# RADIO TEST REPORT

Report No: STS1508002F01

Issued for

Janne Shirley gomez Nit 31445556-6

carrera 5 numero 13-83 oficina 1301 edificio BBVA,cali colombia

| | |
|---|---|
| Product Name: | GSM phone |
| Brand Name: | F.Cell |
| Model No.: | V180 |
| Series Model: | N/A |
| FCC ID: | 2AFHT-V180 |
| Test Standard: | FCC Part 22H and 24E |



Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong,China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com

# TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant's name** ..... : | Janne Shirley gomez Nit 31445556-6 |
| Address ..... : | carrera 5 numero 13-83 oficina 1301 edificio BBVA,cali colombia |
| **Manufacture's Name** ..... : | HONGKONG PSLKSO TECHNOLOGY LIMITED |
| Address ..... : | Room 3201,Building A,World trading plaza Block Futian Rd,Futian District,Shenzhen |
| Product name ..... : | GSM phone |
| Brand name ..... : | F.Cell |
| Model and/or type reference .. : | V180 |
| **Standards** ..... : | FCC Part 22H and 24E |
| Test procedure ..... | TIA 603 C |

This device described above has been tested by STS and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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**Date of Test** .....

Date of performance of tests ..... 05 Aug. 2015 ~11 Aug. 2015

Date of Issue ..... 12 Aug. 2015

Test Result ..... **Pass**

Testing Engineer : (Jin Ming)

Technical Manager : (Vita Li)

Authorized Signatory : (Bovey Yang)

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## Revision History

| Rev. | Issue Date | Report NO. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | 12 Aug. 2015 | STS1508002F01 | ALL | Initial Issue |
| | | | | |

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

The radiated emission testing was performed according to the procedures of ansi C63.10: 2009; TIA 603 C and fcc cfr 47 rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057

| Item Number | Item Description | | FCC Rules |
|---|---|---|---|
| 1 | Output Power | Conducted output power | 22.913(a) / 24.232 (b) |
| | | Radiated output power | |
| 2 | Spurious Emission | Conducted spurious emission | 2.1051 / 22.917 / 24.238 |
| | | Radiated spurious emission | |
| 3 | Frequency Stability | | 2.1055 /24.235 |
| 4 | Occupied Bandwidth | | 2.1049 (h)(i) |
| 5 | Emission Bandwidth | | 22.917(b) / 24.238 (b) |
| 6 | Band Edge | | 22.917(b) / 24.238 (b) |

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong,China
CNAS Registration No.: L7649;
FCC Registration No.: 842334; IC Registration No.: 12108A-1

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

| No. | Item | Uncertainty |
|---|---|---|
| 1 | Conducted Emission (9KHz-150KHz) | ±2.88dB |
| 2 | Conducted Emission (150KHz-30MHz) | ±2.67dB |
| 3 | RF power,conducted | ±0.70dB |
| 4 | Spurious emissions,conducted | ±1.19dB |
| 5 | All emissions,radiated(<1G) 30MHz-200MHz | ±2.83dB |
| 6 | All emissions,radiated(<1G) 200MHz-1000MHz | ±2.94dB |
| 7 | All emissions,radiated(>1G) | ±3.03dB |
| 8 | Temperature | ±0.5°C |
| 9 | Humidity | ±2% |

# 2. GENERAL INFORMATION

## 2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

| | |
|---|---|
| Product Designation: | GSM phone |
| Hardware version: | SC6531-BAR |
| Software version: | MOCOR-12C.W13.04.03 Release |
| FCC ID: | 2AFHT-V180 |
| Frequency Bands: | ☒GSM 850 ☒PCS 1900 (U.S. Bands)<br>☐GSM 900 ☐DCS 1800 (Non-U.S. Bands)<br>U.S. Bands:<br>☐UMTS FDD Band II ☐UMTS FDD Band V<br>Non-U.S. Bands:<br>☐UMTS FDD Band I ☐UMTS FDD Band VIII |
| Max RF Output Power: | GSM850:32.18dBm,GSM1900:25.08dBm |
| Type of Emission: | GSM(850):253KGXW: GSM(1900):250KGXW<br>GPRS(850):248KGXW; GPRS(1900):250KGXW |
| Description test modes (worst case) | SIM 1 and SIM 2 is a chipset unit and tested as single chipset, the SIM 1 is used to tested |
| Antenna: | PIFA Antenna |
| Antenna gain: | 0.5 dBi |
| Power Supply: | DC 3.7V by battery or DC 5.0V supplied by adapter |
| Battery parameter: | Capacitance: 1000mA, Rated Voltage: 3.7V |
| Adapter Input: | AC100-240V, 50-60Hz, 150mA |
| Adapter Output: | DC 5.0V, 1000mA |
| GPRS Class | Multi-Class12 |
| Extreme Vol. Limits: | DC3.3V to 4.2 V (Nominal DC3.7V) |
| Extreme Temp. Tolerance | -30℃ to +50℃ |
| *** Note: The High Voltage 4.2V and Low Voltage 3.3V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.* | |

2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for fcc id: 2AFHT-V180 filing to comply with the fcc part 22H&24E.

2.3 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with eut intended for fcc grant together.

2.4 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.5 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

2.6 CONFIGURATION OF EUT SYSTEM

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

**EUT**

Table 2-1 Equipment Used in EUT System

| Item | Equipment | Model No. | ID or Specification | Note |
|---|---|---|---|---|
| 1 | GSM phone | V180 | FCC ID: 2AFHT-V180 | EUT |
| | | | | |
| | | | | |

*Note: All the accessories have been used during the test. the following "EUT" in setup diagram means EUT system.*

## 2.7 MEASUREMENT INSTRUMENTS

The radiated emission testing was performed according to the procedures of ansi 2009; TIA 603C and fcc cfr 47 rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Last Calibration | Calibrated Until |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4407B | MY50140340 | 2014.10.25 | 2015.10.24 |
| Test Receiver | R&S | ESCI | 101427 | 2014.10.25 | 2015.10.24 |
| Communication Tester | Agilent | 8960 | MY48360751 | 2014.11.20 | 2015.11.19 |
| Communication Tester | R&S | CMU200 | 112012 | 2014.10.25 | 2015.10.24 |
| Test Receiver | R&S | ESCI | 102086 | 2014.10.25 | 2015.10.24 |
| Bilog Antenna | TESEQ | CBL6111D | 34678 | 2014.11.25 | 2015.11.24 |
| Horn Antenna | Schwarzbeck | BBHA 9120D(1201) | 9120D-1343 | 2015.03.06 | 2016.03.05 |

## 3. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GPRS850 and GPRS1900 frequency band.

Note: GSM/GPRS850, GSM/GPRS1900 modes have been tested during the test.

the worst condition (GPRS 850) be recorded in the test report if no other modes test data.

# 4. OUTPUT POWER

## 4.1 CONDUCTED OUTPUT POWER

### 4.1.1 MEASUREMENT METHOD

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GSM/GPRS 850, GSM/GPRS1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

### 4.1.2 MEASUREMENT RESULT

GSM 850:

| Mode | Frequency (MHz) | Peak Power | AVG Power |
|---|---|---|---|
| GSM850 | 824.2 | 32.02 | 31.71 |
| | 836.6 | 31.97 | 31.62 |
| | 848.8 | 32.16 | 31.84 |
| GPRS850 (1 Slot) | 824.2 | 31.99 | 31.60 |
| | 836.6 | 32.02 | 31.68 |
| | 848.8 | **32.18** | 31.94 |
| GPRS850 (2 Slot) | 824.2 | 30.92 | 30.56 |
| | 836.6 | 30.83 | 30.52 |
| | 848.8 | 30.98 | 30.69 |
| GPRS850 (3 Slot) | 824.2 | 28.75 | 28.35 |
| | 836.6 | 28.76 | 28.55 |
| | 848.8 | 28.87 | 28.64 |
| GPRS850 (4 Slot) | 824.2 | 27.66 | 27.42 |
| | 836.6 | 27.74 | 27.53 |
| | 848.8 | 27.78 | 27.48 |

PCS 1900:

| Mode | Frequency (MHz) | Peak Power | AVG Power |
|---|---|---|---|
| GSM1900 | 1850.2 | 24.47 | 24.12 |
| | 1880 | 24.63 | 24.33 |
| | 1909.8 | 24.76 | 24.47 |
| GPRS1900 (1 Slot) | 1850.2 | 24.97 | 24.77 |
| | 1880 | **25.08** | 24.70 |
| | 1909.8 | 25.03 | 24.81 |
| GPRS1900 (2 Slot) | 1850.2 | 23.79 | 23.56 |
| | 1880 | 23.88 | 23.60 |
| | 1909.8 | 23.95 | 23.65 |
| GPRS1900 (3 Slot) | 1850.2 | 21.68 | 21.48 |
| | 1880 | 21.88 | 21.64 |
| | 1909.8 | 21.93 | 21.65 |
| GPRS1900 (4 Slot) | 1850.2 | 20.68 | 20.43 |
| | 1880 | 20.74 | 20.50 |
| | 1909.8 | 20.92 | 20.67 |

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

| UE Transmit Channel Configuration | CM(db) | MPR(db) |
|---|---|---|
| For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH | 0≤ CM≤3.5 | MAX(CM-1,0) |
| Note: CM=1 for $\beta_c/\beta_d$=12/15, $\beta_{hs}/\beta_c$=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference. | | |

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the GSM/GPRSsignal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.
The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

## 4.2 PEAK-TO-AVERAGE RADIO (PAR) OF TRANSMITTER

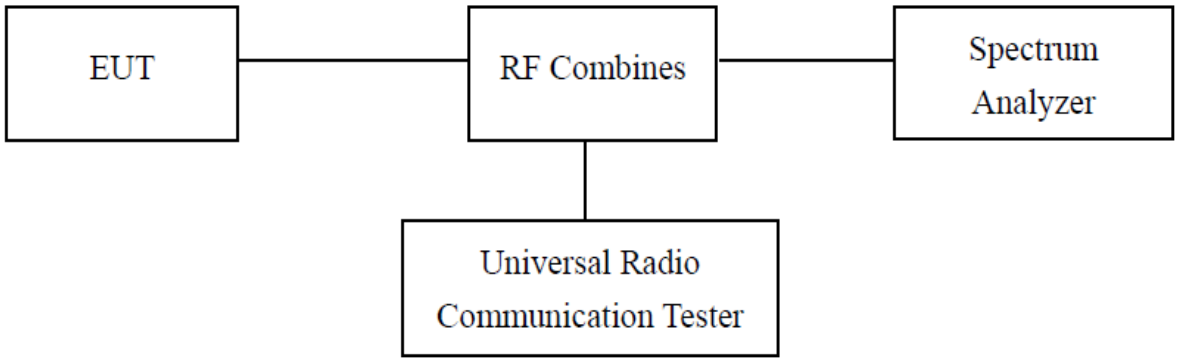
### 4.2.1 STANDARD APPLICABLE

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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.

### 4.2.2 TEST PROCEDURE

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded.

Test Configuration for the emission bandwidth testing:



4.2.3 SUMMARY OF TEST RESULTS

GSM 850:

| Mode | Frequency (MHz) | Peak Power | AVG Power | PAR | Limit |
|---|---|---|---|---|---|
| GSM850 | 824.20 | 32.02 | 31.71 | 0.31 | 13.00 |
| | 836.60 | 31.97 | 31.62 | 0.35 | 13.00 |
| | 848.80 | 32.16 | 31.84 | 0.32 | 13.00 |
| GPRS850 (1 Slot) | 824.20 | 31.99 | 31.60 | 0.39 | 13.00 |
| | 836.60 | 32.02 | 31.68 | 0.34 | 13.00 |
| | 848.80 | **32.18** | **31.94** | 0.24 | 13.00 |
| GPRS850 (2 Slot) | 824.20 | 30.92 | 30.56 | 0.36 | 13.00 |
| | 836.60 | 30.83 | 30.52 | 0.31 | 13.00 |
| | 848.80 | 30.98 | 30.69 | 0.29 | 13.00 |
| GPRS850 (3 Slot) | 824.20 | 28.75 | 28.35 | **0.40** | 13.00 |
| | 836.60 | 28.76 | 28.55 | 0.21 | 13.00 |
| | 848.80 | 28.87 | 28.64 | 0.23 | 13.00 |
| GPRS850 (4 Slot) | 824.20 | 27.66 | 27.42 | 0.24 | 13.00 |
| | 836.60 | 27.74 | 27.53 | 0.21 | 13.00 |
| | 848.80 | 27.78 | 27.48 | 0.30 | 13.00 |

PCS 1900:

| Mode | Frequency (MHz) | Peak Power | AVG Power | PAR | Limit |
|---|---|---|---|---|---|
| GSM1900 | 1850.20 | 24.47 | 24.12 | 0.35 | 13.00 |
| | 1880.00 | 24.63 | 24.33 | 0.30 | 13.00 |
| | 1909.80 | 24.76 | 24.47 | 0.29 | 13.00 |
| GPRS1900 (1 Slot) | 1850.20 | 24.97 | 24.77 | 0.20 | 13.00 |
| | 1880.00 | **25.08** | 24.70 | **0.38** | 13.00 |
| | 1909.80 | 25.03 | **24.81** | 0.22 | 13.00 |
| GPRS1900 (2 Slot) | 1850.20 | 23.79 | 23.56 | 0.23 | 13.00 |
| | 1880.00 | 23.88 | 23.60 | 0.28 | 13.00 |
| | 1909.80 | 23.95 | 23.65 | 0.30 | 13.00 |
| GPRS1900 (3 Slot) | 1850.20 | 21.68 | 21.48 | 0.20 | 13.00 |
| | 1880.00 | 21.88 | 21.64 | 0.24 | 13.00 |
| | 1909.80 | 21.93 | 21.65 | 0.28 | 13.00 |
| GPRS1900 (4 Slot) | 1850.20 | 20.68 | 20.43 | 0.25 | 13.00 |
| | 1880.00 | 20.74 | 20.50 | 0.24 | 13.00 |
| | 1909.80 | 20.92 | 20.67 | 0.25 | 13.00 |

## 4.3 RADIATED OUTPUT POWER

### 4.3.1 MEASUREMENT METHOD

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GSM/GPRS850, GSM/GPRS1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The measurements procedures specified in TIA-603C-2009 were applied.

1.In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.

2.The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. The ARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl

3.The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.

4.From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.

5.The EUT is then put into continuously transmitting mode at its maximum power level.

6.Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.

7.This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).

8.ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi..

