

# TEST REPORT FOR GSM TESTING

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Report No.: SRTC2023-9004(F)-23032901(A)

Product Name: Smart Phone

Product ID: APYHRO00325

Applicant: Sharp Corporation

Manufacturer: Sharp Corporation

Specification: FCC Part 24E, Part 22H, Part 2 (2022)

FCC ID: APYHRO00325

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

### 1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio\_monitoring\_center Testing Center (SRTC). The test results relate only to individual items of the samples which have been tested. The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

### 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:	2023-03-29
Testing Start Date:	2023-03-30
Testing End Date:	2023-04-30

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
Duplex Mode:	FDD
Duplex Spacing:	GSM850:45MHz PCS1900:80MHz
Antenna Type:	PIFA
Antenna Gain:	GSM850: -5.6dBi PCS1900: -2.6dBi ERP = EIRP(Power+Gain) – 2.15 (dB)
Power Supply:	Battery/DC supply
Software Revision:	NA
Hardware Revision:	PVT(Remodeled to the equivalent of MP products)
IMEI:	004401231335783

### 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	2022	Frequency allocations and radio treaty matters; general rules and regulations
FCC Part22	2022	Public mobile services
FCC Part24	2022	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**


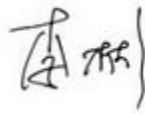

The following are the definition of the test result.

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



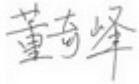
No.	Test case	FCC reference	Verdict	Test Site
1	RF Power Output	2.1046	Pass	1
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)(5)/24.232(c)	Pass	1
3	Occupied Bandwidth	2.1049	Pass	1
4	Emission Bandwidth	2.1049	Pass	1
5	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)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

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:  20230509

No.	Test case	FCC reference	Verdict	Test Site
9	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	Pass	2

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

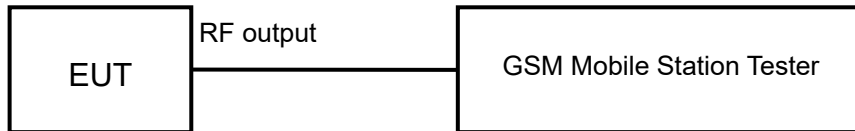
This Test Report Is Approved by: Mr. Liu Wei 	Review by: Mr. Guo Yu 
Tested and Issued by: Mr. Dong Qifeng 	Approved date: 20230509

## **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:

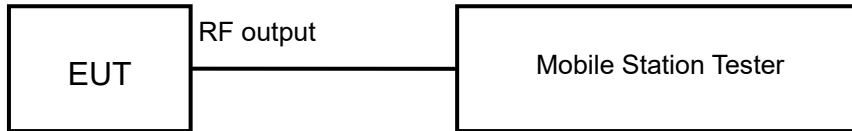
The test results are shown in Appendix A.



## 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:

$$ERP/EIRP = P_{Meas} - LC + GT$$

Where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P<sub>Meas</sub>, typically dBW or dBm)

P<sub>Meas</sub> = 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

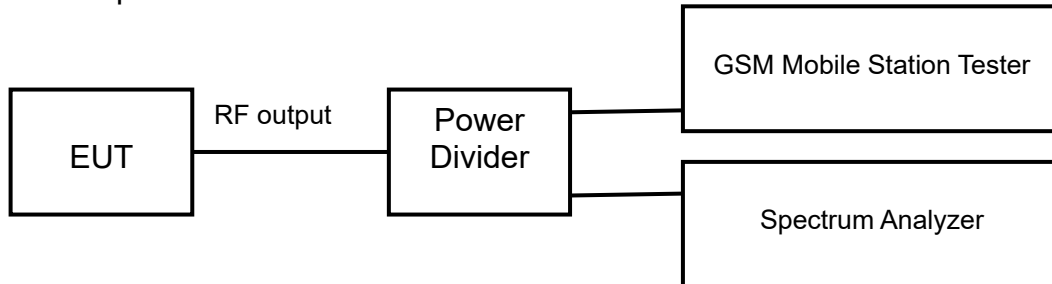
Test result:

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  $\geq 3 \times$  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

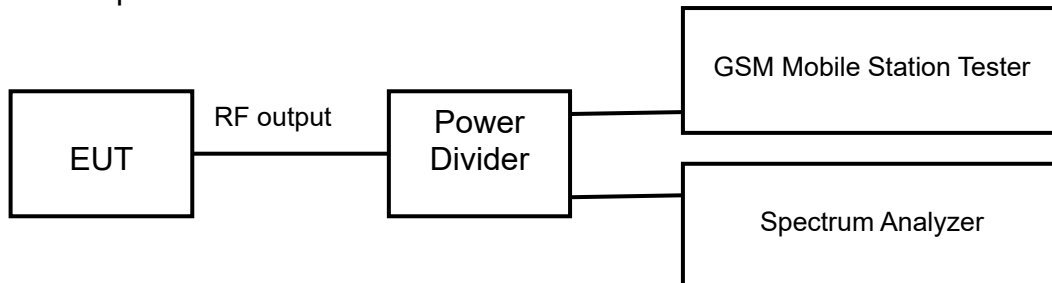
Test result:

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

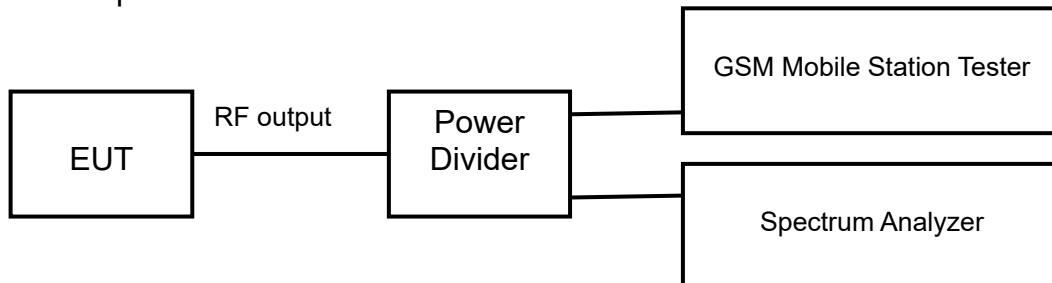
Test result:

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:

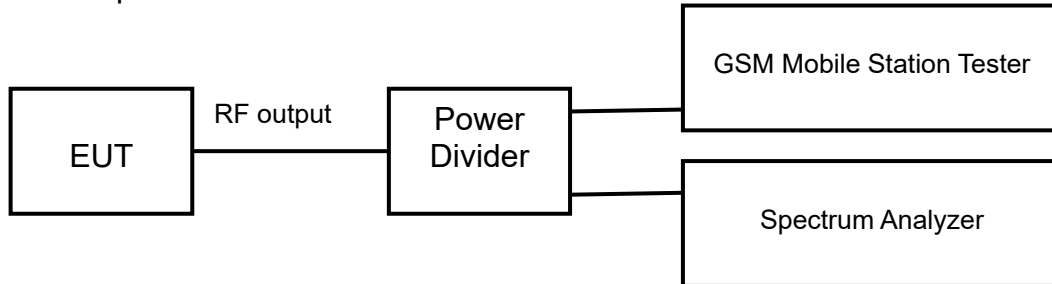
The test results are shown in Appendix A.

## 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  $43 + \log_{10}(P)$  (P [Watts]), where P is the transmitter power in Watts.

Test result:

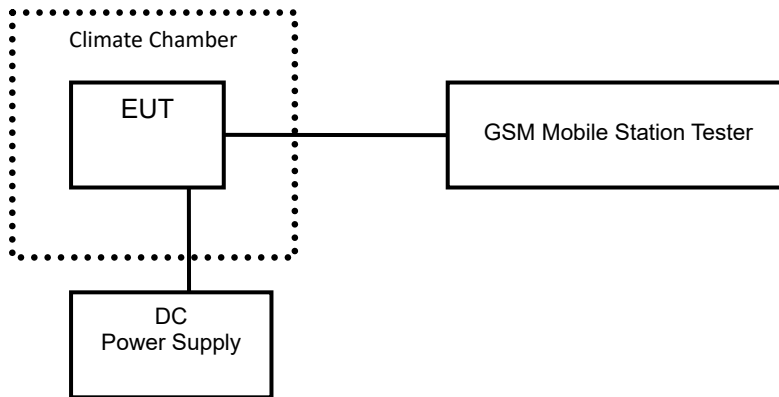
The test results are shown in Appendix A.

## 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.

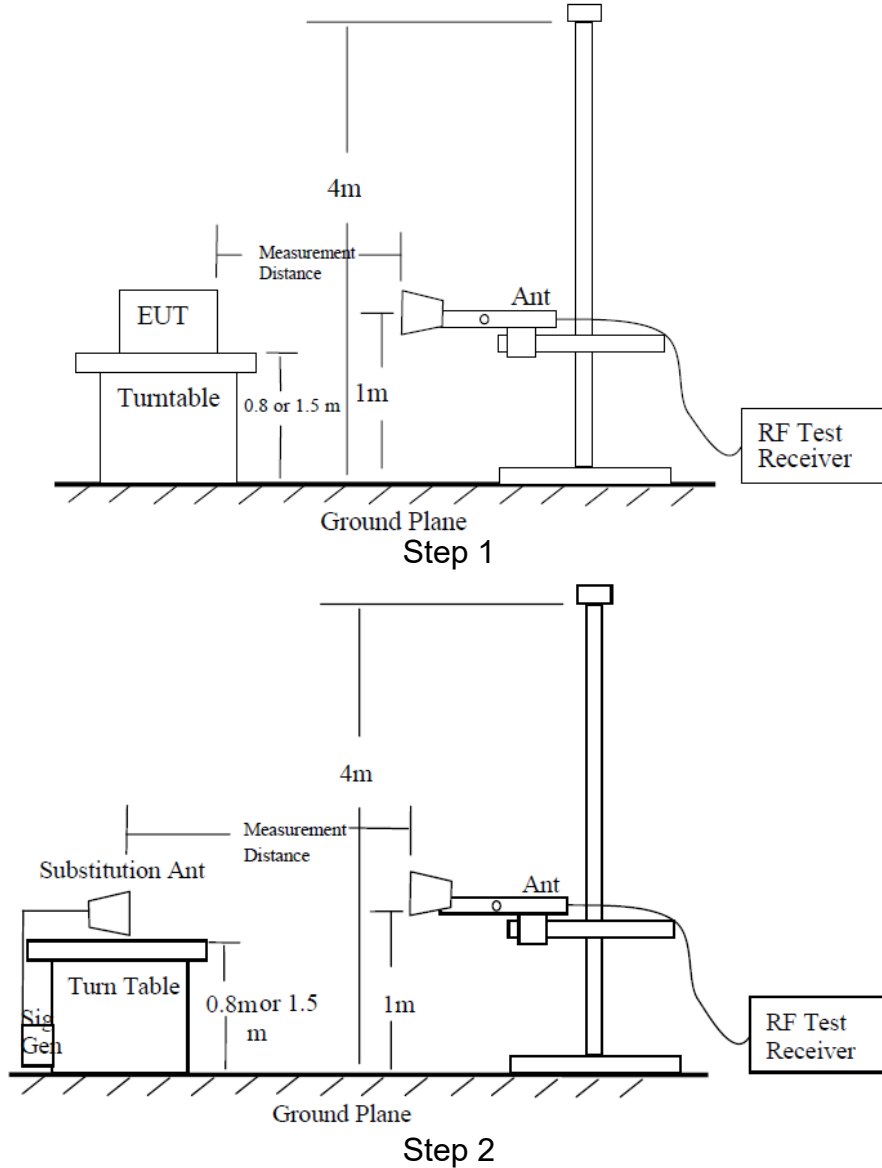
Test result:

The test results are shown in Appendix A.

