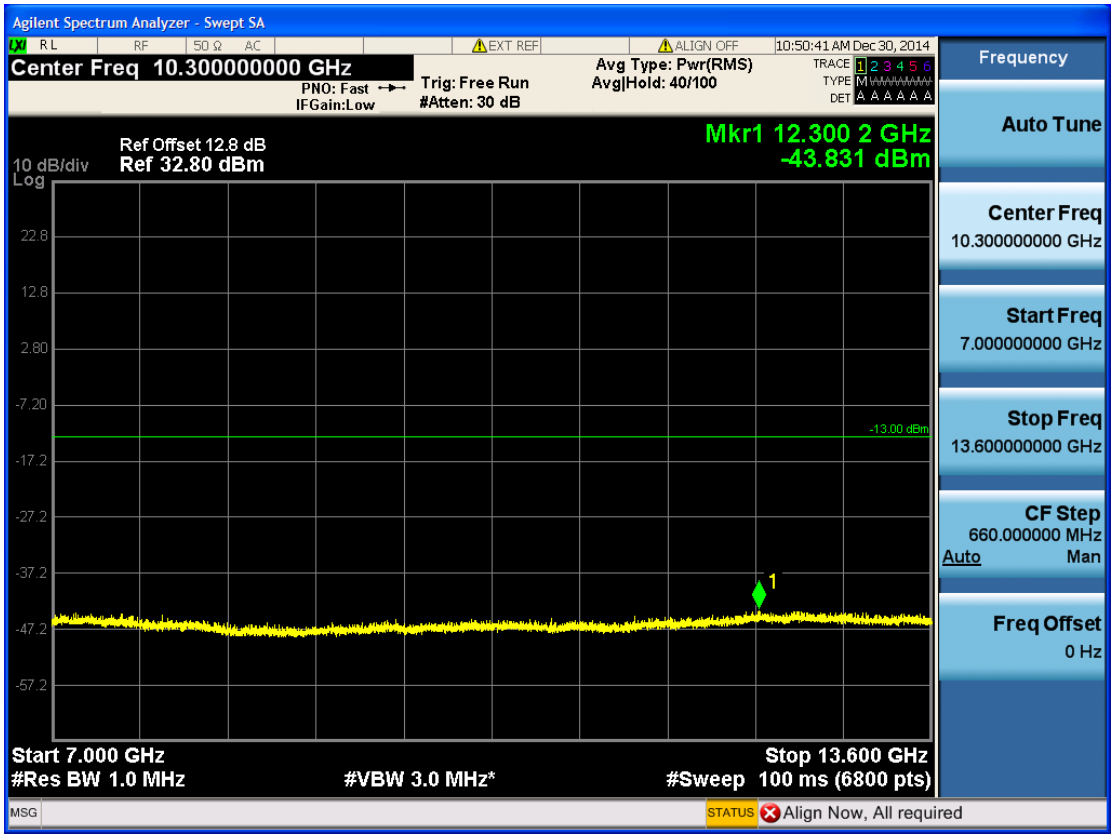

(Plot 5.5.2 B2: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



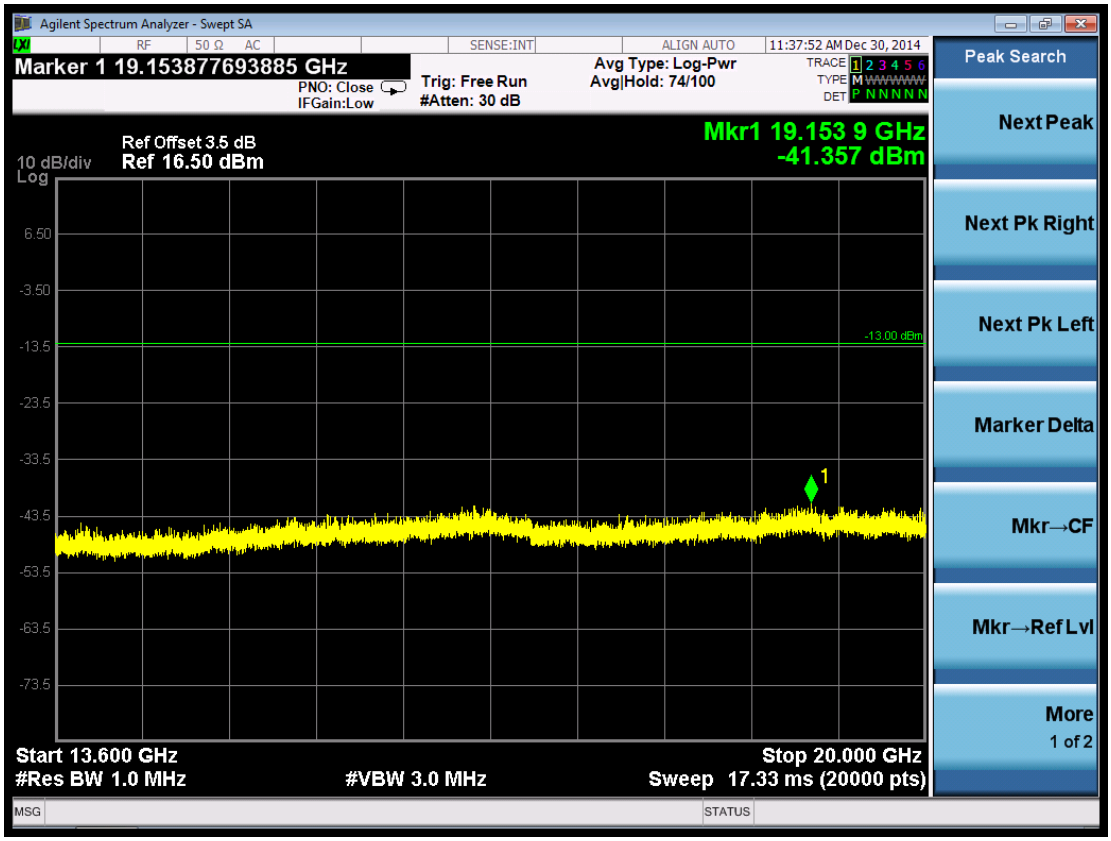

(Plot 5.5.2 