9.Both Horizontal And Vertical Antenna Polarities Were Tested And Performed Pretest To Three Orthogonal Axis. The Worst Case Emissions Were Reported

### 4.3.2 PROVISIONS APPLICABLE

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) specifies, “Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power” and 24.232(c) 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 “Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

| Mode | Nominal Peak Power |
|---|---|
| GSM 850 | <=38.45 dBm (7W) |
| PCS 1900 | <=33 dBm (2W) |

4.3.3 MEASUREMENT RESULT

| Radiated Power (ERP) for GSM 850 MHZ | | | | |
|---|---|---|---|---|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak ERP (dBm) | Polarization Of Max. ERP | |
| GSM850 | 824.2 | 27.01 | Horizontal | Pass |
| | 824.2 | 28.85 | Vertical | Pass |
| | 836.6 | 26.84 | Horizontal | Pass |
| | 836.6 | **29.00** | Vertical | Pass |
| | 848.8 | 26.97 | Horizontal | Pass |
| | 848.8 | 28.99 | Vertical | Pass |

| Radiated Power (ERP) for GPRS 850 MHZ | | | | |
|---|---|---|---|---|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak ERP (dBm) | Polarization Of Max. ERP | |
| GPRS850 | 824.2 | 25.04 | Horizontal | Pass |
| | 824.2 | **27.14** | Vertical | Pass |
| | 836.6 | 25.03 | Horizontal | Pass |
| | 836.6 | 27.12 | Vertical | Pass |
| | 848.8 | 25.13 | Horizontal | Pass |
| | 848.8 | 27.06 | Vertical | Pass |

| Radiated Power (EIRP) for PCS 1900 MHZ | | | | |
|---|---|---|---|---|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak E.I.R.P.(dBm) | Polarization Of Max. E.I.R.P. | |
| PCS1900 | 1850.2 | 19.99 | Horizontal | Pass |
| | 1850.2 | 21.95 | Vertical | Pass |
| | 1880.0 | 19.89 | Horizontal | Pass |
| | 1880.0 | **22.03** | Vertical | Pass |
| | 1909.8 | 19.90 | Horizontal | Pass |
| | 1909.8 | 21.86 | Vertical | Pass |

| Radiated Power (EIRP) for GPRS 1900 MHZ | | | | |
|---|---|---|---|---|
| Mode | Frequency | Result | | Conclusion |
| | | Max. Peak E.I.R.P.(dBm) | Polarization Of Max. E.I.R.P. | |
| GPRS 1900 | 1850.2 | 19.84 | Horizontal | Pass |
| | 1850.2 | 22.01 | Vertical | Pass |
| | 1880.0 | 19.88 | Horizontal | Pass |
| | 1880.0 | **22.02** | Vertical | Pass |
| | 1909.8 | 19.99 | Horizontal | Pass |
| | 1909.8 | 21.86 | Vertical | Pass |

# 5. SPURIOUS EMISSION

## 5.1 SPURIOUS EMISSION

### 5.1.1 MEASUREMENT METHOD

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 30 MHz to 20 GHz.
2. Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

| **Typical Channels for testing of GSM/GPRS 850 MHz** | |
|---|---|
| Channel | Frequency (MHz) |
| 128 | 824.2 |
| 190 | 836.6 |
| 251 | 848.8 |

| **Typical Channels for testing of PCS/ GPRS 1900 MHz** | |
|---|---|
| Channel | Frequency (MHz) |
| 512 | 1850.2 |
| 661 | 1880.0 |
| 810 | 1909.8 |

5.1.2 PROVISIONS APPLICABLE

On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

5.1.3 MEASUREMENT RESULT

PLEASE REFER TO : APPENDIX I TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

Note: 1. Below 30MHZ no Spurious found and The GSM modes is the worst condition.

2. As no emission found in standby or receive mode, no recording in this report.

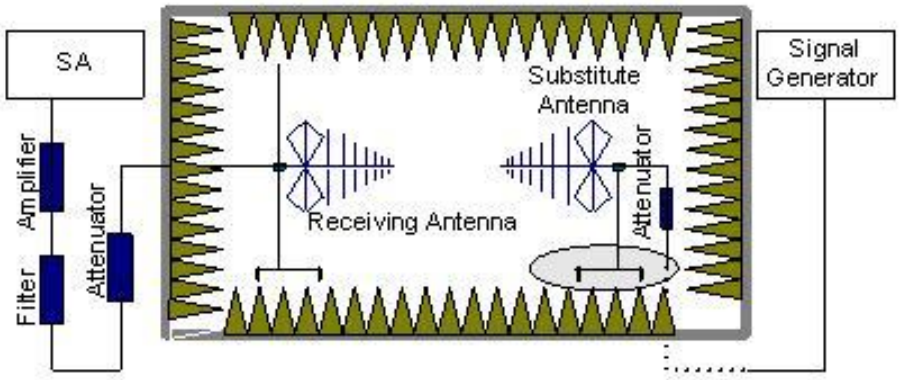
5.2 RADIATED SPURIOUS EMISSION

5.2.1 MEASUREMENT METHOD

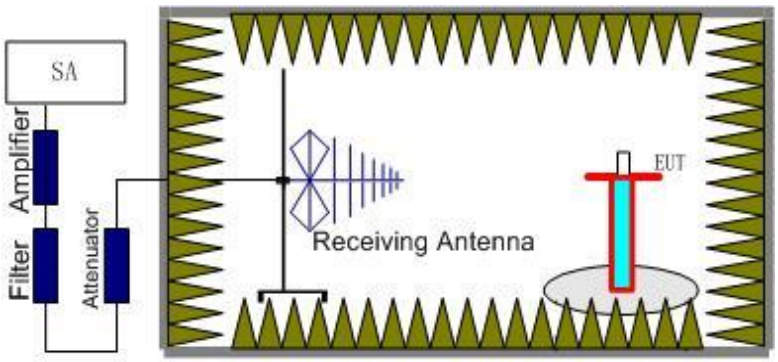
The measurements procedures specified in TIA-603C-2009 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GSM/GPRS850, GSM/GPRS1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The procedure of radiated spurious emissions is as follows:

a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）The SA is calibrated using following setup.




b) EUT was placed on a 0.8 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 test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS 1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz),GSM850 band (824.2MHz, 836.6MHz, 848.8MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the $A_{Rpl}$ is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below: $Power=P_{Mea}+A_{Rpl}$

5.2.2 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee’s frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(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.

Note: only result the worst condition of each test mode.

5.2.3 MEASUREMENT RESULT

GSM 850:

| The Worst Test Results Channel 128/824.2 MHz | | | | | | |
|---|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ | $P_{Mea}$(dBm) | Limit（dBm） | Margin(dBm) | Polarity |
| 1648.421 | -35.87 | -4.65 | -40.52 | -13 | -27.52 | Horizontal |
| 2472.542 | -36.32 | -2.21 | -38.53 | -13 | -25.53 | Horizontal |
| 3296.642 | -31.89 | 0.21 | -31.68 | -13 | -18.68 | Horizontal |
| 1648.213 | -38.56 | -4.65 | -43.21 | -13 | -30.21 | Vertical |
| 2472.653 | -41.81 | -2.21 | -44.02 | -13 | -31.02 | Vertical |
| 3296.563 | -42.47 | 0.21 | -42.68 | -13 | -29.68 | Vertical |
| **The Worst Test Results Channel 190/836.6 MHz** | | | | | | |
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ | $P_{Mea}$(dBm) | Limit（dBm） | Margin(dBm) | Polarity |
| 1673.221 | -36.45 | -4.65 | -41.1 | -13 | -28.1 | Horizontal |
| 2509.674 | -42.21 | -2.21 | -44.42 | -13 | -31.42 | Horizontal |
| 3346.231 | -38.64 | 0.21 | -38.43 | -13 | -25.43 | Horizontal |
| 1673.678 | -37.34 | -4.65 | -41.99 | -13 | -28.99 | Vertical |
| 2509.356 | -31.46 | -2.21 | -33.67 | -13 | -20.67 | Vertical |
| 3346.357 | -36.63 | 0.21 | -36.42 | -13 | -23.42 | Vertical |
| **The Worst Test Results Channel 251/848.8 MHz** | | | | | | |
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ | $P_{Mea}$(dBm) | Limit（dBm） | Margin(dBm) | Polarity |
| 1697.654 | -35.32 | -4.65 | -39.97 | -13 | -26.97 | Horizontal |
| 2546.321 | -43.46 | -2.21 | -45.67 | -13 | -32.67 | Horizontal |
| 3395.275 | -42.57 | 0.21 | -42.36 | -13 | -29.36 | Horizontal |
| 1697.646 | -35.46 | -4.65 | -40.11 | -13 | -27.11 | Vertical |
| 2546.496 | -41.24 | -2.21 | -43.45 | -13 | -30.45 | Vertical |
| 3395.217 | -37.62 | 0.21 | -37.41 | -13 | -24.41 | Vertical |

**Note:** Below 30MHZ no Spurious found and The GSM modes is the worst condition.

PCS 1900:

| The Worst Test Results for Channel 512/1850.2MHz | | | | | | |
|---|---|---|---|---|---|---|
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ | $P_{Mea}$(dBm) | Limit（dBm） | Margin(dBm) | Polarity |
| 3700.487 | -33.34 | 0.33 | -33.01 | -13 | -20.01 | Horizontal |
| 5550.683 | -35.75 | 4.01 | -31.74 | -13 | -18.74 | Horizontal |
| 7400.652 | -42.32 | 10.7 | -31.62 | -13 | -18.62 | Horizontal |
| 3700.576 | -34.35 | 0.33 | -34.02 | -13 | -21.02 | Vertical |
| 5550.241 | -35.43 | 4.01 | -31.42 | -13 | -18.42 | Vertical |
| 7400.453 | -41.21 | 10.7 | -30.51 | -13 | -17.51 | Vertical |
| **The Worst Test Results for Channel 661/1880.0MHz** | | | | | | |
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ | $P_{Mea}$(dBm) | Limit（dBm） | Margin(dBm) | Polarity |
| 3760.352 | -36.42 | 0.33 | -36.09 | -13 | -23.09 | Horizontal |
| 5640.267 | -32.76 | 4.01 | -28.75 | -13 | -15.75 | Horizontal |
| 7520.432 | -42.54 | 10.7 | -31.84 | -13 | -18.84 | Horizontal |
| 3760.684 | -31.12 | 0.33 | -30.79 | -13 | -17.79 | Vertical |
| 5640.452 | -36.32 | 4.01 | -32.31 | -13 | -19.31 | Vertical |
| 7520.653 | -37.34 | 10.7 | -26.64 | -13 | -13.64 | Vertical |
| **The Worst Test Results for Channel 810/1909.8MHz** | | | | | | |
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ | $P_{Mea}$(dBm) | Limit（dBm） | Margin(dBm) | Polarity |
| 3819.542 | -32.56 | 0.33 | -32.23 | -13 | -19.23 | Horizontal |
| 5729.653 | -35.54 | 4.01 | -31.53 | -13 | -18.53 | Horizontal |
| 7639.751 | -37.63 | 10.7 | -26.93 | -13 | -13.93 | Horizontal |
| 3819.432 | -32.32 | 0.33 | -31.99 | -13 | -18.99 | Vertical |
| 5729.764 | -41.65 | 4.01 | -37.64 | -13 | -24.64 | Vertical |
| 7639.21 | -38.21 | 10.7 | -27.51 | -13 | -14.51 | Vertical |

**Note:** Below 30MHZ no Spurious found and The GSM modes is the worst condition.

# 6. FREQUENCY STABILITY

## 6.1 MEASUREMENT METHOD

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(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.

Note: only result the worst condition of each test mode.

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 channel 661 for PCS 1900 band , channel 190 for GSM 850 band 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 -20℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 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 1 1/2 hours at each temperature, unpowered, before making measurements.

.At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

6.2 PROVISIONS APPLICABLE

6.2.1 FOR HAND CARRIED BATTERY POWERED EQUIPMENT

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. 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 3.3VDC and 4.2VDC, with a nominal voltage of 3.7VDC. 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.

6.2.2 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, the normal environment temperature is 20oC.

6.3 MEASUREMENT RESULT

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, the normal environment temperature is 20oC.

| Frequency Error Against Voltage for GSM 850 band | | |
|---|---|---|
| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
| 3.4 | -12 | -0.014 |
| 3.7 | 15 | 0.018 |
| 4.2 | 21 | 0.025 |

| Frequency Error Against Temperature for GSM 850 band | | |
|---|---|---|
| temperature(℃) | Frequency error(Hz) | Frequency error(ppm) |
| -30 | 13 | 0.016 |
| -20 | -16 | -0.019 |
| -10 | -32 | -0.038 |
| 0 | 31 | 0.037 |
| 10 | -19 | -0.023 |
| 20 | 13 | 0.016 |
| 30 | -24 | -0.029 |
| 40 | 20 | 0.024 |
| 50 | 25 | 0.030 |

| Frequency Error Against Voltage for GPRS850 band | | |
|---|---|---|
| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
| 3.4 | -15 | -0.018 |
| 3.7 | 23 | 0.028 |
| 4.2 | 22 | 0.026 |

| Frequency Error Against Temperature for GPRS850 band | | |
|---|---|---|
| temperature(℃) | Frequency error(Hz) | Frequency error(ppm) |
| -30 | -12 | -0.014 |
| -20 | 32 | 0.038 |
| -10 | -15 | -0.018 |
| 0 | -26 | -0.031 |
| 10 | 13 | 0.016 |
| 20 | 18 | 0.022 |
| 30 | -26 | -0.031 |
| 40 | 22 | 0.026 |
| 50 | 16 | 0.019 |

| Frequency Error Against Voltage for GSM1900 band | | |
|---|---|---|
| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
| 3.4 | 26 | 0.014 |
| 3.7 | 22 | 0.012 |
| 4.2 | 15 | 0.008 |

| Frequency Error Against Temperature for GSM1900 band | | |
|---|---|---|
| temperature(℃) | Frequency error(Hz) | Frequency error(ppm) |
| -30 | -15 | -0.008 |
| -20 | -22 | -0.012 |
| -10 | 15 | 0.008 |
| 0 | 21 | 0.011 |
| 10 | 26 | 0.014 |
| 20 | 23 | 0.012 |
| 30 | 32 | 0.017 |
| 40 | -15 | -0.008 |
| 50 | -23 | -0.012 |

| Frequency Error Against Voltage for GPRS1900 band | | |
|---|---|---|
| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
| 3.4 | 32 | 0.017 |
| 3.7 | -15 | -0.008 |
| 4.2 | 24 | 0.013 |

# 7. OCCUPIED BANDWIDTH

## 7.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

## 7.2 PROVISIONS APPLICABLE

Limits applicated report test result only.

