# FCC Radio Test Report

## FCC ID: QIPBGS12

**This report concerns: Original Grant**

| | |
|---|---|
| **Project No.** | : 1902H007 |
| **Equipment** | : GSM/GPRS Wireless Module |
| **Test Model** | : BGS12 |
| **Series Model** | : N/A |
| **Applicant** | : Gemalto M2M GmbH |
| **Address** | : Gemalto M2M GmbH , Siemensdamm 50 Berlin Germany |

| | |
|---|---|
| **Date of Receipt** | : Feb. 28, 2019 |
| **Date of Test** | : Mar. 01, 2019 ~ Mar. 12, 2019 |
| **Issued Date** | : Mar. 22, 2019 |
| **Tested by** | : BTL Inc. |

**Technical Manager** : David Mao
(David Mao)

**Authorized Signatory** : James Chiu
(James Chiu)


**BTL INC.**

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Shanghai 201210,China
TEL: +86-021-61765666


Certificate # 5123.03

## Declaration

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, A2LA, or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

**BTL**'s laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Table of Contents Page

## REPORT ISSUED HISTORY

| Report Version | Description | Issued Date |
|---|---|---|
| R00 | Original Issue. | Mar. 22, 2019 |

## 1. GENERAL SUMMARY

| | | |
|---|---|---|
| Equipment | : | GSM/GPRS Wireless Module |
| Brand Name | : | CINTERION |
| Test Model | : | BGS12 |
| Series Model | : | N/A |
| Applicant | : | Gemalto M2M GmbH |
| Manufacturer | : | Gemalto M2M GmbH |
| Address | : | Gemalto M2M GmbH , Siemensdamm 50 Berlin Germany |
| Date of Test | : | Mar. 01, 2019 ~ Mar. 12, 2019 |
| Test Sample | : | Engineering Sample No.: B190300056 |
| Standard(s) | : | 47 CFR FCC Part 24 Subpart E<br>47 CFR FCC Part 2<br>ANSI/TIA/EIA-603-E-2016<br>KDB 971168 D01 Power Meas License Digital Systems v03r01 |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-2-1902H007) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

**Test results included in this report are only for the PCS1900.**

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC Part 24 Subpart E& Part 2 | | | |
|---|---|---|---|
| Standard(s) Section | Test Item | Judgment | Tested By |
| 2.1046 & 24.232(c) | Radiated power | PASS | Krain Wu |
| 2.1046 & 24.232(c) | Maximum Output Power | PASS | Krain Wu |
| 2.1049 & 24.238(a) | Occupied Bandwidth | PASS | Krain Wu |
| 2.1051 & 24.238(a) | Conducted Spurious Emissions | PASS | Krain Wu |
| 2.1053 & 24.238(a) | Radiated Spurious Emissions | PASS | Krain Wu |
| 24.238(a) | Band Edge Measurements | PASS | Krain Wu |
| 24.232(d) | Peak To Average Ratio | PASS | Krain Wu |
| 2.1055 & 24.235 | Frequency Stability | PASS | Krain Wu |

NOTE:

(1)" N/A" denotes test is not applicable to this device.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210,China
BTL's test firm number for FCC: 476765
BTL's designation number for FCC: CN1241

## 2.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

The BTL measurement uncertainty as below table:

A. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U,(dB) |
|---|---|---|---|---|
| SH-CB01 | CISPR | 9KHz ~ 30MHz | V | 3.79 |
| | | 9KHz ~ 30MHz | H | 3.57 |
| | | 30MHz ~ 200MHz | V | 4.12 |
| | | 30MHz ~ 200MHz | H | 3.20 |
| | | 200MHz ~ 1,000MHz | V | 3.12 |
| | | 200MHz ~ 1,000MHz | H | 3.18 |

| Test Site | Method | Measurement Frequency Range | U,(dB) |
|---|---|---|---|
| SH-CB01 | CISPR | 1GHz ~ 6GHz | 4.40 |
| | | 6GHz ~ 18GHz | 4.86 |
| | | 18GHz ~ 26.5GHz | 3.64 |
| | | 26.5GHz ~ 40GHz | 3.78 |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | | | | | |
|---|---|---|---|---|---|
| Equipment | GSM/GPRS Wireless Module | | | | |
| Brand Name | CINTERION | | | | |
| Test Model | BGS12 | | | | |
| Series Model | N/A | | | | |
| Model Difference(s) | N/A | | | | |
| Hardware Version | B2 | | | | |
| Software Version | 00.915 | | | | |
| Antenna Type | Internal Antenna | | | | |
| Antenna Gain | PCS1900/GPRS1900 | 2.7dBi | | | |
| IMEI No. | 353514100000325 | | | | |
| Modulation Type | GSM/GPRS | | GMSK | | |
| Operation Frequency | GSM/GPRS | | 1850.2MHz ~ 1909.8MHz | | |
| Max. EIRP Power | GSM | | GMSK | 29.73 | dBm |
| | GPRS | | GMSK | 29.76 | dBm |
| Power Source | DC power supply. | | | | |
| Power Rating | DC 3.8V | | | | |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. EUT operation frequency: 824.2MHz ~ 848.8MHz; 1850.2MHz ~ 1909.8MHz. Only 1850.2MHz ~ 1909.8MHz test data record in this report.

## 3.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

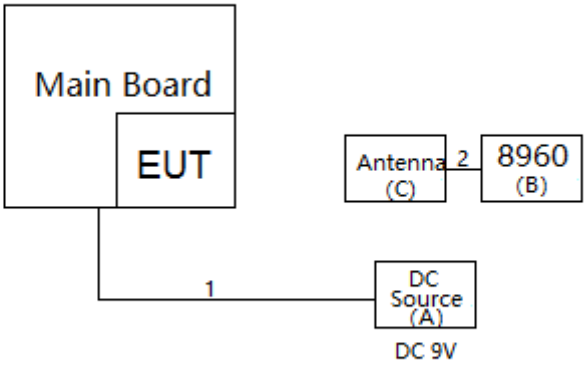
Following channel(s) was (were) selected for the final test as listed below:

| GSM MODE | | | |
|---|---|---|---|
| Test Item | Available Channel | Tested Channel | Mode |
| EIRP | 512 to 810 | 512, 661, 810 | GSM, GPRS |
| Maximum Output Power | 512 to 810 | 512, 661, 810 | GSM, GPRS |
| Occupied Bandwidth | 512 to 810 | 512, 661, 810 | GSM, GPRS |
| Condcudeted Emission | 512 to 810 | 661 | GSM, GPRS |
| Radiated Emission | 512 to 810 | 661 | GSM, GPRS |
| Band Edge | 512 to 810 | 512, 810 | GSM, GPRS |
| Peak to Average Ratio | 512 to 810 | 512, 661, 810 | GSM, GPRS |
| Frequency Stability | 512 to 810 | 661 | GSM |

**EUT TEST CONDITIONS:**

| Test Item | Environmental Conditions | Test Voltage |
|---|---|---|
| EIRP | 21°C, 54%RH | DC 3.8V |
| Maximum Output Power | 21°C, 54%RH | DC 3.8V |
| Occupied Bandwidth | 21°C, 54%RH | DC 3.8V |
| Conducted Emission | 21°C, 54%RH | DC 3.8V |
| Radiated Emission | 21°C, 54%RH | DC 3.8V |
| Band Edge | 21°C, 54%RH | DC 3.8V |
| Peak to Average Ratio | 21°C, 54%RH | DC 3.8V |
| Frequency Stability | Normal and Extreme | Normal and Extreme |

## 3.3 BLOCKDIGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED FOR RADIATED




## 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. |
|---|---|---|---|---|
| A | DC Power Supply | GW | GPC3030ND | N/A |
| B | 8960 SERIES 10 WIRELESS COMMUNICATIONS TEST SET | Agilent | E5515C | GB45070942 |
| C | Double-Ridged Waveguide Horn Antenna | ETS-Lindgren | 3117 | 00206960 |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| 1 | NO | NO | 1.2M | DC Cable |
| 2 | NO | NO | 1M | Cable |

# 4. TEST RESULT

## 4.1 OUTPUT POWER MEASUREMENT

### 4.1.1 LIMIT

Mobile / Portable station are limited to 2 watts e.i.r.p.

### 4.1.2 TEST PROCEDURE

**EIRP:**

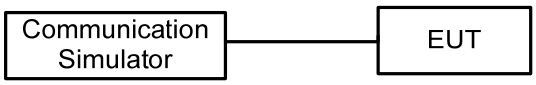
EIRP= Output Power +Antenan gain

**Maximum Output Power:**

The EUT was set up for the maximum power with GSM and GPRS link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

### 4.1.3 TESTSETUP LAYOUT

Output Power Measurement




### 4.1.4 TEST DEVIATION

No deviation

### 4.1.5 TEST RESULTS

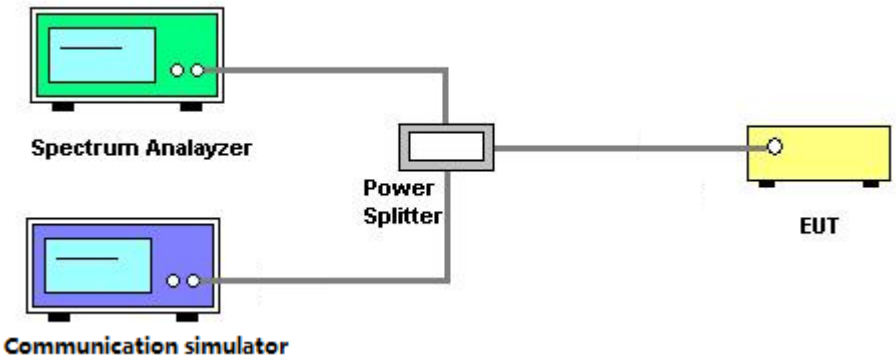
Please refer to the Appendix A.

## 4.2 OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 TEST PROCEDURE

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth and 26dB bandwidth.

### 4.2.2 TEST SETUP LAYOUT




### 4.2.3 TEST DEVIATION

No deviation

### 4.2.4 TEST RESULTS

Please refer to the Appendix B.

## 4.3 CONDUCTED EMISSIONS MEASUREMENT

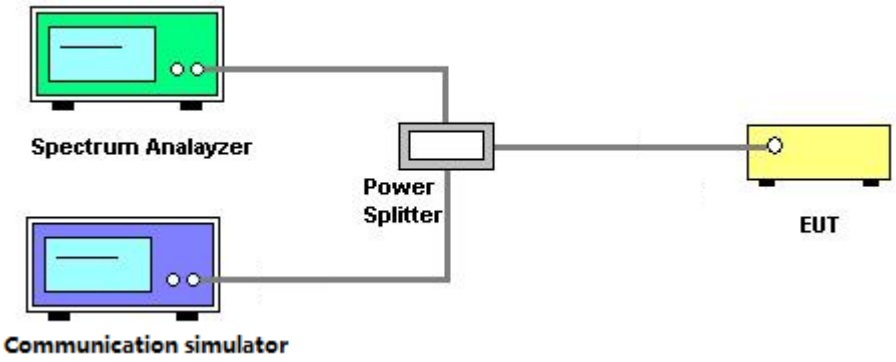
### 4.3.1 LIMIT

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 emission limit equal to -13dBm.

### 4.3.2 TEST PROCEDURES

1. The testing follows FCC KDB 971168 v03r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set RBW>=1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43+10log(P)dB below the transmitter power P(Watts)
   =P(W)-[43+10log(P)](dB)
   =[30+10log(P)](dBm)-[43+10log(P)](dB)
   =-13dBm

### 4.3.3 TESTSETUP LAYOUT




### 4.3.4 TESTDEVIATION

No deviation

### 4.3.5 TEST RESULTS

Please refer to the Appendix C.