B3: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



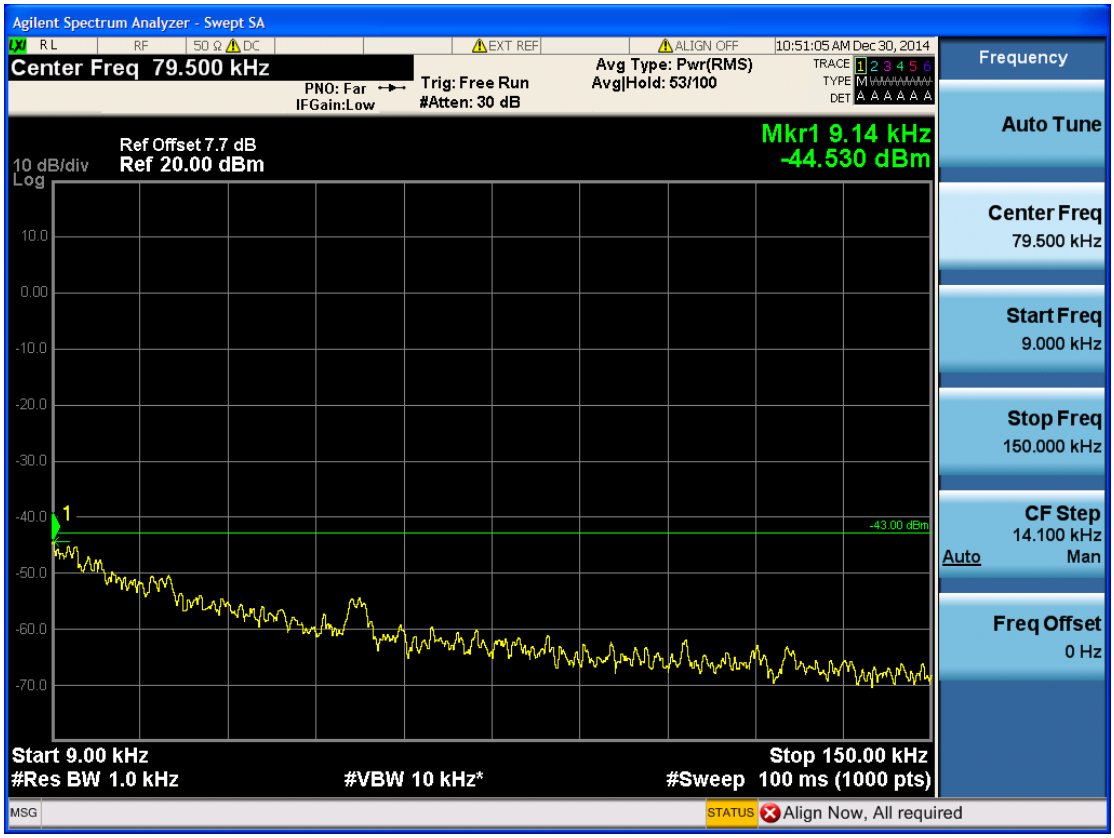

(Plot 5.5.2 B4: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



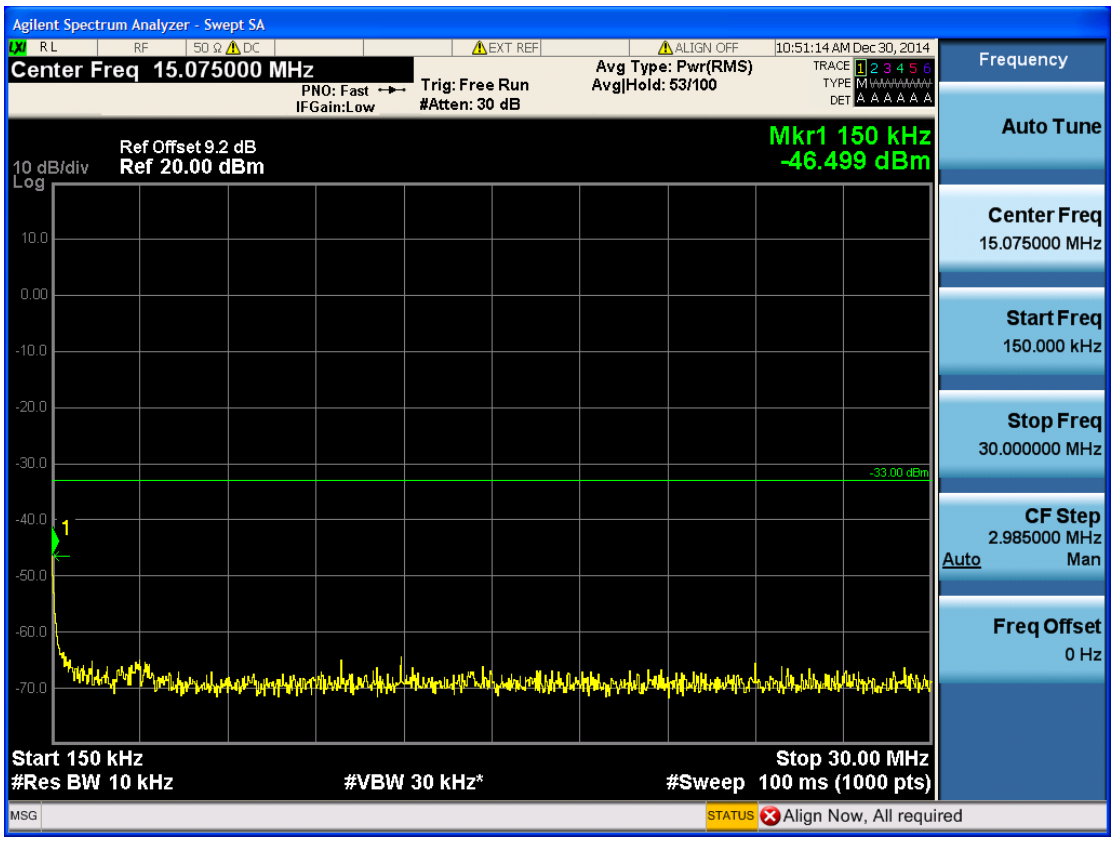