## 7.3 MEASUREMENT RESULT

| **Occupied Bandwidth (99%) for GSM 850 band** | | |
|---|---|---|
| Mode | Frequency(MHz) | Occupied Bandwidth (99%)( kHz) |
| Low Channel | 824.2 | 253.001 |
| Middle Channel | 836.6 | 251.325 |
| High Channel | 848.8 | 245.329 |
| **Occupied Bandwidth (99%) for GPRS 850 band** | | |
| Mode | Frequency(MHz) | Occupied Bandwidth (99%)( kHz) |
| Low Channel | 824.2 | 243.505 |
| Middle Channel | 836.6 | 247.609 |
| High Channel | 848.8 | 245.901 |

| **Occupied Bandwidth (99%) for GSM1900 band** | | |
|---|---|---|
| Mode | Frequency(MHz) | Occupied Bandwidth (99%)( kHz) |
| Low Channel | 1850.2 | 244.966 |
| Middle Channel | 1880.0 | 249.562 |
| High Channel | 1909.8 | 250.420 |
| **Occupied Bandwidth (99%) for GPRS1900 band** | | |
| Mode | Frequency(MHz) | Occupied Bandwidth (99%)( kHz) |
| Low Channel | 1850.2 | 246.472 |
| Middle Channel | 1880.0 | 250.235 |
| High Channel | 1909.8 | 239.379 |

# 8. EMISSION BANDWIDTH

## 8.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

## 8.2 PROVISIONS APPLICABLE

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

## 8.3 MEASUREMENT RESULT

| **Emission Bandwidth (-26dBc) for GSM850 band** | | |
|---|---|---|
| Mode | Frequency(MHz) | Emission Bandwidth (-26dBc)( kHz) |
| Low Channel | 824.2 | 317.466 |
| Middle Channel | 836.6 | 317.668 |
| High Channel | 848.8 | 318.174 |
| **Emission Bandwidth (-26dBc) for GPRS850 band** | | |
| Mode | Frequency(MHz) | Emission Bandwidth (-26dBc)( kHz) |
| Low Channel | 824.2 | 321.386 |
| Middle Channel | 836.6 | 316.100 |
| High Channel | 848.8 | 318.239 |

| **Emission Bandwidth (-26dBc) for GSM1900 band** | | |
|---|---|---|
| Mode | Frequency(MHz) | Emission Bandwidth (-26dBc)( kHz) |
| Low Channel | 1850.2 | 315.428 |
| Middle Channel | 1880.0 | 310.800 |
| High Channel | 1909.8 | 319.038 |
| **Emission Bandwidth (-26dBc) for GPRS1900 band** | | |
| Mode | Frequency(MHz) | Emission Bandwidth (-26dBc)( kHz) |
| Low Channel | 1850.2 | 315.724 |
| Middle Channel | 1880.0 | 317.899 |
| High Channel | 1909.8 | 311.114 |

# 9. BAND EDGE

## 9.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

## 9.2 PROVISIONS APPLICABLE

as Specified in FCC rules of 22.917(b) and 24.238(b)

## 9.3 MEASUREMENT RESULT

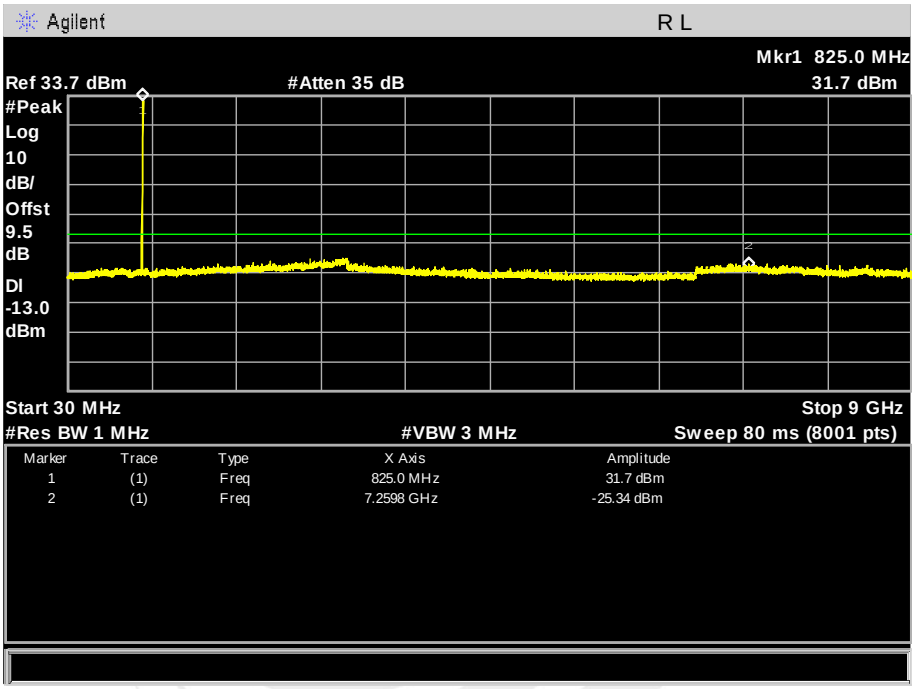
Please refers to Appendix III for compliance test plots for band edges

# APPENDIX I

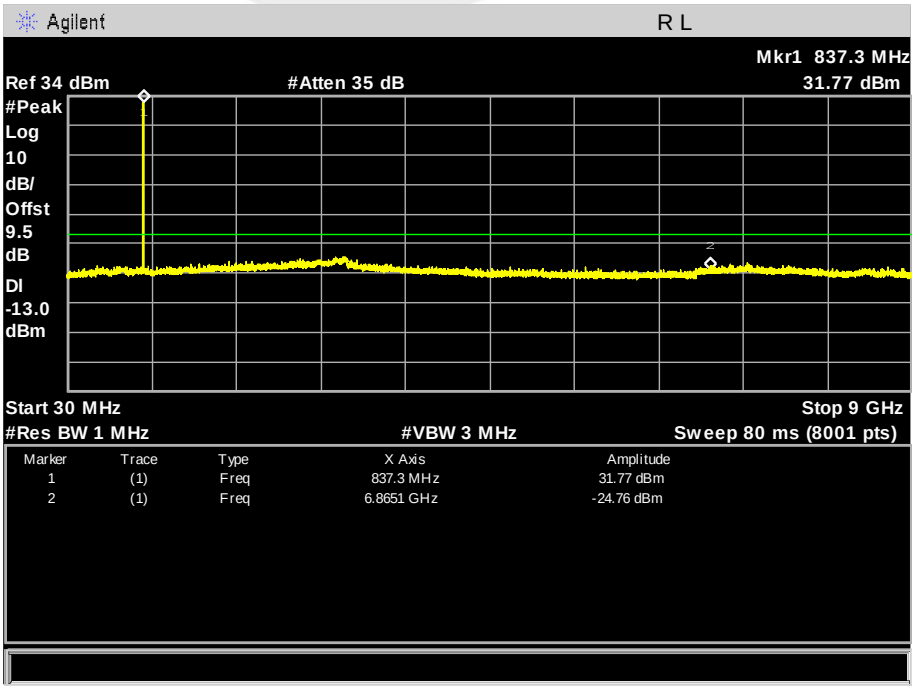
# TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

CONDUCTED EMISSION IN GSM 850 BAND

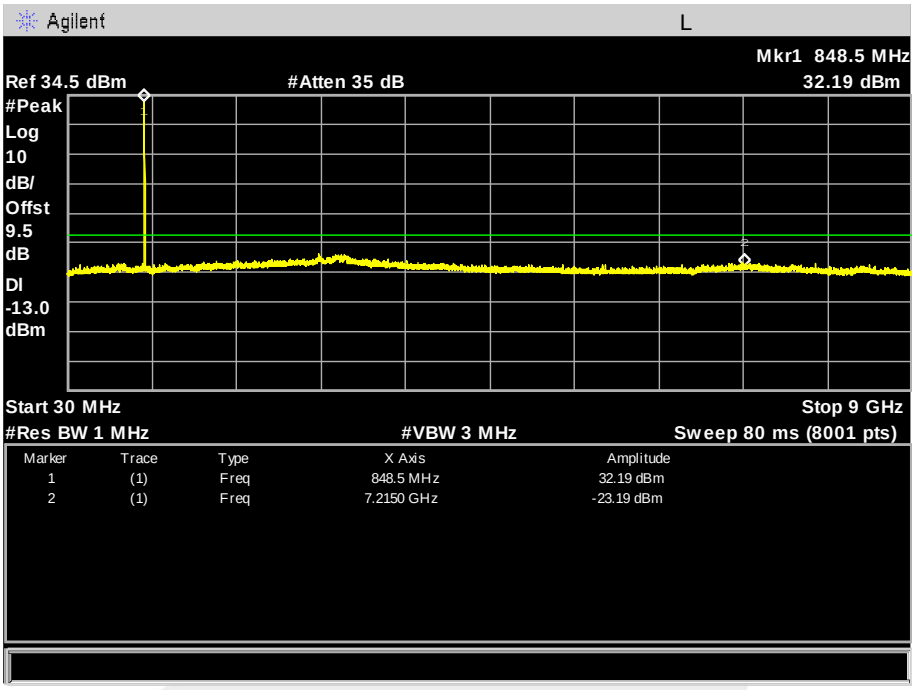
Conducted Emission Transmitting Mode CH 128 30MHz – 9GHz




Conducted Emission Transmitting Mode CH 190 30MHz – 9GHz

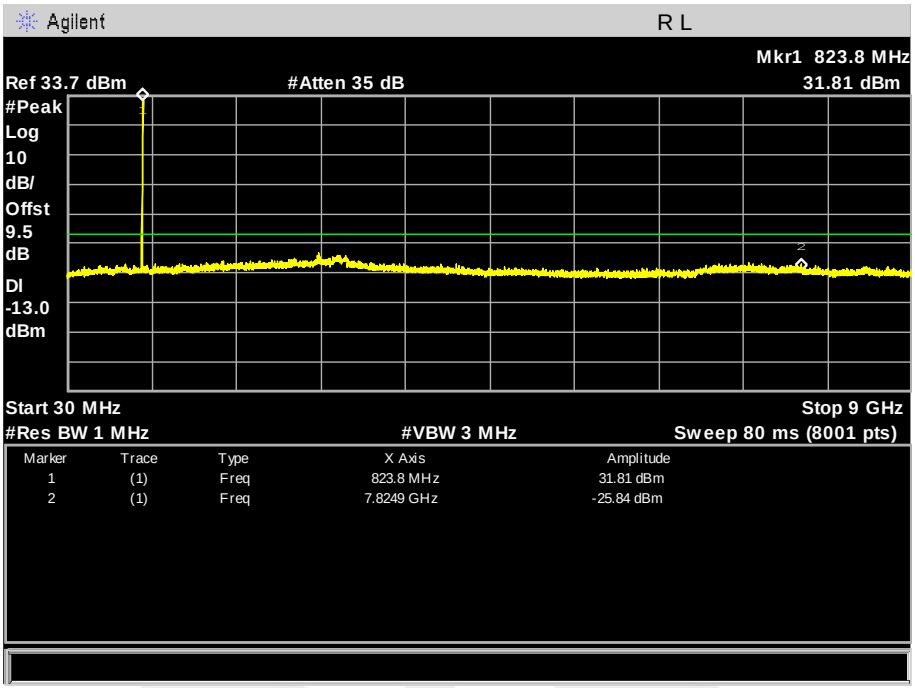


Conducted Emission Transmitting Mode CH 251 30MHz – 9GHz

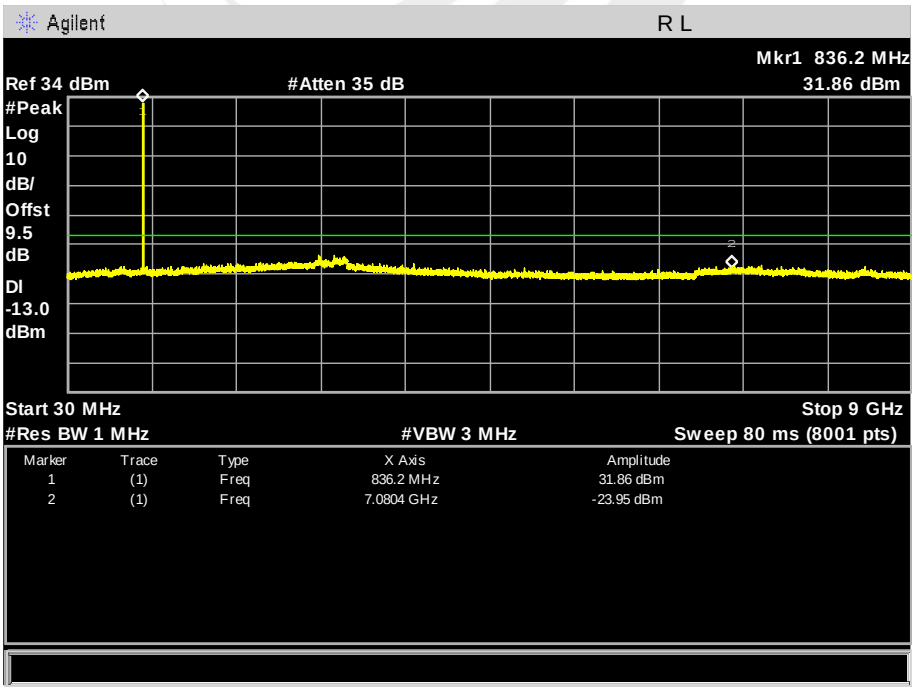


## CONDUCTED EMISSION IN GPRS 850 BAND

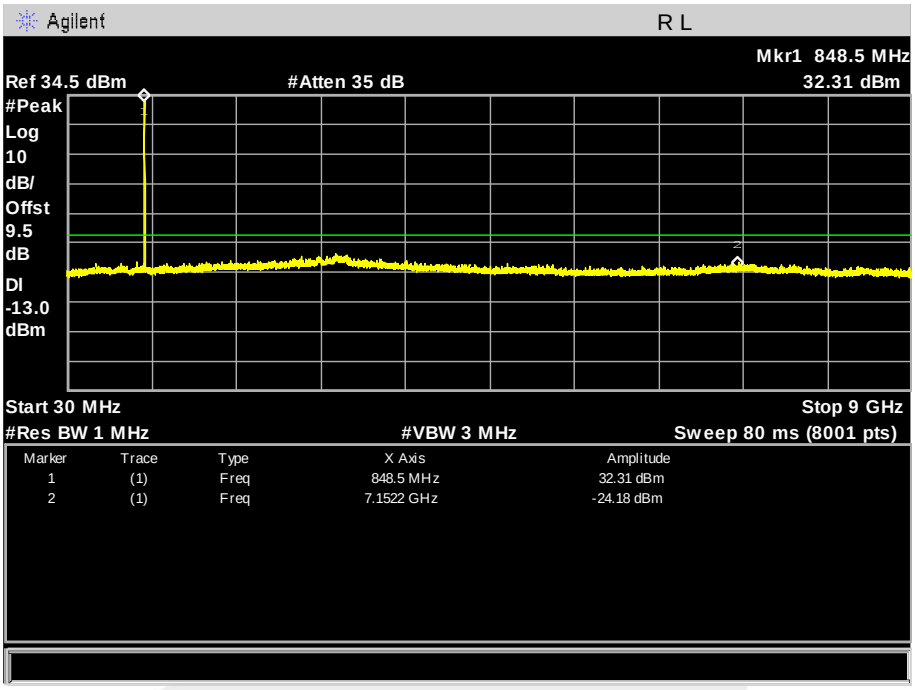
### Conducted Emission Transmitting Mode CH 128 30MHz – 9GHz