## 6.8 Radiated Spurious Emissions

Rule Part(s)  
FCC Part2.1053/ 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:**

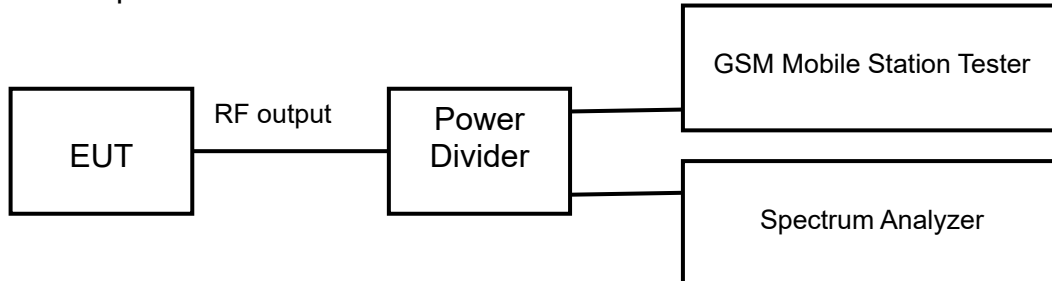
The test results are shown in Appendix B.



## 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	2023.03.06	2024.03.05
5	Power Divider / 11667A	HP	19632	2022.06.21	2023.06.20
6	DC Power Supply / E3645A	Agilent	MY40000741	2023.03.06	2024.03.05
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**

**GSM850**

**1 RF Power Output**

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	31.97
836.6	190	32.33
848.8	251	32.23

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	1Down4Up	27.58
836.6	190	1Down4Up	27.65
848.8	251	1Down4Up	27.68
824.2	128	2Down3Up	28.81
836.6	190	2Down3Up	28.92
848.8	251	2Down3Up	28.93
824.2	128	3Down2Up	30.71
836.6	190	3Down2Up	30.66
848.8	251	3Down2Up	30.75
824.2	128	4Down1Up	32.77
836.6	190	4Down1Up	32.82
848.8	251	4Down1Up	32.65

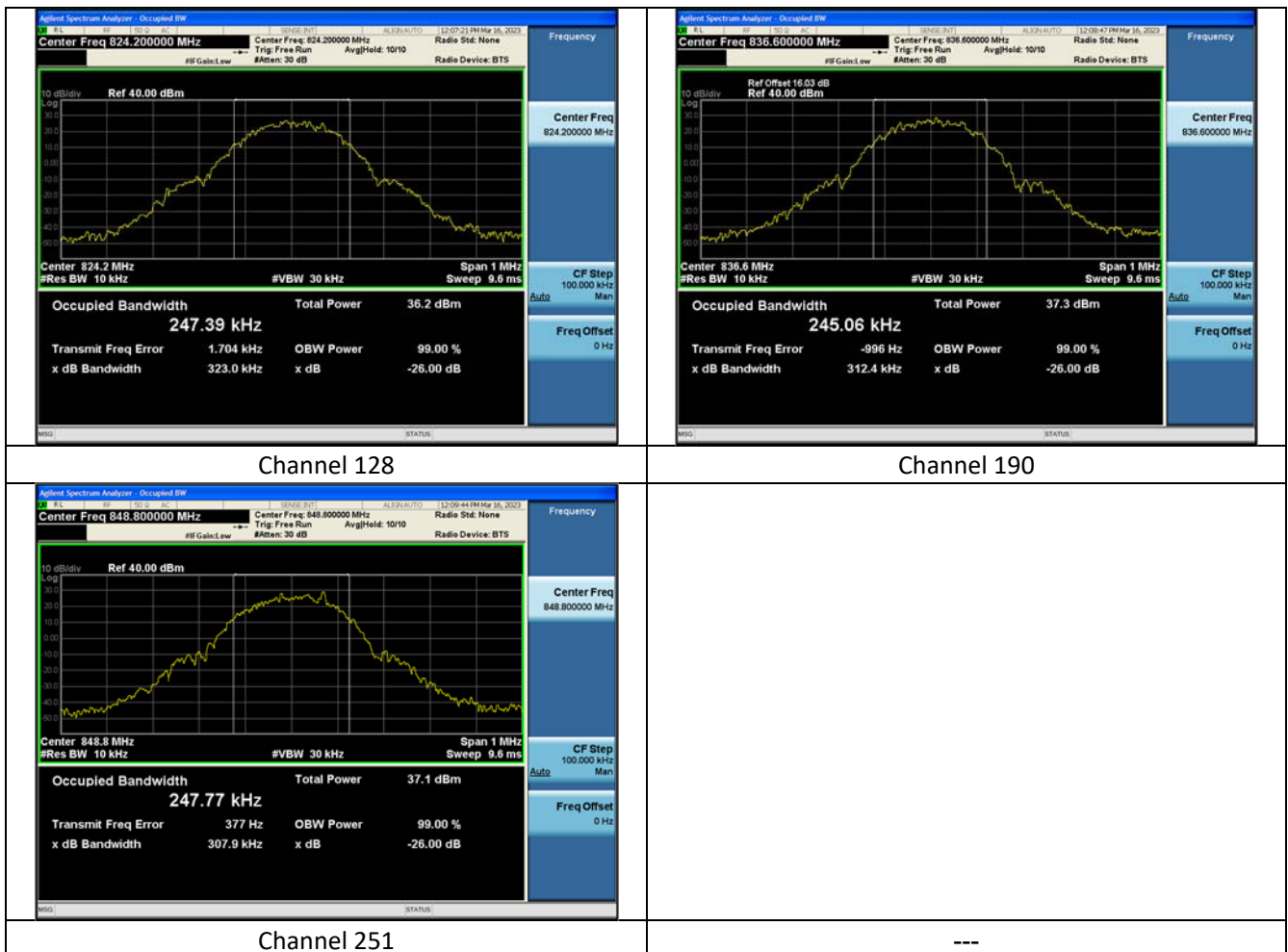
## 2 Occupied Bandwidth GSM MODE

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	247.39
836.6	190	245.06
848.8	251	247.77

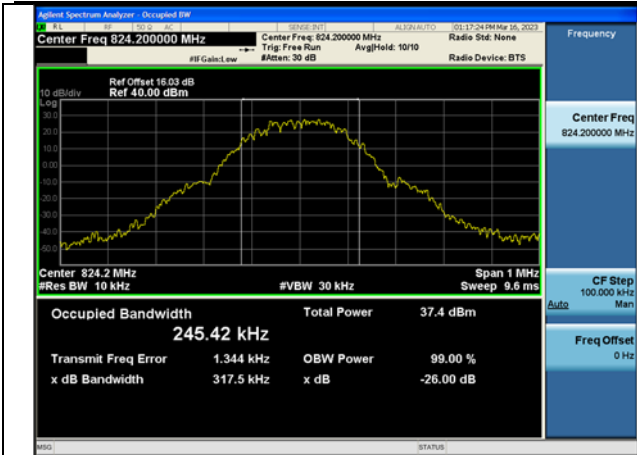
## GPRS MODE

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	245.42
836.6	190	245.29
848.8	251	241.42