(Plot 5.5.2 B5: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



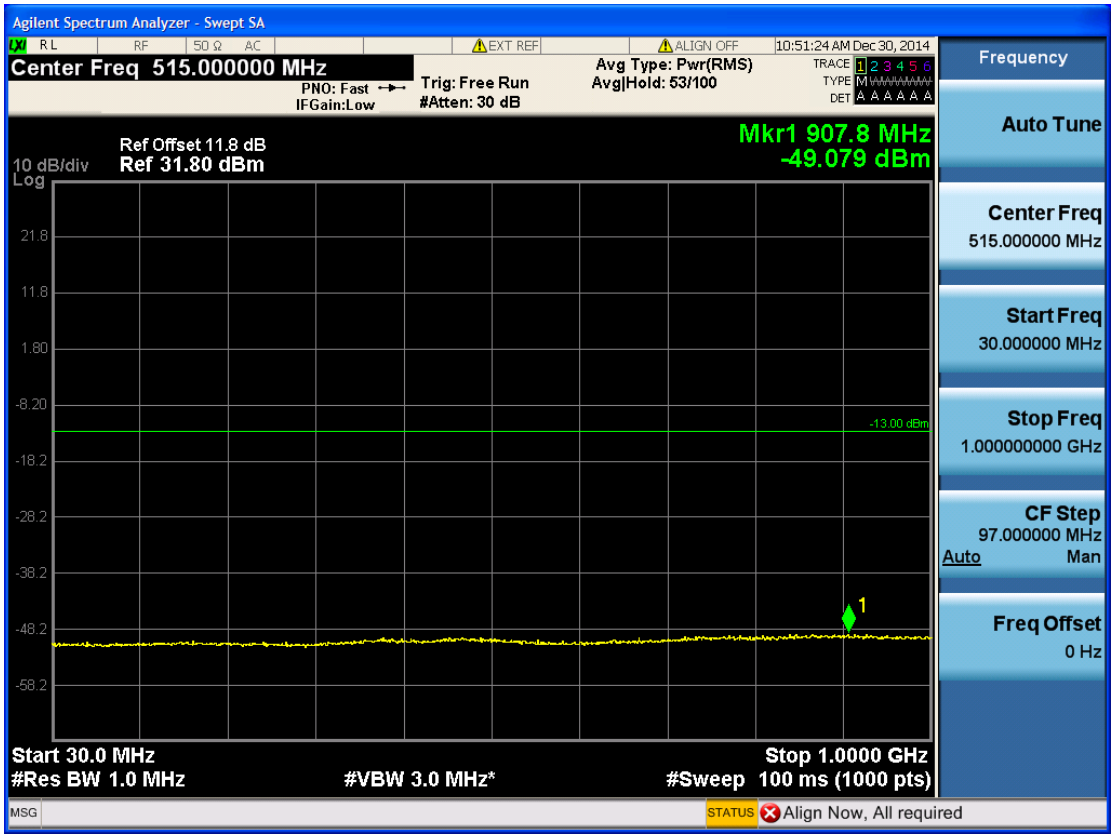

(Plot 5.5.2 B6: Channel 661: 1880.00MHz @ Traffic @ PCS1900)