### Conducted Emission Transmitting Mode CH 190 30MHz – 9GHz

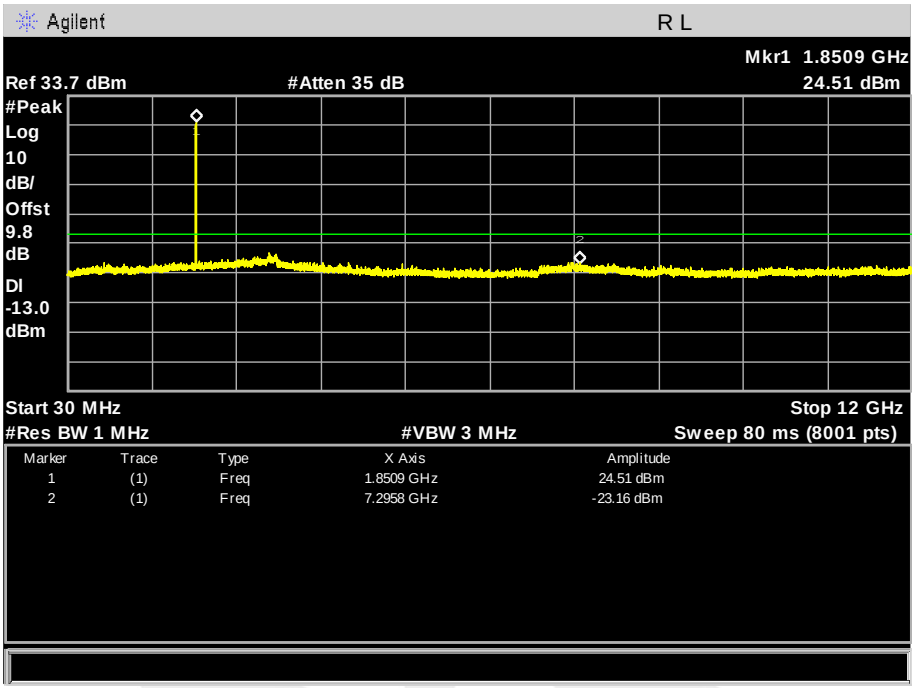


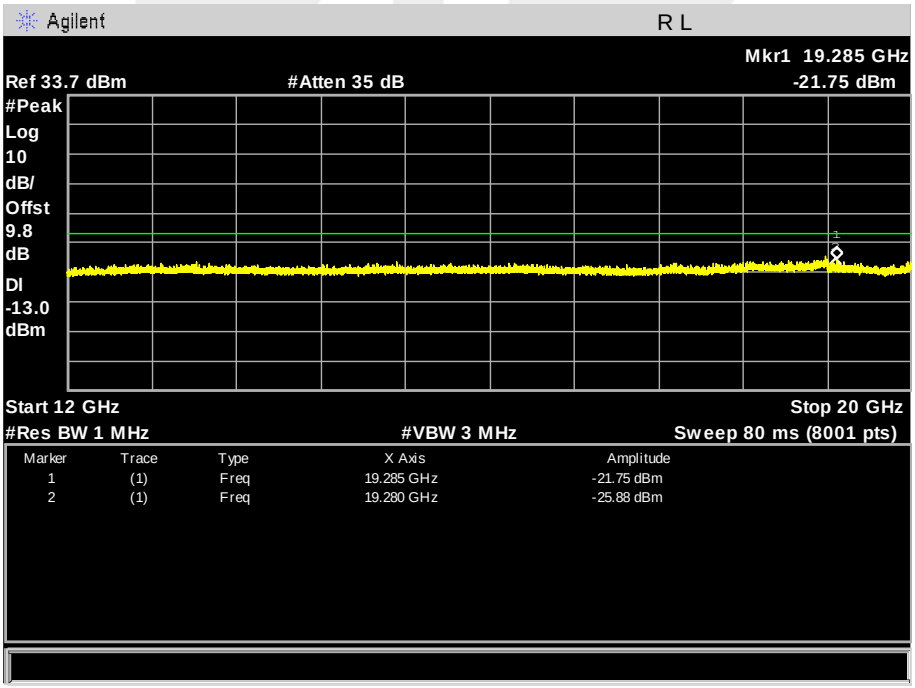
Conducted Emission Transmitting Mode CH 251 30MHz – 9GHz



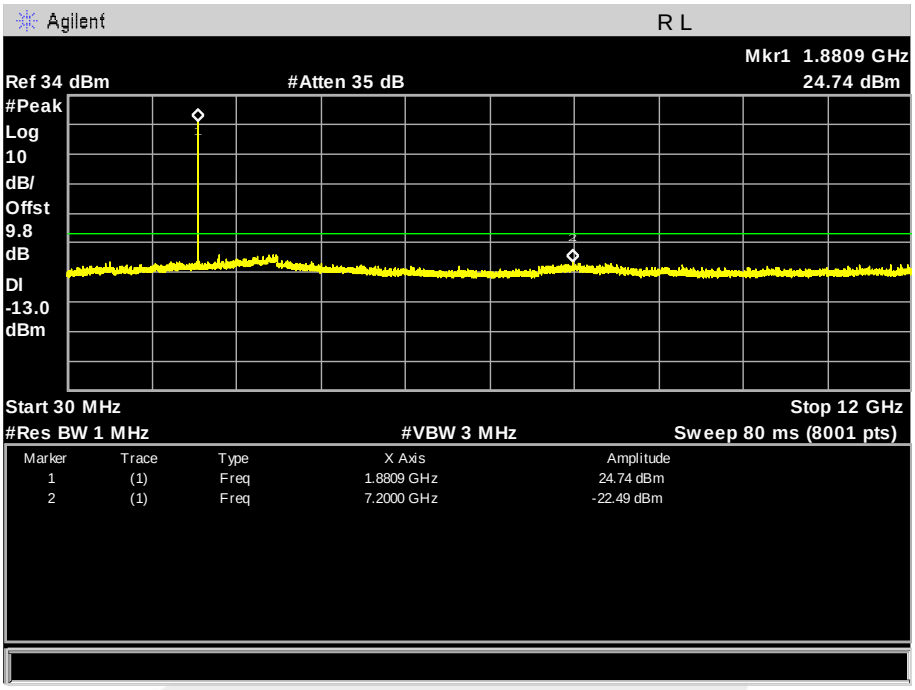
CONDUCTED EMISSION IN GSM1900 BAND

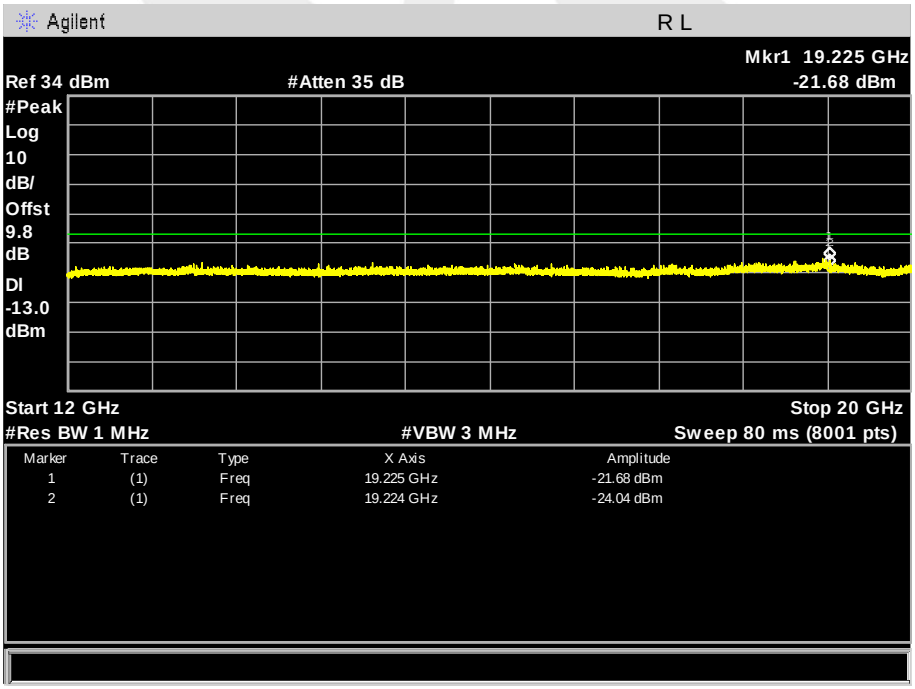
Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



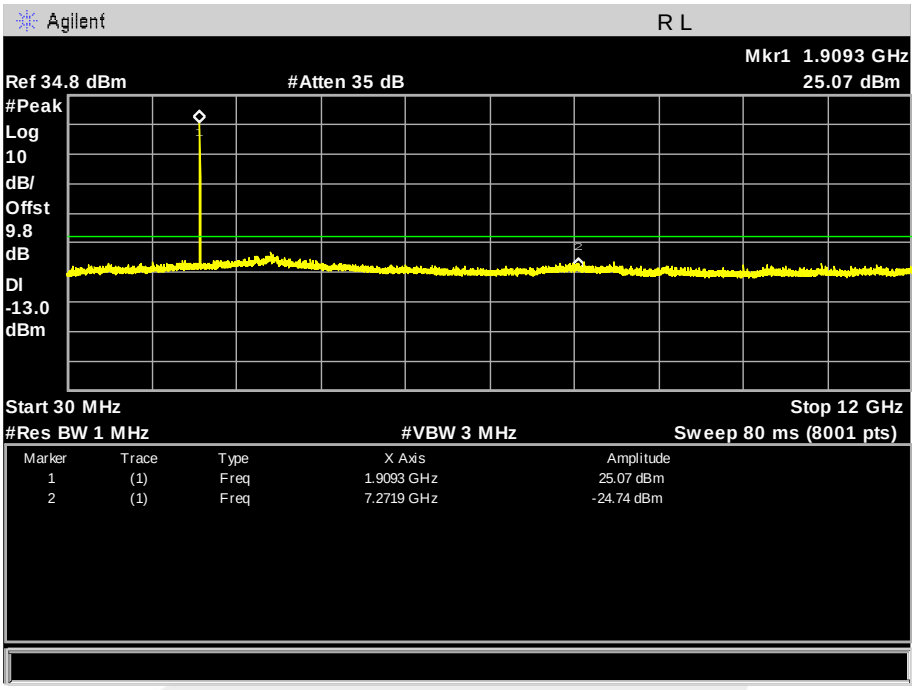



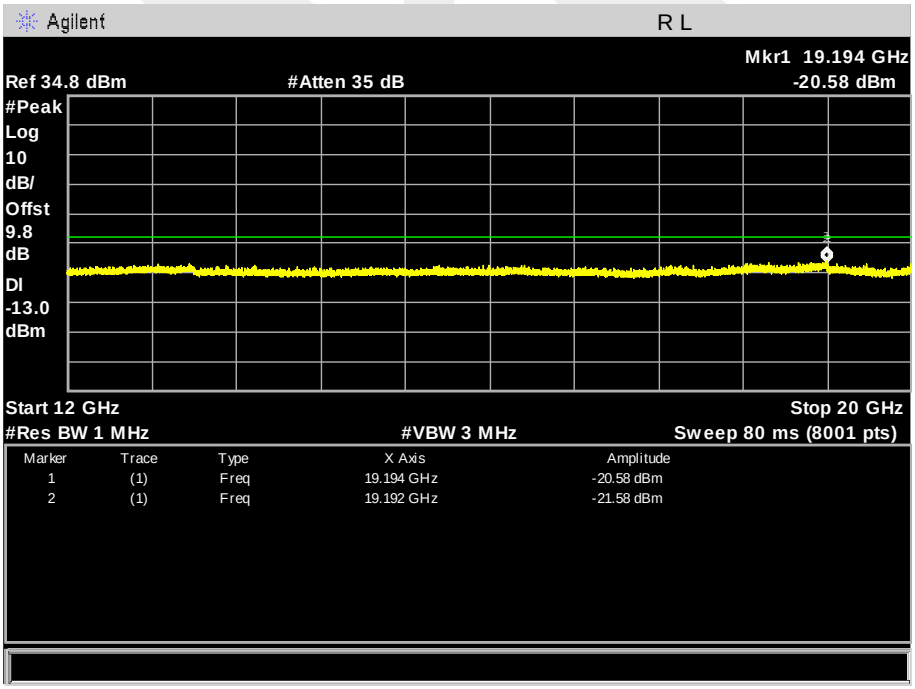
Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz



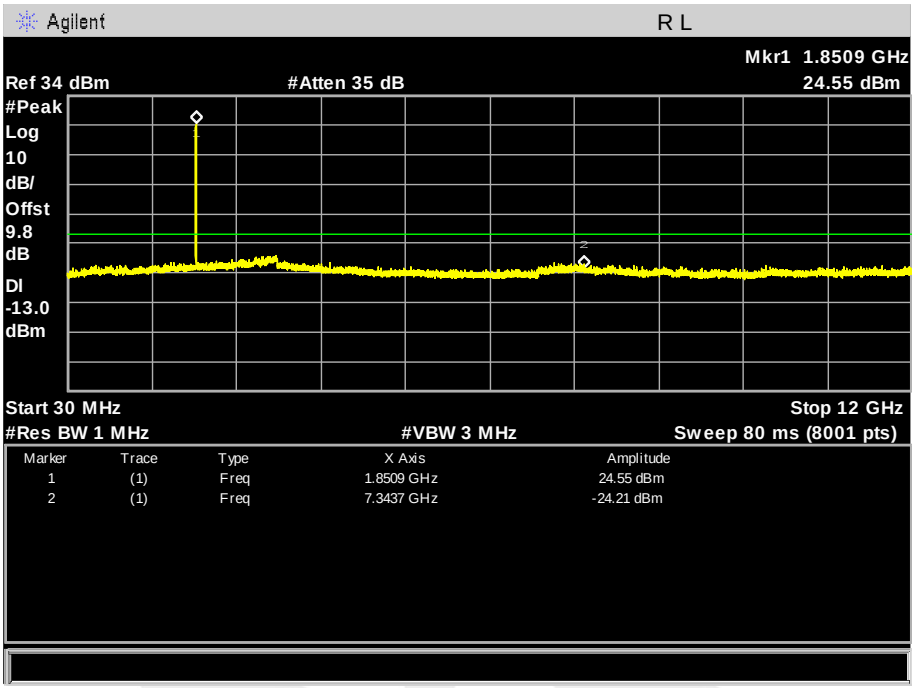
Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz

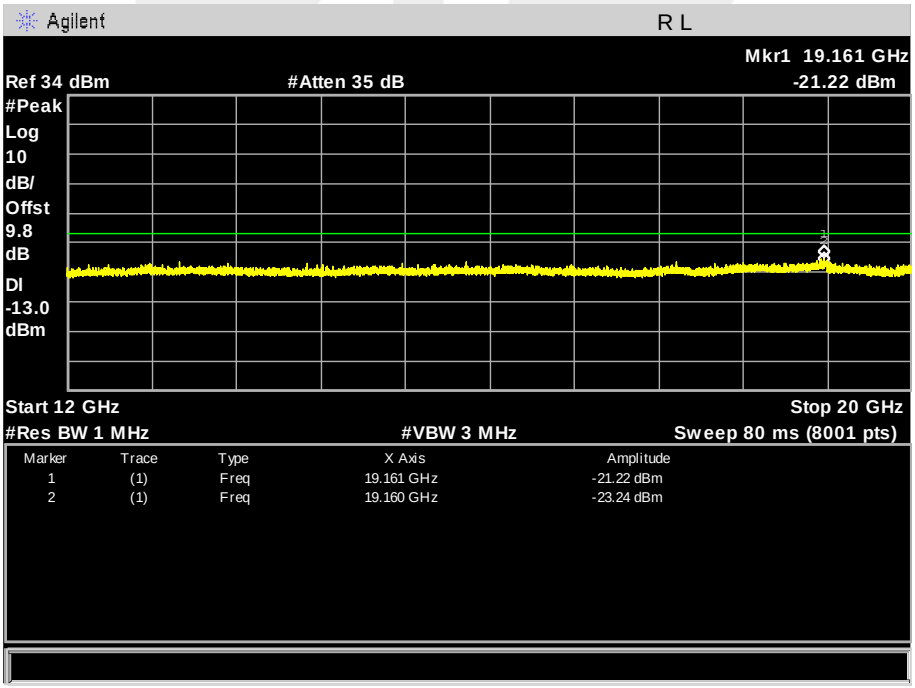


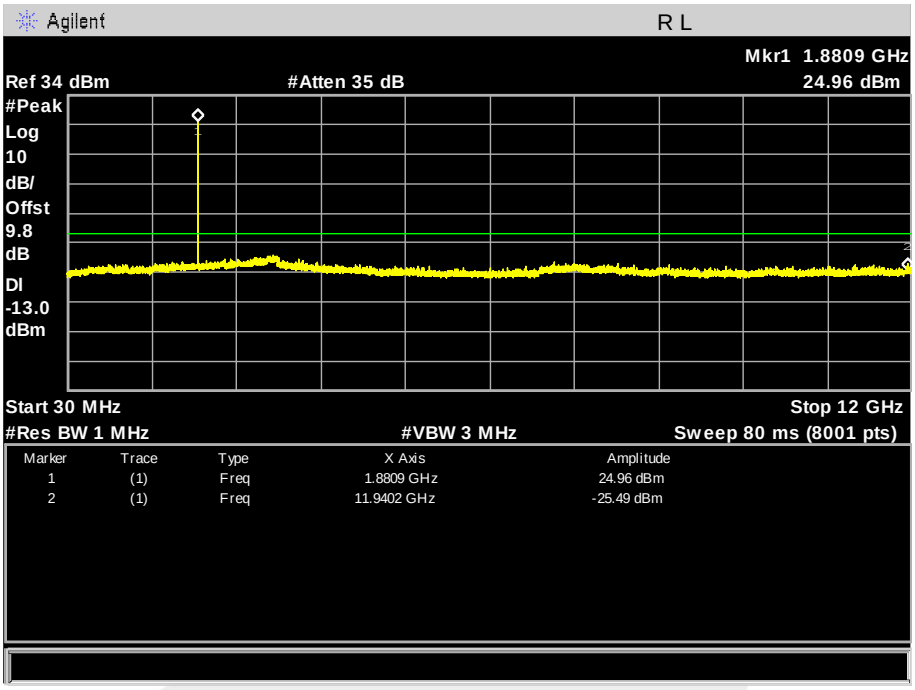
CONDUCTED EMISSION IN GPRS1900 BAND

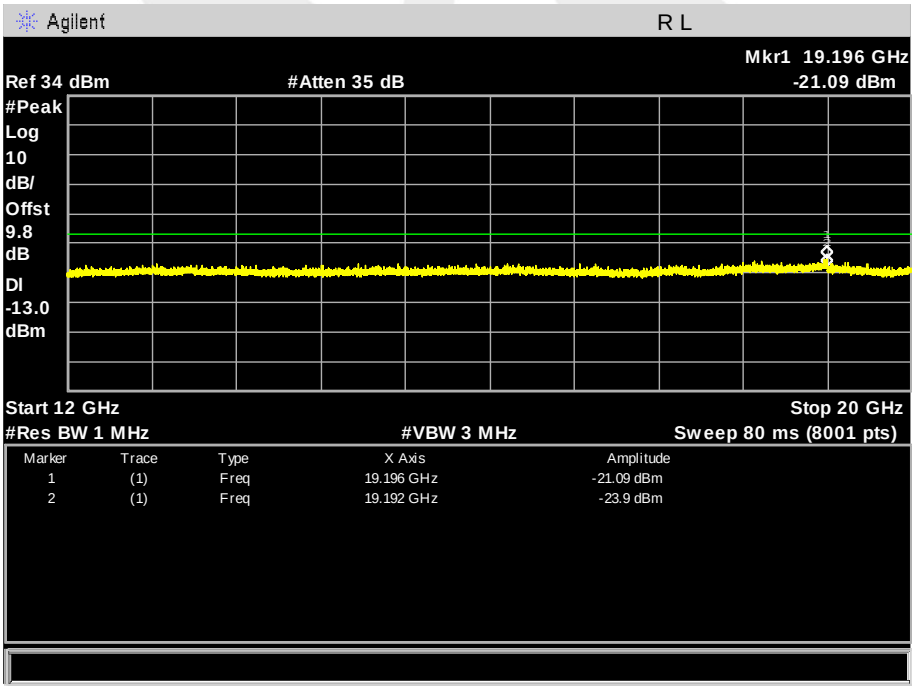
Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



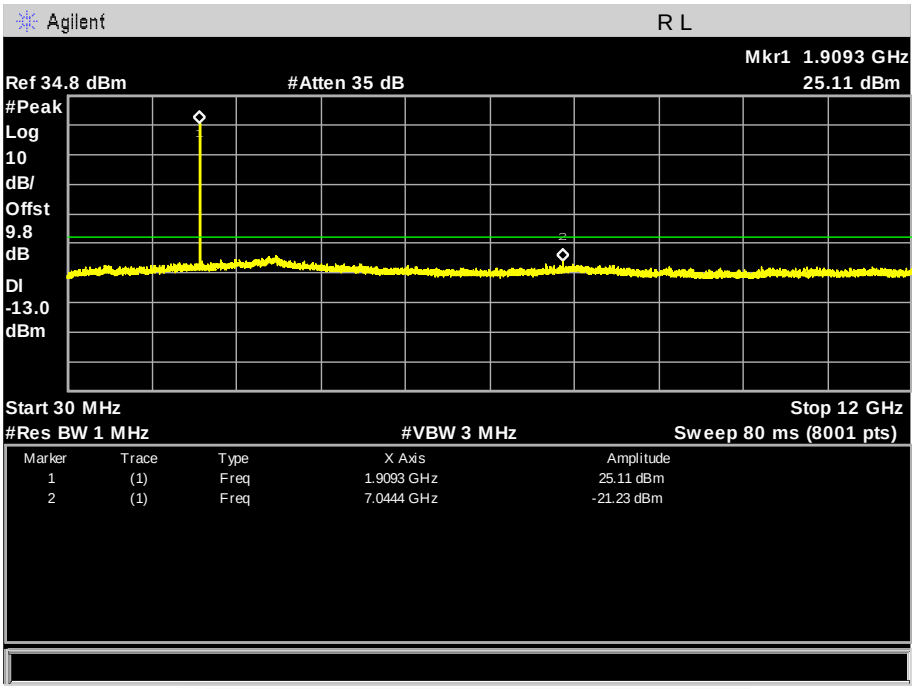



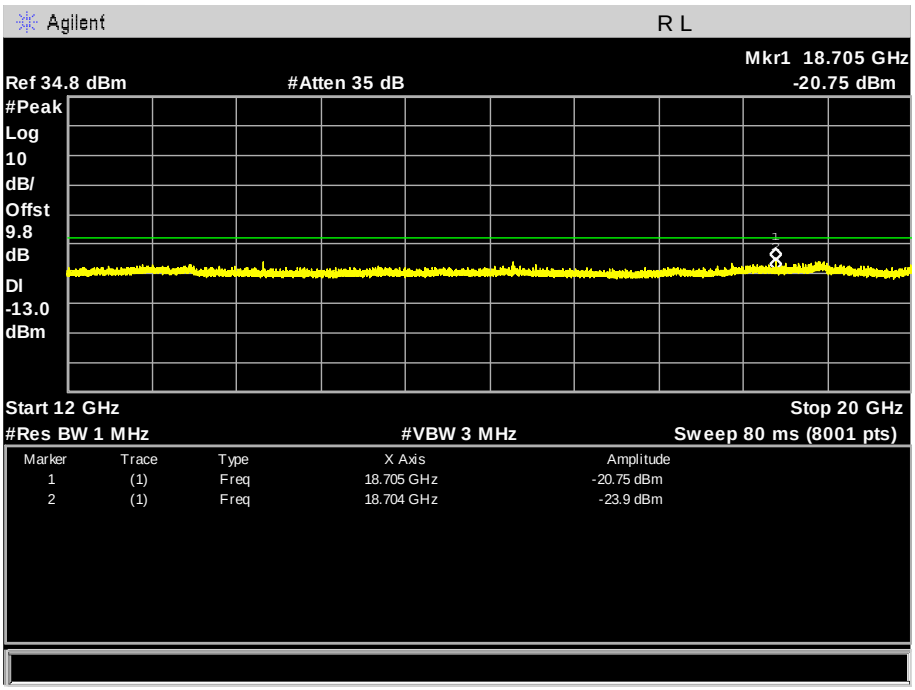
Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz



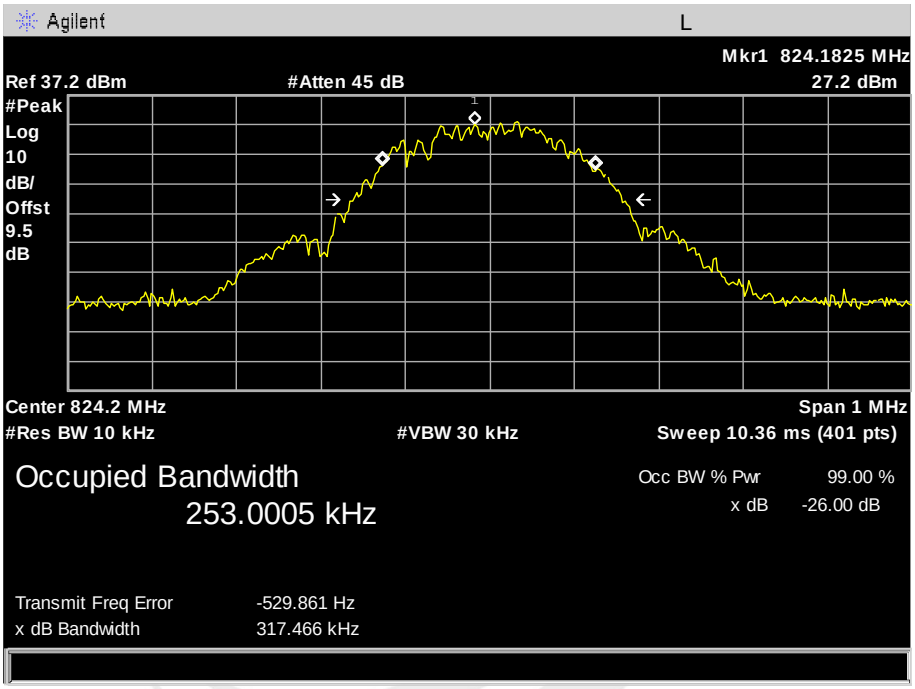



# APPENDIX II

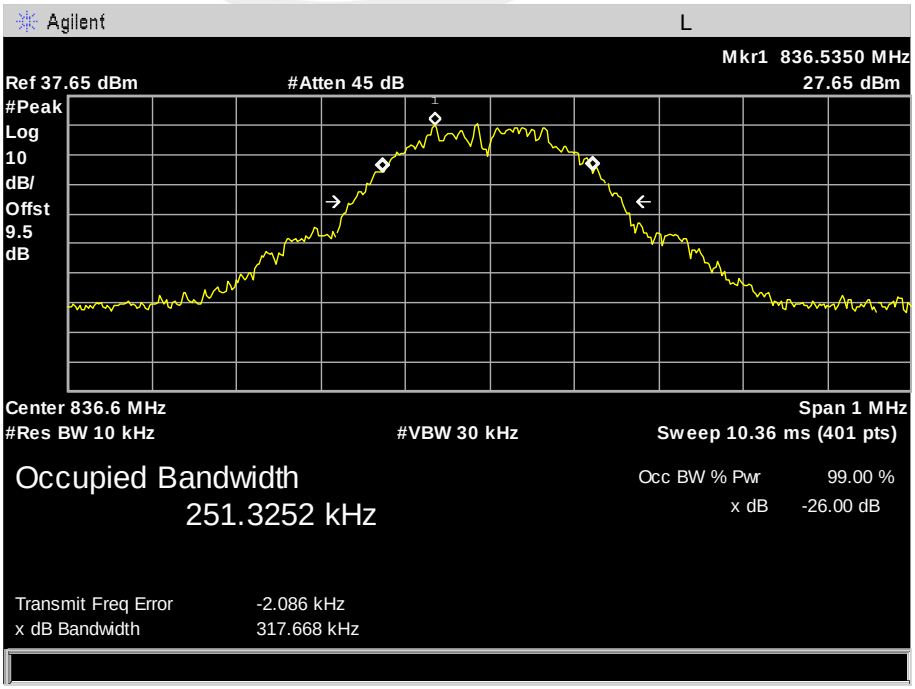
# TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)

