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# TEST REPORT FOR GSM TESTING

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Report No.: SRTC2022-9004(F)-22080102(A)

Product Name: Smart Phone

Product ID: AEL013, AEL014, AEL15

Applicant: Sharp Corporation

Manufacturer: Sharp Corporation

Specification: FCC Part 24E, Part 22H, Part 2 (2021)

FCC ID: APYHRO00319

The State Radio\_monitoring\_center Testing Center (SRTC)  
15th Building, No.30 Shixing Street, Shijingshan District, Beijing, P.R.China

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## CONTENTS

<b>1. GENERAL INFORMATION .....</b>	<b>2</b>
1.1 Notes of the test report .....	2
1.2 Information about the testing laboratory .....	2
1.3 Applicant’s details .....	2
1.4 Manufacturer’s details .....	2
1.5 Test Environment .....	2
<b>2 DESCRIPTION OF THE DEVICE UNDER TEST .....</b>	<b>3</b>
2.1 Final Equipment Build Status .....	3
2.2 Support Equipment .....	3
<b>3 REFERENCE SPECIFICATION .....</b>	<b>4</b>
<b>4 KEY TO NOTES AND RESULT CODES .....</b>	<b>4</b>
<b>5 RESULT SUMMARY .....</b>	<b>5</b>
<b>6 TEST RESULT .....</b>	<b>7</b>
6.1 RF Power Output .....	7
6.2 Effective Radiated Power and Effective Isotropic Radiated Power .....	8
6.3 Occupied Bandwidth .....	9
6.4 Emission Bandwidth- .....	10
6.5 Spurious Emissions at antenna terminal .....	11
6.6 Band Edges Compliance .....	12
6.7 Frequency Stability .....	13
6.8 Radiated Spurious Emissions .....	14
6.9 Peak-Average Ratio .....	16
<b>7 MEASUREMENT UNCERTAINTIES .....</b>	<b>17</b>
<b>8 TEST EQUIPMENTS .....</b>	<b>18</b>
<b>APPENDIX A – TEST DATA OF CONDUCTED EMISSION .....</b>	<b>19</b>
<b>APPENDIX B – TEST DATA OF RADIATED EMISSION .....</b>	<b>59</b>

## 1. GENERAL INFORMATION

### 1.1 Notes of the test report

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### 1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Test Site 1:	15th Building, No.30 Shixing Street, Shijingshan District
Test Site 2:	No.80, Zhaojiachang, Beizang, Daxing District
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
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Designation Number:	CN1267
Registration number:	239125

### 1.3 Applicant's details

Company:	Sharp Corporation
Address:	1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan

### 1.4 Manufacturer's details

Company:	Sharp Corporation
Address:	1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan

### 1.5 Test Environment

Date of Receipt of test sample at SRTC:	2022-08-01
Testing Start Date:	2022-08-01
Testing End Date:	2022-09-01

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	40
Maximum Extreme	55	---
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	4.0
Maximum Extreme Supply Voltage (V d.c.):	4.0
Minimum Extreme Supply Voltage (V d.c.):	3.7

## **2 DESCRIPTION OF THE DEVICE UNDER TEST**

### **2.1 Final Equipment Build Status**

Frequency Range:	GSM850: Tx:824~849MHz Rx:869~894MHz PCS1900: Tx:1850~1910MHz Rx:1930~1990MHz
Modulation Type:	GPRS:GMSK
Emission Designator:	300KGXW/300KG7W
Duplex Mode:	FDD
Duplex Spacing:	GSM850:45MHz PCS1900:80MHz
Antenna Type:	Inverted-F Antenna
Antenna Gain:	GSM850: -5.8dBi/PCS1900: -3.6dBi ERP = EIRP(Power +Gain) – 2.15 (dB)
Power Supply:	Battery / Charger
Software Revision:	A719G
Hardware Revision:	DVT(Remodeled to the equivalent of MP products)
IMEI:	004401231250842 004401231251410

### **2.2 Support Equipment**

The following support equipment was used to exercise the DUT during testing:

N/A

### **3 REFERENCE SPECIFICATION**

Specification	Version	Title
FCC Part2	2021	Frequency allocations and radio treaty matters; general rules and regulations
FCC Part22	2021	Public mobile services
FCC Part24	2021	Personal communications services
ANSI C63.26	2021	American national standard for compliance testing of transmitters used in licensed radio services
KDB 971168 D01	April 9, 2018	Measurement guidance for certification of licensed digital transmitters
TIA-603-E-2016	March 2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

### **4 KEY TO NOTES AND RESULT CODES**

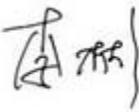
The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
NT	Normal Temperature
NV	Nominal voltage
HV	High voltage
LV	Low voltage

## 5 RESULT SUMMARY

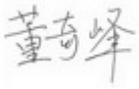
No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)(5)/24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	2.1049	Pass
5	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)	Pass
6	Band Edges Compliance	2.1051/22.917(a)/24.238(a)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	Peak-Average Ratio	24.232(d)	Pass

Test Site 1: 15th Building, No.30 Shixing Street, Shijingshan District

This Test Report Is Approved by: Mr. Peng Zhen 	Review by: Mr. Li Bin 
Tested and Issued by: Mr. Du Wei 	Approved date:  20220903

No.	Test case	FCC reference	Verdict
9	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	Pass

Test Site 2: No.80, Zhaojiachang, Beizang, Daxing District

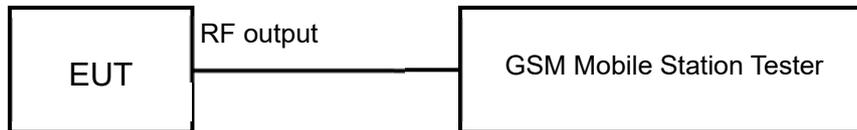
This Test Report Is Approved by: Mr. Liu Wei 	Review by: Mr. Guo Yu 
Tested and Issued by: Mr. Dong Qifeng 	Approved date: 20220903

## **6 TEST RESULT**

### **6.1 RF Power Output**

Rule Part(s)  
FCC Part 2.1046

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration. The measurement will be conducted at three channels (Low, Middle and High channels)

Limits: No specific conduct power requirements in part 2.1046.

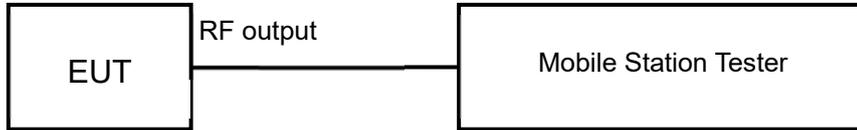
Test result:

The test results are shown in Appendix A.

## 6.2 Effective Radiated Power and Effective Isotropic Radiated Power

Rule Part(s)  
FCC Part 22.913(a)(5)/Part 24.232(c)

Test setup:



Test procedure:  
KDB 971168 D01 v03r01 – Section 5.6

Test Settings

Subclause 5.2.5.5 of ANSI C63.26-2015 is applicable, along with the following provisions. For personal/portable radios utilizing an integral antenna, the factor LC is typically negligible. However, in a fixed station transmit system that utilizes a long cable run between the transmitter and the transmitting antenna, this factor can be significant. The minimum cable loss should be used in this equation.

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:

$$\text{ERP/EIRP} = \text{PMeas} - \text{LC} + \text{GT}$$

Where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Limits for GSM850:

Operation Mode	Power Step	E.R.P. (dBm)
GSM	5	≤38.45
GPRS	3	≤38.45

Limits for PCS1900:

Operation Mode	Power Step	E.I.R.P. (dBm)
GSM	0	≤33
GPRS	3	≤33

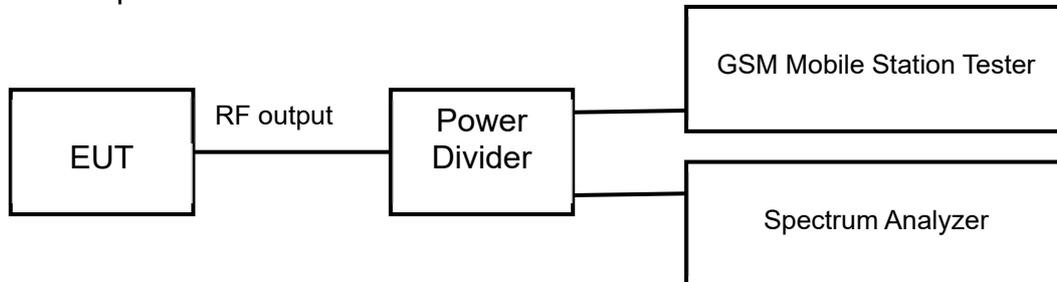
Test result:

The test results are shown in Appendix A.

## 6.3 Occupied Bandwidth

Rule Part(s)  
Part 2.1049

Test Setup:



Test procedure:  
KDB 971168 D01 v03r01 – Section 4.2

### Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq$  3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Limits: No specific occupied bandwidth requirements in part 2.1049

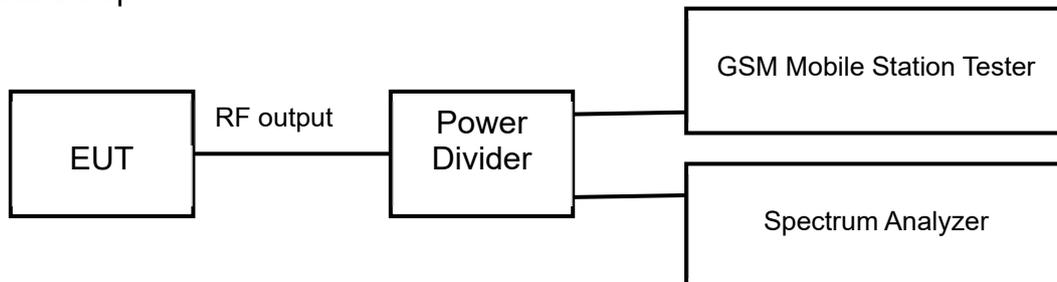
Test result:

The test results are shown in Appendix A.

## 6.4 Emission Bandwidth-

Rule Part(s)  
Part 2.1049

Test Setup:



Test procedure:  
KDB 971168 D01 v03r01 – Section 4.2

### Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 26dB occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq$  3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the emission bandwidth observed in Step 7

Limits: No specific occupied bandwidth requirements in part 2.1049

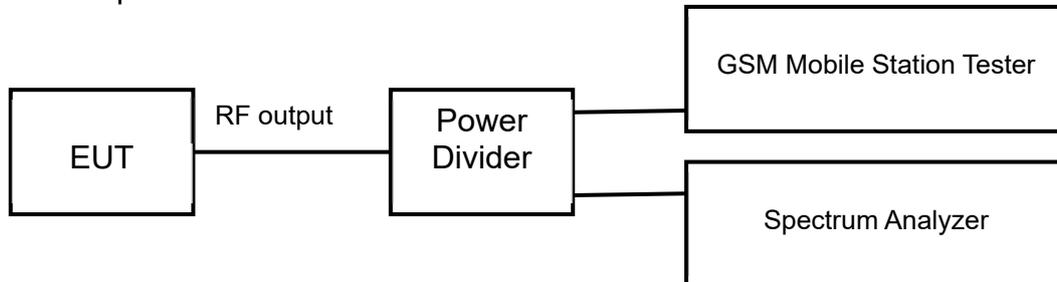
Test result:

The test results are shown in Appendix A.

## 6.5 Spurious Emissions at antenna terminal

Rule Part(s)  
FCC Part 2.1053/22.917 (a)/ 24.238(a)

Test Setup:



Test procedure:  
KDB 971168 D01 v03r01 – Section 6.0

### Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz for Cell, 20GHz for PCS
2. RBW=100 kHz (For below 1GHz), 1MHz (For above 1GHz)
3. VBW  $\geq 3 \times$  RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. Sweep time = auto couple
7. The trace was allowed to stabilize

### Limits:

The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P_{\text{[Watts]}})$ , where P is the transmitter power in Watts.

### Test result:

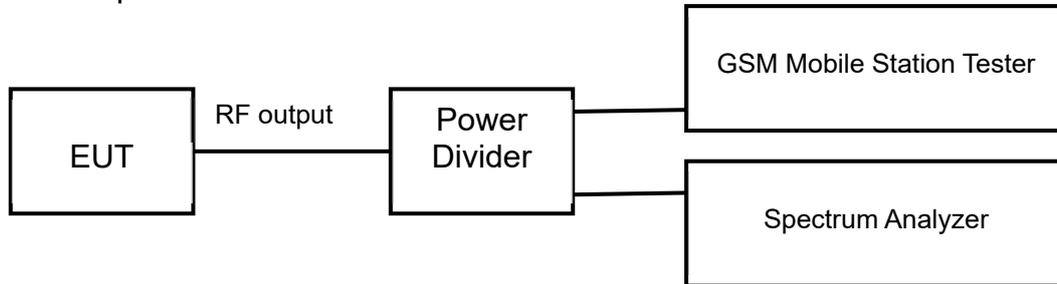
The test results are shown in Appendix A.

## 6.6 Band Edges Compliance

Rule Part (s)

FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

Test Setup:



Test procedure:

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span=2MHz
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times \text{Span}/\text{RBW}$
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Limit: The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P)$  [Watts], where P is the transmitter power in Watts.

Test result:

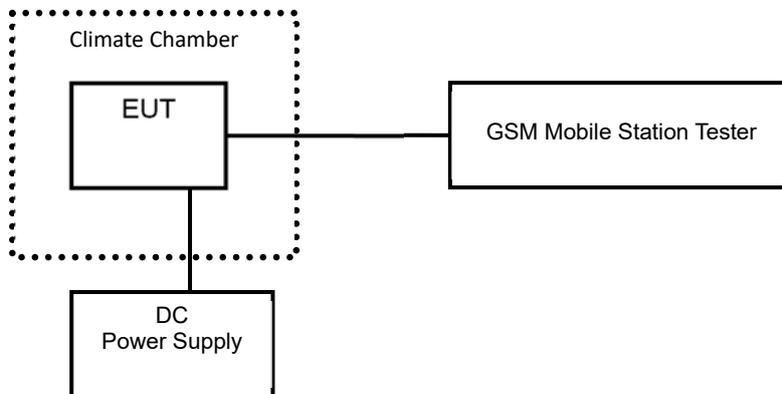
The test results are shown in Appendix A.

## 6.7 Frequency Stability

Rule Part(s)

FCC Part 2.1055/22.355 /Part 24.235

Test setup:



Test Procedure:

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C (The temperature range can be declared by the manufacturer). A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Limits: For Part 22, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test result:

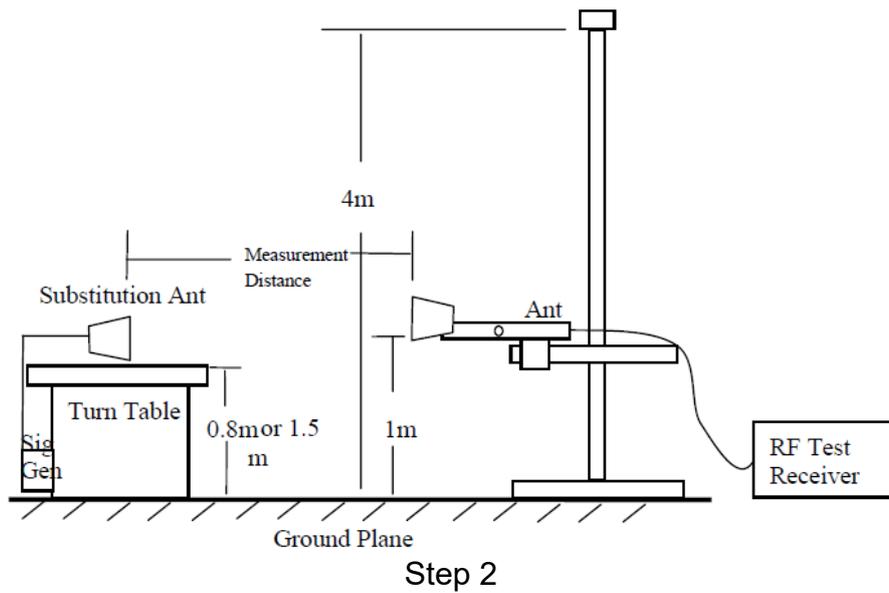
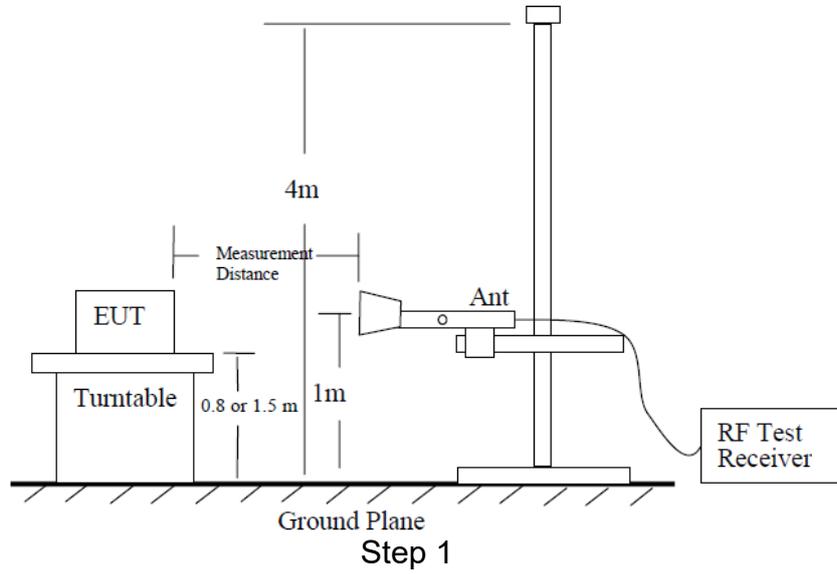
The test results are shown in Appendix A.