## 4.4 RADIATED EMISSIONS MEASUREMENT

### 4.4.1 LIMIT

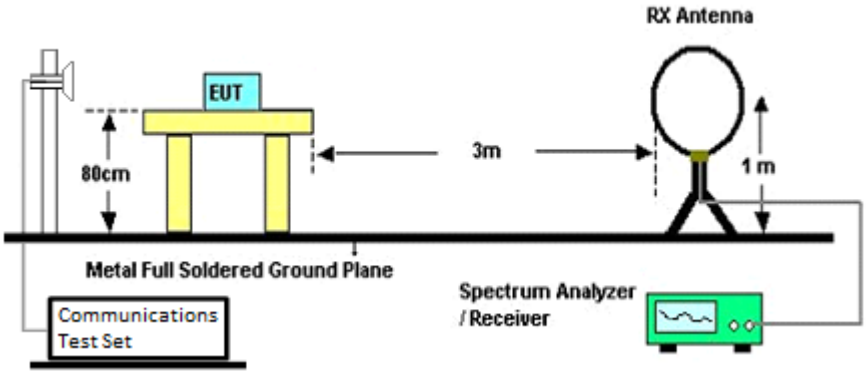
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

### 4.4.2 TEST PROCEDURES

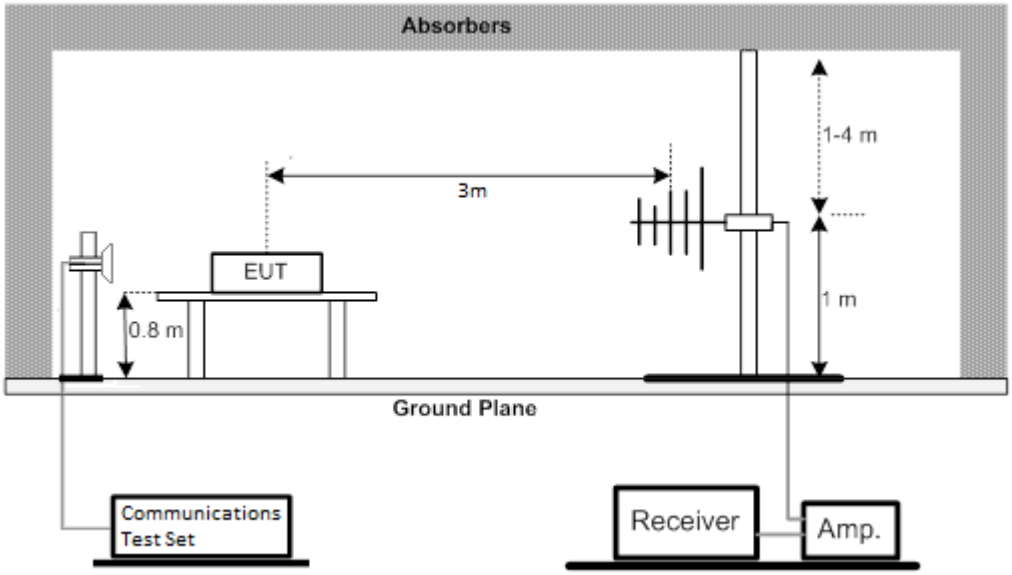
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step a. Record the power level of S.G
3. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

### 4.4.3 TESTSETUP LAYOUT

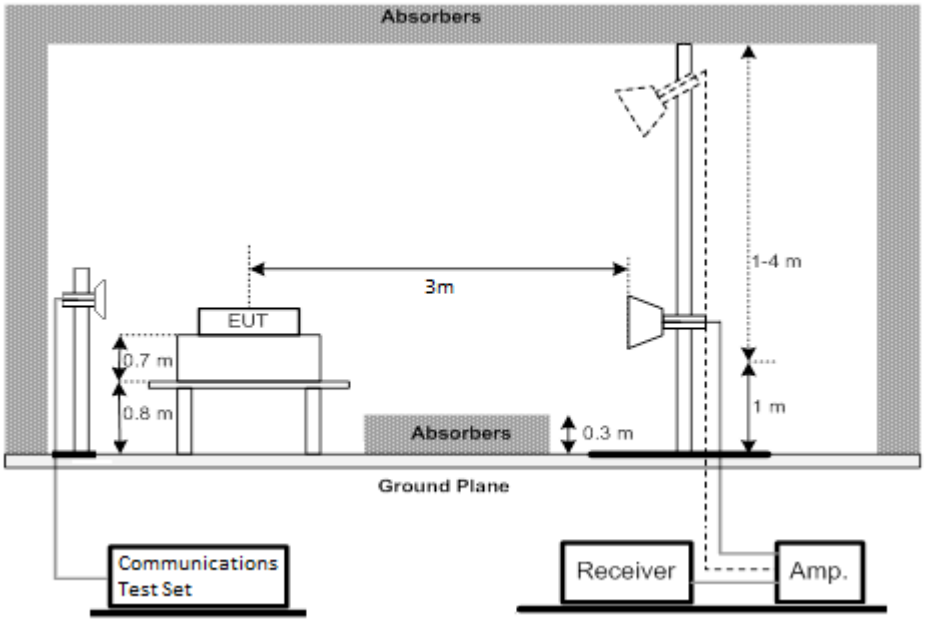
**Below 30MHz**




**30MHz to 1GHz**



**Above 1GHz**




### 4.4.4 TESTDEVIATION

No deviation

### 4.4.5 TEST RESULTS (9KHZ TO 30MHZ)

Please refer to the Appendix D.

### 4.4.6 TEST RESULTS (30MHZ TO 1000MHZ)

Please refer to the Appendix E.

### 4.4.7 TEST RESULTS (ABOVE 1000MHZ)

Please refer to the Appendix F.

## 4.5 BAND EDGE MEASUREMENT

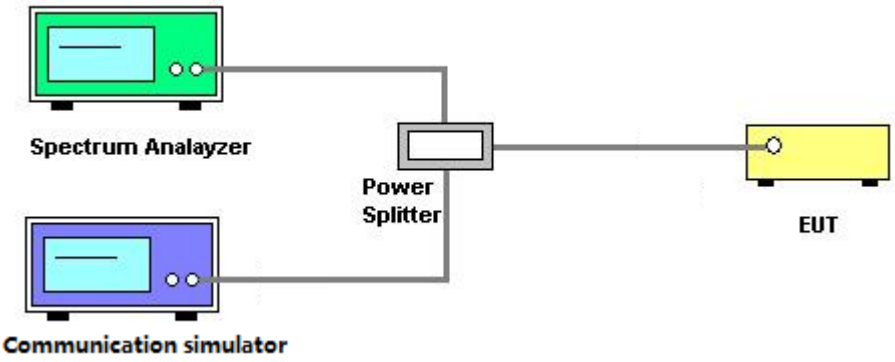
### 4.5.1 LIMIT

A 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. 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.

### 4.5.2 TEST PROCEDURES

1. All measurements were done at low and high operational frequency range.
2. The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM/GPRS).
3. Record the max trace plot into the test report.

### 4.5.3 TESTSETUP LAYOUT




### 4.5.4 TESTDEVIATION

No deviation

### 4.5.5 TEST RESULTS

Please refer to the Appendix G.

## 4.6 PEAK TO AVERAGE RATIO MEASUREMENT

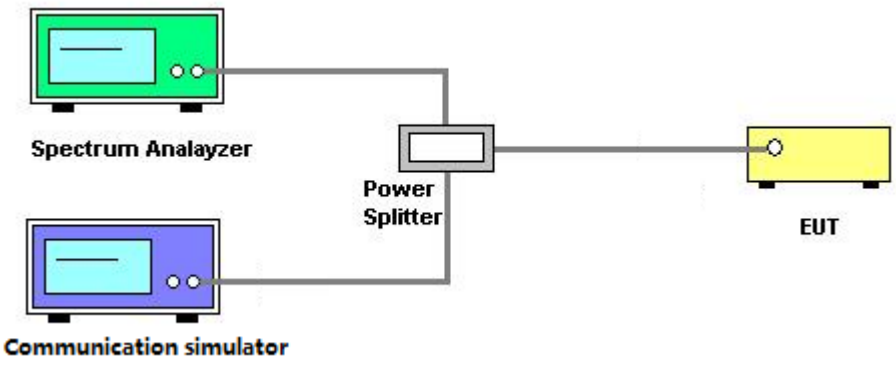
### 4.6.1 LIMIT

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 4.6.2 TEST PROCEDURES

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

### 4.6.3 TESTSETUP LAYOUT




### 4.6.4 TESTDEVIATION

No deviation

### 4.6.5 TEST RESULTS

Please refer to the Appendix H.

## 4.7 FREQUENCY STABILITY MEASUREMENT

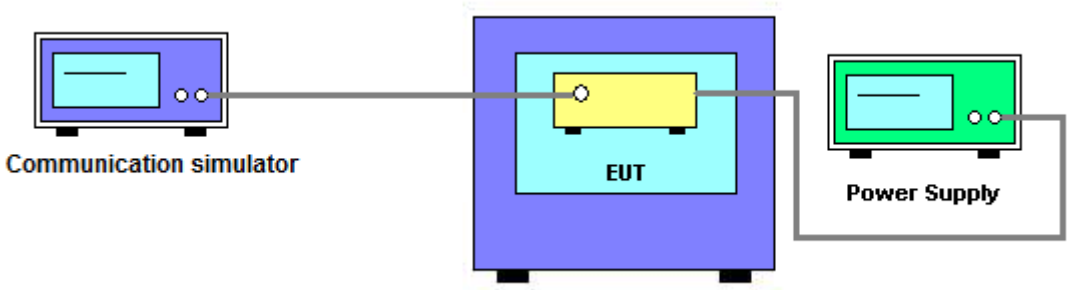
### 4.7.1 LIMIT

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

### 4.7.2 TEST PROCEDURES

1. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
2. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
3. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5°C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. The frequency error was recorded frequency error from the communication simulator.

### 4.7.3 TESTSETUP LAYOUT




### 4.7.4 TESTDEVIATION

No deviation

### 4.7.5 TEST RESULTS

Please refer to the Appendix I.

## 5. LIST OF MEASUREMENT EQUIPMENTS

| Radiated Emission Measurement | | | | | |
|---|---|---|---|---|---|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Pre-Amplifier | emci | EMC184045SE | 980409 | Mar. 31, 2019 |
| 2 | Pre-Amplifier | emci | EMC012645SE | 980421 | Mar. 31, 2019 |
| 3 | Pre-Amplifier | emci | EMC9135 | 980400 | Mar. 31, 2019 |
| 4 | Double Ridged Broadband Horn Antenna | Schwarzbeck | BBHA 9120D | 9120D-1787 | Mar. 31, 2019 |
| 5 | Double-Ridged Waveguide Horn Antenna | ETS-Lindgren | 3116C | 00203919 | Mar. 31, 2019 |
| 6 | TRILOG Broadband Antenna | Schwarzbeck | VULB 9168 | 719 | Mar. 31, 2019 |
| 7 | Cable | N/A | EMC102-SM-SM-6000 | 170336 | Jun. 10, 2019 |
| 8 | Cable | N/A | EMC102-KM-KM-2500 | 170627 | Jun. 10, 2019 |
| 9 | Cable | N/A | EMC104-SM-NM-3500 | 170621 | Jun. 10, 2019 |
| 10 | Cable | N/A | EMC104-SM-SM-1000 | 170331 | Jun. 10, 2019 |
| 11 | Cable | N/A | EMC104-SM-SM-7000 | 170330 | Jun. 10, 2019 |
| 12 | Notch Filter | Woken | WFIL-N699-721F-03 | WRS45WC2B2 | Jul. 17, 2019 |
| 13 | Notch Filter | Woken | WFIL-N1710-1755F-01 | WR455FWC2B6 | Jul. 17, 2019 |
| 14 | Notch Filter | Woken | WFIL-N1850-1910F-01 | WRS45WC2B4 | Jul. 17, 2019 |
| 15 | Notch Filter | Woken | WFIL-N824-849F-01 | WRS45WC2B6 | Jul. 17, 2019 |
| 16 | MXE EMI Receiver | Keysight | N9038A | MY57150106 | Mar. 31, 2019 |
| 17 | EXA Spectrum Analyzer | Keysight | N9010A | MY56480545 | Mar. 31, 2019 |
| 18 | 8960 SERIES 10 WIRELESS COMMUNICATIONS TEST SET | Agilent | E5515C | GB45070942 | Nov. 11, 2019 |
| 19 | Controller | MF | MF-7802BS | N/A | N/A |
| 20 | Controller | innco systems GmbH | CO3000-1D | 976 | N/A |
| 21 | EMI Test Receiver | R&S | ESCI | 100082 | Mar. 31, 2019 |
| 22 | Loop Antenna | emci | EMCI LPA600 | 275 | Mar. 31, 2019 |