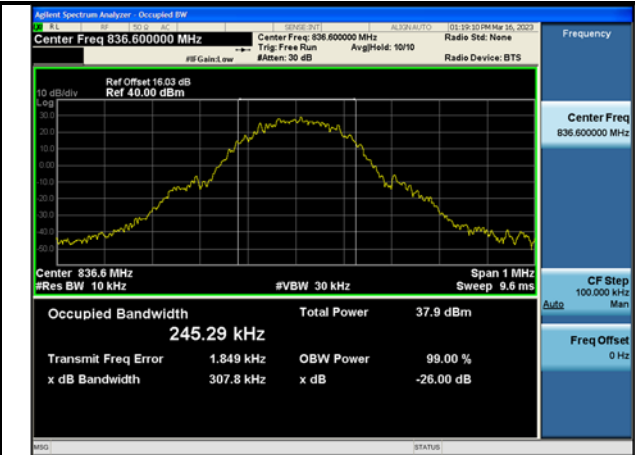
## GSM MODE



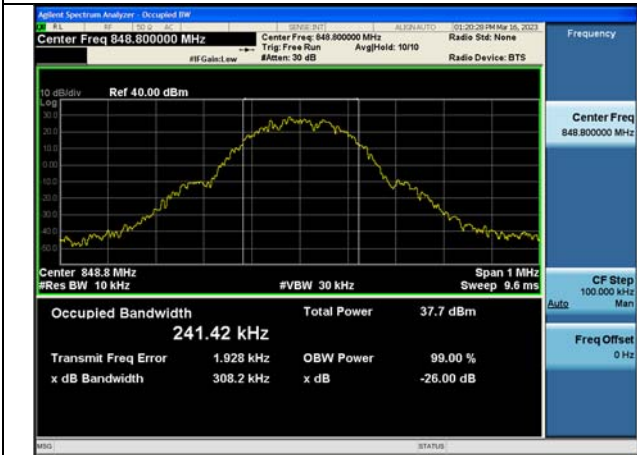
## GPRS MODE



Channel 128



Channel 190



Channel 251



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### 3 Emission Bandwidth

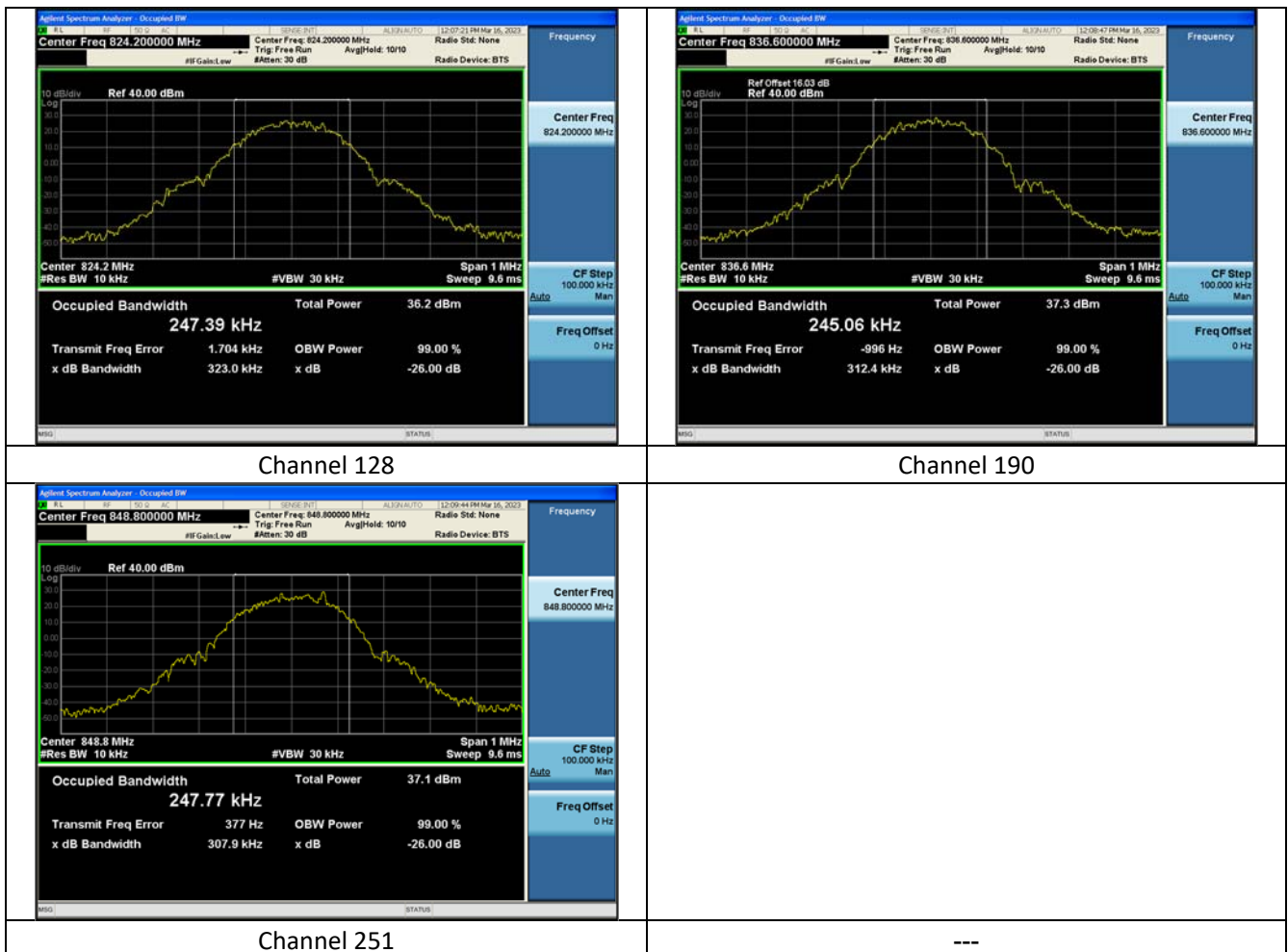
#### GSM MODE

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
824.2	128	323.00
836.6	190	312.41
848.8	251	307.93

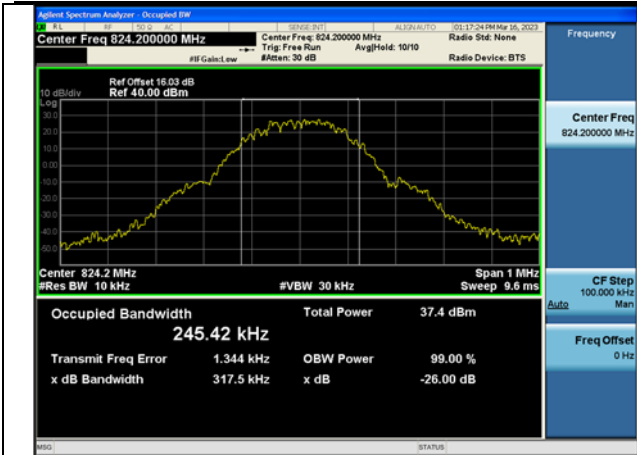
#### GPRS MODE

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
824.2	128	317.54
836.6	190	307.82
848.8	251	308.18

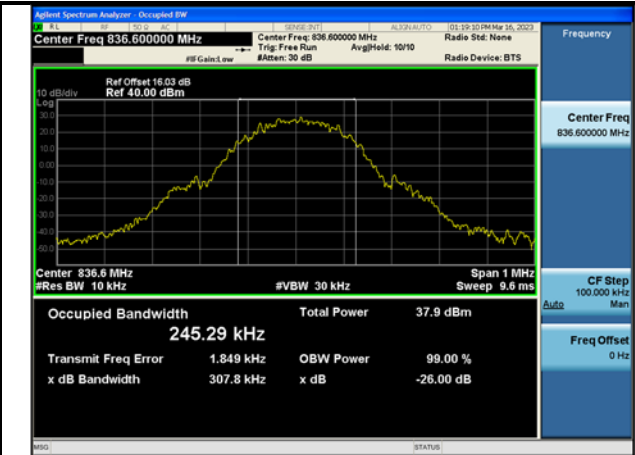
#### GSM MODE



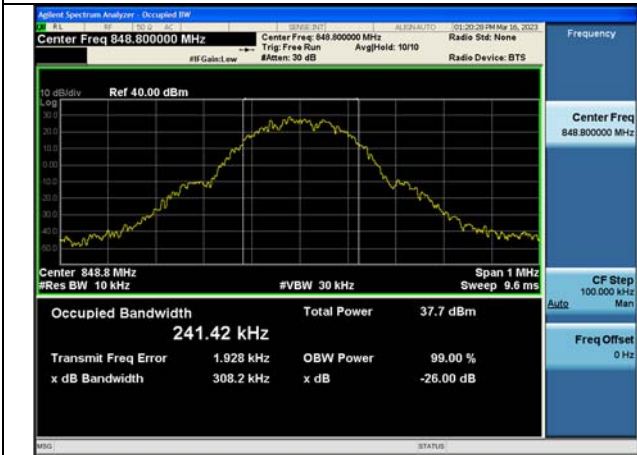
#### GPRS MODE



Channel 128



Channel 190



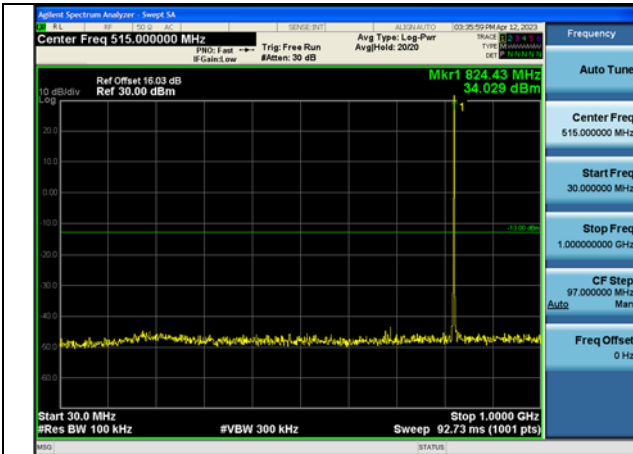
Channel 251



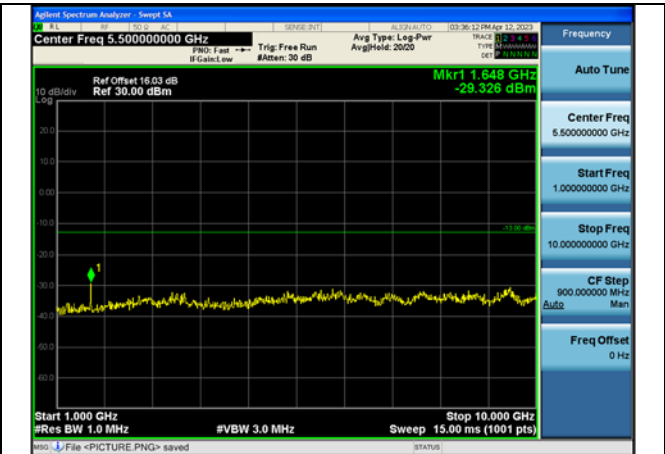
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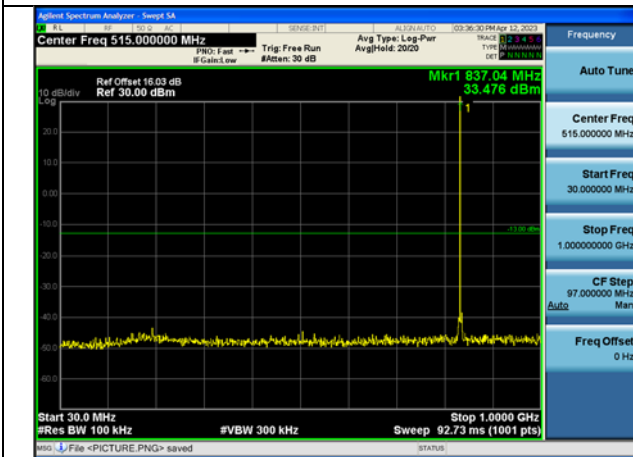
**4 Spurious Emissions at antenna terminal**  
**GSM MODE**