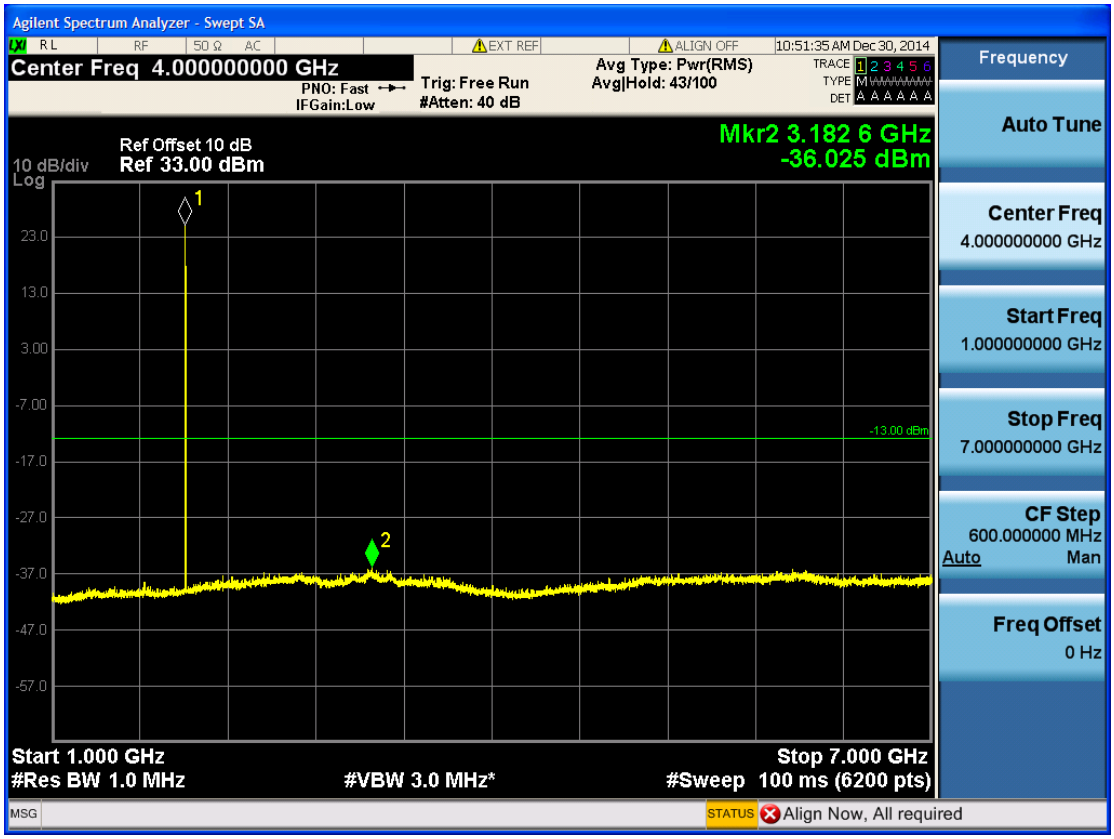

(Plot 5.5.2 C1: Channel 810: 1909.80MHz @ Traffic @ PCS1900)



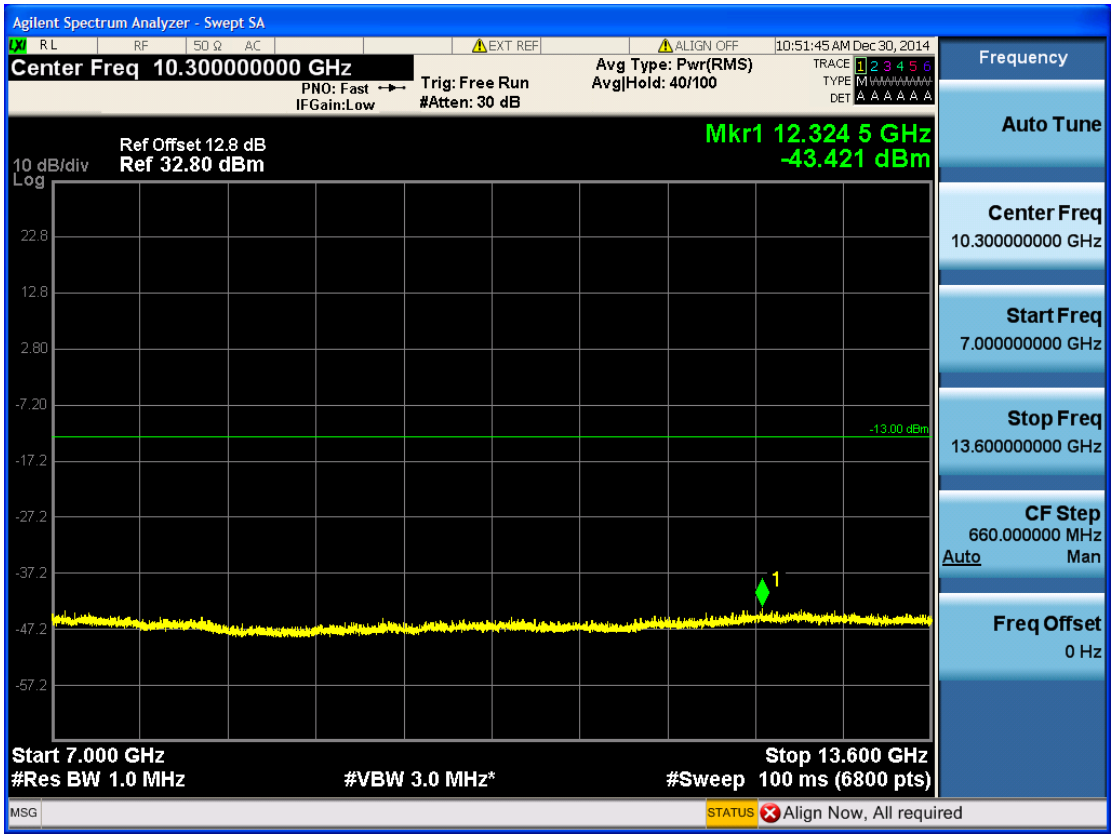

(Plot 5.5.2 C2: Channel 810: 1909.80MHz @ Traffic @ PCS1900)