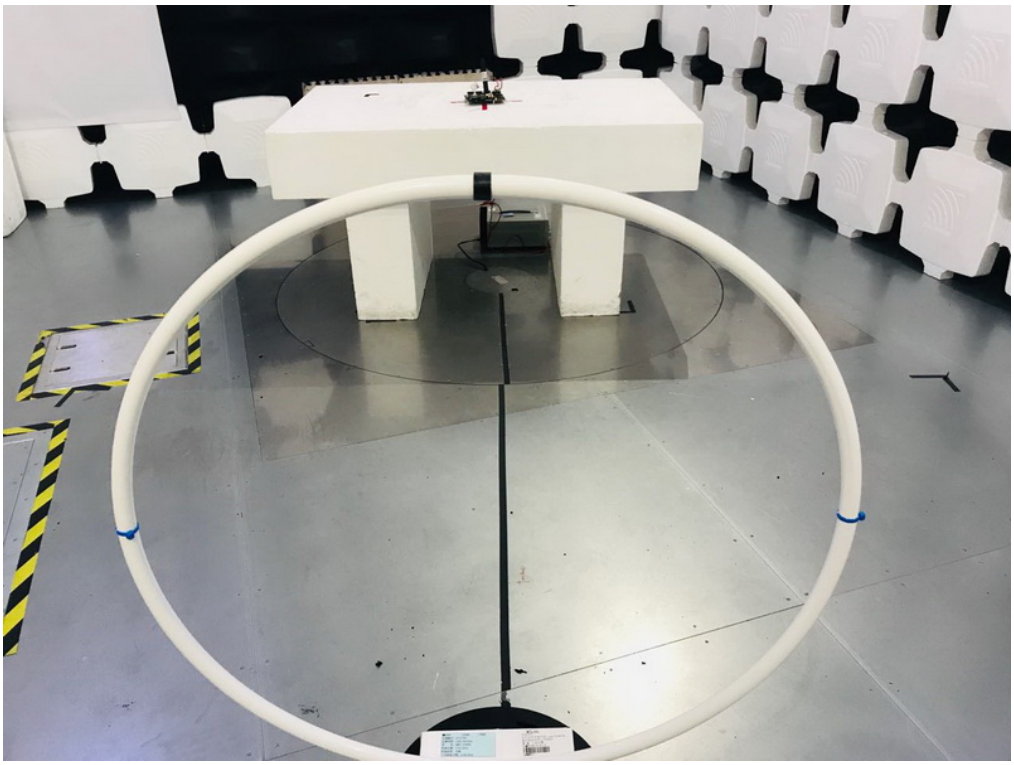
| Conducted Emission & Band Edge & Occupied Bandwidth Measurement | | | | | |
|---|---|---|---|---|---|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | 8960 SERIES 10 WIRELESS COMMUNICATIONS TEST SET | Agilent | E5515C | GB45070942 | Nov. 20, 2019 |
| 2 | Spectrum Analyzer | R&S | FSP40 | 100626 | Mar. 31, 2019 |
| 3 | EXA Spectrum Analyzer | Keysight | N9010A | MY56480579 | Mar. 31, 2019 |
| 4 | Power Divider | JUK | PD-2SF-2060 | N/A | N/A |

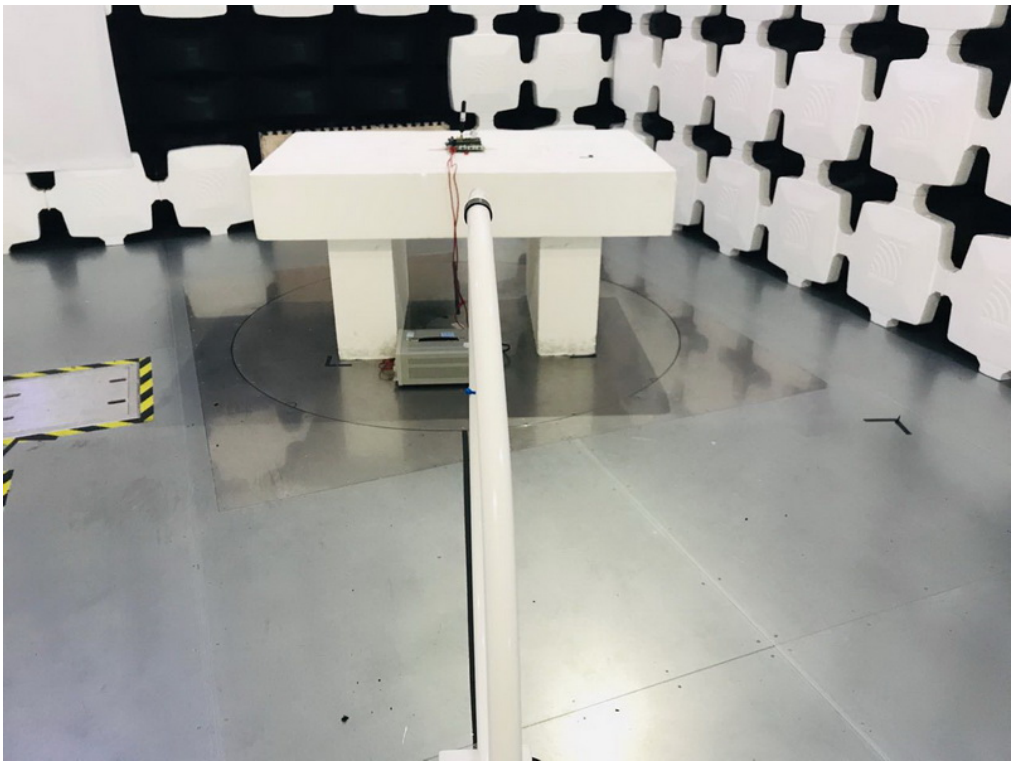
| Frequency Stability Measurement | | | | | |
|---|---|---|---|---|---|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | 8960 SERIES 10 WIRELESS COMMUNICATIONS TEST SET | Agilent | E5515C | GB45070942 | Nov. 20, 2019 |
| 2* | Spectrum Analyzer | R&S | FSP40 | 100626 | Mar. 31, 2019 |
| 3 | EXA Spectrum Analyzer | Keysight | N9010A | MY56480579 | Mar. 31, 2019 |
| 4 | Power Divider | JUK | PD-2SF-2060 | N/A | N/A |

Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.
*All calibration period of equipment list is three year