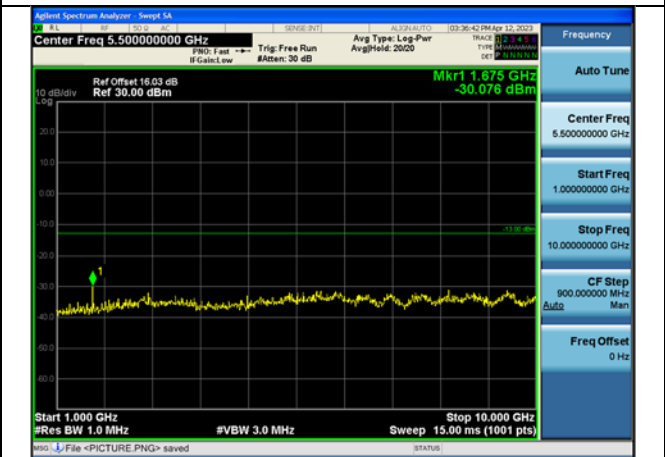
Channel 128



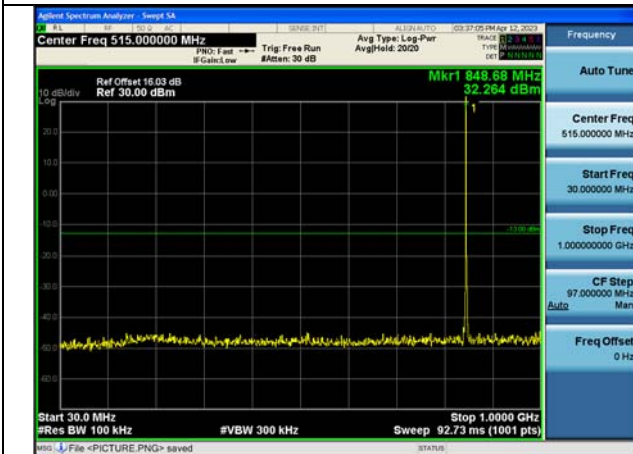
Channel 128



Channel 190



Channel 190

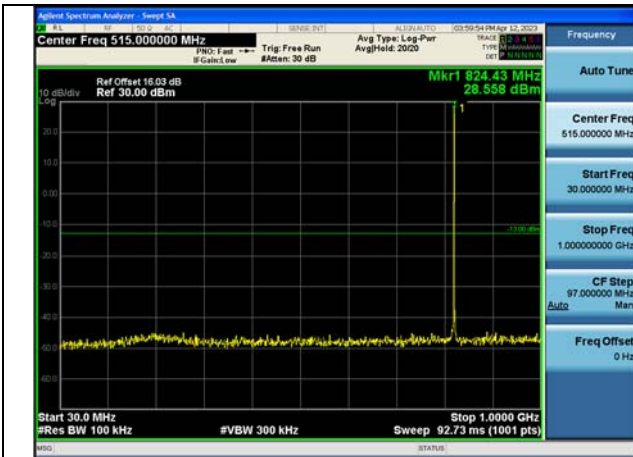


Channel 251



Channel 251

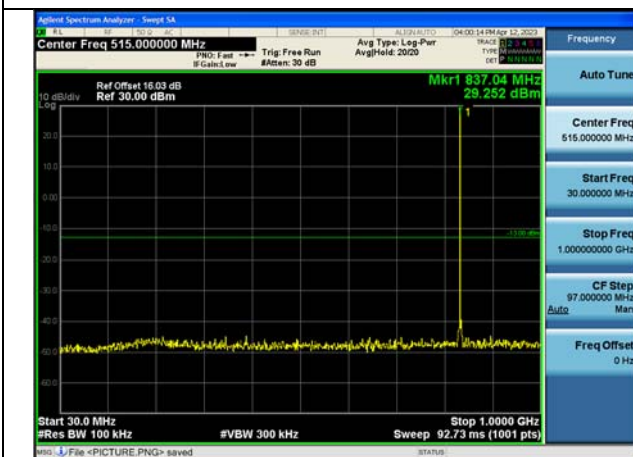
GPRS MODE



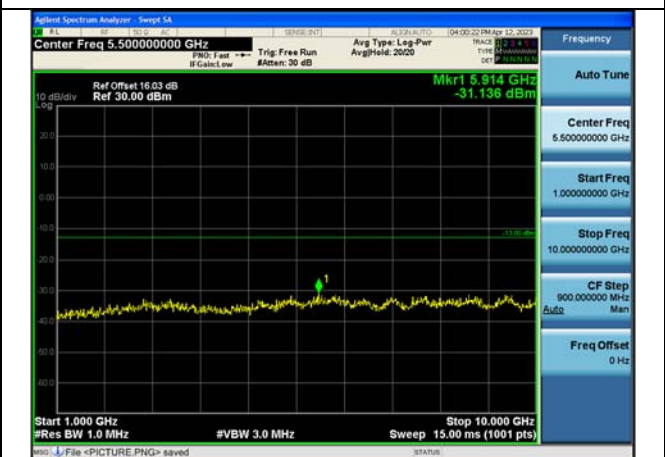
Channel 128



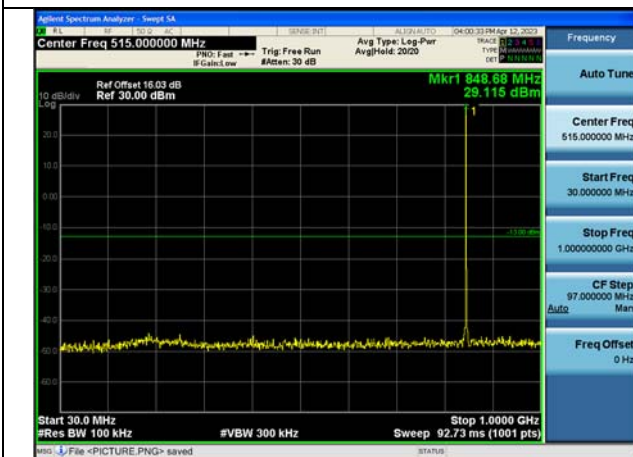
Channel 128



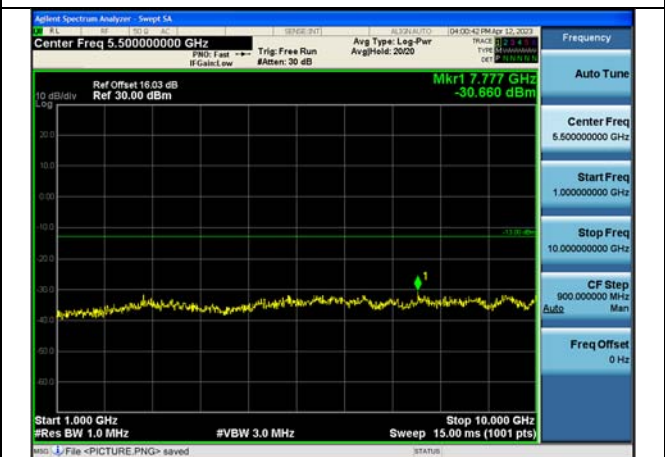
Channel 190



Channel 190

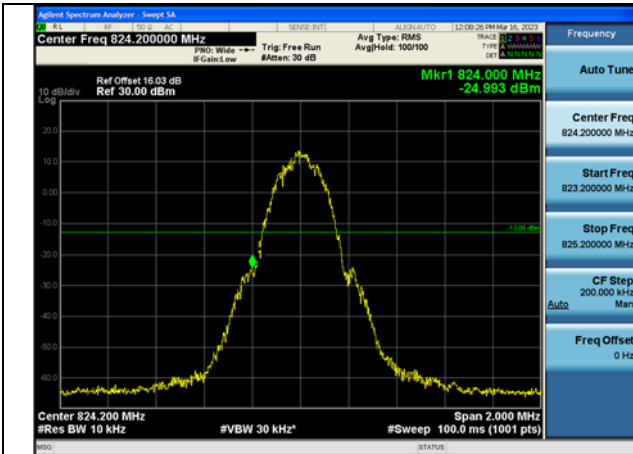


Channel 251

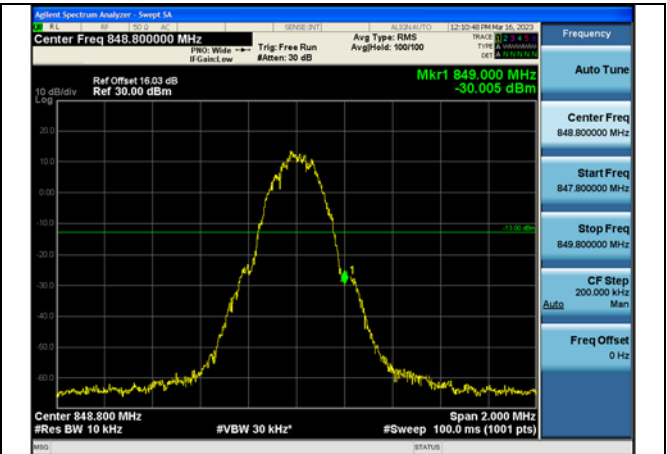


Channel 251

**5 Band Edges Compliance**  
**GSM MODE**

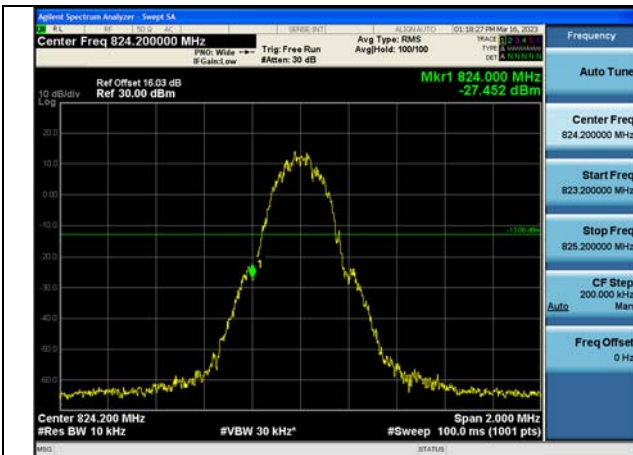


Channel 128

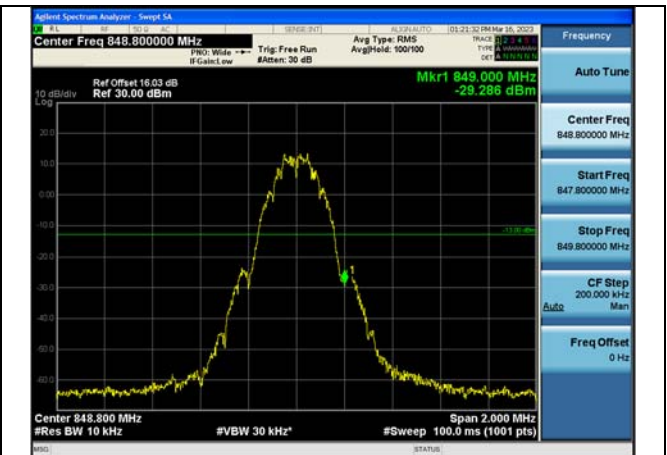


Channel 251

**GPRS MODE**



Channel 128



Channel 251

## 6 Frequency Stability

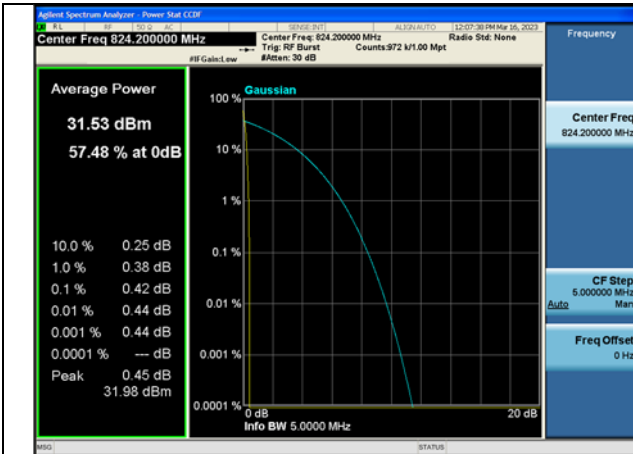
Test Mode: GSM MODE

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 190	Channel 251
-10	0.011	0.015	0.014
-0	0.015	0.013	0.018
+10	0.007	0.012	0.014
+20	0.014	0.009	0.012
+30	0.017	0.011	0.014
+40	0.012	0.014	0.012
+50	0.011	0.013	0.011
+55	0.013	0.018	0.011
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 190	Channel 251
LV	0.007	0.015	0.015
HV	0.014	0.013	0.012