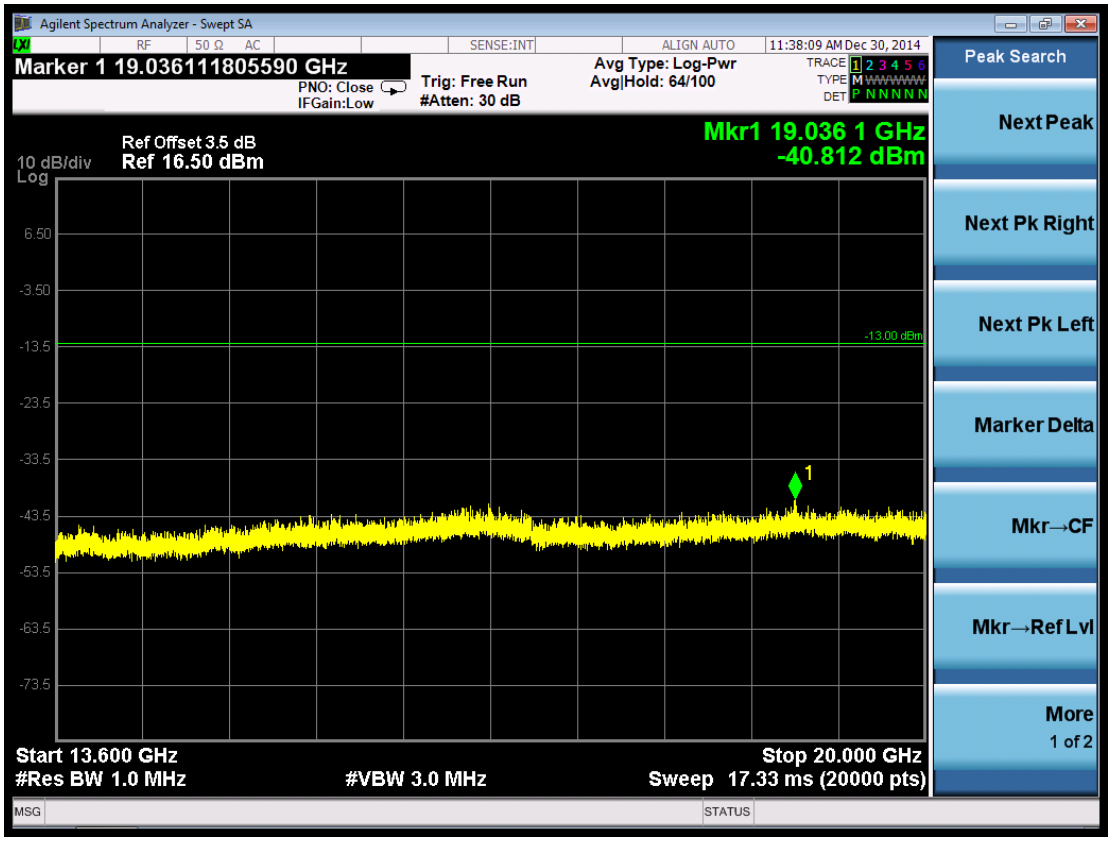

(Plot 5.5.2 C3: Channel 810: 1909.80MHz @ Traffic @ PCS1900)