# EMISSION BANDWIDTH (-26dBC)

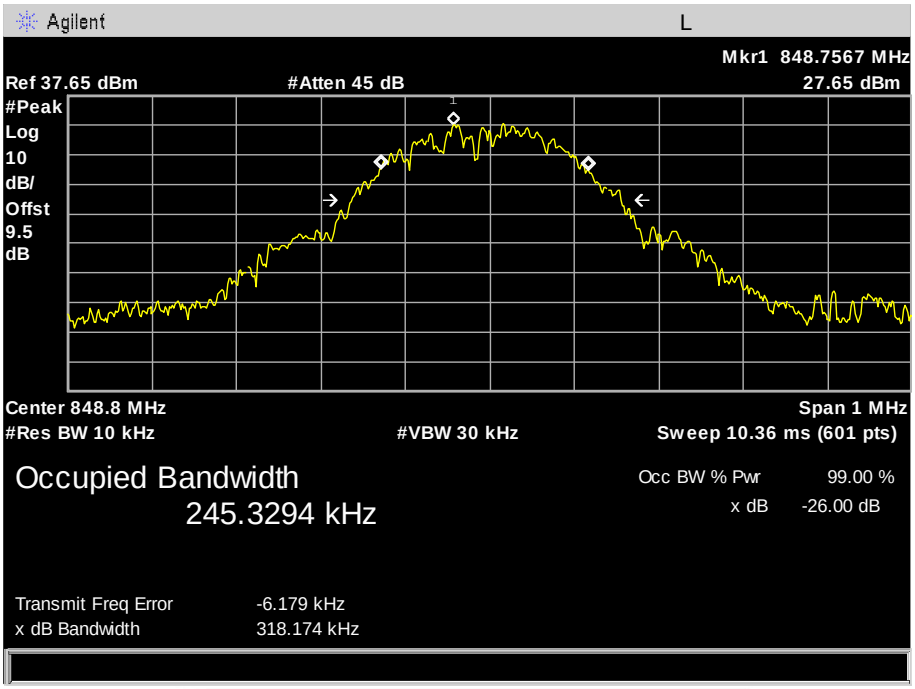
Occupied Bandwidth (99%) GSM 850 BAND CH 128



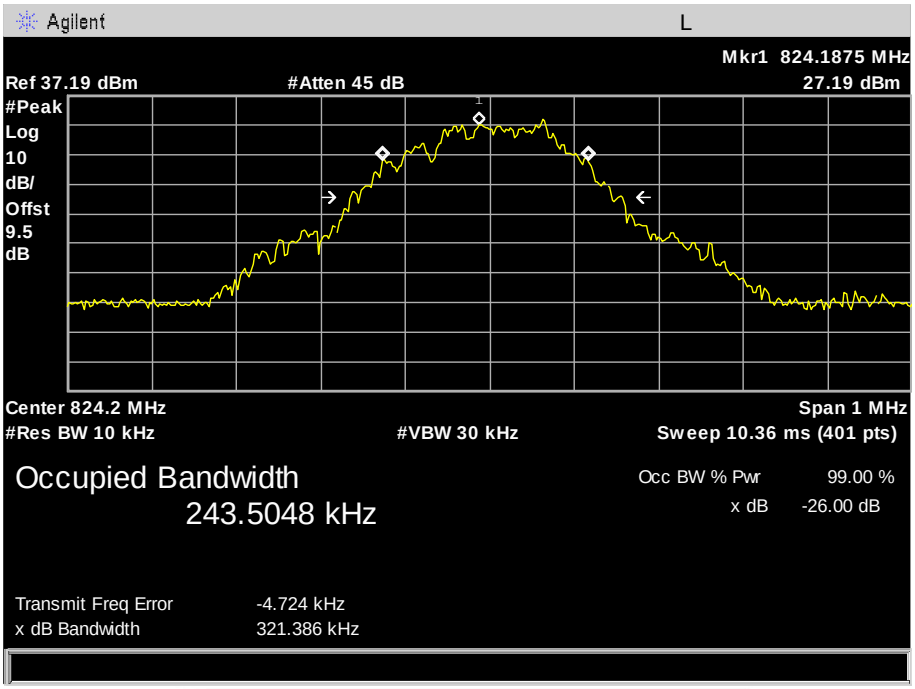

Occupied Bandwidth (99%) GSM 850 BAND CH 190



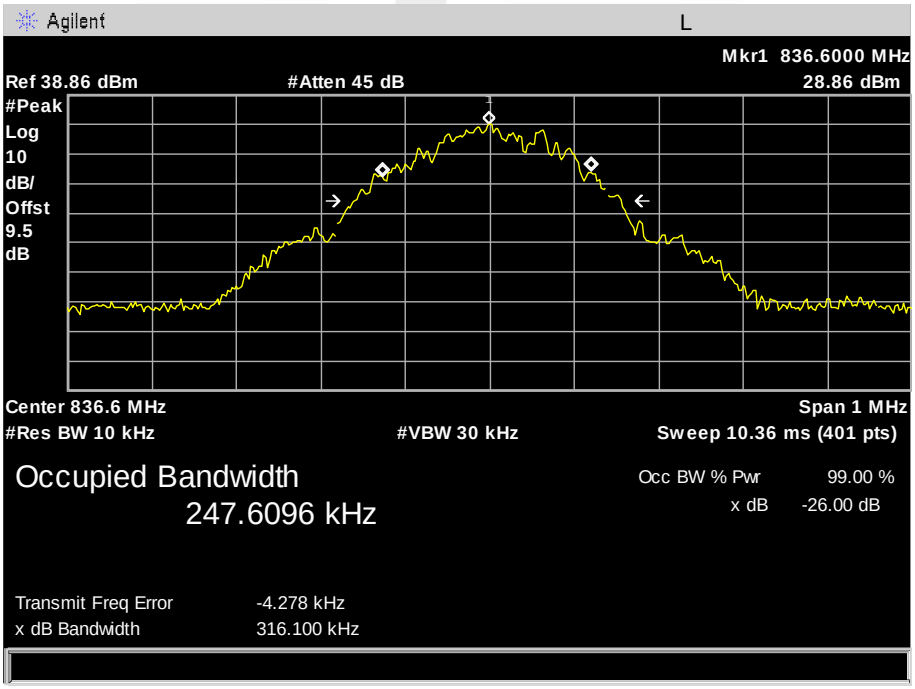
Occupied Bandwidth (99%) GSM 850 BAND CH 251



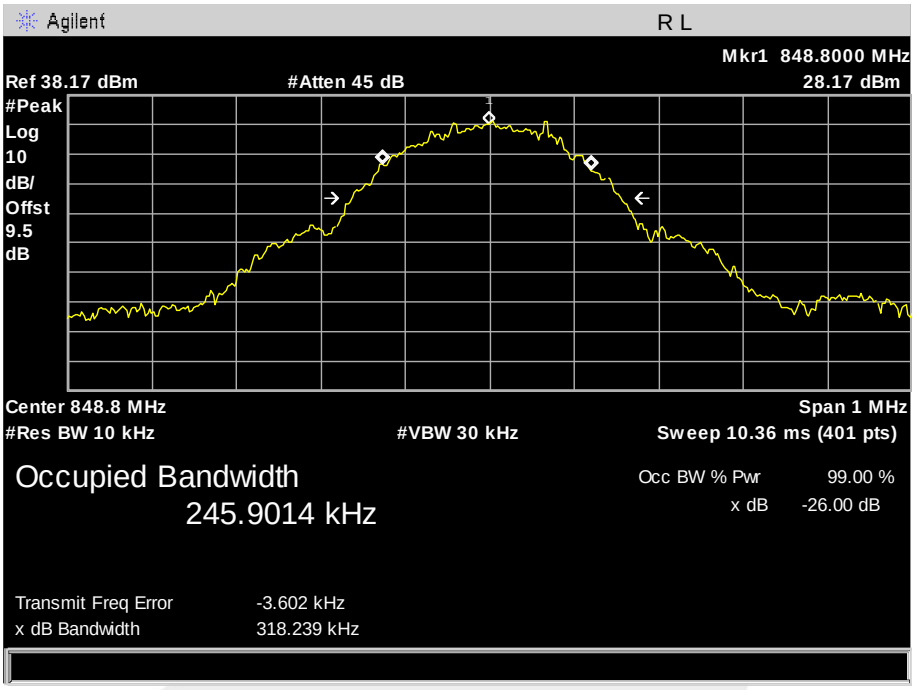
Occupied Bandwidth (99%) GPRS 850 BAND CH 128



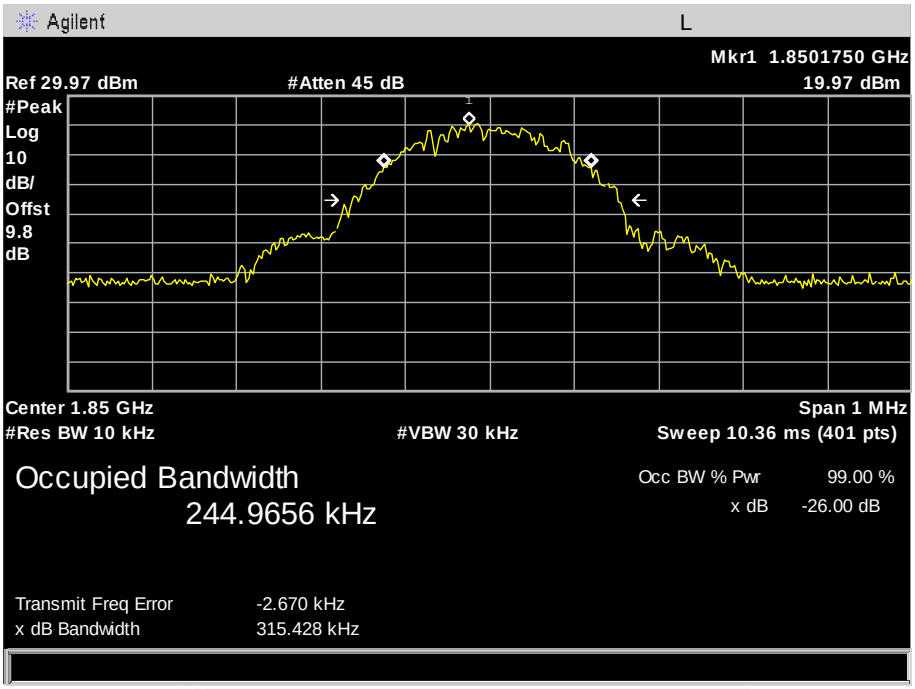

Occupied Bandwidth (99%) GPRS 850 BAND CH 190



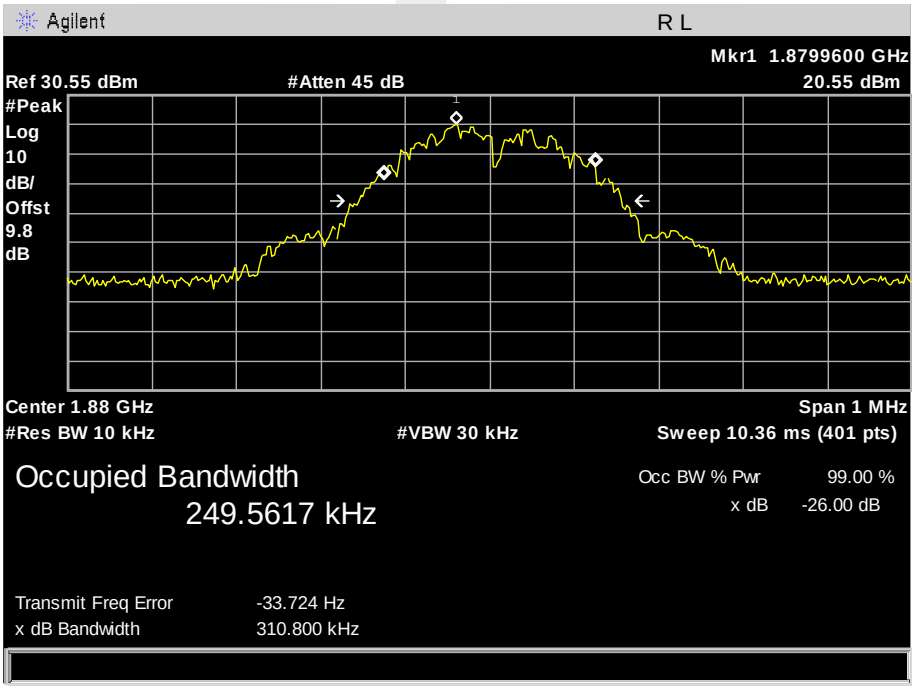
Occupied Bandwidth (99%) GRPS 850 BAND CH 251