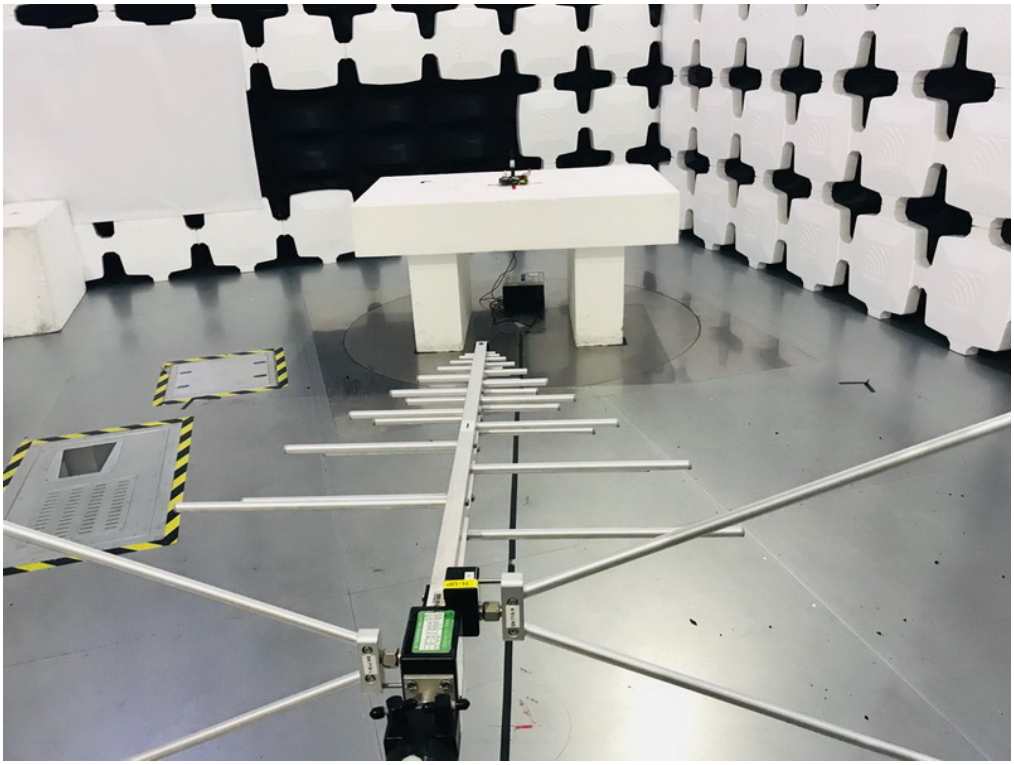
## 6. EUT TEST PHOTO

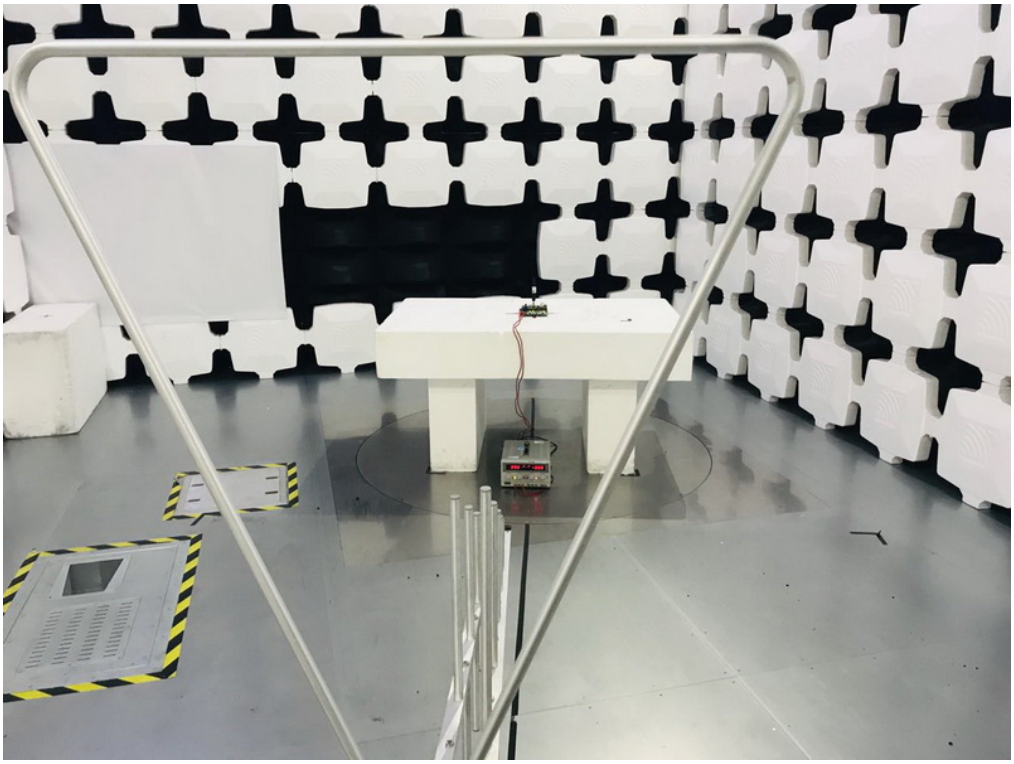
**9 kHz to 30 MHz**



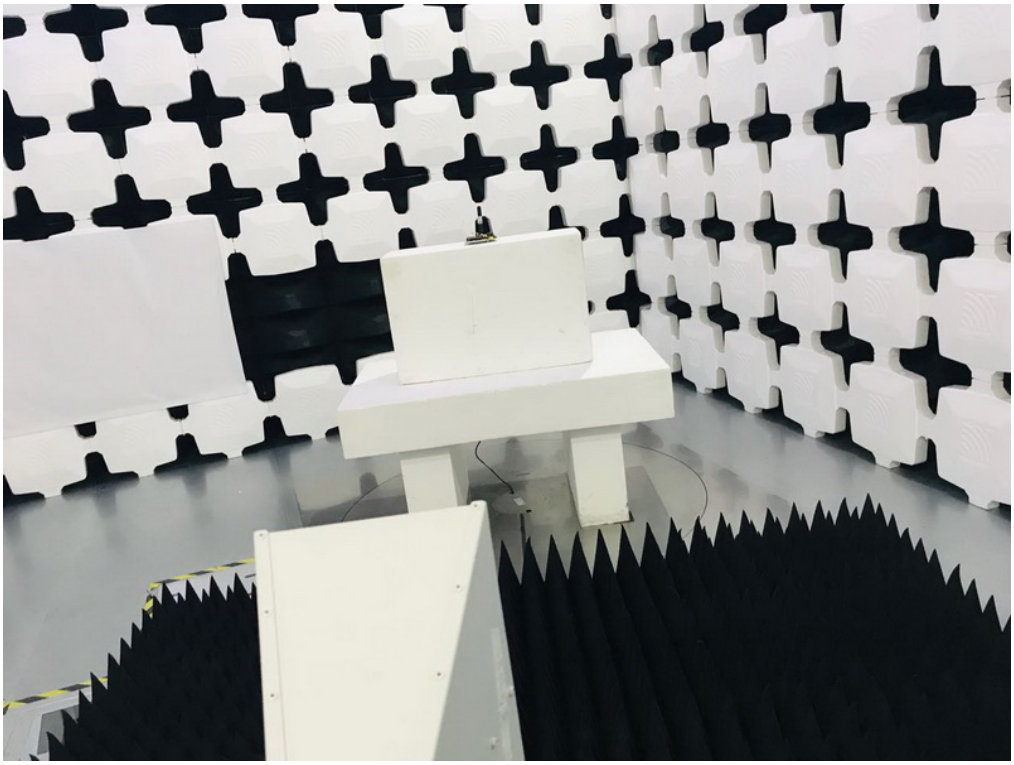


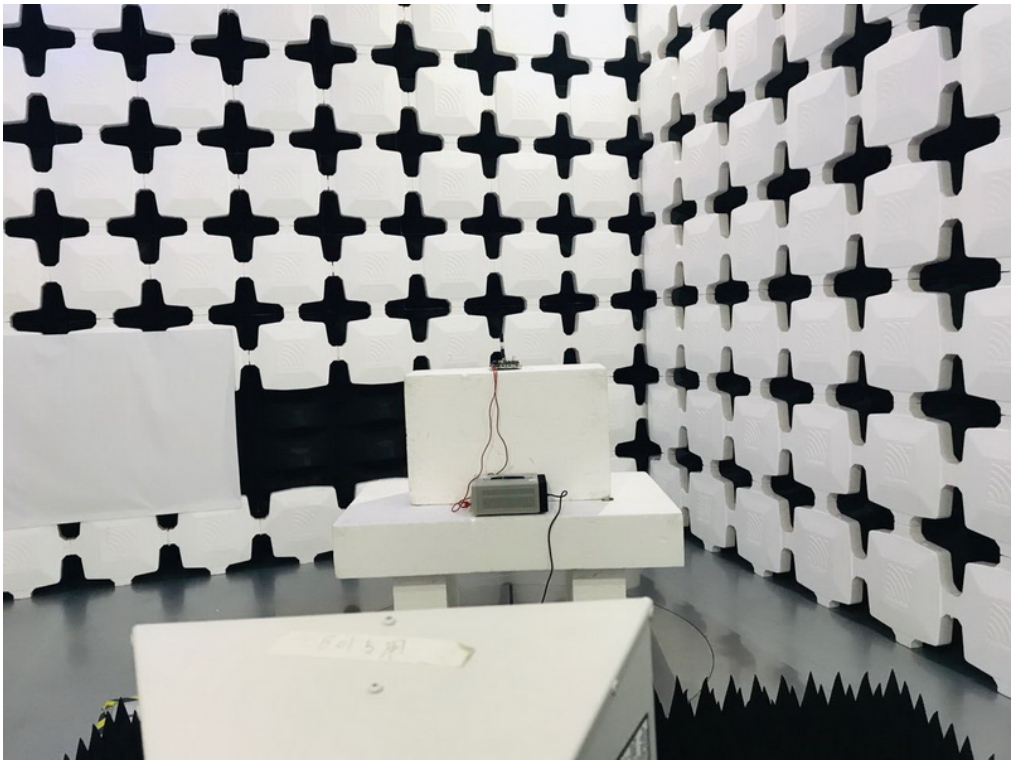
**30 MHz to 1 GHz**





**Above 1 GHz**





# APPENDIX A - MAXIMUM OUTPUT POWER

**Maximum Output Power (dBm):**

| GSM/GPRS | | Burst Output Power | | |
|---|---|---|---|---|
| | | 512CH | 661CH | 810CH |
| | | 1850.2MHz | 1880MHz | 1909.8MHz |
| PCS1900 | | 26.93 | 27.03 | 26.89 |
| GPRS1900 (GMSK) | 1 Tx Slot | 27.03 | 27.06 | 26.96 |

**EIRP Power (dBm):**

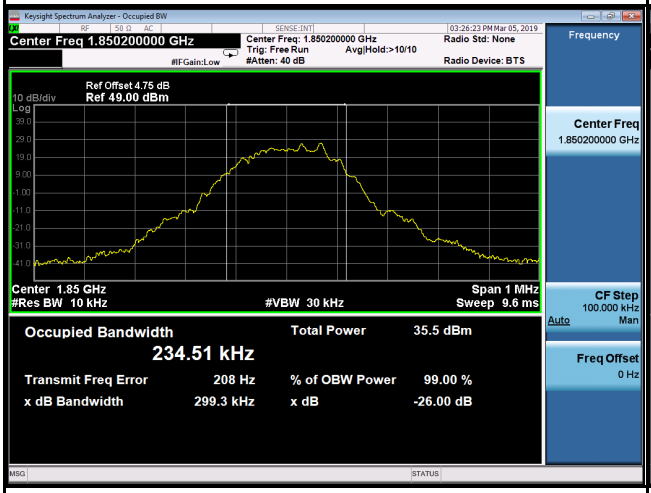
| GSM/GPRS | | EIRP Power | | |
|---|---|---|---|---|
| | | 512CH | 661CH | 810CH |
| | | 1850.2MHz | 1880MHz | 1909.8MHz |
| PCS1900 | | 29.63 | 29.73 | 29.59 |
| GPRS1900 (GMSK) | 1 Tx Slot | 29.73 | 29.76 | 29.66 |

# APPENDIX B - OCCUPIED BANDWIDTH

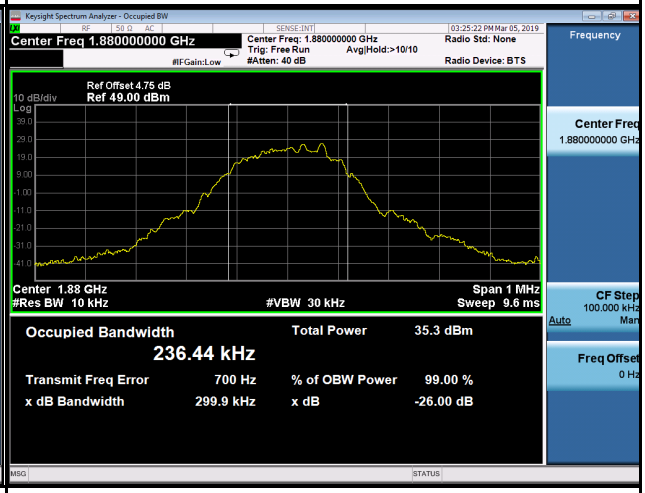
| PCS1900 | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | Channel | Frequency (MHz) | 26dB Bandwidth (MHz) |
| 512 | 1850.2 | 0.235 | 512 | 1850.2 | 0.299 |
| 661 | 1880 | 0.236 | 661 | 1880 | 0.300 |
| 810 | 1909.8 | 0.236 | 810 | 1909.8 | 0.299 |

Spectrum Plot

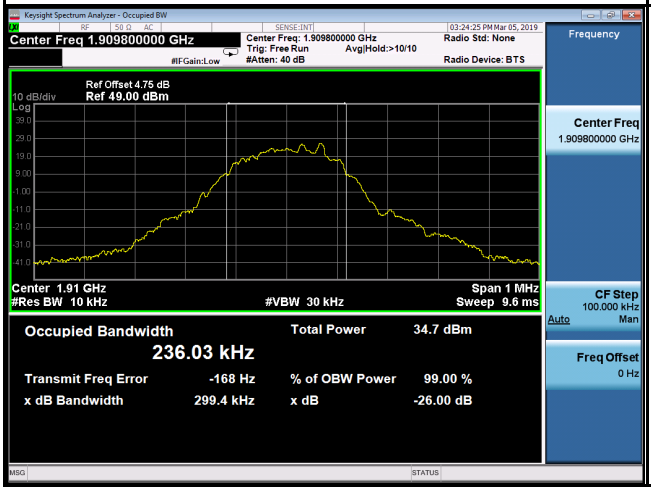
GSM -512




GSM-661



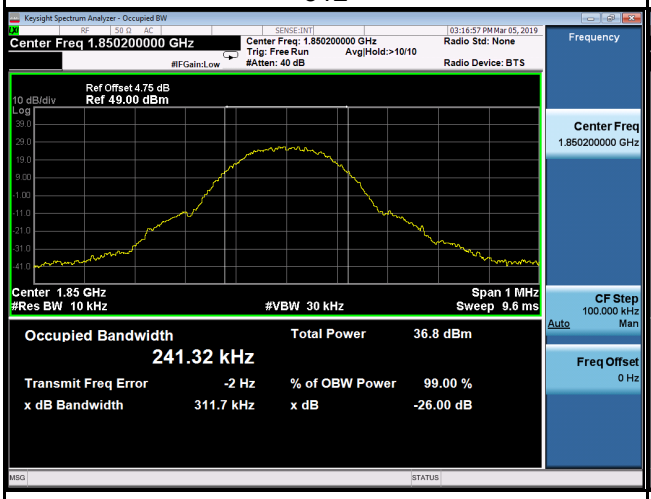

GSM-810



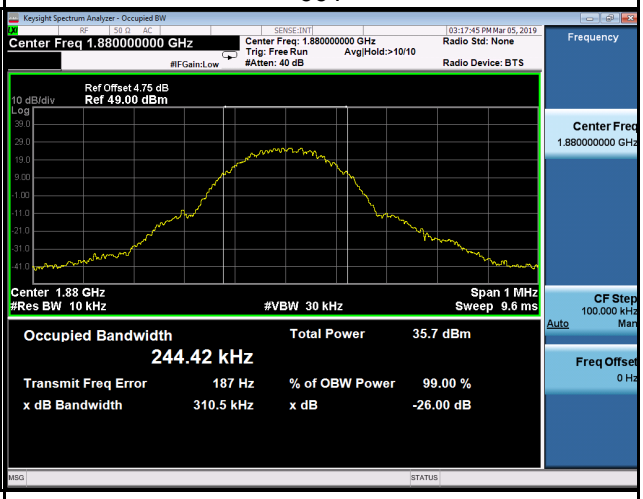
| GPRS1900 | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | Channel | Frequency (MHz) | 26dB Bandwidth (MHz) |
| 512 | 1850.2 | 0.241 | 512 | 1850.2 | 0.312 |
| 661 | 1880 | 0.244 | 661 | 1880 | 0.311 |
| 810 | 1909.8 | 0.240 | 810 | 1909.8 | 0.312 |