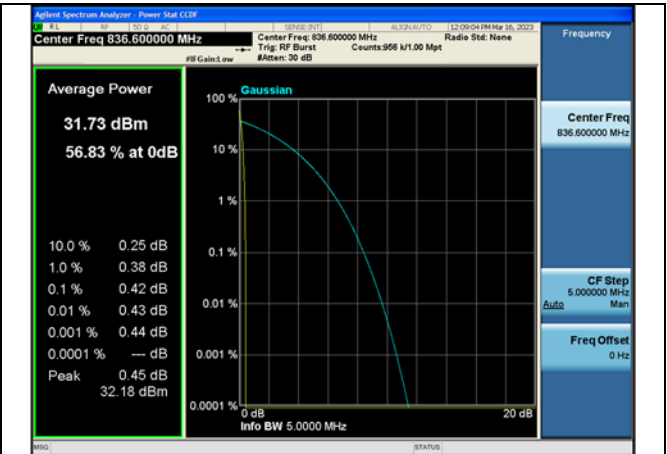
Test Mode: GPRS MODE

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 190	Channel 251
-10	0.034	0.031	0.034
-0	0.036	0.035	0.034
+10	0.036	0.034	0.032
+20	0.035	0.034	0.035
+30	0.035	0.034	0.035
+40	0.036	0.033	0.034
+50	0.032	0.034	0.034
+55	0.035	0.033	0.035
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 190	Channel 251
LV	0.035	0.034	0.035
HV	0.035	0.034	0.032

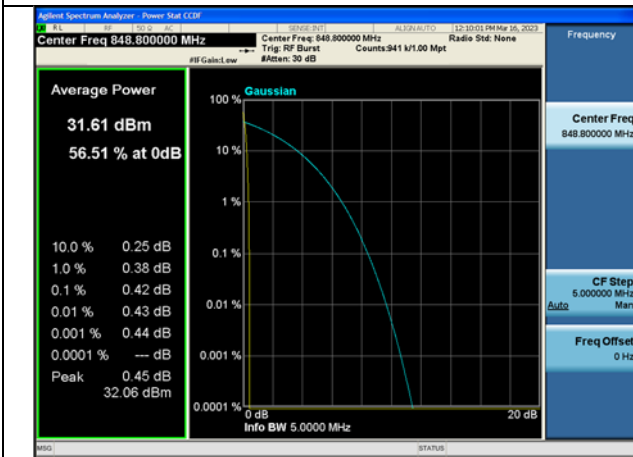
**7 Peak-Average Ratio**  
**GSM MODE**



Channel 128



Channel 190

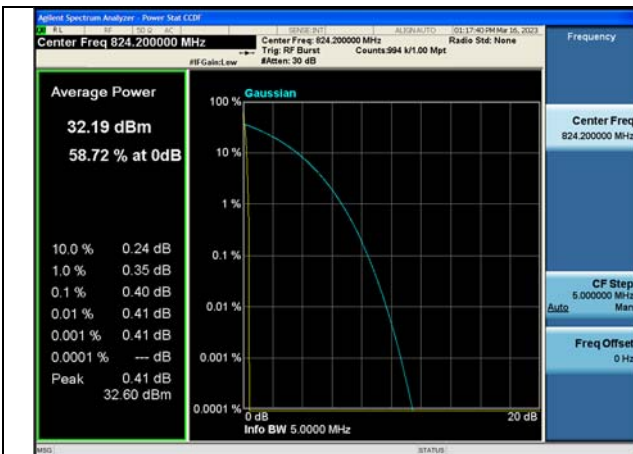


Channel 251

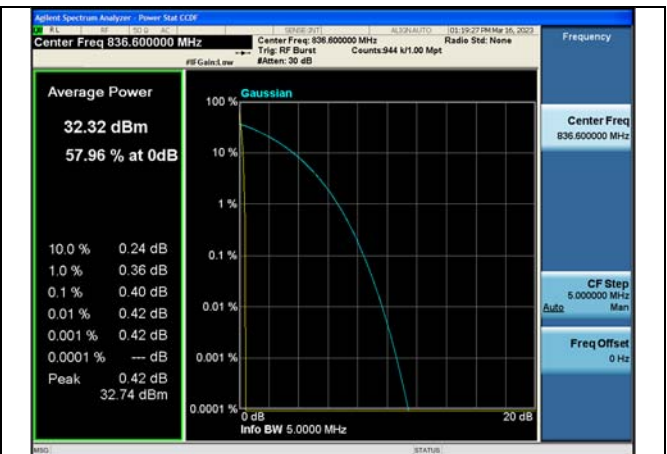


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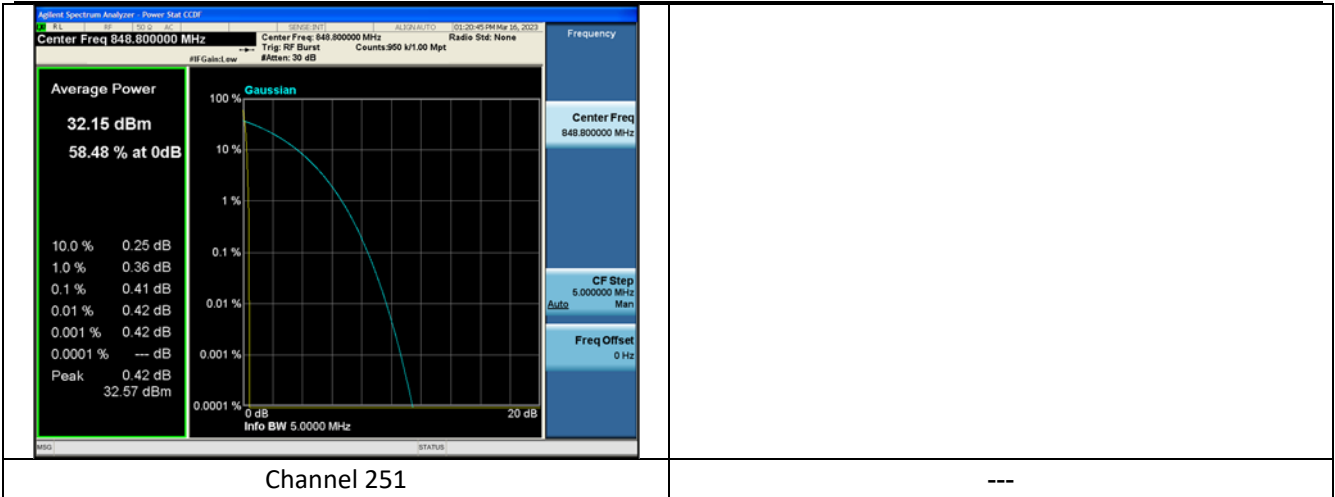
**GPRS MODE**



Channel 128



Channel 190



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

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	31.97	24.22	0.264
836.6	190	32.33	24.58	0.287
848.8	251	32.23	24.48	0.281

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	1Down4Up	27.58	19.83	0.096
836.6	190	1Down4Up	27.65	19.90	0.098
848.8	251	1Down4Up	27.68	19.93	0.098
824.2	128	2Down3Up	28.81	21.06	0.128
836.6	190	2Down3Up	28.92	21.17	0.131
848.8	251	2Down3Up	28.93	21.18	0.131
824.2	128	3Down2Up	30.71	22.96	0.198
836.6	190	3Down2Up	30.66	22.91	0.195
848.8	251	3Down2Up	30.75	23.00	0.200
824.2	128	4Down1Up	32.77	25.02	0.318
836.6	190	4Down1Up	32.82	25.07	0.321
848.8	251	4Down1Up	32.65	24.90	0.309

### PCS1900

#### 1 RF Power Output

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	29.52
1880	661	29.47
1909.8	810	29.40

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	1Down4Up	24.37

1880	661	1Down4Up	24.26
1909.8	810	1Down4Up	24.09
1850.2	512	2Down3Up	25.61
1880	661	2Down3Up	25.36
1909.8	810	2Down3Up	24.99
1850.2	512	3Down2Up	27.22
1880	661	3Down2Up	26.98
1909.8	810	3Down2Up	26.67
1850.2	512	4Down1Up	29.43
1880	661	4Down1Up	29.17
1909.8	810	4Down1Up	29.13