## 6.8 Radiated Spurious Emissions

Rule Part(s)

FCC Part 2.1053/ 22.917(a)/Part 24.238(a)

Test Setup:



**Test procedure:**

The measurements procedures in TIA-603-E-2016 are used.

The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

**Step 1:**

The measurement is carried out in the chamber. EUT was placed on a 0.8m (f<1GHz)/ 1.5m (f>1GHz) high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna from 1m to 4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 100 kHz (f<1GHz)/1MHz (f>1GHz). The antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 10th harmonic of the carrier. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

**Step 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.

A power (P<sub>mea</sub>) 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<sub>r</sub>). The power of signal source (P<sub>mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna (P<sub>ca</sub>) and the Substitution Antenna Gain (G<sub>a</sub>).

**Calculation procedure:**

The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

$$\text{Power (EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_{\text{a}}$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{\text{mea}} + P_{\text{ca}} + G_{\text{a}} = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

Note: We tested both horizontal and vertical polarization, but only the largest numerical polarity of the two polarities was recorded in the final report.

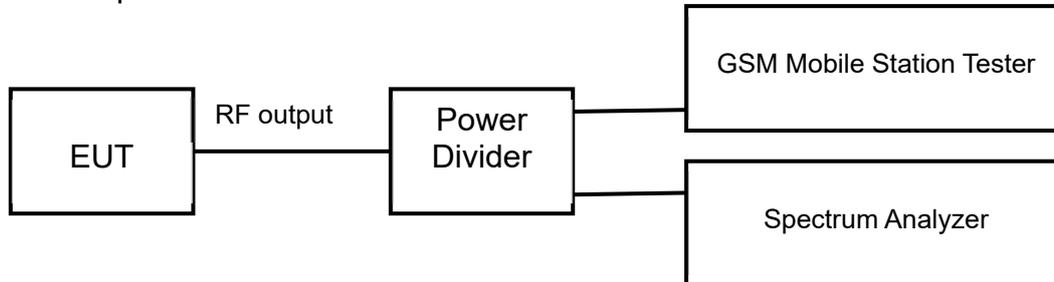
**Test result:**

The test results are shown in Appendix B.

## 6.9 Peak-Average Ratio

Rule Part(s)  
FCC Part 24.232(d)

Test Setup:



Test procedure:  
KDB 971168 D01 v03r01 – Section 5.7.1

Test settings:

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Limits: the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test result:

The test results are shown in Appendix A

## 7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
RF Power Output	0.6 dB	
Effective Radiated Power and Effective Isotropic Radiated Power	0.6 dB	
Occupied Bandwidth	3kHz	
Emission Bandwidth	3kHz	
Peak-Average Ratio	0.8dB	
Frequency Stability	48Hz	
Band Edges Compliance	1.2dB	
Spurious Emissions at antenna terminal	9kHz~2GHz	1.2dB
	2G~3.6GHz	1.4dB
	3.6G~8GHz	2.2dB
	8G~12.75GHz	2.7dB
Radiated Emission Measurement	30MHz~200MHz	4.88dB
	200MHz~1GHz	4.87dB
	1GHz~18GHz	4.58dB
	18GHz~40GHz	4.35dB

## **8 TEST EQUIPMENTS**

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	Mobile Station Tester / MT8820C	Anritsu	6201300660	2022.06.21	2023.06.20
2	Radio Communication Station / CMW500	R&S	161702	2022.06.21	2023.06.20
3	Spectrum Analyzer / FSV40	R&S	101065	2022.06.21	2023.06.20
4	Spectrum Analyzer / N9020A	Agilent	MY48010771	2022.05.18	2023.05.17
5	Power Divider / 11667A	HP	19632	2022.06.21	2023.06.20
6	DC Power Supply / E3645A	Agilent	MY40000741	2022.04.22	2023.04.21
7	Temperature chamber / SH241	ESPEC	92013758	2022.06.21	2023.06.20
8	Fully-Anechoic Chamber / 12.65m×8.03m×7.50m	FRANKONIA	----	----	----
9	Semi-Anechoic/Chamber / 23.18m×16.88m×9.60m	FRANKONIA	---	----	----
10	Turn table Diameter:1m	FRANKONIA	----	----	----
11	Turn table Diameter:5m	FRANKONIA	----	----	----
12	Antenna master FAC(MA4.0)	MATURO	----	----	----
13	Antenna master SAC(MA4.0)	MATURO	----	----	----
14	Shielding room / 9.080m×5.255m×3.525m	FRANKONIA	----	----	----
15	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100512	2022.06.21	2023.06.20
16	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100513	2022.06.21	2023.06.20
17	Ultra log antenna / HL562	R&S	100016	2022.06.21	2023.06.20
18	Receive antenna /3160-09	SCHWARZ-BECK	002058-002	2022.06.21	2023.06.20
19	EMI test receiver / ESI 40	R&S	100015	2022.06.21	2023.06.20
20	EMI test receiver / ESCS30	R&S	100029	2022.06.21	2023.06.20
21	Receive antenna / HL562	R&S	100167	2022.06.21	2023.06.20
22	AMN / ENV216	R&S	3560.6550.12	2022.06.21	2023.06.20
23	FCC auto test system / RT9100L-2	Radiosky	V1.05	/	/
24	EMI test software / EMC32	R&S	V10.20.01	/	/

**APPENDIX A – TEST DATA OF CONDUCTED EMISSION**

**1. RF Power Output**

**GSM850**

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	32.35
836.6	190	32.24
848.8	251	32.71

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	1Down4Up	26.79
836.6	190	1Down4Up	26.49
848.8	251	1Down4Up	26.97
824.2	128	2Down3Up	27.85
836.6	190	2Down3Up	27.53
848.8	251	2Down3Up	28.11
824.2	128	3Down2Up	29.83
836.6	190	3Down2Up	29.74
848.8	251	3Down2Up	30.08
824.2	128	4Down1Up	32.34
836.6	190	4Down1Up	32.52
848.8	251	4Down1Up	32.67

**2. Occupied Bandwidth**

**GSM850**

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	240.54
836.6	190	238.19
848.8	251	247.29

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	239.48
836.6	190	241.61
848.8	251	240.33

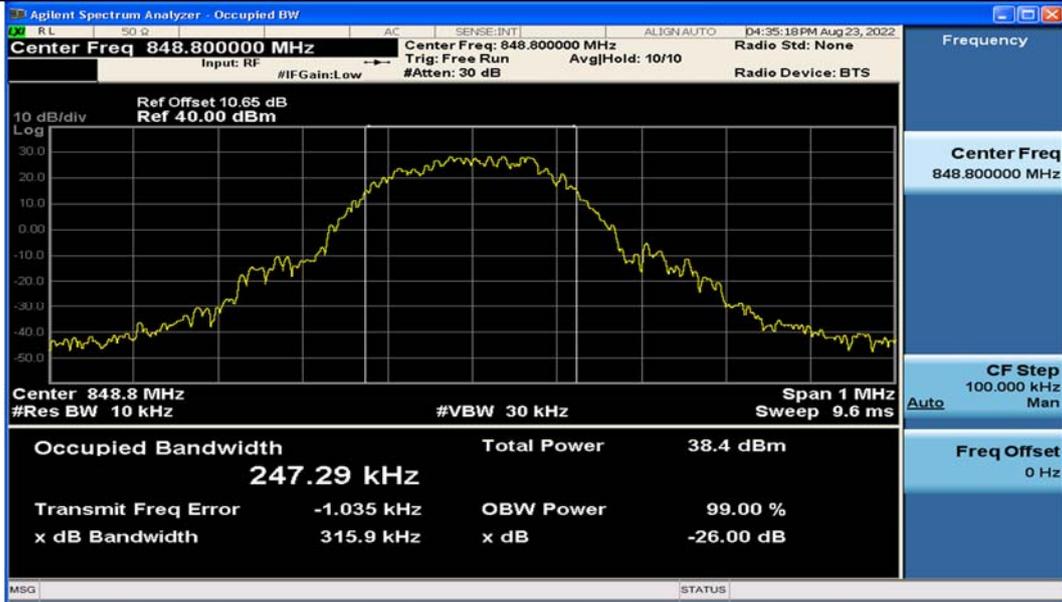
**GSM850**  
GSM MODE:



Channel 128

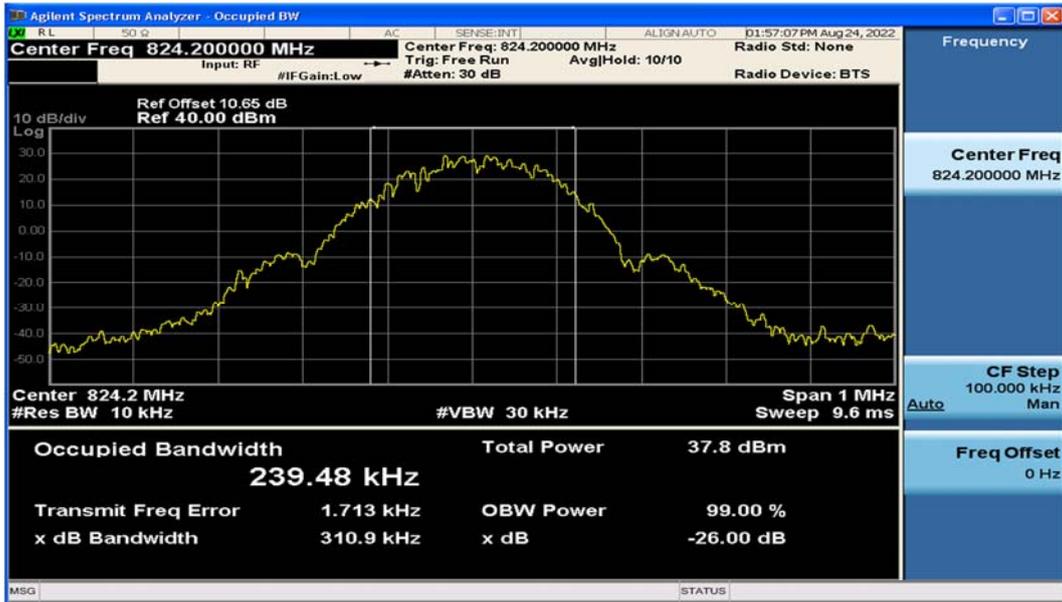


Channel 190

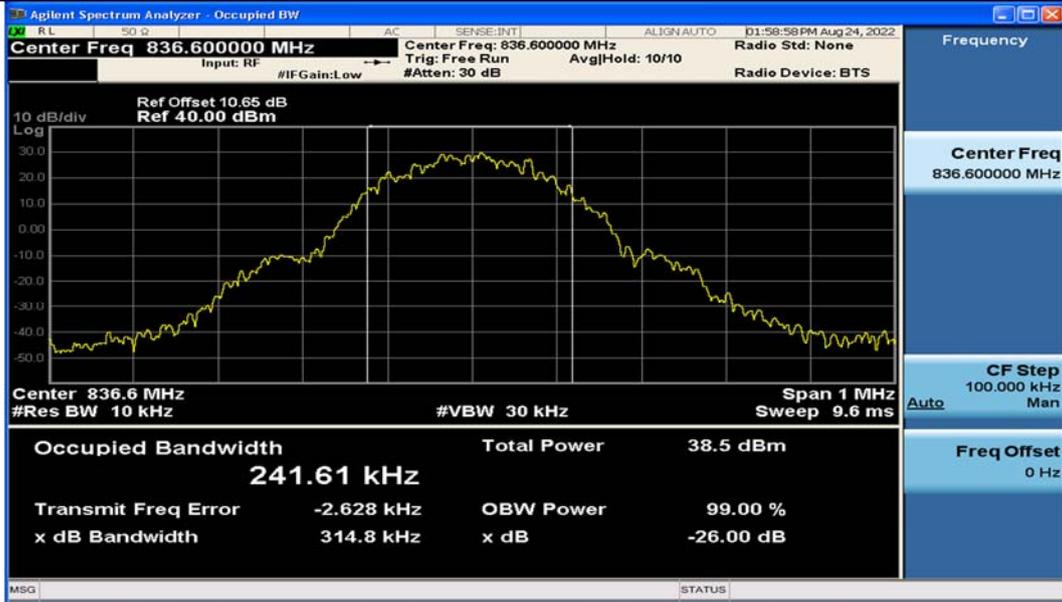


Channel 251

GPRS MODE:



Channel 128



Channel 190



Channel 251

**3. Emission Bandwidth**

**GSM850**

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
824.2	128	316.40
836.6	190	317.11
848.8	251	315.86

GPRS MODE:

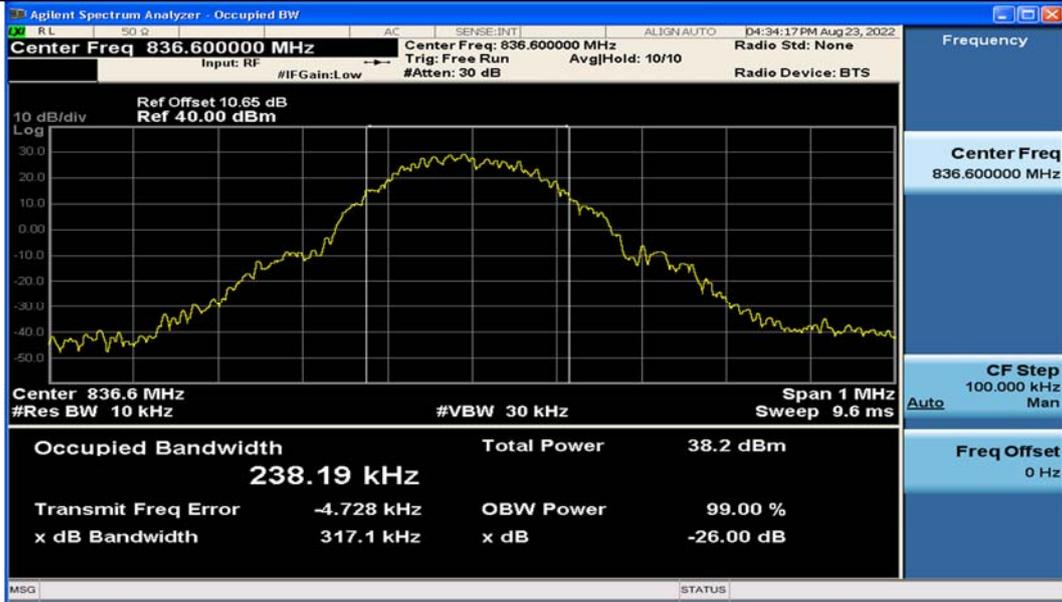
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
824.2	128	310.88
836.6	190	314.81
848.8	251	318.94

**GSM850**

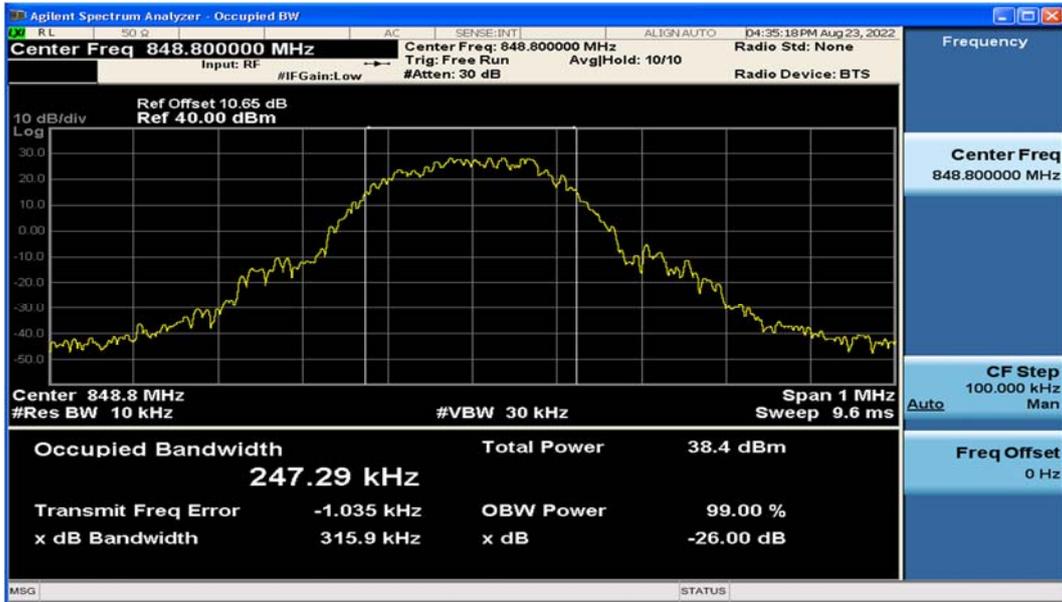
GSM MODE:



Channel 128

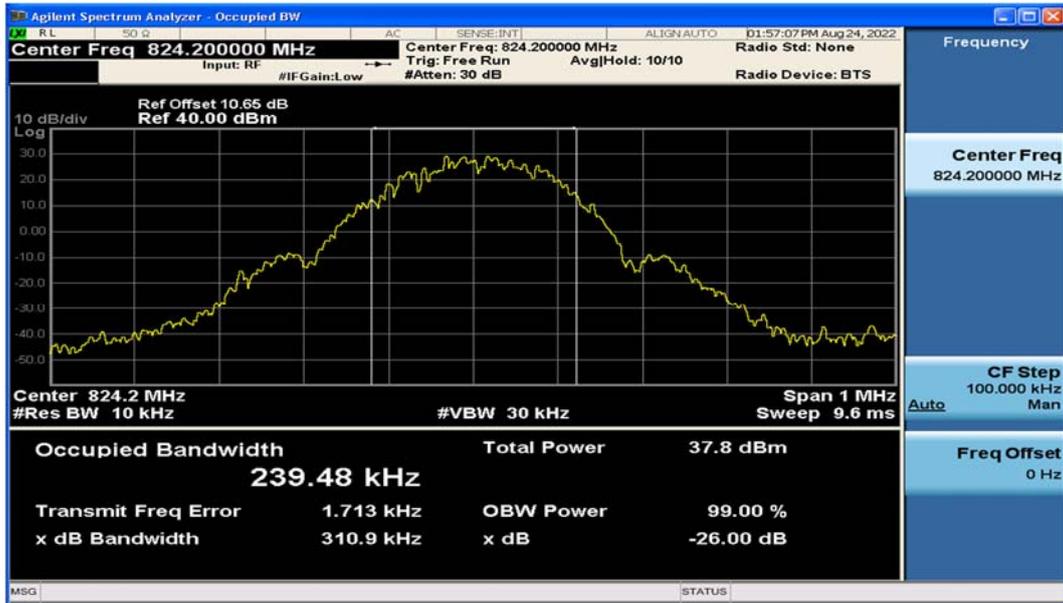


Channel 190

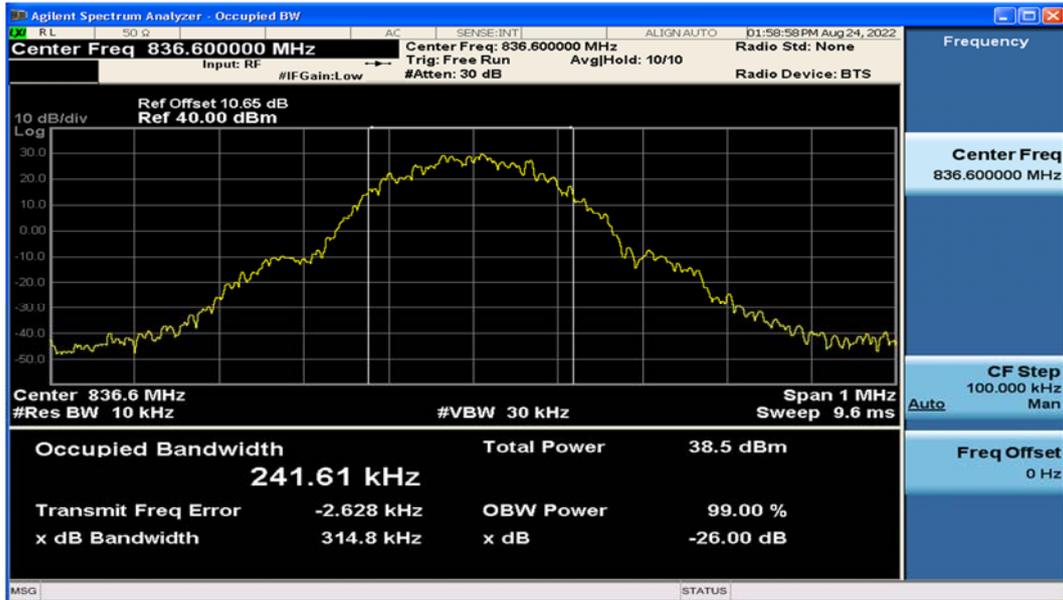


Channel 251

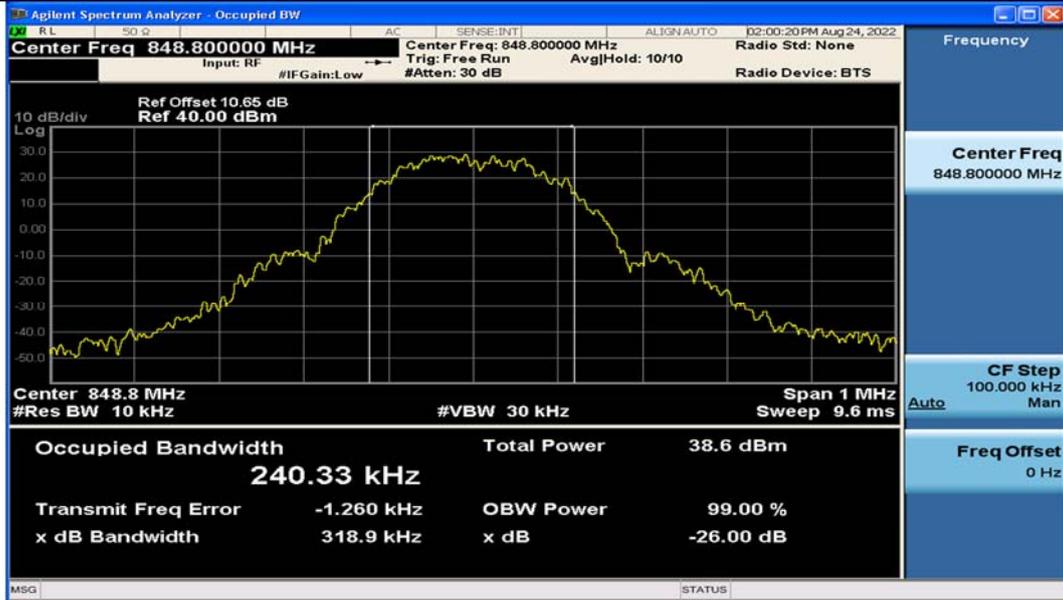
GPRS MODE:



Channel 128



Channel 190

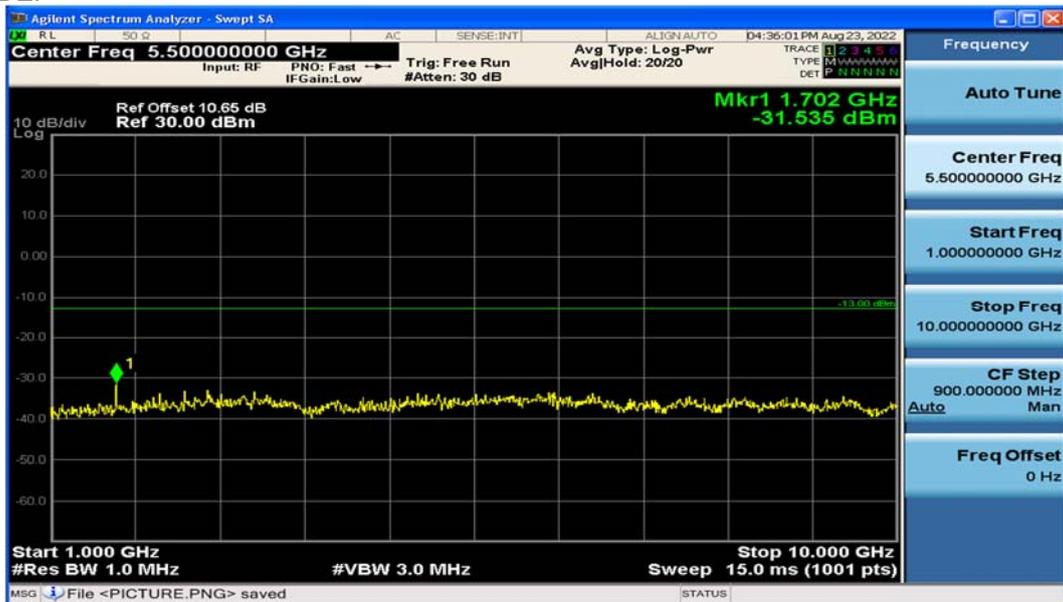


Channel 251

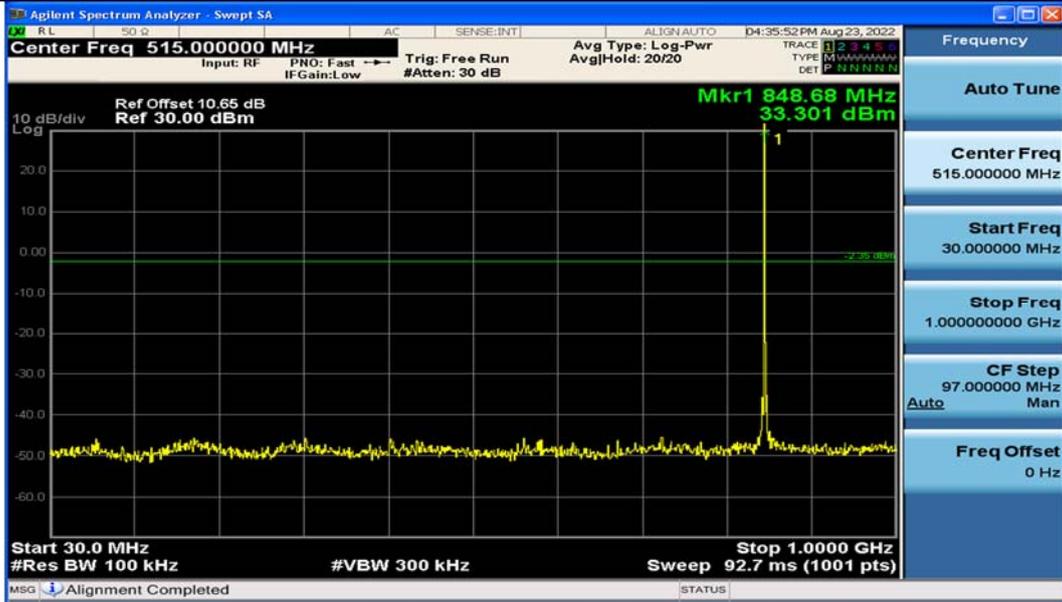
#### 4. Spurious Emissions at antenna terminal

##### GSM850

GSM MODE:



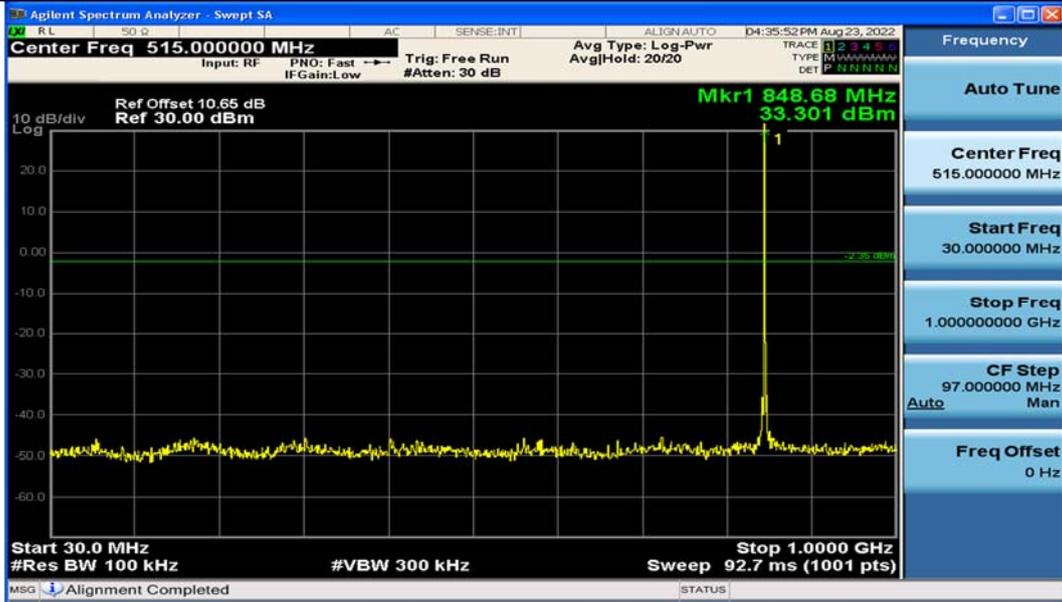
Channel 128



Channel 128



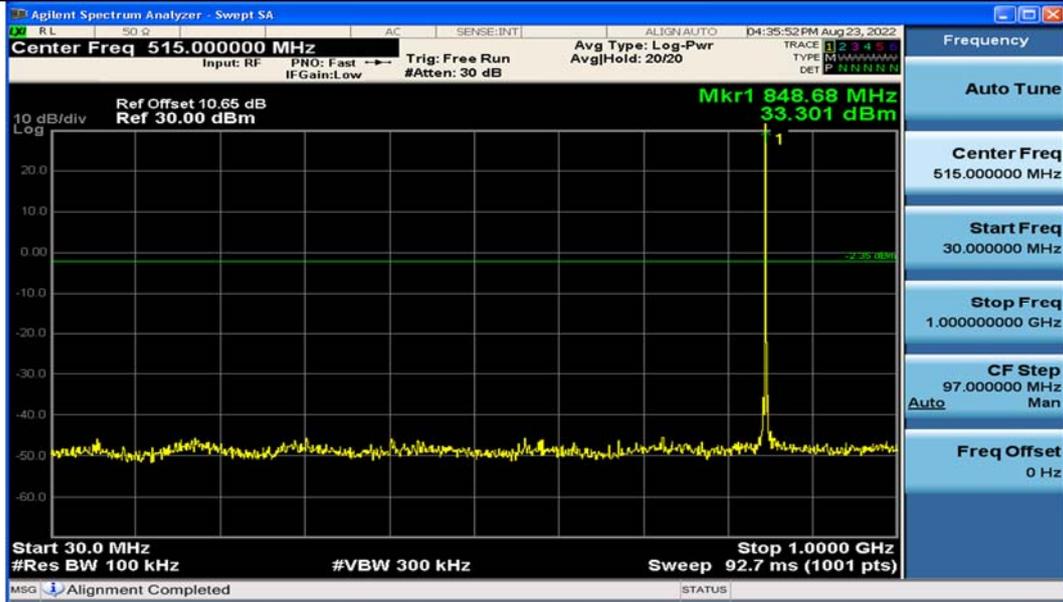
Channel 190



Channel 190

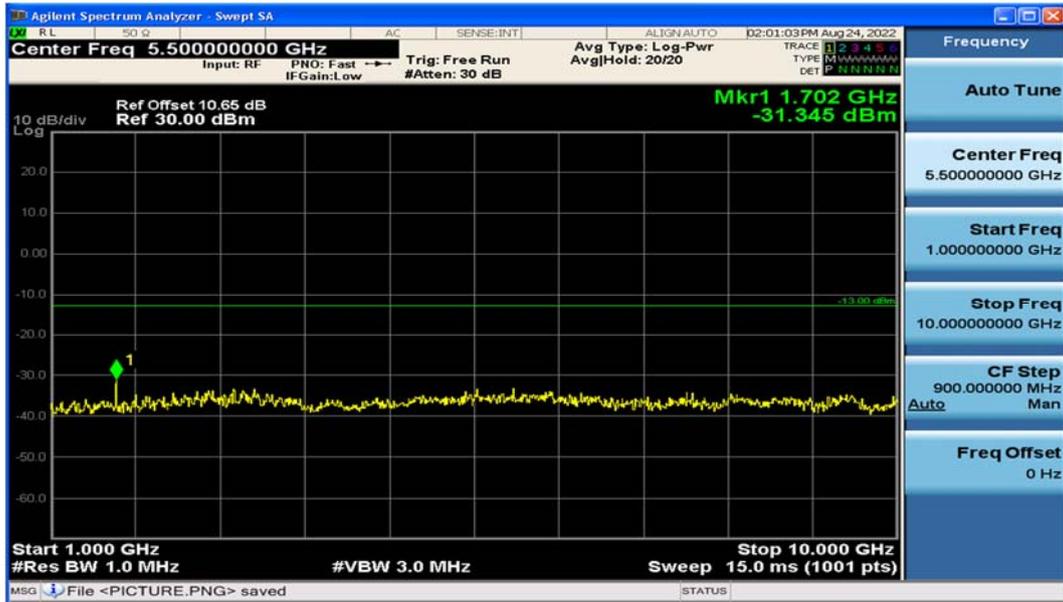


Channel 251

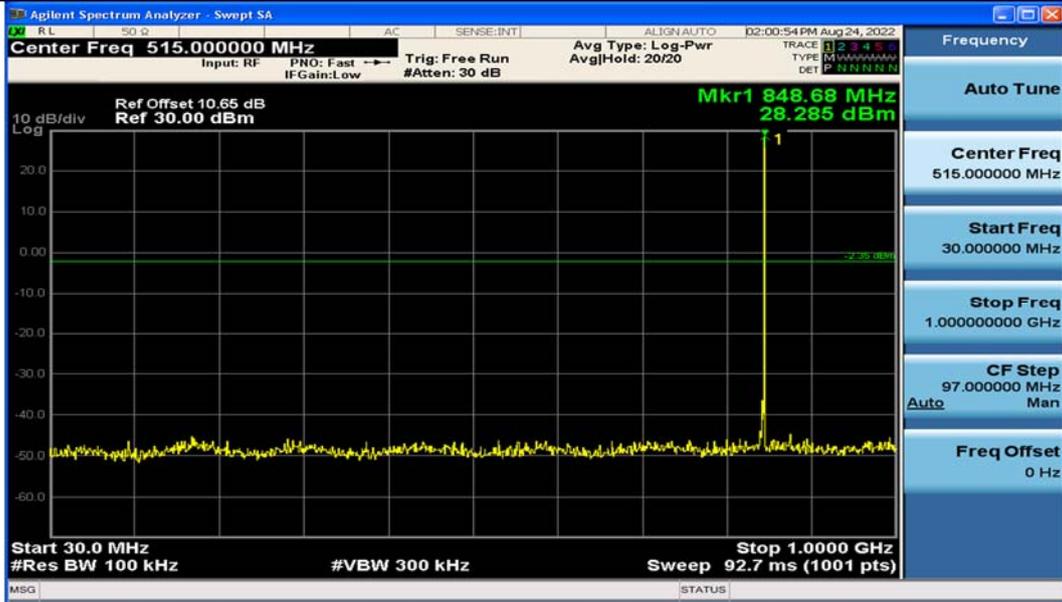


Channel 251

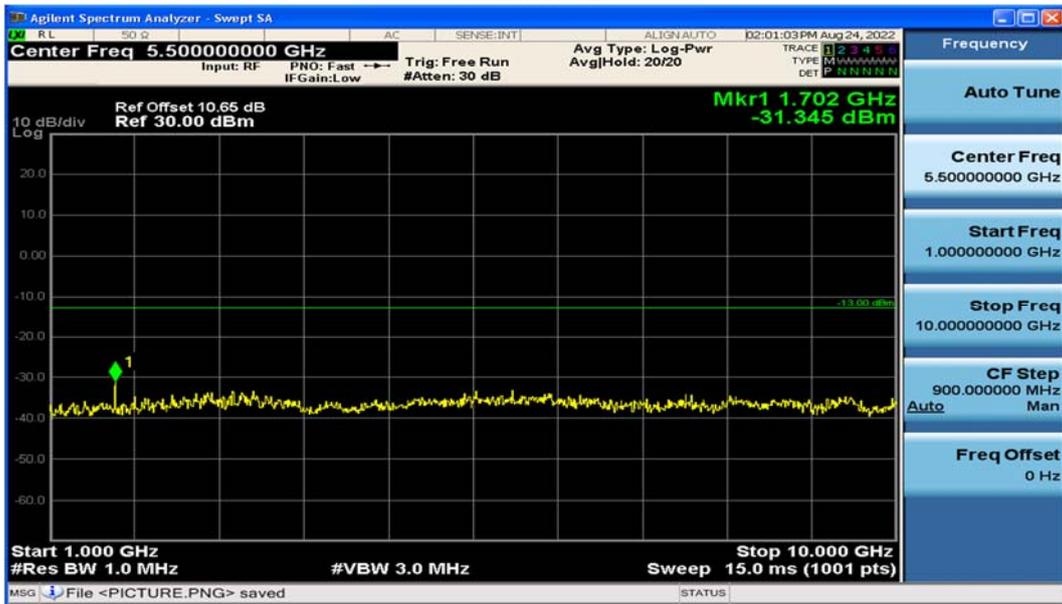
GPRS MODE:



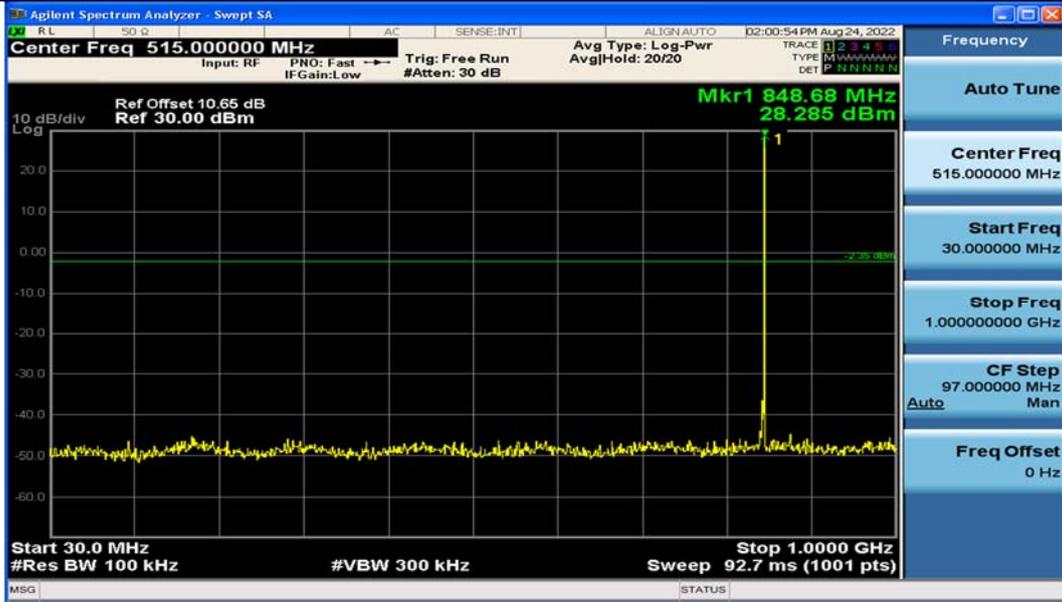
Channel 128



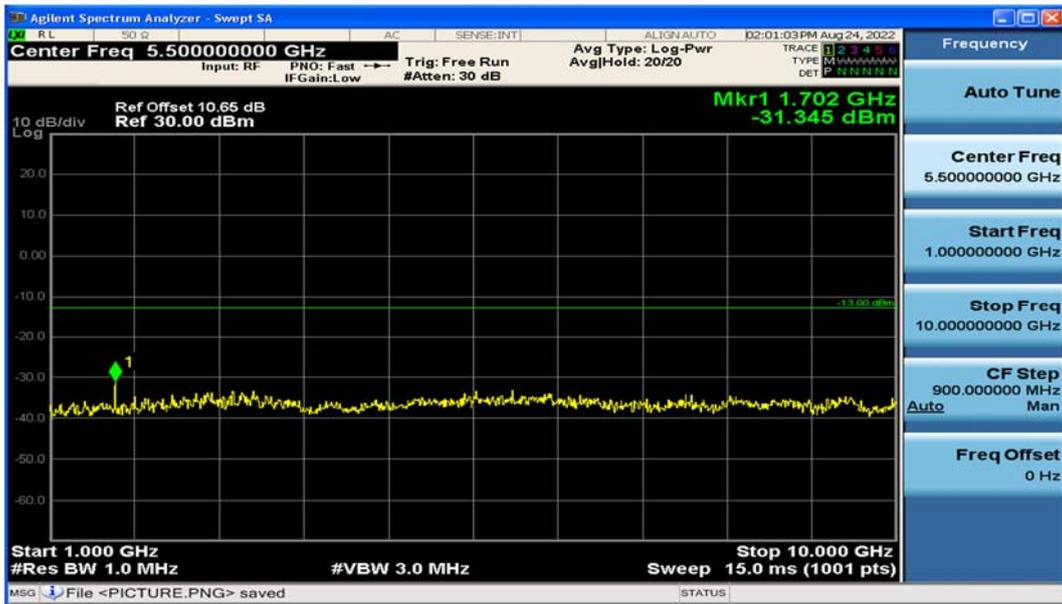
Channel 128



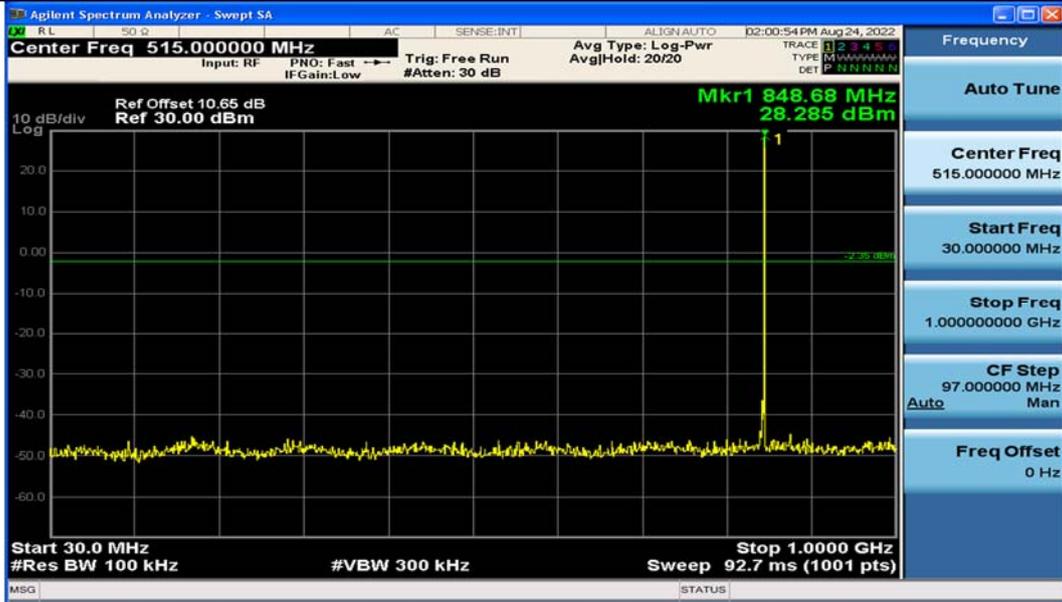
Channel 190



Channel 190



Channel 251

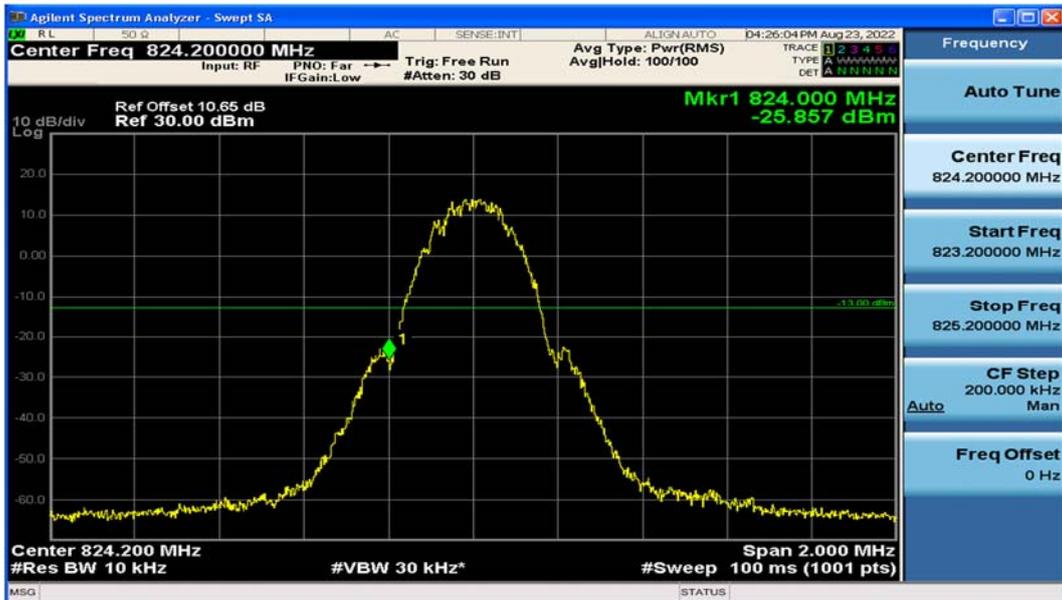


Channel 251

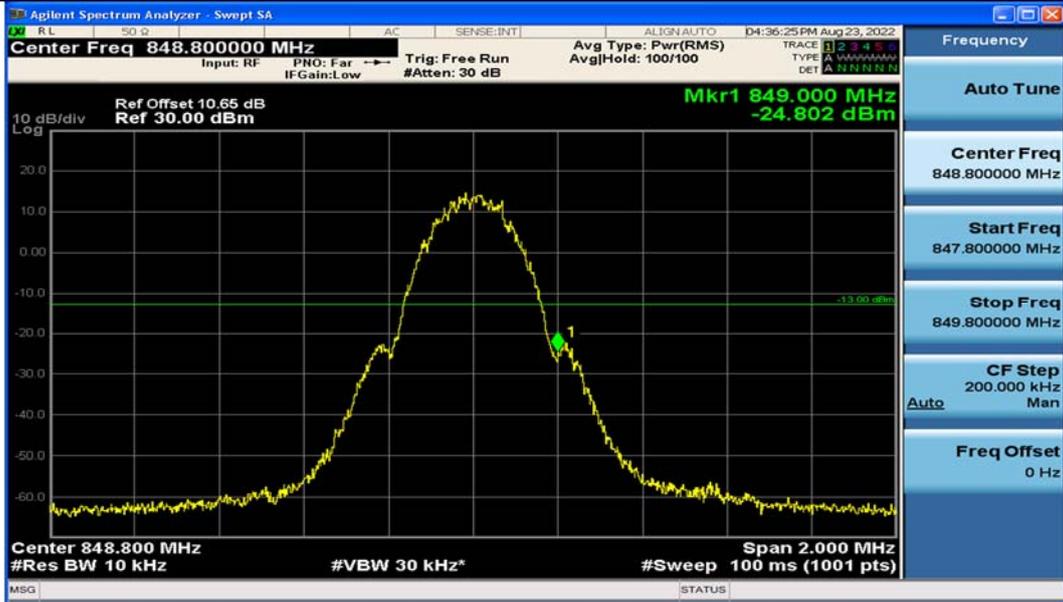
## 5. Band Edges Compliance

### GSM850

GSM MODE:

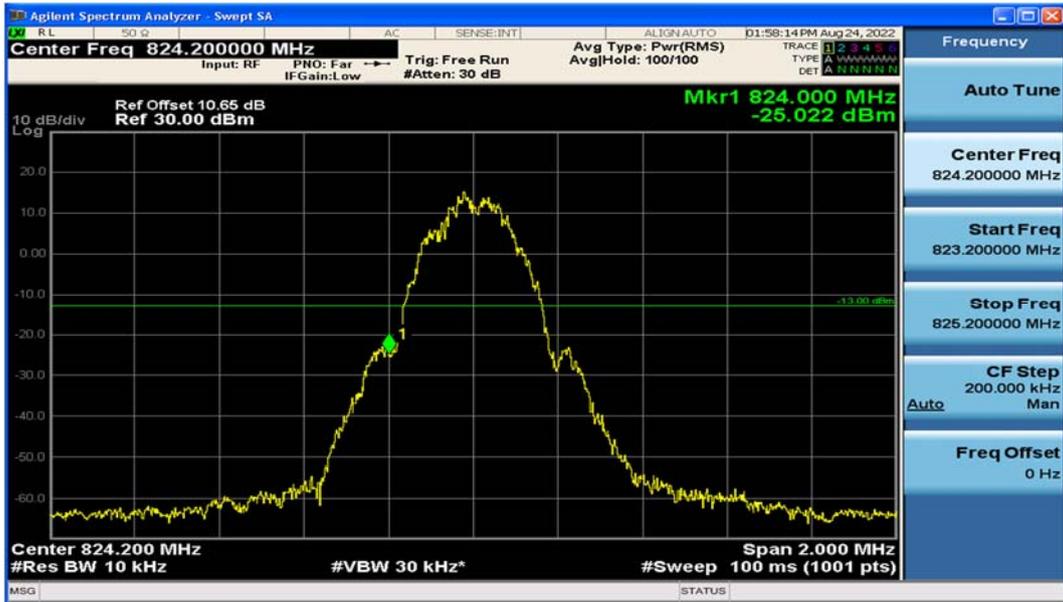


Channel 128

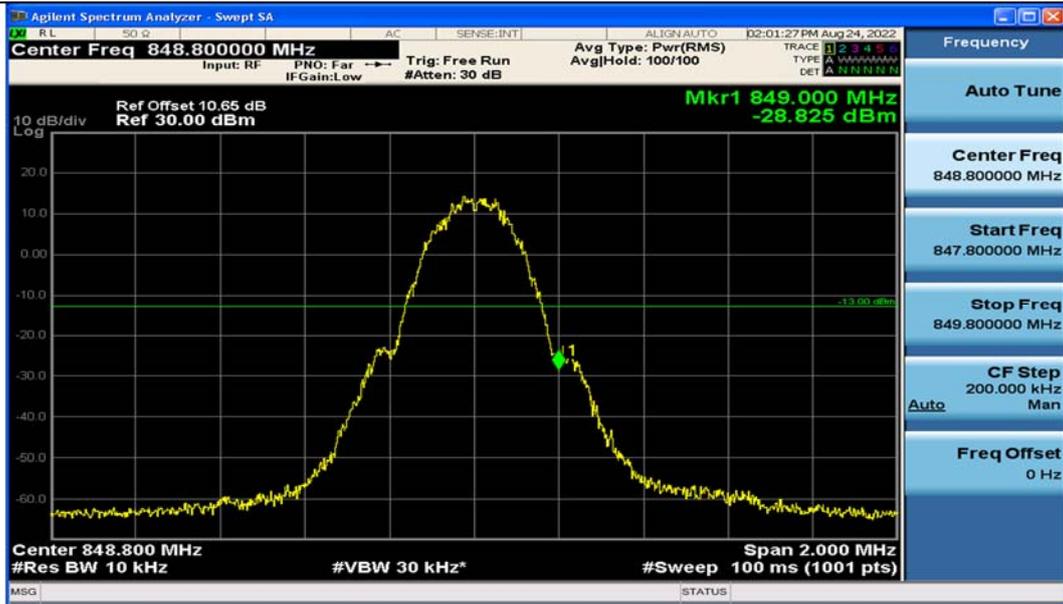


Channel 251

GPRS MODE:



Channel 128



Channel 251

## 6. Frequency Stability

### GSM850

GSM MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 190	Channel 251
-10	-0.014	-0.006	-0.008
-0	-0.014	-0.010	-0.008
+10	-0.004	-0.006	-0.004
+20	0.000	0.000	0.003
+30	-0.015	-0.008	-0.014
+40	-0.010	-0.005	-0.003
+50	-0.009	-0.007	-0.008
+55	-0.006	-0.005	-0.005
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 190	Channel 251
LV	-0.026	-0.003	-0.007
HV	-0.005	-0.002	-0.006

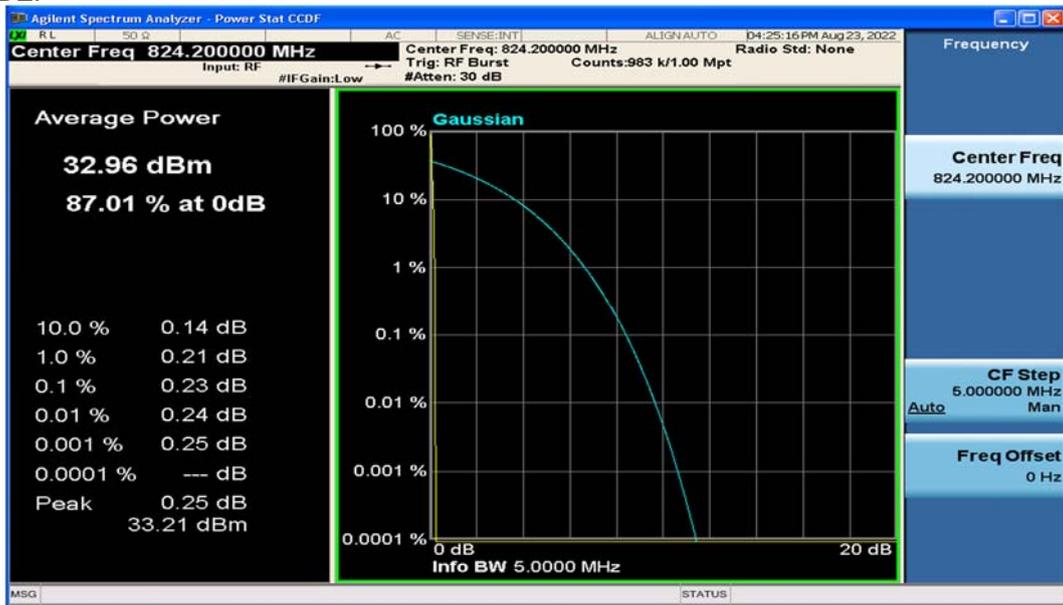
GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 190	Channel 251
-10	0.001	0.000	0.000
-0	0.001	-0.001	0.000
+10	-0.002	0.000	-0.001
+20	0.000	-0.003	-0.001
+30	0.000	-0.002	0.001
+40	0.001	-0.002	-0.001
+50	0.001	0.000	0.000
+55	0.001	-0.001	-0.002
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 190	Channel 251
LV	0.000	-0.001	0.000
HV	0.000	-0.001	-0.001

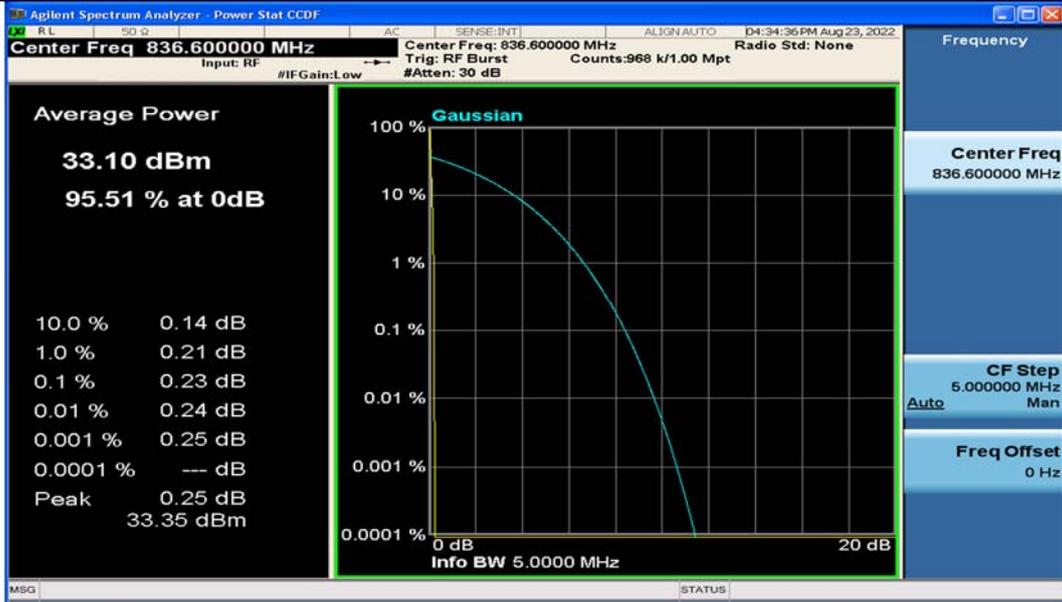
7. Peak-Average Ratio

GSM850

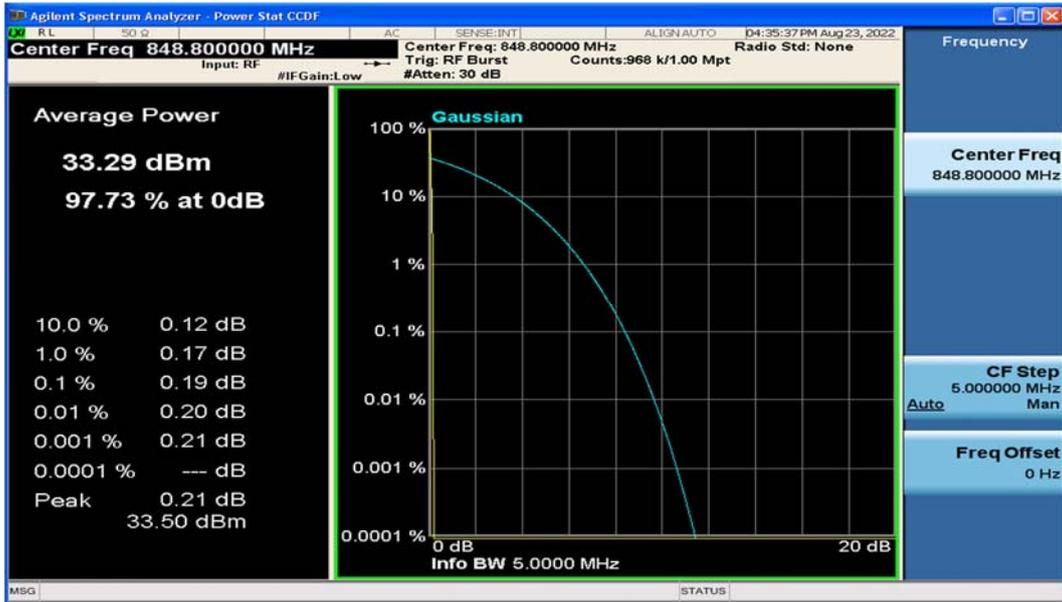
GSM MODE:



Channel 128



Channel 190

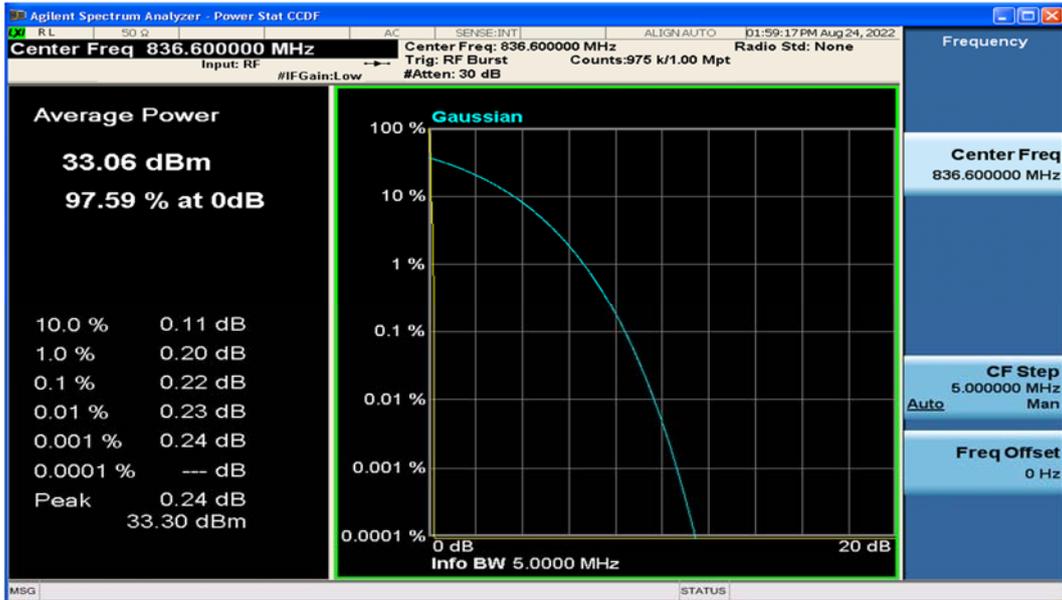


Channel 251

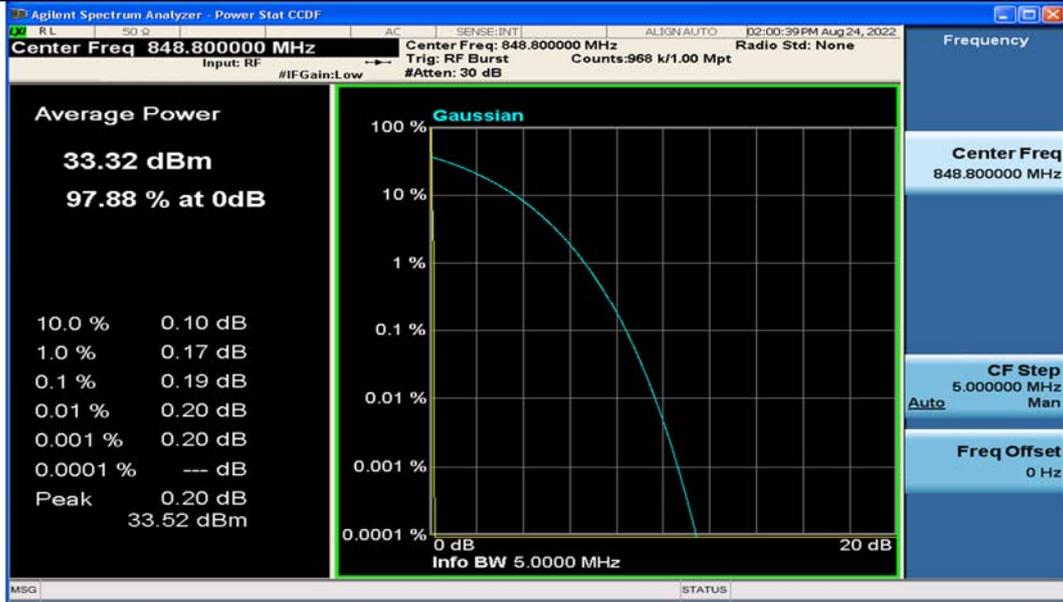
GPRS MODE:



Channel 128



Channel 190



Channel 251

**8. Effective Radiated Power and Effective Isotropic Radiated Power**

**GSM850**

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	32.35	24.40	0.275
836.6	190	32.24	24.29	0.269
848.8	251	32.71	24.76	0.299

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	1Down4Up	26.79	18.84	0.077
836.6	190	1Down4Up	26.49	18.54	0.071
848.8	251	1Down4Up	26.97	19.02	0.080
824.2	128	2Down3Up	27.85	19.90	0.098
836.6	190	2Down3Up	27.53	19.58	0.091
848.8	251	2Down3Up	28.11	20.16	0.104
824.2	128	3Down2Up	29.83	21.88	0.154
836.6	190	3Down2Up	29.74	21.79	0.151
848.8	251	3Down2Up	30.08	22.13	0.163
824.2	128	4Down1Up	32.34	24.39	0.275
836.6	190	4Down1Up	32.52	24.57	0.286
848.8	251	4Down1Up	32.67	24.72	0.296

## 1. RF Power Output

### PCS1900

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	29.23
1880	661	29.39
1909.8	810	29.27

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	1Down4Up	23.53
1880	661	1Down4Up	23.55
1909.8	810	1Down4Up	23.66
1850.2	512	2Down3Up	24.78
1880	661	2Down3Up	24.75
1909.8	810	2Down3Up	24.74
1850.2	512	3Down2Up	26.55
1880	661	3Down2Up	26.50
1909.8	810	3Down2Up	26.36
1850.2	512	4Down1Up	29.26
1880	661	4Down1Up	29.25
1909.8	810	4Down1Up	29.24

## 2. Occupied Bandwidth

### PCS1900

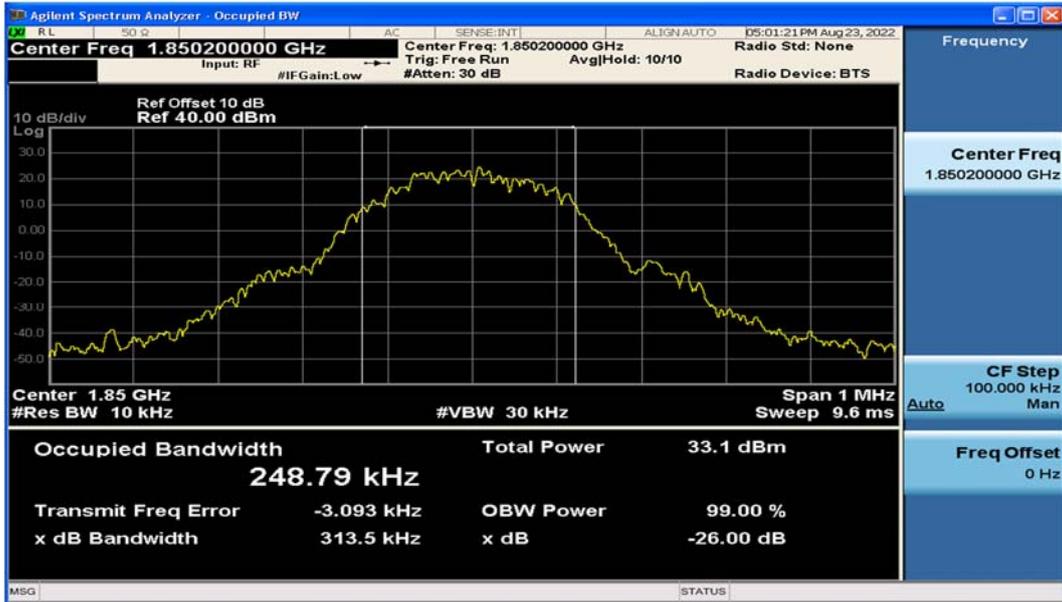
GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	248.79
1880	661	241.01
1909.8	810	252.45