Spectrum Plot

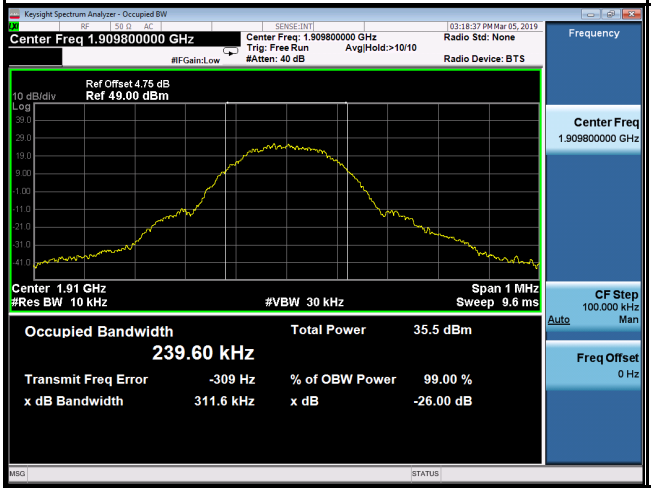
512




661



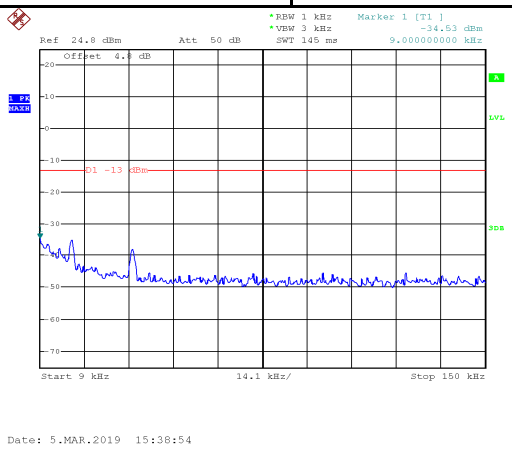
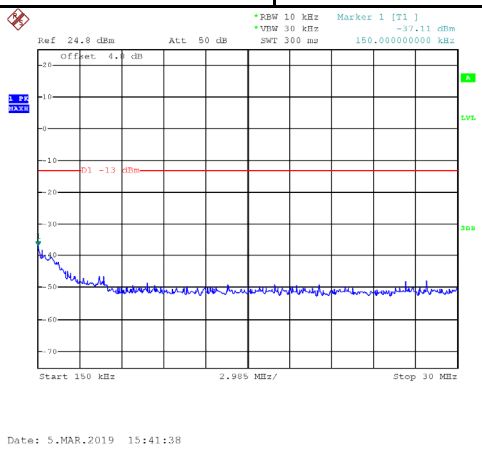
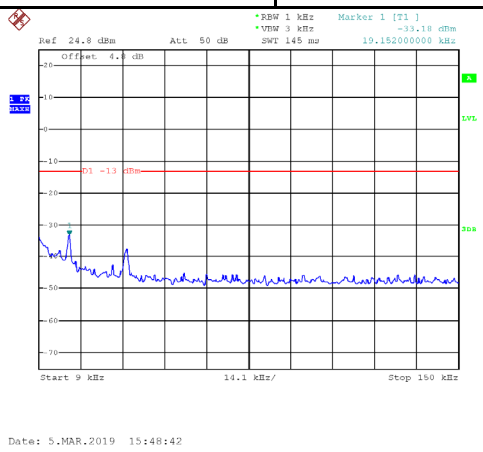
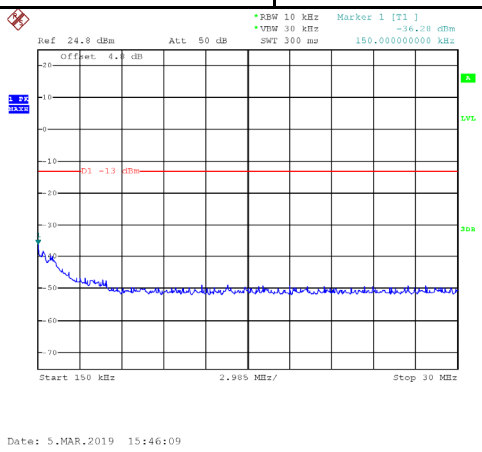

810




-

-

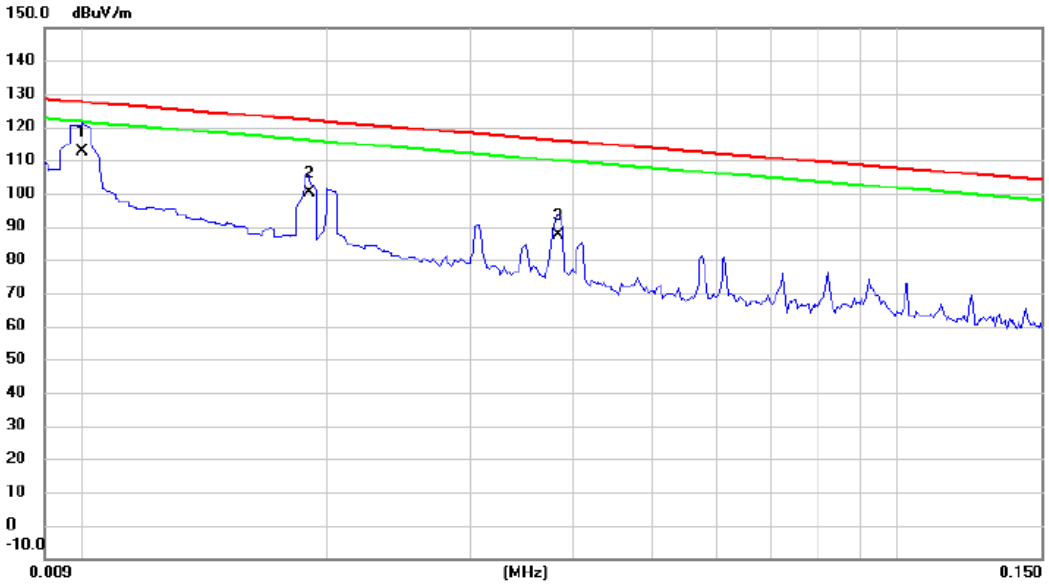
# APPENDIX C - CONDUCTED EMISSIONS

| PCS1900 | | PCS1900 | |
|---|---|---|---|
| Channel | Frequency(MHz) | Channel | Frequency(MHz) |
| 661 | 1880 | 661 | 1880 |
|  | |  | |
| GPRS1900 | | GPRS1900 | |
| Channel | Frequency(MHz) | Channel | Frequency(MHz) |
| 661 | 1880 | 661 | 1880 |
|  | |  | |

# APPENDIX D - RADIATED EMISSION (9KHZ TO 30MHZ)

| Test Mode: | TX Mode |
|---|---|

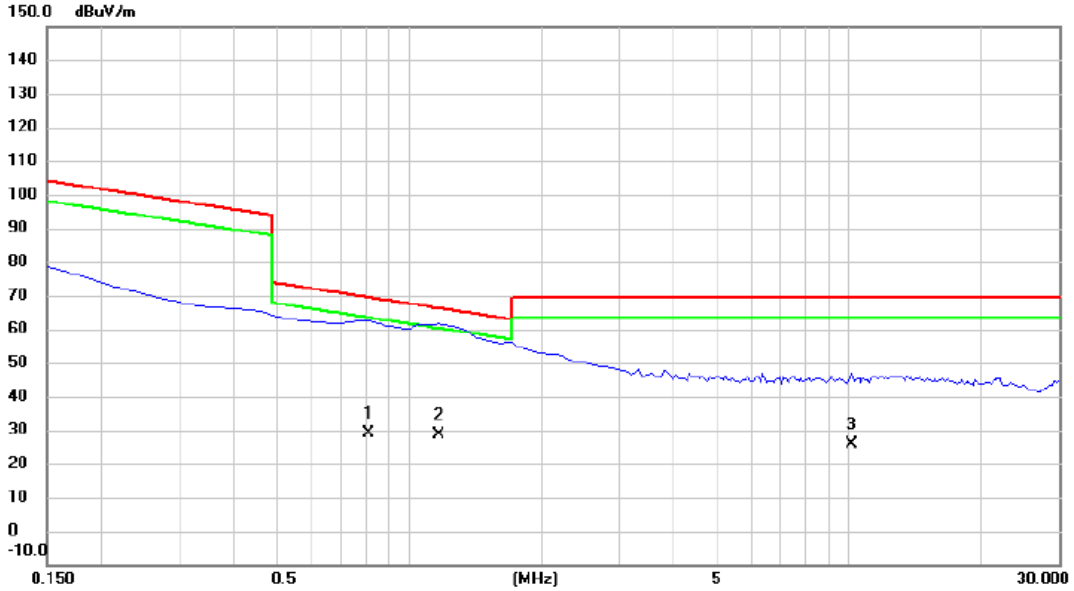
Ant 0°




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 0.0100 | 34.11 | 78.40 | 112.51 | 127.60 | -15.09 | AVG | |
| 2 | | 0.0190 | 27.24 | 72.91 | 100.15 | 122.03 | -21.88 | AVG | |
| 3 | | 0.0383 | 20.17 | 67.21 | 87.38 | 115.94 | -28.56 | AVG | |

| Test Mode: | TX Mode |
|---|---|

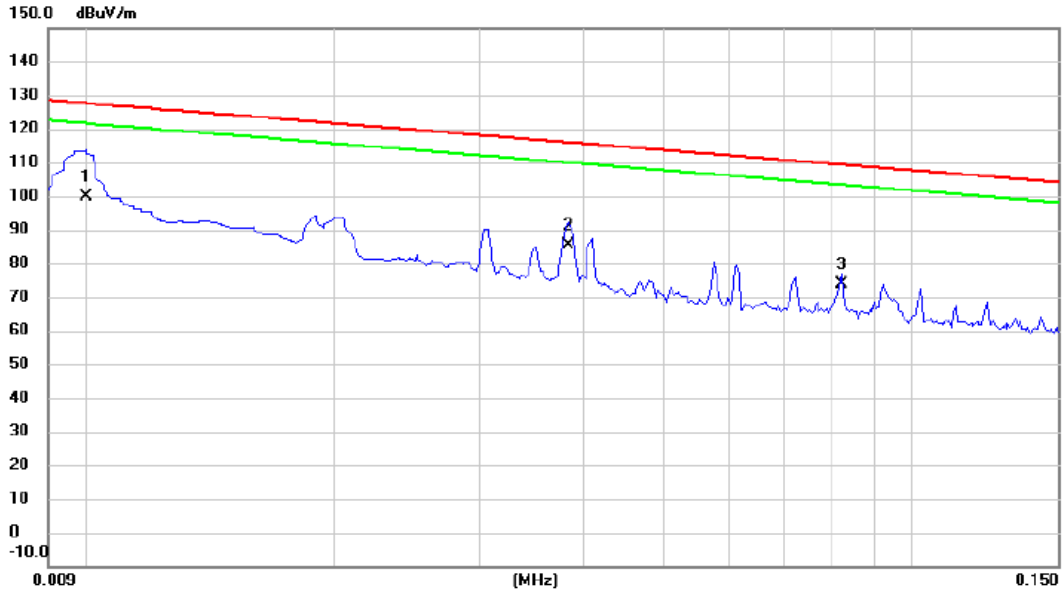
Ant 0°




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 0.8080 | -12.86 | 42.05 | 29.19 | 69.46 | -40.27 | QP | |
| 2 | * | 1.1670 | -12.35 | 40.80 | 28.45 | 66.26 | -37.81 | QP | |
| 3 | | 10.1393 | -12.01 | 37.97 | 25.96 | 69.54 | -43.58 | QP | |