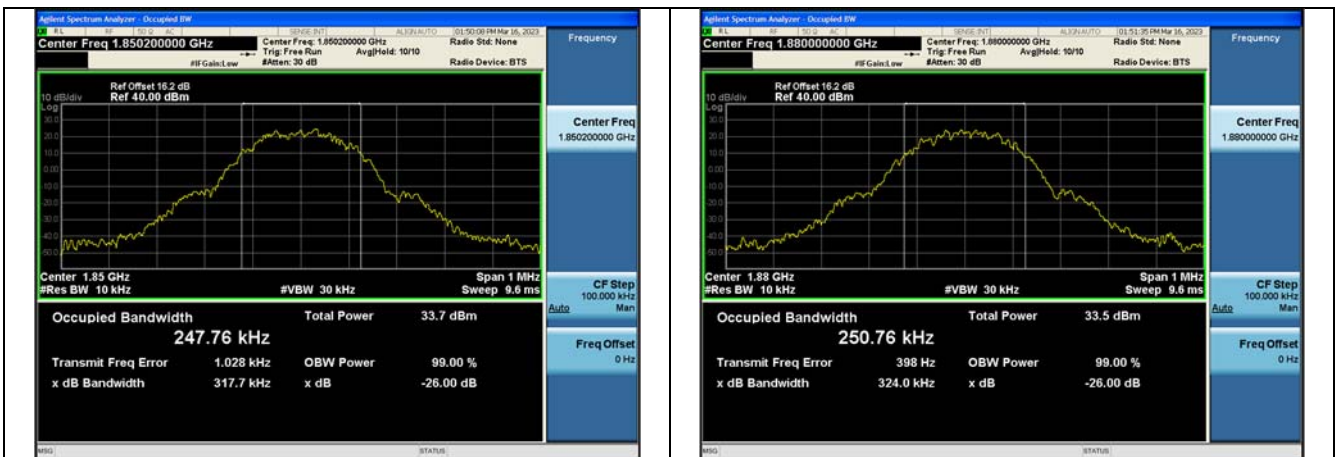
## 2 Occupied Bandwidth GSM MODE

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	247.76
1880	661	250.76
1909.8	810	245.97

## GPRS MODE

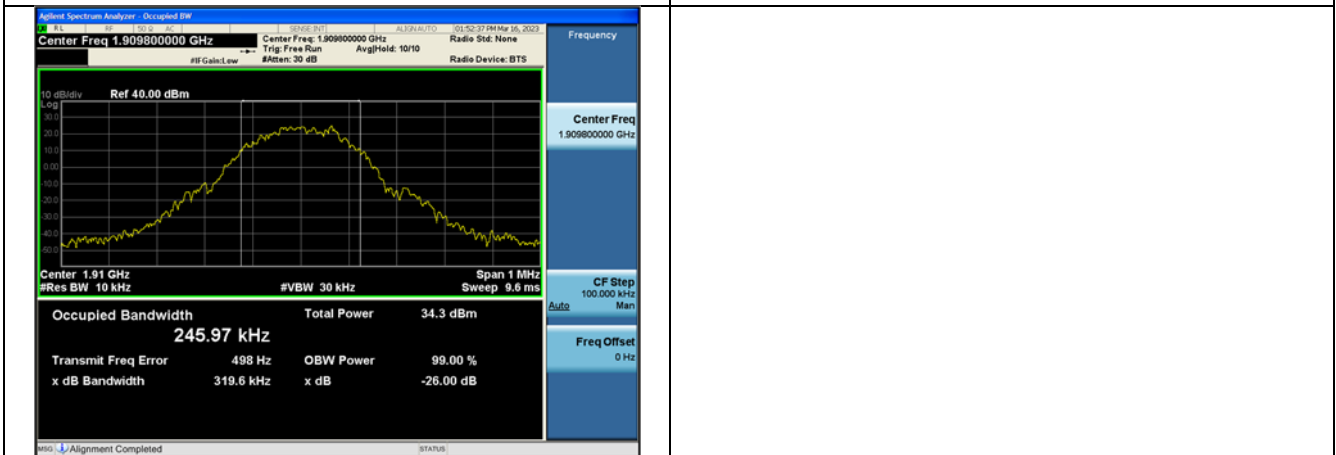
Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	242.84
1880	661	251.65
1909.8	810	245.12

## GSM MODE



Channel 512

Channel 661

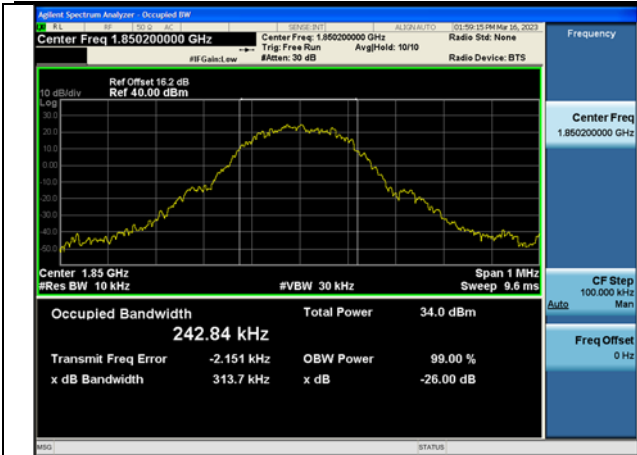


Channel 810

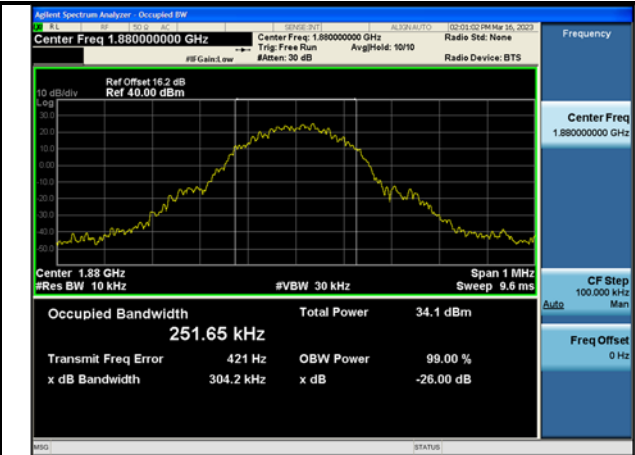
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## GPRS MODE

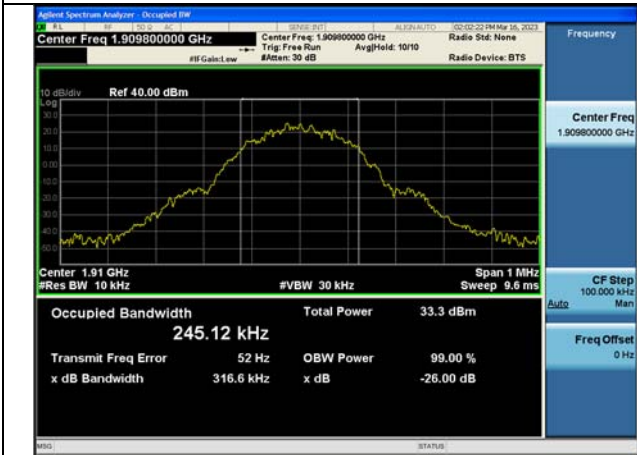




Channel 512



Channel 661



Channel 810



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### 3 Emission Bandwidth

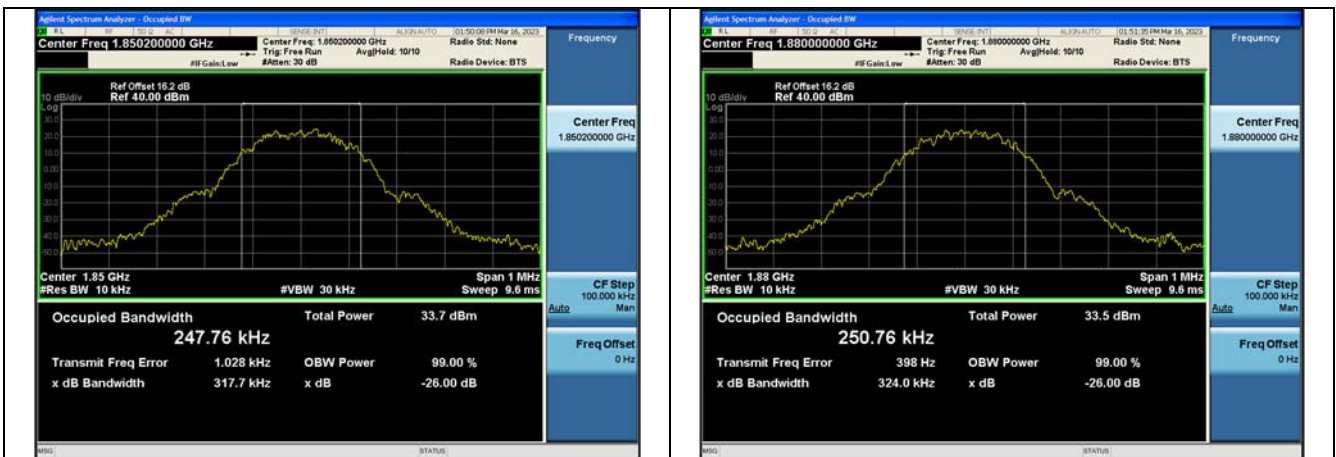
#### GSM MODE

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
1850.2	512	317.72
1880	661	324.00
1909.8	810	319.62

#### GPRS MODE

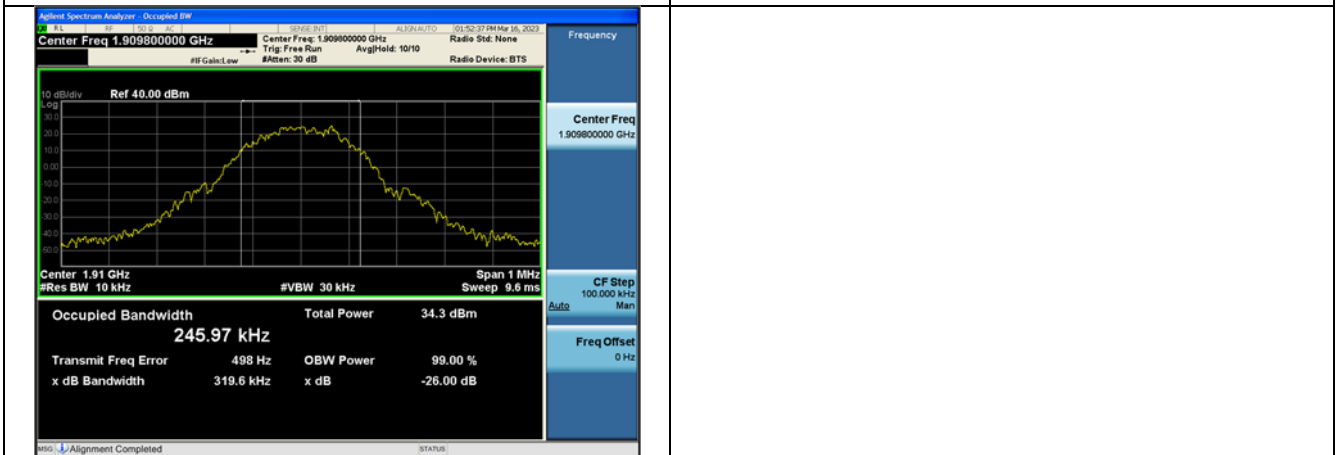
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
1850.2	512	313.65
1880	661	304.16
1909.8	810	316.62