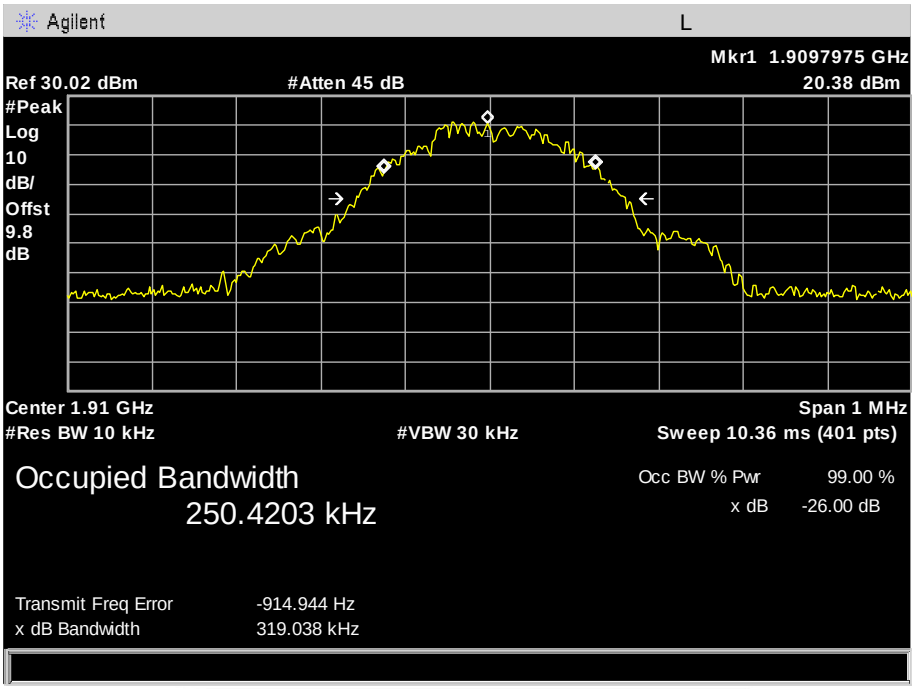
Occupied Bandwidth (99%) PCS 1900 BAND CH 512



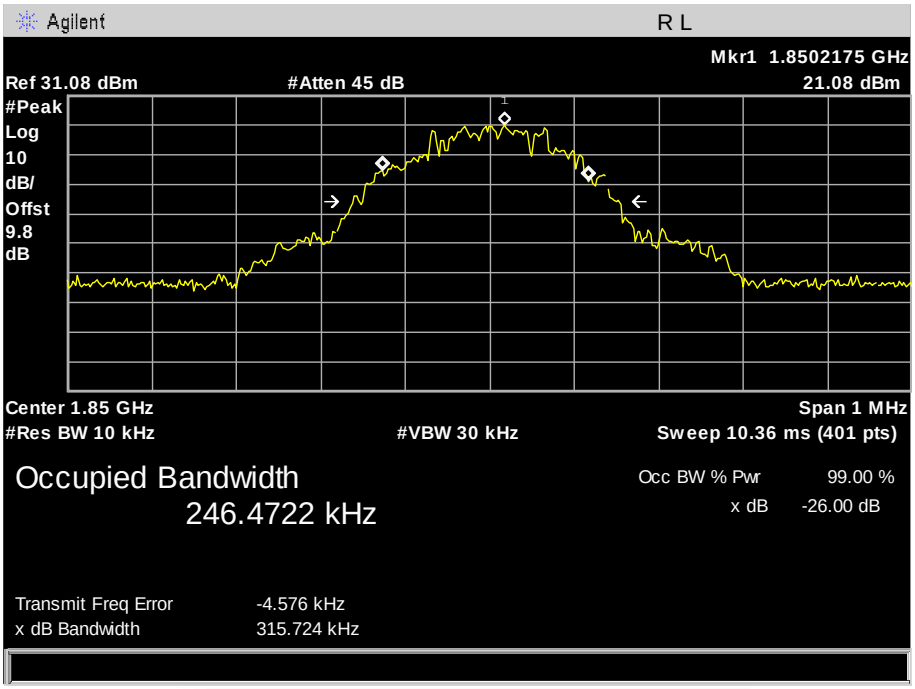

Occupied Bandwidth (99%) PCS 1900 BAND CH 661



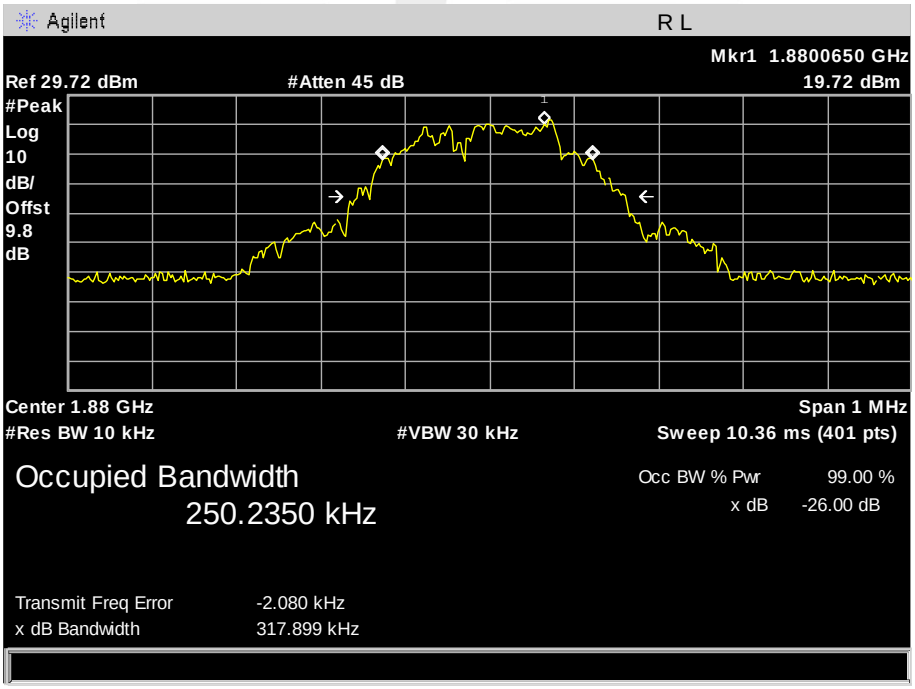
Occupied Bandwidth (99%) PCS 1900 BAND CH 810



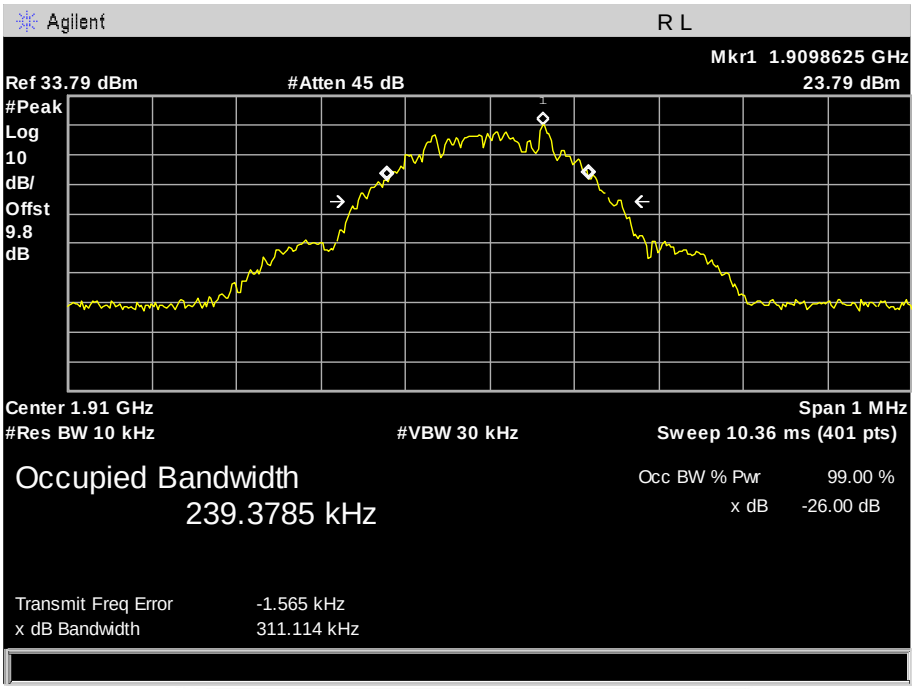
Occupied Bandwidth (99%) GPRS 1900 BAND CH 512




Occupied Bandwidth (99%) GPRS 1900 BAND CH 661



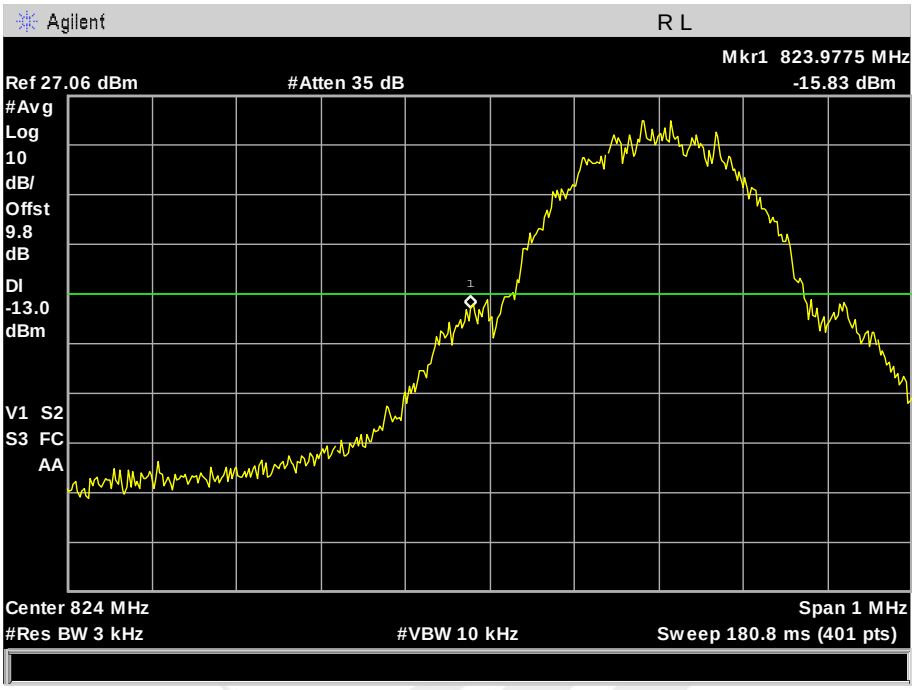
Occupied Bandwidth (99%) GPRS 1900 BAND CH 810