| Test Mode: | TX Mode |
|---|---|

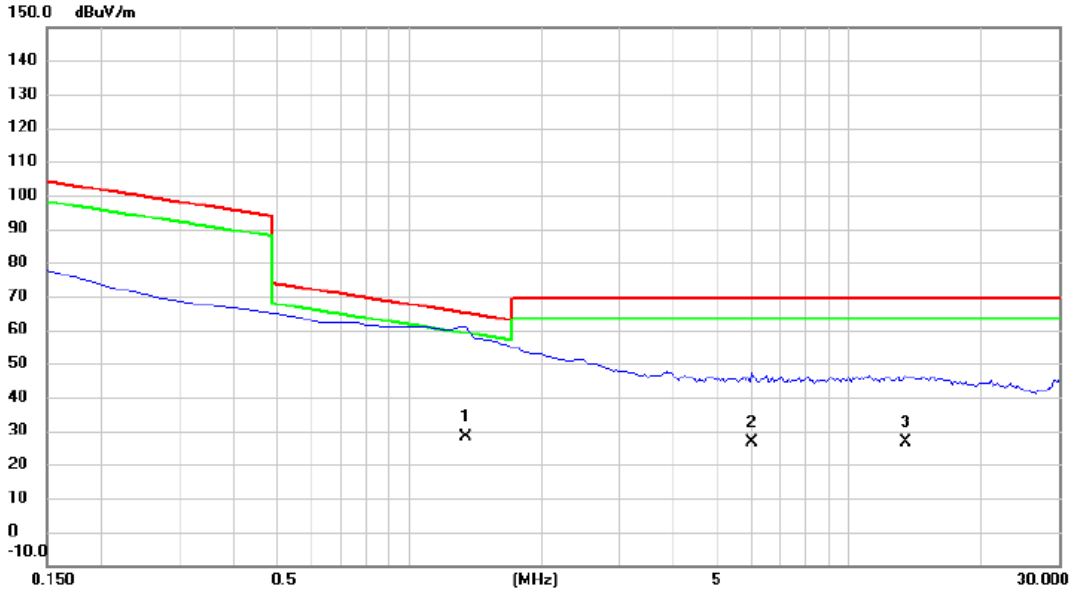
Ant 90°




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 0.0100 | 21.24 | 78.40 | 99.64 | 127.60 | -27.96 | AVG | |
| 2 | | 0.0383 | 18.15 | 67.21 | 85.36 | 115.94 | -30.58 | AVG | |
| 3 | | 0.0821 | 13.71 | 59.91 | 73.62 | 109.32 | -35.70 | AVG | |

| Test Mode: | TX Mode |
|---|---|

Ant 90°

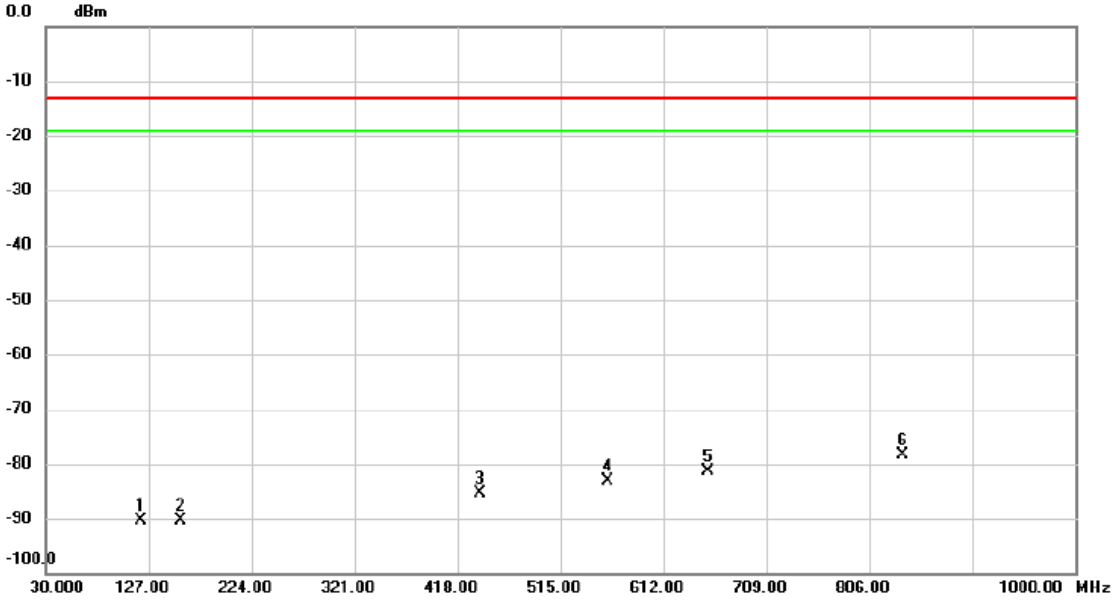



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 1.3463 | -12.33 | 40.37 | 28.04 | 65.02 | -36.98 | QP | |
| 2 | | 6.0121 | -11.21 | 37.80 | 26.59 | 69.54 | -42.95 | QP | |
| 3 | | 13.4894 | -11.47 | 37.97 | 26.50 | 69.54 | -43.04 | QP | |

# APPENDIX E - RADIATED EMISSION (30MHZ TO 1GHZ)

| Test Mode: | PCS1900_TX CH661 |
|---|---|

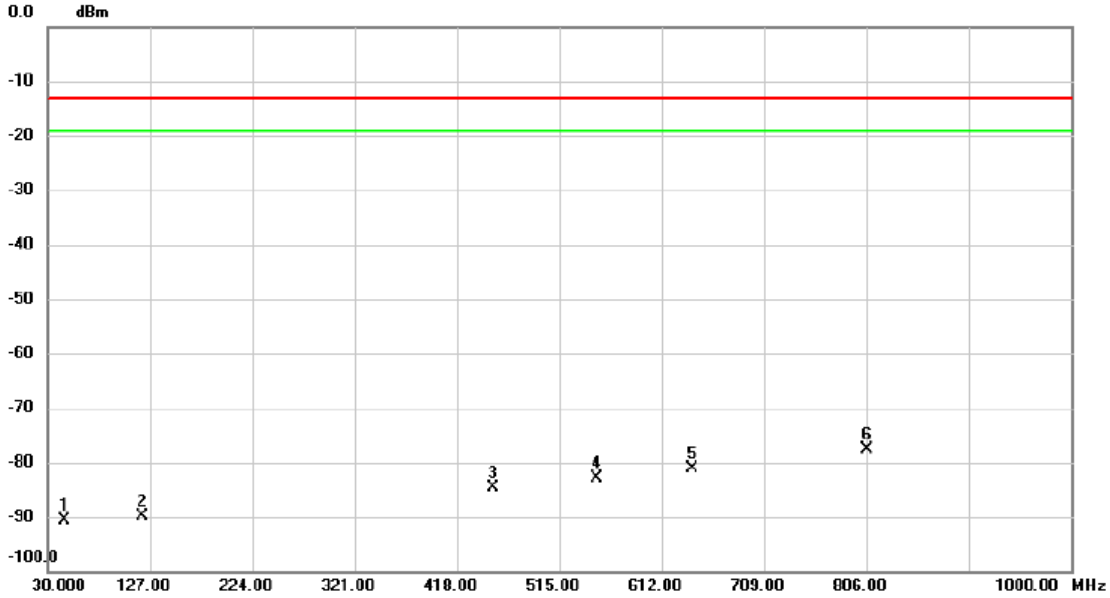
**Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 119.2400 | -71.31 | -19.11 | -90.42 | -13.00 | -77.42 | peak | |
| 2 | | 157.5550 | -74.06 | -16.38 | -90.44 | -13.00 | -77.44 | peak | |
| 3 | | 439.3400 | -73.82 | -11.51 | -85.33 | -13.00 | -72.33 | peak | |
| 4 | | 559.6200 | -73.85 | -9.36 | -83.21 | -13.00 | -70.21 | peak | |
| 5 | | 653.7100 | -73.66 | -7.65 | -81.31 | -13.00 | -68.31 | peak | |
| 6 | * | 838.0100 | -72.64 | -5.80 | -78.44 | -13.00 | -65.44 | peak | |

| Test Mode: | PCS1900_TX CH661 |
|---|---|

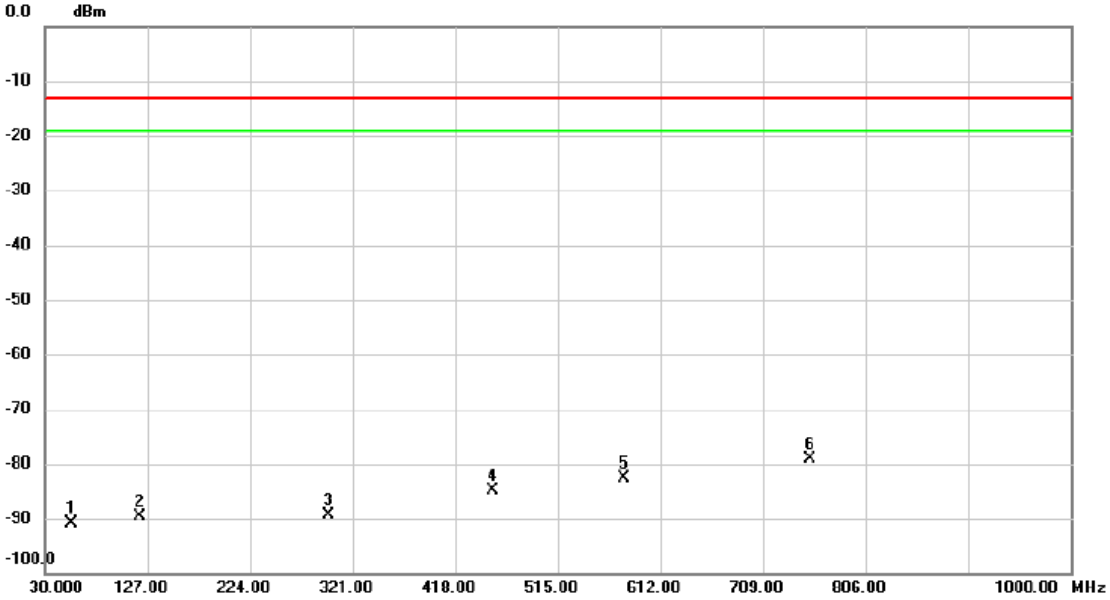
**Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 46.0050 | -72.85 | -17.78 | -90.63 | -13.00 | -77.63 | peak | |
| 2 | | 119.7250 | -70.70 | -19.08 | -89.78 | -13.00 | -76.78 | peak | |
| 3 | | 451.9500 | -73.48 | -11.16 | -84.64 | -13.00 | -71.64 | peak | |
| 4 | | 550.8900 | -73.55 | -9.35 | -82.90 | -13.00 | -69.90 | peak | |
| 5 | | 640.6150 | -73.28 | -7.91 | -81.19 | -13.00 | -68.19 | peak | |
| 6 | * | 806.9700 | -71.07 | -6.61 | -77.68 | -13.00 | -64.68 | peak | |