(Plot 5.5.2 C4: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

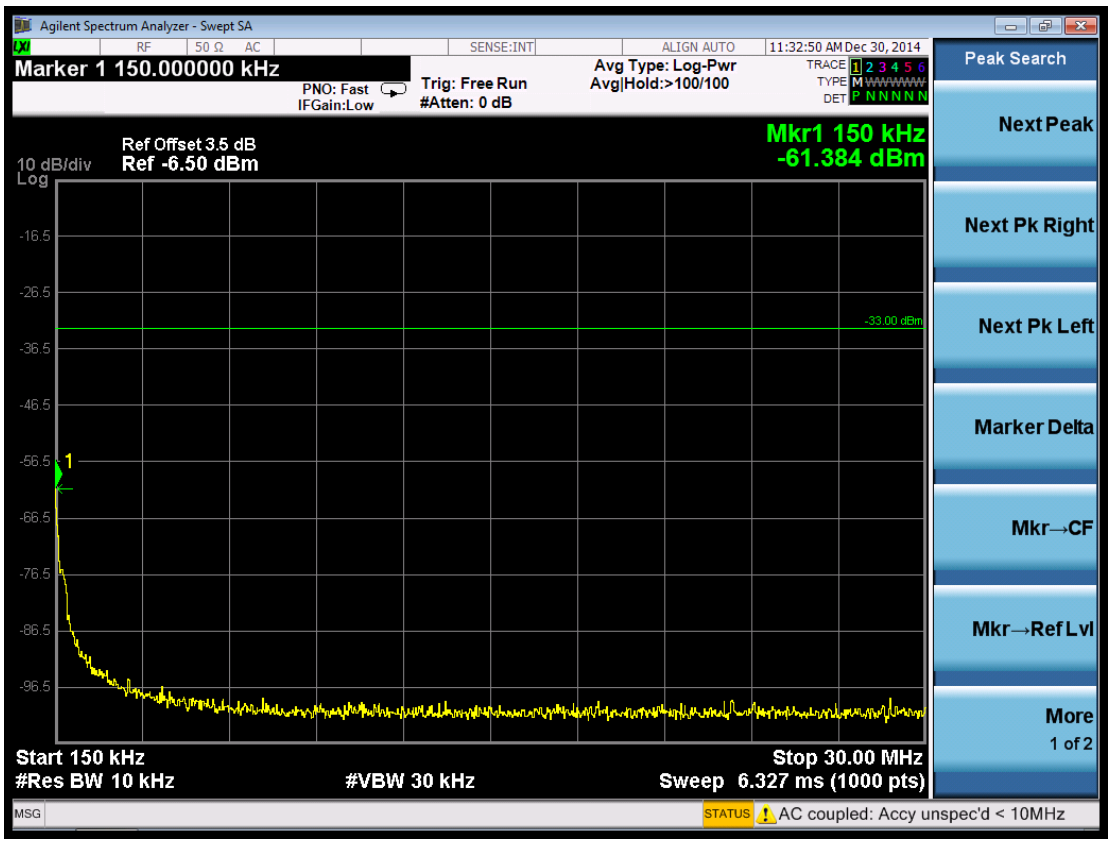



(Plot 5.5.2 C5: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

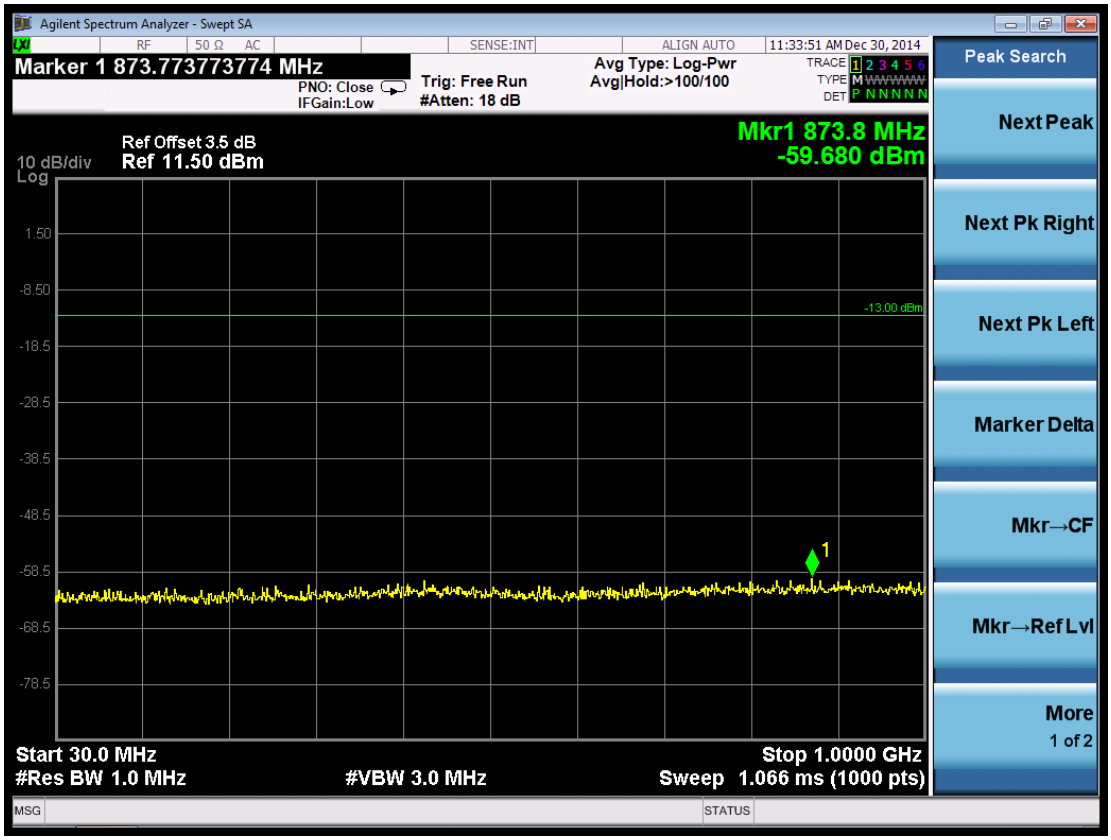



(Plot 5.5.2 C6: Channel 810: 1909.80MHz @ Traffic @ PCS1900)