# APPENDIX III

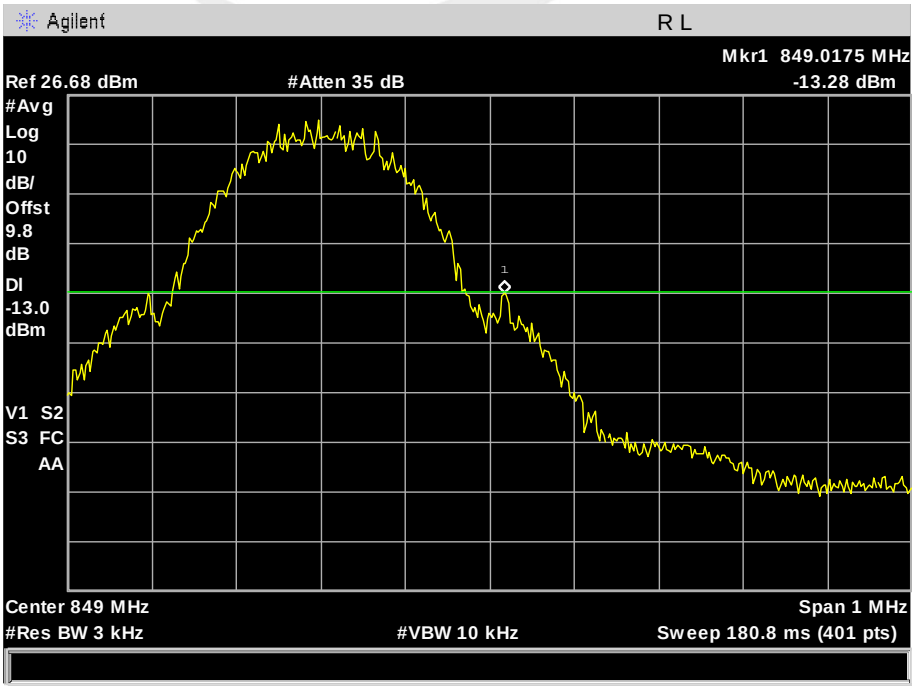
# TEST PLOTS FOR BAND EDGES

Low Band Edge GSM 850 BAND CH 128



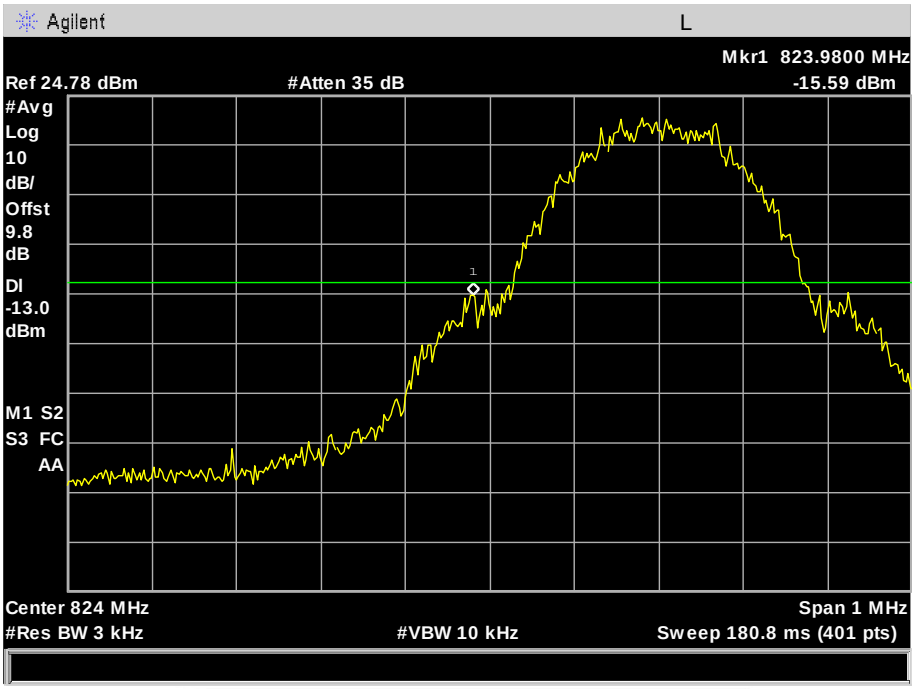

Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

High Band Edge GSM 850 BAND CH 251



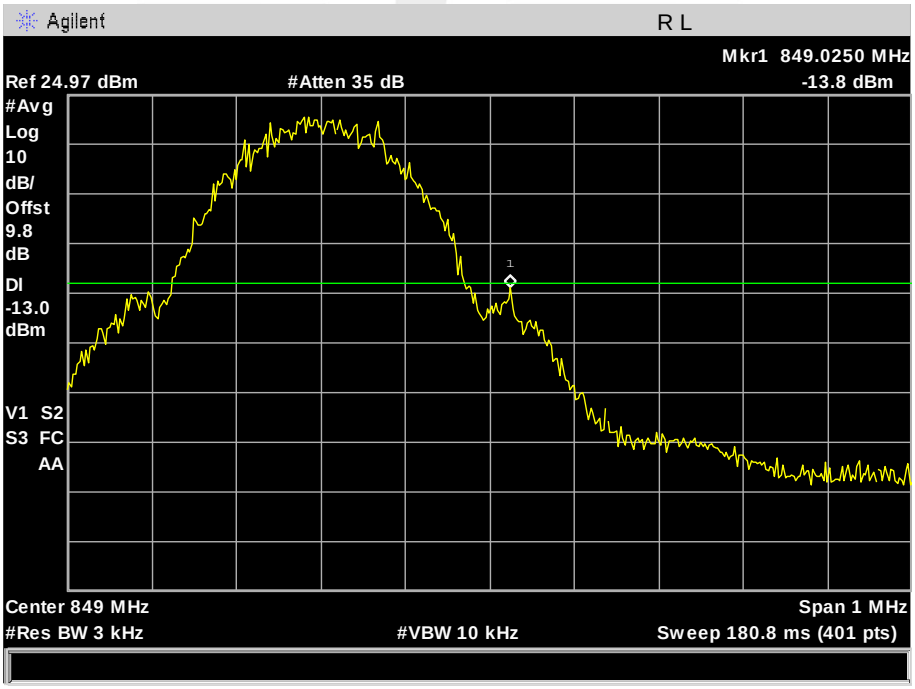

Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

Low Band Edge GPRS 850 BAND CH 128



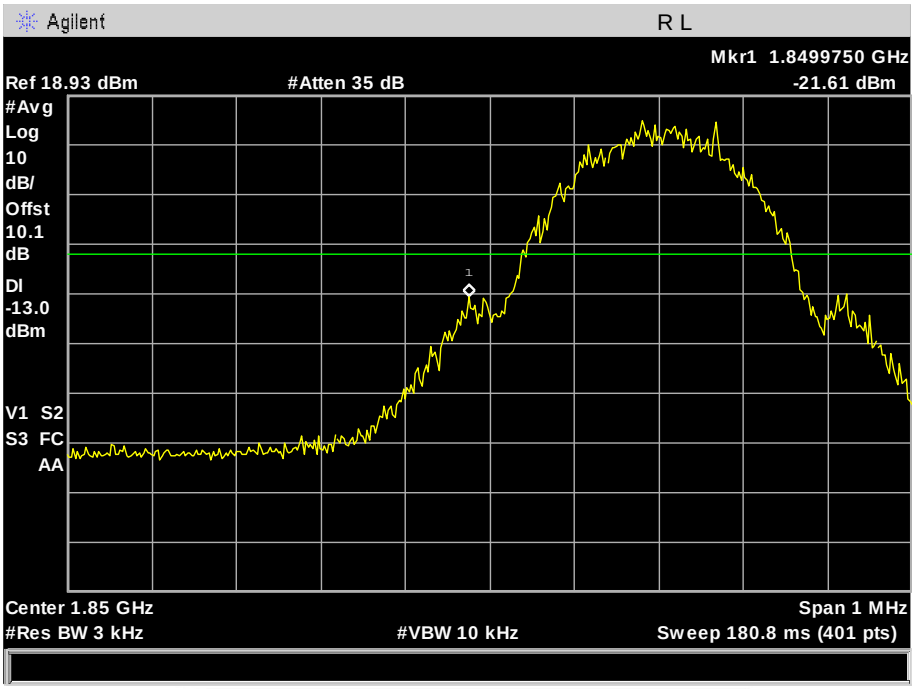

Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

High Band Edge GPRS 850 BAND CH 251



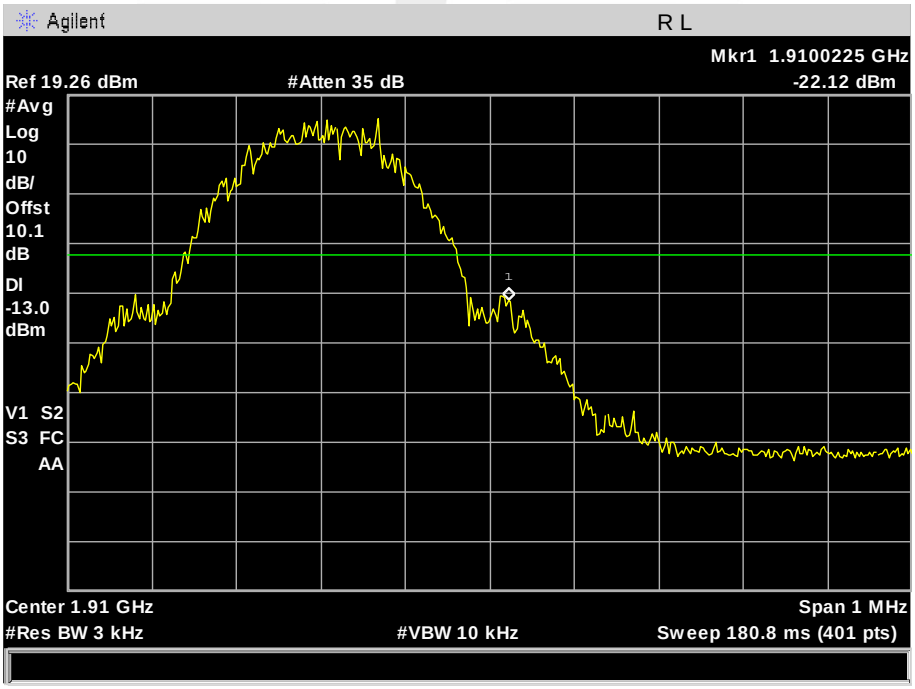

Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

Low Band Edge PCS 1900 BAND CH 512



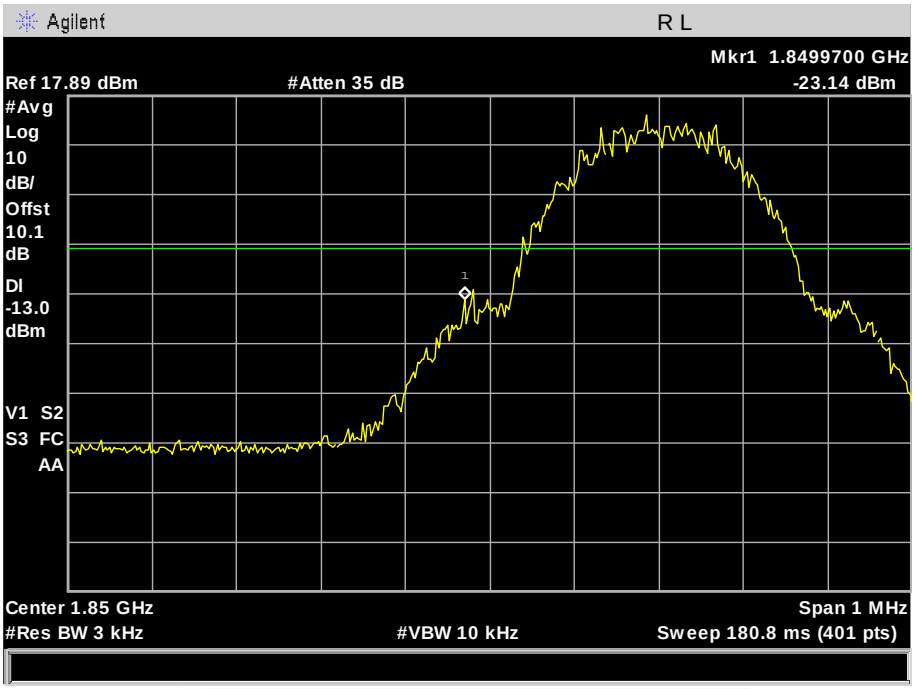

Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB

High Band Edge PCS 1900 BAND CH 810



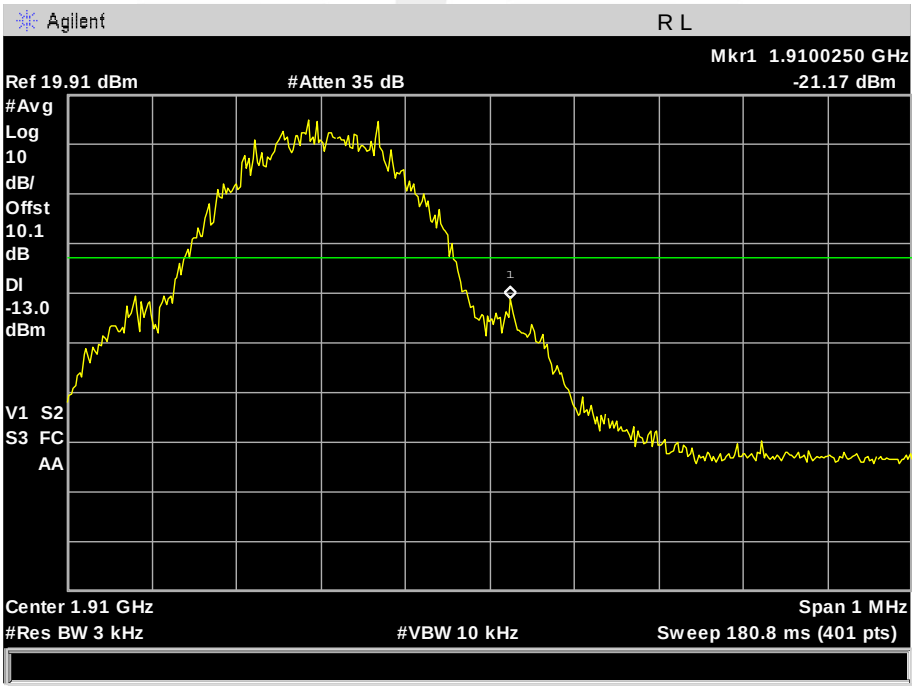

Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB

Low Band Edge GPRS 1900 BAND CH 512




Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB

High Band Edge GPRS 1900 BAND CH 810

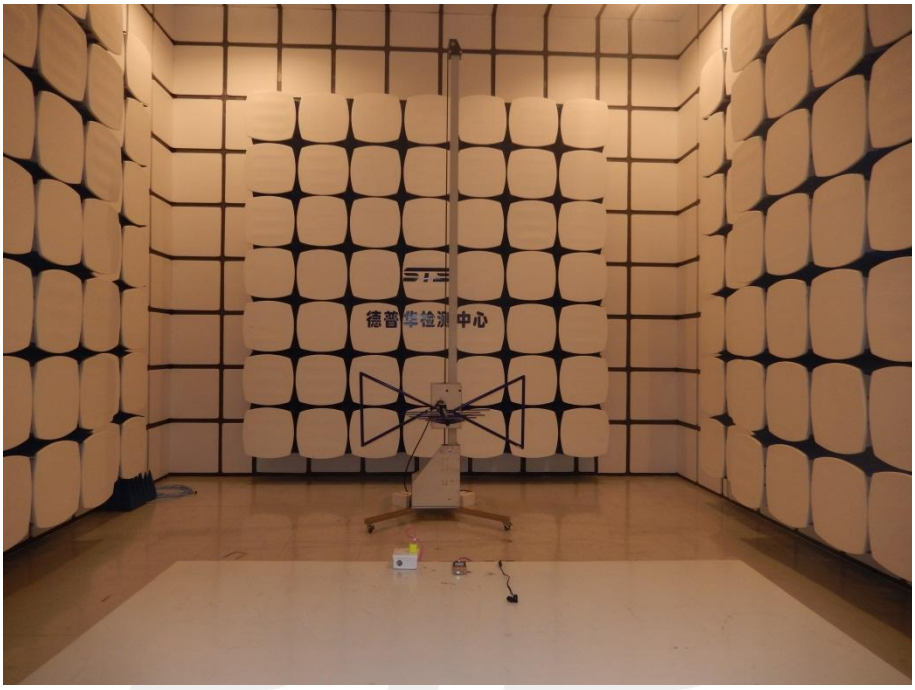


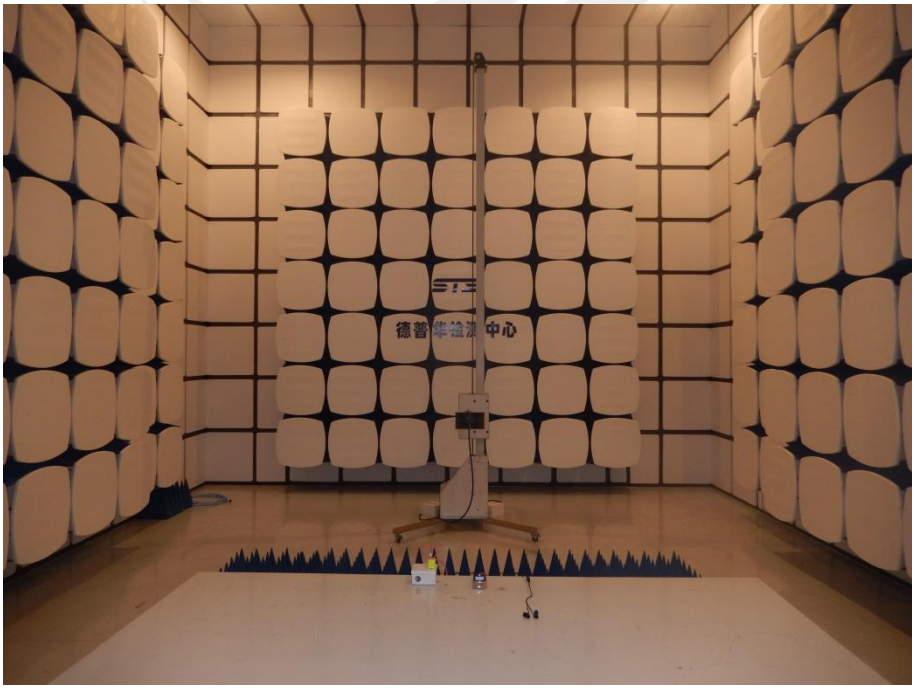

Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB

# APPENDIX IV

# PHOTOS OF TEST SETUP

RADIATED SPURIOUS EMISSION





※※※※※END OF THE REPORT※※※※※