| Test Mode: | GPRS1900_TX CH661 |
|---|---|

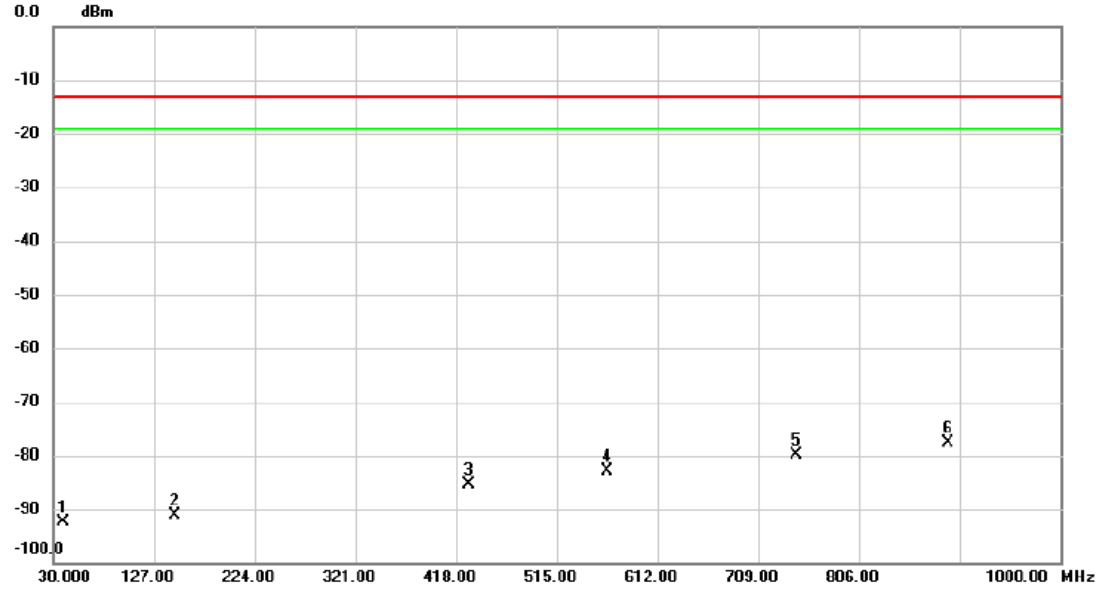
**Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 55.2200 | -72.43 | -18.42 | -90.85 | -13.00 | -77.85 | peak | |
| 2 | | 119.7250 | -70.48 | -19.08 | -89.56 | -13.00 | -76.56 | peak | |
| 3 | | 298.6900 | -73.96 | -15.48 | -89.44 | -13.00 | -76.44 | peak | |
| 4 | | 452.9200 | -73.69 | -11.19 | -84.88 | -13.00 | -71.88 | peak | |
| 5 | | 577.0800 | -73.26 | -9.37 | -82.63 | -13.00 | -69.63 | peak | |
| 6 | * | 753.1350 | -73.21 | -5.85 | -79.06 | -13.00 | -66.06 | peak | |

| Test Mode: | GPRS1900_TX CH661 |
|---|---|

**Horizontal**

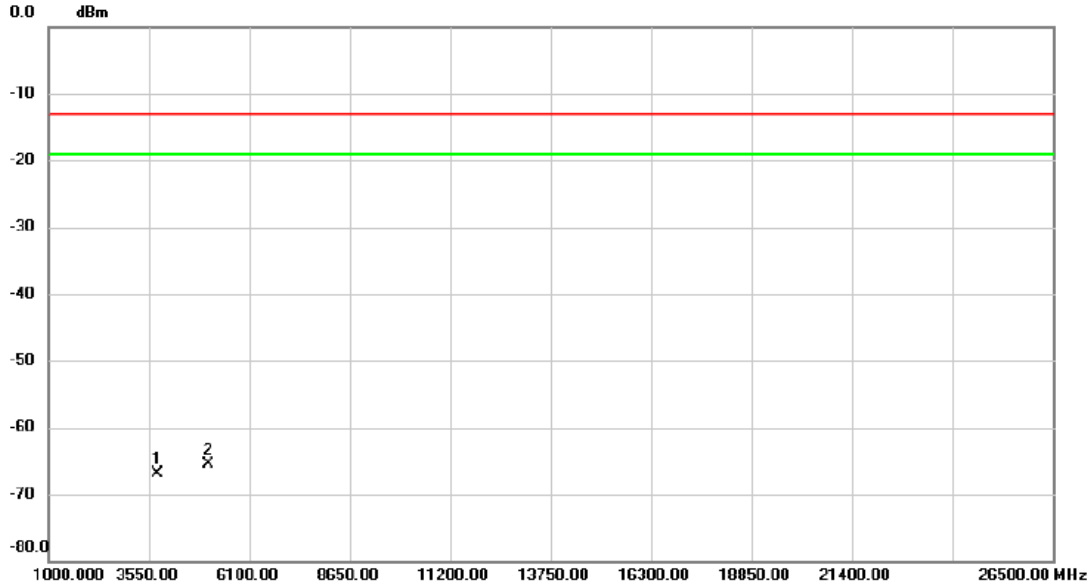



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 39.7000 | -75.03 | -17.22 | -92.25 | -13.00 | -79.25 | peak | |
| 2 | | 146.8850 | -74.39 | -16.85 | -91.24 | -13.00 | -78.24 | peak | |
| 3 | | 429.6400 | -73.57 | -11.90 | -85.47 | -13.00 | -72.47 | peak | |
| 4 | | 563.9850 | -73.44 | -9.36 | -82.80 | -13.00 | -69.80 | peak | |
| 5 | | 746.3450 | -73.92 | -5.99 | -79.91 | -13.00 | -66.91 | peak | |
| 6 | * | 891.3600 | -72.36 | -5.32 | -77.68 | -13.00 | -64.68 | peak | |

# APPENDIX F - RADIATED EMISSION (ABOVE 1GHZ)

| Test Mode: | PCS1900_TX CH661 |
|---|---|

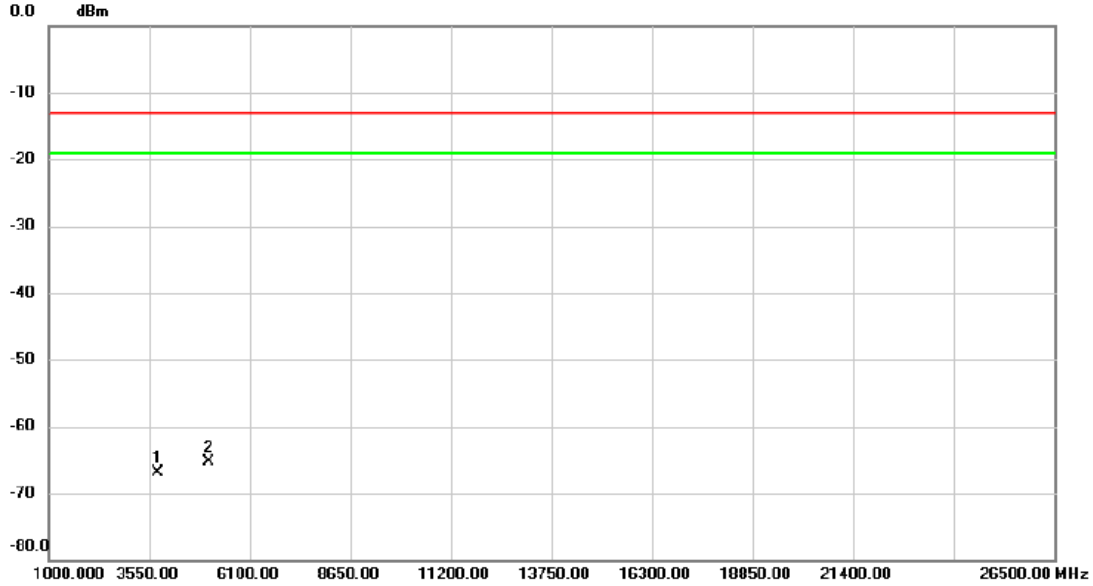
**Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 3759.920 | -52.97 | -13.90 | -66.87 | -13.00 | -53.87 | peak | |
| 2 | * | 5063.780 | -55.78 | -9.75 | -65.53 | -13.00 | -52.53 | peak | |

| Test Mode: | PCS1900_TX CH661 |
|---|---|

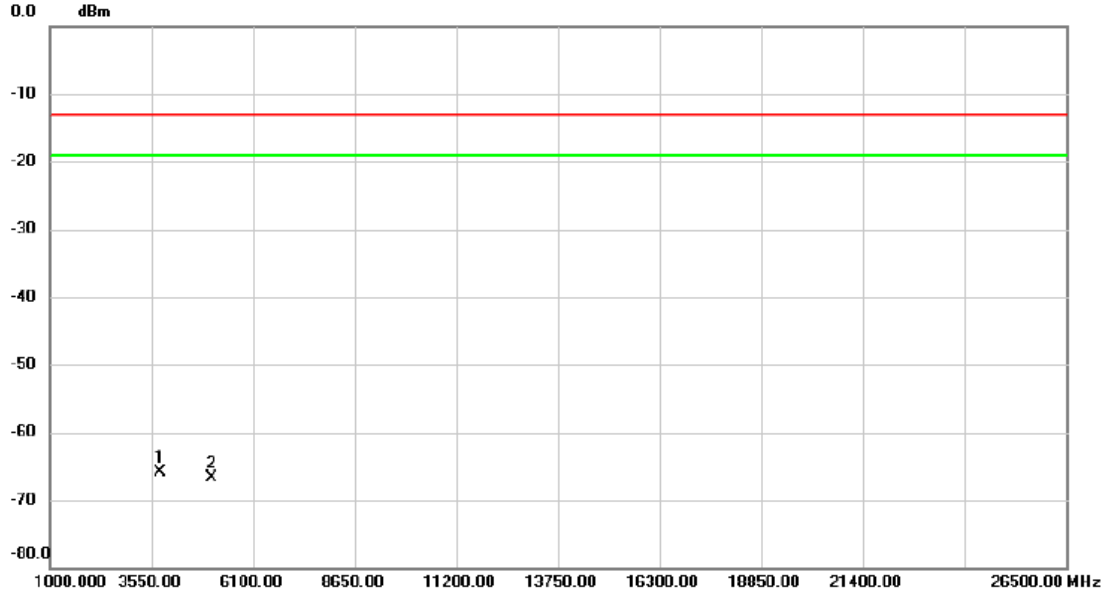
**Horizontal**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 3760.200 | -52.96 | -13.90 | -66.86 | -13.00 | -53.86 | peak | |
| 2 | * | 5063.700 | -55.46 | -9.75 | -65.21 | -13.00 | -52.21 | peak | |

| Test Mode: | GPRS1900_TX CH661 |
|---|---|

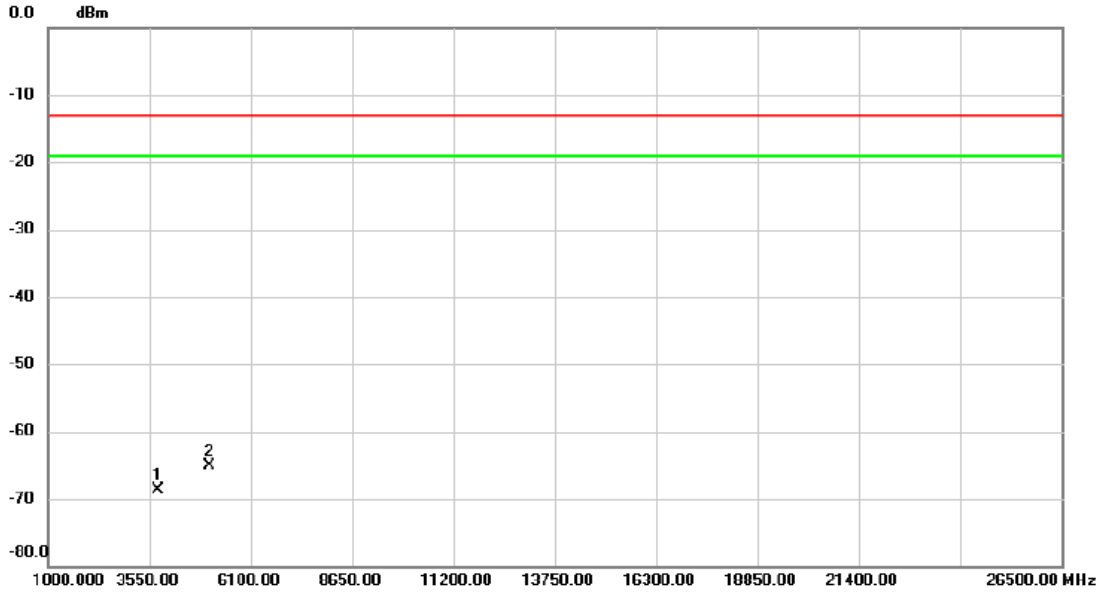
**Vertical**




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | * | 3760.060 | -51.92 | -13.90 | -65.82 | -13.00 | -52.82 | peak | |
| 2 | | 5066.510 | -56.87 | -9.74 | -66.61 | -13.00 | -53.61 | peak | |