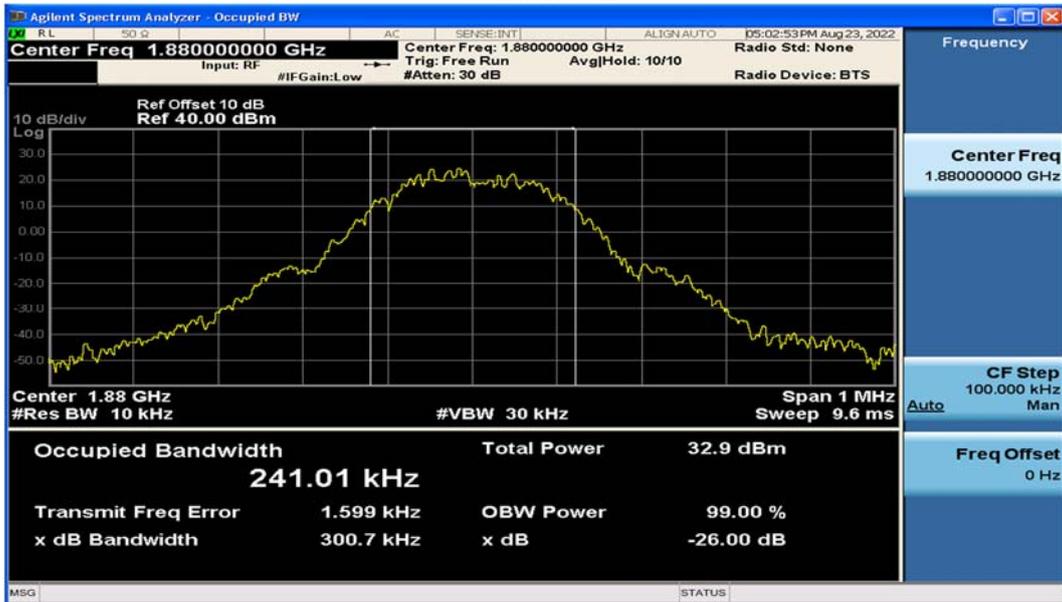
GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	239.87
1880	661	243.34
1909.8	810	233.09

PCS1900  
GSM MODE:



Channel 512

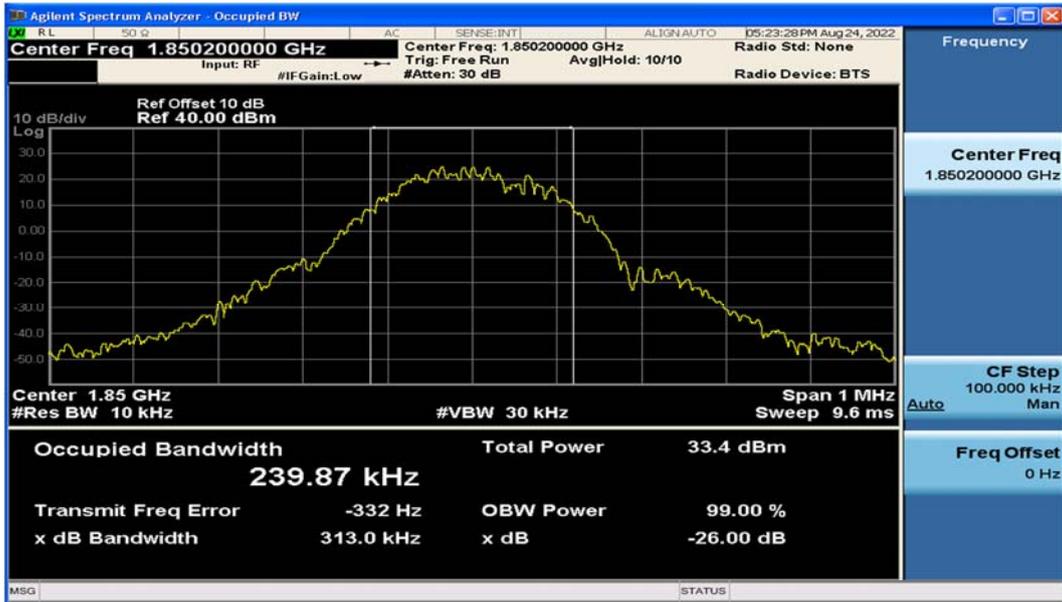


Channel 661



Channel 810

GPRS MODE:



Channel 512



Channel 661



Channel 810

**3. Emission Bandwidth**

**PCS1900**

GSM MODE:

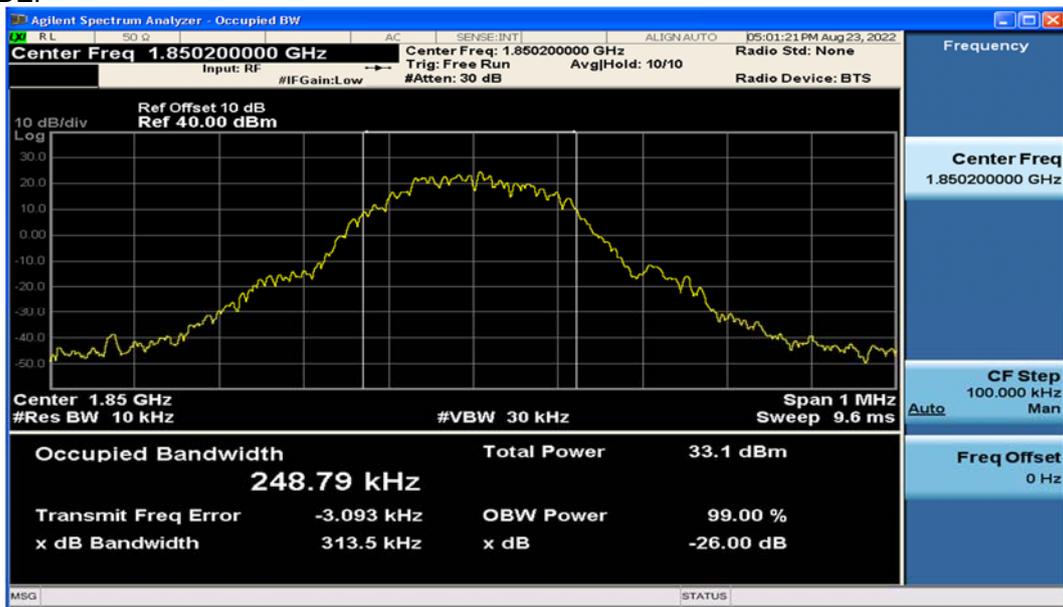
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
1850.2	512	313.54
1880	661	300.68
1909.8	810	314.94

GPRS MODE:

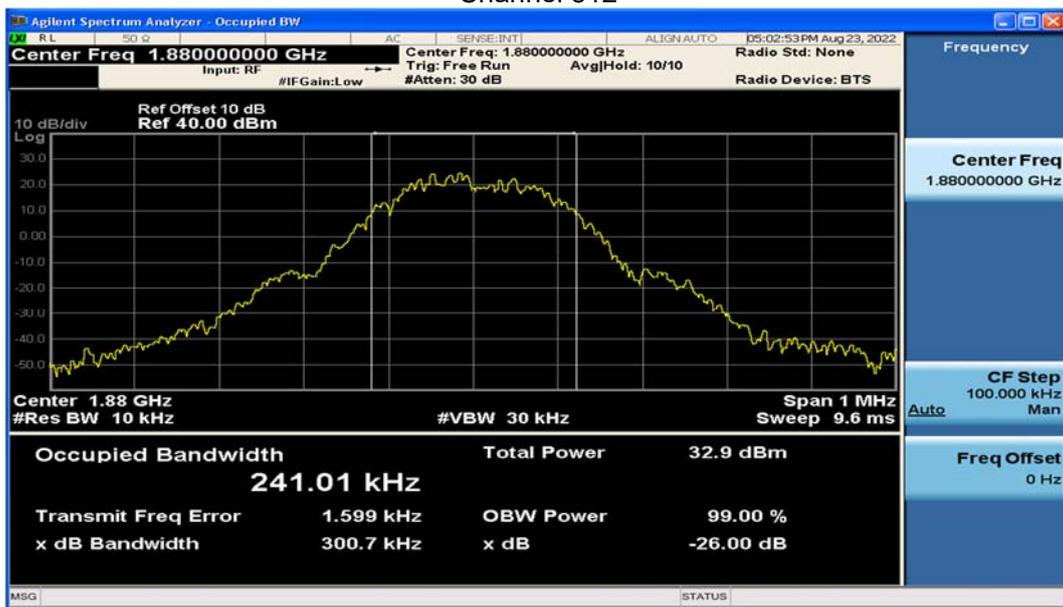
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
1850.2	512	312.99
1880	661	309.86
1909.8	810	314.85

**PCS1900**

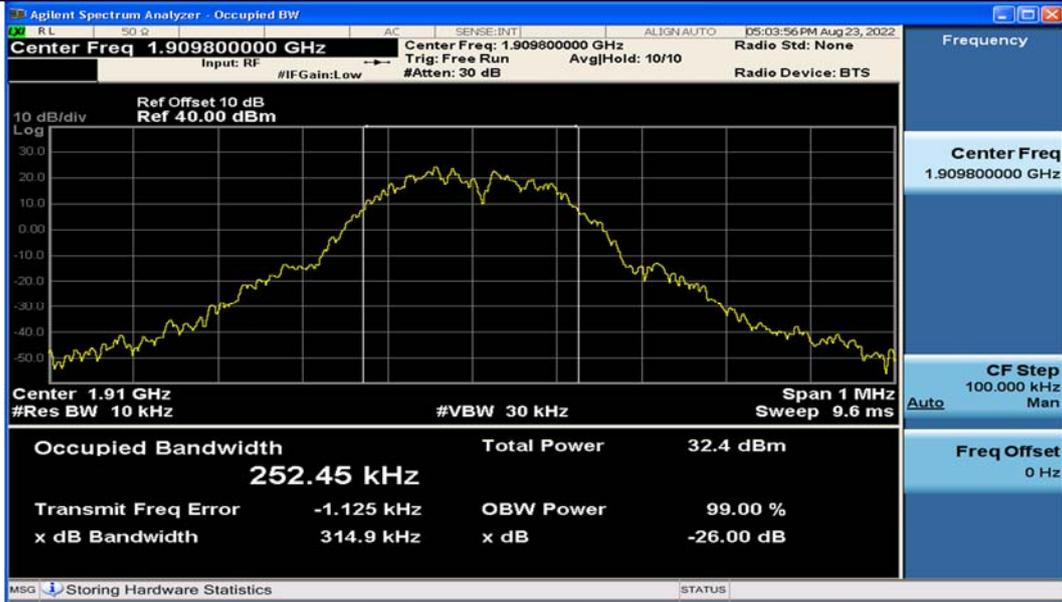
GSM MODE:



Channel 512

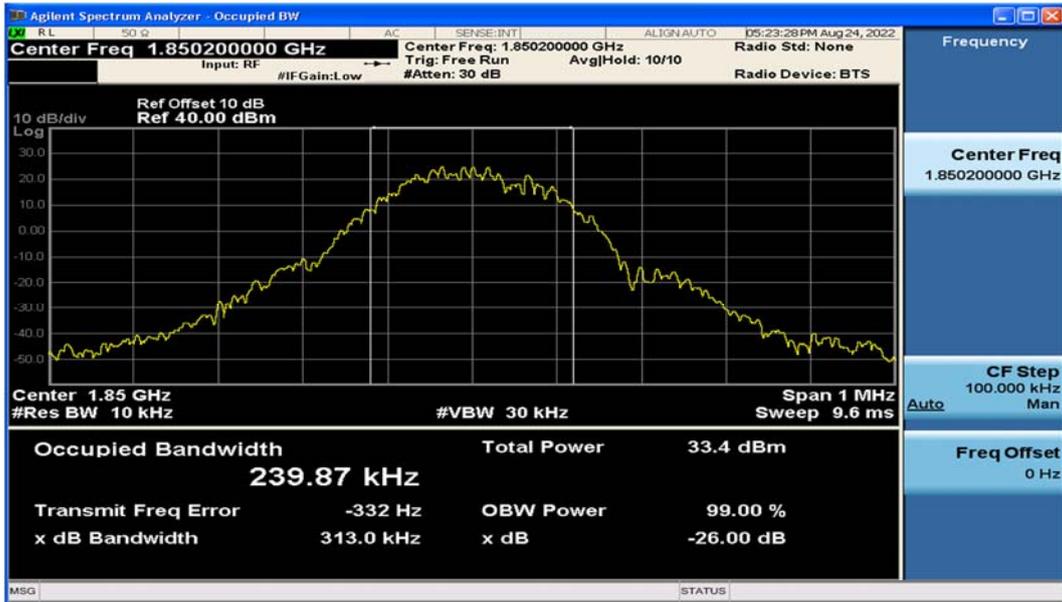


Channel 661



Channel 810

GPRS MODE:



Channel 512

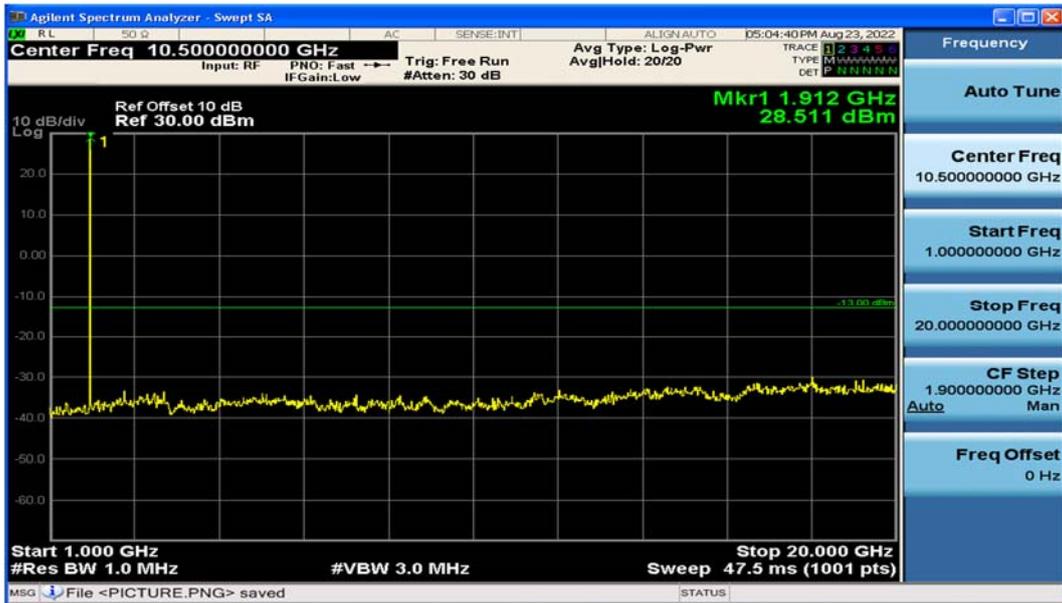


Channel 661

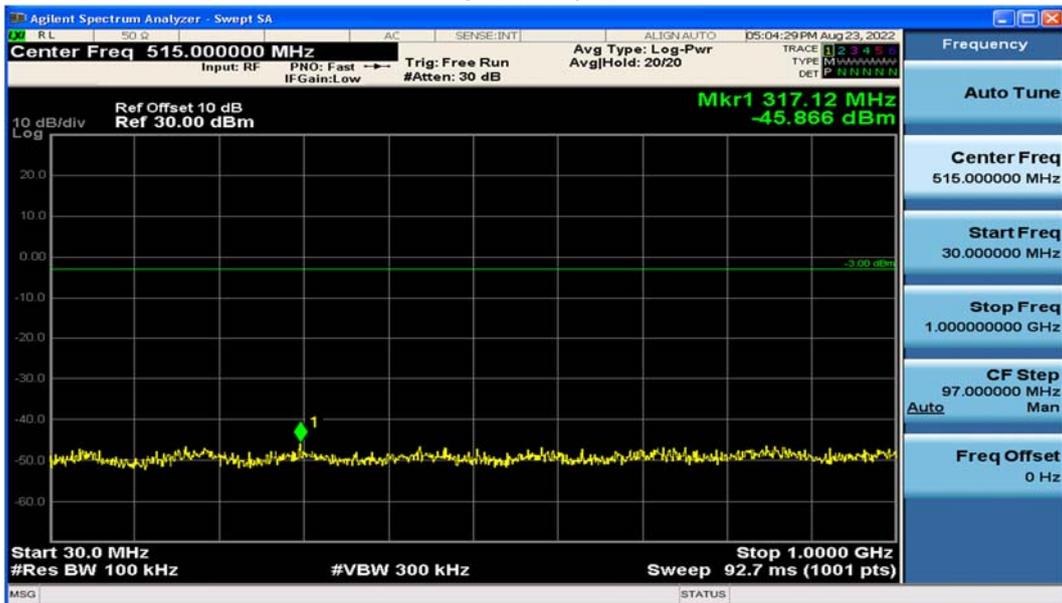


Channel 810

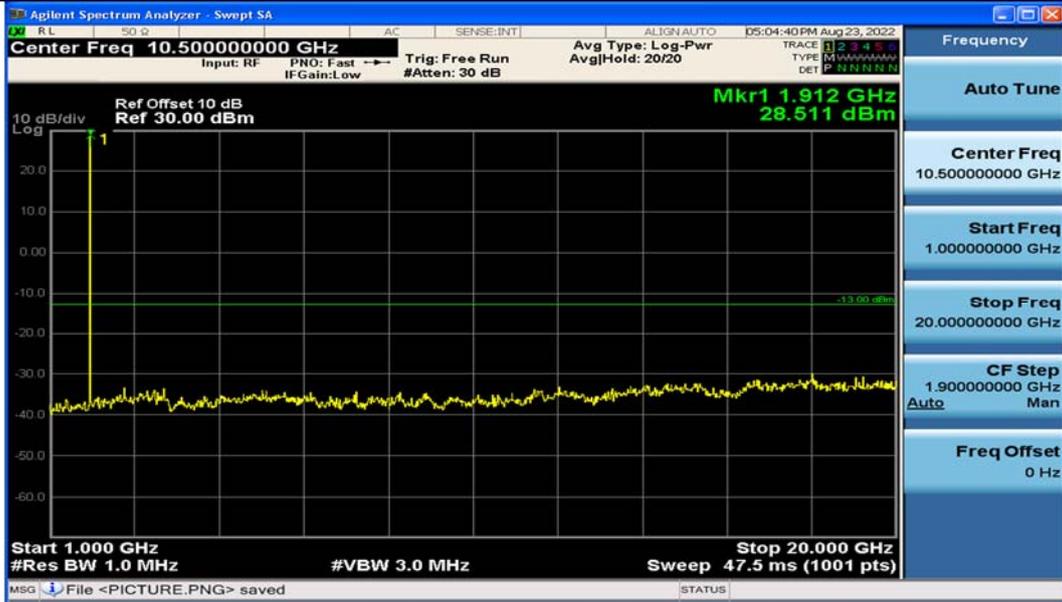
**4. Spurious Emissions at antenna terminal**  
**PCS1900**  
**GSM MODE:**