#### GSM MODE



Channel 512

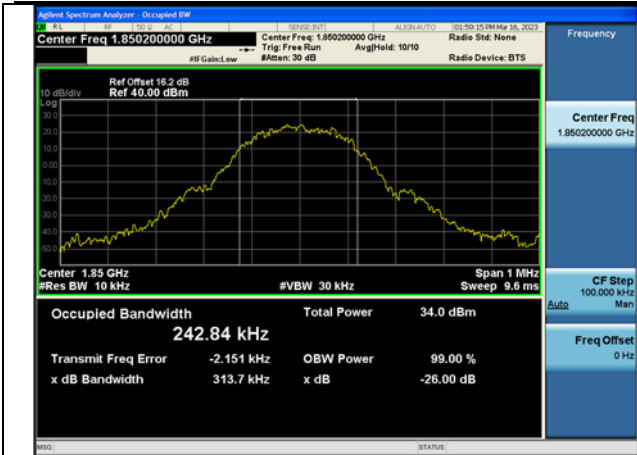
Channel 661



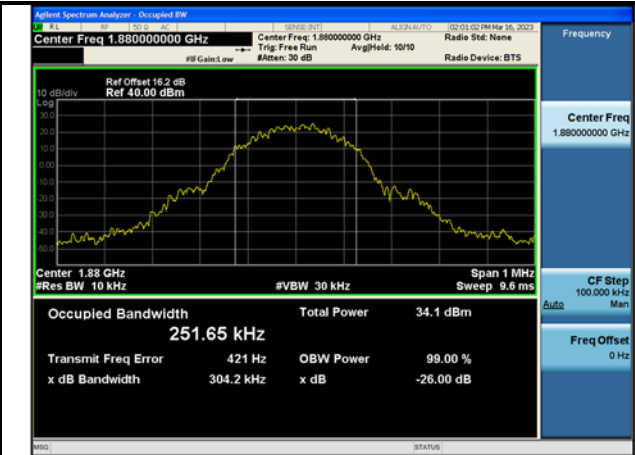
Channel 810

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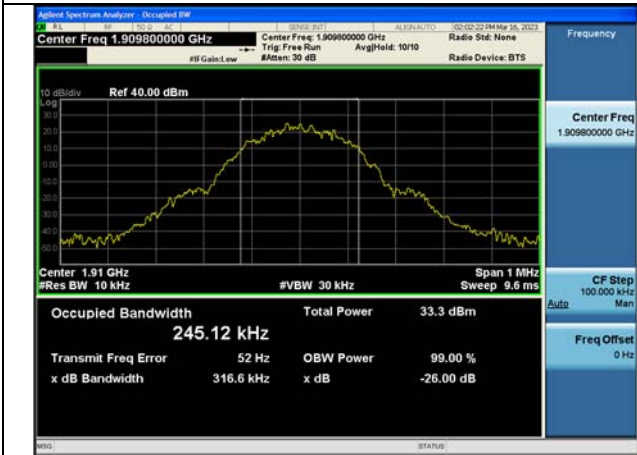
#### GPRS MODE



Channel 512



Channel 661

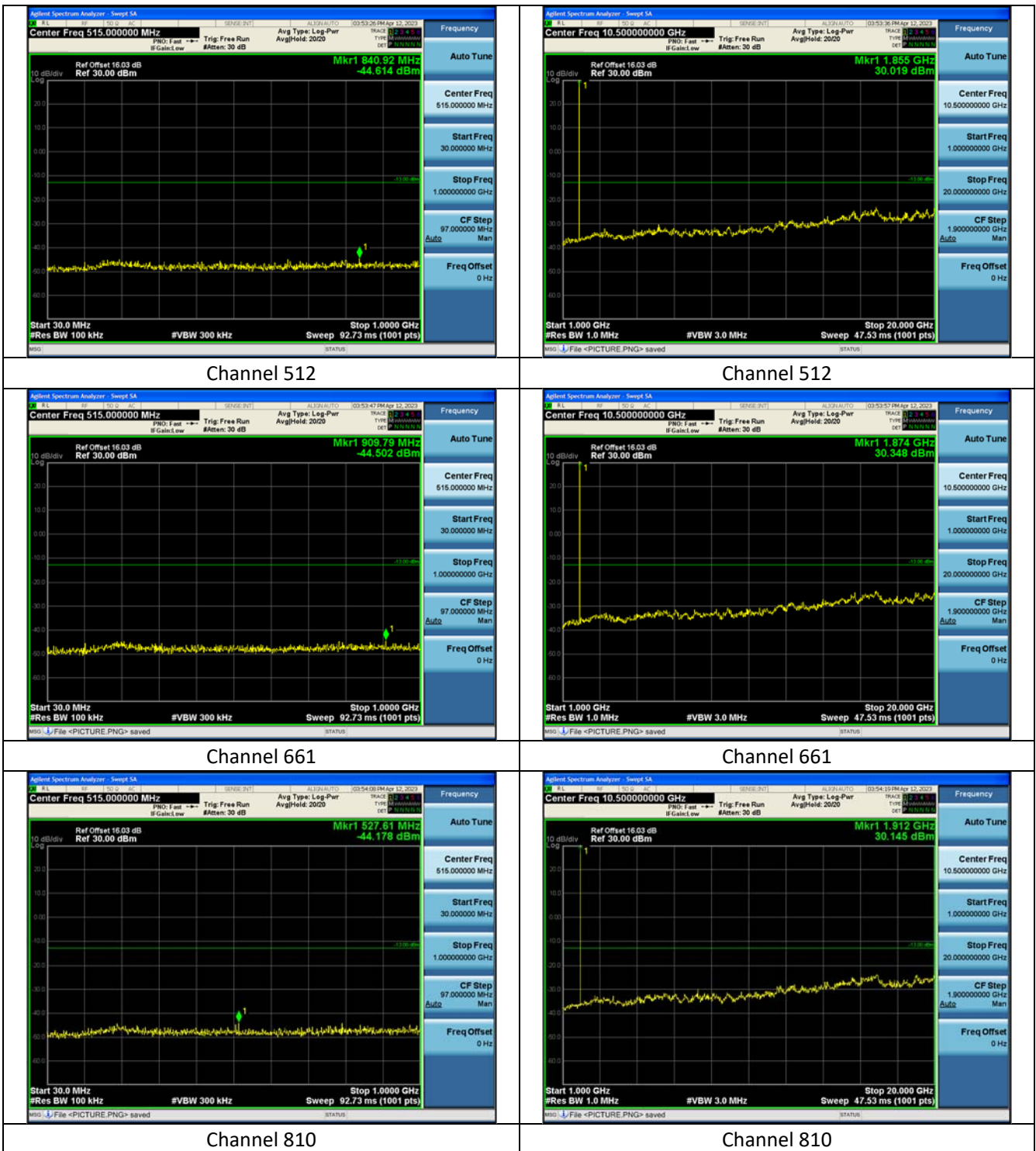


Channel 810

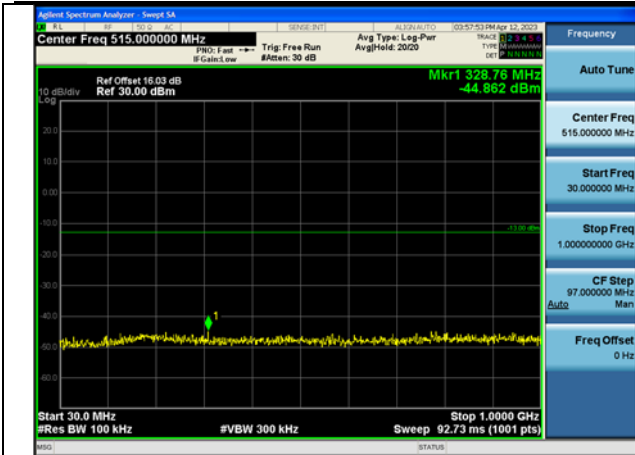


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**4 Spurious Emissions at antenna terminal**  
**GSM MODE**