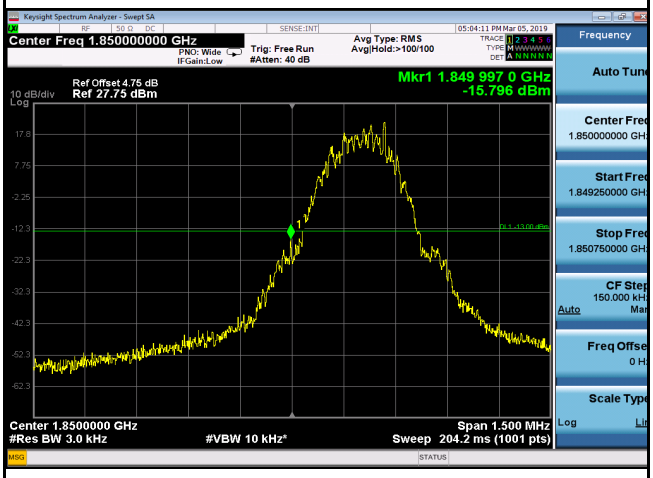
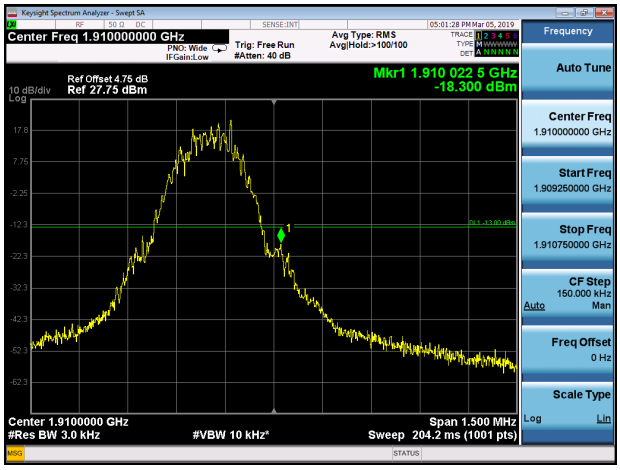
| Test Mode: | GPRS1900_TX CH661 |
|---|---|

**Horizontal**



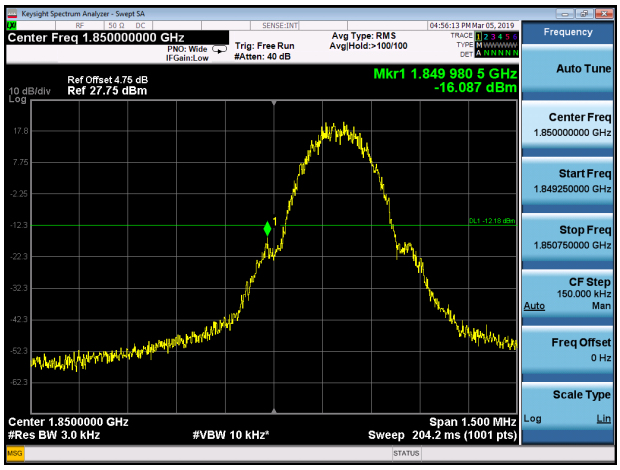
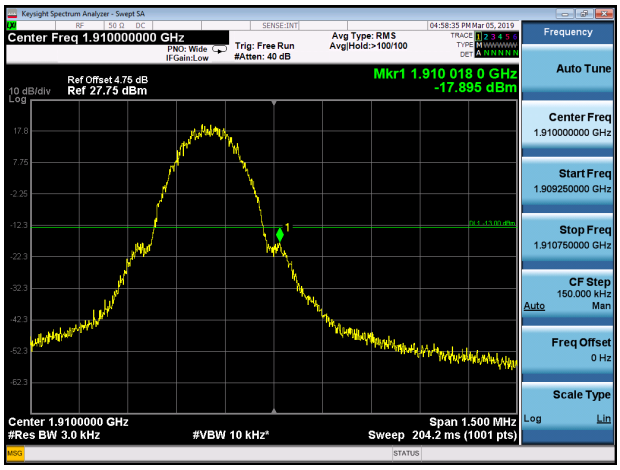

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBm | dB | dBm | dBm | dB | Detector | Comment |
| 1 | | 3758.955 | -54.86 | -13.90 | -68.76 | -13.00 | -55.76 | peak | |
| 2 | * | 5066.140 | -55.44 | -9.74 | -65.18 | -13.00 | -52.18 | peak | |

# APPENDIX G - BAND EDGE

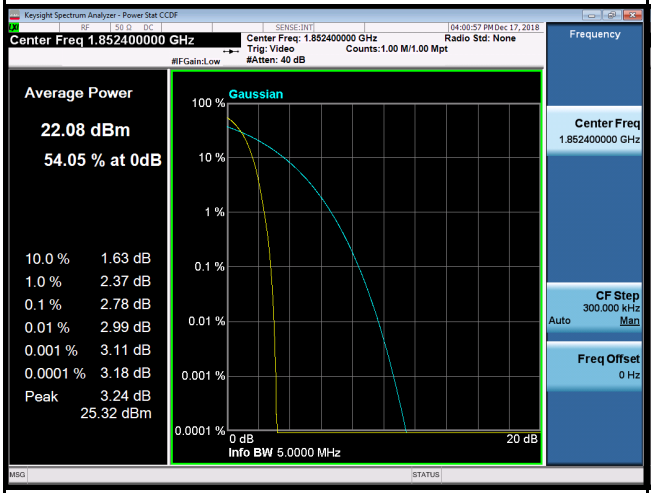
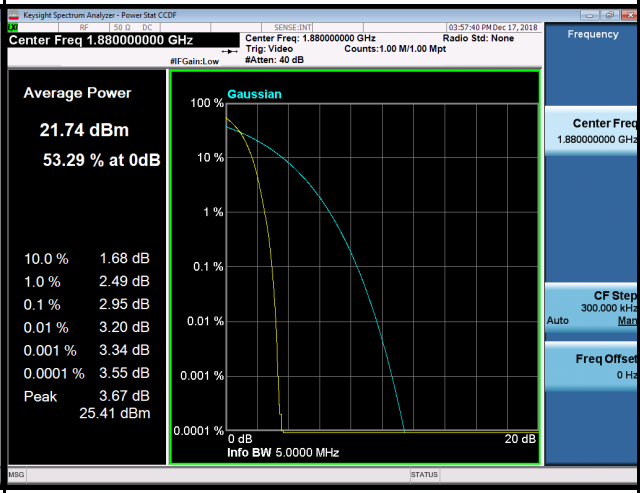
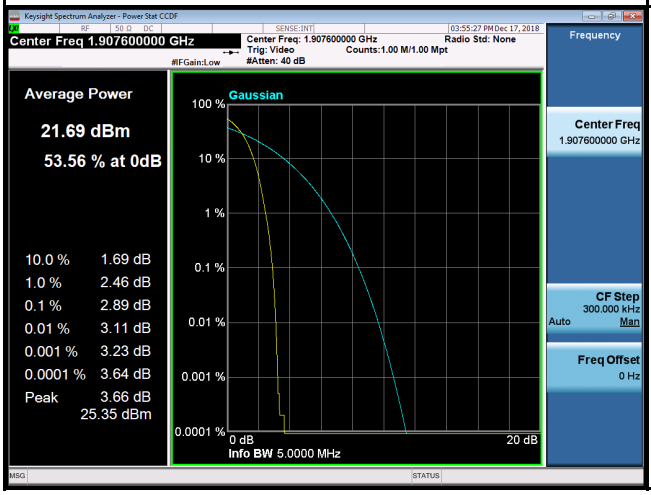
| PCS1900 | | | |
|---|---|---|---|
| Channel | 512 | Channel | 810 |
|  | |  | |

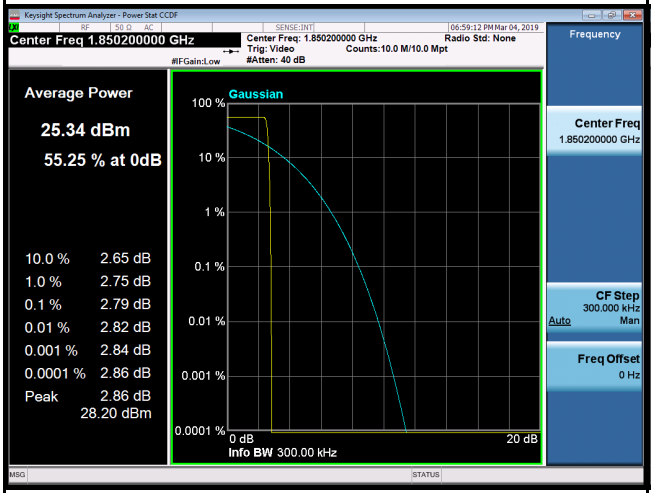
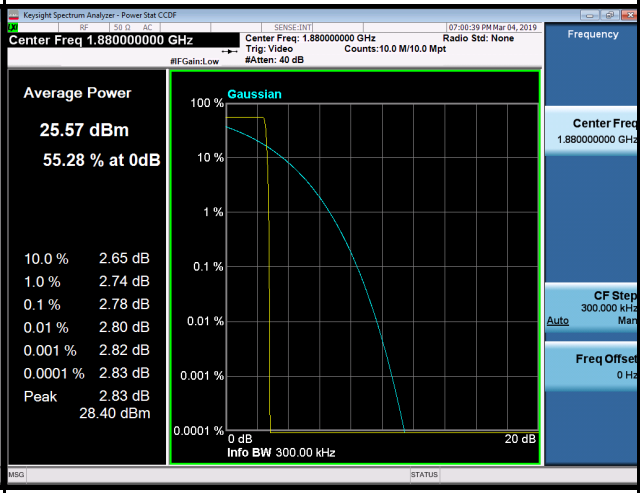
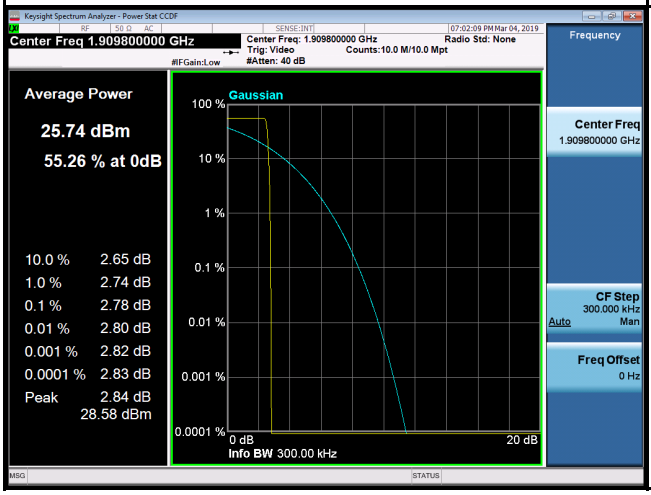




| GPRS1900 | | | |
|---|---|---|---|
| Channel | 512 | Channel | 810 |
|  | |  | |

# APPENDIX H - PEAK TO AVERAGE RATIO

| PCS1900 | |
|---|---|
| 512 | 661 |
|  |  |
| 810 | - |
|  | - |

| GPRS1900 | |
|---|---|
| 512 | 661 |
|  |  |
| 810 | - |
|  | - |

# APPENDIX I - FREQUENCY STABILITY

| Test Mode: | PCS1900_CH661 |
|---|---|

**Temperature vs. Frequency Stabiility**

| Temperature(℃) | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|---|---|---|---|
| -10 | 5.43 | 0.002888298 | ±2.5 |
| 0 | 2.47 | 0.00131383 | |
| 10 | 8.33 | 0.004430851 | |
| 20 | 7.61 | 0.004047872 | |
| 30 | 6.27 | 0.003335106 | |
| 40 | 7.19 | 0.003824468 | |
| 50 | 8.36 | 0.004446809 | |
| 55 | 6.76 | 0.003595745 | |
| Max. Deviation (ppm) | 8.36 | 0.004446809 | |

**Voltage vs. Frequency Stability**

| Voltage(Volts) | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|---|---|---|---|
| 3.42 | 5.72 | 0.003042553 | ±2.5 |
| 3.80 | 3.58 | 0.001904255 | |
| 4.18 | 7.04 | 0.003744681 | |
| Max. Deviation (ppm) | 7.04 | 0.003744681 | |

**End of Test Report**