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# TEST REPORT FOR GSM TESTING

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Report No.: SRTC2022-9004(F)-22020801(A)

Product ID : AEE001

Applicant: Sharp Corporation

Manufacturer: Sharp Corporation

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

FCC ID: APYHRO00305

The State Radio\_monitoring\_center Testing Center (SRTC)  
15th Building, No.30 Shixing Street, Shijingshan District, Beijing, P.R.China  
Tel: 86-10-57996183 Fax: 86-10-57996388

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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)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liu Jia
Tel:	+86 10 57996183
Fax:	+86 10 57996388
Email:	liujiaf@srtc.org.cn
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:	2022-02-08
Testing Start Date:	2022-02-10
Testing End Date:	2022-02-28

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: -4.5dBi/PCS1900: -4.8dBi ERP = EIRP(Power +Gain) – 2.15 (dB)
Power Supply:	DC supply
Software Revision:	A126A
Hardware Revision:	DVT(Remodeled to the equivalent of MP products)
IMEI:	004401230696045

### **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

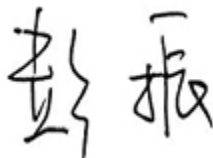
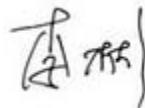

### **4 KEY TO NOTES AND RESULT CODES**

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	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	Pass
9	Peak-Average Ratio	24.232(d)	Pass

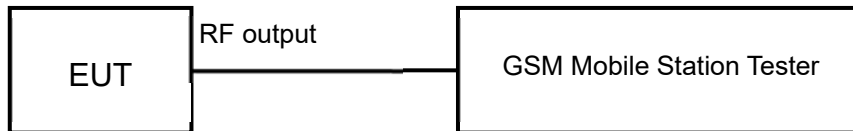
This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. Liu Ce 	Issued date: 20220315

## **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:

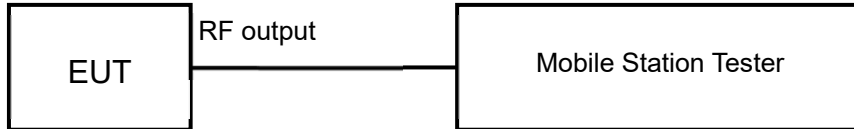
The test results are shown in Appendix A.



## 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

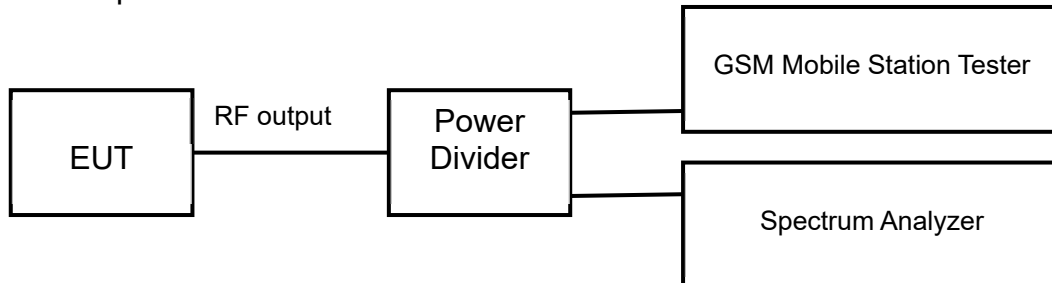
Test result:

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

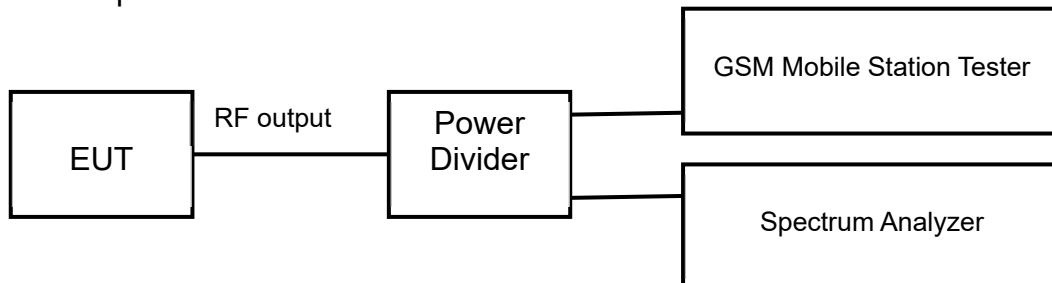
Test result:

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

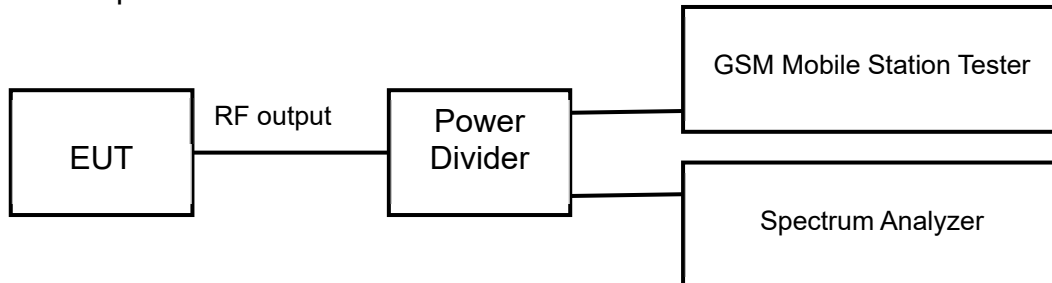
Test result:

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:

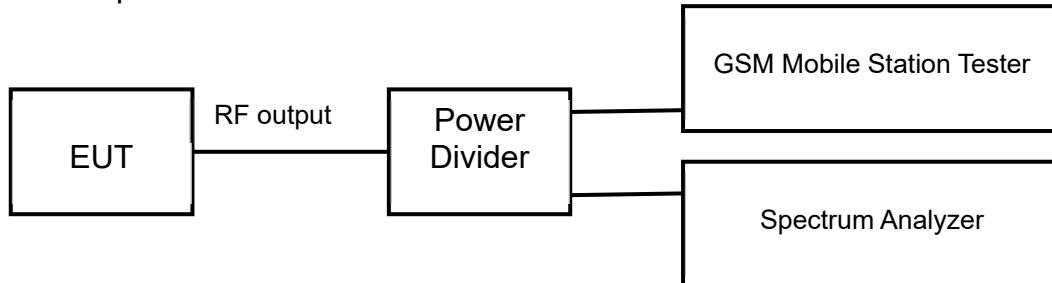
The test results are shown in Appendix A.

## 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  $\geq 2 \times \text{Span/RBW}$
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:

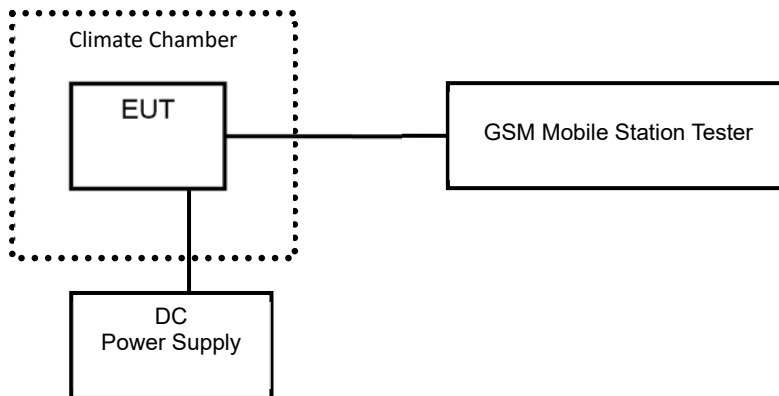
The test results are shown in Appendix A.

## 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:

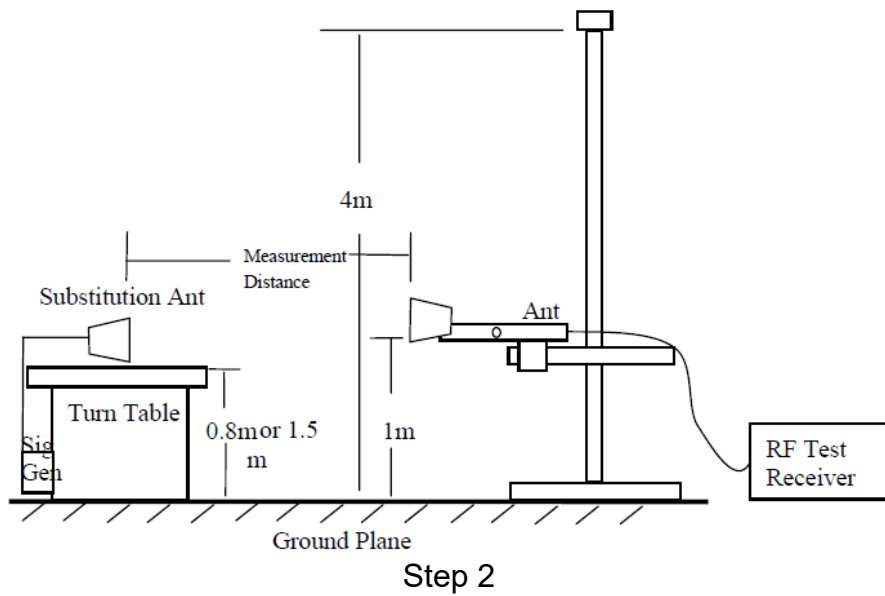
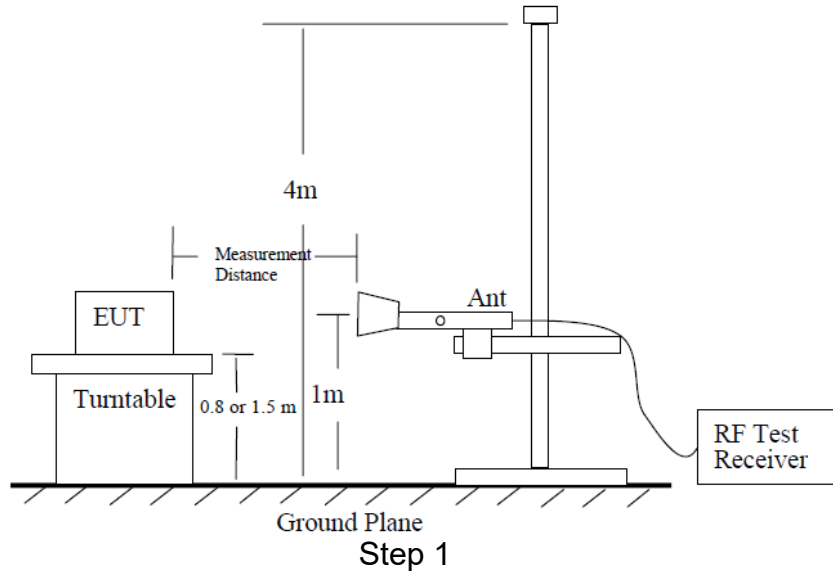
The test results are shown in Appendix A.

## 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:**

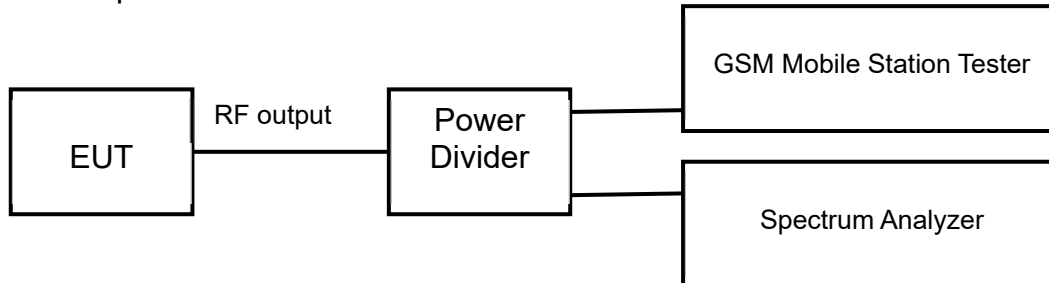
The test results are shown in Appendix B.



## 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	2021.06.21	2022.06.20
2	Radio Communication Station / CMW500	R&S	161702	2021.06.21	2022.06.20
3	Spectrum Analyzer / FSV40	R&S	101065	2021.06.21	2022.06.20
4	Spectrum Analyzer / N9020A	Agilent	MY48010771	2021.05.18	2022.05.17
5	Power Divider / 11667A	HP	19632	2021.06.21	2022.06.20
6	DC Power Supply / E3645A	Agilent	MY40000741	2021.04.22	2022.04.21
7	Temperature chamber / SH241	ESPEC	92013758	2021.06.21	2022.06.20
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	2021.06.21	2022.06.20
16	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100513	2021.06.21	2022.06.20
17	Ultra log antenna / HL562	R&S	100016	2021.06.21	2022.06.20
18	Receive antenna /3160-09	SCHWARZ-BECK	002058-002	2021.06.21	2022.06.20
19	EMI test receiver / ESI 40	R&S	100015	2021.06.21	2022.06.20
20	EMI test receiver / ESCS30	R&S	100029	2021.06.21	2022.06.20
21	Receive antenna / HL562	R&S	100167	2021.06.21	2022.06.20
22	AMN / ENV216	R&S	3560.6550.12	2021.06.21	2022.06.20

**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	32.00
836.4	189	32.21
848.8	251	31.53

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	4Down1Up	32.03
836.4	189		32.14
848.8	251		31.46
824.2	128	3Down2Up	29.67
836.4	189		30.08
848.8	251		29.24
824.2	128	2Down3Up	27.91
836.4	189		28.46
848.8	251		27.61
824.2	128	1Down4Up	26.70
836.4	189		27.40
848.8	251		26.42

## 2. Occupied Bandwidth

### GSM850

GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	250.36
836.4	189	244.57
848.8	251	246.02

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	248.91
836.4	189	238.78
848.8	251	246.02

### GSM850

GSM MODE:



Date: 16.FEB.2022 11:32:27

Channel 128



Date: 16.FEB.2022 11:33:31

Channel 189



Date: 16.FEB.2022 11:34:17

Channel 251

GPRS MODE:



Date: 16.FEB.2022 11:48:56

Channel 128



Date: 16.FEB.2022 11:50:11

Channel 189



Date: 16.FEB.2022 11:51:08

Channel 251

### 3. Emission Bandwidth

#### GSM850

GSM MODE:

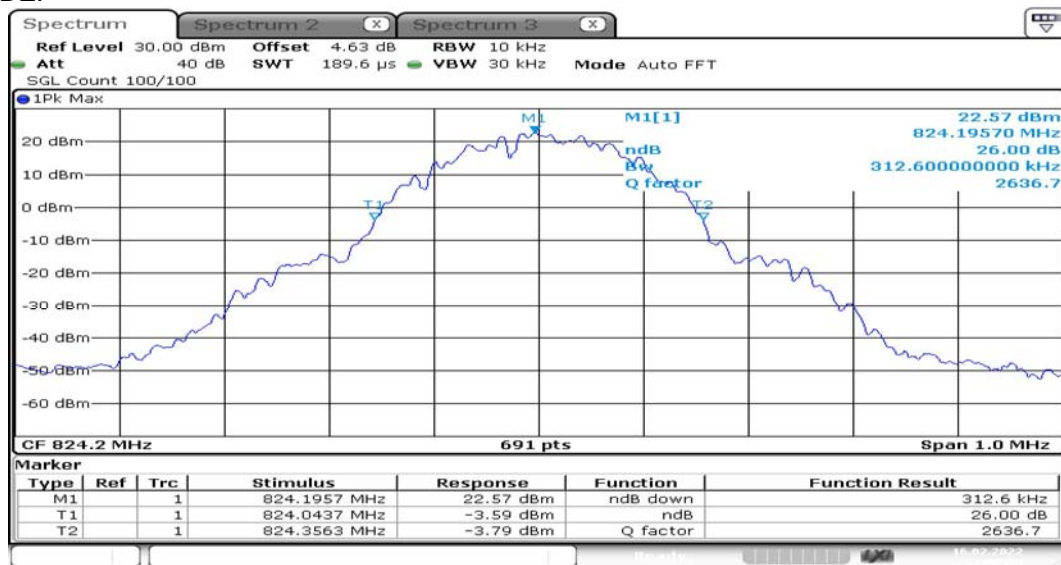
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
824.2	128	312.60
836.4	189	303.90
848.8	251	301.00

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
824.2	128	314.00
836.4	189	309.70
848.8	251	311.10

#### GSM850

GSM MODE:



Date: 16.FEB.2022 11:32:34

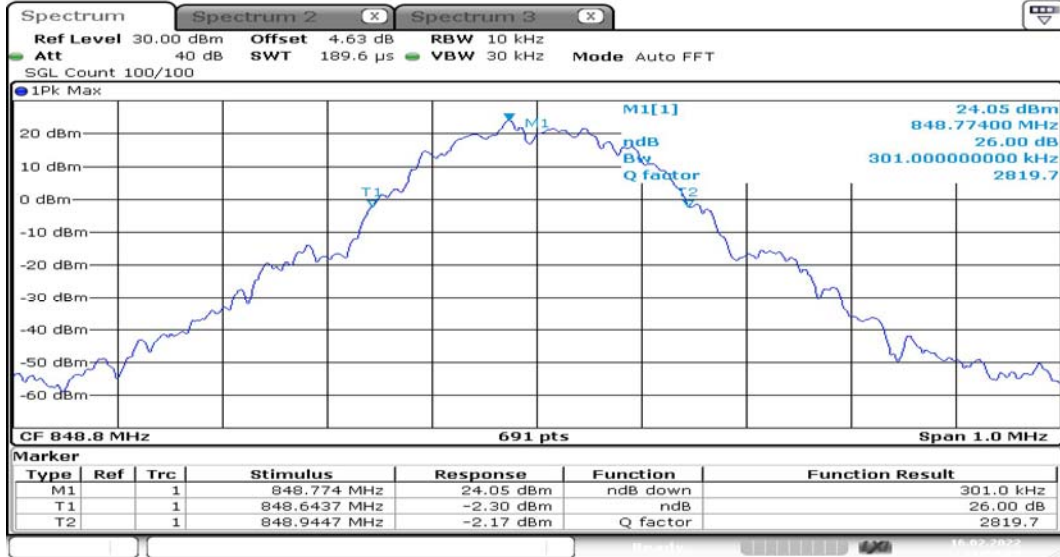
Channel 128



Date: 16.FEB.2022 11:33:38

Channel 189

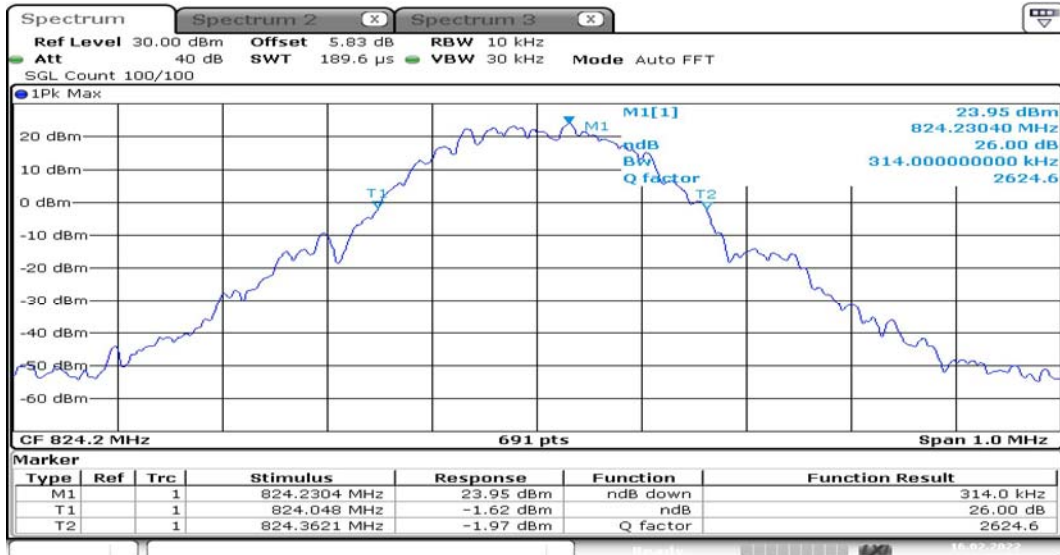




Date: 16.FEB.2022 11:34:23

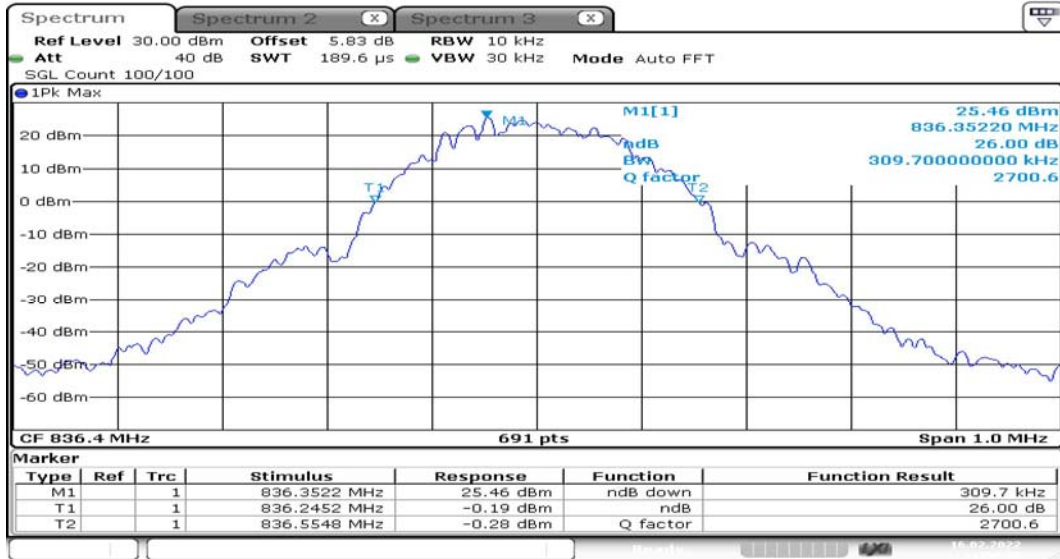
Channel 251

GPRS MODE:



Date: 16.FEB.2022 11:49:03

Channel 128



Date: 16.FEB.2022 11:50:18

**Channel 189**



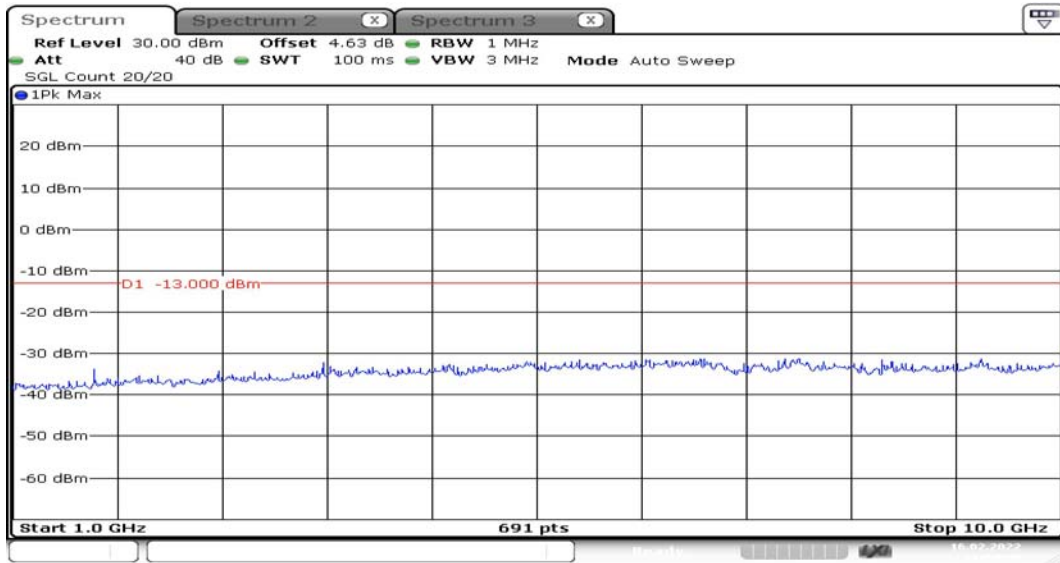
Date: 16.FEB.2022 11:51:14

**Channel 251**

**4. Spurious Emissions at antenna terminal**

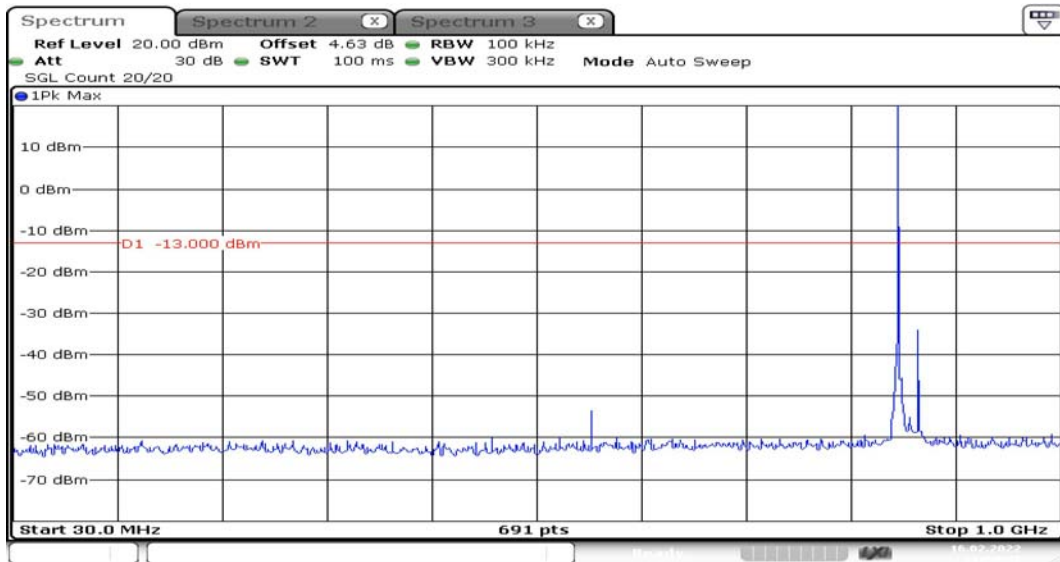
**GSM850**

GSM MODE:



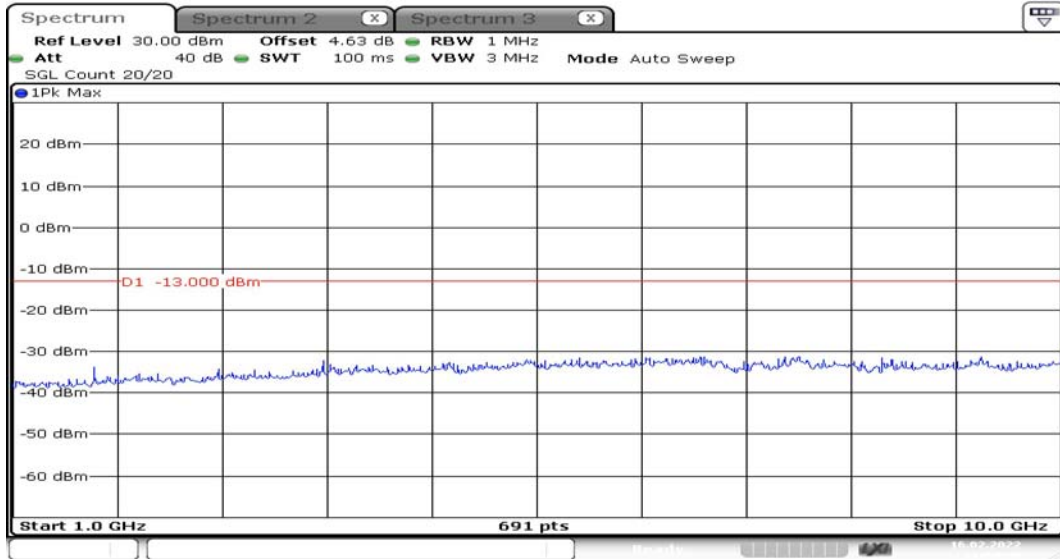
Date: 16.FEB.2022 11:34:48

**Channel 128**



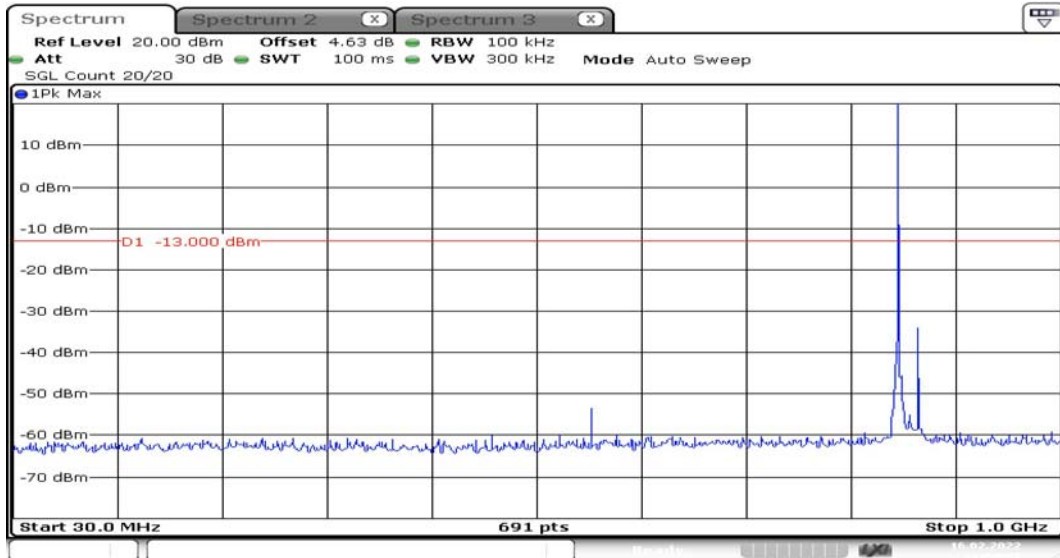
Date: 16.FEB.2022 11:34:41

**Channel 128**



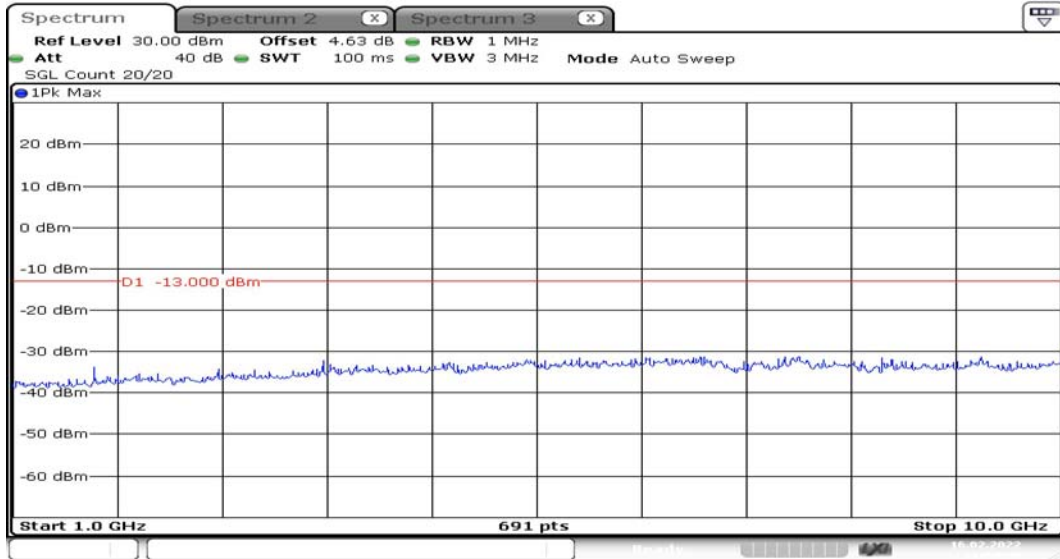
Date: 16.FEB.2022 11:34:48

Channel 189



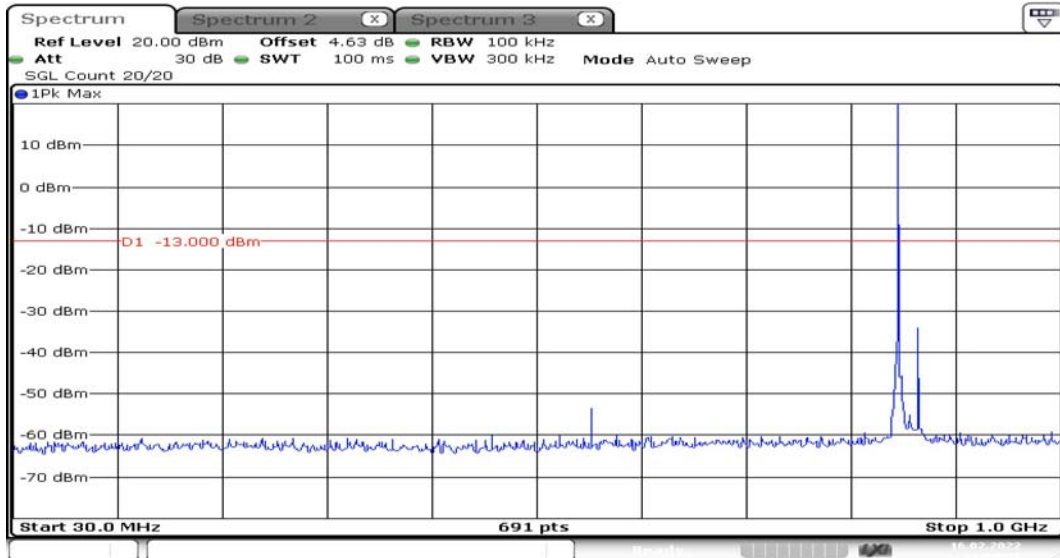
Date: 16.FEB.2022 11:34:41

Channel 189



Date: 16.FEB.2022 11:34:48

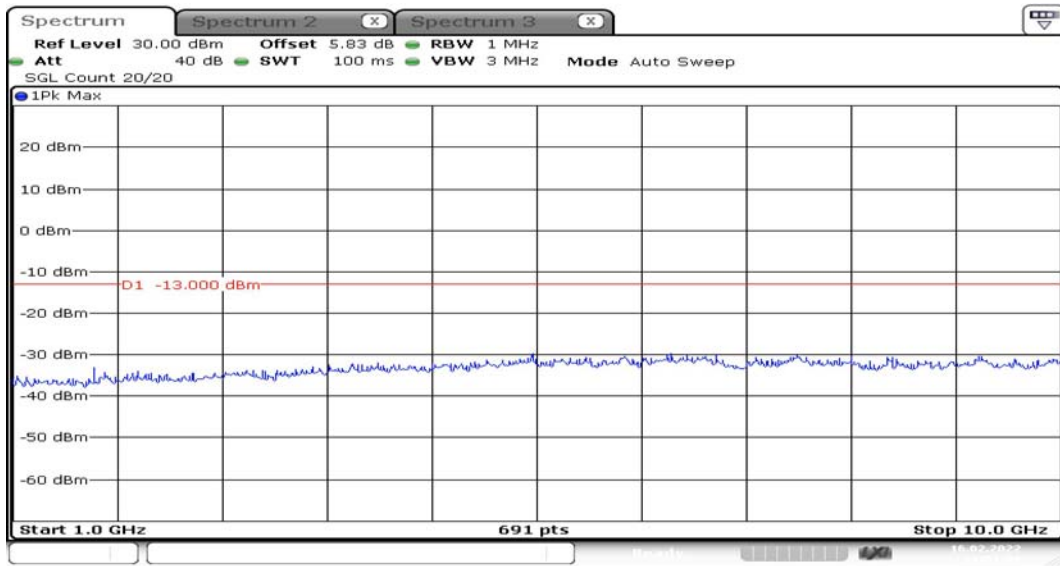
Channel 251



Date: 16.FEB.2022 11:34:41

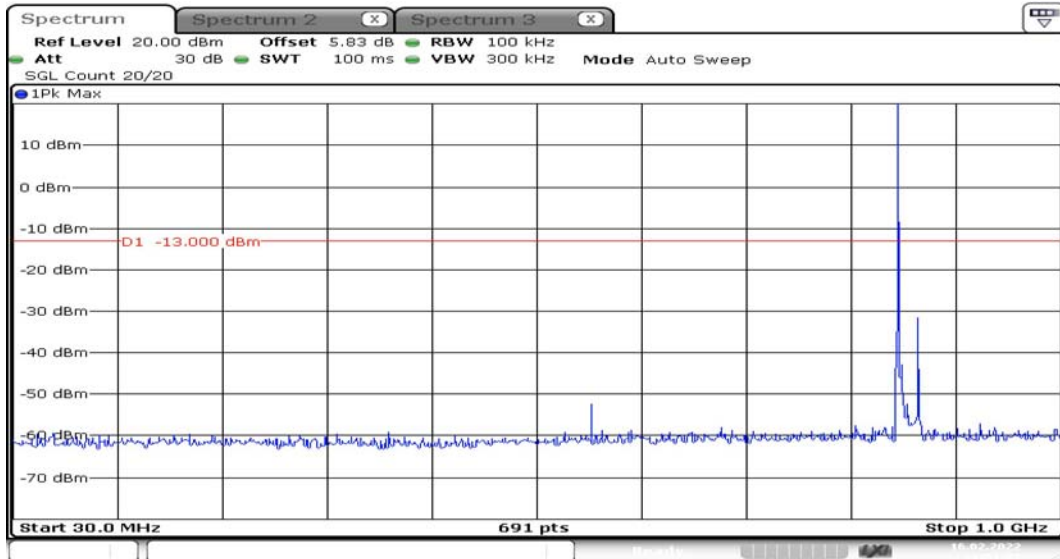
Channel 251

GPRS MODE:



Date: 16.FEB.2022 11:51:39

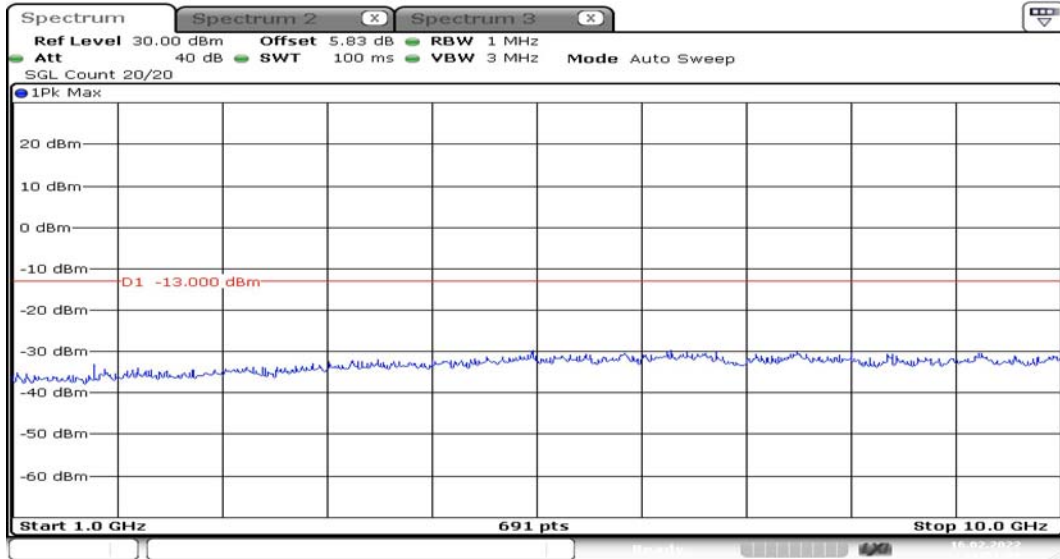
Channel 128



Date: 16.FEB.2022 11:51:30

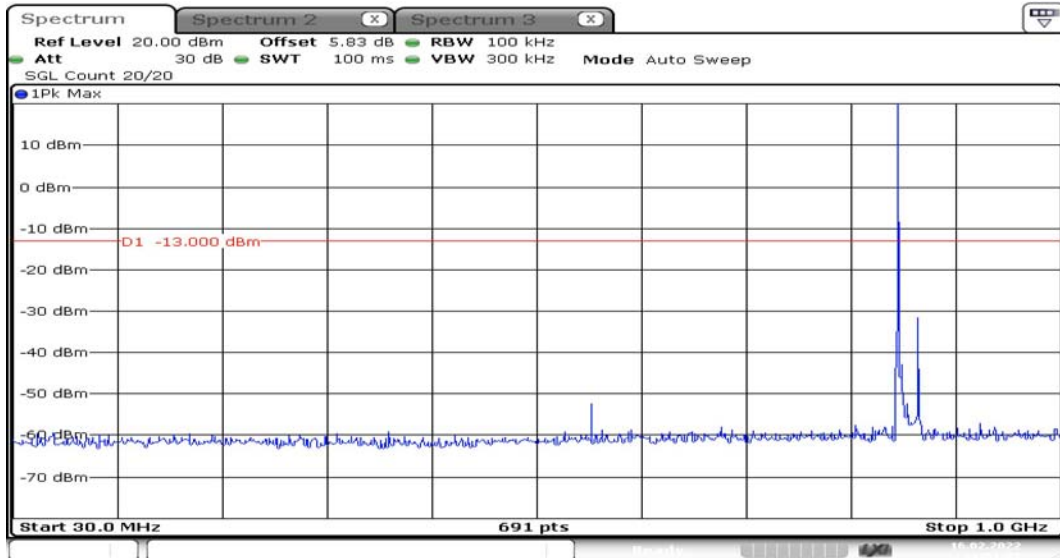
Channel 128





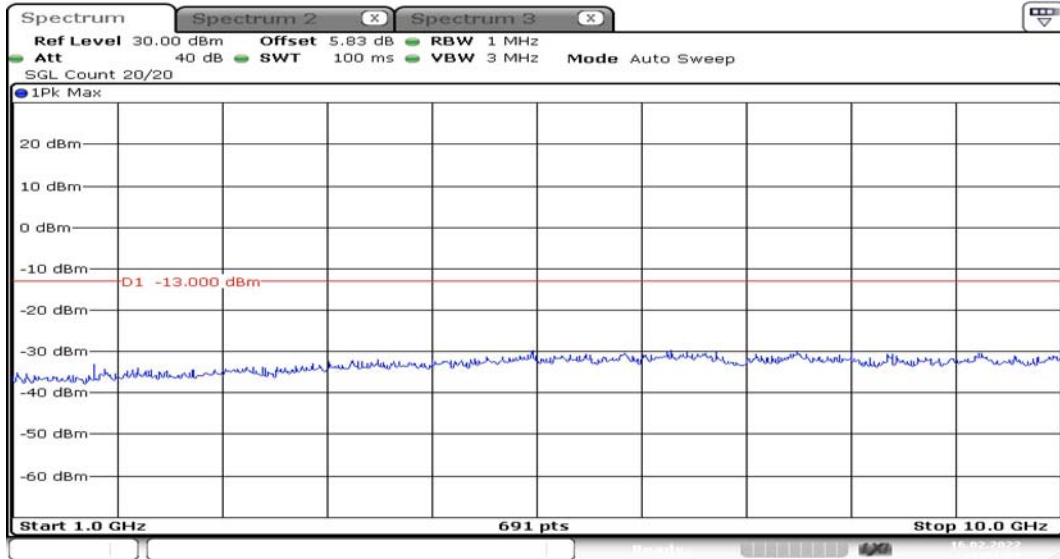
Date: 16.FEB.2022 11:51:39

Channel 189



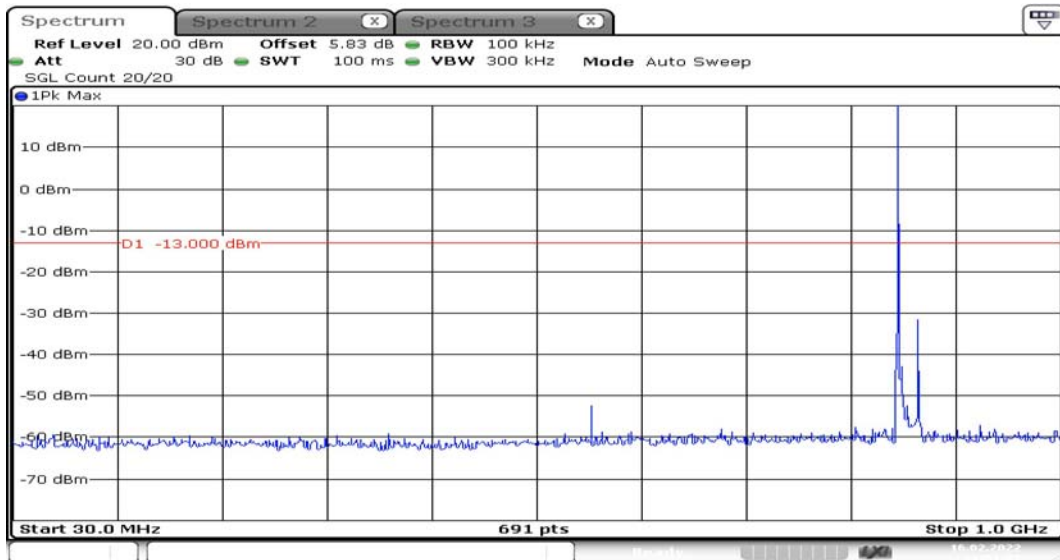
Date: 16.FEB.2022 11:51:30

Channel 189



Date: 16.FEB.2022 11:51:39

Channel 251



Date: 16.FEB.2022 11:51:30

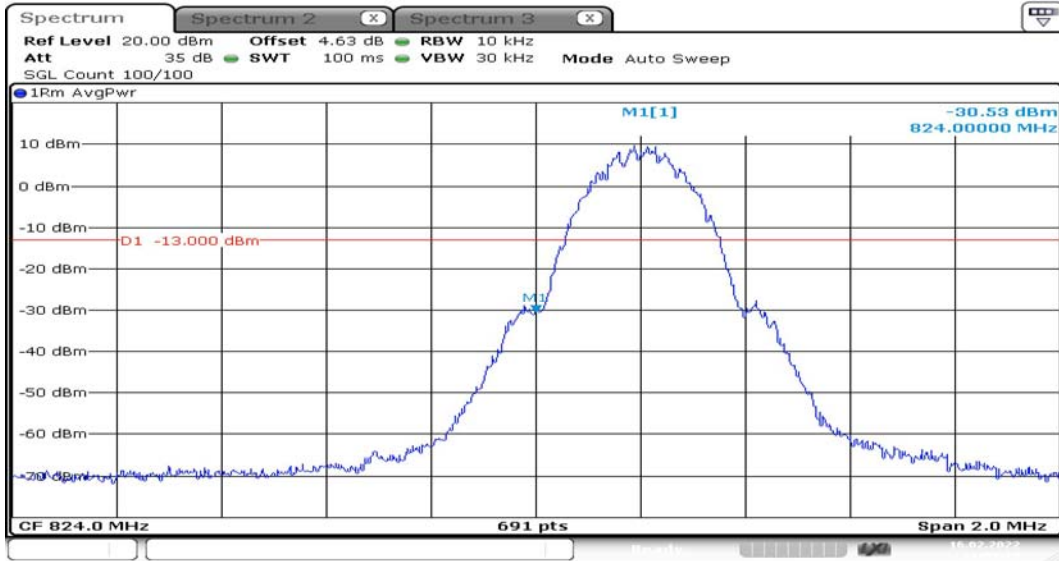
Channel 251



**5. Band Edges Compliance**

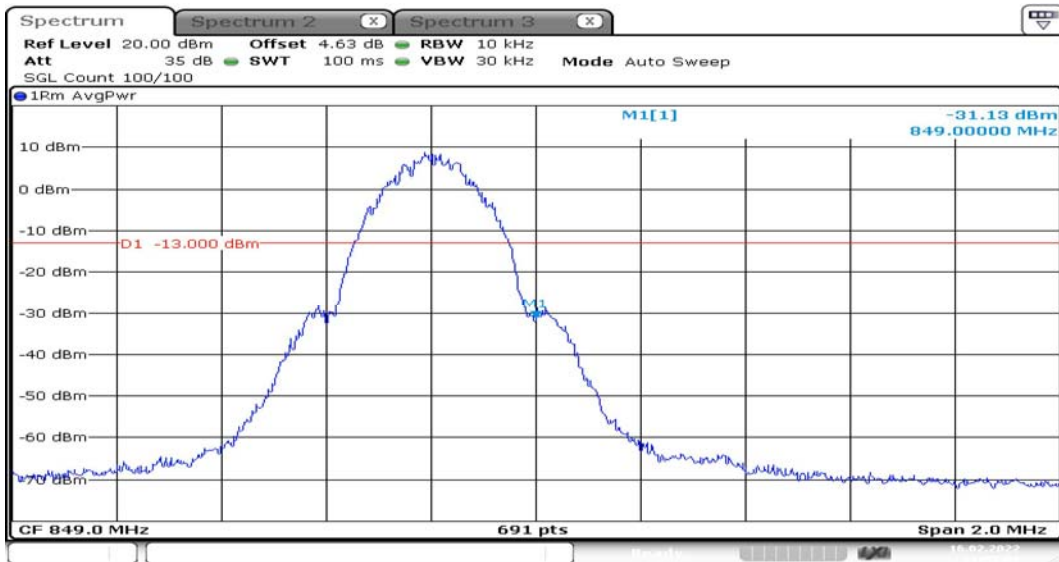
**GSM850**

GSM MODE:



Date: 16.FEB.2022 11:33:18

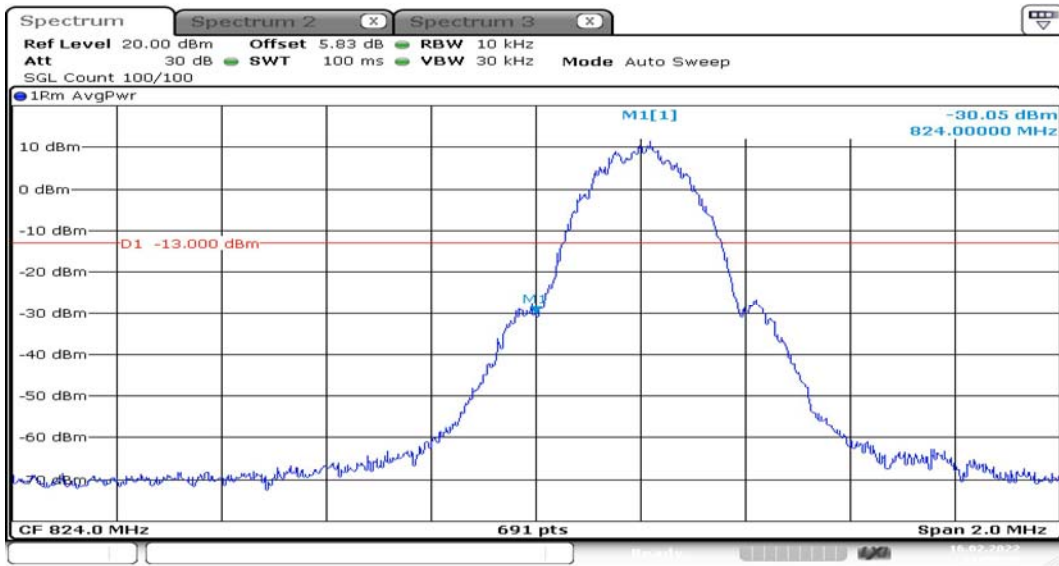
Channel 128



Date: 16.FEB.2022 11:35:08

Channel 251

GPRS MODE:



Date: 16.FEB.2022 11:49:46

Channel 128



Date: 16.FEB.2022 11:51:58

Channel 251

## 6. Frequency Stability

### GSM850

GSM MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 190	Channel 251
-10	-0.011	-0.004	-0.003
-0	-0.007	-0.002	0.000
+10	-0.009	-0.003	0.000
+30	-0.009	0.002	0.000
+40	-0.007	-0.002	0.002
+55	-0.015	-0.003	-0.007
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 190	Channel 251
LV	-0.008	-0.005	-0.003
HV	-0.014	-0.008	-0.003

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 190	Channel 251
-10	0.015	0.016	0.019
-0	0.015	0.015	0.018
+10	0.011	0.011	0.014
+30	0.008	0.012	0.015
+40	0.011	0.009	0.014
+55	0.013	0.011	0.013
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 190	Channel 251
LV	0.014	0.015	0.019
HV	0.009	0.011	0.015

**7. Peak-Average Ratio**

**GSM850**

GSM MODE:



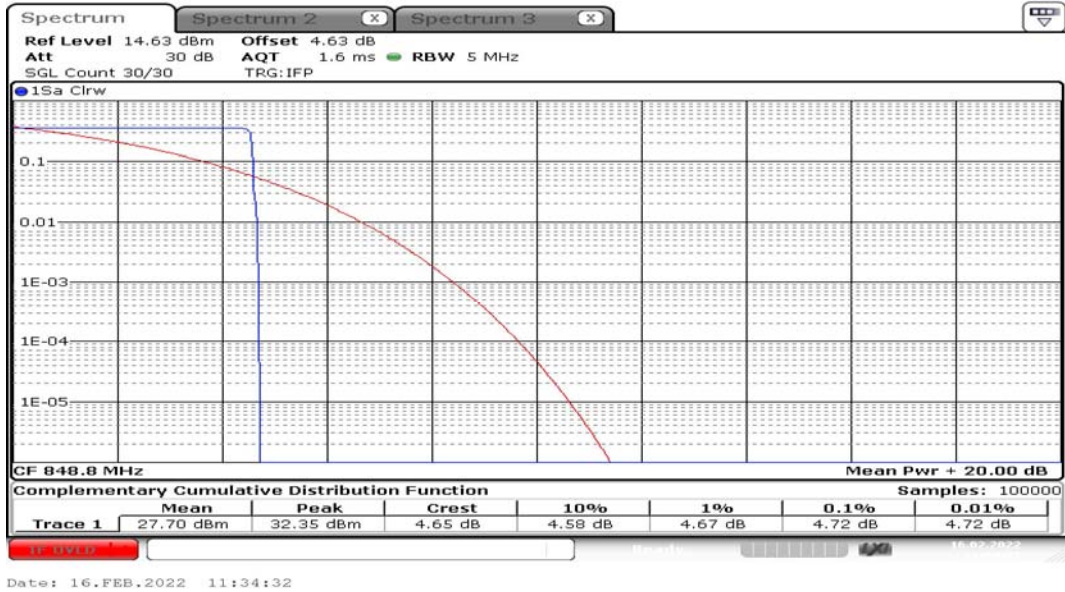
Date: 16.FEB.2022 11:32:41

Channel 128



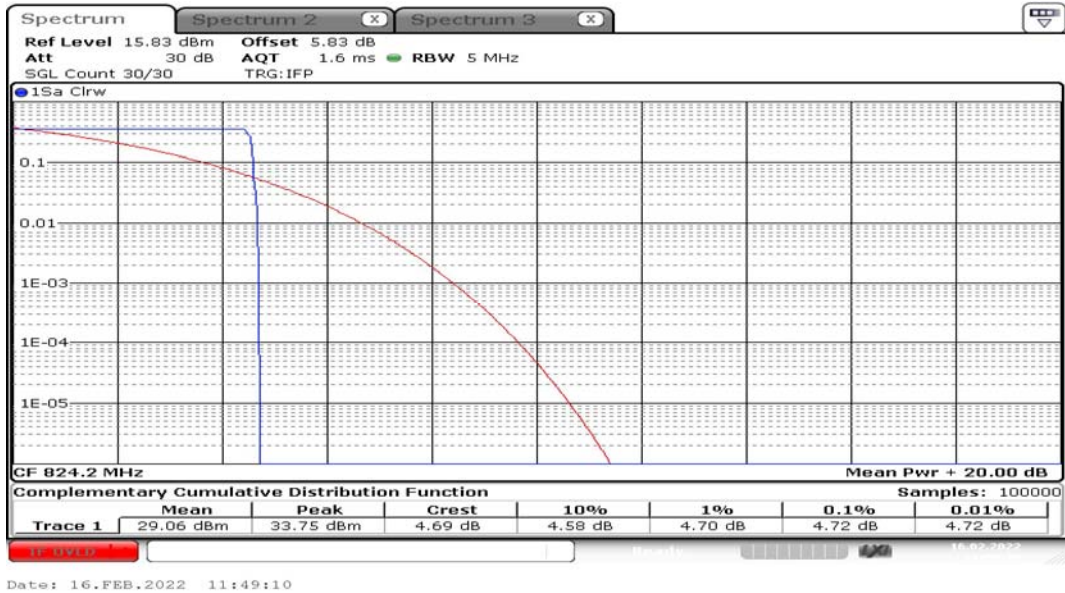
Date: 16.FEB.2022 11:33:45

Channel 189



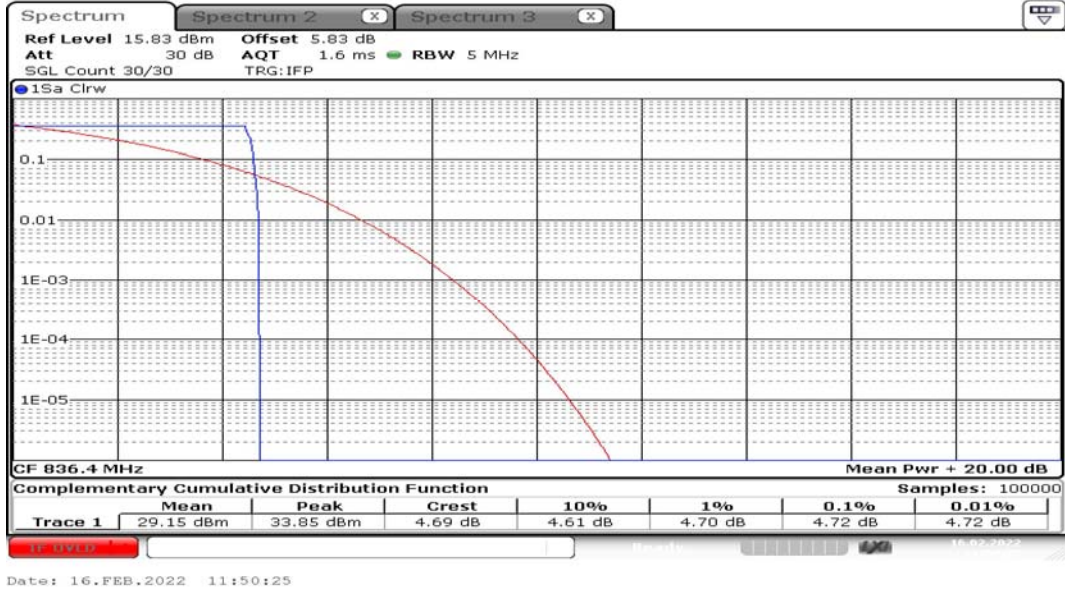
Channel 251

GPRS MODE:

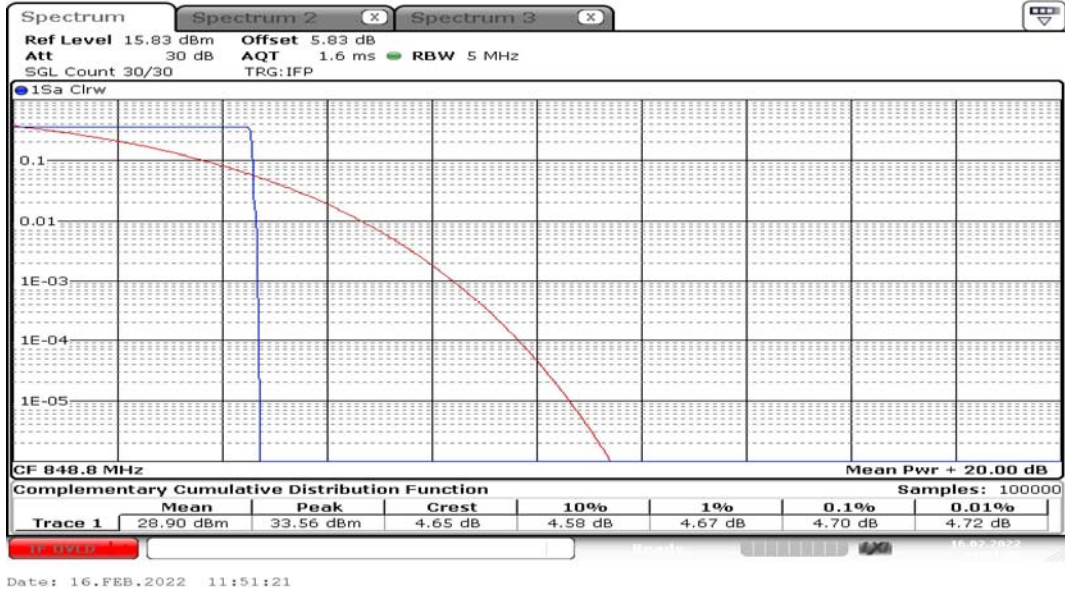


Channel 128





Channel 189



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	32.00	25.35	0.343
836.4	189	32.21	25.56	0.360
848.8	251	31.53	24.88	0.308

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
824.2	128	4Down1Up	32.03	25.38	0.345
836.4	189		32.14	25.49	0.354
848.8	251		31.46	24.81	0.303
824.2	128	3Down2Up	29.67	23.02	0.200
836.4	189		30.08	23.43	0.220
848.8	251		29.24	22.59	0.182
824.2	128	2Down3Up	27.91	21.26	0.134
836.4	189		28.46	21.81	0.152
848.8	251		27.61	20.96	0.125
824.2	128	1Down4Up	26.70	20.05	0.101
836.4	189		27.40	20.75	0.119
848.8	251		26.42	19.77	0.095

## 1. RF Power Output

### PCS1900

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	28.02
1880	661	28.71
1909.8	810	28.24

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	4Down1Up	28.09
1880	661		28.75
1909.8	810		28.25
1850.2	512	3Down2Up	25.87
1880	661		26.28
1909.8	810		25.90
1850.2	512	2Down3Up	24.25
1880	661		24.52
1909.8	810		24.12
1850.2	512	1Down4Up	23.22
1880	661		23.35
1909.8	810		23.11



**2. Occupied Bandwidth**

**PCS1900**

GSM MODE:

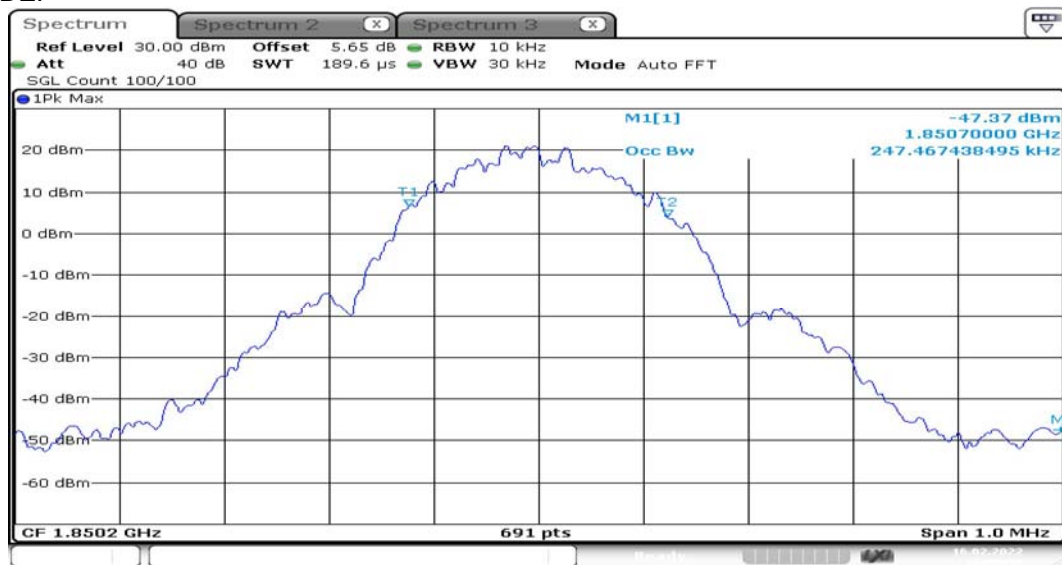
Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	247.47
1880	661	241.68
1909.8	810	246.02

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	240.23
1880	661	233.00
1909.8	810	246.02

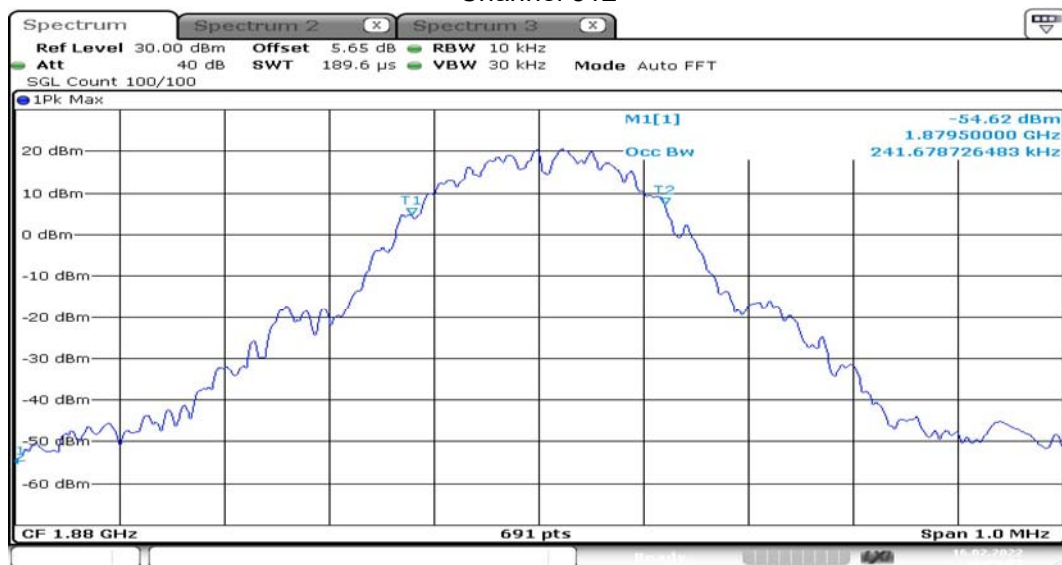
**PCS1900**

GSM MODE:



Date: 16.FEB.2022 10:38:50

Channel 512



Date: 16.FEB.2022 10:39:52

Channel 661



Date: 16.FEB.2022 10:40:35

Channel 810

GPRS MODE:



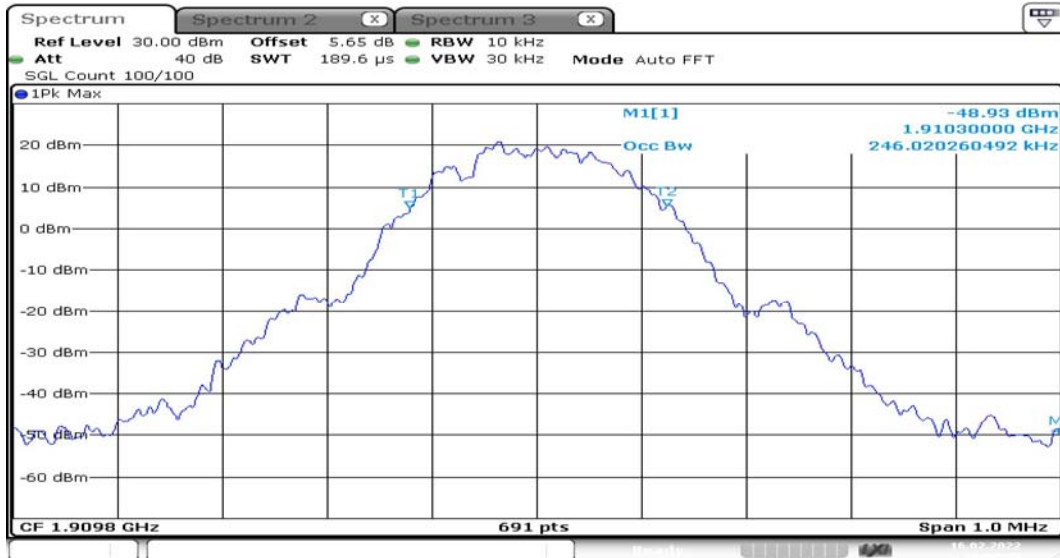
Date: 16.FEB.2022 10:48:23

Channel 512



Date: 16.FEB.2022 10:49:41

Channel 661



Date: 16.FEB.2022 10:50:40

Channel 810

### 3. Emission Bandwidth

#### PCS1900

GSM MODE:

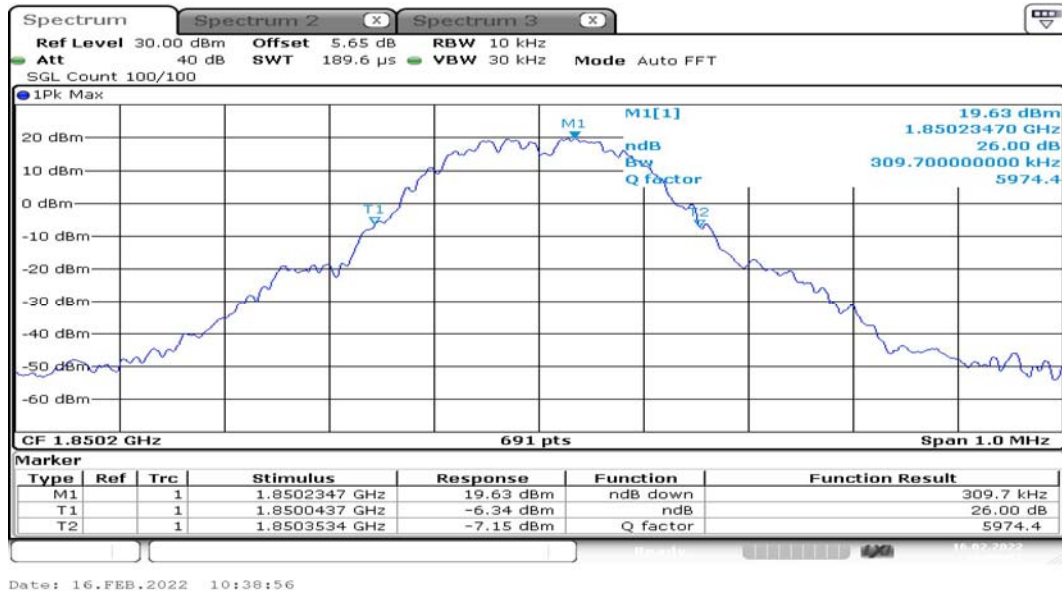
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power(kHz)
1850.2	512	309.70
1880	661	303.90
1909.8	810	301.00

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB (kHz)
1850.2	512	312.60
1880	661	315.50
1909.8	810	308.20

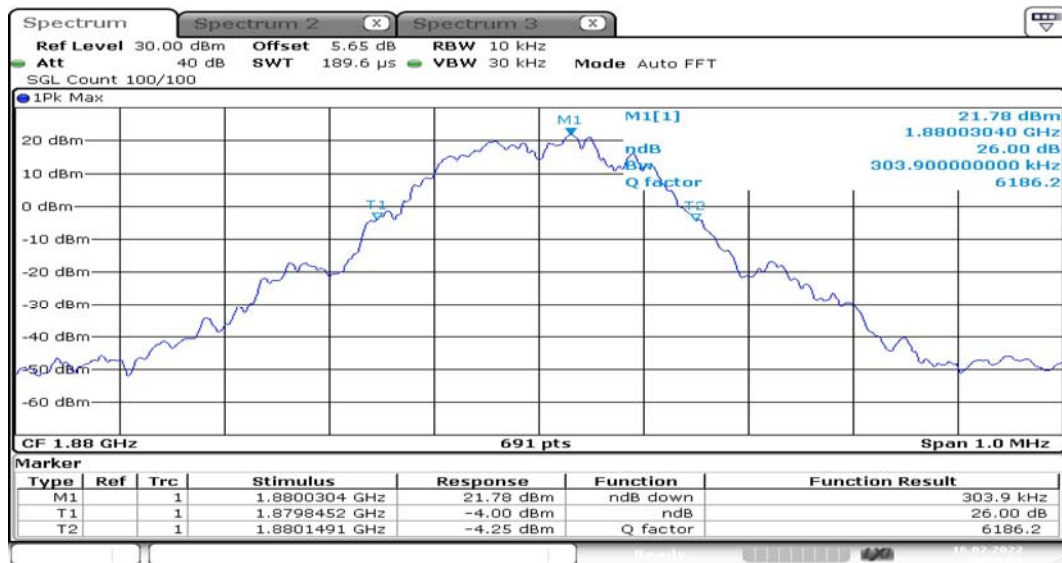
#### PCS1900

GSM MODE:



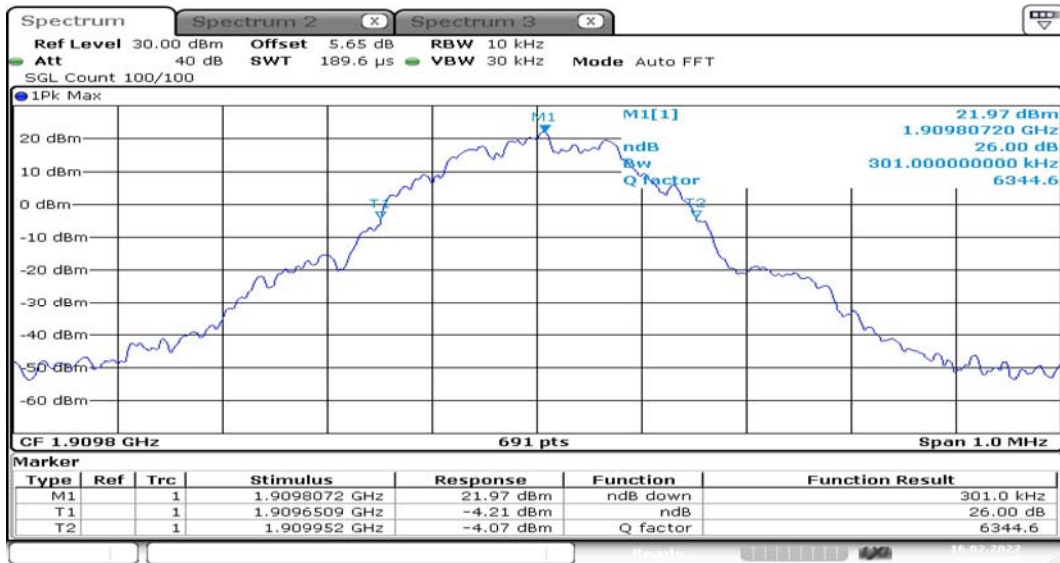
Date: 16.FEB.2022 10:38:56

#### Channel 512



Date: 16.FEB.2022 10:39:58

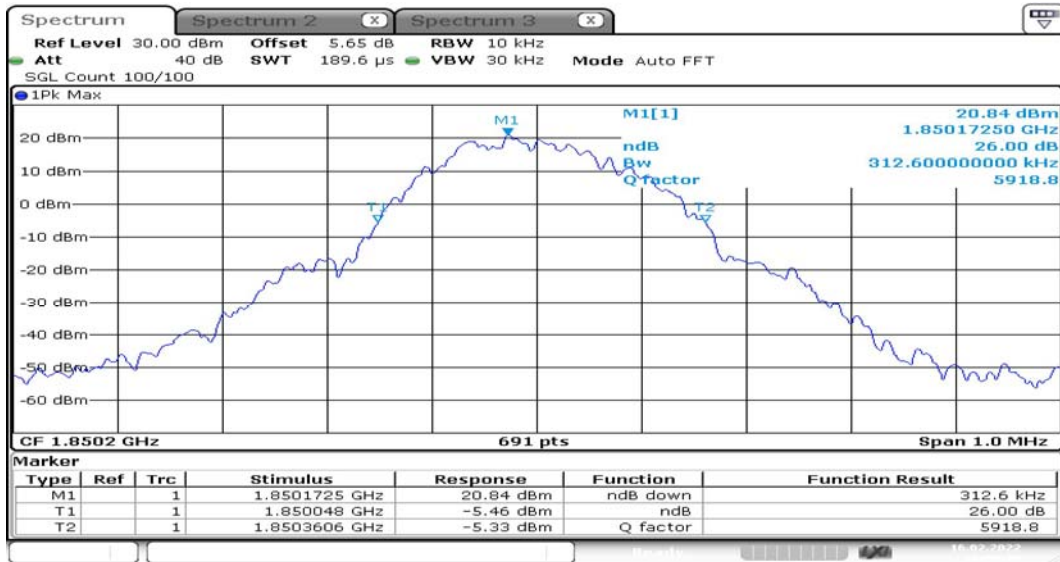
Channel 661



Date: 16.FEB.2022 10:40:41

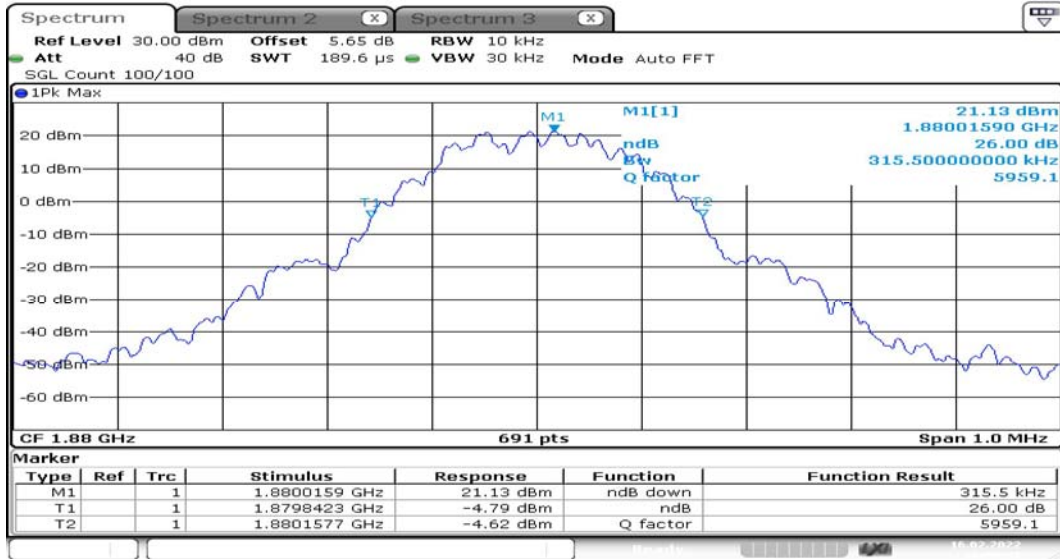
Channel 810

GPRS MODE:



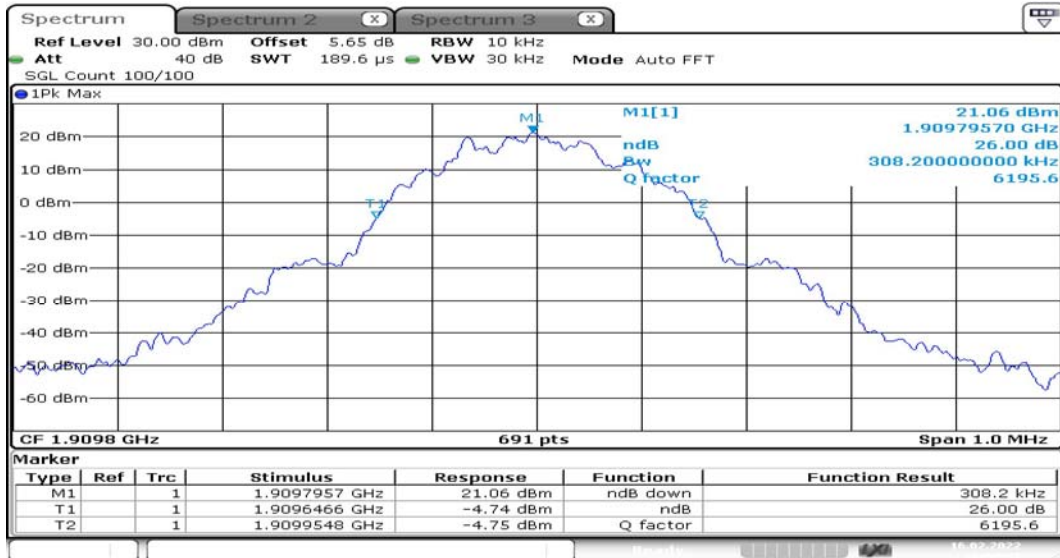
Date: 16.FEB.2022 10:48:30

Channel 512



Date: 16.FEB.2022 10:49:47

Channel 661

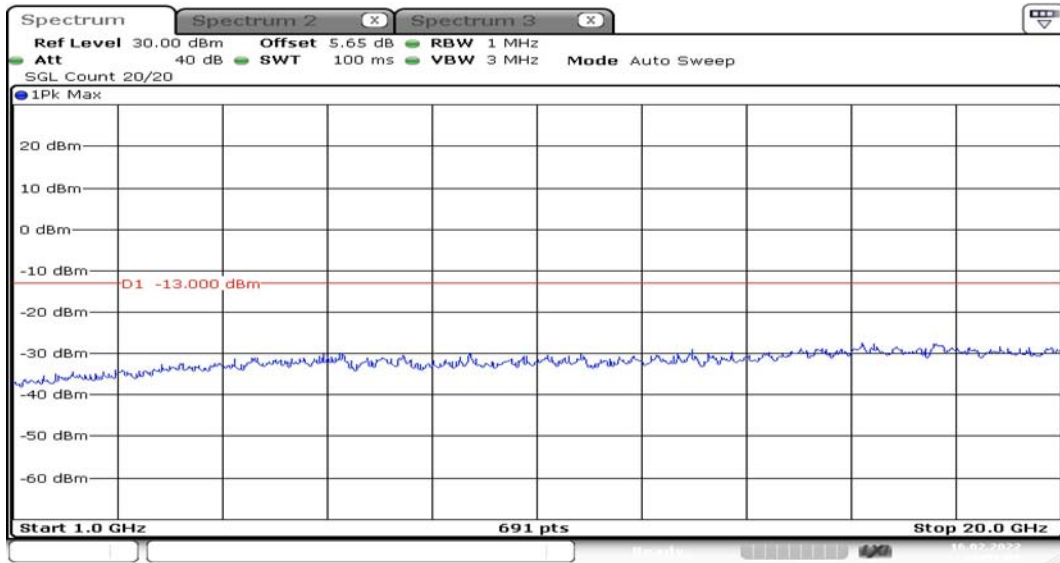


Date: 16.FEB.2022 10:50:47

Channel 810

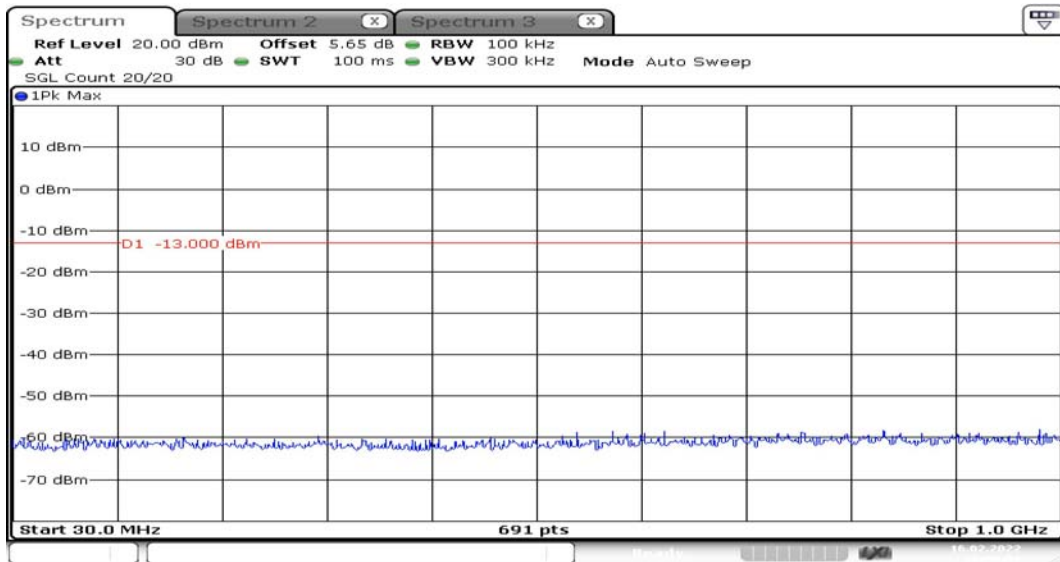


**4. Spurious Emissions at antenna terminal**  
**PCS1900**  
**GSM MODE:**



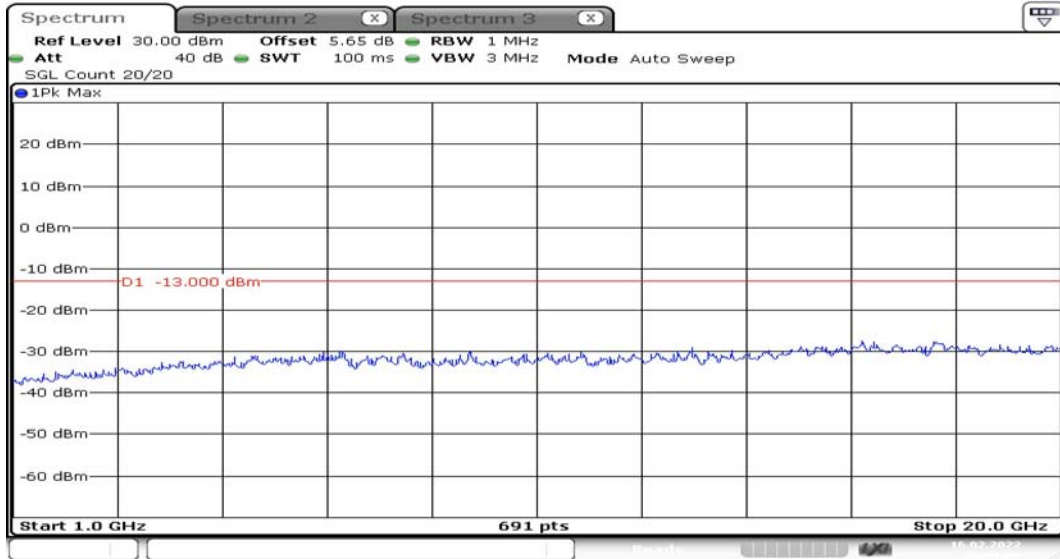
Date: 16.FEB.2022 10:41:07

**Channel 512**



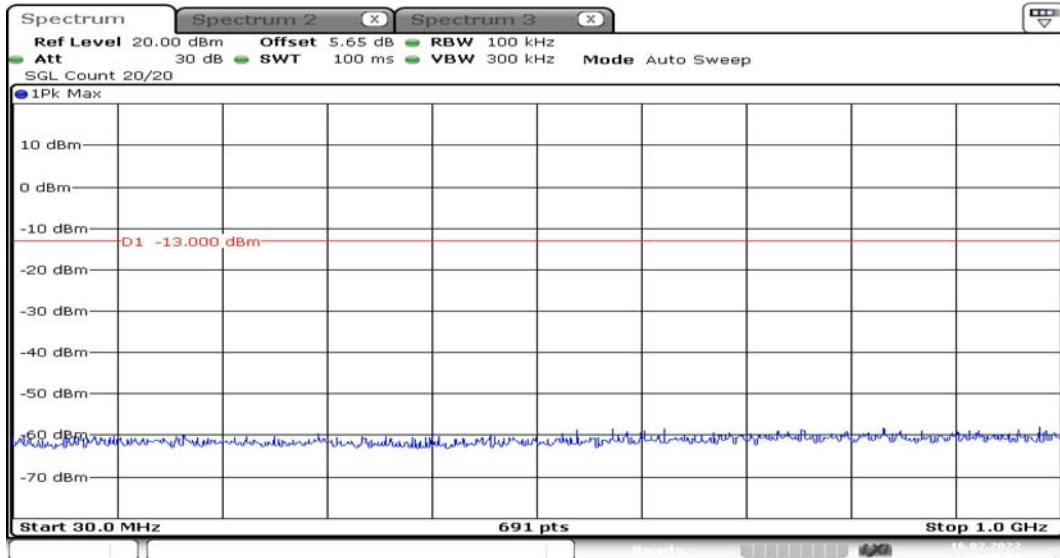
Date: 16.FEB.2022 10:40:58

**Channel 512**



Date: 16.FEB.2022 10:41:07

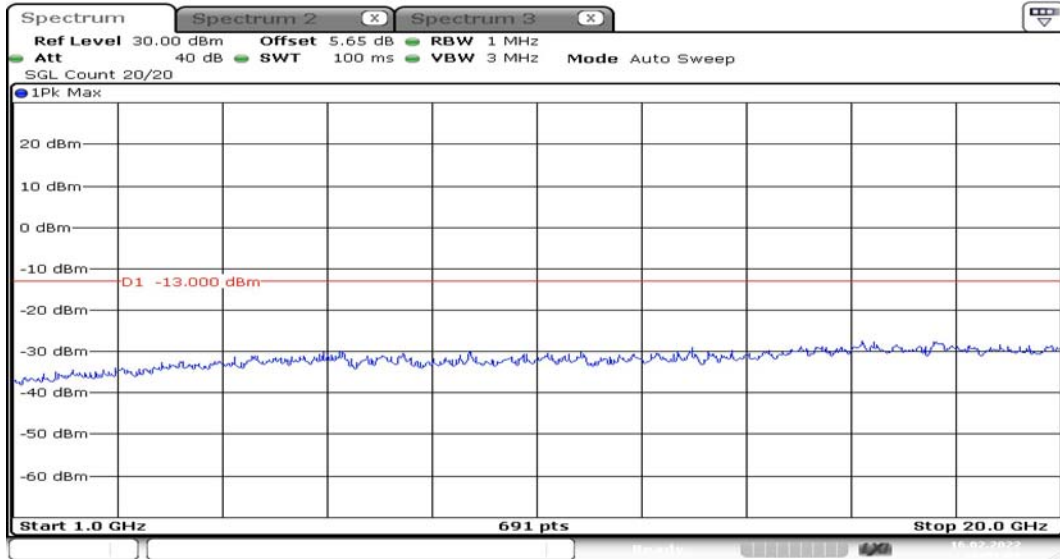
Channel 661



Date: 16.FEB.2022 10:40:58

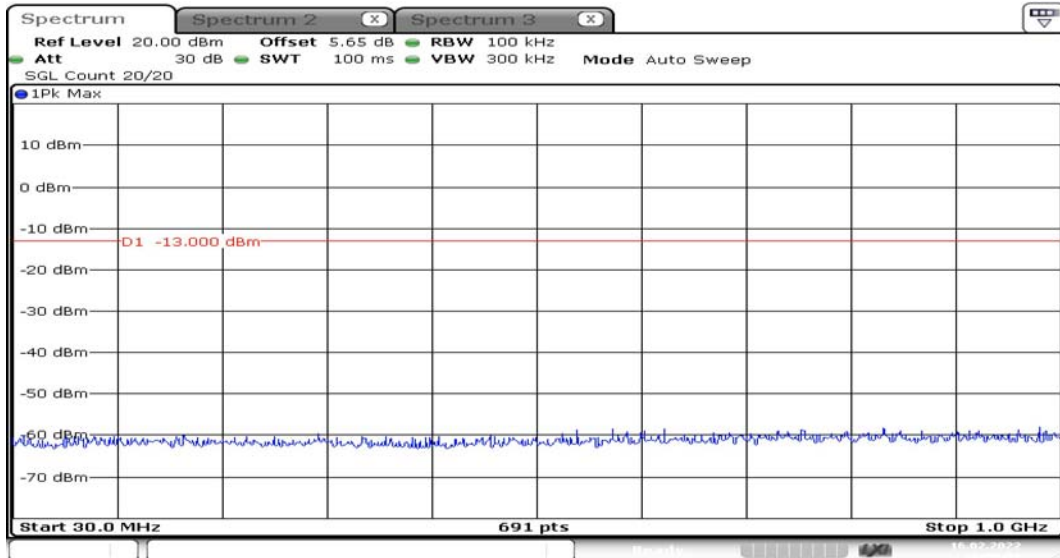
Channel 661





Date: 16.FEB.2022 10:41:07

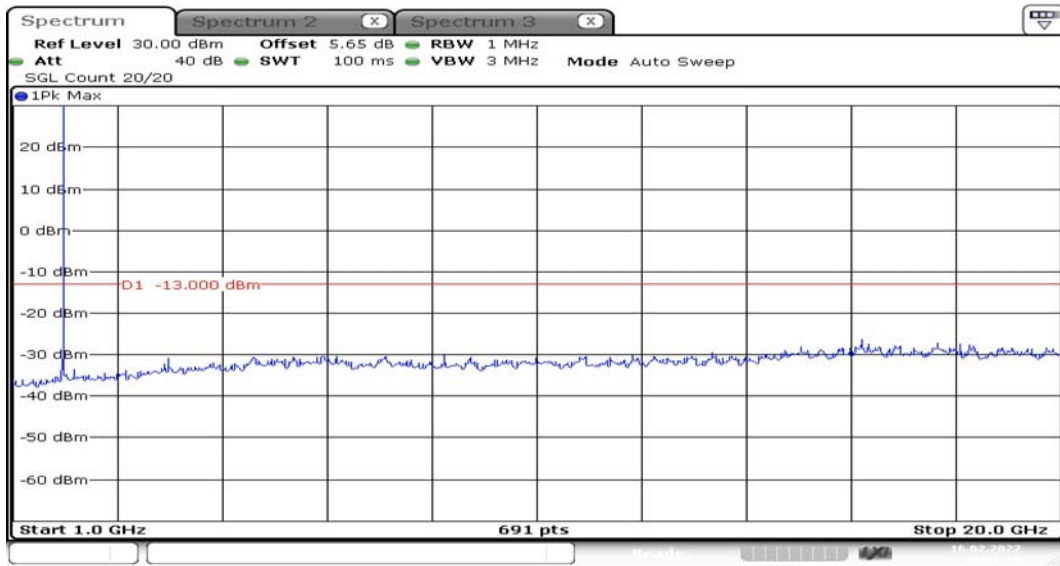
Channel 810



Date: 16.FEB.2022 10:40:58

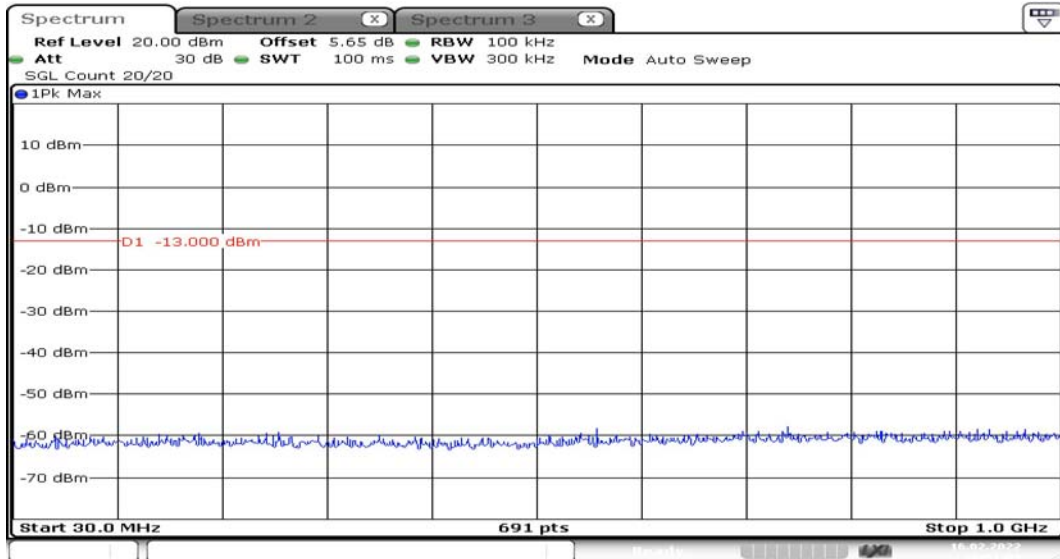
Channel 810

GPRS MODE:



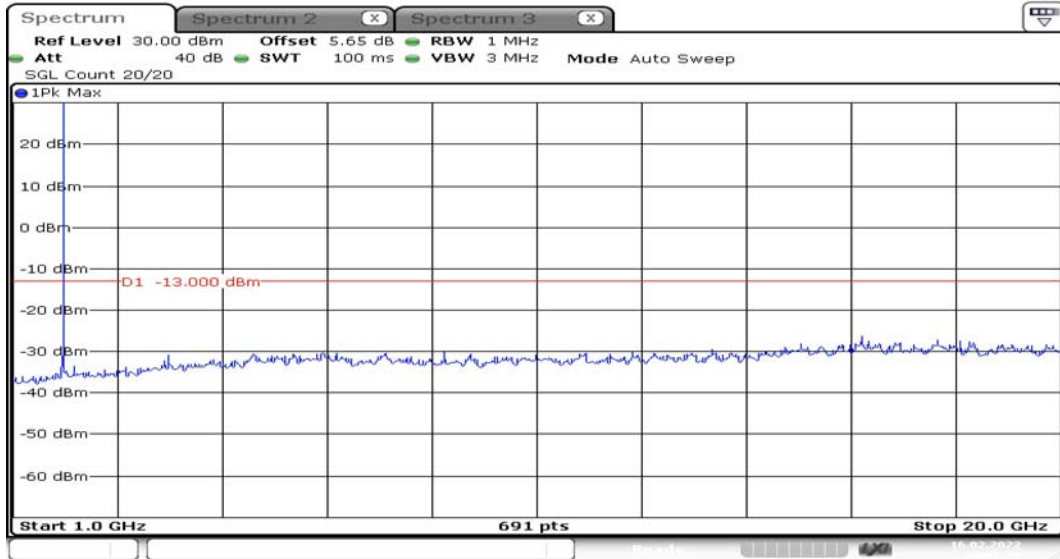
Date: 16.FEB.2022 10:51:13

Channel 512



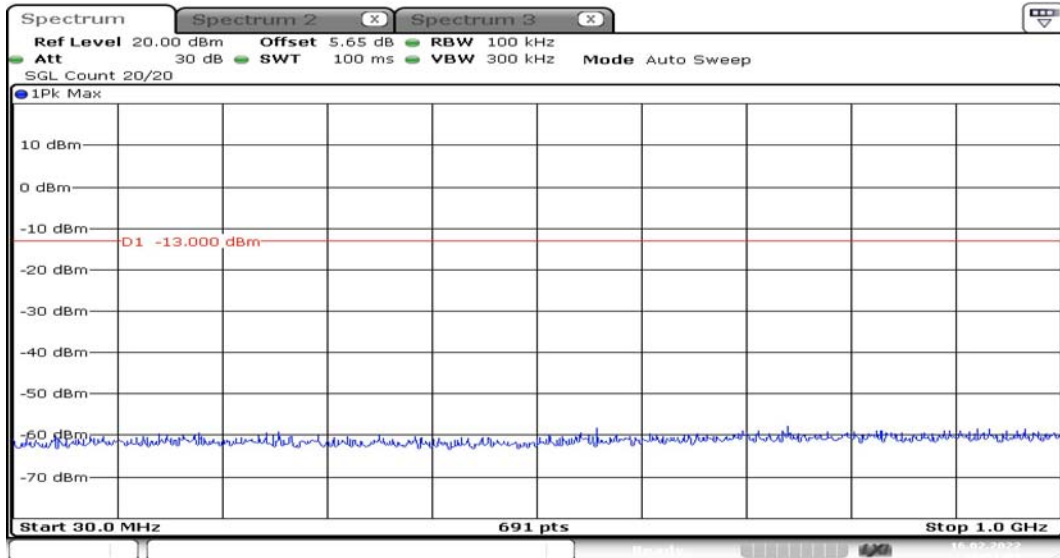
Date: 16.FEB.2022 10:51:03

Channel 512



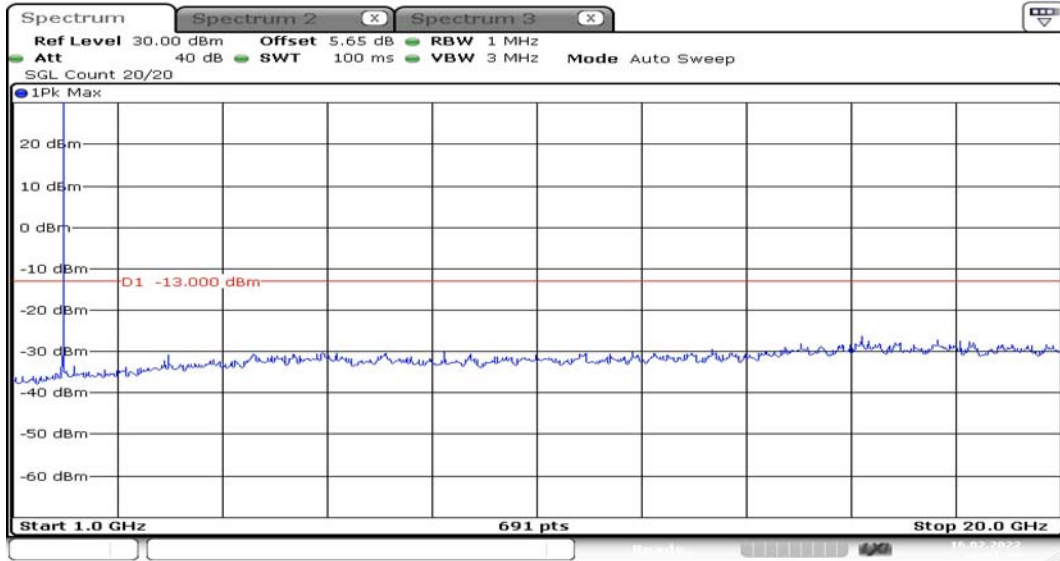
Date: 16.FEB.2022 10:51:13

Channel 661



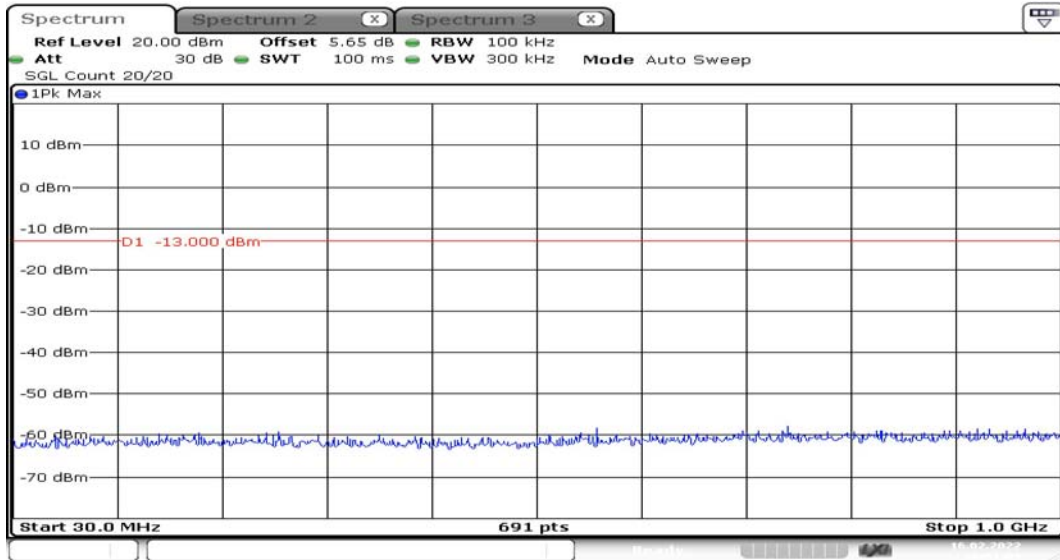
Date: 16.FEB.2022 10:51:03

Channel 661



Date: 16.FEB.2022 10:51:13

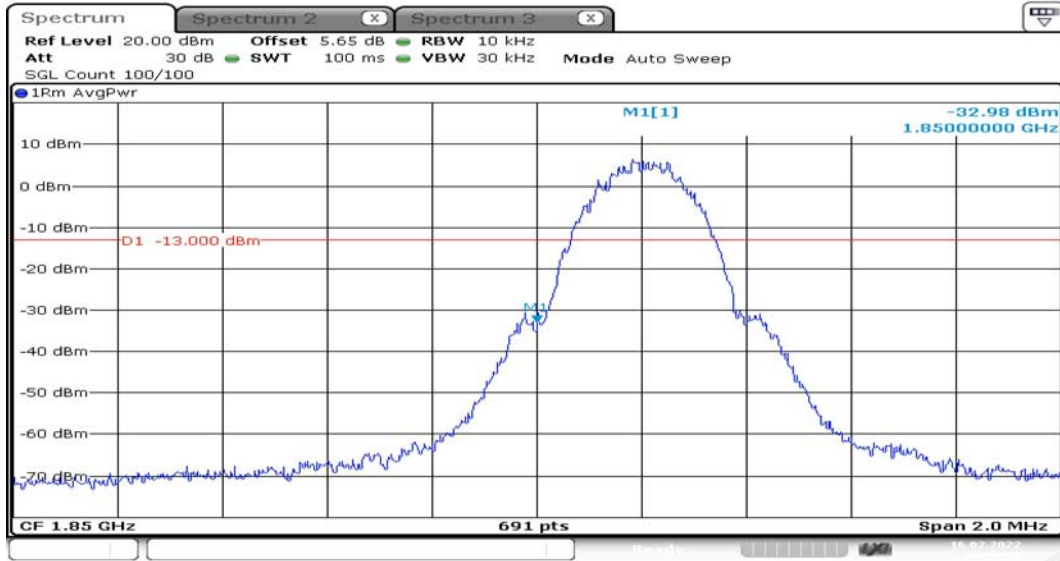
Channel 810



Date: 16.FEB.2022 10:51:03

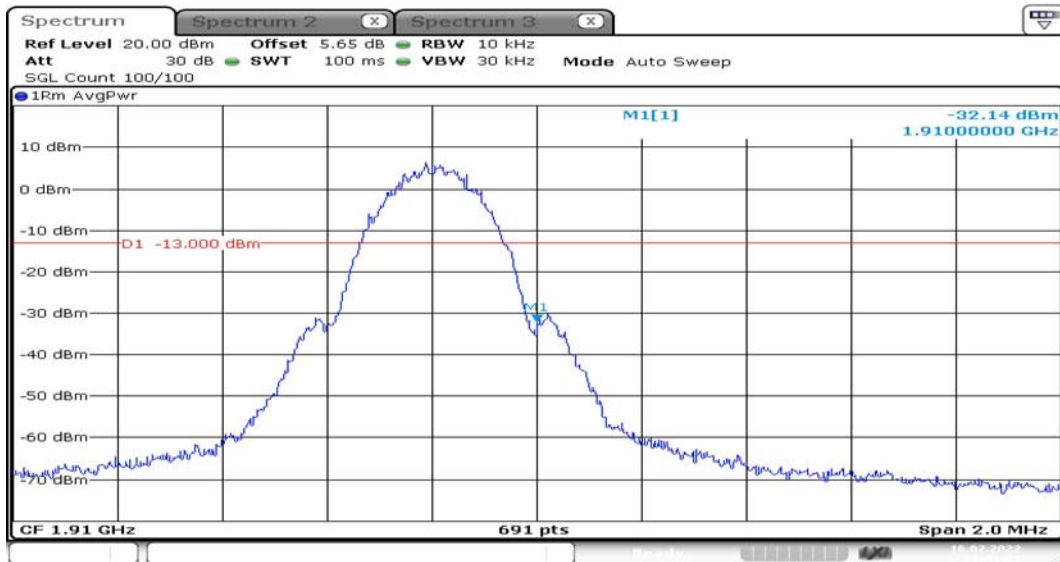
Channel 810

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



Date: 16.FEB.2022 10:39:43

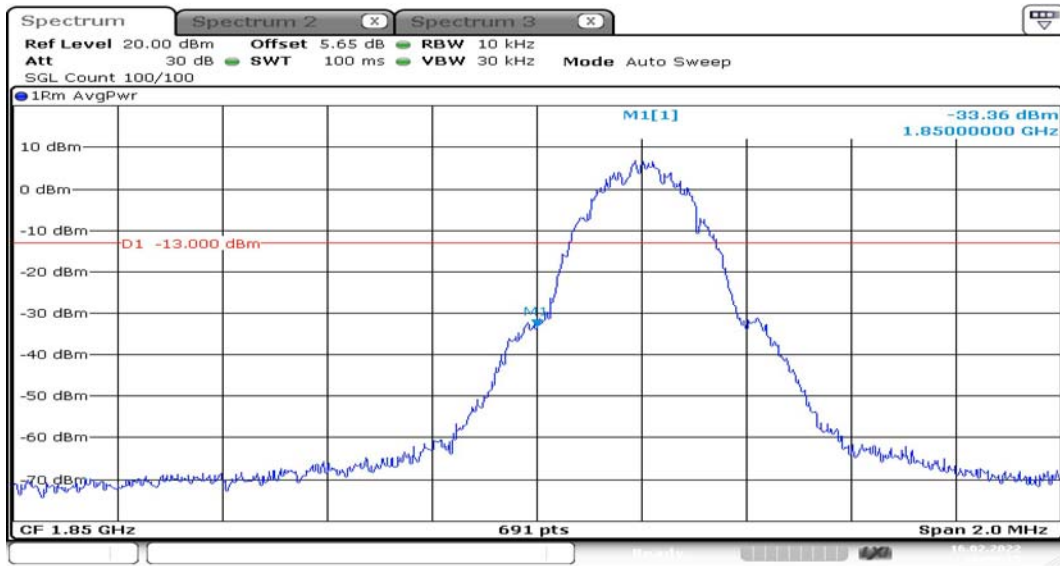
Channel 512



Date: 16.FEB.2022 10:41:27

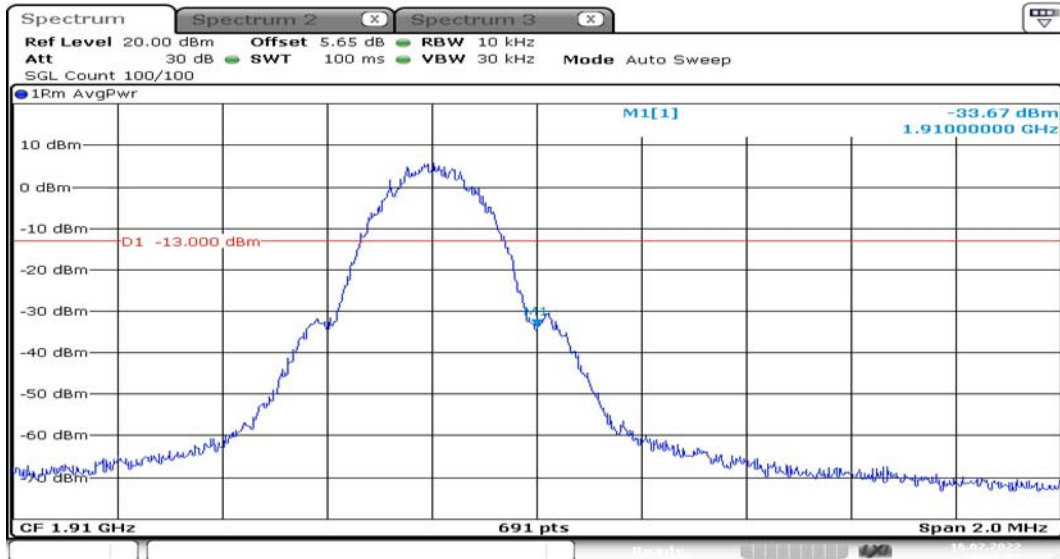
Channel 810

GPRS MODE:



Date: 16.FEB.2022 10:49:15

Channel 512



Date: 16.FEB.2022 10:51:32

Channel 810

## 6. Frequency Stability

### PCS1900

GSM MODE:

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

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
-10	0.018	0.016	0.014
0	0.017	0.014	0.014
+10	0.015	0.013	0.015
+30	0.015	0.013	0.014
+40	0.015	0.013	0.014
+55	0.016	0.013	0.014
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	0.016	0.014	0.013
HV	0.016	0.012	0.014



**7. Peak-Average Ratio**  
**PCS1900**  
**GSM MODE:**



Date: 16.FEB.2022 10:39:04

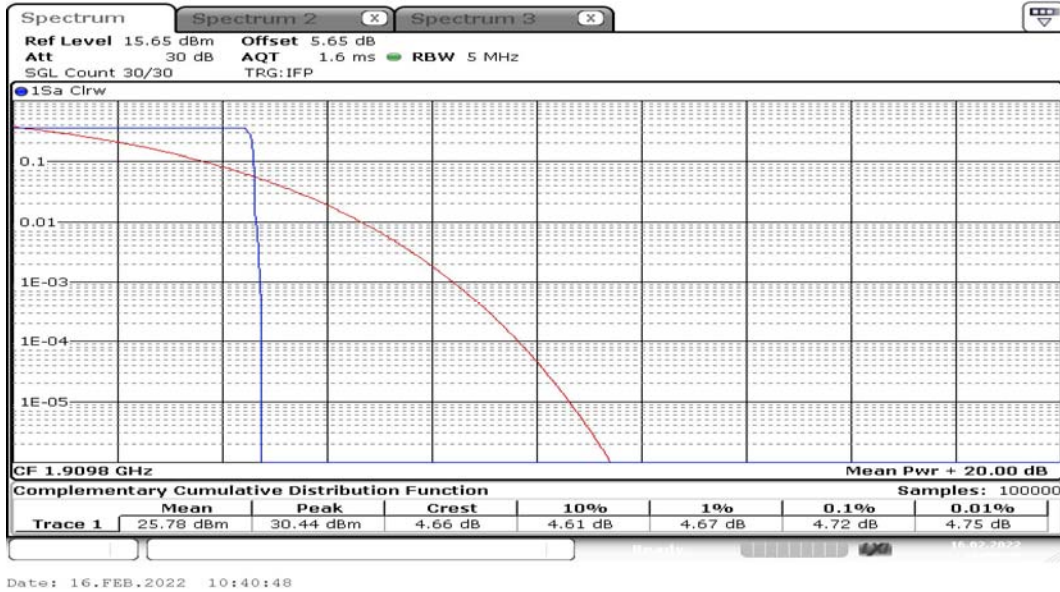
Channel 512



Date: 16.FEB.2022 10:40:06

Channel 661





Channel 810

GPRS MODE:



Channel 512



Date: 16.FEB.2022 10:49:55

Channel 661



Date: 16.FEB.2022 10:50:54

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	28.02	23.22	0.210
1880	661	28.71	23.91	0.246
1909.8	810	28.24	23.44	0.221

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	Conducted Power (dBm)	ERP/EIRP (dBm)	ERP/EIRP (W)
1850.2	512	4Down1Up	28.09	23.29	0.213
1880	661		28.75	23.95	0.248
1909.8	810		28.25	23.45	0.221
1850.2	512	3Down2Up	25.87	21.07	0.128
1880	661		26.28	21.48	0.141
1909.8	810		25.90	21.10	0.129
1850.2	512	2Down3Up	24.25	19.45	0.088
1880	661		24.52	19.72	0.094
1909.8	810		24.12	19.32	0.086
1850.2	512	1Down4Up	23.22	18.42	0.070
1880	661		23.35	18.55	0.072
1909.8	810		23.11	18.31	0.068

## **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
4822.945313	-60.48	-13	Vertical
5917.687500	-60.10	-13	Vertical
7164.164063	-59.59	-13	Vertical
8618.742188	-56.14	-13	Vertical
10390.804688	-56.98	-13	Vertical
11513.882813	-57.33	-13	Vertical

#### **1900 Test result**

GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
4343.437500	-62.13	-13	Vertical
5132.812500	-61.25	-13	Vertical
6099.375000	-59.59	-13	Vertical
8404.218750	-58.41	-13	Vertical
10473.281250	-57.04	-13	Vertical
14575.781250	-50.41	-13	Vertical

---End of Test Report---