**GPRS MODE**



Channel 512



Channel 512



Channel 661



Channel 661

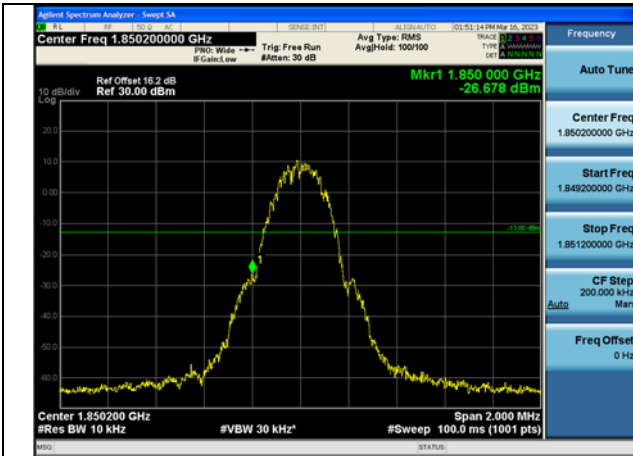


Channel 810

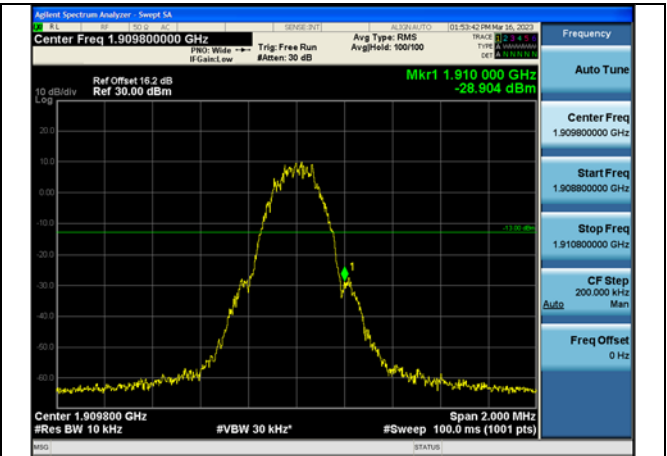


Channel 810

**5 Band Edges Compliance**  
**GSM MODE**

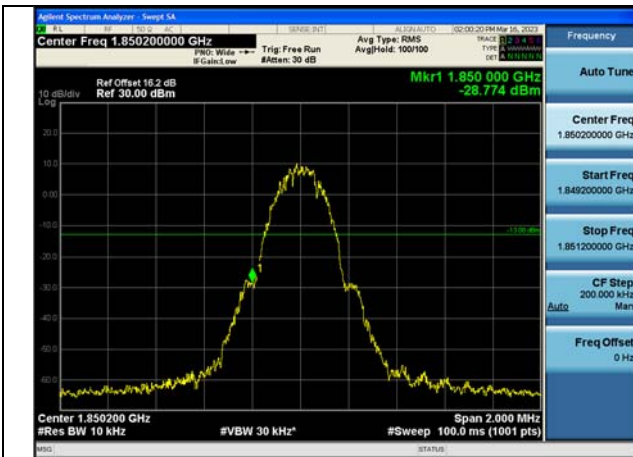


Channel 512

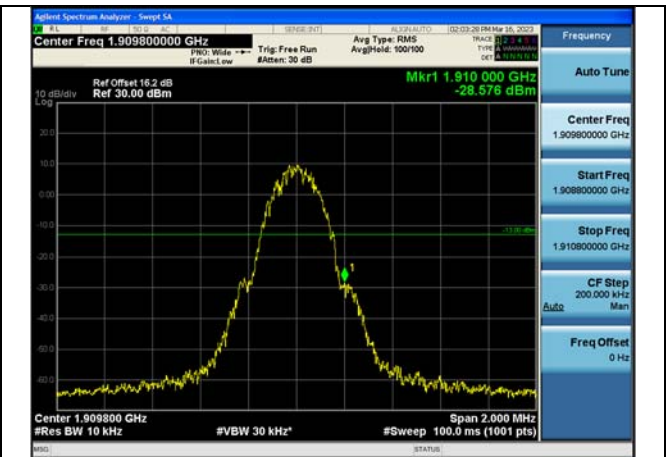


Channel 810

**GPRS MODE**



Channel 512



Channel 810

## 6 Frequency Stability

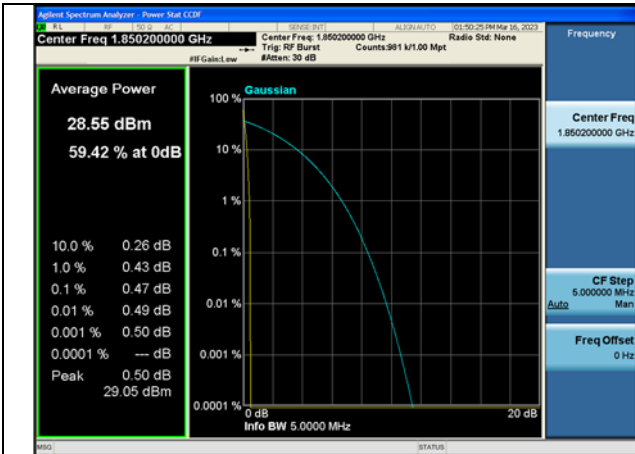
Test Mode: GSM MODE

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
-10	0.011	0.013	0.012
0	0.012	0.012	0.010
+10	0.009	0.010	0.012
+20	0.009	0.013	0.010
+30	0.008	0.012	0.010
+40	0.009	0.011	0.007
+50	0.007	0.012	0.009
+55	0.011	0.009	0.008
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	0.009	0.012	0.011
HV	0.011	0.013	0.010

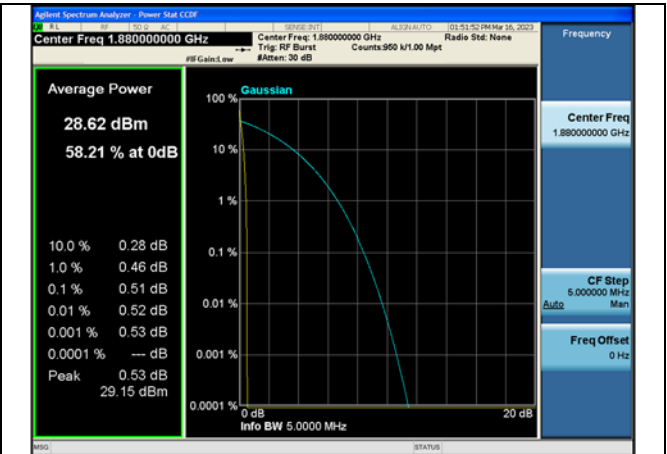
Test Mode: GPRS MODE

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
-10	0.013	0.015	0.013
0	0.013	0.014	0.013
+10	0.013	0.015	0.012
+20	0.014	0.014	0.013
+30	0.012	0.014	0.012
+40	0.013	0.013	0.012
+50	0.011	0.012	0.010
+55	0.012	0.015	0.011
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	0.013	0.014	0.011
HV	0.012	0.014	0.011

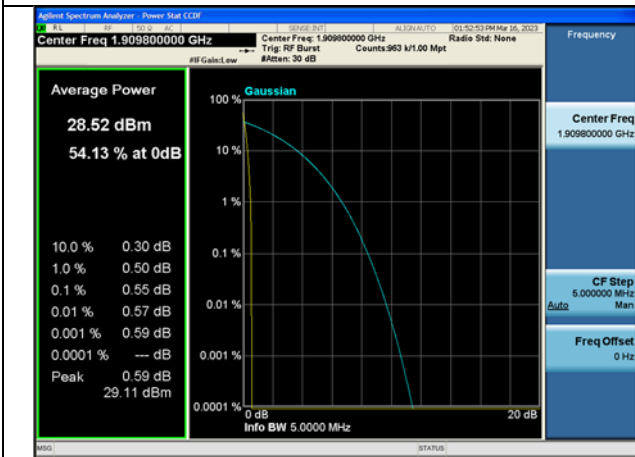
**7 Peak-Average Ratio**  
**GSM MODE**



Channel 512



Channel 661

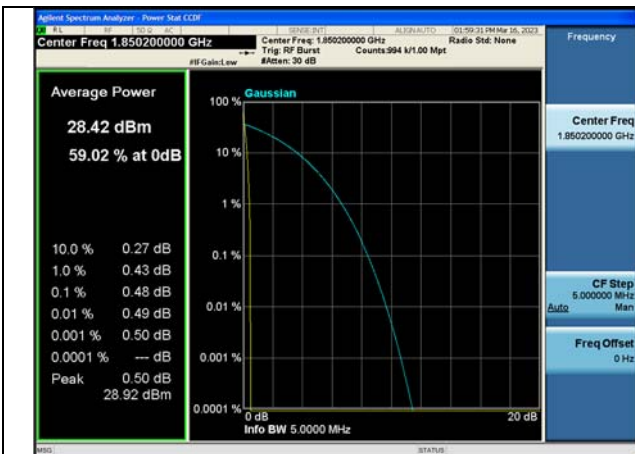


Channel 810

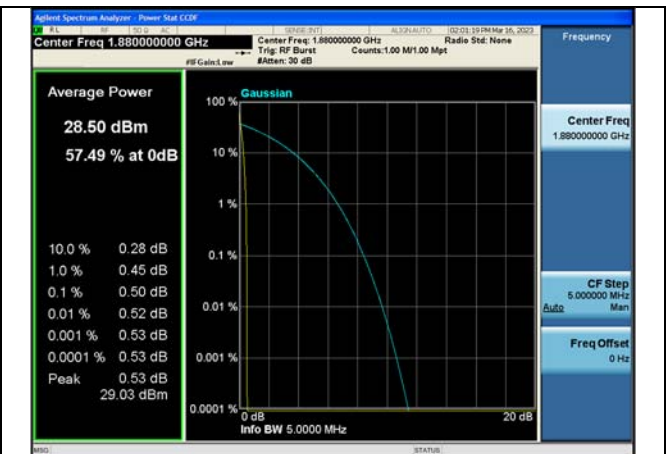


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**GPRS MODE**

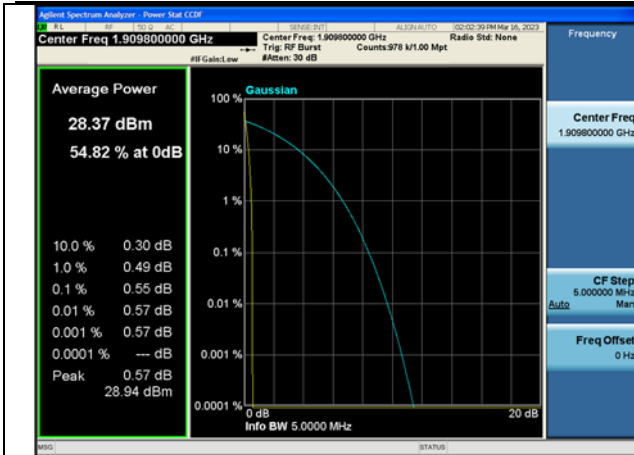


Channel 512



Channel 661





Channel 810

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## 8 Effective Radiated Power and Effective Isotropic Radiated Power

### GSM Measured Power:

Carrier frequency (MHz)	Channel No.	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	29.52	26.92	0.492
1880	661	29.47	26.87	0.486
1909.8	810	29.40	26.80	0.479

### GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	1Down4Up	24.37	21.77	0.150
1880	661	1Down4Up	24.26	21.66	0.147
1909.8	810	1Down4Up	24.09	21.49	0.141
1850.2	512	2Down3Up	25.61	23.01	0.200
1880	661	2Down3Up	25.36	22.76	0.189
1909.8	810	2Down3Up	24.99	22.39	0.173
1850.2	512	3Down2Up	27.22	24.62	0.290
1880	661	3Down2Up	26.98	24.38	0.274
1909.8	810	3Down2Up	26.67	24.07	0.255
1850.2	512	4Down1Up	29.43	26.83	0.482
1880	661	4Down1Up	29.17	26.57	0.454
1909.8	810	4Down1Up	29.13	26.53	0.450

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

### **Radiated Spurious Emissions**

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

Note: The scanned graph represents the maximum of both horizontal and vertical polarizations and is not a single horizontal or vertical polarization scan.

#### **850 Test result**

GSM/GPRS MODE Channel 189:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1470.00	-77.29	-13.00	Vertical
1662.20	-75.26	-13.00	Vertical
2426.00	-78.56	-13.00	Vertical
9400.00	-52.43	-13.00	Vertical
11290.00	-48.36	-13.00	Vertical
12720.00	-48.54	-13.00	Vertical

#### **1900 Test result**

GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1168.00	-80.69	-13.00	Vertical
1494.00	-76.84	-13.00	Vertical
2440.00	-78.61	-13.00	Vertical
10260.00	-51.81	-13.00	Vertical
11230.00	-48.80	-13.00	Vertical
12720.00	-48.60	-13.00	Vertical

---End of Test Report---