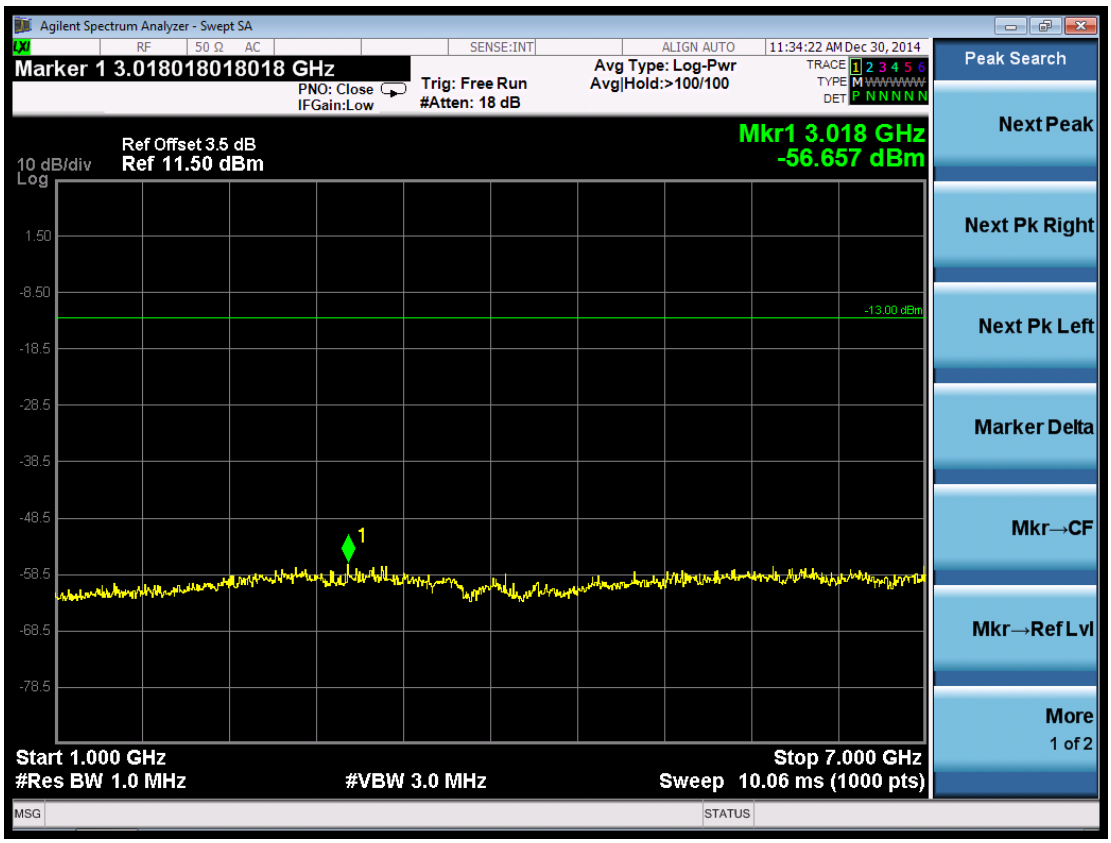

(Plot 5.5.2 D1: Idle @ PCS1900)



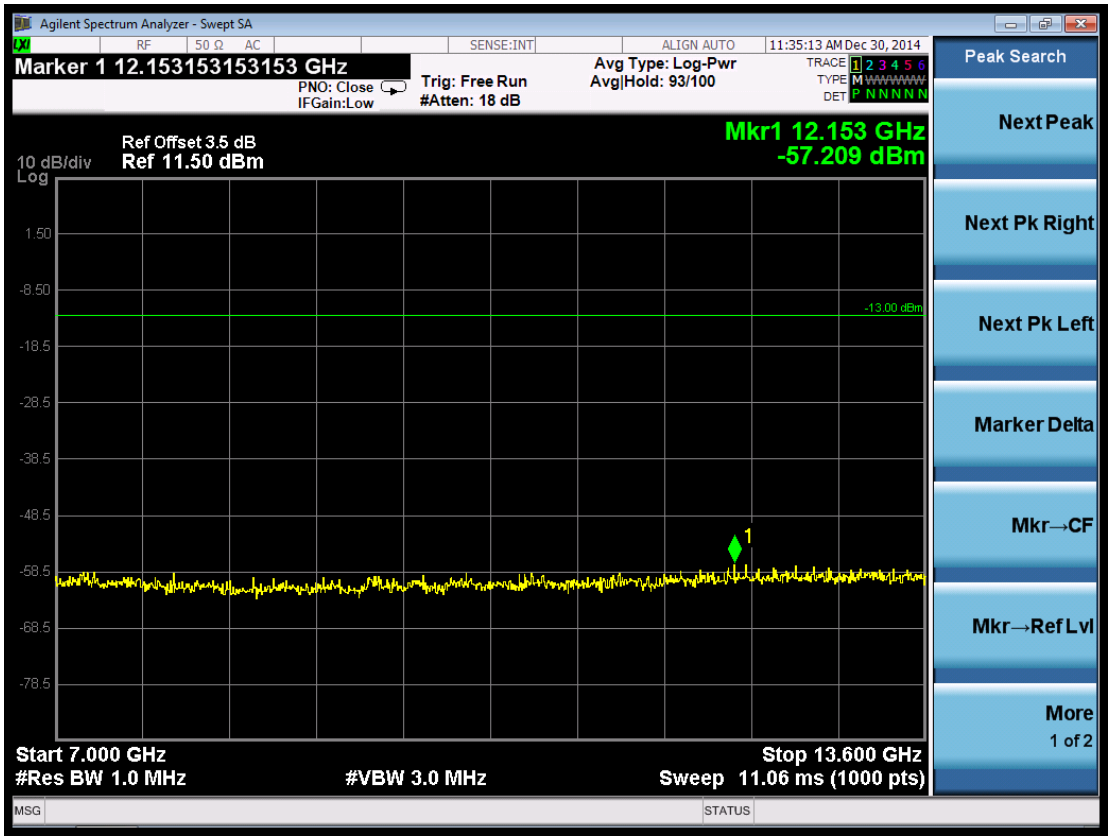

(Plot 5.5.2 D2: Idle @ PCS1900)




(Plot 5.5.2 D3: Idle @ PCS1900)




(Plot 5.5.2 D4: Idle @ PCS1900)




(Plot 5.5.2 D5: Idle @ PCS1900)