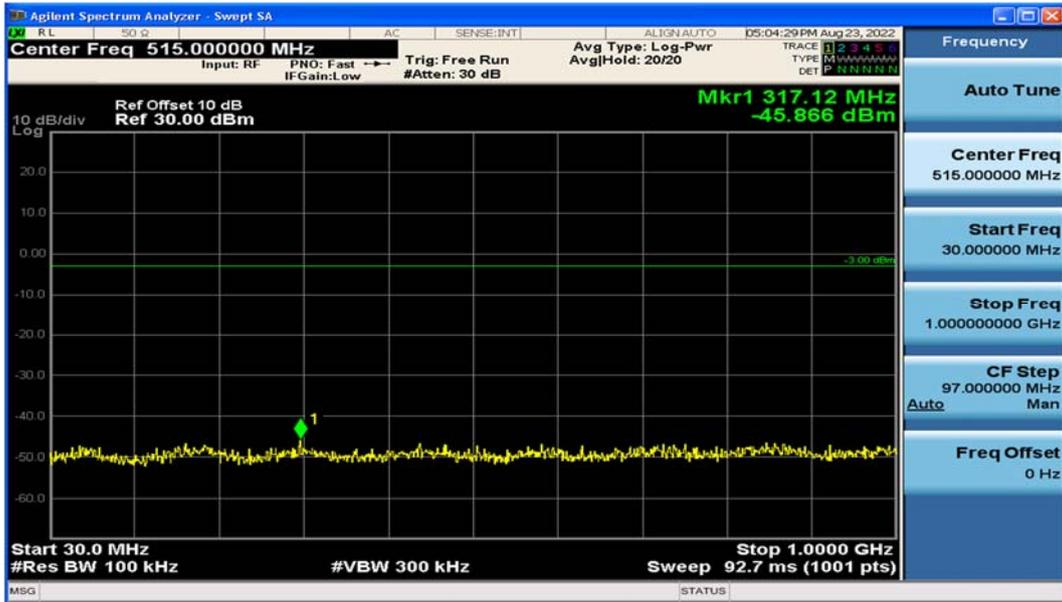
Channel 512



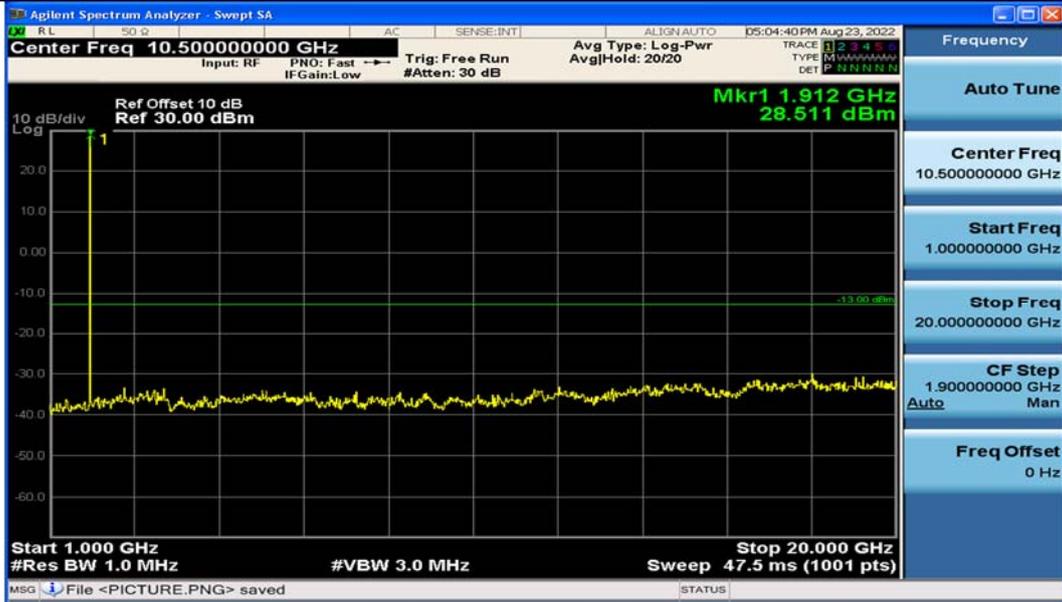
Channel 512



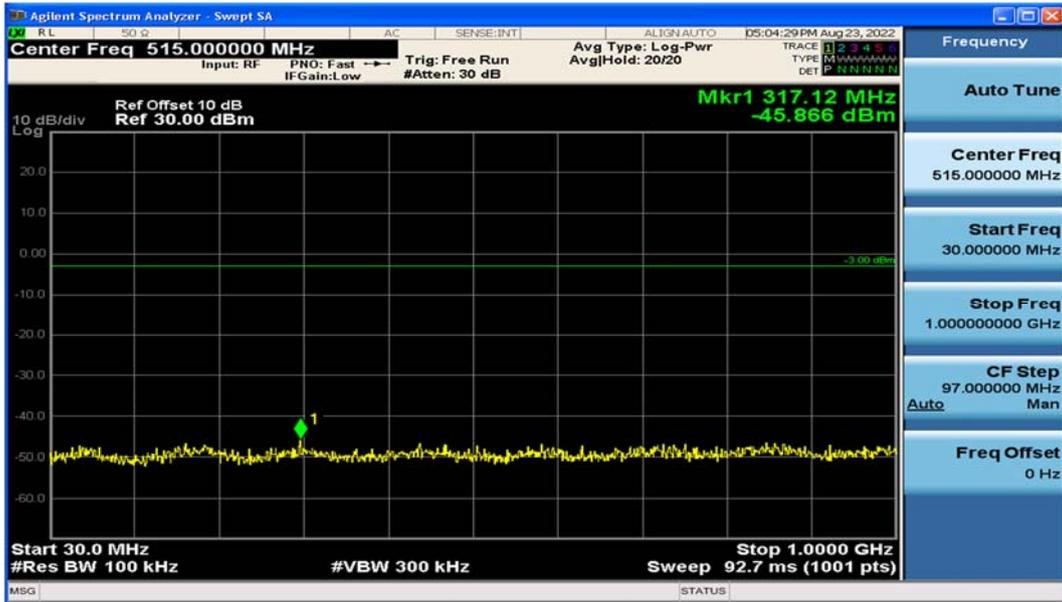
Channel 661



Channel 661



Channel 810

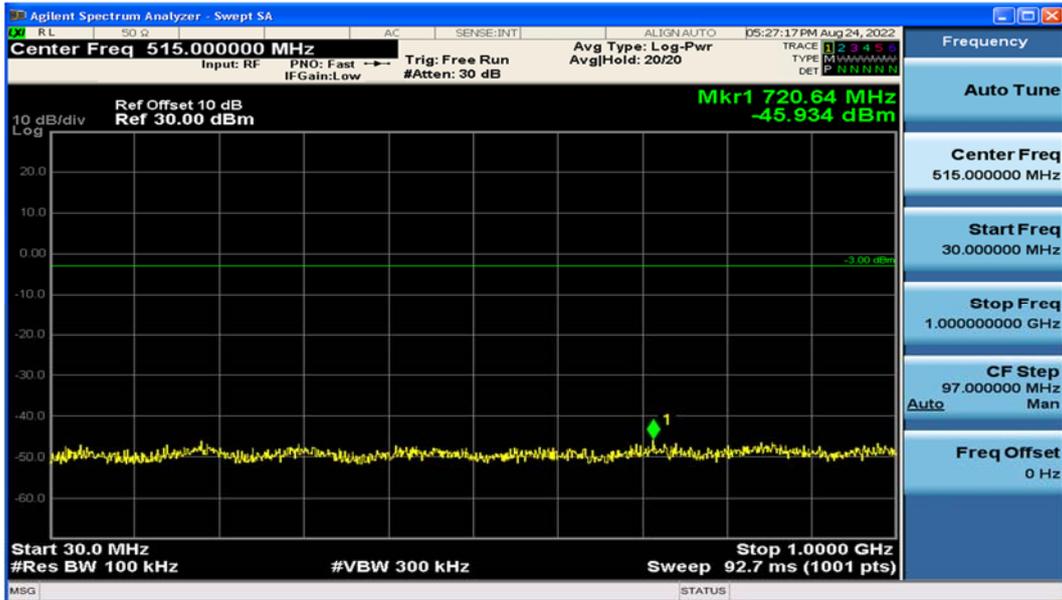


Channel 810

GPRS MODE:



Channel 512



Channel 512



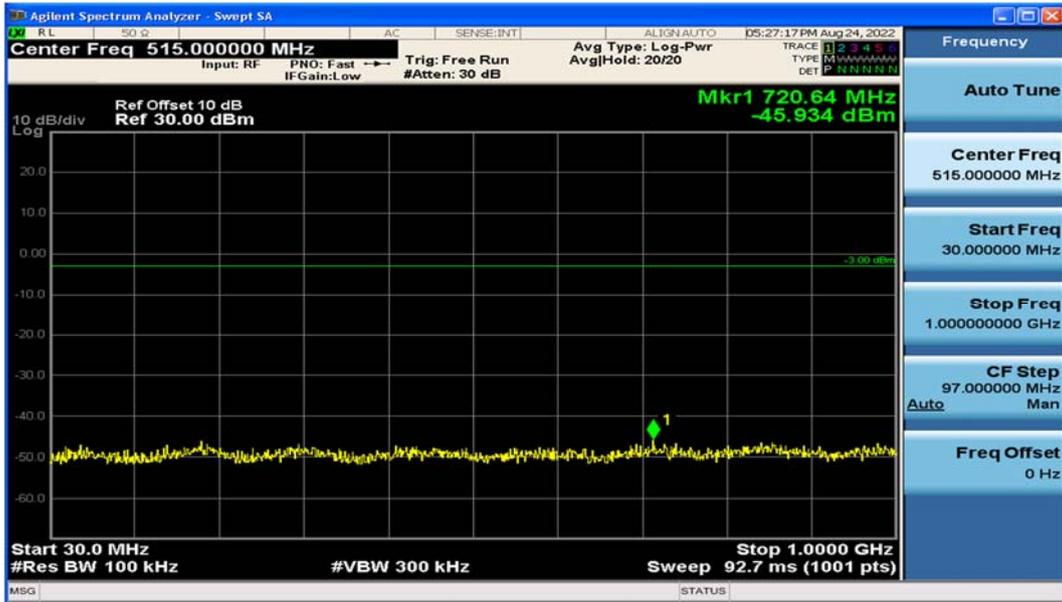
Channel 661



Channel 661

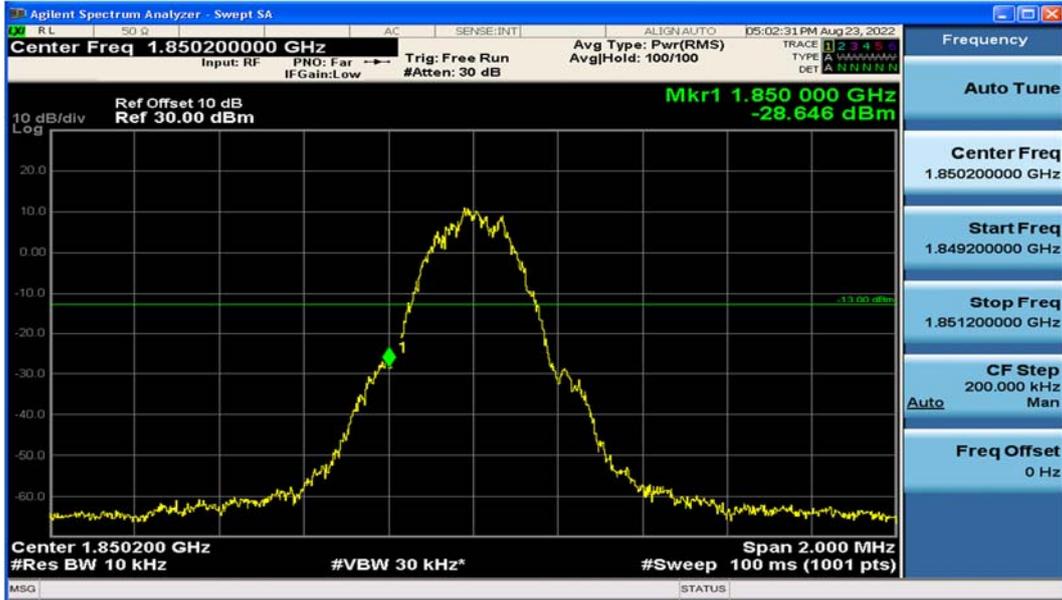


Channel 810

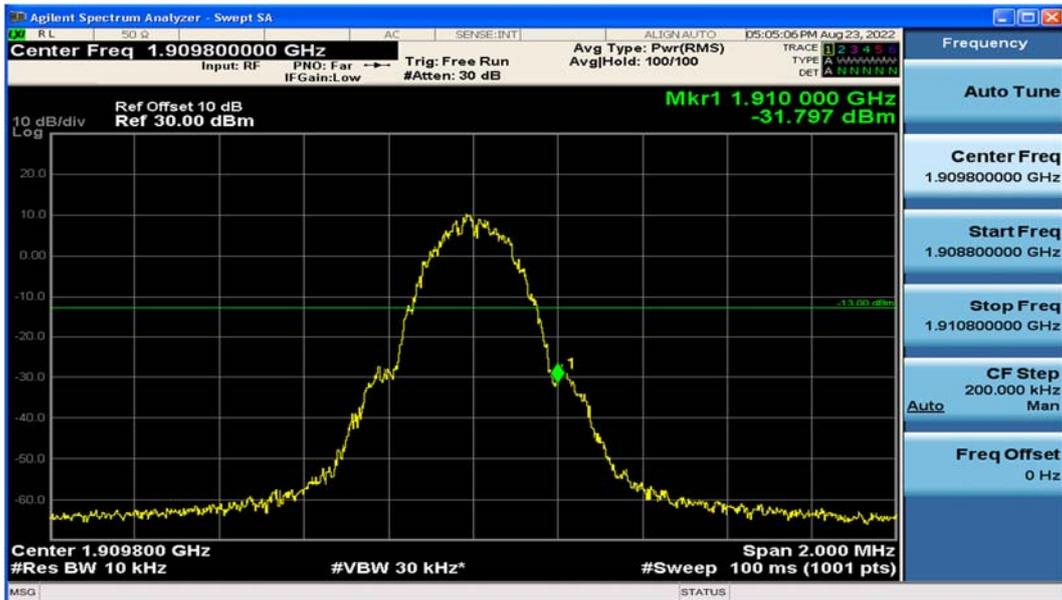


Channel 810

**5. Band Edges Compliance**  
**PCS1900**  
GSM MODE:

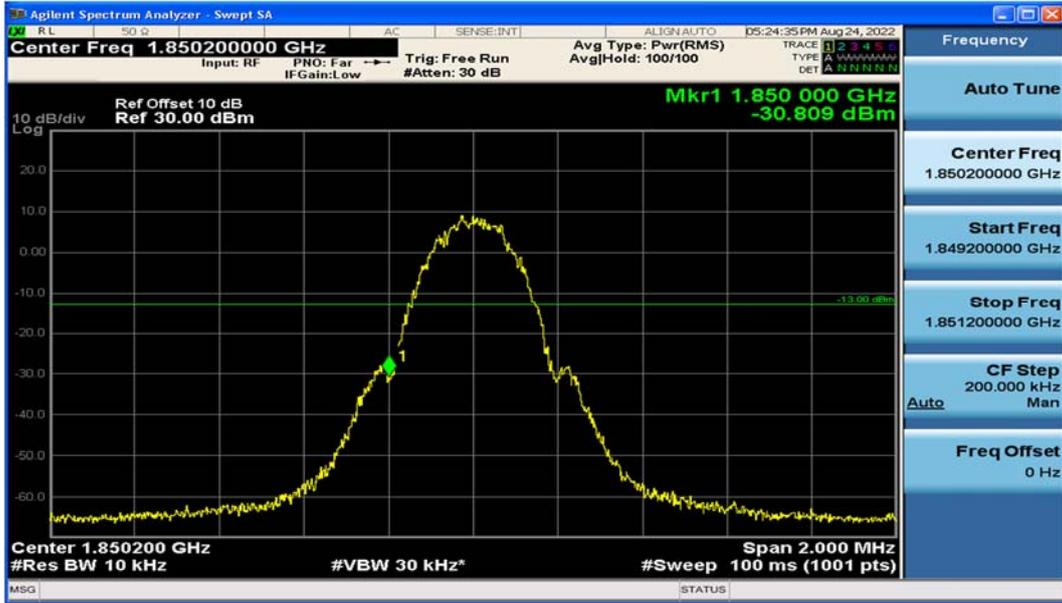


Channel 512

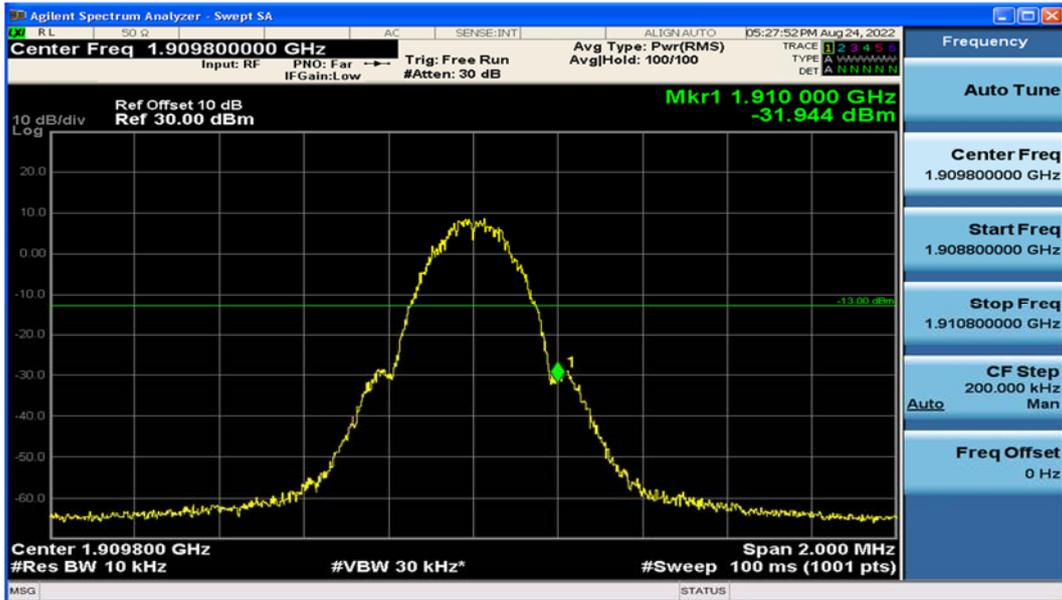


Channel 810

GPRS MODE:



Channel 512



Channel 810

## 6. Frequency Stability

### PCS1900

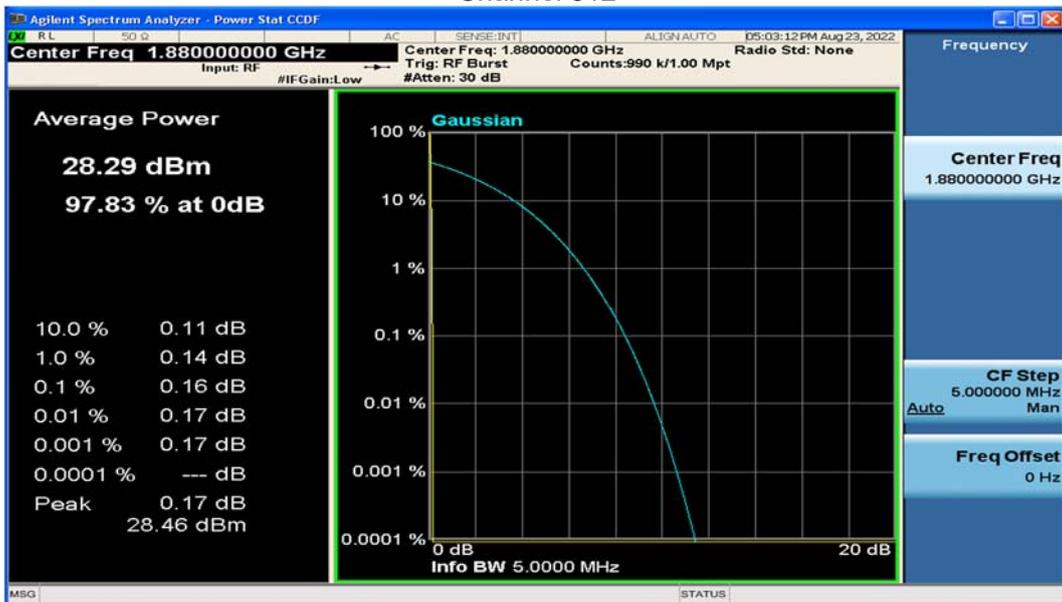
GSM MODE:

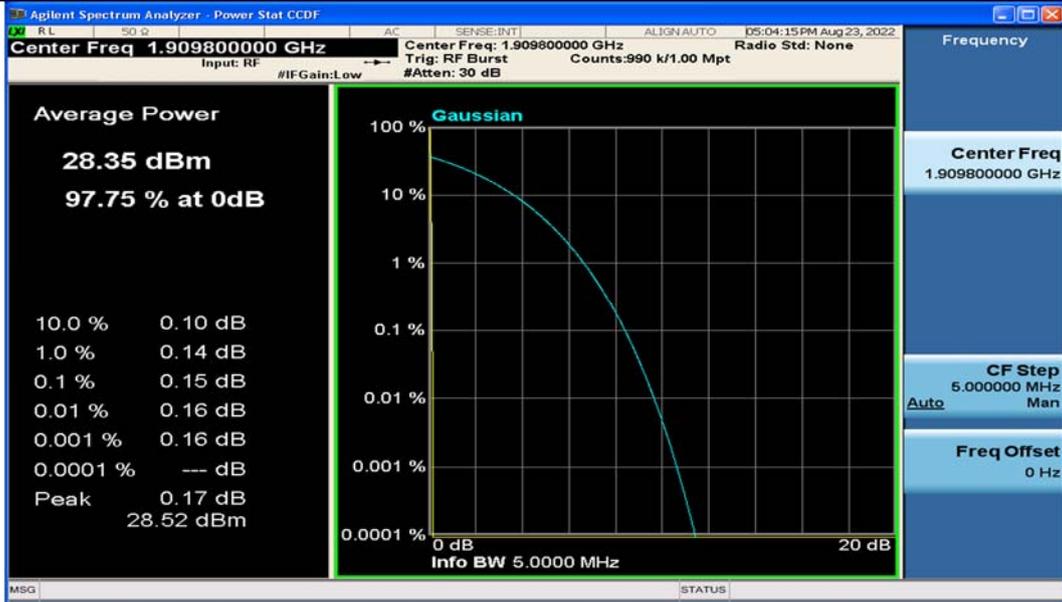
Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
-10	0.004	0.003	0.003
0	0.005	0.009	0.006
+10	0.004	0.005	0.002
+20	0.000	0.000	-0.002
+30	0.003	0.006	0.004
+40	0.003	0.002	0.000
+50	0.002	0.008	0.002
+55	0.006	0.006	0.004
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	0.001	0.006	0.004
HV	0.005	0.004	0.003

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
-10	0.007	0.006	-0.005
0	0.005	0.011	-0.004
+10	0.008	0.004	-0.002
+20	0.000	0.001	-0.006
+30	0.003	0.006	0.002
+40	-0.001	0.005	-0.003
+50	0.006	-0.001	-0.006
+55	0.007	0.005	0.002
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	0.005	0.007	0.001
HV	0.005	0.006	0.002

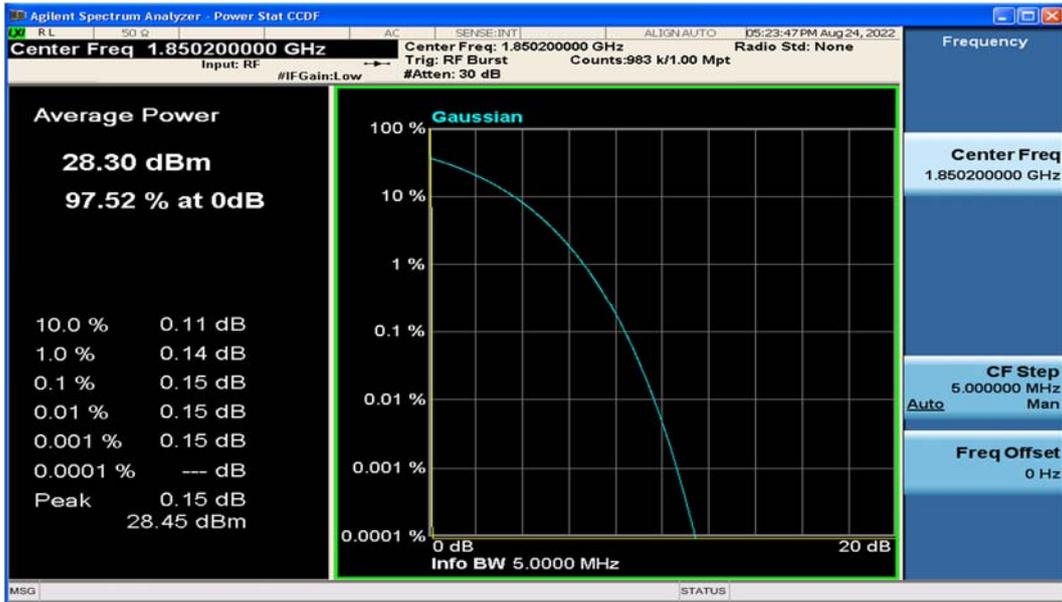
7. Peak-Average Ratio  
PCS1900  
GSM MODE:



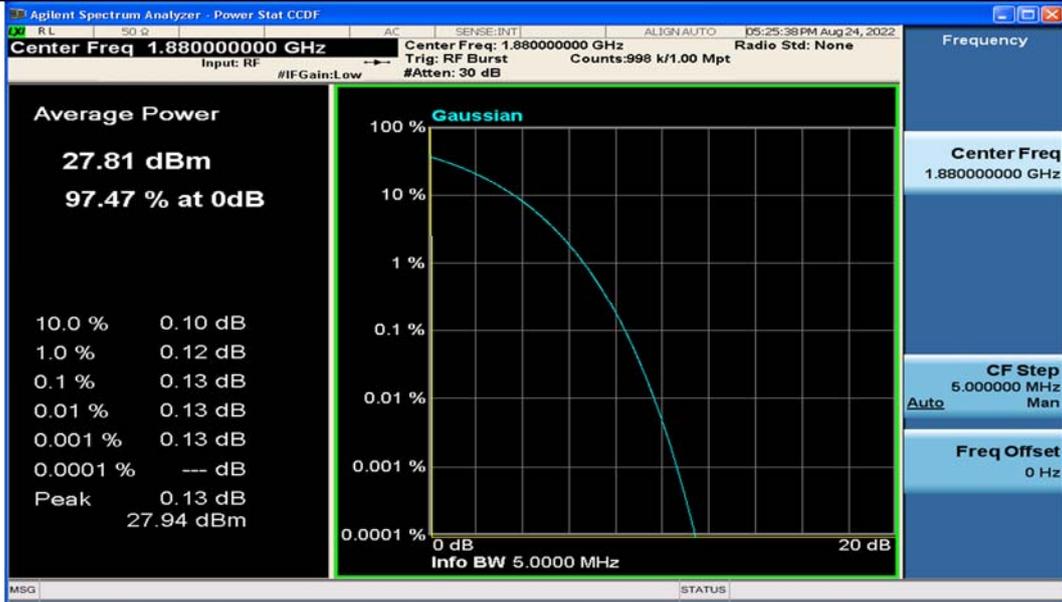


Channel 810

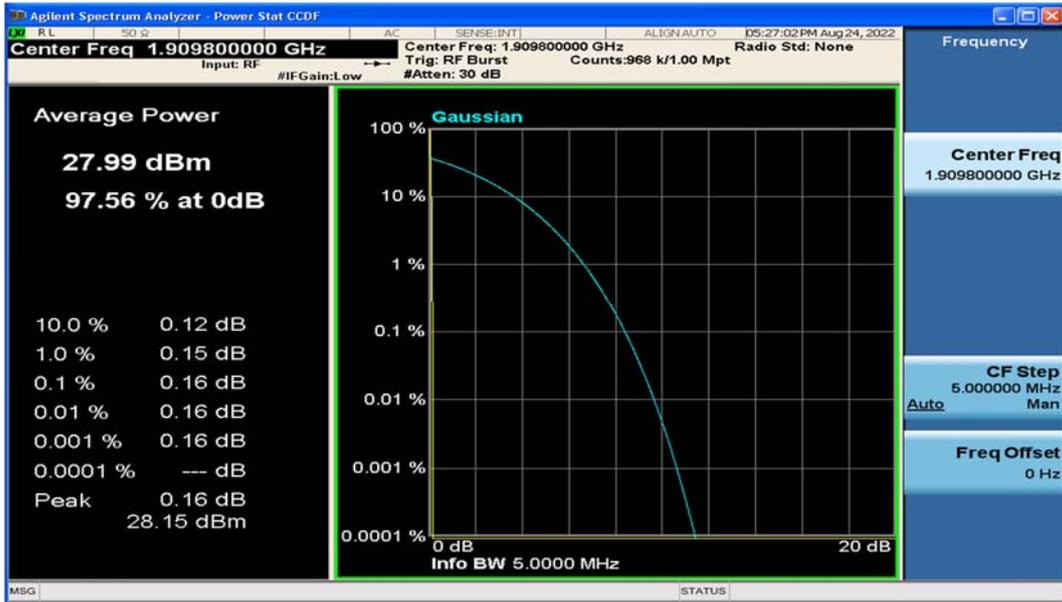
GPRS MODE:



Channel 512



Channel 661



Channel 810

## 8. Effective Radiated Power and Effective Isotropic Radiated Power

### PCS1900

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	29.23	25.63	0.366
1880	661	29.39	25.79	0.379
1909.8	810	29.27	25.67	0.369

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	1Down4Up	23.53	19.93	0.098
1880	661	1Down4Up	23.55	19.95	0.099
1909.8	810	1Down4Up	23.66	20.06	0.101
1850.2	512	2Down3Up	24.78	21.18	0.131
1880	661	2Down3Up	24.75	21.15	0.130
1909.8	810	2Down3Up	24.74	21.14	0.130
1850.2	512	3Down2Up	26.55	22.95	0.197
1880	661	3Down2Up	26.50	22.90	0.195
1909.8	810	3Down2Up	26.36	22.76	0.189
1850.2	512	4Down1Up	29.26	25.66	0.368
1880	661	4Down1Up	29.25	25.65	0.367
1909.8	810	4Down1Up	29.24	25.64	0.366

## **APPENDIX B – TEST DATA OF RADIATED EMISSION**

### **Radiated Spurious Emissions**

Note: The worst channel results are reflected in the report.

#### **850 Test result**

GSM/GPRS MODE Channel 189:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1791.875000	-67.51	-13.00	Vertical
2499.875000	-66.92	-13.00	Vertical
2908.187500	-65.80	-13.00	Vertical
1599.750000	-61.70	-13.00	Vertical
2070.000000	-67.58	-13.00	Vertical
2394.750000	-67.68	-13.00	Vertical

#### **1900 Test result**

GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
8749.687500	-57.33	-13.00	Vertical
10435.312500	-57.20	-13.00	Vertical
14744.531250	-52.72	-13.00	Vertical
16879.218750	-46.85	-13.00	Vertical
17399.062500	-46.78	-13.00	Vertical
17935.312500	-44.63	-13.00	Vertical

---End of Test Report---