(Plot 5.5.2 D6: Idle @ PCS1900)

## 5.6 Frequency Stability Test

**TEST APPLICABLE**

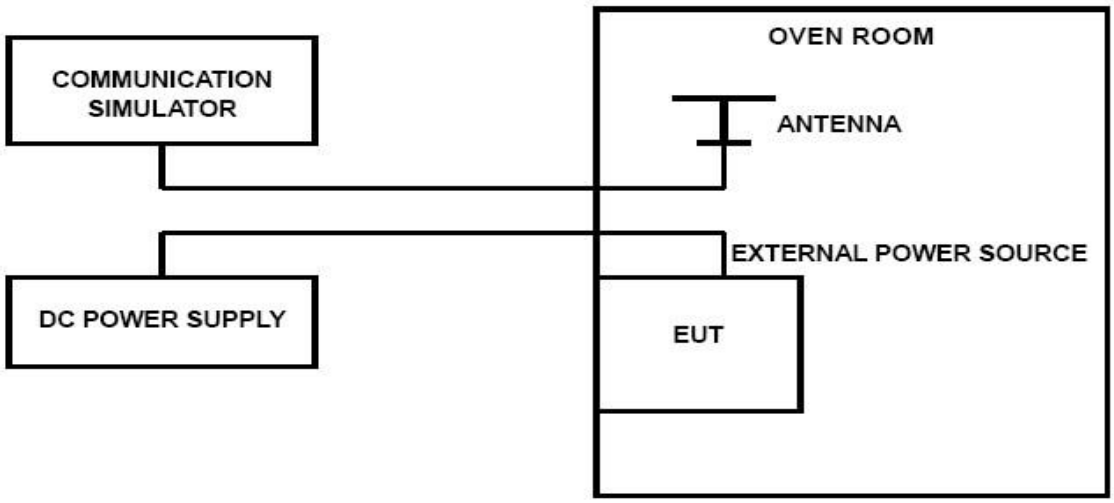
1. According to FCC Part 2 Section 2.1055 (a) (1), the frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃ centigrade.
2. According to FCC Part 2 Section 2.1055 (a) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried voltage equipment.

**TEST PROCEDURE**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature;
2. Subject the EUT to overnight soak at -30℃;
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on middle channel of PCS 1900 and GSM850, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
5. Premeasured carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 0.5 hours unpowered, to allow any self-heating to stabilize, before continuing;
6. Subject the EUT to overnight soak at +50℃;
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming;
8. Repeat the above measurements at 10℃ increments from +50℃ to -30℃. Allow at least 0.5 hours at each temperature, unpowered, before making measurements;
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure;

**TEST CONFIGURATION**



**TEST LIMITS**

***For Hand carried battery powered equipment***

According to the JTC standard the frequency stability of the carrier shall be accurate to within 2.50 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.50VDC and 4.20VDC, with a nominal voltage of 3.70DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

***For equipment powered by primary supply voltage***

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d) (1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

**TEST RESULTS**

| GSM/TM1/GSM850/Channel 190 | | | | | |
|---|---|---|---|---|---|
| **DC Power** | **Temperature (℃)** | **Frequency error(Hz)** | **Frequency error(ppm)** | **Limit (ppm)** | **Verdict** |
| 3.50 | 25 | 85 | 0.102 | 2.50 | PASS |
| 3.70 | 25 | 122 | 0.146 | 2.50 | PASS |
| 4.20 | 25 | 78 | 0.093 | 2.50 | PASS |
| 3.70 | -30 | 95 | 0.114 | 2.50 | PASS |
| 3.70 | -20 | 86 | 0.103 | 2.50 | PASS |
| 3.70 | -10 | 108 | 0.129 | 2.50 | PASS |
| 3.70 | 0 | 95 | 0.114 | 2.50 | PASS |
| 3.70 | 10 | 141 | 0.169 | 2.50 | PASS |
| 3.70 | 20 | 93 | 0.111 | 2.50 | PASS |
| 3.70 | 30 | 76 | 0.091 | 2.50 | PASS |
| 3.70 | 40 | 93 | 0.111 | 2.50 | PASS |
| 3.70 | 50 | 87 | 0.104 | 2.50 | PASS |

| GSM/TM1/PCS1900/Channel 661 | | | | | |
|---|---|---|---|---|---|
| DC Power | Temperature (℃) | Frequency error(Hz) | Frequency error(ppm) | Limit (ppm) | Verdict |
| 3.50 | 20 | 242 | 0.129 | 2.50 | PASS |
| 3.70 | 20 | 228 | 0.121 | 2.50 | PASS |
| 4.20 | 20 | 192 | 0.102 | 2.50 | PASS |
| 3.70 | -30 | 241 | 0.128 | 2.50 | PASS |
| 3.70 | -20 | 184 | 0.098 | 2.50 | PASS |
| 3.70 | -10 | 204 | 0.109 | 2.50 | PASS |
| 3.70 | 0 | 136 | 0.072 | 2.50 | PASS |
| 3.70 | 10 | 271 | 0.144 | 2.50 | PASS |
| 3.70 | 20 | 145 | 0.077 | 2.50 | PASS |
| 3.70 | 30 | 199 | 0.106 | 2.50 | PASS |
| 3.70 | 40 | 173 | 0.092 | 2.50 | PASS |
| 3.70 | 50 | 229 | 0.122 | 2.50 | PASS |

END